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The Automated Authority Subsystem at the National Library of Canada

Edwin J. BUCHINSKI: Chief, Office of Library Standards; William L. NEWMAN: Head, Data Processing Section; and Mary Joan DUNN: Head, Library Systems Analysis Section, National Library of Canada.

This paper describes the automated authority system at the National Library of Canada. The system incorporates features such as the ability to control bilingual headings, and the ability to store and control authorities for multiple applications and libraries. Advantages of the automated authority system are reported. Implications of enhancements to the system with respect to potential or actual systems and services including MARC distribution, CONSER, the Canadian Union Catalogue, and shared cataloging will be discussed in a future article.

INTRODUCTION

Within the National Library of Canada, several bilingual (French/English) authority files are maintained. The national bibliography *Canadiana,* the National Library's catalogs, and the "neutral" authority file which will be published all have common authority headings and related information, yet each may demand a different usage of these headings, or may contribute unique headings to the totality of authorities. The authority subsystem, an extension of the *Canadiana*/Cataloguing Subsystem, was designed to control the multiple bilingual authority file situation and, at the same time, to exploit commonalities. In addition to current uses, this design will have long-term implications for the National Library's objectives of customizing the Canadian MARC services, of improving union catalog services, and of providing cataloging support services.

BACKGROUND

The Canadian Task Group on Cataloguing Standards issued its final report, *Cataloguing Standards,* in 1972. This report contains the recommendations adopted by the National Library for bilingual cataloging.[1] Since 1971, all headings (or authorities) have been provided in Canada's two official languages in the form prescribed by the English and French language versions of the *Anglo–American Cataloging Rules* (AACR).[2, 3] The French language is used by the National Library in the descriptive cataloging of publications in the Romance languages, and English is used for those in

other languages. Complete descriptive cataloging in English and French is provided for bilingual publications. French language subject headings are assigned from the most recent list of subject headings developed by the Université Laval Library, the *Répertoire de vedettes-matière,* while English subject headings are assigned from the latest edition of the *Library of Congress Subject Headings* (LCSH), supplemented by the most recent *List of Canadian Subject Headings,* as required.[4–6]

The Task Group also recommended that Canadian libraries abandon superimposition, thereby encouraging their adoption of the proposed bibliographic standards; and it supported the removal of AACR rules 98 and 99 from the North American text, urging that all remaining differences between the North American and British texts be reconciled.

The requirement of the National Library's bilingual cataloging policy, that access to all bibliographic records be provided in both official languages, was taken into consideration in the design of the Canadian MARC (CAN/MARC) formats. As recommended by the MARC Task Group in its report *Canadian MARC,* the format allows equivalent English and French name headings to be stored in the 9XX fields of bibliographic records.[7] Equivalent subject headings are stored in the 6XX fields, the English and French headings being identified by second indicator values.

The *Canadiana*/Cataloguing Subsystem, developed and implemented between 1972 and 1975, maintains a data base of MARC records in the National Library's internal processing format.[8, 9] From these records, the subsystem produces: Canadian MARC records (for monographs on a weekly basis to subscribers, and for serials to the CONSER (CONversion of SERials) Project), the text and index of the national bibliography, *Canadiana* (excluding audio/visual materials) using computerized photocomposition, and catalog cards for National Library catalogs.

THE NATIONAL LIBRARY AUTHORITY SUBSYSTEM

The National Library of Canada's automated authority subsystem was designed to meet two major objectives. The first objective was to control the Library's multiple bilingual authority files. Meeting this objective required that the system be capable of supporting the generation of a variety of authority products for a variety of uses. The second major objective of the subsystem was to interface with and control the Library's machine-readable bibliographic file.

The authority subsystem generates a number of application-specific products. Both the content and the physical medium of these products can be defined. The Library can, for example, produce a listing of Canadian government headings, in English or in French, in separate or combined sequence. Similar lists of subject headings could also be generated. This authority information may be output on cards, in a printed listing, or on COM (computer output microform).

The product generation capability of the authority subsystem, independent of its relationship to the National Library's bibliographic file, is to be used in the provision of services to the Canadian library community. However, the authority subsystem was also designed to interface with the existing bibliographic subsystem and to satisfy the bilingual access requirements of that subsystem.

An authority record control number replaces a heading in bibliographic records. This control number is used to access an internal authority record containing equivalent headings, associated notes, and linkages to related records. Before the implementation of the authority subsystem, in order to provide data to satisfy the access and indexing requirements of *Canadiana*, the multiple language access requirements of the CAN/MARC record distribution service, and the defined single language access requirement of the National Library card catalogs, it was necessary to store English and French equivalences for main and added entries, including series, and for subject headings in each bibliographic record. Cross-references and history notes were also included in the bibliographic record and linked to their associated headings. It is now unnecessary to input headings, cross-references or history notes in the bibliographic record itself. They are retrieved with linkage codes from the authority file when the bibliographic record is selected for a product.

The authority/bibliographic subsystems interface provides several benefits. The use of authority control numbers in bibliographic records represents an obvious saving in the time required to code and proofread data, and in the size of bibliographic records. More important, however, is the contribution of the interface to the integrity of the bibliographic file. Authority information is recorded only once and then is used with bibliographic records as required. The possibility of the same heading appearing in slightly different forms because of transcription errors is eliminated. Control mechanisms eliminate the possibility of using a heading which is a see-reference as a main or added entry. Further, a revision to a heading is made only once, in the appropriate authority record, and is then reflected in all products which are generated from the bibliographic records which access that authority record.

Internal Authority Record Format and File Structure

An authority record in the National Library's internal format, illustrated in Figure 1, consists of a 90-character leader, a variable length record directory, variable fields, and linkage fields. Each variable field contains subfield codes at the beginning, followed first by a control subfield "w," and then by the authority data. Apart from subfield "w," which is unique to the authority record format (as proposed in the draft LC MARC II authorities format) and the linkage fields, this structure is identical to that employed for bibliographic records in the internal National Library formats for serials and monographs.[10] The directory entries con-

```
.24/06/76  09:15:35  FORMATTED DUMP OF MARC FILE                                    ***INTERNAL***      PAGE      1


1          10                  12                        15    17    19                  21      25      29 31                  33        34
0000A0247  0000000000000000 00000000000000000000000    963     10 0000000000000000 750408 750221 v v 0000000000000000 00011110 0 x

           41                  43  45  47    56        57    62        63
           0000000000000011 c 0 0   f 0 m 00000011 a 0 m 00000001 n 0

           1   4   6   7   8  9     11
           040 01  00  00  00     33      0   ‡wac‡n 75/02/21            ‡OONL‡OONL%
           043 01  00  00  00     30     33   ‡wa‡n 75/02/21             ‡n-cn---%
           110 01  00  00  00     80     63 10‡wab‡n 75/02/21   c         ‡Canada.‡Minist`ere de l'expansion 'economique r'egionale%
           210 01  00  00  00     68    143 10‡wab‡n 75/02/21   c         ‡Canada.‡Dept. of Regional Economic Expansion%
           365 01  00  00  00    163    211   ‡wa‡r 75/04/08             ‡Etabli le 1er avril 1969.  A assimil'e la Direction g'en'erale
                                              du d'eveloppement rural du Minist`ere des for^ets et du d'eveloppement rural.%
           465 01  00  00  00    131    374   ‡wa‡n 75/02/21             ‡Created Apr. 1, 1969.  Absorbed the Rural Development Branch of
                                               the Dept. of Forestry and Rural Development.%
           580 01  00  00  00     77    505 1 ‡wab‡n 75/02/21            ‡Canada.‡Ministere de l expansion economique regionale%
           680 01  00  00  00     73    582 1 ‡wab‡n 75/02/21            ‡Canada.‡Department of Regional Economic Expansion%
           919 01  00  00  00     56    655 0000-A-9902
                                          0000-E-1355
                                          0000-E-2947
                                          0000-F-0374
                                          0000-G-6754
                                          0000-H-2944
                                          0000-J-2943
                                          0000-J-7260
                                          0000-J-9905
                                          0000-K-2942
                                          0001-D-1548
           929 01  00  00  00     41    711 0000-L-0248 75/02/21 n x 00 00 0 xxnnnn
                                          0000-C-0245 75/02/21 n a 00 00 0 eennnn
```

Fig. 1. Authority Record in the National Library of Canada Internal Format.

sist of a three character tag, an indication of the specific occurrence of that tag, an error identifier, the length of the variable field, and the starting character position of the variable field.

The linkage fields are necessitated by the internal design constraint that each entry, or heading, along with the relevant notes, filing information, and control data, comprise a single authority record in the direct access authority file. Therefore, headings for a corporate name, for any cross-references associated with that name, and for former and subsequent names of the body are each contained in a separate authority record. The actual use of each of these headings (as an accepted heading which may be used in conjunction with a bibliographic record as a main or added entry, or as a variant form of name which is used only as a reference to the accepted heading) must be specified in the control fields of the authority record. Related headings are then linked together through the linkage fields.

A unique feature of the internal system is that a particular heading may be used differently within the National Library depending on the application or the product being generated. Headings used as main headings or added entries in bibliographic records in *Canadiana*, the national bibliography, can appear as see-references in the internal National Library catalog. Use of headings can be uniquely specified for an arbitrary maximum of six applications, libraries or users within the current format. This maximum can be easily extended.

Control data within the linkage fields are used to indicate the specific relationship between the headings (see, see-from, see-also, see-also-from, dual see-also/see-also-from, broader, narrower) for each application or library/user. This indication of record types and of record relationships can be manipulated to generate products such as references for a library catalog or a list of subject headings.

Figure 2 is a stylized illustration of how application specific usage and linkages are recorded. Note that each heading is stored in a separate authority record, and that, although authorities 1, 2, and 3 have different usages and relationships for the two applications/libraries shown, each heading is stored only once in the authority file.

Each authority record may contain an English heading, a French heading, or headings in both of Canada's official languages. A code within the leader identifies the language(s) in which the heading is recorded. Unique tags are assigned to equivalent headings. Situations arise in which a given corporate name or subject heading may have two or more equivalences in the other Canadian official language. The format and authority system are designed to handle this situation and the more common one-to-one relationship.

Figure 3 is a stylized illustration of a bilingual record and associated see-from references, again for two applications/libraries.

An additional feature of the internal format is that a single authority heading can consist of two variable length fields. Author/title headings,

Authority Control Number	Heading	Application A Usage	Application B Usage	Linkage Fields														
				linked to:			linked to:			linked to:			linked to:			linked to:			
				No.	A Type	B Type	No.	A Type	B Type	No.	A Type	B Type	No.	A Type	B Type	No.	A Type	B Type	
1	Common Cold	see from	established heading	2	not used	see from	3	see	not used	4	not used	dual see also/see also from	5	not used	dual see also/see also from	6	not used	see also	E*OR
2	Cold, common	not used	see from	1	not used	see	E*OR												
3	Cold (Disease)	established heading	not used	1	see from	not used	4	dual see also/see also from	not used	5	dual see also/see also from	not used	6	see also	not used	E*OR			
4	Catarrh	established heading	established heading	1	not used	dual see also/see also from	3	dual see also/see also from	not used	E*OR									
5	Cough	established heading	established heading	1	not used	see also	3	see also	not used	E*OR									
6	Influenza	established heading	established heading	1	not used	see also from	3	see also from	not used	E*OR									

*EOR = end of record

Fig. 2. Stylized Illustration of Application/Library-Specific Usage and Linkage for Two Applications/Libraries.

Authority Control Number	Heading	Application A		Application B		Linkage Fields								
						linked to:				linked to:				
		Usage	Language	Usage	Language	No.	Language	A Type	B Type	No.	Language	A Type	B Type	
1	National Library of Canada Bibliothèque nationale du Canada	established heading	1. both	established heading	English - use French as see from	2	both	see from	see from	3	both	see from	see from	2. EOR
2	Canada. National Library Canada. Bibliothèque nationale	see from	1. both	see from	both (to English)	1	both	see	see	2. EOR				
3	NLC BNC	see from	1. both	see from	both (to English)	1	both	see	see	2. EOR				

1. language of entry should correspond to language of the work
2. end of record

Fig. 3. Stylized Illustration of Billingual Authority Information.

such as "Shakespeare, William. Hamlet," are divided into author and title components. Each portion is fully delimited, with "Shakespeare, William" coded as specified for the personal name fields in a bibliographic record. "Hamlet" is coded as a uniform title with the specific indicators and subfield codes that would be required by the uniform title field in the bibliographic record. Four different types of title statements are permitted by the authority format. These conform to the specifications for uniform title, romanized title, collective title, and bibliographic title in the Canadian MARC communication formats.

Figure 4 illustrates an authority record which consists of an author and a title field. This single authority record can subsequently serve as a main entry (110) plus a uniform title (240) in the bibliographic record or as an author/title added entry in field 710. In order to serve this dual purpose, the authority record must be coded to the full extent required by fields 110 and 240 in the bibliographic record. The detailed coding of the uniform title segment is disregarded when this authority information is transferred to the 710 field. In this case, the uniform title is merely converted to a subfield "t" within 710.

Figure 5 is a sample bibliographic record in the internal version of the Canadian MARC format being used in the National Library of Canada. Subfield code "u" is used within the bibliographic record field to identify an authority control number. Use of this subfield is permitted in all variable length fields that function as access points to a bibliographic record, i.e., all fields identified by the 1XX, 4XX, 6XX, 7XX, and 8XX tags.

Neutral Authority File

Authority files are by definition library-specific, since they record a library's established form and use of particular headings. In order to build a file that is potentially useful to other libraries, the National Library adopted a "neutral file" principle for establishing headings. The phrase "neutral file" was coined to indicate that authority records created for distribution do not necessarily reflect the National Library's own usage (although headings established according to neutral file standards will always be accepted for use in *Canadiana*). Headings within the "neutral file" are established according to:

1. *Anglo American Cataloging Rules* (Revised) in the case of personal and corporate names, and headings for series, titles, author/titles, and conferences (English and French versions).
2. *Library of Congress Subject Headings* for English language non-Canadian subject headings (most recent edition and supplements).
3. *List of Canadian Subject Headings* for Canadian English language subject headings (most recent edition supplemented by the National Library as necessary).
4. *Répertoire de vedettes-matière* for French language subject headings (most recent edition and supplements).

```
75/03/25      PROOF SHEET                                                                                    PAGE 0102

TRANSACTION RECORD

001(v                          0000-J-0177%

NO ERRORS FLAGGED FOR TRANSACTION RECORD 0000-J-0177

MASTER RECORD.  DATE ENTERED ON FILE 75/02/12

001                            0000-J-0177%

008                          1.          2.1         4.t         5.0         6.          7.          8.f         9.0

                            10.m        11.1,2      12.a        13.0        16.m        17.0        18.n        19.0

040        ‡wac‡             1.  2.  3.  4.  5.  ‡OONL‡OONL%

043        ‡wa‡              1.  2.  3.  4.  5.  ‡n-cn---%

110       10‡wak‡            1.  2.c 3.  4.  5.  ‡Canada.‡Lois, statuts, etc.%

140       10‡wa‡             1.  2.c 3.  4.  5.  ‡Loi sur les produits dangereux%

210       10‡wak‡            1.  2.c 3.  4.  5.  ‡Canada.‡Laws, statutes, etc.%

240       10‡wa‡             1.  2.c 3.  4.  5.  ‡Hazardous products act%

RECORD VERIFIED
```

Fig. 4. Author/Title Authority Record.

```
24/06/76  09:18:04  FORMATTED DUMP OF MARC FILE                                                    ***INTERNAL***     PAGE     1

1              36 13                15    17    19 21     25     29 30 31                33 34 38

 760706794 9 01 0000000001000000   553     9 00 760521 760521 v  a  0000000010000111 0  NL

               50                65       73 74                76 77 78 79 80 81 82 83  86 87  90

                                        i  0000000000100000    n  a  1  m  5  7  onc f  eng

               1   4  6 7  8  9     11

               001 01 a 00 00    12     0  760706794 %
               008 01 a 00 00    29    12 s1975    ab        0001      %
               020 01 a 00 00    26    41   #b#pa.  Spiral binding.%
               026 01 a 00 00     7    67   #a#1%
               040 01 a 00 00    17    74   #ab#CaOONL#eng%
               110 01 a 00 00    15    91  0#u#0000A0247%
               245 01 a 00 00   132   106 10#ae#Population characteristics unincorporated communities, Newfoundland & Labrador /#Depar
                                          tment of Regional Economic Expansion. -%
               260 01 a 00 00    65   238 1 #abc#Ottawa :#Department of Regional Economic Expansion,#1971.%
               300 01 a 00 00    51   303   #abc#xiii, 189 p. :#col. ill., col. map ;#28 cm.>
```

Fig. 5. Bibliographic Record in the National Library of Canada Internal Format for Monographs.

Records for variant headings, including those established according to other rules or lists, are created and linked to records containing the corresponding neutral file headings. This linkage structure provides libraries the option of using neutral file or variant headings according to local practice. Library-specific use may be related to the neutral file by means of the library/user/application specific control fields.

Canadiana/Cataloging/Authority Products

Figure 6 is a sample output record resulting from the combination of data in the authority and bibliographic files. The authority control numbers in the bibliographic record in Figure 5 are replaced with the corresponding headings from the authority file by the program that selects records to generate products. The appropriate language version of the heading is selected for the main entry and its language equivalence is transferred to the bibliographic field 910 in accordance with Canadian MARC specifications (see the first 910 field in Figure 6). A see-reference is created in the output record according to instructions carried in the second authority linkage field (929) from Figure 1. Four 990 fields are generated in the output bibliographic record by the select program. For each equivalence, cross-reference, or history note that is transferred from the authority file, a separate 990 field is created to link it to the appropriate heading field in the bibliographic record.

Authority Products

Figure 7 shows some planned and actual products made possible by the authority system developed at the National Library of Canada. Cataloguing Branch staff have been inputting records, primarily for Canadian federal and provincial name headings, since October 1974. The file as of July 1976 contained approximately 13,000 records (8,000 acceptable headings, plus their references). The first printed listing of authority headings was generated in January 1976. Since then, a cumulated listing of all headings in the file has been produced every two weeks. Authority cards for National Library internal catalogs were first produced in July 1976. A COM listing of headings is expected to be available for distribution late in 1976.[11] Figure 8 is a sample page from the internal authorities listing. The government headings are being created according to the "neutral file" criteria.

The *List of Canadian Subject Headings* was published by the Canadian Library Association in 1971 as a supplement to the *Library of Congress Subject Headings*. The headings were constructed, in accordance with LCSH, to provide a more specific subject approach for collections specializing in *Canadiana*. At the recommendation of the Canadian Task Group on Cataloguing Standards, a contract was issued in 1973 to enhance this initial effort. Notations have been developed to designate Canadian head-

```
24/06/76  09:16:47  FORMATTED DUMP OF MARC FILE                                                    ***INTERNAL***      PAGE      1

1              36 13                 15    17    19 21      25      29 30 31                 33 34 38

 760706794 9 01 0000000001000000  1193     20 00 760521 760521 v  a  0000000000000100 0  NL

               50                 65        73 74                 76 77 78 79 80 81 82 83  86 87  90

                                          i  0000000010100011     n  a  1  m  5  7  onc f  eng

               1   4  6 7  8  9      11

               001 01 a 00 00     12      0  760706794 %
               005 01 0 F0 F0     17     12 1100101191001021%
               008 01 a 00 00     29     29 s1975    ab         0001      %
               020 01 a 00 00     26     58   #b#pa.  Spiral binding.%
               026 01 a 00 00      7     84   #a#1%
               040 01 a 00 00     17     91   #ab#CaOONL#eng%
               110 01 a 00 00     52    108 10#ab#Canada.#Dept. of Regional Economic Expansion.%
               245 01 a 00 00    132    160 10#ae#Population characteristics unincorporated communities, Newfoundland & Labrador /#Depar
                                            tment of Regional Economic Expansion. -%
               260 01 a 00 00     65    292 1 #abc#Ottawa :#Department of Regional Economic Expansion,#1971.%
               300 01 a 00 00     51    357   #abc#xiii, 189 p. :#col. ill., col. map ;#28 cm.%
               880 01   40 40     56    408 10#ab#Canada.#Department of Regional Economic Expansion%
               880 02   40 40     60    464 10#ab#Canada.#Ministere de l expansion economique regionale%
               910 01   00 00     64    524 10#ab#Canada.#Minist`ere de l'expansion `economique r`egionale.%
               910 02   00 00    114    588 10#z#Created Apr. 1, 1969.  Absorbed the Rural Development Branch of the Dept. of Forestry a
                                            nd Rural Development.%
               910 03   00 00     34    702 10#a#Regional Economic Expansion.%
               910 04   00 00     40    736 10#ab#Canada.#Rural Development Branch.%
               990 01 a 00 00     22    776 01#ab#91001ab#11001ab%
               990 02 a 00 00     21    798 21#ab#11001ab#91002z%
               990 03 a 00 00     21    819 11#ab#91003a#11001ab%
               990 04 a 00 00     22    840 11#ab#91004ab#11001ab>
```

Fig. 6. Output Record Resulting from the Combination of Authority and Bibliographic Data.

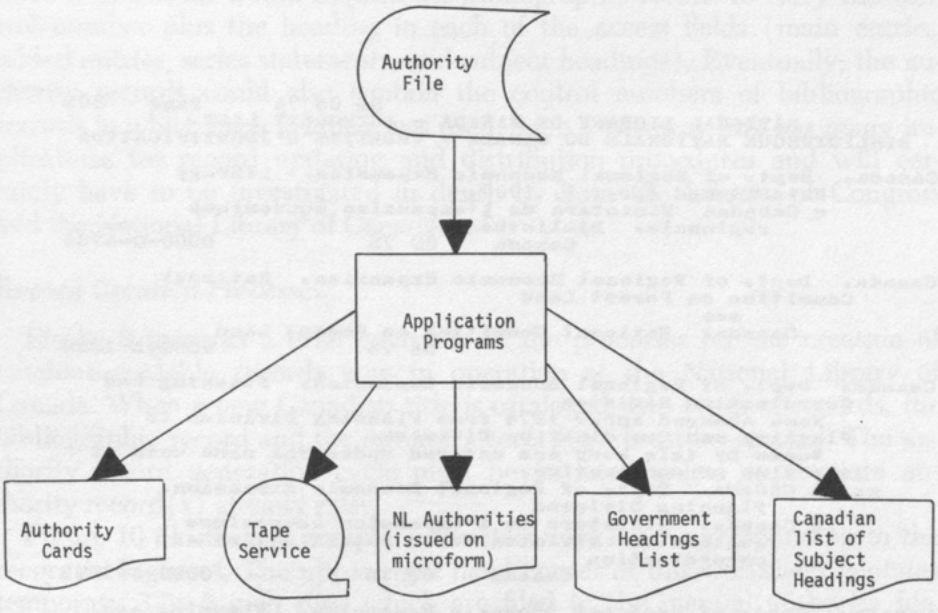


Fig. 7. Authority File Products.

ings that are permitted by LCSH, headings that duplicate LCSH, headings that are in conflict with LCSH, and rejected Library of Congress headings. Some examples illustrate these relationships:

1. Coins, Canadian (permitted by L.C.)
   xx Beaver token (unique to Canadian headings list)
2. Seven Years War (Canadian heading)
   French and Indian Wars (corresponding LCSH)
3. Fur trade (common to both, but the Canadian list permits chronological subdivision)

A *Canadian MARC Communication Format: Authorities* is available in a draft version.[12] Discussions between representatives of the Library of Congress MARC Development Office and the Canadian MARC Office have been conducted during the past two years in the hope that the American and Canadian formats will be compatible. Minor differences exist between the two formats, but the Canadian format follows the Library of Congress approach exactly wherever applicable. With finalization of the communication format, it will be possible to devise a conversion program to produce records for a Canadian MARC record service for authorities. There is little demand from the Canadian library community to commence such a service in the immediate future and consequently little opportunity to obtain a serious review of the proposed format. An authority record service, if implemented, would probably not contain any links from the authority records to the bibliographic record in the initial phases.

```
                                        08 05 76      Page   309
        NATIONAL LIBRARY OF CANADA - AUTHORITY LIST
  BIBLIOTHEQUE NATIONALE DU CANADA - VEDETTES D'IDENTIFICATION

Canada.  Dept. of Regional Economic Expansion.  Library
        Established Apr., 1, 1969.
        q Canada.  Ministère de l'expansion économique
            regionale.  Bibliotheque
                          Canada     09 75          0000-G-6754

Canada.  Dept. of Regional Economic Expansion.  National
      Committee on Forest Land
              see
          Canada.  National Committee on Forest Land
                                     04 75          0000-A-1359

Canada.  Dept. of Regional Economic Expansion.  Planning and
      Coordination Division
        Name changed Apr.? 1974 from Planning Division to
      Planning and Coordination Division.
        Works by this body are entered under the name used at
      the time of publication.
    sa/xx Canada.  Dept. of Regional Economic Expansion.
            Planning Division
        q Canada.  Ministere de l'expansion économique
            regionale.  Division de la planification et
            co-ordination
                          Canada     08 75          0000-J-2943

Canada.  Dept. of Regional Economic Expansion.  Planning and
      Coordination Division.  Economic Analysis Branch
              see
          Canada.  Dept. of Regional Economic Expansion.
            Economic Analysis Branch
                                     05 75          0000-F-2946

Canada.  Dept. of Regional Economic Expansion.  Planning Division
      Established Apr. 1, 1969.  Name changed Apr.? 1974 from
      Planning Division to Planning and Coordination Division.
        Works by this body are entered under the name used at
      the time of publication.
    sa/xx Canada.  Dept. of Regional Economic Expansion.
            Planning and Coordination Division
        q Canada.  Ministere de l'expansion economique
            regionale.  Division de la planification
                          Canada     08 75 D-BN/NL  0000-K-2942

Canada.  Dept. of Regional Economic Expansion.  Planning
      Division.  Economic Analysis Branch
              see
          Canada.  Dept. of Regional Economic Expansion.
            Economic Analysis Branch
                                     08 75          0000-G-2945

Canada.  Dept. of Regional Economic Expansion.  Regional Studies
      Section
        Established 1969?  Ceased to exist in Mar.? 1974.
        x Canada.  Dept. of Regional Economic Expansion.
            Economic Analysis Branch.  Regional Studies Section
        q Canada.  Ministere de l'expansion economique
            regionale.  Etudes regionales
                          Canada     08 75          0000-E-2947

Canada.  Dept. of Regional Economic Expansion (Western Region)
      Library
        q Canada.  Ministère de l'expansion économique
            regionale (Region de l'Ouest)  Bibliotheque
                          Canada     11 75          0000-J-9905
```

Fig. 8. Page from the Internal Authorities Listing.

Such a constraint would require the bibliographic record to carry the control number plus the heading in each of the access fields (main entries, added entries, series statements, and subject headings). Eventually, the authority records could also contain the control numbers of bibliographic records in which each heading was used. Such a two-way link has many implications for record updating and distribution procedures and will certainly have to be investigated in depth by both the Library of Congress and the National Library of Canada.

Record Creation Processes

Figure 9 presents a brief overview of the processes for the creation of machine-readable records now in operation at the National Library of Canada. When a new Canadian title is cataloged, two types of records, the bibliographic record and the authority record(s), must be created. The authority record generation cycle must be initiated unless appropriate authority record(s) already exist.

Figure 10 illustrates a sample authorities worksheet corresponding to the record in Figure 4. The upper right hand corner of this worksheet contains temporary 3-by-5 inch slips which are filed in the manual authority file. This file will be maintained until an on-line authority system is operational. Both the English and French headings are recorded in the temporary area of the worksheet and two temporary slips are filed, one for each language version of the heading.

Figure 11 illustrates another sample worksheet for a corporate name. Two history notes, one each in the two official languages, are shown (tagged 365 and 465), in addition to a filing field (tagged 580) for the French version of the corporate name. Filing data are required in a very few instances when a heading is to be filed differently than it is written. Adoption of a different standard for filing in manual and automated library catalogs would require some modification of filing information associated with headings, a process that will undoubtedly be made easier by the authority system.

An authority record for a variant heading may be created by encoding only two or three fields: control number (001), English heading (210), and French heading (110), if the heading exists in both of Canada's official languages.

A linkage field is added to the record for the accepted heading to allow the records for the variant forms to be linked to it, and to specify the relationships between the headings. The reverse linkages are machine-generated. The actual content that must be transcribed to create the record for the variant heading is limited because a considerable amount of data is supplied by the record creation program.

Proofsheets are generated following transcription of the data on the authorities worksheet into machine-readable form and submission to the authority record creation programs (pre-edit and edit/update). Error mes-

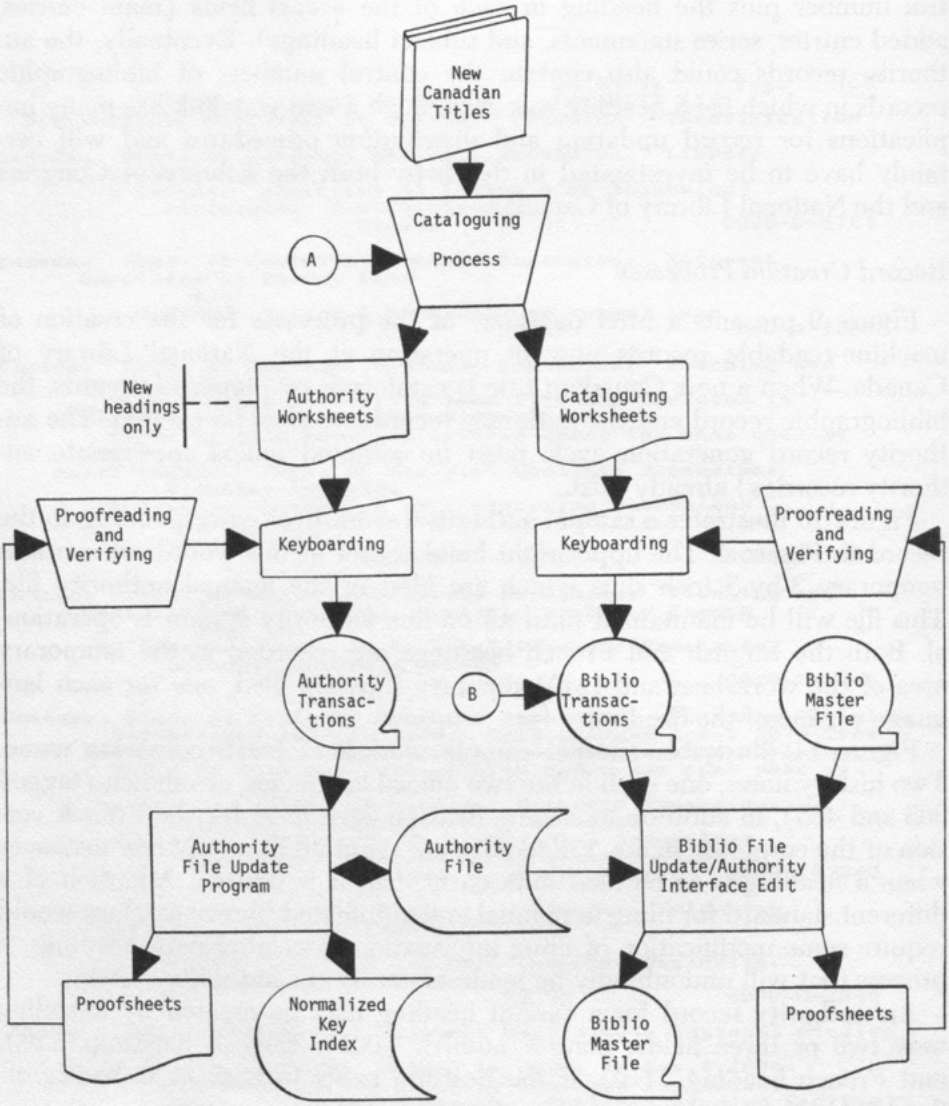
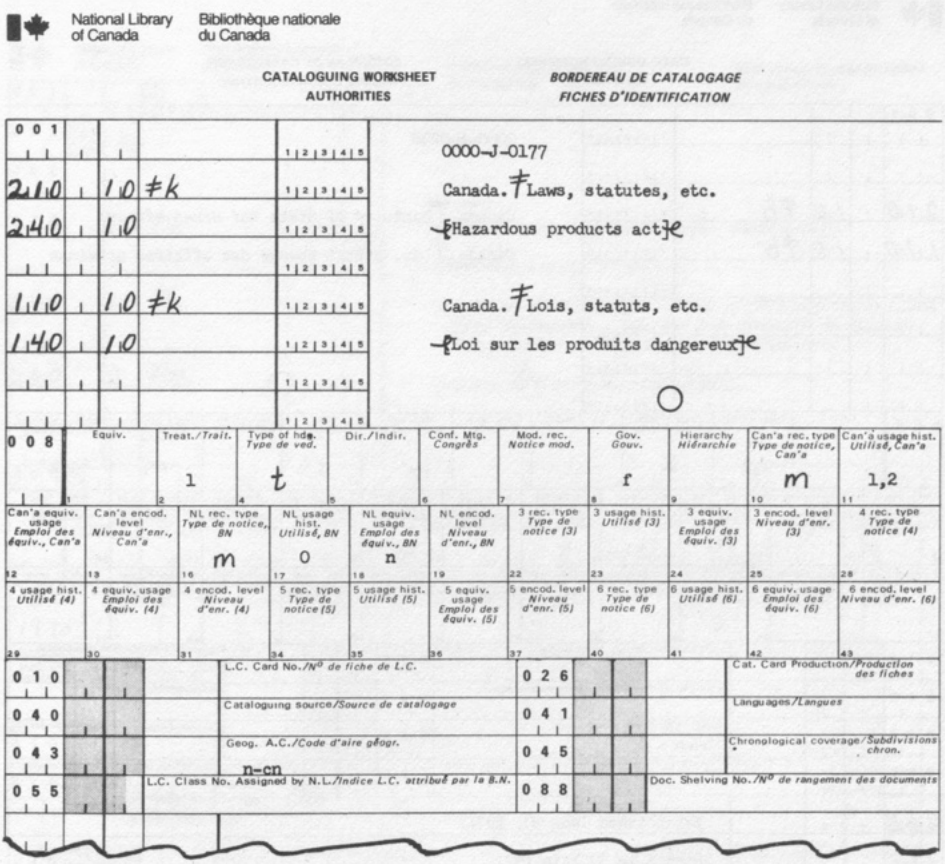


Fig. 9. Record Creation Processes.

sages are listed on this proofsheet whenever machine-detectable errors are encountered.

Figure 12 is a sample cataloging worksheet for a monograph record. Both the heading and the authority control number are included on the worksheet to assist in the proofreading and verification process. Unless the heading is included it is impossible for the proofreaders to determine that the appropriate authority record was accessed.

Note that only the authority control number is actually input into the



National Library of Canada — Bibliothèque nationale du Canada

CATALOGUING WORKSHEET
AUTHORITIES

BORDEREAU DE CATALOGAGE
FICHES D'IDENTIFICATION

001				0000-J-0177
210	10	≠k		Canada. ≠Laws, statutes, etc.
240	10			≠[Hazardous products act]≠
110	10	≠k		Canada. ≠Lois, statuts, etc.
140	10			≠[Loi sur les produits dangereux]≠
				O

008	Equiv.	Treat./Trait.	Type of hdg. Type de ved.	Dir./Indir.	Conf. Mtg. Congrès	Mod. rec. Notice mod.	Gov. Gouv.	Hierarchy Hiérarchie	Can'a rec. type Type de notice, Can'a	Can'a usage hist. Utilisé, Can'a
	1	2	4	5	6	7	8	9	10	11
		1	t				f		m	1,2

Can'a equiv. usage Emploi des équiv., Can'a	Can'a encod. level Niveau d'enr., Can'a	NL rec. type Type de notice, BN	NL usage hist. Utilisé, BN	NL equiv. usage Emploi des équiv., BN	NL encod. level Niveau d'enr., BN	3 rec. type Type de notice (3)	3 usage hist. Utilisé (3)	3 equiv. usage Emploi des équiv. (3)	3 encod. level Niveau d'enr. (3)	4 rec. type Type de notice (4)
12	13	16	17	18	19	22	23	24	25	28
		m	0	n						

4 usage hist. Utilisé (4)	4 equiv. usage Emploi des équiv. (4)	4 encod. level Niveau d'enr. (4)	5 rec. type Type de notice (5)	5 usage hist. Utilisé (5)	5 equiv. usage Emploi des équiv. (5)	5 encod. level Niveau d'enr. (5)	6 rec. type Type de notice (6)	6 usage hist. Utilisé (6)	6 equiv. usage Emploi des équiv. (6)	6 encod. level Niveau d'enr. (6)
29	30	31	34	35	36	37	40	41	42	43

010	L.C. Card No./N° de fiche de L.C.	026	Cat. Card Production/Production des fiches
040	Cataloguing source/Source de catalogage	041	Languages/Langues
043	Geog. A.C./Code d'aire géogr. n-cn	045	Chronological coverage/Subdivisions chron.
055	L.C. Class No. Assigned by N.L./Indice L.C. attribué par la B.N.	088	Doc. Shelving No./N° de rangement des documents

Fig. 10. Authorities Worksheet.

machine-readable bibliographic record and that the entire main entry and uniform title are not keyed. The authority file is accessed each time a subfield "u" appears in a bibliographic data field that can function as a heading or access point. During this access to the authority file, called the interface edit in the flowchart in Figure 9, a number of error checks are performed. These include checks that an authority record exists for a specified authority control number, that the authority record has been verified as correct, and that the bibliographic tag from which the authority file access emanated is consistent with the type of authority heading. The last check ensures, for example, that a topical subject heading is not accessed through a main entry field.

Normalized Key

A matching key is computer-generated for each authority heading in the authority file and stored as an inverted access point to the heading. This character string or "normalized key" is patterned on the key designed

National Library of Canada / Bibliothèque nationale du Canada

CATALOGUING WORKSHEET
AUTHORITIES

BORDEREAU DE CATALOGAGE
FICHES D'IDENTIFICATION

001 — 0000-A-0298

210 1 0 ǂb — Canada. ǂ Ministry of State for Urban Affairs

110 1 0 ǂb — Canada. ǂ Dép. d'Etat chargé des affaires urbaines

008	Equiv.	Treat./*Trait.*	Type of hdg. *Type de ved.*	Dir./Indir.	Conf. Mtg. *Congrès*	Mod. rec. *Notice mod.*	Gov. *Gouv.*	Hierarchy *Hiérarchie*	Can'a rec. type *Type de notice, Can'a*	Can'a usage hist. *Utilisé, Can'a*
		1,2	X				f		m	1,2

Can'a equiv. usage *Emploi des équiv., Can'a*	Can'a encod. level *Niveau d'enr., Can'a*	NL rec. type *Type de notice, BN*	NL usage hist. *Utilisé, BN*	NL equiv. usage *Emploi des équiv., BN*	NL encod. level *Niveau d'enr., BN*	3 rec. type *Type de notice (3)*	3 usage hist. *Utilisé (3)*	3 equiv. usage *Emploi des équiv. (3)*	3 encod. level *Niveau d'enr. (3)*	4 rec. type *Type de notice (4)*
		m	1	n						

4 usage hist. *Utilisé (4)*	4 equiv. usage *Emploi des équiv. (4)*	4 encod. level *Niveau d'enr. (4)*	5 rec. type *Type de notice (5)*	5 usage hist. *Utilisé (5)*	5 equiv. usage *Emploi des équiv. (5)*	5 encod. level *Niveau d'enr. (5)*	6 rec. type *Type de notice (6)*	6 usage hist. *Utilisé (6)*	6 equiv. usage *Emploi des équiv. (6)*	6 encod. level *Niveau d'enr. (6)*

010 — L.C. Card No./*N° de fiche de L.C.*

026 — Cat. Card Production/*Production des fiches*

040 — Cataloguing source/*Source de catalogage*

041 — Languages/*Langues*

043 — Geog. A.C./*Code d'aire géogr.* n-cn

045 — Chronological coverage/*Subdivisions chron.*

055 — L.C. Class No. Assigned by N.L./*Indice L.C. attribué par la B.N.*

088 — Doc. Shelving No./*N° de rangement des documents*

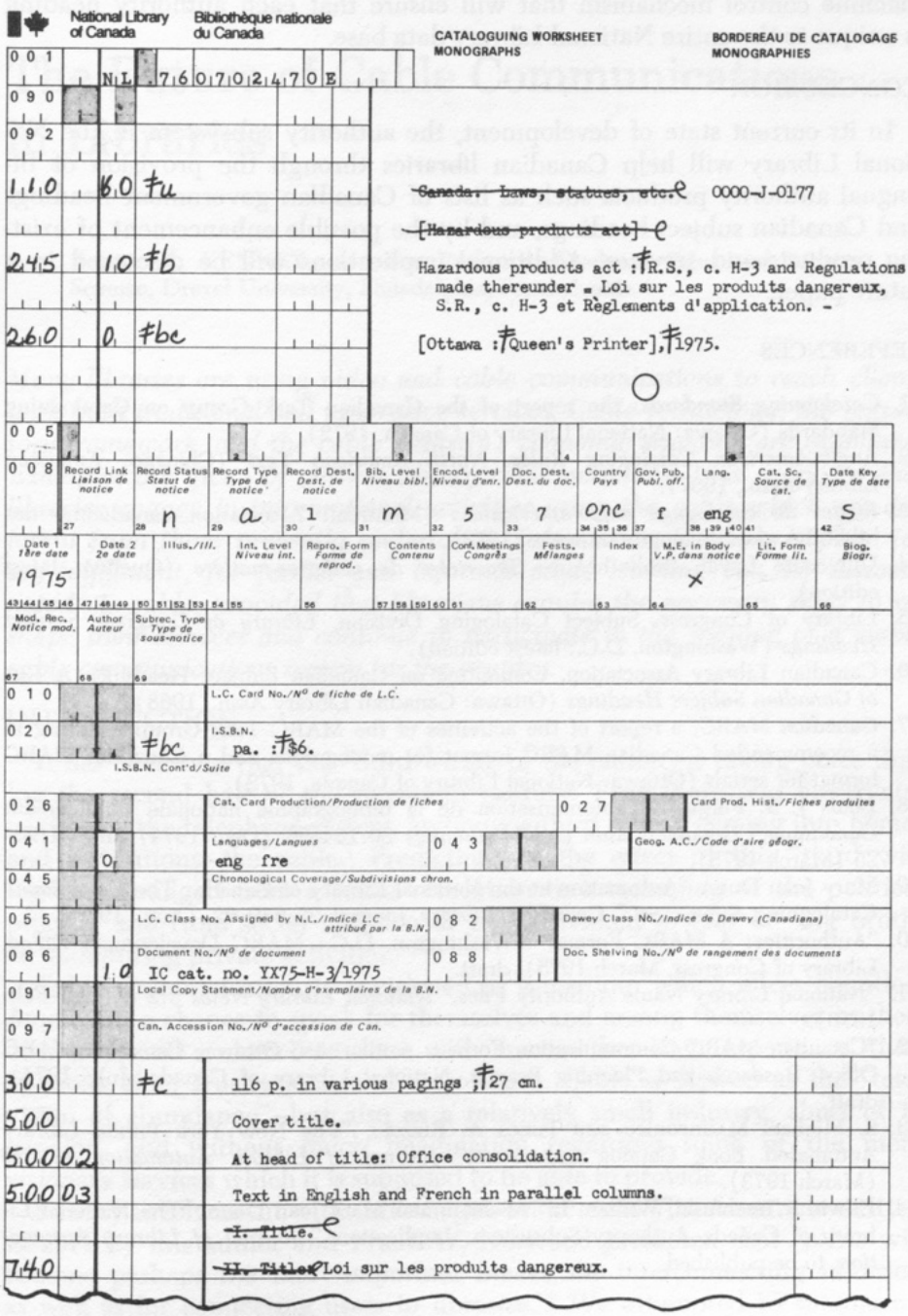
465 — Established June 30, 1971.

365 — Etabli le 30 juin 1971.

510 1 ǂb — Canada. ǂ Departement d Etat charge des affaires urbaines

Fig. 11. Authorities Worksheet for a Corporate Name.

for the New York Public Library authority system. As explained by Malinconico and Rizzolo, the normalized key ensures that a bibliographic heading exists only once in the machine-based authority file.[13] The first step in the normalized key generation algorithm is the elimination of diacritics, extraneous spaces, punctuation, and subfield coding. Then all characters in the heading are converted to their equivalent upper case EBCDIC representation. Finally any nonblank characters after the 80th are input to a hashing algorithm. All incoming headings are machine-matched against existing headings in the indexed sequential inverted index file. A new incoming heading and its resultant normalized key will be added to the authority file only if the match based on the normalized key fails to encounter an identical normalized key within the authority file. It is on the basis



National Library of Canada — Bibliothèque nationale du Canada

CATALOGUING WORKSHEET MONOGRAPHS — BORDEREAU DE CATALOGAGE MONOGRAPHIES

Tag	Ind.	Subfields	Data
001			NL 76 070 2470 E
090			
092			
110	1	0 ‡u	~~Canada. Laws, statues, etc.~~ 0000-J-0177
			~~[Hazardous products act]~~
245	1	0 ‡b	Hazardous products act :‡R.S., c. H-3 and Regulations made thereunder = Loi sur les produits dangereux, S.R., c. H-3 et Règlements d'application. -
260	0	‡bc	[Ottawa :‡Queen's Printer],‡1975.

005	008 Record Link Liaison de notice	Record Status Statut de notice	Record Type Type de notice	Record Dest. Dest. de notice	Bib. Level Niveau bibl.	Encod. Level Niveau d'enr.	Doc. Dest. Dest. du doc.	Country Pays	Gov. Pub. Publ. off.	Lang.	Cat. Sc. Source de cat.	Date Key Type de date
		n	a	1	m	5	7	onc	f	eng		s

Date 1 1ère date	Date 2 2e date	Illus./Ill.	Int. Level Niveau int.	Repro. Form Forme de reprod.	Contents Contenu	Conf. Meetings Congrès	Fests. Mélanges	Index	M.E. in Body V.P. dans notice	Lit. Form Forme lit.	Biog. Biogr.
1975									x		

Mod. Rec. Notice mod.	Author Auteur	Subrec. Type Type de sous-notice

Tag	Ind.	Subfields	Data
010			L.C. Card No./N° de fiche de L.C.
020		‡bc	I.S.B.N. pa. :‡$6.
			I.S.B.N. Cont'd/Suite
026			Cat. Card Production/Production de fiches
027			Card Prod. Hist./Fiches produites
041	0		Languages/Langues eng fre
043			Geog. A.C./Code d'aire géogr.
045			Chronological Coverage/Subdivisions chron.
055			L.C. Class No. Assigned by N.L./Indice L.C attribué par la B.N.
082			Dewey Class No./Indice de Dewey (Canadiana)
086	1	0	Document No./N° de document IC cat. no. YX75-H-3/1975
088			Doc. Shelving No./N° de rangement des documents
091			Local Copy Statement/Nombre d'exemplaires de la B.N.
097			Can. Accession No./N° d'accession de Can.
300		‡c	116 p. in various pagings ;‡27 cm.
500			Cover title.
500	02		At head of title: Office consolidation.
500	03		Text in English and French in parallel columns.
			~~I. Title.~~
740			~~II. Title.~~ Loi sur les produits dangereux.

Fig. 12. Cataloging Worksheet for a Monograph Record.

of the normalized key that the National Library expects to implement a machine control mechanism that will ensure that each authority heading is unique to the entire National Library data base.

CONCLUSION

In its current state of development, the authority subsystem in the National Library will help Canadian libraries through the provision of bilingual authority products such as lists of Canadian government headings and Canadian subject headings, and by the possible enhancement of existing products and services. Additional implications will be discussed in a future paper.

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14. Edwin J. Buchinski, William L. Newman, and Mary Joan Dunn, "The National Library of Canada Authority Subsystem: Implications," *Journal of Library Automation,* to be published.

The Future of Cable Communications in Libraries

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Many libraries are using video and cable communications to reach clients with both traditional and innovative services. Cable technology, the regulatory framework, and the cable industry's economic situation are examined. Examples are given of current library cable activities. It is proposed that libraries engage in informational activities using the cable which are different from those presently undertaken. Information for daily coping, for self-fulfillment, for formal and informal adult learning can be disseminated via cable, provided that librarians acquire the necessary skills to reshape their services and continue to participate in the shaping of a viable cable communications system for the country.

INTRODUCTION

It has been said that the "third wiring of the nation" is taking place during the second half of the twentieth century. First there was electricity, next came the telephone system, and now a third wire is coming into homes and institutions—the cable.[1] Predictions of the effect of this "third wiring" have ranged from a social revolution to a reshaping of the political process, and from social isolation of the individual to fear of "big brother" monitoring private activities.

Cable communication is envisioned as a medium which offers countless Americans a chance to speak for themselves and among themselves in their own way, and a chance to share with one another their experience, their opinions, their frustrations, and their hopes. Cable is viewed as the "television of abundance"—but also as a relatively small industry, short of financing, and without much imagination regarding some of the more visionary services which it is supposed to be able to provide.

Library involvement with cable began in the early 70s. An article written in 1971 by this author and Frank W. Norwood predicted that "cable will become perhaps *the* most important means for interconnecting libraries, as well as for connecting users to libraries."[2] We attempted to summarize what was known about cable at that time and to encourage librarians to use the new medium.

In the relatively short span of five years, librarians have indeed become involved in the use of cable (Table 1). Particularly the public libraries have engaged in activities ranging from informing and organizing their communities, participating in franchise negotiations, purchasing equipment, training themselves and members of the community to produce programs, and cablecasting such programs where cable systems were available. Some libraries administer one or more cable channels. The ALA has set up a special section for Video and Cable Communications within ISAD, and has published a number of informational and bibliographic publications for the guidance of video/cable librarians.[3–5] There is now a newsletter specifically directed at librarians who are involved with video and cable.[6]

Table 1. Video/Cable Activities in Libraries

Activity	*1973*	*1974*	*1975 (prelim.)*
Libraries with video only; no cablecasting	100	185	293
Libraries with video *and* cablecasting	43	60	76

Sources. For 1973 and 1974: Brigitte L. Kenney and others, *Inventory of Video/Cable Activities in Libraries, 1973. 1974.* Available as part of the *Cable TV Information Packet* (Chicago: American Library Assn., 1973). For 1975: "Over 300 Libraries Engaged in Video/Cable Activities," *CableLibraries* 3, no. 9:1 (Sept. 1975).

It seems appropriate now to survey the current status of cable communications in libraries and to see how much of the promise, as perceived five years ago, has come true. We will first deal with the technology and the regulatory and economic environment within which cable communications exist. Next, we will outline current activities of libraries in some detail. Finally, we will develop some possible new approaches to using this technology for purposes different from those presently seen, which may lead to an integration of cable technology with other telecommunications technologies with the goal of providing an electronic structure for the development of a national information network responsive to new client groups and information needs.

CABLE COMMUNICATIONS* TECHNOLOGY

In its seminal report on cable communications written in 1969, the Sloan Commission foresaw rapid development of this technology and equally rapid "wiring up" of the nation which, according to Sloan, would have cable in 40–60 percent of American homes by 1980.[7] This prediction is not on its way to fruition despite the fact that cable has experienced accelerated growth since 1972. Cable was originally designed to provide better reception of television signals by transmission from a common antenna to

* "Cable communications" and "cable" are the terms chosen throughout this report to describe the technology often called CATV or cable television. "Communications" denotes a broader application of cable than merely the provision of improved television signals.

homes via coaxial cable rather than through the air, but it has several other advantages that make it an exceptional medium for the transmission of all types of information, in many different forms. These are:

- A virtually unlimited number of channels is available when transmitting over coaxial cable rather than through the air where the necessary division of the electromagnetic spectrum limits television to a fixed number of VHF and UHF channels.
- On these channels, video may be transmitted, as well as audio and digital signals, making it at present the only communications technology that includes the transmission of all types of data and visual information and connects to individual homes.
- Equipment to produce software (programs) for cable costs far less than hardware used for broadcast television. A small, portable camera and recorder may be used, costing less than $2,000, to provide satisfactory black-and-white videotapes. This allows individuals and groups who did not have access to television in the past because of the prohibitive cost of production to produce their own material.
- Coaxial cable has not only a very large information-carrying capability but also can transmit in two directions: *from* the studio, "headend,"* or mobile unit *to* all homes connected to the system as well as *from* homes and other reception points back "upstream" *to* the headend or studio. This capability allows people to "talk back to their television set" in reality, to respond to polls, educational programs, visual presentation of shopping offerings, and indexed news and current awareness services. It should be emphasized that the coaxial cable has only the *capability* for two-way transmission; additional and often costly equipment is needed to implement two-way cable communications.
- Data transmission reliability is better with coaxial cable than with telephone lines. The transmission speed is far greater as well, and equipment for connecting computers to the cable is less complicated and costly than that used for computer-telephone interfacing. Thus cable systems can assume increasing importance for institutions which need high-speed, reliable data transmission capability at reasonable cost.
- While the emphasis in cable system development has been to connect homes to a television origination point of some sort, there is an equally feasible capability to interconnect institutions in a so-called point-to-point network, allowing the exchange of data and other information without these being cablecast to homes as well. Figure 1

* "Headend" denotes the point at which the cable system picks up over-the-air signals and down-converts them for transmission over coaxial cable. It usually consists of an antenna and a small building which may or may not contain switching gear and a studio.

illustrates a one-way cable system which provides program material to homes and institutions connected to it. Figure 2 illustrates a point-to-point network that would interconnect branch libraries and the main public library as well as provide a linkage between the main library, city agencies, and academic institutions. "Sub-districting" or "hubs" are possible even in a one-way system, allowing local matters to be disseminated to the appropriate neighborhoods. The same is true of point-to-point networks, where "switching" (interconnecting of cable channel A, serving libraries, with cable channel B, serving academic institutions) is possible.

From this brief list of unique features it may be seen that the technical capabilities inherent in a cable system can be most useful to institutions such as libraries, schools, hospitals, and municipal agencies of all types. In fact, optimal utilization of the technical capabilities of a given cable system would provide an entirely new communications structure for any given community, often substituting cable communications for transporting people and materials through congested urban areas, thus saving time and improving resource sharing among like and unlike institutions. The resources and services of these agencies and institutions could be brought

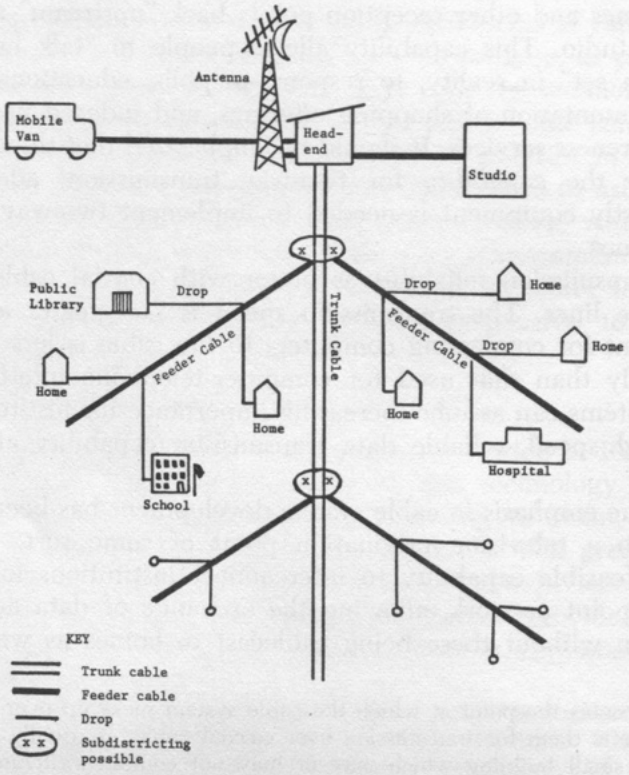

Fig. 1. Traditional One-Way Cable System.

directly into people's homes as well, using the same cable system, removing some of the communications barriers now standing in the way of full utilization of a given community's assets.

As yet no city has taken advantage of the cable system to provide even some of the services outlined above. Partial attempts will be described. However, it is first necessary to discuss why the promising technology of cable has not been as fully utilized as was originally envisioned.

THE REGULATORY AND ECONOMIC ENVIRONMENT

Cable systems are usually privately owned, either by individual companies or by so-called MSOs (Multi-System Operators). A listing of the twenty-five major cable systems appears in Table 2.

The growth of the cable industry has been slow but steady; Table 3 presents an indication of this growth in terms of increase in number of cable systems and total subscribers.

Cable developed as an ancillary service to over-the-air broadcasting; its original purpose was merely the provision of interference-free television signals. Its development began in 1951; for several years it was not clear whether or not cable was to be treated as an entirely private enterprise or if it should come under regulations similar to those extended over broad-

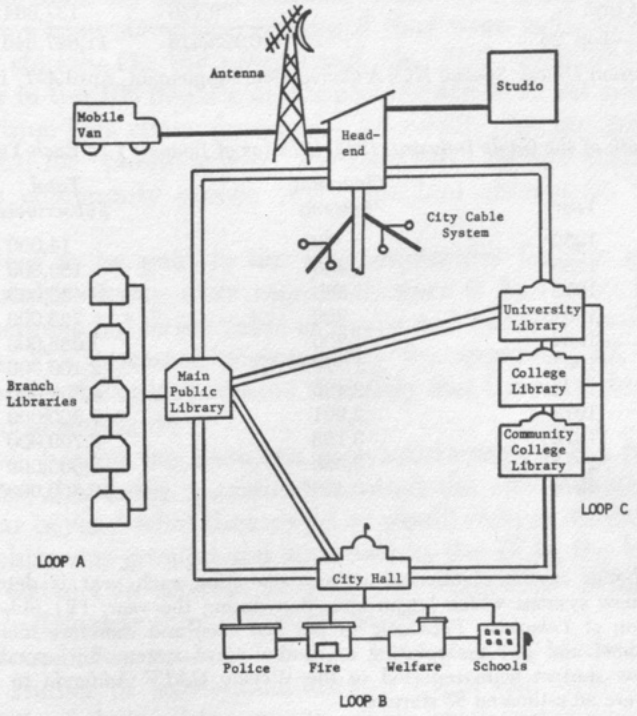

Fig. 2. Point-to-Point Network (Institutional).

Table 2. Twenty-Five Top Cable Operators

Rank	System Operator	Number of Subscribers	Homes Passed by Cable	Homes in Franchised Areas
1	TelePrompTer Corp.	1,094,164	2,387,715	3,323,822
2	Tele-Communications Inc.	549,797	1,179,760	1,588,093
3	Warner Cable Corp.	531,486	1,003,865	N.A.
4	American TV & Communications Corp.	513,000	1,018,000	1,800,000
5	Cox Cable Communications Inc.	394,000	760,000	1,775,000
6	Viacom Internation Inc.	324,000	615,000	975,000
7	Sammons Communications Inc.	277,878	438,678	500,000
8	Communications Properties Inc.	265,000	434,980	1,114,566
9	United Cable TV Corp.	205,305	372,809	599,959
10	UA-Columbia Cablevision Inc.	198,000	300,000	370,000
11	Cablecom-General Inc.	190,000	324,000	329,000
12	Service Electric Cable TV Inc.	165,202	200,000	258,000
13	Storer Cable TV Inc.	146,000	224,000	N.A.
14	Continental Cablevision Inc.	145,000	306,000	439,000
15	Midwest Video	145,000	195,000	260,000
16	TeleCable Corp.	133,000	266,000	300,000
17	NewChannels Corp.	128,806	200,000	232,500
18	General Electric Cablevision Corp.	120,000	205,000	65,000
19	Athena Communications Corp.	101,893	271,888	374,038
20	Liberty Communications Inc.	97,396	159,000	175,000
21	Daniels Properties Inc.	88,962	176,147	179,000
22	Vikoa Inc.	85,100	124,900	137,200
23	Manhattan Cable TV Inc.	80,000	230,000	350,000
24	Western Communications Inc.	77,703	96,900	101,900
25	Telesis Corp.	76,726	137,604	240,000
	Total—Top 25	6,133,418	11,627,846	15,487,078

Source: *Television Digest,* Special NCTA Convention Supplement, April 4–7, 1976, p.2–3.

Table 3. Growth of the Cable Industry, 1952–1976 (as of January 1 of Each Year)

Year	Operating Systems	Total Subscribers
1952	70	14,000
1955	400	150,000
1958	525	450,000
1961	700	725,000
1964	1,200	1,085,000
1967	1,770	2,100,000
1970	2,490	4,500,000
1973	2,991	7,200,000
1974	3,158	8,700,000
1975	3,366	9,800,000
1976	3,450*	10,800,000*

* Estimated.

Note: The change in the number of systems operating each year is determined by three factors: (1) new systems which began operation during the year; (2) older systems coming to the attention of *Television Factbook* for the first time and therefore included in the total for the first time; and (3) the splitting or combining of systems by operators. For calendar 1974, 152 new starters were reported in the *Weekly CATV Addenda* to the Factbook. In 1975, there were an estimated 85 starters.

Source: Excerpted from *Television Digest,* Special NCTA Convention Supplement, April 4–7, 1976, p.32.

casting by the Federal Communications Commission. This uncertainty ended in 1966 when the FCC decided to assume regulation. The reason given for this decision was that cable retransmitted over-the-air signals and thus should come under the same regulation as over-the-air broadcasting; it may be speculated, however, that cable was beginning to develop so rapidly that it was perceived as a threat by the broadcasting industry. As long as broadcasters saw only the additional audiences to be delivered to them by cable operators who were carrying their stations on systems distant from their stations, cable was a welcome extender of the advertising market; when broadcasters discovered that cable operators were importing distant signals which carried advertising *into* their local markets, they began to perceive cable as competition. When the FCC asserted its jurisdiction over cable, it was concerned only with the importation of television signals from other cities.

The FCC subsequently developed a set of rules which were intended to deal with these knotty problems while permitting cable to grow and to develop into a medium that would become a forum for local opinions, issues, and agencies. The regulations, issued in 1972, contained severe restrictions on the importation of distant signals, particularly for the top 100 markets, which deliver the largest audiences to advertisers.[8] Only a certain number of stations could be imported, fewer in the larger markets than in smaller ones. As well, "black-out" rules were adopted, preventing a cable operator from showing programs if they were to be aired on a local broadcast station. On the other hand, the FCC mandated that each cable operator in the 100 major markets provide access to his system by the provision of three free channels, one for education, one for governmental use, and a third for "public access," the so-called soapbox channel, which would enable community groups and individual citizens to make their voices heard.

Franchise fees to be paid to the local authorities for the privilege of using public rights-of-way were regulated, since it had been found that local city fathers tended to see cable as a new and lucrative source of revenue. Also, the FCC assumed responsibility for approving all local franchises awarded by the cities to insure that they met federal rules, including minimal technical standards.

This approval process has been less than satisfactory; it has been found, in several cases, that cable operators promised the city technical features and services far beyond what they could or would deliver, in the hope that once the franchise was granted and approved by the FCC, the local system could ask for waivers on grounds ranging from lack of available financing to unreasonable demands from the municipality.

The local franchising process has also been erratic; while some cities made careful studies of telecommunications needs and developed sound plans for growth of their cable systems, others have simply seen the cable system as a source of free services which cable operators were expected to

provide. The revenue obtainable from franchise fees has been a bone of contention, with some cities asking for unreasonable amounts.

On the other hand, the cable industry has been less than responsive to local needs. While origination of local programs was once mandated by the FCC and has been strongly encouraged by organizations and groups throughout the country including the National Cable Television Association, statistics for 1975 showed that only 28 percent of all cable systems offered such services.[9] Cable operators as a group suffer from a "television mentality," seeing their services in terms of improved over-the-air television, perhaps automated news and weather services, and more recently, pay cable. Homeowners connected to the cable system usually pay a one-time installation fee and are assessed a monthly charge for their connection, ranging from $4–$9 per month. Pay cable, where available, assesses additional fees for the privilege of watching first-run movies and national sports events.

The possibilities inherent in "other" services provided over the cable, such as education in an off-campus mode for adults, local events and issues, institutional offerings, and data communications, are not being recognized as a viable means of income by most operators, with some few notable exceptions. Until that attitude is changed, there is little hope that the kinds of cable systems which are responsive to local needs will be developed throughout the nation.

The FCC has been less than helpful in bringing about this change. While its 1972 rules mandated a reasonable set of conditions which would permit the newer uses of cable technology, these rules were virtually rescinded in 1975 and 1976. Deadlines for compliance with FCC rules which had been established were eliminated. Two of the three free access channels were removed from the rules; local origination of programming was also dropped. On the other hand, cable operators with more than 3,500 subscribers are now required to furnish equipment which would allow groups and organizations to produce their own programs. Channel space for such programs must be made available, provided that this space requirement does not exceed present channel capacity of the system.

There have been suggestions that cable be treated as a common carrier. This approach would remove all responsibility for programming from the cable operator and would permit anyone to lease channel space to cablecast his or her own materials. The president's *Report on Cable* suggests such an approach; other organizations have endorsed this concept as well.[10–12] The advantage would be that the cable operator could do what he does best—construct a system which brings in clear signals and provide equipment for others to bring more sophisticated services to the public, based on the demand for such services as perceived by its providers. The problem is that it would be difficult to persuade the operator to install such sophisticated equipment as may be needed for point-to-point data communications, subdistricting, and the like without anyone initially being able to assure him

that the additional income would offset his investment.

It is necessary here to mention another reason for the less-than-rapid growth of cable systems in the United States. Along with most other business ventures, the cable industry suffered from the effects of a declining economy; risk capital became scarce and the rapid growth of systems which was envisioned has not taken place. The spectacular and widely discussed financial and management problems of TelePrompTer, the nation's largest cable operator, have not aided the cable industry in winning the confidence of funders.[13] Moreover, it may be speculated that cable operators' lack of imagination in developing new and commercially viable services (other than pay cable, which has been promoted widely and is experiencing rapid growth) may have been another factor in the reluctance of financing sources to extend credit to cable owners. In addition, the cost of construction has soared, particularly in the major markets, where very large investments are needed merely to construct the basic cable system. Nonetheless, the blame for cable's problems is usually placed with the FCC and its allegiance to the broadcast industry.

CABLE COMMUNICATIONS USE

Cable systems may range from older ventures carrying as few as six to twelve channels to those more recently built having a channel capacity of twenty-six to forty-four channels. Channel capacity is a function of the signal-carrying capacity of the cable itself, but more importantly, of the type of amplification, signal splitting, and signal conversion equipment. While the cable itself is relatively inexpensive, equipment to allow more channels to be carried can be very costly. Thus the reluctance of cable operators to upgrade their systems is explained, at least in part.

Lack of such equipment need not prevent a great many uses of the cable for the community. A prime example of imaginative uses of a relatively old cable system (twelve channels) is in Reading, Pennsylvania. By means of interconnecting various channels at the headend for different applications, the Berks Cable TV System manages to provide channel time for a large group of community users. It also interconnects schools, for example, in what simulates a point-to-point network for interschool use.

The Berks Cable TV System in Reading may very well be *the* outstanding example of how the vision of cable as a *communications* system has been translated into reality. This has been done by the cable operator who firmly believes that financial viability goes hand-in-hand with making his system available to the community. While the uses of Berks Cable have been widely described in the literature, it may be useful to summarize some of the activities.[14]

The Berks Cable TV System carries programming from twenty-seven off-the-air, one microwave, and twelve to fourteen locally produced programming sources—all on twelve channels. Of the 61,000 homes passed by the system, 34,100 or 56 percent are connected to it. The cable system began

local origination programming* as early as 1967 (before the FCC rules went into effect); public access programming* soon replaced it, growing from one-half hour to eight hours per week. Experimentation has ranged from presenting a meeting of the local Ku Klux Klan to the biography of a local black physician. Gradually the pattern changed; access programming in Reading has reached maturity and is basically provided in four different ways: on leased channels, by a group of schools, by public groups, and by governmental agencies. The cable operator himself no longer participates; groups with their own advisory boards are completely responsible for planning, establishing guidelines, content, and production of programs. "The only things we do now are those subjects too hot to handle for any group in the community," states Joe Masciotti, cable system manager.[15]

There are about fifteen points in the cable system's service area from which programs may originate; these origination points can be interconnected in various configurations to reach their intended audience. While no separate channels are available for any specific organization or cause, "blacked-out" time is used for much of the programming; as yet the system has not experienced demands for channel time it could not fulfill.

Personnel of the Berks Cable System is firmly committed to public access; as yet it has no intention to fill up channel space with pay programming as so many other systems have done, believing instead that "resources and people in the community should be deeply involved in cable programming—people make things happen." This attitude has resulted in a large number of subscribers, and indications are that a responsible and enthusiastic cable operator can make a success of public access programming, both for the community and for the fiscal health of his system.

We have described the Berks Cable TV System at some length to lay to rest contentions from most cable operators that services for the public are a financial drain on the system, are impossible to provide without elaborate and expensive equipment, and are not conducive to increasing the number of subscribers. Often lack of interest within a given community is cited as a reason for not providing public services. The Berks cable operator "pushed" these services; he aggressively promoted, encouraged, facilitated, until the community learned the positive gains to be obtained from community-oriented cable services. A period of maturity has now been reached; the cable operator need no longer promote. Cable is an integral part of school, community, and governmental programs, and is being run by well-established groups. There is no intention of ever again doing without its special advantages.

* Local origination programming is that which the cable operator himself undertakes. Public access programming consists of making time available on the system for community groups and individuals to have their say. This may occur on a channel especially set aside (the "Public Access" channel) or on available channel space. The operator has no control over public access programming.

While several other cable systems in the country have shown similar commitment, notably those operated by United Cable Corporation in Tulsa, Oklahoma, Hayward, California, and other cities, and the Manhattan Cable TV Company in New York City, many cable operators look askance at public programming. Only time will convince them that this type of nontelevision programming is profitable and worthwhile; several experiments now being carried out will no doubt contribute to this change.

Manhattan Cable TV cablecasts over 800 hours of public access programming per month on two of its channels especially set aside for such purposes, and is also pioneering in several other areas—it has instituted a service which interconnects the computers of banks and brokerage houses via coaxial cable instead of telephone lines. A careful study by the Bankers Trust Company in which the data transmission capability and reliability of both telephone and coaxial cable were tested in parallel reveals higher reliability and speed of the cable system, as well as lower cost for interface equipment.[16] This application, the use of a commercial cable system for data transmission, is as yet unique to Manhattan Cable; many believe that future applications of cable will lie in this area and are watching Manhattan Cable's experience with interest.

The very high data transmission rate and capability of interconnecting to computers are also being tested by another service, available to all Manhattan Cable's subscribers as of the Fall of 1976.[17] Reuter's, the international news service, has developed a minicomputer-based information retrieval system, which will bring news, theater announcements, traffic reports, shopping tips, and similar listings to cable subscribers. A continuous data stream, traveling at 2.5 million bits per second, is intercepted at the home television set by a small button terminal which selects from an index a part of the computer-stored information. This information can then be viewed on a channel set aside for the Reuter service.

Reuter's plans to market the service nationwide to all cable systems. Time may be leased so that any agency with information of general interest can cablecast it along with the material provided by Reuter's. The implications for libraries are clear; thus far, cable systems have lacked the capability of providing information on demand, a feature needed by libraries which want to appeal to special user groups or information needs.

VIDEO, CABLE, AND LIBRARIES

Three stages of involvement with the cable medium must be differentiated when discussing libraries' activities.

1. If no cable system has been built in a given community, this does not necessarily mean that there can be no activity. Many libraries (particularly public libraries and to a lesser degree academic ones) have engaged in planning and training activities which are designed to prepare themselves and their communities for the arrival of the cable system. Yet others are preparing and acquiring video materials for the

time when cable distribution becomes possible.

2. If a cable system exists it could be one of the older ones, constructed some years ago, with none of the necessary technology built in to allow two-way communication, multiple (and abundant) channels, and free access channels. Nonetheless, libraries in communities with such cable systems actively participate in the use of whatever channel space might be available for the community's use.

   In some cases the library has its own channel or administers one or more channels for city government, public access use, etc., even where the FCC does not require such channels.

3. In newer systems and in those located in one of the 100 major markets,* libraries' involvement ranges from none to active use of one or more channels, administration of one or more channels, and a considerable variety of types of programming.

Accurate data on the number of libraries which are either actually cablecasting or are engaged in planning and training activities prior to such cablecasting are not available. The author attempted, in 1973 and again in 1974, to collect such data by questionnaire, visits, and analysis of the published literature. The data are available as part of a Cable TV Information Packet but are not only incomplete but out of date as well.[18] Later efforts by Kandy Brandt have not elicited complete data either; it is interesting to note, however, that a comparison of the available data shows a considerable increase in library activities (see Table 1).

Because of the incompleteness of the data, the only clear fact emerging from this comparison is that there has indeed been a considerable increase in cable/library activities. The types of programming engaged in are varied indeed; Table 4 presents a tabulation of returns from the Brandt survey.[19] Librarians have, quite reasonably, begun with those activities which they knew best. Children's story hours are one of the most popular public library activities; to tape these as they happen or stage them in a cable studio is relatively easy, and the cablecasts of such offerings are almost always popular. In addition, the tapes or videocassettes of story hours can be played back in the library at the convenience of children who could not attend at the original time. Story hours have been enhanced by the use of visual aids of all kinds; puppets, toys, pictures, and films have been used successfully.

To advertise the library's services is another most popular type of cable programming. The library is thus brought to viewers who might never have used it, and its services are explained—even to those who may know about some of its services but not all. The mounting of educational programs is also relatively easy; the library may use owned or borrowed films,

* "Major television market" or "major market" denotes the specific service zone covered by television stations in a given city or metropolitan area. It is so designated by the FCC and includes the major population centers and 90 percent of the U.S. population.

Table 4. Video/Cable Programming in Libraries

Type of Program	*Number of Libraries*
Information about library service	60
Story hours	58
Educational programs on specific topics	51
Educational programs for specific groups	49
Talk shows/interviews	43
Book reviews	34
In-service training	32
Community events	31
Spot announcements	28
Meetings or conferences	23
Adult education	15
Local news	14
PBS or commercial tapes	13
Children's video club	6
Audience participation shows	5
Video reference club	4
Foreign language programs	4
Unspecified	32

Source: "Over 300 Libraries Engaged in Video/Cable Activities," *CableLibraries* 3, no. 9:1 (Sep. 1975).

videotapes available from elsewhere, local speakers, and visiting celebrities who are experts on a given topic. Slides, pictures, and graphics may be used to advantage; this is particularly useful in subjects where the visual element adds an important dimension, such as art appreciation programs, "how-to" offerings of all kinds, and "hard" subjects requiring formulae or diagrams. Book reviews are, not surprisingly, very popular; these can be improved by visuals and often include interviews with authors.

All of the above programs have one thing in common—they present material which the library either already has or events which are presented routinely within the walls of the library. This type of programming might be called "traditional" although this label is by no means meant to be pejorative. To extend the audience for the library's legitimate offerings is one of the best ways to experiment with the use of the cable system; much experience is gained in this way which can then be utilized to embark on more innovative services. By "innovative" are meant those services which would not be possible at all without use of the video technology and cable as a transmission medium.

One of the more demanding efforts is that of taping community events as they happen and making them available either in the library or over the cable system. These events may range from community ballet programs to zoning board and city council hearings, and from local baseball games to recording visual history by interviewing local citizens with unusual knowledge about local history and/or objects of historical significance which may be displayed along with the interview.

Video reference service is another innovative application. Any tele-

phone reference request which cannot be answered fully in a verbal mode is completed by displaying the desired material under a small camera. The image is then transmitted to the viewer's home on a cable channel set aside for that purpose. Examples of such visual materials are diagrams, maps, pictures, graphs, formulae, and tables. In communities where this type of service has been offered it was found that it was not used very heavily because most questions can be answered over the telephone, but that the overall volume of reference questions increased dramatically because of the publicity given the video reference service.

While much effort has gone into programs which might be considered library-related, a new role for the library has emerged as well—that of community programming facility. A number of libraries have properly perceived cable as a medium for bringing information about community issues to citizens, "live" and in a spontaneous manner. Events are captured as they occur by the individuals or groups most concerned, and are disseminated to others via cable with the library providing equipment, training, and technical know-how. To justify this new role, librarians have had to rethink their definition of "information"—no longer book- or institution-based. "Information" is that event or set of facts which, when combined with previous knowledge, results in learning, in new knowledge. The librarian's province is *all* information, no matter what form and no matter how conveyed. Thus the librarian finds himself in a role very different from previous ones. Not only does he acquire, store, and disseminate information, but he is also involved in creating it. This may be either as the originator of material or the facilitator who causes others to create material.

Thus we find librarians who have equipped studios and acquired portable video equipment, have trained citizens and groups to use this equipment, and have provided technical expertise. They have then offered the library as a depository and dissemination point. In many cases this activity has occurred in communities which do not yet have a cable system; viewing is library-based. In other cases, the library became the intermediary between the community and the cable system, sometimes merely obtaining time on the system, sometimes operating a cable channel.

In some cities governmental agencies which become interested in the use of the local cable system for dissemination of health, welfare, and other vital information to the citizens turn to the library as the municipal agency politically most neutral and also most expert in media use to administer the governmental cable channel. In other cities the library is responsible for all public access activities, providing training, facilities, and scheduling.

In every case the library stands to gain from such activities. The community, not usually aware of the library as much more than a book-dispensing agency, perceives it in a new role—that of information intermediary. The library gains visibility among those citizens and agencies with whom it works in cable programming and credibility with those who

recognize its expertise in the video/cable area. Library personnel are in touch with many more groups and individuals than before and thus can broaden their base of community support.

Another advantage is that of increased interagency cooperation. Public libraries have worked with consortia of educational institutions, community colleges, public access groups, civic groups of all kinds, and governmental agencies. Sharing of resources and expertise takes place, agencies and groups learn about each other, and strong alliances are formed. These alliances can have financial consequences as well; often funding is forthcoming for video and cable activities for libraries where such funds might not have been available for the more traditional library services.

NEW USES FOR CABLE IN LIBRARIES

While video/cable activities in libraries have been many and varied, they may be characterized as being in their infancy. Librarians are just beginning to realize the possibilities inherent in the medium. Much video programming which is cablecast is still much "like television."

The real promise of cable has yet to be realized by most librarians. When the cable itself is considered as a broad information-carrying highway, rather than a carrier of television, it can be used to disseminate information responsive to those needs presently not met satisfactorily by most libraries. Several information needs may be identified:

1. *Survival or "daily coping" information.* Every person has a need to find answers to daily living problems. These may range from social service-type information for citizens who cannot find their way through the maze of agencies set up to help them and who often do not even perceive their problems as amenable to information solutions, to those problems arising from unfamiliar surroundings and new situations confronting people (Where to find a physician? How to find a repair person who is reliable? Which airlines offer excursion fares? What permits are needed to remodel a basement?).
2. *Leisure time activities and informal learning.* Questions may arise concerning local events (What's playing at the movies? Which Bicentennial events are offered this week?) and opportunities for learning new skills (Where to go for a brush-up course in French? Which garage provides mechanic's training and tools for laypersons?). Listings of lectures, films, and written materials on a given topic are examples of the types of information needs adults may have for self-fulfillment. While information is usually available somewhere on most of these topics, it is rarely brought together in one place and in a form usable for most people.
3. *Formal learning.* At a time when economic necessity and technological obsolescence cause frequent job changes, many people have need for additional training to upgrade job skills or to change directions altogether. Rarely if ever is there a community-wide directory of

adult education offerings with adequate description of content, admission requirements, tuition, and the like. Opportunities may be missed by not knowing of these offerings, and money may be wasted on inappropriate courses. Moreover, most formal learning opportunities still require people to travel to a given location. Cable television offers the opportunity for disseminating information about courses as well as offering the courses themselves over the cable.

4. *Job-related information needs.* Continuous upgrading of skills is required in most work situations merely to stay abreast of technical and other developments. Librarians have traditionally served this need by providing reference services, abstracts and indexes, and access to the journal literature. The computer plays a growing role in information retrieval, and machine-readable data bases are becoming increasingly important accessories in this information activity. Current awareness services and SDI keep technical people abreast of recent developments. Most of these activities require people to visit the library, requiring travel time and considerable effort.

The four types of information needs have only partially been met by librarians up to now. Cable offers vastly expanded opportunities for each.

Information on daily coping, or information and referral, has only recently been recognized by librarians as a legitimate library activity.[20] I&R as presently provided by nonlibrary agencies has technical and political problems. Technical problems arise from a lack of recognition that the *organization* of information for retrieval is of paramount importance. Much attention has been paid to the referral aspect of this activity, relatively little to the organization of the information data base. When libraries have performed this function they have tended to organize the information along traditional library lines, using a card file and subject headings. Because the file is dynamic (people and agencies change) and requires multiple access points, the skills acquired by librarians in organizing machine-readable files are badly needed. As yet, we know of few applications of these skills to I&R services.[21, 22]

If the file is organized properly, one of its access points would be by problem encountered (e.g., "husband has left, what services are available to me and my children?") as well as by other considerations. If the file were organized in this fashion, it would be well suited for dissemination over the cable system. A problem would be stated (oral as well as written announcements would be desirable, perhaps in multiple languages), and a listing of agencies could follow which would partially or fully help solve the problem, with limitations on usage clearly stated. This kind of dissemination would reach people where they are, via a medium with which they are familiar. They would not need to go to agencies, stand in line, be subjected to varying levels of treatment, nor would they need to be referred from one agency to another.

Were the file computer-based, it could be made available even more suc-

cessfully, by employing a retrieval service such as Reuter's, mentioned previously. The small fee required for the button terminal could perhaps be paid for by welfare funds or food stamps so that cost would be no barrier to obtaining such services.

We strongly believe that this type of information service is one of the most promising for cable, allowing the widest possible distribution of information vitally important to almost everyone. To reach this level of information service, public librarians would need to acquire skills somewhat different from those they now possess. Extensive knowledge of indexing techniques and thorough understanding of computer-based information retrieval would be needed. However, the results would probably be rewarding. A need presently only minimally met by most agencies could be offered by the presumably best equipped agency. The agency would then be able to serve a far wider population group than it presently serves, one which pays for library services without greatly benefiting from them at the present time.

Leisure-time and informal learning needs have been met reasonably well by the public library for those people who know about the library's services. These services can be extended to a far larger population group via cable. Announcements of library-based services as well as directories of leisure and learning opportunities elsewhere can become a most important part of the library's activities. Visual reinforcement of printed announcements (photographs, slides, and videotapes) can stimulate demand for events. These same events can be videotaped and brought via cable to those people who could not attend.

Similarly, educational offerings can be announced, reinforced by visual presentations, and taped for later playback. Students could make their own videotapes as they discover a new area of interest, and these "process" tapes could serve to stimulate others who may be hesitant to embark on a learning program.

In all these activities the public library would act as an organizer of information and a clearinghouse. It would draw its raw material from community resources and would, in the process, discover what and where these are. Sharing would undoubtedly become more widespread and scarce resources would go much farther than they do now. Cooperation with other types of libraries with more specialized resources would become mandatory.

Because cable systems are local in nature they would serve well for the dissemination of information in a given city or metropolitan area, provided the cable system were so constructed as to serve the entire area. Should the two-way capability be activated, interlibrary and interagency communication of information could be vastly enhanced.

However, libraries have long recognized that local self-sufficiency is not possible and have engaged in networking over distance. If cable is to serve as the local distribution system for all types of information, it becomes

necessary to interconnect local cable systems to insure that sharing can take place over distance as well.

CONCLUSION

There is no technical reason why the activities described above cannot be performed; at present, cable systems are already interconnected to receive pay cable programming, utilizing satellite communications. The problem lies in the regulatory structure which does not encourage local franchising authorities to consider interconnection with neighboring cable systems. We have detailed some of the reasons why cable operators themselves do not perceive nontelevision applications of cable to be viable at present; cities are equally shortsighted in not seeing cable as a communications medium for sharing resources. Much work remains to be done by librarians and others to bring about the upgrading of cable systems and the regulatory framework, on the federal as well as state and local level, to encourage such interconnection.

Should libraries engage in cable technology, they would substantially contribute to the development of far more responsive information services than those which exist today—responsive to special user groups with specialized information needs. This development would be in keeping with the overall development of a national program for library and information services whose goal it is to serve all the people with all types of information.

Before this can happen, librarians along with other groups will need to increase their efforts to participate actively in the shaping of their local cable systems, as well as in the design of the regulatory structure which can either inhibit or enhance the growth of cable communications. They will need to continue to explore newer uses of cable as well as acquire the necessary skills to permit this. Too, funding sources will have to be found to permit some experimentation with new uses of cable so that the activities described speculatively above may be tested in an operational environment. We believe that cable can be a means of reaching a far larger constituency with specialized services, a means for sharing of scarce resources, and a technology through which support may be gained for libraries from people who have not in the past known about or supported them.

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An Improved Title Word Search Key for Large Catalog Files

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The title discrimination performance of the 3,1,1,1 title search key was tested on MARC monograph record files ranging in size from 30,000 to over 500,000 records. A new title search code, 4,2,2,2 with modifications, was tested with the same range of file sizes and found to provide significant improvements in performance. Data were also obtained from full title searching to find the upper limit of performance that is possible with title word search keys.

INTRODUCTION

Most of the information retrieval systems such as DIALOG, ORBIT, BASIS, and MEDLINE, comprised of data bases from the abstracting and indexing services, provide a capability to search on author names or title words in addition to subject term searching. This title word searching capability is very helpful for the file user, but is relatively expensive to provide and maintain. With the exception of BALLOTS and several other systems, few of the computer-based systems working with conventional library catalog records provide any title word searching capability.

The lack of a title word searching capability in a particular system is usually due to economics or local machine limitations. For title word searching, a very large index of title words (half a million or more words for some files) must be built and maintained as a machine file, usually in some form of direct access device such as disk storage. As the number of titles in the on-line machine-readable cataloging data bases increases, so does the volume of direct access space needed to store the bibliographic records and associated indexes. This procedure is a very expensive proposition, especially if files are to be made available for on-line searching. The present high cost of building and maintaining such machine indexes has led to the compromise approach of building indexes that correspond to search codes derived from the title words, or from combined author and title words. Such search codes give some title searching capability, but with considerable savings in file space and costs.

Because a search code is a form of text compaction, the truncated search

key is naturally less specific than the whole text it represents. The problem for the index designers is how to produce a truncated search key which is as specific as possible while being easy to manipulate by the people who have to use it.

Title word searching and search codes are of interest both for batch and on-line searching. The batch searching of catalog data bases is often done for on-demand catalog card production systems in which catalog card sets or catalogers' worksheets are printed from the file in response to a search for the catalog information for a given title. A similar process is sometimes followed for the search and copy operations that are part of an effort to convert an existing catalog card file into machine language form (i.e., a retrospective catalog conversion). Retrospective conversions are often done by searching a data base for a match with a given title (at least for those records that do not have a Library of Congress card number), and copying out one or more machine records for that title. On-line searching of titles in catalog files is most often seen with on-line catalogs such as the installations at IBM-Los Gatos or Ohio State University, or with the on-line cataloging support systems such as OCLC or BALLOTS.

Much work has already been done on the design and evaluation of author and title indexes based on truncated search keys which are sufficiently distinct to be useful in on-line, interactive cataloging support systems.[1–4] Although one theoretical work has suggested that the degree of distinctness of any search key index will deteriorate as the collection increases in size, very little experimental data have been reported regarding the performance of such search keys for large files.[5]

This paper specifically reports, over a large range of file sizes, the behavior of one such truncated search key, the 3,1,1,1 truncated title search code developed by the Ohio College Library Center (OCLC). This code was chosen by OCLC as one that could be used efficiently by a large number of people in an on-line cataloging environment.

OBJECTIVES

The objectives of our effort were to:

1. Evaluate the performance of the OCLC 3,1,1,1 search code, in terms of its precision of retrieval, particularly with a large file.
2. Develop and test other search codes that were a potential improvement over the 3,1,1,1 code.

METHOD

As a test data base, the authors used the complete LC MARC monograph data base (over 500,000 records at the time of this study). We were concerned only with title word searching. Computer programs were written to take each title and subtitle in the file and create a corresponding 3,1,1,1 search key. For this, the first three characters of the first word and the first character of each of the next three title words were used if available.

Initial articles A, An, and The were to be ignored. No other publication information such as edition, volume, or date or place of publication were included as part of the search code. With various subsections of the file, a count was made of the total number of unique search keys generated. This count was always less than the total number of records in that subsection because some different titles generated the same search keys.

Tabulations were also made, using the full MARC file, of the number of records retrieved for each search key, and a frequency distribution was compiled to show how often a single search key retrieved N citations. Search codes and associated titles that were found to generate a large number of retrievals were examined closely to see what changes would improve the performance of those codes. A new search code was formulated on the basis of this analysis, and subjected to the same testing and data analysis as the 3,1,1,1 code.

FINDINGS

Ideal Search Key

In the ideal case each title would lead to a unique search key, so that when that key was used only the corresponding title record would be retrieved from the file. In this case, N titles would yield N unique search keys, each of which retrieved only its corresponding title. Actual performance is of course less than this ideal.

3,1,1,1 Search Key

The results of the statistical analysis of the degree of title discrimination of the 3,1,1,1 search key are given in Table 1 and plotted in Figure 1, as tested on various file sizes from 29,919 to 543,332 records. The percentages in Table 1 were computed on the basis of the total number of records in the file. No allowance was made for the records that had no titles because the blank title count was not available for all the file sizes. However, since the number of blank titles is relatively small and would change the percentages by less than 1 percent, it was felt to be more appropriate to be consistent and to treat all of the percentage computations in the same way (i.e., on the basis of the total record count). The percentages for the full title search key are more correctly figured on the basis of the total title records. The data clearly show a degradation in performance as the search key is used with larger files. In fact, the 540,215 title records in the complete file generated only 332,507 different search keys instead of the 540,215 keys which would have been derived in the ideal case. This result corresponds to a consolidation to 61.6 percent of the number of titles in the file. The percentage computation is used in this report as one of the measures of the degree of discrimination, distinctness, or reduction associated with each search code and file size. One data point reported previously for the 3,1,1,1 code by OCLC is included in

Table 1. Results of Tests of Search Keys

Data Base	*Number of Title Records in Data Base*	*Number of Unique Keys Generated With This Search Key*		
		3,1,1,1 Key	*4,2,2,2 Key*	*Full Title*
Partition I (Feb 1974)	29,919	27,014 (90.3%)	28,673 (95.8%)	
Partition I (Jul 1975)	36,526*	32,963 (90.2%)	35,316 (96.7%)	35,866 (98.9%)
OCLC File	135,938	115,623 (85.1%)		
Partition A (Feb 1974)	152,835	119,070 (77.9%)	141,005 (92.3%)	
Partition B (Feb 1974)	190,509	141,168 (74.1%)	173,278 (91.0%)	
Partition B (Jul 1975)	238,778†	170,303 (71.3%)	211,749 (88.7%)	227,582 (95.8%)
Partition A (Jul 1975)	268,028‡	192,725 (71.9%)	240,957 (89.9%)	257,931 (96.8%)
Complete File (Feb 1974)	373,263	245,627 (65.8%)	323,653 (86.7%)	
Complete File (Jul 1975)	543,332§	332,507 (61.2%)	455,421 (83.8%)	508,388 (94.1%)

* Includes 276 blank titles.
† Includes 1,196 blank titles.
‡ Includes 1,645 blank titles.
§ Includes 3,117 blank titles.

the tables and figure for reference purposes.[6] Because the OCLC data were obtained from a different collection of titles, even though the file sizes are about the same, one would expect slightly different results.

The frequency distribution information for the 3,1,1,1 key is given in Table 2 and plotted in Figure 2. For the full file, approximately 46 percent of the titles were represented by a unique search key, that is, 248,089 of the 540,215 title records generated a search key that was not generated by any other record. However, over 60,000 (11.2 percent) of the titles were consolidated into groups of ten titles or more that responded to the same search key. Thus there is a high probability that any given search code will retrieve multiple records—an inconvenience for the searcher. A total of twenty-three codes (e.g., PRO, , ,) all retrieved more than 100 records each. The extreme case was an instance in which 297 titles were retrieved by the same search key (AGR,C,A,B); in this case a search for any one of these titles would have retrieved all 297 titles that were of the form "Agricultural Commodities, Agreement Between the United States of America and . . ."

An examination of the search failures (i.e., the multiple responses to the same search key) showed that many of the failures were due to the frequent use of some common words in the titles, such as:

Proceedings of . . .
Introduction to . . .
Buying a . . .

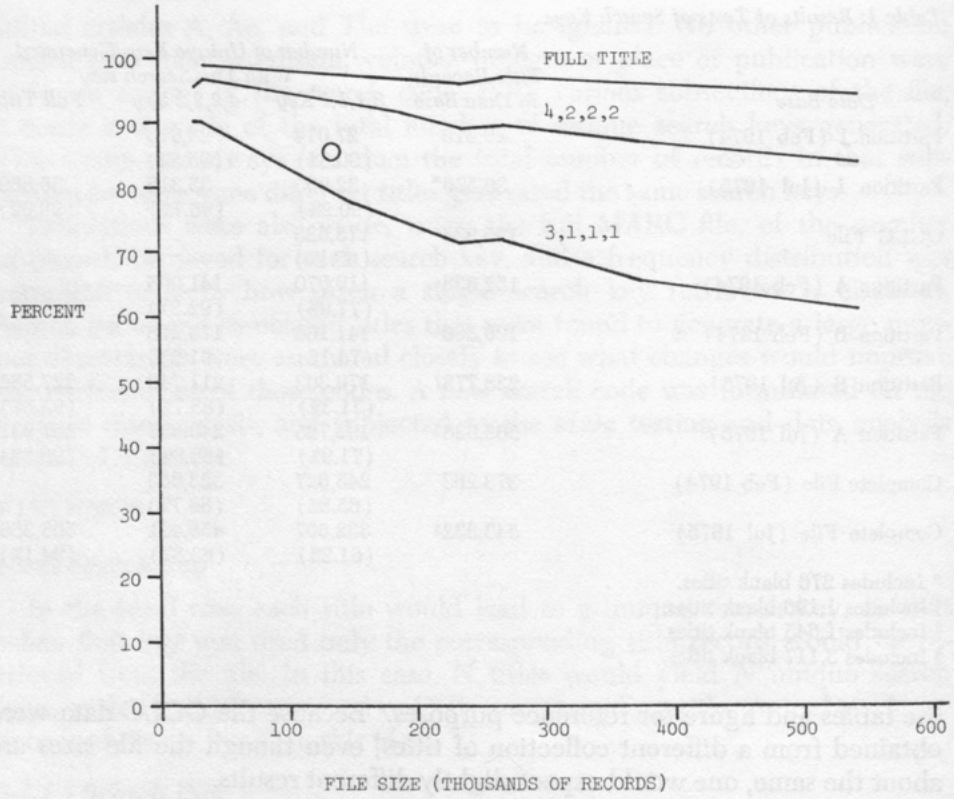

Fig. 1. Search Code Uniqueness as a Function of File Size.

where the connecting words were so common that they lost much of their power of discrimination. For this reason, it was proposed that our new search key would exclude some of these words in its formulation, just as the 3,1,1,1 code now excludes the initial articles A, An, and The. The list of twenty-one words we initially chose to be ignored were those listed below:

A	AS	FOR	IN	OF	OR	WHAT
AN	AT	FROM	INTO	ON	THE	WHERE
AND	BY	HOW	IT	ONTO	TO	WITH

These words were chosen intuitively and seemed to work satisfactorily, but could have been chosen more analytically, as noted later.

4,2,2,2 Search Key

Our new search key was a modification of the 3,1,1,1 key. It takes the first four characters of the first title word, and then the first two characters of each of the next three title words. All of the twenty-one common words shown above are ignored in the formulation of the search key, no matter where they occur in the title.

Table 2. Extent of Title Code Uniqueness for Various Search Codes (cont'd)

Number of Records With the Same Search Code	*Number of Occurrences in File of 540,215 MARC Title Records*		
	3,1,1,1 Code	*4,2,2,2 Code*	*Full Title Code*
1 (unique)	248,089	403,284	484,788
2	49,006	39,340	20,545
3	15,655	7,103	1,991
4	7,119	2,515	484
5	3,793	1,153	215
6	2,324	627	117
7	1,426	380	77
8	1,068	253	49
9	733	172	24
10	580	124	26
11	388	116	10
12	351	73	3
13	272	61	16
14	220	42	7
15	196	32	1
16	134	26	4
17	124	19	7
18	108	28	4
19	75	15	2
20	87	10	1
21	69	16	1
22	67	10	3
23	47	10	1
24	37	11	3
25	41	7	
26	32	11	
27	36	8	1
28	36	6	
29	26	4	
30	25	6	
31	22	5	1
32	23	4	
33	13	5	
34	19	3	
35	12	3	1
36	15	6	
37	16	2	
38	21		
39	17	1	1
40	6		
41	7	1	
42	5	1	
43	7		
44	7	1	
45	8	2	
46	4		
47	4		
48	9	1	
49	7	1	
50	4	2	
51	5		
52	4		
53	5		

Table 2. Extent of Title Code Uniqueness for Various Search Codes

Number of Records With the Same Search Code	*Number of Occurrences in File of 540,215 MARC Title Records*		
	3,1,1,1 Code	*4,2,2,2 Code*	*Full Title Code*
54	6		
55	4	1	
56	6		
57	5	1	
58	5		
59	1		
60	1		
61	2	1	
63	2		
64	2		
65	4		
66	1	1	
67	5		
68	1		
69	1		
70	1	1	
71	3	1	
72	2		
73	4		
74	1		
75	1	1	1
76	1		
77	1		
78	5		
79	3		
82	2	2	
84	1		
86	1		
87	1		
89	2		1
90	2		
92	1		
97	1		
99	1		
100		1	
102	1		
104	1		
106	1		
109	2		
112	2		
123	1		
127	1		1
145	2		
146		1	
151	1		
152		1	
153	1		
158	2		
164		1	
177	1		
181	1		
184		1	
187	1		
More than 200	5	3	2

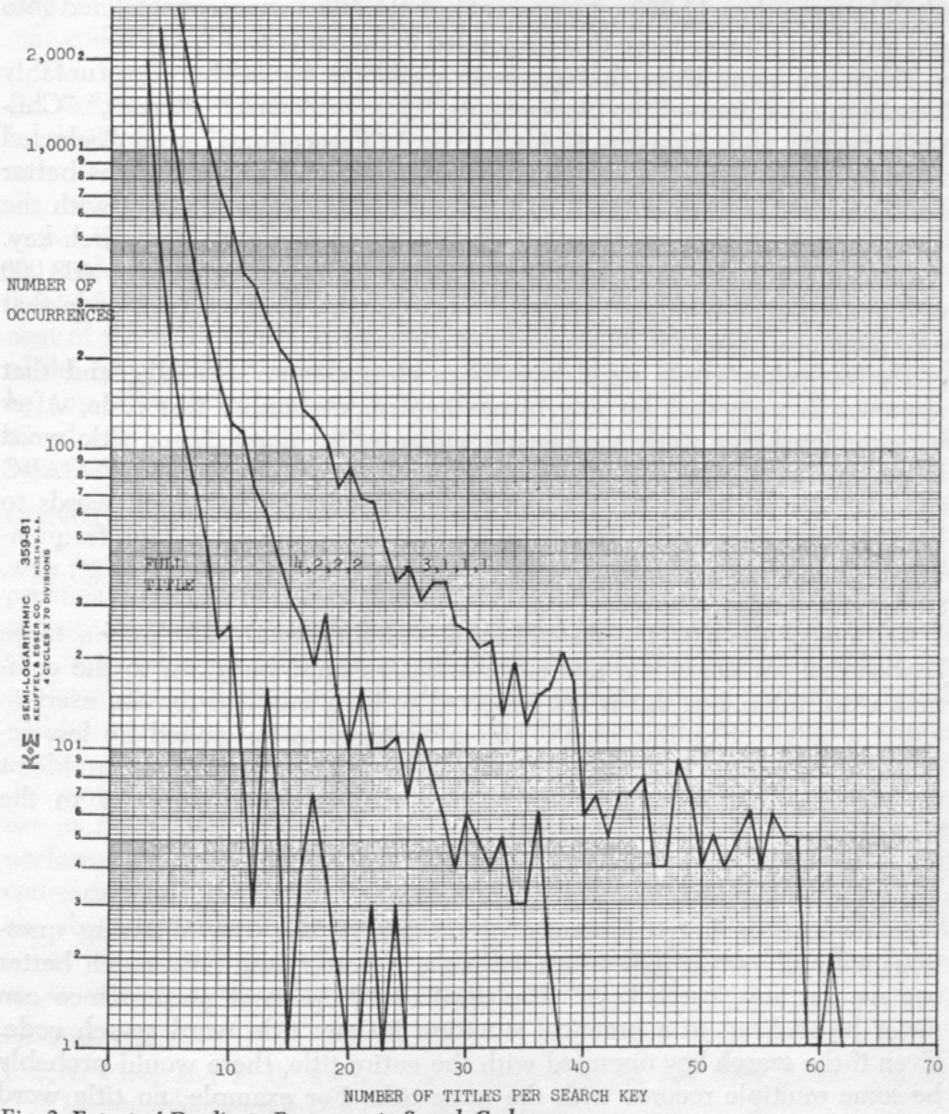

Fig. 2. Extent of Duplicate Responses to Search Codes.

The results of testing this new key on the various file sizes are given in Table 1 and illustrated in Figure 1. It can be seen that this new code also degrades in performance as the file gets larger, but does provide significantly better title discrimination than the 3,1,1,1 key, for any file size.

A frequency distribution of the number of titles corresponding to one of the 4,2,2,2 codes, or N codes, is given in Table 2 and illustrated in Figure 2. For the full file, approximately 75 percent of the titles were represented by a unique search key; that is, 403,284 of the 540,215 title records generated a search key that was not generated by any other record.

Slightly more than 11,000 (2.1 percent) of the titles were consolidated into groups of ten titles or more that responded to the same search key.

There are some titles that generate problems for both codes, notably "Agricultural Commodities Agreement . . . ," "Poems," "Report," "Chilton's Repair and Tune-up Guide . . . ," "Proceedings," and "Selected Poems"; however the frequency distribution for the 4,2,2,2 code is better for the user than that of the 3,1,1,1 code. That is, fewer searches with the 4,2,2,2 code will generate long lists of titles that respond to the search key. Note that for the same large file the 4,2,2,2 code generates over 403,000 codes that point to a single record, in comparison to the 3,1,1,1 code that only generates about 248,000 codes to single records.

The exclusion words could have been chosen more carefully, and that approach is suggested for any future implementation of this code. After we completed this study we became aware of an unpublished title word frequency list that had been prepared from a sample of 200,000 LC MARC records.[7] We reviewed the list and found most of our exclusion words to be high frequency words. However, we also saw many other high frequency words that should be considered for inclusion in such a table (e.g., new, study, first, guide).

The use of the 4,2,2,2 code will require slightly more information to be keyboarded for searching, and some attention must be given to the common word table, but this is not expected to be a problem for the users in either a batch or on-line mode. The advantages to be gained by less redundant output are believed to greatly outweigh any extra input problems for the user and provide a performance that is clearly superior to the 3,1,1,1 code.

The Upper Limit on Search Code Performance

In evaluating the performance of the 4,2,2,2 key, the following questions naturally arose: "How can we make it better, and how much better can we get any search key?" The ideal of 100 percent performance can never be realized in a practical situation by any title word search code. Even if the search key operated with the entire title, there would probably be some multiple records with the same title. For example, no title word search key can distinguish among the scores of different records in this file with the title "Poems," or the many different records with the title "Report." And of course no title search code can discriminate among the records that have no titles. (Over 2,000 records in the MARC data base do not have titles.) The only way to obtain the necessary additional discriminating power would be to incorporate some other data elements such as author, edition, or publication data into the search code.

We were interested in determining the upper actual limit—an empirical or practical limit, rather than an ideal limit—that could be obtained with a title word search key. This limit would be the best possible actual performance that could be achieved with any search key and would be our

target objective against which we could compare the performance of specific codes.

The upper performance limit was obtained by using the full titles as the search keys and determining the total number of search keys generated by this process. The data are given in Table 1 and plotted in Figure 1. Not only do the data provide an empirical measure of the "packing factor" or degree of consolidation of title records, but they also provide an empirical upper limit or standard against which future tests of other codes should be made. Data on the degree of duplication of search codes are given in Table 2 and Figure 2. Note that for the full file, approximately 90 percent of the titles were represented by a unique search key. That is, 484,788 of the 540,215 title records generated a search key that was not generated by any other record. About 3,500 (0.6 percent) of the titles were consolidated into groups of ten titles or more that responded to the same search key. Only three of the titles retrieved more than 100 records.

CONCLUSION

A review of the performance of the 4,2,2,2 key in the context of this practical upper limit shows that the new 4,2,2,2 key not only provides consistently better performance than the 3,1,1,1 key for any file size, but it is also very close to the maximum performance that could possibly be achieved by searching only on title words. Additional improvements could still be made, including the addition of other words to the exclusion table as noted earlier. The lengthening of the code segments would also improve the performance, but might not be worth the extra keyboarding effort in use or the added index disk storage requirement. Both codes degrade in performance as the file size gets larger. In the end the performance of the codes depends largely on the actual titles in the collection. Consequently, the absolute value of the code performance may be different for different collections of title records; however, their relative performance should be approximately as described in this report.

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System to Manage Reserve Texts (SMART)

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SMART is a batch processing system developed at Eastern Illinois University to handle technical processing of the reserve materials. Using punched card input, the system generates all necessary catalogs and reports for use of the reserve collection. In operation since 1973, SMART has proved that it can do what it was designed to do with efficiency and effectiveness.

BACKGROUND

There seem to be relatively few computerized reserve processing systems in operation today. Fasana, Gallivan, Simmons, and Weyhrauch have reported the reserve materials processing activities at their respective institutions.[1–4] A review of these systems indicated to us that none of them would meet our specific requirements and a decision was made to develop a computerized catalog processing system to meet our local requirements.

Eastern Illinois University is a medium-sized state-supported university with an enrollment of approximately 8,000 students. The university employs about 700 faculty members and offers graduate and undergraduate programs in a variety of subject fields. The university library has some 325,000 volumes in its collection as of June 30, 1974. The Self-Study Materials Center (SMC) of the university library houses all reserve materials as well as other self-instruction hardware and software. During a given semester some 3,500 to 4,000 items are placed on reserve. These items include books, periodicals, microforms, and audio-visual materials. Reserve items may come from any of three sources—the university library, the textbook library, or from the individual faculty members' personal collections.

Prior to computerization, a card catalog was used to provide access to the reserve collection. The catalog was organized by course name and number, and a card was filed for each title on reserve behind the appropriate course number. Another card catalog, kept behind the reserve desk, contained shelflist, circulation, author and title cards for all items on reserve. In addition, a textbook library and personal copies file was maintained for all textbooks and instructor-owned materials on reserve. Whenever an item

was placed on reserve, five or six catalog cards had to be typed and placed in the appropriate card file. The reserve card catalog was cumbersome to use. Students who wished to check out materials on reserve were forced to wait in line to use the catalog, and reserve desk personnel had to come from behind the reserve desk to the card catalog to assist students in locating reserve items. Shelfreading was difficult, as the reserve clerk had to read the shelves while referring to a card file, and a change in the status of a reserve item required the pulling and retyping of as many as six different cards. Also, it was difficult to make instructors aware, on a regular basis, of the items being held on reserve for their courses. Over the years the reserve collection accumulated a great deal of unused and outdated materials. Without the benefit of careful and regular shelfreading and verification, the reserve card catalog contained many mistakes.

Several factors led to the computerization of the reserve operation. Effective in fall 1973, Eastern Illinois University changed from a quarter to a semester system. One of the results of this changeover was the renumbering of all university courses. The existing reserve card catalog, therefore, had to be modified to reflect the new course numbers. Another factor that affected reserve catalog automation was the increase in AV materials utilization. In 1973, the university received a special grant to purchase AV hardware and software suitable for individualized instruction. The new AV collection was combined with the reserve collection to form the Self-Study Materials Center (SMC) in the university library. Since many AV materials began to be used for reserve purposes, there was a substantial processing increase in order to maintain the reserve catalog. This processing increase and the change to a semester system, along with the many defects apparent in the traditional reserve card catalog, resulted in the automation of the reserve catalog.

SYSTEM DESIGN

The System to Manage Reserve Texts (SMART) was designed with the following objectives in mind:

1. To shift the reserve catalog processing load as much as possible from clerical personnel to the computer;
2. To provide multiple access points to the reserve catalog;
3. To have the capability to identify for faculty, on a periodic basis, the materials on reserve for their classes and the status of these materials;
4. To generate reserve statistics, such as the number of AV materials on reserve, the number of items on reserve for a given instructor, etc.

SMART Files

SMART was designed to take full advantage of existing machine-readable data bases, such as the university personnel record file from which

SMART accesses the instructor's name and address as needed to generate various SMART reports.

SMART MASTER is an indexed sequential file, created for the exclusive use of SMART. This file resides on an IBM 2314 disk pack and occupies about ten cylinders. SMART MASTER is available to the SMART system in a random access mode; it is updated on a daily basis during the first two or three weeks of each semester to incorporate all new reserve materials and about twice a week or as needed thereafter. This file contains about 5,500–6,000 records per semester. Each record in the file is eighty characters long. The records are punched onto an 80-column card and then added to the disk file. All records in the file contain the following data fields:

FIELDS	EXPLANATION
O.S. Control	Operating System Control byte to indicate the status of the record.
Call number	
Copy number	
Author	
Title	
Owner	Textbook library, personal copy, etc.
Term	Reserve term: fall, spring, summer, or permanent.
Year	Last digit of the year of the reserve term for nonpermanent reserve materials.
Department	Code to identify the academic department for which item is on reserve.
Course number	Number of course for which item is on reserve.
Reserve type	Period for which item is circulated—two hour, three day, etc.
Instructor ID	Social security number of the instructor. This field allows SMART to access instructor's name, address, etc., as needed from university personnel file.
Entry Indicator	Type of entry: main entry, shelflist, cross-reference. A cross-reference is coded for each item on reserve for more than one course.
Control number	System control number to identify each record to add, change, and delete as needed.

The record layout was specifically designed to keep all alphanumeric character fields at the beginning of the record and all numeric character fields toward the end of the record. This technique simplifies coding, keypunching and, to some extent, editing.

Hardware

No new computing hardware was acquired to support SMART. Rather, the existing facilities of the Eastern Illinois University Computer Center were used. Eastern Illinois University's computing system configuration at

the time of SMART implementation is outlined below:

1 IBM S/360 model 50 CPU with 252 K fast core and 1000 K slow core
2 IBM 2314 disk storage facilities
3 IBM 2400 tape drives
1 IBM 1403 line printer
1 IBM 2540 card read/punch

Software

Seventeen PL/1 programs were written to support SMART. Each program was written to perform a specific task such as adding records to the file or sorting records into a given sequence. All programs are in the form of OS load modules and reside in a private system library named SMARTLIB. There are four cataloged job control language (JCL) procedures written for the system. The reserve clerk activates one of these procedures by submitting the appropriate EXEC card, and the procedure in turn invokes the programs from SMARTLIB necessary to process the request. For example, ISDSMART is the name of the most frequently used procedure. When activated, this procedure invokes all necessary programs to update the SMART master file, to sort and print multiple copies of the reserve public class list, reserve shelflist, reserve author catalog, and reserve title catalog. The use of cataloged procedures obviates the need for large card decks and potential errors in the handling of such decks. The cataloged procedures were designed to test for certain conditions before a step is scheduled for execution. The conditions to be tested may be issued by a preceding job step or may be supplied by the reserve clerk through the PARM option of the EXEC statement. This condition testing saves the machine time by bypassing the execution of steps not needed for a given job run. Further, the SMART programs are designed in such a way as to internally generate all necessary variables such as printout headings or date of printout in order to eliminate the possibility of human error in feeding such data into the computer. The programs were coded in a modular fashion so that as new needs become apparent the programs can be linked in a sequence suitable to accommodate the new requirement. The core storage requirements of the SMART programs range from 16 K to 128 K bytes.

COSTS

One of the main advantages of SMART is its economic viability. It was designed to use only existing computer and personnel resources. No new equipment or personnel were acquired to support the system.

One Time Costs

System design and programming costs (labor)	$1,500.00
Program testing (machine)	650.00

Recurring Costs

Operating costs (labor—keypunch and clerical)	$360.00 monthly (approximately)
Punched cards assignable to SMART	$30.00 yearly (approximately)
Costs of all computer resources used by SMART	$3,156.46 (for FY75)

Throughout the development of SMART, a close watch was kept on the development costs. A record of system designer and programmer time, clerical time, and keypunch time devoted to SMART was kept in order to arrive at an accurate estimation of costs. Salary, costs associated with fringe benefits, and institutional overhead were also included in computing the labor costs.

OPERATION

At the onset of a new semester, reserve requests are received from faculty members. After locating the desired books, periodicals, or AV materials, each item is coded and an IBM card is punched by the library's data processing department. The reserve items are labeled and shelved, and appropriate IBM cards are submitted with the SMART update program. This program generates several public class lists in which reserve items are conveniently listed by department name, course number, and instructor's name. Copies of the public class lists are placed in strategic locations throughout the library as well as at the reserve desk. The update program also generates a listing of reserve items by call number, by author, and by title. These listings are kept at the reserve desk for the use of reserve personnel. The shelflist, in which reserve items are listed by call number, is used by reserve personnel to shelfread the reserve collection, to verify reserve requests, and to determine at a glance the status of any given item on active reserve or in the inactive collection. The author and title lists aid in locating an item held at the reserve desk. The original IBM cards submitted with the program are returned and filed for later use such as changing the status of a reserve record from active to inactive and vice versa. Since the reserve clerk need only code one line for each reserve item, and since programs submitted to the computer center are returned the next day, the public class list is easily kept up to date. Materials requested for reserve can be on the shelves and listed in the public class reserve catalog in a matter of days. At the beginning of a semester when most new reserve items are requested, reserve catalogs are printed on a daily basis. Throughout the semester, the update program is submitted whenever additions to the reserve collection are made, items are removed from reserve, or changes in the status of a reserve item (i.e., circulation time, course number, instructor's name) are needed. No recoding is necessary in order to delete an item from the reserve catalog, to activate an item held previously in the inactive reserve collection, or to change the status of an item

on reserve. The reserve clerk simply pulls the appropriate IBM card from the file, indicates what changes are necessary, delivers it to the data processing department for punching, and submits corrected cards with the SMART update program. In this way changes in reserve listings can be effected with minimal time and effort.

Programs other than SMART update are used throughout the semester to meet a variety of needs. A program has been designed to delete and another to activate quantities of reserve entries so that individual IBM cards need not be changed and repunched. There is a program to deactivate all nonpermanent reserve entries at the end of the semester and one to duplicate the entire IBM card file. By submitting the appropriate programs contained in the SMART system, the reserve clerk can generate active and inactive reserve listings. With another program, faculty checklists in which items on active reserve are listed by faculty members can also be generated. The reserve clerk receives two copies of each checklist. One copy is retained in the reserve files for an accurate listing by instructor of materials on reserve, and the other copy is sent to the appropriate faculty member. Aside from a listing of materials on reserve, these checklists contain information helpful to the reserve clerk, such as faculty member's campus address and phone number. The reserve clerk may also insert a variable message into the program that prints out at the top of each checklist. At midsemester, faculty members are directed to notify the reserve desk for any changes in status of items on reserve or additions needed. At the end of a semester, these faculty checklists are used to remind faculty members that materials on nonpermanent reserve will be removed from reserve unless the reserve desk is notified otherwise. Faculty members may retain checklists for their personal use or use them to submit changes or new requests for reserve materials. Faculty checklists greatly simplify record keeping and aid in the transition from semester to semester. Because faculty members are kept well informed of their individual holdings, the reserve collection is kept accurate and free of an accumulation of unwanted items. At the end of each semester, the SMART master file for that semester is transferred to a tape as an historical file for future research use.

CONCLUSION

The computerization of reserves has, in a variety of ways, benefitted both library patrons and personnel assigned to the SMC desk.

Advantages to the library:

(a) Chores associated with the maintenance of a traditional card catalog have been eliminated.

(b) Since SMART periodically informs each faculty member what is on reserve for his particular classes, he can request the library to remove from reserve status items no longer needed. This enables the library to utilize rather limited space allocated to the re-

serve collection more efficiently by keeping only currently needed items on reserve.

(c) Placement of extra copies of reserve printouts at the public catalog and at the reference desk obviate the need for flagging reserve items in the public catalog.

(d) The SMC personnel no longer need to leave the desk to help patrons in using the card catalog. They can aid the patrons from the desk with the printouts kept at the desk.

Advantages to instructors:

(a) Each instructor periodically receives a checklist of items on reserve for his classes to insure that the items he has requested have been placed on reserve.

(b) Instructors also receive notices informing them when to place items on reserve for the next semester and what they have on reserve for the current semester.

(c) Some instructors take old copies of reserve printouts to their offices to see what their colleagues have on reserve and to make any desired changes in the light of new information.

Advantages to students:

(a) Students no longer need to wait in line to consult the card catalog during rush hours.

(b) Instructor's name along with the course number in the printout seems to be helping students to find materials easily.

Data cumulated in the historical file can be used to establish reserve patterns (how many instructors place materials on reserve? how long does an item stay on reserve? what is the frequency with which the instructors change items on reserve?).

With two years of operational experience SMART has proved to be efficient and effective.

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Patron Appraisal of Computer-Aided On-Line Bibliographic Retrieval Services

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The results of a patron assessment of computer-aided on-line bibliographic retrieval services in the Marriott Library at the University of Utah are analyzed and discussed. Cost effectiveness of on-line searching and data base use frequencies and patterns are also briefly discussed.

INTRODUCTION

As the scientific and technical research "information explosion" continues at almost exponential rates, bibliographic abstracting and indexing services, e.g., Chemical Abstracts Service, are having to use computers to organize and process this mass of information in order to keep their bibliographic services timely. This computer processing of information results in machine-readable files or tapes of bibliographic information contained in the printed abstract and index journals.[1-3] A recent and rapidly growing phenomenon is the commercial reprogramming and marketing of these files or data bases in an interactive on-line format for use on a computer terminal by libraries and other organizations.[4-6] Serious researchers are using these commercial services for a considerable part of their searching of research literature.[7-9] The two best known of the commercial bibliographic search services are Lockheed Information Systems' DIALOG search service (hereafter referred to as Lockheed) and System Development Corporation's ORBIT search service (hereafter referred to as SDC). These services cater primarily to serious researchers in the pure sciences and technology, the social and behavioral sciences, and in business and industry.

As traditional centers for the storage and retrieval of research literature, academic libraries are obvious places for providing on-line bibliographic search services.[10, 11] Progressive academic libraries are now making machine-readable data bases a vital part of their reference and information services.[12, 13] The Association of Research Libraries has recently prepared a handbook to guide academic libraries in establishing these services.[14]

ON-LINE BIBLIOGRAPHIC RETRIEVAL IN THE UNIVERSITY OF UTAH MARRIOTT LIBRARY

The J. Willard Marriott Library (main library) at the University of Utah introduced the Lockheed DIALOG search service in November 1973 on a trial basis. A Texas Instruments Silent 700 terminal was leased and placed in a small enclosed faculty study carrel. Full service for patrons began in January 1974. In March 1974, the Marriott Library applied to the University of Utah Office of Research Administration for a grant to subsidize the first year's service in order to attract users and to promote the service. A $16,000 grant was received for the period from March 1974 through June 1975. Free trial searches were offered to key researchers on campus, and special notices and fliers were printed and sent all over campus.[15] The service was announced in the campus newspaper and in other media.

Use by patrons was limited primarily to researchers in education and psychology initially. Researchers in science and engineering tried the National Technical Information Service (NTIS) and the *Engineering Index* (COMPENDEX) data bases, but were primarily interested in seeing *Chemical Abstracts* available on-line. *Chemical Abstracts Condensates* (CAC) from 1972 was put on-line in May 1974 by Lockheed and from 1970 by SDC (SDC's CAC data base is called CHEMCON). The Marriott Library added SDC's search service in June 1974, at which time use of on-line services by science faculty and researchers picked up dramatically. The availability of CAC was apparently the main reason for this increase. Overall response to on-line bibliographic search services by patrons was immediately favorable and often enthusiastic, as it was in other universities offering these services.

In March 1975 a Data Base Usage Committee was named, reporting to the associate director of libraries, to study user reaction to this new service and to make recommendations about future directions and organization of the service. One of this committee's first jobs was to do a patron survey (Figure 1) for the purpose of writing a proposal for further subsidy from the Office of Research Administration. In addition to this survey, the committee also studied data base use frequency patterns (Tables 1 and 2) and searcher or librarian reaction to on-line services. When the Lockheed system first went on-line in November 1973, there were eight data bases available for searching. There are now forty-eight data bases available between the Lockheed and SDC systems. From the modest beginning of performing about one search per workday in January 1974, the service has grown in popularity to the point that in June 1976, the Marriott Library was performing six to seven searches per working day (a search is defined as one run in one data base for a single patron). This is an increase of about 650 percent in two and a half years.

UNIVERSITY OF UTAH LIBRARIES
COMPUTERIZED BIBLIOGRAPHIC SEARCH APPRAISAL

We are attempting to monitor user satisfaction with and demand for the Marriott Library's computer-aided bibliographic search service as a measure of whether to increase prices and continue or discontinue the service. Please check off the items on this questionnaire at your convenience and return to: Ryan E. Hoover, 161 Marriott Library, University of Utah, Salt Lake City, UT 84112.

1. NAME (Optional): ..... 2. DATE: .....
3. DEPARTMENT or ORGANIZATION: .....
4. USER CATEGORY (Please check): FACULTY ..... DOCTORAL STUDENT ..... MASTERS STUDENT ..... UNDERGRADUATE ..... PROFESSIONAL RESEARCHER ..... OTHER .... (Please specify)
5. How did you learn about this service? (Please check): LIBRARIAN ..... COLLEAGUE (Word-of-mouth) ..... LIBRARY ANNOUNCEMENT ..... CAMPUS NEWSPAPER ..... OTHER ..... (Please specify)
6. How many times have you used this service? (Please check): ONCE ....., TWICE ..... THREE TIMES ..... FOUR TIMES ..... FIVE OR MORE TIMES .....
7. DATA BASES USED (Please specify): .....
8. Please check the approximate percentage range in which you think the citations from your search were RELEVANT to your research topic:
   0-20% ..... 20-40% ..... 40-60% ..... 60-80% ..... 80-100%.....
   YES (Please specify topic): ..... NO .....
9. Do you think this service is a worthwhile adjunct to more traditional library services? (Please check): YES..... NO ..... NOT SURE .....
10. Would you be interested in periodic update searches on your research topic? (Please check): YES ..... NO ..... NOT SURE .....
11. Would you like to see additional data bases made available? (Please specify):
12a. Would you continue to use this service at an increased cost of $5.00 (instead of $3.00) per data base for 20 minutes and 5¢ per citation or 10¢ per abstract? (Please check):
   YES ..... NO ..... NOT SURE ..... (Reasons?)
12b. Would you continue to use this service at $1.50 per minute and 10¢ per citation or 15¢ per abstract? (Please check):
   YES ..... NO ..... NOT SURE ..... (Reasons?)
13. Additional comments, suggestions or complaints regarding any aspect of the present search service:

Fig. 1. User (Patron) Survey Questionnaire on the Bibliographic On-Line Search Service at the University of Utah Marriott Library.

PRESENT SEARCH SERVICE OPERATION

At present, a user wishing to do an on-line bibliographic search contacts a trained subject reference librarian (searcher) in one of three reference divisions of the Marriott Library—Science and Engineering, Social and Behavioral Sciences, or Government Documents. After determining with the aid of the librarian whether or not the research topic is suitable for an on-line search, the patron fills out a search request form (Figure 2) and discusses the search topic in detail with the librarian. Together they determine which data bases are to be searched and what keywords or other

Table 1. Frequency and Length of Use on On-Line Bibliographic Data Bases, July 1975–June 1976, at the University of Utah Marriott Library

Data Base	*Number of Searches**	*Average Minutes per Search**	*Percentage of Total*
CAC	254	7.47	18
ERIC	341	14.03	25
NTIS	120	6.30	9
PSYCH ABS	227	11.45	16
Other	447	6.58	32
TOTAL	1389	9.17	100

* A search is defined as one run in a single data base for a single patron.

Table 2. Frequency of Patron Presence While Search Is Run by Librarian/Searcher for Fifty Searches, July 1975–June 1976, at the University of Utah Marriott Library

Data Base	*Patron Present*	*Patron Absent*	*Total Searches*
CAC	12	38	50
ERIC	49	1	50
NTIS	18	32	50
PSYCH ABS	48	2	50

parameters will be used. They then develop a search strategy based on those parameters. The searcher schedules a time for the terminal session. As in most university libraries, the librarian/searcher (sometimes called the "search intermediary") is the only person who uses the computer terminal.[16] The patron may choose to be present or absent during the on-line session depending on the nature of the search topic, the number of times he or she has used the service, and his or her confidence in the subject and searching expertise of the librarian/searcher (Table 2). During the on-line session, the searcher displays a few sample citations to determine the relevance of the search strategy. If citations do not appear to be relevant, the search parameters are reformulated until a relevant citation set is retrieved or it is determined that no relevant citations on the search topic exist in the data base(s) chosen. When the patron and/or searcher are satisfied that the relevant citation set has been retrieved, the searcher requests an off-line printout of the citations through the "print" command. If the patron is in a hurry for citations, they may be printed on-line if he or she is willing to pay for the on-line time. Total turn-around time for an off-line printout to be mailed to the library is from three to five days. The patron usually pays for the search upon receipt of the printout.

The Marriott Library passes on most of the on-line search costs to the patron or user as do most educational institutions using commercial on-line services. The Marriott Library uses a combination of fixed and variable charges in setting patron prices for on-line searches. A small percentage of educational institutions uses this cost recovery method—most use strictly a variable charge. As with the majority of academic libraries, the Marriott Library attempts to recover most of the costs of offering the service—about 90 percent. At the time the user survey was conducted in

UNIVERSITY OF UTAH LIBRARIES

MARRIOTT LIBRARY **Computer-aided Literature Search** REQUEST FORM

Science & Engineering, 581-7533 - Social & Behavioral Sciences, 581-7702 - Documents, 581-8394

NAME (Person using bibliography):	___UofU Regular student ___UofU Faculty / staff ___UofU Continuing ed.	___Associate or Friend ___UCLC Institution ___Other
DEPARTMENT, ORGANIZATION, AGENCY or COMPANY:		DATE:
ADDRESS (Campus or other):		PHONE:
REQUEST SUBMITTED BY (If other than above):	MAXIMUM COST desired:	PHONE (If different):
CHARGE TO CAMPUS ACCOUNT NO:	PAYMENT TO BE BY: ____CHECK ____CASH	PRINTED BIBLIOGRAPHY TO BE: ____PICKED UP ____MAILED

SEARCH TITLE or SEARCH TOPIC. List all relevant subject terms, keywords, synonyms, formulas, acronyms, etc. which are essential to the search topic. Also list limiting or restrictive conditions such as languages, terms or other parameters NOT to be included, e.g.,"English only."

CONTINUE ON OTHER SIDE IF NECESSARY CONTINUE ON OTHER SIDE IF NECESSARY

DATA BASES TO BE SEARCHED:		
Science & Engineering:	___METADEX (Metals Abstracts)	___DISSERTATIONS Abstracts
___BIOSIS (Biological Abst.)	___METEOROLOGICAL Abstracts	___ERIC (Educational Research)
___CAIN (Agriculture Index)	___NTIS (Govt.tech.reports)	___FOUNDATIONS/GRANTS Index
___CHEMCON (Chem.Abst.'72-)	___OCEANIC Abstracts	___LIBCON (LC Books,monographs)
___CHEM7071 (Ch.Abs.'70-'71-)	___POLLUTION Abstracts	___PATS (Predicasts market abs)
___CLAIMS (Chem.engr.patents)	___SCISEARCH (Sci.Cit.Index)	___P/E NEWS (Petroleum busines)
___COMPENDEX (Engineering)	___SSIE (Smithsonian science)	___PSYCHOLOGICAL Abstracts
___DISSERTATIONS Abstracts	___TULSA (Energy Abstracts)	___SOC SCISEARCH (Social sci.)
___GEO-REF (Geology, earth)	Social & Behavioral Sciences:	___SSIE (Smithsonian research)
___INSPEC/E (Electronics)	___ABI/INFORM (Business,mgt.)	Documents - Federal Govt. Info.:
___INSPEC/P (Physics Abst.)	___AIM/ARM (Vocational educ.)	___ASI (American Statistical)
___ISMEC (Mechanical engr.)	___CEC (Exception.Child.Abs.)	___CIS (Congressional Info.)
	___CIN (Chem. Industry Notes)	___NTIS (Govt.research reports)

**** FOR LIBRARY USE ONLY ****

____Data bases @ $5.00	$_____	____Citations @ 20¢	$_____
____Data bases @ $15.00	_____	____Citations @ 25¢	_____
____Data bases @ $20.00	_____	____Minutes @ $1.50	_____
____Citations @ 10¢	_____	____Minutes @ $2.00	_____
____Citations @ 15¢	_____	____	_____

____DIALOG ____SDC ORBIT	TOTAL SEARCH LENGTH or TIME:	TOTAL SEARCH COST:
PAYMENT RECEIVED (Date):	PAYMENT MADE BY: ___CHECK ___CASH ___CAMPUS ORDER NO:_____	
SEARCH COMPLETED (Date):	PRINTOUT RECEIVED (Date):	SEARCHER:

Fig. 2. University of Utah Marriott Library Patron On-Line Bibliographic Search Request Form.

April–May 1975, the library was using the price schedule shown in Figure 3: $3 per data base for twenty minutes on-line time and 5¢ per citation printed and 10¢ per citation with abstract printed for the university user community. This fee schedule was used in conjunction with the university subsidy. In April 1975, prices were increased (Figure 4) to $5 per data base for fifteen minutes on-line time and 10¢ per citation printed off-line and 15¢ per citation printed on-line for university users. Off-campus users holding a $10 per year library use permit are charged $15 per data base for fifteen minutes or $1.50 per minute, whichever is less; 15¢ per off-line citation and 20¢ per on-line citation. Off-campus users without a library permit are charged at higher than cost to encourage purchase of the $10 library permit so that the library has some control over the occasional patron who reneges on search printout pickup and payment. A study is presently underway to determine exactly how much of actual cost the library is recovering under the current fee schedule.

PATRON APPRAISAL SURVEY

In April–May 1975, the Marriott Library Data Base Usage Committee did a survey of patrons (end-users) of on-line bibliographic services using the questionnaire shown in Figure 1. Of seventy questionnaires given out

UNIVERSITY OF UTAH LIBRARIES
COMPUTER-AIDED BIBLIOGRAPHIC SEARCH
PRICES

Under the present University-subsidized bibliographic literature search service, the Marriott Library charges the following for computer-aided searches:

FOR UNIVERSITY OF UTAH USERS:
$3.00 per data base for 20 minutes.
.05 per citation printed.
.10 per abstract printed.
FOR ALL OTHER USERS:
$1.00 per minute computer time.
.10 per citation printed.
.15 per abstract printed.
(Prices subject to change without notice)

Fig. 3. On-Line Bibliographic Search Service Charges, Nov. 1973–April 1975, at the University of Utah Marriott Library.

only twenty-six were returned. Although this sample population of twenty-six is small and no hard conclusions can be drawn, the results indicate the general overall pattern of use and are interesting. Tables 3–6 show the results of the survey. The item numbers in the left-hand columns of tables 3–6 correspond to questions 4–12 on the survey questionnaire.

Tables 3 and 4 show the results of questions 4–8. Item 4, "user category," indicates that most users of on-line services are faculty and doctoral students, i.e., serious researchers, as expected. The next largest single group is professional researchers on campus or in government and industry. Oth-

UNIVERSITY OF UTAH LIBRARIES
COMPUTER SEARCH PRICES

Computer-aided literature search costs are based on the number of data bases searched, the number of references or citations printed, and the length of time spent on-line with the computer. Users will be charged depending on their category as follows:

A. REGULAR UNIVERSITY OF UTAH STUDENTS, FACULTY & STAFF WITH CURRENT PHOTO I.D. CARD
   - $ 5.00 per data base for 15 minutes each base, or $1.50 per minute, whichever is less. $1.50 each additional minute over first 15 minutes.
   - $ .10 per citation printed off-line, to be mailed.
   - $ .15 per citation printed on-line in the library.

B. UNIVERSITY OF UTAH CONTINUING EDUCATION STUDENTS WITH CURRENT FEE RECEIPT—STUDENTS, FACULTY & STAFF OF UCLC INSTITUTIONS—LIBRARY ASSOCIATES (BUSINESS, INDUSTRY, GOVERNMENT) WITH CURRENT LIBRARY PERMIT—FRIENDS OF THE LIBRARY WITH I.D. CARD
   - $15.00 per data base for 15 minutes each base, or $1.50 per minute, whichever is less. $1.50 each additional minute over first 15 minutes.
   - $ .15 per citation printed off-line, to be mailed.
   - $ .20 per citation printed on-line in the library.

C. ALL OTHER USERS
   - $20.00 per data base for 15 minutes each base, or $2.00 per minute, whichever is less. $2.00 each additional minute over first 15 minutes.
   - $ .20 per citation printed off-line, to be mailed.
   - $ .25 per citation printed on-line in the library.

Prices are subject to change at any time.

Form #187/1M/3-76

Fig. 4. On-Line Bibliographic Search Service Prices, April 1976–Present, at the University of Utah Marriott Library.

er studies show a similar pattern of primary users.[17] Question 5, "how did you learn about this service?" suggests that the best publicity for on-line services was by word-of-mouth, either by librarians or by faculty and student colleagues, and that the next most successful method was by library announcements and fliers. This latter method was the most successful for professional researchers on campus, whereas word-of-mouth was most successful for faculty and doctoral students (Table 4). Among faculty, free initial searches were successful in getting faculty to use the service. Live demonstrations are also very effective in attracting new patrons to on-line services but the Marriott Library does not use this method except for one or two persons at a time because of the small quarters for the terminal.

Of the seventeen people using the service for the first time, the four faculty members were given free initial searches and two of the three faculty members using the system twice were also given free initial searches (Tables 3 and 4, item 6). The data bases most often used by the survey group (Tables 3 and 4, item 7) in the order of decreasing frequency were ERIC (Educational Resources Information Center), CAC, PSYCH ABS (*Psychological Abstracts*), and NTIS. In many institutions, CAC and NTIS are the most heavily used scientific bases, and the overall frequencies for the four bases mentioned above recurred in a later Marriott Library frequency of use study (Table 1).[18] CAC is by far the largest and most comprehensive scientific data base (over 1.5 million citations) and NTIS cov-

Table 3. Survey of Twenty-Six Patrons (End-Users) of On-Line Bibliographic Search Service at the University of Utah Marriott Library, April–May 1975. Responses to Items 4–8 on Survey Questionnaire (Figure 1)

Questionnaire Item Number	*Number and Percentage of Responses*				
4. User category (n = 27)*	Faculty 10 36%	Doctoral Student 9 33%	Masters Student 2 8%	Undergrad Student 2 8%	Professional Researcher 4 15%
5. How was service discovered? (n = 31)*	Librarian 10 32%	Colleague 10 32%	Library Fliers 7 23%	Campus News Media 2 6%	Other 3 9%
6. How many times used? (n = 26)	Once 17 64%	Twice 3 12%	Three Times 2 8%	Four Times 1 4%	Five or More Times 3 12%
7. Data bases used (n = 54)*	CHEM ABS CON 9 17%	ERIC 10 19%	NTIS 5 9%	PSYCH ABS 8 15%	Other 22 40%
8. Percent of relevant citations (n = 26)	0–20 5 19%	20–40 3 12%	40–60 4 15%	60–80 8 31%	80–100 6 23%

* For these questions, respondents checked more than one item.

ers scientific and technical reports sponsored by government subsidy and not often reported in other bibliographic sources. Education, psychology, and educational psychology are large research areas at the University of Utah, and this is reflected in the heavy use of the ERIC and PSYCH ABS data bases.

Item 8 (Tables 3 and 4) was intended to show in a very general way the success of searches done by the sample population. The results were not meant to be substantive or quantitative. It is interesting that the largest group (31 percent) and next largest group (23 percent) felt that their searches were 60–80 percent and 80–100 percent successful, respectively. Of these two groups, faculty searchers indicated the highest success, possibly suggesting that they knew most precisely the topics they wanted to search. Nineteen percent, again mostly faculty, thought that their searches were only 0–20 percent relevant. Further analysis revealed that four of the five patrons (two faculty and two doctoral students) in this latter group were doing research on original topics and were reasonably confident that there was no published literature on their topics. In this regard, these searches were successful even though no citations were retrieved. The one other respondent in this group concluded that no literature on his topic was included in the available data bases—something he suspected when he began the search. The remaining respondents in the 20–40 percent and 40–60 percent groups were doing searches in ERIC or

Table 4. Responses by Patron Category to Items 5–8 on Patron Survey of On-Line Bibliographic Search Service, University of Utah Marriott Library, April–May 1975 (n = 27)[*]

Questionnaire Item Number	*Number of Responses By Patron Category*				
	Faculty (n = 10)	Doctoral Student (n = 9)	Masters Student (n = 2)	Undergrad Student (n = 2)	Professional Researcher (n = 4)
5. How was service discovered?					
Librarian	6	2	1	0	1
Colleague	1	4	1	3	1
Library Flier	1	1	0	1	4
Campus Media	2	0	0	0	0
Other	0	2	0	1	0
6. How many times used?					
Once	4	6	1	2	0
Twice	3	0	0	0	0
Three Times	0	2	0	0	0
Four Times	0	1	0	0	0
Five or More	2	0	1	0	0
7. Which data bases used?					
CAC	5	2	1	0	1
ERIC	3	4	1	2	0
NTIS	2	1	1	0	1
PSYCH ABS	3	4	0	1	0
Other	11	2	3	1	5
8. Percentage relevant citations					
0–20	3	2	0	0	0
20–40	0	1	1	1	0
40–60	1	2	0	0	1
60–80	2	2	1	1	2
80–100	3	2	0	0	1

[*] There were twenty-six respondents, but one checked himself as both faculty and a doctoral student.

PSYCH ABS and possibly either did not have a clear concept of their search topics or felt that the terminology of their topics was too broad or "fuzzy" to precisely define the topics.

Tables 5 and 6 show the results of questions 9–12 on the user survey. All twenty-six respondents (100 percent) thought that on-line bibliographic services in the library were worthwhile and useful (item 9). This has been an almost universal response of serious users of on-line services nationwide. When aked if periodic update (SDI) searches on their search topics were desired (item 10), all nine of the faculty respondents and three of the four professional researcher respondents said "yes," indicating that these two groups of patrons are most likely to do on-going research on a topic. Four of the nine doctoral students said "yes" to this question, two said "no," and three were "not sure." Most doctoral students are doing one time research on a dissertation topic, but the "yes" and "not sure" re-

sponses indicate that some expect to continue research after finishing their dissertation. The single master's student and single professional researcher who checked "not sure" to this question possibly felt that they may at some time wish an update on their topics but that at the time of the survey were primarily interested in a retrospective search only. Of the twenty-six respondents to item 11, eighteen (69 percent) desired additional data bases. Among the coverage desired, BIOSIS, materials science, bioengineering, and SSIE (Smithsonian Science Information Exchange) were high on the list. SSIE was available at the time of the survey and other data bases (BIOSIS included) have since appeared to satisfy some of this desired coverage. The other 31 percent of respondents thought that data base coverage was sufficient for their search topics. Again, the results seem to indicate that the serious researchers (i.e., faculty, doctoral students, and professional researchers) most wanted additional data base coverage. One of the doctoral student responses was "I'm not sure what you mean [by this question]" which was interpreted as a "no" response.

The most controversial question on the survey form regards the cost of the service (Tables 5 and 6, item 12), as was expected. Cost or price is always an area of concern for consumers of any product or service. Since the original purpose of the patron survey was to show a need for continued subsidy of on-line services by the university, particular attention was paid to the responses to questions 12a and 12b. At the time of the survey, the Marriott Library was using the fee schedule shown in Figure 3. This was a very lenient price structure subsidized by the university and giving members of the university community a 40–50 percent cost subsidy.

The responses to question 12a in Tables 5 and 6 indicate that 81 percent of users would continue using the on-line services at an increased price of $5 per data base (instead of $3) for twenty minutes on-line. Eight of nine faculty respondents, six of nine doctoral students, and all four professional researchers said that they would continue using the service at this price. One faculty member and three doctoral students said they were not sure if they would use it again at this price, indicating that they might. None of these two groups said flatly that they would not use the service again at this price. The responses to question 12b were a different story, however. When asked if they would continue use of the service at $1.50 per minute on-line and at 10¢ per citation and 15¢ per abstract (versus 5¢ and 10¢, respectively), only 46 percent of all respondents said "yes," 27 percent said "no," and 27 percent were "not sure." As in the previous question, the majority of faculty and professional researchers (seven of nine and three of four, respectively) said they would still use the service. Only one doctoral student said he would continue use at this price whereas five said that they would not. Two faculty, three doctoral students, and one professional researcher said they were not sure, again indicating that they might use the service again at $1.50 per minute. The results of this portion of the survey

Table 5. Survey of Twenty-Six Patrons of On-Line Bibliographic Seach Service at the University of Utah Marriott Library, April–May 1975. Responses to Items 9–12 on survey questionnaire (Figure 1)

Questionnaire Item Number	*Number and Percentage of Responses*		
	Yes	No	Not Sure
9. Is service worthwhile?	26 100%	0	0
10. Are search updates desired?	18 69%	2 8%	6 23%
11. Additional data bases desired?	18 69%	8 31%	—
12a. Continue use @ $5.00/20 min.?	21 81%	1 4%	4 15%
12b. Continue use @ $1.50/min. and 10¢/citation?	12 46%	7 27%	7 27%

*Table 6. Responses by Patron Category to Items 9–12 on Patron Survey of On-Line Bibliographic Search Service, University of Utah Marriott Library, April–May 1975 (n = 27)**

Questionnaire Item Number	*Number of Responses by Patron Category*				
	Faculty (n = 10)	Doctoral Student (n = 9)	Masters Student (n = 2)	Undergrad Student (n = 2)	Professional Researcher (n = 4)
9. Is service worthwhile?					
Yes	10	9	2	2	4
No	0	0	0	0	0
Not Sure	0	0	0	0	0
10. Are search updates desired?					
Yes	10	4	1	0	3
No	0	2	0	2	0
Not Sure	0	3	1	0	1
11. Additional data bases desired?					
Yes	8	6	1	1	3
No	2	3	1	1	1
12a. Continue use @ $5.00/20 min.?					
Yes	8	6	1	1	4
No	0	0	1	0	0
Not Sure	2	3	0	1	0
12b. Continue use @ $1.50/min. and 10¢/citation?					
Yes	7	1	0	0	3
No	0	5	1	2	0
Not Sure	3	3	1	0	1

* There were twenty-six respondents, but one checked himself as both faculty and a doctoral student.

indicate that faculty and professional researchers have "unlimited" or substantial outside funds to support their research, whereas students usually have limited funds for costly projects related to their studies. Fifty per-

cent of the master's and undergraduate students polled said they would not use the service at $1.50 per minute and 50 percent said that they were not sure. This is in contrast to 50 percent of this same group who said they would continue use at $5.00 for twenty minutes.

Subsequent to this survey, the Marriott Library implemented a new fee schedule (Figure 4) which was a compromise between the prices queried in items 12a and 12b in the survey. This present fee schedule gives the university community a 10–15 percent subsidy and charges off-campus users (a minority of patrons) at full cost or slightly above cost. The library recovers an estimated 90 percent of costs under the present schedule. Even under the higher price structure, use by all classes of patrons has consistently increased, a fair indication of the value placed on on-line bibliographic services by users. There was no noticeable drop in use of the service when the new higher prices went into effect at the Marriott Library.

Where libraries began on-line services with a period of free or very low cost searches and later began to charge higher prices, use has usually dropped quite noticeably whereas when higher fees have existed from the inception of on-line service, use has typically not decreased noticeably when fees have increased slightly to meet increased costs.[19] Student user groups have usually shown the greatest decline in use when fees have been increased greatly or have been initiated after a free trial period. Faculty and research staff with access to outside funds have usually continued to use on-line services as expected, even at higher costs.

The unanimous opinion among the polled users that on-line bibliographic services are indeed worthwhile and the majority opinion that these services would be used even at increased prices are interpreted to mean that the *speed* with which a bibliography can be compiled is the primary reason for enthusiasm for the service. This is a subjective judgment borne out by solicited and unsolicited comments frequently made by patrons. It is difficult for many new users to comprehend that it is now possible to sort among many thousands of concepts to retrieve a desired set of literature citations from a store of more than a million documents (in the case of CAC) in a matter of a few moments. More often than not, there is an expression of amazement if not outright disbelief when patrons are first exposed to an interactive on-line search firsthand. Rapid retrieval of citations is what makes on-line bibliographic retrieval so cost-effective for most users. At the University of Florida, sixty-eight respondents to a search appraisal questionnaire estimated that the library saved agricultural researchers alone 172.75 hours per week or 8,983 man-hours per year by making the National Agricultural Library's CAIN on-line data base available.[20] Gross monetary benefits were estimated to be $56,000 per year in research time saved.

At the Lockheed California-Company Library, sixty-six searches done on the Lockheed on-line system were compared with forty-eight manual searches by the library staff.[21] The average cost of the manual search was

$250 for twenty-two hours of searching and typing versus $47 for forty-five minutes on-line including communications and off-line print costs. At the National Oceanic and Atmospheric Administration's Environmental Research Laboratories (NOAA/ERL) Library in Boulder, Colorado, searches on six topics were done manually and on-line.[22] One hundred six man-hours spent on the manual searches retrieved 622 citations while fifteen hours spent on the on-line searches retrieved 2,234 citations on the same topics. It is not known how many of the citations retrieved were entirely relevant to the search topics. Studies done on the use of the *Chemical Abstracts Condensates* (CAC) on-line data base vs. printed subject and chemical compound indexes of *Chemical Abstracts* indicate that the computer search usually retrieves as many or more relevant citations in much less time than a manual search, is therefore more cost-effective, and provides for greater patron satisfaction because of the very short turnaround time.[23, 24]

As a further example of the cost-effectiveness of computer-aided on-line bibliographic searching, the Marriott Library's Science and Engineering Division staff annually prepares a bibliography of Utah geology for the Utah Geological and Mineralogical Survey (Table 7). Since 1974, when the American Geological Institute's GEOREF data base became available from SDC, these bibliographic searches have been done on-line. Table 7 shows the savings in time and cost by doing the bibliography on-line as compared to manual preparation prior to 1974. Total cost for this search at 1976 personnel and computer search costs is estimated at $61.04 for the manual search and $42.50 for the on-line search.

Table 7. Cost Comparison Between Manual and On-Line Search in Geology Literature for Annual Bibliography on Utah Geology Prepared by the University of Utah Marriott Library

Search	*Preparation Time*	*Preparation Costs*			*Total Cost*
		Bibliographer		*Typist*	
Manual Search	12 hours	8 hours @ $6.38/hour		4 hours @ $2.50/hour	$61.04
		Searcher	*Computer Time*	*Citations*	
On-Line Search	1 hour	1 hour @ $6.38/hr.	15 minutes @ $1.50/min.	90 off-line @ 20¢/cit.	$43.69

ON-LINE USE PATTERNS

Since the patron survey, a study of on-line use frequencies and patterns was done. A record of the numbers of searches done between July 1, 1975 and June 30, 1976 was analyzed for data base use frequencies. The results show the same relative frequencies of usage among the four most heavily-used data bases as were ascertained from the original patron survey (Table 3). ERIC, CAC, PSYCH ABS, and NTIS, in order of decreasing frequency, continue to be the most used bases. The average on-line lengths of searches in these four data bases were determined; the average lengths of

searches in ERIC and PSYCH ABS were almost twice the average lengths of searches in CAC and NTIS, respectively. At first it was thought that the extra length of searches in ERIC and PSYCH ABS might possibly be due to less precise or less complete preparation of searching strategies by patrons and searchers of these data bases. This was ruled out upon examination of search strategies, however.

One reason for the longer time spent on-line in ERIC searches is that all ERIC searches at the Marriott Library are done in the Lockheed system, which uses ERIC as the default file (the least expensive file), meaning that all logging in and search starting is done in the ERIC data base, regardless of the data base intended for use. This "begin" or log-in time was found to be negligible, however, and did not significantly affect the overall length of ERIC searches. Another reason, believed to be a major one, is that the language or terminology in education and psychology is "fuzzier" or less specific and precise than the language in pure science and technology. In chemistry, for example, searches in CAC are often done on a specific chemical compound or compounds or on a specific process which is precisely named, while in education or psychology, it is often unclear which terms precisely identify a search topic. As a result, there tends to be much more on-line revision of search strategies and parameters in ERIC and PSYCH ABS than in CAC or NTIS. An analysis of patron presence while the librarian runs the on-line search tends to substantiate this observation. Table 2 shows the number of times the patron or user was present during fifty searches in each of the four most-used data bases. The searcher or librarian alone did a greater portion of the searches in CAC and NTIS, whereas the patron was almost always present during an ERIC or PSYCH ABS search. When a patron is present, there tends to be more on-line manipulation of terminology regardless of the data base(s) used and the fact that patrons are usually present for ERIC and PSYCH ABS searches seems to indicate that patrons, librarians, or both are less sure about the specificity of terminology in these data bases than are patrons and librarians in searching CAC or NTIS. Comments by patrons and searchers in both areas tend to lend support to this assumption.

CONCLUSION

The results of a survey of patrons of on-line bibliographic retrieval services at the University of Utah Marriott Library indicate that patrons think on-line services are very worthwhile, that faculty and graduate students, particularly at the doctoral level, are the heaviest users of on-line services, that patrons most often learned about the service by word-of-mouth, that they are willing to pay for the considerable amount of time saved, that CAC *(Chemical Abstracts Condensates)*, ERIC (Educational Resources Information Center), NTIS (National Technical Information Service), and PSYCH ABS *(Psychological Abstracts)* are the most heavily-

used data bases, and that patrons with outside funding sources are most likely to continue using on-line services at higher prices.

Subjective conclusions are that on-line bibliographic services enhance librarians' prestige as professionals, that they result in greater library and interlibrary loan use by people who are not otherwise regular library users, and that searches in the social and behavioral sciences require longer on-line sessions than do searches in the pure sciences and technology, probably because of less precise research language or terminology in the former than in the latter.

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Technical Communications

ANSI Opposes Enactment of Standards Act

The American National Standards Institute opposes enactment of the Voluntary Standards and Certification Act of 1976, S. 3555. It believes that the bill's provisions are unnecessary and undesirable and raise serious constitutional questions.

This position was expressed by ANSI in a statement that it had been invited to present to a hearing of the Senate Antitrust and Monopoly Subcommittee. At the last possible moment, after extensive preparation and after Institute witnesses and staff had traveled to Washington, the hearing was canceled.

ANSI's prepared statement on the bill has been sent to members of the subcommittee, but no witnesses from the private sector opposed to the bill have been heard by the Senate group. In a letter to Senator Philip A. Hart, chairman of the subcommittee, ANSI strongly recommended "that no action be taken on this far-reaching legislative proposal—which will, if enacted, place the entire voluntary standards system under absolute government control —until extensive hearings are held." The Institute pointed out that "Certainly every party in opposition to S. 3555 deserves the same right to be heard that has already been extended to those who support the bill." . . . and that "Simply printing statements in the record does not appear to be an acceptable solution."

Under the proposed legislation, no private organization could conduct standards development or certification activities unless it had obtained a certificate from the Department of Commerce attesting that it meets the criteria set forth in the bill and rules of the Federal Trade Commission. ANSI, in its statement on S. 3555, predicted that enactment would "dry up the wellspring of voluntary action or, at best, drive standardization back into the caves of unilateral action by industry and/or government agencies from which it emerged—by mutual consent—early in this century."

The voluntary standards system that ANSI has successfully coordinated for the past 58 years accounts for more than 90 percent of nongovernment standards development in the nation. The costs are astronomical, exceeding $250 million each year. Thousands of highly qualified, technically competent individuals are made available by industry, by government, and by a host of trade, technical, professional, labor, and consumer organizations to develop standards at virtually no cost to the taxpayers (other than the cost of government employee participation).

These resources, human and financial, the Institute stated, are voluntary. "No one dictates to any company or group that it must participate or what positions it should take once it agrees to become involved. Standardization under the voluntary system depends upon willingness of a variety of interests, some in conflict and each having firm positions to support, to . . . agree on consensus documentation of knowledge and/or practice in the form of varying types of standards . . ."

Our experience indicates "that such voluntary action and interaction are virtually impossible to achieve under conditions of the implied threat of civil penalty as well as under a regulated system of standards development," ANSI stated.

The standards that result from voluntary cooperation and that are subsequently submitted to ANSI for verification of evidence of consensus developed within organizations and committees, ANSI pointed out, are subjected to review under criteria that provide credibility and confidence to the end product, American National Standards. All submitted standards must also be subjected to public review and comment and all comments received must be acted upon by the originating organizations before ANSI will approve a standard. An open, well-documented appeal mechanism is available for any interested party, whether it is a participant

in the development of a given standard or not. Appeal in ANSI can go as high as the Institute's Board of Directors. In addition, any party that is still not satisfied can seek relief through the courts.

"Since 1970, when ANSI's current system of review and approval was initiated, more than 7,000 cases have been completed with a total of only 16 appeals. Even more important, only 4 cases have been appealed to the Board of Directors. None has been taken to court in an antitrust action against ANSI." Since ANSI was founded some 20,000 individual standards cases have been handled, and the Institute has never been a party to an antitrust or trade restraint action.

ANSI refuted the implication, made in the bill's "findings of fact," that voluntary standardization creates grave hardships for small business. "Just the reverse is true," it stated. "Small business can obtain all the information available in recognized consensus standards at an average cost of $2.50 per standard. Individual enterprises can thus enter new markets and compete for business. Small business is among the true beneficiaries of voluntary standardization." (The National Small Business Association has indicated that it supports in principle ANSI's statement on S. 3555. "Mandatory standards," NSBA declares, "have not proven an effective method for gaining cooperation from the smaller firms; they will stifle the innovation and creativity of many small firms. Voluntary standards are working. Let's keep it that way.")

In view of the successful record of voluntary standards development and availability of a voluntary national consensus system in which public and private groups are active participants, ANSI stated, it would be better for Congress to ensure enforcement of existing antitrust and consumer protection laws than to add further layers of regulation.

The Institute also expressed the view that S. 3555's attempt to accommodate the Constitutional rights of association and freedom of speech is unsuccessful. In this connection, ANSI posed various questions about possible implementation of the act that cannot be answered without raising Constitutional issues.

The bill also sets forth conditions for U.S. participation in international nontreaty standardization activities. The provisions are apparently based on the mistaken premise that U.S. participation in international standardization is ineffective. ANSI represents U.S. interests in the International Organization for Standardization (ISO), and an ANSI-affiliated national committee is the U.S. member of the International Electrotechnical Commission (IEC). The tremendous depth and effectiveness of ANSI participation in ISO is evident in the fact that ANSI is active in some 600 technical committees, subcommittees, or work groups and is responsible for some 160 technical secretariats.

"ANSI has assumed responsibility for the U.S. share of dues to both ISO and IEC since the midthirties. Millions of ANSI's dollars have been contributed simply because ANSI feels that continued participation in international standardization is important to the nation."

ANSI, the statement continued, would welcome legislation that would establish rational national policy on international standardization and clarify the division of responsibility and authority between the public and private sectors. "Legislation now is not timely, however, in light of action under way in the General Agreement on Tariffs and Trade (GATT), which has as one of its major challenges elimination of nontariff barriers to trade." GATT has under consideration a Code of Conduct for Standards and Certification. ANSI is preparing a comprehensive report on the impact of the GATT code on voluntary standards, which will include recommendations on how the provisions of the code should be implemented in the United States. No action should be taken on international standards legislation, ANSI recommended, until this and other studies have been completed and evaluated.

News and Announcements

Kent State Offers Videotapes on the Use of the OCLC System

Kent State has developed new videotapes, in color, centering on the OCLC system.

KSU prepared its first series of instructional tapes for use with new staff and library science students. They were designed for in-house training programs.

As the network expanded, other libraries began to use the tapes. With extended use, staff who originally made the series became aware of limitations in the programs.

In response to surprisingly wide interest, a new color series has been created without the local orientation of the originals. They were made after consultation with librarians and library educators who used the earlier series.

They have been prepared in the following sequence:

PUBLIC SERVICES PROGRAMS

Finding Information in the OCLC Data Base—Part I
Finding Information in the OCLC Data Base—Part II

TECHNICAL SERVICES PROGRAMS

The OCLC System
On-Line Cataloging
The Local Data Record
Automated Check-In

Two twelve-minute Public Services Programs, titled *Finding Information in the OCLC Data Base,* are of interest to librarians and library science students but oriented to library users. On cassette, they can be used by patrons, with a minimum of wear and tear on reference staff.

Finding Information in the OCLC Data Base—Part I covers simple searching, using the *author-title* and *title* algorithms. A viewer can do some successful searching after completing this basic program.

Finding Information in the OCLC Data Base—Part II develops searching skills introduced in Part I, covers exceptions to the searching "rules," corporate entry problems, use of the "stop list," and introduces the *author* search. It is assumed terminals will be turned on and logged-in in public areas of the library, and instructions for these operations are not presented.

The Technical Services series begins with *The OCLC System,* aimed at librarians and library science students who plan to be involved in system interface. It introduces network concepts, hardware, bibliographic format and cataloging based on records already part of the on-line union catalog.

On-Line Cataloging includes a detailed explanation of the terminal and its special capabilities for cataloging monographs and serials. This is written for library staff and library science students but is especially aimed at individuals who wish to develop skills operating the terminal for cataloging and input.

Two additional programs in the Technical Services series were to be completed in late fall 1976. They are *The Local Data Record* and *Automated Check-In.* The first covers form and function of the local data record's fields. It compares and contrasts these with the bibliographic "cataloging" record. The second is focused on library staff whose work includes serial check-in. It highlights procedures and techniques for manipulation of the on-line check-in record.

These programs are available singly or in sequence and can be ordered on ¾-inch cassette or ½-inch tape. Information on price and ordering is available from: Jack W. Scott, Assistant Director, University Libraries, Kent State University, Kent, OH 44242.

CLR Funds Experiment at Syracuse University to Improve Subject Access to Books

The Council on Library Resources has awarded up to $76,615 to the Syracuse University School of Information Studies for an experiment that may result in improved subject access to monographs by

augmentation of MARC records.

Working with a sample of books drawn from the collections of the University of Toronto and comprising a number of subject categories in the humanities and social sciences, proponents of the project plan to enlarge the subject description contained in the MARC record of each book by utilizing a set of selection rules for choosing words and phrases found within the index and/or table of contents. The file of descriptions for the books in the sample will be processed by the System Development Corporation's ORBIT Search Service. Computer-based subject searches can then be made by both project staff and others who have access to the Service. The results of the experiment will be analyzed and evaluated to determine the feasibility and utility of performing on-line computer subject searches for monographs with an enriched record.

Until recently, library users have relied upon the traditional card catalog for searching and locating monographs. Most catalogs contain listings for each item by author, title, and subject. While the card catalog works well when an author or title is known, it is less efficient for retrieving materials by subject, since only a few broad terms can be used for each item. Several current computer-based abstracting and indexing services have provided far more detailed subject access to journal articles (e.g., *Psychological Abstracts, Index Medicus, Engineering Index,* etc.). However, little has been done to provide the same retrieval capability for the user of monographs. By enriching existing records for monographs, it is hoped that more specific searches in the "free text" mode can be made.

According to Pauline Atherton, professor in the School of Information Studies and principal investigator for the project, if the results are successful, "book indexers and publishers may wish to take greater care in preparing indexes, knowing the use of their efforts for on-line searching."

ISAD Institute
Scheduled for February

The Information Science and Automation Division of the American Library Association announces an institute on the "National Bibliographic Network" at the Chicago Hyatt Regency Hotel, Chicago, Illinois, February 24–25, 1977. Program chairperson is S. Michael Malinconico, New York Public Library.

This institute is intended to provide a forum for discussion of major policy issues that will need to be resolved before planning for a national bibliographic network is complete, as well as provide the participants with information regarding developments toward establishment of such a network. Views will be expressed by prominent members of the library profession, each serving as a spokesman for a facet of the community within which he/she is concerned.

The problems that will be discussed at the institute will include the formulation of a national bibliographic policy. What is a national bibliographic network? Centralization versus decentralization. How should a national network be governed? What will be the physical components? Who should be part of it? What will the impact be on library service and librarianship?

Additionally the requirements for a national bibliographic network will be considered from the viewpoint of the public library, the research library, existing networks, the academic library, and the Library of Congress. The impact of such a network on various facets of the information dissemination field will also be discussed. Such areas as the international implications and the role of the National Commission, the Library of Congress, and professional associations will be important points debated.

For information and the registration form, contact Mr. Donald P. Hammer, Information Science and Automation Division, American Library Association, 50 E. Huron St., Chicago, IL 60611; telephone (312) 944-6780, ext. 266.

On-Line Review

Professor Martha Williams of the University of Illinois at Urbana and Alex Tomberg, Vice Chairman of the European

Association of Scientific Information Dissemination Centres (EUSIDIC) are to share the Editorship of a new journal—*On-Line Review*. *On-Line Review* will be published by Learned Information, a young company specializing in information publishing and in servicing the information publishing industry.

On-Line Review is launched at a time when on-line interactive information retrieval systems are effecting fundamental changes in the library and information center of today. In five years such systems have grown in usage from a few library locations to thousands of locations extending even beyond the traditional library environment. These changes raise technical, economical, social, legal, educational, and professional questions at a rate which taxes our ability to digest and correlate events which are shaping a new future in libraries and information centers. *On-Line Review* sets out to provide a forum for the presentation, discussion and analysis of these issues and to help create an identity for a "new" profession among those concerned with on-line information retrieval.

On-Line Review's coverage will span the broad range of subjects that relate to all aspects of on-line systems of interest to the professional user and manager of such systems. Emphasis will be given to articles concerned with the practical aspects of using, selecting, and managing on-line systems. Specific subjects covered will include topics such as the comparative economics of local automation versus on-line access (performance studies; procedures, practices, and standards; product description and evaluation; applications in retrospective information retrieval); current awareness; cataloging; bibliographic, quantitative, and private data; user education; data base formats; access languages and indexing; etc.

A news section edited by Tom Hogan (vice-president, Data Courier Inc.) will include reports on current activities, new systems and equipment, a calendar of forthcoming events, and a review of new data bases and books.

An international Editorial Advisory Board is being formed and will be composed of eminent representatives of their profession who will provide the necessary counsel to ensure that *On-Line Review* meets the needs of its readers.

On-Line Review will be published quarterly with the first issue due in the first quarter of 1977. The annual subscription price is $25 for individual subscriptions and $45 for institutional subscriptions.

The editors invite authors from the Americas interested in submitting manuscripts for publication in *On-Line Review* to write to: Professor Martha Williams, R.R. No. 1, Monticello, IL 61856. Authors from outside the Americas should contact: Alex Tomberg, P.O. Box 1766, The Hague, Netherlands. News items should be sent to: Tom Hogan, 7400 Singletree Ln., Louisville, KY 40291.

Requests for information on subscriptions and advertisements should be addressed to the publisher: Learned Information, Penthouse 1, 15 W. 55th St., New York, NY 10019; or Learned Information (Europe) Ltd., Woodside, Hinksey Hill, Oxford, OX1 5BP, England.

Historical Abstracts, America: History and Life, *and* Artbibliographies Modern *to Be Available On-line*

The American Bibliographical Center–Clio Press has announced that three of its data bases will be available late in 1976 through the Lockheed DIALOG[R] Information Retrieval Service for on-line, interactive computer searches. The three data bases are *Historical Abstracts, America: History and Life,* and *Artbibliographies Modern.*

Historical Abstracts and *America: History and Life* abstract or cite articles on political, diplomatic, economic, social, cultural, and intellectual history, gathered from an international selection of 1,900 journals in 30 languages. The data bases developed are by far the most useful and detailed yet compiled in the field of history.

America: History and Life will contain 70,000 entries on-line by the end of 1976. Journal articles, book reviews, and dissertations dealing with American history and studies are abstracted, annotated, or cited.

Historical Abstracts deals with world history outside of the United States and Canada, and covers the period 1450 to the present. The *Historical Abstracts* on-line data base will contain 30,000 abstracts of journal articles by the end of 1976.

The data base of *Artbibliographies Modern*, produced at ABC–Clio's England office, covers books, articles, and exhibition catalogs published since 1970 in the field of modern art (1800 to the present). More than 500 journals dealing with modern art are screened for articles to be cited or abstracted, making the specialized bibliographic coverage provided by *Artbibliographies Modern* the most complete available in the field. This data base will contain 21,000 entries on-line by the end of 1976.

Each bibliographic entry from the three data bases includes all authors; full title in the original language, with an English translation if necessary; journal, book, dissertation, or catalog citation; ABC–Clio accession number; and, in most cases, an abstract or annotation and the name of the abstracter.

For more information contact Tape Lease Coordinator, ABC–Clio, Box 4397, Santa Barbara, CA 93103.

This Month in Telecommunications

The Center for Communications Management introduces an ongoing telecommunications research report service, *This Month in Telecommunications*. This continuing research service has been designed to provide the user with an information bridge between the surface news and the practical implications of common carrier rate activity. Every month, thousands of common carrier tariff filings are reviewed, important activities analyzed and digested, and findings reported from the telecommunication user's perspective.

This Month is a unique information service for the telecommunications industry —affording continuing analyses of important regulatory and common carrier events affecting the user's telecommunications budget, facilities management requirements, and system planning parameters. As an information research service, *This Month* goes far beyond the surface news to uncover the practical events which affect the business telecommunications sector.

In addition to coverage of new and timely rate activity at the state and interstate levels, *This Month* will include special reports on a variety of reference and planning information. Scheduled for upcoming issues are research features on such topics as basic traffic theory, Telex relay from the United Kingdom, practical applications of AIOD, emerging telecommunication market opportunities, and budget planning for next year.

This Month is available from CCMI on an annual (twelve issues) subscription basis at $75.00 for U.S. and North America. Overseas subscription is $95.00.

For additional information, please contact Mr. Minor S. Huffman, Jr., telephone (201) 825-3311.

Study of Keyword Indexing on Libraries

Mr. Philip Schwarz, automation librarian at the University of Wisconsin-Stout, is working on a CLR Fellowship to examine the role of locally generated title-derivative (keyword) indexing in libraries. Librarians currently working in this area are asked to send a brief description of their work to Philip Schwarz, the Library, University of Wisconsin-Stout, Menomonie, WI 54751.

Computer-Assisted Instruction Bibliography

Computer-assisted instruction—from the viewpoints of the researcher and the practitioner—is the subject of a new annotated bibliography issued by the ERIC Clearinghouse on Information Resources at Stanford University.

Computer Assisted Instruction: The Best of ERIC 1973–May 1975 contains more than ninety annotations of reports, articles, and papers indexed and available from ERIC, the Educational Resources Information Center.

The thirty-eight-page paper, authored by Marion Beard of the Institute for Mathematical Studies in the Social Sci-

ences at Stanford University, includes a three-page introduction. Sections cover: CAI in General, Specific Applications and Cases, PLATO and TICCIT, Research via CAI, Applications in Teacher Training, Development of Author Languages, and District-Wide Experience. An index concludes the paper. Complete ordering instructions for ERIC microfiche or photocopies are given.

This paper serves as an update to the earlier ERIC publication, *The Best of ERIC: Recent Trends in Computer-Assisted Instruction* (ED 076 025). The new *Computer Assisted Instruction* is available for $2.25 from Box E, School of Education, Stanford University, Stanford, CA 94305. Checks must be included with orders and made payable to "Box E." Purchase Orders Cannot Be Accepted. It also will be available from the ERIC Document Reproduction Service when its ED number is announced.

New Computer Output Microfilm Audiovisual Package Available from NMA

COM: Systems and Applications, the latest audiovisual presentation in the National Micrographics Association's series, is now available.

More than seventy full-color 2″ x 2″ slides with standard cassette cover the applications and advantages of computer output microfilm (COM). Art work and photographs of actual applications are used to provide the viewer with a comprehensive overview of COM's capabilities. The audiocassette is available with audible and inaudible pulses. Running time for the program is approximately thirty minutes.

COM: Systems and Applications is available from Publication Sales, National Micrographics Association, 8728 Colesville Rd., Silver Spring, MD 20910, at $100 per package. It is not available on a loan basis. Payment must accompany order.

Brodart Introduces Computerized Book Order System

Brodart, Inc., Williamsport, Pennsylvania, has introduced a computerized book ordering system. The Instant Response Ordering System was developed primarily as a service for larger public and university libraries as a response to provide a timely, accurate, and fast book acquisitions process. The system is designed to save libraries time in locating, checking, and ordering titles.

Data Processing Extension Course for Librarians

Does data processing and its foreign-sounding language intimidate you?

University of Wisconsin-Extension offers "Data Processing: Basic Concepts" for librarians who will be working with computer systems in their circulation and reference departments.

The ten-lesson correspondence course discusses what computers can do, terminology, hardware, elementary applications, and the selection, design, and use of computer systems.

For more information, write: Independent Study Coordinator, Department of Business and Management, University of Wisconsin-Extension, 432 N. Lake St., Madison, WI 53706, or call (608) 262-2155.

3M Library Systems Broadens Capabilities

The Library Systems unit of 3M Company's Microfilm Products Division has purchased substantially all of the assets of Information Dynamics Corporation (IDC), North Reading, Massachusetts, for an undisclosed sum.

IDC formerly marketed a microfilm subscription service known as MCRS (Micrographic Catalog Retrieval System) which featured library catalog cards conveniently packaged in microfiche format, as well as systems for retrieval, display, and reproduction. The business unit will now be operated by 3M Library Systems at 90 Main St., North Reading, Massachusetts.

IDC pioneered the development of bibliographic and information systems and services for libraries, and offered an extensive machine-readable data base on monographic literature.

Input

To the Editor:

In considerable appreciation for the MARC data element statistics contribution of Williams and Shefner,[1] I'd like to express the hope that *JOLA* will see to continuation of their work by means of a regularly published update. As may be seen in Williams and Shefner, these statistics do change.

Changes in the current period are presumably due less to AACR revision than to the addition of new languages to the data base, i.e., in 1969–70, the data base included only cataloging for books in English; the April 1974–March 1975 data base included at most 3 months of records for books in German, Spanish, Portuguese and French. By September 1976, the data base included records for monographs in 27 additional languages.[2]

In the future, of course, the data element statistics will presumably continue to change, due both to AACR revision and to the planned 1978 expansion of MARC to include all roman alphabet languages.

Justine Roberts
Library
University of California,
San Francisco

1. Martha E. Williams and Gordon J. Shefner, "Data Element Statistics for the MARC II Data Base," *Journal of Library Automation* 9:89–100 (June 1976).
2. Communication from the MARC Editorial Division, Library of Congress, September 21, 1976. The languages being input as of 1976 are Afrikaans, Anglo-Saxon, Basque, Breton, Catalan, Danish, Dutch, English, Middle English, Estonian, Finnish, French, Middle French, Old French, Frisian, German, Middle High German, Old High German, Other Germanic, Icelandic, Irish, Italian, Latin, Norwegian, Portuguese, Provencal, Other Romance, Romanian, Romansh, Spanish, Swedish, Welsh.

To the Editor:

Mr. Charles Bourne's excellent and exhaustive report on "Initial Article Filing," *JOLA* (Sept. 1975) contains unfortunately several mistakes regarding Hebrew and Yiddish. Since I am sure that this article will be used by many people as an authoritative guideline to initial articles and their homographs in other languages, I feel that it is important to correct any mistakes both for the sake of scientific accuracy and in order not to mislead those who will rely on the data in this report.

First, a general remark about a feature to which several of the mistakes can be traced: the note "transliterated" has sometimes been added to Hebrew or Yiddish, in other cases, and for Arabic and Greek it has not been indicated. By definition, *all* articles, prefixes, etc., originally written in non-Roman characters refer, of course, to transliterated titles and names only; if those names or words were filed in their original script, the problem would not exist. Given, therefore, that we deal with transliterated articles and initial words, these must follow accepted standards such as the schemes of the Library of Congress (LC) or the International Organization for Standardization. It is well known that library transliterations do not always follow these or other standard schemes but for the purpose of valid comparisons this variable must be held constant under all circumstances, i.e., in deciding whether a particular concatenation of letters is or is not an article or a word in a language written in a non-Roman script, its *standard* transliteration, say by LC, must be the standard of comparison. In other words, if random sampling of transliterated Arabic, Hebrew, Yiddish, or Greek titles brings up a homograph generated by a non-standard transliteration it must be rejected as not being relevant. In fact, the same procedure has been applied in Mr. Bourne's list to English (or any other language written in Roman script): the word *De* is *not* counted as an English article (only as a word), although "The" is sometimes rendered as "De" in spellings that try to imitate dialects, etc. In other words: non-standard spellings (whether original or transliterated) cannot be considered for the purpose of a study of this

kind, otherwise just about anything would be acceptable as an article or a word.

One other remark concerning Yiddish: all titles cited in the right-hand margin for this language are in Hebrew, *not* in Yiddish; some of them are wrongly transliterated, e.g., "Hen Kol Hadash" (p. 239) which should be "En Kol Hadash"; i.e., the first words of the Hebrew translation of Remarque's *All Quiet on the Western Front.*

The following lists indicate the initial articles to which Hebrew should be *added* because they have transcribed homographs in Hebrew (with examples of Hebrew titles beginning with such words) and initial articles that should be *deleted* as being either non-existent or due to non-standard transcription.

(a) Add HEBREW to the following

Article	*Example of transcribed Hebrew title*
Am	Am oved
Di°	Di Sahav
El	El rosh ha-har
He (*without* hyphen)	He daroma
Hen†	
I	I ha-matmon
Li	Li velakh
Lo	Lo bayom
Lu	Lu hayiti
Na	Na lit'om
Uma	Uma bemoladeta

(b) Delete the following

Das (Yiddish)	Heis (Hebrew)
Die (Yiddish)	Hen (Yiddish)
Eyn, Eyne (Yiddish)	Ho (Hebrew)

° *Di* is an article in Aramaic, not in Hebrew, but it appears sometimes in Hebrew names derived from Aramaic, as in the example given.

† The word means "they" (feminine) and could appear as a first word in a title, but I could not find an actual title of this kind.

I hope that these remarks will contribute to the usefulness of the list of initial articles for filing purposes.

Hans H. Wellisch
Associate Professor
College of Library and Information Services
University of Maryland
College Park, Maryland

To the Editor:

I have just reviewed again your issue of September 1976 and the article by Foil/Carter on Computer-Based Circulation Systems.

I do not understand how you would find this information valuable since the survey was done in the Fall of 1974.

If you cannot print these articles on a timely basis, it is my opinion that the space be used for other purposes.

Dean R. Gattone,
Head, Circulation Services
University of Maryland Undergraduate Library
College Park, Maryland

The editor and authors recognize the speed with which technology has caught up with the study. However, we felt it was valuable to publish the paper for three reasons: (1) it is concerned with data entry devices, rather than circulation systems as a whole—an unusual approach to analysis; (2) despite rapidly changing technologies, hundreds of libraries still use the equipment discussed in the study; and, most importantly, (3) the techniques used to analyze and evaluate the equipment were felt to be valuable and potentially transferable to other library situations.

SKM

Book Reviews

Information Retrieval, British & American, 1876–1976, by John Metcalfe. Metuchen, N.J.: Scarecrow, 1976. 243p. with index and references. LC:75-29154. ISBN: 0-8108-0875-7.

This book is mistitled. It should have the title "Obscure Minutiae in Indexing and Classification Schemes in Nineteenth Century USA and UK, with Before and Afterthoughts." The author goes on and on about the obscure and better-known librarians, indexers, and catalogers who brought us to where we are today with pre- and post-coordinate indexes, mixed catalogs, and zeros in decimal systems (the last entry in the book's index!). The book is a mix of anecdotes, tidbits, and details about Poole's indexes, Cutter's catalogs, and Dewey's girls and schedules. Most of the narrative is tedious reading unless you relish knowing and reading more and more about title word inverted indexing of the mid-nineteenth century. Unfortunately there are no charts or explanatory historical tables to put the sketches and profiles into a living order of things. The book, by p.55, seems to drone on and on like a lecture without slides or overheads. Even a picture of a man with a handlebar mustache would have been a welcome relief.

I doubt that students currently enrolled in cataloging or indexing classes would/should take the time to read this book, but teachers of these courses should refer to it for anecdotes about the pioneers in the field. Where else could you find out who called book classification "a logical absurdity" or what Poole's "mud catalogs" were? "Amateurs" of cataloging and classification will find the trivia here delightful, but contemporary historians will be disappointed in the coverage of the twentieth century. By p.175, little has yet been said about post-World War I. The author waits until p.213 (with only three pages of text left in the book!) to cover "Computers and IR." Without covering the subject at all, he boldly predicts, "Computer use for IR and for service to libraries may eventually prove to have been in about mid-career in 1976." Not knowing when this "career" started, it is difficult to say how many years are left, but I hope the next history writer will correct Mr. Metcalfe's treatment of the last hundred years as well as the next hundred. Obviously my last remark must be that the history of IR is yet to be written. This book may have partially served a gathering function for such a tour de force, but it most certainly is not what it purports to be.

Pauline Atherton, Professor
School of Information Studies
Syracuse University

Travels in Computerland: Or, Incompatibilities and Interfaces: A Full and True Account of the Implementation of the London Stage Information Bank, by Ben Ross Schneider. Reading, Mass.: Addison-Wesley, 1974. 244p. ISBN: 0-201-06737.

If there is one single book librarians should read before embarking on the great library automation adventure, this is it. Written by an English professor somewhat in the style of *Gulliver's Travels,* it tells us of the trials and tribulations of an ordinary but resourceful human being who conceived of the idea of putting into machine-readable form the publication *The London Stage, 1660–1800.* This scholarly work, published by Southern Illinois Press in eleven volumes after thirty-five years of work by five scholars, is similar to a library catalog or bibliography in that it brings together a tremendous amount of data. This one contains "a calendar of plays, entertainments and afterpieces, together with casts, boxreceipts and contemporary comment, compiled from playbills, newspapers and theatrical diaries of the period." The task was simply to keypunch the data (keeping all the distinctions implied to the reader of the original publication via format, type style, context, etc.) and use a computer to sort and tabulate it to produce a product of interest to scholars, thereby "liberat(ing) theatre historians' wives from endless drudgery." (The author's sexism, though at times tongue-in-cheek, can be annoying

as he describes the world of literature and data processing.)

The author's description of his project is fascinating because he describes it in a step-by-step fashion, just as he slowly came to it, with all of his hopes and false leads, as he gradually learned what computerization actually meant. From it we learn, as he did, not only of the positive things that computerization forces us to do, but of all the things that computerization cannot do. The frustrations we feel when we realize that automation is a lot of hard work rather than magic come clearly through. To get a flavor of what a hard process it is to learn even this, here is the author's description of his encounter with a library to which he turned for information.

> Widener Library, one of the seven largest in the world, had no more than a dozen books on the subject (automatic information retrieval), half of which were really books on library science. The periodical collection contained none of the basic computer journals. . . . This dearth of material on computers was all the more surprising because Widener Library was itself nationally famous for its own efficient system of keeping track of books by computer. To read *Computing Reviews* at Harvard, it was necessary to travel half a mile north of Widener, past Sanders Theatre, to one of the physics buildings in the green lane across from the glass flowers, climb four flights of staircases smelling of science, past the usual dedicatory plaques and memorial sculptures, past glass cases full of souvenirs of someone's late 19th century expedition to Peru, . . . to a small just-renovated science library, so little known and little used that you didn't even have to show a pass. If you knew where it was you were authorized to use it.

In the chapter called "Concerning the Specs" (the specifications of what is wanted out of the computer system and how it will be achieved), we are presented with a lively discussion of how one resolves ambiguity in the document that is to be made machine-readable and the various costs of so doing. Can a computer tell a last name from a first name? Should it? If it cannot, and the "keypuncher" must put in some special mark to indicate which name is which, how much time and ability will the decision-making and marking process take? With tens of thousands of names, this is not a trivial question. Failure to consider questions of this type leads to a product that is, in some sense, unsatisfactory and/or very expensive. Besides, how many special "mark" characters does a keypunch, an MT/ST, an optical scanner, a CRT, etc., actually have? Although the discussion of all these devices in this book is very informal, it is probably one of the best surveys of the data input industry, data input devices, and tradeoffs in input system design for text processing (e.g., library applications) that this reviewer has ever seen. The interrelationships between the idiosyncrasies of the various devices and the effect each of these can have on project specifications, as well as the pitfalls of each device (character set, paper requirements, converting machines, costs, etc.) are all brought forward. The author finally sawed off the left-hand side of letter "O" from his selectric typewriter ball so that the optical scanner could tell the number zero from the letter "O." People can triumph over machines!

The book discusses with a great deal of sophistication all of the difficulties of getting done what can be done with modern data processing equipment. We are told that "country people used to call the Montgomery Ward catalogue 'the wish book'. We should call the computer 'the wish machine'."

> I note how much grief was caused by my taking estimates of feasibility at face value. Machines did not meet specifications, schedules could not be met. And it wasn't for lack of trying. . . . Real machines can't perform as well as imaginary machines, not even a thousandth as well as some people's imaginary machines, and it is not machines but people who feed and direct them and make up for their deficiencies, who really guide us to the land of our dreams where the nightingale is singing . . .

In the end, despite the distinct impression of a scholar who attended a seminar on the "London Stage Information Bank"

that the project had "fallen short of its goals," the author got pretty much what he started out to get when he began the project. The main lesson we draw from his experiences is the tremendous level of skill that is required of any project manager in automation to separate information from misinformation and to deal with all the complexities and parts (no matter how few) of even a simple computerization project. The author concludes, and all librarians in today's age of cooperation and networks should take note, that "so many people and institutions were involved, so many were the ways in which they interreacted, so many chances for failure lay in wait. . . . What a miracle that I made no fatal error!"

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Statement of Ownership and Management

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Extent and Nature of Circulation

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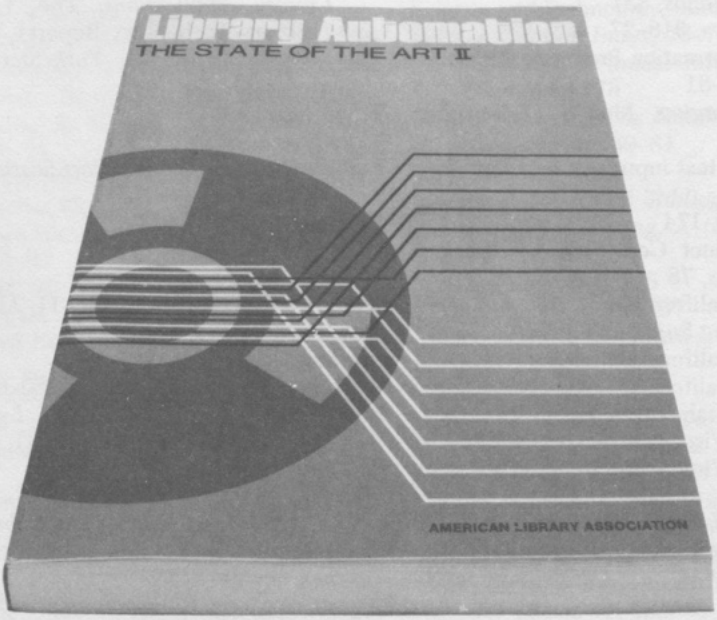

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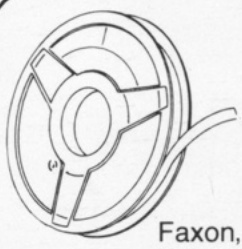

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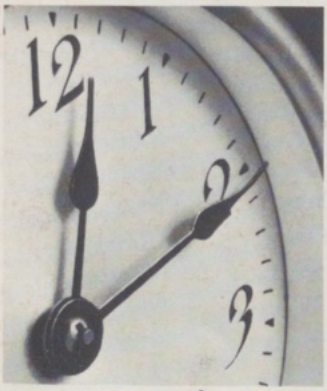

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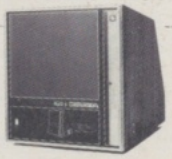

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