The Online Subject/Title Catalog of Western Michigan University

James N. Sleep
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THE ONLINE SUBJECT/TITLE CATALOG
OF WESTERN MICHIGAN UNIVERSITY

by

James N. Sleep

A Thesis
Submitted to the
Faculty of The Graduate College
in partial fulfillment of the
requirements for the
Degree of Master of Science
Department of Computer Science

Western Michigan University
Kalamazoo, Michigan
August 1982

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An online subject searchable catalog has been developed to allow public access to the OCLC-MARC subscription tapes of the Western Michigan University Libraries. The system has been implemented on the Western Michigan University Academic Computer Center DECsystem-10 computer and is currently running with access to nearly one hundred thousand citations. During the design of the Online Subject/Title Catalog, statistical analysis of the source data was performed. Paper products based on the OCLC-MARC subscription tapes, such as KWOC indexes, were also developed. A novel feature of this project was the use of SNOBOL4 as the main computer language used.
ACKNOWLEDGMENTS

Thanks should be given to the Reference staff of Waldo Library for bringing the idea of an online catalog to the author's attention and for their many suggestions along the way. The great number of people who tried out early versions of the system also provided many useful suggestions. Special recognition must be made of Dr. D. Kountanis, the supervisor for this thesis, whose alternate prodding and patience finally led to its completion.

James N. Sleep
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CHAPTER I

INTRODUCTION

The major result to be described here is the design and implementation of the Western Michigan University Online Subject/Title Catalog. This publicly accessible online catalog has access to nearly one hundred thousand citations from the Western Michigan University Libraries. This description is broken down into three main parts, the first describes the source of the raw data used in the production of the Online Subject/Title Catalog. This section will also describe several of the statistics that were produced to analyze that data. The second part describes some of the paper products that were produced during the early stages of design of the online system. The third part describes the Online Subject/Title Catalog, both how it works internally and how the library patron uses it.
CHAPTER II

SOURCE DATA AND STATISTICAL ANALYSIS

Introduction

In order to facilitate the production of several hard-copy products and to aid in the design of the Online Subject/Title Catalog, a wide range of statistical analysis was performed on the OCLC-MARC subscription tapes of Western Michigan University Libraries. Some of the statistics that will be described here have also been used to analyze other sets of MARC cataloging data, notably the CONSER file of serials from the Library of Congress and a one percent sample of the entire OCLC data base. However the example results described here were based on the Western Michigan University Libraries OCLC-MARC subscription tapes that cover the period from July 1976 through June 1981. These tapes contained over one hundred thousand transactions, involving 86,742 unique OCLC control numbers. The subscription tapes were processed to remove records that contained duplicate OCLC control numbers. Even though this method was not perfect it did create a file that came close to having just one record per title. It was this unduplicated file that has been used to produce several hard-copy products and in the creation of the Online Subject/Title Catalog.

Most of the results presented here are basically frequency
counts and corresponding percentages of various properties of the cataloging records. Even these very simple types of statistics can be very useful in planning uses for the OCLC-MARC subscription tapes. In addition, some of the results can be used directly in acquisition analysis, resource allocation, and collection development. By having all cataloging transactions in a machine readable form, information could be extracted that was not previously available to the managers of the library.

Source of Data

OCLC Cataloging

Most of the large libraries in the United States today use computerized cataloging of acquisitions. By a wide margin, the most popular system is OCLC (Online Computer Library Center) a not-for-profit corporation based in Dublin, Ohio. OCLC cataloging is done through terminals located in the libraries and connected to the OCLC computer system by leased phone lines.

The total number of libraries using OCLC cataloging is hard to determine since some libraries do cataloging for many other area libraries and some libraries have several terminals. As of January 1981 there were about 3500 terminals in the OCLC system. The next most popular system is the Research Library Network (RLIN), based in Stanford, California. Both of these systems use the MARC (MAchine Readable Cataloging) format developed by the Library of Congress in the late 1960's. The advantages of OCLC cataloging include the
sharing of the work involved in entering items into the system among many libraries and being able to edit entries or produce new catalog cards without having to totally reenter the cards.

The actual method of cataloging most items on OCLC terminals involves searching the system to see if the item has already been entered by someone else. About ninety percent of the acquisitions at Western Michigan University Libraries are already in the OCLC system by the time they are cataloged. The Library of Congress accounts for about seventy percent of the entries into the system. The Library of Congress does an accurate and complete job of cataloging and for this reason most items in the system are of high quality. After the item is found in the OCLC system, the local libraries' specific information is added to the record. This local information includes local call number, location information, and such things as number of copies.

The command is then given on the OCLC terminal to produce cards for the card catalog. The cards are then mailed to the library. If at a later time the cards need to be changed the entry can be called up and the changes made and new cards produced. These are the transactions that appear on the subscription tape.

When an item is first entered into the system it is automatically given a sequence number by OCLC. This "OCLC number" is unique for each item and when a item has its information changed it still keeps its OCLC number. Thus by counting OCLC numbers instead of transactions on the subscription tapes one can get a better idea
of the number of unique titles that have been entered.

**Subscription Tapes**

For this project the most important feature of OCLC cataloging was the availability of a "subscription tape" that included all transactions done over the OCLC terminals. From this tape all cataloging information could be extracted. The cost of the subscription tapes, a few hundred dollars per year, was minimal when compared to the cost of entering the information into a system by hand. Since about ninety percent of the items acquired at Western Michigan University Libraries had already been entered into the OCLC system when cataloged, the savings were even greater.

The subscription tapes were available at intervals ranging from two weeks to six months. Western Michigan University Libraries got their subscription tapes at six month intervals. Because of this, information could have been up to six months out of date when the tapes arrived. The advantage to this longer period was that fewer tapes needed to be handled and stored. The disadvantage was that the time between when an item was cataloged and when it could be processed from a tape might have been up to six months. At the present time having a mean lag time of three months has been accepted. If a larger number of entries were being made more frequent tape acquisitions would be needed to avoid having too much data to handle at one time.

While most large libraries do subscribe to the tape service, few
actually use the tapes. The Michigan Library Consortium in 1975 began subscribing to the tapes for all libraries in Michigan. The tapes they have been acquiring contain all transactions for all Michigan libraries. The tapes are not separated by library but rather have all the separate libraries' transactions merged on each tape. This means that to provide a specific library's transactions would require stripping from the consortium tapes the transactions for just that library. Several libraries stopped their tape subscriptions when told that the Michigan Library Consortium would be providing the tapes to individual libraries at reduced cost. As of this time the consortium has been unable to do this and some libraries have found themselves without tapes for large numbers of their entries.

OCLC does not provide tapes for periods before a library started subscribing to the tape service. Thus a library would have available only those items entered into the OCLC system after the tape subscription was started. OCLC has in the past offered tapes to libraries of entries into the OCLC system made before the specific library had subscribed to the tapes. OCLC has said that they do not expect to offer this service in the future. Thus any library that is considering using the tapes for some project should start the tape subscription as soon as possible.

**OCLC-MARC Format**

The format that the subscription tapes were in was called
OCLC–MARC format. This format was nearly identical to the LC–MARC format developed by the Library of Congress. The MARC (MAchine Readable Cataloging) format for each bibliographic record consisted of several parts. The first part was a leader that contains such information as the type of record and the total size of the record. Next came a directory that described how to unpack the third part to the record. The third and last part consisted of several subrecords in a packed format. For each subrecord, an entry in the directory gave its starting position in the record, its length, and the kind of subrecord it was.

Each subrecord had associated with it a three digit code called a "tag". The meaning of each tag was predefined by the OCLC–MARC format and allowed the information in the record to be meaningfully interpreted.

Each subrecord, sometimes called a tag field or variable field, also contained an optional indicator field that aided in the decoding of the data in the subrecord. In the subrecord, information was further divided into separate subfields by special delimiter characters. The subfield delimiters consisted of a special control character followed by a single alphanumeric character.

As an example of this, the tag number for title information was "245" with the indicator field telling which character position to start at when sorting for filing purposes. In tag 245, subfield indicator "a" denoted the start of the main title, subfield indicator "b" denoted start of the subtitle, and subfield indicator "c" denoted
start of the author subfield.

The format used on the subscription tapes did not resemble the format that appeared on OCLC cataloging terminals. While it should have been possible to process the tapes in the original format, it was found to be much easier to convert them to an unpacked and more readable format where each tag field was on a separate line in the file.

Several utility programs were written in the course of developing the Online Subject/Title Catalog system that were used in processing the tapes. Several of these were later expanded to produce paper products from the subscription tapes such as bibliographies and key word indexes. A set of statistical programs were also written to analyze the subscription tapes to best determine the design constraints needed for an online catalog.

Conversion to Display Format

The format that the subscription tapes were in was greatly different from the format that the OCLC terminals used to display citations. It was decided that the most useful form for the records would be in a form that resembled the OCLC terminal format. The first step to convert to "display format" involved conversion of the character set of the tape to one that our computer facilities, a Digital Equipment Corporation DECSистем-10, could handle. The subscription tapes were written in a format called "Extended ASCII" which had a greater number of characters than the format on the
DECsystem-10 which was "ASCII" (American Standard Code for Information Interchange). A prewritten program was used to convert the tapes to the ASCII character set. The characters that existed in Extended ASCII but not ASCII were converted into backslashes ("\"). Even though the number of such characters was less than one in one thousand, due to the large amount of data several hundred such unconvertable characters existed on each tape. The major source of such characters came from foreign language entries.

The next step in the conversion process was to unpack the data from the format that the subscription tapes came in, to the more readable format that we had chosen. The record on the subscription tape consisted of a leader, a directory to the tag fields, and the tag fields packed according to the directory. Our conversion program created a new tag for the leader information. This "002" tag was put after the "001" tag and contained some of the information that determined what kind of item it was. The directory in the record told the start position and length of each tag field. The method used was to pick off one tag field at a time, add the tag number that was in the directory, and output it to the display format file. A very small number of tag fields were found to contain line-feeds and thus the program died when it expected a longer tag field than was there. This was solved by reading in records until an end-of-record character was found. The line-feeds may have been entered when a return was typed on the OCLC terminal by accident.

The language used for the conversion program was SNOBOL4 and the
The program was compiled using the FASBOL compiler. SNOBOL4 was chosen because of its powerful text handling features and efficient disk input and output operations. The program converted about 1500 records per minute of computer time. Each record of the display file occupied an average of 640 bytes of storage which was slightly less than the subscription tape format. The reduction in size came from removing the directory, and deleting unneeded end-of-tag and end-of-record characters.

Analysis of Raw Data

Design of Statistics

Most of these statistics were developed over a period of several months as new uses for the OCLC-MARC subscription tapes were implemented. Because the results of the statistics were needed to aid in the design of specific products and because the results were often unexpected, some of the statistics were displayed in a form that may seem awkward.

Another problem that had to be faced in the design of the computer software to create the statistics was the large size of the data to be analyzed. The data for the Western Michigan University Libraries OCLC-MARC subscription tapes required ninety thousand blocks of disk storage on the Western Michigan University Academic Computer Center DECsystem-10. This was about sixty mega-bytes of disk storage. In order to handle such large amounts of data two approaches were used. The first method was to use special disk space...
provided by the computer center that permitted the entire set of OCLC-MARC subscription tapes to be stored as a single file on disk. The second method, the one used by most of the statistical programs, was to break up the OCLC-MARC subscription tapes into several files each roughly of the same size. The file size was chosen so that no special provisions were needed to store the file being processed while the next file was retrieved from magnetic tape. The programs to analyze the files read in as many files as desired and printed summary statistics for all the files combined. An advantage of this method was that as the number of entries increased with time, the amount of disk space required to process the data would not increase.

Programming Considerations

As the data being analyzed were basically textual information, a programming language was needed that was designed to process this type of data. Also, because of the need to handle large amounts of data, the language chosen had to have fast and efficient disk input facilities. A language that met all of these requirements was FASBOL, a compiled version of SNOBOL4 for the DECsystem-10.

An advantage of FASBOL was the existence of a data structure that allowed for the simple creation of frequency counts. These "tables" acted like normal arrays except that the subscripts could be character strings and the size of the tables did not need to be predeclared. The FASBOL run time system used a hash search to insert items into tables, this being more efficient than could be expected.
from a user written routine in another high level language.

Again because of the large size of the data being analyzed, there were sometimes a very large number of possible values to tabulate. In some cases a single program would have required too much memory to keep all of the counts in core. Because of this, related items were sometimes counted by separate programs.

After counting the frequencies of a particular record type, the values and the counts for each value were generally output to a disk file and then sorted by the value. To sort the results, a vendor supplied disk sort routine was used. The format of the resulting output was chosen with readability in mind. In order to be reproduced here some of the results have been reformatted to better fit the page size used.

Examples of Statistics

For convenience the various statistical results were given names based on the item being analyzed in the MARC record (see Table 1). What follows is a brief description of each statistic and how it was generated. For some of the statistics there is sample output from the OCLC-MARC subscription tapes of Western Michigan University Libraries given in the appendix B.
Table 1
Statistical Analysis

<table>
<thead>
<tr>
<th>NAME OF STATISTIC</th>
<th>ITEM BEING ANALYZED</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAG COUNT</td>
<td>Tag occurrences and lengths</td>
</tr>
<tr>
<td>TAG FREQUENCY</td>
<td>Number of tags used in record</td>
</tr>
<tr>
<td>LC COUNT</td>
<td>Library of Congress class frequencies</td>
</tr>
<tr>
<td>TAG PATTERNS</td>
<td>Tag patterns used in cataloging</td>
</tr>
<tr>
<td>COTAGS</td>
<td>Co-occurrence of tags in records</td>
</tr>
<tr>
<td>CAT COUNT</td>
<td>Cataloging agency</td>
</tr>
<tr>
<td>INDICATOR COUNT</td>
<td>Indicators in each tag</td>
</tr>
<tr>
<td>DELIMITER COUNT</td>
<td>Subfield Delimiters in each tag</td>
</tr>
<tr>
<td>LOC COUNT</td>
<td>Location in branch libraries</td>
</tr>
<tr>
<td>WORD COUNT</td>
<td>Frequency and size of words in tags</td>
</tr>
</tbody>
</table>

Tag Count

This statistic counted the number of times each tag occurred in the entire data set and for each tag, statistics about the number of characters in that tag. The minimum, maximum, and mean number of characters for each tag was calculated. Also computed was the standard deviation of the number of characters in the tag and, to aid in more advanced statistics, the sum-of-squares of the number of characters in the tag.

The number of 001 tags, the OCLC control numbers, gives the
total number of records analyzed. By looking at certain tags a rough breakdown of the types of items cataloged could be made. For example, by looking at the tags in the range from 400 to 490 the number of items that were part of a series could be determined. What may have been errors in cataloging also showed up in the data. For each record there should have been exactly one title, the 245 tag, however in this data there were more 245 tags than records.

At the end of the results for individual tags, a summary of the total tags seen and the ranges of the number of tags per record were printed.

This statistical analysis proved to be very useful in the design of the Online Subject/Title Catalog. The total amount of storage space required to store particular tags could be directly calculated. The tags that were to be used to create the index files in the system could be counted and the data base processing programs optimized to best fit the data being worked on.

While other analysis similar to this have been performed on other sets of cataloging data, the results obtained here varied from the previously reported work and should point out the importance of statistics based on the actual data to be processed. See appendix B.1.

Tag Frequency

This statistic counted the number of tags used in each record and then printed a distribution of that number. It can be seen that
the number of tags was strongly centered around the high teens and except for a few unusual cases did not vary widely. This suggested that the methods used in cataloging were not dependent on who had done the cataloging.

One problem encountered with the analysis of this data was that the statistical packages available often could not handle the number of samples generated from the data. To solve this problem, custom written programs were produced that in general did not give as sophisticated statistics as might have been desired but were still useful. See appendix B.2.

**LC Class Count**

The same program that produced the TAG COUNT statistics also counted the frequency of Library of Congress call number classes. To do this it was mandatory to use the profile used by OCLC to produce catalog cards for the Western Michigan University Libraries to determine which of the several call number tags actually contained the call number used to shelf the item. For the Western Michigan University Libraries, the tags examined were 050, 090, and 099. If a 090 tag existed the 050 tag was ignored and if a 099 tag existed both 050 and 090 tags were ignored.

The Library of Congress classes were taken to be the leading letters in the call number with a maximum of four characters allowed. If the call number did not fit the predefined pattern it was counted as "unclassified". The frequencies were counted for four different
categories of cataloging. The first category was for those items
cataloged by Western Michigan University Libraries. The second
category was those items cataloged by the Library of Congress. The
third category was those items cataloged by contributing libraries.
A total of all categories was also calculated. The cataloging agency
was determined from the 049 tag.

This statistic can be valuable in collection development and in
evaluation of acquisition patterns. See appendix B.3.

**Tag Patterns**

This statistic produced counts for each of the sequences of tag
numbers used in cataloging items. The sequences were counted for
groups of tags with the same first digit, thus producing results for
each range of one hundred numbers. The order that the tag numbers
were used was the index into the table of frequencies. This meant
that both the specific tags used and the pattern of those tags within
the individual records were counted.

Due to the large number of patterns that occurred in the data,
one thousand nine hundred sixty eight combinations for the collection
of Western Michigan University Libraries, the printing of the results
of this statistic required a large amount of paper. See appendix
B.4.

**Co-occurrence of Tags**

This statistic, like TAG PATTERNS looked at the usage of tag
numbers and how certain tags were used at the same time as other
tags. For each of the tag numbers used, the number of records that
contained that tag number was counted. This unique count could be
less than the total number of times a tag number occurred as was
counted by TAG COUNT.

For each tag number, the number of times each other tag number
also occurred in the same record was counted. The total counts were
printed along with a graphical representation of the relative
frequency of each tag co-occurring with the given tag.

This statistic could be used to analyze cataloging patterns and
for deciding which tags to include in the database for an online
catalog. By eliminating redundant tags, as shown by tags with
similar usage co-occurring, the space requirements could be reduced.
The results for the 001 tag was especially important because, as every
record has a 001 tag, this showed the overall tag usage for all
records. See appendix B.5.

Cataloging Agency Count

This statistic examined the cataloging agency codes that
appeared in the 040 tag. There were three possible subfields entries
in the 040 tag. Subfield "A" denoted original cataloging agency,
subfield "B" denoted the agency that entered the item into the OCLC
data base, and subfield "D" was used whenever an item was modified.
Because an item could have been modified several times, the number of
subfield "D" occurrences did not match the total number of records
examined.

From this statistic it could be seen that most of the items in the collection of Western Michigan University Libraries were cataloged by the Library of Congress. However, most of the modifications were done locally as would be expected. See appendix B.6.

Indicator Count

This statistic counted the different two character indicator fields used for each tag. As different indicators have different meanings for each tag this statistic gave a wide variety of information. For example the indicator field in the 008 tag gave the date of entry into the OCLC system.

The indicators were counted as pairs rather than as separate single characters. This allowed indicators that were used as two character sets to be recognized. The single character indicators could be counted by adding up all of the two character combinations that contained the character of interest. See appendix B.7.

Delimiter Count

This statistic counted the various patterns of subfield delimiters that occurred for each tag number. The subfield delimiters were extracted from each tag and along with the tag number were used as the index into the table of frequencies.

An example of the utility of the statistic comes from looking at
the 245 tags and how many possess subfield "B" or subfield "C" entries. This gives a direct count of the number of titles that have subtitle entries or that have author statements. This could be useful when creating products from the OCLC-MARC subscription tapes that include different parts of the title. See appendix B.8.

Location Count

This statistic counted the location codes from the 049 tag. This four letter code indicated the library that performed the transaction recorded on the tape, whether the item was considered a serial or not, and which of the branch libraries the item was to be shelved in. The Western Michigan University Libraries had several branch libraries and also used the location code to separate items held in special collections within the main library.

A direct count of the acquisitions of each of the branch libraries was given by this statistic as well as the relative number of serials and monographs cataloged. As would be expected, most of the items cataloged went into the main collection with its location shown by the "Z" for the fourth letter in the code. See appendix B.9.

Word Count

This statistic was the most complex of all produced during this project. By counting the sizes and number of words in certain fields the parameters used in generating the index for the Online
Subject>Title Catalog could be rationally determined. The tags used in building the index for the data base of the Online Subject>Title Catalog were the 245 tag, title, and the tags in the range 600 through 690, the subject headings. This statistic examined those tags and counted what matched the definition of "words". Words were defined as starting with a letter and composed of letters and digits. A stop word list of words to ignore was used to limit the indexing to those words that had utility in searching. This statistic proved valuable when determining how long to make the maximum key size. As can be directly seen, the vast majority of words were less than or equal to fifteen characters in length. This size was chosen as it required an integral number of computer words to store on the DECsystem-10, the machine the Online Subject>Title Catalog was implemented on. See appendix B.10.

Conclusions

The OCLC–MARC subscription tapes provide in machine readable format a valuable resource. Due to the controlled format and contents of the tapes, they are ideal for processing into a variety of useful products. The variable length records and variable number of tags per record may require the use of programming languages such as SNOBOL4 that are designed specifically to handle data of this type. For maximum utility the data can be processed into other products, however even the raw data would be a valuable resource for many sophisticated users.
By generating statistics that describe the contents of the OCLC-MARC subscription tapes, much useful information can be obtained. This information can be used directly as well as aiding in the design of user products. By having accurate and complete statistics, the design of the Online Subject/Title catalog was much simplified.
CHAPTER III

PAPER PRODUCTS

Introduction

While most large libraries are using OCLC (Online Computer Library Center) cataloging and many of these subscribe to their subscription tapes, few libraries are benefitting from the great possibilities of machine readable cataloging records. For the Western Michigan University Libraries, we have produced a wide variety of products from our OCLC-MARC subscription tapes. Along with a subject-searchable online catalog, several hard-copy products of interest to library patrons as well as librarians have been produced. Even though the main thrust of this project was the Online Subject/Title Catalog, the development of the paper products described here shows what can be done with limited computer resources. Whereas an online catalog requires an interactive computer system and much online disk storage, paper products can be produced with little impact on computer resources or produced in a batch mode.

Analysis of Data

In order to get some idea of what was contained on our subscription tapes, several statistical programs were written

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specifically to analyze OCLC-MARC records. These were used to produce information on what tags existed on the tapes, how many characters the tags contained, and what tags occurred with other tags. By looking at what subfield delimiters occurred in what tags, it could be determined if combinations of interest existed often enough to produce hard-copy lists of records having specific tag/delimiter combinations. Even though some statistical analysis has been done on entries in the OCLC system, it was found that our own records often varied considerably from what would have been expected if no analysis had been done. Particularly for libraries that tend toward limited collections such as academic or special libraries, doing some form of analysis on subscription tapes can save time and effort in later stages.

Production of Products

The format of the OCLC-MARC subscription tapes does not resemble the format used to display records on OCLC terminals. Before any products were produced the records on the tape were converted into a form that was easier to handle and conformed to the computer system used. The Western Michigan University Academic Computer Center's DECsystem-10 was used in the production of all products. The character set used on the DECsystem-10, ASCII (American Standard Code for Information Interchange), lacks some of the characters used in Extended ASCII, the character set used on the subscription tapes. The tapes were converted to ASCII with characters that could not be

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converted changed to backslashes ("\"). Then the packed format of the OCLC-MARC records was converted to a form that resembles that used on the OCLC terminals. Even though it should be possible to process the tapes directly, by first converting to a simpler format, the complexity of the design and programming tasks were reduced. For an example of the format used see appendix A.

Example Products

The first paper product produced was a simple title list. This was produced by extracting the 245 tag from each record and then sorting the resulting file. This was quickly improved by adding the call number to the title and stripping off leading articles, such as "the", "an", and "a". The removal of articles produced a better sorting of the titles and the addition of the call number allowed the item to be located in the library. See appendix C.l.

Call Number

To determine the call number in use for a given library requires knowledge of the profile used to produce catalog cards. At the Western Michigan University Libraries, the 050, 090, and 099 tags must all be examined to find the call number actually in use. The call numbers were output inside parenthesis so that they could be extracted as single items in later processing.
KWOC Indexes

The title lists were then further processed by using a KWOC (Key Word Out of Context) index program. This resulted in an index to the holdings by single terms in the title. See appendix C.2. Since the KWOC program treated call numbers the same as words, a shelf list by call number could be produced at the same time. See appendix C.3.

Subject Headings

By adding subject headings, extracted from tags in the range 600 through 690, to the title list and then KWOCing the results, subject term access can be had to specific collections. Due to the large size of the KWOC index this product is best used with small collections or specific types of items. A product of this type we produced was a KWOC index of titles and subject headings of our serial holdings.

Language Bibliography

Information not normally available on the catalog cards can be extracted from the OCLC-MARC records. For example, the language used in the work is given in the 008 tag. We produced a foreign language bibliography for holdings in the Western Michigan University Libraries by extracting all items that had a non-English language code, and then producing a list that contained the title, call number, and language code for that work. This list was then sorted by language and call number. The resulting product is used to locate
items written in a specific language. By sorting by call number, items of the same general subject matter fall together for each language. See appendix C.4.

**Place Name Bibliography**

Subject headings in the card catalog allow easy access to only the first term in the heading, and unless the cataloger used all possible variations in the order of the words in the heading, some items of potential interest will be difficult to find in the card catalog. The subject headings use subfield "z" to indicate geographic place name for the subject heading. However this is often not the first word in the subject heading and by searching in the catalog by only the place name will not find the item. We have produced a place name bibliography by extracting records that have a subfield "z" in any of the subject heading tags. The place name subfield, title, and call number are then output. The result is then sorted by place name, thus allowing access in a form not normally available. See appendix C.5.

**Numbered Series List**

At Western Michigan University Libraries most numbered series are not traced, and thus can not be located in the card catalog with a rational amount of effort. Because the demand existed, a bibliography of numbered series was produced. This involved extracting those items that had what looked like numbered series...
entries. Any record having a digit in any of the tags 400 through 490 were taken to be part of a numbered series. The series name, title, and call number was output and the result sorted by series name. While this simplistic method produced some items that were not strictly numbered series, the product produced was useful and generally complete. See appendix C.6.

Alternate Call Number Catalogs

While most libraries use only one form of catalog numbering, several forms exist in the OCLC-MARC record. One that was of interest to some of our librarians was the Dewey call number that is in the 082 tag. By extracting records with Dewey numbers and producing a list consisting of Dewey number, title, and Library of Congress call number, a Dewey catalog was produced. See appendix C.7. A KWOC index of Government Printing Office publications was produced by extracting the title, LC call number, and G.P.O. number and then processing the results with a KWOC program. The G.P.O. number is in the 086 tag. See appendix C.8. Another product produced was a National Library of Medicine catalog. The programs to produce each of these catalogs were basically the same for each alternate number, the only change being the tag used for the second call number.

Conclusions

While some of these products have become obsolete with the
implementation of the Online Subject/Title Catalog at Western Michigan University Libraries, they are often the simplest, quickest, and most cost effective way to gain added access to our collection. The use of a high-level language designed for handling text enabled products to be produced with reasonable effort. Often the hardest part of producing a product was the creation of the initial idea for the product, the actual production being routine because existing software could be used with little or no modification.
CHAPTER IV

ONLINE SUBJECT/TITLE CATALOG

Introduction

The production of an online catalog is a subject that is receiving a great deal of interest in library circles. With most large libraries using some form of computerized system for the production of catalog cards, and with the cost of computer hardware dropping, many libraries are considering some form of online system. The advantages of an online catalog system are many, the most obvious being the power a computer can bring to searching for bibliographic records having particular properties. Many systems exist already that provide not only some of the features of the traditional card catalog but also circulation control or bookkeeping facilities.

The approach taken in most existing systems is to duplicate the features of a card catalog and only then to add those features that are not normally available through a card catalog. For the system described in this technical report, the approach was to first look for those things that a computer can do best and apply the power available in a large time sharing computer system to the needs of the library patron.

The Western Michigan University Libraries consist of a large main library and several smaller branch libraries. The Western
Michigan University Libraries have been using OCLC (Online Computer Library Center) cataloging for five years. However, like many libraries, even though the subscription tapes were purchased, nothing in the way of usable products had been produced from them. It was not economically feasible to embark on a large scale project to produce a full online catalog system. Also since an expanded circulation system was recently installed, there was reluctance on the part of the library administration to support a project that might in some way duplicate the expected features of the circulation system.

For these reasons, the effort of this project was focused on a system that would provide the most unique features at the lowest cost. An online subject searchable catalog of citations on the OCLC-MARC subscription tapes was picked as something feasible and useful.

Existing computer resources and expertise was used as much as possible. It was made clear that while some moral support would be available from the Western Michigan University Libraries, very little financial support would be available. Since the system would be designed and run on the Western Michigan University Academic Computer Center system, there would always be limitation on the amount of computer resources available. Even with these restrictions it was believed that a practical and useful system could be produced.
Overview of Desired System

The goal of this project was to produce a system that could be used by an untrained library patron to find citations that would be difficult or impossible to locate using the card catalog. The end product was not meant to replace the card catalog but rather to act as an extension to it. Subject searching was picked as the most useful feature that was lacking in a card catalog and the most amenable to computerized methods. The user interface would have to be simple and easily learned. A command language that resembled some of the existing commercial systems was designed. The system was to be self-documenting with internal assistance available to the user at all levels. The number and complexity of commands to the system was to be kept to a minimum. A requirement that the user would need no extra documentation such as user manuals to operate the system forced the command language to require little if any special knowledge of the internal workings of the system.

The system was designed with the idea of having publicly available terminals in the library and at other locations on campus that patrons could use to find citations on their own. Because the planned users were library patrons rather than the cataloging and administrative staff of the library, some features that could have been easily implemented were not. This was due to the low usefulness for the expected users of the system of these proposed features. An example would be searching by Library of Congress subject headings. To use this type of searching requires knowledge of cataloging
practices and access to the current Library of Congress subject headings lists. The average library patron would find this of little use even though the cataloging staff might find this very helpful.

Since the source of the bibliographic information was to be the OCLC-MARC subscription tapes that Western Michigan University Libraries receive at six month intervals, the system would not have the capability of constant updating and insertions. This allowed the data base generation programs to be simpler and permitted the structure of the data base to be optimized for space and time efficiency without having to plan for dynamic changes in the data.

One of the results of being produced as an experimental system was to force implementation in a manner that would allow later modification. Changes were expected both in the appearance of the system to the user as well as the internal structure of the system. The data base was to be designed to allow future expansion as the number of OCLC entries increased. The programming was to be done in a modular manner so that modifications in one subsystem could be made without requiring changes to other parts of the system.

Design of System

Choice of Features

The first stage in the design of the system was to decide what features would be possible and pick those that would be of the greatest utility. This system was created to be an extension to the card catalog and to enable location of citations that would be
difficult or impossible with just the card catalog. It was not meant to replace the card catalog but rather to make available the power of computer searching and the greater depth of indexing available because of OCLC cataloging. It was also important to decide who would be the most likely users of the system. The user group this system was targeted at was the patrons of the library. All too often online catalogs have been aimed at the technical services staff and the administrators of the library. For this reason many of the existing commercial systems are of little utility to the casual library user. To allow the untrained person to gain from the system required the user interface to be simple and easy to comprehend. To some extent this desire was compromised by the decision to follow the general form of some existing commercial systems. This choice was made to placate some library staff members that were afraid they would have had to learn yet another system. Some of the ideas borrowed from the commercial systems did turn out to be useful and would have been included in our system anyway. The one criterion that was kept in mind at all times was "how will this aid the user of the system in locating citations of interest?", because of this such things as call number searching was left unimplemented since it would help the average library patron only slightly.

The first feature decided upon was subject searching. Subject searching for our system was defined as the ability to search for citations having user specified keywords in either the title or subject headings. This allowed the user to look for citations on a
particular topic without having to know the actual title or subject heading. The ability to look for citations by exact subject heading was not chosen to be implemented because subject headings were very dependant on cataloging methods used and were something the average library patron would not want to learn. Title searching was also not chosen to be implemented. Searching for title implies that the user already knows the exact title and thus could easily find the item in the card catalog. Title searches could still be done to some extent by searching for the key words in the known title. Author searching was also not chosen for this system because the small number of items any author produces and and the existing ability to find items by author in the card catalog.

The actual method chosen for subject searching was to create a "save set" of the citations that had the desired key word. A save set was to appear to the user as an internal list of items that all had the desired properties. It was decided to allow created save sets to be listed on the user terminal in a format that resembled a catalog card citation. It was also decided to permit the save sets to be output to a disk file in either the citation format or in a format that allowed further processing such as sorting or generation of key-word indexes.

An important feature chosen was the ability to combine save sets using Boolean operators to create new save sets having more complex properties. The three Boolean operators picked were "AND", "OR", and "EXL". "AND" selected citations that were in both of two save
sets or had both of two key words. "OR" selected citations that were in either of two save sets or that had either of two key words. "EXL" selected items in one but not a second save set or items having one but not a second key term. "EXL" was chosen over having a "NOT" operator to prevent a search using the "NOT" operator that might select all possible items.

All branch libraries and special collections were to be included in a single data base. Even though early experimental versions of the Online Subject/Title Catalog kept branch libraries as separate data bases, users of this method found that having a single data base did not produce a large number of unwanted items during searching yet did produce the greatest number of desired items.

Good internal documentation and error diagnostics were clearly something that had to be implemented if the system was to be used by people unfamiliar with computers and computer search systems. Preventing the user from causing himself or the system any harm was thus a prime concern.

Design of User Interface

The functionality and ease of use of the user interface was of prime importance to insure that both skilled and naive users would be able to make full use of the system. Even though the command language was loosely patterned after some of the existing commercial systems, the general form of commands was kept simple and self consistent. This meant that some features that could have been
implemented were left out because they would have required a major modification to the command format.

Particular attention was paid to making the user interface as immune to user errors as was possible. The command parser was designed to ignore incorrect spacing, and to handle both upper case and lower case characters without creating error conditions. The user was to be able to always get out of any pathological state by interrupting the program with a control-c character. The program would handle the control-c interrupt without exiting and ask the user what to do next. At no time would the user be able to cause an error that would bomb the program and lose citations that had been searched for.

Arbitrary abbreviation of commonly used commands was to allow users of the system as much freedom as possible when performing frequent operations. Extensive internal documentation in the form of a powerful help command was to provide information to new users of the system or users that wished to use more advanced features. For a listing of the various help responses actually produced see appendix H.

When an incorrect command was detected an appropriate error message was to be output. The error message would give enough information to allow the user to locate and correct the command. The user would always be able to resort to the help command for more information.

The command parser was to be expandable as new features became
needed. As some features were performed by more than one command, the user interface would allow commands to be added as required to permit resemblance to existing systems.

Another feature of the system would be the use of run-time switches, either given by the user or read from a special switch file, to modify the default behavior of the system. This would allow users with special needs to tailor the Online Subject/Title Catalog to their requirements.

**Internal Design of Data Base**

**Designing Data Base Contents**

The choice of the contents of the data base involved the selection of what bibliographic information would be made available to the user of the system, what information would be searchable, and where to extract that information from the OCLC-MARC records. The information that would be displayed as citations that were located by the user had to be limited in size. The entire MARC record would have required much more disk storage space than was available. The items that would be of most utility to the user and would enable the citations to be easily located were thus of prime importance. The full title was picked as one item that would have to be available. Previous analysis of Western Michigan University Libraries' OCLC-MARC entries showed that this would require an average of about 125 bytes per record. The title was extracted from the 245 tag subfields "a", "b", and "c". In the 245 tag subfield "a" is the main title,
subfield "b" is the subtitle, and subfield "c" is the statement of responsibility. To enable citations to be found in the library the call number was included in the items to be displayed. The call number was extracted from the 050, 090, or 099 tags depending on whether the item was given a local call number that differed from the library of congress call number. The call number required about ten bytes per entry. Since Western Michigan University has several branch libraries, a location code for items not held in the main library was included. The location code was extracted from the 049 tag and converted to a three to five letter code. Also extracted from the 049 tag was whether the item was a serial or a monograph. If it was a serial the word "SERIAL" was displayed in the citation. The copyright date was extracted from the 260, tag subfield "c", and displayed in the citation. Another piece of information displayed is whether the item contained a bibliography. Any item having a 504 tag was assumed to have a bibliography and "BIBL" was displayed in the citation. To aid the user in deciding if a citation was what was needed the subfield "a", from the 300 tag was displayed. This subfield contained collation notes and generally showed the number of pages the item had. This typically required ten bytes to store. The last piece of information that was displayed was the language the item was written in, if not English. This was displayed in the three letter code that was directly extracted from the 008 tag. Even though the amount of storage required would vary greatly from item to item by analysis of the data beforehand a very good estimate was made.
for the disk space required to store the displayed information. The average for Western Michigan University Libraries' items came to 160 bytes per item.

The areas to be searchable needed to be limited to only those having subject terms of interest. For this reason only the subject headings, that is the tags from 600-695, and the title, subfields "a" and "b" from 245 tags, would be searchable. The author fields, call numbers, publisher, and many other fields of interest to the library staff or that were accessible in the card catalog were not used. Since the subject headings were to be searched but would not be displayed, separate methods had to be used to store the key information and to store the displayable citations.

The ability to search for key terms independent of location or order in the citation was the access method chosen. Key terms were to be extracted from the title and the subject headings and would be searchable without regard of the original context or location. This loses the ability to do "phrase searching" but permitted the user to find items without having to know the context or exact usage.

The choice of what would be defined as a legal key term was made after analysis of the word content of the OCLC-MARC records for Western Michigan University Libraries' entries. The maximum size for key terms was set at fifteen characters. This size was picked because word size analysis showed that fifteen characters would encompass over ninety-eight percent of the words in the searchable fields and because multiples of five characters made the most
efficient use of the DECsystem-10 architecture. The minimum size for a key term was set at three characters. Examination of the list of words in the data showed few smaller than three characters with any use in searching. To remove terms with limited utility to the expected user key terms were limited to those that began with a letter and contained only letters and digits. This caused numbers such as year dates to be ignored as key terms.

Key and Record Structure

With the information that needed to be stored in the data base well defined the next step involved designing the actual method of storage in the disk system on the DECsystem-10. To limit the number of disk operations during searching, random access files were used to store the information. Because of its relative simplicity and compactness an inverted list structure was chosen for the data base. A three level index and the text of the citations to be displayed were to be the parts of the data base.

The text for the citations consisted of records of variable length, the size depending of the length of title, and whether the optional information such as language was present. The size of the records required varied from about twenty up to several hundred characters. So that space would not be wasted by using the maximum space for all records, the citation records were first packed up by removing carriage-return, linefeed pairs and replacing them by a single character, the percent sign ("%"). The percent sign was used
since analysis of the character content of the OCLC-MARC record showed that percent signs were not present in the data and could safely be used as a delimiter between lines in the citation. At the end of the record an up-arrow ("\^\n") was placed to indicate end of logical record. The up-arrow also did not occur in the data and could be used without fear of it showing up at the wrong place.

The record was then divided into twenty character segments and output to a random access file. A logical record consisting of one citation could thus have required several physical records in the "text file". The twenty character physical record size was picked because it required four computer words of computer memory to store on the DECsystem-10 and thus each physical record started at a multiple of a power of two number of words in the disk file. This simplified the arithmetic required for the random access disk input and output routines. The pointers in the index file pointed to a start of a logical record in the text file. Thus the greater number of possible physical records that would occur with a smaller physical record would have required more space to store the pointers to those records. Each logical record would on the average have one half of a physical record wasted at the end of the logical record. Thus for each logical record, ten characters were wasted in the text file on disk. A larger physical record would waste more characters per logical record. Thus a physical record size of twenty was settled upon as a compromise between all the constraints.

The index to the text file was set up as three files, one that
would be kept in core during the time the program was run, and the other two files that read from disk in random access mode. The top index, the one that was kept in core by the program, consisted of the first two characters of the key terms and pointers into the next file for the range of key terms starting with those two characters. Included in this file was also the two character combinations consisting of one or two wild card characters and each possible letter or number along with the range of key terms that would have to be searched to find all possible matches of search terms starting with those wild card characters. For the total collection this file consisted of 585 two character combinations. Since this file was to be read in only once when the program was loaded and saved as a core image file, it was stored in sequential mode and no effort was made to make it very space efficient. This file was read into a SNOBOL4 data structure called a "table", and was thus called the "table file".

The next level in the index contained the actual key terms. This "key file" is pointed to by entries in the table file and contained a list of unique key terms, sorted in alphabetical order. It also contained a pointer to the next level in the index, and a count of how many items had this key term in them. The key file used four words of space for each key term. Three words were used for the fifteen character key term. The fourth word was split into two fields, the first field of 20 bits stored the pointer to the next level of the index. The second field in the remaining 16 bits of the
36 bit word contained the count of how many items had that key term in them. Thus a maximum of 65536 items could have had any single key term. The 20 bits of the pointer to the next level of the index limited the total number of non-unique key terms to 1048576. This was the maximum limit for the number of key terms that could be extracted from the display file, with a key term found in multiple records being counted each time.

The next level of the index was the one pointed at by the key file and it was this file that points at the text file. This file contained the list of logical records in the text file that had a specific key term. This "record file" stored the pointers to the beginning physical record of a logical record in the text file that had a key term from the key file. The pointers were stored in the record file one per word. Thus 36 bits were used for each pointer into the text file. This limited the maximum number of physical records in the text file to 68 billion. This gave nearly unlimited range to the pointers to the text file. In the system at the Western Michigan University Libraries there were about ninety thousand titles on line with room for a total of about one hundred fifty thousand without any modifications to the system.

The size of the text file and the record file would grow as the number of entries in the system grew. The table file would reach its maximum size when all possible two letter combinations were found. The key file grew but at a rate that appeared logarithmic. This was caused by key terms found in new entries to the system already
occuring in some previous entry. The key file had just one entry per unique key term and thus grew only as new key terms occured in entries. The total size for the four files for the Western Michigan University Libraries collection of ninety thousand entries was twenty five thousand disk blocks on the DECSytem-10 which was sixteen megabytes of space.

The structure of the data base allowed searching to proceed at a fast and efficient pace but did not allow additions or deletions to be made to the data base. As the Western Michigan University Libraries received their subscription tapes at six month intervals, the requirement to completely regenerate the data base came only twice each year. No need existed to make more frequent changes. If more frequent modifications were to be made some kind of data base structure that allowed this would be preferable.

Implementation Language

The choice of implementation language for a system often shapes the limitations and general form of that system. For this system what was needed was a language that had powerful character string handling features, the ability to perform random access input and output to disk files, and flexible terminal input and output facilities. Another consideration was that the language produce code that was efficient both in use of computer time and memory space. A language that met all of these requirements and was familiar to the programmer was FASBOL. FASBOL is a compiled version of SNOBOL4, a
string handling language developed by Bell Laboratories.

The SNOBOL4 language is designed for operations on text rather than simply arithmetic operations. Since much of what was done in a system such as this amounted to modifying and transmitting character strings the SNOBOL4 computer language seemed to be ideal. The FASBOL compiler for SNOBOL4 produced assembly language code that ran much faster and in less computer memory than interpreted versions of SNOBOL4. FASBOL had built-in terminal input and output facilities that allowed the user interface to be fairly invulnerable to user error. Even though FASBOL had no random access mode of disk input and output the FASBOL compiler could produce code that was linkable to assembly language routines. This allowed special routines to be written in assembly language to do the random access input and output. Having to write assembly language routines for this involved more work but probably produced a system that ran faster than one that might have used a preexisting facility.

Even though SNOBOL4 is not one of the three or four most common computer languages, versions of SNOBOL4 exist for most computer lines. FASBOL implementations exist on Digital Equipment and Univac computers. For IBM computers, SPITBOL is a compiled version of SNOBOL4 that is nearly identical to FASBOL. Interpreted versions of SNOBOL4 exist on Honeywell and Control Data systems.

Using SNOBOL4 made the implementation and design much easier, however this does not mean that such a system could not be implemented using another language that had the required facilities.
Using the FASBOL compiler did save a great amount of time and work, and the system would have been completed much later and would not have been as easy to use, if another language had been used.

**Programming Considerations - Dynamic Sets**

Since the save set method of storing groups of citations was used in this system, a decision had to be made as to how they would be represented in the computer system. The actual information to be stored in the save sets was the logical record number for the citation in the text file. This method involved storing only a single integer number rather than a variable amount of text. To store this set of numbers in the computer required one word of computer memory per set entry. The simplest way to do this would have been to create an array large enough to hold the maximum number of save sets when all were filled up to the maximum number of entries per set. This forces one of two alternatives in the use of the array space. One alternative required that rather small limits be put on the set sizes. The other alternative would have been to penalize all users with larger amount of memory use when most users would not ever approach the maximum limits. Another method that would have allowed nearly unlimited set size was to store the sets created in a disk file. This would have saved on memory utilization at the great expense of having to do many more disk operations. The method chosen was to use a feature of SNOBOL4 that permitted creation and deletion of arrays at run-time. Save sets were represented by a program.
defined data type that contained a count of the number of items in the set and an array that was only large enough to hold the list of set entries. The FASBOL run-time system allowed dynamic creation and deletion of arrays as needed. Thus the amount of memory in use by the system would grow as more or larger save sets were generated. Since the user generated data types could be passed back and forth to routines in the program, operations such as Boolean operations and parsing of search expressions were easily handled.

Programming Considerations - User Invulnerability

It was important that no action on the part of the user would cause the Online Subject>Title Catalog to unexpectedly halt or to enter a state that the user could not get out of. Almost all possible problems could be detected and handled by the mainline FASBOL program. Two assembly language routines were written to trap the cases that could not be detected in FASBOL. The first routine was used to trap control-C's and return control to the main program. Control-C's on the DECsystem-10 normally cause an immediate exit to monitor level. This was not desirable because the user would lose all created save sets. An assembly language subroutine was written that trapped control-C's and passed control to a special label in the mainline program where the user would be asked to confirm the desire to leave the program. In order to avoid leaving the pointers into the data base in a pathological state, control-C's during disk input operations were to be ignored. The other possible problem for which
an assembly routine was written was the attempt to use more memory space than allowed. Before the dynamic creation of the array used to store a save set, the current amount of memory in use would be checked against the maximum allowed. If there was not enough memory available, an appropriate error message would be issued and the save set would not be created.

Resultant Code

The code produced for this system could be divided into three parts. The first part was the programs required to produce the database and to regenerate it each time a new subscription tape came from OCLC. Five FASBOL programs with a total size of 750 lines of code were written to handle these operations. The second part of the system was the actual Online Subject/Title Catalog program. This FASBOL program was about one thousand seven hundred lines long which is fairly small for programs of this power. If FASBOL had not been the implementation language the program would have been much longer. The third part of the programs included the assembly language routines used by most of the FASBOL programs. This library of routines was about 800 lines of MACRO-10 code. Since the random access disk input and output routines existed as three separate programs that did almost exactly the same operations, the writing of them involved mostly copying the first one that worked and making the slight modifications to change it into the other routines. For a listing of the source code for the Online Subject/Title Catalog see
appendix I.

Along with these programs about fifty other programs were written, mostly in FASBOL, for statistical analysis of the OCLC-MARC data, and to produce hard copy products that were developed at the same time.

Run Time Requirements

The Online Subject/Title Catalog program was implemented on a DECsystem-1099 system. The system was the Western Michigan University Academic Computer Center system, consisting of a dual KL-10 processor, seven RP06 disk drives with a total of 1232 megabytes of online storage, and 768 kilo-words of core memory. As this was a time sharing system with up to one hundred seventy-five users at the same time, the Online Subject/Title Catalog was designed to put as little load as possible on the computer resources.

The Online Subject/Title Catalog was designed to run under the TOPS-10 version 7.01 operating system. However, few if any of the system dependant features were mandatory and the system could easily have been run on any DECsystem-10 or DECsystem-20 with only minor modifications. To move to a different vendor's computer would require the random access input and output routines to be rewritten and some allowances to be made for variations in the SNOBOL compilers.

The online subject index program was stored as an executable core image file so that when run the program would not have to be
recompiled and linked. The program required a minimum of thirty two kilo-words of memory when run. As citations were searched for and save sets created, the memory space would grow dynamically up to about fifty kilo-words when twenty save sets of one thousand citations each were created.

Some effort was made to make the program reentrant and thus allow for some of the invariant code to be shared when several users were accessing the system at the same time. This proved not to be feasible due the the structure of the FASBOL run time library.

The central processor run time required to search the data base for citations or to merge save sets with the Boolean operators was fairly small. For example, to search for those items having both the key term "HEALTH" and the key term "CARE" involved extracting the 1026 citations with "HEALTH" and the 712 citations with "CARE" then performing a Boolean "AND" operation on the two lists. This involved performing twenty eight blocks of disk reads and required 1.15 seconds of CPU time, resulting in 268 citations with both terms.

The amount of computer resources used by the Online Subject/Title Catalog was small because of the simple and efficient structure of the data base. The requirement to completely regenerate the data base each time a new subscription tape was received was more than offset by having the Online Subject/Title Catalog be relatively fast in use.
Automated Production of Database

Removal of Duplicates from Display File

Since the subscription tape was a transaction file and not an inventory file, a given item might have shown up several times. This could happen, for example, if the item was entered and then later modified. At Western Michigan University Libraries, items entered for the first time into the OCLC system were first entered without local holding information and then later modified to reflect changes from standard cataloging format. This produced at least one duplicate record on the tape for each locally entered item.

Each item on the tape had a unique sequence number assigned to it by OCLC. This OCLC control number allowed the removal of duplicates in the display file. First, all the OCLC numbers were extracted and sorted. Then successive numbers were compared and duplicates were output to a separate disk file. The display file was then read and rewritten checking OCLC numbers. If the OCLC number of the record in the display file was one of the duplicates it was ignored and that OCLC number marked as being ignored. If there were several duplicates in the file, all but the last occurrence of records with that OCLC number were to be ignored. This would leave the last record with a given OCLC number to be output to the file of non-duplicates. It was assumed here that the last item in the display file was the most complete and correct. It also forced the display file to be kept in date order. The individual subscription
tapes had transactions ordered from oldest to most recent and if tapes were kept in order of period covered by each tape the entire file would be correct by date.

A small number of items would slip through this scheme because when a item was cataloged it might not have been found in the OCLC system even though it already existed. If this happened a new OCLC number would be assigned and the item would show up twice in the display file with two different OCLC numbers. Because this happened very rarely and was very hard to catch, no attempt was made to correct for such duplication.

Stop Word List

The method of key generation involved creating an index entry for all key words in areas of interest in the record. A key word was defined for this system to be any sequence of characters starting with a letter and consisting only of letters and numbers. A minimum key word size of three characters was chosen to eliminate key words too short to bother with. This still left many words that are too common or too uninformative to be useful in the index, such as "THE". A "stop word list" was used to prevent these words from showing up in the index.

A standard stop word list that came with a system program was used as a starting point. A special program was written that counted the frequency of words not on a stop word list. Words that occurred frequently and were judged to be of little use were added to the stop
word list. By adding such words to the stop word list, they did not have index entries made for them and the size of the index file was reduced. The drawback to putting an item on a stop word list was that records could no longer be found using that stopped word. There must be a balance between indexing depth and efficiency. It was found that the smaller the stop word list, the more useful the system was. As the number of items on the stop word list was reduced, the number of possible access points for any record would grow. Alternately, it was possible to have a record nearly disappear if most of its key words showed up on the stop word list. The stop word list used for the latest generation consisted of 56 words. See Appendix D.

Generation of Data Base

The generation of the data base involved several separate steps. These steps were done separately because of programming considerations and because having a generation process that could be stopped part way to completion was convenient in our computer environment. Some of the steps in the generation process were best done by system programs. An example of this would be the sorting of the key terms extracted from the OCLC-MARC records. Using a system program such as SORT meant that execution of the data base generation program for the previous step would end and control would then pass to the sorting program. After the sort was completed control could then be passed back to one of the generation programs. Using system
programs when possible saved development time when designing the system and computer time when running the system. In some cases, however, it was found that system programs were not as efficient as custom written programs that served the same function. An example of this was a KWOC (Key Word Out of Context) program that existed on the Western Michigan University Academic Computer Center system. A custom written program was found to run several times faster and allowed inclusion of features not existing in the system version.

The generation process was broken down into seven logically separate steps. Some of the steps were carried out concurrently with each other as the operations for one step might involve doing work that would have had to be done again in the next step and did not create conflicts.

The first step in the process was the conversion of the format of the subscription tapes from the OCLC archival format to the display format that was found to be easier to work with. The second step was to locate the OCLC control numbers for duplicate items. The third and fourth steps were done concurrently with a single program. These two steps are the generation of the text records to be displayed as citations and the extraction of the key terms from the areas of interest in the OCLC-MARC records. The fifth step was to sort the key terms using a system sort program. The sixth step involved extracting unique key terms from the sorted list of key terms and producing the index files. This step involved two separate programs but could have been done by one. The choice to use two
programs was based on simplicity of resulting programs and the desire to check the correctness of the results after the first program was done. The last step involved the generation of the file that was to be read into the in-core table. This table file of the first two characters of key terms was generated by the second of the programs that produced the index files. One consideration in the designing of the programs for data base generation was that some of the methods used were new to the programmer. Because of this, it was desirable to have the capability to stop at critical points in the generation process and inspect the results for correctness.

Generation of Text Records

Text to be displayed in citations to the user of the system was extracted in a single pass through the source OCLC-MARC records. Records that were among the list of duplicate records were ignored. The duplicate record list contained one occurrence of the OCLC control number of each duplicate record. This means that an item that occurred once would have had no duplicates and would not have shown up in the list. An item that had, for example, six occurrences would have had five duplicates and would have shown up in the duplicate list five times. The duplicate list was read into a table and the count of the duplicates was kept in the table and indexed by the OCLC control number for that duplicate.

As records were read in, the OCLC control number for each record was checked against the table. If it was not in the table it was
accepted. If it existed in the table it was ignored and the count
for that item decremented by one. If the count for the OCLC control
number was zero, all duplicates had already been ignored and the item
was accepted.

When a record had been accepted as a non-duplicate the tag
fields of interest were examined. The 008 tag was examined and if
the language code indicated that the item was written in some
language other than English the three letter code for the language
was extracted and held for later use. The 049 tag was examined for
the location code in the Western Michigan University Libraries
system. If the code was for something other than the main collection
a three to five letter code for that branch collection was located
from a table and saved. If the 049 tag indicates that the item was a
serial, than the word "SERIAL" was put into a flag and saved. From
the 050, 090, and 099 tags the call number in use at the Western
Michigan University Libraries was extracted. The call number had
subfield delimiters replaced by spaces and the reformatted call
number was saved with parenthesis around it. The 245 tag subfields
"a", "b", and "c" contain the full title and primary responsibility.
The entire tag was extracted and converted to upper case characters
and the subfield delimiters replaced by spaces. The copyright date
was extracted from the 260 tag subfield "c". From the 300 tag
subfield "a", the pagination was extracted. If a 504 tag existed
than the word "BIBL" was stored in a flag to indicate that the item
contained a bibliography. The subject headings were not extracted.
for later display because of space limitations.

The citation was then output in random access mode to the text file. Where new lines were to start in the citation a percent sign ("%") was inserted in the record. At the end of the record an up-arrow ("\u2192") was added. The format for the citation is thus:
call number in parenthesis, new line, 245 tag subfield "a", new line,
245 subfield "b", new line, 245 subfield "c", new line, pagination,
bibliography flag if any, copyright date, language code if any, and serial flag.

The logical records constructed by this process required varying number of physical records in the text file to store. The logical record was broken into twenty character sections and output to the text file. The physical record number of the start of the logical record was pointed to by the index files. The use of percent signs and the up-arrow in the logical record allowed reconstruction of the desired format from the more compact form. The percent sign and the up-arrow were chosen because they did not normally occur in the data.

**Extraction of Keys**

During the process of generation of the text file, the key terms were extracted from the fields that were to be searchable. When a record was accepted as not being a duplicate, the fields to be searched were converted to upper case and subfield delimiters were changed to spaces. Character set shifting delimiters such as the altmode were deleted. Each field was then broken up into key terms.
using a method that was similar to a KWOC (Key Word Out of Context) index program. As each key term was extracted it was checked for unique occurrence. If a key term was found more than once in a record, later occurrences in that record were ignored. At the end of the record all the key terms found in that record were output along with the starting physical record number of the logical record in the text file from which the key terms were extracted. Thus the list of key terms contained pairs of first the key term and second the record number for the text file entry produced from the item having that key term. The key term was padded with blanks on the right side so that the list could be sorted by key term.

The 245 tag, subfields "a" and "b", were processed for key terms. The subfield "c" of the 245 tag, the primary responsibility, was not searchable. This choice was made to limit the size of the index and because this information was available in the card catalog. Other title tags, those from tag 200 through 250, were processed for key terms in all subfields. The subject heading, tags 600 through 695, had all of their subfields processed for key terms. The local subject headings, tags 690 through 695 were included because even though they might have had headings that did not conform to Library of Congress standards, the key terms would be of use to a user searching for the item.

Compaction of Key Terms

The next phase of the generation process involved reduction of
the list of key terms to unique items. This was done to save space in the key file. For the Western Michigan University Libraries' collection of ninety thousand items there were over five hundred thousand keys extracted from the OCLC-MARC display file. However, only fifty thousand of these were unique terms. Storing unique key terms only once resulted in a nearly ten fold saving in space required. The small overhead to add another level to the index was negligible when compared to the savings in disk space used and the number of disk accesses required.

The method used to locate unique key terms was to sort the list of key terms and associated record numbers by key term. Thus all record numbers for items having the same key term would be sorted together. The key term was the main sort key and the record number was used as a secondary sort key during the sorting process. Thus for any key term a sorted list of record numbers was produced.

This stage of the key generation process required an efficient sort program and a large amount of temporary disk space for scratch files that the sort program used. About one hundred thousand blocks of DECSYSTEM-10 disk space was used for sorting the key terms for the entire collection. This was about sixty-four megabytes of disk space. For a very large collection the ability to sort the key terms might be the limiting factor on the number of items that could be processed.
**Generation of Key File**

The next step in the process involved taking the sorted list of key terms and associated record numbers and producing the index files that were searched by the Online Subject/Title Catalog program. This was done by two separate programs. The first took the sorted key terms and record numbers and output to the record file the list of record numbers in random access mode. At the same time the program output a sequential mode file containing a list of the unique key terms and the range of physical record numbers in the record file that contained the list of records in the text file that had that unique key term. Unique key terms were located by comparing adjacent key terms and checking when the term changed. The term and the range of the corresponding records in the record file were then output. The record file contained exactly the list of record numbers that occurred in the sorted key term file.

The resulting list of unique terms and ranges were then processed by a second program. This program output the unique key terms and the ranges of records in the record file in random access mode. The key term was stored in three words, five characters per words. The range of records in the record file was stored in a single word of 36 bits. It was stored as a starting record number of 20 bits and a count of 16 bits. The packing of the key term and pointers into the record file in this manner caused the key file to grow slowly when compared to the source OCLC-MARC display file.

While producing the key file the program also produced a list of

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key terms and the number of items that had that term. This sequential mode file could be sorted by key term but could also be sorted by number of occurrences. This gave a guide to what key terms would be useful for searching and did aid in the development of the stop word list.

**Generation of Table File**

The same program that produced the key file also produced a list of the first two key characters of the key terms and the range of records in the key file that had key terms with those first two letters. Also produced were the range of key terms that would need to be searched for each possible use of one or two wild card characters in a search term. This list was output to a sequential mode file. The first record in this table file was a header that identified the collection the data base was generated from. This file was read into a SNOBOL4 table data structure when the Online Subject/Title Catalog program was loaded into core and saved as an absolute core image file.

Since the table file was read in only once each time the program was recompiled and reloaded, having it in sequential mode and in unpacked format would not cause a delay at run time. With a much larger collection, the table could be expanded to the first three characters of the key terms and could be kept not in core but rather in a random access file. If memory space permitted even a three character table could be kept in core with the resulting increase in
access speed.

The number of entries in the table file did not grow with the collection size as nearly all two character combinations for the beginning of key terms existed in even small collections.

**Updating the System**

When a new OCLC-MARC subscription tape was received it was necessary to update the contents of the data base. Due to the structure of the data base, each time a new subscription tape was to be merged into the existing data base, the entire generation process was performed. Even though this required old records to be completely reprocessed, it allowed changes in the holding information to be up to date and correct. Changes in location codes, call numbers, and subject headings for items that already existed in the data base but occurred on the new subscription tape were made automatically. The assumption was made that the most recent entry was to be taken as the most complete and correct one available.

Regeneration of the data base each time a new subscription tape was received meant that the regeneration process was performed at least once each six months, the interval that Western Michigan University Libraries received subscription tapes. This required about three hours of computer time on the Academic Computer Center DECSYSTEM-10. The advantage gained from having to do a total regeneration each time items were to be added to the data base came from the resulting simplicity in the structure of the data base. By
not having the linked structure that dynamic insertion would have required, the Online Subject/Title Catalog program could perform searches with a minimum of processing overhead. For the number of holdings that were involved at Western Michigan University Libraries, on the order of one hundred thousand, the cost of regeneration was small compared to the savings in having the Online Subject/Title Catalog program be as fast as possible. The regeneration was done during off-peak hours on the computer system and created no load on the computer resources.

The regeneration did require a large amount of temporary disk space to use for sorting the OCLC control numbers and the key terms. For this reason one hundred thousand blocks of disk space, about sixty-four megabytes, was provided on a short term basis by the Academic Computer Center.

The program for the first step of the key generation process was written so that the entire set of OCLC-MARC display files did not have to be on online disk storage at the same time. The program would read in one set of records at a time and when finished with those would ask for the next set to be processed. This permitted having only one set of OCLC-MARC display records on disk at a given time. As each OCLC-MARC display file was to be input it was read off tape by another job and made available to the program. The OCLC-MARC display files were the contents of each separate subscription tape converted to display format and were kept on magnetic tape in order of date received.
The regeneration of the data base could have been done in a merging fashion. The previous sorted files of OCLC control numbers and key terms could be merged with the OCLC control numbers and key terms extracted from the new subscription tape. However this would have prevented easy updating of location and call number changes, something that was required for the type of collection at the Western Michigan University Libraries. If a collection was much larger or did not require that the contents of the text file to change then a merging method of data base regeneration could be used to advantage. For the results of the latest regeneration see appendix E.

Command Language

The command language for the Online Subject/Title Catalog was loosely patterned after some of the existing commercial online search systems. However, the command format was kept relatively simple and self consistent. For this reason, some features that could have been implemented were not because of the required changes to the command language. In some cases identical functions were performed by two or more different commands. This was because users requested compatibility with systems that they were familiar with and because as the program evolved an attempt was made to keep upward compatibility between versions. This meant that once a command had been introduced, if only for experimental purposes, that command would not be removed from the command language.

The general form for commands to the Online Subject/Title
Catalog was a single word command followed by an optional argument. The command parser ignored spacing and upper and lower case variation in user commands. Most commands could be abbreviated to a single character. The exceptions to this were commands that would cause problems if accidently typed, for example the "EXIT" command. For sample executions of the Online Subject/Title Catalog see appendix G.

Command Summary

The following is a summary of commands for the Online Subject/Title Catalog program. Listed for each of the commands is the action the Online Subject/Title Catalog performed and the argument the command took if any.

COMMAND: DISPLAY
ACTION: LISTED CURRENT SAVE SETS AND CONTENTS.
ARGUMENT: NONE.

COMMAND: EXIT
ACTION: EXITED FROM PROGRAM AND RETURNED TO MONITOR.
ARGUMENT: NONE.

COMMAND: EXPAND
ACTION: SHOWED KEY TERMS THAT MATCHED A KEY DESCRIPTOR.
ARGUMENT: SINGLE KEY DESCRIPTOR WITH OR WITHOUT WILDCARDS.

COMMAND: FINISH
ACTION: SAME AS EXIT.
COMMAND: HELP
ACTION: GAVE INTERNAL DOCUMENTATION ON USE OF PROGRAM.
ARGUMENT: OPTIONAL ITEM THAT HELP WAS NEEDED ON.

COMMAND: INFO
ACTION: GAVE CURRENT STATUS, SUCH AS NUMBER OF SETS USED.
ARGUMENT: NONE.

COMMAND: LOGOFF
ACTION: BEGAN LOGOUT DIALOG TO LOG OFF SYSTEM.

COMMAND: OUTPUT
ACTION: OUTPUT SET TO DISK FILE IN SINGLE LINE FORMAT.
ARGUMENT: SAVE SET NAME OR BOOLEAN EXPRESSION.

COMMAND: PRINT
ACTION: OUTPUT SET TO LINE PRINTER IN CITATION FORMAT.
ARGUMENT: SAVE SET NAME OR BOOLEAN EXPRESSION.

COMMAND: QUICK
ACTION: SAME AS EXPAND.

COMMAND: RESET
ACTION: DELETED ALL CURRENT SAVE SETS.
ARGUMENT: NONE.

COMMAND: SEARCH
ACTION: CREATED A SAVE SET WITH SPECIFIC PROPERTIES.
ARGUMENT: EXPRESSION OF KEY DESCRIPTORS AND SET NAMES.
COMMAND: SELECT
ACTION: SAME AS SEARCH.

COMMAND: STEPS
ACTION: SET OR CLEARED FLAG TO SAVE SUBSETS IN SEARCHES.
ARGUMENTS: NONE, USER WAS PROMPTED FOR DESIRED ACTION.

COMMAND: STOP
ACTION: SAME AS EXIT.

COMMAND: TYPE
ACTION: TYPED ON USER TERMINAL CITATIONS IN A SAVE SET.
ARGUMENT: SAVE SET NAME OR BOOLEAN EXPRESSION.

COMMAND: WHAT
ACTION: SAME AS DISPLAY.

COMMAND: WRITE
ACTION: OUTPUT TO DISK FILE SAVE SET IN CITATION FORMAT.
ARGUMENT: SAVE SET NAME OR BOOLEAN EXPRESSION.

Wild Card Characters

There were three wild card characters permitted in key descriptors. The key descriptors could not have one of these wild card characters in the first two character positions because of the use of the two character index to key terms in the key file. By use of run-time switches, the Online Subject/Title Catalog could be put into "expert mode" which permitted use of wild cards as the first two
characters in a search term. The drawback to this increased power was that the entire key file might have to be searched to find all possible matches. The wild card character asterisk ("*"), matched any number of characters including nulls. Right hand truncation was thus achieved by ending a key descriptor with a "*". The "*" had more power than that, having been usable inside of a key descriptor. Thus "AR*TIC" would match "ARCTIC" as well as "ARTISTIC". The wild card character question mark ("?"), replaced any single character. For example "WOM?N" would have matched "WOMEN" as well as "WOMAN". The wild card character percent sign ("%"), matched either a single character or a null. The "%" was primarily used as a pluralizing wild card. For example, "M?N%" would have matched "MEN", "MAN", "MENS", and "MANS". By using wild card characters, powerful search terms were built up as needed.

The use of the "EXPAND" command allowed the user to determine how many key terms would match a key descriptor and which ones might be of interest. This allowed the user to find all key terms that would be desired and ignore those that were close but not wanted, while saving computer time and disk accesses.

There were three Boolean operators permitted in expressions of key terms and set names. The operators were "AND", "OR", and "EXL". The "AND" operator performed a Boolean "AND", with the result being those citations in both of the operand sets. The "OR" performed a Boolean inclusive "OR" with the result being those citations in either of the operand sets. The "EXL" had the same
effect as a Boolean "AND NOT". This "EXCLUDE" was used instead of a
"NOT" to prevent senseless searches of the form "NOT TERM". The
result of the "EXL" was those citations in the first operand set but
not in the second operand set.

No implied precedence of operators existed with evaluation of
expressions performed from left to right. Arbitrarily complex
Boolean expressions were allowed with parenthesis used to force
evaluation to proceed as desired. If the Online Subject/Title
Catalog was running in "expert mode" and no operator was present
between operands then an implied "AND" was inserted.

BNF Expression Grammar

The following is a BNF type grammar for the key descriptors and
for the set descriptors. The character "!" is a meta-syntactic
symbol used in the grammar notation to denote a choice between two or
more options.

\[
\text{SETDESCRIPTOR} = \text{EXPRESS} \\
\text{KEYDESCRIPTOR} = \text{LETTER ALPHANUMERIC CHARACTER} \\
\text{LETTER} = \"A\" ! \"B\" ! \"C\" ! \ldots ! \"Z\" \\
\text{ALPHANUMERIC} = \text{LETTER} ! \text{DIGIT} \\
\text{DIGIT} = \"1\" ! \"2\" ! \"3\" ! \ldots \"9\" ! \"0\" \\
\text{CHARACTER} = \text{LETTER} ! \text{ALPHANUMERIC} ! \text{WILDCARD} \\
\text{WILDCARD} = \"?\" ! \"*\" ! \"%\" \\
\text{SETNAME} = \"S\" \text{ NUMBER} ! \"\" \text{ NUMBER} \\
\text{NUMBER} = \text{DIGIT} ! \text{DIGIT DIGIT} ! \text{DIGIT DIGIT DIGIT}
\]
General Methods of Measurement

In a project of this type, the response of the end users of the system is all important. If the users find that they do not get useful results or can not easily operate the user interface then they will soon abandon the system. Two methods were employed to measure how the Online Subject/Title Catalog was being used and how the users of the system felt about it.

The first method involved having the computer system automatically record use statistics each time the program was run. The second method involved having a subset of the users answer a questionnaire about their use of the Online Subject/Title Catalog.

Along with these direct methods, note was taken of how the user community responded on its own behalf. Several Western Michigan University department and college publications carried announcements about the Online Subject/Title Catalog and special services that used the system were offered by the Western Michigan University Libraries. Use of the system was also given as a class assignment in several classes.
Automatic Logging of Usage

A useful feature of the DECsystem-10 computer is a file protection system called FILE DAEMON (FILDAE). FILDAE allows access to files and programs to be restricted to particular users. It also allows usage of those files or programs to be recorded automatically. The object code file for the Online Subject/Title Catalog was protected so that FILDAE was invoked each time it was run. FILDAE was also invoked at the time when the user stopped running the Online Subject/Title Catalog and ran another program or logged off the computer system. FILDAE recorded the current amount of computer resources used both when the program was run and when it was stopped. This allowed calculation of resource utilization for each use of the system.

The method involved was to record how much of specific resources the user had been charged for at the start of the Catalog run and subtract that from the values at the time the Catalog was stopped. Some slight error may have been introduced due to the fact that the ending values were recorded only when the user logged off or ran another program. If the user left the Online Subject/Title Catalog but did nothing else the elapsed time would continue to accumulate.

The statistics recorded for each run of the Online Subject/Title Catalog included five measurements of program use. The first and simplest is the elapsed time from the start of when the Online Subject/Title Catalog was run until the user stopped the Catalog, either to log off the system or to run another program. If the user
stopped the Catalog and then restarted it, this would count as two runs of the program and the elapsed times would be counted separately for each run.

The next item recorded was the CPU (Central Processor Unit) time. This is what is commonly called "computer time" and measures how much the computer had to work during the run. CPU time will be a small fraction of the elapsed time, and having the Online Subject/Title Catalog on a time sharing system allowed several users to access the system at the same time.

A statistic that involves CPU time is KCT (Kilo-Core Ticks). This is the measure of the use of the core memory of the computer and is the product of the computer time and how much memory was in use during that time. It is one of the items that computer charges are based on and reflected the total load the user put on the system.

The last two statistics measured access to disk files. The number of disk blocks read is a rough measure of how many citations were actually searched. Because of the structure of the data-base a direct correlation between blocks read and items searched was hard to come by. Another factor that showed up in disk reads was the reading of the object file of the program into core before execution. This typically required about 200 disk blocks of reads. A very approximate correlation can be made by performing a known number of searches and then counting the number of blocks read. This yields about three citations searched for each disk block read.

The number of disk blocks written is a direct reflection of how
many citations were output to the line printer or to a disk file. It takes about one-fourth disk block for each citation output in this manner.

The total number of users of the Online Subject/Title Catalog was counted and the project-programmer number used to access the DECsystem-10 was recorded. By sorting the resulting list of project-programmer numbers, the frequency with which each user ran the Catalog could be counted.

Recording of Usage

The recording of the usage of the Online Subject/Title Catalog was started on 15 July 1981. Even though there were some uses of the system in the first three months it was not until the official public release of the Online Subject/Title Catalog on 1 September 1981 that heavy use began.

Usage was logged until 31 December 1981 at which time totals were calculated. Then on 1 January 1982 the totals were reset and recording resumed. Recording of use was performed until 10 March 1982, at which time a second set of totals were calculated. Because many computer accounts are deleted between semesters and the project-programmer numbers for a given user might change, combining the two periods was not practical.

Usage Statistics

The following table (Table 2) is a summary of usage for each of
the two periods of recording. It can be seen that the means for all categories stayed constant or increased for the second period. As more people learn of the system, it is expected that usage will continue to increase over time.

### Table 2

**Usage Statistics**

<table>
<thead>
<tr>
<th>Period</th>
<th>July-Dec 1981</th>
<th>Jan-March 1982</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citations in Data Base</td>
<td>87000</td>
<td>93470</td>
</tr>
<tr>
<td>Total Runs</td>
<td>1917</td>
<td>1124</td>
</tr>
<tr>
<td>Mean Usage</td>
<td>349</td>
<td>488</td>
</tr>
<tr>
<td>Total Users</td>
<td>400</td>
<td>248</td>
</tr>
<tr>
<td>Elapsed Time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>14:10.5</td>
<td>14:55.8</td>
</tr>
<tr>
<td>Total</td>
<td>452:52:05</td>
<td>279:40:25</td>
</tr>
<tr>
<td>CPU Time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>10.61</td>
<td>13.67</td>
</tr>
<tr>
<td>Total</td>
<td>05:39:03</td>
<td>4:16:47</td>
</tr>
<tr>
<td>KCT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>25637</td>
<td>33276</td>
</tr>
<tr>
<td>Total</td>
<td>49146051</td>
<td>37401780</td>
</tr>
<tr>
<td>Disk Reads</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>480.8</td>
<td>516.95</td>
</tr>
<tr>
<td>Total</td>
<td>921681</td>
<td>581055</td>
</tr>
<tr>
<td>Disk Writes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>7.08</td>
<td>10.54</td>
</tr>
<tr>
<td>Total</td>
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User Survey

In order to judge the needs of users of the Online Subject/Title Catalog and to solicit suggestions for improvements, a questionnaire was sent out to a sampling of the users that were recorded in the log file. This sample was somewhat skewed in favor of faculty and staff and against students because mailing addresses were easier to find for them. The eleven questions were designed to determine how the system was being used and to gain insight into what the users expected from such a system. As this was done soon after the system was released for public use, the total number of users of the system was still fairly small. By getting user reactions at this early point, it was possible to include worthwhile suggestions in later versions of the system.

A total of forty-five questionnaires were returned. This is not claimed to be a statistically valid sample set. However, it did yield some valuable information about the end users and what they wanted. For a sample questionnaire in the original form, see appendix F.

Survey Question Results

Overall the users seem to like the system and what it can do for them. Even though the system is somewhat limited in its coverage and approach, users are finding it a valuable tool. For a listing of the survey results for each question, see appendix F.3.
User Activities

Several individual users and groups of users made special effort to use the Online Subject>Title Catalog and to publicize it existence. Almost all of these actions were taken without any prompting from the author of the system. Press coverage in Western Michigan University publications, services offered by the Western Michigan University Libraries, and the use of the Online Subject>Title Catalog in classes are some of these activities.

Publicity in University Publications

Even though the Administration of the Western Michigan University Libraries did little in the way of public announcements after the release of the Online Subject>Title Catalog, several department and college publications carried articles about the system. The Graduate College Bulletin, the College of Arts and Sciences newsletter, the College of Health and Human Services Research Center newsletter, and the Academic Computer Center newsletter all had articles announcing the system and how it could be accessed. The student newspaper, the "Herald", and the university newsletter, the "Western News", both carried articles describing the development of the system and suggesting the value it could be to users of the library.
**Services Using the System**

The Online Subject/Title Catalog has been used as part of services provided by the Western Michigan University Libraries. The reference desk personnel of the Western Michigan University Waldo Library have been using the system to help answer patron questions about hard to find references. The online searching service of the Western Michigan University Libraries that have used commercial systems in the past, will sometimes search the data base of the Online Subject/Title Catalog before doing costly commercial searches. Particularly for general topics, this will often produce satisfactory results from the local collection. The reference desk of the Western Michigan University Educational Resource Center (ERC) has run a special promotion of the Online Subject/Title Catalog. A form was printed that permitted students and staff to request searches using the system to be performed by ERC staff.

**Use in University Classes**

The Online Subject/Title Catalog has been incorporated into some Western Michigan University classes. The School of Librarianship uses the system in its Online Searching class. Use of the Online Subject/Title Catalog instead of commercial systems allows students greater amounts of time on an online system. The greater user friendliness and internal documentation of the system when compared to commercial system also is of benefit in a teaching environment. The Technical Writing class has also used the system to show students...
what the future holds for access to library resources. A class in
Labor Economics used the Online Subject/Title Catalog to help find
references for use in term paper production. As more students and
faculty learn of the ease of use and power of the Online
Subject/Title Catalog, it is expected that more direct class room use
of the system will occur.

Evaluation of User Response

The overall user response has been very good. Even though the
Online Subject/Title Catalog has been in operation for a short period
of time, a large number of frequent users already exists. User
suggestions and comments are still solicited so that the system can
continue to grow and improve. The interest shown by the user
community has been most gratifying to the author of the system and
attests to the need that existed for a system like the Online
Subject/Title Catalog.

Epilogue - Final Status

Due to the unusual nature of the Online Subject/Title Catalog,
an agreement has been made between the Western Michigan University
Academic Computer Center and the Western Michigan University Waldo
Libraries. This agreement fixes responsibility for maintaining the
data base and providing computer resources. One of the reasons that
such an agreement was required was that the administration of the
library felt that the Online Subject/Title Catalog competed with the
CLSI circulation system currently in use. Because of the large amount of University funds and outside grant money that has been expended on the CLSI system, the existence of a system superior in some function caused some embarrassment. Reproduced in appendix J is the text of the agreement worked out to ensure that the program would continue to exist with minimum cost to all parties. The Online Subject/Title Catalog is called "online library index" (OLLI) in the agreement because the library administration was reluctant to call the system a "catalog".

Conclusions

The Online Subject/Title Catalog system is an example of what can be produced with only limited resources. Even though the cost of the system was far less than some of the existing systems at other institutions, features were made available that provide the library patron with a powerful and easy to use system.

This kind of system could be implemented by most institutions without great cost. To keep cost under control and to end up with a usable system, it is mandatory to limit the scope of the system and to focus on those features most needed. A system of this type could be scaled up for collections up to a million or so items with some changes due to the size of index files. For a very large collection a medium scale dedicated computer system such as a DECsystem-20 would probably be required.

While the demands on libraries continue to grow and the
resources of libraries and groups of libraries are not permitted to grow as rapidly, a system such as this could aid in making the best use of existing resources.
CHAPTER V

OVERALL CONCLUSIONS

This project has been very successful in its main goal, namely the design and implementation of a highly usable subject searchable online catalog based on the OCLC-MARC subscription tapes of the Western Michigan University Libraries. At the same time statistical analysis of the OCLC-MARC subscription tapes produced information that was useful in its own right and suggested new uses for the data. Paper products were also designed and produced on a limited basis that demonstrated uses for the tapes that required very little in the way of computer resources.

Arrangements have been made so that the Online Subject/Title Catalog will be maintained on a long term basis. This will mean that the Western Michigan University community will be able to benefit from the results of the project for a long time. The system of programs developed during this project have also been adapted to handle other sets of data and may form a collection of software tools that will be made available to all users of the Academic Computer Center facilities.

This project had a very low total cost, due in part to having been done as a Master's Thesis by an unsupported graduate student. This along with its general success, produced a extraordinary
cost/benefit ratio. If done as a commercial enterprise the cost might have been prohibitive and the pressure to produce a final product would have meant that the end results would not have been as remarkable.
CHAPTER VI

PRESENTATIONS

During the development of the Online Subject/Title Catalog, several presentations on the system were made to various groups. The presentations served two valuable purposes, to advertise the existence of the system and to get suggestions from possible users. A series of slides were prepared and three technical reports produced to assist the presentations.

Talks were given to groups from the libraries of Western Michigan University, Kalamazoo College, Oakland University, and Hope College. The Online Subject/Title Catalog was the topic of a Western Michigan University Department of Computer Science colloquium. At the 1982 Association of Computing Machinery Computer Science Conference in Indianapolis, Indiana, the author presented an impromptu talk on the system when a scheduled speaker failed to show for the library systems session.
CHAPTER VII

COOPERATION

An important part of the success of this project was the close cooperation between the people with the computer expertise and the librarians requesting products. Often what the librarians thought would be impossible would turn out to be quite possible and worthwhile. By good communication, the librarians and the computer experts were able to avoid the common problem of each side working independently of the other, thus creating little of use to either.
APPENDIXES

Some of the following appendixes have been reformatted or reduced in order to fit the page size used. Some of the statistical results and paper products were originally produced on 132 column wide line printer paper. They have been reduced to 90 columns but retain the same general appearance.
APPENDIX A

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082  #a812/5/2
049  #aEXWR [c.1Ref]
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245 10#aArthur Miller, a reference guide /#cJohn H. Fer
260 0 #aBoston :#bG. K. Hall,:#cc1979.
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500  #aIncludes index.
600 10#aMiller, Arthur,#d1915- #xBibliography.
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008  781218a1979 nyu 00100 eng
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260 0 #aNew York :#bCrowell,#cc1979.
300  #axiv, 271 p. ;#c24 cm.
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86

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Mohrman, Kathryn.

Federal grants: a basic handbook / by Kathryn Mohrman, with Myra Ficklen, Brenda Latimer.


47 p. ; 22 cm.

Bibliography: p. 31-39.

Federal aid to higher education, United States.

Ficklen, Myra.

Latimer, Brenda.
APPENDIX B

SAMPLE STATISTICS

The following examples of statistical results were derived from the OCLC-MARC subscription tapes of Western Michigan University Libraries as of 31 December 1981. The tapes had been processed to remove entries with duplicate OCLC control numbers. Some of the results have been reformatted slightly to better fit the page size or truncated to a manageable length.
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<td>306 (124/86742=0.1%)</td>
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<td>66.</td>
<td>310 (151/86742=0.2%)</td>
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<td>67.</td>
<td>321 (13/86742=0.0%)</td>
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<td>69.</td>
<td>362 (1602/86742=1.8%)</td>
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<td>70.</td>
<td>400 (29/86742=0.0%)</td>
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<td>71.</td>
<td>410 (190/86742=0.2%)</td>
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<td>504 (53685/86742=61.9%)</td>
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<td>505 (1572/86742=1.8%)</td>
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<td>81.</td>
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<td>82.</td>
<td>511 (573/86742=0.7%)</td>
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<td>83.</td>
<td>515 (287/86742=0.3%)</td>
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<td>84.</td>
<td>518 (75/86742=0.1%)</td>
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87. 530 (1/86742=0.0%) 1
88. 533 (27/86742=0.0%) 1
89. 546 (85/86742=0.1%) 1
90. 550 (226/86742=0.3%) 1
91. 555 (46/86742=0.1%) 1
92. 570 (53/86742=0.1%) 1
93. 580 (223/86742=0.3%) 1
94. 590 (1162/86742=1.3%) 15
95. 600 (11157/86742=12.9%) 1600-600
96. 610 (3128/86742=3.6%) 161
97. 611 (77/86742=0.1%) 1
98. 630 (527/86742=0.6%) 16
99. 650 (69508/86742=80.1%) 1650-650-650-650-650-650-650-650-650-
100. 651 (13110/86742=15.1%) 1651-651-
101. 690 (813/86742=0.9%) 16
102. 691 (132/86742=0.2%) 1
103. 692 (3/86742=0.0%) 1
104. 693 (29/86742=0.0%) 1
105. 695 (1/86742=0.0%) 1
106. 700 (31302/86742=36.1%) 1700-700-700-700-700-7
107. 705 (453/86742=0.5%) 17
108. 710 (9859/86742=11.4%) 1710-71
109. 711 (348/86742=0.4%) 1
110. 715 (220/86742=0.3%) 1
111. 730 (1317/86742=1.5%) 17
112. 740 (3653/86742=4.2%) 174
113. 760 (5/86742=0.0%) 1
114. 777 (1/86742=0.0%) 1
115. 780 (217/86742=0.3%) 1
116. 785 (330/86742=0.4%) 1.
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<td>(209/86742=0.2%)</td>
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<td>125. 872</td>
<td>(142/86742=0.2%)</td>
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<td>(14/86742=0.0%)</td>
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<td>127. 901</td>
<td>(24/86742=0.0%)</td>
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<td>128. 911</td>
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APPENDIX C

PAPER PRODUCTS

The following examples of paper products were produced from the OCLC-MARC subscription tapes of the Western Michigan University Libraries for the period July 1976 through December 1981. While some have been made obsolete by the Online Subject/Title Catalog, some are still being produced and used by library staff and patrons. Some slight reformatting of the products has been done to better fit the page sized used.
C.1 Title List

APHA DRUG NAMES : AN INDEX OF DRUG NAMES. (RS55.A441976)
ASTRONAUTS AND COSMONAUTS BIOGRAPHICAL AND STATISTICAL DATA, REVISED-M(TL789.85.A1U521978)
OUSE OF REPRESENTATIVES, NINETY-FIFTH CONGRESS, SECOND SESSION, BY THE SCIENCE PO
LICY RESEARCH DIVISION, CONGRESSIONAL RESEARCH SERVICE, LIBRARY OF CONGRESS, [PRE
PARED BY MARCIA S. SMITH].
ASTRONOMY AND COSMOLOGY : A MODERN COURSE /FRED HOYLE. (QB43.2.H69)
ATLAS OF HUMAN ANATOMY /ORIGINAL AUTHOR JOHANNES SOBOTTA ; BASED UPON THE 1(QM25.S6761977)
7TH GERMAN ED., EDITED BY HELMUT FERNER [ AND] JOCHEN STAUBESAND.
BARRON'S GUIDE TO FOREIGN MEDICAL SCHOOLS : SELECTING THEM, SURVIVING THEM, AND(R838.4.F56)
SUCCESSFULLY PRACTICING IN THE UNITED STATES /BY CARLA FINE.
BASIC RESEARCH IN THE MISSION AGENCIES : AGENCY PERSPECTIVES ON THE CONDUCT AND SUPPORT OF BASIC RESEARCH /REPORT OF THE NATIONAL SCIENCE BOARD.
BETTER HOMES AND GARDENS FAMILY MEDICAL GUIDE, EDITED BY DONALD G. COOLEY. (RC81.A2C61973)
BIBLIOGRAPHY OF BIOETHICS /EDITED BY LEROY WALTERS. (Z6675.E8W34)
BIBLIOGRAPHY OF BIOETHICS /EDITED BY LEROY WALTERS. (Z6675.E8W34)
BIOGRAPHICAL DICTIONARY OF AMERICAN SCIENCE : THE SEVENTEENTH THROUGH THE NINETEENTH CENTURIES /CLARK A. ELLIOTT.
BIOGRAPHICAL DICTIONARY OF AMERICAN SCIENCE : THE SEVENTEENTH THROUGH THE NINETEENTH CENTURIES /CLARK A. ELLIOTT.
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BIOLOGICAL ABSTRACTS/RRM. (Z5321.B672)
BIOLOGICAL ABSTRACTS/RRM. (Z5321.B672)
BIORESEARCH INDEX. (Z5321.B672)
BIORESEARCH TITLES. (Z5321.B672)
BRIEF GUIDE TO SOURCES OF SCIENTIFIC AND TECHNICAL INFORMATION /SAUL HERNER (Q223.H421980)
; WITH GENE P. ALLEN AND NANCY D. WRIGHT.
BUTTERWORTHS MEDICAL DICTIONARY /EDITED BY ARTHUR SALUSBURY MAGNALTY. (R121.B751978)
CAMBRIDGE ENCYCLOPEDIA OF ASTRONOMY /SIMON MITTON, EDITOR-IN-CHIEF; F(QB43.2.C35(PHYSIC))
OREWORD BY SIR MARTIN RYLE.
CANCER-CAUSING AGENTS : A PREVENTIVE GUIDE /BY RUTH WINTER. (RC268.6.W561979)
AROLD I. KAPLAN, BENJAMIN J. SADOCK.
CONSUMER’S DICTIONARY OF FOOD ADDITIVES /RUTH WINTER. (TX53.A3W551978)
CONTROVERSIES IN THERAPEUTICS /EDITED BY LOUIS LASAGNA. (RM263.C68)
DANGEROUS PROPERTIES OF INDUSTRIAL MATERIALS /N. IRVING SAX, ASSISTED BY M(T55.3.H3S31979)
ARILYN C. BRACKEN ... [ET AL.].
DICIONARIO PARA INGENIEROS :ESPANOL-INGLES E INGLES-ESPANOL /POR LOUIS ROBB(T9.R6181978)
DICTIONARY OF BIOLOGY :ENGLISH, GERMAN, FRENCH, SPANISH /BY GUNTHER HAENSCH A(QH302.5.H33)
ND GISELA HABERKAMP DE ANTON.
DICTIONARY OF IMMUNOLOGY /COMPILLED BY MEMBERS OF STAFF OF THE DEPARTMENT (QR180.4.H471977)
OF MICROBIOLOGY AND IMMUNOLOGY, DEPARTMENT OF PATHOLOGY, AND INSTITUTE OF VIROLOGY, UNIVERSITY OF GLASGOW ; EDITED BY W. J. HERBERT AND P. C. WILKINSON.
DICTIONARY OF USEFUL PLANTS. (QK98.4.C66)
DICTIONNAIRE INTERNATIONAL D'ABREVIATIONS SCIENTIFIQUES ET TECHNIQUES. (Q179.A9X)
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DIRECTORY OF ELECTRONIC CIRCUITS, WITH A GLOSSARY OF TERMS /MATTHEW MANDL(TK7867.M3251978)

C.2 KWOC Index

BINDING
TIME-RELATED CHANGES IN RAT ANDROGEN BINDING PROTEIN(QP9999.S74X(MAIN))
FOLLOWING A STERILIZING DOSE OF 3-CHLORO-1,2-PROFANEOL /BY SHIRLEY J
. STEIN.
BINDRA
PROSTAGLANDIN SYNTHESIS /JASJIT S. BINDRA, RANJNA Bindra.(QP801.P68B56)
BINFORD
PATHOLOGY OF TROPICAL AND EXTRAORDINARY DISEASES /EDITED BY (RC961.P37)
CHAPMAN H. BINFORD AND DANIEL H. CONNOR ; SPONSORED AND SUPPORTED BY AR
MED FORCES INSTITUTE OF PATHOLOGY ... [ET AL.].
BING
CHEMISTRY AND PHYSIOLOGY OF THE HUMAN PLASMA PROTEINS(QP99.3.P7C431979)
BIOCHEMICAL GENE EXPRESSION: PROTEIN SYNTHESIS AND CONTROL, RNA S (QM105.P531978V.2)
SYNTHESIS AND CONTROL, CHROMATIN STRUCTURE AND FUNCTION /FEDS FEDERATION OF EUROPEAN BIOCHEMICAL SOCIETIES, 11TH MEETING, COPENHAGEN, 1977; EDITORS, BRIAN F. C. CLARK, HANS KLENOW, JESPER ZEUTHEN.

BIOCHEMICAL GROWTH FACTORS: CELLULAR GROWTH PROCESSES, GROWTH FACTORS (QM105.F471978V.7)
TORS, HORMONAL CONTROL OF GROWTH /FEDS FEDERATION OF EUROPEAN BIOCHEMICAL SOCIETIES, 11TH MEETING, COPENHAGEN, 1977; EDITORS, KNUD W. KAstrup, JENS HIRIIS NIELSEN.


C.3 Shelf List

(QM105.S9X1975) SYMPOSIUM ON DEVELOPMENT OF THE BASICRANIUM /EDITED BY JAMES F. BOSMA.
(QM181.W34) CLINICAL ANATOMY OF THE HEART /BY ROBERT WALMSLEY AND HAMISH WATSON.
(QM23.2.B371976) PRIMARY ANATOMY /JOHN V. BASHMAJIAN.
(QM23.2.C521978) SYNOPSIS OF GROSS ANATOMY: WITH CLINICAL CORRELATIONS /JOHN B. CHRISTENSEN, IRA R. TELFORD.
(QM23.2.E431976) CLINICAL ANATOMY: A REVISION AND APPLIED ANATOMY FOR CLINICAL STUDENTS.
(QM23.2.G71975) GRANT’S METHOD OF ANATOMY: BY REGIONS, DESCRIPTIVE AND DEDUCTIVE.
(QM23.2.H3531976) TEXTBOOK OF HUMAN ANATOMY /EDITED BY W. J. HAMILTON.
(QM23.2.J63) JOHNS HOPKINS ATLAS OF HUMAN FUNCTIONAL ANATOMY /ORIGINAL ILL. WITH DES
C.5 Place Name Bibliography

BRAZIL * AFRO-BRAZILIANA : A WORKING BIBLIOGRAPHY (Z1697.N4P67)
BRAZIL * BRAZILIAN SLAVERY : AN ANNOTATED RESEARCH BIBLIOGRAPHY (Z1697.R3C66)
BRAZIL, MATO GROSSO (STATE) * EXTERNAL ARTICULATION AND DOMESTIC PRODUCTIO(N : THE ARTIFACT TRADE OF THE MAMAINDE OF NORTHWESTERN MATO GROSSO, BRAZIL (F2520.1.M24A86)
BRAZIL, NORTHEAST * DROUGHT AND IRRIGATION IN NORTH-EAST BRAZIL (HD1872.H341978)
BRAZIL, RIO DE JANEIRO * HOUSING AND SOCIAL TRANSFORMATION (HD7323.R5R3X)
BRAZIL, RIO DE JANEIRO * MYTH OF MARGINALITY : URBAN POVERTY AND POLITICS IN (HN290.R47P47)
BRAZIL, RIO DE JANEIRO
BRAZIL, RIO GRANDE DO SUL (STATE) * DECISION—MAKING AMONG DESCENDANTS OF GER(MAN IMMIGRANT FARMERS IN RIO GRANDE DO SUL, BRAZIL (HD1516.B7K5X)
BRAZIL, RIO GRANDE DO SUL (STATE) * SMALL COLLECTION OF FISHES FROM RIO GRAND(E DO SUL, BRAZIL / BY A. LOURENCO GOMES. (QL632.B8G64)
BRAZIL, SAO PAULO METROPOLITAN AREA * SAO PAULO : URBAN DEVELOPMENT AND EMPLOY(HMENT (HD5755.S2S3)
BRITISH COLUMBIA * TRAITS OF AMERICAN INDIAN LIFE & CHARACTER (E173.R24NO.91972)
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C.6 Numbered Series Bibliography

AMERICAN ETHNOLOGICAL SOCIETY. MONOGRAPH NO. 31 * A COMMUNITY IN THE ANDES; (E51.A556V.31)
AMERICAN ETHNOLOGICAL SOCIETY. MONOGRAPH NO. 32 * LAND AND POLITY IN TIBET. (E51.A556V.32)
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AMERICAN ETHNOLOGICAL SOCIETY. MONOGRAPH NO.36 * WEST INDIAN FAMILY STRUCTURE(E51.A55V.36)
AMERICAN ETHNOLOGICAL SOCIETY.MONOGRAPH[S],52 * LEADERSHIP AND AUTHORITY IN (DT515.42.088)
    AN AFRICAN SOCIETY;
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    NE SOCIAL STRUCTURE OF NORTH AMERICAN INDIANS.
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    LLAGE IN TRANSITION.
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AMERICAN FISHERIES SOCIETY : SPECIAL PUBLICATION ; NO. 11 * SELECTED COOLWATER (QL625.S9X)
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AMERICAN GOVERNMENT AND HISTORY ;V. 1 * IMMIGRATION AND ETHNICITY : (Z7165.U5B83)
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    AND ELECTIONS :
AMERICAN GOVERNMENT AND HISTORY INFORMATION GUIDE SERIES ; V. 3 * SOCIAL HISTO(Z7165.U5T5)
    HY OF THE UNITED STATES :
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C.7 Dewey Number Catalog

020/.7 * Writing Objectives for Bibliographic Instruction in Academic Libraries (Z1001.W75)
Edited by Mary B. Cassata and Herman L. Totten.
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Education Program Planning for Library Staffs in the Southwest, March 17-28, 1975 /Edited and Compiled by Donald D. Foos.
020/.711/73 * Search for a Scientific Profession: Library Science Education in the U.S. and Canada /By L. Houser and Alvin M. Schrader.
020/.75 * COLLECTING RARE BOOKS FOR PLEASURE AND PROFIT /BY JACK MATTHEWS. (Z987.M371977)
020/.8 * ART OF THE LIBRARIAN; A COLLECTION OF ORIGINAL PAPERS FROM THE LIBRARY. O(Z674.A67)
FOR THE UNIVERSITY OF NEWCASTLE UPON TYNE. (EDITED BY ALAN JEFFREYS).
020/.8 * CHARLES AMMI CUTTER, LIBRARY SYSTEMATIZER /EDITED BY FRANCIS L. MIKSA(Z674.C1977)
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FOR GOVERNANCE AND FACULTY STATUS FOR LIBRARIANS. /PROCEEDINGS OF A PRECONFERENCE
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ARCH LIBRARIES AT SAN FRANCISCO, JUNE 27 AND 28, 1975. EDITED BY MILICENT D. ABEL
020/.8 * STUDIES IN COMPARATIVE LIBRARIANSHIP; THREE ESSAYS PRESENTED FOR THE SE(Z665.B927)
VENEMA PRIZE 1971 BY A. D. BURNETT, R. K. GUPTA AND S. SIMSOVA. WITH A FOREWORD BY
FRANK FRANCIS.
020/.8 020/.711/73 * SHAPING OF AMERICAN LIBRARY EDUCATION /BY CHARLES(Z674.A75NO.36Z668)
D. CHURCHWELL.
020/.8 020/.725.3/3 * LIBRARY OF CONGRESS SUBJECT HEADINGS :PRINCIPLES AND APPLICAT(Z674.A75NO.36Z668)
ION /LOIS MAI CHAN.
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020/.92/4B * MELVIL DEWEY, HIS ENDURING PRESENCE IN LIBRARIANSHIP /EDITED BY SARAH(92D519)
K. VANN.
020/92/2B * DICTIONARY OF AMERICAN LIBRARY BIOGRAPHY /EDITORIAL BOARD, GEORGE(R020.922D55)
S. ROBINSKI, JESSE HANK SHERA, HODAN S. WYNAR ; EDITED BY HODDEN S. WYNAR.
021 * CHANGING TIMES, CHANGING LIBRARIES /[EDITED BY] GEORGE S. BONN, SYLVI(Z716.4.A451976)
LA FAIBISOFF.
021 * HANDBOOK OF BLACK LIBRARIANSHIP /COMPILED AND EDITED BY E. J. JOSEY AND ANN (021H23)
ALLEN SHOCKLEY.
021.4 * SOCIAL RESPONSIBILITIES AND LIBRARIES :A LIBRARY JOURNAL/SCHOOL LIBRARY(Z716.4.S6)
JOURNAL SELECTION /COMPILED AND EDITED BY PATRICIA GLASS SCHUMAN.
021.6/4 * LIBRARY RESOURCE SHARING :PROCEEDINGS OF THE 1976 CONFERENCE ON RE(Z731.C741976)
SOURCE SHARING IN LIBRARIES, PITTSBURGH, PENNSYLVANIA /[EDITED BY] ALLEN KENT, THO
M. J. GALVIN.

021.6/4 * MULTITYPE LIBRARY COOPERATION /EDITED BY BETH A. HAMILTON AND WILLIAM (Z731.M84)
B. ERNST, JR.

021.6/4/09748 * PLAN FOR LIBRARY COOPERATION IN PENNSYLVANIA /SUBMITTED TO(021.6409748P69)
THE STATE LIBRARY OF PENNSYLVANIA BY CHARLES T. MEADOW ... [ET AL.]

021.6/5 * NETWORKS AND DISCIPLINES; PROCEEDINGS OF THE EDUCOM FALL CONFERENCE (Z680.3.E331973)
CE, OCT. 11, 12, 13, 1973, ANN ARBOR, MICH

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THE URBAN LIBRARIES COUNCIL BY THE GOVERNMENT STUDIES AND SYSTEMS, INC.

021/.0028/54 0251.1/828/54 * NEGOTIATING FOR COMPUTER SERVICES : PAPERS (021.002854C641977)
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27, 1977 /J. L. DIVILBISS, EDITOR.

021/.009 * HISTORY OF LIBRARIES IN THE WESTERN WORLD /BY ELMER D. JOHNSON AN(2721.J631976)
D MICHAEL H. HARRIS.

021/.0094 * HISTORIC LIBRARIES OF EUROPE /WINFRIED L\OSCHBURG ; [TRANSLATED FR(2789.L6313)
ON THE GERMAN BY ELISABETH ROSA].

021/.00973 * AMERICAN LIBRARY DEVELOPMENT, 1600-1899 /ELIZABETH W. STONE. (Z731.S87)

021/.00973 * ARCHIVE-LIBRARY RELATIONS /EDITED BY ROBERT L. CLARK, JR. ; CONTRIBUTIONS(2731.A76)
UTES: ROBERT L. BRUBAKER [ET AL.].

021/.00973 * LIBRARIES AND THE LIFE OF THE MIND IN AMERICA : ADDRESSED DELIVERED(Z731.L544)
AT THE CENTENNIAL CELEBRATION OF THE AMERICAN LIBRARY ASSOCIATION.

021/.00973 * NATIONAL INVENTORY OF LIBRARY STATISTICS PRACTICES; FINAL REPORT (Z731.U661972)

021/.009741 * LIBRARY SERVICES AND CONSTRUCTION ACT; FIVE-YEAR PLAN FOR ST(2732.M22M321972)
ATWIDE LIBRARY DEVELOPMENT IN MAINE.

021/.009747 * PUBLIC AND ASSOCIATION LIBRARIES STATISTICS. (2732.N7N4645)

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FOR LIBRARY DEVELOPMENT IN ILLINOIS, 1972-77.
C.8 GPO Publications

(*C13.44:125) THERMOCOUPLE REFERENCE TABLES BASED ON THE IPTS-68[BY(QC100.U556NO.125)] ROBERT L. POWELL [AND OTHERS.
(*C13.44:139) INTERACTIONS OF HIGH ENERGY PARTICLES WITH NUCLEI. (QC100.U556NO.139)
(*C13.44:147) RELATIVISTIC MANY-BODY BOUND SYSTEMS /MICHAEL DANOS A(QC100.U556NO.147) ND VINCENT GILLET.
(*C13.44:148) ROLE OF STANDARD REFERENCE MATERIALS IN MEASUREMENT S(QC100.U556NO.148) YSTEMS /J. P. CALI ... [ET AL.].
(*C13.44:149) MEASUREMENT ASSURANCE PROGRAM, A CASE STUDY :LENG(QC100.U556NO.149,ETC) TH MEASUREMENTS /PAUL E. PONTIUS.
(*C13.44:150) THERMOCOUPLE REFERENCE TABLES BASED ON THE IPTS-6(QC100.U556NO.125SUPP) 8 REFERENCE TABLES IN DEGREES FAHRENHEIT FOR THERMOELEMENTS VERSUS PLAT INUM(PT-67) /ROBERT L. POWELL AND GEORGE W. BURNS.
(*C13.44:150.) LIQUID-IN-GLASS THERMOMETRY /JACQUELYN A. WISE. (QC100.U556NO.150)
(*C13.44:152) GAGE BLOCK MEASUREMENT PROCESS USING SINGLE WAVELENGT(QC100.U556NO.152) H INTERFEROMETRY /JOHN S. BEERS.
(*C13.44:157) COMPUTERS, HEALTH RECORDS, AND CITIZEN RIGHTS /ALAN F(QC100.U556NO.157) E. WESTIN ; SPONSORED BY THE INSTITUTE FOR COMPUTER SCIENCES AND TECHNOL GY, NATIONAL BUREAU OF STANDARDS.
(*C3.62/7:) URBAN ATLAS;TRACT DATA FOR STANDARD METROPOLITAN STATISTI(G1201.A1U55X) CAL AREAS.[PREPARED BY BUREAU OF THE CENSUS AND MANPOWER ADMINISTRATION ]
(*C57.119:IR1) IRAN :A SURVEY OF U.S. BUSINESS OPPORTUNITIES. (HC475.U6X)
(*C57.2:H31) GUIDE TO FEDERAL DATA SOURCES ON MANUFACTURING. (HF5353.U5X)
(*C57.502:EQ5) EQUIPMENT LEASING AND RENTAL INDUSTRIES :TRENDS AND PROSPECTS(HD52.G3X) [PREPARED BY RENEE L. GALLOP].
(*CR1.2:B81/3) TWENTY YEARS AFTER BROWN :A REPORT OF THE UNITED STATES CO(KF4749.A33X) MISSION ON CIVIL RIGHTS.
MEXICAN AMERICAN EDUCATION STUDY. PHOTOS BY ROBERT D. MOESE (LC2687.S6A5)

PERSONNEL POLICIES AND PRACTICES /U.S. CIVIL SERVI (27164.C81U4568N0.68)

MANPOWER PLANNING AND UTILIZATION. (27164.C81U4568N0.69)

POSITION CLASSIFICATION, PAY AND EMPLOYEE BENEFITS (27164.C81U4568N0.77)

ADMINISTRATION OF TRAINING. (27164.C81U4568N0.79)

PERSONNEL MANAGEMENT IN STATE AND LOCAL GOVERNMENT (27164.C81U4568N0.85)

AREA HANDBOOK FOR AUSTRIA /COAUTHORS, EUGENE K. KEEFE ... (DB17.K4)

AREA HANDBOOK FOR JAMAICA /COAUTHORS, IRVING KAPLAN ... (P1868.A7)

GUIDES TO GERMAN RECORDS MICROFILMED AT ALEXANDRIA, VA. (D735.A58)

K-12 CLASSROOM TEACHERS AND CAREER EDUCATION :THE BEAUTIFUL (LC1045.H626X)

L PEOPLE/BY KENNETH B. HOYT.

NEEDS ASSESSMENT /PROJECT SHARE. (27164.C4H6XAug.1976)

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GY /BETSY M. SProuse, Ed.

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/ PREPARED BY URBAN AND RURAL SYSTEMS ASSOCIATES.

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BLACK STUDIES: ISSUES IN THEIR INSTITUTIONAL SURVIVAL /PRINCIPAL INVESTIGATORS: ELIAS BLAKE, HENRY COBB ... [ET AL.]

TOWARD THE MAINTENANCE OF QUALITY GRADUATE EDUCATION IN HISTORICALLY BLACK COLLEGES AND UNIVERSITIES; [A REPORT OF THE OFFICE OF EDUCATION WORKING CONFERENCE-MEETING OF DEANS OF BLACK GRADUATE SCHOOLS]
APPENDIX D

STOP WORD LIST

The following is the stop word list used during the last regeneration of the data base for the Online Subject/Title Catalog. After each word is a count of the number of times that stop word occurred in the searchable fields of the OCLC-MARC subscription tape records. The counts are useful in determining if a word should be removed from the stop word list. It is expected that the stop word list will contain even fewer entries the next time the data base is regenerated.

<table>
<thead>
<tr>
<th>Stop Word</th>
<th>Count</th>
<th>Stop Word</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABOUT</td>
<td>326</td>
<td>AFTER</td>
<td>181</td>
</tr>
<tr>
<td>AGAINST</td>
<td>267</td>
<td>ALL</td>
<td>284</td>
</tr>
<tr>
<td>AMONG</td>
<td>173</td>
<td>AND</td>
<td>59680</td>
</tr>
<tr>
<td>ARE</td>
<td>172</td>
<td>BEFORE</td>
<td>172</td>
</tr>
<tr>
<td>BETWEEN</td>
<td>309</td>
<td>CAN</td>
<td>168</td>
</tr>
<tr>
<td>FOR</td>
<td>8834</td>
<td>FROM</td>
<td>2918</td>
</tr>
<tr>
<td>HIS</td>
<td>669</td>
<td>INTO</td>
<td>496</td>
</tr>
<tr>
<td>ITS</td>
<td>862</td>
<td>KNOW</td>
<td>99</td>
</tr>
<tr>
<td>MAY</td>
<td>276</td>
<td>NEAR</td>
<td>369</td>
</tr>
<tr>
<td>OUR</td>
<td>258</td>
<td>OVER</td>
<td>167</td>
</tr>
<tr>
<td>SINCE</td>
<td>216</td>
<td>SOME</td>
<td>338</td>
</tr>
<tr>
<td>THAT</td>
<td>196</td>
<td>THE</td>
<td>54574</td>
</tr>
<tr>
<td>THEIR</td>
<td>710</td>
<td>THEY</td>
<td>113</td>
</tr>
<tr>
<td>THROUGH</td>
<td>471</td>
<td>TOWARD</td>
<td>329</td>
</tr>
<tr>
<td>UNDER</td>
<td>339</td>
<td>WHAT</td>
<td>384</td>
</tr>
<tr>
<td>WHERE</td>
<td>100</td>
<td>WHO</td>
<td>391</td>
</tr>
<tr>
<td>WITH</td>
<td>2996</td>
<td>WITHOUT</td>
<td>130</td>
</tr>
<tr>
<td>YOU</td>
<td>274</td>
<td>AUTHORS</td>
<td>1230</td>
</tr>
<tr>
<td>ETC</td>
<td>3283</td>
<td>NEW</td>
<td>3778</td>
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<tr>
<td>OLD</td>
<td>564</td>
<td>OTHER</td>
<td>763</td>
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<tr>
<td>PART</td>
<td>201</td>
<td>SELECTED</td>
<td>1104</td>
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<td>STUDY</td>
<td>4273</td>
<td>ASPECTS</td>
<td>2947</td>
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<td>STUDIES</td>
<td>2857</td>
<td>REPORT</td>
<td>1451</td>
</tr>
<tr>
<td>INTRODUCTION</td>
<td>1317</td>
<td>UND</td>
<td>1094</td>
</tr>
<tr>
<td>HOW</td>
<td>856</td>
<td>DER</td>
<td>1031</td>
</tr>
<tr>
<td>DES</td>
<td>947</td>
<td>USE</td>
<td>846</td>
</tr>
<tr>
<td>HELD</td>
<td>658</td>
<td>VON</td>
<td>679</td>
</tr>
<tr>
<td>LES</td>
<td>538</td>
<td>YOUR</td>
<td>371</td>
</tr>
</tbody>
</table>
GENERATION COUNTS

This is the results from the data base generation for all records entered into the OCLC-MARC system through 31 December 1981. Each of the data base creation programs produces the counts of the number of records processed. This is used to insure error free operation of the various programs.

Statistics from latest REGENERATION of Data Base.
Date of rebuilding: 30-Jan-82
Time Required from start to finish including converting tape and making mistakes: 10 hours
Computer time used: about 3.5 hours
Total number of records in data base: 93470
Total number of records on raw files: 94569
Number of duplicates ignored in processing: 1099
Number of records on last tape: 7827
Total key terms extracted: 789787
Physical records in text file: 642505
Keys per record: 8.45
Number of unique key terms: 55888
Number of Records per Key term: 14.13
Entries in two-character table file: 580
APPENDIX F

USER SURVEY

This informal survey was sent out to a sample of users recorded in the log file. The survey was designed to obtain information useful in making improvements to the system. The physical format was chosen to fit on two sides of narrow continuous computer forms. The following two sides are compressed slightly in length.

F.1 User Survey Side One

COMPUTER SCIENCE DEPARTMENT
4050 FRIEDMANN HALL
W.M.U.

USER NAME AND ADDRESS GOES HERE

refold with return address outside and seal with tape or staple

Dear Online Subject/Title Catalog User:

Please take a minute to fill out this informal survey and drop it back into the Campus Mail. Your name and project/programmer number appeared in the log file of Catalog users. If another person actually used your number to access the Catalog, please pass this along to them. By completing this form and sending it back to me, I can get a better idea of how well the Catalog is working, who is using it, and if improvements need to be made. This will help the user community get a useful system and will help me with my Master’s thesis. If you have any further questions please contact me at the Computer Science Department (383-6151).

Thank You,

Jim Sleep

CAMPUS MAIL
CAMPUS MAIL

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F.2 User Survey Side Two

Online Subject/Title Catalog User Survey

1) How did you find out about the Online Subject/Title Catalog?

2) Have you been able to use the Catalog without assistance?

3) Did you have difficulty using the DECsystem-10 computer?

4) Did you find citations that satisfied your needs?

5) Did you actually use any of the books located by using the Catalog?

6) Is there enough internal documentation given by the Catalog in the form of error messages and the HELP command?

7) Do you plan to use the Online Subject/Title Catalog again?

8) Would you like to see a workshop on the use of the Catalog?

9) Would having other libraries, e.g. Kalamazoo College, be of benefit to you?

10) What added features or improvements to the Catalog would help you the most?

11) Do you have any other comments, questions, complaints,
F.3 Survey Results

What follows are the results for each of the questions asked. For most of the questions short answers or a yes/no response were expected. For the last two questions, more extensive answers were solicited.

Question 1) How did you find out about the Online Subject/Title Catalog?
The author of the system: 10
University publications: 5
Library staff: 12
Faculty: 8
Academic Computer Center: 5
Others: 5

The main mode of learning about the system seems to be word of mouth. This may be due to the lack of publicity that the Western Michigan University Libraries have given to the system.

Question 2) Have you been able to use the Catalog without assistance?
Yes: 36
No: 3
With assistance: 6

The system seems to have met its goal of use by library patrons.

Question 3) Did you have difficulty using the DECSYSTEM-10 computer?
Yes: 4
No: 41

The use of a well designed interactive computer system helped in creating an easy to use product.

Question 5) Did you actually use any of the books located by using the Catalog?
Yes: 34
No: 11

The increased use of library resources is the ultimate goal of this project and seems to be achieved.

Question 6) Is there enough internal documentation given by the Catalog in the form of error messages and the HELP command?
Yes: 34
No: 11
Having good internal documentation was an early design requirement. Since the time of this survey even better and more internal documentation has been added.

Question 7) Do you plan to use the Online Subject/Title Catalog Again?
Yes: 42
Perhaps: 3

This shows overwhelming user satisfaction with the system.

Question 8) Would like to see a workshop on the use of the Catalog?
Yes: 20
NO: 23
No answer: 2

Most users feel they have been able to learn how to use the system by themselves. At this time no workshop has been given.

Question 9) Would having having other libraries, e.g. kalamazoo College, be of benefit to you?
Yes: 34
No: 6
Maybe: 4
No Answer: 1

Even though there is demand for it and the programming to allow it has already been done, the inclusion of other collections has not been done. This is mostly because of the political problems involved with outside use of Western Michigan University resources.

Question 10) What other features or improvements to the Catalog would help you the most?
Author searching: 13
More documentation: 12
Adding earlier acquisitions: 6
Addition of serials: 5
Sorting of citations: 4
Public terminal in library: 3
Phrase searching: 2
More extensive citations: 2
Larger save sets: 1
Fewer stop words: 1
Access to other collections: 1
Put number on citations: 1
No answer: 8

Some surveys had more than one answer to this question. Some of these suggestions have been implemented, such as a sorting capability.
and the option for larger save sets and numbering of citations on output. The suggestion of a public terminal in the library that could be used by library patrons to access the system could be easily done but requires the support of the library administration. The searching by author, while the most often suggested improvement, would likely require another system. Due in part to demand generated by this system, the Western Michigan University Libraries have started a retrospective conversion project. It will be several years before all earlier acquisitions have been added to the OCLC system but when this has been done the full power of the Online Subject/Title Catalog will be available for the entire collection.

Question 11) Do you have any other comments, suggestions, complaints, et cetera?
No answer: 16
This is a good idea: 13
Needs more documentation: 9
Should add earlier acquisition: 4
Should access other collections: 1
Should include serials: 1
Should have indication of missing books: 1
Make it available to outside users: 1
APPENDIX G

SAMPLE RUNS

The following are actual sample executions of the Western Michigan University Online Subject/Title Catalog. The runs were recorded using a session logging program. User input is in lower case and most responses by the system are in upper case. The first run shows the general operation of the system in its normal mode. Each of the commands to the system are demonstrated. The second run shows how the behavior of the system can be modified using run time switches. This example shows how the experienced user might tailor the system for creating large save sets. The last run shows the error massages that the system produces for various error conditions or invalid inputs. In some cases where the system produced lengthy output this has been reduced and elipsis used to show omission of some text.

After the sample runs, an example of the type of bibliography that can be produced by the Online Subject/Title Catalog is given.

G.1 Normal Operation

.run 1br:cat

WELCOME TO W.M.U. ONLINE SUBJECT/TITLE CATALOG. VERSION D-6

The Online Subject/Title Catalog has finally found a permanent home with the Academic Computer Center. The author wishes to thank all those whose support has led to this state. Now that control of the system has been transferred, suggestions and complaints should be sent to the W.M.U. Academic Computer Center or the W.M.U. Waldo Libraries.

YOU ARE NOW ACCESSING THE Entire Collection(Jul 1976 - Dec 1981)

FOR HELP TYPE "HELP"

CAT> help
COMMANDS ARE:
DISPLAY EXIT EXPAND HELP INFO OUTPUT PRINT QUICK
RESET SEARCH SELECT STEPS STOP TYPE WHAT WRITE

145
FOR MORE HELP PRINT THE FILE LBR:CAT.HLP
HELP IS AVAILABLE FOR SPECIFIC COMMANDS AND FEATURES OF
THE ONLINE SUBJECT/TITLE CATALOG. TO GET A LIST OF ITEMS WITH
MORE HELP AVAILABLE TYPE "HELP HELP".

CAT> help steps
The "STEPS" command can be used to turn on a mode of operation
of the Online Subject/Title Catalog where during the evaluation
of search expressions, each subexpression will have the
associated save set created and saved. For example, if the
"STEPS" command has been issued, when the following search
command is given:

CAT> SEARCH HYDROLOG* OR (GROUND AND WATER)

Along with the final save set, sets for "HYDROLOG*", "GROUND",
"WATER", and "(GROUND AND WATER)" are automatically saved.

The use of this feature can save time when several combinations
of terms will be created. To turn off this feature use the
"STEPS" command for a second time.

TRY AGAIN

CAT> expand library
   E1 <LIBRARY> 1236

CAT> expand librar*
   E1 <LIBRARIAN> 50
   E2 <LIBRARIANS> 139
   E3 <LIBRARIANSHIP> 79
   E4 <LIBRARIES> 956
   E5 <LIBRARY> 1236

CAT> search library
FOUND 1236
CREATING SET #1 <LIBRARY> 1236 ITEMS

CAT> search librar*
FOUND 1718
CREATING SET #2 <LIBRAR*> 1718 ITEMS

CAT> quick comput*
   E1 <COMPUTABILITY> 1
   E2 <COMPUTABLE> 4
   E3 <COMPUTADORA> 1
   E4 <COMPUTATION> 10
E5 <COMPUTATIONAL> 33
E6 <COMPUTATIONS> 7
E7 <COMPUTED> 3
E8 <COMPUTER> 652
E9 <COMPUTERIZE> 1
E10 <COMPUTERIZED> 21
E11 <COMPUTERS> 339
E12 <COMPUTERWORLD> 1
E13 <COMPUTING> 43
E14 <COMPUTO> 1

CAT> select comput*
FOUND 938
CREATING SET #3 <COMPUT*> 938 ITEMS

CAT> s s2 and s3
FOUND 27
CREATING SET #4 <(LIBRAR*) AND (COMPUT*)> 27 ITEMS

CAT> type s4

<((LIBRAR*) AND (COMPUT*))> 27
%NUMBER OF ENTRIES EXCEEDS 20
HOW MANY DO YOU WANT TO SEE? 4

Z678.9 .R68
COMPUTERS FOR LIBRARIES /
J.E. ROWLEY.
159 P. ; BIBL 1980

Z678.9 .T42 1978
AN INTRODUCTION TO COMPUTER-BASED LIBRARY SYSTEMS /
L.A. TEDD.
XIV, 208 P. ; BIBL 1978

Z692.M5 M533
MICROFORMS MANAGEMENT IN SPECIAL LIBRARIES :
A READER /
EDITED BY JUDY H. FAIR.
XII, 272 P. ; BIBL 1979

Z678.9 .C63
DEVELOPING COMPUTER-BASED LIBRARY SYSTEMS /
BY JOHN CORBIN.
X, 226 P. : 1981

CAT> search
SEARCH FOR WHAT TERM OR COMBINATION OF TERMS?
stress
FOUND 161
CREATING SET #5 <STRESS> 161 ITEMS

CAT> e nurs*
   E1 <NURSE> 48
   E2 <NURSERY> 22
   E3 <NURSES> 35
   E4 <NURSING> 261

CAT> s e1 or e3 or e4
FOUND 283
CREATING SET #6 <(NURSE) OR (NURSES) OR (NURSING)> 283 ITEMS

CAT> s s6 and s5
FOUND 2
CREATING SET #8 <((NURSE) OR (NURSES) OR (NURSING)) AND (STRESS)> 2 ITEMS

CAT> type .
TYPE WHICH SET ON THE TERMINAL? 8

<(((NURSE) OR (NURSES) OR (NURSING)) AND (STRESS))> 2

RT86 .L58
LIVING WITH STRESS AND PROMOTING WELL-BEING :
A HANDBOOK FOR NURSES /
EDITED BY KAREN E. CLAUS, JUNE T. BAILEY.
XII, 175 P. : BIBL 1980

RT86 .W58
WOMEN IN STRESS :
A NURSING PERSPECTIVE /
EDITED BY DIANE K. KJERVIK, IDA M. MARTINSON.
342 P. : BIBL 1979

CAT> what

<table>
<thead>
<tr>
<th>SET</th>
<th>ITEMS</th>
<th>SEARCH TERMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1236</td>
<td>LIBRARY</td>
</tr>
<tr>
<td>2</td>
<td>1718</td>
<td>LIBRAR*</td>
</tr>
<tr>
<td>3</td>
<td>938</td>
<td>COMPUT*</td>
</tr>
<tr>
<td>4</td>
<td>27</td>
<td>(LIBRAR*) AND (COMPUT*)</td>
</tr>
<tr>
<td>5</td>
<td>161</td>
<td>STRESS</td>
</tr>
<tr>
<td>6</td>
<td>283</td>
<td>(NURSE) OR (NURSES) OR (NURSING)</td>
</tr>
</tbody>
</table>
| 7   | 283   | ((NURSE) OR (NURSES) OR (NURSING)) AND ((NURSE)
OR (NURSES) OR (NURSING))

8 2 ((NURSE) OR (NURSES) OR (NURSING)) AND (STRESS)

CAT> steps
SUBSETS ARE NOT BEING SAVED AT EACH STEP
DO YOU WANT TO START SAVING THEM? yes
ALL SUBSETS SAVED AT EACH STEP

CAT> s color and photography
CREATING SET #9 <COLOR> 135 ITEMS
CREATING SET #10 <PHOTOGRAPHY> 343 ITEMS
FOUND 8
CREATING SET #11 <COLOR AND PHOTOGRAPHY> 8 ITEMS

CAT> steps
SUBSETS ARE BEING SAVED AT EACH STEP
DO YOU WANT TO STOP SAVING THEM? yes
ONLY FINAL SET NOW BEING SAVED

CAT> t s11

<COLOR AND PHOTOGRAPHY> 8

TR140.F76 A34
PHOTOGRAPHS FOR THE TSAR :
THE PIONEERING COLOR PHOTOGRAPHY OF SERGEI MIKHAILOVICH
PROKUDIN-GORSKII COMMISSIONED BY TSAR NICHOLAS II /
EDITED WITH AN INTROD. BY ROBERT H. ALLSHOUSE.
XXIII, 216 P. : BIBL 1980

TR654 .C675
MARIE COSINDAS, COLOR PHOTOGRAPHS /
WITH AN ESSAY BY TOM WOLFE ; [EDITED BY SUSAN FELDMAN].
143 P. : BIBL 1978

TR654 .07
ONE OF A KIND :
RECENT POLAROID COLOR PHOTOGRAPHY /
PREF. BY BELINDA RATHBONE ;
INTRODUCTORY ESSAY BY EUGENIA PARRY JANIS.
77 P. : BIBL 1979

TR647 .D54 1977
FRANK DIPERNA COLOR PHOTOGRAPHS :
JUNE 4-JULY 17, 1977, THE CORCORAN GALLERY OF ART,
WASHINGTON, D.C.

TR659 .C52
LANGDON CLAY, COLOR ATLAS :
INCLUDING FLAT LANDS & RELATED VIEWS, JULY 21-SEPTEMBER 23, 1979
THE CORCORAN GALLERY OF ART, WASHINGTON, D.C.

TR654 .M4637
CAPE LIGHT :
COLOR PHOTOGRAPHS /
BY JOEL MEYEROWITZ ; FOREWORD BY CLIFFORD S. ACKLEY ;
INTERVIEW BY BRUCE K. MACDONALD.
CA. 100 P. : 1978

TR510 .H25 1976
THE CREATION /
ERNST HAAS.
159 P. (CHIEFLY COL. ILL.) ; 1976

TR520 .H9
THREE-COLOUR PHOTOGRAPHY: 
THREE-COLOUR PRINTING AND THE PRODUCTION OF PHOTOGRAPHIC PIGMENT 
PICTURES IN NATURAL COLOURS.
BY ARTHUR FREIHERRN [!] VON HUBL ... TR. BY HENRY OSCAR KLEIN.
148 P. 1904

CAT> display

SET ITEMS SEARCH TERMS
   ----- -------- --------------
1 1236 LIBRARY
2 1718 LIBRAR*
3 938 COMPUT*
4 27 (LIBRAR*) AND (COMPUT*)
5 161 STRESS
6 283 (NURSE) OR (NURSES) OR (NURSING)
7 283 ((NURSE) OR (NURSES) OR (NURSING)) AND ((NURSE) OR (NURSES) OR (NURSING))
8 2 ((NURSE) OR (NURSES) OR (NURSING)) AND (STRESS)
9 135 COLOR
10 343 PHOTOGRAPHY
11 8 COLOR AND PHOTOGRAPHY

BF701 .G29
EYE COLOR, SEX, AND CHILDREN'S BEHAVIOR /
A. L. GARY, JOHN GLOVER.
XII, 170 P. : BIBL 1976

BF 9999 .A38X (MAIN)(ARC)
THE EFFECT OF ATTENDING BEHAVIOR TRAINING ON PERFORMANCE OF A
PAIRED COLOR DISCRIMINATION TASK /
BY STEPHEN MICHAEL AGGAS.
V, 38 LEAVES ; BIBL 1976

QL404 .S36 1973
SHELLS IN COLOR.
PHOTOS. BY KJELL B. SANDVED. TEXT BY R. TUCKER ABBOTT.
112 P. BIBL 1973

CAT> search sll
FOUND 8

CAT> reset

DO YOU WANT TO DELETE ALL SAVE SETS? yes
ALL SAVE SETS DELETED

CAT> info

W.M.U. ONLINE SUBJECT/TITLE CATALOG. VERSION D-6
COLLECTION BEING ACCESSED: Entire Collection (Jul 1976-Dec 1981)
0 SETS IN USE OUT OF 20
SAVE STEPS FLAG IS OFF

CAT> e jefferson

E1 <JEFFERSON> 51

CAT> s el exl thomas
FOUND 20
CREATING SET #1 <(JEFFERSON) EXL THOMAS> 20 ITEMS

CAT> write sl

<((JEFFERSON) EXL THOMAS)> 20

FILE FOR OUTPUT OF ITEMS? jeff.bib
HEADER FOR FILE(END WITH BLANK LINE)?
Example Write of Set

WRITING SET:
<((JEFFERSON) EXL THOMAS)> 20 ITEMS

PRODUCED 2 PAGES

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CAT> stop

DO YOU WANT TO EXIT FROM THE CATALOG? yes

THANK YOU

EXIT

.type jeff.bib

Example Write of Set

W.M.U. ONLINE SUBJECT/TITLE CATALOG. VERSION D-6
OUTPUT FROM COLLECTION: Entire Collection (Jul 1976-Dec 1981)
PRODUCED: 16:54 ON 06/11/82
OF SET: ((JEFFERSON) EXL THOMAS)
NUMBER OF ITEMS: 20

KF4541 .R43
THE AMERICAN IDEAL OF EQUALITY :
FROM JEFFERSON'S DECLARATION TO THE BURGER COURT /
CHARLES M. REDENIUS.
166 P. ; BIBL 1981

E467.1.D26 W326
JEFFERSON DAVIS GETS HIS CITIZENSHIP BACK /
ROBERT PENN WARREN.
114 P. ; 1980

E458 .L75
A. LINCOLN/JEFFERSON DAVIS :
THE HOUSE DIVIDED /
[BY DAVID LINDSEY]
186 P. : BIBL 1960

KF4992 .B75 1977(REF)
CONSTITUTION, JEFFERSON'S MANUAL, AND RULES OF THE HOUSE OF
REPRESENTATIVES OF THE UNITED STATES, NINETY-FIFTH CONGRESS /
BY WM. HOLMES BROWN.
XIII, 1073 P. ; 1977

RC564 .C6 1978
SUBSTANCE ABUSE AND PSYCHIATRIC ILLNESS :
PROCEEDINGS OF THE SECOND ANNUAL COATESVILLE-JEFFERSON
CONFERENCE ON ADDICTION /
EDITED BY EDWARD GOTTHEIL, A. THOMAS MCELLENN, KEITH A. DRULEY.
XIII, 210 P. : BIBL 1980

KFZ9105 .J44
JEFFERSON DAVIS AND THE CONFEDERACY AND TREATIES CONCLUDED BY
THE CONFEDERATE STATES WITH INDIAN TRIBES /
EDITED BY RONALD GIBSON.
VIII, 205 P. ; BIBL 1977

F680 .P82 1978
PORTRAIT AND BIOGRAPHICAL ALBUM OF JACKSON, JEFFERSON AND POTTAWATOMIE COUNTIES, KANSAS:

E302 .J442 1979
SELECTED WRITINGS /
THOMAS JEFFERSON ; EDITED BY HARVEY C. MANSFIELD, JR.
XLIV, 94 P. ; BIBL 1979

RC566.A1 C6 1977
ADDICTION RESEARCH AND TREATMENT :
CONVERGING TRENDS: PROCEEDINGS OF THE FIRST ANNUAL COATESVILLE-JEFFERSON CONFERENCE ON ADDICTION /
EDITED BY EDWARD L. GOTTHEIL ... [ET AL.].
146 P. : BIBL 1979

E487 .E8
AFTER SECESSION :
JEFFERSON DAVIS AND THE FAILURE OF CONFEDERATE NATIONALISM /
PAUL D. ESCOTT.
XIV, 295 P. ; BIBL 1978

SMITH. N 002(MUS)
MUSIC FROM THE AGE OF JEFFERSON.
[SOUND RECORDING] FRE

E467.1.D26 C3
THE IRON WILL OF JEFFERSON DAVIS /
CASS CANFIELD.
XIV, 146 P. : BIBL 1978

F 148 .C732X 1977
COMMENORATIVE BIOGRAPHICAL RECORD OF CENTRAL PENNSYLVANIA, INCLUDING THE COUNTIES OF CENTRE, CLEARFIELD, JEFFERSON AND CLARION, CONTAINING BIOGRAPHICAL SKETCHES OF PROMINENT AND REPRESENTATIVE CITIZENS, AND OF MANY OF THE EARLY SETTLED FAMILIES.
2 V. (1679, 45 P.) : 1977

F411 .B63 1978
BIOGRAPHICAL AND HISTORICAL MEMOIRS OF PULASKI, JEFFERSON, LONKE, FAULKNER, GRANT, SALINE, PERRY, GARLAND AND HOT SPRING COUNTIES, ARKANSAS :
COMPRISING A CONDENSED HISTORY OF THE STATE ... BIOGRAPHIES OF
DISTINGUISHED CITIZENS ... [ETC.].
113-811, [57] P. : 1978

E467.1.D26 E24
JEFFERSON DAVIS /
CLEMENT EATON.
XII, 334 P. : 1977

F332.J4 D8 1976
JEFFERSON COUNTY AND BIRMINGHAM, ALABAMA :
HISTORICAL AND BIOGRAPHICAL, 1887 /
JOHN WITHERSPOON DUBOSE.
XVI, 595 P. : 1976

Z733.U57 M27
BOOKS IN TRANSIT :
FROM MONTICELLO TO THE LIBRARY OF CONGRESS /
BY DUMAS MALONE.
31 P. : BIBL 1977

F540 .P85 1975
PORTRAIT AND BIOGRAPHICAL RECORD OF CLINTON, WASHINGTON, MARION
AND JEFFERSON COUNTIES, ILLINOIS :
CONTAINING BIOGRAPHICAL SKETCHES OF PROMINENT AND REPRESENTATIVE
CITIZENS OF THE COUNTIES TOGETHER WITH BIOGRAPHIES AND PORTRAITS
OF ALL THE GOVERNORS OF THE STATE AND THE PRESIDENTS OF THE
UNITED STATES.
584, 32 P. : 1975

F457.L7 M47
JEFFERSON'S NEPHEWS :
A FRONTIER TRAGEDY /
BOYNTON MERRILL, JR.
XV, 462 P. : BIBL 1976

F127.J4 H8 1976
A HISTORY OF JEFFERSON COUNTY IN THE STATE OF NEW YORK FROM THE
EARLIEST PERIOD TO THE PRESENT TIME /
BY FRANKLIN B. HOUGH ... 
601 P. : BIBL 1976

.Welcome to W.M.U. Online Subject/Title Catalog. Version D-6

The Online Subject/Title Catalog has finally found a
permanent home with the Academic Computer Center. The
author wishes to thank all those whose support has led
to this state. Now that control of the system has been
transferred, suggestions and complaints should be sent
to the W.M.U. Academic Computer Center or the W.M.U.
Waldo Libraries.

YOU ARE NOW ACCESSING THE Entire Collection (Jul 1976-Dec 1981)

FOR HELP TYPE "HELP"

CAT> expand child*

  E1 <CHILD> 1014
  E2 <CHILDAW> 1
  E3 <CHILDBEARING> 4
  E4 <CHILDBIRTH> 19
  E5 <CHILDCARE> 2
  E6 <CHILDE> 2
  E7 <CHILDREN> 1
  E8 <CHILDHOOD> 155
  E9 <CHILDLESS> 1
  E10 <CHILDLESSNESS> 1
  E11 <CHILDMINDER> 1
  E12 <CHILDBEARING> 3
  E13 <CHILDRED> 1
  E14 <CHILDREN> 2288
  E15 <CHILDRENS> 6
  E16 <CHILDWOLD> 1

CAT> search child*
FOUND 2924
CREATING SET #1 <CHILD*> 2924 ITEMS

CAT> expand comput*

  E1 <COMPUTABILITY> 1
  E2 <COMPUTABLE> 4
  E3 <COMPUTADORA> 1
  E4 <COMPUTATION> 10
  E5 <COMPUTATIONAL> 33
  E6 <COMPUTATIONS> 7
  E7 <COMPUTED> 3
  E8 <COMPUTER> 652
  E9 <COMPUTERIZE> 1
  E10 <COMPUTERIZED> 21
  E11 <COMPUTERS> 339
  E12 <COMPUTERWORLD> 1
  E13 <COMPUTING> 43
  E14 <COMPUTO> 1

CAT> search comput*
FOUND 938
CREATING SET #2 <COMPUT*> 938 ITEMS
CAT> search s1 and s2
FOUND 3
CREATING SET #3 <(CHILD*) AND (COMPUT*)> 3 ITEMS

CAT> print childbearing

<CHILDBEARING> 4
DO YOU WANT TO PRINT THE SET ON THE LINE PRINTER? yes
HEADER FOR FILE(END WITH BLANK LINE)?
Example of the Print Command

WRITING SET:
<CHILDBEARING> 4 ITEMS

PRODUCED 1 PAGES

CAT> print
OUTPUT WHICH SET TO THE LINE PRINTER? 3

<((CHILD*) AND (COMPUT*))> 3
DO YOU WANT TO PRINT THE SET ON THE LINE PRINTER? yes
HEADER FOR FILE(END WITH BLANK LINE)?
Another example of the Print Command

WRITING SET:
<((CHILD*) AND (COMPUT*))> 3 ITEMS

PRODUCED 1 PAGES

CAT> ty
TYPE WHICH SET ON THE TERMINAL? 3

<((CHILD*) AND (COMPUT*))> 3

QA20.C65 P36 1980(PHYSIC)
MINDSTORMS :
CHILDREN, COMPUTERS, AND POWERFUL IDEAS /
SEYMOUR PAPERT.
VIII, 230 P. : BIBL 1980

LC4019 .G64(ERC)
SPECIAL TECHNOLOGY FOR SPECIAL CHILDREN :
COMPUTERS TO SERVE COMMUNICATION AND AUTONOMY IN THE EDUCATION
OF HANDICAPPED CHILDREN /
BY E. PAUL GOLDENBERG.
XII, 183 P. : BIBL 1979

LB1051 .S419(ERC)
ANXIETY, LEARNING, AND INSTRUCTION /
JOAN E. SIEBER, HAROLD F. O'NEIL, JR., SIGMUND TOBIAS.
G.2 Use of Run-Time Switches

.ru lbr:cat(expert,nonote,number,maxtmp:13000)

WELCOME TO W.M.U. ONLINE SUBJECT/TITLE CATALOG. VERSION D-6

YOU ARE NOW ACCESSING THE Entire Collection (Jul 1976-Dec 1981)

FOR HELP TYPE "HELP"

CAT> expand america%

   E1 <AMERICA> 2587
   E2 <AMERICAN> 4396
   E3 <AMERICAS> 32

CAT> s e1 e2 e3
FOUND 6529
CREATING SET #1 <(AMERICA) (AMERICAN) (AMERICAS)> 6529 ITEMS

CAT> e history

   E1 <HISTORY> 12016

CAT> s e1
FOUND 12016
CREATING SET #2 <(HISTORY)> 12016 ITEMS

CAT> s s1 s2
FOUND 1832
CREATING SET #3 <((AMERICA) (AMERICAN) (AMERICAS)) ((HISTORY))> 1832 ITEMS

CAT> s western michigan university libraries
FOUND 9
CREATING SET #4 <WESTERN MICHIGAN UNIVERSITY LIBRARIES> 9 ITEMS
CAT> type s4
<(WESTERN MICHIGAN UNIVERSITY LIBRARIES)> 9

1) QA 76 .T39X 1981 NO.4
PAPER PRODUCTS FROM OCLC-MARC SUBSCRIPTION TAPES /
BY JAMES N. SLEEP.
10, [9] LEAVES ; 1981

2) QA 76 .T39X 1981 NO.3
ONLINE SUBJECT INDEX FOR BIBLIOGRAPHIC RECORDS /
BY JAMES N. SLEEP.
72 LEAVES ; BIBL 1981

AFRO-AMERICAN BOOKS IN THE WESTERN MICHIGAN UNIVERSITY LIBRARIES
A CATALOG OF BOOKS ADDED TO THE COLLECTION 1966-1975 /
DWIGHT B. WALDO LIBRARY, REFERENCE SERVICES, WESTERN MICHIGAN
UNIVERSITY.
2 V. ; 1981

4) Z 881 .M57 F4748X(REF)
GOV-KWOC :
KEYWORD INDEX TO GOVERNMENT DOCUMENTS CATALOGED WITHIN WESTERN
MICHIGAN UNIVERSITY LIBRARIES /
BY DANIEL FERRER.
CA. 350 P. ; 31 X 39 CM. 1980

5) Z 881 .M57 S55X(SCIR)
MED-KWOC :
KEYWORD INDEX TO MEDICAL LITERATURE WITHIN WESTERN MICHIGAN
UNIVERSITY LIBRARIES /
BY JAMES N. SLEEP AND DANIEL FERRER.
CA. 400 P. ; 1980

6) Z881.M57 F4763X(REF)
PLACE SUBDIVISION BIBLIOGRAPHY WITHIN THE HOLDINGS OF WESTERN
MICHIGAN UNIVERSITY LIBRARIES /
BY DANIEL FERRER AND JAMES N. SLEEP.
CA. 250 P. ; 1980
7) Z881.M57 F4773X(CAT)
SERIES HOLDING CATALOG:
NUMBERED SERIES WITHIN THE HOLDINGS OF THE WESTERN MICHIGAN UNIVERSITY LIBRARIES /
BY DANIEL FERRER AND JAMES N. SLEEP.
CA. 375 P.; 1980

8) Z881.M57 F4744X(CAT)
FOREIGN LANGUAGE BIBLIOGRAPHY WITHIN THE HOLDINGS OF WESTERN MICHIGAN UNIVERSITY LIBRARIES /
BY DANIEL FERRER AND JAMES N. SLEEP.
CA. 150 P.; 1980

9) Z6203 .L57X(ICS)
A LIST OF SERIALS IN MEDIEVAL AND EARLY MODERN STUDIES:
IN THE LIBRARIES OF CALVIN COLLEGE (MIGRC), CENTRAL MICHIGAN UNIVERSITY (MIMPT), EASTERN MICHIGAN UNIVERSITY (MIYEM), HOPE COLLEGE (MIHOL), MERCY COLLEGE (MERCY), OAKLAND UNIVERSITY (MIROCHOU), UNIVERSITY OF MICHIGAN (MIU), UNIVERSITY OF WINDSOR (CAOWA), WESTERN MICHIGAN UNIVERSITY (MIKW) /
COMPILED FOR THE MICHIGAN CONSORTIUM FOR MEDIEVAL AND EARLY MODERN STUDIES UNDER THE DIRECTION OF GEORGE T. BEECH, MEDIEVAL INSTITUTE, WESTERN MICHIGAN UNIVERSITY, BEATRICE H. BEECH, CISTERCIAN LIBRARY, WESTERN MICHIGAN UNIVERSITY, BY PETER FARRELL ... [ET AL.]
[100] P.; 1979

CAT> expand *computer*

E1 <COMPUTER> 652
E2 <COMPUTERIZE> 1
E3 <COMPUTERIZED> 21
E4 <COMPUTERS> 339
E5 <COMPUTERWORLD> 1
E6 <MICOCOMPUTERS> 1
E7 <MICROCOMPUTER> 28
E8 <MICROCOMPUTERS> 68
E9 <MINICOMPUTER> 2
E10 <MINICOMPUTERS> 21

CAT> search womZn* and relig*
%WILD CARD MATCH OF 25 KEY TERMS BY RELIG*
DO YOU WANT TO CONTINUE? yes
FOUND 38
CREATING SET #5 <WOM%N* AND RELIG*> 38 ITEMS
CAT> output s5

<(WOMZN* AND RELIG*)> 38

FILE FOR OUTPUT OF ITEMS? womrel.out
OUTPUTING SET:
<(WOMZN* AND RELIG*)> 38 ITEMS

CAT> stop

DO YOU WANT TO EXIT FROM THE CATALOG? yes

THANK YOU
EXIT

 ty womrel.out
HQ1147.F7 W452WOMEN IN FRANKISH SOCIETY :MARRIAGE AND THE CLOISTER, 500 TO 900 /SUZANNE FORAY WEMPLE.Z348 P. ; BIBL 1981
GN483.3 .L562EMERGING FROM THE CHRYSALIS :STUDIES IN RITUALS OF WOMEN'S INITIATION /BRUCE LINCOLN.ZXXII, 153 P. ; BIBL 1981
PR 151 .W6 W642WOMEN, LITERATURE, CRITICISM /EDITED BY HARRY R. GARVIN.Z177 P. ; BIBL 1978

PR1810 .D63THE ORIGINS OF ANCRENE WISSE /BY E. J. DOBSON.Z441 P. ; BIBL 1976
BL458 .H44 19772DIE FRAU IN DEN RELIGIONEN DER MENSCHHEIT /J. FRIEDRICH HEILLER.Z194 P. ; BIBL 1977 GER
HQ1394 .G15 19722WOMAN, CHURCH, AND STATE.Z554 P. ; 22 CM. 1972
DT25 .W42AFRICA BEFORE THEY CAME; THE CONTINENT, NORTH, SOUTH, EAST, AND WEST, PRECEDING THE COLONIAL POWERS.ZXI, 396 P. 1965

.r sort

*womrel.out=womrel.out/asc/var/k:1:50/r:1000
Sorted 38 records
171 KEY comparisons, 4.50 per record
145 record leaves in memory, 2P buffer memory
0 runs, 0 iterations
62P of memory retained at one time
0:00:00 CPU time, 6.61 MS per record
0:00:24 elapsed time
*C

 ty womrel.out
BL2218.2 .0432DIE STELLUNG DER FRAU IN SHINTO :ZEINE

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RELIGIONSPHANOMENLOGISCHE UND -SOZIOLOGISCHE UNTERSUCHUNG /VON
HARUKO OKANO.ZXIV, 236 P. ; BIBL 1976 GER

PR1808 .S3 1956(ICS)%THE ANCREN RIWLE (THE CORPUS MS : ANCRENE
WISSE) /%TRANSLATED INTO MODERN ENGLISH BY M. B. SALU ; WITH AN
INTRO. BY GERARD SITWELL AND A PREFACE BY J. R. R. TOLKIEN.
ZZXVII, 195 P. ; 1956
PR1810 .D6%THE ORIGINS OF ANCRENE WISSE /%BY E. J. DOBSON.%441
P. ; BIBL 1976
Z1361.N39 R53(REF)%BLACK WOMEN AND RELIGION :%A BIBLIOGRAPHY /
ZMARILYN RICHARDSON.ZXXIV, 139 P. : 1980
Z7963.R4 R68X(REF)%FEMINIST SPIRITUALITY :%A SELECT BIBLIOGRAPHY
/ZCOMPILED BY BETTY ROSZAK.%4 P. ; 1979

.run lbr:recite

RECITE - Program to reformat single line output from
W.M.U. Online Subject/Title Catalog into multi-line
citation format.

This program takes files in the format produced by the
OUTPUT command within the Catalog and reformats them
into the same multi-line citation format as used by the
TYPE, PRINT, and WRITE commands within the Catalog.
If the file has been sorted before it is reformatted,
the resulting bibliography will also be sorted.

For more help with this program see the file "LBR:SORT.HLP"
or use the "HELP SORT" command within the Catalog.

Input file in single-line format? womrel.out
File for multi-line, citation format output? womrel.out

Enter header for output file (End with blank line).
Women AND Religion Bibliography from
W.M.U. Online Subject/Title Catalog

WORKING......

Read 38 Records
Output 4 Pages

EXIT

.ty womrel.out
Women AND Religion Bibliography from
W.M.U. Online Subject/Title Catalog

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G.3 Error Messages

.+run lbr:cat

WELCOME TO W.M.U. ONLINE SUBJECT/TITLE CATALOG. VERSION D-6

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YOU ARE NOW ACCESSING THE Entire Collection (Jul 1976-Dec 1981)

FOR HELP TYPE "HELP"

CAT> garbage

?ILLEGAL COMMAND - "GARBAGE"
FOR LIST OF LEGAL COMMANDS TYPE "HELP"

CAT> help garbage
?NO HELP AVAILABLE FOR GARBAGE

CAT> search badtrm$
?ILLEGAL CHARACTER "$" IN SEARCH TERM

?BAD SEARCH OR SEARCH TERMS
TRY AGAIN

CAT> search the
ZWARNING: "THE" IS A STOPPED WORD
FOUND 0
NO ITEMS FOUND - NO SET CREATED

CAT> search (abs or bad
?UNMATCHED PARENTHESIS IN EXPRESSION

?BAD SEARCH OR SEARCH TERMS
TRY AGAIN

CAT> search z
?KEY TERM TOO SHORT - "Z"
KEY TERM MUST BE AT LEAST THREE CHARACTERS LONG

?BAD SEARCH OR SEARCH TERMS
TRY AGAIN
CAT> expand zap and bad
?KEY TERM TO EXPAND MUST BE SINGLE TERM NOT EXPRESSION

CAT> expand z
?KEY TERM TOO SHORT - "Z"
KEY TERM TO EXPAND MUST BE AT LEAST THREE CHARACTERS LONG

CAT> search this is a very long line that should generate an error message to that effect

?INPUT LINE TOO LONG - PLEASE RETYPE.

CAT> search 1
?AMBIGUOUS USE OF NUMBER "1" IN EXPRESSION
USE "E1" FOR EXPANDED TERM NUMBER.
USE "S1" FOR SET NUMBER.

?BAD SEARCH OR SEARCH TERMS
TRY AGAIN

CAT> search cat dog
?ILLEGAL EXPRESSION - MISSING OPERATOR?

?BAD SEARCH OR SEARCH TERMS
TRY AGAIN

CAT> search s1
?SAVE SET #1 DOES NOT EXIST

?BAD SEARCH OR SEARCH TERMS
TRY AGAIN

CAT> search e1
?NO SUCH EXPANDED TERM - "E1"

?BAD SEARCH OR SEARCH TERMS
TRY AGAIN

CAT> search and
?CAN NOT SEARCH FOR BOOLEAN OPERATOR - "AND"

?BAD SEARCH OR SEARCH TERMS
TRY AGAIN

CAT> search america or american
?MAXIMUM SAVE SET SIZE EXCEEDED

?BAD SEARCH OR SEARCH TERMS
TRY AGAIN

CAT> output s1
?SAVE SET #1 DOES NOT EXIST
?ILLEGAL SET OR OUTPUT COMMAND

CAT> print si
?SAVE SET #1 DOES NOT EXIST

?ILLEGAL SET OR PRINT COMMAND

CAT> write si
?SAVE SET #1 DOES NOT EXIST

?ILLEGAL SET OR WRITE COMMAND

CAT> type si
?SAVE SET #1 DOES NOT EXIST

?ILLEGAL SET OR TYPE COMMAND

CAT> expand co*

E1  <COACH> 13
E2  <COACHED> 1
E3  <COACHES> 13
E4  <COACHING> 67
E5  <COACTIVA> 1
E6  <COAGULATION> 3

E96  <COEFFICIENTS> 8
E97  <COELESTEM> 1
E98  <COELESTIUM> 1
E99  <COELORUM> 1
E100 <COENOBITARUM> 1

?TOO MANY EXPANSION TERMS - TRY AGAIN

CAT> search co*
ZWild Card Match of 25 Key Terms by CO*
Do you want to continue? yes
ZWild Card Match of 50 Key Terms by CO*
Do you want to continue? no
?BAD SEARCH OR SEARCH TERMS
TRY AGAIN

CAT> search el
FOUND 13
CREATING SET #1 <(COACH)> 13 ITEMS
CAT> search e2
FOUND 1
CREATING SET #2 <(COACHED)> 1 ITEMS

CAT> search e3
FOUND 13
CREATING SET #3 <(COACHES)> 13 ITEMS

. .

CAT> search el8
FOUND 1
CREATING SET #18 <(COASTER)> 1 ITEMS

CAT> search el9
FOUND 1
CREATING SET #19 <(COASTING)> 1 ITEMS

CAT> search e20
FOUND 1
CREATING SET #20 <(COASTLINE)> 1 ITEMS

CAT> search e21
FOUND 18
?MAXIMUM NUMBER OF SAVE SETS EXCEEDED
PLEASE TYPE "RESET" AND TRY AGAIN

CAT> reset

DO YOU WANT TO DELETE ALL SAVE SETS? yes
ALL SAVE SETS DELETED

CAT> expand america

E1 <AMERICA> 2587

CAT> search el
FOUND 2587
CREATING SET #1 <(AMERICA)> 2587 ITEMS

CAT> search el
FOUND 2587
CREATING SET #2 <(AMERICA)> 2587 ITEMS

CAT> search el
FOUND 2587
CREATING SET #3 <(AMERICA)> 2587 ITEMS

. .
CAT> search el
FOUND 2587
CREATING SET #14 <(AMERICA)> 2587 ITEMS

CAT> search el
FOUND 2587
CREATING SET #15 <(AMERICA)> 2587 ITEMS

CAT> search el
?NOT ENOUGH CORE AVAILABLE
USE "RESET" COMMAND TO DELETE SAVE SETS
?BAD SEARCH OR SEARCH TERMS
TRY AGAIN

CAT> stop

DO YOU WANT TO EXIT FROM THE CATALOG? yes

THANK YOU

EXIT

G.4 Example Bibliography

The following is a bibliography produced using the Online Subject/Title Catalog. The search terms used were COMPUTER* AND LIBRAR*. The resulting set was then written out to a file using the OUTPUT command and then sorted by call number. A sorted bibliography was then produced by reformattting the file into citation format by use of the RECITE program.

Computers AND Libraries Bibliography Produced
By W. M. U. Online Subject/Title Catalog

(LIB)
COMPUTER-ASSISTED BOOK SELECTION USING MACHINE READABLE CATALOGING (MARC II) TAPES. BIBL 1972

(LIB)
COMPUTERIZED NETWORKS AMONG LIBRARIES AND UNIVERSITIES: AN ADMINISTRATOR'S OVERVIEW /
BY LEWIS B. MAYHEW.
73 P. ; BIBL 1975

(LIB)
UTILIZATION OF INDIVIDUALIZED INSTRUCTION (NON-COMPUTERIZED) IN ACCREDITED GRADUATE LIBRARY SCHOOLS
IN THE UNITED STATES AND CANADA.
BIBL 1973

001.6443 C73(LIB)
COMMERCIAL COM CATALOGS:
HOW TO CHOOSE, WHEN TO BUY /
COMPILED BY THE CATALOG USE COMMITTEE, REFERENCE AND
ADULT SERVICES DIVISION, AMERICAN LIBRARY ASSOCIATION.
47 P. ; BIBL 1978

020.28 T25(LIB)
AN INTRODUCTION TO COMPUTER-BASED LIBRARY SYSTEMS /
L. A. TEDD.
XIV, 208 P. ; BIBL 1977

021.002854 C64 1977(LIB)
NEGOTIATING FOR COMPUTER SERVICES:
PAPERS PRESENTED AT THE 1977 CLINIC ON LIBRARY
APPLICATIONS OF DATA PROCESSING, APRIL 24-27, 1977 /
J. L. DIVILBISS, EDITOR.
117 P. CM. 1978

021.65 N33(LIB)
A COMPUTER NETWORK PROTOCOL FOR LIBRARY AND INFORMATION
SCIENCE APPLICATIONS /
NCLIS/NBS TASK FORCE ON COMPUTER NETWORK PROTOCOL.
VII, 90 P. ; BIBL 1977

021.65 N46(LIB)
NETWORKS AND THE UNIVERSITY LIBRARY;
PROCEEDINGS OF AN INSTITUTE,
PRESENTED BY THE UNIVERSITY LIBRARIES SECTION,
ASSOCIATION OF COLLEGE & RESEARCH LIBRARIES, AT LAS
VEGAS, NEVADA, JUNE 21, 22, & 23, 1973. EDITED BY
LEMOYNE W. ANDERSON.
IV, 90 . BIBL 1974

025.0202854 G87(LIB)
MINICOMPUTERS IN LIBRARIES, 1979-80 /
BY AUDREY N. GROSCH.
142 P. 28 CM. BIBL 1979

025.62 B27(LIB)
A COMPUTER-BASED INTERLIBRARY LOAN COMMUNICATIONS
SUBSYSTEM.
IV,48 . ; BIBL 1977

029.7 C47(LIB)
CHARGING FOR COMPUTER-BASED REFERENCE SERVICES /
EDITED BY PETER G. WATSON.
49 P. ; BIBL 1978
029.7 I12L LIB
LIBRARY AUTOMATION: COMPUTERIZED SERIALS CONTROL.
106 p. BIBL 1971

LB2341 E38 1980 ERC
PLANNING FOR COMPUTING IN HIGHER EDUCATION /
EDITED BY JAMES C. EMERY.
XIII, 240 p. : 1980

ML111 M9 NO.2 MUS
DIRECTORY OF MUSIC LIBRARY AUTOMATION PROJECTS /
COMPiled BY GARRETT H. BOWLES [AND OTHERS].
29 p. : 1973

QA276.4 B73 PHYSC
STATLIB :
A STATISTICAL COMPUTING LIBRARY /
WILLIAM M. BRELSFORD, DANIEL A. RELLES.
XVIII, 427 p. : BIBL 1981

R118.4 U6 M4 1980 SCIR
MEDICAL AND HEALTH INFORMATION DIRECTORY :
A GUIDE TO STATE, NATIONAL, AND INTERNATIONAL
ASSOCIATIONS, STATE AND FEDERAL GOVERNMENT AGENCIES,
U.S. AND FOREIGN MEDICAL SCHOOLS, HOSPITALS, GRANT-AWARD
SOURCES, HEALTH CARE DELIVERY AGENCIES, JOURNALS,
NEWSLETTERS, REVIEW SERIALS, ABSTRACTING SERVICES,
PUBLISHERS, RESEARCH CENTERS, COMPUTERIZED DATA BANKS,
AUDIOVISUAL SERVICES, PRIZES AND AWARDS, LIBRARIES
AND INFORMATION CENTERS, CONSULTING ORGANIZATIONS /
COMPiled AND EDITED BY ANTHONY T. KRUZAS ; ASSISTANT
EDITORS, ROBERT FITCH ALLEN ... [ET AL.].
XX, 835 p. ; 1980

R118.4 U6 M4
MEDICAL AND HEALTH INFORMATION DIRECTORY :
A GUIDE TO STATE, NATIONAL AND INTERNATIONAL
ORGANIZATIONS, GOVERNMENT AGENCIES, EDUCATIONAL
INSTITUTIONS, HOSPITALS, GRANT-AWARD SOURCES, HEALTH
CARE DELIVERY AGENCIES, JOURNALS, NEWSLETTERS, REVIEW
SERIALS, ABSTRACTING SERVICES, PUBLISHERS, RESEARCH
CENTERS, COMPUTERIZED DATA BANKS, AUDIOVISUAL SERVICES,
AND LIBRARIES AND INFORMATION CENTERS /
ANTHONY T. KRUZAS, EDITOR ; ROBERT FITCH ALLEN.
XVI, 664 p. ; 1977

Z1006 V33 REF
INTERNATIONAL DIRECTORY OF ACRONYMS IN LIBRARY,
INFORMATION AND COMPUTER SCIENCES /
PAULINE M. VAILLANCEORT.
XI, 518 P. ; 1980

Z5640 .J63 1978(PHYS1C)
A LIBRARY LIST ON UNDERGRADUATE COMPUTER SCIENCE, COMPEER ENGINEERING, AND INFORMATION SYSTEMS /
PREPARED BY A JOINT COMMITTEE OF THE ASSOCIATION FOR COMPUTING MACHINERY AND THE IEEE COMPUTER SOCIETY.
43 P. ; 1978

Z674 .152 NO.120
COMPUTER ASSISTED INDEXING IN THE CENTRAL STATE UNIVERSITY LIBRARY /
BY GEORGE L. GARDINER.
24 P. ; 1975

Z678.9 .C63
DEVELOPING COMPUTER-BASED LIBRARY SYSTEMS /
BY JOHN CORBIN.
X, 226 P. : 1981

Z678.9 .N6(LIB)
LIBRARY SCIENCE COMPUTER PROGRAMMING UNIT /
SCHOOL OF LIBRARY SCIENCE, THE UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL.
79 P. : BIBL 1976

Z678.9 .P34
CASE STUDIES IN LIBRARY COMPUTER SYSTEMS /
BY RICHARD PHILLIPS PALMER.
XVI, 214 P. : BIBL 1973

Z678.9 .R68
COMPUTERS FOR LIBRARIES /
J.E. ROWLEY.
159 P. ; BIBL 1980

Z678.9 .T42 1978
AN INTRODUCTION TO COMPUTER-BASED LIBRARY SYSTEMS /
L.A. TEDD.
XIV, 208 P. : BIBL 1978

Z692.M5 M533
MICROFORMS MANAGEMENT IN SPECIAL LIBRARIES :
A READER /
EDITED BY JUDY H. FAIR.
XII, 272 P. : BIBL 1979
APPENDIX H

HELP FILES

What follows are the "HELP" files created to help users of the Online Subject/Title Catalog while running the system. Each of the help files describe a particular command or feature of the system. For each help file the command used to access it is given followed by text of the file as a user would see it. While this is not a user manual in the strictest sense, it allows easy internal access when running the system.

H.1 Help CAT

After you LOGIN into the DECSYSTEM-10 and you want to run the Online Subject/Title Catalog use the monitor command:

.RUN LBR:CAT

An example run may be found in LBR:DEMO.HLP or may be seen by using the "HELP DEMO" command within the Catalog.

Commands are:

EXPAND <terms> ;To give count of entries having given terms.
QUICK <terms> ;To give count of entries having given terms.
SEARCH <terms> ;To create save set with given terms.
SELECT <terms> ;To create save set with given terms.
TYPE <set> ;To list items in save set on terminal.
WRITE <set> ;To output save set to disk in citation format.
OUTPUT <set> ;To output save set to disk in sortable format.
PRINT <set> ;To print save set on the line printer.
DISPLAY ;To list set status.
WHAT ;To get current status.
INFO ;To set subset saving mode.
<set> can be any set name. <terms> can be a single term or several terms combined using Boolean operators. The Boolean operators are:

<table>
<thead>
<tr>
<th>Operator</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;term&gt; OR &lt;term&gt;</td>
<td>Items having either term.</td>
</tr>
<tr>
<td>&lt;term&gt; AND &lt;term&gt;</td>
<td>Items having both terms.</td>
</tr>
<tr>
<td>&lt;term&gt; EXL &lt;term&gt;</td>
<td>Items having first but not second term.</td>
</tr>
</tbody>
</table>

Evaluation is from left to right unless parenthesis are used e.g.:

CAT> SEARCH CAT AND (DOG OR MOUSE)

Key terms and keywords are from the titles, subtitles, and subject headings. All phrases are broken into single words. <term> can only be letters, numbers, or wild card characters.

Wild card characters are:

- A "*" WILL MATCH ANY STRING OF CHARACTERS INCLUDING NULL
- A "?" WILL MATCH ONLY A SINGLE CHARACTER
- A "%" WILL MATCH A SINGLE CHARACTER OR NULL

Do not use a wild card for the first two characters.

Terms are unique only to fifteen characters.

H.2 Help HELP

To run the Online Subject/Title Catalog use the monitor command:

.RUN LBR:CAT

Help is available for various features and commands of
the Online Subject/Title Catalog. Help can be obtained from within the catalog or by using the "HELP" monitor command. While running the Online Subject/Title Catalog you can get help for a particular item by using the command "HELP <item>" where <item> is the item that you want more information on. Help can also be obtained by using the monitor command ".HELP LBR:<item>" where <item> is the item to get help for. Help is available for the following items:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>AID</td>
<td>WHERE TO GET SPECIAL ASSISTANCE</td>
</tr>
<tr>
<td>BOOL</td>
<td>BOOLEAN OPERATORS AND EXPRESSIONS</td>
</tr>
<tr>
<td>CAT</td>
<td>CONDENSED HELP OF MOST USEFUL COMMANDS AND FEATURES</td>
</tr>
<tr>
<td>DEMO</td>
<td>A SHORT DEMONSTRATION OF THE SYSTEM IN ACTION</td>
</tr>
<tr>
<td>EXIT</td>
<td>EXIT COMMAND - TO LEAVE THE PROGRAM WHEN FINISHED</td>
</tr>
<tr>
<td>EXPAND</td>
<td>EXPAND COMMAND - TO GET COUNT OF CITATIONS FOR KEY TERMS</td>
</tr>
<tr>
<td>FILES</td>
<td>USE OF DECSYSTEM-10 FILES AND FILE NAMES</td>
</tr>
<tr>
<td>FORMAT</td>
<td>GENERAL FORMAT OF THE CITATIONS GENERATED BY THE CATALOG</td>
</tr>
<tr>
<td>GRIPE</td>
<td>HOW AND WHERE TO MAKE COMPLAINTS AND SUGGESTIONS</td>
</tr>
<tr>
<td>HELP</td>
<td>THIS LIST</td>
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<tr>
<td>HINT</td>
<td>SOME NICE THINGS TO KNOW WHEN USING THE PROGRAM</td>
</tr>
<tr>
<td>INFO</td>
<td>INFO COMMAND - GET CURRENT STATUS OF CATALOG</td>
</tr>
<tr>
<td>INTRO</td>
<td>A SHORT INTRODUCTION TO WHAT THE SYSTEM CAN DO</td>
</tr>
<tr>
<td>LANG</td>
<td>THREE LETTER CODES USED FOR NON-ENGLISH LANGUAGE ITEMS</td>
</tr>
<tr>
<td>LOCATE</td>
<td>WHAT THE LOCATION CODES MEAN AND WHERE TO FIND ITEMS</td>
</tr>
<tr>
<td>NEW</td>
<td>NEW FEATURES OF THE ONLINE SUBJECT/TITLE CATALOG</td>
</tr>
<tr>
<td>OUTPUT</td>
<td>OUTPUT COMMAND - OUTPUTS SAVE SET IN SINGLE LINE FORMAT</td>
</tr>
<tr>
<td>PRINT</td>
<td>PRINT COMMAND - OUTPUTS SAVE SET TO LINE PRINTER</td>
</tr>
<tr>
<td>QUICK</td>
<td>QUICK COMMAND - SAME AS THE EXPAND COMMAND</td>
</tr>
<tr>
<td>RESET</td>
<td>RESET COMMAND - DELETE ALL CURRENT SAVE SETS</td>
</tr>
<tr>
<td>SEARCH</td>
<td>SEARCH COMMAND - CREATE A SAVE SET FOR KEY TERM OR TERMS</td>
</tr>
<tr>
<td>SELECT</td>
<td>SELECT COMMAND - SAME AS THE SEARCH COMMAND</td>
</tr>
<tr>
<td>SORT</td>
<td>HOW TO PRODUCE BIBLIOGRAPHIES SORTED BY CALL NUMBER</td>
</tr>
<tr>
<td>STEPS</td>
<td>STEPS COMMAND - TO SAVE SUBSETS FROM BOOLEAN EXPRESSIONS</td>
</tr>
<tr>
<td>STOP</td>
<td>STOP WORD LIST OF KEY TERMS NOT INCLUDED IN INDEX</td>
</tr>
<tr>
<td>SWITCH</td>
<td>RUN TIME SWITCHES AND SWITCH.INI FILE USE</td>
</tr>
<tr>
<td>TYPE</td>
<td>TYPE COMMAND - TO DISPLAY SAVE SETS ON THE TERMINAL</td>
</tr>
<tr>
<td>WHAT</td>
<td>DISPLAY AND WHAT COMMANDS - TO LIST CREATED SAVE SETS</td>
</tr>
<tr>
<td>WILD</td>
<td>WILD CARD CHARACTERS AND TRUNCATION</td>
</tr>
<tr>
<td>WRITE</td>
<td>WRITE COMMAND - TO OUTPUT SAVE SET TO DISK FILE</td>
</tr>
</tbody>
</table>

For example:

To get help on the "SEARCH" command while using the catalog type:

CAT> HELP SEARCH

or use the monitor command:
.HELP LBR:SEARCH

H.3 Help AID

If you need personalized assistance or would like a demonstration of the Online Subject/Title Catalog, this can be arranged. We would be happy to show interested parties how the system can help users of the library. Please contact us at:

Waldo Library Reference Desk (383-1849).
or
Academic Computer Center (383-0095).

H.4 Help BOOL

Boolean operators are used to combine save sets or to search for entries having a combination of key terms. There are three Boolean operators for the Online Subject/Title Catalog. They are:

<table>
<thead>
<tr>
<th>OPERATOR</th>
<th>RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR</td>
<td>Entries in either set or having either term.</td>
</tr>
<tr>
<td>AND</td>
<td>Entries in both sets or having both terms.</td>
</tr>
<tr>
<td>EXL</td>
<td>Entries that are in first set but not second set or having the first term but not the second term.</td>
</tr>
</tbody>
</table>

Examples:

CAT> SEARCH CANCER OR CARCINOMA ; Find entries with either term.
CAT> SEARCH SI AND INDUSTRIAL ; Creates new set of entries from set #1 that also have the key term "INDUSTRIAL".

CAT> TYPE MICHIGAN EXL KALAMAZOO ; Prints on terminal entries with "MICHIGAN" for a key term but not "KALAMAZOO".

Boolean expressions may be arbitrarily complex with as many operators as needed. Evaluation is from left to right. If needed, parenthesis may be used to force searching to proceed in any order desired. Thus:

CAT> SEARCH (CAT OR CANINE) AND (EYE OR OPTICAL)

Will perform both "OR" operations before the "AND"
operation.

H.5 Help DEMO

The following is a demonstration run of the Online Subject/Title Catalog from LOGIN through logging off the system. Several of the most useful features of the Catalog are used.

LOGIN 75740,75740
Job 39 W.M.U. Dual KL10 7.01 TTY304
Password:

Quota = $ 1000.00    Approx. bal. = $ 238.19
09:03  10-Aug-81    Mon

.R LBR:CAT

WELCOME TO W.M.U. ONLINE SUBJECT/TITLE CATALOG. VERSION D-5

THE ONLINE SUBJECT/TITLE CATALOG HAS HAD THE LATEST SIX MONTHS OF ACQUISITIONS INCLUDED AND SEVERAL IMPROVEMENTS AND NEW FEATURES HAVE BEEN ADDED. FOR MORE INFORMATION USE THE "HELP NEW" COMMAND.

If you have any questions please contact:
The W.M.U. Academic Computer Center

YOU ARE NOW ACCESSING THE ENTIRE COLLECTION (JUL 1976-DEC 1981)

FOR HELP TYPE "HELP"

CAT> EXPAND WOMEN

E1 <WOMEN> 1381

CAT> EXPAND WOM*N*

E1 <WOMAN> 266
E2 <WOMANHOOD> 4
E3 <WOMANKIND> 4
E4 <WOMANLIFE> 1
E5 <WOMANPOWER> 1
E6 <WOMANPRIEST> 1
E7 <WOMANS> 1
E8 <WOMANSPRIRIT> 1
E9 <WOMANTHOLOGY> 1
E10 <WOMEN> 1381

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CAT> SELECT E5
FOUND 1
CREATING SET #1 <(WOMANPOWER)> 1 ITEMS

CAT> TYPE S1
<(WOMANPOWER)> 1

HQ1206 .M34
WOMANPOWER:
A MANUAL FOR WORKSHOPS IN PERSONAL EFFECTIVENESS /
BY LAURA G. MANIS.
128 P. : 1977

CAT> S WOMANPOWER
FOUND 1
CREATING SET #2 <WOMANPOWER> 1 ITEMS

CAT> TYPE S2
<(WOMANPOWER)> 1

HQ1206 .M34
WOMANPOWER:
A MANUAL FOR WORKSHOPS IN PERSONAL EFFECTIVENESS /
BY LAURA G. MANIS.
128 P. : 1977

CAT> E DIRECTOR*

E1 <DIRECTOR> 25
E2 <DIRECTORATE> 4
E3 <DIRECTORATES> 2
E4 <DIRECTORIES> 696
E5 <DIRECTORIO> 1
E6 <DIRECTORS> 91
E7 <DIRECTORSHIP> 4
E8 <DIRECTORY> 392

CAT> SELECT WOM*N* AND DIRECTORIES
FOUND 23

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CREATING SET #3 <WOM*N* AND DIRECTORIES> 23 ITEMS

CAT> S WOM*N* AND E4
FOUND 23
CREATING SET #4 <WOM*N* AND (DIRECTORIES)> 23 ITEMS

CAT> TYPE S4

<(WOM*N* AND (DIRECTORIES))> 23
NUMBER OF ENTRIES EXCEEDS 20
HOW MANY DO YOU WANT TO SEE? 1-3

HQ 1906 .K1 K34X (MAIN) (BUS) (ERC)(RHC)
THE KALAMAZOO WOMAN.
V. SERIAL

HV 699 .P76X 1980(REF)
PROGRAMS PROVIDING SERVICES TO BATTERED WOMEN /
COMPILED BY CENTER FOR WOMEN POLICY STUDIES,
RESOURCE CENTER ON FAMILY VIOLENCE.
III, 214 P. ; 1980

HD6095 .D57(REF)
DIRECTORY OF CAREER RESOURCES FOR WOMEN :
A GUIDE TO CAREER RESOURCES AND OPPORTUNITIES FOR WOMEN /
EDITOR-IN-CHIEF, ALVIN RENETZKY, EDITOR, DANIEL J. JACOBSON,
ASSISTANT EDITOR, HYNDA RUDD.
287 P. ; 1979

CAT> STOP

DO YOU WANT TO EXIT FROM PROGRAM? YES

THANK YOU
EXIT

.KJOB
Confirm: F

Job 39 User ENGELKE H [75740,75740]
Logged-off TTY304 at 9:08:22 on 10-Aug-81
Runtime: 0:00:11.47, KCS:396, Connect time: 0:05:01
Disk Reads:426, Writes:7

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H.6 Help EXIT

When finished using the Online Subject/Title Catalog you can leave the Catalog by one of two methods. The first method is to type a Control-C and when asked if you want to stop, reply with a "YES". Then when asked about leaving the Catalog again reply with "YES". The second method is to use one of the several commands that stop the running of the Catalog. These commands are "STOP", "EXIT", and "FINISH". After you give any one of these three commands you will be asked if you want to leave the Catalog. To do so, reply with a "YES". When you leave the Online Subject/Title Catalog all of the save sets that you have created are lost, thus the reason for the redundant prompting for confirmation before allowing the user out of the Catalog.

It is possible for the user to be automatically LOGGED-OFF from the DECsystem-10 when the Catalog is stopped. To do this use the "LOGOFF" command. This command will perform the KJOB monitor command which will ask for confirmation. Logging out can be used as the standard action to take when leaving the Catalog by the use of run time switches. A KJOB/BATCH can be forced if desired that will insure the user will be logged out, even if files need to be deleted to allow it. See "HELP SWITCH", for information on this and other ways the behavior of the Online Subject/Title Catalog can be altered.

H.7 Help EXPAND

The QUICK command has exactly the same action as the EXPAND command.

The EXPAND command produces a list of key terms that match a given key descriptor that may include wild card characters. There are three items in the list. The first item is an identifier of the form "En" where n is a number assigned to each valid key term found. The second item in the list is the actual key term that matches the key descriptor. These are displayed in alphabetical order. The third item in the list is the number of entries that have that key term in either the title or subject headings. The maximum number of expanded terms that can be listed is 100.

Example of the use of EXPAND command:

CAT> EXPAND WOM?N*
E1 <WOMAN> 10

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E2 <WOMANHOOD> 5
E3 <WOMEN> 18
E4 <WOMENFOLK> 4

The expanded terms can be used in search commands or just the identifiers can be used. Thus after the above expand command the following two commands are equivalent:

CAT> SEARCH WOMAN OR WOMANHOOD
CAT> SEARCH E1 OR E2

The expanded terms are substituted for the given "En" form of identifiers when the sets are displayed or printed.

The EXPAND command may be abbreviated to a single letter. For example:

CAT> E CATALOG*

H.8 Help FILES

Files on the DECsystem-10 have names composed of two parts. The first part is the FILE NAME and can be from one to six alpha-numeric characters. The second part is the EXTENSION and can be omitted or can be from one to three alpha-numeric characters. The file name and extension for the file are separated by a period ("."). Examples of legal names are:

FILE.EXT , BOOKS.3 , CATLOG , JAPAN.ONL , FIL.FIL , ANDTHI.S

If a file is created with the same name as a preexisting file than the old file will be lost and replaced by the new file. To get a list of the files currently under your disk area, use the ".DIRECT" monitor command.

The ".TYPE <filnam>" monitor command can be used to print a file on your terminal where <filnam> is the file to type. To output a file to the line printer at the Computer Center use the ".PRINT <filnam>" monitor command. More documentation on how to use files is available in the Input/Output room at the Academic Computer Center, third floor of Rood Hall.
H.9 Help FORMAT

The general format for citations produced by the Online Subject>Title Catalog includes the information to locate the item in the library as well as determine whether the item is of potential use. The citation that is produced by the "TYPE", "WRITE", and "PRINT" commands is of the following general format:

CALL-NUMBER (LOCATION IF NOT MAIN COLLECTION)
MAIN TITLE
SUBTITLE
AUTHOR
PAGINATION "BIBL" COPYRIGHT-DATE LANGUAGE-CODE-IF-NOT-ENGLISH

The "BIBL" code is present if the item contains a bibliography. For a list of the location codes see "HELP LOCATE". For a list of the language codes see "HELP LANG".

Some examples of citations produced by the Catalog:

HG3753 .P63(BUS)
EAST WEST TRADE FINANCING:
AN INTRODUCTORY GUIDE /
BY SUZANNE F. PORTER.
V, 125 P. ; BIBL 1976

PT3708 .M35
ZWEI DEUTSCHE LITERATUREN? :
ZU G. GRASS, U. JOHNSON, H. KANT, U. PLENZDORF U. C. WOLF :
MIT E. BIBLIOGR. D. SCHONEN LITERATUR IN D. DDR (1968-1974) /
EBERHARD MANNACK.
142 P. ; BIBL 1977 GER

QL737.U55 N64A
NORTH AMERICAN MOOSE CONFERENCE AND WORKSHOP.
V. SERIAL

H.10 Help GRIFE

You can always use "RUN CSG:MAIL" to send mail by computer. Please use 75740, 75740 as the project-programmer number to send to.

Suggestions and comments to make this a better system are always welcomed.
Help HINT

When using the program there is some useful things to know.

1) The normal order of using the commands:

   EXPAND
   SEARCH
   TYPE

   The reason for this is that you first want to see what terms or subjects are available. So you use the EXPAND command to see what terms are in the index. When you use the EXPAND command you normally use truncation, e.g. EXPAND TEST*

   After you have identified the subject terms that you want, you then use the SEARCH command and make a set. It is in the SEARCH command mode that you can use Boolean operators. To get the union of sets use the "OR" operator, or if you want to look at the intersection of the sets then you use the "AND" operator (see "HELP BOOL").

   Then after you have created the right set you can type out the citation(s) on your terminal with the TYPE command (see "HELP TYPE").

2) When you are using the terminal and typing in different commands and you make mistakes in typing you can use the following system commands:

   Control-U Deletes the whole line you typed in.
   Control-H Deletes just one character at a time.
   Control-W Deletes a word at a time.
   Control-R Will re-type your line to check it.

3) If you are using an expensive paper in your terminal and would like to use less of the paper, then before running the Catalog, type ".TTY NO BLANK". This will cause your terminal to stop typing blank lines.

4) If you are getting characters deleted on the left-hand side of your terminal, then before you run the Catalog type ".TTY FILL 2". This will give the printing head time to get back to the left side before it needs to start printing again.
H.12 Help INFO

The "INFO" command is used to get the current status of the Online Subject>Title Catalog. When the command is given you will see the following information:

W.M.U. ONLINE SUBJECT/TITLE CATALOG. VERSION D-5
5 SETS IN USE OUT OF 20
SAVE STEPS FLAG IS OFF

Thus you can see how many save sets are left without having to use the "DISPLAY" command. The save steps flag is set by the "STEPS" command and automatically saves all sub-sets created in searches using Boolean expressions. See "HELP STEPS".

H.13 Help INTRO

The W.M.U. Online Subject>Title Catalog is a program that is in effect a computerized card catalog. It has however several advantages over the card catalog. Some of the most obvious are:

1) Convenience of searching for holdings without need to travel to library.

2) Ability to find holdings that would be difficult or impossible to find using the card catalog.

3) Capacity to produce hard copy lists of specific groups of holdings, producing instant bibliographies for given subject area.

4) Relative insensitivity to cataloging method used when holding acquired.

5) Speed with which large groups of possible areas of interest may be searched.

6) Having Boolean operators, the Online Subject>Title Catalog can find very specialized holdings without having to examine large numbers of catalog cards.

7) Entries found already exist at W.M.U. and do not need to be located elsewhere.

8) All faculty and most students have access to the
program through the academic computer facilities.

The Online Subject/Title Catalog uses the OCLC-MARC subscription tapes that are created when items are cataloged by W.M.U. libraries. These tapes are reformatted into a compact form. At the same time key terms are extracted from the title and subject headings of each entry. The key terms are all words larger than a given minimum size and not occurring on a "stop word" list of words too common to produce indexes for. By not being limited to specified subject headings or title phases, the Online Subject/Title Catalog allows the user to search for whatever terms he might be interested in.

The period covered by the Online Subject/Title Catalog is from July 1976 until the latest tape received by W.M.U., currently through December 1981.

As the OCLC-MARC cataloging tapes are delivered at six month periods, there will sometimes be a delay between when an item is acquired and when it shows up in the system.

It is expected that the university community will recognize the valuable and unique resource that the Online Subject/Title Catalog provides and will show the need to continue the system on an ongoing basis.

H.14 Help LANG

The following is a list of the most common of the three letter codes that are used in citations to indicate that the language an item has been written in is something other than English. These are only the most common ones. If the language used is one of these then the language can be used as a "subject" term when searching. Thus items written in Italian can be searched for using "ITALIAN" as a search term.

<table>
<thead>
<tr>
<th>CODE</th>
<th>LANGUAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARA</td>
<td>ARABIC</td>
</tr>
<tr>
<td>CHI</td>
<td>CHINESE</td>
</tr>
<tr>
<td>DUT</td>
<td>DUTCH</td>
</tr>
<tr>
<td>FRE</td>
<td>FRENCH</td>
</tr>
<tr>
<td>FRM</td>
<td>FRENCH</td>
</tr>
<tr>
<td>FRO</td>
<td>FRENCH</td>
</tr>
<tr>
<td>GER</td>
<td>GERMAN</td>
</tr>
<tr>
<td>GMH</td>
<td>GERMAN</td>
</tr>
</tbody>
</table>

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H.15 Help LOCATE

When citations are produced by the "TYPE", "WRITE", or "PRINT" commands in the Online Subject/Title Catalog the location of the item in the Western Michigan University Library system is given if that item is in a collection other than the main collection in Waldo Library.

The code printed is generally the same used in the card catalog. If the item is located in more than one collection than each location is given. The following is a list of the location codes in use by the Catalog at this time and where the corresponding collection is located:

<table>
<thead>
<tr>
<th>CODE</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACQ</td>
<td>ACQUISITIONS; FIRST FLOOR, WALDO LIBRARY</td>
</tr>
<tr>
<td>ARC</td>
<td>ARCHIVES; GROUND FLOOR, WALDO LIBRARY</td>
</tr>
<tr>
<td>BUS</td>
<td>BUSINESS LIBRARY; NORTH HALL, EAST CAMPUS</td>
</tr>
<tr>
<td>CAT</td>
<td>CATALOGING; FIRST FLOOR, WALDO LIBRARY</td>
</tr>
<tr>
<td>DOC</td>
<td>GOVERNMENT DOCUMENT COLLECTION; THIRD FLOOR, WALDO LIB.</td>
</tr>
<tr>
<td>ERC</td>
<td>EDUCATIONAL RESOURCE CENTER; SANGREN HALL</td>
</tr>
<tr>
<td>ICS</td>
<td>INSTITUTE FOR CISTERCIAN STUDIES; WEST HILLSIDE HALL</td>
</tr>
<tr>
<td>LIB</td>
<td>SCHOOL OF LIBRARIANSHIP LIBRARY; SECOND FLOOR, WALDO LIB</td>
</tr>
<tr>
<td>MAP</td>
<td>MAP COLLECTION; THIRD FLOOR, WALDO LIBRARY</td>
</tr>
<tr>
<td>MCB</td>
<td>BUSINESS LIBRARY (MICROFORM); NORTH HALL, EAST CAMPUS</td>
</tr>
<tr>
<td>MCD</td>
<td>GOVERNMENT DOCUMENTS (MICROFORM); THIRD FLOOR, WALDO</td>
</tr>
<tr>
<td>MCE</td>
<td>EDUCATIONAL RESOURCE CENTER (MICROFORM); SANGREN HALL</td>
</tr>
<tr>
<td>MCM</td>
<td>MAP COLLECTION (MICROFORM); THIRD FLOOR, WALDO LIBRARY</td>
</tr>
<tr>
<td>MCP</td>
<td>PHYSICAL SCIENCE (MICROFORM); THIRD FLOOR, ROOD HALL</td>
</tr>
<tr>
<td>MFC</td>
<td>MICROFICHE COLLECTION; FIRST FLOOR, WALDO LIBRARY</td>
</tr>
<tr>
<td>MFL</td>
<td>MICROFILM COLLECTION; FIRST FLOOR, WALDO LIBRARY</td>
</tr>
<tr>
<td>MPT</td>
<td>MICROPRINT COLLECTION; FIRST FLOOR, WALDO LIBRARY</td>
</tr>
<tr>
<td>MSR</td>
<td>MUSIC SOUND RECORDING; MUSIC LIBRARY, MAYBEE HALL</td>
</tr>
<tr>
<td>MUS</td>
<td>MUSIC LIBRARY; MAYBEE HALL</td>
</tr>
</tbody>
</table>
Most newspapers are in Waldo Library on the second floor, West Wing. And most of the current Periodicals are on the ground floor of Waldo Library.

Within Waldo Library the Library of Congress call number break down is the following:

AC-AZ FIRST FLOOR, EAST WING
B-BX THIRD FLOOR, EAST WING
C-F SECOND FLOOR, WEST WING
G-GT SECOND FLOOR, WEST WING
GV SECOND FLOOR, WEST WING
H-K SECOND FLOOR, WEST WING
L-LT SECOND FLOOR, WEST WING (MOST ARE IN ERC NOT IN WALDO)
M-NX FIRST FLOOR, EAST WING
P-PZ FIRST FLOOR, EAST WING
Q,QD,QH-QR GROUND FLOOR, EAST WING
R-RZ GROUND FLOOR, EAST WING
S-SK GROUND FLOOR, EAST WING
T-TX GROUND FLOOR, EAST WING
U-UH SECOND FLOOR, WEST WING
V-VM SECOND FLOOR, WEST WING
Z SECOND FLOOR, WEST WING AND REFERENCE DEPT., FIRST FLOOR

If you have more questions about where to find things within the Western Michigan University Libraries system then please contact the Reference Desk on first floor Waldo Library or call them at 383-1849.

Note: most of the Government Documents have not been cataloged, hence will not show up in the Online Subject/Title Catalog. Please contact them at third floor Waldo Library or at 383-1849.
New features of the Online Subject/Title Catalog
(As of 10-May-82)

0) On input lines longer than 80 characters, an error message will be printed and the line ignored.

1) Maintainence and supervision of the Online Subject/Title Catalog have been transfered to the Academic Computer Center.

New features of the Online Subject/Title Catalog
(As of 10-Feb-82)

0) The latest six months of acquisitions have been added to the data base. This brings the total number of records to 93470. The number of key terms for which items exist is 55888. This gives a mean of 14.1 Records for each Key Term searched for. There is a mean of 8.5 Key Terms to access each Record. This indicates both the depth and width of accessing power the Catalog has.

1) The HELP files available through the Catalog or by Monitor command have been reformatted and updated. If you have any suggestions for improved content or clarity please see "HELP GRIPE".

NEW FEATURES OF THE ONLINE SUBJECT/TITLE CATALOG
(As of 21-Nov-81).

0) It should be impossible to get an "ERROR 20" message in the catalog. This bug was caused by the user trying to create more save sets than core existed to store them in. When too many or too large save sets are created, a warning message is given and the set is not saved.

NEW FEATURES OF THE ONLINE SUBJECT/TITLE CATALOG
(As of 16-Oct-81).

0) The error handling and associated messages have been improved and hopefully made more informative. A larger set of possible error types are checked for and specific messages given in case of an error. If you have any comments or suggestions on the error trapping or lack of it see "HELP GRIPE".

1) The PRINT command to output save sets directly to the line printer now asks for confirmation as the default. This was done because users were generating LPT: output by using the PRINT command when they really wanted to use the TYPE command to list save sets on the terminal.
2) In the PRINT and WRITE commands the number of pages produced is given but the number of lines is no longer listed. This change was made because some users were confused when they were given both the number of pages and the number of lines output.

3) The set to output is now shown by the PRINT, WRITE, and OUTPUT commands before asking for confirmation or destination.

H.17 Help OUTPUT

The "OUTPUT" command is used to output entries in a save set to a disk file. The entries are output each on a single line so that they may be sorted or further processed, for example, a KWOC index may be produced. This format differs from the format produced by the "WRITE" command that splits the entry into several lines with each part of the entry on a separate line.

The general form of the command is:

CAT> OUTPUT Sn

To output save set #n to a disk file. You will be asked the file name to use. File names consist of up to six characters, a period ("."), and then up to three more characters. Legal characters for file names include letters and numbers. If a file already by that name it will be deleted and replaced by the new file.

After exiting from the Online Subject/Title Catalog, the file produced may be listed on your terminal with the system "TYPE" command thus:

(TYPE FILENAME

Where FILENAME is the name you gave when the file was created by the "OUTPUT" command. To output the file to the line printer at the Computer Center in Rood Hall use the system "QUEUE" command thus:

(QUEUE FILENAME

The file is not protected and might be deleted when you log off. To protect the file use the system "PROTECT" command thus:

(PROTECT FILENAME

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For more information on files and how to use them see "DECsystem-10 Operating System Commands Manual". A copy of this is available at the Computer Center or use the "HELP FILES" command in the catalog.

To change the contents of a file produced by the "OUTPUT" command back to citation format use the program "LBR:RECITE". For help with producing sorted bibliographies with the "OUTPUT" command see "HELP SORT".

H.18 Help PRINT

The "PRINT" command is used to output entries in a save set directly to the line printer. The entries are output in citation format, with each part of the entry on a different line. This is different from the "OUTPUT" command that outputs entries on a single line so that they may be sorted or processed further.

The general form of the command is:

CAT> PRINT Sn

To output save set Sn to line printer. You will then be asked to supply a header for the list. The header is printed at the top of the page and is for identification or comments. The heading can be as long as you wish. When all of the header has been specified enter a blank line. If no header is needed just type a return.

The line printer output can be picked up at the Input/Output window at the Academic Computer Center, third floor of Rood Hall.

H.19 Help QUICK

The EXPAND command has exactly the same action as the QUICK command.

The QUICK command produces a list of key terms that match a given key descriptor that may include wild card characters. There are three items in the list. The first item is an identifier of the form "En" where n is a number assigned to each valid key term found. The second item in the list is the actual key term that matches the key descriptor. These are displayed in alphabetical order. The
third item in the list is the number of entries that have that key term in either the title or subject headings. The maximum number of expanded terms that can be listed is 100.

Example of the use of QUICK command:

CAT> QUICK WOMAN*
E1 <WOMAN> 10
E2 <WOMANHOOD> 5
E3 <WOMEN> 18
E4 <WOMENFOLK> 4

The expanded terms can be used in search commands or just the identifiers can be used. Thus after the above QUICK command the following two commands are equivalent:

CAT> SEARCH WOMAN OR WOMANHOOD
CAT> SEARCH E1 OR E2

The expanded terms are substituted for the given "En" form of identifiers when the sets are displayed or printed.

The QUICK command may be abbreviated to a single letter. For example:

CAT> Q CATALOG*

H.20 Help RESET

The "RESET" command is used to delete all save sets that have been created by the SEARCH command. The Online Subject/Title Catalog allows at most twenty save sets to be stored at the same time. If the maximum number of save sets is reached a warning message is given. If you wish to create some new save sets use the "RESET" command to delete all of the existing save sets. When the "RESET" command is given you will be asked if you are sure you want to delete all save sets. If so type "YES". Any other response will cause the "RESET" command to be ignored and the save sets kept.

H.21 Help SEARCH
The "SEARCH" and "SELECT" commands perform identical functions.

The "SEARCH" command is used to create save sets of citations that contain a particular key term or combination of key terms. To search for a single key term the general form is:

CAT> SEARCH <TERM>

Where <TERM> is the key term to search for. Key terms are composed of letters, numbers and wild card characters. For example, to search for all citations having terms that start with "MATH" the command is:

CAT> SEARCH MATH*

Boolean expressions can be used to search for combinations of terms. For example, to search for citations having both the term "STRESS" and terms starting with "NURS" the command is:

CAT> SEARCH STRESS AND NURS*

The number of the save set created is given and the number of entries found is listed. If no citations matching the requirements are found no save set is created. Previously created save sets may be used in Boolean expressions and arbitrarily complex expressions can be used with parentheses used where needed. For more information see the help available on "BOOL" and "WILD".

H.22 Help SELECT

The "SELECT" and "SEARCH" commands perform identical functions.

The "SELECT" command is used to create save sets of citations that contain a particular key term or combination of key terms. To select for a single key term the general form is:

CAT> SELECT <TERM>

Where <TERM> is the key term to select for. Key terms
are composed of letters, numbers and wild card characters. For example, to select for all citations having terms that start with "MATH" the command is:

CAT> SELECT MATH*

Boolean expressions can be used to select for combinations of terms. For example, to select for citations having both the term "STRESS" and terms starting with "NURS" the command is:

CAT> SELECT STRESS AND NURS*

The number of the save set created is given and the number of entries found is listed. If no citations matching the requirements are found no save set is created. Previously created save sets may be used in Boolean expressions and arbitrarily complex expressions can be used with parentheses used where needed. For more information see the help available on "BOOL" and "WILD".

H.23 Help SORT

It is possible to produce bibliographies from the Online Subject/Title Catalog that are sorted by call number. The process required to do this is as follows:

1) Produce a save set of the desired citations. For help with this see "HELP SEARCH".

2) Output the save set using the "OUTPUT" command. Example:

   CAT> OUTPUT S3

   This will output to a user specified disk file save set #3. The save set is output with each citation on a single line. The file name given will be used in the next step. For help with files see "HELP FILES" or see the DECsystem-10 Operating System Commands Manual.

3) After leaving the Online Subject/Title Catalog (use the "EXIT" command), the output file can be sorted. Use the system SORT program under the system area. The command to SORT that will produce a file sorted by call number is:
4) The file is now sorted and is ready to be returned to the format that is used by the "TYPE" , "WRITE" , and "PRINT" commands in the Online Subject/Title Catalog. To do this run the program LBR:RECITE. You will be asked for the file to reformat. This is the file that is to the left of the "=" in the sort command. The program will then ask for the name of the file for the reformatted list of citations. This file will contain the sorted bibliography that was desired. You will then be asked for a header for the output list, this can be as long as desired. Enter the header until done then type a blank line.

An example run of the whole process follows with computer output in UPPER CASE and user input in lower case:

...... from within the Online Subject/Title Catalog ......

CAT> search computer* and business*
FOUND 30
CREATING SET #1 <computer* AND BUSINESS*> 30 ITEMS

CAT> output s1

FILE FOR OUTPUT OF ITEMS? comput.ono
OUTPUTING SET:
<COMPUTER* AND BUSINESS*> 30 ITEMS

CAT> exit

DO YOU WANT TO EXIT FROM PROGRAM? yes

THANK YOU

EXIT

.r sort

*computer.ons=computer.ono/k:1:50/r:1500/asc/var
SORTED 30 RECORDS
111 KEY COMPARISONS, 3.70 PER RECORD
RECITE - PROGRAM TO REFORMAT SINGLE LINE OUTPUT FROM W.M.U. ONLINE SUBJECT/TITLE CATALOG INTO MULTI-LINE CITATION FORMAT.

THIS PROGRAM TAKES FILES IN THE FORMAT PRODUCED BY THE OUTPUT COMMAND WITHIN THE CATALOG AND REFORMATS THEM INTO THE SAME MULTI-LINE CITATION FORMAT AS USED BY THE TYPE, PRINT, AND WRITE COMMANDS WITHIN THE CATALOG. IF THE FILE HAS BEEN SORTED BEFORE IT IS REFORMATTED, THE RESULTING BIBLIOGRAPHY WILL ALSO BE SORTED.

FOR MORE HELP WITH THIS PROGRAM SEE THE FILE "LBR:SORT.HLP" OR USE THE "HELP SORT" COMMAND WITHIN THE CATALOG.

INPUT FILE IN SINGLE-LINE FORMAT? comput.ons

FILE FOR MULTI-LINE, CITATION FORMAT OUTPUT? comput.onp

ENTER HEADER FOR OUTPUT FILE (END WITH BLANK LINE).

computers and business

WORKING......

READ 30 RECORDS

OUTPUT 3 PAGES

EXIT

.type comput.onp

COMPUTERS AND BUSINESS

HD 38 .J4X 1977
THE BUSINESS MANAGEMENT LABORATORY :
A COMPUTER SIMULATION /
RONALD L. JESEN, DAVID J. CHERRINGTON.
132 LEAVES IN VARIOUS FOLIATIONS : 1977

HD69.I7 K33
MULTINATIONAL COMPUTER SYSTEMS :
AN INTRODUCTION TO TRANSNATIONAL DATA FLOW AND DATA REGULATION
HARRY KATZAN, JR.
XIII, 198 P. ; BIBL 1980
H.24 Help STEPS

The "STEPS" command can be used to turn on a mode of operation of the Online Subject/Title Catalog where during the evaluation of search expressions, each subexpression will have the associated save set created and saved. For example, if the "STEPS" command has been issued, when the following search command is given:

\texttt{CAT> SEARCH'HYDROLOG*' OR (GROUND AND WATER)}

Along with the final save set, sets for "HYDROLOG*", "GROUND", "WATER", and "(GROUND AND WATER)" are automatically saved.

The use of this feature can save time when several combinations of terms will be created. To turn off this feature use the "STEPS" command for a second time.

H.25 Help STOP

In order that the index of the Online Subject/Title Catalog does not become cluttered with terms that occur large number of times but have little use in searching, a list of words to omit from the key term extraction process has been created. This "Stop Word List" has fifty-five
terms on it for the current version of the Catalog. If a search is attempted for a key term on the stop word list, a warning message is printed and the search stopped. When using the "EXPAND" command any matching terms from the stop word list are listed followed by "<STOPPED>" to indicate that no citations would be found if that term were used in a search.

The complete list of stop words used in the current version of the Online Subject/Title Catalog follows:

<table>
<thead>
<tr>
<th>ABOUT</th>
<th>AFTER</th>
<th>AGAINST</th>
<th>ALL</th>
<th>AMONG</th>
<th>AND</th>
<th>ARE</th>
<th>ASPECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUTHORS</td>
<td>BEFORE</td>
<td>BETWEEN</td>
<td>CAN</td>
<td>DER</td>
<td>DES</td>
<td>ETC</td>
<td>FOR</td>
</tr>
<tr>
<td>FROM</td>
<td>HELD</td>
<td>HIS</td>
<td>HOW</td>
<td>INTO</td>
<td>INTRODUCTION</td>
<td>ITS</td>
<td></td>
</tr>
<tr>
<td>KNOW</td>
<td>LES</td>
<td>MAY</td>
<td>NEAR</td>
<td>NEW</td>
<td>OLD</td>
<td>OTHER</td>
<td>OUR</td>
</tr>
<tr>
<td>OVER</td>
<td>PART</td>
<td>REPORT</td>
<td>SELECTED</td>
<td>SINCE</td>
<td>SOME</td>
<td>STUDIES</td>
<td>STUDY</td>
</tr>
<tr>
<td>THAT</td>
<td>THE</td>
<td>THEIR</td>
<td>THEY</td>
<td>THROUGH</td>
<td>TOWARD</td>
<td>UND</td>
<td>UNDER</td>
</tr>
<tr>
<td>USE</td>
<td>VON</td>
<td>WHAT</td>
<td>WHERE</td>
<td>WHO</td>
<td>WITH</td>
<td>WITHOUT</td>
<td>YOU</td>
</tr>
<tr>
<td>YOUR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

H.26 Help SWITCH

The Online Subject/Title Catalog currently supports several switches that can appear in a SWITCH.INI file or after the RUN command such as this:

In your SWITCH.INI file:

CAT/EXPERT/NONOTE/NUMBER

or at run time:

.RUN LBR:CAT(EXPERT,STEPS)

The following switches are currently supported:

<table>
<thead>
<tr>
<th>SWITCH</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXPERT</td>
<td>Put implied Boolean &quot;AND&quot; between operands if all else fails and put implied &quot;OR&quot; between expanded terms if all else fails. Also allows arbitrary use of wild card characters including left hand truncation (can use VAST amounts of computer time).</td>
</tr>
<tr>
<td>NOEXPERT</td>
<td>Do not use implied Boolean &quot;AND&quot; and &quot;OR&quot; (default).</td>
</tr>
<tr>
<td>STEPS</td>
<td>Save all subsets created in Boolean expressions.</td>
</tr>
<tr>
<td>NOSTEPS</td>
<td>Do not save subsets (default).</td>
</tr>
</tbody>
</table>
TLIMIT:N Ask for confirmation on TYPE's of sets bigger than N (default=20). If N=0 always ask how many to type.

WLIMIT:N Ask for confirmation on WRITE's bigger than N (default=200).

OLIMIT:N Ask for confirmation on OUTPUT's bigger than N (default=600).

PLIMIT:N Ask for confirmation on PRINT's bigger than N (default=0).

THEAD:N Put header on TYPE's bigger than N. If N<0 ask about headers on TYPE's bigger than -N. (default=50).

SETS:N Allow up to N save sets (default=20).

MAXTMP:N Force the maximum result of Boolean operation to be smaller than N. (default=3000).

EXPAND:N Allow up to N EXPAND'ed terms (default=100).

LOGOUT Try to LOGOUT job when done.

NOLOGOUT Do not LOGOUT job when done (default).

KJOB Do a KJOB/BATCH when done (Very Dangerous!).

NOKJOB Do not do a KJOB/BATCH when done (default).

NUMBER Put sequence numbers on citations.

NONUMBER Do not put sequence numbers on citations (default).

NOTE Type notice file when catalog is run (default).

NONOTE Do not type notice file when catalog is run.

TRUNCATE:N Give warning after N matches when using key descriptor with wild card characters in searching (default=25).

PROMPT:"STR" Change prompt string to STR. Can be arbitrary string delimited by quotes. (default= "CAT> ").

Switches on the RUN command override the SWITCH.ini file.

This feature may change slightly at some future date, if you need more help please use the "HELP GRIPE" command to contact the author.

H.27 Help TYPE

The "TYPE" command is used to list the contents of a save set on the terminal. The save set is listed in the same citation format as used by the "WRITE" and "PRINT" commands. If the number of items in the save set is too large (default=20) then the user is asked how many should be typed. The user can respond with "ALL" , "NONE" , a single number telling how many from the start to type or a range of the form N-M or N,M where N is the first citation to type and M is the last citation to type. If the set size is
large enough (default=50) then a header is printed at the
top of the list. The defaults for size and header limits
can be changed by the use of run time switches - try
"HELP SWITCH".

The general form of the TYPE command is:
CAT> TYPE Sn

To type on the terminal save set number n.

H.28 Help WHAT

To get a list a what save sets have been created and
what the search terms used for each along with how many
citations were found use the "WHAT" command or the "DISPLAY"
command. The function of both of these commands is
identical. A sample of the result from these commands:

CAT> WHAT

<table>
<thead>
<tr>
<th>SET</th>
<th>ITEMS</th>
<th>SEARCH TERMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>844</td>
<td>COMPUT*</td>
</tr>
<tr>
<td>2</td>
<td>1383</td>
<td>BUSINESS*</td>
</tr>
<tr>
<td>3</td>
<td>31</td>
<td>(COMPUT*) AND (BUSINESS*)</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>METAL* AND WELD*</td>
</tr>
</tbody>
</table>

H.29 Help WILD

There are three Wild Card characters that may be used
in key descriptors when SEARCH'ing or when EXPAND'ing a
term. The wild card characters are used to create a key
discriptor that will match several possible key terms.

The wild card characters are:

<table>
<thead>
<tr>
<th>CHARACTER</th>
<th>REPLACES</th>
</tr>
</thead>
<tbody>
<tr>
<td>*</td>
<td>Any number of characters</td>
</tr>
<tr>
<td>?</td>
<td>A single character</td>
</tr>
<tr>
<td>%</td>
<td>A single character or null</td>
</tr>
</tbody>
</table>

Thus WOM?N* will match WOMAN, WOMEN, WOMANHOOD, etc.
An "*" at the end of a term will match any key beginning
with that term. This is right truncation. For example,
PHOTO* will match PHOTOGRAPH, PHOTOGRAPHIC, PHOTOGRAPHS ,
etc. The "%" can be used for matching plurals. For
example, CATZ will match CAT as well as CATS.

Wildcards may not be used for the first two characters of a term.

Wise use of wildcards and first using the "EXPAND" command will produce more efficient and complete results for the "SEARCH" command.

H.30 Help WRITE

The "WRITE" command is used to output entries in a save set to a disk file. The entries are output in citation format, with each part of the entry on a different line. This differs from the "OUTPUT" command that outputs entries on a single line so that they may be sorted or processed further.

The general form of the command is:

CAT> WRITE Sn

To output save set #n to a disk file. You will be asked the file name to use. File names consist of up to six characters, a period ("."), and then up to three more characters. Legal characters for file names include letters and numbers. If a file exists already by that name it will be deleted and replaced by the new file.

You will then be asked to supply a header for the file. The header is output at the start of the file and is for identification or comments. The heading can be as long as you wish. When all of the header has been specified enter a blank line. If no header is needed just type a return.

After exiting from the Online Subject/Title Catalog, the file produced may be listed on your terminal with the system "TYPE" command thus:

(TYPE FILENAME)

Where FILENAME is the name you gave when the file was created by the "WRITE" command. To output the file to the line printer at the Computer Center in Rood Hall use the system "QUEUE" command thus:

(QUEUE FILENAME)

The file is not protected and might be deleted when you
log off. To protect the file use the system "PROTECT" command thus:

.PROTECT FILENAME

For more information on files and how to use them see "DECsystem-10 Operating System Commands Manual". A copy of this is available at the Computer Center. Or use the "HELP FILES" command in the Catalog.
The following is some of the source code for the Online Subject/Title Catalog. Listed is the program that accesses the data base through its user interface. It is written in FASBOL, a compiled version of SNOBOL4. Comments in the program are preceded by an asterisk. Also listed is one of the assembly language routines that do the actual random access disk input-output. It is written in MACRO-10 and comments are preceded by a semi-colon.

I.1 CATLOG.FAS

* CATLOG.FAS
* EVOLVED VERSION OF
* ONLINE.FAS
*
* ONLINE SUBJECT/TITLE CATALOG FOR OCLC-MARC DATA
* *
* AUTHOR: JAMES N. SLEEP
* DATE WRITTEN: 12-DEC-80
* DATE MODIFIED: 13-FEB-81
* DATE REMODIFIED: 15-JULY-81 (VERSION D-1)
* DATE REMODIFIED: 5-AUG-81 (VERSION D-2)
* *
* DESIGNED TO RUN FROM AND UNDER LBR: ERSATZ DEVICE
* WITH SINGLE COLLECTION
* MORE MODS: 6-SEP-81 (VERSION D-3)
* STOP WHEN KEY LEXICALLY GONE PAST,
* LEFT HAND TRUNCATION UNDER EXPERT MODE
* FIX TO DELETE SETS AND ARRAYS WHEN NOT NEEDED (YET AGAIN)
* *
* NEXT VERSION: 16-OCT-81 (VERSION D-4)
* BETTER ERROR REPORTING, CONFIRMATION DEFAULT ON PRINT
* *
* NEXT VERSION: 21-NOV-81 (VERSION D-5)
* WILL NOT CREATE SET IF NO ROOM IN CORE.
* *
* NEXT MOD: 10-MAY-82 (VERSION D-6)
* REPORT IF INPUT LINE TOO LONG

200
* SETUP DECLARATIONS

DECLARE('SNOBOL.MAIN','CAT')
DECLARE('OPTION','NO.STNO')
DECLARE('ENTRY.LABEL','LOOP')
DECLARE('ENTRY.LABEL','INTERT')
DECLARE('ENTRY.LABEL','RESTR')
DECLARE( 'EXTERNAL.FORTRAN.FUNCTION','FRECOR(1)')
DECLARE( 'EXTERNAL.FORTRAN.FUNCTION','LPTSPL(0)')
DECLARE( 'EXTERNAL.FORTRAN.FUNCTION','CLRINT(0),CHKINT(1)')
DECLARE( 'INTEGER','FREECORE,COLLCORE')
DECLARE( 'INTEGER','INTERRUPT')
DECLARE( 'EXTERNAL.FORTRAN.FUNCTION','LOGOUT(0),KJOB(0)')
DECLARE( 'EXTERNAL.FORTRAN.FUNCTION','RESCAN(1)')
DECLARE( 'EXTERNAL.FORTRAN.FUNCTION','CLRCAT(1)')
DECLARE( 'EXTERNAL.FORTRAN.FUNCTION','SETCAT(4)')
DECLARE( 'STRING','RUNCOM(80)')
DECLARE( 'STRING','CATDEV(6),CATSFD(6)')
DECLARE( 'ENTRY.VARIABLE','PRMSTR,OUTLIM,NUMFLG,TRNLIM')
DECLARE( 'ENTRY.VARIABLE','LOGFLG,NOTFLG,TYHEAD')
DECLARE( 'ENTRY.VARIABLE','PRMSTR,OUTLIM,NUMFLG,TRNLIM')
DECLARE( 'ENTRY.VARIABLE','LOGFLG,NOTFLG,TYHEAD')
DECLARE( 'ENTRY.VARIABLE','EXPFLG,TYPLIM,WRTLIM,PRTLIM')
DECLARE( 'ENTRY.VARIABLE','EXPFLG,TYPLIM,WRTLIM,PRTLIM')
DECLARE( 'ENTRY.VARIABLE','CATPRJ,CATPRG')
DECLARE( 'EXTERNAL.FORTRAN.FUNCTION','SETREE(0)')
DECLARE( 'EXTERNAL.FUNCTION','FROMTO')
DECLARE( 'EXTERNAL.FUNCTION','PROSWT')
DECLARE( 'EXTERNAL.FUNCTION','GETINI')
DECLARE( 'EXTERNAL.FUNCTION','ASCII')
DECLARE( 'EXTERNAL.FUNCTION','DECOCT')
DECLARE( 'EXTERNAL.FUNCTION','MEMBER')
DECLARE( 'EXTERNAL.FORTRAN.FUNCTION','TXTIN(1),GETTXT(2)')
DECLARE( 'EXTERNAL.FORTRAN.FUNCTION','RECIN(1),GETREC(2)')
DECLARE( 'EXTERNAL.FORTRAN.FUNCTION','KEYIN(1),GETKEY(4)')
DECLARE( 'EXTERNAL.FUNCTION','DSKIN,DSKOUT,SETTTY')
DECLARE( 'INTEGER','FWRDS')
DECLARE( 'INTEGER','EXPFLG,TYPLIM')
DECLARE( 'ENTRY.VARIABLE','EXPFLG,NUMFLG,TRNLIM')
DECLARE( 'ENTRY.VARIABLE','LOGFLG,NOTFLG,TYHEAD')
DECLARE( 'EXTERNAL.VARIABLE','TYPE,PROMPT,ACCEPT')
DECLARE('GLOBAL.VARIABLE','READ, WRITE, PREAD')
DECLARE('STRING','TERM(15), TEXT(20)')
DECLARE('INTEGER','FSTKEY, LSTKEY, IKEY, IREC, RECNUM, PNT1, PNT1')
DECLARE('INTEGER','SIZ1, SIZ2, TMPNT, R1, R2')
DECLARE('INTEGER','GARBSIZE')
DECLARE('PURGE.LABEL','ALL')
DECLARE('UNPURGE.VARIABLE','DESCOR, REFORM, GARBSIZE')
DECLARE('UNPURGE.VARIABLE','FILNAM, SETA, STERM, KEYEXP, FP, LP')
DECLARE('UNPURGE.VARIABLE','OP, SET1, SET2, SETSZ, SETA, SETB, KEY')
DECLARE('UNPURGE.VARIABLE','GETANS, PARSESET, NULLSET, MAKESET')
DECLARE('UNPURGE.VARIABLE','ORSET, ANDSET, EXLSET, GENPAT')
DECLARE('PURGE.VARIABLE','ALL')

* START PROGRAM

* SET STATEMENT LIMIT VERY HIGH FOR DEBUGGING REASONS
&STLIMIT = 999999

* SET UP DEFINITIONS FOR FUNCTIONS
DEFINE('GETANS()')
DEFINE('NULLSET()')
DEFINE('GARBAGE(GARBSIZE)')
DEFINE('REFORM(DESCOR)')
DEFINE('PARROT(FILNAM)')
DEFINE('SAVEIT(SETA, STERM)')
DEFINE('PARSESET(KEYEXP)FF, LP, OP, SET1, SET2')
DEFINE('MAKESET(SETSIZ)')
DEFINE('ORSET(SETA, SETB)')
DEFINE('ANDSET(SETA, SETB)')
DEFINE('EXLSET(SETA, SETB)')
DEFINE('GENPAT(KEY)')

* SET UP PATTERNS FOR LATTER USE
VERSION = 'D-6'
ESCHR = ASCII(27)
ALTCHR = ASCII(29)
HTAB = '
SPACE = '
CNTRLZ = ASCII(26)
CNTRLJ = ASCII(10)
CNTRLG = ASCII(7)
CNTRLL = ASCII(12)
CNTRLK = ASCII(11)
CNTRLCHR = ANY(CNTRLZ CNTRLJ CNTRLG CNTRLL CNTRLK)
                  CNTRLJ ESCCHR ALTCHR)
SWITCHDLM = '‐' ! ':' ! '*' ! '('
HLPPAT = 'EXPAND' ! 'WILD' ! 'BOOL' ! 'INTRO' ! 'GRIPE'
       ! 'WRITE' ! 'PRINT' ! 'RESET' ! 'QUICK'
       ! 'HELP' ! 'FILES' ! 'NEW'
       ! 'INFO' ! 'SWITCH'
       ! 'OUTPUT' ! 'SEARCH' ! 'SELECT' ! 'DEMO'
       ! 'AID' ! 'TYPE' ! 'CAT' ! 'FORMAT' ! 'STEPS' ! 'LANG'
       ! 'HINT' ! 'SORT' ! 'EXIT' ! 'STOP' ! 'WHAT' ! 'LOCATE'

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FRM1 = POS(0) '(' BAL . SAV ')' RPOS(0)
FRM2 = POS(0) SPACE REM . SAV
FRM3 = POS(0) ARB . SAV SPACE RPOS(0)
FRMEXP = FRM1 | FRM2 | FRM3
ANDPAT = " AND " | 
ORPAT = " OR " | 
EXLPAT = " EXL " | 
OPRPAT = ANDPAT | ORPAT | EXLPAT
OPRTERMS = " AND " | " EXL " | " OR "
DIGITS = "0123456789"
NUMBER = POS(0) SPAN(DIGITS) RPOS(0)
ANYDIGIT = ANY("0123456789")
UCASE = FROMTO("A", "Z")
LCASE = FROMTO("a", "z")
KEYCHR = UCASE DIGITS
MAXCHR = ASCII(127)
MAXCHRS = MAXCHR MAXCHR MAXCHR
WILDONES = "?*%"
WILDCHR = ANY("?*%")
BADCHR = NOTANY(UCASE DIGITS "?*%")
BADEXPCHR = NOTANY(SPACE UCASE DIGITS "?*%()#@&!")
GOODSPAN = SPAN(UCASE DIGITS "?*%")
GOODCHR = "?*%" UCASE DIGITS
ANYUCASE = ANY(UCASE)
ANYLCASE = ANY(LCASE)
ANYKEYCHR = ANY(UCASE DIGITS)
KEYTERM = POS(0) ANYUCASE ANYKEYCHR GOODSPAN RPOS(0)
SDIGS = ANYDIGIT ANYDIGIT | ANYDIGIT
EDIGS = ANYDIGIT ANYDIGIT ANYDIGIT | SDIGS
EFLD = (SPACE ! '(' | POS(0) ) . EDLM1 ('E' ! '@') EDIGS . ENUM
(SPACE ! ')' | RPOS(0)) . EDLM2
SFLD = (SPACE ! '(' | POS(0) ) . SDLM1 ('S' ! '#') SDIGS . SNUM
(SPACE ! ')' | RPOS(0)) . SDLM2
NOTSPACE = NOTANY(SPACE)

* SET STEP SAVING FLAG OFF AND OTHER DEFAULTS
TYHEAD = 50
TYPLIM = 20
WRTLIM = 200
OUTLIM = 600
PRTLIM = 0
PRMSTR = "CAT>"
TRNLIM = 25
NOTFLG = -1
NUMFLG = 0
LOGFLG = 0
EXPFLG = 0
MAXSAV = 20
MAXTMP = 3000
EXPMA = 100
STPFLG = 0

* CREATE A DATA TYPE FOR STORING SAVE SETS
DATA(SET(ARR,BIG))
* MAKE TABLES FOR LATER USE
* MAKE ONE FOR THE LOCATION OF DATA BASES
  BASTBL = TABLE()
  BASTBL<"TOTAL"> = "DSKE,75740,75740,TOTAL"
*
* CLEAR PREVIOUS I/O ASSIGNMENTS
  RELEASE(0)
  SETTTY()
* FOR NOW ALL WE HAVE IS THE TOTAL COLLECTION
  BASE = "TOTAL"
*
* SEE WHERE THE COLLECTION IS STORED
  SETBAS BASLOC = BASTBL<BASE>
  BASLOC POS(0) ARB . DEV "," ARB . PRJ
    "," ARB . PRG "," REM . SFD
* PICK OFF THE VARIOUS PARTS AND PREPARE FOR PASSING TO MACRO
  CATDEV = RPAD(DEV,6)
  CATSFD = RPAD(SFD,6)
  CATPRJ = DEC(OCT(PRJ)
  CATPRG = DEC(OCT(PRG)
* INVOKE ROUTINE TO SET THE "CAT" PATH SPECIFICATION TO WHERE
  COLLECTION IS HELD
  SETCAT(CATDEV,CATPRJ,CATPRG,CATSFD)
* PICK OFF LOCATION AND AFTER FORMATTING SET LOGICAL "CAT:"
* TO THAT STRUCTURE,PPN AND SFD.
*
* PREPARE TABLE FOR FIRST TWO LETTERS OF KEY TERMS
  TBLSIZ = 0
  TCHAN = DSKIN("READ","CAT:ONLINE.TBL",50) :S(SIZIT)
  TYPE = "?CAN NOT READ TABLE FILE?"
  FREEZE(0)
  SIZIT DUMB = READ :F(SIZSET)
* JUST READ IT IN ONCE TO SEE HOW BIG IT IS
  TBLSIZ = TBLSIZ + 1 :(SIZIT)
* KNOWING HOW BIG IT IS ALLOWS A CLOSE FIT
  SIZSET TBLSIZ = TBLSIZ + 1
  TYPE = "TABLE WILL BE TBLSIZ ELEMENTS LARGE"
  RELEASE(TCHAN)
  MINMAX = TABLE(TBLSIZ)
* OPEN UP THE TABLE FILE WITH THE INDEX IN IT
  DSKIN("READ","CAT:ONLINE.TBL",50) :S(SAYIT)
  FREEZE(0)
* JUST DIE IF WE CAN NOT (SHOULD NEVER HAPPEN)
* COME HERE WHEN TABLE FILE HAS BEEN OPENED
* FIRST LINE IN TABLE FILE WILL HAVE TITLE PRECEEDED BY A "Z"
  SAYIT REC1 = READ
    REC1 POS(0) "Z" REM . SETNAM
* SAVE THE SET NAME FOR LATER USE
* READ IN THE ENTIRE TABLE CHECKING FOR CORRECT FORMAT
  ZLOOP REC = READ :F(GOTEM)
RECLN(2) CHR2 ',' ARB KMIN ',' REM KMAX :F(ZLOOP)
* FORMAT IS TWO CHARS, A COMMA, FIRST KEY, A COMMA, LAST KEY
* GET A TERM FOR THE TABLE
MINMAX<CHR2> = KMIN ',' KMAX :(ZLOOP)
* AND PUT IT IN THE TABLE

* WHEN ALL DONE CLEAR OUT THE I/O CHANNEL USED AND GO ON
GOTEM RELEASE(0)
* WE NOW FREEZE THE PROGRAM WITH THE TABLE FILE READ IN
  TYPE = 'SAVE ME NOW AS CAT'
  FREEZE()
* WE HAVE NO CREATED THE CORE IMAGE READY TO BE RUN
***** THIS IS THE START OF THE PROGRAM AT RUN TIME *****
*****
**
* GET THE SWITCH.INI SETTINGS IF ANY
SWITINI = GETINI("CAT") :F(NOTINI)
SWITINI = REPLACE(SWITINI,LCASE,UCASE)
* CHANGE TO UPPER CASE
PROSWT(SWITINI)
* PROCESS THEM UP RIGHT

* NOW WE GET THE RUN TIME SWITCHES
NOTINI RESCAN(RUNCOM)
* GET RUN TIME COMMAND
SWITRUN = REPLACE(RUNCOM,LCASE,UCASE)
* CHANGE TO UPPER CASE
SWITRUN POS(0) ARB SWTCHDLM = '/ ' :F(GOTSWT)
SWTRNLPSWITRUN ',' '=' '/ ' :S(SWTRNLPSWITRUN')
  RPOS(0) =
* GET THE SWITCH PART OF THE COMMAND
* SEE IF GOOD SWITCHES
* CHEW THEM UP AND TRY AGAIN
PROSWT(SWITRUN)
* JUST HANDLE THEM AS BEFORE
* RUN TIME SWITCHES OVER RIDE .INI SWITCHES
GOTSWT
* CREATE ARRAY SPACE AS NEEDED
* MAKE AN ARRAY TO WORK IN DURING EVALUATION
TMPARR = ARRAY(MAXTMP)
* AND TELL HOW BIG IT IS
* MAKE AN ARRAY TO KEEP TRACK OF THE GENERATED SAVE SETS
TRMSET = ARRAY(MAXSAV)
SAVSET = ARRAY(MAXSAV)
SAVCNT = 0
* MAKE AN ARRAY TO STORE EXPANDED TERMS IN
* AND SAY HOW MANY WE CAN HAVE
EXPARR = ARRAY(EXPMAX)
EXPCNT = 0
* ARRAYS MADE TO ORDER BY SWITCHES
* CHANGE THE DEFINITION OF WHAT A KEYTERM IS IF IN EXPERT MODE
  KEYTERM = ?INE(EXPFLG,0) POS(O) GOODSPAN RPOS(O)
* ANYTHING GOES IF EXPERT
* SET UP TTY I/O END CLEAR OUT ALL THE REST
  RELEASE(0)
  SETTTY()
* GO TO IT
  TYPE = "WELCOME TO W.M.U. ONLINE SUBJECT/TITLE"
  "CATALOG. VERSION " VERSION
  TYPE =
* PUT OUT NOTICE FILE.
  ?INE(NOTFLG,0) PARROT('LBR: CAT.NOT')
* BUT ONLY IF WANTED
  TYPE =
  TYPE = "YOU ARE NOW ACCESSING THE `SETNAME
  TYPE =
  TYPE = "FOR HELP TYPE "HELP"
  TYPE =
* GIVE A SUGGESTION AND OPEN UP THE RANDOM ACCESS INDEX
* AND TEXT FILES
  SETCAT(CATDEV,CATPRJ,CATPRG,CATSF)
  KEYINO
  RECINO
  TXTINO
* SET REENTER AND CONTROL-C TRAPS
  SETREE(0)
* THIS IS THE MAIN LOOP WHERE IT ALL TAKES PLACE
* PUT OUT A NICE PROMPT SO THE USER KNOWS
* THAT WE ARE EXPECTING SOMETHING
* AND CLEAR ANY PENDING CONTROL-C'S
* LOOP
  ?CHKINT(INTERRUPT)
  ?INE(INTERRUPT,0) :S(INTRPT)
* IF PENDING CONTROL-C GO TO SEE IF DONE
  PROMPT = PRMSTR
  COMM = GETANSO
  COMM NSPAN(SPACE) ARB . MODE SPAN(SPACE) REM . FTERM :S(OKRES)
* CHECK FOR SPECIAL COMMANDS
  ?IDENT(COMM,"HELP") :S(HELP)
  ?IDENT(COMM,"LOGOFF") :S(KJOBIT)
  ?IDENT(COMM,"FINISH") :S(STOP)
  ?IDENT(COMM,"EXIT") :S(STOP)
  ?IDENT(COMM,"STOP") :S(STOP)
  ?IDENT(COMM,"RESET") :S(RESET)
  ?IDENT(COMM,"WHAT") :S(WHAT)
  ?IDENT(COMM,"INFO") :S(INFO)
  ?IDENT(COMM,"STEPS") :S(STEPS)
  COMM POS(0) "DIS" :S(WHAT)
* CHECK FOR NORMAL COMMANDS WITH NULL ARGUMENTS
  'HELP' POS(O) COMM :S(HELP)
  'TYPE' POS(O) COMM :S(TYPENULL)
  'WRITE' POS(O) COMM :S(WRITENULL)
  'PRINT' POS(O) COMM :S(PRINTNULL)
  'OUTPUT' POS(O) COMM :S(OUTPUTNULL)
  'QUICK' POS(O) COMM :S(QUICKNULL)
  'EXPAND' POS(O) COMM :S(QUICKNULL)
  'SEARCH' POS(O) COMM :S(SEARCHNULL)
  'SELECT' POS(O) COMM :S(SEARCHNULL)

* COME HERE WHEN ALL ELSE FAILS
BADRES
  TYPE =
  TYPE = '?'ILLEGAL COMMAND - "" COMM ""
  TYPE = 'FOR LIST OF LEGAL COMMANDS TYPE "HELP"
  TYPE = :/(LOOP)

* SEND THEM BACK FOR ANOTHER TRY
HELP
  TYPE = 'COMMANDS ARE:
  TYPE = 'DISPLAY EXIT EXPAND HELP INFO OUTPUT PRINT QUICK'
  TYPE = 'RESET SEARCH SELECT STEPS STOP TYPE WHAT WRITE'
  TYPE =
  TYPE = 'FOR MORE HELP PRINT THE FILE LBR:CAT.HLP'
  TYPE = 'HELP IS AVAILABLE FOR SPECIFIC COMMANDS'
  TYPE = 'AND FEATURES OF'
  TYPE = 'THE ONLINE SUBJECT/TITLE CATALOG.'
  TYPE = 'TO GET A LIST OF ITEMS WITH'
  TYPE = 'MORE HELP AVAILABLE TYPE "HELP HELP"'
  TYPE =
  TYPE = :/(LOOP)

* COME HERE TO PROCESS GENERAL COMMANDS
OKRES
  'EXPAND' POS(O) MODE :S(QUICK)
  'QUICK' POS(0) MODE :S(QUICK)
  'SELECT' POS(O) MODE :S(SEARCH)
  'SEARCH' POS(O) MODE :S(SEARCH)
  'TYPE' POS(O) MODE :S(TYPE)
  'WRITE' POS(O) MODE :S(WRITE)
  'OUTPUT' POS(O) MODE :S(OUTPUT)
  'PRINT' POS(O) MODE :S(PRINT)
  'WHAT' POS(O) MODE :S(WHAT)
  'HELP' POS(O) MODE :S(MHELP)
  :/(BADRES)

* IF NONE OF THE COMMANDS MATCH WE MUST HAVE A PROBLEM
*
* COME HERE TO GET HELP FROM HELP FILES
MHELP
  FTERM POS(O) HLPPAT RPOS(O) :S(GIVHELP)
  TYPE = '?NO HELP AVAILABLE FOR ' FTERM
  TYPE = :/(LOOP)
GIVHELP
  HLPFIL = 'LBR:' FTERM '.HLP'
PARROT(HLPFIL)
**TYPE** =

**TYPE** = 'TRY AGAIN'

**TYPE** = :(LOOP)

* COME HERE ON NULL SEARCH AND SELECT

SEARCHNULL

**TYPE** = 'SEARCH FOR WHAT TERM OR COMBINATION OF TERMS?'

FTERM = GETANS()

* THIS HANDLES THE SEARCH AND SELECT COMMANDS

SEARCH FNDSET = PARSESET(FTERM) :F(BADTRM)

**TYPE** = 'FOUND ' BIG(FNDSET)

SAVEIT(FNDSET,FTERM)

FNDSET =

**TYPE** = :(LOOP)

* COME HERE ON GENERALIZED SEARCH ERROR

BADTRM

GARBAGE(0)

**TYPE** = '?BAD SEARCH OR SEARCH TERMS'

**TYPE** = 'TRY AGAIN'

**TYPE** = :(LOOP)

* QUICKNULL

PROMPT = 'NUMBER OF CITATIONS FOR WHICH KEY TERM?'

FTERM = GETANS()

* COME HERE TO SHOW ALL KEYWORDS THAT MATCH A GIVEN TERM

QUICK

FTERM KEYTERM :S(QUICKOK)

* SEE IF GOOD TERM TO EXPAND

FTERM SPACE :F(QBADONE)

* SEE IF SPACES IN TERM

**TYPE** = '?KEY TERM TO EXPAND MUST BE SINGLE TERM NOT EXPRESSION'

**TYPE** = :(LOOP)

* CHECK NEXT ON ILLEGAL CHARACTERS

QBADONE

FTERM BADCHR . BADONE :F(QBADTWO)

**TYPE** = '?ILLEGAL CHARACTER " " BADONE " " IN KEY TERM.'

**TYPE** = :(LOOP)

* SEE IF TOO SHORT

QBADTWO

?IGT(SIZE(FTERM),2) :S(QBADTRM)

**TYPE** = '?KEY TERM TOO SHORT " " FTERM " "

**TYPE** = '?KEY TERM TO EXPAND MUST BE AT LEAST ' THREE CHARACTERS LONG'

**TYPE** = :(LOOP)

* IF THAT IS THE PROBLEM SAY SO

* IF NOT JUST GIVE GENERAL COMPLAINT

QBADTRM

**TYPE** = '?ILLEGAL KEY TERM " " FTERM " "

**TYPE** = :(LOOP)

* COME HERE IF TERM IS OK

QUICKOK

?IEQ(EXPFLG,0) :S(QNORM)

FTERM POS(0) WILDCHR :F(QNORM)

CHR2 = '**' :(QEXPRT)
* SET SPECIAL TABLE ENTRY IF EXPERT USES LEFT HAND TRUNCATION
QNORM FTERM LEN(2) . CHR2 :S(QEXPRT)
* SEE IF TERM LONG ENOUGH
   TYPE = 'KEY TERM TOO SHORT - "" FTERM ""
   TYPE = 'KEY TERM TO EXPAND MUST BE AT LEAST
   " "THREE CHARACTERS LONG"
   TYPE = :(LOOP)
QEXPRT ?MEMBER(MINMAX,CHR2) :F(NONQK)
   TYPE = MINMAX<CHR2> ARB . KMIN ',', REM . KMAX
   KCNT = KMIN
   TRMPAT = GENPAT(FTERM)
PASTTERM = REPLACE(FTERM,WILDONES,MAXCHRS)
* MAKE A KEY TERM IMAGE THAT IS GREATER
* THAN ANY POSSIBLE FOUND ONE
   FNDFLG = 0
   WLDFLG = 0
   EXPCNT = 0
   FTERM WILDCHR :F(QLOOP)
   WLDFLG = -1
* WE CLEAR CONTROL-C'S AND THEN CHECK EACH TIME TO SEE
* IF NEW ONE IS PENDING
   CLINT()
QLOOP ?CHKINT(Interrupt)
   ?INE(Interrupt,0) :S(QDONE)
   * SEE IF CONTROL:-C IF SO STOP
   ?IGT(KCNT,KMAX) :S(QDONE)
   ?GETKEY(TERM,RMIN,RMAX,KCNT)
   TERM = TRIM(TERM)
   KCNT = KCNT + 1
   ?LGT(TERM,PASTTERM) :S(QDONE)
* SEE IF WE HAVE GONE PAST ANY POSSIBLE KEY TERM
   TERM TRMPAT :F(QLOOP)
   FNDFLAG = -1
   RCNT = RMAX - RMIN + 1
   ?IEQ(RCNT,0) :S(EXPSTP)
   EXPCNT = ?ILT(EXPCNT,EXPMAX) EXPCNT + 1 :F(OVREXP)
   TYPE = LPAD('E' EXPCNT,4) '<' TERM '>' RCNT
   EXPARR<EXPCNT> = TERM
   ?INE(WLDFLG,0) :S(QDONE)F(QDONE)
EXPSTP TYPE = '<' TERM '>' STOPPED'
   ?INE(WLDFLG,0) :S(QDONE)F(QDONE)
* IF ITEM IS ON STOP WORD LIST IT WILL HAVE
* ZERO ITEMS AND SHOULD BE NOTICED
* GET THE TERM AND SAVE IT FOR POSSIBLE LATER USE
* OVREXP TYPE = 'TOO MANY EXPANSION TERMS - TRY AGAIN'
   TYPE = :(LOOP)
QDONE TYPE =
   ?INE(FNDFLG,0) :S(LOOP)
NONQK  TYPE = "NONE FOUND WITH THAT TERM"
        TYPE = :(LOOP)

* COME HERE TO ZAP ALL SAVE SETS
RESET  TYPE =
        PROMPT = "DO YOU WANT TO DELETE ALL SAVE SETS?"
        RES = GETANS()
        ?IDENT(RES, "YES") :S(RESETUM)
        ?IDENT(RES, "NO") :S(LOOP)
        TYPE = "PLEASE ANSWER "YES" OR "NO""
        :(RESET)

RESETUM
        TYPE = "ALL SAVE SETS DELETED"
        SAVCNT = 0
        SAVSET =
        GARBAGE(0)
        SAVSET = ARRAY(MAXSAV) :(LOOP)

**
* COME HERE TO GIVE SOME INFORMATION
INFO   TYPE =
        TYPE = "W.M.U. ONLINE SUBJECT/TITLE CATALOG. VERSION"
        VERSION
        TYPE = "COLLECTION BEING ACCESSED: "
        SETNAM
        TYPE = SAVCNT " SETS IN USE OUT OF "
        MAXSAV
        STPSET = "ON"
        STPSET = ?IEQ(STPFLG, 0) "OFF"
        TYPE = "SAVE STEPS FLAG IS "
        STPSET
        TYPE = ?INE(EXPFLG, 0) "CATALOG IS IN EXPERT MODE"
        TYPE = :(LOOP)

* COME HERE TO CHANGE STEP SAVING FLAG SETTING
STEPS  ?IEQ(STPFLG, 0) :S(STPOFF)
        TYPE = "SUBSETS ARE BEING SAVED AT EACH STEP"
        PROMPT = "DO YOU WANT TO STOP SAVING THEM?"
        REP = GETANS()
        ?IDENT(REP, "NO") :S(STPSAM)
        ?IDENT(REP, "YES") :S(STPSETOFF)
        TYPE = "PLEASE ANSWER "YES" OR "NO"
        :(STEPS)
STPSETOFF
        STPFLG = 0
        TYPE = "ONLY FINAL SET NOW BEING SAVED"
        TYPE = :(LOOP)
STPOFF  TYPE = "SUBSETS ARE NOT BEING SAVED AT EACH STEP"
        PROMPT = "DO YOU WANT TO START SAVING THEM?"
        REP = GETANS()
        ?IDENT(REP, "NO") :S(STPSAM)
IDENT(REP, 'YES') :S(STPSETON)
TYPE = 'PLEASE ANSWER "YES" OR "NO"'
(STEPS)

STPSETON
STPFLG = -1
TYPE = 'ALL SUBSETS SAVED AT EACH STEP'
TYPE = :(LOOP)

STPSAM
TYPE = 'NO CHANGE TO STEP SAVING MODE'
TYPE = :(LOOP)

* COME HERE TO REPORT ON OUR SAVE SETS
WHAT
?IEQ(SAVCNT, 0) :S(WHATNONE)
I = 1
TYPE =
TYPE = 'SET ITEMS SEARCH TERMS'
TYPE = '--' -- -- -- -- -- -- -- --

WHATLP
?IGT(I, SAVCNT) :S(WHATDN)
TYPE = LPAD(I, 3) LPAD(BIG(SAVSET<I>), 7) HTAB TRMSET<I>
I = I + 1 :(WHATLP)

WHATDN
TYPE = :

WHATNONE
TYPE =
TYPE = 'NO SAVE SETS EXIST'
TYPE = :(LOOP)

* COME HERE ON NULL OUTPUT COMMAND
OUTPUTNULL
PROMPT = 'OUTPUT WHICH SET TO DISK FILE IN SINGLE LINES?'
FTERM = GETANS()
FTERM NUMBER :F(OUTPUT)
FTERM = 'S' FTERM :F(OUTPUT)

* SEE IF JUST NUMBER GIVEN

* COME HERE TO OUTPUT A SAVE SET TO THE DISK FILE
* THIS GOES OUT IN SINGLE LINE FORMAT
OUTPUT WRTSET = PARSESET(FTERM) :F(BADOUT)

* GET THE SET TO OUTPUT
FTERM = REFORM(FTERM)

* MAKE THE SET NAME LOOK PRETTY
SETSZ = BIG(WRTSET)
TYPE =
TYPE = '<' FTERM '>' ' SETSZ
?IEQ(SETSZ, 0) :S(OUTNON)
?IGT(SETSZ, OUTLIM) :F(OUTOK)
TYPE = 'NUMBER OF ENTRIES EXCEEDS ' OUTLIM
PROMPT = 'DO YOU WANT TO OUTPUT THEM ALL? '
ANS = GETANS()

OUTOK
ANS POS(O) 'Y' :F(OUTFIN)

PROMPT = 'FILE FOR OUTPUT OF ITEMS? ' WRTFIL = GETANS()
DCHAN = DSKOUT('WRITE', WRTFIL, 1500) : S(OUTFILE)
TYPE = 'FOR HELP TRY "HELP FILES"' : (OUTFIN)

OUTFILE

TYPE = 'OUTPUTING SET:'
TYPE = '<' FTERM '>' ' SETSZ ' ITEMS'
TYPARR = ARR(WRTSET)
I = SETSZ

OUTLP
?ILT(I, 1) : S(OUTDON)
TCNT = TYPARR<1>
TSTR =
OINLP
?GETTXT(TEXT, TCNT)
TCNT = TCNT + 1
TSTR = TSTR TEXT
TSTR = ' ' ' ' REM = F(OINLP)
WRITE = TSTR
I = I - 1 : (OUTLP)

OUTDON RELEASE (DCHAN)

OUTFIN TYPARR =
WRTSET =
TYPE = : (LOOP)

OUTNON TYPE =
TYPE = 'NO ITEMS IN SAVE SET.'
TYPE = : (LOOP)

BADOUT TYPE =
TYPE = '?ILLEGAL SET OR..OUTPUT COMMAND'
TYPARR =
WRTSET =
TYPE = : (LOOP)

* COME HERE ON NULL PRINT COMMAND
PRINTH

PROMPT = 'OUTPUT WHICH SET TO THE LINE PRINTER? '
FTERM = GETANS() 
FTERM NUMBER :F(PRINT)
FTERM = 'S' FTERM : (PRINT)

* SEE IF JUST NUMBER GIVEN
* COME HERE TO OUTPUT SET DIRECTLY TO LINE PRINTER
* THIS IS DONE BY SETTING THE OUTPUT TO TO A SPOOLED LPT FILE
* AND USING THE WRITE ROUTINE
PRINT WRTSET = PARSESET(FTERM) : F(BADPRT)
* GET THE SET TO WRITE
FTERM = REFORM(FTERM)

* MAKE IT PRETTY
SETSIZ = BIG(WRTSET)
TYPE =
TYPE = '<' FTERM '>' ' SETSZ
?IEQ(SETSIZ, 0) : S(WRTNON)
?IEQ(PRTLIM, 0) : S(PRTCHK)
?IGT(SETSIZ,PRTLIM) :F(PRTOK)
TYPE = "NUMBER OF ENTRIES EXCEEDS PRTLIM"

PRTCHK PROMPT = "DO YOU WANT TO PRINT THE SET"
* ON THE LINE PRINTER?"
ANS = GETANS()
ANS POS(0) 'Y' :F(WRTFIN)
* SET THE LPT FOR SPOOLING
PRTOK LPTSPL()
WRTFIL = 'LPT:PRINT' :(GOTWFIL)
* SET THE FILE NAME FOR SPOOLING AND GO
BADPRT TYPE =
WRTSET =
TYPE = '?ILLEGAL SET OR PRINT COMMAND'
TYPE = :(LOOP)
* COME HERE ON NULL WRITE COMMANDS
WRITENULL
PROMPT = 'WRITE WHICH SET TO A DISK FILE?'
FTERM = GETANS()
FTERM NUMBER :F(WRITE)
FTERM = 'S' FTERM :(WRITE)
* COME HERE TO OUTPUT SET TO DISK FILE IN CITATION FORMAT
WRITE WRTSET = PARSESET(FTERM) :F(BADWRT)
* GET THE SET TO WRITE
FTERM = REFORM(FTERM)
* MAKE IT PRETTY
SETSIZ = BIG(WRTSET)
TYPE =
TYPE = '<' FTERM '>' SETSIZ
?IEQ(SETSIZ,0) :S(WRTNON)
?IGT(SETSIZ,WRTLIM) :F(WRTOK)
TYPE = "NUMBER OF ENTRIES EXCEEDS WRTLIM"
PROMPT = "DO YOU WANT TO OUTPUT THEM ALL?"
ANS = GETANS()
ANS POS(0) 'Y' :F(WRTFIN)
WRTOK TYPE =
PROMPT = 'FILE FOR OUTPUT OF ITEMS?'
WRTFIL = GETANS()
GOTWFIL DCHAN = DSKOUT("WRITE",WRTFIL,132) :S(WRTFILE)
TYPE = 'FOR HELP TRY "HELP FILES"' :(WRTFIN)
WRITENULL
WRTCNT = 0
TYPE = 'HEADER FOR FILE(END WITH BLANK LINE)?'
HEADLP WHEAD = ACCEPT
WRTCNT = WRTCNT + 1
WRITE = ?DIFFER(WHEAD) WHEAD :S(HEADLP)
WRTCNT = WRTCNT - 1
TYPE = 'WRITING SET:'
TYPE = '<' FTERM '>' SETSIZ ITEMS'
WRITE = "W.M.U. ONLINE SUBJECT/TITLE CATALOG. VERSION " VERSION
WRITE = 'OUTPUT FROM COLLECTION:' SETNAM
DTIME = DAYTIM()
DTIME (BREAK(“:”) BREAK(“:”) BREAK(“:”)) . DTIME.
WRITE = ‘PRODUCED: ’ DTIME ‘ ON ’ DATE()
WRITE = ‘OF SET: ’ FTERM
WRITE = ‘NUMBER OF ITEMS: ’ SETSZ
WRITE = WRCTNT = WRTCNT + 6
TYPARR = ARR(WRTSET)
I = SETSZ
WRTLPtr  ?ILT(I,1) :S(WRDTON)
WRITE = WRCTNT = ?INE(NUMFLG,0) SETSZ - I + 1
WRTCNT = ?INE(NUMFLG,0) WRTCNT + 1
WRTCNT = WRTCNT + 1
TCNT = TYPARR<1>
TSTR = WINLPPtr  ?GETTXT(TEXT,TCNT)
TSTR = TSTR TEXT
TCNT = TCNT + 1
TEXT ‘ ‘ :F(WINLP)
* OUTPUT THE TEXT ONE LINE AT A TIME TO THE FILE
WOUTLP TRST ARB . WRITE ‘ ‘ :F(WOUTDN)
WRTCNT = WRTCNT + 1 :WOUTLP
WOUTDN TRST (LEN(1) ARB) . WRITE ‘ ‘
WRTCNT = WRTCNT + 1
I = I - 1 :WRTLPtr
WRDTON RELEASE(DCHAN)
TYPE =
TYPE = ‘PRODUCED (WRTCNT - 1) / 60 + 1 ‘ PAGES
WRTFIN TYPARR =
WRTSET =
TYPE = :LOOPT
WRTNON TYPE =
TYPE = ‘NO ITEMS IN SAVE SET.’
TYPE = :LOOPT
BADWRT TYPE =
TYPARR =
WRTSET =
TYPE = ‘?ILLEGAL SET OR WRITE COMMAND’
TYPE = :LOOPT
* COME HERE WHEN A NULL TYPE IS REQUESTED
TYPENUMLL PROMPT = ‘TYPE WHICH SET ON THE TERMINAL? ‘
FTERM = GETANS()
FTERM NUMBER :F(TYPE)
FTERM = ‘S’ FTERM
:TYPE
* ADD SET NAME IF JUST A NUMBER

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*COME HERE TO TYPE A SAVF SET ON THE TELETYPE

**TYPE** TYPSET = PARSESET(FTERM) :F(BADTYP)
* GET THE SET TO TYPE
  FTERM = REFORM(FTERM)

**MAKE IT PRETTY**

**TYPE** =
  SETSIZ = BIG(TYPSET)
  TYPE = '〈'' FTERM ''〉' ` SETSIZ
  ?IEQ(SETSIZ,0) :S(TYPNON)
  TYPLST = SETSIZ
  TYPFST = 1
  ?IEQ(TYPLIM,0) :S(TYPRLIM)

* SEE IF ALWAYS PROMPT

  ?IGT(SETSIZ,TYPLIM) :F(TYPOK)
  TYPE = `NUMBER OF ENTRIES EXCEEDS` TYPLIM
TYPRNG PROMPT = `HOW MANY DO YOU WANT TO SEE?`

  ANS = GETANS()
  ANS POS(0) 'N' :S(TYPFIN)
  ANS POS(0) 'A' :S(TYPDK)
  ANS POS(0) 'Y' :S(TYPDK)
  ANS NUMBER . TYPLST :S(T1TOM)
  ANS POS(0) SPAN(DIGITS) . TYPFST ('--' '','')
  SPAN(DIGITS) . TYPLST RPOS(0) :S(TNTOM)
  TYPE = `PLEASE ANSWER WITH "ALL","NONE",``

  'A SINGLE NUMBER, OR A RANGE'
  TYPE = :TYPRLIM)

T1TOM TYPFST = 1
TNTOM TYPLST = ?IGT(TYPLST,SETSIZ) SETSIZ

* MAKE SURE THE SET ITEMS COME FROM LEGAL PLACES

TYPOK

  ?ILT(TYPLST - TYPFST + 1,TYHEAD) :S(NOTHED)
  ?ILT(TYPLST - TYPFST + 1,0 - TYHEAD) :S(NOTHED)
  ?IGE(TYHEAD,0) :S(MAKHED)
  TYPE =
  PROMPT = `DO YOU WANT A HEADER?`
  ANS = GETANS()
  ANS POS(0) 'Y' :F(NOTHED)

MAKHED TYPE =
  TYPE =
  TYPE = `W.M.U. ONLINE SUBJECT/TITLE CATALOG. VERSION` VERSION
  TYPE = `OUTPUT FROM COLLECTION:` SETNAM
  DTIME = DAYTIM()
  DTIME (BREAK(’:’)) ‘;’ BREAK(‘;’)) . DTIME
  TYPE = `PRODUCED: ` DTIME ` ON ` DATE()
  TYPE = `OF SET:` FTERM
  TYPE = `NUMBER OF ITEMS:` SETSIZ

NOTHED

  TYPE =
  TYPARR = ARR(TYPSET)
  TYPLST = SETSIZ - TYPLST + 1
  I = SETSIZ - TYPFST + 1
* REMEMBER TO OUTPUT THEM IN REVERSE ORDER (NEWEST FIRST)
* TURN CHECKING OF CONTROL C'S AT THIS TIME
?CLRINT()
* WHEN 'CONTROL-C HAPPENS JUST STOP NICELY
TYLP  ?CKINT(INTERUPT)
?INE(INTERUPT,0) :S(TYPDON)
?ILT(I, TYPLST) :S(TYPDON)
TCNT = TYPARR\(<I>\)
TYPE =
TYPE = ?INE(NUMFLG,0) SETSZ - I + 1 ')
TSTR =
TINLP  ?GETTXT(TEXT, TCNT)
TSTR = TSTR TEXT
TCNT = TCNT + 1
TEXT '' :F(TINLP)
* OUTPUT THE TEXT ONE LINE AT A TIME TO THE TTY
TOUTLP TSTR ARB . TYPE 'Z' = :S(TOUTLP)
TSTR (LEN(1) ARB) . TYPE ''
I = I - 1 : (TYLP)
TYPDON TYPE =
TYPE =
TYPFIN TYPARR =
TYPSET =
TYPE = :(LOOP)
TYPNON TYPE =
TYPE = 'NO ITEMS IN SAVE SET.'
TYPE = :(LOOP)
BADTYP TYPE =
TYPARR =
TYPSET =
TYPE = '?ILLEGAL SET OR TYPE COMMAND'
TYPE = :(LOOP)

* FUNCTION BODIES GO HERE
*
*
* GENPAT GENERATES A PATTERN TO MATCH THE INPUT SEARCH TERM
GENPAT GENPAT = POS(0)
GENLP
?IDENT(KEY, '*') :S(RETURN)
KEY LEN(1) . CHR = :F(GFIN)
GENPAT = ?IDENT(CHR, '*') GENPAT ARB :S(GENLP)
GENPAT = ?IDENT(CHR, '?') GENPAT LEN(1) :S(GENLP)
GENPAT = ?IDENT(CHR, '%') GENPAT (LEN(1) ! '') :S(GENLP)
GENPAT = GENPAT CHR :(GENLP)
GFIN GENPAT = GENPAT RPOS(0) :(RETURN)
INTRPT TYPE =
    TYPE =
    PROMPT = 'DO YOU WANT TO STOP? '
    GETANS() POS(0) 'Y' :S(STOP)
    RELEASE(0)
    KEYIN()
    TXTIN()
    RECIN()
    TYPE = :(LOOP)
RESTRT TYPE = '?RESTART NO LONGER SUPPORTED.'
    TYPE = 'PLEASE START OVER.'
    TYPE =
    FREEZE(0) :(END)

STOP TYPE =
    PROMPT = 'DO YOU WANT TO EXIT FROM THE CATALOG? '
    SANS = GETANS()
    SANS POS(0) 'Y' :F(LOOP)
    RELEASE(0)
    TYPE =
    TYPE = 'THANK YOU'
    CLRCAT()
    ?INE(LOGFLG,0) :S(KJOBIT)
    FREEZE(0) :(END)

KJOBIT TYPE =
    TYPE = 'NOW LOGGING OFF FROM THE DECSYSTEM-10'
    TYPE =
    ?IEQ(LOGFLG,-2) ?KJOB()
    * IF IMMEDIATE KJOB/BATCH WANTED (CRAZY) DO IT
    LOGOUT()
    * OTHER WISE TRY A KJOB AND ASK FOR CONFIRMATION
    * TRY A LOGOUT RUN
    * THIS ROUTINE SAVES A SET INTO OUR SAVE ARRAY
    SAVEIT ?EQ(BIG(SETA),0) :S(NOSAV)
    ?GT(BIG(SETA),MAXTMP) :S(OVRSAV)
    * SEE IF ACCEPTABLE SET TO SAVE
    STERM POS(0) ('S' ! ' '} SDIGS RPOS(0) :S(SAVDUP)
    SAVCNT = ?ILT(SAVCNT,MXSsav) SAVCNT + 1 :F(OVRSET)
    STERM = REFORM(STERM)
    * MAKE THE SET NAME PRETTY
    TYPE = 'CREATING SET ' '#' SAVCNT ' <'
    STERM '>' BIG(SETA) ' ITEMS'
    TRMSET<SAVCNT> = STERM
    SAVSET<SAVCNT> = SETA
    :(RETURN)
    * DO NOT SAVE SETS THAT ALREADY EXIST
    SAVDUP :(RETURN)
    * REPORT IF NO ITEMS FOUND IN SET
    NOSAV TYPE = 'NO ITEMS FOUND - NO SET CREATED'
TYPE = :(FRETURN)
* DO NOT SAVE SETS THAT ARE TOO BIG
OVRSAV TYPE = 'SET TOO LARGE TO SAVE - NO SET CREATED'
TYPE = :(FRETURN)

*COME HERE IF ALL SETS USED UP
OVRSET TYPE = '?MAXIMUM NUMBER OF SAVE SETS EXCEEDED'
GARBAGE(0)
TYPE = 'PLEASE TYPE "RESET" AND TRY AGAIN'
TYPE = :(FRETURN)

* THIS ROUTINE GETS INPUT AND RETURNS IT IN GOOD FORMAT

* GETANS RETURNS THE INPUT TEXT WITH LEADING AND TRAILING TABS
* AND SPACES DELETED. CONTROL CHARACTERS THAT
* NORMALLY DELIMIT LINES
* BUT THAT FASBOL IGNORES REMOVED.
* AND LOWER CASE CONVERTED TO UPPER CASE.

GETANS
ANSANS = ACCEPT
?IGE(SIZE(ANSANS),80) :S(GETBIG)
ANSANS = TRIM(ANSANS)
ANSANS = REPLACE(ANSANS,LCASE,UCASE)
GETALP ANSANS CNTRLCHR = :S(GETALP)
GETRTB ANSANS HTAB = SPACE :S(GETRTB)
GETLRS ANSANS SPACE SPACE = SPACE :S(GETLRS)
GETANS = TRIM(ANSANS) :(RETURN)

* COME HERE IF INPUT TOO LONG

GETBIG

TYPE =
TYPE = '?INPUT LINE TOO LONG - PLEASE RETYPE.' :(GETANS)

* SETFNC.FAS
*
* DESCRIPTION: SET MANIPULATING FUNCTIONS FOR BOOLEAN OPERATORS
* FOR ONLINE CATALOG.
* *
* AUTHOR: JAMES N. SLEEP
* DATE WRITTEN: 10-FEB-81
* *
* PARSESET(KEYEXP) TAKES AN EXPRESSION
* OF KEY TERMS AND OPERATORS
* AND USING RECURSIVE DESCENT RETURNS A SET HAVING
* THE REQUIRED PROPERTIES.

PARSESET
* FIRST SEE IF A PENDING CONTROL-C EXISTS
?CHKINT(Interrupt)
?IEQ(Interrupt,0) :S(PRSNOINT)
* IF SO ABORT SEARCH
  TYPE =
  TYPE = "%SEARCH ABORTED" :(FRETURN)
* JUST DIE AND TRY TO RETURN
PRSNINT

* SEE IF ANY BAD CHARACTERS
  KEYEXP BADEXPCHR . BADONE :F(PRSPRN)
  TYPE = "?ILLEGAL CHARACTER "" BADONE "" IN SEARCH TERM"
  TYPE = :(FRETURN)
* IF SO JUST SAY SO AND GO BACK
PRSPRN KEYEXP FRMEXP = SAV :S(PRSPRN)
* TAKE OUT LEADING OR TRAILING SPACES AND PARENS
PRSNUM KEYEXP NUMBER . BADNUM :F(PRSNAM)
* SEE IF JUST A SINGLE NUMBER
  TYPE = "?AMBIGUOUS USE OF NUMBER "" BADNUM "" IN EXPRESSION"
  TYPE = "USE "E" BADNUM "" FOR EXPANDED TERM NUMBER."
  TYPE = "USE "S" BADNUM "" FOR SET NUMBER."
  TYPE = :(FRETURN)
* SEE IF WE HAVE A SET NAME
  PRSNAM KEYEXP POS(O) ("S" ! "#") SDIGS . SSNUM
  RPOS(O) :S(GETSAV)
* SEE IF WE HAVE AN EXPANSION TERM
  KEYEXP POS(O) ("E" ! "@") EDIGS . EXPNUM RPOS(O) :S(GETEXP)
  KEYEXP KEYTERM :S(GETSET)
* SEE IF WE ARE DOWN TO A SINGLE KEY TERM
* LOOK FOR MORE BAD CASES BEFORE PARSING
PRSSZ ?IGT(SIZE(KEYEXP), 2) :S(PRSBAL)
* SEE IF JUST TWO CHARACTERS OR LESS(IMPOSSIBLE)
  TYPE = "?KEY TERM TOO SHORT - "" KEYEXP """
  TYPE = "KEY TERM MUST BE AT LEAST THREE CHARACTERS LONG"
  TYPE = :(FRETURN)
* SEE IF BALANCED EXPRESSION
PRSBAL KEYEXP POS(O) BAL RPOS(O) :S(PRSTRY)
  TYPE = "?UNMATCHED PARENTHESIS IN EXPRESSION"
  TYPE = :(FRETURN)
* IF NOT SAY SO AND DIE
* TRY TO PARSE UP THE EXPRESSION AT THE LAST OPERATOR
PRSTRY P = 0
  PRSOPR KEYEXP POS(O) BAL OPRPAT @P BAL RPOS(O) FAIL
  KEYEXP POS(O) BAL . FP OPRPAT . OP POS(P)
  BAL . LP RPOS(O) :S(DOIT)
* SEE IF WE HAVE A LEGAL EXPRESSION TO BREAK UP
  ?INE(EXPFLG, 0) :S(PRSEXPERT)
  TYPE = "?ILLEGAL EXPRESSION - MISSING OPERATOR?"
  TYPE = :(FRETURN)
* SEE IF IN EXPERT MODE
* IF SO TRY TO MAKE AN IMPLIED "AND"
PRSEXPERT KEYEXP ((SPACE ! POS(O)) ("E" ! "@"))
EDIGS) . FP SPAN(SPACE)
(("E" ! '@') EDIGS (SPACE ! RPOS(0))) . LP =
FP ¬'1' LP :S(PRSOPR)
* FIRST SEE IF THERE IS TWO EXPAND'ED TERMS
* THAT ARE NEXT TO EACH OTHER
* IF SO MAKE IMPLIED OR, IF NOT TRY IMPLIED AND
KEYEXP NOTSPACE . FP SPAN(SPACE) NOTSPACE . LP = FP ¬'&' LP
:SPR(SPR)
TYPE = 'ILLEGAL EXPRESSION - MISSING OPERATOR'
TYPE = :FRETURN
* IF WE CAN TRY TO PARSE IT IF NOT JUST FAIL

* DOIT SET1 = PARSESET(FP) :F(PRSZAP)
* IF THE STEP FLAG SET SAVE AS WE GO
?INE(STPFLG,0) :F(IGSET1)
SAVEIT(SET1,FP) :F(PRSZAP)
IGSET1 SET2 = PARSESET(LP) :F(PRSZAP)
* SAVE THE SECOND SET IF WE WANT TO
?INE(STPFLG,0) :F(IGSET2)
SAVEIT(SET2,LP) :F(PRSZAP)
* RECURSIVELY GENERATE THE TWO HALVES OF THE EXPRESSION
IGSET2 OP ORPAT :S(DOOR)
* SEE IF WE ARE ORING
OP EXLPAT :S(DOECL)
* SEE IF WE ARE EXCLUDING
OP ANDPAT :S(DOAND)
* SEE IF WE ARE ANDING
TYPE = 'IMPOSSIBLE ERROR CONDITION 1 IN PARSESET'
FREEZE(0)
* OOPS!!
DOOR PARSESET = ORSET(SET1,SET2) :F(PRSZAP)S(DOZAP)
* DO THE OR AND GO BACK
DOEXL PARSESET = EXLSET(SET1,SET2) :F(PRSZAP)S(DOZAP)
* EXCLUDE AND GO BACK
DOAND PARSESET = ANDSET(SET1,SET2) :F(PRSZAP)S(DOZAP)
* WE WANT TO DELETE UNNEEDED SETS
DOZAP SET1 =
SET2 = :F(RETURN)
* SAME HERE BUT FOR FAILURE
PRSZAP SET1 =
SET2 = :F(RETURN)

* COME HERE TO RETURN A SAVED SAVE SET
GETSAV ?ILE(SSNUM,SACNT) ?IGT(SSNUM,0) :S(GOTSAY)
TYPE = "?SAVE SET SSNUM DOES NOT EXIST"
TYPE = :F(RETURN)

GOTSAV
PARSES = SAVSET<SSNUM> :F(RETURN)

* COME HERE WHEN A EXPANDED TERM IS NEEDED
GETEXP ?ILE<EXPNUM,EXPCNT)?IGT(EXPNUM,0) :F(BADEXP)
KEYEXP = EXPARR<EXPNUM> :F(GETSET)

* LET THEM KNOW IF THAT IS A BAD EXPANSION TERM
BADEXP TYPE = "?NO SUCH EXPANDED TERM - "E" EXPNUM "\n"TYPE = :F(RETURN)

* COME HERE TO GET THE RECORDS FOR SINGLE SEARCH TERM
GETSET
KEYEXP POS(0) OPRTERMS . OPRBAD RPOS(0) :F(GETKIT)
TYPE = "?CAN NOT SEARCH FOR BOOLEAN OPERATOR - "O" OPRBAD "\n"TYPE = :F(RETURN)

* DO NOT ALLOW OPERATORS TO BE USED AS SEARCH TERMS
GETKIT
?IEQ(EXPFLG,0) :F(KEYNORM)

* SEE IF LEFT HAND TRUNCATION IN USE
KEYEXP POS(0) WILDCHR :F(KEYNORM)
FSTTWO = "**" :F(KEYEXPRT)

* USE SPECIAL TABLE ENTRY FOR LEFT HAND TRUNCATION
KEYNORM KEYEXP LEN(2) . FSTTWO :S(KEYEXPRT)

* IF KEY TOO SHORT SAY SO
KEYEXPRT ?MEMBER(MINMAX,FSTTWO) ?F(NONFND)
MINMAX<FSTTWO> ARB . FSTKEY . REM . LSTKEY
PASTKEY = REPLACE(KEYEXP,WILDONES,MAXCHRS)

* MAKE A KEY GREATER THAN ANY WE WANT
KEYPAT = GENPAT(KEYEXP)
IKEY = FSTKEY
TRNSTOP = TRNLIM
TRNCNT = 0
WLDFIG = 0
KEYEXP WILDCHR :F(NOWLD)
WLDFIG = -1

NOWLD WRKSET = NULLSET()

* PREPARE THE PATTERN AND THE SET
* TO PUT THE RESULTING RECORDS IN
*
* LOOP THROUGH FOR EACH MATCHING KEY
KEYLP

* FIRST SEE IF A PENDING CONTROL-C EXISTS
?CHKINT(INTERRUPT)
?IEQ(INTERRUPT,0) :S(KEYNOINT)

* IF SO ABORT SEARCH
TYPE =
TYPE = "SEARCH ABORTED" :F(KEYZAP)

* JUST DIE AND TRY TO RETURN
KEYNOINT ?IGT(IKEY,LSTKEY) :S(GOTSET)

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* SEE IF WE HAVE SEEN THEM ALL
  ?GETKEY(TERM,RMIN,RMAX,IKEY)
  TERM = TRIM(TERM)
  IKEY = IKEY + 1
  ?LGT(TERM,PASTKEY) :S(GOTSET)
* SEE IF WE ARE BEYOND ALL POSSIBLE GOOD KEY TERMS
  TERM KEYPAT :F(KEYLP)
* SEE IF THIS KEY TERM MATCHES OUR PATTERN
* IF SO WE MAKE A SET TO PUT IT INTO
  RCNT = RMAX - RMIN + 1
* SEE IF IT IS A STOPPED TERM THAT HAS NO ITEMS
  ?INE(RCNT,0) :S(KEYGO)
  ?INE(WLDFLG,0) :S(KEYLP)
* IF THERE ARE WILD CARD CHARACTERS JUST IGNORE IT
* IF NO WILD CHARACTERS GET UPSET WITH USER
  TYPE = 'WARNING- "KEYEXP" IS A STOPPED WORD'
  :(NONFND)
KEYGO
  NEWSET = MAKESET(RCNT) :F(KEYZAP)
  NEWARR = ARR(NEWSET)
  I = 0
  IREC = RMIN
* WE NOW PUT ALL OF THE RECORDS INTO THE SET
RECLP ?IGT(IREC,RMAX) :S(GOTREC)
  ?GETREC(RECNUM,IREC)
  I = I + 1
  IREC = IREC + 1
  NEWARR = RECNUM :S(RECLP)
* HAVING PUT ALL THE RECORDS INTO THE SET
* WE SEE IF NEED TO GET MORE
GOTREC ?IEQ(WLDFLG,0) :S(RETCNEW)
  WRKSET = ORSET(WRKSET,NEWSET) :F(KEYZAP)
  NEWARR =
  NEWSET =
  TRNCNT = TRNCNT + 1
  ?ILE(TRNCNT,TRNSTOP) :S(KEYLP)
* SEE IF TOO MANY WILDCARDED ITEMS FOUND
  TYPE = 'WARNING CARD MATCH OF ' TRNSTOP ' KEY TERMS BY ' KEYEXP
  PROMPT = 'DO YOU WANT TO CONTINUE?'
  ANS = GETANS()
  ANS POS(O) 'Y' :F(KEYZAP)
* IS USER WANTS TO JUST KEEP GOING
  TRNSTOP = TRNSTOP + TRNLIM :(KEYLP)
* IF MORE ARE NEEDED ADD THEM TO WHAT WE HAVE AND TRY AGAIN
RETCNEW PARSESET = NEWSET
  WRKSET =
  NEWARR =
  NEWSET = :(RETURN)
* IF NO WILDCARD FIRST ONE WE FIND IS THE ONLY ONE
GOTSET PARSESET = WRKSET
  NEWARR =
NEWSET =
WRKSET = :(RETURN)
* WHEN ALL DONE RETURN THE SET WE HAVE BUILD UP.

NONFND PARSESET = NULLSET()
WRKSET =
NEWARR =
NEWSET = :(RETURN)
* IF NONE MATCH RETURN A NULL SET

* UPON FAILURE DELETE TEMPORARY SETS AND FAIL RETURN
KEYZAP NEWARR =
NEWSET =
WRKSET =
PARSESET = :(FRETURN)

* NULLSET() RETURNS AN EMPTY SET
NULLSET = NULLSET = SET(0,0) :(RETURN)

* MAKESET(SETSZ) RETURNS A SET WITH ARRAY SIZE OF SETSZ
* IT FAILS IF NO ROOM IS AVAILABLE
MAKESET
* WE NEED CORE TO STORE ARRAY PLUS A LITTLE OVERHEAD
GARBAGE(SETSZ * 1.5 + 200) :S(MAKIT)
* CHECK FOR FREE ROOM
  TYPE = "NOT ENOUGH CORE AVAILABLE"
  TYPE = "USE "RESET" COMMAND TO DELETE SAVE SETS" :(FRETURN)
* TELL BAD NEWS AND GO BACK
MAKIT MAKESET = SET(ARRAY(SETSZ), SETSZ) :(RETURN)

* ORSET(SETA, SETB) RETURN A NEW SET THAT CONTAINS ALL ELEMENTS
* IN EITHER SETA OR SETB
* ORSET
TPMPNT = 0
SIZ1 = BIG(SETA)
SIZ2 = BIG(SETB)
?IEQ(SIZ1,0) ?IEQ(SIZ2,0) :S(ORNONE)
?ILE(SIZ1,MAXTMP) ?ILE(SIZ2,MAXTMP) :F(OVRTMP)
PNT1 = 1
PNT2 = 1
ARR1 = ARR(SETA)
ARR2 = ARR(SETB)
?IGT(PNT1, SIZ1) :S(ORSTF2)
?IGT(PNT2, SIZ2) :S(ORSTF1)
R1 = ARR1<PNT1>
R2 = ARR2<PNT2>
* STARTING AT THE SMALLEST OF EACH ARRAY
* WE MERGE THE TWO TOGETHER
ORLP  ?IEQ(R1,R2) :S(OREQ)
?ILT(R1,R2) :S(ORLT)
?IGT(R1,R2) :S(ORGT)

* DEPENDING ON HOW THE TWO ENTRIES ARE RELATED WE MERGE THEM

ORLT  TMPPNT = ?ILT(Tmppnt,Maxtmp)  Tmppnt + 1 :F(OVRTMP)
TMPARR<TMPPNT> = R1
PNT1 = PNT1 + 1
?IGT(PNT1,SIZ1) :S(ORSTF2)
R1 = ARR1<PNT1> :O(ORLP)

ORGT  TMPPNT = ?ILT(TMPPNT,MAXTMP)  TMPPNT + 1 :F(OVRTMP)
TMPARR<TMPPNT> = R2
PNT2 = PNT2 + 1
?IGT(PNT2,SIZ2) :S(ORSTF1)
R2 = ARR2<PNT2> :O(ORLP)

OREQ  TMPPNT = ?ILT(TMPPNT,MAXTMP)  TMPPNT + 1 :F(OVRTMP)
TMPARR<TMPPNT> = R1
PNT1 = PNT1 + 1
PNT2 = PNT2 + 1
?IGT(PNT1,SIZ1) :S(ORSTF2)
?IGT(PNT2,SIZ2) :S(ORSTF1)
R1 = ARR1<PNT1>
R2 = ARR2<PNT2> :O(ORLP)

* COME HERE WHEN SECOND SET EXHAUSTED
ORSTF1 ?IGT(PNT1,SIZ1) :S(ORDONE)
TMPPNT = ?ILT(TMPPNT,MAXTMP)  TMPPNT + 1 :F(OVRTMP)
TMPARR<TMPPNT> = ARR1<PNT1>
PNT1 = PNT1 + 1 :O(ORSTF1)

* COME HERE WHEN FIRST SET EXHAUSTED
ORSTF2 ?IGT(PNT2,SIZ2) :S(ORDONE)
TMPPNT = ?ILT(TMPPNT,MAXTMP)  TMPPNT + 1 :F(OVRTMP)
TMPARR<TMPPNT> = ARR2<PNT2>
PNT2 = PNT2 + 1 :O(ORSTF2)

* COME HERE WHEN ALL FINISHED
ORDONE  ?IEQ(TMPPNT,0) :S(ORNONE)
ORSET = MAKESET(TMPPNT) :F(OVRDIE)
* IF WE CAN NOT DO IT JUST DIE
ORARR = ARR(ORSET)
I = 1

* PUT THE SAVE ENTRIES INTO THE SET TO BE RETURNED
ORSTF ?IGT(I,TMPPNT) :S(ORRET)
ORARR<I> = TMPARR<I>
I = I + 1 :O(ORSTF)
* COME HERE ON AN EMPTY SET
ORNONE ORSET = NULLSET() :(ORRET)

* COME HERE TO KILL THE UNUSED SETS AND GO BACK
ORRET ARR1 = 
ARR2 = 
SETA = 
SETB = :(RETURN)

* ANDSET(SETA,SETB) RETURNS A NEW SET THAT CONTAINS ALL ELEMENTS
* IN BOTH SETA AND SETB
*
ANDSET TMPNNT = 0
SIZ1 = BIG(SETA)
SIZ2 = BIG(SETB)
?INE(SIZ1,0) ?INE(SIZ2,0) :F(ANDNONE)
PNT1 = 1
PNT2 = 1
ARR1 = ARR(SETA)
ARR2 = ARR(SETB)
?IGT(PNT1,SIZ1) :S(ANDSTF)
?IGT(PNT2,SIZ2) :S(ANDSTF)
R1 = ARR1<PNT1>
R2 = ARR2<PNT2>

* STARTING AT THE SMALLEST OF EACH ARRAY
* WE MERGE THE TWO TOGETHER
ANDLP ?IEQ(R1,R2) :S(ANDEQ)
?ILT(R1,R2) :S(ANDLT)
?IGT(R1,R2) :S(ANDGT)
*
* DEPENDING ON HOW THE TWO ENTRIES ARE RELATED WE MERGE THEM

ANDGT PNT2 = PNT2 + 1
?IGT(PNT2,SIZ2) :S(ANDSTF)
R2 = ARR2<PNT2> :(ANDLP)

ANDLT PNT1 = PNT1 + 1
?IGT(PNT1,SIZ1) :S(ANDSTF)
R1 = ARR1<PNT1> :(ANDLP)

ANDEQ TMPNNT = ?ILT(TMPNNT,MAXTMP) TMPNNT + 1 :F(OVRTMP)
TMPARR<TMPNNT> = R1
PNT1 = PNT1 + 1
PNT2 = PNT2 + 1
?IGT(PNT1,SIZ1) :S(ANDSTF)
?IGT(PNT2,SIZ2) :S(ANDSTF)
R1 = ARR1<PNT1>
R2 = ARR2<PNT2> :(ANDLP)

* COME HERE WHEN ALL FINISHED
ANDSTF ?IEQ(TMPNNT,0) :S(ANDNONE)

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ANDSET = MAKESET(TMPPNT) :F(OVRDIE)
* IF WE CAN NOT DO IT JUST DIE

ANDARR = ARR(ANDSET)
I = 1
* PUT THE SAVE ENTRIES INTO THE SET TO BE RETURNED
ANDPUT ?IGT(I,TMPPNT) :S(ANDRET)
ANDARR<I> = TMPARR<I>
I = I + 1 :(ANDPUT)

* COME HERE ON AN EMPTY SET
ANDNONE ANDSET = NULLSET() :(ANDRET)

* COME HERE TO KILL UNUSED SETS
ANDRET ARR1 =
ARR2 =
SETA =
SETB = :(RETURN)
* EXLSET(SETA,SETB) RETURNS A NEW SET THAT CONTAINS ALL ELEMENTS
* IN EITHER SETA EXL SETB
*
EXLSET TMPPNT = 0
SIZ1 = BIG(SETA)
?IEQ(SIZ1,0) :S(EXLNONE)
SIZ2 = BIG(SETB)
PNT1 = 1
PNT2 = 1
ARR1 = ARR(SETA)
ARR2 = ARR(SETB)
?IGT(PNT1,SIZ1) :S(EXLNONE)
?IGT(PNT2,SIZ2) :S(EXLSTFl)
R1 = ARR1<PNT1>
R2 = ARR2<PNT2>

* STARTING AT THE SMALLEST OF EACH ARRAY
* WE MERGE THE TWO TOGETHER
EXLLP ?IEQ(R1,R2) :S(EXLLEQ)
?ILT(R1,R2) :S(EXLLT)
?IGT(R1,R2) :S(EXLGT)

* DEPENDING ON HOW THE TWO ENTRIES ARE RELATED WE MERGE THEM

EXLGT PNT2 = PNT2 + 1
?IGT(PNT2,SIZ2) :S(EXLSTF1)
R2 = ARR2<PNT2> :(EXLLP)

EXLLT TMPPNT = ?ILT(TMPPNT,MAXTMP) TMPPNT + 1 :F(OVRTMP)
TMPARR<TMPPNT> = R1
PNT1 = PNT1 + 1
?IGT(PNT1,SIZ1) :S(EXLDONE)
R1 = ARR1<PNT1> :(EXLLP)
EXLEQ  PNT1 = PNT1 + 1
PNT2 = PNT2 + 1
?IGT(PNT1,SIZ1) :S(EXLDONE)
?IGT(PNT2,SIZ2) :S(EXLSTF1)
R1 = ARR1<PNT1>
R2 = ARR2<PNT2> :() (EXLLP)

* COME HERE WHEN SECOND SET EXHAUSTED
EXLSTF1  ?IGT(PNT1,SIZ1) :S(EXLDONE)
          TMPPPNT = ?ILT(TMPPNT,MAXTMP)  TMPPNT + 1 :F(OVRTMP)
          TMPARR<TMPPNT> = ARR1<PNT1>
          PNT1 = PNT1 + 1 :() (EXLSTF1)

* COME HERE WHEN ALL FINISHED
EXLDONE  ?IEQ(TMPPNT,0) :S(EXLNONE)
          EXLSET = MAKESET(TMPPNT) :F(OVRDIE)
* IF WE CAN NOT DO IT JUST DIE
          EXLARR = ARR(EXLSET)
          I = 1
* PUT THE SAVE ENTRIES INTO THE SET TO BE RETURNED
EXLSTF  ?IGT(I,TMPPNT) :S(EXLRET)
          EXLARR<I> = TMPARR<I>
          I = I + 1 :() (EXLSTF)

* COME HERE ON AN EMPTY SET
EXLNONE  EXLSET = NULLSET() :() (EXLRET)

* COME HERE TO KILL SPACE AND GO BACK
EXLRET ARR1 =
              ARR2 =
              SETA =
              SETB = :() (RETURN)

* COME HERE WHEN WORK SPACE EXCEEDED
OVRTMP  TYPE = "?MAXIMUM SAVE SET SIZE EXCEEDED"
* COME HERE TO JUST GO BACK AS A FAILURE
OVRDIE ARR1 =
              ARR2 =
              SETA =
              SETB =
              GARBAGE(0)
              PARSESET = NULLSET() :() (RETURN)

* THIS FUNCTION
* DOES A GARBAGE COLLECTION AND WARNS IF SPACE PROBLEMS
* MIGHT OCCUR LATER.
GARBAGE
COLLECT(0)
FRECOR(FREECORE)
* FIRST SEE IF LOTS OF FREE ROOM ABOVE CURRENT SPACE
?IGT(FREECORE,GARBSIZE) :S(RETURN)
* IF NOT TRY
* TO SEE WHAT A GARBAGE COLLECTION DOES
COLLECT(GARBSIZE - FREECORE) :S(RETURN)
* IF EVEN A GARBAGE COLLECTION DOES NOT GET ENOUGH THEN DIE
GARBAD :(FRETURN)
*
* THIS FUNCTION COPIES A FILE TO THE TERMINAL
PARROT PCHAN = DSKIN("PREAD",FILNAM,132) :F(PARDIE)
PARLP TYPE = PREAD :S(PARLP)
RELEASE(PCHAN) :(RETURN)
* TELL IF FILE NOT THERE
PARDIE TYPE = "?CANNOT READ FILE"
:(FRETURN)
* GO BACK WITH THE BAD NEWS
* THIS ROUTINE TAKES SET DESCRIPTORS
* AND CONVERTS THEM TO A STANDARD FORM
REFORM
RPREPS DESCOR SFLD = SDLM1 "(" TRMSET<SNUM> ")" SDLM2 :S(RPREPS)
RPREPE DESCOR EFLD = EDLM1 "(" EXPARR<ENUM> ")" EDLM2 :S(RPREPE)
* WHAT WE HAVE DONE HERE IS TO REMOVE
* SUCH THINGS AS E1 AND S3 AND REPLACE
* THEM WITH WHAT THEY MEAN
  REFORM = DESCOR :(RETURN)
* AND GO BACK
END

I.2 RANTXT.MAC

; RANTXO.MAC
TITLE RANTXO
SUBTTL RANDOM ACCESS OUTPUT PACKAGE FOR FASBOL
; THIS WILL HANDLE THE TEXT I/O FOR THE ON-LINE CATALOG
; AUTHOR : JAMES N SLEEP
; DATE WRITTEN 12-NOV-80
;
; CALL SEQUENCES:
; TXTOUT(TXT,N)
; PUTTXT(TXT,N)
; WHERE TXT IS A DECLARED STRING AND N IS THE RECORD NUMBER
; TXT MUST BE OF LENGTH 20 CHARACTERS (4 WORDS)
;
ENTRY TXTOUT
TXTOUT: Z
MOVE 1,[XWD 2,SAVIT] ;FASBOL USES JRA-JSA
BLT 1,SAVIT+13 ;SAVE THE AC’S
SETOM PREBLK ;SO WE CAN PLAY WITH THEM
GOTFIL: OPEN 10,0PBLK ;CLEAR OUT LAST BLOCK USED COUNTER
JRST OPERR ;OPEN THE FILE IN IKAGE MODE
  ;REPORT IF NOT THERE

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MOVE 4,LKPNT
BLT 4,LKBLK+3
ENTER 10,LKBLK
JIRST ENTERR
MOVE 1,[XWD SAVIT,2]
BLT 1,15
JRA 16,(16)

LKPNT: XWD FILBLK,LKBLK
FILBLK: SIXBIT/ONLINE/
SIXBIT/TXT/
Z
XWD Z,Z

OPERR: OUTSTR [ASCIZ/
?OPEN ERROR?[/
EXIT

LKERR: OUTSTR [ASCIZ/
?LOOKUP ERROR?[/
EXIT

ENTERR: OUTSTR [ASCIZ/
?ENTER ERROR?[/
EXIT
HALT

OPBLK: 17
SIXBIT/CAT/
Z

LKBLK: SIXBIT/ONLINE/
SIXBIT/TXT/
Z
XWD Z,Z

ENTRY PUTTXT

;THIS ROUTINE DOES THE ACTUAL OUTPUT
MOVE 1,[XWD 2,SAVIT]
BLT 1,SAVIT+13
MOVE 1,@1(16)
SOJ 1,
IDIV 1,RECBLK
AOJ 1,
CAME 1,PREBLK
JRST REPBLK

PUTSTR: MOVEM 1,PREBLK
IMUL 2,RECSIZ
ADDI 2,INBLK
MOVEI 3,@1(16)
HRL 4,3
HRR 4,2
ADD 2,RECSIZ ;TO LOCATION IN BUFFER BLOCK
SOJ 2, ;WITH SINGLE INSTRUCTION
BLT 4,(2) ;LIKE THIS.
MOVE 1,[XSW SAVIT,2] ;RESTORE THE AC'S
BLT 1,15 ;AS WE ARE DONE
JRA 16,(16) ;AND GO BACK
REPBLK: MOVE 5,PREBLK ;COME HERE IF USING NEW BLOCK
JUMPL 5,PUTSTR ;SEE IF FIRST TIME USED EVER.
SOJ 5, ;OTHERWISE CALCULATE WHERE TO
IMUL 5,BLKNUM ;OUTPUT BLOCK TO FILE
AOJ 5, ;AS LOGICAL BLOCK SIZE MAY BE
USETO 10,(5) ;LARGER THAT PHYSICAL USED BY USET
OUT 10,INPNT ;SET BLOCK COUNTER AND DUMP BLOCK
JRST PUTSTR ;GO BACK TO HANDLE NEW STRING
JRST UPERR ;IS OUT FAILS SAY SO
UPERR: OUTSTR [ASCIZ/ ;JUST ANNOUNCE PROBLEM
?UPDATE OUTPUT ERROR?
/] ;WITH OUTPUT
EXIT ;AND THEN
;DIE.

TXTEND: Z ;THIS USES JRA-JSA ALSO
MOVE 1,PREBLK ;GET LAST BLOCK USED
SOJ 1, ;CALCULATE PHYSICAL BLOCK
IMUL 1,BLKNUM ;THAT FALLS INTO
AOJ 1, ;AND THE SET THE BLOCK NUMBER
USETO 10,(1) ;TO PHYSICAL BLOCK NEEDED
OUT 10,INPNT ;AND OUTPUT LAST BLOCK USED
SKIPA ;JUMP IF OK
JRST UPERR ;OTHERWISE REPORT PROBLEMS
CLOSE 10, ;CLOSE OUT FILE
JRA 16,(16) ;AND GO BACK
JRA 16,(16)
EXIT ;DATA LOCATIONS
SAVIT: BLOCK 40 ;PLACE TO SAVE AC'S
INPNT: IOWD "D1280,INBLK ;I/O WORD FOR OUTPUT BLOCK BUFFER
Z ;
INBLK: BLOCK "D1280 ;OUTPUT BUFFER = 10 BLOCKS
PREBLK: -1 ;LAST BLOCK USED
BLKNUM: "D10 ;NUMBER OF PHYSICAL/LOGICAL BLOCK
RECBLK: "D320 ;NUMBER OF RECORDS PER BLOCK
RECSIZ: "D4 ;RECORD IS FOUR WORDS
PRGEND ;THAT'S ALL FOLKS
; RANTXI.MAC
TITLE RANTXI
SUBTTL RANDOM ACCESS INPUT PACKAGE FOR FASBOL
; THIS WILL HANDLE THE TEXT I/O FOR THE ON-LINE CATALOG
; AUTHOR : JAMES N SLEEP
; DATE WRITTEN 12-NOV-80
;
; CALL SEQUENCES:
ENTRY TXTIN

TXTIN: Z ; SET UP FOR JSA-JRA CALL
  MOVE 1,[XWD 2,SAVIT] ; SAVE AC'S TO PLAY
  BLT 1,SAVIT+13 ; WITH WHILE HERE
  SETOM PREBLK ; CLEAR OUT LAST BLOCK COUNTER
  CLOSE 10, ; FREE CHANNEL IF USED
  OPEN 10,OPBLK ; OPEN UP IN IMAGE MODE
  JRST OPErr ; GET UPSET IF CAN NOT OPEN
  MOVE 4,LKPNT ; SET UP LOOKUP BLOCK
  BLT 4,LKBLK+3 ; EACH TIME USED
  LOOKUP 10,LKBLK ; TRY TO GET FILE
  JRST LKERR ; IF NOT SAY SO.
  MOVE 1,[XWD SAVIT,2] ; RETSTORE AC'S AS
  BLT 1,15 ; WE ARE DONE
  JRA 16,(16) ; AND GO BACK

LKPNT: XWD FILBLK,LKBLK ; POINTER TO SET UP LOOKUP BLOCK
  FILBLK: SIXBIT/ONLINE/ ; FILE NAME TO LOOK FOR
  SIXBIT/TXT/ ; IS ONLINE.TST
  Z ; NO PPN
  XWD Z,Z ; USES LOGICAL DEVICE

OPErr: OUTSTR [ASCIZ/ ; REPORT IF OPEN FAILS
  ?OPEN ERROR?
  /] ; FOR ANY REASON
  EXIT ; AND THEN WE
  ; DIE

LKERR: OUTSTR [ASCIZ/ ; REPORT IF FILE IS NOT
  ?LOOKUP ERROR?
  /] ; TO BE READ IN
  EXIT ; AT THIS TIME
  ; AND DIE

ENTRerr: OUTSTR [ASCIZ/ ; SAME FOR ENTRER
  ?ENTER ERROR?
  /]
  EXIT
  HALT

OPBLK: 17 ; USE IMAGE MODE
  SIXBIT/CAT/ ; ON LOGICAL DEVIDCE "CAT"
  Z
  LKBLK: SIXBIT/ONLINE/ ; FILE NAME IS RESET
  SIXBIT/TXT/ ; ALL TIMES USED AS LOOKUP
  Z
  XWD Z,Z

ENTRY GETTXT
GETTXT: Z
MOVE 1,[XWD 2,SAVIT]  ;JRA-JAS HERE TO READ STRING
BLT 1,SAVIT+13  ;SAVE AC'S
MOVE 1,@1(16)  ;TO AVOID PROBLEMS IN MAINLINE
SOJ 1,  ;GET RECORD NUMBER
IDIV 1,RECBLK  ;CALCULATE BLOCK NUMBER
AOJ 1,  ;THAT WOULD FALL IN
CAME 1,PREBLK  ;WITH GIVEN RECORD SIZE
JRST GETBLK  ;SEE IF SAME AS LAST TIME
GETSTR: IMUL 2,RECSIZ  ;IF NOT WE NEED NEW BLOCK
ADDI 2,INBLK  ;OTHERWISE FIND WHERE THE
MOVEI 3,@(16)  ;RECORD FALLS IN BLOCK
HRL 4,2  ;GET ADDR TO RETURN STRING TO
HRR 4,3  ;RECORD FALLS IN BLOCK
ADD 3,RECSIZ  ;BUILT BLT POINTER TO
SOJ 3,  ;USE WHEN RETURNING STRING
BLT 4,(3)  ;TO CALLING ROUTINE
SOJ 4,  ;WITH SINGLE INSTRUCTION
MOVEI 4,0(16)  ;THE BLOCK TRANSFER
IMULI 2,5  ;GET STRING ADDR AGAIN
MOVEM 2,(4)  ;TAKE ONE FROM IT TO GET
MOVE 1,[XWD SAVIT,2]  ;SIZE COUNTER TO SET TO SIZE
JRST GETSTR  ;FIND HOW MANY WORDS THAT IS
OUTSTR [ASCIZ/  ;AND SEND THAT BACK
?INPUT ERROR?  ;THE BLOCK TRANSFER
/]  ;RESTORE AC'S
EXIT  ;GET STRING ADDR AGAIN
HALT  ;TO WHAT THEY WERE

; DATA LOCATIONS
SAVIT: BLOCK 40  ;AND GO BACK
INPNT: IOWD "D128,INBLK  ;WE NEED TO GET NEW
Z  ;BLOCK BEFORE READING IT
INBLK: BLOCK "D128  ;SET BLOCK AND INPUT FROM FILE
PREBLK: -1  ;AND GO BACK TO GET STRING
BLKNUM: "D1  ;IF INPUT FAILS
RECSIZ: "D3  ;SAY SO AND THEN
END  ;PLACE TO SAVE AC'S
RECSIZ: "D4  ;JUST
END  ;BLOC K BUFFER
PREBLK: "D1  ;LAST BLOCK USED
RECSIZ: "D4  ;ONE LOGICAL PER PHYSICAL BLOCK
END  ;THAT'S END OF THIS

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BIBLIOGRAPHY


