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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
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Western Michigan University
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THE ONLINE SUBJECT/TITLE CATALOG
OF WESTERN MICHIGAN UNIVERSITY

James N. Sleep, M.S.

Western Michigan University, 1982

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.

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James N. Sleep

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TABLE OF CONTENTS

ACKNOWLEDGMENTS ii

LIST OF TABLES viii

Chapter

I. INTRODUCTION 1

II. SOURCE DATA AND STATISTICAL ANALYSIS 2

 Introduction 2

 Analysis of Raw Data 10

 Conclusions 20

III. PAPER PRODUCTS 22

 Introduction 22

 Analysis of Data 22

 Production of Products 23

 Example Products 24

 Conclusions 27

IV. ONLINE SUBJECT/TITLE CATALOG 29

 Introduction 29

 Overview of Desired System 31

 Design of System 32

 Automated Production of Data Base 51

 Command Language 64

User Response	70
Epilogue - Final Status	78
Conclusions	79
V. OVERALL CONCLUSIONS	81
VI. PRESENTATIONS	83
VII. COOPERATION	84
APPENDIXES	85
A. OCLC-MARC DISPLAY FORMAT	86
B. SAMPLE STATISTICS	88
B.1 Tag Count	89
B.2 Tag Frequencies	94
B.3 LC Class Count	94
B.4 Tag Patterns	97
B.5 COTAGS	101
B.6 Cataloging Count	106
B.7 Indicator Count	107
B.8 Delimiter Count	109
B.9 Location Count	113
B.10 Word Count	114
C. PAPER PRODUCTS	117
C.1 Title List	118
C.2 KWOC Index	120

C.3	Shelf List . . . . .	.123
C.4	Language Bibliography . . . . .	.125
C.5	Place Name Bibliography . . . . .	.127
C.6	Numbered Series Bibliography . . . . .	.130
C.7	Dewey Number Catalog . . . . .	.132
C.8	GPO Publications . . . . .	.135
D.	STOP WORD LIST . . . . .	.138
E.	GENERATION COUNTS . . . . .	.139
F.	USER SURVEY . . . . .	.140
F.1	User Survey Side One . . . . .	.140
F.2	User Survey Side Two . . . . .	.141
F.3	Survey Results . . . . .	.142
G.	SAMPLE RUNS . . . . .	.145
G.1	Normal Operation . . . . .	.145
G.2	Use of Run-Time Switches . . . . .	.157
G.3	Error Messages . . . . .	.163
G.4	Example Bibliography . . . . .	.167
H.	HELP FILES . . . . .	.171
H.1	Help CAT . . . . .	.171
H.2	Help HELP . . . . .	.172
H.3	Help AID . . . . .	.174
H.4	Help BOOL . . . . .	.174
H.5	Help DEMO . . . . .	.175

H.6	Help EXIT . . . . .	.178
H.7	Help EXPAND . . . . .	.178
H.8	Help FILES . . . . .	.179
H.9	Help FORMAT . . . . .	.180
H.10	Help GRIPE . . . . .	.180
H.11	Help HINT . . . . .	.181
H.12	Help INFO . . . . .	.182
H.13	Help INTRO . . . . .	.182
H.14	Help LANG . . . . .	.183
H.15	Help LOCATE . . . . .	.184
H.16	Help NEW . . . . .	.185
H.17	Help OUTPUT . . . . .	.187
H.18	Help PRINT . . . . .	.188
H.19	Help QUICK . . . . .	.188
H.20	Help RESET . . . . .	.189
H.21	Help SEARCH . . . . .	.189
H.22	Help SELECT . . . . .	.190
H.23	Help SORT . . . . .	.191
H.24	Help STEPS . . . . .	.194
H.25	Help STOP . . . . .	.194
H.26	Help SWITCH . . . . .	.195
H.27	Help TYPE . . . . .	.196
H.28	Help WHAT . . . . .	.197
H.29	Help WILD . . . . .	.197
H.30	Help WRITE . . . . .	.198

I.	SOURCE-PROGRAMS	. . . . .	.200
I.1	CATLOG.FAS	. . . . .	.200
I.2	RANTEXT.MAC	. . . . .	.228
J.	MAINTENANCE AGREEMENT	. . . . .	.233
	BIBLIOGRAPHY	. . . . .	.235

LIST OF TABLES

Table

1. STATISTICAL ANALYSIS	13
2. USAGE STATISTICS	74

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 DECsystem-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 back-slashes ("\"). 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

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

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

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 data base 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 specially 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

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

converted changed to back-slashes ("\"). 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.1.

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 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 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 ("^") 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

occurring in some previous entry. The key file had just one entry per unique key term and thus grew only as new key terms occurred 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 DECsystem-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, a 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 data base 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 Data Base

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, then 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 then 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 ("^") 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

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 accidentally 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.

SETDESCRIPTOR = EXPRESS

KEYDESCRIPTOR = LETTER ALPHANUMERIC CHARACTER

LETTER = "A" ! "B" ! "C" ! ... ! "Z"

ALPHANUMERIC = LETTER ! DIGIT

DIGIT = "1" ! "2" ! "3" ! ... "9" ! "0"

CHARACTER = LETTER ! ALPHANUMERIC ! WILDCARD

WILDCARD = "?" ! "*" ! "%"

SETNAME = "S" NUMBER ! " " NUMBER

NUMBER = DIGIT ! DIGIT DIGIT ! DIGIT DIGIT DIGIT

```
EXPANDNAME = "E" NUMBER ! "@" NUMBER
BOOL = " AND " ! " OR " ! " EXL "
EXPRESS = TERM ! "(" EXPRESS ")" ! EXPRESS BOOL EXPRESS
TERM = KEYDESCRIPTOR ! SETNAME ! EXPANDNAME
```

User Response

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

Period	July-Dec 1981	Jan-March 1982	
Citations in Data Base	87000	93470	Titles
Total Runs	1917	1124	Runs of Program
Mean Usage	349	488	Runs per Month
Total Users	400	248	Accounts
Elapsed Time			
Mean	14:10.5	14:55.8	HR:MIN:SEC
Total	452:52:05	279:40:25	HR:MIN:SEC
CPU Time			
Mean	10.61	13.67	HR:MIN:SEC
Total	05:39:03	4:16:47	HR:MIN:SEC
KCT			
Mean	25637	33276	Kilo-Core*Ticks
Total	49146051	37401780	Kilo-Core*Ticks
Disk Reads			
Mean	480.8	516.95	128 Word Blocks
Total	921681	581055	128 Word Blocks
Disk Writes			
Mean	7.08	10.54	128 Word Blocks
Total	13564	11844	128 Word Blocks

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 its 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 an 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

OCLC-MARC DISPLAY FORMAT

001 oc174775958
 002 00600pam 2200205 i 45
 008 790308s1979 mau b 00110 eng
 010 #a 79010121
 040 #aDLC#cDLC#dEXW
 020 #a0816178224
 050 0 #aZ8574.88#b.F47
 082 #a812/.5/2
 049 #aEXWR [c.1Ref]
 100 10#aFerres, John H.
 245 10#aArthur Miller, a reference guide /#cJohn H. Fer
 res.
 260 0 #aBoston :#bG. K. Hall,#cc1979.
 300 #axvi, 225 p. ;#c25 cm.
 490 0 #aA Reference publication in literature
 500 #aIncludes index.
 600 10#aMiller, Arthur,#d1915- #xBibliography.
 001 oc174570518
 002 00677pam 2200217 i 45
 008 781218s1979 nyu 00100 eng
 010 #a 78003308
 040 #aDLC#cDLC#dEXW
 020 #a0690017707 :#c\$12.95
 050 0 #aHQ1154#b.F446 1979
 082 #a301.41/2/08
 049 #aEXWR [c.1Ref]
 245 00#aFeminist quotations :#bvoices of rebels, reform
 ers, and visionaries /#ccompiled by Carol McPhe
 e, Ann FitzGerald.
 250 #alst ed.
 260 0 #aNew York :#bCrowell,#cc1979.
 300 #axiv, 271 p. ;#c24 cm.
 500 #aIncludes indexes.
 650 0#aFeminism#xQuotations, maxims, etc.
 700 10#aMcPhee, Carol.
 700 10#aFitzGerald, Ann.
 001 oc173608099
 002 00809nam 2200241 i 45
 008 780109s1977 dcu b 00010 eng
 010 #a 77154244
 040 #aDLC#cDLC#dEXW

043 #an-us---
050 0 #aLB2342#b.M58
082 #a379/.1214/0973
049 #aEXWR [c.lRef]
100 10#aMohrman, Kathryn.
245 10#aFederal grants :#ba basic handbook /#c[by Kathryn Mohrman, with Myra Ficklen, Brenda Latimer].
260 0 #aWashington :#bFederal Resources Advisory Service, Association of American Colleges,#c1977.
300 #a47 p. ;#c22 cm.
500 #aCover title.
504 #aBibliography: p. 31-39.
650 0#aFederal aid to higher education#zUnited States.
700 10#aFicklen, Myra.
700 10#aLatimer, 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.

B.1 Tag Count

ITEM	TAG	COUNT	MIN	MAX	MEAN	ST. DEV.	SUM	SUM-OF-SQUARES
1	001	86742	12	18	13.02	2.26	1129878	15160068
2	002	60538	24	24	24.00	0.00	1452912	34869888
3	007	597	6	10	9.99	0.16	5966	59636
4	008	86742	40	40	40.00	0.00	3469680	138787200
5	010	70418	16	46	16.17	0.83	1138792	18464496
6	012	42	5	32	14.71	12.43	618	15426
7	015	9430	6	35	10.22	2.37	96400	1038476
8	019	460	10	37	11.87	3.31	5464	69942
9	020	62734	6	107	19.42	8.72	1218700	28446892
10	022	825	13	24	13.01	0.38	10736	139832
11	025	29	10	19	16.37	2.77	475	7995
12	028	36	17	46	23.86	6.90	859	22165
13	030	4	9	10	9.50	0.58	38	362
14	033	1	22	22	22.00	0.00	22	484
15	035	127	5	82	15.07	13.36	1914	51320
16	037	200	11	71	19.95	5.01	3991	84631
17	039	25	17	17	17.00	0.00	425	7225
18	040	86210	7	82	17.50	3.38	1509495	27416957
19	041	4575	7	33	10.53	1.93	48205	524927
20	042	535	6	19	10.36	2.50	5543	60763
21	043	24923	5	50	12.30	3.72	306780	4121258
22	045	650	6	32	8.05	1.22	5239	43189
23	047	115	6	46	11.41	5.42	1313	18341
24	048	354	6	68	13.67	10.19	4841	102845
25	049	86727	8	227	19.52	5.90	1693136	36070798
26	050	64345	6	70	18.14	3.54	1167405	21986825
27	051	151	11	156	29.00	12.69	4380	151214

28	052	1	8	8	8.00	0.00	8	64
29	055	8	12	22	17.12	3.80	137	2447
30	060	3171	8	48	18.98	6.64	60192	1282128
31	069	2	11	11	11.00	0.00	22	242
32	070	32	12	27	18.87	4.75	604	12100
33	072	12	8	14	9.00	2.34	108	1032
34	074	321	5	30	11.03	3.70	3543	43497
35	080	2	9	11	10.00	1.41	20	202
36	082	61739	5	43	13.07	3.91	807238	11499344
37	086	813	10	35	18.33	3.62	14908	284010
38	089	3	15	20	17.00	2.65	51	881
39	090	15105	5	41	18.48	3.06	279251	5304493
40	092	2916	5	37	15.92	4.62	46431	801617
41	096	1483	11	67	20.85	3.36	30925	661561
42	099	12484	7	51	23.84	5.77	297685	7513983
43	100	64081	9	115	25.80	7.24	1653675	46030808
44	110	5580	10	188	53.49	22.95	298498	18905454
45	111	1816	20	208	82.32	22.81	149508	13252844
46	130	208	10	100	32.79	15.76	6822	275158
47	210	2	13	22	17.50	6.36	35	653
48	212	7	36	64	50.71	10.78	355	18701
49	222	765	7	121	39.30	19.85	30068	1482696
50	240	3311	7	126	35.08	15.03	116175	4824079
51	242	1	44	44	44.00	0.00	44	1936
52	243	3	22	30	27.33	4.62	82	2284
53	245	86743	7	742	95.46	50.38	8280641	1010668512
54	246	549	7	113	41.75	19.47	22922	1164798
55	247	5	34	67	44.39	13.32	222	10566
56	250	12341	6	291	14.88	12.72	183736	4733104
57	260	86050	8	326	51.87	24.55	4463708	283418608
58	261	1	70	70	70.00	0.00	70	4900

59	262	619	20	81	35.61	8.18	22047	826595
60	263	6314	7	24	8.00	0.20	50527	404593
61	265	120	9	165	28.64	33.04	3437	228339
62	300	85990	6	163	28.75	9.30	2472744	78540116
63	301	7	36	114	70.28	29.70	492	39872
64	305	619	29	72	44.94	7.08	27824	1281634
65	306	124	10	66	12.59	7.74	1562	27050
66	310	151	10	67	15.93	8.54	2406	49284
67	321	15	18	42	30.00	7.11	450	14208
68	350	1730	7	72	9.94	3.83	17202	196470
69	362	1609	6	203	23.43	15.21	37703	1255601
70	400	29	22	83	44.89	14.29	1302	64174
71	410	191	21	134	60.80	22.49	11614	802326
72	440	3024	13	152	44.10	15.79	133371	6635693
73	490	30859	5	250	44.11	19.74	1361213	72073768
74	500	53826	6	808	44.62	43.38	2402230	208486448
75	501	148	31	197	78.10	34.22	11560	1075048
76	502	1081	9	185	55.76	18.32	60280	3724010
77	503	35	23	236	83.37	46.09	2918	315498
78	504	54166	7	232	34.93	9.53	1892055	71007316
79	505	1572	13	1345	171.39	156.34	269431	84577440
80	507	1	24	24	24.00	0.00	24	576
81	510	4	25	41	32.25	6.70	129	4295
82	511	573	23	361	91.78	61.48	52592	6989292
83	515	329	17	294	59.82	38.11	19683	1654063
84	518	75	18	195	60.81	33.64	4561	361135
85	520	978	11	491	124.50	46.58	121768	17280460
86	525	80	25	280	73.38	44.19	5871	585141
87	530	1	32	32	32.00	0.00	32	1024
88	533	27	73	104	84.22	8.96	2274	193608
89	546	85	14	116	35.91	18.73	3053	139135

90	550	234	19	582	119.53	68.62	27972	4440882
91	555	46	16	154	56.56	31.55	2602	191976
92	570	53	27	190	52.16	30.48	2765	192555
93	580	256	34	482	113.53	67.56	29065	4463779
94	590	1220	5	324	33.93	26.52	41406	2262352
95	600	13227	10	158	46.37	17.66	613337	32567531
96	610	3441	9	135	45.53	17.85	156687	8230533
97	611	84	13	105	49.54	21.32	4162	243958
98	630	621	9	167	38.71	19.07	24041	1156201
99	650	129185	7	115	34.75	14.87	4489540	184582528
100	651	19373	8	135	42.31	14.76	819799	38911808
101	690	1401	9	104	38.80	12.35	54360	2322600
102	691	166	11	91	40.12	12.31	6661	292283
103	692	3	49	61	54.33	6.11	163	8931
104	693	30	21	117	46.03	19.45	1381	74541
105	695	2	32	43	37.50	7.78	75	2873
106	700	43861	8	197	27.55	11.62	1208492	39223030
107	705	912	13	47	22.55	5.80	20570	494648
108	710	11860	8	216	53.62	22.02	636050	39862740
109	711	363	12	166	77.38	23.93	28091	2381141
110	715	246	17	102	32.35	10.76	7959	285863
111	730	1350	7	147	27.37	12.07	36954	1208068
112	740	4039	5	150	37.71	18.88	152312	7183172
113	760	7	20	62	39.57	17.69	277	12839
114	777	1	56	56	56.00	0.00	56	3136
115	780	219	9	184	54.25	30.39	11881	845903
116	785	330	6	160	52.98	29.21	17485	1207239
117	787	3	33	56	41.33	12.74	124	5450
118	800	24	19	131	63.04	21.75	1513	106267
119	810	1262	24	233	82.15	24.82	103676	9293936
120	811	8	41	88	70.00	19.64	560	41900

121	830	3	31	58	44.00	13.53	132	6174
122	840	367	19	138	50.16	15.53	18409	1011735
123	870	392	22	145	47.63	18.47	18674	1022950
124	871	236	30	165	71.45	23.28	16864	1332386
125	872	143	41	166	86.47	23.70	12366	1149088
126	873	14	25	73	40.78	11.52	571	25013
127	901	33	6	14	11.69	3.33	386	4870
128	911	4	7	7	7.00	0.00	28	196
129	936	35	8	43	15.74	9.52	551	11757

TOTAL RECORDS: 86742

TOTAL TAGS: 1486526

AVERAGE TAGS PER RECORD: 17.14

AVERAGE CHARACTERS PER TAG: 32.02

MAXIMUM TAGS PER RECORD: 36

MINIMUM TAGS PER RECORD: 8

B.2 Tag Frequencies

TAGS PER RECORD FOR ENTIRE COLLECTION

TAGS	COUNT	PERCENT	TAGS	COUNT	PERCENT
8	1	0.00001	9	42	0.00048
10	333	0.00384	11	990	0.01141
12	2063	0.02378	13	3785	0.04364
14	5864	0.06760	15	8907	0.10268
16	12436	0.14337	17	13979	0.16116
18	13263	0.15290	19	10258	0.11826
20	6824	0.07867	21	4021	0.04636
22	2085	0.02404	23	1031	0.01189
24	458	0.00528	25	205	0.00236
26	93	0.00107	27	38	0.00044
28	28	0.00032	29	18	0.00021
30	7	0.00008	31	4	0.00005
32	5	0.00006	33	1	0.00001
34	1	0.00001	35	1	0.00001

B.3 LC Class Count

TOTAL CATALOG DISTRIBUTION

TOTAL OF 86742 ITEMS CATALOGED

LC CLASS	COUNT	PERCENTAGE	LC CLASS	COUNT	PERCENTAGE
A	1	0.001	ABC	6	0.007
AC	49	0.056	AE	9	0.010
AG	28	0.032	AI	14	0.016
AM	23	0.027	AP	61	0.070
AS	711	0.820	AY	8	0.009
B	945	1.089	BC	68	0.078
BD	209	0.241	BF	1889	2.178
BH	34	0.039	BJ	172	0.198
BL	563	0.649	BM	184	0.212
BP	141	0.163	BQ	139	0.160
BR	386	0.445	BS	197	0.227
BT	291	0.335	BV	240	0.277
BX	1056	1.217	CB	195	0.225
CC	64	0.074	CD	48	0.055
CE	1	0.001	CJ	32	0.037
CN	4	0.005	CR	15	0.017
CRI	2	0.002	CS	104	0.120
CT	130	0.150	D	738	0.851
DA	608	0.701	DB	60	0.069
DC	346	0.399	DD	241	0.278
DE	11	0.013	DF	105	0.121
DG	149	0.172	DH	12	0.014
DJ	12	0.014	DJK	18	0.021

DK	277	0.319	DL	22	0.025
DP	79	0.091	DQ	6	0.007
DR	47	0.054	DS	1560	1.798
DT	882	1.017	DU	71	0.082
DX	2	0.002	E	2800	3.228
EML	1	0.001	EMS	1	0.001
F	1828	2.107	G	415	0.478
GA	39	0.045	GB	141	0.163
GC	89	0.103	GF	84	0.097
GN	591	0.681	GR	167	0.193
GT	87	0.100	GV	704	0.812
H	399	0.460	HA	163	0.188
HB	747	0.861	HC	1349	1.555
HD	3372	3.887	HE	254	0.293
HF	2087	2.406	HG	797	0.919
HJ	234	0.270	HM	794	0.915
HN	741	0.854	HNH	6	0.007
HQ	1384	1.596	HS	18	0.021
HT	639	0.737	HV	2292	2.642
HX	349	0.402	IPL	1	0.001
J	27	0.031	JA	204	0.235
JC	338	0.390	JF	164	0.189
JK	528	0.609	JL	77	0.089
JN	259	0.299	JQ	157	0.181
JS	183	0.211	JV	45	0.052
JX	559	0.644	K	157	0.181
KD	65	0.075	KDE	2	0.002
KE	10	0.012	KEO	1	0.001
KF	1299	1.498	KFA	3	0.003
KFC	10	0.012	KFD	3	0.003
KFF	1	0.001	KFI	6	0.007
KFK	2	0.002	KFM	46	0.053
KFN	5	0.006	KFO	3	0.003
KFP	1	0.001	KFS	2	0.002
KFT	1	0.001	KFV	1	0.001
KFW	4	0.005	KFX	3	0.003
KFZ	1	0.001	KZ	8	0.009
KZA	14	0.016	KZB	23	0.027
KZC	6	0.007	KZD	8	0.009
KZE	8	0.009	KZK	2	0.002
KZL	2	0.002	KZLB	1	0.001
KZLC	1	0.001	KZLH	1	0.001
KZLM	2	0.002	KZLP	2	0.002
KZLV	1	0.001	KZM	9	0.010
KZN	8	0.009	KZO	1	0.001
KZP	10	0.012	KZQ	13	0.015
KZQG	1	0.001	KZQH	2	0.002
KZQR	1	0.001	KZQS	2	0.002
KZQY	5	0.006	KZR	3	0.003
KZRA	2	0.002	KZRC	8	0.009
KZRJ	4	0.005	KZRM	2	0.002

KZRP	4	0.005	KZRT	1	0.001
KZRV	2	0.002	KZS	5	0.006
KZT	6	0.007	KZTE	1	0.001
KZTG	3	0.003	KZTN	2	0.002
KZTR	2	0.002	KZTS	10	0.012
KZTU	1	0.001	KZUP	1	0.001
L	132	0.152	LA	426	0.491
LB	2954	3.406	LC	1274	1.469
LD	44	0.051	LE	1	0.001
LF	18	0.021	LG	9	0.010
LJ	1	0.001	M	718	0.828
MET	2	0.002	MF	8	0.009
ML	978	1.127	MT	301	0.347
N	657	0.757	NA	484	0.558
NB	114	0.131	NC	112	0.129
ND	487	0.561	NE	102	0.118
NK	205	0.236	NX	140	0.161
P	633	0.730	PA	405	0.467
PB	42	0.048	PC	131	0.151
PD	24	0.028	PDB	1	0.001
PE	342	0.394	PF	144	0.166
PG	325	0.375	PH	20	0.023
PJ	86	0.099	PK	77	0.089
PL	265	0.306	PM	27	0.031
PN	1945	2.242	PP	1	0.001
PQ	2327	2.683	PR	2813	3.243
PS	2880	3.320	PT	1643	1.894
PZ	138	0.159	Q	560	0.646
QA	2128	2.453	QB	164	0.189
QC	720	0.830	QD	834	0.961
QE	417	0.481	QH	954	1.100
QK	293	0.338	QL	926	1.068
QM	82	0.095	QP	975	1.124
QR	244	0.281	R	389	0.448
RA	739	0.852	RB	110	0.127
RC	1710	1.971	RD	92	0.106
RE	17	0.020	RF	75	0.086
RG	98	0.113	RJ	358	0.413
RK	13	0.015	RL	4	0.005
RM	190	0.219	RN	1	0.001
RS	49	0.056	RT	118	0.136
RX	2	0.002	RZ	11	0.013
S	250	0.288	SB	160	0.184
SD	35	0.040	SF	92	0.106
SH	34	0.039	SK	24	0.028
T	368	0.424	TA	244	0.281
TC	50	0.058	TD	370	0.427
TE	133	0.153	TF	8	0.009
TG	4	0.005	TH	229	0.264
TJ	315	0.363	TK	556	0.641
TL	286	0.330	TN	93	0.107

TP	216	0.249	TR	281	0.324
TS	263	0.303	TT	248	0.286
TX	240	0.277	U	112	0.129
UA	145	0.167	UB	25	0.029
UC	12	0.014	UD	4	0.005
UF	28	0.032	UG	41	0.047
UH	18	0.021	UNCL	1870	2.156
V	22	0.025	VA	20	0.023
VB	3	0.003	VE	5	0.006
VF	2	0.002	VG	21	0.024
VK	8	0.009	VM	21	0.024
X	154	0.178	Z	3830	4.415

B.4 Tag Patterns

TOTAL RECORDS: 86742

*COUNT	PERCENT	* PATTERN OF TAGS
15057	17.358	1??
64081	73.875	1??-100
5580	6.433	1??-110
1816	2.094	1??-111
208	0.240	1??-130
2	0.002	2??-210-222-245-260-265
1	0.001	2??-212-222-245-246-260-265
2	0.002	2??-212-222-245-260
3	0.003	2??-212-222-245-260-265
1	0.001	2??-212-245-260-265
1	0.001	2??-222-245
2	0.002	2??-222-245-246-246-246-246-260
6	0.007	2??-222-245-246-246-246-260
19	0.022	2??-222-245-246-246-260
1	0.001	2??-222-245-246-250-260
155	0.179	2??-222-245-246-260
2	0.002	2??-222-245-246-260-265
1	0.001	2??-222-245-247-247-260
1	0.001	2??-222-245-250-260
544	0.627	2??-222-245-260
25	0.029	2??-222-245-260-265
1	0.001	2??-240-245-246-260
1	0.001	2??-240-245-250-250-260-263
556	0.641	2??-240-245-250-260
23	0.027	2??-240-245-250-260-263
2292	2.642	2??-240-245-260
94	0.108	2??-240-245-260-263
344	0.397	2??-240-245-262
1	0.001	2??-242-245-260
1	0.001	2??-243-245-260

2	0.002	2??-243-245-262
70	0.081	2??-245
1	0.001	2??-245-245-250-260
1	0.001	2??-245-246-246
1	0.001	2??-245-246-246-246-260
7	0.008	2??-245-246-246-246-260
24	0.028	2??-245-246-246-260
5	0.006	2??-245-246-250-260
243	0.280	2??-245-246-260
2	0.002	2??-245-246-260-265
1	0.001	2??-245-247-247-260
1	0.001	2??-245-247-260
10964	12.640	2??-245-250-260
782	0.902	2??-245-250-260-263
6	0.007	2??-245-250-260-265
64787	74.689	2??-245-260
5414	6.241	2??-245-260-263
78	0.090	2??-245-260-265
1	0.001	2??-245-261
273	0.315	2??-245-262
54547	62.884	4??
21	0.024	4??-400
5	0.006	4??-400-440
2	0.002	4??-400-490
178	0.205	4??-410
1	0.001	4??-410-410
2	0.002	4??-410-440
4	0.005	4??-410-490
2716	3.131	4??-440
1	0.001	4??-440-400
1	0.001	4??-440-410
44	0.051	4??-440-440
1	0.001	4??-440-440-440
7	0.008	4??-440-440-490
153	0.176	4??-440-490
1	0.001	4??-440-490-440
3	0.003	4??-440-490-490
27414	31.604	4??-490
4	0.005	4??-490-410
34	0.039	4??-490-440
1	0.001	4??-490-440-490
1573	1.813	4??-490-490
1	0.001	4??-490-490-440
28	0.032	4??-490-490-490
13505	15.569	5??
12639	14.571	5??-500
3006	3.465	5??-500-500
527	0.608	5??-500-500-500
96	0.111	5??-500-500-500-500
17	0.020	5??-500-500-500-500-500
3	0.003	5??-500-500-500-500-500-500

4	0.005	5??-500-500-500-500-500-504
1	0.001	5??-500-500-500-500-500-504-500
1	0.001	5??-500-500-500-500-500-505
1	0.001	5??-500-500-500-500-500-590
16	0.018	5??-500-500-500-500-504
2	0.002	5??-500-500-500-500-504-500
3	0.003	5??-500-500-500-500-505
1	0.001	5??-500-500-500-500-580
3	0.003	5??-500-500-500-500-590
1	0.001	5??-500-500-500-500-590-590
2	0.002	5??-500-500-500-502-504
109	0.126	5??-500-500-500-504
20	0.023	5??-500-500-500-504-500
7	0.008	5??-500-500-500-504-505
1	0.001	5??-500-500-500-504-520
1	0.001	5??-500-500-500-504-590
26	0.030	5??-500-500-500-505
1	0.001	5??-500-500-500-515-550
1	0.001	5??-500-500-500-518-505
2	0.002	5??-500-500-500-520
1	0.001	5??-500-500-500-520-550-580
1	0.001	5??-500-500-500-525
2	0.002	5??-500-500-500-546
1	0.001	5??-500-500-500-550
1	0.001	5??-500-500-500-550-550-580
2	0.002	5??-500-500-500-555
1	0.001	5??-500-500-500-580
4	0.005	5??-500-500-500-590
3	0.003	5??-500-500-500-590-590
1	0.001	5??-500-500-500-590-590-580
1	0.001	5??-500-500-502
1	0.001	5??-500-500-502-500-504
5	0.006	5??-500-500-502-504
2	0.002	5??-500-500-503
873	1.006	5??-500-500-504
164	0.189	5??-500-500-504-500
7	0.008	5??-500-500-504-500-500
1	0.001	5??-500-500-504-500-500-500
1	0.001	5??-500-500-504-500-505
1	0.001	5??-500-500-504-500-590
9	0.010	5??-500-500-504-504
2	0.002	5??-500-500-504-504-500
1	0.001	5??-500-500-504-504-505
23	0.027	5??-500-500-504-505
12	0.014	5??-500-500-504-590
90	0.104	5??-500-500-505
2	0.002	5??-500-500-505-500
2	0.002	5??-500-500-505-504
1	0.001	5??-500-500-505-511
1	0.001	5??-500-500-511-500
1	0.001	5??-500-500-511-505

11	0.013	5??-500-500-515
2	0.002	5??-500-500-515-500
1	0.001	5??-500-500-515-500-500
1	0.001	5??-500-500-515-515-500-555-590-590
1	0.001	5??-500-500-515-515-525-580
1	0.001	5??-500-500-515-515-555-590-590-590
1	0.001	5??-500-500-515-515-580-590-590
2	0.002	5??-500-500-515-546
1	0.001	5??-500-500-515-550-580
1	0.001	5??-500-500-515-570
1	0.001	5??-500-500-515-570-515-590
2	0.002	5??-500-500-515-590-590
1	0.001	5??-500-500-518-500
8	0.009	5??-500-500-520

B.5 COTAGS

001 001 001 001 001 001 001 001 001 001 001 001 001 001 001 001 001 001

001 (86742/86742=100%)

0 10 20 30 40 50 60 70 80 90 100

1.	001	(86742/86742=100.0%)	!001-001-001-001-001-001-001-001-001-001-001-001-001-001-001-
2.	002	(60538/86742=69.8%)	!002-002-002-002-002-002-002-002-002-002-0
3.	007	(597/86742=0.7%)	!0
4.	008	(86742/86742=100.0%)	!008-008-008-008-008-008-008-008-008-008-008-008-008-008-
5.	010	(70418/86742=81.2%)	!010-010-010-010-010-010-010-010-010-010-010-010-
6.	012	(42/86742=0.0%)	!
7.	015	(9429/86742=10.9%)	!015-01
8.	019	(460/86742=0.5%)	!0
9.	020	(60708/86742=70.0%)	!020-020-020-020-020-020-020-020-020-020-0
10.	022	(825/86742=1.0%)	!0
11.	025	(29/86742=0.0%)	!
12.	028	(28/86742=0.0%)	!
13.	030	(4/86742=0.0%)	!
14.	033	(1/86742=0.0%)	!
15.	035	(126/86742=0.1%)	!
16.	037	(199/86742=0.2%)	!
17.	039	(25/86742=0.0%)	!
18.	040	(86210/86742=99.4%)	!040-040-040-040-040-040-040-040-040-040-040-040-040-040-
19.	041	(4574/86742=5.3%)	!041
20.	042	(535/86742=0.6%)	!0
21.	043	(24919/86742=28.7%)	!043-043-043-043-
22.	045	(650/86742=0.7%)	!0
23.	047	(115/86742=0.1%)	!

24. 048 (339/86742=0.4%) |
 25. 049 (86727/86742=100.0%) |049-049-049-049-049-049-049-049-049-049-049-049-049-049-049-
 26. 050 (64345/86742=74.2%) |050-050-050-050-050-050-050-050-050-050-
 27. 051 (151/86742=0.2%) |
 28. 052 (1/86742=0.0%) |
 29. 055 (8/86742=0.0%) |
 30. 060 (3170/86742=3.7%) |06
 31. 069 (2/86742=0.0%) |
 32. 070 (32/86742=0.0%) |
 33. 072 (12/86742=0.0%) |
 34. 074 (321/86742=0.4%) |
 35. 080 (2/86742=0.0%) |
 36. 082 (61736/86742=71.2%) |082-082-082-082-082-082-082-082-082-082-
 37. 086 (811/86742=0.9%) |0
 38. 089 (3/86742=0.0%) |
 39. 090 (15051/86742=17.4%) |090-090-0
 40. 092 (2910/86742=3.4%) |09
 41. 096 (1441/86742=1.7%) |0
 42. 099 (12484/86742=14.4%) |099-099-
 43. 100 (64081/86742=73.9%) |100-100-100-100-100-100-100-100-100-100-
 44. 110 (5580/86742=6.4%) |110
 45. 111 (1816/86742=2.1%) |11
 46. 130 (208/86742=0.2%) |
 47. 210 (2/86742=0.0%) |
 48. 212 (7/86742=0.0%) |
 49. 222 (765/86742=0.9%) |12
 50. 240 (3311/86742=3.8%) |124
 51. 242 (1/86742=0.0%) |
 52. 243 (3/86742=0.0%) |
 53. 245 (86742/86742=100.0%) |245-245-245-245-245-245-245-245-245-245-245-245-245-
 54. 246 (470/86742=0.5%) |12

55.	247	(3/86742=0.0%)	!
56.	250	(12340/86742=14.2%)	1250-250-
57.	260	(86050/86742=99.2%)	1260-260-260-260-260-260-260-260-260-260-260-260-260-260-260-260
58.	261	(1/86742=0.0%)	!
59.	262	(619/86742=0.7%)	12
60.	263	(6314/86742=7.3%)	1263
61.	265	(120/86742=0.1%)	!
62.	300	(85990/86742=99.1%)	1300-300-300-300-300-300-300-300-300-300-300-300-300-300-300
63.	301	(7/86742=0.0%)	!
64.	305	(619/86742=0.7%)	13
65.	306	(124/86742=0.1%)	!
66.	310	(151/86742=0.2%)	!
67.	321	(13/86742=0.0%)	!
68.	350	(1730/86742=2.0%)	13
69.	362	(1602/86742=1.8%)	13
70.	400	(29/86742=0.0%)	!
71.	410	(190/86742=0.2%)	!
72.	440	(2970/86742=3.4%)	144
73.	490	(29225/86742=33.7%)	1490-490-490-490-490-
74.	500	(44567/86742=51.4%)	1500-500-500-500-500-500-500-50
75.	501	(148/86742=0.2%)	!
76.	502	(1080/86742=1.2%)	15
77.	503	(35/86742=0.0%)	!
78.	504	(53685/86742=61.9%)	1504-504-504-504-504-504-504-504-5
79.	505	(1572/86742=1.8%)	15
80.	507	(1/86742=0.0%)	!
81.	510	(2/86742=0.0%)	!
82.	511	(573/86742=0.7%)	15
83.	515	(287/86742=0.3%)	!
84.	518	(75/86742=0.1%)	!
85.	520	(972/86742=1.1%)	15

86.	525	(77/86742=0.1%)	!
87.	530	(1/86742=0.0%)	!
88.	533	(27/86742=0.0%)	!
89.	546	(85/86742=0.1%)	!
90.	550	(226/86742=0.3%)	!
91.	555	(46/86742=0.1%)	!
92.	570	(53/86742=0.1%)	!
93.	580	(223/86742=0.3%)	!
94.	590	(1162/86742=1.3%)	!5
95.	600	(11157/86742=12.9%)	!600-600
96.	610	(3128/86742=3.6%)	!61
97.	611	(77/86742=0.1%)	!
98.	630	(527/86742=0.6%)	!6
99.	650	(69508/86742=80.1%)	!650-650-650-650-650-650-650-650-650-650-650-
100.	651	(13110/86742=15.1%)	!651-651-
101.	690	(813/86742=0.9%)	!6
102.	691	(132/86742=0.2%)	!
103.	692	(3/86742=0.0%)	!
104.	693	(29/86742=0.0%)	!
105.	695	(1/86742=0.0%)	!
106.	700	(31302/86742=36.1%)	!700-700-700-700-700-7
107.	705	(453/86742=0.5%)	!7
108.	710	(9859/86742=11.4%)	!710-71
109.	711	(348/86742=0.4%)	!
110.	715	(220/86742=0.3%)	!
111.	730	(1317/86742=1.5%)	!7
112.	740	(3653/86742=4.2%)	!74
113.	760	(5/86742=0.0%)	!
114.	777	(1/86742=0.0%)	!
115.	780	(217/86742=0.3%)	!
116.	785	(330/86742=0.4%)	!

117.	787	(2/86742=0.0%)	!
118.	800	(23/86742=0.0%)	!
119.	810	(1243/86742=1.4%)	18
120.	811	(8/86742=0.0%)	!
121.	830	(3/86742=0.0%)	!
122.	840	(364/86742=0.4%)	!
123.	870	(348/86742=0.4%)	!
124.	871	(209/86742=0.2%)	!
125.	872	(142/86742=0.2%)	!
126.	873	(14/86742=0.0%)	!
127.	901	(24/86742=0.0%)	!
128.	911	(2/86742=0.0%)	!
129.	936	(35/86742=0.0%)	!

B.6 Cataloging Count

AGENCY	COUNT	PERCENT	AGENCY	COUNT	PERCENT	AGENCY	COUNT	PERCENT
a 001	1	0.001	a 003	1	0.001	a AAA	104	0.129
a ABC	15	0.019	a ACC	3	0.004	a ACM	1	0.001
a ADA	4	0.005	a AED	6	0.007	a AEF	2	0.002
a AEG	1	0.001	a AEL	1	0.001	a AEP	2	0.002
a AFP	2	0.002	a AFU	20	0.025	a AGL	51	0.063
a AGN	2	0.002	a AJB	2	0.002	a AKC	12	0.015
a AKD	12	0.015	a AKF	1	0.001	a AKL	3	0.004
a AKM	1	0.001	a AKR	30	0.037	a AKU	4	0.005
a ALG	1	0.001	a ALL	3	0.004	a ALM	21	0.026
a AMH	10	0.012	a AMK	3	0.004	a ANC	3	0.004
a AOP	2	0.002	a APL	64	0.080	a AQM	1	0.001
a ARL	19	0.024	a ASC	1	0.001	a ASH	9	0.011
a ASL	14	0.017	a ASU	1	0.001	a ATO	2	0.002
a AVR	1	0.001	a AWC	52	0.065	a AYP	4	0.005
a AZA	5	0.006	a AZN	40	0.050	a AZS	117	0.146
a AZT	5	0.006	a AZU	63	0.078	a BAB	2	0.002
a BAL	9	0.011	a BAN	9	0.011	a BBH	40	0.050
a BCT	2	0.002	a BDC	1	0.001	a BEA	4	0.005
a BER	1	0.001	a BFL	5	0.006	a BGU	19	0.024
a BHA	3	0.004	a BJO	7	0.009	a BKM	16	0.020
a BLC	1	0.001	a BMC	11	0.014	a BNG	65	0.081
a BOS	17	0.021	a BPS	3	0.004	a BSC	1	0.001
a BST	1	0.001	a BTC	3	0.004	a BTI	5	0.006
a BTL	1	0.001	a BTS	14	0.017	a BUC	1	0.001
a BUF	43	0.054	a BWE	7	0.009	a BXM	15	0.019
a BYN	7	0.009	a BZM	2	0.002	a Bib	1	0.001
a COO	1	0.001	a CAP	6	0.007	a CAS	9	0.011
a CBC	6	0.007	a CBT	2	0.002	a CBU	4	0.005
a CBY	7	0.009	a CCA	1	0.001	a CCH	11	0.014
a CCM	2	0.002	a CDC	9	0.011	a CDH	2	0.002
a CDL	1	0.001	a CDS	15	0.019	a CDU	1	0.001
a CFC	4	0.005	a CFI	2	0.002	a CFL	3	0.004
a CFS	26	0.032	a CGP	32	0.040	a CHE	3	0.004
a CHS	11	0.014	a CLA	4	0.005	a CIN	57	0.071
a CIP	1	0.001	a CIT	13	0.016	a CKC	2	0.002
a CKM	1	0.001	a CLA	5	0.006	a CLC	2	0.002
a CLE	26	0.032	a CLO	3	0.004	a CLU	24	0.030
a CLV	9	0.011	a CNC	1	0.001	a CNO	5	0.006
a COA	12	0.015	a COC	1	0.001	a COD	2	0.002
a COF	8	0.010	a COH	3	0.004	a COI	4	0.005
a COO	292	0.363	a COQ	1	0.001	a COT	2	0.002
a COV	18	0.022	a COW	6	0.007	a COX	2	0.002
a COY	1	0.001	a CPL	12	0.015	a CPO	3	0.004
a CPP	1	0.001	a CPS	5	0.006	a CPT	1	0.001
a CRA	3	0.004	a CRU	14	0.017	a CSF	5	0.006
a CSH	2	0.002	a CSJ	15	0.019	a CSL	42	0.052
a CSM	3	0.004	a CSO	1	0.001	a CST	1	0.001
a CSU	28	0.035	a CTL	3	0.004	a CTU	1	0.001

a CU-	1	0.001	a CUB	1	0.001	a CUF	8	0.010
a CUI	22	0.027	a CUM	1	0.001	a CUN	1	0.001
a CUR	16	0.020	a CUS	24	0.030	a CUT	1	0.001
a CUX	3	0.004	a CWR	20	0.025	a CWS	1	0.001
a CXP	5	0.006	a CZA	1	0.001	a CZL	9	0.011
a CaO	1	0.001	a Cah	1	0.001	a Can	1	0.001
a Cat	25	0.031	a Chi	1	0.001	a Cle	1	0.001
a Col	22	0.027	a CtY	3	0.004	a DAU	1	0.001
a DAY	23	0.029	a DCL	13	0.016	a DCU	87	0.108
a DDC	4	0.005	a DEC	1	0.001	a DGU	36	0.045
a DGW	10	0.012	a DHU	23	0.029	a DIL	1	0.001
a DJB	6	0.007	a DKC	14	0.017	a DLC	64560	80.354
a DLM	35	0.044	a DMM	109	0.136	a DNL	1	0.001
a DNU	4	0.005	a DOJ	3	0.004	a DOS	2	0.002
a DPB	6	0.007	a DPL	1	0.001	a DRB	113	0.141
a DRU	3	0.004	a DSC	9	0.011	a DUQ	3	0.004
a DVP	51	0.063	a DWT	1	0.001	a DXU	31	0.039
a DZM	10	0.012	a Det	1	0.001	a D1C	1	0.001
a EAP	1	0.001	a EAU	45	0.056	a EBS	2	0.002
a ECL	4	0.005	a ECO	2	0.002	a ECU	1	0.001
a EDB	1	0.001	a EEA	5	0.006	a EEH	14	0.017
a EEJ	1	0.001	a EEL	5	0.006	a EEM	192	0.239
a EEP	3	0.004	a EEW	3	0.004	a EEX	133	0.166
a EIB	2	0.002	a ELW	27	0.034	a EMU	5	0.006
a ERE	25	0.031	a EWF	11	0.014	a EXA	7	0.009
a EXB	4	0.005	a EXC	4	0.005	a EXG	2	0.002
a EXH	3	0.004	a EXK	9	0.011	a EXN	17	0.021
a EXO	3	0.004	a EXP	1	0.001	a EXQ	3	0.004
a EXR	5	0.006	a EXS	1	0.001	a EXW	2606	3.244
a EYC	3	0.004	a EYD	2	0.002	a EYE	18	0.022
a EYH	3	0.004	a EYM	55	0.068	a EYP	16	0.020
a EYR	12	0.015	a EYU	2	0.002	a EYW	17	0.021
a EYZ	9	0.011	a EZA	14	0.017	a EZC	16	0.020
a EZF	2	0.002	a EZL	3	0.004	a EZN	14	0.017
a EZP	2	0.002	a EZT	7	0.009			

B.7 Indicator Count

TAG	INDIC	COUNT	TAG	INDIC	COUNT
001	oc	86742	002	00	55404
002	01	5117	002	02	17
007	b	1	007	c	1
007	ab	1	007	bb	1
007	bc	1	007	d3	2
007	db	588	007	dn	1
007	sl	1	008	00	414
008	68	95	008	69	437
008	70	904	008	71	1272
008	72	2378	008	73	2155

008	74	3485	008	75	7941
008	76	14631	008	77	15533
008	78	15603	008	79	13050
008	80	8146	008	81	698
010		70418	012		42
015		9430	019		460
020		62734	022		477
022	0	327	022	1	21
025		29	028	00	24
028	20	9	028	22	2
028	30	1	030		4
033	2	1	035		127
037		200	039	0	25
040		86210	041		1
041	0	1599	041	1	2975
042		535	043		24923
045		649	045	2	1
047		115	048	0	192
048	1	83	048	2	79
049		85796	049	||	931
050		864	050	0	9
050	0	62764	050	00	151
050	01	2	050	1	460
050	|	93	050	|0	2
051		150	051	0	1
052		1	055	00	7
055	01	1	060		3170
060	0	1	069	0	2
070		32	072		12
074		321	080		2
082		59014	082	0	2725
086		54	086	0	755
086	1	4	089		3
090		15105	092		2916
096		1483	099		12484
100	00	352	100	01	8
100	1	51	100	10	62274
100	11	167	100	20	1222
100	21	5	100	30	2
110	00	54	110	1	1
110	10	1797	110	11	25
110	2	2	110	20	3633
110	21	68	111	00	2
111	10	23	111	20	1785
111	21	6	130	0	179
130	1	5	130	00	19
130	10	5	210		2
212	0	6	212	3	1
222	00	654	222	02	2
222	03	1	222	04	50
222	10	55	222	14	3

240	00	1707	240	02	62
240	03	189	240	04	226
240	05	3	240	0|	108
240	10	691	240	12	10
240	13	25	240	14	38
240	15	2	240	1|	227
240	20	4	240	30	11
240	33	5	240	34	1
240	3|	2	242	00	1
243	10	3	245	00	12194
245	02	247	245	03	127
245	04	2312	245	05	3
245	0|	379	245	10	51062
245	11	10	245	12	2692
245	13	1370	245	14	13730
245	15	25	245	16	1
245	18	2	245	19	1
245	1|	2588	246	01	2
246	03	1	246	04	2
246	08	1	246	10	21
246	11	8	246	13	22
246	14	31	246	15	1
246	16	4	246	17	23
246	18	30	246	20	1
246	23	1	246	24	1
246	30	149	246	31	32
246	32	5	246	33	82
246	34	24	246	35	1
246	36	4	246	37	23
246	38	17	246	39	63
247	00	2	247	10	3
250		12341	260		19

B.8 Delimiter Count

TAG	DELIMS	COUNT	TAG	DELIMS	COUNT
001		86742	002		60538
007		597	008		86742
010	a	70383	010	al	1
010	az	33	010	azzz	1
012	a	17	012	abcdefghi	14
012	ae	9	012	az	1
012	l	1	015	a	9429
015	aa	1	019	a	419
019	aa	34	019	aaa	5
019	aaaa	2	020	a	36376
020	aa	395	020	aaa	23
020	aaaa	1	020	aaac	1
020	aab	1951	020	aaba	2

020	aabab	7	020	aababc	1
020	aabc	168	020	aac	21
020	aacb	1	020	aacbabc	1
020	ab	149	020	aba	8
020	abab	36	020	ababab	2
020	ababc	6	020	abc	229
020	abca	1	020	abcab	8
020	abcabc	22	020	abcabcabc	1
020	abcb	1	020	ac	18609
020	aca	22	020	acab	622
020	acabaa	1	020	acabab	1
020	acabc	1095	020	acabcab	1
020	acabcabc	20	020	acac	30
020	acacabc	3	020	acacac	1
020	acacb	4	020	acb	2
020	acbc	2	020	acc	1
020	az	4	020	azc	1
020	b	201	020	bc	260
020	bcb	1	020	bcbc	2
020	c	2184	020	cab	1
020	cabc	2	020	cac	1
020	cb	1	020	cbc	1
020	z	179	020	zbab	1
020	zbc	1	020	zc	69
022	a	822	022	az	1
022	y	2	025	a	29
028	aa	2	028	ab	34
030	a	4	033	aa	1
035	a	85	035	aa	4
035	aaaa	2	035	ab	26
035	aba	1	035	abaa	3
035	abaaab	1	035	abaabab	1
035	abab	1	035	b	3
037	a	187	037	aaa	1
037	ab	12	039	abcde	25
040	abcd	8	040	abcdd	7
040	abcddd	3	040	abcdddd	2
040	abcdddddd	3	040	abcddddddd	1
040	ac	2674	040	acd	65743
040	acdd	10159	040	acddd	1101
040	acdddd	332	040	acdddd	152
040	acdddddd	74	040	acddddddd	45
040	acddddddd	26	040	acdddddddd	7
040	acdddddddd	4	040	acdddddddddd	2
040	ad	1	040	c	29
040	cd	5235	040	cdd	494
040	cddd	60	040	cdddd	26
040	cdddd	6	040	cdddddd	7
040	cdddddd	2	040	cddddddd	2
040	d	4	040	dd	1
041	a	4213	041	aa	2

041	ab	123	041	abb	1
041	ae	25	041	aee	1
041	b	3	041	be	1
041	d	4	041	de	103
041	e	98	041	ee	1
042	a	193	042	aa	341
042	aaa	1	043	a	21860
043	aa	2531	043	aaa	530
043	aaaa	2	045	a	644
045	aa	3	045	aaa	1
045	aaaaa	1	045	bb	1
047	a	29	047	aa	50
047	aaa	22	047	aaaa	7
047	aaaaa	4	047	aaaaaa	2
047	aaaaaaaaa	1	048	a	155
048	aa	49	048	aaa	18
048	aaaa	12	048	aaaaa	6
048	aaaaaa	3	048	aaaaaaa	3
048	aaaaaaaa	1	048	aaaaaaaa	1
048	aaaaaaaaa	4	048	aaab	1
048	aab	1	048	aabbbb	1
048	ab	10	048	abb	1
048	abbbaa	2	048	b	16
048	baa	52	048	baa	4
048	baaa	1	048	baaaa	1
048	baaaaaaaa	1	048	baba	1
048	bba	1	048	bbaa	1
048	bbb	1	048	bbba	1
048	bbbaa	1	048	bbbbaa	3
048	bbbbaaaaaa	1	048	bbbba	1
049	a	75207	049	ac	11192
049	acac	1	049	acc	2
049	acdvv	3	049	acv	1
049	acvcv	2	049	acvvvv	1
049	adcvvpvcvvp	1	049	adpvp	2
049	adpvvpvp	1	049	adv	12
049	advpcvpv	1	049	advpvp	1
049	advpvpvpn	1	049	advv	65
049	ap	1	049	av	232
049	avpvp	1	050	a	360
050	aa	3	050	aaaa	1
050	ab	62419	050	aba	1540
050	abaa	15	050	abaaaaaaa	1
050	abab	4	050	abb	2
051	ab	4	051	abc	140
051	ac	3	051	c	4
052	a	1	055	a	1
055	ab	7	060	a	2861
060	aa	299	060	aaa	1
060	ab	9	060	aba	1
069	a	2	070	a	16

070	ab	16	072	a	10
072	aa	2	074	a	321
080	a	2	082	a	54196
082	a2	2624	082	aa	4611
082	aa2	252	082	aaa	48
082	aaa2	1	082	aaaa	2
082	aaaa2	1	082	b	4
086	a	813	089	a	3
090	a	25	090	aa	5
090	aaaa	2	090	ab	15063
090	aba	9	090	bb	1
092	a	330	092	aa	9
092	ab	2576	092	abb	1
096	a	1445	096	aa	9
096	aaa	2	096	aaaa	1
096	ab	24	096	aba	1
096	abb	1	099	a	7
099	aa	1592	099	aaa	1514
099	aaaa	5976	099	aaaaa	2995
099	aaaaaa	386	099	aaaaaaa	14
100	a	36377	100	ab	19
100	abb	6	100	abcd	13
100	abcdw	2	100	abd	2
100	abw	1	100	ac	226
100	accd	1	100	acd	625
100	acde	7	100	acd	18
100	ace	4	100	ack	1
100	acw	7	100	ad	22316
100	adc	2	100	ade	429
100	adew	7	100	adw	1242
100	ae	631	100	aed	1
100	aew	7	100	ak	2
100	al	1	100	aq	4
100	aqcdw	1	100	aqd	8
100	aqdw	97	100	aqw	36
100	at	3	100	aw	1984
100	dd	1	110	a	2498
110	aa	1	110	ab	2040
110	abb	613	110	abb	78
110	abbbb	10	110	abbbb	1
110	abbbw	4	110	abbbk	1
110	abbw	7	110	abg	1
110	abk	4	110	abt	2
110	abtf	1	110	abw	98
110	ae	3	110	af	1
110	ak	126	110	akb	1
110	akf	1	110	akgw	1
110	akk	1	110	at	2
110	aw	85	111	a	61
111	ab	3	111	abbcd	1
111	abc	2	111	abcc	1

111	abcd	558	111	abd	34
111	ac	1	111	acc	3
111	acd	958	111	ad	49
111	adc	9	111	adcw	59
111	adw	5	111	ae	2
111	andc	1	111	andcw	63
111	andw	3	111	anw	2
111	aqd	1	130	a	177
130	ad	1	130	af	2
130	ak	3	130	al	9
130	alk	1	130	alsf	6
130	alw	1	130	ap	2
130	aplf	1			

B.9 Location Count

TOTAL OF 86727 ITEMS HAVE LOCATION CODE

LOCATION	COUNT	PERCENTAGE
EXW1	7	0.008
EXW2	15	0.017
EXW4	1	0.001
EXW5	1	0.001
EXWA	329	0.379
EXWB	4153	4.789
EXWC	38	0.044
EXWD	13	0.015
EXWE	6804	7.845
EXWF	649	0.748
EXWG	273	0.315
EXWH	1	0.001
EXWI	703	0.811
EXWJ	182	0.210
EXWK	123	0.142
EXWL	1936	2.232
EXWM	2457	2.833
EXWO	4	0.005
EXWP	3455	3.984
EXWQ	1	0.001
EXWR	4151	4.786
EXWS	130	0.150
EXWT	244	0.281
EXWU	102	0.118
EXWV	50	0.058
EXWW	9	0.010
EXWZ	59293	68.367
EXX1	5	0.006
EXX2	22	0.025

EXX4	1	0.001
EXXA	2	0.002
EXXB	181	0.209
EXXC	5	0.006
EXXD	14	0.016
EXXE	209	0.241
EXXF	23	0.027
EXXG	1	0.001
EXXI	11	0.013
EXXJ	10	0.012
EXXK	1	0.001
EXXM	23	0.027
EXXN	2	0.002
EXXP	99	0.114
EXXQ	3	0.003
EXXR	84	0.097
EXXS	1	0.001
EXXT	6	0.007
EXXU	4	0.005
EXXV	31	0.036
EXXW	10	0.012
EXXX	29	0.033
EXXZ	824	0.950
[R]	1	0.001
[SAM	1	0.001

B.10 Word Count

Analysis of word size from the entire Western Michigan University OCLC-MARC subscription tapes. Records examined include all tags 600-690 and 245 tags with subfield "C" deleted. This corresponds almost exactly to the fields used in generating the index for the Online Subject/Title Catalog.

READ 254276 RECORDS
MINIMUM SPECIFIED WORD SIZE: 3

	COUNT	MINIMUM	MAXIMUM	AVERAGE
WORDS	1153359	3	100	7.05
UNIQUE	1123851	3	100	7.12
UNSTOP	988006	3	100	7.61

FREQUENCY BY WORD SIZE

SIZE	TOTAL WORDS	UNIQUE WORDS	UNSTOPPED WORDS
3	155578	136402	26748
4	71643	70565	62264

5	116292	114701	108173
6	187919	185840	184052
7	150868	149361	141901
8	139504	138057	137143
9	113139	112232	112232
10	88686	88014	88014
11	49293	48910	48910
12	38310	37976	36762
13	19377	19167	19167
14	14021	13951	13951
15	3906	3887	3887
16	1797	1787	1787
17	1218	1214	1214
18	756	753	753
19	358	357	357
20	246	245	245
21	118	117	117
22	111	111	111
23	88	87	87
24	53	53	53
25	17	17	17
26	13	13	13
27	14	14	14
28	6	6	6
29	9	9	9
30	4	4	4
31	7	7	7
32	2	2	2
33	2	2	2
38	1	1	1
40	1	1	1
41	1	1	1
100	1	1	1

DISTRIBUTION OF WORDS NOT ON STOP WORD LIST
FOR EACH INPUT RECORD

MINIMUM WORDS PER RECORD: 0
MAXIMUM WORDS PER RECORD: 67
AVERAGE NUMBER OF WORDS PER RECORD: 3.89

WORDS PER RECORD

WORDS	COUNT	WORDS	COUNT	WORDS	COUNT
1	16476	2	57538	3	55566
4	49058	5	32767	6	17511
7	10659	8	5523	9	2999
10	1799	11	1201	12	839
13	580	14	447	15	353

16	213	17	159	18	136
19	85	20	82	21	63
22	49	23	35	24	21
25	22	26	13	27	11
28	10	29	13	30	11
31	5	32	7	33	
34	1	35	3	36	2
37	1	38		39	
40		41		42	1
49	1	50		51	
58		59		60	1

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)
AY 31, 1978 :REPORT /PREPARED FOR THE COMMITTEE ON SCIENCE AND TECHNOLOGY, U.S. H
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 COND(T14.5.U5410TH1978)
UCT AND SUPPORT OF BASIC RESEARCH /REPORT OF THE NATIONAL SCIENCE BOARD.
- BETTER HOMES AND GARDENS FAMILY MEDICAL GUIDE,EDITED BY DONALD G. COOLEY. A(RC81.A2C61973)
RT DIRECTION BY PAUL ZUCKERMAN.
- BIBLIOGRAPHY OF BIOETHICS /EDITED BY LEROY WALTERS. (Z6675.E8W34)
- BIOGRAPHICAL DICTIONARY OF AMERICAN SCIENCE :THE SEVENTEENTH THROUGH THE NINETEE(Q141.E37)
NTH CENTURIES /CLARK A. ELLIOTT.
- BIOGRAPHICAL DIRECTORY OF THE AMERICAN PUBLIC HEALTH ASSOCIATION, 1979 /COMPI(RA424.4.A47)
LED FOR THE ASSOCIATION BY JAQUES CATTELL PRESS.
- BIOLOGICAL ABSTRACTS/RRM. (Z5321.B672)
- BIORESEARCH INDEX. (Z5321.B672)
- BIORESEARCH TITLES. (Z5321.B67)
- 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 MACNALTY. (R121.B751978)
- CAMBRIDGE ENCYCLOPAEDIA OF ASTRONOMY /SIMON MITTON, EDITOR-IN-CHIEF ; F(QB43.2.C35(PHYSC))
OREWORD BY SIR MARTIN RYLE.
- CANCER-CAUSING AGENTS :A PREVENTIVE GUIDE /BY RUTH WINTER. (RC268.6.W561979)

CATALOG OF TERATOGENIC AGENTS /THOMAS H. SHEPARD. (QM691.S531980)
 CELL BIOLOGY /COMPILED AND EDITED BY PHILIP L. ALTMAN AND DOROTHY DITTMER KATZ(QH581.5.C4)
 CHARACTERISTICS OF THE NATIONAL SAMPLE OF SCIENTISTS AND ENGINEERS, 1974.(Q149.U5U541975B)
 CHECKLIST OF UNITED STATES TREES :(NATIVE AND NATURALIZED) /BY ELBERT L. LIT(QK481.L51979)
 TLE, JR.
 CIRCUITS FOR ELECTRONICS ENGINEERS /EDITED BY SAMUEL WEBER. (TK7867.C51977)
 CITIZENS' ENERGY DIRECTORY /COMPILED BY JAN SIMPSON WITH KEN BOSSONG ;(TJ163.25.U6C571980)
 COVER ART BY TOM CHALKLEY.
 CIVIL AIRCRAFT OF THE WORLD /JOHN W. R. TAYLOR & GORDON SWANBOROUGH. (TL685.T391978)
 CLINICAL ATLAS OF HUMAN CHROMOSOMES /JEAN DE GROUCHY, CATHERINE TURLEAU ; FORE(RB44.G7613)
 WORD BY VICTOR MCKUSICK.
 CLINICAL DIAGNOSIS AND MANAGEMENT BY LABORATORY METHODS /[EDITED BY] JOHN BE(RB37.T631979)
 RNARD HENRY.
 CLINICAL ONCOLOGY FOR MEDICAL STUDENTS AND PHYSICIANS :A MULTIDISCIPLINARY(RC262.C55X1978)
 APPROACH /EDITOR: PHILIP RUBIN ; ASSOCIATE EDITOR: RICHARD F. BAKEMEIER.
 COLLEGE PROGRAMS FOR PARAPROFESSIONALS;A DIRECTORY OF DEGREE-GRANTING PROGRAM(HV11.Q41975)
 S IN THE HUMAN SERVICES.
 COMPENDIUM OF ORGANIC SYNTHETIC METHODS[BY] IAN T. HARRISON AND SHUYEN HARRISON(QD262.H32)
 COMPILATION OF JOURNAL INSTRUCTIONS TO AUTHORS. (R119.U5X)
 COMPLETE ILLUSTRATED ENCYCLOPEDIA OF THE WORLD'S MOTORCYCLES /EDITED BY ERWIN (TL440.T733)
 TRAGATSCH.
 COMPLETE OUTDOORSMAN'S GUIDE TO BIRDS OF EASTERN NORTH AMERICA /BY JOHN P.(QL685.M191976B)
 S. MACKENZIE ; ILLUSTRATED BY TERENCE SHORTT.
 COMPOSITION OF FOODS :RAW, PROCESSED, PREPARED /BY BERNICE K. WATT AND ANNA(TX551.W371975)
 BEL L. MERRILL ; WITH THE ASSISTANCE OF REBECCA K. PECOT... [ET AL.].
 COMPOSITION OF SCIENTIFIC WORDS :A MANUAL OF METHODS AND A LEXICON OF MATE(PE1175.B761978)
 RIALS FOR THE PRACTICE OF LOGOTECHNICS /ROLAND WILBUR BROWN.
 COMPREHENSIVE GUIDE TO THE CANNABIS LITERATURE /COMPILED BY ERNEST L. ABEL. (Z7164.N17A23)
 COMPREHENSIVE GUIDE TO THE ENGLISH-LANGUAGE LITERATURE ON CANNABIS.(MARIHUAN(Z7164.N17G34)
 A)[BY] J. R. GAMAGE & E. L. ZERKIN.
 COMPREHENSIVE TEXTBOOK OF PSYCHIATRY, II /[EDITED BY] ALFRED M. FREEDMAN, H(RC454.F741975)

AROLD I. KAPLAN, BENJAMIN J. SADOCK.
 CONSUMER'S DICTIONARY OF FOOD ADDITIVES /RUTH WINTER. (TX553.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.].
 DICCIONARIO 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 BIOLOGY[BY] M. ABERCROMBIE, C. J. HICKMAN AND M. L. JOHNSON. (QH13.A251973)
 DICTIONARY OF IMMUNOLOGY /COMPILED BY MEMBERS OF STAFF OF THE DEPARTMENT (QR180.4.H471977)
 OF BACTERIOLOGY AND IMMUNOLOGY, DEPARTMENT OF PATHOLOGY, AND INSTITUTE OF VIROLOG
 Y, 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)
 DICTIONNAIRE TECHNIQUE GENERAL ANGLAIS-FRANCAIS /J.-GERALD BELLE-ISLE ; PREF.(T10.B441977)
 DE PIERRE AGRON.
 DIRECTORY OF ACCREDITED RESIDENCIES. (R840.D56)
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C.2 KWOC Index

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 KRONIEK DER CISTERCIENSERABDIJ "MARIA TOEVLUCHT" TE ZUNDERT, 1900-1950 /DO(BX3440.Z8B6)DUT
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 BYZANTINE EMPIRE * PEASANT SOCIETY IN THE LATE BYZANTINE EMPIRE :A SOCIAL AND DEMOGRAPHIC STUDY (HD664.L34)
 BYZANTINE EMPIRE * TRIBONIAN (KZD.H66X1978)
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 BYZANTINE EMPIRE * TRANSFIGURATIONS :STUDIES IN THE DYNAMICS OF BYZANTINE ICONOGRAPHY (ND142.C87)
 BYZANTINE EMPIRE * BYZANTINE BOOKS AND BOOKMEN. (Z8.B92B9X)
 CALETA SAN PABLO, PERU * FISHERMEN OF CALETA SAN PABLO (HD9464.P52C34X)
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 CALIFORNIA * INFORMATION NEEDS OF CALIFORNIANS :COMMISSIONED BY CALIFORNIA STATE LIBRARY : FOR THE CALIFORNIA GOVERNOR'S CONFERENCE ON LIBRARIES AND INFORMATION SERVICES (025.5809794K54)
 CALIFORNIA * CALIFORNIA JOB AGENT INCENTIVE PAY PLAN:A CASE STUDY FOR MANPOWER MANAGEMEN (AS36.R28NO.5068)
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 CALIFORNIA * ENERGY ALTERNATIVES FOR CALIFORNIA :PATHS TO THE FUTURE / WILIAM AHERN ... [ET AL.] (AS36.R3NO.1793)
 CALIFORNIA * COPAYMENTS AND DEMAND FOR MEDICAL CARE :THE CALIFORNIA MEDICID EXPERIENCE (AS36.R3NO.2167)
 CALIFORNIA * DOING CRIME :A SURVEY OF CALIFORNIA PRISON INMATES (AS36.R3NO.2200)
 CALIFORNIA * BALANCING ENERGY AND THE ENVIRONMENT :THE CASE OF GEOTHERMAL DEVELOPMENT (AS36.R3NO.2274)
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AND ELECTIONS :
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 AMERICAN LECTURE SERIES ; NO. 1033 * MAN IN EXTREME ENVIRONMENTS (QP82.S54)
 AMERICAN LECTURE SERIES ; NO. 997 * BOTULISM : (QR201.B7S56)
 AMERICAN LECTURE SERIES ; PUBLICATION NO. 1005 * PHYSICAL MEDICINE AND REHABI(RD594.3.C84)
 LITATION APPROACHES IN SPINAL CORD INJURY
 AMERICAN LECTURE SERIES ; PUBLICATION NO. 1009 * PHYSICAL PERFORMANCE, FITNESS(RC1235.Y68)
 , AND DIET
 AMERICAN LECTURE SERIES ; PUBLICATION NO. 1011 * BIOKINETICS AND BIODYNAMICS OF(QM601.B54)
 HUMAN DIFFERENTIATION :
 AMERICAN LECTURE SERIES ; PUBLICATION NO. 1014 * THE CERVICAL SYNDROME (RC422.C4J331978)
 AMERICAN LECTURE SERIES ; PUBLICATION NO. 1035 * CRIME AND THE ENVIRONMENT (HV6150.H35)
 AMERICAN LECTURE SERIES ; PUBLICATION NO. 975 : A PUBLICATION IN THE BANNERST(HD7255.C845)
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 RATIONS IN REHABILITATION FACILITY DEVELOPMENT
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 TURATED FATTY ACIDS IN HEALTH AND DISEASE
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 RGANS
 AMERICAN LECTURE SERIES ; PUBLICATION NO. 993 * BECOMING A PSYCHOTHERAPIST (RC480.G638)
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AMERICAN LECTURE SERIES, PUBLICATION ; NO. 1010 * MECHANIZING MICROBIOLOGY (QR65.M38)

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AMERICAN LECTURE SERIES, PUBLICATION NO. 865. A MONOGRAPH IN AMERICAN LECTURES IN ORTHOPAEDIC SURGERY * REFLEX TESTING METHODS FOR EVALUATING C.N.S. DEVELOPMENT, (RJ488.F561973(MAIN))

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020/.7 * WRITING OBJECTIVES FOR BIBLIOGRAPHIC INSTRUCTION IN ACADEMIC LIBRARIES(Z1001.W75)
:A SUMMARY OF THE PROCEEDINGS OF SESSIONS OF THE MIDWEST FEDERATION OF LIBRARY ASSOCIATIONS, DETROIT, OCT. 1-2, 1975 /SPONSORED BY WISCONSIN LIBRARY ASSOCIATION AND WISCONSIN ASSOCIATION OF ACADEMIC LIBRARIES, TASK FORCE ON INSTRUCTION IN ACADEMIC LIBRARIES ... [ET AL.].

020/.7/11 * ADMINISTRATIVE ASPECTS OF EDUCATION FOR LIBRARIANSHIP :A SYMPOSIUM /(Z668.A26)
EDITED BY MARY B. CASSATA AND HERMAN L. TOTTEN.

020/.7/1178 * PROCEEDINGS OF THE HEA TITLE II-B INSTITUTE ON CONTINUING EDUCATION PROGRAM PLANNING FOR LIBRARY STAFFS IN THE SOUTHWEST, MARCH 17-28, 1975 /EDITED AND COMPILED BY DONALD D. FOOS.(Z668.I481975)

020/.711/73 * ALA ACCREDITATION PROCESS, 1973-1976 :SURVEY OF LIBRARY SCHOOLS WHERE PROGRAMS WERE EVALUATED UNDER THE 1972 STANDARDS /RUSSELL E. BIDLACK.(Z668.B62)

020/.711/73 * SEARCH FOR A SCIENTIFIC PROFESSION :LIBRARY SCIENCE EDUCATION IN THE U.S. AND CANADA /BY L. HOUSER AND ALVIN M. SCHRADER.(020.711H84)

- 020/.75 * COLLECTING RARE BOOKS FOR PLEASURE AND PROFIT /BY JACK MATTHEWS. (Z987.M371977)
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- 020/.8 * STUDIES IN COMPARATIVE LIBRARIANSHIP;THREE ESSAYS PRESENTED FOR THE SE(Z665.B927)
 VENSMA PRIZE 1971 BY A. D. BURNETT, R. K. GUPTA AND S. SIMSOVA. WITH A FOREWORD BY
 FRANK FRANCIS.
- 020/.8 S020/.711/73 * SHAPING OF AMERICAN LIBRARY EDUCATION /BY CHARLES(Z674.A75NO.36Z668)
 D. CHURCHWELL.
- 020/.8 S025.3/3 * LIBRARY OF CONGRESS SUBJECT HEADINGS :PRINCIPLES AND APPLICAT(025.33C45)
 ION /LOIS MAI CHAN.
- 020/.92/2B * LIBRARIANS OF CONGRESS, 1802-1974. (020.92L69)
- 020/.92/2B * QUIEN ES QUIEN :A WHO'S WHO OF SPANISH-HERITAGE LIBRARIANS IN THE(Z720.A4T73)
 UNITED STATES /EDITED BY ARNULFO D. TREJO, WITH THE ASSISTANCE OF KATHLEEN L. LOD
 WICK.
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 K. VANN.
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 S. BOBINSKI, JESSE HAUK SHERA, BOHDAN S. WYNAR ; EDITED BY BOHDAN S. WYNAR.
- 021 * CHANGING TIMES, CHANGING LIBRARIES /[EDITED BY] GEORGE S. BONN, SYLV(Z716.4.A451976)
 IA 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

- MAS J. GALVIN.
- 021.6/4 * MULTITYPE LIBRARY COOPERATION /EDITED BY BETH A. HAMILTON AND WILLIAM (2731.M84)
 B. ERNST, JR.
- 021.6/4/09748 * PLAN FOR LIBRARY COOPERATION IN PENNSYLVANIA /SUBMITTED TO(021.6409748P69)
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] 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.
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R [AND] JOE MANCIAS, JR.

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(*HE1.111/2:T22) K-12 CLASROOM TEACHERS AND CAREER EDUCATION :THE BEAUTIFU(LC1045.H626X)
L PEOPLE/BY KENNETH B. HOYT.

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(*HE1.18/4:EX7) EXPERIENCES IN EVALUATING HUMAN SERVICES. (Z7164.C4H6XNOV.1977)
(*HE1.214:976) NATIONAL DIRECTORY OF EDUCATIONAL PROGRAMS IN GERONTOLO(HV1450.S6X1976)
GY /BETSY M. SPROUSE, ED.

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/PREPARED BY URBAN AND RURAL SYSTEMS ASSOCIATES.

(*HE1.2:W84/5/975) CHILD CARE AND THE WORKING WOMAN :REPORT AND RECOMMENDATION(HV854.U55X)
S OF THE SECRETARY'S ADVISORY COMMITTEE ON THE RIGHTS AND RESPONSIBILIT
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(*HE1.411:B49) BIBLIOGRAPHY OF BILINGUAL-BICULTURAL PRESCHOOL MATERIAL FOR(Z5814.P616)
THE SPANISH SPEAKING CHILD /INTERAMERICA RESEARCH ASSOCIATES.

(*HE1.452:AD7/3) SUBSIDIZED ADOPTION IN AMERICA. (HV875.U51976)
(*HE1.452:SH2) SHARING & CARING. (HV875.U493X)

- (*HE1.6/3:AU2/2) GUIDE FOR AUDITS OF HEAD START PROGRAM GRANTS. (LB2830.U72X1977)
 (*HE1.6:ED8) FINAL TITLE IX, REGULATION IMPLEMENTING EDUCATION AMENDMENTS OF 1972 PROHIBITING SEX DISCRIMINATION IN EDUCATION, EFFECTIVE DATE: JULY 21, 1975.
- (*HE19.102:AD7) EDUCATION OF ADOLESCENTS :THE FINAL REPORT AND RECOMMENDATIONS OF THE NATIONAL PANEL ON HIGH SCHOOL AND ADOLESCENT EDUCATION. (LB1607.E4X)
- (*HE19.102:B56/2) BLACK STUDIES :ISSUES IN THEIR INSTITUTIONAL SURVIVAL /PRINCIPAL INVESTIGATORS: ELIAS BLAKE, HENRY COBB ... [ET AL.] (E184.7.I56X)
- (*HE19.102:B56/3) 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] (LC2801.W6X)

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.

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

APPENDIX E

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.

CAMPUS
MAIL

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

JAMES N. SLEEP
COMPUTER SCIENCE DEPARTMENT
4050 FRIEDMANN HALL
WESTERN MICHIGAN UNIVERSITY
KALAMAZOO, MI 49008

please fold with return address outside seal with tape or staple

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

No answer: 3

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 messages 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 lbr: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
```


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

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)

8 2 OR (NURSES) OR (NURSING))
 ((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 sll

<(COLOR AND PHOTOGRAPHY)> 8

TR140 .P76 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.
 [12] P. : BIBL 1977

TR659 .C52
 LANGDON CLAY, COLOR ATLAS :

INCLUDING FLAT LANDS & RELATED VIEWS, JULY 21-SEPTEMBER 23, 1979
 THE CORCORAN GALLERY OF ART, WASHINGTON, D.C.
 [15] P. : BIBL 1979

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

CAT> type s9

<(COLOR)> 135
 %NUMBER OF ENTRIES EXCEEDS 20
 HOW MANY DO YOU WANT TO SEE? 120-122

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 e1 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

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 MCLELLAN, 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:
CONTAINING FULL PAGE PORTRAITS AND BIOGRAPHICAL SKETCHES OF
PROMINENT AND REPRESENTATIVE CITIZENS OF THE COUNTY, TOGETHER
WITH PORTRAITS & BIOGRAPHIES OF ALL THE GOVERNORS OF THE STATE
AND OF THE PRESIDENTS OF THE UNITED STATES.
782, [43] P. : 1978

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
COMMEMORATIVE 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,
LONOKE, 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

.run lbr: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> expand child*

E1 <CHILD> 1014
E2 <CHILDAW> 1
E3 <CHILDBEARING> 4
E4 <CHILDBIRTH> 19
E5 <CHILDCARE> 2
E6 <CHILDE> 2
E7 <CHILDEN> 1
E8 <CHILDHOOD> 155
E9 <CHILDLESS> 1
E10 <CHILDLESSNESS> 1
E11 <CHILDMINDER> 1
E12 <CHILDREARING> 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(PHYSC)
 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.

IX, 262 P. ; BIBL 1977

CAT> exit

DO YOU WANT TO EXIT FROM THE CATALOG? yes

THANK YOU

EXIT

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

3)

Z 1361 .N39 M56X 1981 (ARC) (SPL)(REF)
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 (MIHOLH), 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 <MICROCOMPUTERS> 1
 E7 <MICROCOMPUTER> 28
 E8 <MICROCOMPUTERS> 68
 E9 <MINICOMPUTER> 2
 E10 <MINICOMPUTERS> 21

CAT> search wom%n* 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 W45%WOMEN IN FRANKISH SOCIETY :%MARRIAGE AND THE
CLOISTER, 500 TO 900 /%SUZANNE FONAY WEMPLE.%348 P. ; BIBL 1981
GN483.3 .L56%EMERGING FROM THE CHRYSALIS :%STUDIES IN RITUALS OF
WOMEN'S INITIATION /%BRUCE LINCOLN.%XII, 153 P. : BIBL 1981
PR 151 .W6 W64X%WOMEN, LITERATURE, CRITICISM /%EDITED BY HARRY
R. GARVIN.%177 P. ; BIBL 1978

.

.

.

PR1810 .D6%THE ORIGINS OF ANCRENE WISSE /%BY E. J. DOBSON.%441
P. ; BIBL 1976

BL458 .H44 1977%DIE FRAU IN DEN RELIGIONEN DER MENSCHHEIT /%VON
FRIEDRICH HEILER.%194 P. ; BIBL 1977 GER

HQ1394 .G15 1972%WOMAN, CHURCH, AND STATE.%554 P. ; 22 CM. 1972

DT25 .W4%AFRICA BEFORE THEY CAME;%THE CONTINENT, NORTH, SOUTH,
EAST, AND WEST, PRECEDING THE COLONIAL POWERS.%VI, 396 P. 1965

.r sort

*womrel.out=womrel.out/asc/var/k:l: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

BF1573 .A34 1979%DRAWING DOWN THE MOON :%WITCHES, DRUIDS,
GODDESS-WORSHIPPERS, AND OTHER PAGANS IN AMERICA TODAY /%MARGOT
ADLER.%XI, 455 P., [4] LEAVES OF PLATES : BIBL 1979

BL2218.2 .O43%DIE STELLUNG DER FRAU IM SHINTO :%EINE

RELIGIONSPHANOMENLOGISCHE UND -SOZIOLOGISCHE UNTERSUCHUNG /%VON
HARUKO OKANO.%XIV, 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.
%XXVII, 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 /
%MARILYN RICHARDSON.%XXIV, 139 P. : 1980
Z7963.R4 R68X(REF)%FEMINIST SPIRITUALITY :%A SELECT BIBLIOGRAPHY
/%COMPILED 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

BF1573 .A34 1979
 DRAWING DOWN THE MOON :
 WITCHES, DRUIDS, GODDESS-WORSHIPPERS, AND OTHER PAGANS IN
 AMERICA TODAY /
 MARGOT ADLER.
 XI, 455 P., [4] LEAVES OF PLATES : BIBL 1979

BL2218.2 .043
 DIE STELLUNG DER FRAU IM SHINTO :
 EINE RELIGIONSPHANOMENLOGISCHE UND -SOZIOLOGISCHE UNTERSUCHUNG /
 VON HARUKO OKANO.
 XIV, 236 P. ; BIBL 1976 GER

BL325.F4 S76
 ANCIENT MIRRORS OF WOMANHOOD :
 OUR GODDESS AND HEROINE HERITAGE /
 MERLIN STONE ; ILLUSTRATED BY CYNTHIA STONE.
 V. : 1979

.
 .
 .

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.
 XXVII, 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 /
 MARILYN RICHARDSON.
 XXIV, 139 P. : 1980

Z7963.R4 R68X(REF)
 FEMINIST SPIRITUALITY :
 A SELECT BIBLIOGRAPHY /
 COMPILED BY BETTY ROSZAK.
 4 P. ; 1979

G.3 Error Messages

```
.run lbr: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> 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
?WARNING- "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 s1
?SAVE SET #1 DOES NOT EXIST

?ILLEGAL SET OR PRINT COMMAND

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

?ILLEGAL SET OR WRITE COMMAND

CAT> type s1
?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*
%WILD CARD MATCH OF 25 KEY TERMS BY CO*
DO YOU WANT TO CONTINUE? yes
%WILD CARD MATCH OF 50 KEY TERMS BY CO*
DO YOU WANT TO CONTINUE? no
?BAD SEARCH OR SEARCH TERMS
TRY AGAIN

CAT> search e1
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 e18
FOUND 1
CREATING SET #18 <(COASTER)> 1 ITEMS

CAT> search e19
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 e1
FOUND 2587
CREATING SET #1 <(AMERICA)> 2587 ITEMS

CAT> search e1
FOUND 2587
CREATING SET #2 <(AMERICA)> 2587 ITEMS

CAT> search e1
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 reformatting 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 /
COMPLIED 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. VAILLANCOURT.

XI, 518 P. ; 1980

Z5640 .J63 1978(PHYSC)

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

Z674 .I52 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 list set status.
INFO ;To get current status.
STEPS ;To set subset saving mode.
```

```

RESET          ;To clear save sets.
STOP           ;To exit from program.
FINISH         ;To exit from program.
EXIT           ;To exit from program.
LOGOFF        ;To exit from program.
HELP          ;To get instructions.

```

<set> can be any set name. <terms> can be a single term or several terms combined using Boolean operators. The Boolean operators are:

Operator -----	Result -----
<term> OR <term>	Items having either term.
<term> AND <term>	Items having both terms.
<term> EXL <term>	Items having first but not second term.

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:

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

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:

OPERATOR	RESULT
-----	-----
OR	Entries in either set or having either term.
AND	Entries in both sets or having both terms.
EXL	Entries that are in first set but not second set or having the first term but not the second term.

Examples:

```
CAT> SEARCH CANCER OR CARCINOMA ; Find entries with either term.
CAT> SEARCH S1 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 <WOMANSPIRIT> 1
 E9 <WOMANTHOLOGY> 1
 E10 <WOMEN> 1381

E11 <WOMENFOLK> 2
E12 <WOMENS> 1
E13 <WOMUNAFU> 1

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

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

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
```

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 then 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 GRIPE

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.

H.11 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
COLLECTION BEING ACCESSED: ENTIRE COLLECTION(JUL 1976-DEC 1981)
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 that 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.

CODE	LANGUAGE
----	-----
ARA =	ARABIC
CHI =	CHINESE
DUT =	DUTCH
FRE =	FRENCH
FRM =	FRENCH
FRO =	FRENCH
GER =	GERMAN
GMH =	GERMAN

GOH = GERMAN
 GRC = GREEK
 GRE = GREEK
 HEB = HEBREW
 HIN = HINDI
 ITA = ITALIAN
 JPN = JAPANESE
 KOR = KOREAN
 LAT = LATIN
 RUS = RUSSIAN
 SAN = SANSKRIT
 SLA = RUSSIAN
 SPA = SPANISH

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:

CODE	LOCATION
----	-----
ACQ	ACQUISITIONS; FIRST FLOOR, WALDO LIBRARY
ARC	ARCHIVES; GROUND FLOOR, WALDO LIBRARY
BUS	BUSINESS LIBRARY; NORTH HALL, EAST CAMPUS
CAT	CATALOGING; FIRST FLOOR, WALDO LIBRARY
DOC	GOVERNMENT DOCUMENT COLLECTION; THIRD FLOOR, WALDO LIB.
ERC	EDUCATIONAL RESOURCE CENTER; SANGREN HALL
ICS	INSTITUTE FOR CISTERCIAN STUDIES; WEST HILLSIDE HALL
LIB	SCHOOL OF LIBRARIANSHIP LIBRARY; SECOND FLOOR, WALDO LIB
MAP	MAP COLLECTION; THIRD FLOOR, WALDO LIBRARY
MCB	BUSINESS LIBRARY (MICROFORM); NORTH HALL, EAST CAMPUS
MCD	GOVERNMENT DOCUMENTS (MICROFORM); THIRD FLOOR, WALDO
MCE	EDUCATIONAL RESOURCE CENTER (MICROFORM); SANGREN HALL
MCM	MAP COLLECTION (MICROFORM); THIRD FLOOR, WALDO LIBRARY
MCP	PHYSICAL SCIENCE (MICROFORM); THIRD FLOOR, ROOD HALL
MFC	MICROFICHE COLLECTION; FIRST FLOOR, WALDO LIBRARY
MFL	MICROFILM COLLECTION; FIRST FLOOR, WALDO LIBRARY
MPT	MICROPRINT COLLECTION; FIRST FLOOR, WALDO LIBRARY
MSR	MUSIC SOUND RECORDING; MUSIC LIBRARY, MAYBEE HALL
MUS	MUSIC LIBRARY; MAYBEE HALL

PHYSC PHYSICAL SCIENCES LIBRARY; THIRD FLOOR, ROOD HALL
 REF REFERENCE COLLECTION; FIRST FLOOR, WALDO LIBRARY
 RES RESERVE COLLECTION; GROUND FLOOR LOBBY, WALDO LIBRARY
 RHC REGIONAL HISTORY COLLECTION; GROUND FLOOR, WALDO LIBRARY
 ROTC ROTC COLLECTION; OAKLAND GYM, EAST CAMPUS
 SCIR SCIENCE REFERENCE COLLECTION; GROUND FLOOR, WALDO LIB.
 SER SERIALS DEPT.; GROUND FLOOR, WALDO LIBRARY
 SPL SPECIAL COLLECTION; FIRST FLOOR, WALDO LIBRARY
 ULT ULTRAFICHE COLLECTION; FIRST FLOOR; WALDO LIBRARY

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)
 N-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.

H.16 Help NEW

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) Maintenance and supervision of the Online Subject/Title Catalog have been transferred 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 exists 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

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 #n 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 WOM?N*
```

```
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:

```
*FILNAM.ONS=FILNAM.ONO/K:1:50/R:1500/ASC/VAR
```

Where FILNAM.ONO was the file name used in the "OUTPUT" command and FILNAM.ONS is the file for the sorted list of citations. The SORT program will list the number of records sorted and other varied statistics and come back with another "*". Return to monitor by typing a Control-C.

- 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

*comput.ons=comput.ono/k:1:50/r:1500/asc/var
SORTED 30 RECORDS
111 KEY COMPARISONS, 3.70 PER RECORD
```

141 RECORD LEAVES IN MEMORY, 2P BUFFER MEMORY
 0 RUNS, 0 ITERATIONS
 46P OF MEMORY RETAINED AT ONE TIME
 0:00:00 CPU TIME, 7.93 MS PER RECORD
 0:00:26 ELAPSED TIME
 *^C

.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? 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. JENSEN, 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

HD9696.C63 U5159
 DATA PROCESSING IN 1980-1985 :
 A STUDY OF POTENTIAL LIMITATIONS TO PROGRESS /
 T. A. DOLOTTA ... [ET AL.].
 XII, 191 P. ; BIBL 1976

HF 5548.2 .A58X(BUS)
 GUIDELINES FOR GENERAL SYSTEM SPECIFICATIONS FOR A COMPUTER
 SYSTEM /
 [PREPARED BY COMPUTER APPLICATION SUBCOMMITTEE,
 AMERICAN INSTITUTE OF CERTIFIED PUBLIC ACCOUNTANTS]
 34 P. : 1976

HF 5548.2 .H64X
 FORTRAN APPLICATIONS IN MANAGEMENT EDUCATION /
 EDITED BY KENNETH W. HOLLMAN AND C. BRUCE KAVAN.
 VII, 228 P. : 1975

..... AND SO ON

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:

```
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:

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

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:

SWITCH	ACTION
-----	-----
EXPERT	Put implied Boolean "AND" between operands if all else fails and put implied "OR" 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).
NOEXPERT	Do not use implied Boolean "AND" and "OR" (default).
STEPS	Save all subsets created in Boolean expressions.
NOSTEPS	Do not save subsets (default).

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 of both of these commands is identical. A sample of the result from these commands:

CAT> WHAT

SET	ITEMS	SEARCH TERMS
1	844	COMPUT*
2	1383	BUSINESS*
3	31	(COMPUT*) AND (BUSINESS*)
4	2	METAL* AND WELD*

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 descriptor that will match several possible key terms.

The wild card characters are:

CHARACTER	REPLACES
*	Any number of characters
?	A single character
%	A single character or null

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, CAT% 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.

APPENDIX I

SOURCE PROGRAMS

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
```

*

* SETUP DECLARATIONS

```

DECLARE('SNOBOL.MAIN', 'CAT')
DECLARE('OPTION', 'NO.STNO')
DECLARE('ENTRY.LABEL', 'LOOP')
DECLARE('ENTRY.LABEL', 'INTRPT')
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('INTEGER', 'LOGFLG, NOTFLG, TYHEAD')
DECLARE('ENTRY.VARIABLE', 'PRMSTR, OUTLIM, NUMFLG, TRNLIM')
DECLARE('INTEGER', 'OUTLIM, NUMFLG, TRNLIM')
DECLARE('ENTRY.VARIABLE', 'LOGFLG, NOTFLG, TYHEAD')
DECLARE('INTEGER', 'EXPFLG, TYPLIM, WRTLIM, PRTLIM')
DECLARE('ENTRY.VARIABLE', 'EXPFLG, TYPLIM, WRTLIM, PRTLIM')
DECLARE('INTEGER', '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', 'EXPCNT, EXPNUM')
DECLARE('INTEGER', 'STPFLG, EXPMAX')
DECLARE('ENTRY.VARIABLE', 'STPFLG, EXPMAX')
DECLARE('INTEGER', 'MAXSAV')
DECLARE('INTEGER', 'SAVCNT, SSNUM, DCHAN, PCHAN')
DECLARE('ENTRY.VARIABLE', 'MAXSAV')
DECLARE('INTEGER', 'I, TCNT, RMAX, RMIN, KMAX, KMIN, RCNT, KCNT')
DECLARE('INTEGER', 'WLDFLG, QMODE, FNDFLG, DMPFLG, DMPCHN')
DECLARE('INTEGER', 'TYPLST, TYPFST')
DECLARE('INTEGER', 'TRNCNT, TRNSTOP, WRTCNT')
DECLARE('INTEGER', 'DMPCNT')
DECLARE('INTEGER', 'MAXTMP')
DECLARE('ENTRY.VARIABLE', 'MAXTMP')
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,SETSIZ,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 DEBUGGIN REASONS
  &STLIMIT = 9999999
* 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)FP,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'
  ESCCHR = ASCII(27)
  ALTCHR = ASCII(29)
  HTAB = ' '
  SPACE = ' '
  CNTRLZ = ASCII(26)
  CNTRLJ = ASCII(10)
  CNTRLG = ASCII(7)
  CNTRLI = ASCII(12)
  CNTRLK = ASCII(11)
  CNTRLCHR = ANY(CNTRLZ CNTRLG CNTRLI CNTRLK
  CNTRLJ ESCCHR ALTCHR)
  SWTCHDLM = '-' | ';' | '!' | '('
  HLPAT = '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'

```

```

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)) . SDLML ('S' ! '#') SDIGS . SNUM
(SPACE ! ')') ! RPOS(0) . SDLML2
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
EXPMAX = 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 = DECOCT(PRJ)
  CATPRG = DECOCT(PRG)
* INKOVE 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 PRECEDED BY A '%'
SAYIT RECl = READ
  RECl POS(0) '%' REM . SETNAM
* SAVE THE SET NAME FOR LATER USE
* READ IN THE ENTIRE TABLE CHECKING FOR CORERECT FORMAT
ZLOOP REC = READ :F(GOTEM)

```

```

REC LEN(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)
SWTRNLP SWITRUN ',' = '/' :S(SWTRNLP)
SWITRUN ')' 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(0) GOODSPAN RPOS(0)
* 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 ' SETNAM
    TYPE =
    TYPE = 'FOR HELP TYPE "HELP"'
    TYPE =
* GIVE A SUGGESTION AND OPEN UP THE RANDOM ACCESS INDEX
* AND TEXT FILES
    SETCAT(CATDEV,CATPRJ,CATPRG,CATSPD)
    KEYIN()
    RECIN()
    TXTIN()
* 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 = GETANS()
* GET THAT SOMETHING
* SEE IF NULL
    ?IDENT(COMM) :S(LOOP)
* TRY TO BREAK RESPONSE IN TO COMMAND AND TERMS
    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(0) COMM :S(HELP)
'TYPE' POS(0) COMM :S(TYPENULL)
'WRITE' POS(0) COMM :S(WRITENULL)
'PRINT' POS(0) COMM :S(PRINTNULL)
'OUTPUT' POS(0) COMM :S(OUTPUTNULL)
'QUICK' POS(0) COMM :S(QUICKNULL)
'EXPAND' POS(0) COMM :S(QUICKNULL)
'SEARCH' POS(0) COMM :S(SEARCHNULL)
'SELECT' POS(0) 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'
. ' AND FEATURES OF'
. TYPE = 'THE ONLINE SUBJECT/TITLE CATALOG.'
. ' 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(0) MODE :S(QUICK)
'QUICK' POS(0) MODE :S(QUICK)
'SELECT' POS(0) MODE :S(SEARCH)
'SEARCH' POS(0) MODE :S(SEARCH)
'TYPE' POS(0) MODE :S(TYPE)
'WRITE' POS(0) MODE :S(WRITE)
'OUTPUT' POS(0) MODE :S(OUTPUT)
'PRINT' POS(0) MODE :S(PRINT)
'WHAT' POS(0) MODE :S(WHAT)
'HELP' POS(0) 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(0) HLPAT RPOS(0) :S(GIVHLP)
TYPE = '?NO HELP AVAILABLE FOR ' FTERM
TYPE = :(LOOP)
GIVHLP 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
    CLRINT()
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)
    FNDFLG = -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(QLOOP)F(QDONE)
EXPSTP TYPE = ` <` TERM `> STOPPED`
    ?INE(WLDFLG,0) :S(QLOOP)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'
      TYPE =
      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 = :(LOOP)
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 :(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
  SETSIZ = BIG(WRTSET)
  TYPE =
  TYPE = '<< FTERM >> ' SETSIZ
  ?IEQ(SETSIZ,0) :S(OUTNON)
  ?IGT(SETSIZ,OUTLIM) :F(OUTOK)
  TYPE = '%NUMBER OF ENTRIES EXCEEDS ' OUTLIM
  PROMPT = 'DO YOU WANT TO OUTPUT THEM ALL? '
  ANS = GETANS()
  ANS POS(0) 'Y' :F(OUTFIN)
OUTOK TYPE =
  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 '>' SETSIZ ' ITEMS'
        TYPARR = ARR(WRTSET)
        I = SETSIZ
OUTLP ?ILT(I,1) :S(OUTDON)
        TCNT = TYPARR<I>
        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
PRINTNULL
        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 '>' SETSIZ
        ?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)
WRTFILE
        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(':')) . DTIME
WRITE = 'PRODUCED: ' DTIME ' ON ' DATE()
WRITE = 'OF SET: ' FTERM
WRITE = 'NUMBER OF ITEMS: ' SETSIZ
WRITE =
WRTCNT = WRTCNT + 6
TYPARR = ARR(WRTSET)
I = SETSIZ
WRTLP ?ILT(I,1) :S(WRTDON)
WRITE =
WRITE = ?INE(NUMFLG,0) SETSIZ - I + 1 ')'
WRTCNT = ?INE(NUMFLG,0) WRTCNT + 1
WRTCNT = WRTCNT + 1
TCNT = TYPARR<I>
TSTR =
WINLP ?GETTXT(TEXT,TCNT)
TSTR = TSTR TEXT
TCNT = TCNT + 1
TEXT '^' :F(WINLP)
* OUTPUT THE TEXT ONE LINE AT A TIME TO THE FILE
WOUTLP TSTR ARB . WRITE '%' = :F(WOUTDN)
WRTCNT = WRTCNT + 1 :(WOUTLP)
WOUTDN TSTR (LEN(1) ARB) . WRITE '^'
WRTCNT = WRTCNT + 1
I = I - 1 :(WRTLP)

WRTDON RELEASE(DCHAN)
TYPE =
TYPE = 'PRODUCED ' (WRTCNT - 1) / 60 + 1 ' PAGES'
WRTFIN TYPARR =
WRTSET =
TYPE = :(LOOP)

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

BADWRT TYPE =
TYPARR =
WRTSET =
TYPE = '?ILLEGAL SET OR WRITE COMMAND'
TYPE = :(LOOP)
* COME HERE WHEN A NULL TYPE IS REQUESTED
TYPENULL PROMPT = 'TYPE WHICH SET ON THE TERMINAL?'
FTERM = GETANS()
FTERM NUMBER :F(TYPE)
FTERM = 'S' FTERM
:(TYPE)
* ADD SET NAME IF JUST A NUMBER

```

```

*COME HERE TO TYPE A SAVE 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(TYPRNG)
* 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(TYPOK)
  ANS POS(0) 'Y' :S(TYPOK)
  ANS NUMBER . TYPLST :S(TITOM)
  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 = :(TYPRNG)
TITOM  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
TYPLP ?CHKINT(INTERRUPT)
      ?INE(INTERRUPT,0) :S(TYPDON)
      ?ILT(I,TYPLST) :S(TYPDON)
      TCNT = TYPARR<I>
      TYPE =
      TYPE = ?INE(NUMFLG,0) SETSIZ -- 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 `%` = :S(TOUTLP)
      TSTR (LEN(1) ARB) . TYPE ``
      I = I - 1 :(TYPLP)

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,MAXSAV) 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)
GETLTB ANSANS (SPACE SPACE) = SPACE :S(GETLTB)
GETLRS ANSANS POS(0) 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
PRSNPOINT

* 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(0) ('S' ! '#' ) SDIGS . SSNUM
.
  RPOS(0) :S(GETSAV)
* SEE IF WE HAVE AN EXPANSION TERM
  KEYEXP POS(0) ('E' ! '@') EDIGS . EXPNUM RPOS(0) :S(GETEXP)
  KEYEXP KEYTERM :S(GETSET)

* SEE IF WE ARE DOWN TO A SINGLE KEY TERM
* LOOK FOR MORE BAD CASES BEFORE PARSING
PRSSIZ ?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(0) BAL RPOS(0) :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
* START LOOKING AT THE BEGINING AND
* MOVE ALONG UNTIL NOTHING LEFT
PRSOPR KEYEXP POS(0) BAL OPRPAT @P BAL RPOS(0) FAIL
  KEYEXP POS(0) BAL . FP OPRPAT . OP POS(P)
.
  BAL . LP RPOS(0) :S(DOIT)
* SEE IF WE HAVE A LEGAL EXPRESSION TO BREAK UP
  ?INE(EXPFLG,0) :S(PRSEXPRT)
  TYPE = '?ILLEGAL EXPRESSION - MISSING OPERATOR?'
  TYPE = :(FRETURN)

* SEE IF IN EXPERT MODE
* IF SO TRY TO MAKE AN IMPLIED 'AND'
PRSEXPRT      KEYEXP ((SPACE ! POS(0)) ('E' ! '@'))

```

```

.      EDIGS) . FP SPAN(SPACE)
.      ((`E` ! `@`) EDIGS (SPACE ! RPOS(0))) . LP =
.      FP `!` 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
.      :S(PRSOPR)
.      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(DOEXL)
* 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 = :(RETURN)
* SAME HERE BUT FOR FAILURE
PRSZAP SET1 =
  SET2 = :(FRETURN)

* COME HERE TO RETURN A SAVED SAVE SET
GETSAV ?ILE(SSNUM,SAVCNT) ?IGT(SSNUM,0) :S(GOTSAV)

```

```

TYPE = `?SAVE SET #` SSNUM ` DOES NOT EXIST`
TYPE = :(FRETURN)
GOTSAV
PARSESET = SAVSET<SSNUM> :(RETURN)

* COME HERE WHEN A EXPANDED TERM IS NEEDED
GETEXP ?ILE(EXPNUM,EXPCNT) ?IGT(EXPNUM,0) :F(BADEXP)
KEYEXP = EXPARR<EXPNUM> :(GETSET)
* LET THEM KNOW IF THAT IS A BAD EXPANSION TERM
BADEXP TYPE = `?NO SUCH EXPANDED TERM - "E` EXPNUM "`
TYPE = :(FRETURN)
* COME HERE TO GET THE RECORDS FOR SINGLE SEARCH TERM
GETSET
KEYEXP POS(0) OPRTERMS . OPRBAD RPOS(0) :F(GETCHKIT)
TYPE = `?CAN NOT SEARCH FOR BOOLEAN OPERATOR - "` OPRBAD "`
TYPE = :(FRETURN)
* DO NOT ALLOW OPERATORS TO BE USED AS SEARCH TERMS
GETCHKIT ?IEQ(EXPFLG,0) :S(KEYNORM)
* SEE IF LEFT HAND TRUNCATION IN USE
KEYEXP POS(0) WILDCHR :F(KEYNORM)
FSTTWO = `**` :(KEYEXPRT)
* USE SPECIAL TABLE ENTRY FOR LEFT HAND TRUNCATION
KEYNORM KEYEXP LEN(2) . FSTTWO :S(KEYEXPRT)
* IF KEY TOO SHORT SAY SO
TYPE = `?KEY TERM TOO SHORT - "` KEYEXP "`
TYPE = :(FRETURN)
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
WLDFLG = 0
KEYEXP WILDCHR :F(NOWLD)
WLDFLG = -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` :(KEYZAP)
* JUST DIE AND TRY TO RETURN
KEYNOINT ?IGT(IKEY,LSTKEY) :S(GOTSET)

```

```

* 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<I> = RECNUM :S(RECLP)
* HAVING PUT ALL THE RECORDS INTO THE SET
* WE SEE IF NEED TO GET MORE
GOTREC ?IEQ(WLDFLG,0) :S(RETNEW)
  WRKSET = ORSET(WRKSET,NEWSET) :F(KEYZAP)
  NEWARR =
  NEWSET =
  TRNCNT = TRNCNT + 1
  ?ILE(TRNCNT,TRNSTOP) :S(KEYLP)
* SEE IF TOO MANY WILDCARDED ITEMS FOUND
  TYPE = '%WILD CARD MATCH OF ' TRNSTOP ' KEY TERMS BY ' KEYEXP
  PROMPT = 'DO YOU WANT TO CONTINUE? '
  ANS = GETANS()
  ANS POS(0) '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
RETNEW PARSESET = NEWSET
  WRKSET =
  NEWARR =
  NEWSET = :(RETURN)
* IF NO WILD CARD 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(SETSIZ) RETURNS A SET WITH ARRAY SIZE OF SETSIZ
* IT FAILS IF NO ROOM IS AVAILABLE
MAKESET
* WE NEED CORE TO STORE ARRAY PLUS A LITTLE OVERHEAD
  GARBAGE(SETSIZ * 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(SETSIZ),SETSIZ) :(RETURN)

* ORSET(SETA,SETB) RETURNS A NEW SET THAT CONTAINS ALL ELEMEMTS
* IN EITHER SETA OR SETB
*
ORSET  TMPPNT = 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(TMPNT,MAXTMP)  TMPNT + 1 :F(OVRTMP)
      TMPARR<TMPNT> = R1
      PNT1 = PNT1 + 1
      ?IGT(PNT1,SIZ1) :S(ORSTF2)
      R1 = ARR1<PNT1> :(ORLP)

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

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

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

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

* COME HERE WHEN ALL FINISHED
ORDONE ?IEQ(TMPNT,0) :S(ORNONE)
      ORSET = MAKESET(TMPNT) :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,TMPNT) :S(ORRET)
      ORARR<I> = TMPARR<I>
      I = I + 1 :(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 TMPPNT = 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 TMPPNT = ?ILT(TMPPNT,MAXTMP) TMPPNT + 1 :F(OVRTMP)
      TMPARR<TMPPNT> = 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(TMPPNT,0) :S(ANDNONE)

```



```

        ANDSET = MAKESET(TMPNT) :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,TMPNT) :S(ANDRET)
        ANDARR<I> = TMPARR<I>
        I = I + 1 :(ANDPUT)

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

* COME HER 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 TMPNT = 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(EXLSTF1)
        R1 = ARR1<PNT1>
        R2 = ARR2<PNT2>
* STARTING AT THE SMALLEST OF EACH ARRAY
* WE MERGE THE TWO TOGETHER
EXLLP ?IEQ(R1,R2) :S(EXLEQ)
        ?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 TMPNT = ?ILT(TMPNT,MAXTMP) TMPNT + 1 :F(OVRTMP)
        TMPARR<TMPNT> = 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)
            TMPPNT = ?ILT(TMP PNT,MAXTMP)  TMP PNT + 1 :F(OVRTMP)
            TMPARR<TMP PNT> = ARR1<PNT1>
            PNT1 = PNT1 + 1 :(EXLSTF1)

* COME HERE WHEN ALL FINISHED
EXLDONE      ?IEQ(TMP PNT,0) :S(EXLNONE)
            EXLSET = MAKESET(TMP PNT) :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,TMP PNT) :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() :(FRETURN)

* 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 = '?CAN NOT 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
SUBTTTL 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()
;   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 ;FASBOL USES JRA-JSA
  MOVE 1,[XWD 2,SAVIT] ;SAVE THE AC'S
  BLT 1,SAVIT+13 ;SO WE CAN PLAY WITH THEM
  SETOM PREBLK ;CLEAR OUT LAST BLOCK USED COUNTER
GOTFIL: OPEN 10,OPBLK ;OPEN THE FILE IN IKAGE MODE
  JRST OPERR ;REPORT IF NOT THERE

```

```

MOVE 4,LKPNT           ;GET FILE SPECS TO USE
BLT 4,LKBLK+3         ;MOVE TO LOOKUP BLOCK
ENTER 10,LKBLK        ;OPEN THE FILE FOR OUTPUT
JRST ENTERR           ;REPORT IF CAN NOT
MOVE 1,[XWD SAVIT,2]  ;RESTORE AC'S
BLT 1,15              ;BEFORE RETURNING
JRA 16,(16)           ;AND GO BACK
                       ;TO CALLING PROGRAM
LKPNT: XWD FILBLK,LKBLK ;POINTER FOR LOOKUP/ENTER BLOCK
FILBLK: SIXBIT/ONLINE/ ;FILE FOR TEXT FILE IS
        SIXBIT/TXT/    ; "ONLINE.TXT"
        Z              ;
        XWD Z,Z        ; IT USES LOGICAL PATH NOT PPN.
OPERR:  OUTSTR [ASCIZ/ ;COME HERE IF DEVICE NOT SET UP
?OPEN ERROR?         ;BEFORE USE
/]                   ;JUST COMPLAIN
        EXIT           ;AND DIE
LKERR:  OUTSTR [ASCIZ/ ;COME HERE IF FILE CAN NOT
?LOOKUP ERROR?      ;BE OPENED
/]                   ;JUST COMPLAIN AND DIE
        EXIT           ;SHOULD NOT HAPPEN
ENTERR: OUTSTR [ASCIZ/ ;SAME THING IF THE
?ENTER ERROR?      ;FILE CAN NOT BE
/]                   ;CREATED
        EXIT           ;DIE IN BOTH CASES
        HALT
OPBLK:  17             ;USE MODE 17 = IMAGE
        SIXBIT/CAT/   ;ON LOGICAL DEVICE "CAT"
        Z              ;
LKBLK:  SIXBIT/ONLINE/ ;INITIAL FILE SPECS
        SIXBIT/TXT/   ;ARE RESET EACH TIME
        Z              ;TO AVOID PPN BEING SET
        XWD Z,Z        ;TO OPEN SEQUENCE
;
ENTRY PUTTXT
PUTTXT: Z              ;THIS ROUTINE DOES THE ACTUAL OUTPUT
MOVE 1,[XWD 2,SAVIT] ;SAVE THE AC'S
BLT 1,SAVIT+13       ;WHILE WE USE THEM
MOVE 1,@1(16)        ;GET RECORD NUMBER TO USE
SOJ 1,                ;CALCULATE ACTUAL BLOCK
IDIV 1,RECBLK        ;NUMBER TO USE
AOJ 1,                ;REC-1/BLOCKSIZE+1=BLOCK NUMBER
CAME 1,PREBLK        ;SEE IF SAME AS LAST BLOCK USED
JRST REPBLK         ;IF NOT WE TO OUTPUT OLD BLOCK
PUTSTR: MOVEM 1,PREBLK ;SAVE OLD BLOCK NUMBER
IMUL 2,RECSIZ        ;CALCULATE STARTING POSITION
ADDI 2,INBLK         ;OF RECORD IN BLOCK
MOVEI 3,@(16)        ;GET ADDR OF STRING TO OUTPUT
HRL 4,3              ;MAKE A BLT POINTER
HRR 4,2              ;TO MOVE FROM CALLING PROGRAM

```

```

      ADD 2,RECSIZ          ;TO LOCATON IN BUFFER BLOCK
      SOJ 2,                ;WITH SINGLE INSTRUCTION
      BLT 4,(2)             ;LIKE THIS.
      MOVE 1,[XWD SAVIT,2] ;RETORE 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
/]                          ;AND THEN
      EXIT                 ;DIE.
      ENTRY TXTEND

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 REPRORT 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                 ;LSAST BLOCK USED
BLKNUM: ^D10              ;NUMBER OF PHYSICAL/LOGICAL BLOCK
RECBLK: ^D320            ;NUMBER OF RECORDS PER BLOCK
RECSIZ: ^D4               ;RECORD IS FOUR WORDS
      PRGEND              ;THATS 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:

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;       TXTIN()
;       GETTXT(TXT,N)
; WHERE TXT IS A DECLARED STRING AND N IS THE RECORD NUMBER
; TXT MUST BE OF LENGTH 20 CHARACTERS (4 WORDS)
; IF THERE IS NO SUCH RECORD ON READ
; THE END-OF-FILE RETURN IS GENERATED
;
;       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 2,Z                         ; USES LOGICAL DEVICE
OPERR:  OUTSTR [ASCIZ/                 ;REPORT IF OPEN FAILS
?OPEN ERROR?                          ;FOR ANY REASON
/]                                       ;AND THEN WE
        EXIT                             ;DIE
LKERR:  OUTSTR [ASCIZ/                 ;REPORT IF FILE IS NOT
?LOOKUP ERROR?                          ;TO BE READ IN
/]                                       ;AT THIS TIME
        EXIT                             ;AND DIE
ENTERR: OUTSTR [ASCIZ/                 ;SAME FOR ENNTER
?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                               ;SETS PPN
        XWD 2,Z
;
;       ENTRY GETTXT

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GETTXT: Z ;JRA-JAS HERE TO READ STRING
        MOVE 1,[XWD 2,SAVIT] ;SAVE AC'S
        BLT 1,SAVIT+13 ;TO AVOID PROBLEMS IN MAINLINE
        MOVE 1,@(16) ;GET RECORD NUMBER
        SOJ 1, ;CALCULATE BLOCK NUMBER
        IDIV 1,RECBLK ;THAT WOULD FALL IN
        AOJ 1, ;WITH GIVEN RECORD SIZE
        CAME 1,PREBLK ;SEE IF SAME AS LAST TIME
        JRST GETBLK ;IF NOT WE NEED NEW BLOCK
GETSTR: IMUL 2,RECSIZ ;OTHERWISE FIND WHERE THE
        ADDI 2,INBLK ;RECORD FALLS IN BLOCK
        MOVEI 3,@(16) ;GET ADDR TO RETURN STRING TO
        HRL 4,2 ;BUILT BLT POINTER TO
        HRR 4,3 ;USE WHEN RETURNING STRING
        ADD 3,RECSIZ ;TO CALLING ROUTINE
        SOJ 3, ;WITH SINGLE INSTRUCTION
        BLT 4,(3) ;THE BLOCK TRANSFER
        MOVEI 4,@(16) ;GET STRING ADDR AGAIN
        SOJ 4, ;TAKE ONE FROM IT TO GET
        MOVE 2,RECSIZ ;SIZE COUNTER TO SET TO SIZE
        IMULI 2,5 ;FIND HOW MANY WORDS THAT IS
        MOVEM 2,(4) ;AND SEND THAT BACK
        MOVE 1,[XWD SAVIT,2] ;RESTORE AC'S
        BLT 1,15 ;TO WHAT THEY WERE
        JRA 16,(16) ;AND GO BACK
GETBLK: MOVEM 1,PREBLK ;WE NEED TO GET NEW
        USETI 10,(1) ;BLOCKBEFORE READING IT
        IN 10,INPNT ;SET BLOCK AND INPUT FROM FILE
        JRST GETSTR ;AND GO BACK TO GET STRING
        OUTSTR [ASCIZ/ ;IF INPUT FAILS
?INPUT ERROR? ;SAY SO AND THEN
/] ;JUST
        EXIT ;DIE
        HALT

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; DATA LOCATIONS
SAVIT: BLOCK 40 ;PLACE TO SAVE AC'S
INPNT: IOWD ^D128,INBLK ;I/O WORD TO INPUT ONE BLOCK
Z
INBLK: BLOCK ^D128 ;BLOCK BUFFER
PREBLK: -1 ;LAST BLOCK USED
BLKNUM: ^D1 ;ONE LOGICAL PER PHYSICAL BLOCK
RECBLK: ^D32 ;32 RECORDS PER BLOCK
RECSIZ: ^D4 ;FOUR WORDS PER RECORD
END ;THATS END OF THIS

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APPENDIX J

MAINTENANCE AGREEMENT

The following is an agreement between the University Libraries and the Academic Computer Center concerning the ownership, use, upkeep, update and maintenance of OLLI.

1. OLLI belongs to University Public Domain since it was developed using both Library and Center resources as a part of a Master's thesis through the Computer Science Department. Use of the software is legal for adaptations to other products; however, the original will not be changed without the Libraries' approval. The Library has approval rights for persons wishing to make adaptations.
2. The University Libraries will provide OCLC tapes for database updates and technical library assistance when needed.
3. The Center will update the database within fifteen (15) days of the receipt of the OCLC tapes around July 1 and December 31 so as to minimize system degradation and to maximize resource allocation.
4. The Center will provide usage information to the University Libraries on a monthly basis.
5. The Center will continue to store all OCLC tapes and will access them only for the purpose of updating the OLLI database.
6. OLLI will be removed if it becomes obsolete, produces erroneous results, becomes superseded in functionality by a superior program or has a low user rate.
7. Documentation will be maintained by the Center and they will provide the Library with OLLI programming assistance at cost.
8. Maintenance and disk storage costs will be the responsibility of the Library, however, this cost will be offset by any revenue generated through external university use of OLLI.
9. The Library will not be responsible for the actions of the individuals who developed this program as they pertain to sale.

10. It would be advisable to reexamine and reevaluate this agreement after one year on the basis of actual performance of the program.

It is our belief that these conditions represent a fair and responsible agreement in this venture, and that cooperative support is required to provide this valuable service to our researchers.

Signed by Jack R. Meagher, Director Academic Computer Center, and Carl Sachtleben, Director University Libraries. Dated 5 May 1982.

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