ABSTRACT

The Naval Missile Center Library uses the IBM 7094 and IBM 1401 to produce a cumulative monthly and annual catalog of the technical document collection. This catalog is printed out in two parts: source and subject. The mechanized system used at the Center is the Technical Library Program Series. A mechanized system for circulation control will be introduced in the near future. If demands on the Library intensify, the computer will be used for literature searches in the document collection. This could be initiated easily, as the subject descriptors for each document are already on the tapes. Efficiency of the Documents Branch is considerably enhanced by the system because the catalog is produced very quickly after the monthly input is completed.
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APPENDICES

A. ORGANIZATION OF LIBRARY

B. SAMPLE OF OUTPUT
I. SUMMARY
I. SUMMARY

The Naval Missile Center is a tenant organization of the Pacific Missile Range. Automatic data processing equipment is employed by the Center's Library to produce a cumulative monthly and annual catalog in book form of the technical document collection. This bulletin is printed out in two parts: source (issuing agency) and subject.

Organization of the Center's Library is illustrated in Appendix A. The Library contains about 30,000 books, 135,000 technical reports, and 23,000 maps and charts. The book collection is growing at the rate of 2,000 volumes per year, and the reports section, at the rate of 350 reports per week. No statistics are available for the map collection growth. The Library subscribes to 550 periodicals and adds about 15 new titles per year. Most of the material in the map collection covers the Pacific Ocean and California areas, with particular emphasis on the Santa Barbara region. All COSATI subject categories are represented in the book, periodical, and document collections, with the greatest emphasis on missile technology and related and supporting fields.

The Library also houses and circulates a collection of about 80,000 vellum drawings. These drawings are the property of the
Technical Support Directorate, but because of lack of storage space in the Directorate, they are presently being serviced by the Library.

The Library serves the population of the Naval Missile Center and the Pacific Missile Range. The total population is about 6,000, nearly equally divided between military and civilian personnel. Regular users, 45 percent of this total, are scientists, engineers, technicians, and administrative and managerial personnel. The Library also publishes a running bibliography on the Sparrow III project and distributes it both on- and off-base. Other government agencies and contractors are given service through interlibrary loans.
II. MECHANIZATION
1. CHRONOLOGY

In 1959, a need for mechanization of the document collection was recognized, and analysis of the problem began.

In 1960, a system of worksheets, keypunching, and EAM processing was designed and operated on the principle of reducing clerical work. The Library staff coded all information on worksheets and sent them to the Data Processing Division. Here the information was punched on EAM cards.

The cumulative catalog began being printed on the IBM 1461 in 1962. Later in the year, the Library began preparing the input on a Flexowriter, which was installed in the Library.

In 1963, the computer operation was analyzed, and a more efficient system was designed -- the Technical Library Program Series. Coding of the new system began in September of that year.

By March of 1964, the new system was operational. The total coding effort was estimated as requiring the time of two men for 6 months.
In 1955, the Library began entering older documents into the system.

2. DESCRIPTION OF PROCESSES

(1) Input Procedures

1. When a document is received in the Library, it is given an accession number. The cataloger then catalogs the document on a worksheet. The following information is supplied: source (issuing agency), title, date, security classification, report number, accession number, and subject descriptors. The number of subject descriptors may not exceed five, as this is the largest number the program will accept. The subject authority is the DDC (formerly ASTIA) thesaurus with additional subject descriptors being established by the Center as required.

2. The document is then processed and shelved for use.

3. The worksheets are given to the Flexowriter operator who punches the data on paper tape daily. The Flexowriter tapes are sent each week to the Data Processing Division for conversion to magnetic tape.
Output

Using the magnetic tape derived from the Library's Flexowriter tape, the Data Processing Division produces each month a cumulative catalog of new additions to the document collection. This is printed out in two parts. In one part, the information is listed alphabetically by issuing agency (see Appendix B-1 for sample); in the other, the alphabetization is by subject descriptor (see Appendix B-2). At the beginning of each year, a new volume is begun, and the final month's cumulated printout is a catalog of all documents received that year.

Each monthly cumulated printout is photographically reduced in size, then reproduced and bound. Several hundred copies are produced for distribution to personnel at the Missile Center and to other activities. The Library retains eight copies which are used for reference work in the Documents Branch.

Upon request, the computer may also produce an authority list of all descriptors used in any one year.
3. MAJOR PROBLEMS

During the first two years of the program, the Library staff coded the document cataloging data on worksheets and forwarded the sheets to the Data Processing Division, where the information was punched on EAM cards. During this period, a great many errors were detected, owing to incorrect punching. This problem was solved by installing a Flexowriter in the Library, and having the information punched on Flexowriter tape by a Library staff member. This solution, however, gave rise to another problem: that of acquiring staff who can operate the Flexowriter and also assist in programming.

The number of descriptors that can be assigned to a document is limited to five. This creates a problem for the indexers, especially when they are indexing such documents as conference proceedings and symposia papers.

4. ACTIVITIES PLANNED FOR MECHANIZATION

The Library has acquired an additional Flexowriter with a card reader/punch attachment. As soon as an additional operator can be trained, the Library expects to initiate the following mechanized system for circulation control of technical documents.
When punching the tape for the cataloging input of a document, the Flexowriter operator will also punch the bibliographical information on a card. When the document is processed for use, the card will go into a pocket on the cover. When a document is borrowed, the Flexowriter card will be filed under the borrower's name. Cards will be punched for documents already in the collection at the time they are first borrowed.

This system will be used as an inventory. The cards may be sorted and printed on the 1401 producing a list of documents charged to each borrower. It is estimated that this system will reduce the inventory process from 3 or 4 months to 3 weeks.

If the requirements placed on the Library are intensified, the computer will be used for literature searches in the document collection. This could be initiated easily, as the subject descriptors for each document are already on the tapes.
III. PROGRAM SYSTEM DATA
III. PROGRAM SYSTEM DATA

1. FILES

There are two files: Source and Subject. The files contain acquisitions for one year only. New files are begun each January.

(1) Source File

In the Source File there is one type-A record for each document. It contains source (or, in special cases, individual authors), title code, accession number, code letter "A", date of acquisition, number of copies, report number, and title. There are also in the Source File one or more type-B records for each document. These contain corporate author, title code, accession number, code letter "B", date of acquisition, and subject descriptors. The Source File is maintained in accession number sequence, with B records following A records.

In the Source File are also found index records. These are records of cross-references on either source or subject descriptor. These records are identified by a dummy accession number that begins with the letter "X". Other fields are blank.
(2) **Subject File**

There is only one type of record in the Subject File. It contains subject descriptor, source, accession number, date, number of copies, report number, and title. There is one record in this file corresponding to each type B record in the Source File. The file is maintained in sequence by subject descriptors, source, and accession number. Index records are included in this file also.

2. **ROUTINES**

The Technical Library Program Series consists of seven main programs, which run on the IBM 1401 with the exception of one sorting job performed on the IBM 7094. Figure 1 (two pages) presents a flow diagram of the system.

(1) **Special File Building**

This program was used (for one run only) to change the format of the Technical Library tape file. Information from the previous single file was used to create two separate files: Source and Subject. Both new files were dated, and the Source File was then sorted by the i401 into sequence by accession number, source, and subject.

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**BAARINC**
FIGURE 1
Flow Chart of Technical Library Program Series
Updated Subject Master

Subj. Printout of Current Month (2 Copies)

Deliver Both Reports to Tech. Library at the Same Time

Tech. Lib. to Pencil in Corrections from Year to Date Subj. Report

Flexowriter Operator to Punch These Corrections as Data is Punched for the Next Monthly Report

Tech. Lib. Sorted Source File

Print Master Source File

Year to Date Source Report

To Tech. Lib.

Monthly Subject Report Printed in Booklet Form Prior to Corrections

A

FIGURE 1 (Continued)
(2) **Conversion of Flexowriter Code to BCD**

Each month, this program is used to process Library file transactions; additions, changes, or deletions to the master report files. The transactions, on paper tapes, are transferred to a single magnetic tape. They are converted from Flexowriter code to internal computer code, in fixed length records, for input to the Change Edit program. Records containing invalid characters are dropped from the magnetic tape and printed for correction.

(3) **Change Edit**

This program edits each transaction and produces a tape for input to the file of updating programs. The file of edited changes is sorted into sequence by accession number, file code (Source or Subject), change code (add, change, or delete), and internal code.

Transactions that fail to conform to specification are dropped from the tape and printed, with the reason for rejection. Because changing a subject would cause the Subject File to be thrown out of sequence, a subject record can be only added to, or deleted from, the file. Each record being modified must
have been added previously to both Subject and Source Files by the use of an "Add" code. To enter an index record into the files, the first position of the accession number must be the letter "X". In order to blank out a field as a record is being modified, it is necessary that a left bracket ( ) be put into the first position of the field to be cleared.

(4) **Source Update and Subject Change**

This program updates the master Source File and creates the changes to update the master Subject File. Also the program assigns an effective date (month and year of the data) to records entered in each run, and a bulletin indicator to all new or changed records. The program rejects records that are not in complete accordance with programmed rules and prints out a list of all master records deleted from the Source and Subject Files. Immediately after this program, the generated Subject File Changes tape is sorted on the 7094 by subject, source, accession number, and change code sequence.

(5) **Subject Update and Print**

This program updates and prints the master Subject File. As dictated by the control card, the program prints selectively.
Control card options are as follows:

1. Print the Subject File for the entire year to date.
2. Print changes of the current month only.
3. Print all records that fall between specific dates.

(6) Selected Source Records Extract

This program selects particular records from the master Source file and writes them on an output tape. By means of a control card, the program determines which records are to be selected. The two possible control card options are as follows:

1. Write on tape only those records that were entered in the current month.
2. Write on tape all records that fall within a certain date period.

(7) Source Print

This program reads and prints the Source File. Index records (cross-reference items) of subjects are not listed. Before this program is run, the file must be sorted to sequence by source on the 7094.
IV. EQUIPMENT, COSTS, AND EVALUATION
IV. EQUIPMENT, COSTS, AND EVALUATION

1. EQUIPMENT

The following equipment is rented by the Test Data Division, Range Operation Department, Pacific Missile Range. It is used primarily for scientific computations and real-time range calculations. It is run on three shifts and is used for a variety of low priority programs.

**IBM 7094**

- 7094 with 32K memory
- 18 729 Mod V magnetic tapes
- 1301 disk
- 716 line printer
- 711 low-speed card reader

**IBM 1401**

- 1401 with 8K memory
- 1402 card reader/punch
- 1403 line printer (132 characters)
- 4 729 Mod V magnetic tapes (permanent)
- 2 729 Mod V magnetic tapes (switchable to 1460)
- Paper tape reader/punch, homemade, 7 level
- 729 Mod V tapes with paper tape reader/punch

The Library owns two Flexowriters, one of which has a card punch attachment.
2. **COSTS**

One man-year was used to convert the control of documents to Flexowriter tape. One full-time Flexowriter operator is now preparing input information, and a second operator is to be added. The operator (who is contractor-supplied) processes 3,300 documents per month. The cost is $5.85 per hour. At a comparable G.S. personnel level, the cost would be $3.85 per hour.

The computer cost, in time, for each of the seven programs is estimated as follows for one month:

1. Build Program 15 minutes
2. Conversion 8 minutes
3. Change edit 8 minutes
4. Source Update & Subject Change 15 minutes
5. Subject Update & Print 10 minutes plus 5 minutes for printing each month of the year to date.
6. Selected Source Records Extract 15 minutes
7. Source Print 10 minutes for each month selected.
3. FACILITY'S EVALUATION OF SYSTEM

Mechanization of the document catalog provides a ready-made cumulative bibliography by subject and insures a quick response to searches. Efficiency of the Documents Branch is considerably enhanced by the system because the catalog is produced very quickly after the monthly input is completed. Although the catalog is not updated and cumulated monthly, this could be done weekly if there were a demand for it.
APPENDIX A

ORGANIZATION OF LIBRARY
APPENDIX B

SAMPLE OF OUTPUT
(in two parts)
<table>
<thead>
<tr>
<th>Source Description</th>
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<td>AERIAL TARGETS-PROPERTIES RADAR - SIMULATION TARGETS-RADIATION</td>
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<td>RADOMES INERTIAL NAVIGATION SYSTEMS PERFORMANCE ANTENNAS-RANGE E-2A - TEST RESULTS EMPENNAGES-MATERIALS</td>
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Best Available Copy
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Digital Computers
Libraries
Catalogs

INSTRUCTIONS

CLASSIFICATION MATRIX

1. OVERVIEW: This report contains the name and address of the Department of the

2. SECURITY CLASSIFICATION: Enter the security classification of the report. If the

3. DISTRIBUTION LIMITATION: Enter the distribution limitation of the report. Include

4. THUMBNAIL ABSTRACT: Enter a brief summary of the report. The summary

5. AVAILABLE LIMITATION NOTICES: Enter any limitations to the distribution of the report other than those

imposed by security classification, using standard statements such as:

1. "Qualified requestors may obtain copies of this report from DDC.

2. "Prepared pursuant to the declassification of this report by DDC is not authorized."

3. "CIA, CEN, and DIA agencies may obtain copies of this report directly from DDC. Other qualified users shall request through"

4. "No military agencies may obtain copies of this report directly from DDC. Other qualified users shall request through"

5. "Distribution of this report is controlled. Qualified DDC users shall request through"

6. "This report has been classified to the DTD of Technical

7. PRELIMINARY NOTICES: Have for additional explanatory

8. SOURCES, MILITARY ACTIVITY: Enter the name of

9. ABSTRACT: Enter an abstract giving a brief and factual

10. KEY WORDS: Key words are technically meaningful terms

There is no limitation on the length of the abstract. How
ever, the suggested length is from 150 to 225 words.

Security Classification

Best Available Copy