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Technical Report

AD 640 110

MECHANIZATION STUDY OF THE LIBRARY U.S. NAVAL POSTGRADUATE SCHOOL, MONTEREY, CALIFORNIA

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ABSTRACT

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A mechanized system is used by the Naval Postgraduate School Library for bibliographic control of its technical documents collection. Descriptive and subject cataloging information is stored on magnetic tape, and literature searches are made. The program used, called SABIR2, is written in assembly language for the CDC 1604 computer, and outputs are printed off line by the IBM 1401 computer. Automatic data processing equipment is also used to produce title and subject lists of the Library's holdings of periodicals. The Library is satisfied with the mechanized system with regard to retrieval relevancy, recall, and usefulness of the end product.

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L SUMMARY

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A mechanized system is used by the Naval Postgraduate School Library for bibliographic control of its technical documents collection. Descriptive and subject cataloging information is stored on magnetic tape. Information on 25,000 documents, received since November 1960, has been stored in the system. (Approximately 15,000 documents added to the collection before that time are listed in a coordinate index.) The system is used to produce literature searches for students, faculty members, and military staff of the Postgraduate School.

Automatic data processing equipment is also used to produce title and subject lists of the Library's holdings of periodicals.

The Library contains 114,000 books, increasing at the rate of 10,000 per year, and 220,000 technical documents, increasing at the rate of 5,000 per year. It subscribes to 2,400 periodicals and adds about 90 titles per year. A collection of 140,000 microcards (chiefly abstracts) is increasing by about 200 cards per year. There are also small collections of vertical file pamphlets, maps, microfilm, and phonograph records. Most of these holdings are in the subjects of the School's curricula: engineering, physical sciences, industrial engineering, management, naval sciences, government, and the

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humanities. The Library supports the teaching program of the School, which confers bachelor's, master's, or doctor's degrees in engineering and related fields.

All faculty, students, military staff, and employees of the School may use the Library's services. This population numbers about 2,775, of whom two-thirds are considered active users. Eighty percent of the active users are engineers and scientists. Dependents of those associated with the School may also use the Library but may not receive reference or copying service or utilize the information retrieval system. Interlibrary loans from other libraries are made for all faculty members, students, and employees.

For organization chart of personnel at the Naval Postgraduate School Library, see Appendix A

The Computer Laboratory at Naval Postgraduate School has a staff of 20, including seven mathematician-programmers ranging in grade from 5 to 13. This staff has a mission to support the activities of the academic program.

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II. MECHANIZATION

1. CHRONOLOGY

In 1960, A. Martin Wildberger studied the problem of subject access to the Library's technical documents and wrote the program used in the Library, Semi-Automatic Bibliographic Information Retrieval System (SABIRS). SABIRS offered an output yielding only the accession numbers of those documents cited. This work is described in Wildberger's thesis, <u>Information Retrieval</u>, completed in 1961.

In August 1961, retrieval service was initiated. One hundred and fifty searches were made during the first six months. Statistics indicate that this grew in 1964/65 to 3, 500 searches per year.

Between April 1963 and April 1964, an improved program called SABIR2 was written by Carol Haworth. SABIR2 provides for a readable output, including accession numbers, corporate authors, report numbers, titles, personal authors, and abstracts.

2. TECHNICAL DOCUMENTS PROCESSES

(1) Establishment of Files

4. When a document is received, it is given an accession number preceded by a letter showing

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classification: U (Unclassified), C (Confidential), or S (Secret). The accession number is entered on a Library Technical Reports Worksheet (see Figure 1). The document then goes to a subject cataloger who assigns descriptors to be used as subject entries for the document. He writes descriptive cataloging text and uniterms on the worksheet. As many as 12 subject entries (uniterms) can be assigned to a document. A clerical assistant codes accession number, corporate authors, date, uniterms, and descriptors (by code numbers) on the worksheet.

The glossary of descriptors is maintained on IBM punch cards. As new descriptors are added, they are filed as a supplement. They are listed alphabetically, along with the corresponding uniterm code number. No numeric list is maintained. When enough new descriptors accumulate, they are integrated into the original alphabet. At present, there are approximately 8,000 terms in use.

2. Document and worksheet are sent to Library's Processing Department. Here, the document is prepared and sent to be shelved. Meanwhile, the Flexowriter

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FIGURE	 ACCESSION NO.		 			 	000	000	000	000	000	000	
	RY TECHWICAL REPORTS WORKSHEET Srpgs 234 (10-63)						000	000	000	000	000	000	FIGURE

operator, located in the Processing Department, punches the cataloging information on the Flexowriter. Descriptive cataloging is punched on one tape and coded information on another.

3. Worksheet is returned to documents room for posting to the coordinate index. This index can be used to retrieve documents received since September 1958. It can be utilized to the greatest advantage when a single concept is involved or when coordination entails a small number of less complex concepts. During periods of computer malfunction, the coordinate index also affords subject access to technical reports received since September 1958.

. С.Я- 4. Punched paper tapes are sent to the Computer Laboratory for input processing. Here the coded and readable data are read into the CDC 1604 core memory and are subsequently added to the Library's readable (English) and coded (document) files on magnetic tape. The paper tapes are then stored.

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(2) Literature Searches

1. Input Procedures

When a user wishes to have a literature search made in the document collection, he fills out, with the assistance of a Library staff member, a Machine Information Retrieval Application (see Appendix B-1). He includes, in the Application, terms from the glossary of descriptors and uniterms which describe the subject fields. As many as six subject search requests may be recorded on one Application. The requester may, if he wishes, limit the sources from which he will accept references and the dates of issue which will be acceptable to him.

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The information is then transcribed into coded data on the lower portion of the Application and sent to the Processing Department, where an operator then punches the coded data onto perforated paper tape. The tape is subsequently sent to the Computer Laboratory where it is read into the CDC 1604. Here the document records are searched and the related English records are selected for the output listing. Only those items are retrieved which have all the desired descriptors.

2. Output

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The output (bibliography) is listed on magnetic tape, and two copies are printed out on the IBM 1401 processor. One copy of the printout is given to the requester and the other is filed for future reference use by the Library. (For sample printouts of search request and bibliography, see Appendix B-2 and B-3.) The original application forms are filed for use in compiling SDI profiles.

Figure 2 shows a flow diagram of the information storage and retrieval system (SABIR2) as it is used on technical documents.

3. PERIODICALS PROCESSES

(1) Input Procedures

A periodical is assigned a subject code on the basis of examination of the first issue received in the Library. The codes assigned are completely independent of codes used in

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FIGURE 2

SABIR2 and are based--in a broad and general way--on the Dewey Decimal Classification. A file of punched card records on the Library's periodicals is maintained in the following card format:

Column	Description
1	Library code
2-3	Subject code
4-10	Numeric code assigned to the alphabetic title for searching
11	Continuation card number
12-79	Title, volumes, dates, etc.
80	Code: + reference document - only copy

(2) Outputs

The periodicals punched card file is sorted on EAM equipment and printed out by the 1401. A list of holdings in alphabetical order by title is printed out annually (see Appendix C-1). A list arranged by subject may be produced more frequently. In the subject list, the titles are arranged alphabetically after each subject (see Appendix C-2). Both the title and subject lists are reproduced and bound in 8-1/2 x 11 document format.

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4. MAJOR PROBLEMS

As in any experimental retrieval service (and this was one of the first, if not the first, in practical operation), problems were met. These involved minor input-output operations, choice of program language, and availability of adequate software. However, these problems either have been eliminated or have eliminated themselves.

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The limit of 50 searches at one time may, in the future, become a problem. However, multiple runs would solve this problem if it ever arises.

5. <u>ACTIVITIES BEING PLANNED OR DEVELOPED</u> FOR MECHANIZATION

The Library proposes to study the application of data-processing to its acquisitions program (including serials) and also to its Circulation Department.

Plans are being made to provide broad subject group listing of descriptors and more adequate descriptor scope notes.

There is also a possibility of installing a time-sharing computer system and numerous remote stations from which users could query the data system.

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III. PROGRAM SYSTEM DATA

The programs are written in assembly language for the CDC 1604 computer. All outputs except for operator messages are printed off line by the 1401.

1. <u>FILES</u>

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(1) DOC (Document) File

Following a 32-character tape label, the file is made up of 120-character records, each containing an eight-digit accession number, eight-digit source code number, eight-character date, and 12 eight-digit uniterm numbers. The records are in sequence by accession number.

(2) ENG (English) File

English language text is stored in this file. The first record is a 32-character tape label. All other records are variable in length, with a maximum of 83 CDC 1604 words and are in binary mode. In each variable-length record, the first word is the word count for the record, the second word is blank, and the third word contains accession number. Thereafter, there are groups of a single word of blanks followed by 15 words of text.

2. ROUTINES

(1) <u>Master Control</u>

This routine communicates with the machine operator to get the date and then loads either the Search or Update routine from the system tape and executes it. After execution, control is returned to Master Control to initiate additional runs.

(2) Search

This routine reads paper tape (Flexowriter or synchrotape) input on which are punched the requests (an identifier followed by uniterms or keywords). After reading all the requests (up to 50), the search routine searches the DOC File for items that have all the desired uniterms. The ENG File that contains the abstracts is read in parallel to the DOC File. When a document in the DOC File satisfies a request, both bibliography and abstract are output to tape for printing on the 1401.

(3) Update

This routine is used to update the DOC or ENG files or to delete from both files. The Update routine accepts two forms of input on paper tape: bibliographic update data or abstracts. In either case, the data are sorted to sequence by accession number, and the proper file(s) is updated. A list of changes or additions is produced. -13^{-1}

IV. EQUIPMENT, COSTS, AND EVALUATION

1. EQUIPMENT

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CDC-1604 (serial 1) with 32K memory; used for scientific programs required for advanced degree students; also used in programming classes; two shifts per day closed shop operation, one shift open shop; owned 1607 tape controllers containing four tape decks each 1607 tape controller (owned by CDC, used occasionally off-line) 405 card reader, switchable to 160 1612 printer, switchable to 160 161 typewriter I/O adapter 1609

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- (IBM) card reader/punch, used for Monitor Program output only
- <u>CDC 160</u> with 4K memory; used primarily for training
 - 161 typewriter

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- 163magnetic tape
- 165 incremental plotter (Cal Comp)

analog equipment

- CDC 160 with 4K memory, located four floors above in Electronic Laboratory, satellite to 1604, serves as interface between experimental
- IBM 1401 with 16K memory; used to support Computer Laboratory activities; used also to drive

		experimental Computer Assisted Instruction system
	1406	with 12K auxiliary memory
	1402	card reader/printer
	1403	printer, 132 positions
2	72911	magnetic tapes
2	1311	disk paks
	1026	transmission control unit for 1050, contains 200-character buffer
	1052	printēr with kēyboard (Selectrič)

These last three line items together, called Computer Assisted Instruction, are undergoing evaluation.

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Peripheral Devices

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its:

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DD65 Data Display, double CRT (prototype to CDC 6600 operator console), complete ALGOL set keyboard with overlays.

A/D/A equipment

Fleet Numeric Weather Facility, which is located near

the Naval Postgraduate School, has several CDC computers (3200 series).

2. COSTS AND TIME

The original SABIRS program was written by Wildberger (1961) as part of his thesis project and took about five months. SABIR2 was written between April 1963 and April 1964 by Carol Haworth (GS 9-11) working about halftime. This includes debugging and documentation.

Search runs in about 15 minutes; update runs 20. Service takes about one to two days because of facility load and low job priority; however, urgent requests can be run on an interrupt basis.

Before the computer system, Flexowriter tapes were (and still are) used to prepare catalog cards. These same tapes are now used as input to the DOC File; thus, no additional expense is incurred in this phase.

The cost in clerical time for coding is about \$5,000 a year. Three professional staff members devote about 50 percent of their time to indexing the input information and analyzing requests for output bibliographies. This latter operation would be the same for a nonautomated system.

3. FACILITY'S EVALUATION OF SYSTEM

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The Library staff expressed satisfaction with the mechanized system with regard to retrieval relevancy, retrieval recall, and usefulness of the end product. The system supplements in an all-important way the traditional reference service required in any significant documentation activity. It should be noted, however, that in the

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aggregate the pre-input processes impose upon the Library heavier • burdens than existed before 1961. The value of SABIR2 cannot, therees fore, be computed in terms of time and labor saved. Rather, it is to be owfound in the dynamic and vitally improved service available to the Library's patrons. 11 d as is put itort-

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ALAA BULLETIN (ONE YEAR PLUS CURRENT YEAR) ...

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- ALA BULLETIN V.43 (1949) + (LOCATED IN LIBRARIANS OFFICE)
- APCA ARSTRACTS V.4, NO.6 (1958) + •• (CONTINUATION OF THE AIR POLLUTION BIBLIOGRAPHY)
- ARS JOURNAL V.29-V.32 (1959-1962) (PRIOR TO V.29,NO.1 TITLE WAS JET PROPULSION. IN JAN 1963 MERGED WITH THE JOURNAL OF AERD/SPACE SCIENCES AND CONTINUES UNDER TITLE AIAA JOURNAL)

ASLE TRANSACTIONS V.1, NO.1 (APR 1958) +

ASH REVIEW OF METAL LITERATURE V.1 (1944) + ••

ASTM BULLETIN NO.30-NO.250 (1928-1960) (WITH JAN 1961 TITLE BECAME MATERIA.S RESEARCH AND STANDARDS)

ABSTRACTS OF CURRENT LITERATURE (ON) AEROSPACE MEDICINE AND BIOLOGY V.34, NO.6 (JUNE 1903) + ++

ABSTRACTS OF DECLASSIFIED DOCUMENTS V.1.2 (1947-1948) •• (SUPERSEDED BY NUCLEAR SCIENCE ABSTRACTS)

ACADEMIE DES SCIENCES, PARIS. COMPTES RENDUS V.211 (1940) +

ACADEMIE ROYALE...DE BELGIQUE. CLASSE DES SCIENCES. BULLETIN V.6-24 (1920-1938) INCOMPLETE

ACADEMY OF MANAGEMENT. JOURNAL V.1, NO.1 (1958) +

- ACADEMY OF POLITICAL SCIENCE, NEW YORK. PROCEEDINGS V.24-25 (1950/52-1952/54) INCOMPLETE . V.27 (1963) +
- ACADEMY OF SCIENCES OF THE USSR. BULLETIN. GEOPHYSICS SERIES NO.1 (1957) +
- ACADEMY OF SCIENCES OF THE USSR. BULLETIN. PHYSICAL SERIES V.18, NO.3 (1954) +
- ACADEMY OF SCIENCES OF THE U.S.S.R. DOKLADY (OCEANOLOGY SECTIONS) (ENGLISH TRANSLATIONS OF SELECTED NJS. BY SCRIPTA TECHNICA, INC.) V.136 (1961) +

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	(SUPERSEDED BY ANALYTICAL CHEMISTRY WITH V.19, 1947)
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Mechanization Study of the School, Monterey, Californ	Library, U.S. Naval nia	Postgraduate
Final Report of	on-site survey	
G. A. Kershaw, D. C E. Merendini, S. M.	rowder, J. E. Davis Thomas	a, E. G. Loges,
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A mechanized system is used by the Naval Postgraduate School Library for bibliographic control of its technical documents collection. Descriptive and subject cataloging information is stored on magnetic tape, and literature searches are made. The program used, called SABIR2, is written in assembly language for the CDC 1604 computer. Automatic data processing equipment is also used to produce title and subject lists of the Library's holdings of periodicals. The Library is satisfied with the mechanized system with regard to retrieval relevancy, recall, and usefulness of the end product.

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