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Technical Report

AD 640 110

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

Submitted to

Defense Supply Agency
Defense Documentation Center
Cameron Station, Virginia

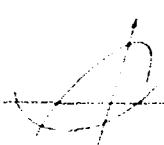
by

Booz, Allen Applied Research Inc.
4733 Bethesda Avenue
Bethesda, Maryland 20014

Under Contract No. DSA-7-15489

BAARINC Report No. 914-1-15

September 1966



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ABSTRACT

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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I. SUMMARY

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

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.

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, Information Retrieval, 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

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

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

0010	LIBRARY TECHNICAL REPORTS WORKSHEET 12ND USMPGS 234 (10-63)	ACCESSION NO.	ACCESSION NO.
0000			
CATALOG			
UNITERM			
CODE			
POST			
PROCESSING			
CATALOG CARDS			
BOOK CARDS			
BOOK COPIES			
TAPE			
KARDEX			
INDEX			
000		000	
000		000	
000		000	
000		000	
000		000	
000		000	

FIGURE 1

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.

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.

(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.

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

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.

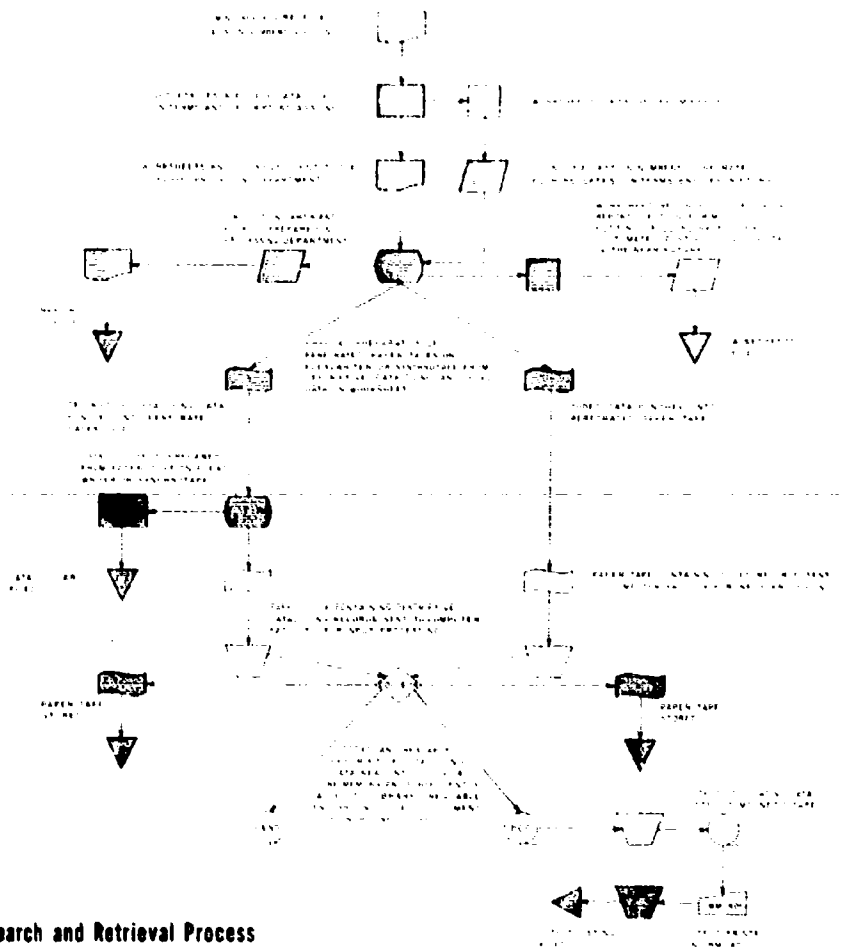
Figure 2 shows a flow diagram of the information storage and retrieval system (SABIR2) as it is used on technical documents.

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

U.S. Naval Postgraduate School Library, Monterey, California
SABIR 2 - Machine Information Storage And Retrieval System
Utilized By The Technical Reports Section



Search and Retrieval Process

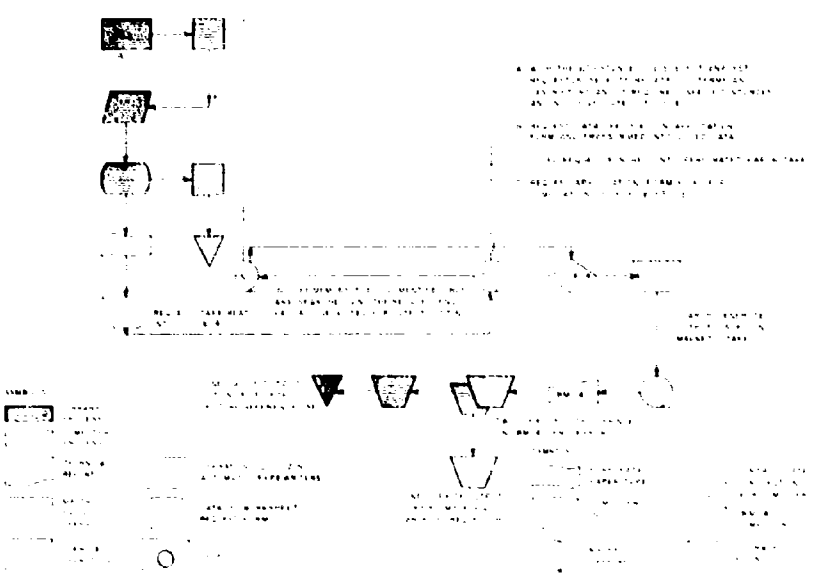


FIGURE 2

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.

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.

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. ACTIVITIES BEING PLANNED OR DEVELOPED 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.

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. FILES

(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) Master Control

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.

IV. EQUIPMENT, COSTS, AND EVALUATION

1. EQUIPMENT

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
2	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
	1609	I/O adapter
	521	(IBM) card reader/punch, used for Monitor Program output only
CDC 160		with 4K memory; used primarily for training
	161	typewriter
	163	magnetic tape
	165	incremental plotter (Cal Comp)
CDC 160		with 4K memory, located four floors above in Electronic Laboratory, satellite to 1604, serves as interface between experimental analog equipment
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	729II	magnetic tapes
2	1311	disk paks
	1026	transmission control unit for 1050, contains 200-character buffer
	1052	printer with keyboard (Selectric)

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

Peripheral Devices

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.

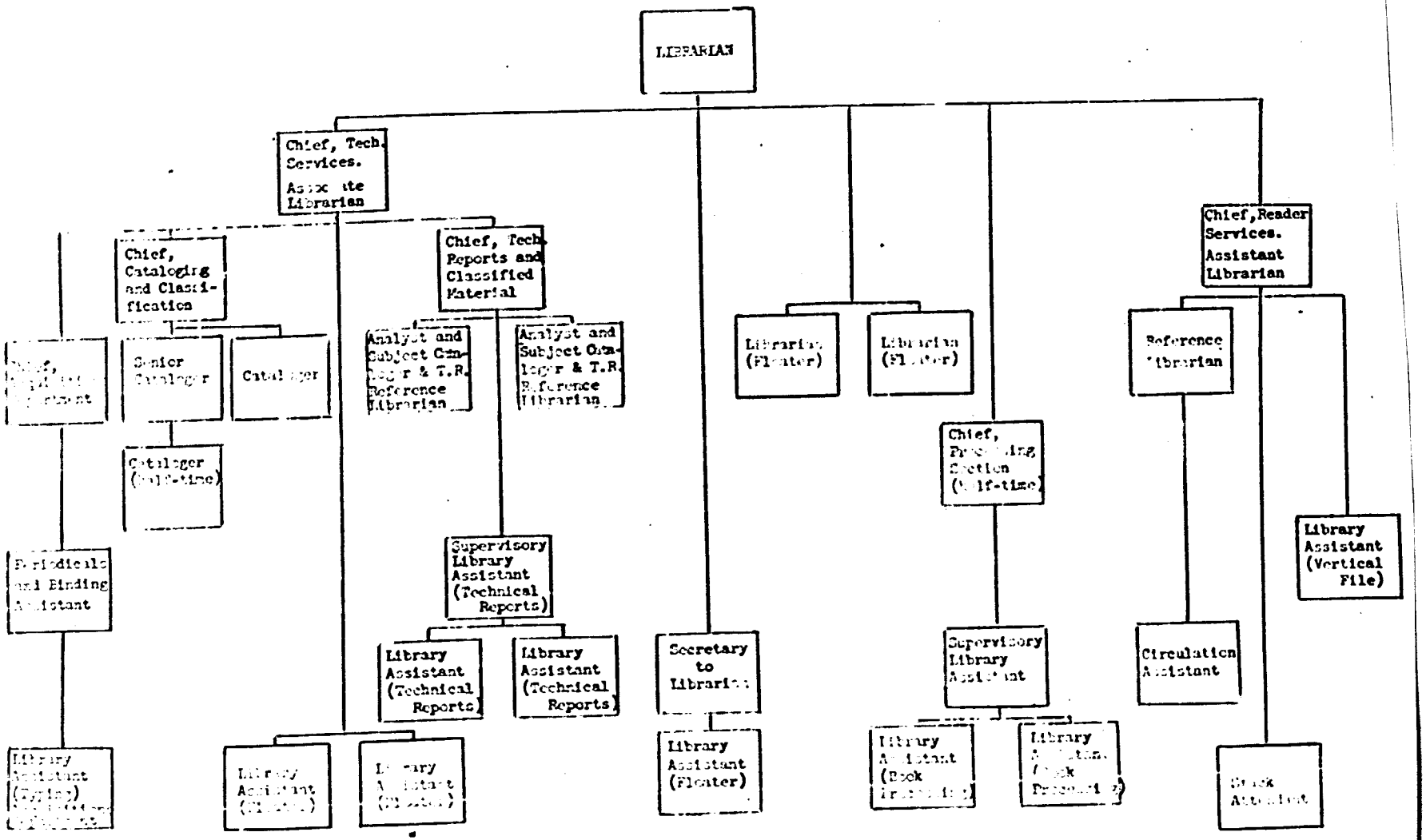
The cost in clerical time for coding is about $5,000 a year. Three professional staff members devote about 50 percent of their time to indexing the input information and analyzing requests for output bibliographies. This latter operation would be the same for a nonautomated system.

3. FACILITY'S EVALUATION OF SYSTEM

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

aggregate the pre-input processes impose upon the Library heavier burdens than existed before 1961. The value of SABIR2 cannot, therefore, be computed in terms of time and labor saved. Rather, it is to be found in the dynamic and vitally improved service available to the Library's patrons.

NAVAL POSTGRADUATE SCHOOL



MACHINE INFORMATION RETRIEVAL APPLICATION
TECHNICAL REPORTS and CLASSIFIED MATERIALS SECTION
12ND PGS 73 (1-65)

United States Naval Postgraduate School
MONTEREY, CALIFORNIA

The Library's Retrieval System is available for literature search of documents received by this department since NOVEMBER 1960

NAME | SCHOOL OR DEPT | DATE

☐ FACULTY ☐ STAFF ☐ STUDENT ☐ OTHER | ROUTING OR BOX NO

☐ I wish to have the printed output sent to me ☐ Retain output pending my collection

AREA of SEARCHES REQUIRED Please specify the subject field(s) in which you are interested by using the terms established in the Glossary of Descriptors and Uniterms For more detailed instructions in the completion of this section, please request the assistance of the staff Up to six searches may be requested on this form

1

2

3

4

5

6

SOURCE or SOURCES (If you wish to have these searches restricted to a particular source or sources (Example: NOTS, China Lake, General Electric etc.) please specify below)

a c

b d

DATE or INCLUSIVE DATES of ISSUE (If you wish to have these searches restricted to documents issued on a particular date (month and year) prior to a particular date, after a particular date, or between two inclusive dates, please specify.)

a c

b d

To be completed by Library Staff

TO Processing Department

NAME OF REQUESTER

1 Please prepare synchrotape exactly as prescribed above.
2 Allow a minimum of 10 to 12 inches of tape feed prior to punching.
3 After all data have been punched on a tape, punch at least three seventh level holes (non-print keys on the Synchrotape or stop-code on the Flexowriter).

LITERATURE SEARCH REQUEST

REQUESTS FOR 08/02/65

CROWD/1/00001257/CRYOGENICS/////

CROWD/2/00001654000004756/INFORMATION/RETRIEVAL//

CROWD/3/00004737/SOUTH/VIETNAM//

CROWD/4/00013044/PARAPSYCHOLOGY/

CROWD/5/00077740000167400002662000001421/SOLID/PROPELLANT/GRAIN/DESIGN//

[illegible] RESEARCH BIBLIOGRAPHY

[illegible]

AEC TECHNICAL INFORMATION BULLETIN (ONE YEAR PLUS CURRENT YEAR)

AIAA BULLETIN (ONE YEAR PLUS CURRENT YEAR) ♦♦

AIAA JOURNAL V.1 (1963) ♦
(THIS JOURNAL COMBINES THE ARS JOURNAL AND THE JOURNAL OF THE AERO/SPACE SCIENCES. PRIOR TO JAN 1963 BOTH JOURNALS WERE PUBLISHED SEPARATELY)

ALA BULLETIN V.43 (1949) ♦
(LOCATED IN LIBRARIANS OFFICE)

APCA ABSTRACTS 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 AERO/SPACE SCIENCES AND CONTINUES UNDER TITLE AIAA JOURNAL)

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

ASM REVIEW OF METAL LITERATURE V.1 (1944) ♦ ♦♦

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

ABSTRACTS OF CURRENT LITERATURE (ON) AEROSPACE MEDICINE AND BIOLOGY V.34, NO.6 (JUNE 1963) ♦ ♦♦

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 NOS. BY SCRIPTA TECHNICA, INC.) V.136 (1961) ♦

ACADEMY OF SCIENCES OF THE U.S.S.R. TRANSACTIONS (TRUDY) OF THE MARINE HYDROPHYSICAL INSTITUTE. (ENGLISH TRANSLATION

AR)

CHEMISTRY (CONT)

RNALS

COMBUSTION AND FLAME V.1 (1957) +

CORROSION V.17, NO.1 (JAN 1961) +

CORROSION PREVENTION AND CONTROL. LONDON V.4 (1957) +

CURRENT CHEMICAL PAPERS NO.1 (JAN 1960) + **

CURRENT CHEMICAL TRANSLATIONS (1965) + **

DEUTSCHE CHEMISCHE GESELLSCHAFT, BERLIN. BERICHTE V.74-V.75 (1941-1942) V.77-V.79 (1944-1946) INCOMPLETE
(AFTER V.80 TITLE CHANGED TO CHEMISCHE BERICHTE)

63
INUES

ELECTROCHEMICAL SOCIETY. JOURNAL V.7 (1950) +
(IN 1950 ABSCREED ELECTROCHEMICAL SOCIETY. TRANSACTIONS)

ELECTROCHEMICAL SOCIETY. TRANSACTIONS V.78-96 (1940-1949)
(IN 1950 ABSCREED BY ELECTROCHEMICAL SOCIETY. JOURNAL)

DARDS)

ELECTROCHEMICAL TECHNOLOGY V.1 (1963) +

EXPLOSIVES ENGINEER V.18-26 (1940-1948) V.32-V.39, (1954-1961)
(CEASED PUBLICATION)

EXPLOSIVSTOFFE V.13 (1965) +

HELVETICA CHIMICA ACTA V.44 (1963) +

HYDROCARBON PROCESSING AND PETROLEUM REFINER V.47, NO.7 (JULY 1964)+
(PRIOR TO V.43, NO.7, JULY 1964 TITLE WAS PETROLEUM REFINER)

INDUSTRIAL AND ENGINEERING CHEMISTRY. V.15 (1923) +
(PRIOR TO V.15, 1923 TITLE WAS JOURNAL OF INDUSTRIAL AND ENGINEERING CHEMISTRY)

INDUSTRIAL AND ENGINEERING CHEMISTRY. ANALYTICAL EDITION V.1-18 (1929-1946)
(SUPERSEDED BY ANALYTICAL CHEMISTRY WITH V.19, 1947)

INDUSTRIAL AND ENGINEERING CHEMISTRY. FUNDAMENTALS. V.1, NO.1 (FEB 1962) +

.18,

INDUSTRIAL AND ENGINEERING CHEMISTRY. PROCESS DESIGN AND AND DEVELOPMENT V. 1, NO. 1 (JAN 1962) +

TIONS)
ICA,

INDUSTRIAL AND ENGINEERING CHEMISTRY. PRODUCT RESEARCH AND DEVELOPMENT V.1, NO. 1 (MAR 1962) +

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R&D

BOOZ ALLEN APPLIED RESEARCH, INC. 4733 Bethesda Avenue Bethesda, Maryland 20014	Unclassified

Mechanization Study of the Library, U.S. Naval Postgraduate School, Monterey, California

Final Report of on-site survey

G. A. Kershaw, D. Crowder, J. E. Davis, E. G. Loges, E. Merendini, S. M. Thomas

September, 1966	36	2
DSA-7-15489	914-1-15	
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Digital Computers
Electronic Accounting Machines
Information Retrieval
Libraries

Security Classification