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Technical Report

AD 640 111

MECHANIZATION STUDY
OF THE
TECHNICAL LIBRARY
U.S. NAVAL MISSILE CENTER
POINT MUGU, CALIFORNIA

BOOZ · ALLEN APPLIED RESEARCH INC

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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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A P P E N D I C E S

- A. ORGANIZATION OF LIBRARY
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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 25,000 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

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I. 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 1401 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.

(2) 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 1401 into sequence by accession number, source, and subject.

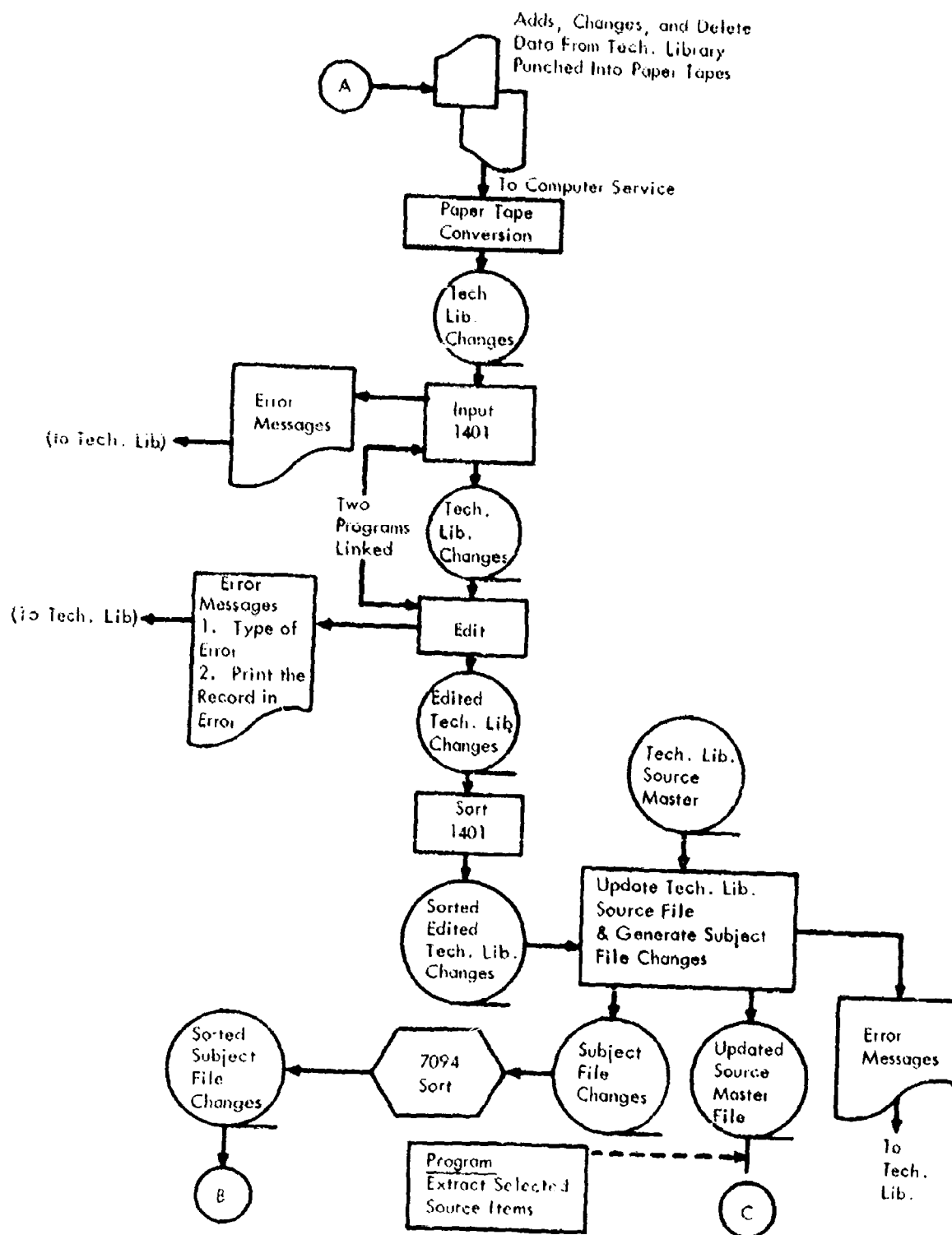


FIGURE 1
Flow Chart of Technical Library Program Series

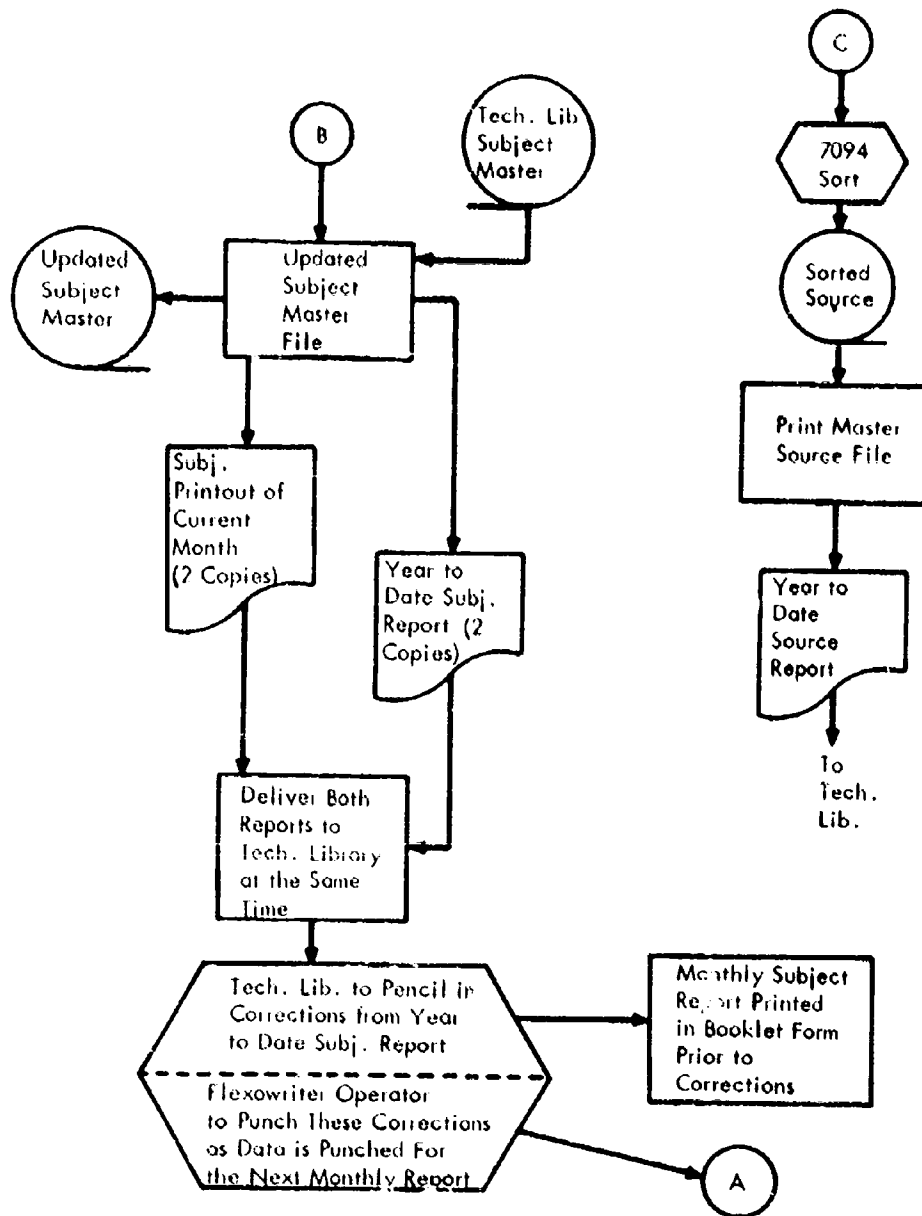


FIGURE 1 (Continued)

(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

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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

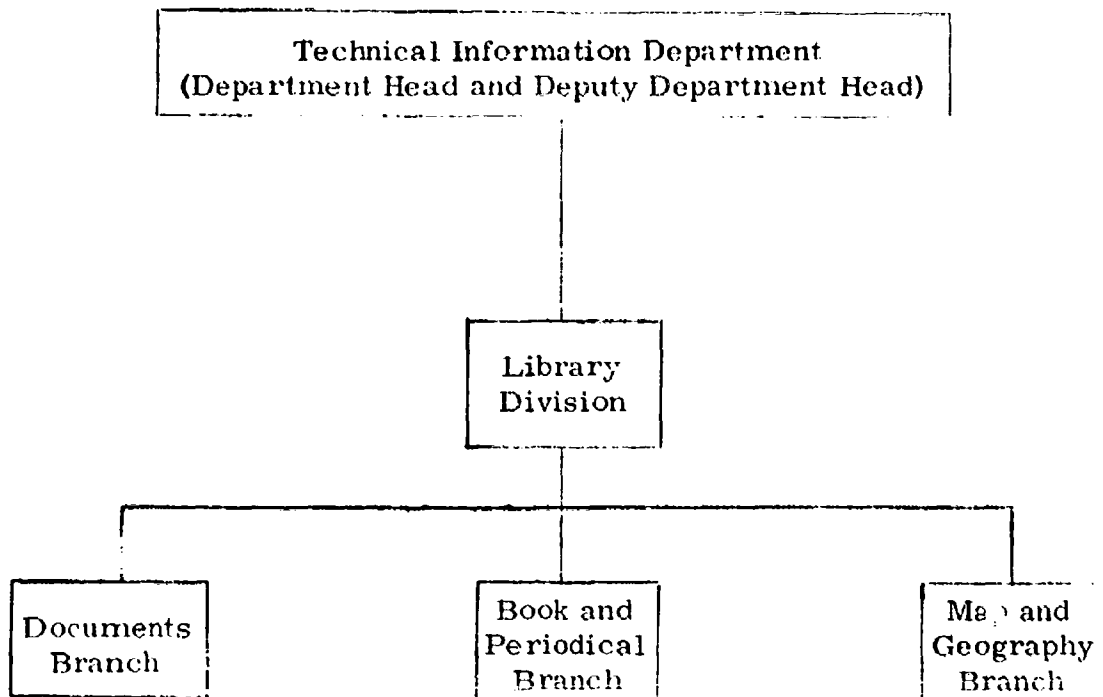
Mechanization of the document catalog provides a ready-made cumulative bibliography by subject and insures a quick response to searches. Efficiency of the Documents Branch is considerably enhanced by the system because the catalog is produced very quickly after the monthly input is completed. Although 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

U. S. NAVAL MISSILE CENTER

ORGANIZATION OF LIBRARY



APPENDIX B

SAMPLE OF OUTPUT (in two parts)

TECHNICAL LIBRARY SOURCE FILE 08 JUN 1965

SOURCE DESCRIPTION	TITLE	SUBJECTS	REPORT NO	DATE	NO	ACCESSION
GREAT BRITAIN ROYAL AIRCRAFT ESTABLISHMENT	TARGET POLICY WITH SPECIAL REFERENCE TO THE SIMULATION OF RADAR ECHOES-AUG 1961.S	AERIAL TARGETS-PROPERTIES RADAR - SIMULATION TARGETS-RADIATION	TECHNICAL NOTE 1.D.6 4	65 05	01	132987
GRUPMAN AIRCRAFT ENGINEERING CORP	E-2A1W2F-11 HAWKEYE DEMONSTRATION DATA REPORT-RE-EVALUATION OF AVIONIC ROTODOME RESPONSE OF NON-METALLIC EMPENNAGE...15 JAN 1965.C	RADOMES INERTIAL NAVIGATION SYSTEMS-PERFORMANCE ANTENNAS-RANGE E-2A - TEST RESULTS EMPENNAGES-MATERIALS	R FP-123-5	65 05	01	132653
	F-4B PILOT RESPONSES TO E-2A VECTORING COMMANDS.FEB 1964.C	AIRCRAFT INTERCEPT CONTROL SYSTEMS E-2A F-4B PILOTS-PERFORMANCE SPARROW III	R 7.R 123-SAS-1	65 05	01	132991
HARRY DIAMOND LABS	COUPLING COEFFICIENTS AND THREE DIMENSIONAL, PIEZOELECTRIC CERAMIC CYLINDER.15 FEB 1965.U	CERAMIC MATERIALS-POLARIZATION ON PIEZOELECTRIC MATERIALS RESONANCE	TR-1274	65 05	01	132764
HAWAII UNIV HAWAII INSTITUTE OF GEOPHYSICS	TIROS OBSERVATIONS OF TYPHOON FORMATION-JAN 1965.U	CLOUDS METEOROLOGICAL SATELLITES TIROS TYPHOONS METEOROLOGICAL DATA	SR 1.HIG-65-3.AFCRL-65-24	65 05	01	132943
HAZELTINE CORP	SUPERRESOLUTION STUDIES.FINAL REPORT.NOV 1964.S	RADAR SIGNALS-PROCESSING WAVEFORMS-EVALUATION DOPPLER RADAR SYSTEMS PULSE COMPRESSION	RADC-TUP-64-254	65 05	01	132902
MERCURIES POWDER CO	DEVELOPMENT OF HIGH ENERGY SOLID PROPELLANTS.FINAL REPORT 1.29 APR 1965.C	PROPELLANT GRAINS-CASTING ROCKET MOTORS(SOLID PROPELLANT) - STATIC FIRING TESTS SOLID PROPELLANTS	AFRPL-TR-64-173	65 05	01	132644
	STUDY OF THE ELECTRONIC CONFIGURATION AND BEHAVIOR OF THE -NF2 GROUP.ANNUAL REPORT.MAR 1964-FEB 1965.U	MASS SPECTROMETRY NITROGEN-FLUORINE COMPOUNDS-ELECTROCHEMICAL REACTIONS	NO.2.HRC-65-1	65 05	01	132752
MERCURIES POWDER CO ALLEGANY BALLISTICS LAB	ALLEGANY BALLISTICS LABORATORY TESTING DEPARTMENT FACILITIES-MAR 1965.U	MERCURIES POWDER CO ALLEGANY BALLISTICS LAB - TEST FACILITIES	ABL/X-136	65 05	01	132150

B-1

TECHNICAL LIBRARY SUBJECT FILE 12 JUL 1965

SUBJECT	TITLE	SOURCE DESCRIPTION	REPORT NO.	DATE	ACC.
AERIAL WARFARE - ANALYSIS	ANALYTICAL APPROACH TO F-4 MANEUVERING IN AIR-TO-AIR COMBAT. 26 MAR 1965.C	MCDONNELL AIRCRAFT CORP	R 8163	65 06 01	133449
AERIAL WARFARE - MATHEMATICAL ANALYSIS	SIMPLE PENETRATION MODEL AND ITS FORTRAN PROGRAM. JUN 1965.O.U	AIR FORCE OPERATIONS ANALYST OFFICE	QA WP 95	65 06 01	133305
ARPA 21A - PERFORMANCE	SHIP SUITABILITY TESTS OF THE SIDEWINDER ICIAM-9C AND A IM-90 MISSILE WEAPON SYSTEM. 18 MAY 1965.C	DENNY A A NAVAL MISSILE CENTER	NMC-TM-65-34	65 06 02	133449A
	SHIP SUITABILITY TESTS OF THE SIDEWINDER ICIAM-9C AND A IM-90 MISSILE WEAPON SYSTEM. 18 MAY 1965.C	NAVAL MISSILE CENTER	NMC-TM-65-34	65 06 02	133449
	SHIP SUITABILITY TESTS OF THE SIDEWINDER ICIAM-9C AND A IM-90 MISSILE WEAPON SYSTEM. 18 MAY 1965.C	SATHRA C R NAVAL MISSILE CENTER	NMC-TM-65-34	65 06 02	133449Y
AERODYNAMIC HEATING	COMPARISONS OF EXPERIMENTAL AND THEORETICAL AERODYNAMIC HEATING RESULTS IN AIR-CORBO N DIOXIDE MIXTURES. 15 JAN 1965.U	CALIFORNIA INSTITUTE OF TECHNOLOGY JET PROPULSION LAB	TP 32-715	65 06 01	131701
	ANALYSIS OF MARS ENTRY WITH CONSIDERATION OF SEPARATION AND LINE-OF-SIGHT RELAY COMMUNICATION FOR BUS-CAPSULE... MAY 1965.U	NASA	NASA TN D-2841	65 06 01	133446
	SEARCH PROCEDURE TO BE USED WITH THE AERODYNAMIC HEATING INFORMATION RETRIEVAL PROGRAM. 29 APR 1964.U	NAVAL ORDNANCE TEST STATION	TN 4061-111	65 06 01	133081
	INSTRUCTIONS ON HOW TO USE THE AERODYNAMIC HEATING INFORMATION RETRIEVAL PROGRAM. 3 MAR 1965.U	NAVAL ORDNANCE TEST STATION	TN 4061-120	65 06 01	133085
AERODYNAMIC HEATING - MEASUREMENT	TECHNIQUE FOR MEASURING HIGH-TEMPERATURE ISOTHERM PATTERNS ON AERODYNAMICALLY HEATED MODELS WITH EXPERIMENTAL... MAY 1965.U	NASA	NASA TN D-2769	65 06 01	133068

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13. 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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