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Technical Report

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MECHANIZATION STUDY
OF THE TECHNICAL LIBRARY,
U. S. ARMY MAP SERVICE,
WASHINGTON, D. C.

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ABSTRACT

The Army Map Service (AMS) Library uses a Univac 1004 computer to produce map accessions lists and bibliographies from punched cards containing printed text. Also, data on a Map Reproduction (Repromat) File are punched onto cards and transferred to magnetic tape on a Honeywell H-800 computer. This tape is used to produce a high-speed printout of the Repromat Tabulation semiannually and a monthly listing to update the semiannual tabulation. It is felt that the mechanized Repromat File system should be modified in a number of ways for greater efficiency.

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I. SUMMARY

Mechanization of the Army Map Service (AMS) Library began in 1945. The original semiautomated system consisted of a card punch, a sorter, and a tabulator and employed 90-column punched cards. At present, these punched cards, containing printed text, make up several of the Library's card files and are used manually for reference purposes. These cards are also used to produce accessions lists and bibliographies, utilizing a Univac 1004 computer.

In 1963, data on the Map Reproduction File (Repromat File) were punched onto 80-column cards and transferred to magnetic tape on the Honeywell H-800 computer system. This tape is used to produce a high-speed printout of the Repromat Tabulation semiannually and a monthly listing to update the semiannual tabulation.

The Repromat File consists of more than 120,000 map sets. There is one set of repromat per map sheet; each set averages 10 pieces of photographic film. The films that make up the Repromat File depict mapping features and are used primarily to make lithographic press plates for the production of maps. The map collection contains some two million maps with an annual increase of approximately

21,000. The Library's book collection consists of approximately 75,000 books with an annual growth of 9,000 volumes. The collection is cataloged by using the Library of Congress classification scheme and a modified 3 x 5 card format. Periodical subscriptions number 1,500 with no noticeable increase, since cancelled subscriptions usually equal the number of new titles added per year. The Document Library collection, although new, numbers 25,000 to 30,000 items with an expected annual growth of 22,000.

II. MECHANIZATION

I. CHRONOLOGY

In 1945, AMS completed the conversion of all maps to a 90-column punched card catalog system.

In 1959, periodical titles were transferred to punched cards which were used to mechanically produce a current list of periodicals received at AMS.

In 1963, a Command Improvement Plan recommended the study of automatic data processing applications to library-type operations, beginning with the Repromat File. A target date of 1964 was established for implementation of recommendations resulting from this study. The Department of Computer Services feasibility study was completed in August, and conversion of the Repromat File to magnetic tape was begun. The system began operation in the fall.

In 1965, AMS began punching onto cards data on books and reports for a Master Authority File.

2. DESCRIPTION OF MAPS PROCESSES

(1) Input Procedures

1. One to ten copies of maps are received; one copy goes to the Reproduction Unit for inclusion in the Repromat File; outside distribution is made (if required), and the Cataloging Section receives up to five copies.
2. Maps are separated by area and placed in catalogers' bins. (Three geographical areas are involved.)
3. Catalogers pick up, check for duplicates, authorities, etc.
4. Data sheets are completed (see Appendix B) and are sent to the Accessioning Unit.
5. Accessioning Unit adds accession number to worksheets and maps and forwards worksheets to Computer Services. (Maps are forwarded to the files.)
6. Cards are keypunched and interpreted in Computer Services and are returned to the Records Unit.

(2) Outputs

Punched Cards

Punched cards and worksheets are returned from Computer Services and proofread. Cards are filed in one or more of the following files: Area; City Plan Area; Authority; Special Service Negative; Army Map Depository (copy of cards on maps going to Depository); Change of Call Number; Scale; City Plan; and Map Series.

Punched cards are prepared in various colors to indicate the type of card and the file for which each card is intended. The cards are punched, using an alphanumeric code. The plain text translation of the punch code is simultaneously printed on the cards. This is done to allow the cards to be used for manual searches. Designations are preprinted on the cards to show the kind of information that must be entered into each field. Reference to code lists is necessary to interpret most of the information, but frequent users of the files soon become familiar with the codes for areas, subjects, and authorities of most interest to them.

There are two types of cards used: A and B (see Appendix B for samples.) A type A card is made for every copy of each sheet in the collection. The type B card gives only the data common to all sheets of one call number. The call number consists of the geographic area, type of map, primary subject classification, producing authority, and scale, in that exact order. For example, a topographic map of France, produced by the AMS at a scale of 1:500,000, would have the call number 006M0130009000000500000. In this number, 6M represents France, 01 indicates a general map, 3000 is the classification number for topographic information, 90000 is the code number for AMS, and 000500000 represents the scale of 1:500,000.

Accessions Lists

Every two weeks an accessions list is prepared from the punched cards for new maps. This is distributed to AMS personnel and outside agencies on the distribution list.

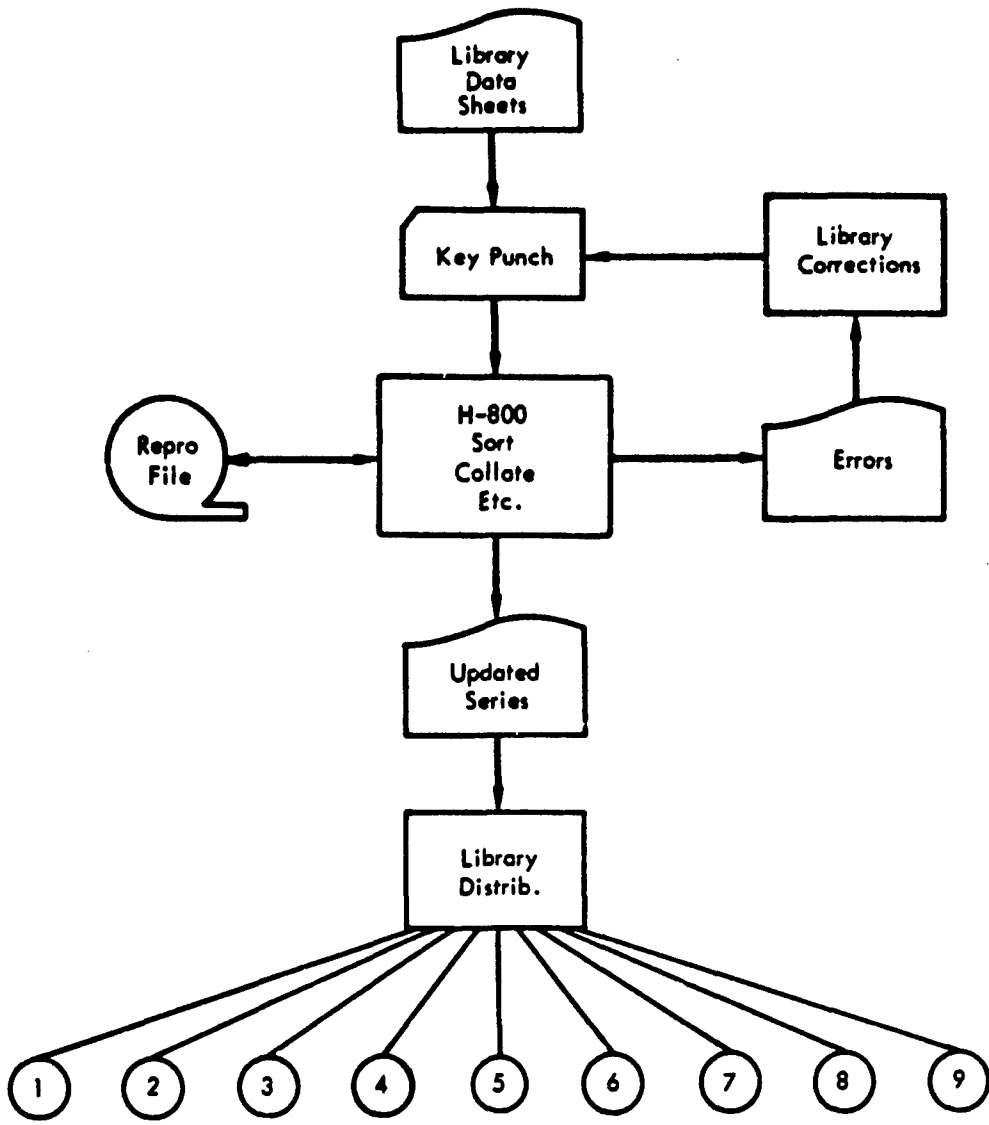
Map Searches

Authorized users may request bibliography searches either verbally or in writing. Cards are pulled by the Library staff and are sent to Computer Services, where a printout is made. All copies of the printout are forwarded to the requester. Appendix C is a copy of a partial printout of a search for all available maps on Thailand.

3. DESCRIPTION OF MAP REPRODUCTION TABULATION PROCESSES

The AMS Repromat Tabulation provides a current list of all Repromats held in the Library. A complete tabulation is produced semiannually that lists all known sheets of a map series and indicates those for which AMS holds Repromats. In addition, a listing updating the basic tabulation is produced monthly.

The mechanization of the Repromat File is described in the flow diagram of Figure 1.



Errors

- 1. Repro
- 2. MAD
- 3. D/GAD
- 4. Library Hdqtrs
- 5. Collection
- 6. AMDEP
- 7. P & P
- 8. USAREUR
- 9. USAMSFE

- 1. No card type designated
- 2. Action code undefined
- 3. Item to be deleted is not in file.
- 4. Item to be updated is not in file.

FIGURE 1
Library Map Reproduction Material
Tabulation

(1) Input Procedures

Input data sheets are prepared in the Library, containing all the data that are to be entered into the file. Copies of the data sheets and instructions for their completion are shown in Appendix D. The input data are then forwarded to Computer Services, where 80-column cards are punched directly from the data sheets, since the card format and data sheet format are identical.

The punched cards are then processed on the H-800 computer to produce a magnetic tape. The data are first sorted by series number and sheet number and then are collated with the Master Repromat File. An error listing is produced for illogical items and cards that have omissions. The error listing is sent back to the Library so that corrected cards may be produced. A printout for those map series that have been modified is then produced and is sent to the Library for distribution.

(2) Output

The output data consists of an 80-column printout of those map series that have been modified. Separate pages are produced for each map series so that the initial printout may be updated by replacement of the corresponding page. Appendix E contains a

sample of the printout format, together with an explanation of the column headings and codes used. Because of the number of copies required, the printout must be run off twice.

4. DESCRIPTION OF BOOKS PROCESSES

Mechanization for books is limited to the Authority File, which is maintained on punched cards for the present. Beginning with the "A's" and proceeding through the alphabetical files, author and source authorities are being entered on worksheets. Approximately 1,000 entries have been processed in the "A's."

Worksheets are completed as follows (see Appendix F for samples of worksheets):

<u>Label</u>	<u>Columns</u>
Code number of authority	1-6
Country abbreviation	8-9
Title or name of authority	12-59
Cross-reference	62-71
Alphabetizing code	73-79

Worksheets are forwarded to Computer Services for keypunching onto 80-column cards. No formal printout of this file has been made.

5. DESCRIPTION OF PERIODICALS PROCESSES

(1) Input Procedures

1. New periodicals are received in the Library.
2. Worksheets are completed as follows (see Appendix G-1 for sample of worksheet):

<u>Label</u>	<u>Columns</u>
Title	1-45
Alphabetizing code	46-51
Texts: 1st	52-53
2nd	55-56
Frequency	58
Retention	60
Areas: 1st	62-65
2nd	67-70
Subject codes:	
1st	71-72
2nd	73-74
Subjects written or abbreviated (up to three)	75-89

3. Subjects are selected from a list of 99 items.
4. Worksheets are forwarded to Computer Services for keypunching.

(2) Output

A list of periodicals currently received in AMS is issued once a year in two parts. The first part is alphabetical; the

second is by subject (see Appendix G-2 to G-4 for examples and instructions). The most recent issue was printed from the punched cards utilizing the Univac 1004 computer. In the future, this file will be transferred to magnetic tape.

6. MAJOR PROBLEMS

As a result of the experience gained since 1963, it is now felt that several areas of the mechanized Repromat File System should be modified. Examples of those areas for which modifications are being considered follow.

The tabulation for each series includes sheets that are not in the inventory. This was done to indicate the contents of the complete map series. It has proved to be a problem from the standpoint of added volume and increased time required for the monthly update.

Any action within a series of maps gives a complete revision of each series. This saves time during the monthly manual correction of the tabulation by allowing a one-for-one page replacement. However, it is primarily responsible for the long printout time required on the high-speed printer.

Printouts of a series include an asterisk to indicate that some action has been taken on an item (i. e. , additions, deletions, revisions);

however, no indication of the type of action is given. This is especially troublesome in the case of deletions.

More identifying information is included in map series printouts than is needed. The map series and number of sheets would have been sufficient. (See Appendix C.)

In order to obtain a printout of an entire series, a particular sheet within the series must be identified. A program for the printout of the entire series would have been of greater benefit.

In order to cancel a series, each sheet number within that series must be identified.

A printout of a specific series can be given, but a computer search cannot be made.

Complete program documentation was not provided.

III. PROGRAM SYSTEM DATA

The Repromat File consists of photographic films that depict mapping features and that are primarily used to make lithographic press plates for the production of maps. The Library originally maintained control of the repromats by using the 90-column punched card file, which contained approximately 130,000 cards. The Repromat File was converted to magnetic tape for use on the AMS Honeywell H-800 series computer in 1963. The conversion was performed by examining and manually recataloging, on new data sheets, every item in the repromat library (120,000 repromat sets--approximately 1,200,000 film pieces). In this way, the magnetic tape file was built up without causing any inconveniences either to the Library or to the Computer Services group. The Library continued to use the 90-column card file until the magnetic tape system was placed in operation.

The computerized Repromat File is arranged by map series numbers and sheet numbers or sheet names; a new series number starts a new page. Whenever a change occurs in a series (repromat added, revised, or deleted), all pages containing the particular series are reprinted. An asterisk to the left of the sheet number or name will

identify the sheet affected. Maintenance of the basic tabulation is performed by manually substituting the new pages for the old.

The program system is depicted in the flow charts of Figure 2. The flow charts describe the main body of the program and do not include the input, presort, and sort routines required before the start of this section of the program. The program reads and compares each item on the master and input data files; performs the necessary operations of addition, deletion, or substitution; and prepares a new master file tape and an output tape to be used for printing and replacement pages for the Repromat Tabulation.

1. FILE

The primary key in the magnetic tape file is the map series number. The secondary key is the map sheet number or sheet name. Map sheet numbers exist in a variety of forms and are more commonly used than names. (Some sheet numbers are Arabic numbers, some are Roman numerals, and others are a combination of both.) The form of a sheet number is constant within a series but may be different from one series to the next. There are approximately 1,200 series in the file.

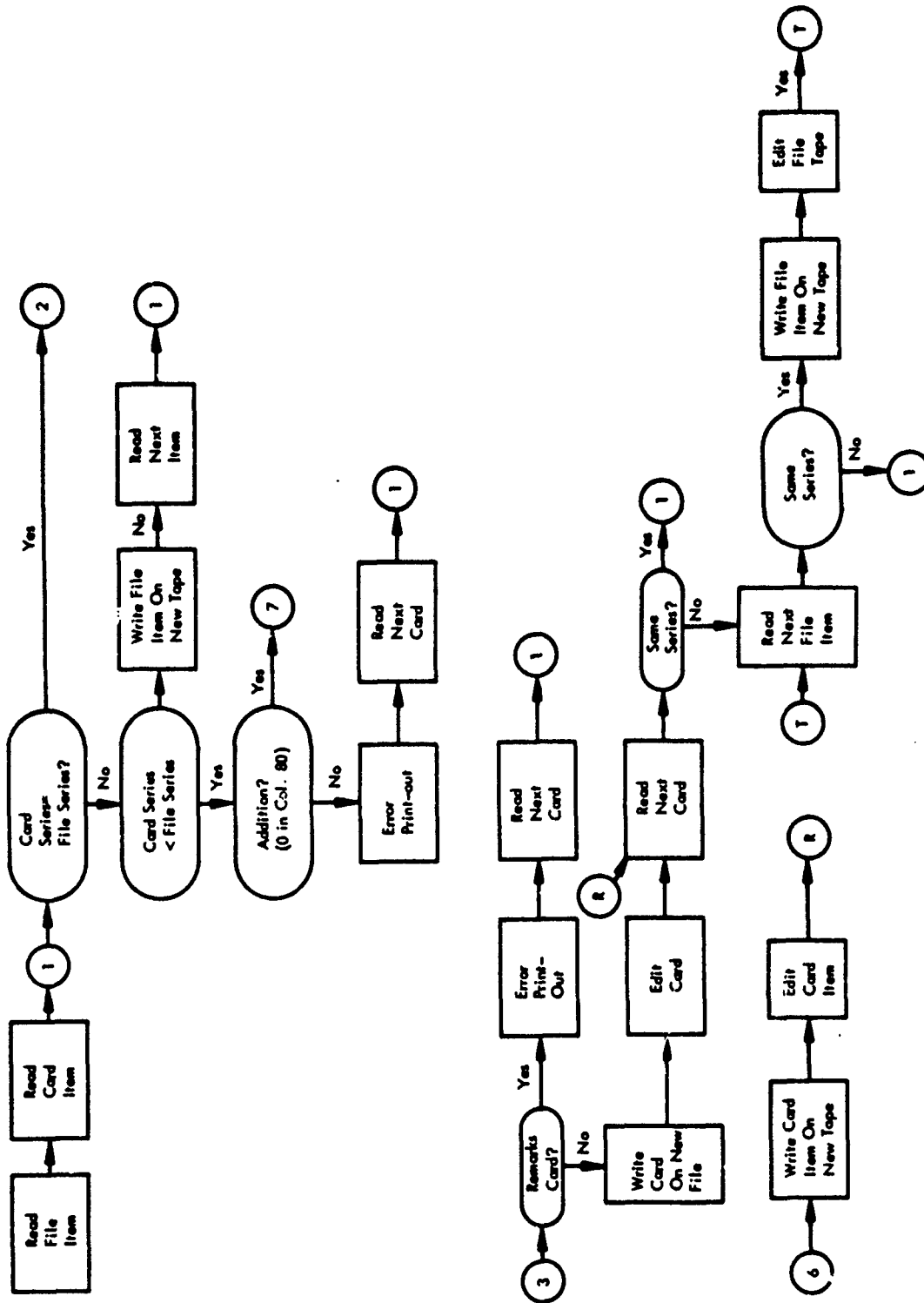
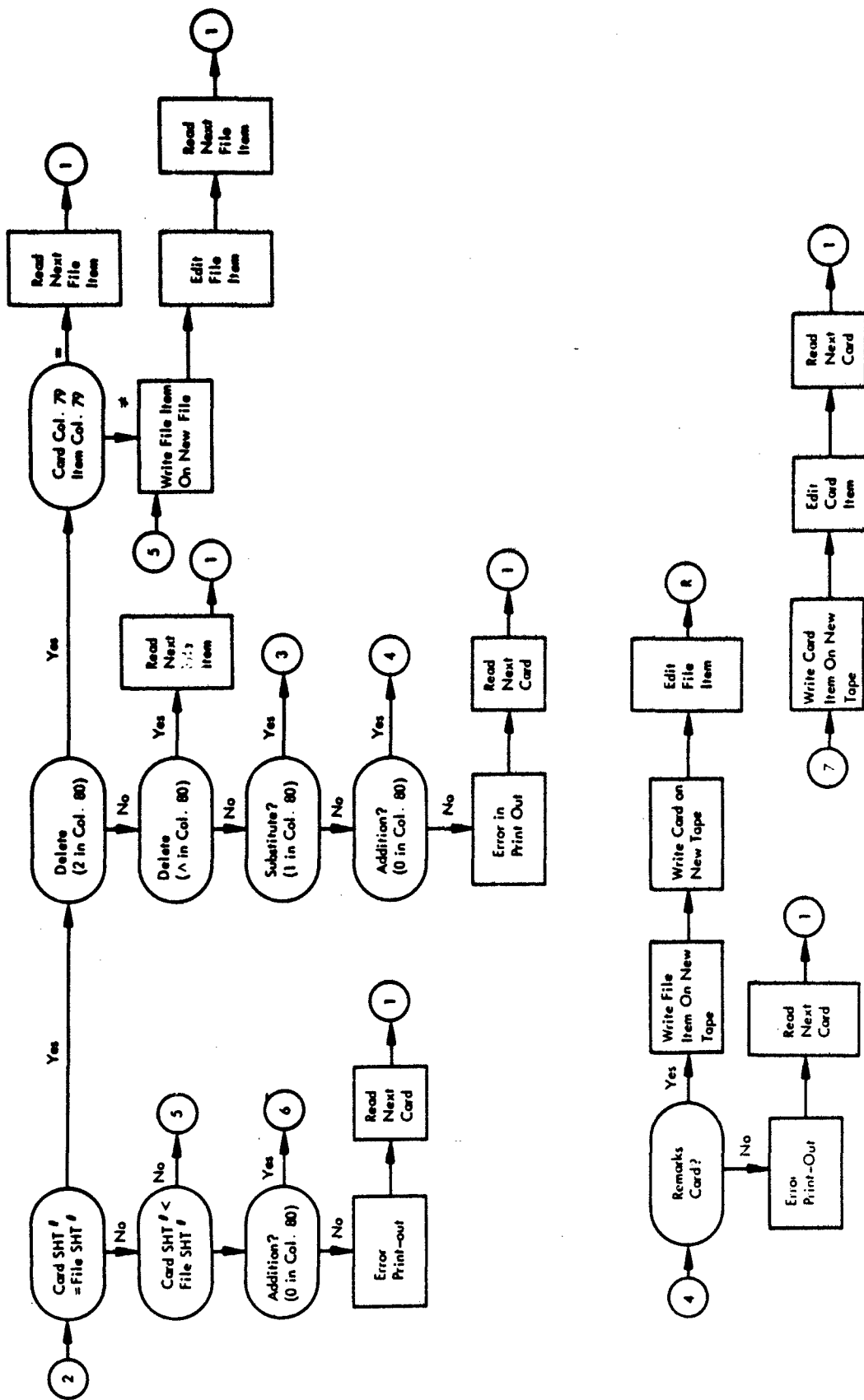


FIGURE 2
Program System - - Map Reproduction Tabulation



System Flow Chart

FIGURE 2 (Continued)

The data entries in the file are arranged by "item". Each item contains all the information associated with a single map series number. This information is categorized into words, and there are 14 words per item. There are two possible formats for each item, as follows:

Format I

<u>Word</u>	<u>Character Format</u>	<u>Explanation</u>
1	SSSSSNN	
2	NNNNNNNN	S's = Series number
3	NNNNNNNN	N's = Sheet names or number
4	NNNNNNNN	
5	SAAADDDO	S = Security, A's = Agency, D's = Data, O = Omaha
6	MMKKKKKK	M's = Material
7	KKKKKKKK	K's = Number and kind of
8	KKTTEEEE	material
9	RRRRRRRR	T's = Total, E's = Edition
10	RRRRRRRIA	R's = Remarks, A = Action I = Data Card Image
11	SSSSSNN	
12	NNNNNNNN	Same as words 1-4 with
13	NNNNNNNN	spaces suppressed to
14	NNNNNNNN	zeros (used as sort keys)

Format II

<u>Word</u>	<u>Character Format</u>	<u>Explanation</u>
1	SSSSSSNN	
2	NNNNNNNN	S's = Series Number
3	NNNNNNNN	N's = Sheet name or number
4	NNNNNNNN	
5-9	RRRRRRRR	R's = Remarks
10	RRRRRRZA	Z = Detail card image A = Action
11	SSSSSSNN	
12	NNNNNNNN	Same as words 1-4 with
13	NNNNNNNN	spaces suppressed to
14	NNNNNNNN	zeros (used as sort keys)

There are 17 items per record. The file identification record must not exceed 242 words in length. The tape is sorted on ascending words: 11, 12, 13, 14. Maintenance of the file involves approximately 500 cards per month. (The printout, however, will have approximately 15,000 line items.)

2. PROGRAMS

There are six major programs that may be identified within the file maintenance program. Because of the lack of complete program documentation at present, the ensuing descriptions must be general in nature.

(1) Input

This run places all punched card input data onto magnetic tape.

(2) Presort

This run rearranges the punched card input data into the word format previously indicated under the file description.

(3) Sort

A modified Honeywell H-800 sort run is employed to sort each item on the input tape in ascending order, using the keys provided by words 11-14. The items are therefore arranged by ascending series number and within each series by ascending sheet number or alphabetic characters (if sheet name is used).

(4) Collate

The collate run is the main body of the program. It compares the master file and the sorted input file; makes the necessary deletions, substitutions and additions; and forms a new master file. It also prepares an output tape to be used for printing the revised pages for the Repromat Tabulation.

(5) Error

If, during the update or collating run, a logical error is discovered (e. g. , an item to be updated does not exist in the master file), an error printout will indicate the card that caused the error and will identify the error condition. The run is not stopped by these errors, and the erroneous information is disregarded by the computer.

(6) Edit

The edit run converts the format of the data on the output tape to the format required for printing. The edit or print format is as follows:

<u>Columns</u>	<u>Heading</u>
2-7	Series
11-30	Sheet number or name
38-40	Sec
42-47	Agency
49-52	Date
54-55	OM
57-59	Mat
62-86	Number and kind of sheets
93-97	Total
99-105	Edition
109-115	Remarks

Data Line--Type 1

<u>Columns</u>	<u>Data</u>
2-7	Series number
11-36	Sheet number or name
39	Security code
43-45	Agency
50-52	Date
55	At Omaha
58-59	Material
62-92	Number and kinds of sheets
95-96	Total
100-103	Edition
106-119	Remarks

Data Line--Type 2

<u>Columns</u>	<u>Data</u>
1-40	Spaces
41-88	Remarks
89-120	Spaces

Appendix E-1 shows a sample of a printed page.

IV. EQUIPMENT AND COSTS

1. REPROMAT FILE

The system employed for automatic data processing of the Repromat File makes use of the electronic data-processing equipment available at AMS in the Department of Computer Services. None of the equipment is owned or operated by the Library. The Library is charged \$250/hour for use of the H-800 computer, \$15/hour for the high-speed printer, and \$8.10/hour for the use of card-handling equipment. Cost of materials used is also charged to the Library. The following are representative monthly operating costs:

Card punching, verifying, etc. (400 cards/mo, 7 hr at \$8.10)	\$ 57
Card to tape and update (1 hr/mo at \$250)	250
Printout (400 pages/mo-- 2 runs--4 hr/mo at \$15)	60
Materials (cards and printpaper)	<u>24</u>
Monthly operating cost (average)	\$391/mo

In addition, services amounting to one full-time cataloger in the Library are required for preparation of the input data sheet and other

duties concerned with the Repromat File. Thus, the cost of the automatic data-handling portion of the system is only a fraction of the cost of the Library catalogers.

The initial one-time costs involved in converting the system were estimated as follows:

Cataloging	\$ 62,600
Key punching, verification, etc.	15,390
Card-to-tape conversion	2,170
Printing	80
Programming	920
Applications analysis	<u>1,300</u>
Total	\$ 82,460

The conversion required the services of 10 catalogers full time for one year plus 1,600 hours overtime.

2. MAP FILE

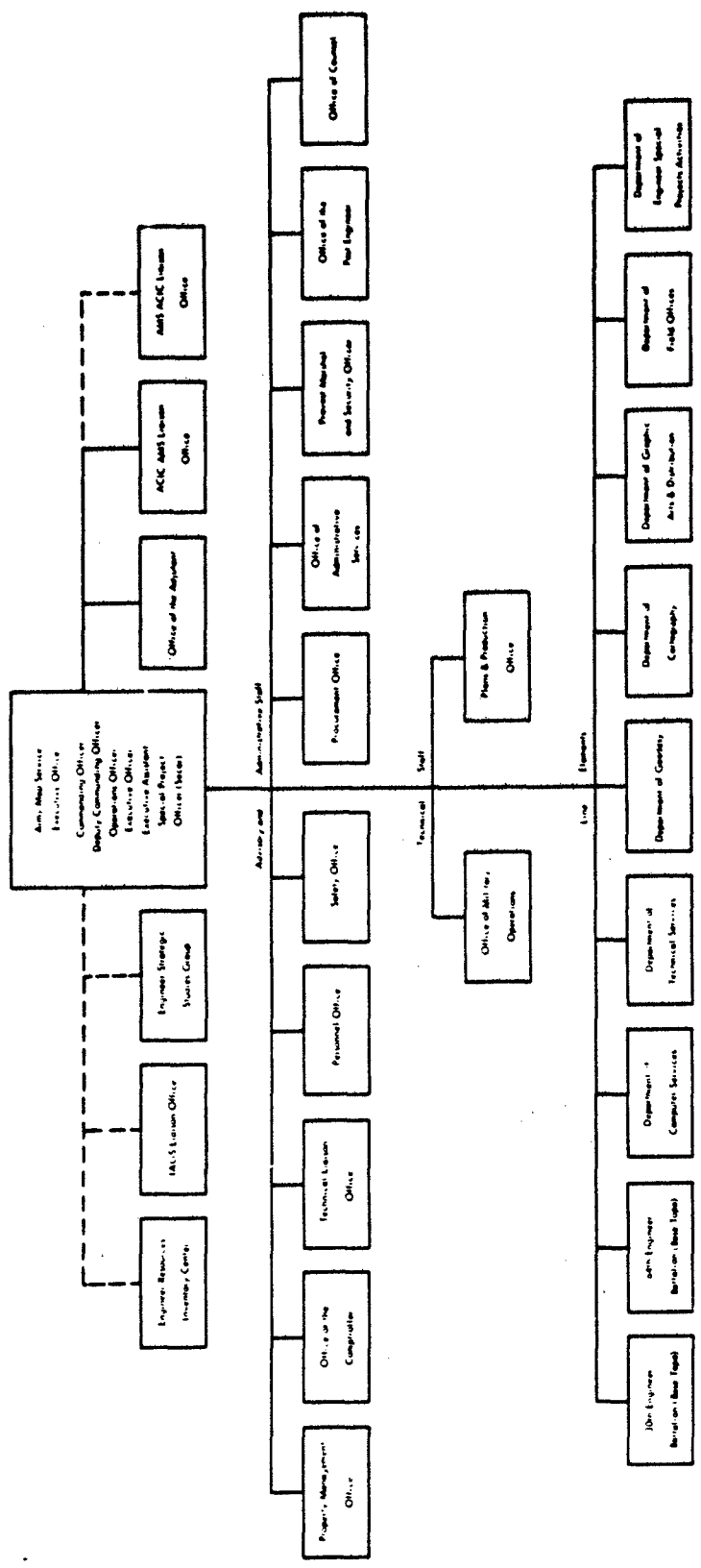
The maintenance of the map card file during Fiscal Year 1965 involved cataloging 88,228 maps, recataloging 15,306 maps, and canceling 67,317 maps. Representative monthly operating costs are as follows:

306 Remington keypunch (250 hr/mo)	\$ 2,025
312 Remington interpreter (25 hr/mo)	203
315 Remington reproducer (20 hr/mo)	162
420 Remington sorter (20 hr/mo)	<u>162</u>
Total	\$ 2,552

The above does not include the cost of the Library personnel who prepare the input data sheet, assign accession numbers, file punched cards, etc. The major portion of the time of 23 catalogers is spent on these tasks.

In addition, an Accessions Bulletin that indicates the new and revised maps in file is printed twice monthly using the Univac 1004. Approximately 70 Bulletins are produced at each printing, with an average over the year of 100 pages per Bulletin.

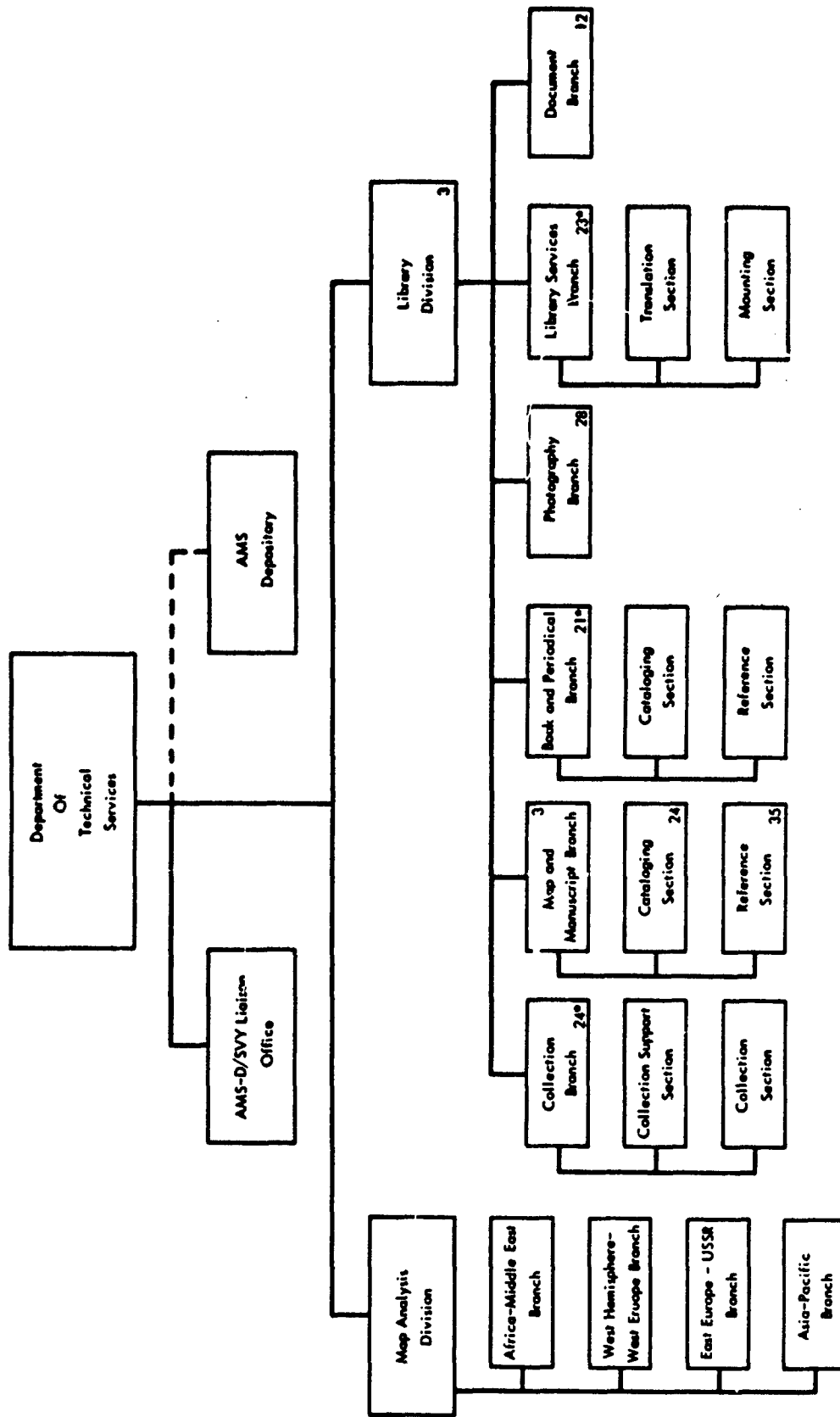
APPENDIX A
ORGANIZATION CHARTS



Legend
 ———— Command
 - - - - - Attached for administrative purposes
 Prepared by
 Management Division
 Office of Comptroller
 Army Map Service
 27 Sep 65

Approved
 W. W. Van Allen
 Colonel, Corps of Engineers
 Comptroller

Army Map Service



* Represents total number of personnel in entire branch

Army Map Service Organization Chart

APPENDIX B
MAPS PROCESSING

REMARKS

MAP CARD
 A CARD CROSS REFERENCE
 B CARD CROSS REFERENCE

CATALOG DATA SHEET (CARD-A & B)
 SERIES

AREA	TYPE	SUBJECT	AUTHORITY	SCALE
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9
10	10	10	10	10
11	11	11	11	11
12	12	12	12	12
13	13	13	13	13
14	14	14	14	14
15	15	15	15	15
16	16	16	16	16
17	17	17	17	17
18	18	18	18	18
19	19	19	19	19
20	20	20	20	20
21	21	21	21	21
22	22	22	22	22
23	23	23	23	23
24	24	24	24	24
25	25	25	25	25

MAP CARD B		EXACT TITLE	AREA SUBJECT	TEXT															
SERIES NUMBER & MISC CROSS REFERENCES		FOLDER - X - REF																	
18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1		
19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	
20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

MAP CARD A																			
SHEET NUMBER OR NAME	NEGATIVE NO	FORM	SIGNIFICANT DATE	SOURCE	DESCRIPTION			SECONDARY AUTHORITY	ACCESSION NUMBER	PRINTING DATE	ACC DATE								
					1	2	3												
26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65
66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85
86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125
126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145
146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165
166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185
186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205
206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225
226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245
246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265
266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285
286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305

ACCESSION DATE

APPENDIX C
MAP SEARCH PRINTOUT

GENERAL MAPS

62

SL 01 2450 85040 2000000
 THE SHELL ROAD MAP OF THAILAND
 85040 SHELL OIL COMPANY INC NEW YORK

ENGL AND THAI

50

SHEET	EDITION	DATE CODE	SEC AUTH	PRINT DATE	SEC CODE
THAILAND		P1963 L		1963	

GENERAL MAPS

SL 01 2450 85043 2300000/2
 ROAD MAP BANGKOK THONBURI AND THAILAND
 85043 CALIFORNIA TEXAS OIL COMPANY LIMITED

THAI

CT

SHEET	EDITION	DATE CODE	SEC AUTH	PRINT DATE	SEC CODE
THAILAND		1964 L		1964	

SERIES MAPS

SL 03 3000 90000 50000

THAILAND
 THAILAND

AMS L708 S

0

THAI ENGL
 3UENGL

0

AM

90000 ARMY MAP SERVICE

SHEET	EDITION	DATE CODE	SEC AUTH	PRINT DATE	SEC CODE
5864 II	1	M1963 L	90052	0364	
5963 III	2	M1964 L	90052	0664	

URBAN AREAS

SL 41 2900 85040 12500

MAP OF BANGKOK

N1345E100310520000 ENGL AND THAI

85040 SHELL OIL COMPANY INC NEW YORK

50

SHEET	EDITION	DATE CODE	SEC AUTH	PRINT DATE	SEC CODE
BANGKOK THAILAND		0164 L		0164	

APPENDIX D

**INPUT PROCEDURES
MAP REPRODUCTION TABULATION**

LAYOUT FORM - 80 COLUMN CARD

Series	Name or Number	SECURITY	AGENCY	DATA	DATE	REPRODUCTION MATERIAL	Number and Kind of Reproduction Material	YOTAL	EDITION	Remarks	CARD	SECTION
1	1011121314151617181920212223242526272829303132											
2	303132333435363738394041424344454647484950515253545556575859606162636465666768697071727374757677787980											
3												
4												
5												
6												
7												
8												
9												
Title Card Type 1, Repro Data Card												
Prepared By						For Program						
By Programmer						Checked By						
Modification						Date						
Remarks												

LAYOUT FORM - 80 COLUMN CARD

Series	Name or Number	Remarks
1	9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32	33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79
2		
3		
4		
5		
6		
7		
8		
9	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79	

Title		Card Type 2, Remarks Card	
Prepared By		For Program	
By Programmer		Checked By	
Modification		Date	
Remarks			

Data Sheet Completion Instructions

In order to prepare data sheets for use as input information, certain basic knowledge of the requirements and limitations of the computer is required. The printout will furnish only information that is put into the computer. As long as the information is routine, the computer operates without any specific instructions. For any information placed in the computer contrary to the normal routine or contrary to its normal sequence, it must be instructed by means of a "flag" appearing in a predetermined column. In this instance, columns 79 and 80 of the data sheet will be reserved for this purpose. The flag is an assigned letter or number which gives instruction to the computer. A list of the assigned flags and their duties appears at the end of this SOP.

The sequence of the computer is 0 thru 9, A thru Z. This being the case, all continental would appear on a printout before any of the alphabetical series. Since this holds true in all areas of the printout, it must be foremost in the cataloguers mind when placing information on the data sheets. Further consideration is given to sequence under Sheet Names or Number.

The allotment of spaces on the data sheet is as follows:

	<u>Spaces</u>	<u>Total</u>
Series	6	
Sheet Name or No.	26	32
Security	1	33
Agency	3	36
Significant Date	3	39
Omaha	1	40
Material	2	42
Pieces	16	58
Total Pieces	2	60
Edition	4	64

The Repromat Files are presently arranged in Series and Sheet Number order. It is desired to continue with this system, consequently, accuracy is of utmost importance in the arrangement of information in the first 32 spaces. These spaces are for the series and sheet number and are the computer's instruction for arranging in order.

Each item appearing on the data sheet is explained in detail below:

a. Series - Spaces 1 thru 6.

The series will be placed on the data sheet, beginning with space one and using as many of the six spaces as required. No blank spaces should appear between the beginning and end of a series identification.

b. Sheet Name or Number - Spaces 7 thru 32.

The sheet name will undoubtedly create the most difficulty and require the most care by the cataloguers. The sheet numbering system for each series will have to be considered before placing on the data sheets. The cataloguer must keep in mind that any time a space is left immediately preceding a zero, the printout will drop the zero. The reason for this is so that when a file is arranged in straight numerical order, the zeros preceding the unit will be dropped. It would appear on the data sheet as follows:

001
002
009
010
012
010
111

The same sheets would appear on the printout as follows:

1
2
9
10
12
101
111

If the numbering system continued into thousands, an additional zero must be added in front, etc. Since the zeros are not desired on the printout but are used to fill the field, it is necessary to leave a space preceding the field. Consequently, space 7 should not be used.

Some of the series (e.g. M841) have sheet numbers beginning with zero: 0810, 0820, etc. The field for these numbers should begin at column 7 so the zeros would not be omitted.

D-3 (continued)

Sheet numbers such as 240 085 in Series K835 must utilize a slant, 240/085 in order to retain the 0 in 085.

Roman numerals are often used as a sheet numbering system such as M761. Since the computer treats the roman numeral as a letter, it requires special treatment. Place Z's in the first two columns (Column 7 and 8) of the name field. The arabic number equivalent recorded in the next columns, filling any spaces between the number and the Z's with zeros. Example:

ZZ001
ZZ011
ZZ111

The sheet number as it normally appears in roman numerals form should be recorded, beginning with column 65.

c. Security - Space 33.

The security codes presently in use by the map library will be used for reproduction material as well.

d. Agency - Spaces 34 thru 36.

This will not change from the policy used on the 90 column card.

e. Significant Date - Spaces 37 thru 39.

No change from old policy.

f. Omaha - Space 40.

Tabs will be received from Omaha of their coverage and will be the sole authority for indicating coverage.

g. Material - Spaces 41 and 42.

A new code has been devised to indicate the type of material reported:

<u>Material</u>	<u>Code</u>
PBN	N1
TBN	N2
VBN	N3
PBP	P1
TBP	P2
VBP	P3
AP	P4
PP	P5

D-3 (continued)

h. Pieces - Spaces 43 thru 58.

It will no longer be necessary to indicate the letter code when listing the pieces, only the number of pulls for each feature in the proper column. The letter code will be programmed into the computer. An additional space was allotted to Miscellaneous (N), to be used when more than 9 pulls are held on one feature. For instance, a set has 11 tints, indicate 9 under tints (R) and list the other two in Miscellaneous. The letter "M" should be used if a pull is missing from a set.

i. Total Pieces - Spaces 59 and 60.

No change in procedure.

j. Edition - Spaces 61 thru 64.

No change in procedure.

Spaces 65 thru 78 are reserved for clarification of sheet name or number or for a plain language explanation of some other feature recorded on the data sheet. At the present time, the only use that comes to mind is for recording the roman numeral sheet numbering system as referred to earlier.

Additional use will be made of the spaces, I'm sure, when we become involved in the actual recording procedure.

In some instances, the regular line map and plastic model utilize the same pulls that are common to both sets. The features that are used to compile both series should be recorded on the data sheets under both sheets, even though there may be only one set of repro. In filing the material, those pulls that are common should be filed with the line map. The folder containing the pulls for the plastic model only should have a note attached: "See line map for remainder of repro."

When it becomes necessary to place additional information on a detail card (information beyond column 80), the same data sheet will be used. The first 32 columns will be prepared exactly as on the header card. The detailed information can then be recorded in plain language, beginning with Column 33. The proper flags must be recorded in Columns 79.

D-3 (continued)

Listed below are the flags which will serve to instruct the computer:

Card Column 79 will indicate the type of card

Code

- 0 - Repro data card (header)
- 1 - Remarks card (detail)

Card column 80 will indicate the action to be taken

0 - File the Card

1 - Up-date information already in file

- 2-a. Delete all cards of the type indicated in column 79 of the indicated series and sheet.
- b. No punch in column 79, delete all cards of the indicated series and sheet.

APPENDIX E

MAP REPRODUCTION TABULATION PRINTOUT
FORMAT AND EXPLANATION

Map Reproduction Tabulation Printout Format

SERIAL	SHEET NUMBER OR NAME	SEC AGENCY	DATE	GM	WAY	NUMBER	AND KIND	OF SHEETS	TOTAL EDITION	REMARKS
1301	ICELAND SPECIAL									
1301	NA 1	AMS	M52	X	N1	1A	1D1E1F	1M	1N	9R 15 4AMS
1301	NA 4									
1301	NA 5									
1301	NA 17	AMS	V52	X	N1	1A	1D 1F	1M	7N 9R 20	1AMS
1301	NA 18	AMS	V58	X	N1	1A	1F	1M	1G	4 1AMS
1301	NA 19	AMS	V52	X	N1	1A	1F	1M		3 1AMS
1301	NA 20	AMS	V48	X	N1	1A	1E1F	1M 1K	7R 12	1AMS
1301	NA 21	AMS	V48	X	N1	1A	1E1F	1M 1K	5R 10	1AMS
1301	NA 22	CNG	M50	X	N1	1A	1F			2 NONE
1301	NA 26									
1301	NA 32	AMS	M60	X	N1	1A	1D2E1F1G1H		2N 9R 18	2AMS
1301	NA 33	AMS	M56	X	N1	1A1B	1D1E2F	2M 1K	2P	11 2AMS
1301	NA 34	AMS	M56	X	N1	1A1B	1D1E1F	1M1J1K	1P 2R 11	3AMS
1301	NA 35	AMS	M56	X	N1	1A	1D 1F	1M	2N 1G9R 16	3AMS
1301	NA 36	AMS	M63	X	N1	1A	1D1E1F	1M1J	1N 1G9R 17	4AMS
1301	NA 37	DMS	P56	X	N1	1A	1D1E1F1G1H	1K	2R 9	3GSG
1301	NA 38	DMS	P56	X	N1	1A	1D1E1F	1M	1R 6	2GSG
1301	NA 43 SA 43	DMS	M45	X	N1	1A	1D1E			3 1GSG
1301	NA 46									
1301	NA 47	AMS	M57	X	N1	1A	1D1E2F	1M	1N1P 9R 17	5AMS
1301	NA 48	DMS	V54	X	N1	1A	1D1E1F	1M 1K	2R 8	5GSG
1301	NA 49	AMS	M44	X	N1	1A	1D1E1F	1M 1K	6R 12	3AMS
1301	NA 50	AMS	M44	X	N1	1A	1D1E1F	1M 1K	8R 14	3AMS
1301	NA 51	AMS	M44	X	N1	1A	1D1E1F	1M	8R 13	3AMS

DESCRIPTION OF REPROMAT PRINTOUT

A brief description of the Series Number, arrangement of the tabulation, and a key to the codes used are explained in the following paragraphs.

1. SERIES NUMBERING SYSTEM

The world is divided into continental and regional areas which are designated by numerals and/or letters.

The series number consists of four elements as follows:

- . First element--a numeral or letter identifying the continental or regional area in which the series occurs
- . Second element--a numeral indicating either the scale or a city plan or photo map
- . Third element--a numeral identifying the subregional area in which the series occurs
- . Fourth element--a numeral giving unique identification to the series

The first element of a series number is selected as follows:

- . A world series is assigned the numeral 1
- . A small scale map covering a continental or regional area is assigned a numeral (e. g. 2-Africa, 3-Antarctica, etc.)
- . For medium and large scale maps of continental areas, a letter is assigned (e. g. A-Canada, E-Latin America, S-Philippine Islands, etc.)
- . The Index to Regional Areas shows the assignment of numerals and letters to the regional areas.

The second element of a series number is selected as follows:

<u>SCALE GROUP</u>	<u>SECOND ELEMENT</u>
1:5, 000, 000 and smaller	1
Larger than 1:5, 000, 000 to 1:2, 000, 000	2
Larger than 1:2, 000, 000 to 1:510, 000	3
Larger than 1:510, 000 to 1:255, 000	4
Larger than 1:255, 000 to 1:150, 000	5
Larger than 1:150, 000 to 1:70, 000	6
Larger than 1:70, 000 to 1:35, 000	7
Larger than 1:35, 000	8
City Plans (regardless of scale)	9
Photo Maps (regardless of scale)	0

The third element of the series number is assigned in accordance with the numerals assigned to subregional areas as indicated on the regional indexes. A numeral "0" is used if the series extends beyond a subregional area.

The fourth element of the series is a number and, in some cases, two. They identify the specific series and are assigned in order as a series is developed.

A letter suffix sometimes appears on a series and is used to denote some specific type of mapping. The following letters appear on this print-out:

- A - An added series
- P - Plastic relief series
- R - Native language series
- S - Special series
- SP - Special Plastic relief series
- W - A special series of the world

2. PRINTOUT ARRANGEMENT

The repromat is recorded on the printout in series and sheet number order. All continental series are listed at the beginning, and the printout then progresses through Area B to Area Z.

Because of the order of priority given to numerals by the computer, certain series are arranged differently than one is normally accustomed to seeing them. For example, Photo maps appear at the front of a series; i. e., L001 appears at the beginning of the L series. Another example is that series L7010 appears before L701.

The computer is incapable of arranging sheets identified by Roman numerals, so all sheet numbers appearing in parenthesis are actually Roman numerals.

3. KEY TO CODES

SEC (Security Code)

Date

W - Edition
 V - Revised
 L - Field Examination
 M - Compiled
 D - Surveyed
 E - Engraved
 P - Published or Printed
 Z - Reprinted
 B - Later than same date map in file
 C - Circa
 X - Interpreted but no applicable code
 Blank - No interpretation date

OM (Omaha)

- . X indicated AMDEP holds like material. In most instances, AMS maintains the negative and AMDEP the positive.
- . O indicates that AMDEP's material is older.
- . Blank indicates no repro at AMDEP.

MAT (Material)

N1 Polyester Base Negative (PBN)
 N2 Topo Base Negative (TBN)
 N3 Vinyl Base Negative (VBN)
 P1 Polyester Base Positive (PBP)
 P2 Topo Base Positive (TBP)
 P3 Vinyl Base Positive (VBP)
 P4 Astrolon Positive (AP)
 P5 Paper Pulls (PP)

Number and kind of sheets

The letter identifies the features appearing on the pulls as follows:

- A - Culture
- B - Border
- C - Names
- D - Relief
- E - Open Water
- F - Drainage
- G - Vegetation
- H - Roads
- J - Residential
- K - Boundary
- L - Air Data
- N - Miscellaneous
- P - All grids except UTM
- Q - UTM Grid
- R - Tints

The number preceding these letters indicate the number of each of these pulls in the set.

APPENDIX F
BOOKS PROCESSING

CATALOG DATA SHEET
SPECIAL REFERENCE FILES

- CANCELLED OR CHANGE OF CALL NO CARD
- BY THIS FORM
- RELISTED
- 1AB

- AUTHORITY CARD
- NUMERICAL
- X-REF
- TRANSLATION
- CANCELLATION

- SPECIAL NUMBER CARD
- SOURCE CARD
- URBAN AREA X-REF

CODE NO		NAME OF AUTHORITY	
TITLE OR NAME OF URBAN AREA			
4	0	8	0
1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20
21	22	23	24
25	26	27	28
29	30	31	32
33	34	35	36
37	38	39	40
41	42	43	44
45			

CODE NO		ALPHABETIZING	
46	47	48	49
50	51	52	53
54	55	56	57
58	59	60	61
62	63	64	65
66	67	68	69
70	71	72	73
74	75	76	77
78	79	80	81
82	83	84	85
86	87	88	89
90			

CATALOG DATA SHEET
SPECIAL REFERENCE FILES

- CANCELLED OR CHANGE OF CALL NO CARD
 BY THIS FORM
 RELISTED
 TAB

- AUTHORITY CARD
 NUMERICAL
 X-REF #1
 TRANSLATION
 CANCELLATION

- SPECIAL NUMBER CARD
 SOURCE CARD
 URBAN AREA X-REF

CODE NO		NAME OF AUTHORITY																																										
SPECIAL NUMBER																																												
TITLE OR NAME OF URBAN AREA																																												
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45

AREA		TYPE		CLAS		AUTHORITY		SCALE		CODE NO		ALPHABETIZING																																
46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90

APPENDIX G
PERIODICALS PROCESSING

CATALOG DATA SHEET
SPECIAL REFERENCE FILES

PERIODICAL LIST

- SPECIAL NUMBER CARD
- SOURCE CARD
- URBAN AREA X-REF

- AUTHORITY CARD
- NUMERICAL
- X-REF
- TRANSLATION
- CANCELLATION

- CANCELLED OR CHANGE OF CALL NO CARD
- BY THIS FORM
- RELISTED
- TAB

CODE NO	NAME OF AUTHORITY																																												
SPECIAL NUMBER																																													
T	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45

AREA	TYPE	CLAS	AUTHORITY										SCALE	CODE NO	ALPHABETIZING																														
46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91

PART I ALPHABETICAL LIST

TITLE	TEXT		F H O	R E T	AREA		SUBJECT
	1ST	2ND			1ST	2ND	
AANNINSTEEN OVEN DE MAANDEN	DU		12	1		1	GEN THOMICS
ABSTRACTS OF PHOTOGRAPHIC SCIENCE AND ENGR LIT	EN		12	2		1	ENGR PHOTO
ACCESSIONS LIST (INDIA)	EN		12	3		5U	BIBLIOGRAPHY
ACCESSIONS LIST (PAKISTAN)	EN		12	1		1 7U	BIBLIOGRAPHY
ACCESSIONS LIST OF THE GEOGRAPH BN OF CANADA	EN		12	C		1	BIBL MAPPING
ACTA GEOGRAPHICA	FR		04	C		1	GEOGRAPHY
ACTA TECHNICA ACAD SCI HUNGAR SEN GEOD ET GEOP	GE EN		02	5		1 37M	GEOQUEST GEOPH
ACTIVIDADE ECONOMICA DE ANGOLA	FR		02	3		12	ECON COND
ADRESSES AGE	EN		12	1		1	GRAPHIC ARTS
ADI NEWSLETTER	EN		06	1		1	DOCUMENTATION
ADMINISTRATIVE MANAGEMENT	EN		12	2		1	MANAGEMENT
ADVANCED MANAGEMENT JOURNAL	EN		04	1		1	MANAGEMENT
AFGHANISTAN NEWS	FR		12	1		1U	GENERAL
AFRICA	SP		12	3		2	GENERAL
AFRICA CALLS FROM RHODESIA AND NYASALAND	EN		06	1		4Y	GENERAL
AFRICA JOURNAL OF THE INTERNAT AFRICAN INST	EN FR		04	3		2	ANTHROP LANG
AFRICA REPORT	EN		12	2		2	ECON COND
AFRICA TODAY	EN		12	3		2	GENERAL
AFRICAN ROADS AND TRANSPORT	EN		06	3		2	ROADS
AFRICAN WORLD	FR		12	1		2	ECON COND
AFRICANA	FR		04	2		0	GEN GEOG
AFRIQUE	FR		12	C		2	GENERAL
AFRIQUE MAGAZINE	FR		06	1		2	ECONOMIC COND
AMMAN	AR		0	C		7P	CURRENT EVENTS
AIAA JOURNAL	EN		12	1		1 51	AERON ASTRON
AIR ALMANAC	EN		03	2		1	AIR NAV GEOD
AIR CONDITIONING HEATING AND VENTILATING	EN		12	C		1	AIR CONDITON
AIR ENGINEERING	EN		12	C		1	AIR CONDITON
AIR FORCE AND SPACE DIGEST	EN		12	1		V	AERONAUTICS
AIRMAN'S INFORMATION MANUAL	EN		26	C		V	AERO AIRWAYS
ALA BULLETIN	FR		10	5		1	LIBRARIES
ALASKA SPORTSMAN	EN		12	1		0	GEN GEOG
ALGERIE AGRICOLE	FR AH		06	1		4P	AG. CULTURE
ALL INDIA MOTORIST	EN		12	1		1 5U	SHIPPING TRNSPT

PART 2 SUBJECT LIST

TITLE	TEXT		F R O	R E T	AREA		SUBJECT
	1ST	2ND			1ST	2ND	
COMMONWEALTH DEVELOPMENT	EN		06	1	1		ECON CONO
ECONOMIC AND STATISTICAL REVIEW	EN		04	1	0		ECON CONO
ECONOMIC BULLETIN (NATN BANK OF EGYPT)	EN		04	2	7P		FIN ECON CONO
ECONOMIC GEOGRAPHY	EN		04	5	1		GEO EC CONO
ECONOMIC NEWS OF BULGARIA	EN		IR	1	20M		CON ECON CONO
EKONOMICHESKAYA GAZETA	RS		D	X	N		ECON CONO
ETUDES ET CONJONCTURE	FR		12	C	6M		ECONOMIC CONO
ETUDES ET STATISTIQUES	FR		12	4	176	86	ECON CONO
FAR EASTERN ECONOMIC REVIEW	EN		52	1	5		ECON CONO
FEDERAL NIGERIA	EN		12	1	66		GENE ^U ECON C
GERMANY: THE MAGAZINE OF THE FEDERAL REPUBLIC	EN		04	1	4MV		EN ECON CONO
GHANA RECONSTRUCTS	EN		06	1	256		ECON CONO
HS.N CHIEN-SHE	CH		12	2	1L		ECON CONO
INDUSTRIAL REVIEW OF AFRICA	EN		12	1	1	2	INT ^U ECON CONO
INDUSTRY OF FREE CHINA	EN		12	2	193L		ECON CONO IND
INDUSTRY TODAY	EN		12	2	1	1R	ECON CONO IND
INFORMACION ECONOMICA SEMANAL	SP		52	C	16E		ECON CONO
INTERNATIONAL COMMERCE	EN		52	1	1	V	CON ECON CONO
INTERNATIONAL FINANCIAL NEWS SURVEY	EN		52	1	1		COMM ECON CON
ISRAEL ECONOMIC INDICATORS	HE EN		12	C	13K		ECON CONO
LATIN AMERICAN REPORT NEWSLETTER	EN		IR	1	7		GEN ECON CONO
MAGNEN DIGEST	EN		12	1	P		GEN ECON CONO
MEXICAN AMERICAN REVIEW	EN		12	2	V	F	ECON CONO IND
NEKHODNOYE KHOZATSTVO KAZAKHSTANA	RS		12	2	3M		ECON CONO
NETHERLANDS ECONOMIC BULLETIN FOR THE FOREIGN P	EN		24	1	33M		ECON CONO
NOTES ET ETUDES DOCUMENTAIRES	FR		IR	1	1		ECON CONO
NOTES ET ETUDES DOCUMENTAIRES SUPPLEMENT	FR		7W	1	1		ECON CONO
OPTIMA	EN		04	1	1	9Y	ECON CONO
ORIENTAL ECONOMIST	EN		12	1	73L		ECON CONO
OVERSEAS BUSINESS REPORTS	EN		IR	1	1		CON ECON CONO
OVERSEAS REVIEW	EN		12	1	1		ECON CONO
PLANOVNO STUPANSTVO I STATISTIKA	RU		12	1	20M		ECON CONO
POWER AND INDUSTRY	EN		12	2	5		ECON CONO
QUARTENLY ECONOMIC REV OF BELGIUM LUXEMBURG	EN		04	1	13M	23M	GEOE ECON CONO

LIST OF PERIODICALS CURRENTLY RECEIVED IN BOOK AND PERIODICAL LIBRARY JANUARY 1965

The first part of this list is arranged alphabetically by title and the second part alphabetically by broad subject. Each entry gives the title of the periodical, the language of the text, frequency of publication, period of retention in Army Map Service Book and Periodical Library, areas, and specific subjects concerned. These periodicals are routed upon receipt to interested elements in AMS. After routing, they are available for loan to individuals in AMS or through the Inter-Library Loan procedure to agencies outside AMS.

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EXPLANATORY NOTES

Title

1. Initial articles are omitted.
2. The first two words are usually not abbreviated; any other words are abbreviated to shorten the title to fit the space allowed.
3. Subtitles are not given unless needed to distinguish between otherwise identical titles.

Text

1. No more than two different languages are shown.
2. The first language listed is probably the most important or most used in the periodical; the second language may be for abstracts, etc.

3. Abbreviations used:

AF AFRIKAANS	EN ENGLISH	IN INDONESIAN	RS RUSSIAN
AG AFGHAN	ES ESTONIAN	IT ITALIAN	SC SERBO CROAT
AL ALBANIAN	ET ETHIOPIAN	JA JAPANESE	SL SLOVENIAN
AM AMHARIC	FI FINNISH	KO KOREAN	SP SPANISH
AR ARABIC	FL FLEMISH	MO MONGOLIAN	SW SWEDISH
BR BURMESE	FR FRENCH	NO NORWEGIAN	TH THAI
BU BULGARIAN	GE GERMAN	PE PERSIAN	TI TIBETIAN
CH CHINESE	GR GREEK	PL POLISH	TU TURKISH
CZ CZECH	HE HEBREW	PR PORTUGUESE	UK UKRAINIAN
DA DANISH	HU HUNGARIAN	RM RUMANIAN	VT VIETNAMESE
DU DUTCH	IC ICELANDIC		UR URDU

Frequency

1. Code used:
D = Daily
IR = Irregular
SW = Semiweekly or twice a week
TW = Triweekly or three times a week
2. A number indicates the number of times a year the periodical is issued.

Retention

1. Code used for AMS retention of periodicals:
P = Permanent
Number = Number of years
X = Less than 1 year
C = Cancelled after routing

Area

1. The AMS Library Theater area code is used.
2. Only two areas are given; if relative importance can be determined, the more important area is given first.

Subject

1. Abbreviations are used freely in order to show several subjects. They may vary depending on the space available; for example: The abbreviation for public works may be PUB WKS or P WK.
2. Two spaces are used between words to show two subjects, one space indicates one subject either inverted or in running order; for example: Geography, Economic and Current Events.

As an additional aid to research, separate tabulator listings can be supplied for areas, texts, frequency of publication, or retention in AMS Book and Periodical Library.

DOCUMENT CONTROL DATA - R&D		
1. ORIGINATOR'S NAME AND ADDRESS (Include complete address) BOOZ ALLEN APPLIED RESEARCH, INC. 4733 Bethesda Avenue Bethesda, Maryland 20014		2. SECURITY CLASSIFICATION Unclassified
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5. AUTHOR(S) (Last name, first name, initial) G. A. Kershaw, D. Crowder, J. E. Davis, E. G. Loges, E. Merendini, S. M. Thomas		
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9. PROJECT NO.	9b. OTHER REPORT NUMBERS (Any other numbers that may be assigned this report) AD 640 121	
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13. ABSTRACT <p>The Army Map Service (AMS) Library uses a Univac 1004 computer to produce map accessions lists and bibliographies from punched cards containing printed text. Also data on a Map Reproduction (Repromat) File are punched onto cards and transferred to magnetic tape on a Honeywell H-800 computer. This tape is used to produce a high-speed printout of the Repromat Tabulation semiannually and a monthly listing to update the semi-annual tabulation. It is felt that the mechanized Repromat File system should be modified in a number of ways for greater efficiency.</p>		

14	KEY WORDS	LINK A		LINK B		LINK C	
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