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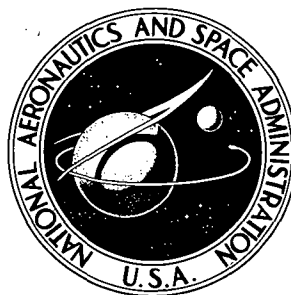
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AN ONLINE INTERACTIVE BOOK-LIBRARY-MANAGEMENT SYSTEM

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16. Abstract

The book-library-management system was designed to perform rapidly all circulation-desk bookkeeping duties at the Technical Library of the Manned Spacecraft Center, Houston, Texas. The system and its associated computers and remote-console input/output devices have produced noticeable improvements in various library operations by decreasing the number of errors, eliminating some operations, and freeing the library technician for more important work by decreasing the number of manual operations. In addition, less large-scale computer time is required to generate the necessary periodic statistical and inventory reports for management and control purposes.

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SUMMARY

Computers and remote-console input/output devices are being used effectively and efficiently in a real-time online environment at a technical-library circulation desk to accomplish the following.

1. Maintain an accurate, up-to-date history for each book in the library

2. Cross-reference various data such as user names and accession numbers

3. Interrogate data files using one or more entry algorithms

4. Provide the necessary periodic statistical and inventory reports for management and control purposes

This report describes the book-library-management system designed for the Technical Library of the Manned Spacecraft Center, Houston, Texas. The system rapidly performs all circulation-desk bookkeeping duties, thereby freeing the library technician for more important work.

INTRODUCTION

The Manned Spacecraft Center (MSC) Library was organized to serve the Space Task Group (STG), the predecessor of MSC. At that time, all circulation and statistical records were maintained and updated manually because there were few personnel in the STG and few books to be maintained.

The manual system had many disadvantages that the librarians had to accept, such as the following.

1. Circulation data had to be recorded manually in several places for each transaction (chargeout, turn-in, etc.).

2. Reserve lists had to be scanned visually each time a book was returned to the circulation desk.

3. Error checking was performed by the same individual who updated the records, or it was not performed at all.

4. Overdue notices were mailed if time permitted.

These problems increased in magnitude and complexity as the size of the STG and the number of books in the library increased. The formal transition of the STG into the MSC, the increase in the number of NASA personnel, the increase in the number and types of books, and the influx of contractor personnel made a more efficient and modern library circulation system necessary.

A semiautomated circulation system was developed that improved the library circulation system through extensive use of data-processing equipment. This new system provided weekly inventory reports (sequenced by accession number, call number, and user name), preprinted overdue notices, and compiled weekly circulation statistics. The complete history and status of each publication were maintained on a magnetic tape, updated weekly, that was used as input to a report-generating program.

Although this system improved the overall circulation system, many problems offset the benefits. The inventory listings usually did not contain transactions made after noon on Friday. Supplemental listings had to be maintained during the week to reflect the transactions made since the last inventory reports. The time saved by the computer processing was offset by the time required to fill out keypunch forms, check the interim listings, and so forth, with the result that a large number of human errors occurred, especially when the circulation desk was very busy. Every time a book was returned to the library, the list of reserve requests had to be scanned manually to determine if another user was waiting for the book. It was very difficult to purge the master file to clear errors that appeared because "fake" transactions had to be entered in the correct order to accomplish the correction.

More accurate records had to be maintained for the expanding library, and more efficient circulation procedures had to be introduced. The problems confronting the library were outlined in a series of meetings between the Computation and Analysis Division systems personnel and the library personnel. As a result of these meetings, an online circulation system was formulated.

The major item contributing to the system design was the development of detailed flow charts for each library function. The functional flow charts were then analyzed to eliminate unnecessary operations, and an overall flow chart of the operation was obtained by integrating the individual function charts.

LIBRARY FUNCTIONS

The MSC Technical Library personnel are responsible for the orderly and efficient operation of the library. This responsibility includes making the latest books available to the MSC staff, simplifying and streamlining circulation procedures, and maintaining accurate statistical and inventory reports for management purposes. Several distinct functions are performed by these personnel, such as the following.

1. Processing and preparing new books for circulation

2. Charging books to library users and extending the due date when requested

3. Recycling returned books so they may be charged out by another user (including processing reserve requests for books that are charged out)

4. Dropping books from the active circulation system

5. Retrieving data pertaining to the status of various books, including those charged to a particular user

6. Mailing overdue notices when necessary

SYSTEM REQUIREMENTS

The following requirements for the book-library-management (BLM) system were selected during several consultative sessions with the library staff.

1. The file must be nondestructible, or there must be a method of rebuilding the file if it is erased.

2. The file must be generated initially from existing data, not by entering the history data manually.

3. Error checking must be performed by the computer whenever possible.

4. A correctional procedure must be included to permit the library technician to delete procedural errors from the console. Complex errors should be corrected by the system-programing personnel.

5. Cross-referencing must be available among the book history data, user name, and call number.

6. A method must be available for obtaining inventory reports when required.

7. The remote input/output console should be on line and ready for immediate response.

8. Communications between the library technician and the computer system must be in a dialog form easily understood by the library technician.

9. The library technician must receive a copy of every transaction performed.

10. All processing and circulation functions must be performed immediately as data are entered by the library technician.

11. The system must be capable of servicing multiple remote input/output consoles simultaneously.

EQUIPMENT

Each computer system available at MSC was evaluated for its interactive on-line capabilities. To be selected, a system was required to have the following characteristics.

1. Real-time data-communications capability

2. Large mass storage other than magnetic tapes

3. Multiprograming capability

4. Available core memory to be reserved for the required software

A UNIVAC 418 computer, already operating as a message switcher and remote input/output terminal controller, was selected for the system. This computer, with its executive software system and software support package, is designed primarily for data-communications applications. The configuration of the existing system (fig. 1) included the necessary mass storage (Fastrand II drum), available core memory, communications terminal modules, and a communications controller that allowed simultaneous operation of multiple communications lines. Teletypewriters were selected for the remote input/output console because of simplicity, low cost, reliability, and printed-page capability.

The interaction between the BLM system and the primary remote batch input/output terminal system was examined to determine if a conflict would occur between central-processing-unit (CPU) processing and input/output operations. Because the BLM-system response requirements would be dependent on the rate that data would be
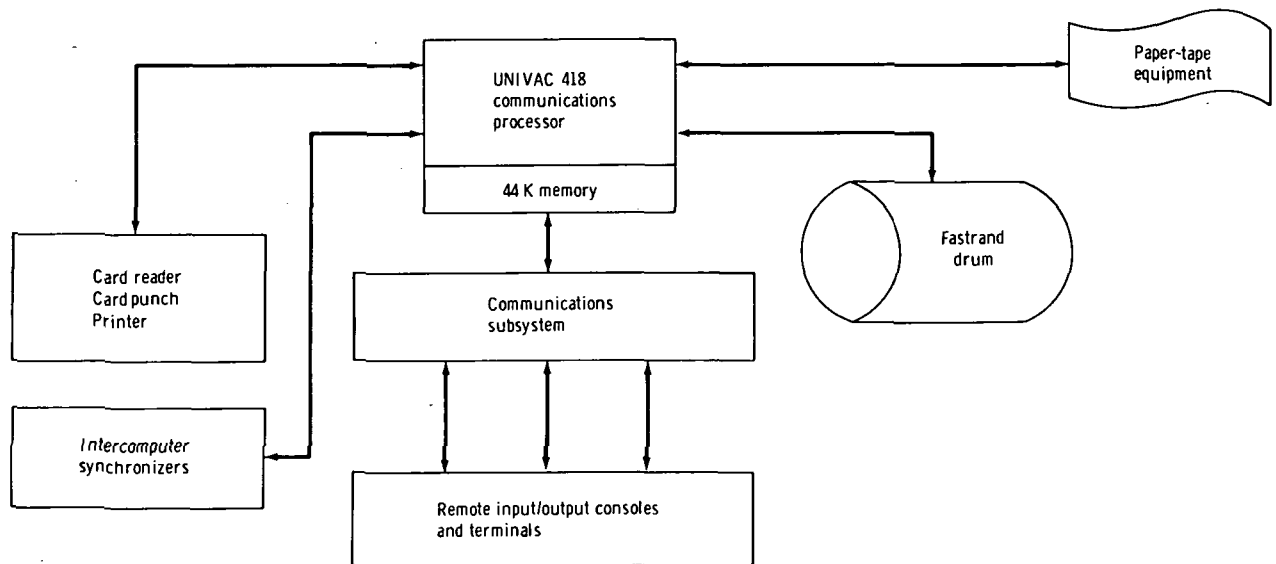

Figure 1. - The UNIVAC 418 configuration.

received from the remote console and because processing would be performed at a lower priority level in the computer, CPU conflicts for processing time were determined not to be a problem. Transfer of data to and from the file area on the mass-storage device did prove to be a possible bottleneck if all operational terminals began sending and receiving data at the maximum rate. In this case, only a longer response time would be noticeable — no loss of data.

SYSTEM COSTS

Two factors contribute to the cost of this type of system, hardware and software. The software cost will vary depending on the skill of the programer and sophistication of the programing language. The hardware cost will vary depending on the amount of computer facilities that must be dedicated for the system, the communications facilities required, and the type of input/output consoles selected.

TECHNICAL DESIGN

Design of the BLM system required that existing software be used if possible and that a minimum amount of core storage be committed to reduce overall costs. In the following discussion, all numbers preceded by a 0 are to be interpreted as octal values. The design effort was divided into five areas.

1. Content and structuring of the drum resident data files

2. A program to generate the initial files from existing data

3. The online program to interface the library technician, the computer, and the drum resident data files

4. The offline support program

5. The inventory-report-generating program

This partitioning of the system development effort permitted concurrent design, programing, and checkout in each area with a minimum amount of interface between personnel.

FILE DEFINITION

The design of drum resident files was governed by three criteria.

1. The history data for each book in the file must be directly accessible by sequential accession number.

2. The data must be cross-referenced by user name and call number referenced to accession number.

3. The files must be either nondestructible or reloadable.

A decision was made to maintain three separate but related files: (1) a master history file (MHF), (2) a daily transaction file (DTF), and (3) a free-chain cross-reference file (CRF).

Master History File

The MHF contains a unique entry for each book history and is ordered sequentially by accession number. The data contained in each entry (table I) consist of book-description data, book-status and book-usage data, user data, and drum-addressing data. The entire file is relocatable, and individual histories are directly addressable by means of the file base address.

TABLE I.- MASTER-HISTORY-FILE ENTRY FORMAT

Characters	Contents
Book data	
1 to 6	Accession number
7 to 27	Call number
28 to 30	Copy number
31 to 33	Edition number
34 to 36	Publication year
37 to 51	Author name
52 to 120	Title
Use status	
121 to 122	Usage counter
123	Status of the book
User data	
124 to 129	Due date
130 to 132	Permanent loan flag
133 to 147	User name
148 to 153	Mail code
154 to 165	Unused
166 to 168	System

Daily Transaction File

The DTF is used to record the updates made to the MHF each day. Every time a command is executed that updates the contents of the MHF, the history record also is written in the next available DTF entry. The circulation statistics are maintained in the first entry of the file (table II). The format of the data in each DTF entry is the same as that in the MHF entry (table I).

TABLE II. - DAILY-TRANSACTION-FILE

MASTER ENTRY FORMAT

Words	Contents
1	Transaction counter
2	Number of processes (P)
3	Number of circulates (C)
4	Total number of turn-ins (T)
5 to 14	Turn-ins — codes 0 to 9
15	Number of drops (D)
16	Reserve list pointer
17 to 56	Unused

Cross-Reference File

The CRF correlates the MHF (a well-ordered data file) with two unconstrained variables — the user name and the call number. The CRF (table III) consists of the following items.

1. A master record (one dedicated link)

2. A base user-name/index area (01000 dedicated links)

3. A base call-number/index area (0100 dedicated links)

4. A free-chain-link pool area (variable number of links)

TABLE III. - CROSS-REFERENCE-FILE MAP

Type of data	Absolute address
Master entry	BA + 0
User name/index	BA + 1 + HC
Call number/index	BA + 1001 + HC

Free chain links
 	
   User name/index
 	
   Call number/index
 	
   Accession-number lists
 	
   Reserve list
	BA + pointer

The master record contains status and usage data necessary for the maintenance of the free-chain portion of the file and is referenced only when the online program is initiated. Each user-name/index link (table IV) contains the chain-linkage data and five slots for user data that correlate a user and a list of accession numbers of the books charged to the user. Each call-number/index link (table V) contains the chain-linkage data and five slots for call-number data that correlate a call number and a list of accession numbers of the books with that call number. The free-chain-pool links are used for extension of the user-name/index chain, extension of the call-number/index chain, formation of the accession-number chains for either index, and formation of the reserved book list. The user-name/index and call-number/index base links are entered by using the CRF base address plus a 9-bit or 6-bit hash code, respectively. The chain of links is searched for a matching name or call number, and the pointer to the accession-number list is retrieved. Links that are part of the free-chain pool (whether in use or in the pool) are addressed by adding the relative pointer to the CRF base address. The hash codes are obtained by compressing the user name of the call number to the required number of bits by repeated "exclusive OR-ing" of the data.

TABLE IV. - TYPICAL USER-NAME/INDEX LINK

Words	Number	Contents
Control words[a]		
1	--	Count of entries in use
2 to 3	--	Pointer to preceding link ≥ 0
4 to 5	--	Pointer to following link ≥ 0
User entries		
6 to 10	1	5 words for user name
11 to 12		Unused
13		Count of user's delinquent books ≥ 0
14 to 15		Pointer to list of accession numbers
16 to 25	2	Same contents as user entry number 1
26 to 35	3	Same
36 to 45	4	Same
46 to 55	5	Same
56	--	Unused

[a]Each word has three characters.

TABLE V. - TYPICAL CALL-NUMBER/INDEX LINK

Words	Number	Contents
Control words[a]		
1	--	Count of entries in use
2 to 3	--	Pointer to preceding link ≥ 0
4 to 5	--	Pointer to following link ≥ 0
Call entries		
6 to 12	1	7 words for call number
13		Unused
14 to 15		Pointer to list of accession numbers
16 to 25	2	Same contents as call entry number 1
26 to 35	3	Same
36 to 45	4	Same
46 to 55	5	Same
56	--	Unused

[a]Each word has three characters.

A typical user-name/index chain is shown in figure 2. The chain contains three links: (1) the base link with three user entries, (2) the free-chain link (031577) with two user entries, and (3) the free-chain link (016733) with three user entries. In this particular chain, no user has more than one accession-number link chained to him; however, any of the chains (user-name/index or accession number) may be extended with only the size of the free-chain pool restricting the chain length.
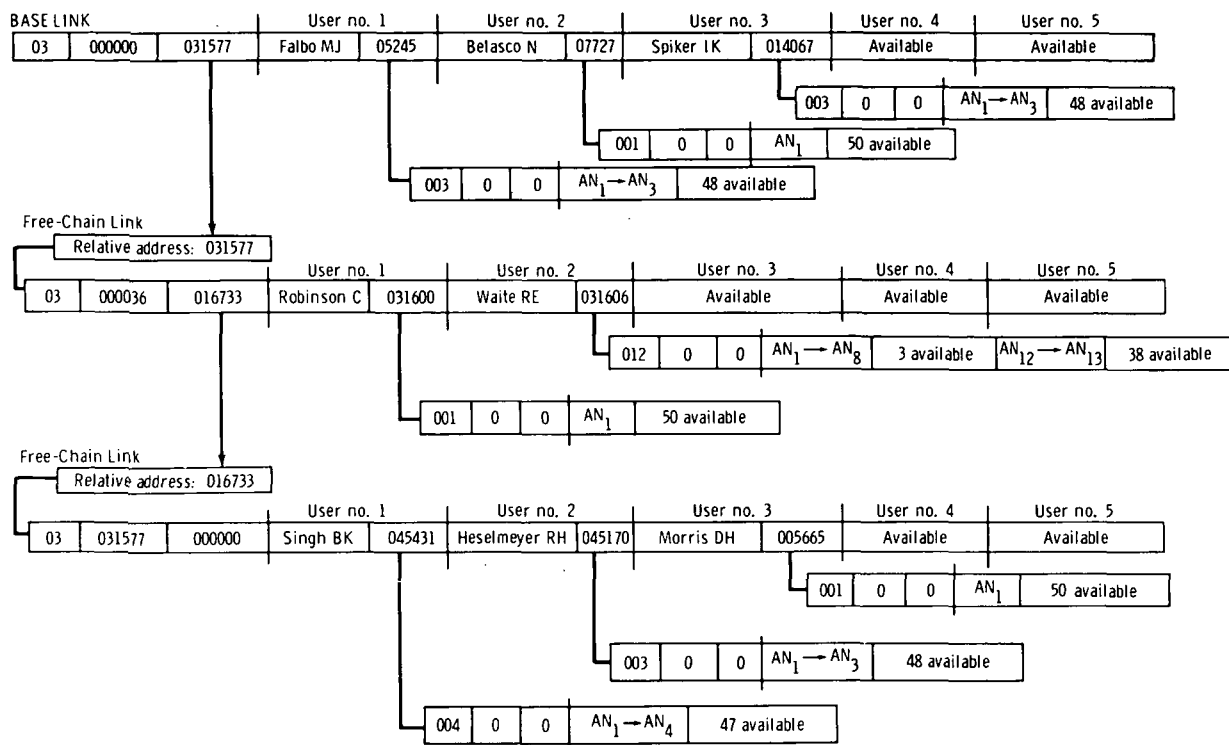
Figure 2. - Typical user-name/index chain.

INITIAL FILE GENERATOR

The initial file generator or data converter is designed to reformat data from the semiautomated system file. Each history record is stored on the Fastrand drum as it is formatted. The histories containing errors in key data fields are flagged to indicate that library action is required.

ONLINE PROGRAM FUNCTIONS

The BLM program is designed to interface the library technician with the drum resident files by means of the remote console and UNIVAC 418 computer. The BLM program is written in assembly language (ART418) to use the power and capabilities of the computer to the greatest extent and to fulfill the system requirements. The BLM program performs the following tasks.

1. Generates the necessary internal constants and linkages with the communications-interrupt-answer (CIA) routine

2. Decodes and validates commands that are entered by the library technician and passes control to the proper processing routine

3. Inputs the data required to complete execution of the command, performing as many cross-checks on the data as possible in the process

4. Updates the MHF and DTF if a file-updating command is being executed

5. Updates the CRF when necessary

6. Prints diagnostic messages at the library console, at the computer console, or both, if serious error conditions arise

7. Schedules a self-termination sequence when instructed by the library technician or by the UNIVAC 418 computer operator

8. Tabulates and totals the counts of all file-updating commands performed since the last MHF dump

A flexible set of commands enables the library technician to perform all normal daily transactions. These commands are either file-updating commands that modify the contents of the MHF, DTF, and CRF or interrogation and control commands that display file data or parameters. Whenever a command is entered, the BLM program determines that room is available in the file areas (if it is a file-updating command) and then whether the current status of the book allows execution of the command (e.g., a book "on the shelf" cannot be turned in).

File-Updating Commands

There are five commands, some of which have two variations, that modify the contents of the MHF. Final updating of the files does not occur until data are approved by the library technician. Appendix A contains samples of these commands, and a summarized list is presented in table VI.

TABLE VI. - SUMMARY OF FILE-UPDATING COMMANDS

Command	Code	Description
Process — manipulates data describing a book		
Normal	P	Enters a book in the file for the first time
Reprocess	PR	Corrects description data for a book already in the file
Circulate — charges a book to a user		
Normal	C	Charges a book to a new user
Recirculate	CR	Extends the due date of a book already charged out

TABLE VI. - SUMMARY OF FILE-UPDATING COMMANDS - Concluded

Command	Code	Description
Circulate — charges a book to a user - Concluded		
Turn-in	T	Returns a book to on-the-shelf status
Drop	D	Removes a book from active status
Trouble	F	Changes the value of the trouble/overdue code

Circulate command. - The circulate command is used to charge a book to a user. Two forms of the command, circulate normal (C) and circulate renewal (CR), are valid. The C variation is used when the book is available for chargeout. The BLM program confirms that the book is not charged out, echoes the call number for a validity check, requests the necessary data concerning the user (name, mail code, and due date), and updates the drum resident files. If the user requesting a book is currently holding delinquent books, the library technician is notified so the circulate command can be aborted. The CR variation is used when a user wishes to renew a book already charged to him. The BLM program confirms that the book is already circulated, echoes the call number for a validity check, requests the new due date, and updates the drum resident files. If the book has been reserved by another user, the library technician is instructed to recall the book instead of renewing it and to make it available to the next user.

Turn-in command. - The turn-in (T) command is used when a user returns a book that is to be put on the shelf for recirculation. The BLM program confirms that the book is valid and circulated, echoes the call number for validation, and updates the drum resident files. If the book is currently on the reserve list, the library technician is notified so the book can be charged out immediately to the user who made the reservation.

Process command. - The process command is used to enter new books into the file or change data that describe a book already in the file. Two forms of this command, process normal (P) and reprocess (PR) are valid. The P variation is used to enter a new book into the file. The BLM program confirms that the accession number assigned is unused, requests book description data (call number, copy, edition, publication year, author, and title), and updates the drum resident files. The PR variation is used to change description data for a book already in the file. The BLM program confirms that the book is not circulated and echoes the call number for validation. If commanded to continue, the BLM program deletes all record of the book from the drum resident files and continues as if the P variation were entered. No circulated book can be reprocessed until it is turned in by the user.

Drop command. - The drop (D) command is used to remove a book from active status in the circulation system. The BLM program confirms that the book is on the shelf and echoes the call number for validation. The BLM program then charges the book to a fictitious person named DROPPED and updates the drum resident files.

Trouble command. - The trouble (F) command is used to change the value of the trouble/overdue code in a specified book history. The BLM program confirms that the book is circulated, echoes the call number for validation, and requests the new code. The MHF and DTF are updated, and the delinquency counter in the user-index entry of the CRF is updated if necessary.

Display and Control Commands

Five commands display information and two commands control the BLM program. Appendix B contains samples of these commands, and a summarized list of the commands is presented in table VII.

TABLE VII. - SUMMARY OF DISPLAY AND CONTROL COMMANDS

Command	Code	Description
Display commands		
Accession number	IA	Displays history data for a specific book
Call number	IC	Displays history data for all books with a common call number
User name	IU	Displays accession numbers of all books charged to a specific user
Reserve	R	Enters a specific book in a reserve list
Action	A	Displays the number of transactions contained in the DTF
Control commands		
End	E	Terminates the BLM program

Inquiry command. - Three forms of the inquiry command are used to display data contained in either the MHF or the CRF. The inquiry-by-accession-number (IA) variation is used to display all data pertinent to a specific book. If the book is circulated, the BLM program keys on the accession number and displays all the book data and user data. The inquiry-by-call-number (IC) variation is used to display data of all books that have the same call number. The BLM program retrieves the list of accession numbers from the call-number/accession-number link of the CRF and then retrieves and displays book and user data from each history (in the same format as the IA variation). If an inquiry is made on a particular call number and more than 10 books have the number, the histories of the first 10 are printed on the console and the library technician is referred to the inventory listing for the remaining histories. The inquiry-by-user-name (IU) variation is used to obtain a list of accession numbers of all the books charged to a user. The BLM program retrieves the list of accession numbers from the CRF and displays the numbers one at a time.

Reserve command. - The reserve (R) command is used to reserve a book for a user before it is turned in by the current user. The call number of the particular book is entered in a list that is interrogated each time a book is turned in or renewed.

Action command. - The action (A) command is used to display the count of file-updating commands executed during the current workday.

End command. - The end (E) command is used to terminate the BLM program and to clear it from the computer memory.

BOOK-LIBRARY-SUPPORT PROGRAM

The book-library-support (BLS) program is designed to perform all offline-support for the BLM system, such as dumping the drum resident files onto magnetic tape, reloading the drum resident files that have been erased, and generating the cross-reference index. When an option is selected and initiated, processing is performed in phases until complete. If the BLS program requires additional data to continue processing, the operator is informed by console typeout. Normally, the drum resident file can be rebuilt by reloading the MHF, DTF, and CRF dump tapes in the proper sequence.

The overdue codes are updated each Friday during the MHF dump, and the necessary entries are made on both the drum resident file and the dump tape. If a book becomes delinquent, the necessary indicators are set to alert the library technician in case the particular user attempts to charge out additional books.

REPORT GENERATOR

The report generator is a portion of the semiautomated system (fig. 3) that was revised to accept the MHF dump tape as input and to generate (1) complete inventory listings sorted by accession number, call number, and user name; (2) first and second overdue notices; (3) delinquent and trouble lists; and (4) circulation statistics for the interval since the last MHF dump. Appendix C contains samples of the various reports.
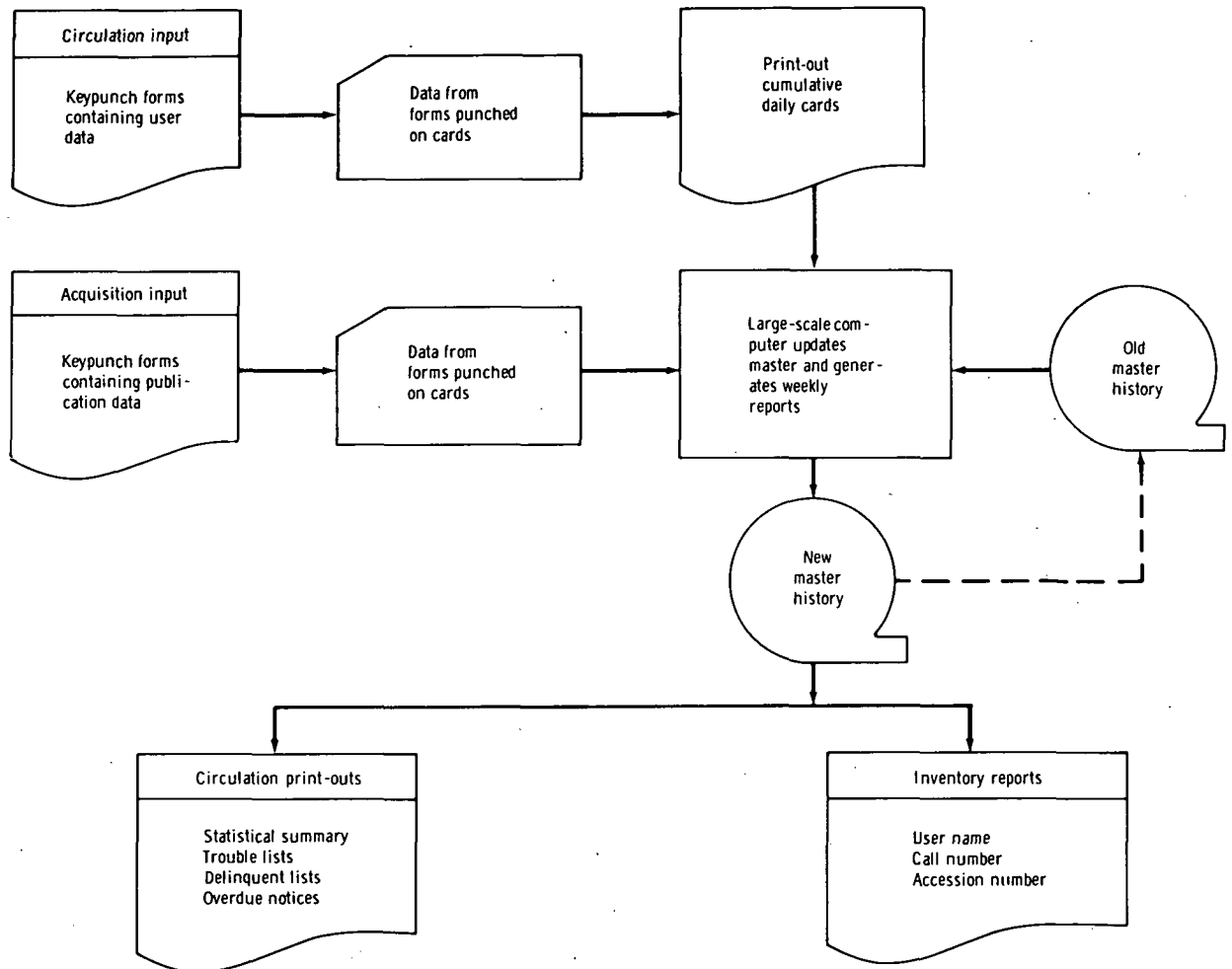
Figure 3. - Semiautomated circulation system.

SYSTEM OPERATION

Operation of the BLM system (fig. 4) can be described best as a coordinated flow of data through the online program, the support program, and the report generator program. The BLM program, activated each morning by the library technician at the remote console, is used to update the drum resident files and to retrieve information from the files for display. The BLS program is loaded and executed upon termination of the BLM program to obtain a backup copy of the transactions of the day in the event the drum resident file must be reloaded. Each Friday, the entire MHF is dumped onto a magnetic tape to provide a base reference for file reloading and for an input-data source for the report generator. The report generator then processes the MHF dump tape and produces the overdue notices, delinquent and trouble lists, circulation statistics, and other required reports.

Figure 4. - Data flow in the BLM system.

SYSTEM ACTIVATION

Activation of a system such as the BLM system is a one-time operation and cannot be repeated with the original data once the system has been in operation. Therefore, every effort must be made to build the drum resident data files correctly the first time. Several guidelines were established to ensure an error-free file.
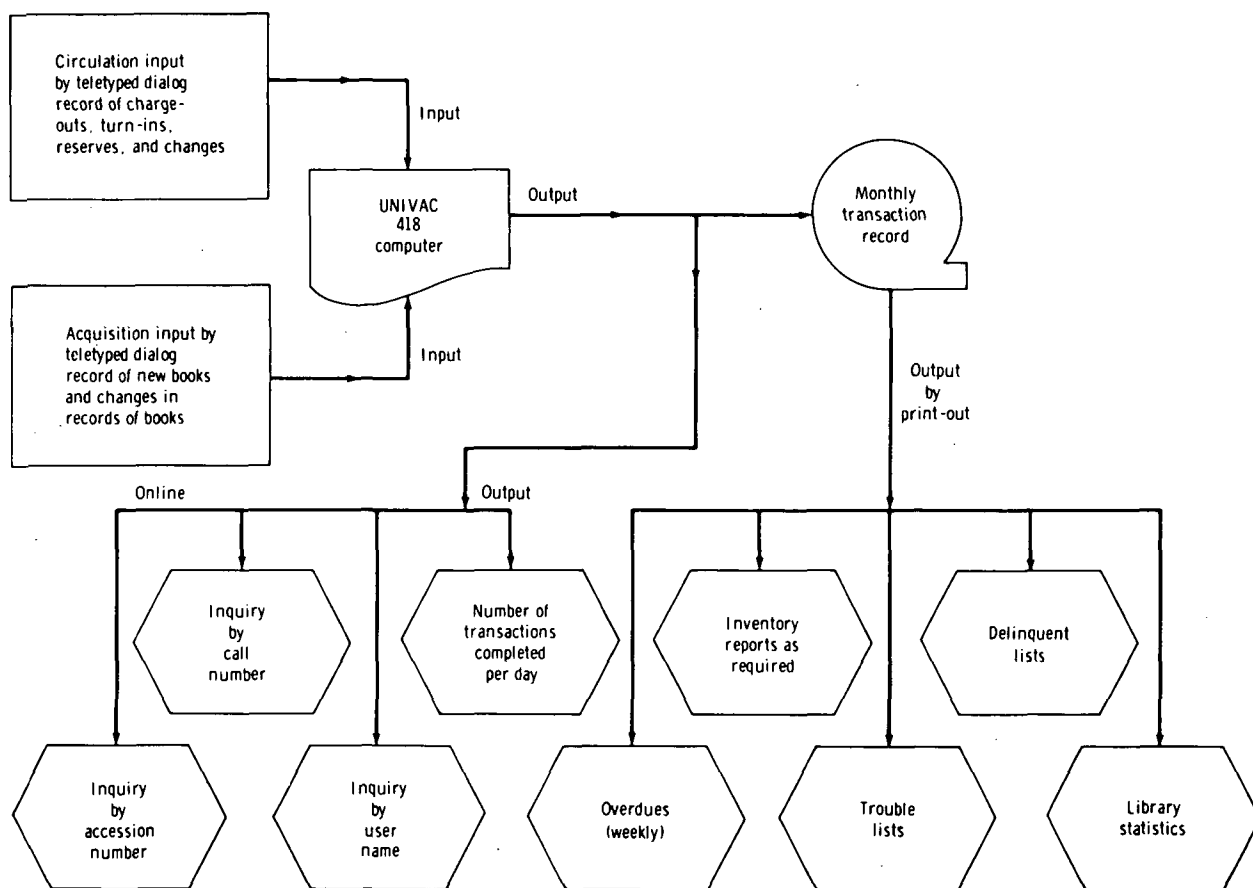
1. The semiautomated file data base used as input to the file generator should be as nearly current as possible to simplify the conversion.

2. Histories that contain erroneous data as specified by library personnel must be flagged for corrective action.

3. A method must be provided for the system personnel to cross-check reformatted data in the new file with the input data.

4. The entire drum resident file must be generated in one continuous operation, with built-in breakpoints available in case the program must be restarted.

5. Reload tapes must be made as soon as the file is generated.

6. The old system and the new system should be operated in parallel through at least one reporting cycle.

History-File Generation

A copy of the semiautomated system data base was reformatted, checked for invalid call numbers and user names, and written on the drum as the MHF. Each history record was scanned for several types of errors during the reformatting process, including the following.

1. Invalid user names

2. Invalid call numbers

3. Incorrectly formatted call numbers

4. Incorrect usage statistics

A list of the histories that could not be properly reformatted was printed for corrective action by the library personnel.

Cross-Referencing

Cross-referencing of the file data was performed during the second phase of the system activation. The entire file was scanned — one history at a time — and the user-name/accession-number and call-number/accession-number indexes were generated. Constants and pointers required to continue the cross-referencing operation from a restart condition were maintained on the drum.

Reload Tapes

The MHF and CRF were copied onto magnetic tape as soon as they were generated to provide a base for possible file regeneration. These base tapes eliminated the possibility of beginning the file generation with original input data from the semiautomated system.

Data Validation

The newly established files were cross-checked against the inventory listings made with the semiautomated system report generator. The BLM program was used to retrieve data from the drum resident files for the cross-checks, thus providing a final check on the operational BLM program and a verification that all data were correct.

Parallel Operation

The semiautomated system and the online system were operated in parallel for 4 weeks to develop sufficient confidence in the online system before the semiautomated system was entirely terminated. The two systems were maintained independently during the 4 weeks. The inventory reports generated with each system were cross-checked each week, and any discrepancies were investigated and corrected if they occurred in the online system.

Indoctrination and Training

The librarians and library technicians were trained in operation of the system in two phases: (1) as active participants during development and (2) as users when the operational system was ready for use. The library staff assisted the system programers in fixing the final data-input formats and console typeout messages periodically, using a practice file. Final training and indoctrination were accomplished with a detailed operators' manual and "hands-on" operation of the console. Because the teletype keyboard is essentially the same as a standard typewriter keyboard and because data-input formats are fairly rigid, very little training was required to teach personnel to operate the console.

CONCLUSIONS

The system has proven extremely successful in the 18 months it has been operational. Several improvements could be made that would enhance the system.

1. The KSR 35 teletypewriter should be replaced by a quieter device that would permit locating the console at the circulation desk.

2. The cross-referencing algorithm used should be modified to permit more efficient use of the drum storage. The procedure of generating these indexes from scratch should be analyzed in detail to permit modification of the indexing routine.

3. The correctional procedures necessary to correct file errors that result from undetected software or hardware problems should be simplified wherever possible.

The successful design and activation of a book-library-management system require that the following tasks be performed in minute detail.

1. The functions performed by the library personnel should be flow-charted in detail to eliminate as many needless operations as possible, to combine remaining operations where possible, and to present additional areas in which the facility operation can be streamlined.

2. Preliminary operational procedures, formats for data input and output data, error checking and correctional schemes, periodic reports and their formats, and so on should be approved by the library personnel and computer-systems personnel.

3. A thorough study should be made of the facility area to determine the most desirable type of console device to be used. Factors such as permissible noise levels, temperature and humidity, proximity of customers and possibility of their tampering with the console, and so forth should be considered.

4. The operational online program must perform as many cross-checks, format checks, and validity checks as possible to prevent erroneous data from entering the system and to prevent destruction of the file.

5. A positive, rapid method must be available for rebuilding the drum resident files if they are destroyed. This must be accomplished with as little system downtime as possible.

The overall philosophy, design, and operation of the library-management system demonstrate the feasibility and practicality of a technical-library circulation system operating on line.

The system has produced the following noticeable improvements in library operations.

1. A decrease in the number of manual operations required to pass books through the circulation system

2. A decrease in the number of errors in the data file

3. A decrease in the time required to retrieve information pertaining to a particular book, the books charged to a particular user, and the books having a common call number

4. Elimination of all keypunching and associated operations

5. More accurate inventory reports, overdue notices, and circulation statistics

6. A printed copy of all transactions performed each day

7. A decrease in the amount of large-scale computer time required to generate inventory reports

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APPENDIX A

SAMPLES OF FILE-UPDATING COMMANDS

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```
NEXT  ?  PN
ACNO  ?  34801
CALL  ?  JL 777.C22,V1L
COPY  ?  001
EDIT  ?  02
YEAR  ?  70
AUTH  ?  WILSON G M
TIT1  ?  A REAL-TIME LIBRARY MONITOR
OK    ?  Y




NEXT  ?  PR
ACNO  ?  34801
JL 777.C22,V1L          001
OK    ?  Y
ACNO  ?  34801
CALL  ?  KL8838 B11,L1
COPY  ?  002
EDIT  ?  01
YEAR  ?  69
AUTH  ?  GORDON P T
TIT1  ?  AN ONLINE LIBRARY MONITOR
OK    ?  Y
```

TYPICAL PROCESS COMMANDS

```
NEXT  ?  C
ACNO  ?  31468
QB 461 C52,V1           001
OK    ?  Y
USER  ?  MC CLUSKEY G E
MAIL  ?  TG4
DUE   ?  071069
OK    ?  Y




NEXT  ?  CR
ACNO  ?  30982
TK7835 N8,V1-2          001
DUE   ?  071069
OK    ?  Y




NEXT  ?  CR
ACNO  ?  26347
QB 591 L83,             001
RSVD
```

TYPICAL CIRCULATE COMMANDS

```
NEXT ? T
ACNO ? 11494
TJ 785 S64,              001
OK    ? Y



NEXT ? T
ACNO ? 26196
TJ 787 S62,              001
OK    ? Y
RSVD LAST ? Y



NEXT ? T
ACNO ? 24062 ON SHLF
```

TYPICAL TURN-IN COMMANDS

```
NEXT ? D
ACNO ? 34801
KL8888 B11,L1            002
OK    ? Y
```

TYPICAL DROP COMMAND

```
NEXT ? F
ACNO ? 34801
JL 777.C22,V1L           001
CODE ? 2
OK    ? Y
```

TYPICAL TROUBLE COMMAND

APPENDIX B

SAMPLES OF DISPLAY AND CONTROL COMMANDS

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```
NEXT ? IA
ACNO ? 23510
CALL ; QA 374 S94,            002
EDIT ;
YEAR ; 66
AUTH ; BRAMBLE
TITL ; NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIO
     ; NS PROCEEDINGS
USER ; MURAD P A
MAIL ; ES54
DUE  ; 061969  0



NEXT ? IA
ACNO ? 01768
CALL ; QA  76.5L49P,         001
EDIT ;
YEAR ; 62
AUTH ; LEDLEY
TITL ; PROGRAMMING/UTILIZING DIGITAL COMPUTERS
USER ; WILSON D N
MAIL ; BRN
DUE  ; 070769  0



NEXT ? IA
ACNO ? 17031
CALL ; QH 366 D76,           001
EDIT ;
YEAR ; 66
AUTH ; DUCROCO
TITL ; THE ORIGINS OF LIFE
```

TYPICAL INQUIRY-BY-ACCESSION-NUMBER COMMANDS

```
NEXT ? IC
CALL ? QB   44 AL7,

ACNO ; ⓪7333
CALL ; QB   44 AL7,                ⓪⓪1
EDIT ;
YEAR ;
AUTH ; ALTER
TITL ; PICTORIAL ASTRONOMY

ACNO ; ⓪7991
CALL ; QB   44 AL7,                ⓪⓪2
EDIT ; ⓪2
YEAR ; 63
AUTH ; ALTER
TITL ; PICTORIAL ASTRONOMY

ACNO ; 1124⓪
CALL ; QB   44 AL7,                ⓪⓪5
EDIT ;
YEAR ; 63
AUTH ; ALTER
TITL ; PICTORIAL ASTRONOMY

ACNO ; 11242
CALL ; QB   44 AL7,                ⓪⓪7
EDIT ;
YEAR ;
AUTH ; ALTER
TITL ; PICTORIAL ASTRONOMY
USER ; EXTRA
MAIL ; BM6
DUE  ; 12⓪⓪68P ⓪
```

TYPICAL INQUIRY-BY-CALL-NUMBER COMMAND

```
NEXT ? IU
USER ? COLUNGA D
ACNO ; 29216
ACNO ; 21726
ACNO ; 21971
ACNO ; 24615
ACNO ; 2⓪⓪33
ACNO ; 28656
ACNO ; 25312
ACNO ; 18⓪63
ACNO ; 1284⓪
ACNO ; 16887
ACNO ; 18886
ACNO ; 166⓪6
ACNO ; 31⓪59
ACNO ; 22972
ACNO ; 1⓪8⓪5
ACNO ; ⓪8138
ACNO ; 32813
ACNO ; ⓪2258
ACNO ; 22246
ACNO ; 26185
ACNO ; 1⓪68⓪
ACNO ; ⓪4751
ACNO ; 25152
DONE



NEXT ? IU
USER ? BROVEY M A
NO BOOKS
```

TYPICAL INQUIRY-BY-USER-NAME COMMANDS

```
NEXT ? R
CALL ? QA 611 B42,
OK    ? Y
```

TYPICAL RESERVE COMMAND

```
NEXT ? A
⓪⓪⓪121 ACTS
```

TYPICAL ACTION COMMAND

APPENDIX C

SAMPLES OF LISTINGS, STATISTICS, AND OVERDUE NOTICES

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PERSON	CIVN.	DATE	OD	USE	ACCN.	CALL NO.	COPY	ED	YR	AUTHOR	TITLE
TROMBLEY J F	EC441	P040046	0	01	16576	TS 283 A6.	001		65	ASME	RULES FOR CONSTRUCTION OF UNFIRED PRESSURE VESSELS
VILLEMARETTE R	EP421	112069	1	02	16577	TC 177 A5.	001		59	ASME	FLUID METERS
EXTRA	BM6	P060068	0	02	16578	TA 175 W86.	004	02	64	WOODSON	HUMAN ENGINEERING GUIDE FOR EQUIPMENT DESIGNERS
RIPPSTEIN M	EC7	P103067	0	02	16579	QB 351 W6.	001	02	41	WINTER	ANALYTICAL FOUNDATIONS OF CELESTIAL MECHANICS
ALLEN J H	BH231	P040046	0	01	16580		001		50	PATTERSON	GERMAN ENGLISH DICT FOR CHEMISTS
		P040048	0	01	16581		003		64	AMISS	USE OF HANDBOOK TABLES/FORMULAS
SAUERS D G	EC7	081368	0	10	16582	QC 612.S4M63.	001		65	MOTOROLA	SEMICONDUCTOR DATA MANUAL
FULTON W	EE5	P040056	0	01	16583	QC 495 W93.	003		64	WRIGHT	MEASUREMENT OF COLOUR
FULTON W	EE5	P040046	0	01	16584	QC 100 N21.V1	003		61		PRECISION MEASUREMENT/CALIBRATION V1
FULTON W	EE5	P040056	0	01	16585	QC 100 N21.V1	004		61		PRECISION MEASUREMENT/CALIBRATION V1
FULTON W	EE5	P040066	0	01	16586	QC 100 N21.V1	005		61		PRECISION MEASUREMENT/CALIBRATION V1
FULTON W	EE5	P040026	0	01	16587	QC 100 N21.V1	006		61		PRECISION MEASUREMENT/CALIBRATION V1
FULTON W	EE5	P040068	0	01	16588	QC 100 N21.V2	003		61		PRECISION MEASUREMENT/CALIBRATION V2
FULTON W	EE5	P040046	0	01	16589	QC 100 N21.V2	004		61		PRECISION MEASUREMENT/CALIBRATION V2
FULTON W	EE5	P040046	0	01	16590	QC 100 N21.V2	005		61		PRECISION MEASUREMENT/CALIBRATION V2
FULTON W	EE5	P040064	0	01	16591	QC 100 N21.V2	006		61		PRECISION MEASUREMENT/CALIBRATION V2
FULTON W	EE5	P040066	0	01	16592	QC 100 N21.V3	003		61		PRECISION MEASUREMENT/CALIBRATION V3
FULTON W	EE5	P043068	0	01	16593	QC 100 N21.V3	004		61		PRECISION MEASUREMENT/CALIBRATION V3
FULTON W	EE5	P043056	0	01	16594	QC 100 N21.V3	005		61		PRECISION MEASUREMENT/CALIBRATION V3
FULTON W	EE5	P040064	0	01	16595	QC 100 N21.V3	006		61		PRECISION MEASUREMENT/CALIBRATION V3
MC BRIDE J	ES1	P070068	0	01	16596	TA 407.2F6.	001	04	65	ROARK	FORMULAS FOR STRESS/STRAIN
		P100168	0	01	16597	T 9 C35.	024	04	58		CHAMBERS TECH DICT
BENSON H E	FS36	P060067	0	02	16598	TA 654.2K84.	003		54	KORNHAUSER	STRUCTURAL EFFECTS OF IMPACT
KENYON F J	FM6	P040056	0	01	16599	QB 8 UN3E.	014		61	GT BRIT NAO	EXPLANATORY SUPP TO THE ASTRONOMICAL EPHEMERIS/THE AMERICAN EPHEMERIS
MC KAY D S	ET33	P040056	0	01	16600						PHASE DIAGRAMS FOR CERAMISTS
HAWKINS H G	DD	P080068	0	12	16601	RA 409.557.V1	002		64	LEVIN	COMPUTERS IN BIOMEDICAL RESEARCH V1
		P080068	0	04	16602	RA 409.557.V2	002		65	STACY	COMPUTERS IN BIOMEDICAL RESEARCH V2
			0	04	16603	RA 409.557.V2	003		65	STACY	COMPUTERS IN BIOMEDICAL RESEARCH V2
DANIELSON H R	CF24	120369	0	22	16604	TJ 213 T64.	004		59	TOU	DIGITAL/SAMPLED-DATA CONTROL SYSTEMS
MIDDLETON C F	FC62	120169	0	22	16605	TJ 213 T64.	005		59	TOU	DIGITAL/SAMPLED-DATA CONTROL SYSTEMS
BANKS C J	ED13	112169	1	20	16606	CA 303 B91.	022		65	BUCK	ADVANCED CALCULUS
CORBETT A	RH2	P120068	0	16	16607	CA 303 B91.	020		65	BUCK	ADVANCED CALCULUS
			0	01	16608	HF5547 H97.	013		56	HUTCHINSON	STD HANDBOOK FOR SECRETARIES
		031968	0	06	16609	CP 141 W82.	004		64	WOHL	MODERN NUTRITION IN HEALTH/DISEASE
			0	01	16610	BF 30 AN7.V17	001		56	FARNSWORTH	ANNUAL REVIEW OF PSYCHOLOGY V17
OWENS D W	FC9	112869	0	19	16611	QC 125 SY6.	003		60	SYMON	MECHANICS
		082157	0	21	16612	QC 125 SY6.	004		60	SYMON	MECHANICS
			0	03	16613	QH 485 A8.	001		65	AUSTIN	FERTILIZATION
		080057	0	05	16614	QA 164 S5.	001		65	SHARP	FINITE FUNCTIONS
			0	05	16615	QA 164 S5.	002		65	SHARP	FINITE FUNCTIONS
			0	06	16616	QA 276 I13.	001		65	IBM	IBM SCIENTIFIC COMPUTING SYMPOSIUM ON STATISTICS PROCEEDINGS
			0	03	16617	CA 276 I13.	002		65	IBM	IBM SCIENTIFIC COMPUTING SYMPOSIUM ON STATISTICS PROCEEDINGS

PERSON	DIVN.	DATE	OD	USE	ACCN.	CALL NO.	COPY	ED	YR	AUTHOR	TITLE
ALDRIN E E	CP7	PG60054	0	C3	05857	TL 794 K81,	067			KOELLE	HANDBOOK OF ASTRONAUTICAL ENGINEERING
ALDRIN E E	CP7	PG50064	0	03	06047	QE 26 G41,	023	02		GILLULY	PRINCIPLES OF GEOLOGY
ALDRIN E E	CR7	PC60C44	0	03	06175	GE 5 AM3,	004		52	AMER GEO INST	DICTIONARY OF GEOLOGICAL TERMS
ALEXANDER I S	NC3	P10CC69	0	01	31108	TP 270 F32,V3	003		66	FECDROFF	FNCY OF EXPLOSIVES/RELATED ITEMS
ALEXANDER I S	NC3	P10C069	0	02	24653	TP 761.C65C6,	004		66	COMPRESSED GAS	HDBK OF COMPRESSED GASES
ALEXANDER I S	NC3	P110069	0	02	22713	TJ 151 OR2,	048	17	64	CBERG	MACHINERYS HANDBOOK
ALEXANDER I S	NC3	P110069	0	03	26309	UF 563 P6,	009		66	POLLARD	AEROSPACE ORDNANCE HANDBOOK
ALEXANDER J D	EC5	PO50065	0	C4	C5600	R 121 D73,	007			DCRLAND	DORLAND S ILLUSTRATED MEDICAL DICTIONARY
ALEXANDER J D	EE461	P092154	0	03	C9663	QC 371 C76,	002				CONFERENCE ON OPTICAL INSTRUMENTS AND TE
ALFORD G	CR	PC10C67	0	C5	01974	HF5547 HC7,	041	07	62	HUTCHINSON	STANDARD HANDBOOK FOR SECRETARIES
ALFORD G E	LINK	112669	0	26	14346	CB 54 A4,	001		65	ALLEN	THE GUEST
ALFORD G E	LINK	112669	0	28	04492	QA 533 R39,	001			RICHARDSON	PLANE AND SPHERICAL TRIGONOMETRY
ALFORD G F	LINK	112669	0	35	03038	QA 535 R7,	001		42	BRINK	SPHERICAL TRIGONOMETRY
ALGRANTI J S	CC	PO30066	0	01	16131		005		63		AIR NAVIGATION
ALGRANTI J S	CC	PO30066	0	02	16003	QB 65 N75,	001	15	64	NCRTCN	NORTONS STAR ATLAS/TELESCOPIC HANDBOOK 1
ALISON P I	RH5	PG1C067	0	01	21180		004	26	60	AMER FCUNDRYMEN	PATTERNMAKERS MANUAL
ALISON P I	RH5	P050056	0	01	16853	TP 986.P6L3,	006		60	LAWRENCE	PULYESTER RESINS
ALISON P I	RH5	PO6CC65	0	02	17367	TP 986.E6S2,	007		58	SKEIST	EPOXY RESINS
ALISON P I	RH	PC70066	0	02	13969				56	SLARY	ENGINEERING DESCRIPTIVE GEOMETRY
ALISON P I	RH	PO7CC66	0	02	13351	TJ 151 OR2,	031		64	CBERG	MACHINERY S HANDBOOK
ALLEE J C	LEC	122065	5	07	23289	TK7888 I16,	002		67	IEEE	1967 ANNUAL SYMPOSIUM ON RELIABILITY
ALLEE J C	LEC	110065	2	08	32802	QE 501 C23,	001		58	CAILLEUX	ANATOMY OF THE EARTH
ALLEN R H	LEC	120165	0	21	16275	HD 20 J6,	001		63	JCHNSCN	THEORY/MANAGEMENT OF SYSTEMS
ALLEN R H	LEC	120455	0	C7	18703	QA 76.5M18,	009	00	65	MCCRACKEN	GUIDE TO FORTRAN 4 PROGRAMMING
ALLEN R H	LEC	120465	0	28	07659	QA 248 L62,	001			LIGHTSTONE	THE AXIOMATIC METHOD
ALLEN R H	LEC	120469	0	28	04982	QA 37 IN2,	001			INDRITZ	METHODS IN ANALYSIS
ALLEN R H	LEC	120965	0	04	33498	CA 402 W46,	001	00	69	WHITE	SYSTEMS ANALYSIS
ALLEN R H	LEC	120965	0	03	25489	C 175 S53,	001		56	SMITH	SCIENCE OF NATURE AN INTRODUCTION
ALLEN R H	LEC	120965	0	10	12573	QA 402 S88,	001		64	STURRFRUD	ANALYSIS/SYNTHESIS OF LINEAR TIME-VARIAB
ALLEN J C	RP7	PO0CC66	0	02	06082	TJ1165.L4AM3,	0C7			LEGRAND	THE NEW AMERICAN MACHINIST S HANDBOOK
ALLEN J C	BH3	PG1C057	0	02	20965		303		66	SIENKO	CHEMISTRY PRINCIPLES/PROPERTIES
ALLEN J C	BH3	PC10C47	0	01	2C974		033		63	STCNE	LABCRATORY STUDIES/PROBLEMS IN GENERAL C
ALLEN J C	RH	PO70068	0	01	13953	TJ 151 OB2,	004		64	OBERG	MACHINERY S HANDBOOK
ALLEN J C	BH3	P100068	0	01	31052	TA 405 S45,	004		62	SINGER	STRENGTH OF MATERIALS
ALLEN J C	BH3	P100068	0	04	30863	TJ 230 SH6L,	007		63	SHIGLEY	MECHANICAL ENGINEERING DESIGN
ALLEN J C	BH3	P110068	0	37	11786	CA 47 B8,	001	04	65	PURINGTON	HANDBOOK OF MATHEMATICAL TABLES/FORMULAS
ALLEN J H	RH231	PC40066	0	01	16581				64	AMISS	USE OF HANDBOOK TABLES/FORMULAS

CALL NO.	COPY	ED	YR	ACCN.	OD	USE	PERSON	DIVN.	DATE	AUTHOR	TITLE
QA 76.524,	001		67	24494	0	18	NASH C O	GE	121269	ZIEGLER	TIME-SHARING DATA PROCESSING SYSTEMS
QA 76.524,	002		67	24495	2	16	LAMBERT M L	LEC	111469	ZIEGLER	TIME-SHARING DATA PROCESSING SYSTEMS
QA 76.8SE5,	001			07660	0	15	MSG	BM6	P030069	SENSEMAN	PROGRAMMING/WIRING THE UNIVAC 1C04... C
QA 76.8SE5,	002			07661	0	07	SMITH H R	OM40	P090764	SENSEMAN	PROGRAMMING/WIRING THE UNIVAC 1004... C
QA 76.9SE5,	003		64	17579	0	01	WALKER L T	ER341	P060056	SENSEMAN	PROGRAMMING/WIRING THE UNIVAC 10C4 CARD
QA 76.8.112C5,	001	70	6b	17782	0	05	MORELAND W G	PHILCO	112669	OPLER	PROGRAMMING THE IBM SYSTEM/360
QA 76.8.112C6,	002		66	21C59	0	38	STEIN R L	UNIVAC	112859	COMPUTER USAGE	PROGRAMMING THE IBM SYSTEM 360
QA 76.8.114SA2,	001		62	02905	0	10				SAXON	PROGRAMMING THE IBM 1401
QA 76.8.114SA2,	002		62	03252	0	CC				SAXON	PROGRAMMING THE IBM 1401
QA 76.8.114SA9,	003		62	04725	0	C8			320757	SAXON	PROGRAMMING THE IBM 1401
QA 76.8.114SA9,	004		62	04726	0	15	EXTRA		P100067	SAXON	PROGRAMMING THE IBM 1401
QA 76.8.114G4,	L01	C2	62	02976	0	CR				GERMAIN	PROGRAMMING THE IBM 1620
QA 76.8.114G4,	002	C2	62	13165	0	14				GERMAIN	PROGRAMMING THE IBM 162C
QA 76.9.114G4,	002		62	13166	0	19		BM6		GERMAIN	PROGRAMMING THE IBM 1620
QA 76.3.115G2,	001		63	09025	0	19			P050769	GRUENBERGER	INTRO TO ELECTRONIC COMPUTERS
QA 76.8.125SA9,	001		63	02904	0	35				SAXON	PROGRAMMING THE IBM 7090
QA 76.8.125SA9,	002		63	03253	0	30			052268	SAXON	PROGRAMMING THE IBM 7090
QA 76.9.125SA9,	003		63	03277	0	27				SAXON	PROGRAMMING THE IBM 7090
QA 76.8.125SA9,	005		63	C4724	0	39				SAXON	PROGRAMMING THE IBM 7090
QA 76.8.125SA9,	007		63	C5651	C	C2	KIRKPATRICK J	EO3	P041064	SAXON	PROGRAMMING THE IBM 709C
QA 76.8.125SA9,	008		63	05652	0	C2	MALONE C F	EO2	P041064	SAXON	PROGRAMMING THE IBM 7090
QA 76.8.125SA9,	009		63	05653	0	09			P120365	SAXON	PROGRAMMING THE IBM 7090
QA 76.8.125SA9,	010		63	05954	0	06	EXTRA	BM6	P020068	SAXON	PROGRAMMING THE IBM 7090
QA 76.9.125SA9,	011		63	25955	0	10			P100069	SAXON	PROGRAMMING THE IBM 7090
QA 76.9.125SA9,	012		63	05956	0	07	TAYLOR G D	LINK	112869	SAXON	PROGRAMMING THE IBM 7090
QA 76.8.1C456,	002		67	25628	0	22	MARIN C	ILC	112569	ANDREE	COMPUTER PROGRAMMING/RELATED MATHEMATICS
QA 76.8.16456,	002		67	25551	0	17				ANDREE	COMPUTER PROGRAMMING/RELATED MATHEMATICS
QA 76.8.16456,	003		67	25562	0	17				ANDREE	COMPUTER PROGRAMMING/RELATED MATHEMATICS
QA 76.8.F253,	002		65	12879	0	07				SAXON	PROGRAMMING THE RCA 301
QA 76.3.FK2S3,	002		65	12880	0	04			110966	SAXON	PROGRAMMING THE RCA 301
QA 90 C7,	001		65	17975	0	11				CROWHURST	GRAPHICAL CALCULATORS/THEIR DESIGN
QA 90 C74,	001			C0763	0	20				DOUGLASS	ELEMENTS OF NOMOGRAPHY
QA 90 E59,	001		64	16386	0	06			081666	ELLERBY	GRAPHS/CALCULUS
QA 90 K55,	001		66	30410	0	01			050669	KNIGHT	UNDERSTANDING GRAPHS
QA 93 G6,	001		65	1C352	0	21				GOODMAN	THE PLEASURE OF MATH.
QA 93 N47,	001			09451	0	08			052968	NEWSOM	MATHEMATICAL DISCOURSES, THE HEART OF...
QA 9C 14,	001		64	13183	0	04			043367	INGHAM	DISCRETUS CALCULUS
QA 125 MB9,	002			C7283	0	23	GONZALES L F	BM9	121269	MUELLER	ARITHMETIC-ITS STRUCTURE AND CONCEPTS
QA 135 SH4,	001			10510	1	15	THOMAS W F	ES37	111869	SHIPP	DEVELOPING ARITHMETIC CONCEPTS/SKILLS
QA 141 J15,	001		62	07293	0	CC	ZARDENETA E	LTV	112569	JACOBOWITZ	COMPUTER ARITHMETIC
QA 141 H27,	001		65	28318	0	07				REIGH	NUMERATION SYSTEMS/SCIENTIFIC NOTATION
QA 152 D55.V2	001		67	12256	0	03			102965	DOLCIANI	MODERN ALGEBRA-STRUCTURE/METHOD
QA 152 F55,	001			23451	0	11				FISHER	INTEGRATED ALGEBRA/TRIGONOMETRY
QA 152 L22,	001		65	15514	0	19				LANCASTER	FOUNDATIONS OF ALGEBRA
QA 152 P45,	001		63	16472	2	22	JACKSON J H	BM6	111069	PETERS	ALGEBRA A MODERN APPROACH
QA 152 P45,	002	OR	63	25294	0	11	HOBKIRK J W	PHILCO	120869	PETERS	ALGEBRA A MODERN APPROACH

Borrower	Dept	Call No.		Author	Title
BAKER J M	LEC			MCCNEY	FACTS FROM FIGURES
BENNETT G K	LEC			DEUTSCH	ESTIMATION THEORY
CABLE J W	IF			ROTH	COMPENDIUM OF HUMAN RESPONSES TO THE AER...
CABLE J W	IF			ROTH	COMPENDIUM OF HUMAN RESPONSES TO THE AER...
CARLSON J A	PG7			GEARY	ELEMENTS OF LINEAR PROGRAMMING WITH ECON...
CHRISTOFFERSON	LEC			SHILOV	MATHEMATICAL ANALYSIS V77
CHRISTOFFERSON	LEC			MCCBRANCT	INTRODUCTION TO THE THEORY OF INTEGRATIO...
COAN P	CE2			CHIN	TELEVISION BROADCASTING
COAN P	CE2			ROACH	HANDBOOK OF BASIC CIRCUITS
COAN P	CE2			GLASERO	FUNDAMENTALS OF TELEVISION ENGINEERING
DELANEY F C	LEC			FALK	STATISTICAL THEORY WITH ENGINEERING ...
DELANEY F C	LEC			CSILE	STATISTICS IN RESEARCH
DUPONT A	FM			FARL	GROUND EFFECT MACHINES
EGGLESTON T W	CFE			ELCHINATSEV	QUANTUM MECHANICS
EGGLESTON T W	CFE			POJANSKY	INTRODUCTORY QUANTUM MECHANICS
EGGLESTON T W	CFE			ELCHINSSEV	PRINCIPLES OF QUANTUM MECHANICS
EGGLESTON T W	CFE			CALLING	INTRODUCTION TO QUANTUM MECHANICS
EVANS C	IF			COSGRIFF	TERRAIN SCATTERING PROPERTIES FOR SENSOR
EVANS C	IF			GARCIA	PROBLEMS OF ATMOSPHERIC CIRCULATION
EVANS C	IF			KATZ	APPLICATION OF PASSIVE MICROWAVE TECHNOL
EVANS C	IF			KONDRATYEV	RADIATION IN THE ATMOSPHERE
EVANS C	CF3			VON ARX	INTRODUCTION TO PHYSICAL OCEANOGRAPHY
FABIAN M A	LEC			LESLIE	GREGG SHORTHAND SIMPLIFIED FOR COLLEGES
FLETCHER H F	TG2			HILL	MECHANICS/THERMODYNAMICS OF PROPULSION
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