BROWN UNIVERSITY LIBRARY FUND ACCOUNTING SYSTEM

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The computer-based acquisitions procedures which have been developed at the Library provide more efficient and more effective control over fund accounting and the maintenance of an outstanding order file. The system illustrates an economical, yet highly flexible, approach to automated acquisitions procedures in a university library.

The Fund Accounting System of the Brown University Library was initiated on the basis of a program developed in April, 1966. Subsequently, it was decided to implement the program in the fall of that year. The necessary in-house equipment, namely, an IBM 826 Typewriter Card Punch and an IBM 026 Keypunch, was placed on order along with new six-part order forms. About the same time an agreement was reached with the Administrative Data Processing Office of the University (Tabulating) which would provide for rental time on their IBM 1401, 12K system with three magnetic disks and four magnetic tape-storage units. The services of a part-time programmer were also secured through this office. The system became fully operational on December 1, 1966.

The primary objective of the project was to establish more efficient and more effective control over the approximately 150 fund accounts administered by the Order Department of the University Library. In addition, it seemed that a number of by-products were possible. Among these were statistical information for management and a file of bibliographical records from which a new accessions list could be drawn on a regular basis. The system was to accommodate the payment of all invoices to be posted against the aforementioned accounts. These include mono-

graphic and serial publications as well as supplies and equipment. However, records of outstanding orders were to be maintained for monographic publications only. Although the basic routines were to remain much the same, some minor adjustments were necessary to accommodate the new machine system. Also, several files of dubious value to the new system were to be maintained in order to gain empirical evidence as to their worth.

This report is presented as a record of an attempt to develop an economical, yet highly flexible approach to the automating of acquisitions procedures of a university library.

Perhaps the scope of the computer-based acquisitions procedures at Brown may be determined more easily relative to three recently reported systems of varying complexity. One of the best surveys of automated university library acquisitions systems appears in the project report of the University of Illinois, Chicago Campus (1). However, two of the systems summarized here are more recent. The University of Michigan was included in the Illinois literature survey, but the first full description to be published appeared just recently.

Automated acquisitions procedures have been in operation at the University of Michigan Library since June, 1965 (2). The system features a list of items produced by computer from punch cards in which order information has been recorded. This list is produced on a monthly basis with semi-weekly cumulative supplements. The computer also produces status report cards. These are punch cards, containing summarized order information, which travel with the book and at appropriate processing stages are coded and returned to the computer in order to up-date the status code in the processing list. Thus by checking the status code one can determine that a book has been received, received and paid, or cataloged. Claim notices are automatically produced for items which remain on order for longer than the predetermined period. In addition to creating and maintaining full financial records and compiling selected statistics, the system will produce specialized acquisitions lists on demand.

Yale University Library creates a machine readable record of a request before it is searched or ordered (3). As a result, the status-monitoring system is almost immediately effective. An IBM 826 Typewriter Card Punch is used to type purchase orders, and the IBM 357 Data Collection System is used to monitor the progress of an item through the system. The process information list is produced weekly with daily supplements. Automatic claiming and financial record maintenance are also products of the system. Moreover, numerous statistics are planned for management purposes.

The fund control system reported by the University of Hawaii features financial accounting for book purchases based on pre-punched cards corresponding to purchase orders typed (4). The list price is keypunched into the appropriate card in a separate operation and used to encumber

funds. Upon receipt of the book the invoice is matched with the appropriate punch card, and after actual cost is keypunched the card is used to up-date the account.

The Michigan and Yale systems incorporate all of the major features of operational university library automated acquisitions systems. Foremost among them are the list of items being processed and its coordinate monitoring system. The cost of creating and maintaining such a file was prohibitive for Brown. Brown, Michigan and Hawaii generate a machine record after searching. Unlike Michigan and Yale, Brown and Hawaii do not have "total" acquisitions systems plans. At Brown serials control is not included. At Hawaii fund accounting is the only task of the system. Also, Brown differs from Michigan and Yale in that the claiming procedure merely notifies the department that certain items are overdue. The Brown system is certainly not as economical as that of Hawaii, but the use of the Typewriter Card Punch creates a highly flexible and easily expanded system for the difference in cost.

MANUAL FILES AND PROCEDURES

The manual routines of the Order Department are based upon the maintenance of four basic files. The file documents are all parts of the six-part purchase order form. The Outstanding Order Search File is an alphabetical card file representing unfilled orders, requests to search for items, and inquiries for bibliographical information. This file is virtually independent of other routines, thus making it feasible for it to be merged with the file of items waiting to be cataloged. The Processing File consists of outstanding orders filed first by book dealer, and second by order number. This file is used to check in shipments of books, to record reports on orders and to record claims. The Numerical Control File is an order number sequence file containing one copy of every order typed regardless of its ultimate disposition. It provides rapid access to information regarding retrospective orders. The Fund File is a file of completed or cancelled transactions filed first by fund name and second by order number. The latter two files were thought to be of dubious value to the new system. However, it was agreed to maintain both for the time being.

In order to accommodate the Fund Accounting system, the procedures developed feature two basic routines based on the presence or absence of a unique order number.

Unique Order (Figure 1)

Items acquired in this fashion include purchases and solicited gifts. Continuations, but not serials, are included. When a request is received in the Order Department, it is searched in the main catalog, the waiting catalog and the outstanding order file. If it is found to be neither in the Library nor on order, it is then given to an Order Assistant who completes the bibliographical work, if necessary, and assigns a fund and
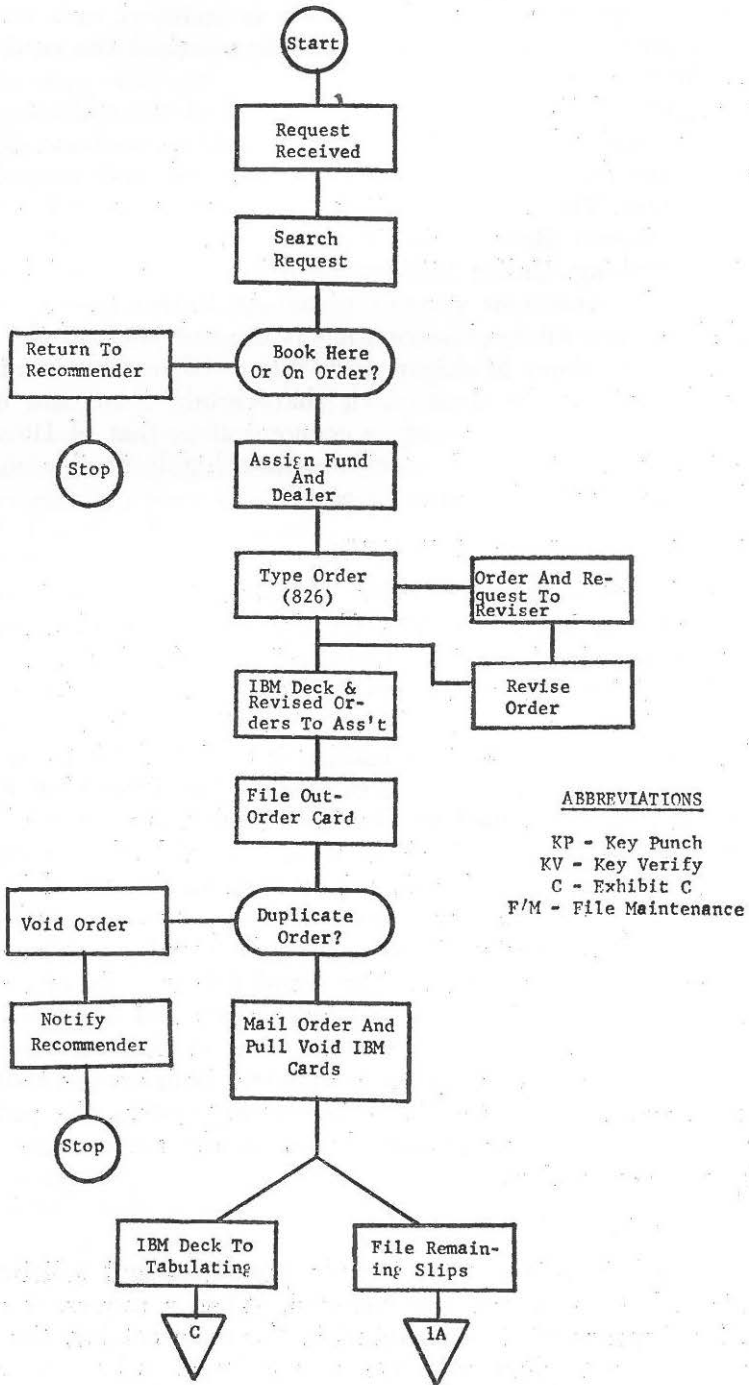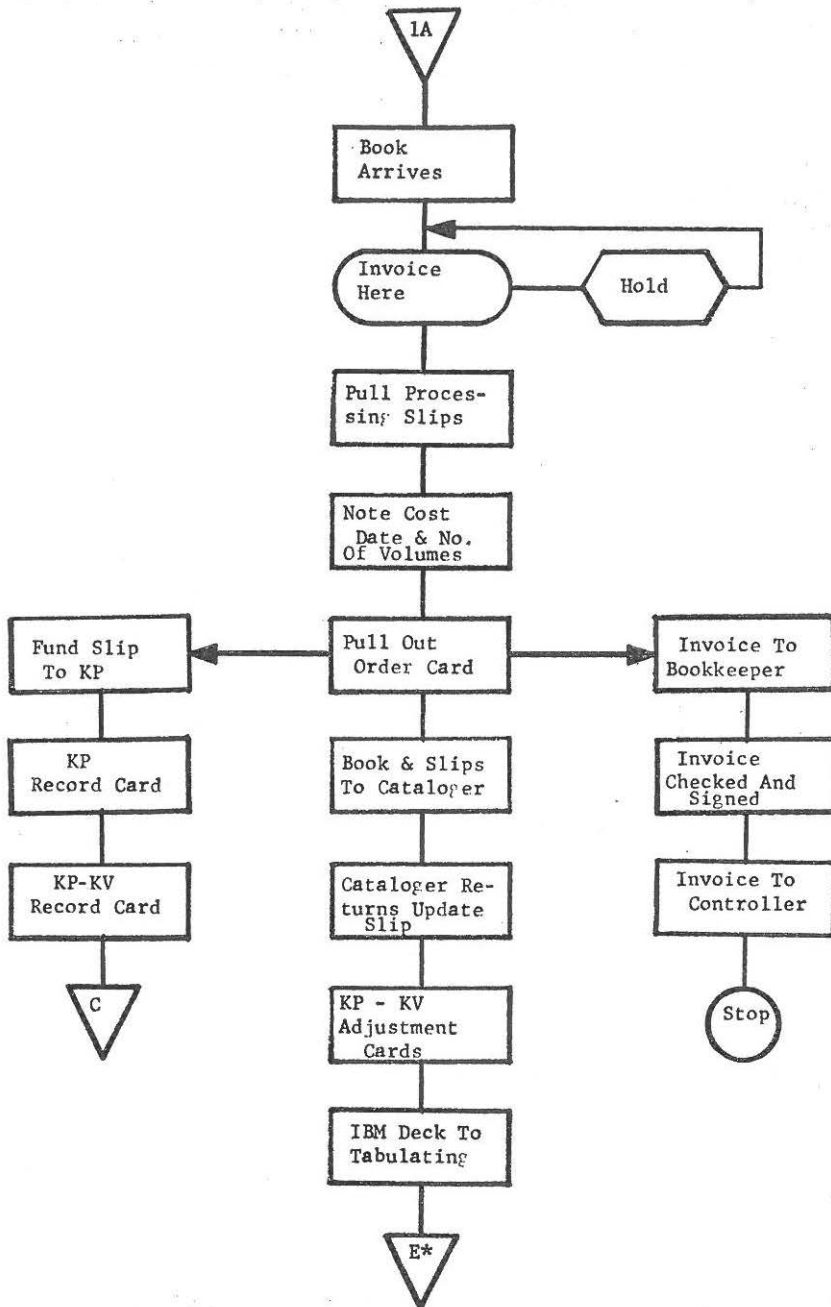
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                                  ┌────────┐
                                  │ Start  │
                                  └────────┘
                                      │
                              ┌───────────────┐
                              │   Request     │
                              │   Received    │
                              └───────────────┘
                                      │
                              ┌───────────────┐
                              │   Search      │
                              │   Request     │
                              └───────────────┘
                                      │
  ┌───────────────┐           ┌───────────────┐
  │  Return To    │───────────│  Book Here    │
  │  Recommender  │           │ Or On Order?  │
  └───────────────┘           └───────────────┘
         │                            │
     ┌────────┐                ┌───────────────┐
     │  Stop  │                │ Assign Fund   │
     └────────┘                │     And       │
                               │   Dealer      │
                               └───────────────┘
                                      │
                               ┌───────────────┐    ┌───────────────┐
                               │ Type Order    │────│ Order And Re- │
                               │    (826)      │    │ quest To      │
                               └───────────────┘    │ Reviser       │
                                      │              └───────────────┘
                               ┌───────────────┐    ┌───────────────┐
                               │ IBM Deck &    │    │   Revise      │
                               │ Revised Or-   │    │   Order       │
                               │ ders To Ass't │    └───────────────┘
                               └───────────────┘
                                      │
                               ┌───────────────┐
                               │ File Out-     │
                               │ Order Card    │
                               └───────────────┘
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ABBREVIATIONS

KP - Key Punch
KV - Key Verify
C - Exhibit C
F/M - File Maintenance

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  ┌───────────────┐           ┌───────────────┐
  │  Void Order   │───────────│  Duplicate    │
  └───────────────┘           │   Order?      │
         │                    └───────────────┘
  ┌───────────────┐           ┌───────────────┐
  │   Notify      │           │ Mail Order And│
  │ Recommender   │           │ Pull Void IBM │
  └───────────────┘           │   Cards       │
         │                    └───────────────┘
     ┌────────┐                      │
     │  Stop  │              ┌────────┴────────┐
     └────────┘              │                 │
                   ┌───────────────┐   ┌───────────────┐
                   │ IBM Deck To   │   │ File Remain-  │
                   │ Tabulating    │   │ ing Slips     │
                   └───────────────┘   └───────────────┘
                           │                   │
                          ▽ C                 ▽ 1A
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Fig. 1. Unique Order Procedure.

N.B.   E* Proposed accessions listing program

Fig. 1 Continued.

dealer. If the price is listed in a foreign currency, the Assistant converts it to U. S. dollars. The request then proceeds to the typist. All unique orders are typed on an 826 Typewriter Card Punch. As the typist fills in the six-part order form, pre-selected pieces of information are key-punched automatically. These fields are as follows:

Order number
Order date
Source type - D for domestic, etc.
Fund number
List price
Author
Title
Imprint
Series

Orders are proofread on the day after they are typed. The forms are separated and the outstanding order cards are filed immediately in order to detect duplicate orders. At this point the dealer slips are mailed and the numerical control slips filed. The processing file documents, each containing a fund slip, an L.C. order slip, and a cataloger's work slip on a separate perforation, are then filed pending the arrival of the books. Also, the deck of IBM cards which has been weeded of voided orders goes to Tabulating.

Although books may be processed without invoices, the normal practice is to process after the arrival of the invoice. The processing file document is obtained and the cost, invoice date and the number of volumes are noted on the fund slip. If the item is a continuation, a supplementary fund slip is made and the original returned to the processing file with the receipt noted. The invoices are cleared and sent to the Controller. The fund slips representing books received are sent to the keypuncher in order to up-date the accounts. In the meantime the books, along with the work slips and the L.C. order slips, are sent to the Catalog Department.

As the books are cataloged, the work slips noting any major bibliographical changes and the call number are returned to the Order Department. From these slips are punched bibliographical adjustment cards and an up-date record card containing the call number and coded for subject and location. The resulting bibliographical record forms the data base for the new accessions listing.

No Unique Order (Figure 2)

Items acquired in this fashion include unsolicited gifts, exchanges, standing orders, etc. Some continuations and all serials invoices are included. Upon arrival, invoiced items without unique order numbers are searched. If they are duplicates they are returned for credit. If they are not duplicates, they are sent to the typist. Catalog file slips are typed
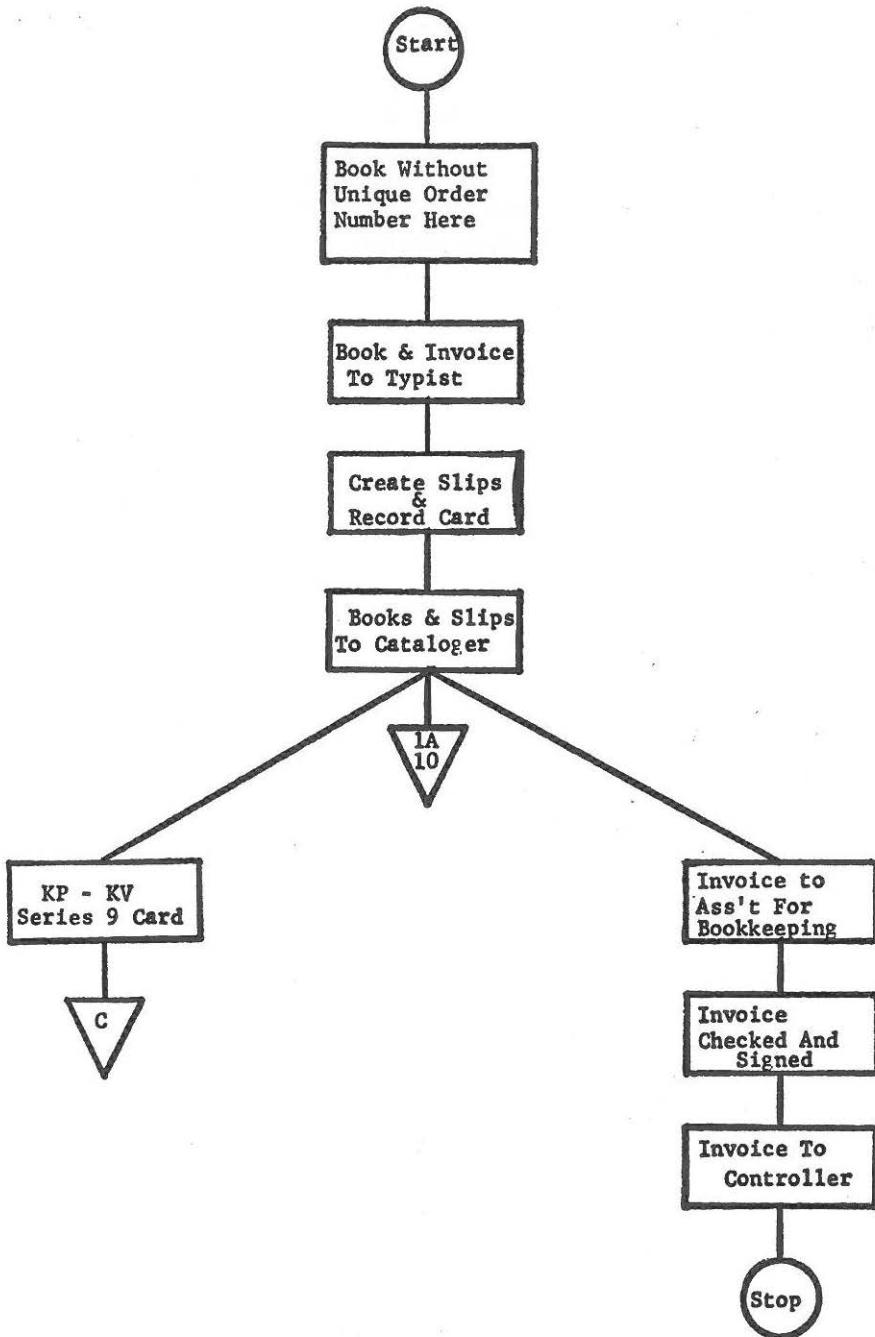
N.B. Of course no record card will be made for gifts or exchanges

Fig. 2. No Unique Order Procedure.

and by-product bibliographical and accounting records are punched. On the record card for accounting, the order number field is filled with nines. This signals the program that this entry is a receipt for which there was no unique order number. The series of order numbers beginning with 900000 was originally reserved for assignment to our standing order agreements with presses, societies, etc. Eventually, each will have its own order number. However, the last number of the series, 999999, will continue to be used for miscellaneous receipts.

Presently no accessions listing records are being generated for items without unique order numbers. However, all purchases without unique order numbers are processed with a series 9 order number.

Serials

All serial invoices are handled as series 9 transactions with no attempt to record bibliographical information or volume counts. Expenditures for serials are accumulated and entered as one transaction each time the accounts are up-dated. This decision was made in anticipation of the development of a separate serials control program.

IBM 1401 FILES AND PROCEDURES

The basic function of the computer program for the Fund Accounting System is to maintain current balances on the various library fund accounts and to maintain a file of outstanding orders exclusive of standing orders. Although several correlative functions are distinct possibilities, the only additional function planned is a file of bibliographic records for the production of an accessions listing. Figures 3, 4, 5 and 6 illustrate the major tasks to be performed by the system. The programming language used is Autocoder.

Fund Balance Forward File

A card file created at the beginning of each fiscal year having two card types.
    1. Fund Group Header Card
        a. Group Code
        b. Group Name
This card assigns a unique code and name to categories of funds such as endowed, special, etc.
    2. Fund Balance Forward and Appropriation Card
        a. Fund Group Code
        b. Fund Code
        c. Fund Name
        d. Previous Year Balance Forward
        e. Current Income or Appropriation
        f. Balance Forward Code
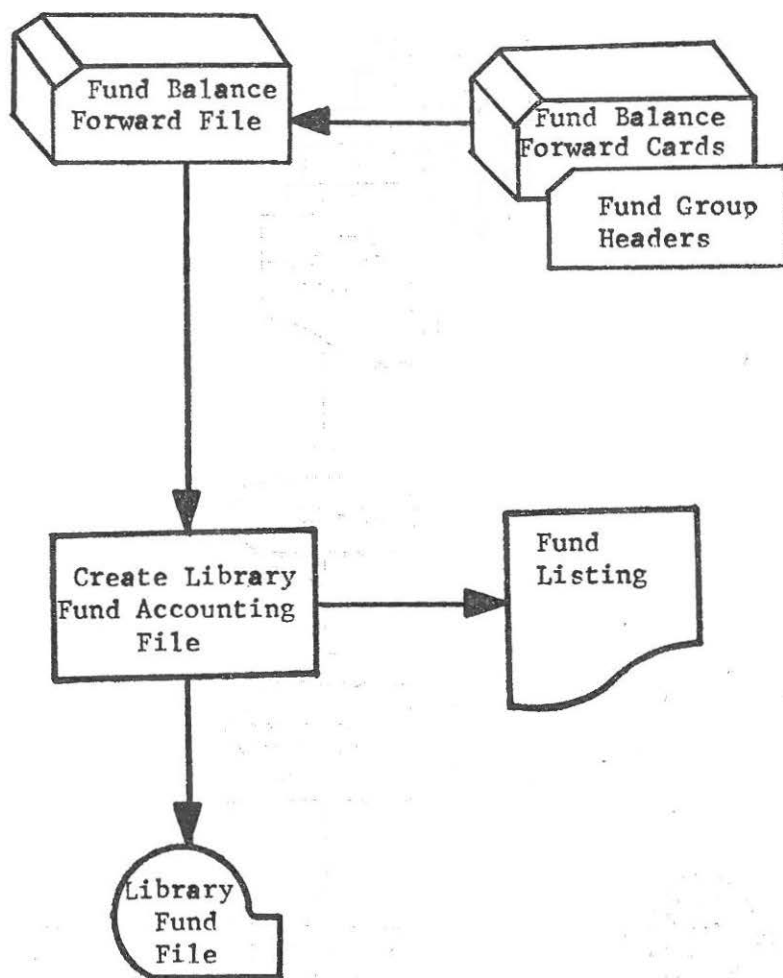   g. Remaining Previous Year Encumbrances

Fig. 3. Fund File Creation.

This card contains information used to establish the individual funds at the beginning of each year. The Balance Forward Code directs the program to carry over excess funds to the next year, not to carry over excess funds to the next year, or to carry over a negative balance to the next year, thereby reducing Cash Balance resulting from the new income or appropriation. Encumbrances are carried over to the next year in order to maintain an accurate Net Available at all times.
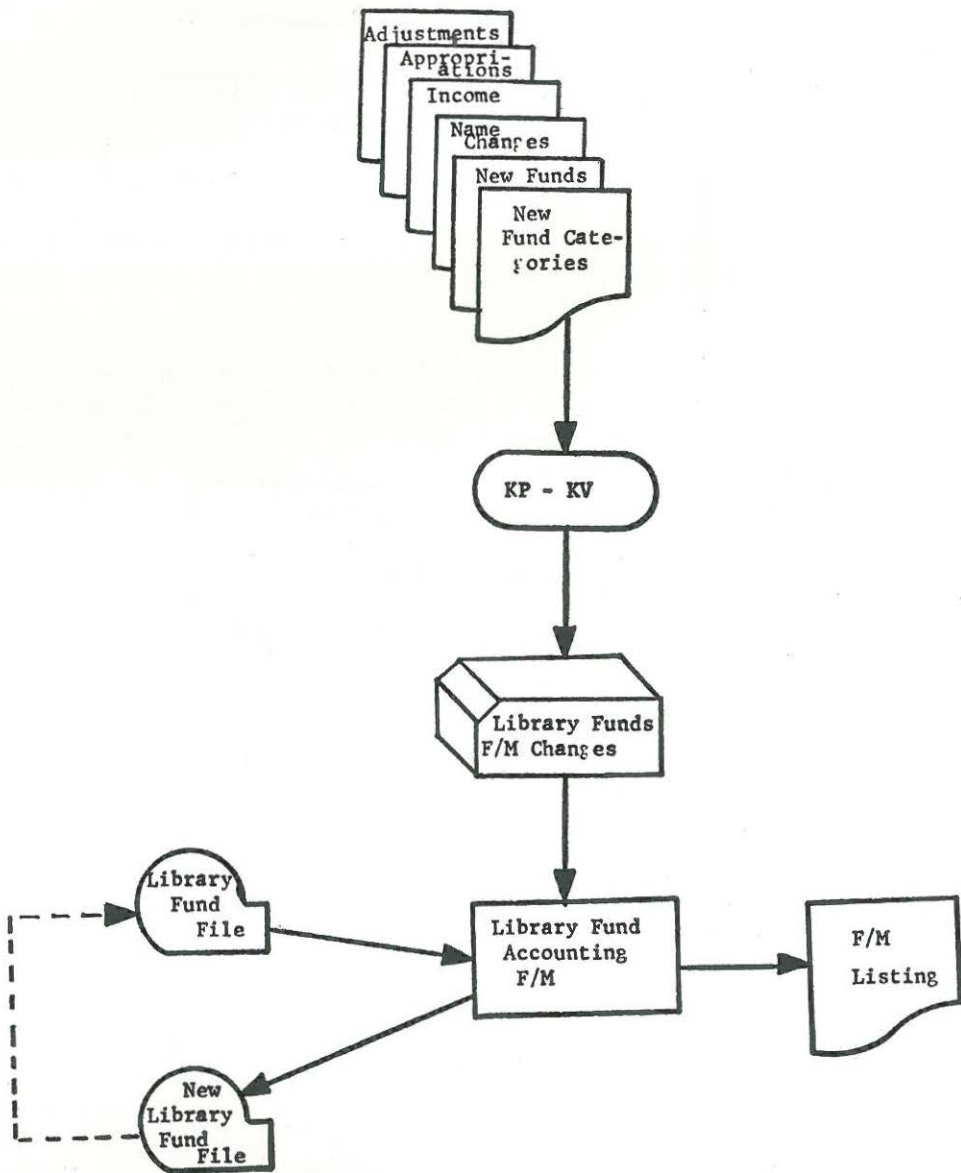
Fig. 4. File Maintenance.
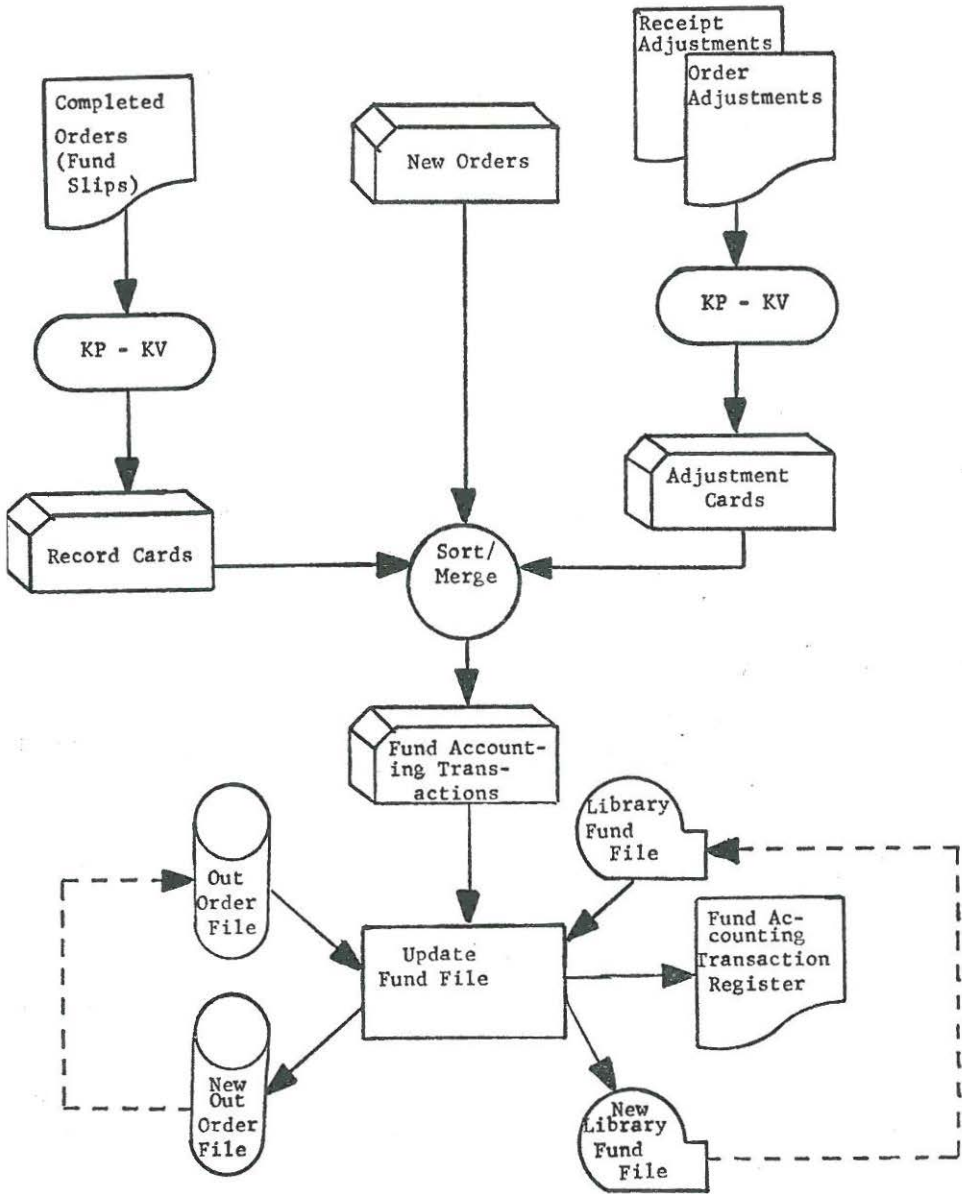
Fig. 5. Fund Accounts Updating.

Library Fund File

A magnetic tape file created from the Fund Balance Forward File and containing three record types.
1. Fund Group Header
2. Fund Record
   a. Fund Group Code
   b. Fund Code
   c. Fund Name
   d. Previous Year Balance Forward
   e. Current Income or Appropriation
   f. Current Expenditures
   g. Cash Balance
   h. Amount Encumbered
   i. Net Available
   j. Volumes Purchased
   k. Balance Forward Code

Fund Record fields a, b, c, d, e, h and k initially are taken from the corresponding fields in the Fund Balance Forward Card. Current Year Expenditures and Volumes Purchased are preset to zero each year. Cash Balance is determined by the sum of the Previous Year Balance Forward and the Current Income or Appropriation. Amount Encumbered will be preset to zero or taken from the fund card. Net Available is determined by the difference between Cash Balance and Amount Encumbered.

   3. Fund Group Trailer

This record is the last within each fund group and contains a summation of the quantitative fields in that fund group. It is used primarily for control purposes.

Figure 4 illustrates the file maintenance program for the Library Fund Files. This program permits the addition or deletion of a Fund Group Code, changes to a Fund Group Header, addition or deletion of a specific fund or changes to a specific fund. However, changes to quantitative fields are limited to those fields which are contained in the Fund Balance Forward Card. Thus, Net Available may not be changed directly by file maintenance but may be changed by manipulating Current Income or Appropriation.

The Library Fund File is a serial file maintained in ascending algebraic sequence on Fund Group Code, Fund Code and Fund Record from major to minor respectively.

Outstanding Order File

A magnetic disk file created and up-dated by three card types.
   1. Order Card
      a. Order Number
      b. Order Date

    c. Source Type - D is domestic, F is foreign

    d. Fund Number

    e. List Price

Figure 5 illustrates the program which processes new orders. This program validates Fund Code, rejects duplicate order numbers and encumbers List Price, thereby reducing Net Available.

    2. Record Card

        a. Order Number

        b. Invoice Date

        c. Fund Code

        d. Cost

        e. Continuation Order Code, if applicable

        f. Number of Volumes

Standing orders, blanket orders, serials, etc. are purchased without placing an order. Consequently, a series 9 order number is assigned to these Record Cards. Such cards will not match the Outstanding Order File by definition but will increase Amount Expended, decrease Cash Balance and Net Available and increase Volumes Purchased. All other Record Cards must match an existing order number on file. On continuations the Record Card for each part received produces a transaction as described above, except that the encumbrance remains unchanged until the final Record Card appears without the Continuation Order Code.

    3. Adjustment Card

This card may be submitted for either an order card or a Record Card. It is differentiated by a special code. Its primary purpose is to correct a previous error or to effect a cancellation.

The Outstanding Order File is in ascending algebraic sequence by Fund Group, Fund Code and order number. All cards used in this program must be pre-sorted into this sequence.

Printout Products

The accumulated punch cards are processed on a bi-weekly schedule by the Tabulating Office. A file maintenance report (Figure 4) is the first product of each run. It lists in detail any adjustments, additions, or deletions to the fund listing plus the results of such operations. At the end of the detailed report is a summary of the status of each active fund. Copies of this latter report are distributed for desk use to all Order Assistants, the Chief Order Librarian, and the Librarian.

The transaction register of fund activity (Figure 5) lists each transaction posted to each fund for the inclusive period. The Assistant in charge of bookkeeping is the primary user of this and the detailed file maintenance report.

The delinquent orders report (Figure 6) lists all past due outstanding orders according to two cycles. Domestic orders are listed bi-monthly and foreign orders are listed quarterly. The listing is of the "tickler" variety, as it may not be necessary to ask reports on all of the items. An order will remain on the delinquent orders report until it is filled or cancelled.
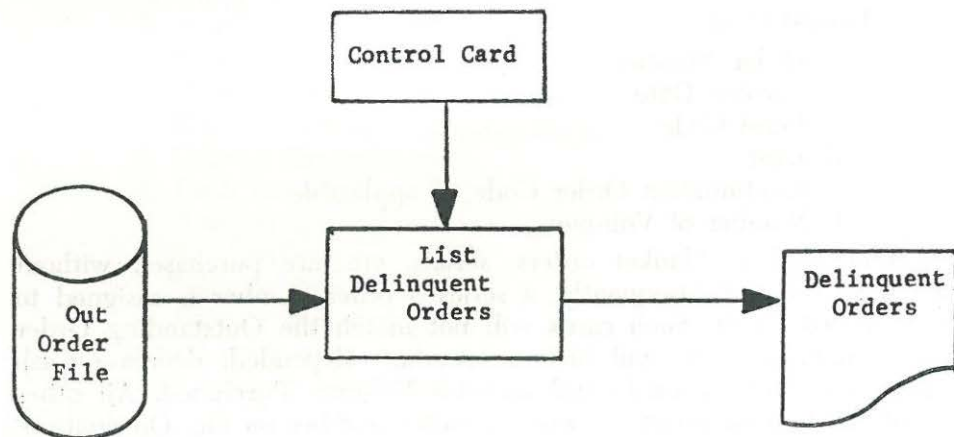

Fig. 6. Delinquent Order Listing.

CONCLUSION

As of October, 1967, the Fund Accounting System has been in operation for ten months. Assessment of its effectiveness in terms of meeting the primary objective shows the System to be an immediate success. At this point costs are about the same for the manual system as for the present one. However, accounts which used to require from 25 to 30 man-hours per month are maintained with about 5 man-hours per month. Our current equipment and processing costs run about $325 per month.

On the other hand, we have become aware of some shortcomings of the system. The addition of a currency conversion sub-routine would greatly expedite the many requests for foreign publications received daily. Secondly, the addition of a dealer code would make the delinquent orders list much more useful. At present a user must search the numerical file for the order to ascertain the dealer. The processing file copies are then pulled to go to the typist who asks reports on delinquent orders. A revised program incorporating both of these features is being planned and will be operational early in 1968.

The proposed accessions listing has been rejected as a by-product of this system primarily because of the limited character set available on our IBM 1403 print chain and the excessive length of the average listing. The time and expense of storing and up-dating the bibliographical record

for each new acquisition should, in our estimation, result in a more palatable end-product. We have, therefore, temporarily discontinued producing punch cards for the bibliographical records. As a corollary, it should be added that we have turned to a consideration of the paper tape typewriters as input/output devices, focusing on their expanded character set and operating speed. The speed of the 826 leaves much to be desired.

The Numerical Control File has proven its usefulness as a rapid index to our files spanning several years. It is extremely helpful in identifying quotes on old order numbers which have long since been cancelled. The Fund File, however, has proven to be a duplicate of our machine file. It is thought that replacement of the slip in the numerical control file with the fund slips would at the same time reduce our files by one and up-date the information in the numerical file.

Finally, this modest beginning, occasioned by limited financial resources as well as the lack of personnel with experience in data processing, seems to have been justified. Moreover, although the increasing complexity of our involvement in library automation poses some serious planning and supervisory problems, we are encouraged by our initial success.

ACKNOWLEDGMENTS

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