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Automated Operations in a University Library—A Summary

Repetitive tasks in libraries, as in other industries, are subject to machine accomplishment. The value of an on-line system to library service will probably make it desirable for the university library to install its own small or medium-sized computer within its machine configuration. The activities of each functional area in a conventional library are surveyed as they could be accomplished in a machine-based system, and prospective improvements in service are noted, as well as likely developments of value to library staff. Particular emphasis is devoted to the utilization of machines in the routines of technical services and in circulation control.

THE USE of machines to accomplish the work of the university library will be limited to clerical tasks, and a useful criterion to judge the intellectual quality or professionalism of a position will be its lack of adaptability to automation.

The ideal machine configuration for a maximum amount of university library automation will include a small or medium-sized computer (an IBM 1440, for example) with tape and disk storage. The system will have to include on-line remote data collection and inquiry stations. It would not be necessary for the computer and its peripheral equipment to be installed in the library, but it would be necessary to locate one or more remote input-output consoles in the library on-line with the computer located elsewhere. Such an on-line system would eliminate much of the usual keypunching and punched card handling as data could be entered into storage directly

from the console keyboard. This system, while far beyond any now in library use, is a practical one and not "the world of tomorrow" type of thing. All of the necessary equipment may be had "off the shelf" or on a delivery date from the major electronic data processing equipment manufacturers.

This article is an attempt to define the specific library operations that readily lend themselves to automation at the present developmental level of both the library and the machine.

It should be stressed that many different configurations of equipment are possible to gain much the same results each offering a different level of sophistication, and a different level of costs. Each library must therefore survey its own needs and wants in order to determine the best configuration of machines to accomplish its aims with the lowest costs. For that reason the hardware and its costs will not be discussed in this paper.

When the decision is made to auto-

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mate a library fully, the end of many old and familiar "institutions" appears in sight. "Sentimentalists" will soon lament the passing of the circulation file, the card catalog, the periodical check-in file or the central serials file, the outstanding order file, and the daily posting of accounts, among other things. As will be seen, the effects of automation are felt chiefly in technical processes, but public services and library administration are not unaffected by any means.

MACHINE STORED BIBLIOGRAPHICAL DATA (COMPUTER CATALOG)

In a systems approach to the planning of an automated library, it quickly becomes evident that the data stored in the card catalog (and/or the shelf list) is the core of any automated system. Nearly every library procedure makes demands upon or adds to the card catalog data. This, of course, is nothing new to librarians, but it is even more true of an automated system than a manual system.

One of the first projects, therefore, that must be accomplished before complete library automation can be effective is that of getting the card catalog data into machine readable form, *i.e.*, producing what might be called a computer catalog. Fortunately, it is necessary to convert only the main entry data and/or shelf list data, as computer programs can be written to produce all other required entries. Needless to say, this conversion is the most time consuming of all the pre-automation tasks. As an example, Purdue's author catalog contains a few more than four hundred thousand cards. It has been estimated that it will require twenty man years of keypunching to convert it to a computer catalog.

Until recently, it has been impossible to place all of Purdue's author catalog data in immediate-access storage. This would be necessary in order to develop a fully automated library system. The development of the new concept of strip storage (data cell) by one of the large computer manufacturers now makes it possible to have immediate-access storage far greater than was ever available before.

A fully automated library would require that a complete record of every item in the library's collections be stored in such a way that immediate inquiry and response is possible. Anything short of this capability would require compromises that would be less than systems automation. Such a lower level of automation is being developed in some libraries today, and it is quite satisfactory in those limited areas of library services; but for the sake of this paper, we are concerned with a system of the highest sophistication available either now or in the immediate future.

As soon as the computer catalog is completed, the library is in a position to take advantage of the superb flexibility of the computer. Its ability to manipulate data in any desired way enables the library to produce book catalogs of its holdings which offer the patron many different retrieval approaches. Catalogs can be published listing holdings by author, subject, title, series, language, publisher, or in any other way—limited only by the imagination of the systems designer, the librarian, or by the data itself.

The advantages of the book catalog over the card catalog have long been recognized by the library profession, but the lack of a quick and inexpensive method of updating has always handicapped the book catalog. With the development of the computer those limitations have been removed, and we may now confidently expect that the book catalog with its inherent ease of dissemination will eclipse the card catalog.

Aside from the incomparable advantages of the book catalog, when the com-

plete bibliographical data is in computer catalog form it is then possible to have immediate access to the library's resources for a multiplicity of uses. The acquisitions unit, for instance, can accomplish much of its searching function by machine. It can also claim outstanding orders or publish its desiderata lists automatically. The circulation unit can automatically print out overdue notices, discharge books, make immediate use of instant unpaid-fine reports, punch out new book cards and print out faculty charge lists, among other things. The reference department can have bibliographies printed out on demand and can maintain exact and up-to-date location records on every book. The demands that can be made on an on-line computer catalog are limited only by the imagination of the library staff. A brief study of some of the possible approaches on a function by function basis will illustrate the point.

SERIALS

There are several libraries with automated serials operations, and their systems have been well described in the literature. An on-line system, however, makes immediate access to computer storage records possible and therefore changes the method of operation somewhat. Since an input-output console would be available, new orders for subscriptions would be "typed" (keyed in) on the console keyboard and the data thereby entered directly into storage. No punched cards are involved in this routine. As a byproduct of the system, the order form would be printed out automatically, but the major concern would be to enter as much information as possible about the serial being ordered. The title, publisher, price, agent, beginning issue, date of order, order number, frequency of publication, language, country of publication, subject, budget information, etc., are some of the data that would be entered at ordering time. Data

not known, such as binding pattern, call number, exact entry (in some cases), availability of indexes, title pages or table of contents, etc., would be entered at the time of cataloging. Duplicate subscriptions could be completely entered as all of the information would be known or could be determined at the time of ordering.

As soon as all known information is in storage, the order form would be printed out ready for mailing, the in-storage budget records updated, in-storage statistical records updated, and the bibliographical data would be ready for inclusion in the next issue of the library's serials catalog as a title "on order." If a typical machine check-in system is used, the correct number of arrival cards anticipating the arrival of the next few issues would be punched.

When the first issue arrives in the library, the correct arrival card would be pulled from the file and the issue sent to be cataloged. The arrival card would be returned to the computer to indicate the receipt of the issue. After cataloging, all previously unknown data would be entered into the computer catalog either by keying it in or by the usual punched-card input method. It would then be possible, with the proper computer programing, to accomplish automatically any number of serials routines. The person who ordered the subscription could be notified by a printed-out notice that the first issue was available, all future checking-in would be handled by the return to the computer of automatically punched arrival cards, a claim system would be ready for use when needed, lists or catalogs of serials could be printed out by any retrieval approach desired, want lists would also be available on demand and by any approach desired, and statistical analyses and forecasts could be run continuously.

Statistical analysis of the serials collection can make available to the library

administrators much information that is useful in the development of a balanced collection. The number of serials by subject field, language, etc., will help indicate the areas needing increased or decreased emphasis. Statistics on duplication can indicate those departmental libraries or subject fields most likely to be ordering titles already available elsewhere in the library system. Statistical reports can be had on subscription agency or publisher response time to orders, claims, and correspondence.

A useful little service, in lieu of a circulating journal system, can be made available to the faculty by tying an automatic notification procedure to the serials check-in system. When a new issue of an irregular serial is entered into the computer catalog by the return of an arrival card to the computer, a notice of the issue's receipt could be printed out ready for mailing to the faculty member. This could be done for any serial, regular or irregular, but it is probably unnecessary with regular serials, as it is not difficult for interested persons to remember when regular publications are usually received in the library.

BINDING

The routine preparation of serials for binding can be reduced to little more than leg work for the library staff. The computer can be programed to punch a card automatically and print out a binder's slip for each "bindable" serial title when the appropriate time arrives. This then leaves library personnel with the job of removing the issues from the shelves, charging them, collating, and tying them for shipment. After the bound volumes are returned to the library, the punched cards are used to update the library's records of volumes bound.

The computer can be required to meet any number of conditions before it may punch the binding card. Examples of such conditions are as follows.

1. Has the first issue of the next volume arrived in the library?
2. Has the index and/or title page and/or table of contents arrived?
3. Has the departmental library concerned used its binding quota?
4. If the title is duplicated elsewhere on campus, are other copies of the volume available while one is at the bindery?

Under such a system the library is obviously granted a level of control over its routine binding operations that is not possible under a manual system.

A variety of useful statistics are available with no effort on the part of the library staff, and the backlog of unbound journals on the library's shelves becomes obvious through the ever growing file of binding cards punched out but not processed because the volumes so represented have not been sent to the bindery.

GIFTS AND EXCHANGES

In the area of gifts and exchanges the obvious application of mechanization is that of desiderata lists and lists of titles available for exchange. The computer can easily coordinate the acquisition unit's lists sent to dealers with those of gifts and exchange sent to other libraries, so that the same title will not appear on both lists at the same time.

The computer can also easily maintain records of exchange agreements and automatically review the activity (or lack of it) with each agreement. For serials, the arrival card is the basis of this operation; for monographs, it would be necessary to keypunch or key in the data indicating the receipt of an item. This would be done at the time of cataloging.

Records of gifts received can be maintained and acknowledgements of those gifts printed out in whatever form is appropriate, providing there is no objec-

tion to present day computer-type fonts appearing on such acknowledgments.

A large percentage of the gifts received in any library is pamphlet material. A very small number of pamphlets are worthy of permanent inclusion in a library's collections, but many pamphlets are worthy of temporary availabliity to patrons. The ease of clearing the library's records in an automated system makes it financially feasible to include almost any ephemeral material in supplemental or temporary book catalogs or in subject lists. In fact, clearing such records can be automatically accomplished by including a future date in the input entry, for computer comparison each day with the current date. When the future date is reached, the computer will "cleanse" itself, and the pamphlet can be discarded on that date without further concern.

ACQUISITIONS

The library's order unit, like its serials unit, handles much information daily that requires immediate, or at least ready, access. Questions regarding the order status of books usually require immediate answers, and an on-line system has this capability. Such a system also makes it possible to transfer some of the order unit's searching responsibilities to the computer. In a typical manual system when an order is received, it is of course necessary, after verification, to search it against the outstanding order file and the library's card catalog. If the title is found to be in either file, no further searching is necessary, and the order, if it is to be placed, is processed using the bibliographical data already on file. This part of the acquisitions routine can be turned over to the computer in libraries where large numbers of publications and other materials are ordered.

The same routine, but on a machine system, would be handled as follows. After verification, the bibliographical data taken from the request form would be keyed directly into the computer, and, through proper programing, a code would be automatically created. The computer would use this code to match against like codes previously created for each item in the library's collections or on order. If a "hit" is made on the code being searched, the computer would immediately print out the necessary bibliographical information and indicate possible duplication so that a decision can be made on the desirability of continuing the ordering procedure on that item. The computer, incidentally, can be programed to make some of these decisions itself.

The codes used for this type of matching procedure consist of the first few letters of several key words or names in an entry. Such codes are simple for a computer to generate automatically.

If the material requested is to be ordered in spite of a "hit," or if no "hit" has been made—which indicates that the item is not in the library's collections—the bibliographical and budget information would be keyed in for a second pass.

On this pass the ordering procedure is completed when a purchase order in the necessary number of copies is printed out, the proper fund is encumbered, the search code is entered into the file for future searches, and the bibliographical data is established as a new entry in the library's records.

A claiming cycle would also be established, so that if the cycle is exceeded, the machine will automatically print out a claim notice.

If the book is o/p or for any like reason will not be received, it can be tagged in storage as a desiderata title and listed out with other such titles for distribution of the lists to o/p dealers.

After receipt of the book, new data would be entered indicating the various stages of processing as the book pro-

ceeds thru cataloging, marking, etc., until ready for circulation. Periodic printouts reflect the book's movements through the course of technical processing.

When the invoice is received, appropriate changes would be made in the necessary accounting records by keypunching or keying-in data, and budget statements would be produced as needed.

Upon completion of the cataloging, the work slip would be sent to the console operator who would insert the final bibliographical information into the system so that the title would appear on the next printout as a completed item. The data would also be flagged in storage as an item to appear in the next issue of the library's new books bulletin. This bulletin, incidentally, would be automatically produced on a stencil or multilith master ready for duplication at the proper time. At this point any necessary catalog cards could be automatically produced, although an automated library would not be likely to need such cards.

Any statistical analyses that are useful to library administrators in the development of a balanced book collection could be had for the price of button pushing. Statistical analyses of duplication by department or subject area, and the related costs, would be available for the asking.

If the library administrator wants to compare the response time of dealers, or their discounts, or the number of their invoicing errors, he can do so because the computer can easily "remember" such information.

The area of acquisitions work, however, that has the greatest need for automation, but cannot under present conditions be automated, is that of bibliographical verification.

In order to automate this phase of order work it would be necessary to place in a random access file all of the bibliographical sources now searched

manually. The crux of the problem rests in two areas, input and costs. Obviously, it is ridiculous to attempt to keypunch or key in the entries in *Cumulative Book Index, National Union Catalog* or *Publishers' Trade List Annual* to say nothing of the major foreign bibliographies. The tremendous mass of data involved and the constant revision required demands the use of character recognition machines or some other rapid input media not now available.

The most promising route of solution at the present time is through the publishers of these bibliographical titles. If during their typesetting operations, the publishers would duplicate the data into punched cards or paper tapes, the data could be read directly into computer storage in libraries. While some method of operation worked out with the publishers might solve the input problem, the difficulties of storage capacity and accessibility can be solved only by technology.

The present day limitations of both input and electronic storage for this mountain of data brings us to the next problem—costs. The least expensive mode of storage, magnetic tape, is almost useless when such enormous quantities of data are subject to random recall. The cost of searching many tapes in an effort to find a specific item of data is prohibitive when mass searching is involved.

The other modes of storage, the random-access types, are too limited in capacity and therefore too high in costs to be helpful at present. It is possible that the new strip storage may offer a solution, but this remains to be seen when that mode becomes available and better known.

CATALOGING

The problem of data input and storage vitally concerns not only the area of acquisitions but also the area of cata-

loging. If all of the major bibliographic sources could be in an immediately accessible machine form, computers could be of much greater help to catalogers than is now possible.

The ideal system, however, would be that of facsimile transmission of cataloging copy from a large cataloging center—the Library of Congress has been suggested—to all of the major research libraries in the country. Such a system would eliminate all cataloging in the other libraries, except perhaps that which stems from local or special interests.

Since that utopia is not yet with us, it is necessary to settle for considerably less in the area of cataloging automation. Even at the deficient level of automation available to us today, much can be done to relieve catalogers and their clerks of some of the dull repetitive tasks necessary in their field.

Any library mechanized to the extent discussed in this paper would have disposed of all card catalogs and would depend on computer printouts and book catalogs. This in itself would eliminate all card duplication and catalog maintenance problems and the high costs involved therewith. The computer would maintain the library's catalog records whenever instructed to do so by keypunched or keyed in data. A really happy situation would be that of a cathode ray tube display system used to recall from storage data needing corrections or additions, and to display it in a readable form while the corrections are being made. The same thing can be accomplished less efficiently (and less dramatically!) by reading computer printouts and keypunching or keying in corrections.

In any event, cataloging work slips would be turned over to key-punchers or console operators instead of to typists, and the necessary book cards, labels, and any other printed paraphernalia would be made available automatically. If it is the custom of the library, patrons could be notified by printed forms of the availability of new titles requested by them.

The development of a computer catalog makes possible more rapid acceptance of new subject headings because of the ease with which changes can be made in mechanized systems.

CIRCULATION

A circulation department using on-line data collection and inquiry stations would probably operate with the prepunched book card and the prepunched patron's identification card as the nucleus of the system. There are mechanized circulation systems that operate without the book card, but none of them are as efficient as those that utilize book cards.

The book card would have punched into it an identification number unique to the book and an author-title code resembling the codes described in the section on acquisitions. Additional information could be coded into the card depending on the results expected from the system and the space available on the card. The cards usually used for circulation systems are only fifty-one column cards so as to fit neatly into book pockets, and, therefore, space is rather limited.

When a patron presents a book for circulation, his identification card containing his prepunched ID number is placed into a slot in the data collection unit. Simultaneously, the book card is placed into a second slot in the same unit, and electrical impulses automatically record the transaction. The date due and any other information can be recorded at the same time either automatically or by keying it in.

Since the library has a computer catalog, the computer can immediately look up the full identification of the book and automatically flag that title as being in circulation. It can also up the circulation

count for the library's statistical records, up the count on that individual book by one, look up the full identification of the patron and record that a freshman or a faculty member or a janitor or a mother of four or a teenager with red hair and/or anything else has taken out a book on a certain subject. Any conceivable combination of information about the transaction can be had in a fraction of a second after the transaction has been recorded. In fact, any response required would be printed out so quickly that it would be instantaneous for all practical purposes.

The system can also serve as a policeman in that it can immediately notify the circulation clerk if the patron has not returned overdue books, is using an invalid ID card, has not paid a lost book charge or owes a fine—it will be happy to print out the bill at a moment's notice. If it is the library's responsibility to account for fines, such accounts would be automatically updated when a fine is paid or when an overdue book is returned.

When a book is returned to the library, it is discharged by removing the book card from the pocket of the book, inserting the card into a data collection unit for a few seconds and returning the card to the book pocket. The book is then reshelved hopefully to await the next patron.

If a patron cannot locate a book at its proper place in the library, it is, of course, hoped that he will inquire at the circulation desk. This situation can be handled in different ways, one of which is that the clerk would key in the call number of the book wanted and press a program key asking the computer for the present location of the book. The system would print out the answer immediately. Any question about an item on order or any information wanted from the student registration file can be answered in this way.

If a patron requests that a book be reserved, the call number can be keyed in, the proper program key pressed, and the job is done. When the book is discharged the reserve status would automatically be noted by the computer, and a notice ready for mailing to the patron printed out.

Lists of charges can be printed out in any useful way. Charges by faculty member, by study carrel, by due date and overdue charges, come to mind immediately.

Obviously, a system such as this would be a tremendous boost to any library, but there is one difficult problem concerned with the establishment of such a system that handicaps the large libraries who are the ones most in need of it. That problem is the necessity of producing the book cards for the retrospective book collection—a small matter of creating one card for each of the thousands of volumes in the library.

A library that has begun its automated system by developing a computer catalog has little problem. The computer will happily punch out all the book cards needed, and, after interpretation, they would be inserted in the books. This insertion can be completed in one of two ways—as a crash program, or as books circulate the correct card is inserted. A wonderful byproduct of this routine is the inventory of the whole collection automatically taken!

Those libraries that have not or cannot begin their mechanization with a computer catalog have other avenues open that would enable them to install a mechanized circulation system. None of the other methods, however, can compare with the system described above.

One of the alternate approaches used to create the necessary cards is that of charging a book in the usual manner and keypunching the book card while the book is in circulation. The original (manual system) charge is sent to the key-

punchers who then punch and verify the book card. When the book is discharged the new card is then inserted in the pocket. This approach eventually solves the problem, but it takes forever to complete the work because rarely circulated books keep cropping up. It has, however, the advantage of spreading costs over a long period of time; furthermore the most active books are the first ones to have cards made for them.

A variation on that theme is possible if a data collection station with a card punch attached is installed in the library. As the data describing the book is keyed in on the collection unit, the necessary data is punched into a book card automatically. This method produces a book card that can be immediately inserted in the pocket. This, however, brings up the problem of entry—it is sometimes difficult or not at all possible to determine the correct entry from the book itself.

A third approach is to mark-sense the call number on a Hollerith card when the book is circulated. Later, the correct entry and any other information can be added from the shelf list and the card keypunched or punched automatically on a reproducer.

The last two methods discussed are, unfortunately, likely to be error prone. The human error problem can limit the dependability of any routine that operates on either keyed in or mark-sensed data unless extreme care is used to prevent errors. If errors can be held to a minimum, either method of input is excellent.

As in the technical processes systems described previously, statistics of all sorts can be had from an automated circulation system. Brief examples would include such statistics as circulation totals by subject, language, etc., totals on each book circulated, and comparisons between various classes of readers and the type of materials circulated to them.

REFERENCE

Like cataloging, much of reference work requires human intellect and, therefore, does not lend itself to machine methods.

The best example of the use of automation in the reference field is that of the machine information retrieval systems so well discussed in the literature. These highly specialized fields are beyond the scope of this paper and need not be discussed here.

In a library devoted to general literature and in which the collections cross all lines of human intellectual endeavor, the contribution of present-day data processing systems to reference services is of somewhat limited value. What the future holds for this area will be of great interest to the library profession, but advancement will probably be slow because of the many library areas needing attention that more readily lend themselves to mechanization.

Obviously, the various book catalogs produced from the computer catalog constitute a major assist to the reference librarian.

The capability of on-line inquiry would also be of major benefit to reference services. This capability would enable the reference librarian to receive the most up-to-date bibliographical information available in the catalog, and the ease with which changes can be made in the computer catalog enables the library staff to move materials freely from one location to another without involved record keeping.

In addition to the above, library automation can at present make a major contribution to reference services through the production of abstracts, machine indexes (KWIC and standard), and demand bibliographies.

A service that would help to clear a minor problem area for reference librarians is that of keeping records of

translations of books and journal articles previously found. The bibliographical data could be entered into a special computer catalog maintained for such purposes. The same can be done for answers previously found to difficult questions most often asked, or any other data of use to the reference staff.

The advantages gained in using a computer over manual methods for such work are not great, but they do exist. The computer cannot be surpassed or even equaled by any manual method of updating, listing, and manipulating data. If such minor uses are developed throughout the library system as by-products of other computer operations, the best possible efficiency can be gained. The costs of the computer exist whether the machine is used or not, and such employment is certainly much more useful than playing checkers or tic-tac-toe just to keep the computer busy.

A reference service that is increasing in popularity is that of selective dissemination of information. This matching of a patron's interest profile (keywords derived from the patron's specialization) with a document profile (keywords derived from the document or from a keyword dictionary) functions as an excellent current awareness service. The major problem concerned with it is the cost of producing the necessary abstracts.

INTERLIBRARY LOAN

This field of interlibrary communications is one of the most promising for future expansion as the necessary equipment is developed and as costs drop to a feasible level for libraries. The future will bring many advances in the way of inquiry stations located in libraries forming communication chains with input-output consoles or cathode ray tube display, television display, etc. These things, and others more dramatic, will come to pass in specialized situations, but how quickly they will be econom-

ically justifiable in general libraries remains to be seen.

In any event, much can be done today with the tools at hand in an automated library with its computer catalog. The distribution of interlibrary loan materials is, of course, a circulation process and, as such, would operate just as any other on-line circulation system. There is also a searching function involved, and it would be handled just as was described in the sections on acquisitions and cataloging. Both functions would operate off the same computer catalog used by all other units of the library.

The usual statistics necessary to evaluate the work of an interlibrary loan unit would be automatically accumulated as the unit's work was carried on each day, just as would be done for any other library activity. Necessary accounting for postage and microfilming (or other duplication) charges would be controlled in the same manner as any other financial accounting in the library.

RESERVE BOOK ROOM

As with interlibrary loan, the reserve book service is, of course, a circulation function and, as such, would operate as the others previously discussed. Its statistics would be collected automatically as the work was performed and fines, if any, handled automatically as well.

The computer catalog would be an extremely useful tool in making available to patrons lists of books on reserve by course name or number, author, title, and subject. At the end of each semester, lists of the titles then on reserve could be produced without human effort and sent to each faculty member for deletion and addition.

Special statistics could easily be collected showing the use made of each reserve book and the length of time the book was presumably used by each student.

To change the records as books are

placed on or taken off reserve would be a simple matter of keying in the call number and pressing a program key to flag the title in the computer catalog or, conversely, to "unflag" it.

TECHNICAL REPORTS COLLECTION

The technical report literature being produced today in such great mass points to one of the outstanding examples of the failure of traditional library methods to cope with the scientific and technical knowledge of the day. This highly specialized literature simply will not fit into the subject straitjackets so loved by many librarians. In order to be satisfactorily retrievable, it is necessary to use methods other than the traditional ones based on the irrelevant classifications of knowledge and on broad subject divisions.

One of the major problems involved with the retrieval of this literature is the need for very minute subject classification. This requirement necessitates special concern for this limited area that is not possible in most of the overworked libraries of today. Regardless of the system used to organize this literature, humans are still necessary to prepare the material for input. It is not necessary, however, for professional librarians to be saddled with this work. It has long been known that people not well versed in science and technology can write excellent abstracts of and assign descriptors to technical literature. Such people working with the proper equipment and under good supervision can develop very fine retrieval systems.

A new technical document entering a library's collection can be quickly abstracted by a person concerned only with this type of literature, and descriptors can be assigned from the document or from the abstract itself. Reference to a descriptor dictionary is necessary for the same reason librarians use lists of subject headings, but this function can be carried out on a computer. Equivalents in terminology can be stored so that the computer will always know the preferred term. Finally, a unique number, not necessarily of any special significance, must be assigned.

The bibliographical citation, the descriptors, and the abstract would be read into random-access memory and would then be available for listing out in any retrieval approach necessary. In essence, a small computer catalog is created for specialized material, and a system of this kind can be developed for any special collection needs.

Depending on the equipment available, more sophisticated systems can be designed around various types of microstorage, reproduction, and display systems that are now available on the market.

BUDGET AND ACCOUNTING

It need not be pointed out that budget forecasting is commonplace in the business world even though it is rare in the library field. Library administrators would do well to look into the use of computers for forecasting budget needs, such as book and subscription prices, salary and wage trends, and equipment requirements and costs. The computer can tell the administrator what to expect in future binding costs according to the library's past rate of serial and book acquisitions. It can tell him which parts of his book and serial collections can be relegated to storage with the least probable service costs in future demands, and it can make educated guesses as to his future supply needs based on past consumption.

An automated accounting system using the same on-line equipment and drawing its data from regular daily library input can make constant checks on the rate of fund expenditures, thereby pointing out funds spent too rapidly or too slowly. It can analyze publishers'

1. Any facility intended primarily for events for which admission is charged to the public.

2. Any gymnasium or other facility specially designed for athletic or recreational activities, other than a course in physical education.

3. Any facility used or to be used for sectarian instruction or religious worship.

4. Any facility used or to be used primarily for any part of the program of a school or department of divinity.

5. Any facility used or to be used by a school of medicine, dentistry, osteopathy, pharmacy, optometry, podiatry, nursing, or public health.

Appropriations to implement the Act for fiscal year 1965 have been requested by the Administration. In April 1964 the House approved the following amounts:

Title I	$230,000,000
Title II	60,000,000
Title III	169,250,000

This is just a beginning. In his speech before the First General Session of the American Library Association conference in St. Louis, Mr. Keppel remarked that: "The Higher Education Facilities Act, with its help to academic library construction, comes none too soon . . . but the unfinished job—the hardest job— still remains. It is to build adequate collections of books and other materials needed by college students and faculty for their study and research. This is both an immediate and a long term, continuing task. A library without books, of course, is about as useful to learning as an empty warehouse." ■■

AUTOMATED OPERATIONS IN A UNIVERSITY LIBRARY

and dealers' prices and discounts, and it can compare the time required by various dealers to fill orders. It can compare the items on an invoice with the acquisitions and serials units' receipt records stored in the computer catalog to determine whether or not the items on the invoice have been received. Supply inventory control with automatic ordering is an obvious routine for such a system, as is equipment inventory control.

LIBRARY OFFICE ROUTINES

Among the uses for computers in library office routines that readily come to mind is a KWIC index of library correspondence, minutes of meetings, library reports, memoranda, and other papers that might inform the left hand about the doings of the other hands.

Needless to point out would be the value of lists of personnel and their assignments, telephone numbers, etc., updated whenever changes occur.

There is also no reason why the library's important correspondence, minutes, reports, etc., could not be stored in microform and tied into the technical reports retrieval system previously described, with or without the KWIC index.

If the library is responsible for its own personnel records, there could be many possibilities for further useful data collection and evaluation. Beyond the usual personnel data maintained by any organization, information can be listed as to special training or talents, foreign languages studied, travel experiences, hobbies or any other data that may be useful to reference librarians looking for answers to questions.

There are, of course, other ways in which automation can be of service to librarians and their patrons. Each librarian, as he becomes familiar with the advantages and limitations of computers and as he learns the theories and techniques of data processing, will find his own uses for this new medium. ■■