The LIBS 100 System

Libraries in the 1970s find themselves facing major challenges in terms of a need and desire to increase and broaden services in a period of fiscal restriction. Demand for the tax dollar to support social programs as well as demands placed on other governmental and quasi-governmental sources of revenue require the library to fight not only for budget increases but even to maintain its present level of funds. At the same time, costs for material and personnel are steadily increasing. In order to balance expenses within the budget, libraries must review the allocation of personnel, particularly those used for behind-the-scenes activities. They must question the need for the methods used and the results achieved by many of the functions which have been performed over the years. Among the activities requiring repetitive clerical tasks are the routines for acquisition of materials, and those required to maintain records of circulation. Automatic information processing systems can help the library conserve its scarce human resources and assist in freeing financial resources for uses other than maintenance of costly behind-the-scenes recordkeeping. This in turn allows the library to broaden and extend its services to the community within the current operating budget.

As libraries have looked at costs required to prepare a major comprehensive computer system fulfilling all their requirements, the initial investment has appeared prohibitively large. In view of the high initial costs, few libraries have achieved any overall cost reduction as a result of automation.

Computer Library Services, Inc. was formed with a view to the past history of computer applications in the library field and the problems which have been associated with initiating comprehensive systems operated by library personnel. CLSI supplies a complete information processing system—the LIBS 100—geared to the needs of the individual library. This system is delivered
ready to use, including the equipment and programming necessary to meet the library's unique requirements. The library need not hire or retain specialists in library data processing applications. Libraries may now automate without major investment in system development or specially trained staff, and without start-up difficulties frequently associated with this process.

The LIBS 100 will support one or more library applications. The capacity of the LIBS 100 system is geared to the task which it is to accomplish. If the library wishes to broaden the range of activities carried out by the system, additional equipment is added to the basic unit, or additional units are added.

The LIBS 100 is specifically tailored to fit the needs of the library. It reduces day-to-day clerical effort by providing new ways to store and retrieve information, eliminates the need for many separate files and allows the library to reallocate its staff to support needed services.

The LIBS 100 has been designed for use by library personnel. CLSI assists the library in educating the staff as to the role of the system in the library's operations and how it is used to assist the library's professional staff. Training of personnel is carried on when the system is installed. The applications are self-instructional through use of an operator instruction panel. Messages are displayed on it as the operator types in data. The bulk of the training is done automatically by the interaction between the system and the operator.

CLSI offers both preventive and corrective maintenance for the LIBS 100 system. Since the library does not operate on what might be considered normal business hours but must have its system operational during the major part of the 24-hour day, CLSI provides its own maintenance staff for the total system which is delivered to the library.

As a result of a major investment by CLSI, libraries no longer need to "invent the wheel" individually. Proven systems are supplied tailored to the library's individual requirements. Following is an overview of the circulation control system.

The CLSI circulation control application records circulation transactions, accepts and files hold requests, produces patron letters, maintains patron and title data, aids in inventory control, and prints a variety of statistical reports. In short, the system deals with all of those functions which are normally associated with the circulation control function. This application is a part of the LIBS 100 Library Information System, and can be operated either as a single (stand-alone) application or as part of an integrated information processing system.

The main purpose of any circulation control system is to answer the
question: "Where can a particular item be found?" Various circulation control systems are more or less effective in answering this question. The better the answer, the greater the range of services which the library can offer. The CLSI system answers this question better than any other system, because one can find out immediately whether there are any copies of a title which are not checked out, and if they are all in circulation, when they are due to be returned.

While it is possible to imagine manual filing systems which could provide this facility, they would be extremely expensive and cumbersome for any but the smallest library. The LIBS 100 can provide this service simply and economically because of the advanced methods used for entering, filing, and retrieving information about an item.

The on-line design of the CLSI circulation control application is based on providing the best possible answer at the lowest cost practical. When one examines the operations of a circulation control system, it is apparent that some activities occur very frequently, or on a regular schedule, while others are less frequent or irregular. The volume of even the most regular activities varies considerably among the branches in a multibranch library. Certain materials have special problems associated with them.

All of these factors have been taken into account in the design of the CLSI circulation control application. The objective of the system is to control the circulation of cataloged, monographic print material. Any item which behaves like an ordinary book can be handled by the system. There are additional, simplified features which allow the library to circulate other materials such as pamphlets, periodicals, and uncataloged books within the system without difficulty, but with correspondingly reduced information.

Fast, accurate data entry is a fundamental requirement for any repetitious, high-volume activity. This is the basic reason why photocharging and embossed patron card systems are popular. The effort required to record the information is very low, while the accuracy is high. The CLSI bar-encoded labels provide another fast, accurate method of recording the transaction coupled with rapid, effortless filing (a characteristic of photocharging but not of the usual embossed patron card methods) and easy retrieval (a facility available in a limited form in manual filing systems, but completely absent in the photocharging systems).

Broadly speaking, the system is concerned with item and patron identification; a checkout transaction establishes a connection between an item and a patron; a check-in removes the connection. These activities can be performed simply by reading bar-encoded labels with the special light pen. The information is then filed automatically. Additional information such as the status of
the patron or the existence of a hold, which is known to the system, is used during checkout or check-in to change the ordinary flow of the activity when necessary. Certain types of statistics are also gathered automatically by the system.

Sometimes it is necessary to do special processing when a book is being checked out, for example, the patron may be delinquent. In these cases, the type of transaction requires more information than that which appears on the label, and the system will be communicating more information than can be handled in a simple illuminated panel display. In this case, keyboard data entry and alphabetic display of responses are required, so the operator must use a keyboard/display terminal.

Since any transaction may be completed using a keyboard/display terminal, small branches which cannot justify more than one terminal should have a keyboard/display. Very small branches may be off-line; that is, they may use any of a number of techniques compatible with this system, or use manual data entry of lists of transactions on a keyboard/display terminal at a central point.

Circulation transactions are quickly and accurately recorded, and the information is automatically filed in such a way that other services may be easily performed. These include answering questions about the status of patrons and books, placing holds (reserves), producing patron letters, and trapping delinquent patrons and copies of books on hold (reserve).

In multibranch libraries, the system can determine which branch has a copy of a book which is not checked out, and a staff member may send an appropriate message to that branch requesting it be held or forwarded to the patron's branch. Holds may be placed against books on order, and be filled immediately as the materials arrive. The details of this operation depend on whether the library has a LIBS 100 book acquisition system and on the means of communication between the two systems.

Patron letters are produced automatically for a number of purposes. When a book on hold (reserve) is returned, a notice is issued to the patron. Overdues and bills are automatically produced. The library may send out recall reminders for books.

The system also produces a number of reports. These fall into several categories: (1) daily reports, which contain, for example, a record of unusual occurrences and a list of titles with many requests against them; (2) operational reports, such as terminal statistics and clearance reports used to verify the accuracy of information about missing items; and (3) statistical reports to meet internal management and legal requirements.

CLSI equipment and services bring to the library all the benefits of
modern data processing techniques and all the advantages of an in-house system, without the high cost of establishing and maintaining a specialized data processing staff. CLSI works closely with the staff of the library to insure that the installed system truly reflects the needs of that particular library.

In the following sections, the system functions and options are described. The discussion begins with a description of the library-oriented data recorded by the system and the methods for entering and updating this information. It then proceeds through the normal functions performed by the light pen, the special functions performed using the keyboard/display terminals, patron letters, reporting, and housekeeping functions.

Circulation Data Base

The collection of information available to the circulation control application is called the Circulation Data Base. Various functions such as check-in and checkout automatically change the contents of the data base. Other operations, such as a patron change of address will also change the contents of the data base.

The following terms will be used frequently in the description of the data base:

1. File—a collection of all records of a single type. For example, all of the patron records constitute the patron file.
2. Record—an organized set of related pieces of information which are usually processed together. For example, the information which describes a patron constitutes the patron record.
3. Field—a defined component of a record, for example, the patron name within the patron record. Usually the fields are the smallest meaningful elements within a record.

The data base is described below in terms of four logical files: patron file—the information about each patron; title file—the information about each title; in-circulation file—records current transactions; hold file—contains outstanding hold requests. The patron and title information, therefore, describe the users and contents of the library, and the in-circulation and hold files describe current activity. In the following discussion, the fields in these records are defined. There are two classes of fields, maintainable and automatic. The maintainable fields are those data items which can be changed directly by an operator. Automatic fields may be examined, but are changed
only as a consequence of some other activity of the system. In the tables below, maintainable fields will be marked (M) and automatic fields (A).

PATRON FILE

The patron data are defined in table 1. When a new patron registers, a record is added to the file containing the basic information required by the library. This would include all maintainable fields except delinquency information. Any of the fields in table 1 may be examined by the operator at any time, even though the automatic fields may not be directly modified.

In some cases, particularly in college and university libraries, the patron information is available from another source in machine-readable form. When this is the case, and the LIBS 100 has the necessary special equipment (industry-compatible magnetic tape, for example), the patron file can be automatically entered or maintained using this data base. The records will be fixed length, and each shall contain the patron name, address, telephone number, alternate key, category, and statistical category. Each of these fields will be fixed length, and will contain blanks if the information is unknown. All fields will replace those in the patron record identified by the alternate key. A new record will be created if there is no record with this key.

The patron file contains a relatively large amount of static information; furthermore, many of the records in the file are rarely referenced (patrons who occasionally or never use the library). The library may wish to place such inactive records on historic files (off-line) and keep only a very limited amount of information immediately available (on-line). The off-line data is recalled to on-line status automatically when a patron becomes active.

The on-line maintenance and inquiry functions relate to active patrons only. A patron is considered active who (1) has a book out or a current hold (reserve) request, (2) has had recent activity, or (3) owes a fine. Since the modification and inquiry functions may only be performed on active patrons, the library would like to keep as many on-line as reasonable. On-line storage is, however, significantly more expensive. With this in mind, the library should select an activity period (time since last activity) which keeps the on-line files as full as practical, consistent with the demands of other files for space. CLSI will help the library establish this date, and will provide methods for monitoring the file sizes.

Off-line maintenance functions include storing, recalling, and purging information. Inactive patrons are stored automatically; a limited amount of information is kept on-line for these patrons (see table 2). Whenever an inactive patron checks out a book, renew his card, or places a hold, his record will be automatically recalled.
<table>
<thead>
<tr>
<th>Field</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name (M)</td>
<td>Up to 25 characters</td>
</tr>
<tr>
<td>Address (M)</td>
<td>Street, city, state, zip (up to 57 characters)</td>
</tr>
<tr>
<td>Telephone number (M)</td>
<td></td>
</tr>
<tr>
<td>Patron category (M)</td>
<td>On-line library, special reserve room (shelf), on-line branch, off-line</td>
</tr>
<tr>
<td></td>
<td>branch, special (e.g., repair, bindery), disposal, system member. (For</td>
</tr>
<tr>
<td></td>
<td>individuals, the patron category may be defined by the library so that</td>
</tr>
<tr>
<td></td>
<td>it determines the patron’s loan period)</td>
</tr>
<tr>
<td>Adult/Young adult/ Juvenile indicator (M)</td>
<td>1 character, library may choose set of values</td>
</tr>
<tr>
<td>Last activity date (A)</td>
<td>Month/day/year for checkout, reserve</td>
</tr>
<tr>
<td>Issuing agency (M)</td>
<td>3 characters</td>
</tr>
<tr>
<td>Delinquency information (M)</td>
<td>(Books owed, due dates, amount owed)</td>
</tr>
<tr>
<td>Alternate key (M)</td>
<td>For access to patron when system assigned patron number is unknown</td>
</tr>
<tr>
<td>Patron number (M)</td>
<td>Bar-encoded label number</td>
</tr>
<tr>
<td>Patron status (A)</td>
<td>Delinquent, lost or stolen card, reregistered</td>
</tr>
<tr>
<td>Statistical field (M)</td>
<td>1 field used to define statistical category</td>
</tr>
<tr>
<td>Additional data field (M)</td>
<td>Up to 15 characters of text, e.g., drivers’ license number or Gaylord</td>
</tr>
<tr>
<td></td>
<td>Card number</td>
</tr>
</tbody>
</table>

Table 1. Complete Patron Data

Patron number (A)
Alternate key (A)
Patron status (A)
Patron category (A)
Issuing agency (A)
Statistical field (A)

Table 2. Inactive Patron Information
Periodically, patrons who have been inactive for a long time will be removed completely from the system (purged). A patron will be purged after three years of inactivity if he has a clean record (does not owe any fines). Patrons who owe the library a fine will be kept for seven years. All purged information will be printed before it is deleted, if the library wishes.

Certain types of modification have additional effects in the system. Adding or re-registering a patron causes the appropriate statistics to be updated. Lost or stolen card reports require a replacement card with a new system-assigned number to be issued. The old card will be trapped at checkout.

There are two access keys in this system. The patron is automatically identified by the machine-readable patron number on the borrower's card. In addition, there is another key used for inquiry, especially when the system-assigned number is not known. This key should be something which the patron can be expected to know. Normally, CLSI recommends an alphabetic key of nine characters. In university libraries, the campus identification number can serve this purpose. Whenever the patron data base is automatically generated from another source, the identifier must be constructed by that source.

**TITLE FILE**

Title maintenance is similar to patron maintenance, but there are some differences because the system must maintain copy identifiers as well as title identifiers. The main functions, therefore, are add, change, list and delete title or copy information, and rename the record.

The fields in a full title record are shown in table 3. An item can be circulated without corresponding title information. Uncataloged material, for example, may be identified simply by the bar-encoded item number. Patron records and late notices for these materials will refer only to the item identification number. It is necessary, however, to include a very limited amount of title information to support the inquiry and hold facilities. These require an association between the item identifier(s) and the separately retrievable title record, since the item identifiers are arbitrary serial numbers, and there is normally no connection between identifiers for different copies of the same work.

The library may choose to identify titles either by alphabetic book-keys or by call numbers (alternate key). In most cases, the book-key approach is superior since fragmentary information can be used to retrieve titles. In some cases, especially in large research libraries, the call number is preferred. CLSI will help the library choose the best retrieval scheme. In libraries using the
The following information is universal (applies to all copies):

<table>
<thead>
<tr>
<th>Field</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brief author (M)</td>
<td>10 characters maximum</td>
</tr>
<tr>
<td>Brief title (M)</td>
<td>30 characters maximum</td>
</tr>
<tr>
<td>Publisher code (M)</td>
<td>5 characters</td>
</tr>
<tr>
<td>Edition class (M)</td>
<td>2 characters (paperback, library, binding, etc.)</td>
</tr>
<tr>
<td>Edition (other than 1st) (M)</td>
<td>10 characters</td>
</tr>
<tr>
<td>Publication (M)</td>
<td>4 characters</td>
</tr>
<tr>
<td>Material class (M)</td>
<td>1 character (record, book, etc.)</td>
</tr>
<tr>
<td>List price (M)</td>
<td>Maximum list of $320</td>
</tr>
<tr>
<td>Call number (M)</td>
<td>The call number can be subdivided into several separately maintain-able fields.</td>
</tr>
<tr>
<td>Date of last activity (A)</td>
<td></td>
</tr>
<tr>
<td>Bibliographic reference (M)</td>
<td>LC Card #, ISBN or similar standard identifier</td>
</tr>
</tbody>
</table>

The following information is available for each volume of multivolume works:

<table>
<thead>
<tr>
<th>Field</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume number (M)</td>
<td>6 characters volume description</td>
</tr>
<tr>
<td>Copy information by volume (M)</td>
<td>See copy information below.</td>
</tr>
</tbody>
</table>

The following information is on a copy-by-copy basis:

<table>
<thead>
<tr>
<th>Field</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bar-encoded label number (M)</td>
<td>17 characters</td>
</tr>
<tr>
<td>Statistical class (M)</td>
<td></td>
</tr>
<tr>
<td>No. of times circulated (A)</td>
<td>3 characters</td>
</tr>
<tr>
<td>Owning agency (M)</td>
<td>3 characters</td>
</tr>
<tr>
<td>Adult/juvenile indicator (M)</td>
<td>1 character</td>
</tr>
</tbody>
</table>

Table 3. Title Information

CLSI book acquisition application, the keys for title records should be assigned in one place, normally in the order department.

When the library has a CLSI book acquisition application installed, much of the information for the add title function can be obtained in machine-readable form from the book acquisition application. Copy information is obtained in this way. When the author/title information in the title record in the acquisition application is fuller than that needed by the circulation control application, it must be edited to compact it.

The change/delete functions are relatively rarely used. These are performed when a copy is withdrawn, or when it is necessary to replace a label which has been defaced or destroyed. When copies are withdrawn, the title
and copy identifiers are placed on the daily log for listing, if the library specifies, along with the reason. Withdrawal reasons are entered in message format by the operator.

The store/recall/purge function of the title maintenance process is also slightly different. A title will be stored off-line when it has been inactive for some time and recalled when it is checked out. This time is adjusted to keep the on-line files as full as practical. This is an automatic function, and takes place during housekeeping operations. The data which are held on-line for stored titles include the bar-encoded label number(s), title key, and statistical category.

The purge operation cannot be performed automatically since weeding requires judgment. The system will produce a list of inactive titles (in shelf order) on demand. The options available are: (1) a list of titles as they are stored automatically; and (2) a list of titles and number of copies each stored prior to a given date and not recalled. These lists are then examined and weeding may be performed selectively. Copies are checked out to disposal using the light pen. If the copy cannot be located, it can be disposed of by keyboard entry.

If a title is added to the file on a temporary basis (i.e., interlibrary loan), it becomes eligible for deletion from the file at the end of the library's specified time period.

**IN-CIRCULATION FILE**

This file records the connection between checked-out materials and the patron who has them. The data recorded are shown in table 4. This record is created during checkout. All changes to the in-circulation data occur as a consequence of a library function (check-in, checkout, etc.).

For direct patron checkout:

<table>
<thead>
<tr>
<th>Item identifier (A)</th>
<th>Bar-encoded label number of material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patron identifier (A)</td>
<td>Patron number (code or JI)</td>
</tr>
<tr>
<td>Date due (A)</td>
<td></td>
</tr>
<tr>
<td>Date loaned (A)</td>
<td></td>
</tr>
</tbody>
</table>

Table 4. In-Circulation Record
HOLD (RESERVE) FILE

The hold file contains the queue of requests for a title within owning agency. This queue is automatically managed by the hold subsystem and the associated functions. The information recorded is shown in table 5. The data are automatically modified by the hold subsystem and the check-in function.

For each agency:
- Title access key
- Volume number

For each hold in queue:
- Date of hold
- Cancel date for hold
- Patron number

If known

For each purchase alert less than 30 days old:
- Date of alert

Table 5. Hold Information

Circulation Transactions

Most of the input to the circulation control application consists of checkout, renewal, and check-in transactions. These may be processed by light pen terminals because all of the information needed may be found on bar-encoded labels. Any of these transactions may be performed at a keyboard/display unit as well. A small branch may have only one terminal; this terminal will be a keyboard/display. Very small branches may have their transactions manually recorded and entered in batches from the keyboard/display at another branch or at the system console.

LIGHT PEN OPERATIONS

The light pen may be used to record normal checkout and check-in transactions, and certain other transactions. The operator is guided through the various sequences by a set of illuminated lights on the terminal. Whenever the terminal expects input, the enter light will be illuminated, along with another lamp indicating the data type. Whenever data are being processed, the Busy lamp will be lit; while this light is on, the terminal will not accept input.

A normal checkout occurs when the patron has a readable bar-encoded
patron card and the patron status is normal, the item has a readable bar-encoded label, and the item is not already checked out. If either the patron or the book has not been converted, the light pen subsystem is used for checkout, but special procedures are followed.

A normal check-in occurs whenever the book has a readable bar-encoded label. The circulation desk clerk sets the terminal function by reading the appropriate bar-encoded tab on the terminal. The function is changed by reading the tab corresponding to the new function.

**LIGHT PEN CHECKOUT**

When the terminal is set for checkout (see figure 1), the checkout light is illuminated. A checkout transaction sequence begins when the patron card is inserted in the slot. The light labeled Patron is illuminated.

The clerk then reads the bar-encoded patron ID by drawing the pen across the label. When the label has been successfully read by the terminal, the Enter light goes out and the Busy lamp lights briefly. While it is on, the system checks the patron’s status, determining first whether he is known to the system, and then whether he is delinquent. There are four conditions for a patron being trapped at checkout: (1) delinquent—set by system, (2) delinquent—set by operator, (3) lost/stolen card, and (4) outdated card of re-registered borrower. In the latter case, the Exception light goes on, the transaction sequence is terminated automatically, and the operator asks the patron to step over to a keyboard input station where the delinquency is resolved.

If the patron record is clear, the standard Loan Period and Item lamps will light; and the clerk proceeds to read labels affixed to the books. If a special loan period is required, the clerk reads the appropriate loan period tab before checking out the item. The standard loan period is automatically restored when a new patron is entered. After each item label is read, the Busy lamp lights while the system checks the item's status.

If the item is marked as being in-circulation, the Exception light is illuminated. The operator may proceed in either of the following ways:

1. Read the Proceed tab on the terminal. This checks in the item from the old checkout and checks it out to this patron. If the item is overdue, the delinquency information is retained and must be cleared manually.
2. Read the Acknowledge tab on the terminal. The item is not discharged and should be held. Presumably, detailed inquiries about the status of the item will be made shortly, and further actions will be based on the results.
Fig. 1. Normal Checkout Function (from light pen terminal)
If the patron and item status are both normal, the checkout is recorded. The relationship between item and patron is noted and the date loaned and due date for the material is recorded. The Loan Period light is illuminated before the book is checked out; the clerk inserts a date slip in the book pocket for the patron’s information. The library may choose to indicate due date by another means; CLSI wishes to point out that a reminder of some sort is necessary or at least desirable.

The system displays the Item light after recording the transaction. Any number of books may be checked out in a sequence without re-reading the patron ID. The sequence is terminated by removing the patron card from the slot of the terminal.

Materials may be checked out to other libraries, to repair, or to discard from the light pen terminal. These are treated as patrons by the system, and the circulation desk should have a set of patron cards bearing the appropriate bar-encoded labels for this purpose.

**LIGHT PEN CHECK-IN FUNCTION (SEE FIGURE 2)**

When the terminal is set for check-in, the Check-in lamp is illuminated. The Item lamp is also lit. The light pen is drawn across the bar-encoded label for each item. If the label is successfully read, the Busy lamp will light briefly. The system clears the records of the checkout and looks on the hold list for holds against the title. If there are none, the Busy light goes out and the Item lamp is lit again.

If there is a hold recorded for the title, the Hold lamp lights, and the operator may not proceed until the Acknowledge tab has been read. The system notes that the item has been checked in, and a notification will be printed the next time patron letters are produced. The operator places the item on the hold shelf.

When materials which have previously been checked out to an off-line institution (or branch) are checked in, the system records the transactions on the daily log. A report containing these transactions will be printed daily, and the off-line institution may use this report to clear any secondary (paper) records.

**LIGHT PEN CHECK-IN OF OVERDUE MATERIALS**

Complete processing of overdue materials is normally performed at a keyboard station. In some cases, however, the light pen is used for these transactions. If the materials have simply been dropped, and the patron is not present, the materials are checked in using the normal check-in procedures.
Fig. 2. Normal Check-in and Overdue Discharge (from light pen terminal)
The transaction is not, however, cleared, but marked as overdue, returned, the return date recorded, and fine calculated.

If the patron is present, and pays the fine in full, the Overdue Check-in tab is used to clear the transaction and the item checked in. This procedure can only be used for materials in hand.

LIGHT PEN RENEWALS (SEE FIGURE 3)

The input sequence for renewal is similar to the checkout procedure. The main difference is that the terminal does not remain in Renewal at the end of the transaction sequence. In addition, certain materials may not be renewed. If an item is on Hold or Overdue the Exception lamp is illuminated. The operator must respond by reading the Acknowledge tab. The item is not renewed, and the patron should be so informed.

The date due calculation is based on the date of renewal, not on the original due date.

LIGHT PEN FUNCTION SELECTION

In general, the various functions are selected by reading a tab on the terminal. Changing from one function to another is accomplished by reading another tab. The following conditions must be satisfied to change from one function to another: (1) The terminal function may be changed at any time during check-in; (2) The terminal function may be changed only between transaction sequences for checkout and renewal operations (no patron card in the slot).

KEYBOARD/DISPLAY OPERATIONS

The keyboard/display unit is more flexible than the light pen, since the information to be entered need not be pre-printed in bar-encoded form. Most of the more complex functions performed at these terminals are discussed in subsequent sections. The keyboard/display may be used for any normal circulation transaction; in addition, it is used for exceptional transactions including: checkout or renewal to a patron who does not have his patron card with him; mail renewal of materials; checkout of materials to a delinquent patron; handling fines for delinquent patrons; checkout of materials (for example, summer or vacation loan items) for periods other than the established loan periods; and checkout or check-in of an item with an illegible label.

Often it is necessary to identify a patron or a title, or both, to perform these functions or make inquiries. The easiest way to make an identification is
Fig. 3. Renewal Function (from light pen terminal)
through the bar-encoded label or the eye-readable number associated with it. If this information is not available, the item or person can be identified by searching the files. The operator enters the title or patron key and the system responds with the record which has that key. This process sometimes results in several possible identifications, and the terminal operator chooses the proper record.

SAFEGUARD PROCEDURES

The ease with which materials may be checked in or out using the light pen, and the fact that the terminals are in relatively exposed locations on the circulation desk require that reasonable precautions be taken. Any terminal may be shut down by reading the Off tab; the system will not accept messages from it until it has been logically reattached by the circulation desk support system.

Whenever an item is checked in on or before the end of the grace period, the transaction record is deleted. This assures the patron that there is no permanent record of his loan habits. On the other hand, it does mean that the materials checked in can be checked out to the same patron immediately. Reasonable care in handling the materials at the circulation desk will prevent this from happening.

Hold (Reserves)

The Hold Subsystem (see figure 4) is conversational, and any keyboard/display, including the system console, may be used to place a hold (reserve).

The first step in placing a hold is patron identification. The operator enters the system assigned patron number. If the patron is a registered user of the library, the LIBS 100 checks his status. The operator may then place the hold or not, as library policy dictates.

The next step is to identify the title. Access to titles is through the Title key. When access to titles is through the Title key, the terminal operator enters the first seven characters of the key and the system responds with the brief author/title which it has recorded for the books which have this partial key. In most cases, there will be one or two titles listed. The full key, including uniqueness digits, is also displayed. There are search facilities which may be used to identify the title when the patron's information is fragmentary (no author, partial title, etc.). While these methods are helpful, the more complete and accurate the information provided, the faster the search.

When the exact title has been identified, the terminal operator may request the due date information for it. The system then displays the due date
Fig. 4. Placing Hold Request (From Keyboard/Display Terminal)
(or due dates if the library has more than one copy) and the length of the hold queue (how many people have already placed holds). In a library that has one or more branches on-line, the copy information includes the owning branch. If two or more libraries share a data base the information initially displayed is that for the library in which the requesting terminal is located. The operator may request information about the holdings of other libraries, if necessary. When a copy is not checked out elsewhere, the operator may enter a message to the other library and ask it to hold the item for pickup or ask to have it sent to the patron's local library or branch.

If there is no copy available for immediate checkout, the patron may have his name added to the queue if he wishes. A cancellation date may be included in the request. If there is a copy in circulation which is eligible for recall, the operator may request a recall notice. Holds are placed against all copies belonging to the requesting branch.

The hold file is checked whenever an item is returned. When the title is found on the list, it is trapped and the system removes the top patron from the list and causes a patron letter to be generated. In addition, the title is placed on the daily log and a report will be printed for the use of the staff managing the hold shelf. This report will contain titles which are being placed on the hold shelf. The report order will be patron alphabetic key or standard identifier, when this is the alternate key. It will be divided by branch when there is more than one on-line branch.

The copy awaiting pickup will be checked out to the hold shelf for a period selected by the library, and the name of the patron who has been notified will be dropped from the queue. If the patron does not pick up the material, it is once more checked in, and if there are more holds, the next patron on the list will be notified.

When a branch queue for a title reaches a certain length (specified by the library) a Purchase Alert is placed on the daily log. The queue length causing the alert is stated in terms of the number of requests per copy. A title will not appear on the Purchase Alert more frequently than once a month for a specific branch.

Holds may be placed against materials which are on order. If the library already owns copies of the title, the hold is placed in the ordinary manner. When the new copies are received, they will be trapped when they are checked in by the circulation system. Procedures are slightly different for titles which are new to the library. The title information may be entered when the books are ordered, and holds placed against it. When the materials arrive, any corrections to title information should be made and the copies entered. The system will check for requests when the item is checked in by
the circulation system. Libraries which use the CLSI book acquisition application may have simplified procedures in this case.

If the library withdraws, or marks as missing, the last copy of a title with outstanding holds, titles are listed on the daily log. The holds are not cancelled. The operator may cancel a hold at any time. To cancel a hold, the patron and title must be identified in a manner similar to that used in placing it.

**Reporting**

**DAILY LOG REPORT**

The daily log report is produced at the end of business each day. It is subdivided into a number of sections, including: terminal statistics (number of transactions, file errors); purchase alerts for hold materials containing author, title, number of copies owned and on order; materials checked in from off-line branches and libraries; last copy withdrawn messages; hold list (holds trapped today); and overflowed patron fine list.

**PATRON LETTERS**

There are a number of occasions when the system produces a letter to a patron (see figure 5). The patron letters may be printed on paper stock or card stock. The paper forms are placed in window envelopes, the card stock forms stapled before mailing. The window envelope must be used for bills, since postal regulations do not allow a request for payment to be made on a postcard.

Patron letter print can be performed at any time; the operator specifies which type of letters are to be printed (late notices, hold notification, recall reminders, bills, or collection notices). When late notices or bills are printed, the system automatically finds the overdue items and prints the notice.

The system may generate first, second, and subsequent notices, and bills for materials not returned. The library chooses how many notices shall precede the bill. Before the bills are printed, the library may want to check the shelves for the missing items. The operator may call for a shelf clearance report to aid in this process. The report is in call number order and contains the author, title, and bar-encoded label number for the missing item.

**PATRON AND CIRCULATION STATISTICS REPORTS**

The patron and title records contain information which is used to control statistical reporting. There are a number of reports which may be based on this information.
Fig. 5. Patron Letter
Interface with Other CLSI Applications

The LIBS 100 supports a number of applications which may be operated separately, or as part of an integrated information processing system. This section is concerned with some aspects of the relationship between these applications, but is not meant to be an exhaustive discussion of the use of the LIBS 100 in such an integrated information processing system.

There are two types of interface between the circulation control application and other CLSI applications. These may be broadly categorized as direct interfaces, where one application has on-line access to the files of another application, and indirect, where communication is through an intermediate file which may be on-line to both applications but acts as a buffer or letter-box between them. These are not rigid categories, and it may be possible to have direct access for inquiry functions and indirect access for modification.

Under ideal circumstances, direct access would appear to be better since it is more flexible. Rarely, however, are circumstances ideal, and indirect access (or no access at all) is used to protect the files of one application from the activities of another.

The kind of access is also influenced by external factors, such as the corporate relationship between the entities operating the applications and whether the applications share an on-line system resource (disk or communications line). The details of the access type and mechanism are, therefore, not discussed here. The subsections below discuss the kind of information flowing between applications.

CIRCULATION CONTROL—BOOK ACQUISITION APPLICATION

The main matters of interest in this relationship are (1) the transfer of new title and copy information from the acquisition application, (2) inquiries about materials on order, and (3) the ordering of new copies or titles by the circulation application.

Generally speaking, the amount of information placed in the title file by the book acquisition application exceeds that needed by the circulation control application. Often the former has bibliographic or near bibliographic quality data, while the latter only needs enough to identify an item to an ordinary library user. Therefore, the size of certain fields may be reduced during the transfer.

If all of the titles had been acquired using a LIBS 100, there would be assured consistency between the keys used by the circulation control application and the book acquisition application. Some means must be developed to insure this consistency. The easiest way to do this would be to have all
circulation control keys in the acquisition files, or available to the acquisition system. This is not always practical, however; hence there is need for a method of adjusting keys as titles are added to the system.

When key adjustment or further data compression is needed, the records involved will be presented to the operator performing the function. It is strongly recommended that the key produced by the acquisition system be accepted and the conflicting record be renamed. This will reduce future conflicts, since added copies will be automatically appended to the record if it has been produced by the acquisition system.

When the acquisition application and the circulation control application have a direct means of communication, the on-order status of materials can be ascertained at any time. This information is manually maintained in other cases, and is, therefore, less trustworthy.

CIRCULATION CONTROL—MATERIALS BOOKING APPLICATION

While the characteristics of these two systems are somewhat similar, they differ enough to preclude the use of shared files. There are close connections between the patron activity and when the same patron uses both services as an individual, he may use the same library card. In this case, delinquent status will be checked in both applications whenever the patron is active in either. The patron files may be combined or separate, depending on the requirements of the application implementation.

INVENTORY CONTROL

The circulation control application will support an inventory control function if the library wishes to convert all of its holdings. Since such a conversion will, at best, take a significant amount of time, manual inventory procedures must be continued. CLSI suggests that the bar-encoded label number be used in place of the conventional accession number for materials added after the installation of the application. If the library continues a second series of accession numbers, manual inventory operations will be significantly more complex, because the reconcilement of missing and in-circulation items requires access by label number.

If the library wishes to do a complete conversion, any systematic approach will work. If the library intends to examine the content of the collection, and to weed extensively during conversion, CLSI suggests that the systematic conversion itself be delayed for perhaps two years so active titles will have been converted before the weeding begins.

The system will construct and maintain a shelflist file to aid in the inventory process. Since this is a bulky, inactive file, it is normally kept
off-line. When inventory is in progress, it is recalled a segment at a time. The inventory control terminal (usually a stand-alone recording terminal) is taken to the corresponding shelves, and each label is read. Books with missing or defaced labels are put aside, and the labels replaced. These copies are checked off manually from a keyboard/display. Then the copies on the shelves are checked off and the in-circulation copies are checked off. At the end of this process, any item not checked off is missing. A report containing author, title, and bar-encoded label number, in shelf sequence, is then printed for a final check. Items still missing are then withdrawn.

**Housekeeping Functions**

There are a number of housekeeping functions which must be performed regularly in order to keep the system in good running order. These include: (1) daily duplication of files to assure back-up which may be used in case of system failure; (2) weekly patron purge/recall operations which place inactive patrons on the off-line files and restore patrons who have become active to the on-line files; (3) weekly title purge/recall operations which perform similar functions with titles.

During the day, special transaction logging operations are performed to support back-up and maintain statistical fields. This logging is normally done to one of the disk files.

Although this paper has concentrated on its use in circulation control, LIBS 100 is designed to be a flexible, expandable system. The system may be extended to additional library activities by adding further equipment to the basic unit or by incorporating additional units into the overall system configuration.