AN ON-LINE LIBRARY SYSTEM
AN "IN-HOUSE" DEVELOPMENT

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ABSTRACT

This paper outlines the proposed on-line system in the Learning Resources Centre of the Red River Community College, that will replace the current batch system. The strengths and weaknesses of the batch system are discussed and the benefits of the on-line development are shown. Developmental considerations and resource sharing aspects of the new system are presented.

UN SYSTEME DE BIBLIOTHEQUE "ON-LINE"
UN DEVELOPPEMENT "IN-HOUSE"

RESUME

Cette étude analyse le système proposé par le Centre de Ressources pour Apprendre du Collège Communautaire de Red River qui remplacera le système Batch, celui qui est présentement utilisé. Les avantages et les désavantages de chaque système sont étudiés. Et enfin les aspects de partage de ressources et les considérations de développement du nouveau système sont présentés.

1. INTRODUCTION

Joining established networks is the promoted road in the current field of library automation. We maintain that there is presently no practical national network operating in Canada. While a number of institutions are prepared to share their resources, there is no facility dedicated to housing this type of operation. From many an individual library's point of view, present service bureaus require the use of exorbitantly expensive and inefficient services in order to access the resources of its users.

What is required is a cooperative network that provides sharing of all or any of their information and service resources. In such a network, decision making would be shared or at least contractually agreed upon by all parties. Because there is no efficient network available, we considered all other alternatives and decided to develop our own on-line system. This system will be able to link to current service bureaus and is open to future networking possibilities.

2. THE ENVIRONMENT

Red River Community College in Winnipeg is a large size college with approximately 5,000 day students (full time equivalent) and 13,000 evening students. The college offers over 200 courses in its four basic divisions, viz. Applied arts and business, Industrial and Technology, Health Services and Continuing Education.

The Learning Resources Centre of the college is considered to be an integral part of the total educational environment and attempts to meet the information needs of its wide variety of users. In addition to the 450 instructional staff and 18,000 students, there are about 250 administrative support staff who draw on the Learning Resources Centre's (LRC) resources. The LRC resource collection includes about 51,000 books, 8,000 audio-visual items, 500 current periodicals and a separate government publications collection of 12,000 items. The LRC has a full time staff of 24 employees. The projected operating budget for 1979-80, excluding salaries and capital equipment, is $128,900. Of this amount, $44,000 is for the acquisition of books, $36,000 for A.V. software and $22,000 for periodicals.

The Computer Centre and the Learning Resources Centre are both part of the Community Colleges Division of the Department of Education. As an administrative support area, the Computer Centre provides all expertise required in the development of information systems within the community colleges structure. Thus, the majority of the development costs for the proposed system are allotted to the computer centre budget rather than to the LRC. The Centre is located next door to the LRC.

3. THE OLD SYSTEM

Since 1969, the Learning Resources Centre has used a batch processing computer system for acquisition of books and cataloging and information retrieval of both print and non-print media, providing reasonably efficient service. Books are ordered through the system and all catalog products for books and catalog cards for both books and audio-visual items are generated by the system, which also provides information retrieval on all cataloged items.

3.1. Specific Functions and Volume of Work

The system's functions, listed below, are based on the average acquisition orders of 450 books and 40 audio-visual items per month.

1. Verifies every requesting instructor's identification for all book orders and checks for duplicates in both the holdings and on order file.
2. Produces purchase orders.
3. Produces on order/in processing list.
4. Produces staff and vendor lists.
5. Links series, volumes, parts, etc. through accession numbers to both books and audio-visual items and provides master accession list.
6. Produces book received listing.
7. Provides catalog card sets for all cataloged items and spine labels and pockets for books.
8. Maintains a subject authority file that checks for new subject entry.
9. Provides for list of recent shelvings.
10. Produces faculty notices of items shelved.
11. Provides information retrieval searches through (a) call number range (b) subject(s).

3.2. Strengths

1. The chief strength of the batch system is that tasks in the Technical Services Sections are speeded up so that materials received can be processed and cards filed in the card catalog within 2 to 4 weeks. It was estimated that the clerical tasks that are currently automated, would involve an additional 6 to 7 to LRC staff if done manually. No manual system could match the computer system in accuracy, speed and consistency and thoroughness.

2. The system also produces additional card sets for satellite library catalogs.

3. Fast and reliable information retrieval is another strength of the system. The faculty of RRCC and the other 2 community colleges in the province can get a complete print out of RRCC holdings in any particular subject. This service, if done manually, could never be provided as efficiently and thoroughly, and would also have adverse effect on the timeliness of the information available to the users.

4. The subject authority file as well as the accession list provides means of cross references of backfiles needed to ensure uniformity of and consistency in practice.

5. Faculty notifications of books ordered that are generated by the computer are much appreciated by the Faculty, as it enables them to make maximum use of newly acquired materials in their instruction.

3.3. Weaknesses

The system designed in 1968 was technically far ahead of its time. Files were organized into what is now called "data base file structure" and by means of very complex ASSEMBLER language programming, this was made to operate within 64K running on an IBM 360/30. By 1978, however, technical problems had become critical.

1. Maximum record capacity (95,000 records) is soon to be reached. Extensive changes would be required to increase system capacity.
2. Computer processing time is excessive. A typical "library run" takes about 4 hours to process.
3. The administration is changing from an "in-house" computer to time sharing at the University of Manitoba. Conversion of the old system would be a mammoth task.
4. System maintenance costs are excessive due to the complexity of ASSEMBLER language programs and missing documentation.
5. Despite the obvious value to the LRC of the functions performed, the system support procedures are extremely inefficient.

-lack of editing necessitates laborious input preparation and error correction procedures.

-lacks "correction" routines in some fields; (eg. misspelled subjects and defunct suppliers can not be corrected or removed).

-some functions occasionally and inexplicably fail (a card or other output might not be produced)

-can not provide second set of catalog cards without resubmitting fully documented form.

-too many "hands" needed in typing full bibliographic information both at Acquisition and Cataloging. This data is keypunched in full again at both points.

-information retrieval can not be performed by subject within selected media--a distinct handicap for the Audio-visual section.

-format of all retrieval outputs are unwieldly, discouraging efficient use.

-lack of features such as, catalog cards burst and sorted ready for filing; "see" and "see also" references; efficient use of space in printing the products.

In the absence of cost guidelines for computer operations, it is difficult to determine the exact cost of the old library system, other than in terms of computer run time. Major contributions to excessive computer processing time are the complexity of the system and its error correction procedures as designed in 1968. However, it was estimated that providing the same level of service on a manual basis would cost an equivalent of an additional 6 to 7 staff members. While the LRC system output has always been considered essential and useful, internally within the computer, the system has become endangered and needs to be updated in terms of current technological advancements.

4. ALTERNATIVE CONSIDERATIONS

Knowing of the imminent collapse of the current system due to critical technical problems, we determined that six options were open to us. After careful evaluation, we decided in favor of developing our own system. The alternatives considered were as follows:

4.1. Modify the Existing System

The existing system consisted of 83 ASSEMBLER language programs. Each of these was severely complicated by the original need to operate within very limited machine capacity. Furthermore, the computer centre is moving from an in-house computer to time sharing with the university. Conversion of the existing system would have been as large a task as developing a completely new system, without the advantage of improved features.

4.2. Share an Existing System

The possibility of sharing an existing system was evaluated carefully. The main disadvantage was the cost. The saving that would be obtained from the operating costs would never make up for the excessive conversion costs. Also, this would have involved additional development to provide the same level of service as had been provided by the old system.

4.3. Acquire a "Package" System

This alternative was eliminated without extensive evaluation of

specific systems. Experience indicates that package systems necessitates substantial modification to the user determined requirements. Such systems are usually large, expensive and incur excessive processing costs because their generalized nature lead to processing inefficiencies in the user operation.

4.4 Convert to a Manual System

This alternative was eliminated because of the cost of the additional staff that would have been required to perform the function done by the old system. Initial estimates of additional staff to maintain the present level of service is seven.

4.5 Do Nothing

The alternative of continuing to "fix" the old system as problems occurred was eliminated because of the need to convert to time sharing. Conversion, as previously mentioned, would be as great a task as writing a new system.

4.6 Develop a New System

Several positive reasons contributed to the decision to develop a new system. These included:

-reprogramming would insure that the system would have a reasonable life expectancy.

-an in-house developed system would consider "clerical efficiency" and thus provide cost savings not anticipated from the other alternatives.

-easier maintenance and complete control of the system are available only under in-house design.

-would ensure availability of all present requirements of the LRC.

-further expansion into circulation more easily realized.

5. THE PROPOSED ON-LINE SYSTEM

Following detailed analysis, which determined our specific requirements, we decided to develop our own on-line system. The proposed system will retain all the strong points of the old system and will also address itself to removing all the weaknesses. In addition, by nature of it being an in-house, on-line development, it will have certain special features.

5.1. General Design

An LRC data base will be developed to support all acquisitions, cataloging and information retrieval requirements for all media types

as well as some limited circulation tasks. The sytem will utilize on-line data entry with full editing and permit a variety of detailed and summarized information displays and reports.

Acquisitions. Acquisition requests will be entered once daily, editing and duplicate checking will be performed during entry. The system will produce purchase orders as well as monitor the order process, produce overdue notices, cancellation documents and acquisition statistics.

Periodicals, serials, annuals, etc. will be included in the scope of the acquisition functions. The system will monitor activity and indicate issues or volumes not received. Data will be available to verify receipt for invoice purposes.

Cataloging. The system will allow pre-cataloging using off-site sources, as well as on-line cataloging by the LRC. Audio-visual materials will be fully cataloged and classified, while periodicals and government publications will be subject classified according to LRC catalog standards. This will provide the basis for a comprehensive information retrieval component covering all media types.

Information Retrieval. Literature search requirements will be supported by displays and reports. Where detailed data is required on specific items, displays of the catalog record will be available. Statistics and lists of items will be obtainable in printed report form.

Administrative Statistics. The sytem will provide:
1. daily system controls.
2. daily and monthly activity statistics by section.
3. monthly expenditure to date by department.
4. yearly budget expenditure analysis.

Circulation. Student overdue notices will be produced as batch output.

5.2. Special Features

1. The sytem is fully interactive, and provides multiple on-line access methods to satisfy various information requirements. Holdings and other records are accessible by purchase order/acquisition number, vendor, author, title, subject or call number.

Acquisition:

2. A rough subject classification is entered for all orders to enable information retrieval on all orders. An "on order" list is also available for public catalog area.

3. All order and catalog data from the first copy or latest previous edition is linked to subsequent order.

4. The system maintains a log of audio-visual materials received for preview and the expected return date.

5. ISBN/ISSN numbers are used to generate publisher and supplier data.

6. Overdue order analysis serves as vendor analysis as well.

Cataloging:

7. A major feature of the system is "pre-cataloging" using an off-site catalog data base. Because of the insignificant number of orders that are not received, searches against catalog data sources will be performed for all uncataloged orders using ISBN/ISSN or LC card numbers. We expect that 60% of our acquisitions can be pre-cataloged. In general, the cataloging information will be accepted with very little changes.

8. Future network arrangements or links to other libraries has been allowed for by recording ISBN/ISSN and LC card numbers.

9. Where unordered items are received, they are entered as "received direct" and may then be cataloged.

10. References and updates can be made to the subject authority file during cataloging.

11. The call number assigned is verified to ensure a unique number.

12. All catalog output is produced in batch and is pre-sorted according to library rules and ready to file.

13. "See" and "see also" references are maintained within the system and utilized in the information retrieval transactions to gather related subject headings.

14. Where archaic subject entries require updating, the "becomes" transaction replaces all occurances of the old subject with that of the new entry and establishes the old term as a "see" reference to that subject.

Information Retrieval:

15. Literature search requests are performed by call number range and by subject for later printing in batch.

16. The literature search facility also provides:
-weeding list--older editons or outdated copyrighted material.
-inventory list--checklist of holdings in call number sequence.
-collection analysis--title count by call number range.
-book catalogs for specific media types.

17. When an item is completely cataloged, a "shelving notice" is produced, ready to be mailed to the instructor.

18. A recent shelving list is produced monthly for all media types.

19. On-line inquiry displays library location and shelf location.

20. A status element is displayed if an item is missing and it is being re-ordered or if it is withdrawn.

5.3. Missing Features and Rationale

1. Cancellation notices will not be produced automatically, but will be activated by transaction based on overdue items. Many of LRC orders are forthcoming publications and it is desirable not to cancel these orders automatically. For this reason, publishers' report date will be entered, so that overdue transactions will be pushed further accordingly.

2. Circulation area is not part of the proposed system. The systems group has other priorities in the colleges and hence the scope of the proposed system has been limited to meeting the needs of the existing system in the technical service and information retrieval. However, implementation of on-line student records system in the very near future will enable us to consider automation of circulation function as well.

3. The LRC will continue to maintain the public card catalog at present, even though information retrieval is provided through on-line access. Conversational literature search on CRT, replacing the public card catalogs will be considered when the cost of hardware declines as it is expected to.

5.4. Cost Benefits of the Proposed System

1. Monthly Costs:

Estimated processing costs:	$2,500
Rental on 2 terminals:	180
Rental on 2 accoustic couplers:	50
	$2,730

Total computer processing, storage and hardware costs represent less than 1% of the LRC operating costs ($310,987). The anticipated staff manpower savings for the LRC is 5.55 staff man years. There will also be complete elimination of all Computer Centre Staff costs: Computer operations, keypunch, clerical and supervision.

2. Cost Comparison of the Proposed System to Current System. No detailed comparisons were made since replacement of the old system was identified as a necessity in the alternatives phase. While this data might be interesting to someone, it was redundant to the decision-making process.

3. Cost Comparison of the Proposed On-line System to Batch System. The cost of the on-line system is the marginal cost of on-line over batch (i.e., the cost of developing the on-line system less the cost of developing a batch system) To accurately determine this cost, we would have to develop both alternatives to a very detailed level; the analysis costs would then be substantially higher than what it is worth doing it.

On-line systems should have lower operative costs than comparable batch system by reducing the input forms, processing files and large output reports, as well as eliminating keypunching and batch control. The cost of terminals and processing time should be less than the batch system equivalents. Over a 2 year period, the increased efficiency of the on-line system will pay back the added development costs.

Other Anticipated On-Line Benefits:

-Extended life expectancy. As more and more on-line systems are developed, the remaining batch systems will be exceptions to the future environment. They will be increasingly more expensive, difficult to operate and maintain and there will be pressures to bring such systems up-to-date.

-Labor and paper costs will continue to rise, while hardware and computer storage costs are expected to continue to decline.

-The cost of maintaining the LRC public card catalog is

estimated to be $4,500 per year. This is greater than the cost of the required number of terminals.

-Further benefits can be obtained by the Computer Centre from the on-line data base (IMS) development experience, since the administration plans to develop an on-line student system.

5.5. Resource Sharing

The following features will demonstrate two potential resource sharing capabilities of the proposed system:

Pre-cataloging Service. The LRC will share in the cataloging service of agencies like the National Library by using cataloging data where available and providing its original entries.

Future Sharing of Resources with other libraries available through the addition of ISBN/ISSN and LC card numbers to the system's data elements.

Hardware. The LRC system will "time share" on University of Manitoba computer, sharing educational computer network. The system also uses the computer centre printer.

Software. Sharable service system that could be used by other community colleges in Manitoba.

Human Expertise. Shared use of computer centre staff. In turn, the library system provides on-line (IMS database) experiences which will facilitate development of an on-line student system.

5.6. Project Plan

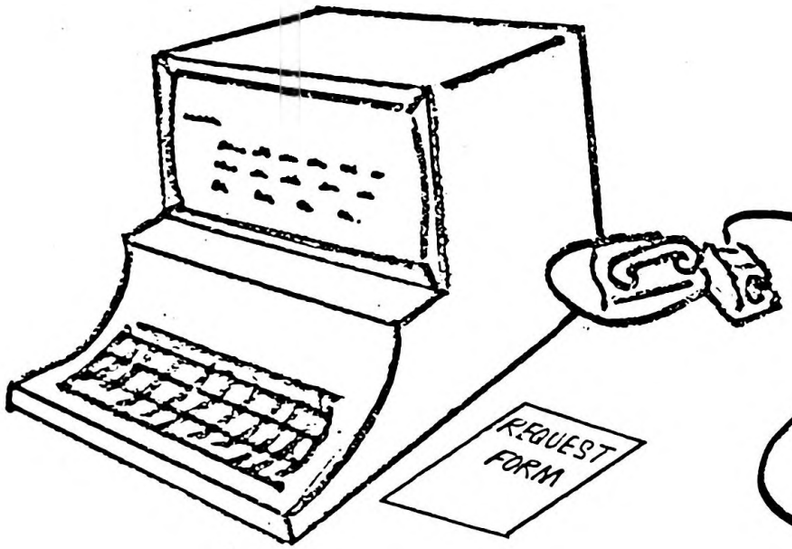
We expect that the programming specifications will be completed by June and the programming and implementation phase to take another 6 months.

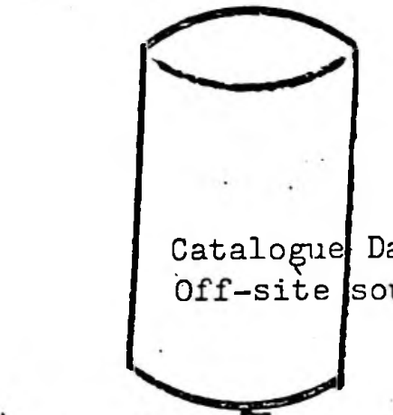
6. CONCLUSION

From an initial feeling of dismay of not being able to join an outside service bureau like UTLAS (because of the cost as well as lack of other features) our mood has now changed to one of optimism and enthusiasm. The benefits occuring to the LRC due to the system being on-line is considerable. In-house development provides control and efficiency of "fit" to defined requirements, and on-line development appears to be a very beneficial move for us.

ORDERING

1. LRC STAFF ENTER REQUEST FORM



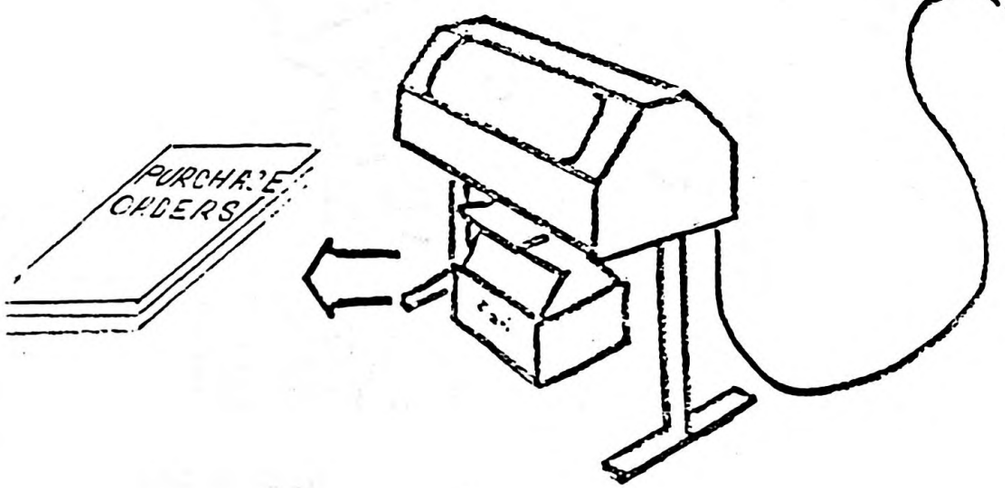


2. PURCHASE ORDERS ARE PRODUCED IF THE REQUEST IS NOT A DUPLICATE

DATA BASE
U of M

Tape

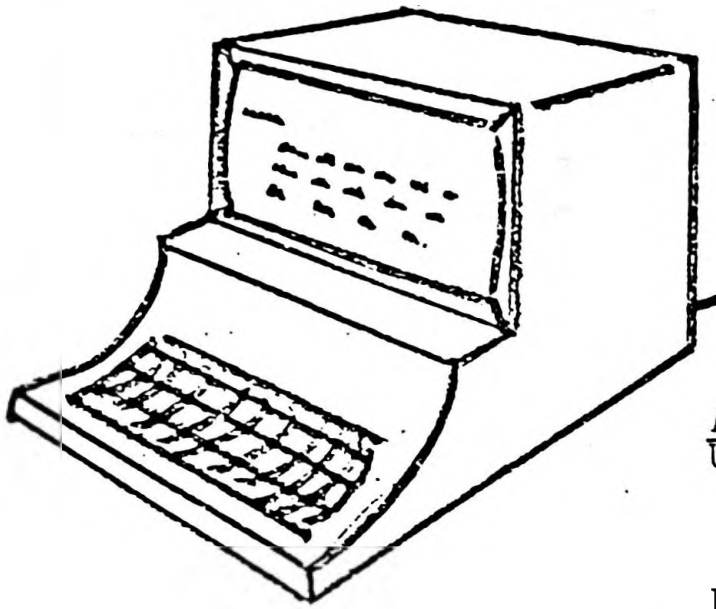
3. EACH WEEK ALL ORDERS ARE TRANSMITTED TO FOR PRE-CATALOGUING. WE EXPECT 60% TO BE RETURNED FULLY CATALOGUED



Transparency
1.2(b)

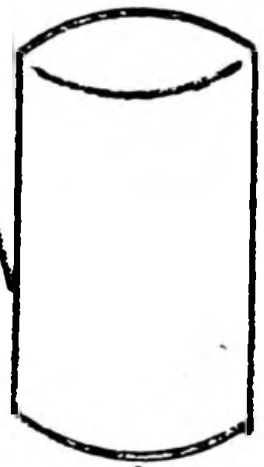
LRC SYSTEM

TERMINALS IN RED RIVER
LEARNING RESOURCES CENTRE
CONNECTED TO U. of M.
BY TELEPHONE

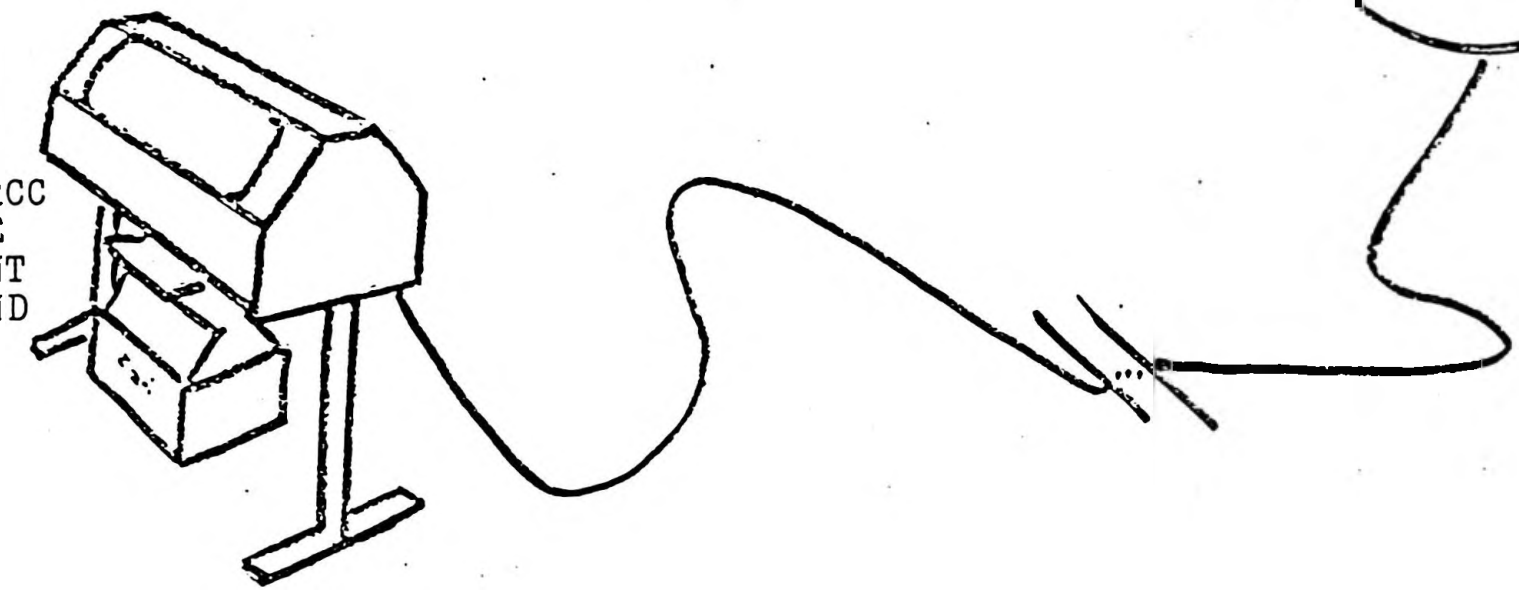


ALL PROCESSING DONE BY LRC
USING TERMINALS INCLUDES:
- ALL INPUT
- ALL CORRECTIONS
- ALL FILES

DISPLAYS:
- ORDERS
- HOLDINGS
- SUBJECTS
- FILES
- ETC.

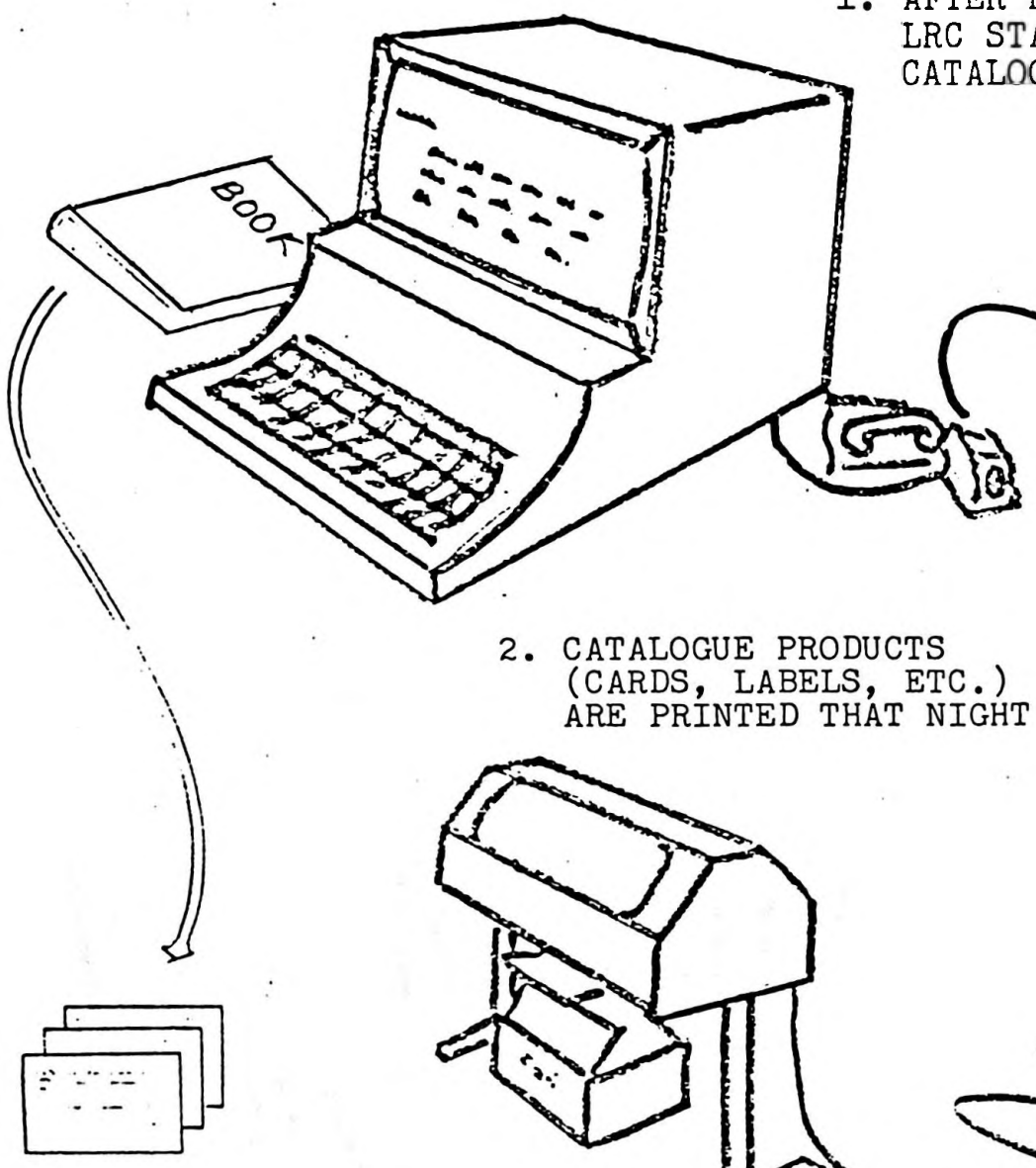


DATA BASE AT UNIVERSITY OF MANITOBA



LRC USES THE RRCC COMPUTER CENTRE PRINTER TO PRINT LARGE REPORT AND OTHER PAPER OUTPUT

1. AFTER RECEIVING
LRC STAFF VERIFY
CATALOGUE DATA



2. CATALOGUE PRODUCTS
(CARDS, LABELS, ETC.)
ARE PRINTED THAT NIGHT

3. CARDS ARE PRESORTED AND
GO DIRECTLY TO CIRCULATION
SOME PROCESSING, LABELS ETC.
IS DONE BY CATALOGUING THEN
THE BOOK GOES TO CIRCULATION

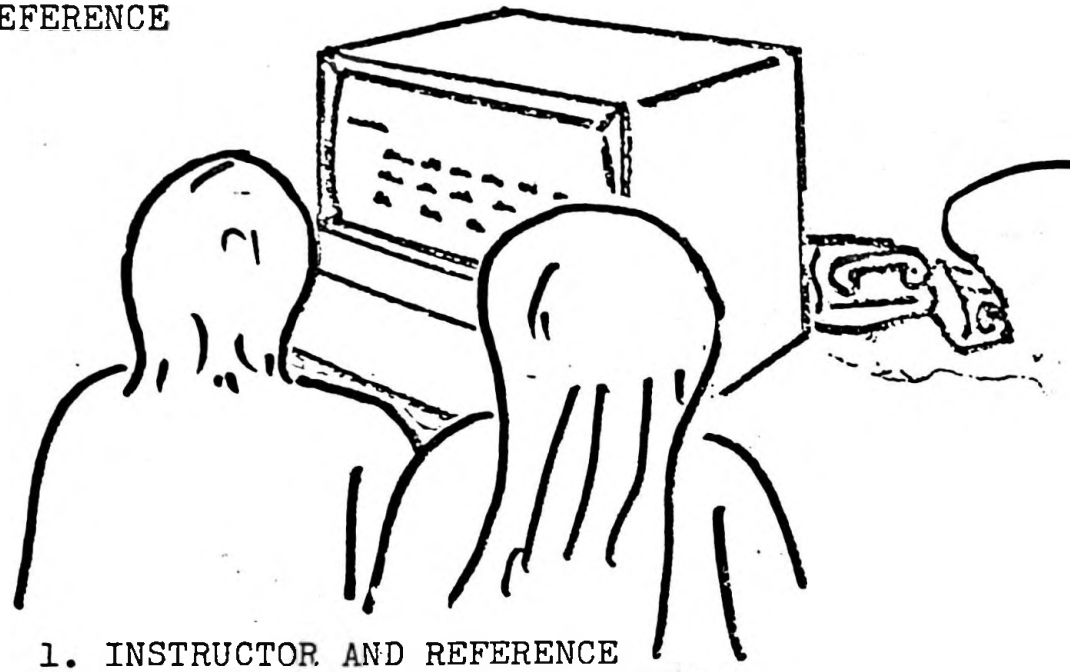
LRC STAFF VERIFY THAT
THE CORRECT CATALOGUE
DATA HAS BEEN OBTAINED

LRC STAFF MAY ALTER
PRE-CATALOGUE DATA

LRC STAFF DO ORIGINAL
CATALOGUING BY ENTERIN
DIRECTLY TO THE
TERMINAL

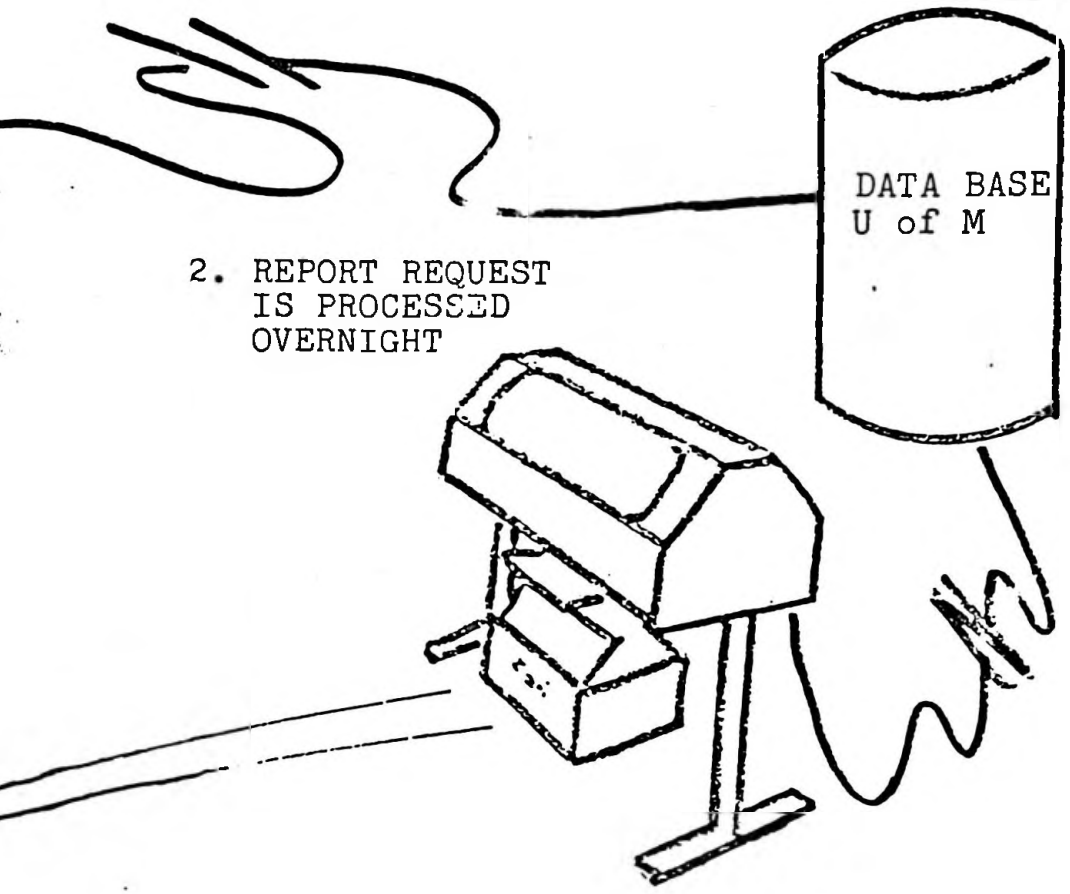
Transparency
1.2(d)

REFERENCE



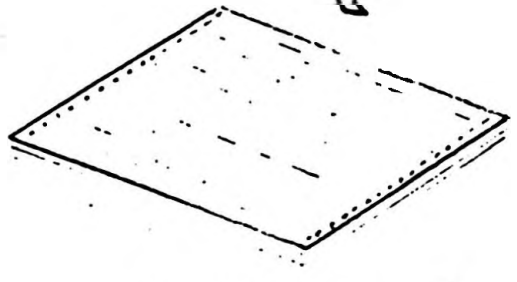
1. INSTRUCTOR AND REFERENCE LIBRARIAN PREPARE AND SUBMIT LITERATURE SEARCH BY SUBJECT OR FOR CALL NUMBER RANGE.

All required detail may be displayed on-line; any required printout is processed overnight



2. REPORT REQUEST IS PROCESSED OVERNIGHT

PRINTER: COMPUTER CENTRE



3. LITERATURE SEARCH LIST HOLDINGS (AND ORDERS) SELECTED MEDIA, YEARS ETC.