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MICROCOMPUTER-BASED LOCAL AUTOMATION MODEL: FUNCTIONAL DESCRIPTION

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PREFACE

The microcomputer-based Local Automation Model (microLAM) is a prototype automated library system designed to support library cataloging and reference functions. This functional description describes the microLAM system designed to meet the operating and service needs of Department of Defense (DoD) libraries with fewer than 80,000 holdings and establishes the basis for subsequent development by specifying the automated processing capabilities and applications for the system.

Intended for implementation by DoD technical libraries, the microLAM will permit users to (1) search and extract bibliographic information contained in the Defense Technical Information Center (DTIC) Technical Reports (TR) data base, (2) catalog holdings in the TR data base, and (3) create, maintain, and search a local catalog. The microLAM will combine these capabilities in a single system using a single command language.

The microLAM will be installed in a prototype site library – at Headquarters, U.S. Army Training and Doctrine Command, Fort Monroe, Virginia – and after successful testing will be available for implementation by other DoD technical libraries.

This functional description is based on information obtained through available documents and direct contact with DoD technical libraries, including a survey in which potential system users identified the features and capabilities required in a local system. After review by DTIC – the system sponsor – and potential users, the functional description will provide the basis for prototype site implementation of the microLAM and will serve as a model for other libraries in planning future implementations.

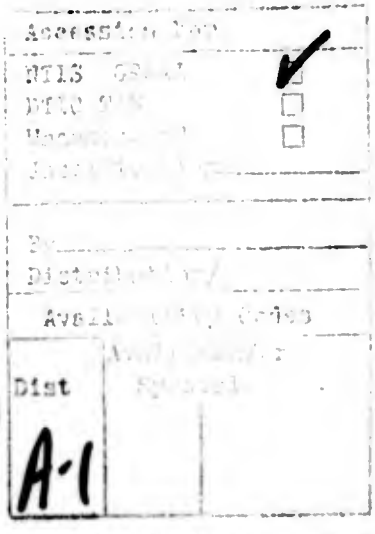


TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

SECTION 1. GENERAL

1.1 Purpose of the Functional Description.

This Functional Description of the microcomputer-based Local Automation Model (microLAM) provides:

- The system requirements that will serve as a basis for mutual understanding between the user and the developer
- Information on performance requirements, preliminary design, and user impacts.

This document adheres to the requirements for a Functional Description in "Department of Defense Standard: Automated Data Systems Documentation," DoD 7935, 15 February 1983, and in "Defense Logistics Agency Information Processing Standards Handbook," DLAH 4730.1, May 1978.

1.2 Project References.

The development of this document is authorized by Logistics Management Institute (LMI) Task Order No. DL503 (MDA903-85-C-0139), "Microcomputer-based Local Automation Model," undertaken by LMI as requested by the Defense Logistics Agency (DLA). The project began on 3 April 1985, is sponsored by the Defense Technical Information Center (DTIC), Information Research and Technology Division, and is monitored by the Office of Information Systems. The test site for initial microLAM development is the Technical Library at Headquarters, U.S. Army Training and Doctrine Command (HQ TRADOC), Fort Monroe, Virginia. Potential users of the system include Department of Defense (DoD) technical libraries and information centers that access the DTIC Technical Reports (TR) data base and that maintain fewer than 80,000 holdings in the library's local collection.

The following documents were referred to in the development of this report:

- LMI Task Order No. DL503, "Microcomputer-based Local Automation Model," Logistics Management Institute, 22 January 1985.
- "Local Automation Model: Functional Description," Logistics Management Institute, September 1983.

- "Local Automation Model: System Specification," Logistics Management Institute, February 1984.

- "Local Automation Model: Assessment of Library Software Availability," Logistics Management Institute, September 1984.

- "Department of Defense Automated Data Systems Documentation Standards," DoD Standard 7935, 15 February 1983.

- Defense Logistics Agency Information Processing Standards Handbook; Volume 8: DLA ADS Life Cycle Management Specifications," DLA Handbook 4730.1, May 1978.

- "Data Element Dictionary, DTIC Uniform Data Systems," DTIC Handbook 4185.8, AD-A083800, April 1980.

1.3 Terms and Abbreviations.

The following acronyms, terms, and abbreviations are used in this document:

- Ada: DoD programming language, Ada is a registered trademark of the U.S. Government (Ada Joint Program Office)

- ADP: Automated data processing

- Data Base: A collection of files maintained and accessed by an automated system for use by applications running on the system

- COM: Computer output microform

- CRT: Cathode ray tube

- DBMS: Data base management system

- DIALOG: An information utility accessed by many DoD technical libraries; registered trademark of DIALOG Information Services, Incorporated

- DLA: Defense Logistics Agency

- DoD: Department of Defense

- DRIT: DTIC Retrieval and Indexing Terminology

- DROLS: Defense Research, Development, Test and Evaluation (RDT&E) On-Line System

- FD: Functional description – a document that defines the requirements of a system and provides the users with a statement of its operational capability

- File: A collection of logically related records, generally all in the same format, maintained and accessed by an automated system as part of a data base for use by applications running on the automated system

- Holding: A technical report, document, book, serial publication, or microfilm in a library's collection

- LAM: Local Automation Model

- MARC: Machine-readable cataloging – a standard format or convention specified to facilitate the exchange of bibliographic information via machine-readable magnetic media

- MicroLAM: Microcomputer-based Local Automation Model

- MS-DOS: Microsoft-Disk Operating System – the operating system used by the International Business Machines (IBM) personal computer and compatible machines; registered trademark of Microsoft, Incorporated

- OCLC: An information utility accessed by many DoD technical libraries; developed and maintained by OCLC, Incorporated

- On-line: In teleprocessing, a system in which the input data enter the computer directly from the point of origin or in which output data are transmitted directly to the point at which they are used

- RDT&E: Research, Development, Test and Evaluation

- RTIS: Remote Terminal Input Subsystem used by DoD libraries to transmit data to DTIC

- SBIN: Shared Bibliographic Input Network – a consortium of technical libraries participating in on-line cataloging using DROLS

- TR: Technical report

- TRADOC: U.S. Army Training and Doctrine Command

- TRALINET: TRADOC library network

- UNIX: Computer operating system; registered trademark of Bell Laboratories.

SECTION 2. SYSTEM SUMMARY

2.1 Background.

DTIC provides on-line search and retrieval access to the TR data base containing citations on more than 1 million technical reports prepared by or for the DoD. Both these capabilities are supported by the DROLS communications and terminal network. Approximately 50 technical libraries participate in the on-line cataloging, while over 800 sites perform on-line searches of the TR data base.

While existing DROLS capabilities offer potential benefits to participating DoD technical libraries (e.g., reduced cataloging workload, on-line subject searches, computer-generated microfiche indices for local holdings), additional capabilities are needed to better meet the service demands of technical libraries. In many instances, technical libraries must maintain a separate local catalog for holding citations that are not eligible for entry in the TR data base (e.g., holdings other than technical reports, holdings subject to limited dissemination or classification safeguards). These local catalogs may be manual card catalogs or may be contained within automated systems whose operating procedures are vastly different from those of DROLS. In addition, cataloging data entries must be duplicated for documents entered in both systems. The LAM project will provide a system that offers ready access to DTIC resources and at the same time meets local service needs for cataloging, related patron reference services, and reduction in data entry duplication.

The LAM will be implemented using commercially available library software integrated with a subset of the Integrated Information System (IIS), an intelligent gateway developed and supported exclusively by Lawrence Livermore National Laboratory.

Implementation of the LAM, however, will not be economical for a number of smaller libraries. Those libraries can benefit from the features and processing capabilities provided by the LAM; with the capabilities offered by the system, any library can contribute and retrieve bibliographic citations in a shared cataloging program. However, for such libraries it is necessary to tailor the system to the environment (typically smaller collections and lower access frequency and transaction volume).

These key features - collection size, access frequency, and transaction volume - influence the hardware and software requirements which, in turn, directly affect the cost of the system.

2.2 Objective.

The objective of the microLAM project is to provide small DoD libraries with improved capabilities for acquiring, processing, and storing bibliographic and patron information at a cost consistent with the size of their collection and the volume of their transactions. The objective will be achieved by enabling users to:

- Store and process bibliographic information on all library holdings including those not eligible for DROLS
- Perform simultaneous searches of DTIC and local files
- Perform separate searches of DTIC or local files, as needed
- Access bibliographic and patron data in a real-time interactive mode
- Process installation-unique collections having special formats
- Generate and store custom output reports
- Process and transmit data in accordance with DoD security and ADP regulations.

2.3 Existing Methods and Procedures.

The bulk of technical library services has traditionally included the following functions: cataloging, reference, circulation management and control, serials control, and acquisition management. These functions provide a comprehensive means for outlining current library operations. Libraries without automated capabilities perform these functions manually, while other libraries perform some or all the functions with automated systems.

This section describes the methods and procedures currently used by small DoD technical libraries to support these functions. Section 2.4 discusses the methods to be used by the proposed microLAM system.

2.3.1 Cataloging.

Catalog Format and Content. While libraries maintain either a manual card catalog or an automated catalog file of library holdings, some libraries have neither. Although the catalog data

maintained by each library is similar, no standard citation format for technical reports is used. The MARC format, widely used in public and academic libraries, is not the format of choice for most potential microLAM users. In addition, the DRIT developed by DTIC is not specific enough for use by many laboratories and centers to classify local holdings. Libraries have augmented the DRIT with more-detailed, locally derived subject terms and descriptors.

Manual Original Cataloging. For libraries that maintain a local catalog, original cataloging is performed by the library staff. No capability currently exists for downloading records from an external data base and modifying those records for use in the local catalog, even though existing records are available.

Multiple Catalogs. Some libraries maintain a portion of their collection on remote systems. Monograph holdings can be maintained on shared catalogs such as OCLC, and some technical reports can be maintained by SBIN members on the TR data base by appending a holding symbol to citation records. While the sharing of citations in external data bases saves staff time, it also fragments the library's catalog and increases the number of systems that the staff must access.

Separate Input. For those libraries performing shared cataloging, duplication of effort can occur if full citations must be added to more than one system. For instance, an SBIN library that catalogs all technical reports produced by its organization will enter a citation in its local system and, if the report has not yet been cataloged by DTIC, enter a full citation in the TR data base as well.

2.3.2 Reference.

Characteristics of Manual Catalog. A manual catalog generally consists of one or more cards for each library holding, organized by title, author, or subject (or all three) and available for use by both the library staff and patrons. All library holdings may be included in a single catalog, or separate catalogs may exist for different classes of holdings (such as technical reports and books).

Characteristics of Locally Automated Catalogs. Libraries maintaining an automated catalog generally share a computer with other non-library applications, operated by non-library personnel. The library usually has only batch access to its automated catalog and must perform library functions without quick access to automated catalog information. The software for local systems is generally

written for the library by in-house programmers and cannot offer many of the features of commercial library software. For instance, most locally developed systems permit few searchable fields, utilize nonstandard search syntaxes, and provide brief, cryptic help and error messages. The catalog is generally structured as a sequential (flat) file, resulting in slow response times for reference searches. A few small libraries have acquired commercial library software and implemented on-line systems on either a minicomputer or microcomputer. These libraries have expressed general satisfaction with their systems.

Multiple Catalogs. Because monographs and documents are often maintained in separate catalogs and both are distinct from the TR data base, a thorough literature search requires the reference librarian to access several sources. The storage of classified citations apart from unclassified citations can further complicate a search.

In the survey of DoD libraries, the feature most widely required by the respondents was the ability to store citations for all library holdings in a single, local system. Over 80 percent of the small libraries responding indicated that without this feature, a microLAM would be of little use.

Manual Merger and Postprocessing of Results. When citations have been retrieved from more than one catalog, the results are generally merged into a single bibliography by manually combining and editing the separate sets of citations. The ability to postprocess (sort, reformat, or edit) search results from external data bases or from a local catalog on a batch-mode system is very limited. When it can be done at all, the librarian or user must store the search results in a file and use additional software (word processor, data base package, etc.) to perform the necessary manipulations.

2.3.3 Circulation Management and Control

Circulation Transactions. Most libraries process circulation transactions manually. Typically, a hard-copy charge slip is completed by the patron or the librarian when a holding is checked out of the library. In some DoD libraries, the librarian knows the base population well enough to recognize most patrons by sight; in other, larger installations, a patron must present suitable identification before charging out a holding. Charge-out slips are generally filed and saved until the holding is returned. A tally of the number of holdings checked out daily is also maintained.

For classified holdings, a special receipt must be completed to indicate the transfer of material to the patron, who assumes responsibility for storing and safeguarding the material in compliance with DoD security regulations. Receipts for classified holdings must be saved.

At many technical libraries, no fixed circulation period is established for holdings checked out to the researchers, faculty, or permanent staff of the laboratory, school, or center served by the library. A patron is permitted to retain a holding indefinitely. When the holding is returned, the library staff reshelves it and either destroys the charge slip or saves it in an inactive file.

Compilation of Statistics and Reports. Statistics of library activity are generally compiled by hand from daily activity reports and other manual records. Because of the time required to perform this task, only the most fundamental statistics are maintained. Similarly, reports such as declassification/downgrade schedules are produced manually by the library staff.

Patron Clearances/Need-To-Know. For libraries containing classified holdings, either a file of patron clearances and need-to-know must be maintained at the circulation desk or the circulation librarian must contact the base security office to verify a patron's clearance. If the library maintains its own list of clearances, the file is either manual (e.g., card file or typed list) or automated on a batch system that produces a printed list used in the library.

2.3.4 Serials Management.

Serials Distribution. When a serial is received at the library, it is logged on the master serial list. If serials are routed outside the library, a routing slip with the names of staff members interested in the serial is produced, often from a file maintained on a word processing system, and attached to the serial for distribution. When the serial is returned from distribution, it is stored with other issues on file. Back issues are either kept for a predetermined period beyond which they are weeded from the collection or are kept indefinitely and bound.

Subscription Processing. Some libraries retain a commercial subscription service, such as that provided by EBSCO,Incorporated, to handle the ordering and billing of serials. Other libraries perform these functions themselves and must maintain the budgetary and vendor data required.

Some libraries perform these functions for only some of their serial subscriptions, depending on the serial publisher.

2.3.5 Acquisition Management.

Multiple Acquisition Methods. DoD libraries use several methods to acquire new holdings. For technical reports and documents, one of three methods may be used: (1) reports produced for DoD can be automatically sent to the library during the distribution process, (2) reports can be acquired to fulfill a patron's request, and (3) reports can be chosen by the library staff as useful for the library. Similarly, book orders are initiated by a patron's request or that of the library staff on the basis of book reviews or recommendations or to replace older editions of books already in the collection.

Coordination. When placing commercial orders, a library must often coordinate its actions with other in-house organizations. For instance, after initiating the paperwork for an order, the library must often submit the order to a budget office for validation; invoices received by the library are generally sent to a finance and accounting office for payment.

2.4 Proposed Methods and Procedures.

The proposed methods and procedures discussed in this section provide a generic description of the microLAM functions. Specific system and performance characteristics are provided in Section 3.

The microLAM will involve the creation and maintenance of a local library bibliographic catalog combined with the capabilities to query this catalog and the TR data base maintained by DTIC. Queries to either the DTIC TR data base or the local catalog will use a single format, applicable to both catalogs and initiated from the same terminal. The microLAM will support the exchange of bibliographic information between DTIC and the local library to the extent permitted by existing information interchange agreements and rules (e.g., level of security classification, proprietary nature of the data). It will allow the local library to access, download, and modify TR data base bibliographic citations. These capabilities – cataloging and reference – form the core capabilities of the microLAM and reflect the principal objective of the project stated in Section 2.2.

While cataloging and reference represent the microLAM capabilities with the broadest applicability and economic value to the majority of potential users, some libraries surveyed indicated

that automated capabilities for circulation management, serials control, and acquisition management are also important. For this reason, the proposed methods and procedures presented in this document for functions beyond cataloging and reference should be viewed as system options.

The microLAM will be designed and developed as a "fully integrated library system" with capabilities for modular implementation. The initial pilot testing will include at least the cataloging and reference functions, and other functions will possibly be added later. This approach provides the developer and the potential users with the opportunity to:

- Demonstrate and review the technical feasibility and economic value of implementing an improved technology for local catalog development and remote and local catalog query
- Establish the framework for orderly, low-risk system expansion as needs and resources dictate
- Reduce the risk inherent in system expansion or full-scale implementation by establishing, through prototype system implementation, the means for integrating automated support for a range of technical library functions
- Identify the extent to which these functions can be transported from the minicomputer-based LAM and demonstrated on the microLAM, given reasonably available and economically justifiable automation technology.

Based on the user requirements identified during the development of the minicomputer-based LAM, from interviews with potential microLAM users, and from the survey of DoD technical libraries, the following subsections present methods, procedures, and principal features proposed for the microLAM. (The survey instrument used to collect data on microLAM requirements and a tabulation of the survey data are provided in Appendices A and B, respectively.)

2.4.1 Cataloging.

Access DTIC. The reference librarian will perform searches of the TR data base using DROLS search capabilities to locate bibliographic data potentially useful for developing a local catalog entry. The search criteria will be formatted by the local system to comply with the DROLS machine protocols. If the local library also has the holding, it may add the DROLS-supported library holding symbol to the TR data base record.

Download Bibliographic Record. When bibliographic data on the TR data base can be used to develop a local catalog entry, these data will be transferred to the local system. Data will be

converted by the microLAM to the format compatible with the local processor and processing software. No user intervention will be required to reformat the data.

Locally Postprocess Downloaded Records. Once the data are transferred to the local system, the user will be able to modify or supplement the bibliographic data for use in the local catalog. Postprocessing may include the addition of subject terms or descriptors, local accession numbers, or alternative data representations.

Update Local Data Base with Downloaded Records. When postprocessing is complete, the revised bibliographic data may be added to the local catalog. Local libraries may choose to store the data temporarily pending a review of the entry for compliance with local cataloging rules and standards.

Create Original, Local Bibliographic Records. Using facilities provided by the local system, the catalog technician may create a bibliographic record for entry into the local catalog, the TR data base, or both. Multiple copies of documents will be cataloged using a single catalog entry.

Submit Catalog Records to DTIC. By implementing the microLAM, a library becomes an SBIN site and as such, may add catalog records to the TR data base. Only bibliographic information meeting TR data base and DROLS criteria (e.g., security classification limitations, access limitations imposed by proprietary information) may be transferred. When local library catalog records use other than DRIT subject terms or descriptors, the appropriate DRIT descriptors must be added to the catalog record prior to its transmission to DTIC. Non-DRIT descriptors may be included on TR field 25, "Identifiers and/or Open-ended Terms." Other data elements may be required for SBIN inputs that are not used in the local catalog.

Update the Local Catalog with Local Bibliographic Records. Upon review and approval of either the locally created or modified catalog record, the catalog technician may add the new record to the local catalog.

Prepare Catalog Back-Up. Periodically, the microLAM software will be used to create local catalog back-up copies. Machine-readable back-up copies will be used to reload the local catalog in the event of a system failure. This capability will also be available to produce any shelf lists or other

listings of the catalog required by the library staff, and thus provide an interim operational capability upon system failure.

Maintain Special Collections. Local libraries may maintain special collections as part of the catalog by using special collection identifiers within the catalog – permitting special collection catalog access via the reference search capabilities for authorized users.

2.4.2 Proposed Reference.

Perform Bibliographic Searches. On the basis of existing DROLS syntax, the microLAM will perform searches of the TR data base. The local catalog may be searched by subject term/descriptor, author, title, date of publication, security classification, local or DTIC accession number, and other locally specified fields.

Select Files to be Searched. The microLAM will search the local catalog, the TR data base, or both sources simultaneously. The user selects the sources from a menu displayed during entry of the search criteria. A single format will be used for entering search criteria. The system will perform all translations necessary for compliance with DTIC and local catalog protocols and syntax.

Download DTIC Bibliographic Data. The microLAM will transfer bibliographic information selected from the TR data base during a user search to the local search.

Postprocess DTIC References. Using the bibliographic data downloaded from DTIC, the local library staff or user may sort the records in alternative sequences, perform additional searches on available data fields, and retrieve and review the information on a local terminal. The data also may be printed and/or temporarily stored for patron use.

Perform Local Catalog Queries. The microLAM will perform searches of the local catalog. The types of searches available will depend on the bibliographic and cataloging information entered by the library staff during cataloging. As a minimum, the system will provide searches by author, title, subject terms/descriptors, and local accession number. The system will be capable of multiple key searches using Boolean logic arguments.

Use a Common Command Language. A single, common command language will be used to search the local catalog, the TR data base, or both. System software will translate the user-entered, common commands into the search syntax required for the data base(s) being searched.

Locally Postprocess Retrieved References. As with the reference data downloaded from the TR data base, the library staff or user will be able to sort, perform additional searches on available data keys, and review the results of the local catalog search.

Remotely Access Local Catalog. The microLAM will allow the local catalog to be accessed by remote users, at the option of the implementing library. This feature will enhance the ability of library networks, such as the TRALINET, to promote resource sharing among its members and permit a central library in the network to maintain an automated union catalog that can be searched by smaller, "branch" libraries.

Access to Other Data Bases. Many DoD libraries routinely access catalogs and data bases other than the local catalog and the TR data base, such as the RECON data bases maintained by the National Aeronautics and Space Administration (NASA) and the Department of Energy (DoE), and commercial systems such as OCLC and DIALOG. The microLAM will support access to these systems and will permit the merger and postprocessing of search results from all sources.

2.4.3 Circulation Management and Control.

Determine Patron's Selection Location and Identify Status. The microLAM will display the location of holdings requested by the patron on the basis of bibliographic information obtained from a local catalog search. If the holding is not available, it will determine the status of the holding (e.g., whether on loan to another patron, on order, reserved).

Check-in/Check-out Holdings. The microLAM will verify a patron's need-to-know and level of security clearance in conjunction with release of a classified holding, update the patron file to indicate the addition of the released holding, and update the patron file to reflect the return of a loaned holding.

Prepare Classified Document Receipts. In conjunction with issuing a classified holding to a patron, the microLAM will print a classified document receipt. Data on the receipt will be extracted from the local catalog and the patron file.

Prepare Downgrading/Declassifying Schedules. At the option of the local library, data on downgrading/declassification schedules may be entered in the local catalog along with other bibliographic data. Periodically, the microLAM will produce schedules for holdings in the current catalog reflecting pending downgrading/declassification actions.

Prepare Classified Document Destruction Schedule and Record. On the basis of the downgrading and declassification schedule entered in the local catalog, the microLAM will produce a classified document destruction schedule and accompanying record for certification by the appointed document custodian.

Create and Update Patron Files. The microLAM will provide a patron file to record the current holdings of each patron, the level of authorized clearance or access, and need-to-know as indicated by applicable subject terms or descriptors contained on the patron record. The level of clearance and need-to-know subject terms will be established and modified by designated library staff members in conjunction with the local installation/facility security officer.

Prepare Reports on Circulation Statistics. Using holding check-out data contained in the local catalog and the patron file, the microLAM will produce circulation statistics for the local collection. Recurring reports may be produced using the host data retrieval language. Ad hoc circulation reports will be developed by the library staff using a query language available within the library software.

Identify Holdings by Patron. If a requested holding is part of the local collection but is charged out to a patron, the microLAM will identify that patron so that the holding may be located.

2.4.4 Serials Management.

Maintain and Update Serial Records. The microLAM will establish a serial record for each periodical or serial subscription. As issues are received, the library staff will update the serial record to reflect current holdings. The serial record will contain the frequency of serial distribution, permitting the identification of issues not received.

Prepare Serials Routing Lists. Where libraries maintain a list of patrons routinely receiving new issues of serials, the microLAM will automatically produce a circulation and routing slip containing the patron names and organizational addresses.

Monitor Binding Operations. When periodicals or serials are removed from the collection for binding or microfilming, the serials record will be annotated to reflect the status of the holding and provide an estimate of when the holding will be available for charge-out.

2.4.5 Acquisition Management.

Maintain Acquisition Budget. For libraries acquiring holdings from commercial vendors or publishers, the microLAM will support entering and updating an acquisition budget.

Check for Order Duplication or Duplication of Existing Holding. Prior to submitting an order for a holding, the library staff can check for duplication of existing holdings within the local catalog or the TR data base and for duplication of orders.

Prepare Preliminary Bibliographic Record for Cataloging. Upon placing an order for a holding or receiving a publication likely to be added to the collection, the library staff can create a preliminary, skeletal bibliographic record for entry into the local catalog. This record identifies the status of the holding as on-order or pending further cataloging and can identify new holding arrival dates, check for duplication of orders, etc.

2.4.6 Summary of Improvements.

The use of the microLAM will provide the following improvements:

- Automated Capabilities. For most libraries, the primary improvement derived from the microLAM will be the automation of procedures that are now performed manually, such as catalog searches and compilation of library statistics. With automation, these functions will require less time and can be performed more thoroughly.

- Functional Improvements (New Capabilities). The implementation of the microLAM will expand the local catalog search capabilities and permit, at the option of the user, simultaneous searches of the local catalog and the DTIC TR data base. The system will also permit libraries to exchange bibliographic information when desired.

- Improvements to Existing Operations (Upgraded Capabilities). Libraries will use fewer resources to develop local catalog entries to the extent that bibliographic data contained in the TR data base are applicable to local holdings. Submitting bibliographic data to the TR data base will be simplified through use of data already entered in the local catalog. Where local libraries currently maintain an automated catalog but are restricted in their search

capabilities, implementation of the microLAM will provide expanded local catalog search capabilities by offering several searchable fields as well as simultaneous searching of the local catalog and the TR data base. Where local libraries do not maintain an automated catalog, the LAM will decrease the resources expended in making bibliographic searches.

- Timeliness (Decreased Response Time or Processing Time). Through use of the simultaneous search option, local libraries will reduce the time needed to conduct reference searches of currently available sources. Through use of multiple key searches and sorts, the local library will reduce the processing time needed to prepare shelf lists indexed by several different keys (e.g., author, title, subject, security classification).

- Elimination or Reduction of Existing Capabilities That Are No Longer Needed. Implementation of the on-line catalog will eliminate the card catalog as the primary reference source for library patrons.

2.4.7 Summary of Impacts.

The following subsections describe the expected organizational, operational, and developmental impacts of the microLAM.

2.4.7.1 User Organization Impacts.

a. Staff Responsibilities.

Operation of the microLAM will require modifications to the methods and procedures used in the operation of the library. The following descriptions of responsibilities categorized by functional area within the library delineate the minimum level of activity necessary to support operation of the microLAM:

- Cataloger. Must enter descriptive and subjective cataloging information, verify bibliographic (catalog) data prior to data base update, and provide both DRIT and local subject terms or descriptions and abstracts prior to transferring local bibliographic data to DTIC.

- Reference Librarian. Must provide assistance to patrons conducting catalog queries, perform catalog (local and DTIC) queries, provide catalog extracts for patrons, and maintain and verify patron need-to-know in conjunction with classified catalog queries and extracts.

- Circulation Manager. Must maintain patron access files and update patron and catalog files as holdings are checked in and out.

b. Operating and Maintenance Responsibilities.

A member of the library staff will serve as the system operator and will be responsible for the following tasks: updating and creating file back-up copies as required, performing daily system startup and shutdown procedures, implementing restart procedures as required, and

monitoring system performance. The system operator will also ensure that all revisions to the library software and accompanying utilities are installed and that scheduled hardware maintenance is provided, coordinate hardware troubleshooting and repair with assigned maintenance personnel, and maintain and update the data dictionary used by the data base management system.

c. Training Requirements.

When the microLAM system is installed, library staff members will receive training on the specific aspects of system operation for their assigned responsibilities. The library staff may provide patron training in the use of the system for reference searches. This patron training may be obtained from outside sources (e.g., the software vendor) or may be conducted by the library staff after system implementation.

d. Additional Staffing Requirements.

Additional staffing may be required to convert existing card catalog data to a form usable by the local (automated) catalog. Temporary employees or contractor-provided data entry services may be used for this task. This additional help will shorten the time needed for conversion without overburdening the existing library staff.

2.4.7.2 User Operational Impacts.

a. Access to the Automated Catalog.

The library may permit patron access to the system for reference searches. Such access would reduce the workload on the reference staff but might require the implementation of a "two-tier" search capability reflecting the different levels of expertise in conducting a reference search. Additional provisions for limiting patron access to bibliographic data on the basis of security clearance and need-to-know will be necessary when the local catalog contains sensitive information.

b. Data Retention.

Data contained in the local catalog will be retained as prescribed in current library operating procedures. Where current manual creation and storage methods limit extended data storage, local operating procedures may be modified to take advantage of expanded data storage capacity provided by the automated catalog.

c. Methods for Providing Input Data.

The microLAM will provide the following methods for inputting data:

- Local Catalog. Information on local holdings must be entered into the microLAM catalog prior to system implementation. Where card catalogs are used, they would be the primary source for bibliographic data entered into the microLAM catalog. Where automated or partially automated catalogs are available, they should be used to load the microLAM catalog. Data from automated catalogs could be added or modified using the cataloging capabilities inherent in the microLAM.

- Patron Files. Where available, patron file entries should be entered through a keyboard from data contained on existing manual charge-out files. Otherwise the patron file can be created as the holdings are checked out during normal library operations.

- Other Locally Required Files or Data Bases. Libraries may have automated records covering other indirect library functions. These records may be converted to microLAM files if they are currently automated, or they may be entered through a keyboard if they are kept manually.

2.4.7.3 User Development Impacts.

a. Development of Local Catalog.

Prior to microLAM implementation, the catalog technician will create the local catalog. Where they exist, automated catalog records may be converted for use in the system. If no automated catalog currently exists, the data base must be entered through the keyboard from the existing card catalog. Assuming an average bibliographic record length of 600 characters, approximately 20 to 30 records can be keyboard-entered per hour. (This rate can be used as a planning factor for estimating the level of effort required to create the catalog.) If automated records exist but their content is inadequate to support full system operation (e.g., subject term or descriptor searches), additional data elements will have to be developed and keyboard-entered.

b. Testing Requirements.

Sufficient time must be allocated to conduct system tests prior to use of the system by the library staff. Since microLAM will use commercially-available library software requiring minor modifications to run on local equipment, it is estimated that 1 to 2 months of operator time will be required to test the system.

c. Conversion Programs to Modify Existing Data Files.

When existing files are available for use in the microLAM, programs for conversion must be written, tested, and debugged. For each file subject to conversion, an estimated 60 to 80 man-hours of application programmer time will be required to develop the conversion program. This estimate is based on the assumption that the existing file is sequential (flat) and that major changes to the data characteristics are not required.

d. Parallel Operations During Testing and Implementation.

The library staff should plan to continue operating under existing methods and procedures in parallel with the new system during testing and implementation. While this procedure will cause a temporary increase in staff workload, it will permit rapid system implementation and will speed problem identification and resolution.

2.5 Assumptions and Constraints.

2.5.1 Test Site Implementation Assumptions.

The following assumptions have been made in planning the test site implementation at HQ, TRADOC:

- The system developer will be responsible for managing the modification and installation of the applications software needed for microLAM operation.
- The system developer will be responsible for obtaining and, with test site personnel, installing the associated operating system, compilers, and utilities (external to the applications software) needed for microLAM operation.
- Equipment needed to implement the system will be available at the test site no later than 31 January 1986.
- DROLS protocols, syntax, and operating procedures will not significantly change during system development and implementation.
- The test site will be responsible for converting or modifying any existing library files or catalogs (automated or manual) for use within the microLAM or for exchanging data between existing files and the microLAM.
- The test site will be responsible for the day-to-day operation of the system.
- When the microLAM is implemented, the test site will provide demonstrations of the system to other DoD libraries considering implementation of the system.

2.5.2 Assumptions Concerning Other Implementation Sites.

The following additional assumptions pertain to microLAM implementations at other libraries:

- Each library will fund all implementation planning required for installation of the system at its site.
- Each library implementing the microLAM will be responsible for obtaining, installing, and operating the local system.

2.5.3 Constraints.

The following constraints affect system development, implementation, and operation:

- The capability to query and retrieve data from the DTIC TR data base is based on the current and future capabilities provided by DROLS and RTIS or subsequent compatible replacement systems.
- Local catalog query and retrieval capabilities will be constrained by the number of searchable data elements selected and entered by the library staff during creation or conversion of catalog records.
- Existing agency and DoD security practices and rules will govern the library capabilities for processing and storing classified and proprietary information.
- Off-the-shelf software that most closely meets microLAM processing requirements will be used subject to adaptation and modification to suit the local processing environment.

SECTION 3. DETAILED CHARACTERISTICS

3.1 Specific Performance Requirements.

In implementing the microLAM at the test and other sites, an existing computer may be used if it has sufficient capacity to meet on-line storage requirements and is capable of running the operating system required by the software chosen for the system. Alternatively, libraries may implement the microLAM on a microcomputer acquired for this purpose and capable of meeting the query, retrieval, data storage, and communications requirements specified for the system. The data in the microLAM data base will be derived from the library's current files, manual and/or automated, and the DTIC TR data base. The microLAM will provide for interactive queries to the local data base, the DTIC TR data base, or both data bases simultaneously. These queries will provide bibliographic searches for library patrons, capture bibliographic data not contained in the local library, and produce standard and/or special reports.

The microLAM data base will contain data elements needed to meet the objectives stated in Section 2.2 and the proposed methods and procedures delineated in Section 2.4. Implementation of the microLAM data base will make use of existing library software packages to the maximum extent possible. In addition to meeting the proposed methods and procedures listed in Section 2.4, candidate software packages will be evaluated on the basis of the following performance requirements:

- Interactive Data Base Query, Retrieval, and Display. MicroLAM users must be able to search the microLAM data base in an on-line interactive mode. The microLAM system must provide the users with a query language using an English-like syntax that allows Boolean combinations of search arguments. The query language must be "user-friendly," in that it must have a "help" function for microLAM users when they reach an impasse and must produce diagnostic messages with errors clearly explained. While not a mandatory feature, the software should be capable of storing and retrieving frequently used queries.

- Automated Data Modifications. The software must support a data dictionary that allows the data base administrator to create, modify, or delete data elements for the microLAM data base.

- Data Base Update. The software must provide capabilities for automatically updating the data base with new citations entered by the user.

- Data Edits. The software must provide the capabilities to:
  - Verify data elements for the correct physical format
  - Ascertain whether certain data elements or combinations of data elements that do not contain a value can be entered into the data base
  - check for uniqueness, valid values, or a range of values.
- Data Base Security. The software must permit the system operator to define security/access requirements by application, record type, and data elements.
- Procedural Language Interface. The system must allow interactive and batch access from applications programs written in a high-level language, such as COBOL (Common Business Oriented Language), C, or Ada.
- Simultaneous Searches. The microLAM will provide automatic and transparent access to data bases so that microLAM libraries will have direct automated access to other library catalogs (e.g., DTIC). Users will have the ability to interrogate that catalog using a common query language and to capture and reformat bibliographic data suitable for input into the microLAM.
- Multiple Users. The hardware and software must provide and control simultaneous access for up to at least 6 users.
- Operating System Portability. The microLAM applications software for the test site will be selected in the next phase of this project. In selecting that software, consideration will be given to the compatibility of required associated operating systems and utilities with the intelligent gateway processor software.

3.1.1 Accuracy and Validity.

Support of microLAM functions requires few arithmetic operations. Essentially an administrative rather than a scientific data processing application, the microLAM will be capable of producing statistical reports related to library circulation operations and acquisition budget management. Some of these reports will contain data elements representing dollar amounts. These data are stored as real numbers and may represent a range of amounts of -999,999.99 to +999,999.99. The accuracy requirement for such fields is two decimal places (representing hundreths of dollars). Computations using these amount fields must preserve that level of accuracy.

Data elements representing dates (e.g., report date) will be in DTIC descriptive cataloging standard format. That format is one or two numeric digits representing day of the month, three alphabetic digits representing month of the year, and two numeric digits representing the year (e.g., 01 JAN 85 or 15 FEB 85).

The need to process data elements representing security classification or special handling procedures increases the level of importance of accuracy and validation. Data elements that depict this information require both human and software verification. The software edits must be capable of cross checking all data elements that contain or refer to associated data elements. An example of this type of validation is Report Classification. An entry in this field is mandatory. In addition, data fields that represent Regrade Category, Report Classification, and Report Title will be validated. Certain data elements, such as Report Classification and Title, will be designated as required elements. The physical format and characteristics of all such data elements entered in the system will be verified automatically to ensure the integrity of the data base. These accuracy and validation edits will use the microLAM software/data dictionary. Edit requirements for data elements in the TR data base are defined in the DTIC Data Element Dictionary.

The microLAM will transmit to and receive data from the DTIC TR data base via communication lines. The microLAM will be designed on the basis of current DTIC communication protocol standards (DROLS/RTIS) and will use the data transmission error-checking routines provided by DROLS/DTIC. These error-checking routines are designed to verify complete and accurate transmission of messages between devices and to provide methods for retransmission of message blocks that are incomplete or erroneous.

3.1.2 Timing.

The following timing requirements apply to the microLAM:

- Response times to user queries of the local data base for bibliographic searches or patron information will average 7.5 seconds or less.
- Response times for executing non-search commands (e.g., selecting system functions and generating output reports) will average 3 seconds or less.
- Response times for queries of the DTIC TR data base are dependent on conditions external to microLAM operations (e.g., DROLS transaction volume and complexity of the search selected). However, microLAM users should make certain that the search submitted to DTIC is well defined and as narrow in scope as possible, consistent with search objectives. This practice should contribute to improved response times from the TR data base and DROLS.
- The software selected for system implementation must be capable of managing or controlling concurrent access to the data base by users operating within separate

microLAM modules. It is likely that simultaneous use of different modules will produce concurrent or nearly concurrent requests for data base access.

- The data base or its associated software must be restorable overnight.
- Reload/restart procedures must be completed within 3 hours of (hardware) system restart.

3.2 Functional Area System Functions.

This section addresses the individual library functions as they relate to the specific performance features discussed in Section 2.4, and how the microLAM will accommodate those features.

3.2.1 System Management.

Processes related to overall data management or common to two or more library functions, such as editing, ad hoc reports, telecommunications, and querying, are as follows:

- MicroLAM Edits. Data entered into the microLAM data base will be subject to edit criteria checks. Additional edits may be made using tailored applications software. These checks (duplicate data, security, and others that are application- or data-dependent) will be made to ensure data base integrity. All errors detected will be displayed along with the data associated with them. These displays will be hard copy listings or CRT displays. All erroneous data will be written on an error file for subsequent correction and entry into the microLAM data base.

- Standard Report Production. The microLAM software will produce a set of standard management reports. The report writer software will support on-line interactive report preparation and submission. Authorized users will be able to use the report writer software to produce standard reports.

- Ad Hoc Report Production. The microLAM report generation facility will enable microLAM users to develop and store ad hoc reports tailored to their specific needs. Users will have on-line interactive access to the report development and generation facilities of the system.

- Data Base Archiving. A machine-readable copy of the microLAM data base will be created after each major file update for use in restoring the data base in the event of microLAM system failure. A hard copy printout of the data base will be produced at the same time as a basis for reconstructing the data base in the event of a catastrophic system failure.

- Data Base Maintenance. The microLAM system will provide the means to perform such routine maintenance tasks on the data base as file maintenance, backup-recovery, usage monitoring, and audit trail creation for updating. The software selected for the microLAM application should provide standard utilities to accomplish these maintenance tasks and require no extensive custom software development.

- Telecommunications Support. The computer system software and DBMS selected for the microLAM will provide direct access to DTIC via a telecommunications network during the required time period for daily system availability.

- Screen Formats. The DBMS used for the microLAM will contain or be compatible with a screen processor. This software will enable microLAM users to communicate with the system via screen formats. These screens will be tailored for each function, allowing on-line data entry, query, and update. In view of the divergence of users' talents, software will be provided to present the user with two levels of communications: first, a formatted screen where the user may simply fill in the blanks, and second, a screen capable of accepting abbreviated processing commands allowing the experienced user to rapidly enter and access system data.

3.2.2 Cataloging.

The microLAM will perform the following cataloging processes:

- Catalog Creation, Updating, and Editing. On-line access to the system will allow authorized library personnel to verify the existence of records and to add new records to the microLAM and DTIC TR data bases. Data will be entered into temporary files for verification and reformatting prior to being entered into the data base. Error reports will be produced as errors are detected. Data entry and retrieval formats will be designed to conduct a prompted interactive dialogue with the microLAM user to locate, display, modify, or add bibliographic records to the data bases.

- Authority File. Library staff users will have on-line access to the microLAM authority file. This on-line interactive file will contain subject headings or key words that characterize technical papers and documents in terms of similar attributes, as well as acceptable corporate and personal authors. On-line interactive access to this file will assist in consistent cataloging of items and facilitate the structure of search criteria for querying the data base. The system will allow designated library personnel to maintain this file of approved subject headings/keywords and corporate and personal authors in an on-line interactive mode.

3.2.3 Reference Function.

The microLAM will perform the following reference processes:

- Data Base Query. The DBMS selected for the microLAM will provide, via the DBMS query language, for Boolean logic searches on data elements that have been defined as searchable. The search criteria must meet at least the minimum requirements defined by DTIC (e.g., title, author, descriptors). The DBMS will contain, or be compatible with, software that will perform simultaneous searches on the local library and DTIC TR data base. This software will translate the microLAM and DTIC search commands into a common search argument and submit the query. The DBMS will provide a capability for displaying on a CRT terminal the user-specified search criteria.

- Automatic Log-on. The microLAM software will have the capability to automatically allow users to access DTIC and local files, given the proper destination code and security clearances/need-to-know. This software will establish proper communications links, verify access rights, and allow the terminal session to begin. Access rights will be issued and removed on the basis of patron need-to-know. The local security officer in conjunction with the library manager will be responsible for establishing and maintaining data on patron clearances and need-to-know.

- Downloading and Postprocessing of Bibliographic Data. Since the microLAM will have the capability to search external files (such as those of DTIC), it will be possible to retrieve citations from different data bases in different formats. The microLAM software will

retrieve and store these bibliographic data in a temporary file. The data may be reformatted, organized, and aggregated in a suitable manner. Redundant bibliographic records will be eliminated by comparing like data elements. The resulting data can be reviewed and analyzed on-line using microLAM postprocessing software.

3.2.4 Circulation Management and Control.

The microLAM will perform the following basic circulation management processes:

- Patron File Query/Update. The microLAM data base will contain a patron file for the library. The data in the patron file consist of patron name, patron ID, security clearance, need-to-know as indicated by subject term or descriptor, and the catalog number and title of documents currently checked out. The microLAM will produce classified and unclassified document charge-out receipts, identify document status, identify patrons with documents currently charged out, and update this file in an on-line interactive mode.

- Data Base Query/Update. To support circulation management, the data base query and update capabilities described in Section 3.2.2 and 3.2.3 will be used to query the catalog to locate a patron holding. Holding status will be updated during check-in and check-out processing.

3.3 Inputs-Outputs.

3.3.1 Inputs.

Several classes of input data will be used in the microLAM:

- Descriptive Bibliographic Information – information about each library holding, such as title, author, and publication data.

- Patron Information – information about each person authorized to checkout holdings, such as name, organization, mailing address, telephone number, and security clearance.

- Subject Categories and Controlled Vocabulary – a list of all subject headings and authorized vocabulary terms used to categorize holdings.

- Circulation Information – information about the current status of a holding, including its due date (if checked out).

- Individual Library Files – files that are unique to a particular library. Each microLAM site will determine its own requirements for unique files.

The test site data base will include data elements from the DTIC TR data base, as well as HQ TRADOC technical library data elements that do not duplicate those from DTIC. By including the DTIC elements, microLAM sites can transmit data to DTIC without manually entering them. Individual data elements considered for inclusion in the test site data base are presented in Appendix C, "Preliminary Data Element List for the Microcomputer-Based Local Automation Model."

Data will be initially submitted and entered into the data base in the following two phases:

- Loading of Machine-Readable Data. These data will be extracted from existing automated library system files, converted to microLAM format, entered into the microLAM, and verified.

- Loading of Hard Copy Data. After the machine-readable data have been loaded, the data base will be augmented by data that currently exist only in hard copy. These data will be keyed into machine-readable form at each microLAM site.

The preparation of input batches can begin when final record layouts, tape and disk characteristics, and telecommunications protocols have been defined. These definitions are dependent upon the final choice of a hardware/software environment for the microLAM.

After the initial data are loaded, routine microLAM inputs of new or revised data can be entered at a CRT terminal using screen formats in either an on-line or batch mode.

3.3.2 Outputs.

The microLAM data base will produce the following four classes of outputs:

- Reports. Reports will provide bibliographies, catalog indexes, shelf lists, and statistical summaries of microLAM system activity.

- Signature Card/Accountability Record. The microLAM will produce the signature cards required to check out classified material.

- Screen Displays. Screen displays will present bibliographic data retrieved from DTIC and the microLAM data base. The data displayed will be retrieved by ad hoc reports using either the on-line query capability or previously defined and stored report programs.

- SBIN Records to DTIC. MicroLAM terminals will be used to transmit SBIN input from the local library files to DTIC. After all required SBIN data elements have been entered into a microLAM record, the system will provide capabilities for modifying the data prior to submission to DTIC.

Each of the outputs will be designed so that library personnel can generate their own reports without the assistance of data processing personnel.

3.4 Data Characteristics.

Data elements proposed for storage in the microLAM data base are presented in Appendix C, "Preliminary Data Element List for the MicroLAM Data Base." The elements selected reflect the features described in Section 2.4. The final list of elements and their characteristics will be determined in a later phase of this project.

The microLAM test site implementation will require a central processing unit with at least 1 megabyte of main memory and approximately 65 to 70 megabytes of disk storage. Table 3-1

TABLE 3-1. ESTIMATE OF EXTERNAL ON-LINE STORAGE REQUIRED FOR MICROLAM TEST SITE

FILE	CHARACTERS
Catalog File 20,000 records x 1500 characters/record	30.00 M characters
Operating System and Utilities	2.00 M characters
Applications Software	2.00 M characters
Authority File 25,000 records x 50 characters/record	1.25 M characters
Patron File 2,000 records x 350 characters/record	.70 M characters
Subtotal	36.95 M characters
Overhead (4/5 of Subtotal)	29.56 M characters
TOTAL	66.51 M characters

presents a breakdown of the external storage requirements. The equipment environment needed for data storage is described in Section 5.1. The data base is estimated to increase at a rate of 5 percent per year on the basis of the growth of the library's collection.

3.5 Failure Contingencies.

Procedures for responding to system failures or potential failures are described in the following subsections; failure contingencies are also discussed in Section 5.5.

3.5.1 Back-up.

To minimize the amount of time lost from damage to, or errors in, the data base and its associated software (e.g., program libraries, directories, tables), sets of back-up files will be created

and maintained. These files will be created according to the schedules outlined in the following paragraphs.

3.5.1.1 Data Base.

A copy of the data base will be produced when it is declared operational. A back-up copy of the data base will be made after every major catalog update but at least once a week. The library manager will be responsible for notifying the system operator whenever a major catalog update is planned. Specific procedures relating to how many versions will be kept, where the back-up versions will be archived, purge dates, and documentation (audit trail) of the contents of each version will be decided by the library manager and the system operator. All back-ups of the data base should be created with password protection to ensure that the proper access with read-only permission is granted. The back-up software and its job control language should be stored using a password-controlled catalog procedure to ensure integrity and security.

3.5.1.2 Application Software.

A copy of the application software (source statements, executable modules) used to process data, produce standard reports, and support the teleprocessing interfaces will be created when the software is declared operational, and additional copies will be made as enhancements are implemented. All data base back-up failure contingencies discussed apply to the application software.

3.5.2 Fall-back.

If local catalog cannot be accessed (because of hardware failure, software processing interruption, or local network failure), temporary reference services will be provided using hard copy shelf lists. These lists should be prepared after each major catalog update but at least once a week. Cataloging operations may be temporarily suspended until the system is operational. If a prolonged suspension of operations is anticipated and a significant cataloging work load remains, bibliographic data developed during cataloging may be recorded on specially formatted coding sheets. These coding sheets would then be used as source documents for entering catalog data from the library terminal upon restoration of system operations. Similarly, checking in and checking out holdings would be

recorded on specially formatted coding sheets for keyboard entry upon resumption of system operations. Verifications of patron need-to-know and security clearances would have to be performed using hard copy reports produced from the patron file periodically or from records (files) maintained by the installation or agency security officer.

In the event of an external teleprocessing failure, all information that is scheduled to be transmitted to DTIC via the teleprocessing subsystem will be stored in temporary files in the microLAM until the ability to transmit has been restored.

3.6 Security.

Although the test site microLAM catalog will store only unclassified/unlimited data, future implementations of the system may include classified data. None of the application or DBMS software associated with operation of the microLAM will be classified. Access to the patron file will be restricted to the reference librarian, the circulation manager, and the installation/facility security officer. The highest classification level for data exchanged between the DTIC TR data base and the test site will also be UNCLASSIFIED. Abstracts and indexes produced by the test site system in response to a patron query will be UNCLASSIFIED.

In future implementations of the system, data exchanged with DTIC and abstract and indexes produced locally may be classified up to SECRET. These outputs may take the form of terminal screen displays or hard copy printouts. When classified titles and descriptors are stored in the catalog, any title or subject term shelf list produced from the catalog must be classified to at least the same level.

If a library wishes to store classified information in the microLAM, the system may need to operate on TEMPEST-certified equipment. The regulations governing the use of TEMPEST equipment present parameters to be considered in making this determination. (For a complete discussion of the decision parameters, see the NACSI 5004, "TEMPEST Countermeasures for Facilities within the United States" dated January 1984, classified SECRET.) These parameters are used by installation/facility security officers to determine the need for TEMPEST equipment.

If classified data are stored in the microLAM, the library must limit access to the system to cleared personnel only. When no cleared personnel are present to control access, the data must be secured in a safe or vault. To accomplish this, all microLAM files can be stored on removable magnetic disks that can be detached from the system and stored securely.

If a library wishes to use the microLAM to retrieve or transmit classified information to DTIC, a dedicated communications line is required between the library and DTIC. If the library already retrieves or transmits classified data to or from DTIC, the installation of the microLAM will not necessitate additional line security.

The patron file may contain data subject to privacy restrictions. Access to this file is restricted to library staff members responsible for establishing and verifying need-to-know and security clearances in conjunction with checking out holdings. Additional security requirements are discussed in Section 5.6.

SECTION 4. DESIGN DETAILS

4.1 System Description.

The microLAM system is a library system designed to support cataloging and reference capabilities for DoD technical libraries and information centers using the TR data base. MicroLAM users will be able to search both the TR data base and a local catalog maintained on the system, using a single search language and format.

When cataloging a new holding, users of the system will be able to check the TR data base for the existence of a catalog record. If the holding is already cataloged, the library can extract the citation for use in its local catalog and can add its own holding symbol to the TR data base citation for future reference or shelf list development. Technical reports cataloged in the local system may be readily transformed for entry into the TR data base, thus reducing the current duplication of effort associated with entering the citation separately in each data base.

In addition to technical reports not eligible for cataloging in the TR data base, libraries may choose to catalog other holdings (e.g., books and serials) in the local system, following their own catalog formats.

A test site prototype of the microLAM will be implemented at the technical library at HQ TRADOC, Fort Monroe, Virginia. System implementation will make maximum use of available off-the-shelf software packages, modified as necessary, to meet the requirements in this document.

Although the main emphasis of the microLAM is on cataloging and reference capabilities, the initial system design includes additional library functions to provide an integrated system design that encompasses the library functions most frequently automated. This design projects future additions to the system and assists libraries in implementing a comprehensive system to support library operations. For requirements definition and future development, six microLAM modules are documented:

1. System Management
2. Cataloging
3. Reference
4. Circulation Management and Control
5. Serials Control
6. Acquisitions Management.

The system requirements contained in this document will be the basis for selecting software for microLAM implementation.

4.2 System Functions.

This section describes the functions specified for each of the six modules of the microLAM. The number in parentheses following the heading of each subsection is an index to the system charts presented in this section. For example, the System Management Module is numbered "1.0," and all constituent functions performed within the module are identified beginning with "1," e.g., Download Retrieved Data (1.5) and Generate Reports (1.8). Figure 4-1 shows the organization of the system. Additional material about each function is provided in Section 3.2.

4.2.1 System Management (1.0).

Functions within this module provide basic operations common to two or more modules: support system maintenance, back-up, and recovery; the interface between the system user and the applications programs contained in other modules; and the interface between the microLAM and the DTIC TR data base. Figure 4-2 lists the functions performed by the System Management Module.

4.2.2 Cataloging (2.0).

Functions within this module enable users to develop and update catalog entries for the local catalog and to retrieve and modify a DTIC TR data base citation for use in the local catalog. In addition, functions within this module permit users to develop and submit catalog entries for the TR data base. The functions performed by the Cataloging Module are shown in Figure 4-3.

FIGURE 4-1. MICROLAM SYSTEM ORGANIZATION

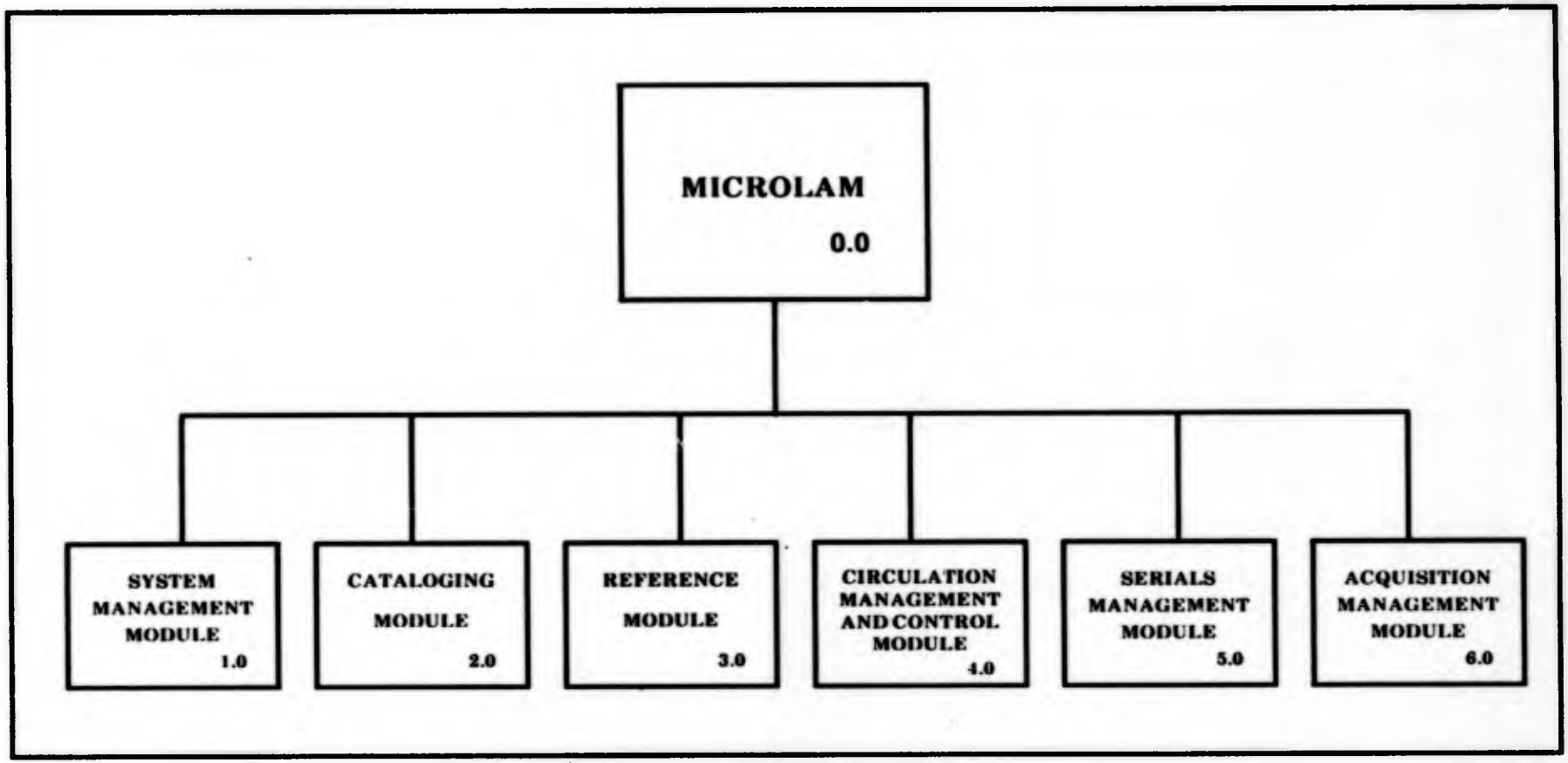


FIGURE 4-2. SYSTEM MANAGEMENT MODULE ORGANIZATION

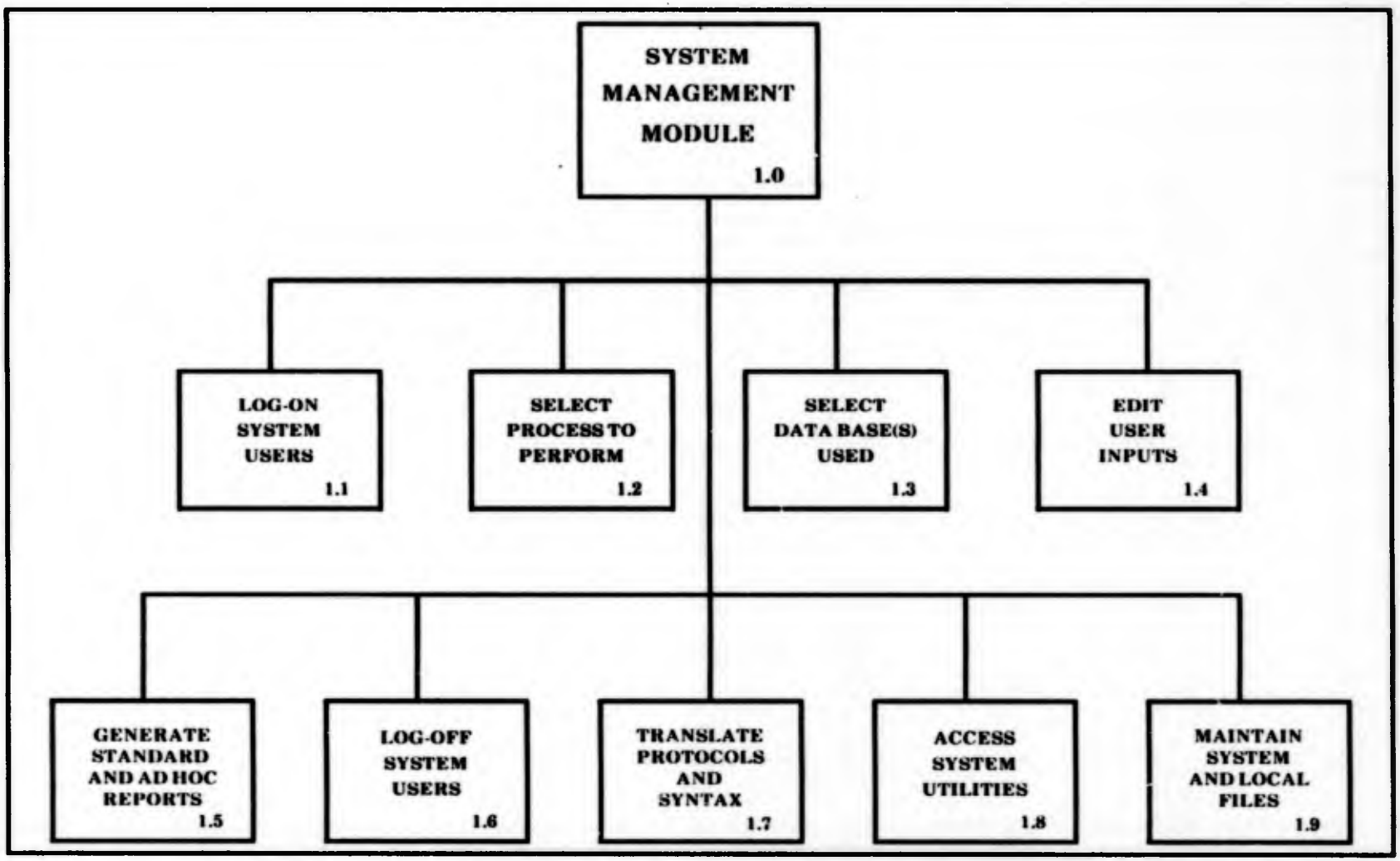
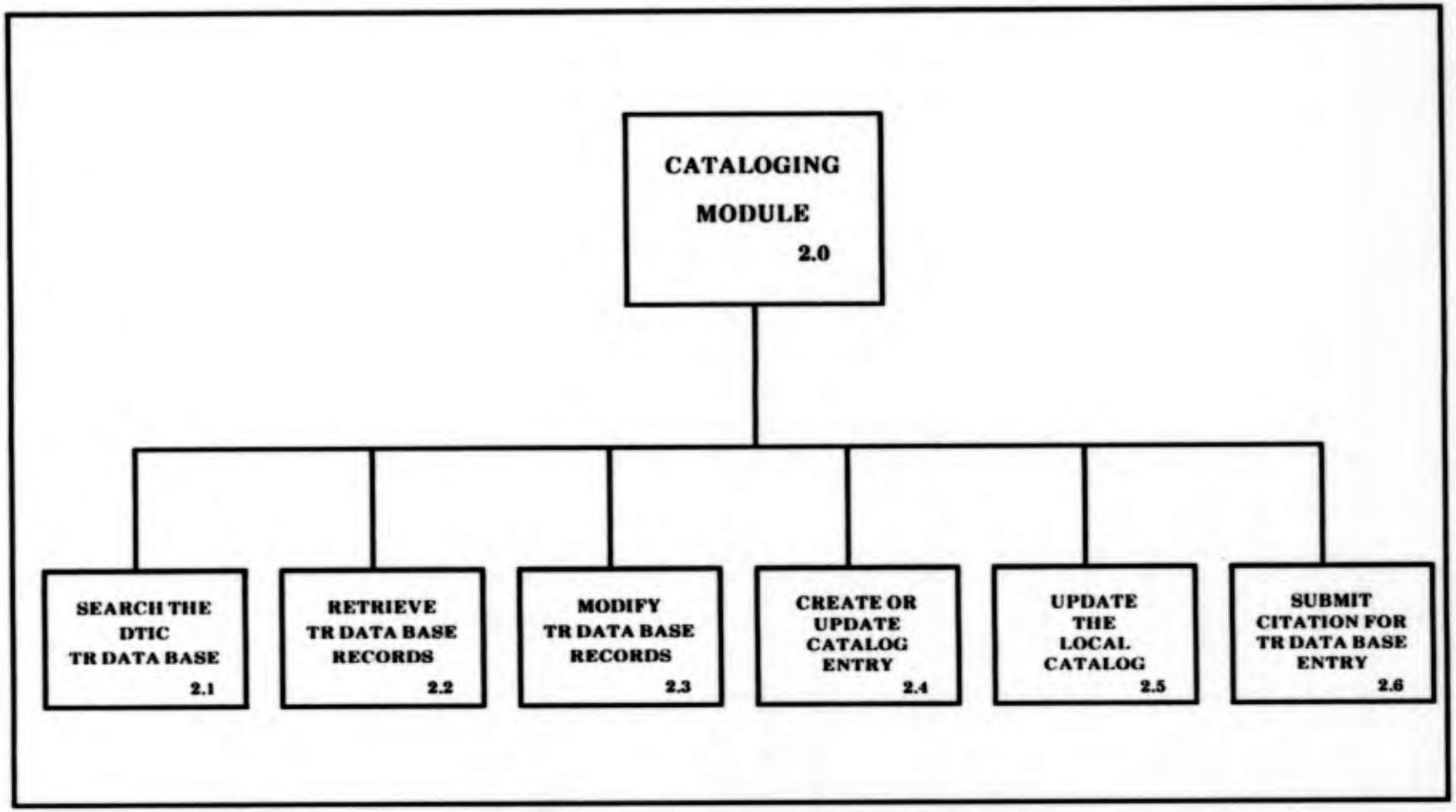


FIGURE 4-3. CATALOGING MODULE ORGANIZATION



4.2.3 Reference (3.0).

This module supports bibliographic searches of the local catalog as well as the TR data base, enabling the library staff to search the local catalog and TR data base by title, author(s), publication date, security classification, local or DTIC accession number, subject term/descriptor, and other user-specified fields. Citations produced by a search can be subsearched, sorted, and printed for use by a patron. Figure 4-4 shows the organization of the Reference Module and lists the functions performed.

4.2.4 Circulation Management and Control (4.0).

The functions in this module are required for collection management and tracking, patron registration, patron verification, and classified holding management (based on patron security clearance and need-to-know). Figure 4-5 lists the functions of the Circulation Management and Control Module.

4.2.5 Serials Management (5.0).

Functions related to tracking subscriptions held by the library are contained in the Serials Management Module. Updating the serials catalog and managing the routing of serials is also supported by this module. The functions performed by the Serials Management Module are shown in Figure 4-6.

4.2.6 Acquisition Management (6.0).

Functions within this module support library operations related to acquisition budget tracking, local catalog duplication checking, and preliminary or initial cataloging for ordered or recently acquired holdings. The functions of the Acquisition Management Module are shown in Figure 4-7.

4.2.7 Accuracy and Validity.

System accuracy and validity are discussed in Section 3.1.1.

4.2.8 Timing.

Timing is discussed in Section 3.1.2.

FIGURE 4-4. REFERENCE MODULE ORGANIZATION

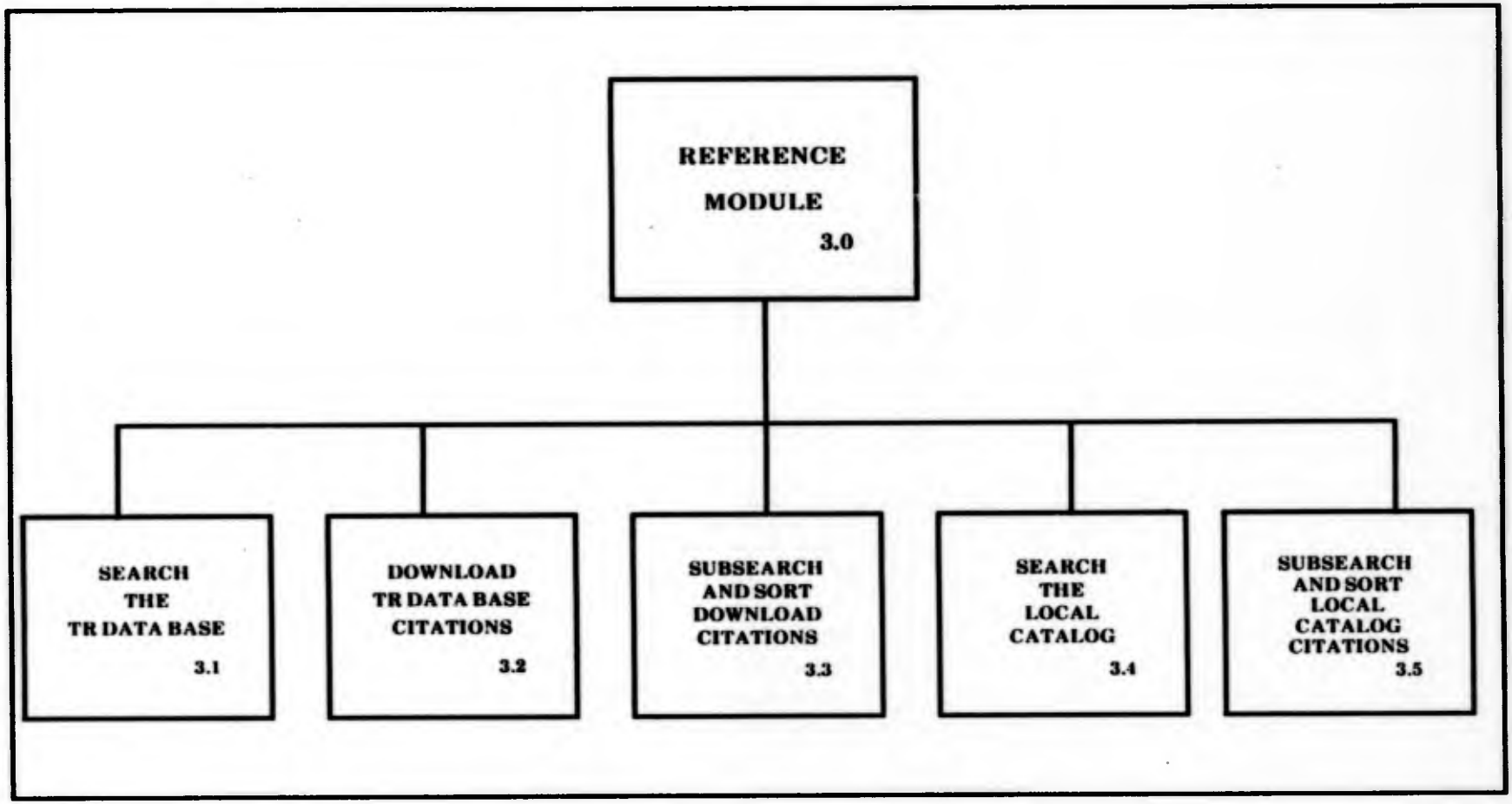


FIGURE 4-5. CIRCULATION MANAGEMENT AND CONTROL MODULE ORGANIZATION

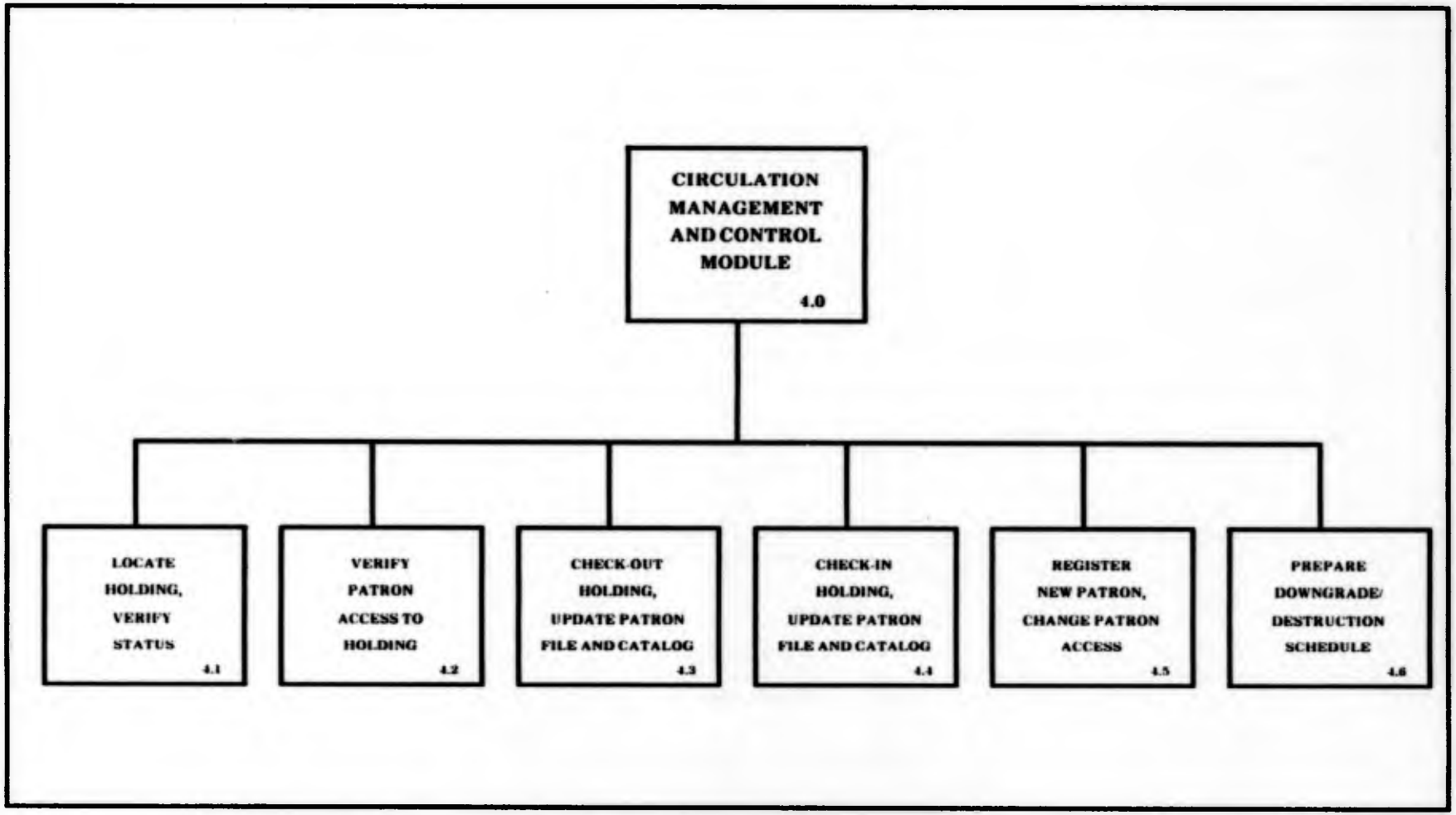


FIGURE 4-6. SERIALS MANAGEMENT MODULE ORGANIZATION

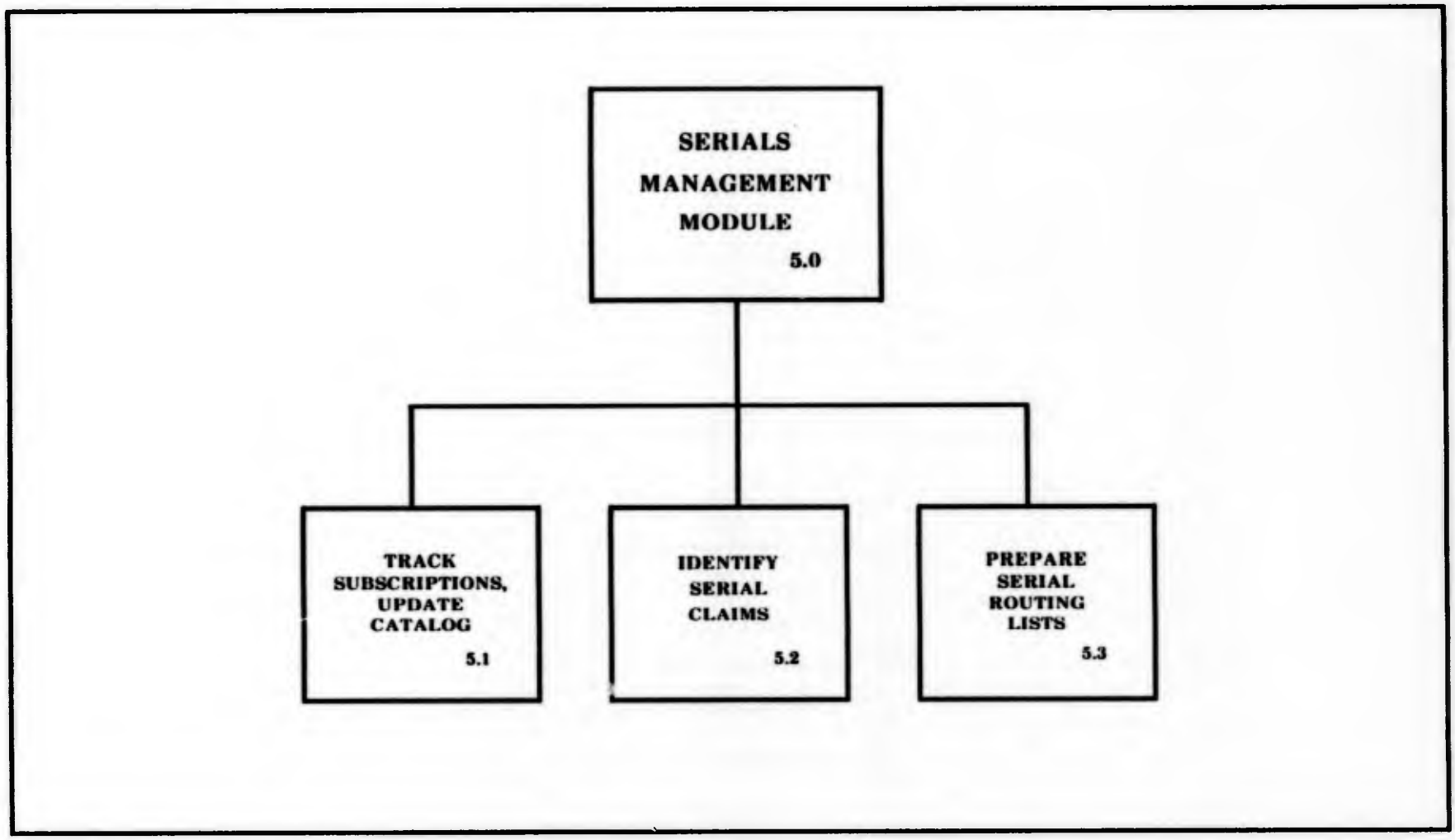
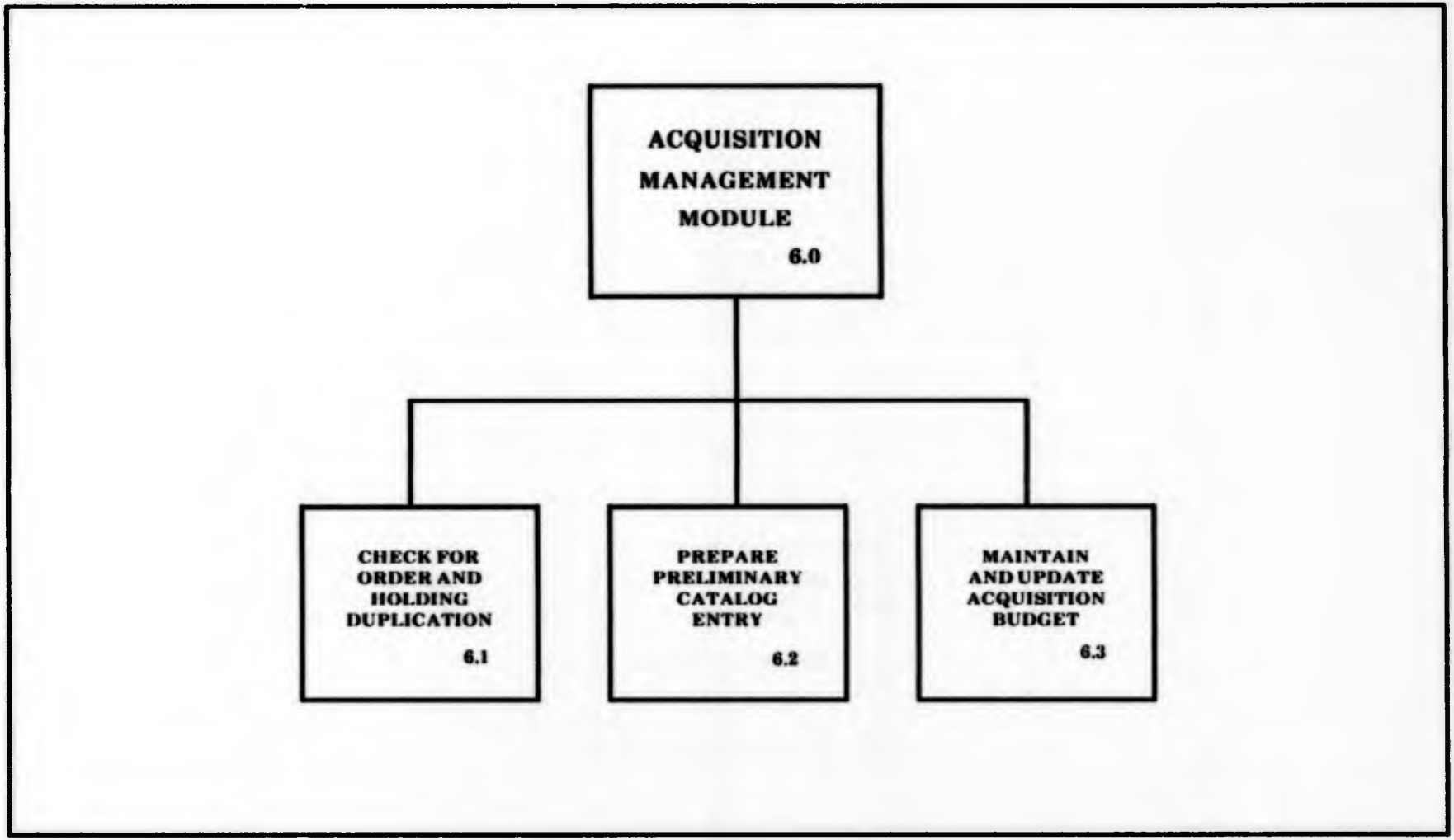


FIGURE 4-7. ACQUISITION MANAGEMENT MODULE ORGANIZATION



4.3 Flexibility.

Capabilities will be provided for adapting the microLAM to changes in selected operating requirements. The likely changes in operating requirements and the corresponding system features that provide the required flexibility are as follows:

- Data Base Content. Once operational, the microLAM data base will enable the user to change the format of elements in the local data base, remove them, or add to them.
- Data Base Structure. Before implementation, the microLAM data base can be structured to reflect the catalog contents and format required by the implementing library.
- Ad Hoc Reports. The microLAM will be capable of producing ad hoc reports to support analysis of library operations and management of library resources.
- DTIC Interface. Although none is now scheduled, changes in the protocols and syntax in use by DTIC (DROLS) after implementation of the test site system would require development and implementation of changes in the protocol and syntax translation software that was first developed for the microLAM. MicroLAM protocol and syntax translation software will comprise a distinct segment of the system software and will be capable of modification without modifying other portions of the system.

4.4 System Data.

4.4.1 Inputs.

System inputs are discussed in Section 3.3.

4.4.2 Outputs.

System outputs are discussed in Section 3.3.

4.4.3 Data Base.

The microLAM data base will contain three categories of data: catalog/bibliographic, patron, and budget. Catalog data may be stored in both the local system and the DTIC TR data base although some elements will be unique to one site or the other. All catalog citations classified above SECRET (or with dissemination restrictions), as well as all patron and budget data, will be stored at the local site only. Appendix C, "Preliminary Data Element List for the MicroLAM Data Base" lists the data elements being considered for the test site data base. The data base is expected to require approximately 65 to 7 megabytes of on-line disk storage, including overhead.

SECTION 5. ENVIRONMENT

5.1 Equipment Environment.

This section describes the equipment environment for the microLAM test site and can be used in developing preliminary hardware acquisition or utilization plans for small DoD technical libraries. Specific equipment characteristics are provided for test site implementation and are based on the processing requirements and library characteristics of the test site. Specific equipment requirements and characteristics for other implementation sites must be established in conjunction with implementation planning and site-specific requirements determination. The following listing indicates the type of equipment needed to implement the microLAM and the system functions supported by each type of equipment:

- A central processor (computer) capable of performing designated operations on data as prescribed by microLAM functions. A central processor is required for all libraries; the size and brand are the only variables and will be established as development progresses.
- A disk controller with magnetic disk drive(s) capable of storage capacity sufficient to handle the on-line catalog, authority, patron, and system files.
- A magnetic tape back-up consistent with the volume of on-line storage of the system, to be used for system restoration. A tape cassette backup is appropriate for this purpose.
- A character printer capable of producing standard system and ad hoc reports, or listings of data that are needed in a hard copy form (e.g., computer paper, preprinted forms).
- An alphanumeric display terminal consisting of a monitor, keyboard, and hardware capable of sending and receiving data to and from a computer. Terminals used for cataloging and reference may require off-line printers to capture retrieved and transmitted data.
- A local communication network, capable of transmitting and receiving data, that links the local user terminals and printers with the local processor. Unclassified communication requires modems, communications controllers/multiplexer, and transmission cables. Classified communication will require encryption devices (to transform data, making it unintelligible to all but the intended receiver) and shielded transmission cables.
- An external network for transmitting and receiving data, linking the microLAM to the DTIC TR data base.
- For libraries requiring communication with a "branch" location, an external network for transmitting and receiving data with the "branch" libraries or remote users.

The following equipment requirements and characteristics are recommended for test site implementation:

- An external network consisting of the existing line connecting the HQ TRADOC and DTIC (DROLS/RTIS) and a modem installed at HQ TRADOC.
- A local communication network linking the local user terminals and printers with the local processor. This network includes a linkage between the processor (located in the technical library) and a terminal located at TRALINET Center.
- A central processor with a word size of at least 16 bits, no less than 1 megabyte of real memory, an operator console, input/output channels adequate to service the input/output devices described herein, and a data communications processor able to support telecommunications access by four users simultaneously, including one user at the TRALINET Center and one user at a remote site.
- A disk controller for fixed and removable media to support system operations and the storage of the on-line catalog, authority, patron, and system files. On-line disk storage capacity available for microLAM files must total at least 65 to 70 million characters.
- A magnetic tape controller to support the backup of all system and data files.
- A character printer capable of producing 132-column output at a rate of at least 150 characters/second.
- Three alphanumeric display terminals that will transmit data generated from their own keyboards, as well as display data from a host or remote computer system. These terminals must provide the user with a visual, CRT means of data communications.

5.2 Support Software Environment.

Specific software packages for implementing the microLAM will be selected in the next phase of this project. However, general software characteristics based on test site processing requirements have been established and are presented in the following paragraphs. These characteristics are provided as guidance for implementation planning and software selection, modification, and testing.

5.2.1 Operating System Requirements.

The operating system must allow "simultaneous" access to the computer system by multiple microLAM users. The system must provide telecommunications software to support input and output operations performed by remote users, and it must include disk-file access methods and file-maintenance procedures (such as file cataloging and back-up). The system must provide utilities such as a sort/merge capability, a procedural language compiler, and a linkage editor and loader for program development.

5.2.2 Other System Software Requirements.

The software selected will support multiuser, on-line access to the data base permitting keyed-field searches and retrieval. It will provide a report-writer package to accommodate the development and storage of recurring and ad hoc reports. The microLAM system will provide facilities for validation checking of input data and for batch and real-time updating of the data base. The system will either incorporate software with data dictionary capabilities or allow data from the microLAM data base to be passed to separate, compatible software packages with these features.

5.2.3 Catalog Modification.

To reduce the effort required to expand catalog records and modify existing data elements, data dictionary capabilities will be incorporated into the microLAM. The data dictionary will provide capabilities for performing global data element restructuring, data base restructuring, and data element documentation and definition.

5.2.4 Protocol and Syntax Conversion.

To permit access to both the local files and the DTIC TR data base, the microLAM requires a protocol and syntax conversion capability. With this feature, users will use a single query language for accessing both the local files and the TR data base. The microLAM will perform the conversions necessary to access and query the source specified by the user. Additionally, this capability will be used to convert data downloaded from the TR data base to be compatible with the format and structure required by the local system.

5.3 Interfaces.

The principal interface of the microLAM will be between the DTIC TR data base and the local library. For libraries wishing to transmit or receive classified data with DTIC, communications lines capable of transferring classified data will be required. Data will be exchanged using DROLS/RTIS formats specified by DTIC. By using protocol translation capabilities, data will be exchanged directly from computer to computer. MicroLAM users will provide bibliographic data to the TR data base for use by other libraries with access to the TR data base. DTIC will provide bibliographic data contained in the TR data base to the local library for use in local cataloging and reference. As required, libraries

may subscribe to other governmental and commercial bibliographic sources. Interfaces with these sources will be developed as required. The priorities, as indicated in the survey of DoD libraries, are for interfaces with DIALOG and OCLC.

Libraries with remote or "branch" libraries and users should plan on expanding the system interfaces to include these sites when cost-effective, telecommunications links can be established to share microLAM resources. Alternatively, branches may catalog and reference locally using less-costly, less-capable systems and periodic exchanges of information with the main library using magnetic disks or hard copy shelf lists.

5.4 Summary of Impacts on the ADP Organization.

The microLAM is designed to be operated and maintained by library personnel with support from the hardware and/or software vendor. The system will not require the assistance of an in-house ADP organization. Thus, the microLAM is not expected to have an impact on in-house ADP organizations.

5.5 Failure Contingencies.

Procedures for restarting after failures or potential failures are described in the following paragraph. Failure contingencies are also discussed in Section 3.5.

In the event an update program terminates because of a program or system failure, the system will restart execution of the batch update at the latest checkpoint. The data base restoration procedure will be executed when the system operator determines that a program or system failure can be classified as an intermittent failure. In the event of an intermittent failure, the data base contents remain intact and the data base is readable. The system operator will restart using the version of the data base that was being used at the time of the failure and will reapply all transactions to the data base. This action will be initiated as soon as possible after error detection in order to restore the use of the system to all microLAM users.

5.6 Security.

5.6.1 System Security.

The specific computer-system security requirements for the microLAM are as follows:

- Access. The system must limit access to authorized users by requiring user name and a password.
- Password. The system must restrict authority for the assignment of user passwords to the microLAM data base administrator.
- Software Protection. The system must protect system software from unauthorized alterations.
- Unauthorized Try. The system must allow "n" attempts to access the system. After "n" attempts, access is denied and the system manager is notified ("n" will be dynamic and will be determined by the system manager).

5.6.2 Program Security.

The following security measures are applicable to the application programs of the microLAM:

- Unauthorized Use. The system must contain a list of authorized users for each program and limit the use of specific programs to authorized users or categories of users.
- Program Modification. The system must provide users with a means of assigning passwords to their programs and must limit access to these programs to library, agency, DoD, Service, and other designated microLAM users.

5.6.3 Data Security.

When used to process classified data, the system must satisfy all DoD and agency data security regulations, including the following:

- Access Rules. Access rules provide or limit user access to specific files and establish the type of access (e.g., read only, read and modify). Only authorized library staff members will be permitted "read and modify" access. Access to the user access rules contained within the system will be restricted to individuals authorized by the library manager and agency/installation security officer.
- Security Markings. All classified material accessible by or within the microLAM will be identified as to its security classification and access or dissemination limitations, and all output of the system, including citations retrieved from the DTIC data bases, will be appropriately marked. Outputs include both hard copy (paper or COM) and CRT screen formats. COM output must contain two sets of security markings: one set readable with the naked eye and a second set at the top and bottom of each reduced page.
- Accountability. The microLAM site will be accountable for all unclassified data that becomes classified as a result of local post-processing.

- Disposition. At the time of their disposal, microLAM data will be secured by means of the erasure and disposition procedures outlined in "ADP Security Manual," DoD 5200.28-M.

- Data Input to DTIC. A microLAM site will adhere to all security restrictions concerning inputs to the TR data base; in particular, no data above the SECRET level will be transmitted to DTIC.

- Password Protection. Passwords help protect data, and local standards governing their issuance and protection of passwords will be followed. Additional protection may be added to the traditional rules governing password protection. For example, the additional protection may be achieved by encryption of the password.

5.6.4 Communications Security.

If a site wishes to exchange classified data with DTIC, network communications security should be focused in two major areas: access control and data protection. Access control involves protecting the mechanisms and environment that house the data communications facility from unauthorized entry and use. Badges, guards, and personal recognition are used to limit access. Password protection will be used as an aid in protecting data. Local standards governing the issuance and protection of passwords will be followed. Additional protection can be added to the traditional rules governing password protection. For example, additional protection could be achieved by encrypting the password.

Protecting data transmitted over communication networks is made difficult because data are transparent. Data are protected while on a communications path by encryption. Encryption provides data security against browsing but it does not protect against sophisticated electronic techniques. Encryption devices and information can be obtained through DoD, DTIC, Service, or agency representatives.

SECTION 6. COST FACTORS

This section presents a discussion of the system development and implementation factors contributing to or influencing the cost of the proposed system. As test site implementation progresses, operating and software costs may be revised as a result of experience with the system. Some of the cost factors pertain solely to test site implementation. Development and testing of the microLAM software for the test site will result in reduced costs of implementation at subsequent sites.

6.1 Test Site Implementation.

Test site implementation will be jointly funded by the system sponsor – DTIC – and the test site agency – HQ TRADOC. Test site implementation will include selection of appropriate application and system software, software modification and implementation, and system testing. Beyond one-time system development costs, it is estimated that the system will cost between $25,000 and $40,000, including hardware, software, network communications equipment, system installation, training, and maintenance. The estimated cost of hardware and software for future implementations of the microLAM is discussed in Section 6.2.1.

6.1.1 Software Procurement and Modification.

As indicated above, microLAM applications software will be modified and implemented by the system developer in conjunction with Lawrence Livermore National Laboratory. Acquisition of the applications and data base software will be the responsibility of the system sponsor and the test site installation. The system sponsor will provide software acquisition support to the test site installation only. System utilities and compilers external to the applications software will be implemented by the system developer and test site personnel. Conversion of files and catalogs (manual and automated) intended for use within the microLAM or intended to exchange data with the microLAM is the responsibility of the test site organization. Implementation of teleprocessing software for supporting locally generated queries of the DTIC TR data will be the responsibility of the system developer.

Acquisition of this software will be the responsibility of the system sponsor and the test site installation.

6.1.2 Equipment Procurement and Installation.

At the test site, the microLAM will be implemented on a computer funded by the test site and will make use of existing DROLS communications lines. A minimum of three terminals and two medium-speed printers will be required – two terminals (one for reference and circulation and one for cataloging) and one printer in the technical library and one terminal and one printer in the TRALINET Center. In addition, the processor must allow for remote access by other TRALINET libraries. The estimated 65 to 70 million bytes of on-line (magnetic disk) microLAM storage for the local catalog, associated files, and software tables provides for 5 percent growth per year in the local catalog over a 5-year system operating cycle.

6.1.3 Other Implementation Costs.

The test site library will be responsible for establishing a machine-readable local catalog for at least a portion of its holdings prior to system operation. On the basis of the performance parameters specified in Section 2.4.7.3, it is estimated that 500 to 750 man-hours would be required to keyboard-enter the initial catalog from existing catalog cards or hard copy shelf list.

In planning for system implementation, the cost of site preparation must be considered, especially within the library. The following items should be addressed when planning for system implementation:

- Sufficient space must be available along with appropriate furniture within the library to install and operate terminals and printers (this includes work areas and storage facilities for personnel operating the terminals).
- The environment (temperature, relative humidity, and dust content) must be controlled within operating specifications of the equipment and to ensure operator comfort.
- Static electricity controls must be implemented to prevent interference with equipment operation.
- Sufficient three-conductor conditioned circuits (15 – 20 amp) must be available within the library to provide power to each terminal and printer.

6.1.4 Operations Cost Factors.

Operation of the system will add to the work load of the library staff. Periodically, an operator will be required to perform scheduled data base updates and prepare backup copies of system files. We estimate 4 to 5 operator hours per week will be needed. Additionally, in the event of system failure resulting in a loss of data or software, an operator will be required to execute restart/restore procedures.

Hardware maintenance and repair for the central processor, terminals, printers, and disk drives will be required and is expected to be performed under contract by the system installer.

Software vendors sometimes modify or enhance their product, giving previous users the option of installing the revised version. A library which has already implemented the microLAM and wishes to install the new version will require the assistance of an applications programmer to load the software and assure that it operates properly. The programmer should be familiar with the system hardware and software before attempting such an update. New software releases should rarely occur and would require an average 30 hours per year of applications programmer time.

In estimating peripheral (disk) storage requirements for the local catalog and associated files, an annual growth factor of 5 percent has been applied.

Miscellaneous computer supplies will be required to support operation of the system: printer paper and ribbons for printers located in the library, magnetic disks or disk packs used for software back-up and restart, and disks or magnetic tape cassettes for data base archiving and backup.

6.2 Preliminary Factors for Other Implementation Sites.

6.2.1 Equipment Factors.

If a computer that meets the operating specifications required for the microLAM is available, libraries should plan implementation on the processor. However, the computer must be capable of providing the access and responsiveness needed to support interactive microLAM operation characteristic of the library operating environment.

If existing computers are inadequate for the microLAM implementation, the local library will need to acquire, install, and make provisions for the operation of another computer. Acquiring the

computer and required peripherals may take from 6 to 18 months, depending on organizational practices and procedures for ADP equipment procurement. If suitable equipment has to be purchased, local libraries will need to acquire a microprocessor and associated operator equipment (generally a keyboard and a CRT), magnetic disk storage systems and controllers/interfaces, and local telecommunications equipment (capable of handling classified data if classified processing is desired). In the event the system will be used to process classified data, a TEMPEST-certified facility or TEMPEST-certified equipment may be needed to house the system. (The requirements associated with classified processing are under further investigation.) If required, it is preferable that this secure facility be located within the library, reducing the cost and complexity of the local communications network.

If not currently installed, a dedicated secure communications line will be needed for cataloging and retrieving classified data using the DTIC TR data base. Currently, it takes approximately 20 to 24 months to obtain the encryption devices needed for implementing remote classified processing capabilities. This lead-time should be taken into consideration when considering the cost for a classified processing capability for the microLAM.

As previously indicated, disk storage requirements for the system will depend on the size of the catalog and associated files maintained by the library. Similarly, the number of communications ports needed on the host processor will depend somewhat on the number of terminals required by the library. If the microLAM is implemented on a library-based microcomputer with 3 to 5 terminals and 40 to 80 million characters of disk storage (corresponding to 15,000 to 30,000 holdings, using complete COSATI records), equipment procurement costs are estimated to be $9,000 to $20,000; software costs will range from $5,000 to $15,000; and training, installation and maintenance costs will be $4,000 to $7,000.

6.2.2 Software Factors.

The software developed or adapted for the test site will provide a basis for adapting software for subsequent implementation sites. However, since the system configuration and on-line catalog

structure is likely to be unique for each library, the system will not be directly transportable, and site-specific costs will be incurred.

The interdependence of off-the-shelf software and hardware adds to the complexity of implementing the microLAM at future sites. In selecting microLAM software, particular consideration is being given to packages that run in a standard operating environment (such as the UNIX and MS-DOS operating systems).

6.2.3 Schedules.

In planning for system implementation, provision must be made for acquiring and/or adapting software for the local system. To begin implementation planning, each library should sponsor or conduct a study to establish the methods, schedule, and associated costs for implementing its microLAM modules. This Functional Description can be used as a point of departure for future implementations. Doing so will reduce the costs associated with system design and may reduce implementation time.

Along with acquiring the software needed to implement microLAM applications within the library, implementation planning must identify the compilers and system utilities required to implement the applications software. This software will generally be hardware-specific and may be available from either the hardware vendor or from a third-party software developer.

SECTION 7. SYSTEM DEVELOPMENT PLAN

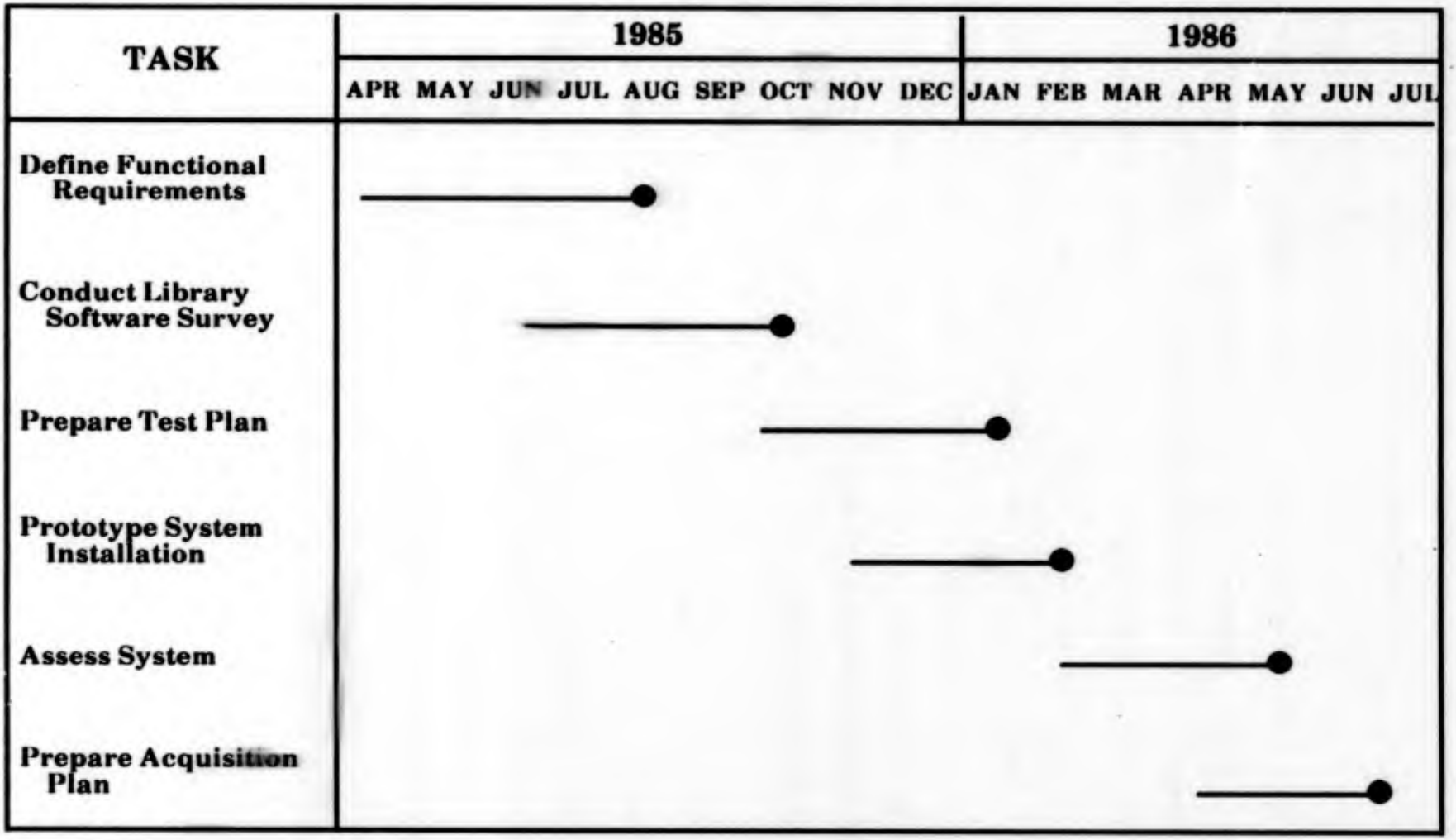
The features specified for the microLAM in Section 2.4 are generally applicable to all small DoD technical libraries. While those libraries may choose to independently pursue the development and implementation of enhanced automated processing capabilities, each library doing so would incur the risks and costs associated with any complex system development. DTIC, acting as the focal point for bibliographic resource-sharing initiatives, has undertaken the design, development, and testing of two functionally equivalent library systems reflecting DoD technical library needs. These systems, the LAM and microLAM, will serve as test beds for establishing the feasibility of implementing a fully integrated library system on a locally based computer capable of supporting the unique requirements of DoD technical libraries.

7.1 Test Site Development Schedule.

Figure 7-1 depicts the development schedule for the test site implementation. With the delivery of the functional description, the first phase of the project is complete. In the second phase, commercially available library-oriented software packages are being identified and evaluated. Based on written descriptions and operational demonstrations, the package that most closely meets the requirements stated in this document will be chosen for use at the test site.

The software package selected for the test site system will not necessarily be the package chosen for the production system at other DoD libraries. Selection of software and hardware for all future sites will be made through competitive procurement. The purpose of the pilot site system is to provide a test-and-development environment for the interoperability of a dedicated, resident library system coupled with common-language local and remote catalog access through an intelligent gateway feature. That is, the prototype system will be used to demonstrate the concept of an integrated library system combined with an intelligent gateway processor used for querying and updating – simultaneously – more than one heterogeneous bibliographic data base (or catalog).

FIGURE 7-1. MICROLAM DEVELOPMENT AND TEST SITE IMPLEMENTATION SCHEDULE



Since a single, common command language will be used to query and update any data base, the system user is relieved of the need to learn a separate language and procedure for each data base accessed.

Following the software survey, a test plan will be prepared and the package chosen will be modified, as required and installed at the test site. Initially it will operate in a stand-alone mode, providing capabilities for automated local collection management only. While the system is being installed at HQ TRADOC, Lawrence Livermore National Laboratory will begin integrating the library package and the gateway software, the IIS. When the integration is complete, the merged software will be installed at the test site, supporting both local collection management and access to the TR data base. Protocol and syntax conversion software will be adapted for the test site system. The complete system will be evaluated by the library staff and system developer on the basis of the features and capabilities delineated in the test plan. At the completion of that phase, a report will be published analyzing the results of the test and providing guidance on the features and performance levels required for future implementations of the system.

In the final phase of the project, an acquisition plan will be developed for acquiring software and hardware for implementing the microLAM at other technical libraries. The acquisition plan will include potential acquisition methods and alternatives, as well as performance specifications and a draft statement of work for use in a competitive procurement.

Selection of a production system will reflect the experience gained through evaluation of the test site system. Performance, interface, and supportability requirements derived from the pilot site evaluation, along with the overall cost of production system implementation and maintenance, will be the basis for selecting hardware and software for the production system.

7.2 System Documentation.

During fiscal year 1985-1986 (FY85-86), the following system documentation will be published:

- Assessment of Library Software. This document will report the results of the assessment of available microcomputer-based library software packages conducted to identify the package(s) most suitable for implementation at the test site.

- Test Plan. This document will detail the steps and methods planned for evaluating the features and capabilities of the test site system.

- Test Analysis Report. The results of the system test will be analyzed and recommendations concerning future microLAM implementations will be made.

- Acquisition Plan. Potential acquisition methods for the microLAM, as well as performance specifications and a draft statement of work, will be provided in this document.

7.3 Participating Organizations.

DTIC is the system sponsor, providing funding and technical guidance for development of the microLAM. It serves as the focal point for reviewing and approving system design and requirements documents. The Technical Library at HQ TRADOC, Fort Monroe, Virginia, is the test site, providing supplemental funding, the microLAM computer, and related software (exclusive of applications and syntax converter adaptation) for implementing, testing, and operating the microLAM. LMI is the system developer, responsible for system design and, in conjunction with Lawrence Livermore National Laboratory, software adaptation. Other DoD technical and academic libraries will participate in the review of system requirements documents, providing comments and recommendations to the system sponsor and developer.

APPENDIX A

SURVEY INSTRUMENT SENT TO DROLS USERS TO IDENTIFY MICROLAM REQUIREMENTS

In April 1985, more than 200 users of the Defense Research, Development, Test, and Evaluation On-Line System (DROLS) in the Office of the Secretary of Defense (OSD) and the Military Services were asked to participate in a survey to describe the fundamental characteristics of their libraries and identify the functions that they require from an automated library system. The responses from libraries that are potential microcomputer-based Local Automation Model (microLAM) users (those with fewer than 80,000 holdings) were used to identify the functional requirements described in this document.

The survey instrument used is presented in this Appendix. The survey results are presented in Appendix B.

LIBRARY SURVEY FOR MICROLAM REQUIREMENTS

I. Features/Capabilities

Listed below are features and capabilities being considered for the microLAM. Please rate each feature using the following scale.

A. Essential feature — without it, the LAM would not be useful to me
B. Useful feature — would like to have it but do not require it
C. Marginal feature — feature has little or no use to me

A	B	C	1.	store citations for all library holdings in a single, local system
A	B	C	2.	perform searches of the TR data base and local catalog/files simultaneously, from a single terminal
A	B	C	3.	merge search results from TR data base and local files
A	B	C	4.	modify retrieved TR citations for submission to the local catalog
A	B	C	5.	process MARC-formatted input/output
A	B	C	6.	design and produce ad hoc and standard reports
A	B	C	7.	store search strategies for future use
A	B	C	8.	store and process classified and restricted citations locally, including citations not permitted by DROLS
A	B	C	9.	submit local citations to DTIC/DROLS without re-entering the citations
A	B	C	10.	hardware dedicated to library use only
A	B	C	11.	support multiple simultaneous users
A	B	C	12.	audit trail to track system activity
A	B	C	13.	creation of a patron file and ability to automate the circulation control function
A	B	C	14.	maintain acquisition budget information
A	B	C	15.	identify and search distinct collections within the library
A	B	C	16.	add new data elements to local files and redefine existing elements
A	B	C	17.	response time of 5 seconds or less for a search or command
A	B	C		response time of 6-10 seconds for a search or command
A	B	C		response time of 11-20 seconds for a search or command
A	B	C		response time of 21 seconds or more for a search or command
A	B	C	18.	maintain multiple copies of a holding
A	B	C	19.	provide searches on keywords, regrade/declassification date and other date fields not searchable in DROLS
A	B	C	20.	provide formatted screens for data entry/cataloging
A	B	C	21.	maintain statistics on system usage and collection characteristics
A	B	C	22.	provide all cataloging and retrieval capabilities offered by DROLS
A	B	C	23.	ability to back-up all files
A	B	C	24.	ability to produce COM (computer output microform)
A	B	C	25.	connect with other bibliographic sources (e.g. DIALOG, OCLC, etc.)
			26.	Which library functions must the system offer?
A	B	C		a. cataloging
A	B	C		b. reference: local catalog
A	B	C		c. reference: remote catalogs/data bases
A	B	C		d. circulation management
A	B	C		e. acquisition control
			27.	any other <u>essential</u> features not listed? _____

II. Statistics

1. How many new citations are added weekly to:
   -local catalog: reports _____
   books/monographs _____
   serials _____
   -DTIC/TR Data base (if SBIN participant)

2. How many reference searches are performed weekly using:
   -local catalog _____
   -DTIC/TR data base _____
   -other bibliographic services (OCLC, DIALOG, RECON) _____

3. How many circulation transactions (number of holdings checked in or out) does the library process per week? _____

4. Size of local catalog
   -how many citations does your local catalog contain?
   -do your citations include abstracts?
   -what is the net rate of growth of your catalog (number of acquisitions minus number of lost or weeded holdings)? _____

5. Is there any information, other than bibliographic citations, that you would want to computerize? What type of information?

   _____

   What volume of data would this entail (no. of records, no. of pages of text, etc.)?

   _____

6. If you were to install the LAM in you library, how many of the following devices do you expect to need?
   -terminals _____ -printers _____

7. How many full-time staff members are assigned to your library?

   _____
   How many part-time staff members? _____
   How many professionals? _____ How many technicians? _____

8. Estimate of user population

   What is the total population of your lab/school/center? _____
   How many are users of the library? _____

III. Other Questions

1. What is the highest classification level of
   -your holdings? _____
   -your local citations? _____
   -the citations retrieved via DROLS from DTIC? _____
   -the citations input to DTIC? (if SBIN participant) _____

2. Do patrons have direct access to the local catalog or is access limited to the library staff?

   _____

   Do you want patrons to have direct access to the system?

   _____

3. Which of the functions performed in your library are currently automated (if any)?

   _____

   _____

   What brand and model of hardware do you use?

   _____

   What library software package do you use?

   _____

   What are the best features of this software?

   _____

   _____

   What are the worst features (or lack of features) of this software?

   _____

   _____

4. Please check any commercial bibliographic service which your library uses or would like to use.

   BRS _____ SDC/Orbit _____ LEXIS _____
   OCLC _____ DIALOG _____ NEXIS _____
   Others (specify) _____

5. Are you interested in installing a LAM in your library?

   _____

6. Any other comments or suggestions?

   _____

   _____

   _____

APPENDIX B

TABULATION OF DATA COLLECTED IN SURVEY OF DROLS USERS

In this appendix, selected data from the microLAM survey responses are presented. The data are organized into two parts, corresponding to Part I and II of the survey instrument. (A copy of the survey instrument is provided in Appendix A.)

Figures B-1 and B-2 present the system features and capabilities, from Part I of the survey, deemed most essential to the system. In order of preference, these features are: the ability to store citations for all classes of holdings (including classified and restricted holdings), the ability to use the system to perform local catalog searches, the need for formatted data entry screens, the ability to perform searches on many fields in the local catalog, and the ability to back-up all local files.

Figures B-3 through B-9 present statistics of various library operations and characteristics. Included are: local catalog size; number of circulation transactions; annual growth rate of library catalog; size of library staff; size of the lab/school/installation served by the library and the estimated number of library users; number of reference searches performed weekly of the local catalog, Technical Reports (TR) data base, and other sources (such as OCLC and DIALOG); and the number of new citations (of reports, books, and serials) added weekly to the local catalog.

FIGURE B-1. MICROLAM SURVEY RESULTS

System Features

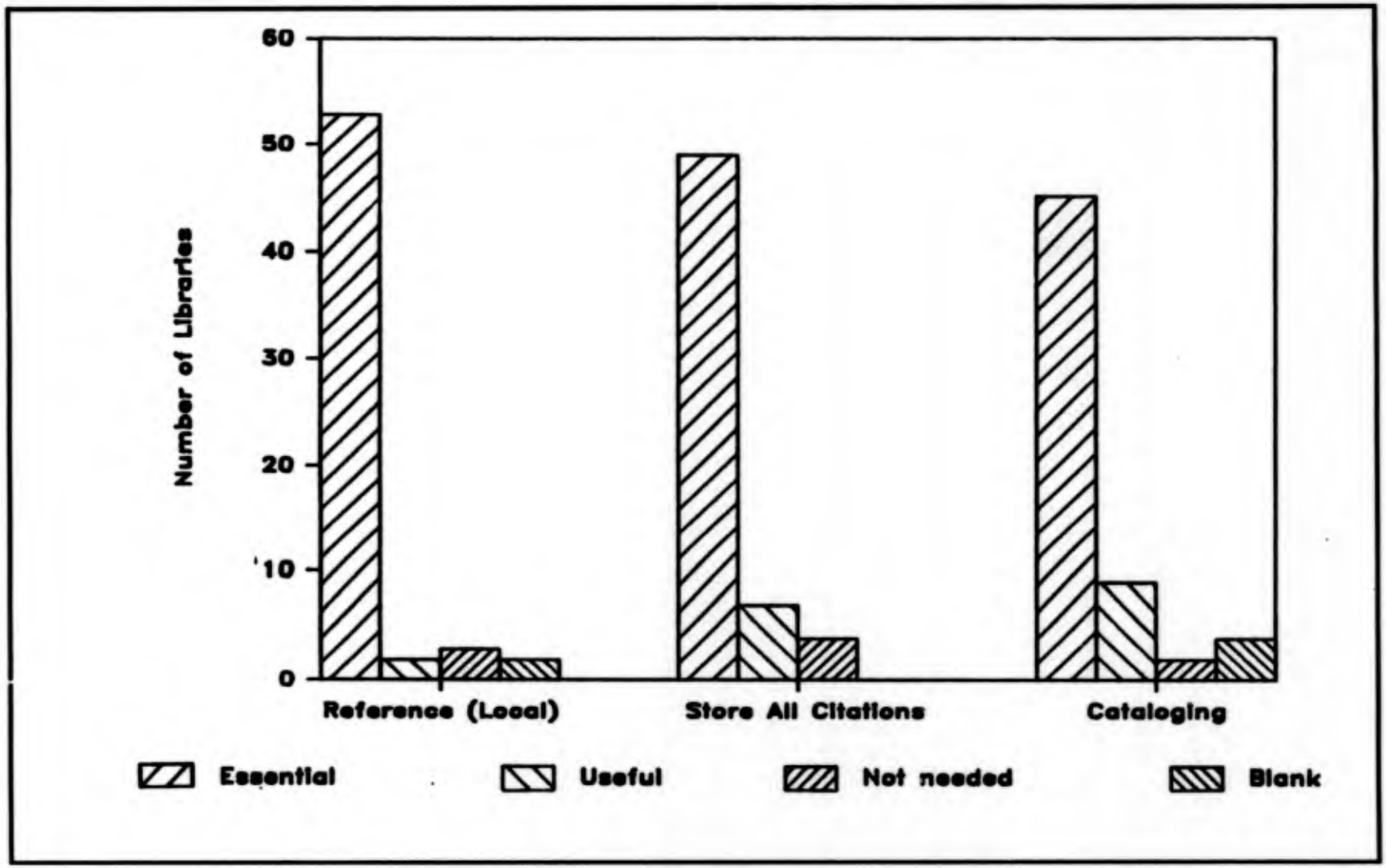


FIGURE B-2. MICROLAM SURVEY RESULTS (CONTINUED)

System Features

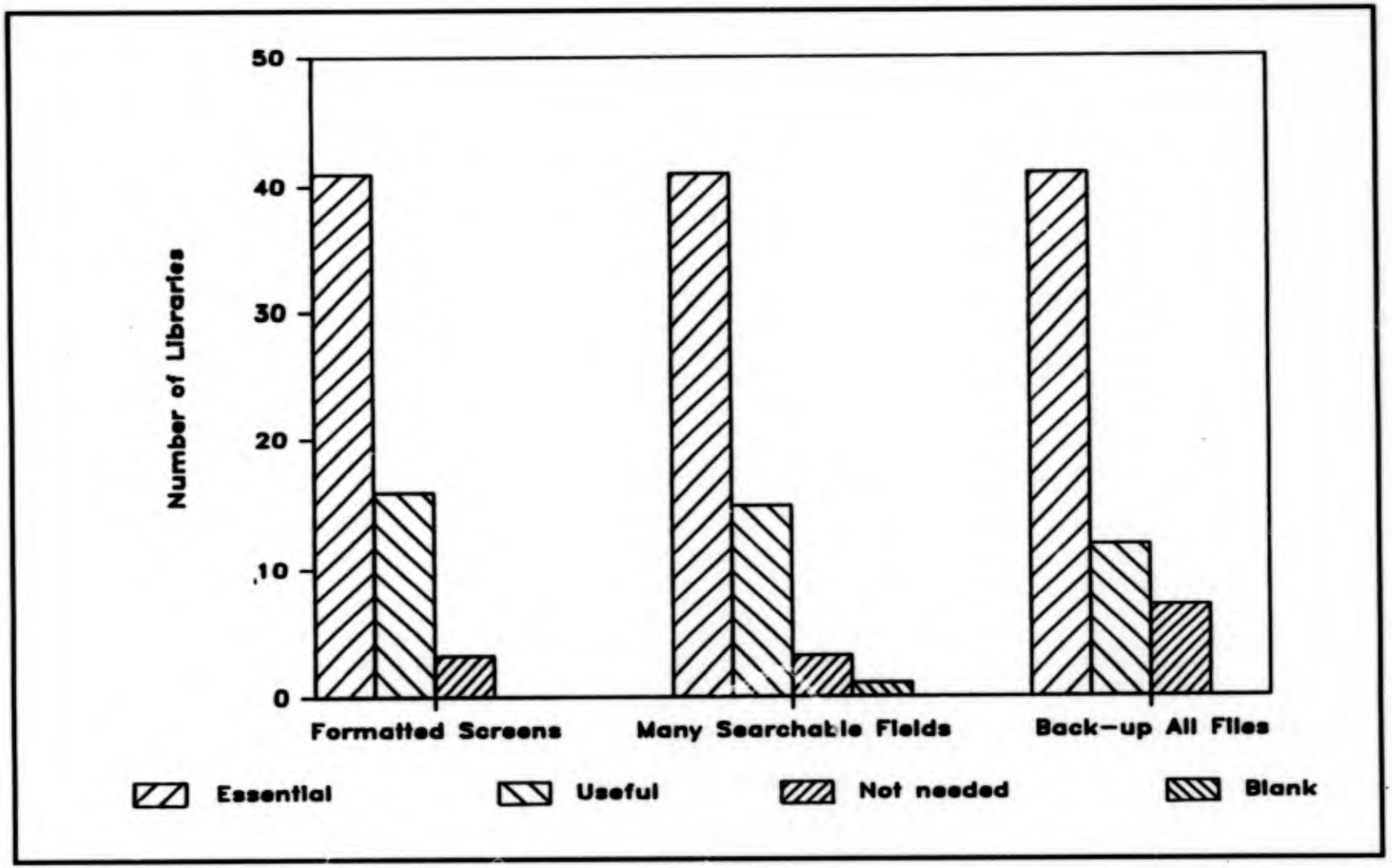


FIGURE B-3. LIBRARY CATALOG SIZE

(Survey Part II, Question 4a)

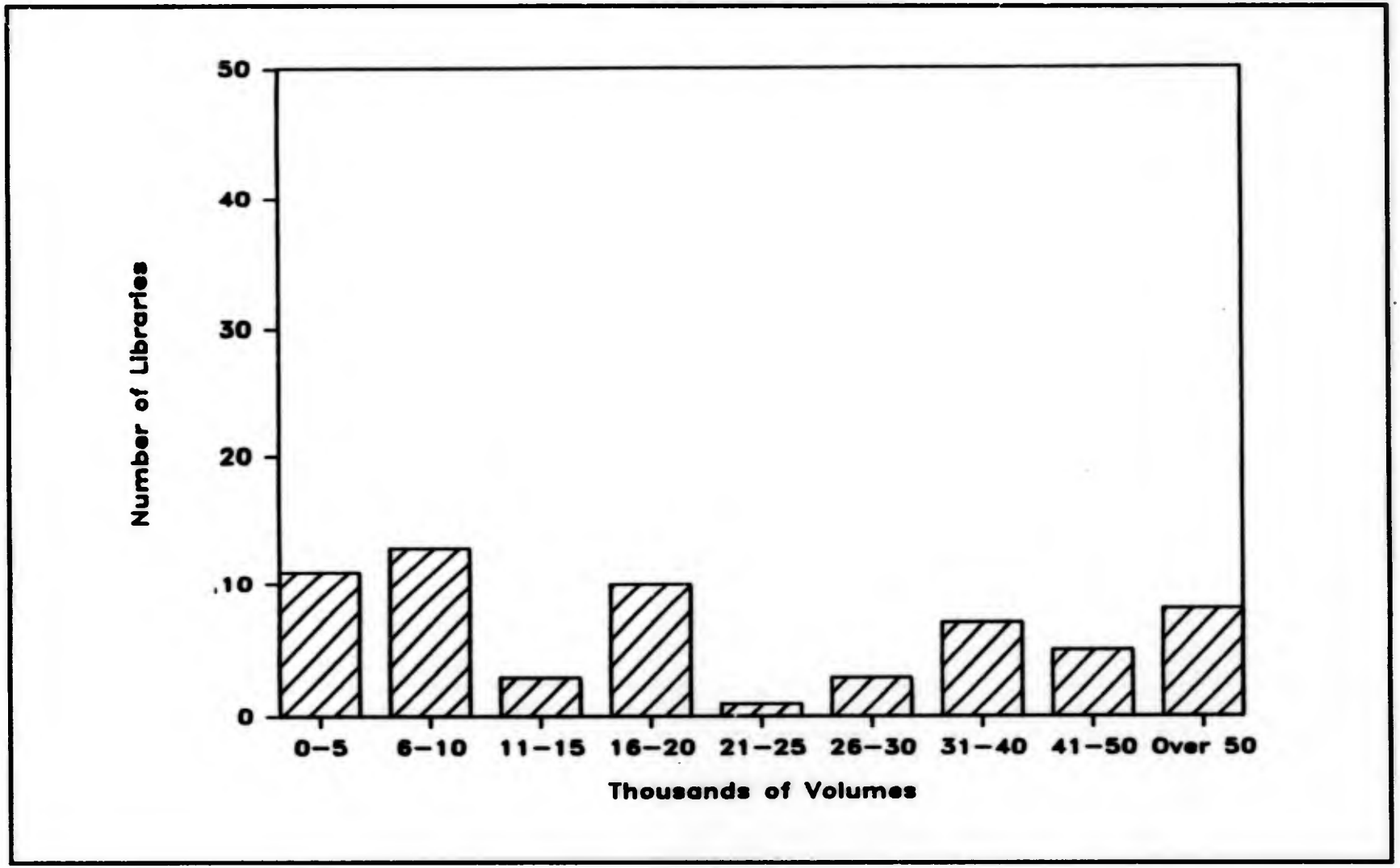


FIGURE B-4. CIRCULATION TRANSACTIONS

(Survey Part II, Question 3)

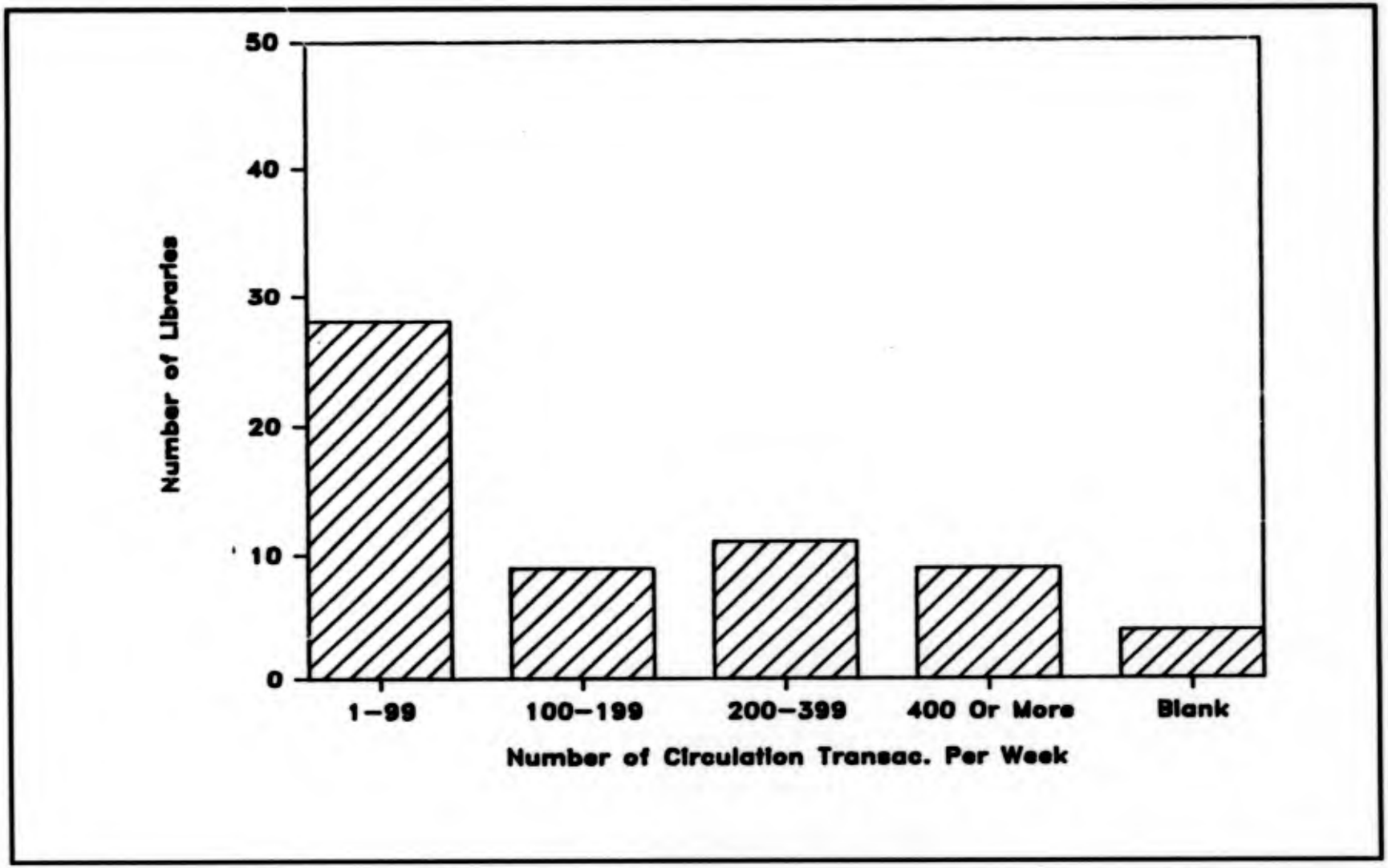


FIGURE B-5. ANNUAL GROWTH RATE OF CATALOG

(Survey Part II, Question 4c)

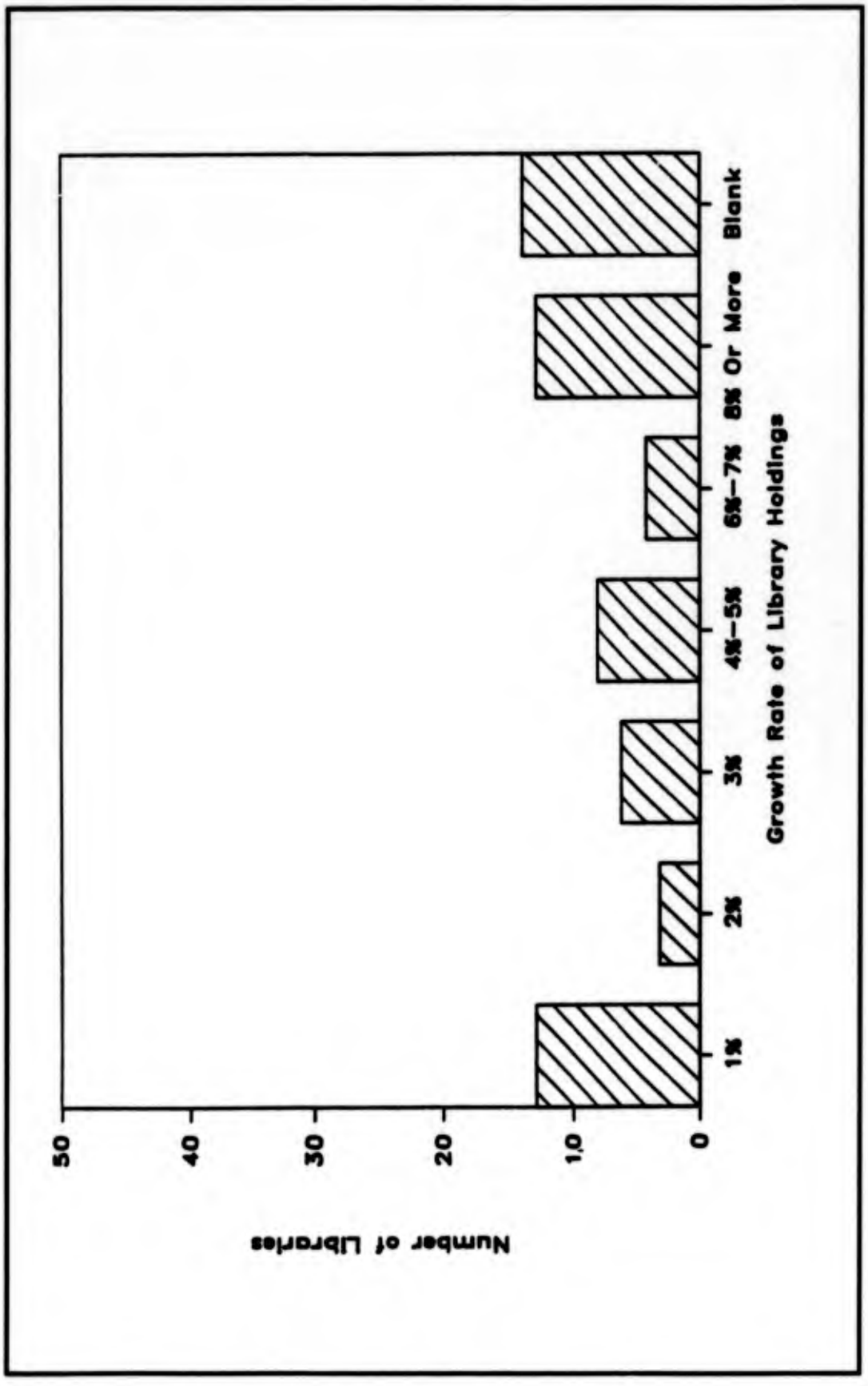


FIGURE B-6. SIZE OF LIBRARY STAFF

(Survey Part II, Question 7)

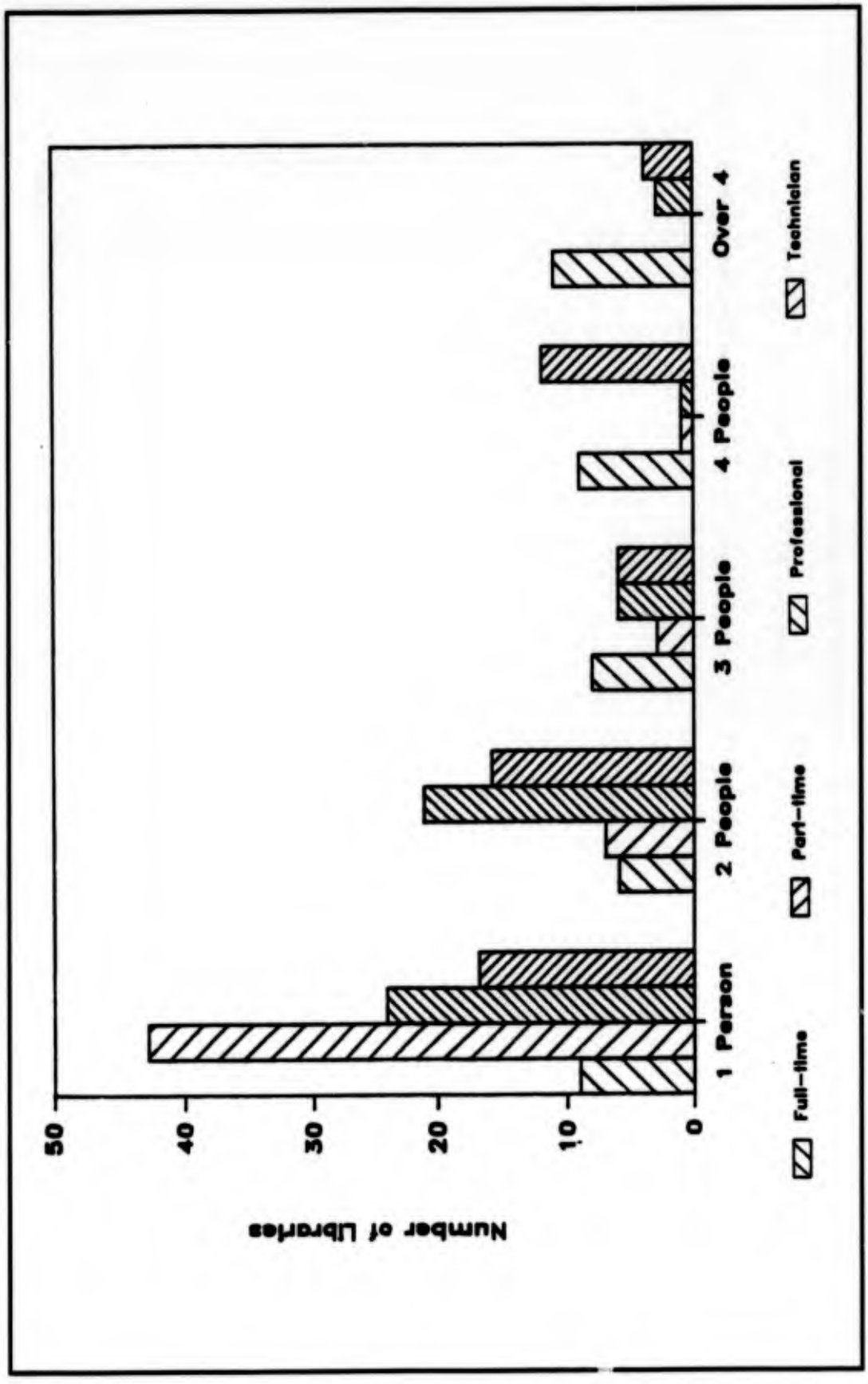


FIGURE B-7. LAB/SCHOOL AND USER POPULATIONS

(Survey Part II, Question 8)

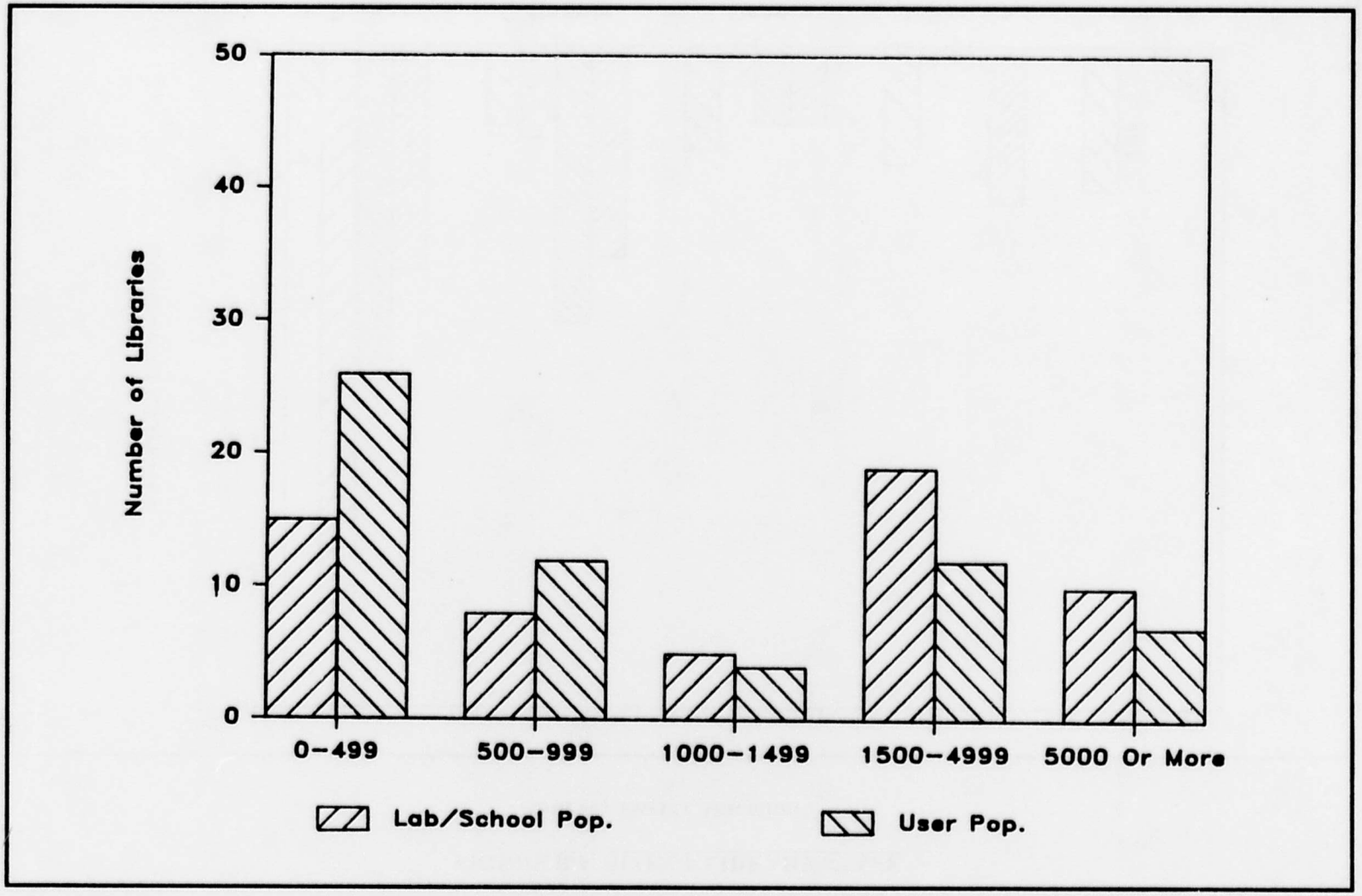


FIGURE B-8. REFERENCE SEARCHES

(Survey Part II, Question 2)

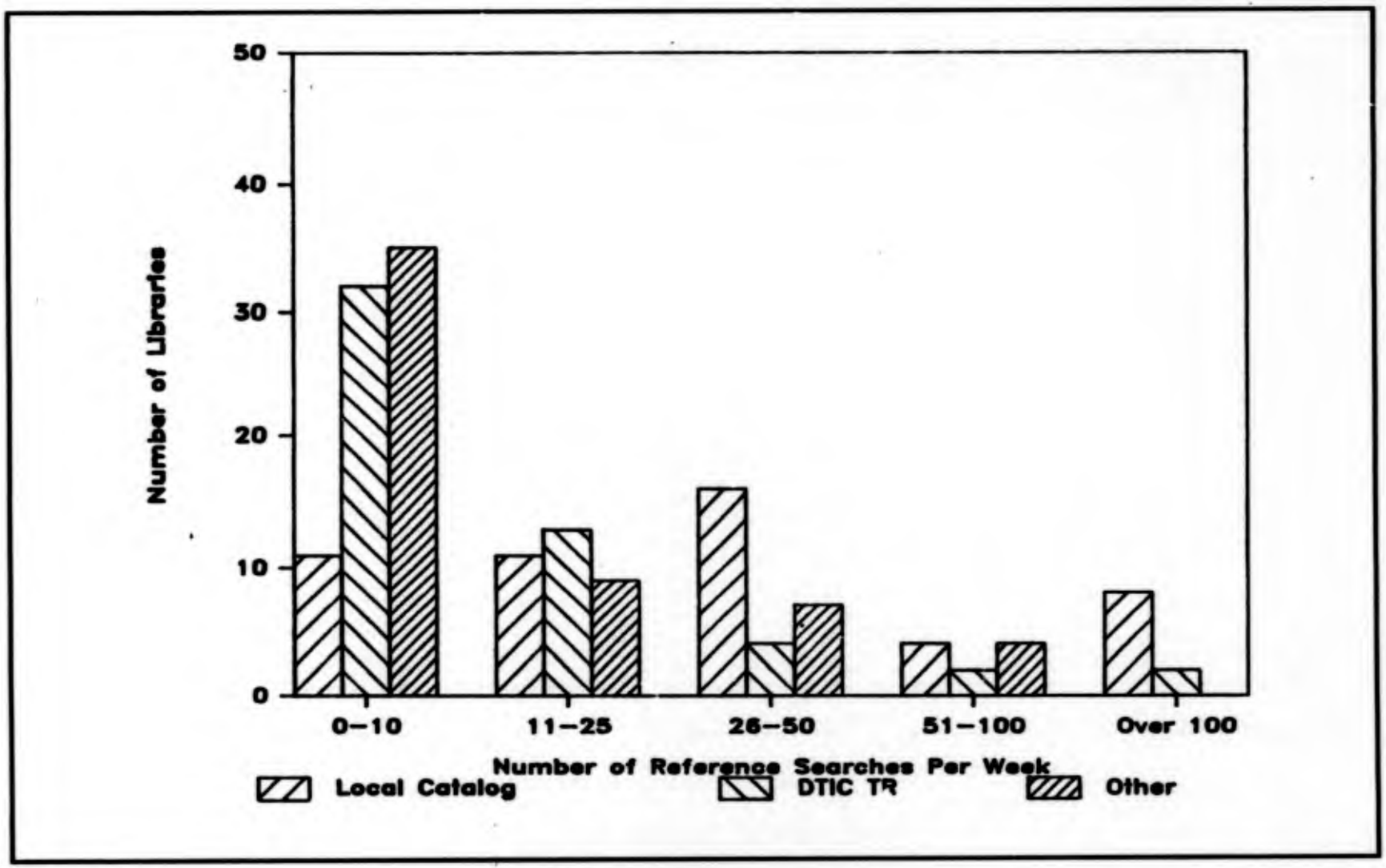
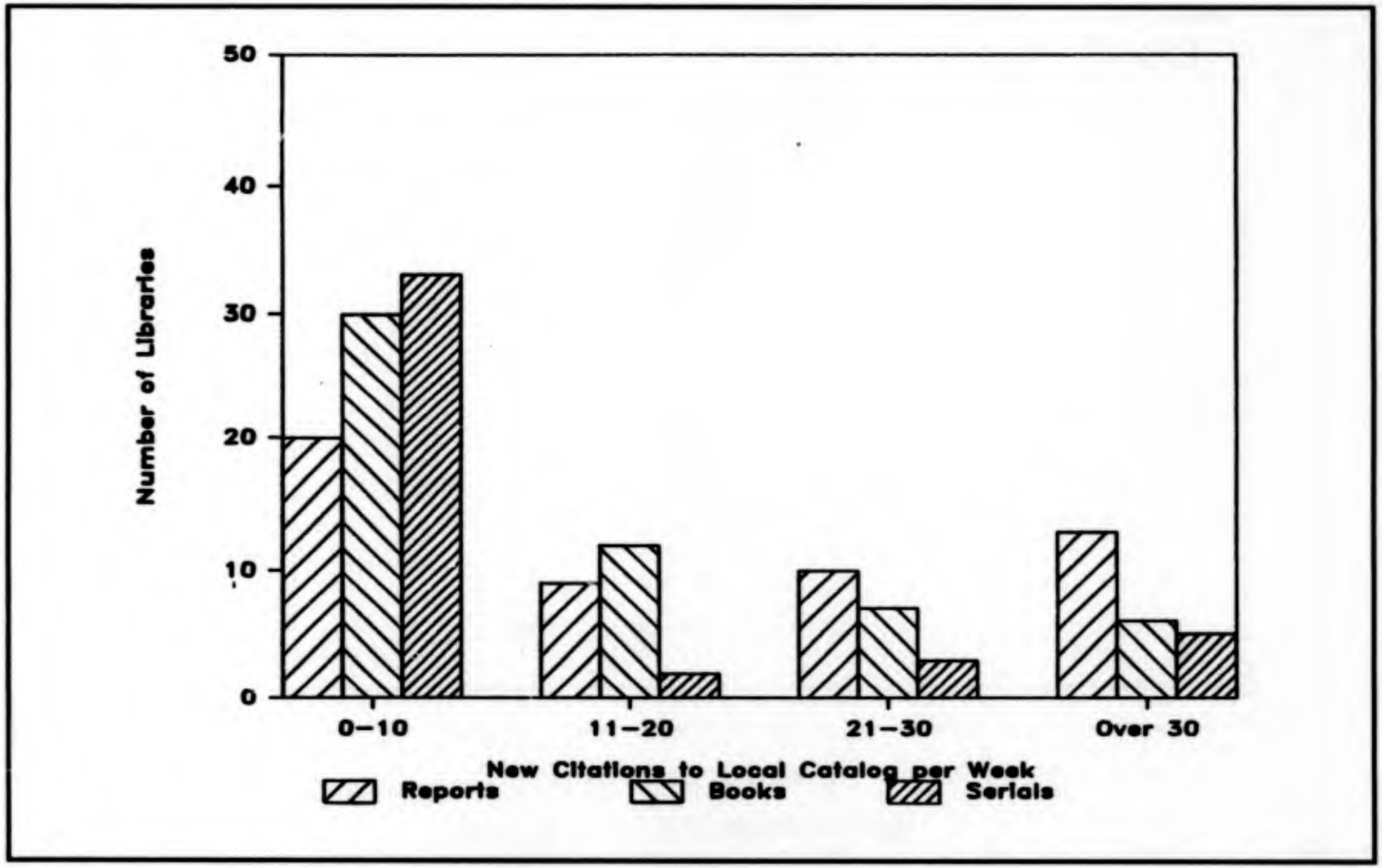


FIGURE B-9. NEW CITATIONS

(Survey Part II, Question 1)



APPENDIX C

PRELIMINARY DATA ELEMENT LIST FOR THE MICROCOMPUTER-BASED LOCAL AUTOMATION MODEL

The data elements tentively identified for inclusion in the micro-based Local Automation Model (microLAM) data base at Headquarters, U.S. Army Training and Doctrine Command (HQ TRADOC) are listed in this Appendix. Table C-1 lists all elements from the DTIC Technical Reports Data Base and Table C-2 lists all elements being considered for the local system. These lists are intended to serve as a working tool for the TRADOC Technical Library and the system design team, and are not intended as a final list.

The following is a list of abbreviations used in these appendix tables:

- IAC - Information Analysis Center
- NTIS - National Technical Information Service
- RDT&E - Research, Development, Test and Evaluation
- SBIN - Shared Bibliographic Input Network.

TABLE C-1. DATA ELEMENTS FROM THE DTIC TECHNICAL REPORTS DATA BASE

TR DATA FIELD	ELEMENT NAME
1	Accession Number
1A	Technical Report Processing Category
2	Subject Fields and Groups
3	Entry Classification or Catalog Card Classification
4	NTIS Price
5	Corporate Author
6	Unclassified Title
7	Classified Title
8	Title Classification
9	Descriptive Note
10	Personal Author
11	Report Data (Excluding Field 1A)
12	Pagination
13	(Not used)
14	Source Series/Report Number
15	Contract (or Grant) Number
16	RDT&E Project Number
17	RDT&E Task Number
18	Monitor Acronym (of Monitor Series)
19	Monitor Series (excluding acronym)
20	Report Classification
21	Supplementary Note
22	Limitations/Distribution – Availability Statement also, Distribution Control Application Date
23/33	Specific Application: SBIN Distribution/Availability Statement
23	Posting Terms

TABLE C-1. DATA ELEMENTS FROM THE DTIC TECHNICAL REPORTS DATA BASE (CONTINUED)

TR DATA FIELD	ELEMENT NAME
24	Descriptor Classification
25	RDT&E Work Unit Number also, Army Project Serial Number Candidate Posting Terms/Identifiers Candidate Posting Terms/Open-Ended Terms Organization Originated Project Number (Local Project Number) Program Element Number
26	Identifiers and Open-Ended Terms Classification
27	Abstract
28	Abstract Classification
29	Initial Inventory/Inventory
30	Annotation/Index Annotation
31	Special Codes
32	Regrade Category Reclassification Code
33	Limitation Availability Codes/Distribution Availability Codes
34	Serial Number/Source Series
35	Source Code
36	Document Location
37	Classification Authority/Classified By
38	Declassification Date/Declassify On
39	Downgrading Date/Downgrade On
40	Geopolitical Code
41	Type Code
42	IAC Report Number
43	IAC Document Type and Location Code
44	IAC Subject Terms

TABLE C-1. DATA ELEMENTS FROM THE DTIC TECHNICAL REPORTS DATA BASE (CONTINUED)

TR DATA FIELD	ELEMENT NAME
45	Extended By
46	Review On
47	Reason Code(s)
48	Remote Terminal (SBIN) Site Holdings Symbol

TABLE C-2. DATA ELEMENTS FOR THE HQ TRADOC LIBRARY FILES

FIELD NUMBER	FIELD NAME	PROPOSED LENGTH
	Cataloging: COSATI Fields	
1	AD Number	7
2	COSATI Groups	18
5	Corporate Author	125
6	Title	125
8	Title Classification	1
9	Descriptive Note	30
10	Personal Authors	50
11	Report Date	9
12	Pagination	4
14	Source Report Number	20
15	Contract	15
18	Monitor Acronym	10
19	Monitor Series	15
20	Report Classification	1
21	Supplementary Note	30
22	Limitations	200
23	Descriptors	225
24	Descriptor Classification	1
25	Identifiers	225
26	Identifier Classification	1
27	Abstract	450
28	Abstract Classification	1
31	Special Codes	3
32	Regrade Category	3
33	Limitation Code	3
35	Source Code	6

TABLE C-2. DATA ELEMENTS FOR THE HQ TRADOC LIBRARY FILES (CONTINUED)

FIELD NUMBER	FIELD NAME	PROPOSED LENGTH
	Cataloging: COSATI Fields (Cont.)	
37	Classification Authority	100
38	Declassification Date/Event	9
39	Downgrade Date/Event	9
48	Holding Libraries	72
	Cataloging: Non-COSATI Fields	
	Material Type (Book, reports, etc.)	1
	Local Document Number	7
	Accountability Status	1
	Copy Numbers	25
	Accession Date	9
	Circulation Status	1
	Cataloger	2
	Circulation Fields	
	Patron Number	6
	Patron Name	25
	Patron Rank	3
	Office Symbol	12
	Office Phone	4
	Security Clearance	1
	Need-to-Know Descriptors	225
	Clearance Verification Date	9
	Variable categories for use studies	1
	Categories for patron type	1
	Date of last transaction	9
	Date Due	9
	Date of Loan	9
	Number of overdue notices sent	1

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Library Automation, Automted System Design, Cataloging, Retrieval, Intelligent Gateway, Shared Cataloging, Resource Sharing.

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The Microcomputer-based Local Automated Model (MicroLAM) project will demonstrate the integration of a local collection management system with access to remote bibliographic data bases. Through an intelligent gateway processor, users of the system will be able to access a local catalog and the Defense Technical Information Center (DTIC) Technical Reports (TR) data base simultaneously. The system will consist of a commercial software package (for local collection management) integrated with a subset of the Lawrence Livermore National

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20. (Continued)

Laboratory (LLNL) Technology Information System (an intelligent gateway). The intelligent gateway permits sharing of bibliographic resources between the network of technical libraries and information centers within the Department of Defense (DoD) and the DoD technical information clearinghouse -- DTIC.

Contained in this functional description are summary description, detailed characteristics and operating environment of the system, as well as the cost factors and development schedule of the LAM project.

Keywords include:

19