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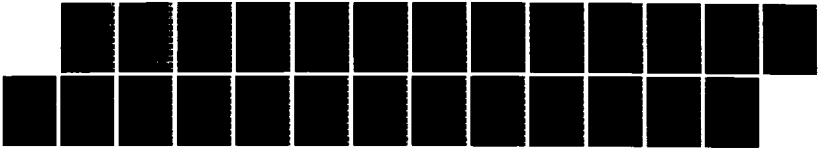

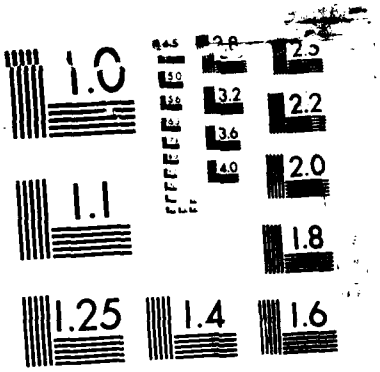

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MICROCOMPUTER-BASED LOCAL AUTOMATION MODEL: SYSTEM PLANNING GUIDANCE

May 1986

Richard W. Hartt
Dennis J. O'Connor

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This document provides guidance to Department of Defense libraries and information centers on implementing the microcomputer-based Local Automation Model, an integrated library system that includes intelligent gateway technology to search, download, analyze, merge and output citations from multiple databases. The document draws on the experience gained in implementing the micro-Lam prototype at the Technical Library, Headquarters US Army Training and Doctrine Command (HQ TRADOC) and provides an outline of tasks to be addressed in implementing the system at other installations. Tasks include deciding which functions to automate, determining requirements for peripheral equipment, and analyzing telecommunications and electrical requirements. Cost estimates for the system are also included.

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MICROCOMPUTER-BASED LOCAL AUTOMATION MODEL: SYSTEM PLANNING GUIDANCE

May 1986

Richard W. Hartt
Dennis J. O'Connor

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SECTION 1. GENERAL

1.1 Purpose.

This document provides guidance to Department of Defense (DoD) libraries and information centers on implementing the microcomputer-based Local Automation Model (microLAM). It draws upon the experience gained in implementing the microLAM prototype at the Technical Library, Headquarters, U.S. Army Training and Doctrine Command (HQ TRADOC), Fort Monroe, Virginia, and provides an outline of tasks to be addressed in implementing the system at other installations. While future implementations may differ from the prototype, a similar set of tasks apply to all sites.

1.2 Project References and Background.

The microLAM project encompasses the design, development, and evaluation of a fully integrated library system for technical libraries and is sponsored by the Defense Technical Information Center (DTIC) located at Cameron Station, Alexandria, Virginia. The requirements of the system are provided in the "Microcomputer-Based Local Automation Model: Functional Description," Logistics Management Institute, October 1985.

The objective of the project has been to provide a system that will be available for implementation by DoD libraries and information centers that access the DTIC Technical Reports (TR) data base, that maintain fewer that 80,000 holdings in the library's local collection, and that require fewer than eight simultaneous users. (For libraries with more than 80,000 holdings and requirements for eight or more simultaneous users, a minicomputer-based Local Automation Model [LAM] is also being developed.) The microLAM prototype system implemented at HQ TRADOC has provided the opportunity to demonstrate and evaluate an automated library

system with special features for bibliographic information sharing. The system will support conventional collection-handling capabilities such as original cataloging, citation retrieval, and circulation management and control. In addition, the system will facilitate information sharing between DoD technical libraries and DTIC by incorporating "gateway" processing capabilities.

Gateway capabilities required for the system include (1) automatic searching of both the local technical library catalog and the DTIC TR data base using a single search language and format, (2) downloading information from the TR data base to the local system, and (3) machine-aided translation of locally created catalog citations into a format acceptable for entry in the TR data base. Thus, with one system and one set of commands, a technical library can (1) maintain and expand a catalog tailored to local needs, (2) access the information contained in the TR data base, and (3) contribute directly to the timely dissemination of scientific and technical information via direct cataloging in the TR data base.

Initiation of and requirements for the microLAM originated from the need to reduce the TR data base cataloging burden placed on Shared Bibliographic Input Network (SBIN) member libraries and thereby promote information sharing. SBIN was established as an experiment in shared cataloging and has become an ongoing DTIC program. In addition to providing inputs to a local catalog, SBIN member libraries catalog their documents into the TR data base using the Remote Terminal Input System (RTIS) available on the Defense Research, Development, Test, and Evaluation (RDT&E) On-Line System (DROLS).

The production microLAM system will be implemented using commercially available library software. Software for the prototype was chosen after evaluating more than 80 commercially available library software products. The gateway features available in the prototype will be provided through adaptation of the

Integrated Information System (IIS) developed by the Technology Information System (TIS) group at Lawrence Livermore National Laboratory (LLNL).

Included in the LAM and microLAM projects is the development of an acquisition strategy and plan for a production system. Competitive bids will be solicited for acquisition of the production system. The performance specifications and statement of work for the solicitation will be developed and refined through experience gained with the prototype systems. Operation of the prototype at HQ TRADOC represents a significant stage of the development life cycle and will lay the foundation for successful acquisition of the production system for other DoD technical libraries and information centers.

1.3 Terms and Abbreviations.

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

- DoD: Department of Defense
- DROLS: Defense RDT&E On-Line System
- DTIC: Defense Technical Information Center
- HQ TRADOC: Headquarters, U.S. Army Training and Doctrine Command, Fort Monroe, Virginia, site of the prototype microLAM
- IIS: Integrated Information System – an intelligent gateway developed and supported by the TIS group at LLNL
- LAM: Local Automation Model – a project sponsored by DTIC for demonstrating, evaluating, and acquiring an integrated library system encompassing local collection management and access to external bibliographic resources
- LLNL: Lawrence Livermore National Laboratory – a Department of Energy-funded, contractor-operated research and development laboratory located in Livermore, California
- MARC: Machine-readable cataloging – a standard format or convention specified to facilitate the exchange of bibliographic information via machine-readable magnetic media
- RDT&E: Research, Development, Test and Evaluation
- RTIS: The Remote Terminal Input System operated by DTIC and used to transfer TR data base inputs from on-line user files to the TR data base

- SBIN: Shared Bibliographic Input Network

- TIS: Technology Information System – used to describe both the work on advanced information-handling technology and the organizational group performing this work at LLNL

- TR Data Base: The Technical Reports data base operated and maintained by DTIC containing over 1 million citations to reports published or sponsored by DoD

- Union List: An inventory common to several libraries and containing some or all of their publications in one or more orders of arrangement.

SECTION 2. AUTOMATION REQUIREMENTS PLANNING

2.1 Introduction.

This section identifies tasks that libraries planning to implement the microLAM must consider. Where applicable, discussion of the system implementation at the prototype site is included.

2.2 Description of Requirements Issues.

Although the functions and capabilities of the microLAM production system will be specified in a Request for Proposals (RFP) to be issued in fiscal year (FY) 1987, several aspects of the system will vary depending on the requirements of the individual library. To successfully implement the microLAM, a library must analyze its requirements and determine how to best meet them. To aid in that analysis, the following subsections present descriptions of the requirements most likely to have a significant effect on system implementation.

2.2.1 Functions to be Automated.

All library functions to be offered by the microLAM will not be determined until the RFP is issued for the production system. The system will certainly offer cataloging, reference, and circulation management and control functions. Cataloging and reference functions apply to both the local catalog and the TR data bases. Those functions will enable a user to search either or both of the data bases as well as to enter citations to either or both. In addition, the system will either offer a distinct acquisitions function or provide for entering of skeletal citations for items on order. The system may offer either a distinct serials management function or the capability of entering serials citations in the bibliographic data base.

Each library must consider which functions beyond reference, cataloging, and circulation management control, if any, it desires to automate. At the prototype site, reference, cataloging, and circulation have been implemented.

2.2.2 Access Control.

Each library must determine who will be granted access to the system. Will the entire library staff have access or only selected staff members? Will library patrons have direct access or will access be provided only through the library staff? Will dial-up access be provided (to users or affiliated libraries)?

The classification level of the data in the system is a key factor in making that decision. For a classified system, more limited access is required. However, even unclassified systems require limitations because users of the microLAM will have access to the TR data base which is restricted.

While a complete list of system users must be determined for security purposes, the number of simultaneous users (users accessing the system at the same time) is needed to determine the size of computer required. The production microLAM is designed to accommodate from one to seven simultaneous users. If a library requires access for eight or more users simultaneously, the minicomputer-based LAM is a more appropriate system.

The prototype system at HQ TRADOC is accessible only to the library staff and TRADOC Library and Information Network (TRALINET) Center staff. Those users have access to the system through three workstations located in the technical library and the TRALINET Center. The system controls access to data through user passwords and access privileges. Passwords must be safeguarded by users and will occasionally be changed to reduce the likelihood of unauthorized access.

Members of the library and TRALINET staff are responsible for granting and controlling user access privileges. Access privileges govern the ability of users to

read, write, and alter data on the system. The system will maintain an audit trail of access attempts and user activity.

When additional telephone lines are installed, dial-up access will be granted to library staff members of other TRADOC technical libraries across the country. The microLAM will serve as the TRADOC union list and will accommodate up to six simultaneous users.

2.2.3 Location of Computer and Workstations.

Each library must determine where to place the main computer components. Those components include the computer, system console, system printer, and modems. The library should also provide adequate space for staff working near the system and adequate space for servicing the equipment.

The location and the space required for each workstation and workstation printer must also be considered. Workstations for reference use will generally be placed on the desk of a library staff member. A workstation will also generally be placed at the circulation desk.

Finally, space will be needed for supplies (such as computer paper, printer ribbons, and data cartridges) and additional equipment as the system expands.

To provide libraries with some basis for estimating the space required for the system, dimensions of the equipment used at the prototype site are provided below. While the equipment for the production system is expected to be similar, it has not yet been selected and may differ somewhat from that used for the prototype. The computer at HQ TRADOC is 8 inches wide, 22 inches deep, 24 inches high, and is placed on the floor; the system console, consisting of a keyboard and monitor, is 18 inches wide and 22 inches deep; and the system printer is 22 inches wide and 14 inches deep. The system console and printer, as well as the reference librarian's workstation are all located on one desk next to the computer. The modem is 6 inches wide, 11 inches deep, and 2 inches high and is located on top of the computer. The

disk drives storing the software and library files and the tape drive for file backups are built into the computer chassis.

For the prototype, two International Business Machines (IBM) Personal Computers (PCs) are used as workstations in the library by the reference librarian and the staff at the circulation desk. The PCs are 24 inches wide and 30 inches deep and each has a printer, 12 inches wide and 9 inches deep, attached to it. A Wang PC is used as the third workstation.

2.2.4 Conversion of Library Catalog and Files.

The status of the library's catalog and other files can radically affect the time required for conversion and cost of that conversion. If an automated catalog exists, it must be converted to a format compatible with the microLAM software. Conversion services will be available as part of production system acquisition. Each library will also have to develop a citation format for the new catalog and the software vendor will provide assistance in that function.

If the library is currently using a manual catalog, such as a card catalog, the conversion task is more difficult. One option is to retrieve citations from existing automated systems and convert them to the local format. Technical report citations, for example, can be obtained from the TR data base. The library could define a TR data base search yielding the citations required for the local catalog, have DTIC create and save the customized bibliography on tape (DTIC refers to this service as Retrospective Bibliography on Magnetic Tape [RBMT]), and have the system vendor convert the tape of citations to the local format. The library could create a similar tape of monograph citations from a shared cataloging service, such as OCLC, for use on the local system. A second, more expensive and time-consuming option, is to key the card catalog records at a workstation. (A commercial data-entry service could be contracted to perform that task.) Data conversion and other system costs are discussed in Section 4.

For the prototype system, citations from other systems were retrieved, stored on tape, and converted. One tape, requested by HQ TRADOC and produced by DTIC, contained 8,000 citations from the TR data base of TRADOC-originated documents; another tape containing approximately 2,500 OCLC citations was produced upon request for HQ TRADOC. Both sets of citations were converted by the software vendor and loaded into the system for the initial catalog.

2.2.5 Citations To Be Included In Automated Catalog.

The microLAM is designed to accept citations representing a wide variety of holdings: technical reports, DoD and Service manuals and documents, monographs, special collections, etc. Each library must decide what types of holdings will be cataloged in the system. For each type of holding, the library will need to identify the descriptive and bibliographic information to be stored in the automated catalog. To reduce duplication of effort and redundancy of systems, libraries should capture as many of their holdings as possible in the system.

The library will also need to estimate the number of citations to be included in the initial catalog and the annual rate of catalog growth for the next 3 to 5 years. These figures are important in determining the size of computer and amount of disk storage required.

The prototype system consists of approximately 10,500 records: 8,000 report citations from the TR data base and 2,500 monograph citations from OCLC. Each citation consists of approximately 1,500 characters. The catalog will eventually include citations for additional holding types, including reports not eligible for the TR data base, technical manuals and other official Army publications, and miscellaneous holdings such as brochures. Some of these additional holdings will be cataloged with a full bibliographic citation; others with only a skeletal citation created when the holding circulates.

2.2.6 Peripheral Equipment.

Peripheral equipment is hardware that is connected, either by cable or by telephone, to the microLAM computer. This can include workstations, printers, and modems. A few issues concerning peripherals should be considered before procuring the system.

First, a library must decide what type of equipment will be used for workstations: PCs or video terminals. Since PCs have more processing capability and therefore lessen the load on the central computer, libraries expecting five or more simultaneous users might achieve better performance using PCs. PCs can also be used as stand-alone processors, running conventional, non-LAM applications such as word processing. Since PCs are more expensive than terminals, libraries with fewer than five simultaneous users can minimize system costs by using terminals as workstations. (Costs are described in Section 4.) To allow for up to six simultaneous users on the prototype system, PCs are being used as workstations.

A second issue involves printers. While not a necessity, we recommend that each workstation be equipped with a printer. Otherwise, information retrieved from the system can be seen only as a display on the video terminal. All workstations at the prototype site are equipped with printers.

2.2.7 Classified Data.

Some libraries may use the microLAM to store, retrieve, and display classified citations. If so, DoD and Service security regulations require specific safeguards. Because of the small size and minimal maintenance requirements of the microLAM computer, most libraries will install the computer within the library rather than in a computer center. Consequently, the library staff will be responsible for protecting not only classified output on video terminals and printers but also the magnetic disks containing classified data.

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

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, microLAM files could 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 the TR data base, it must have a dedicated, encrypted communications line between the library and the TR data base. If the library already retrieves or transmits classified data to or from the TR data base, the existing dedicated DROLS communications line(s) can be used for the microLAM.

The patron file may contain data subject to privacy restrictions. Access to that file should be restricted to library staff members responsible for establishing and verifying need-to-know and security clearances in conjunction with checking out holdings.

The prototype site is an unclassified system. However, security regulations at Fort Monroe, Virginia require system access limitations to prevent unauthorized use. To satisfy that requirement, a password system has been installed for all workstations.

2.2.8 DROLS Access.

If a library chooses to use an existing dedicated DROLS line for the microLAM, that line will need to be connected to the computer. If the computer is not located near the existing line, the line will need to be relocated.

If dial-up access to DROLS will be used, the library must determine how many lines are needed. We recommend that the library install enough lines to permit all workstations that will access DROLS to do so simultaneously. (For example, if three microLAM workstations will be accessing DROLS, three dial-up lines should be installed.)

All DROLS searches performed from the prototype system will be unclassified. Dial-up access to DROLS will be provided. An existing dedicated DROLS line in the library will continue to be used for classified searches and will not be connected to the microLAM.

SECTION 3. SYSTEM IMPLEMENTATION PLANNING

3.1 Introduction.

The requirements discussed in Section 2 can be addressed by a library staff familiar with its library's procedures and workloads. To address the requirements described in this section, a library staff will require additional technical information about the microLAM (available when the production system has been chosen) and technical assistance from building engineers and security personnel.

3.2 Site Preparation.

3.2.1 Electrical.

Installation of the computer for the microLAM will probably require modifications to the utilities available within the computer site. The computer will probably require 110 volts on a three-wire line, up to 30 amperes (amps), similar to many household appliances.

Computers can be susceptible to power surges that can cause errors and damage the equipment. Many vendors recommend individual, dedicated circuits for the computer itself. (A dedicated circuit runs directly from the circuit box with nothing else attached to it.) It is also useful to have a separate circuit breaker for the computer. Peripheral equipment, such as workstations and printers, should not require dedicated power lines.

At the prototype site, several additional electrical lines were installed: four lines were needed for the computer and its peripherals, and two lines were needed for each workstation/printer site.

3.2.2 Telephone.

Additional telephone lines will be required for two reasons. First, all libraries will need lines to access DROLS (as discussed in Section 2.2), and second, some

libraries will also require lines for workstations at remote locations or those not connected by cable to the computer. For example, at the prototype site, users in the TRALINET office located 1/2 mile from the Technical Library will have access to the microLAM over a telephone line installed specifically for TRALINET use.

Workstations can be connected via dedicated or nondedicated, voice-grade telephone lines. For classified access, dedicated lines will be necessary; for unclassified access, nondedicated lines are generally acceptable.

3.2.3 Environmental.

Environmental conditions are very important for proper installation of computer systems. Consideration of the temperature, humidity, dust, noise, and lighting are essential elements in installing a system. Many microcomputers have an ambient temperature range of 60 to 90 degrees Fahrenheit (°F). When the temperature rises above 90°F, equipment failures that reduce the lifetime of the equipment can occur.

Static electricity can also be a problem for computer systems. Many libraries are carpeted, which can escalate static buildup. Maintaining a relative humidity level of 40 to 80 percent can reduce static, and antistatic mats can be placed near the system and antistatic spray used around the system can reduce static.

Dust can damage computers and storage devices. All equipment should be kept free of dust to prevent downtime and prolong life. Of course, people using or maintaining the system need adequate lighting. Manipulating the lighting and using nonglare screens will reduce glare from the workstations. No additional air-conditioning or heating capacity was needed at the prototype site. The system installer did recommend the use of antistatic spray on the carpet around the computer.

3.3 Risk Analysis, Security Assessment and Accreditation.

Risk analysis covers practically every facet of system implementation from suitability of the computer site to plans for data backup and recovery. Its aim is to identify hazards to system operation and select methods for reducing or eliminating the risk. Several publications provide guidelines for conducting risk analysis:

- "Guidelines for Automatic Data Processing Physical Security and Risk Management", Federal Information Processing Standards Publication 31, National Bureau of Standards, June 1974.
- "Guideline for Automatic Data Processing Risk Analysis", Federal Information Processing Standards Publication 65, National Bureau of Standards, 1 August 1979.
- "Guideline for Computer Security Certification and Accreditation", Federal Information Processing Standards Publication 102, National Bureau of Standards, 27 September 1983.

Local automated data processing security regulations, policies, and standard operating procedures should also be consulted.

If the computer will be located in an existing computer center, computer risk analyses may have been conducted for other systems in the center. Those analyses can be used to the extent that there are similarities between the existing systems and the microLAM.

As a result of risk analysis, corrective actions are initiated, as required, and plans developed to operate the system safely. If the computer is to be used to store classified citations or data, completion of risk analysis and corresponding follow-up action leads to system accreditation for processing and storing classified data.

A key aspect of risk analysis is establishing procedures for responding to system failures. To minimize the time lost from damage to, or errors in, the data base and associated software, sets of backup files should be created and maintained on a defined schedule. If the local catalog cannot be accessed (because of hardware failure, software processing interruption, or local network failure), temporary

reference services could be provided using hard-copy shelf lists until the system is restored.

At the prototype site, backup procedures have been established to prevent catastrophic loss. Because of frequent thunderstorms in the area, the use of a surge protector (to protect the computer from electrical power line surges) has been recommended for the computer. Although the system will not store classified data, facility security personnel will perform an accreditation inspection of the system to ensure that procedures preventing unauthorized access are adequate and that other security regulations have been fulfilled.

3.4 Training.

Technical library staff members and other direct users of the system must be trained to use the system. Training should cover system procedures for all library functions implemented. A system operator must be trained to perform file backup and recovery, daily startup and shutdown procedures, and other recurring file maintenance tasks.

Normally, training is considered part of software installation and is provided by the software vendor.

Training at the prototype site was conducted by the software vendor during the week of system installation. The training lasted 2 1/2 days and covered the library functions of retrieval, catalog maintenance, and circulation as well as system administration functions such as startup and shutdown and file maintenance.

SECTION 4. SYSTEM COSTS

4.1 Cost Estimates.

The information in this section is provided as a guide for librarians to develop budget estimates for acquiring the microLAM. The estimates are derived from the costs of the prototype system and are not intended to establish limits on the cost of the production system nor to serve as a cost development guide for vendors bidding on the production system.

To develop a budget estimate for implementing the microLAM, total the applicable costs for each cost category (e.g., software, hardware, data conversion). Some categories include both initial acquisition and operating budget estimates. The operating budget estimates are for costs incurred every year for continued system operation. Budget estimates, by cost category, are as follows.

4.1.1 Software.

- Operating system and utilities – $3,000
- Applications software (cost depends on number of library functions implemented; minimum estimate is for retrieval and cataloging/catalog maintenance only; maximum estimate is for retrieval, catalog maintenance, circulation, and acquisitions) – $6,500 to $12,000
- Software Maintenance (for 1 year) – $1,000 to $2,000

4.1.2 Hardware.

- Central Processor – Basic system configuration with central processor, 80 megabyte (MB) hard disk fixed drive, streaming tape drive, system console, communications ports for up to seven users – $15,000 to $20,000

  This configuration will provide acceptable performance for up to seven simultaneous users performing cataloging, retrieval, and circulation functions. A catalog of up to 25,000 citations of approximately 1,500 characters per citation, can be supported. Up to two additional 80 MB hard disks, each capable of storing approximately 25,000 additional citations, can be added for an additional $2,500 each.

For smaller libraries requiring only one to three users and maintaining a catalog of up to 25,000 citations, the processor cost would be $9,000 to $12,000.

- Peripherals – workstations (terminals or PCs), character printers and modems should be budgeted as follows:

  For processing unclassified data –

  – terminals – $1,000 each OR PCs – $3,000 each
  – character printer – $500 to 750 each

  For processing classified data –

  – TEMPEST protected terminals – $2,500 OR TEMPEST protected PC – $5,000 each
  – TEMPEST protected character printer – $1,500

  Modems (for DROLS access and, optionally, for dial-in users to the microLAM) –

  – 2,400 baud – $800 each
  – 1,200 baud – $500 each

4.1.3 Data Conversion.

Data conversion is potentially the most variable cost for any system implementation.

- Retrospective Bibliography on Magnetic Tape – Tape produced by DTIC containing specified citations from TR data base – $330 per 1,000 citations. (Tapes from DTIC would need to be converted to the local format before being loaded in the microLAM system. See "non-MARC-based records" conversion costs below.)

- Convert existing machine-readable MARC-based records from an existing computer system to the new computer – $500 + 25 cents per record

- Convert existing non-MARC-based records (e.g., TR data base records) from an existing computer system to the new computer – $1,000 plus 25 cents per record

- Manually enter or optically scan citations from an existing card or "paper" catalog – $2.00 per 1,000 characters (minimum of $2.00 per citation)

- Develop citations from documents – probably prohibitive; however, there are sources for machine-readable citations that can serve to get a computer-based catalog started (e.g., the DTIC TR data base, other DoD technical libraries).

4.1.4 Other System Costs.

- Catalog – $2.00 per 1,000 characters (minimum of $2.00 per citation)
- Miscellaneous supplies (computer paper, cable, printer ribbons, backup data cassettes, etc.) – $750 first year, $500 following years
- Hardware Maintenance –

  – Central Processor – $2,500 to $3,000
  – PCs – $350 to $400 each
  – Terminals – $200 to $250 each
  – Printers – $150 each

- System Installation and Initial Training (2 days installation and 3 days training) – $2,500
- Additional Training (for new users or to retrain existing users on new features) – $1,500

4.1.5 Site Preparation.

Site preparation includes the following: electrical power additions or improvements, air-conditioning improvements or additions, and physical security improvements. Plan on one 30-amp circuit for the central processor, two 10-amp circuits for computer peripherals, and one 10-amp circuit for every three to four workstations or workstation printers. All circuits are 110 volts. Electrical systems in older buildings may require significant upgrading unless that upgrading has already been done as part of a building modernization program. New buildings will require fewer improvements.

Temperatures in the room housing the central processor must be maintained between 60 and 90°F. If present heating and air conditioning are adequate to maintain comfortable levels, little additional capacity is required. If present conditions tend to be uncomfortably hot, the addition of the computer and peripherals will worsen the situation.

- Older building, requiring significant improvements to existing marginal electrical wiring and air conditioning – $20,000

– or –

- Minimal improvements to existing adequate facility – $2,500
- Physical security improvements to safeguard equipment and classified data (depending on present facilities) – $1,000 to $5,000
- Uninterruptable power supply (with 20 minutes reserve power, adequate to shut down machine without damage) – $5,000.

4.1.6 Prototype Costs.

The costs for implementing the microLAM prototype are shown in Table 4-1.

TABLE 4-1. MICROLAM PROTOTYPE SYSTEM COSTS

	Cost ($000)
Hardware	
Computer/Central Processor	$20.0
3 Workstations/Personal Computers	8.5
3 Printers	2.0
4 Modems (for dial-in users)	4.0
Miscellaneous supplies (computer paper, floppy disks, cable, printer ribbons/elements, back-up tapes)	0.4
Software	
System software (operating system and license)	2.4
Applications software (cataloging, retrieval, and circulation management and control functions)	9.6
Other	
Data conversion (11,000 records)	5.5
Installation and training (2 days installation/3 days training)	2.5
Software maintenance and support (1 year)	1.4
Hardware maintenance (for computer and workstations – 1 year)	3.1
TOTAL	$59.4

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