TO: PO&A
Public Services Heads
SGLAP

FROM: Ruth Marie Quirk
Systems Librarian

RE: Proposal for installation and evaluation of microcomputers

OBJECTIVES AND CONSIDERATIONS:

The Library has received and will be receiving several varieties of microcomputers, microcomputer peripherals, and software for purposes of testing and evaluation. The primary purposes for the acquisition of these systems are:

1) For library staff to test their suitability for various microcomputer applications scheduled for implementation during FY 1986-87, such as office automation and display/editing of special character sets.

2) For Systems Office staff to do developmental work in preparation for these applications.

3) To test the possibility of networking together the various computers and peripherals.

It should be emphasized that these systems are intended for evaluation and not for immediate installation as staff workstations. In order to accomplish the above objectives, a number of factors must be taken into account:

1) As each new type of microcomputer is received it must be installed in a location or locations where it will be available to all staff for evaluation.

2) The installation must also permit developmental work and monitoring of performance by the Systems Office staff, who will be most directly involved in the initial phase of evaluation. The length of time needed is variable based on machine difficulty and intended application.
3) There is a need for a minimal level of training for staff using the equipment, to prevent damage to hardware and/or software. The amount of training necessary is directly related to type of computer, type of software, and initial knowledge level of the user.

4) There is a need for centralized control of software at this point, since we have purchased only one copy for evaluation and do not yet have licensing for multiple machines on most of the software.

5) The installation must permit easy testing of networking on a small scale.

6) Following evaluation, a plan for continuing maintenance and expansion of the microcomputer hardware must be developed. This plan must also include provision for training.

PLAN:

Taking these considerations into account, the following general plan is suggested. (For those of you familiar with the GSLS computer lab, we anticipate the functional details will be similar to theirs.)

1) Using Added Entry(s) the Systems Office will provide staff with a brief description of the new equipment, a time for general introduction to interested staff, and procedures for accessing the system. NOTE: All pieces of the anticipated system must be received before much can happen. For example, we still have no printer for use with the Apple Macintoshes.

2) One example of each type of equipment will be installed in a central location which will be accessible to all staff. The initial site will be Room 111C in the Administrative Offices area. This location is most suitable for reasons of: security; ease of access by staff; ease of access by Systems staff for monitoring, maintenance, and assistance; and ease of installation. The installation of networking between the microcomputers will include shared use of modem, printer, if possible a shared hard disk, and transfer of files, especially electronic mail.

3) There will be a signup sheet for use of the equipment. All staff using the equipment for the first time will be briefed on its use to forestall damage to hardware and software.

4) All software, manuals, and other documentation will be centrally located at this site. Documentation may be signed out for review and returned.

5) This site will also support one or more Ultimate terminals and a system printer for use in testing ALC software. These are intended for use by those who do not otherwise have access to a terminal and printer for testing, for situations in which a specific function is to be tested by staff at a single site, and for monitoring the interface between microcomputer and Ultimate systems.
6) Additional examples of equipment will be installed in the Systems Office for developmental work, or in the offices of staff selected for testing of specific applications. For example, an IBM compatible running spreadsheet software is being evaluated by the Fiscal Office.

7) Once the initial evaluation is complete, the machines may be released to remote locations. A library-wide committee (SCLAP possibly) needs to overview all hardware and software evaluated to make recommendations for future purchases.

cc: John Haak
    Jean Ehrhorn
SUMMARY

The University of Hawaii at Manoa (UHM) Libraries have been automating both public and technical services for approximately 10 years. End user hardware for automation activities has been limited to (1) dot matrix printers, (2) special use terminals for accessing a specific bibliographic utility (OCLC) and (3) general use dumb terminals for accessing the University of Hawaii Computing Center (UHCC), online literature searching and the in-house automated library system. Microcomputers have not yet been provided for use by the library staff and/or patrons.

This report was developed to expand upon the ideas expressed in "1985-1995 A Strategy for Academic Quality" prepared by the Strategic Plan Steering Committee for the University of Hawaii. The next ten years will bring rapid growth in communications and information technologies therefore it is crucial that the library staff, which serves the university community be as technology-literate as possible. Although a large percentage of the library staff currently use terminals or computers, their use is limited to 'special purpose' shared-systems and many are still not computer literate. The introduction of microcomputers for staff use should aid in quickly closing this literacy gap.

This proposal includes (I) a rationale and general specifications for the introduction of microcomputers to the library to replace terminals; (II) a list of existing and new activities which could be performed by library staff using microcomputers; (III) general hardware and communications requirements; (IV) specifications for use of microcomputer controlled word processors to increase library staff's "word production"; (V) Appendices which include (A) examples of microcomputer applications in libraries; (B) an ergonomics report by a subcommittee of the UHM Steering Committee for the Library Automation Program; (C) a preliminary list of components for a micro network using Macintosh hardware and software (no costs are included since the UHM discount will not be announced until May 1985); (D) a commercially prepared description of the Honeywell microSystem PC (compatible with the Ultimate computer used by UHM library) with IBM PC compatible hardware, bundled software and peripherals and the UHCC price list for IBM microcomputer purchase with a UHM discount.
PROPOSAL FOR MICROCOMPUTER USE

I. RATIONALE FOR THE INTRODUCTION OF MICROCOMPUTERS IN THE LIBRARY TO REPLACE TERMINALS:

The UHM library is currently in the process of automating the major tasks performed by the library staff. This includes ordering, receipt and purchasing, cataloging and circulating library materials. It is fundamental that the library staff become computer literate as part of this process. Much attention has been directed toward the automation of routine library activities yet little attention has been paid to what word processing alone could do for both the professional and paraprofessional staff. Recent expansion of Library Systems Office staff means the necessary technical support to guide and implement installation of microcomputers is available and will not jeopardize the on-going installation of the integrated automated library system. Specific factors which encourage and support introduction of microcomputers include:

1. The UHM library budget for the 1985-87 biennium requests $80,000 to purchase 42 smart terminals, $10,000 for an IBM PC-controlled laser disk reader and $3,200 for microcomputers with enlarged displays for the visually impaired.

2. The cost of microcomputers has dropped drastically in the last five years. This reduction in costs has made it more feasible to consider the use of microcomputers in place of smart terminals. For example, the only terminal currently available which can display the full American Library Association (ALA) character set (TELEX) costs approximately $3,500 each and can only function as a dedicated synchronous terminal. The Research Library Information Network (RLIN) terminal which supports a Chinese, Japanese and Korean character display costs approximately $10,000 each and can only be used as dedicated special purpose terminals.

   For approximately the same investment the library can have work stations which meet immediate needs for record display but which may also be used in other productive activities by staff. Appendix C provides a preliminary list of Macintosh hardware and software and an office layout design that would allow microcomputers to be utilized in place of special single purpose terminals and for other activities as well.

3. The additional effort required to develop custom software for the microcomputers can be offset by the additional productivity due to staff utilization of the microcomputers when the microcomputers are not in use for displaying the ALA character set or accessing laser disk stored records.

   During scheduled off times, staff uses could include word processing (see section IV for a full justification of this application), generation of statistical reports, project planning, organization of small bibliographic databases (i.e.
new acquisitions, special pamphlet files, etc.). Availability of microcomputers would provide an opportunity to lighten the clerical load associated with routine tasks, increase productivity and free up time for implementation of many innovative projects and new services.

4. Microcomputers allow greater flexibility when used as terminals. Tasks which tie the microcomputers directly into the ADLIB system may be handled in one of three ways: (1) strictly as an exchange between two "alien" computers (a local editing microcomputer and the main integrated database management system) or (2) the microcomputer may be used strictly as a terminal, unless (3) the microcomputer supports the PICK operating system and the same software is run on both computer
II. LIST OF POSSIBLE USES OF MICROCOMPUTERS IN UHM LIBRARIES

A. CURRENT ACTIVITIES WHICH CAN BE ENHANCED:

1. Online literature searching. Available software will allow for off-line input of search strategies and the automatic transmission via a telephone during off hours to reduce online costs. Microcomputer software could also improve searching by allowing for the storage of past search strategies and related information (e.g. the rate of successful retrieval within various data files). Online searches result in customized bibliographies which may be stored, updated using a microcomputer and distributed to other patrons with similar information needs.

2. Conventional text processing, production of memos, procedures and other written materials, preparation of library maps and library use instructional materials, current acquisition lists could be replaced with word processing.

3. Computer program development for uploading onto the UHCC computers and for in-house documentation of those programs.

4. Project planning, time-lines and other administrative and management organizational tasks.

5. Scheduling of personnel to cover public service areas.

6. Use of spreadsheet programs to prepare statistical reports and to calculate and predict expenditure of funds. (See Appendix A for an example of the use of microcomputers to track student help funds).

7. The control of sensitive information (see Appendix A or an example of use of PFS to control library staff identifiers and menu assignments for the in-house system).

8. Library skills instruction.
B. ADDITIONAL ACTIVITIES WHICH COULD BE PERFORMED:

1. Chinese, Japanese, Korean and other vernacular languages catalog card production, correspondence and other word processing type tasks.

2. Online display of vernacular language cataloging requiring graphics oriented character sets (such as Chinese, Japanese and Korean).

3. Creation and editing of cataloging records employing the full ALA character set.

ALA expanded character set-to-microcomputer translation table(s) would have to be developed to allow for the display of constructed characters (characters which are built from other characters). There is commercially available software which supports a one-to-one translation for all ALA defined characters. UHM would have to develop software which combines the full character sets into an appropriate display for public viewing.

A design for accessing, displaying, inputting, and creating the Chinese, Japanese and Korean characters using microcomputer capabilities must be completed in order to determine what modifications to standard microcomputers are necessary to accommodate these vernacular language activities (e.g. RAM disk or PROM storage of character set, expanded CPU to facilitate the extensive screen use and interface, hard disk storage for the creation and storage of new characters as needed, special communications hardware to speed up data flow, etc.).

4. Control and monitoring of communications equipment.

5. Computer-aided instruction for training student assistants new library staff members and to enhance current staff skills (e.g. typing tutors, computer literacy).


7. Word processing and bibliographic software to replace typewriters available to students and faculty for preparation of classroom materials and for use by library staff and other faculty members for preparation of customized bibliographies using information downloaded from the UHM library database and other online databases.

8. Online storage of graphic representations of rare material and non-book materials such as artifacts, art prints, etc. This application would require hardware and software which can be used to make a digitized image of the item which
could then be stored and retrieved as a graphic. The system must be small and portable, able to make image of three dimensional objects, and should be easy and fast to learn and use. The graphic images should be stored using a format that is already supported by the system (e.g. Koala MacVision stores the digitized image as a MacPaint document).

9. Database display of enlarged characters for the visually impaired.

10. Microcomputers could serve as smart front-end processors to minimize CPU time required while performing online cataloging on the UHM library automated system.
III. GENERAL HARDWARE REQUIREMENTS:

1. The microcomputers must interface with the Ultimate computer system and it is highly desirable that they interface with the UHCC's IBM 3081 and DEC 2060. (NOTE: UHCC has already written software for IBM PC's to link to these computers and they are currently in the process of writing this software for the Macintosh.)

2. The display screen must minimize health hazards and maximize comfortable use (e.g. have high resolution black lettering on white non-glare screens). (See the report by the SCLAP ergonomics subcommittee in Appendix B).

3. Laser and dot matrix graphics printers must be compatible with the microcomputer and allow for the printing of any character or image that can be displayed on the screen. The printers should be able to utilize both tractor and friction feed for paper.

4. The microcomputers must have Local Area Network (LAN) capabilities. They should be able to interconnect and share common peripherals such as Optical Character Recognition devices (OCR), laser printer and modems. LAN system requirements include the need for an intelligent file server with a 20-megabyte hard-disk system for electronic mail facilities and print spooling. (Apple talk and IBM PC LAN have these capabilities.)

5. There must be the capability for synchronous and asynchronous data communications at a minimum of 56K bits per second (bps).

6. The capability to support 32 network nodes must exist for attachment of workstations, output (printers) and input (OCR) devices at a distance of approximately 200-300 meters between nodes (distributable). The microcomputers must be flexible enough to allow for easy relocation of workstations and devices.

7. Software must be available which supports integrated word processing, spreadsheet generation, graphics, relational database creation, and communications and be easy to use and learn. The software should include the ability to have multiple documents open at once and to cut and paste between them; to update multiple files without opening them all individually; to suppress sensitive information through the use of varying display formats; to produce graphics such as charts and graphs and telephone communications with or without modems.
A. GENERAL REQUIREMENTS FOR COMMUNICATIONS:

The microcomputers must be:

1. Resistant to radio frequency interference (RFI) or static discharge;

2. provide 16 to 32 network nodes without requiring special network configuration;

3. be capable of a 64-192 kilobits per second (bps) data transfer rate using CCITT (Comite Consultatif International Telephonique et Telegraphique) standards;

4. allow 150-300 meters maximum distance between nodes;

5. be compatible with the International Standards Organization (ISO) Open Systems Interconnections (OSI) model. Protocol must be equivalent to the ISO OSI layers 1 through 5 (physical, data link, network, transport and session);

6. operate using an access scheme based on a carrier sense multiple access with collision avoidance (CSMA/CA) model.
IV. SPECIFICATIONS FOR WORD PROCESSORS TO IMPROVE UTILIZATION OF UHM LIBRARY STAFF TIME

INTRODUCTION

The library staff consists of 160 full time employees, including professionals, paraprofessionals, and APTs in clerical technical, and administration positions as well as many part time student employees. In addition to performing tasks which will be automated upon implementation of the ADLIB integrated library software system staff members are also involved in the production of training and instructional materials, library guides, memos and letters, procedural documentation, articles for journals and monographs, and research manuscripts.

The major "product" of any university is knowledge, and knowledge is most frequently transmitted in the form of "words". A university library facilitates access to knowledge which in essence improves the quality of the "product" of the university. The processing of words in the library is steadily increasing, but is inhibited by a lack of personnel to support the various administrative, research, and other writing tasks such as those outlined above.

The existing clerical and support staff attempt to handle the major writing tasks which serve instructional and administrative needs but cannot adequately meet the needs of individual library professionals, researchers and the unique needs of the specialized library collections. This results in a backlog of word processing tasks and forces individuals to seek alternatives such as paying private typists or using text composition programs at UHCC.

The diverse nature of the UHM library collection adds additional complications to automating the processing of words. The library not only provides access to materials which are romanized using an expanded ALA defined character set it also supports vernacular catalogs in graphics oriented character sets such as Chinese, Japanese and Korean.
A. ADVANTAGES OF MICROCOMPUTER-CONTROLLED WORD PROCESSING:

Word processing software relieves staff of the burden of constantly retyping text, simplifying the performance of edits and eliminating the common problem of introducing new errors to the with each retyping.

Word processing greatly increases the ability to manipulate and print text to specification. Text can be copied, moved, searched, replaced or deleted; documents may be merged to create customized form letters and substantially more typing in a manual system.

Word processing allows individuals control over their own documents without requiring the supervision of a central system manager. Each user's work is secure and there is minimal opportunity for an inexperienced user to cause any system-wide problems. Word processing requires a minimum use of paper by providing electronic display and modification capabilities.

Word processing programs are simple to use and do not require great familiarity with computers. They can provide a minimally stressful initiation to computer use and may serve to reduce the training time required for other uses of computerized systems.

B. SPECIFICATIONS:

The word processor must (1) telecommunicate, (2) interface with optical character scanners, and (3) photocomposition devices, in order to reduce the amount of time spent inputting and outputting documents which originate and terminate with another system. The word processor must also support multiple character sets for production of written material in non-Roman languages.

1. Telecommunication provides the ability to receive, write and store computer programs, user documentation, and library data as if it were a text document. When the user is ready, the "text" can then be telecommunicated to the main computer for processing, optimizing time on the main computer.

2. An interface with optical character scanners enables the system to "read" standard type-written pages and greatly decreases the time spent in basic entry of text.

3. An interface with photocomposition devices allows preparation of professional quality typesetting without requiring that the text be retyped into a typesetter. This eliminates the proofing of the newly
input text and reduces the overall production time of photo-read copy.
Enhancing a Mainframe Library System Through Microcomputer Technology

by Marshall Breeding

The Jean and Alexander Heard Library system at Vanderbilt University, like many large libraries, automates many of its functions through a mainframe computer system. We use the Notis (Northwestern Total Integrated System) system developed by Northwestern University. We call our implementation of the Notis automated system “Acorn.” Practically all library tasks relate in some way to Acorn and all library staff and patrons interact with Acorn. Acorn’s functions include the public catalog, circulation, acquisitions, and cataloging.

This discussion will not center on the Acorn system itself, however, but on the use of microcomputers as access points to systems such as Acorn. The use of microcomputers to access mainframe systems is becoming quite common and a great deal of hardware and software facilitates this “micro-to-mainframe link.”

Ideas presented here that relate to our Acorn system can be generalized and applied to other mainframe information systems. I will use the term “host system” to refer to any mainframe-based computer system providing information services.

This article will focus on the ways that a microcomputer can enhance and complement a larger system such as Acorn. I will suggest when it may be advantageous to consider using microcomputers as terminals and when “dedicated” terminals suffice. I will discuss some particular software products that we at Vanderbilt have found to be useful in conjunction with our system. Some of the software may be specific to Notis, but in most cases equivalent programs should exist for other large systems. No single piece of software offers all the functions that relate to enhancing a microcomputer terminal. To implement all these functions, several programs will need to be run on the microcomputer.

Part of this discussion will concern methods of managing a number of software applications simultaneously running on a single microcomputer. This subject has implications beyond microcomputers used as terminals. Managing multiple programs can make any microcomputer a more efficient tool and a more cost-effective investment. I will deal primarily with software, although I will suggest what I consider to be the minimum hardware needed to adequately support these functions.

The Vanderbilt library system has not necessarily implemented all the ideas that I will present. We have experimented with some of these techniques in the library systems office, but have not yet implemented them, or may choose not to implement them in the libraries themselves. While we in the systems office may propose what seems to us to be more efficient and productive methods of automation, the staff of the individual libraries often choose which ideas to implement. If our proposals seem too technical or complex, then they may not be realized. Thus one of our functions is to investigate ways to exploit the available computer technology yet keep it within the limits of what is accessible by non-technical library staff.

Types of Microcomputers in the Libraries

The library system at Vanderbilt employs more than 180 microcomputers. Eighty function primarily as Acorn terminals, and most of the others have a modem or a network connection and access Acorn as a secondary function. Eighteen support CD-ROM products, and the remainder are used for clerical and administrative support. Most professional staff members in the libraries have a microcomputer in their office. Of all the microcomputers owned by the libraries, 80 are directly connected to the Acorn terminal network, 23

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connect to the university computer network, Caravan, and a large percentage of the remainder have a modem that can be used to communicate with Acorn, Caravan, or other information services.

In the Vanderbilt libraries the great majority of microcomputers are PC-compatible systems running the MS-DOS operating system. (I will use DOS to refer to all versions of PC-DOS and MS-DOS.) The libraries currently have only two Macintosh systems, though they are becoming more popular elsewhere on campus.

The majority of the microcomputers in the library system are manufactured by Zenith Data Systems. We selected Zenith microcomputers for use in the libraries for several reasons. Zenith, a well-established developer of microcomputer systems, offers a substantial price discount to educational institutions. The one-year warranty period compares well with the 90 days offered by most other vendors.

The most common microcomputer models in use at Vanderbilt are IBM PC-compatibles (based on the 8088 running at 8 megahertz), though recently we have acquired more AT-class micros. The libraries have not yet purchased any 386-based machines. We have a variety of hardware configurations corresponding to the kind and volume of use expected. For public-use terminals we primarily use systems with two floppy disk drives. Circulation and technical services departments also tend to use the two floppy disk systems, especially if the microcomputer is going to be used almost exclusively for access to Acorn. Administrative, supervisory, and systems staff who are likely to use their microcomputers for applications other than Acorn often have a hard disk with their system. We furnish all the public-use terminals with monochrome displays. Most staff members use monochrome displays with their microcomputers, though color monitors are becoming more common, especially as the quality of color monitors improves.

**Types of Terminals**

For the purposes of this discussion, a terminal is any device that people use to access a large computer system or network. The computer system displays information on the screen of the terminal, and a human user sends information to the computer through the keyboard. A printer is often attached to a terminal to produce a paper copy of the information that displays on the screen.

**Dedicated Terminals**

Users usually access mainframe systems through individual terminals linked to each other, organized into a network and connected to the mainframe computer. Some terminals are single-purpose electronic devices, dedicated to a single system, and lack the ability to be programmed. I will call this kind of terminal a “dedicated” terminal.

The Vanderbilt library system uses two different models of dedicated terminals, both made by Telex Corporation. We have 65 Telex 476L display terminals in our network. The Telex 476L corresponds to the IBM 3276 display terminal, plus it has the capacity to display the complete ALA character set. The 476 monochrome terminal costs around $2,000. We place the Telex terminals in high production settings where it is necessary to display or edit the diacritical markings of the ALA character set. We also use nine of the more ergonomic, and less expensive (about $1,000) Telex 078 model. This terminal does not display ALA diacritics. The 078 type of terminal requires a special control unit that costs around $4,000 and supports up to eight terminals.

**Microcomputer Terminals**

A microcomputer, equipped with the proper communications equipment and terminal emulation software, can serve the same function as a dedicated terminal. Microcomputers lend themselves to this chore since they already incorporate the hardware needed, and can be programmed to do a variety of tasks. The keyboard of the microcomputer may be different from the dedicated terminal and may need labels attached to some of the keys that have special functions.

The microcomputer terminal has two kinds of components—hardware and software. On the hardware end, the micro must have the usual keyboard, monitor, and central processing unit (CPU), plus it must be equipped with the communications hardware necessary to connect to the mainframe system. The data signal from the host system has to be available and be converted to a form that can be understood by the microcomputer. High-speed communications (9600 baud) can be achieved through a protocol converter which feeds the signal directly to the serial port of the computer. 3270 emulator boards provide an alternate method of high-speed access to a mainframe system, and do not require a protocol converter, but instead connect to the same type of control unit as the Telex 078 terminals. A modem and an ordinary phone line can provide a slower, but functional, connection to Acorn.

Software constitutes the other component of the microcomputer terminal. Communications software is the program, or set of machine instructions, that tells
the microcomputer to behave as if it were a dedicated terminal. Communications software comes in many different levels of sophistication. A minimum requirement for our needs is that it emulate specific types of dedicated terminals. The host computer requires that each terminal attached to it be identified as a particular type of dedicated terminal because it must send commands specific to each terminal type. Special codes move the cursor around on the screen and put the text on the screen in proper format and specific functions are assigned to particular keys. The communications software determines that the microcomputer's keyboard and screen behave exactly as if they were part of the type of dedicated terminal assigned by the host system. The ability of a communications program to respond to the commands of specific dedicated terminal types is called "terminal emulation."

There are currently 80 microcomputer terminals in the Acorn terminal network. Since the terminal network uses binary synchronous communications (BSC), and microcomputers use asynchronous communications, we use Micom protocol converters to incorporate microcomputers into the network. Each protocol converter supports up to 12 microcomputer terminals. A basic Zenith microcomputer terminal currently costs $1079, plus a portion of the cost of the protocol converter. The fact that microcomputer terminals, as they are currently set up, do not display the diacritical markings of the ALA character set restricts their use. In the near future we hope to have terminal emulation software that will use the full ALA character set with microcomputer terminals.

The Acorn Terminal Network

Patrons and staff use Acorn through a network of terminals. The nine divisions of the Jean and Alexander Heard Library are spread among eight buildings on campus. There are a total of 165 terminals in this network. Eighty microcomputer terminals and 75 dedicated terminals comprise the Acorn terminal network.

Dial-up lines and the university's broadband network supplement access to Acorn. Library staff may use a microcomputer and modem to connect to Acorn just as if they were part of the Acorn terminal network through our four dial-up lines. Staff use these dial-up lines to work at home and when the terminals or communications equipment of a particular area fail. Library staff who do not have direct Acorn connections in their offices also use the dial-up lines. Caravan, the university's broadband computer network, provides access to a number of mainframe and minicomputer systems across campus, including our Acorn system. Most buildings on campus have been connected to the Caravan network and many university staff have direct connections to the network. Caravan has a large number of dial-up lines for use by all university staff and students. Non-library staff and students gain dial-up access to Acorn through Caravan. Caravan distributes Acorn in two forms. One form, used by non-library staff and students, accesses only the public catalog and does not require a password. The other form, intended for library staff, requires each user to sign on with their authorized password and allows access to all modes of Acorn.

Characteristics of a Dumb Terminal

A dedicated terminal, though it may contain sophisticated communications circuitry, generally does no actual processing of information. The terminal sends characters typed on the keyboard directly to the mainframe system and it is the mainframe itself that interprets, processes, and responds to the keystrokes typed by the user. The terminal displays information on the screen according to the instructions the mainframe system transmits.

A "dumb terminal" sends information directly through the keyboard and receives information directly on the screen without any additional enhancements. For one keystroke of effort, the user gets exactly one keystroke's worth of work. Dumb terminals do not permanently record the information they receive, and do not do any additional processing of the information other than to display and/or print it.

Microcomputers, just as dedicated terminals, can be set up as dumb terminals. If the communications software installed on the microcomputer does not provide any features beyond the emulation of a specific type of terminal, then that microcomputer functions as a dumb terminal.

Since a microcomputer has a great deal of processing ability, it has the potential to not only emulate a dedicated terminal, but also to perform more sophisticated tasks relating to the host system. Dedicated terminals, since they do not have the ability to be programmed, cannot be made into an intelligent terminal.

Characteristics of an Intelligent Terminal

An intelligent terminal, consisting of a microcomputer equipped with software, accomplishes all that a dumb terminal does, plus some offer additional enhancements and capabilities. These added benefits might include the ability to do the following:

- to permanently record information received from the host system
- to further process or manipulate that information
to perform tasks related to the host system, but not performed by that system
- to automate repetitive tasks
- to communicate with other host systems
- to perform functions not directly related to the host system while maintaining convenient access to that system

**Which Terminals Should Be Given Additional Features?**

When a library implements an automated system, the system administrator has to decide what kind of terminals are appropriate for each access point. Some locations might require dedicated terminals while others lend themselves to microcomputer terminals. Once installed, the dedicated terminal will always function as a dumb terminal. Since microcomputer terminals can be set up as either dumb or intelligent terminals, we have installed them in situations with even potential or future needs for increased capabilities.

In many circumstances a dumb terminal is quite adequate, and even preferable to an intelligent terminal. In fact, the majority of the terminals that access our Acorn system would be classified as dumb terminals. We are working toward increasing the level of sophistication with which library staff access the system.

Within the libraries many different kinds of users access the Acorn system, each with characteristic needs relating to the system which affect how necessary it may be to implement features of an intelligent terminal. Users of the system include both patrons and staff. Library staff users represent a number of different library functions including: a) circulation; b) reference desk; c) librarians and bibliographers; d) technical services (cataloging, acquisitions, serials); e) supervisory and administrative staff; f) systems staff. The types of features that can or should be added to a microcomputer terminal relate directly to the needs of the situation and the technical sophistication of the user. I will next discuss each class of library user and suggest how each group may benefit from various features of an intelligent microcomputer terminal.

**Public Access Terminals**

While in some cases it would be beneficial to have additional capabilities on public access terminals, it is also important to make these terminals as easy to use as possible. But as users of the library become more oriented toward computers, they may increasingly need additional capabilities such as the ability to capture information on floppy disks. While it may be useful to some to provide this ability, it must be done in such a way that the use of the terminal does not become too complicated for non-computer-literate patrons. As the libraries equip their public access microcomputer terminals with software that incorporates new features, the operation of the terminal inevitably becomes less straightforward and the possibility for something going wrong increases.

The information needs of library patrons often extend beyond what the local system provides. Thus patrons might be interested in connecting to other information services through public access terminals. A patron might want to search for information from a CD-ROM product or connect to Dialog or BRS, for example. With the right network configuration, it is possible to have multiple information systems available to each public access terminal. We plan eventually to implement such capabilities at Vanderbilt through Caravan, our campus-wide broadband computer network.

**Technical Services Staff**

Most terminals used by technical services staff need to provide access to the host system in the simplest, most reliable way possible. In most cases these staff members have expressed little need for additional capabilities. We have installed dedicated terminals for the majority of technical services staff. Dedicated terminals are the only ones that allow the display and editing of the complete ALA character set, which makes them especially necessary for most catalogers. Since microcomputer terminals cost less, and are often less susceptible to failure than dedicated terminals, we use microcomputer terminals for technical services functions for purely economical reasons. Most of these microcomputer terminals are set up as dumb terminals. Staff can use these microcomputers for other functions such as word processing when they are not being used as terminals.

**Circulation**

Circulation terminals can benefit from microcomputer enhancements in several ways. The circulation departments depend on the mainframe system for all their basic functions. When the mainframe system becomes unavailable, the circulation staff must resort to an alternate method of charging and discharging materials. A circulation backup system running on the same microcomputer normally used for online circulation is a very useful enhancement that would not be possible with a dumb terminal.

A backup circulation system might work in the following manner: Circulation staff would normally
Flow, Organization, and System Charting Program for IBM-Compatible Personal Computers

The Option Editor

The Option Editor allows the user to modify certain features of the printed output. Horizontal and vertical compression, chart and printer width, page height, left and top margins, breaks between shapes, arrows on flow lines, hammer count (used to darken the printed output of dot-matrix printers), and output device are some of the options that can be changed.

Equipment Used to Test EasyFlow's Features

A Zenith Z-181 laptop portable computer with a monochrome graphics display adapter was used to test the program. The Zenith has 640 kilobytes of random access memory and two 3½" drives. An Epson 24-pin LQ-2500 dot-matrix printer with full graphics capability was used to print the chart illustrations contained in this article. Figures 4 and 5 illustrate the two styles of symbols used for organizational charts. Figure 4 includes arrows on flow lines; this option can be set to "no" to disable the arrows. Figure 6 is an example of a multi-page flowchart.

Weaknesses of EasyFlow

EasyFlow suffers, as do most graphics printing programs using dot-matrix printers, from one major weakness, namely: the time taken to load and print a graphic chart. On the equipment tested, only four seconds were needed to save a chart to diskette; however, the same chart required 66 seconds to load. Printing the chart took more than 12 minutes on the Epson LQ-2500, which is a relatively fast dot-matrix printer. Having the Hammer or overstrike option set to three, in order to darken the printed output, accounts for some of the time delay. As a general criticism, printing charts with a dot-matrix printer does take a considerable amount of time. A laser printer or a plotting device would be much faster for users wanting to print a large number of charts.

In attempting to print a file to diskette for use in the word processing program used for this article (WordPerfect Version 4.2), I was unable to transfer graphics characters from an EasyFlow file to a WordPerfect file. File transfer between the programs became virtually impossible. I have encountered this file transfer problem with other graphic programs, and have been advised that this is a common problem. Most file transfer programs use standard ASCII, and do not recognize ASCII characters above character 127. Most graphic characters are above 127 and, as a result, are not transferred.

The Keyword Index used in the EasyFlow manual is another definite weakness. Some topics are difficult, and even impossible, to find using the index. For example, no direct reference can be found for sheet-feeder printers. This topic is, however, covered in two different locations in the manual. Under "Page Height" pages 4-46, and "Plotter Support" pages 4-70, to locate the number of lines that can print on a page. The manual would be much easier to use if the pages were numbered consecutively, instead of using 10 section numbers each with its own pagination.

Conclusion

Despite the weaknesses outlined, EasyFlow does save a considerable amount of time in preparing flowcharts and organizational diagrams. Although it may take some time to print a chart using a dot-matrix printer, modifications to such charts are easy to make without having to manually re-draw the symbols each time a chart has to be changed. The documentation included with the program is well-written and, together with the online help messages, make learning how to set up and use the program easy for even a novice user.

A novice user can produce professional quality charts without having to manually draw the charting symbols. Textual comments inside and outside charting symbols, and flow lines connecting symbols, are much easier to create and modify using EasyFlow as opposed to inserting them in a manually drawn chart. The end product, in my opinion, is well worth the program's modest price, and considering the 30-day money-back guarantee provided, EasyFlow is certainly worth a closer examination for library applications requiring charts that always appear as if they were drawn by a professional.

Notes

1. The program is available for $149.95 plus $2 shipping and handling from HavenTree Software Lim-
Figure 6. A Multipage Flowchart Using EasyFlow.
A Flow, Organization, and System Charting Program for IBM-Compatible Personal Computers

1. Telephone support: (613) 544-6035 ext 47, Order Desk: 1-800-267-0668.


3. Taken from information provided on the cover jacket for the IBM Flowcharting Template. Form GX 20-8020-1 U/M 010.