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PERSONAL COMPUTER INFORMATION CENTER

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INFORMATION CENTER PROJECT - M377

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PERSONAL COMPUTERS IN AN INFORMATION CENTER ENVIRONMENT

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Information Center Project

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ABSTRACT

The General Products Division (GPD) of IBM has a major manufacturing facility located in San Jose, California. Like IBM's customers, the San Jose Manufacturing community has created a large application backlog. This backlog is composed of a wide range of applications. The range includes, at the upper end, the need for large integrated data-base systems spanning many organizations, such as shop-floor control and product-cost systems. At the lower end of this range are needs like modifications of existing reports or adding a report to an existing application.

One way of reducing this backlog is to establish an Information Center (IC). The IC can provide the San Jose user community with the tools and aids necessary to allow the users to reduce their own application backlog. As the idea of an Information Center began to take shape and the scope of its responsibilities began to surface, it became obvious that the IBM Personal Computer was going to play a significant role in the IC. The Personal Computer Information Center (PCIC) was established as a part of the San Jose Information Center.

This paper will address:

- . The need for the Information Center
- . The establishment of the IC and PCIC
- . The organization and scope of the centers
- . Impact on the user and Application Development communities

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1. INTRODUCTION

Application Development (AD) organizations serving a variety of user communities can no longer address the total application backlog within their own organization. As users began to understand the productivity benefit of the computer, a wave of new requirements were being sent to the AD organizations. The San Jose Manufacturing Application Development organization of IBM's General Products Division saw this wave developing and began to explore new ways of doing business. One of the ways of doing business was the creation of the Information Center.

The General Products Division (GPD) has worldwide development and manufacturing responsibility for high-performance storage systems, including tape drives, disk files, and mass-storage systems; as well as system printers, DB/DC program products, programming languages, and related programming.

GPD Headquarters is located in San Jose. The Engineering and Manufacturing facilities are located both in San Jose and in Tucson. The GPD Programming Center, Santa Teresa Laboratory (STL), is about six miles south of the San Jose plant.

The Manufacturing Application Development organization is headquartered in San Jose, but has personnel located at both San Jose and STL. The Tucson plant, the STL programming center, and GPD Headquarters each have their own AD organizations.

2. MANUFACTURING APPLICATION DEVELOPMENT

Manufacturing Application Development (AD), like programming service organizations in many corporations, supports applications such as materials logistics and production control.

AD has gone through many transitional stages. In the early stages it was AD telling the users what the computer can do for them, and the cautious users putting some applications on the batch systems. During this stage the users were still dependent on their manual systems, but were supported by the computer.

Today, the cost of computer usage is going down, and the availability of terminals and integrated data bases is commonplace. This environment has allowed the users to realize significant productivity gains in their areas

through effective use of real-time computerized applications. This realization by the users has created a wave of requirements upon the AD organization.

At first the AD organization tried to service this wave in the traditional approach of service requests and additional resources. However, as the wave continued to swell, it became obvious that other, more unique approaches to the problem had to be found. One of the approaches instituted by GPD was the installation of an Information Center. This center was opened August, 1982.

3. MANUFACTURING INFORMATION CENTER

The mission of the Manufacturing Information Center (IC) is to provide the San Jose Manufacturing community with tools, resources, training, and consultation. This allows the user to become self-sufficient and in turn reduces the demand for AD programming resources.

The tools or packages available at the IC have a common thread of being user-friendly and terminal-initiated. The number and types of packages are continuing to grow and the user is the beneficiary of this growth. Some of the types of packages available, without naming the specific products, are:

- .Information-retrieval and file-inquiry packages which allow the user to extract data selectively, sort and perform calculations upon that data, and produce reports on the screen or hard-copy device.
- .Report-writing packages which provide interactive and easy-to-learn languages for creating reports. Normally, these packages provide user-written modules and are very flexible in designing formal report formats.
- .Graphic packages, which are menu-driven, are available for both simple and complex graphical display needs. The plotting can be done on 32XX and graphics terminals. Data can be generated by other packages and then plotted by the graphics packages.
- .Statistical-analysis packages which are useful for extensive statistical analysis, plus graphic production and report writing.

The resources available to the user include a terminal room with 32XX and graphics equipment. An IBM 6670 Information Distributor is available for text-type hard copy and a graphics hard-copy unit is also provided. Plans are underway to install IC terminal centers in several buildings around the IBM San Jose complex.

The user is trained initially by the IC staff, with the plan to have these users train other users. The training is done using a hands-on environment in the IC terminal room.

The consultation is done by the IC staff. The general guideline is to provide help to the user so the user can become self-sufficient. The staff is responsible for teaching classes, giving demonstrations, and answering hot-line questions.

As the Information Center was being formed, a new product was beginning to impact the data processing and user communities. That product was the IBM Personal Computer.

4. IBM PERSONAL COMPUTER

The IBM Personal Computer (PC), from the day it was announced, was oriented toward the end-user community. With program products such as VisiCalc and EasyWriter, it became an effective end-user tool.

VisiCalc, which is a registered trademark of VisiCorp Inc., is an electronic spread-sheet which is organized into a grid of columns and rows. A user can enter labels, formulas, and values onto this spread-sheet and the PC will do the appropriate calculations. The types of applications which use VisiCalc include planning, forecasting, tracking, and accounting.

EasyWriter, which is a registered trademark of Information Unlimited Software Inc., is a word-processing package. With this word processor, the user can write letters, memos, and technical reports. The power of the word processor is the user's ability to edit the text and make changes on the screen before committing the work to paper.

To add to the power of the PC is a set of software packages, such as full-screen editors, graphics, PC-to-host communications, and prewritten applications. In the area of hardware additions are Red-Green-Blue (RGB) monitors (which are color graphics devices), modems, printers, and other peripheral devices. As the user community began to see the power and productivity

leverage of the PC, inquires on how to order PCs began to emerge.

GPD management recognized that an organization had to be established to control the ordering, servicing, and technical consulting for the PC; however, this organization had to be developed within a resource-constrained environment. Specifically, only one person was authorized to coordinate the PC program at GPD; any other resources would have to come out of current allocations.

During the fourth quarter of 1981, a GPD PC Technical Liaison was established at STL. The responsibility of that person was to provide technical guidance on PC-related questions. The GPD internal branch office became responsible for orders and movements of the PC. During the fourth quarter of 1981, when the number of PCs was small, this arrangement was adequate; however, it became apparent that as the number of orders and questions increased, the support must be increased. It was up to each organization within GPD to determine how they were going to support the PC.

The Programming, Laboratory, Manufacturing, Tucson, and Headquarters organizations each established a representative from their Information Systems function to interface with the PC Technical Liaison. This was a part-time assignment for each of the organizational PC representatives. During the first half of 1982, GPD was assigned an allocation of PCs from the Corporation. It was the responsibility of these representatives to negotiate an organizational allocation from the GPD allocation, determine who in their organization will get the PCs and finally, how to pay for them.

In Manufacturing it was decided to try to provide each major function with one PC. The term function, as used in this report, is defined as a third level of management, usually designating a specific job or product. Examples of functions are Finance, Production Control, and Manufacturing Engineering. This allocation gave the function a chance to determine how they might use the PC. The majority of these units were put into terminal rooms or functional staff offices and were available to the function members. The acceptance of the PC into the users area was immediate and the cost payback was quick in coming.

In Finance, as an example, the users quickly learned VisiCalc and placed tasks on the PC that were not justified on the host systems, but were very time consuming in manual labor. The key to the success of the PC lies in the ability of the user to have as

complete control of the data and program as their pencil and paper, but to be able to have the power of the computer at their fingertips. The users found that they were able to react to changes during the planning cycle faster, and to reduce manual tasks by the use of VisiCalc. The problem now became how to get on the overloaded PC and not what to do with the system. What happened in Finance was being duplicated over and over again in other functions as the requirements for the PC continued to mount.

The workload on the Manufacturing representative was growing as the PC became more productive. The area that caused the greatest amount of work was the justifications, allocations, and financial recoveries. It was decided to put this work back on the functions. Each function that wanted additional PCs was required to appoint a functional representative who would be responsible for consolidating the orders for their function, determining the financial recoveries, and setting an allocation scheme within their function. This left the Manufacturing representative with the requirement of matching the orders from the functions against the planned annual PC allocation to Manufacturing. It was at this point that the Manufacturing representative became a member of the Manufacturing Information Center.

5. PERSONAL COMPUTER INFORMATION CENTER

Consistent with the premise that the PC is an end-user tool, the Manufacturing organization determined that the PC Manufacturing representative should become a member of the Manufacturing Information Center. It was further determined that the scope of the PC in Manufacturing warranted that a Personal Computer Information Center (PCIC) be established within the IC. The PCIC opened for business September, 1982. The Manufacturing representative accepted the position of the PCIC consultant.

The PCIC is responsible for the operation of a PC terminal room; education and consulting with end users; ordering, distributing, and servicing PCs; providing a focal point for the disseminating of information to PC users; and auditing and security guidelines.

a. Terminal room

The PCIC terminal room, which has a variety of hardware configurations, is available on a demand basis to the IC users. The room is used for education and IBM business purposes, and is open during first shift. Arrangements can be made to use the room during other shifts if advance notice is given and approval is secured from a manager.

The PCs located in the PCIC terminal room and the PCIC consultant's office are used as a laboratory for new products, both internal and external to IBM. Normally, new products and external product evaluations will be tried on these PCs before these products are distributed to the Manufacturing users. Sometimes a user will get a specific product program and try it on their system, but the user will provide the PCIC with an evaluation of that product or software. The PCIC must keep their systems up to date in order to provide this service.

A software library is maintained by the PCIC. This library attempts to keep at least one copy of each package of IBM software that is business oriented. The library also maintains selected packages written by outside vendors and programs written by IBMers for use by internal IBM locations. This library is available to the user to read the documentation and/or try the package in the terminal room. This facility is provided so that a determination can be made by the user as to the usefulness of a specific package or program.

b. Education and consulting

Education on the PC is handled in a variety of ways. The IBM voluntary education center teaches introductory PC classes. San Jose Education teaches courses in BASIC and PASCAL. However, the majority of users learn VisiCalc and EasyWriter by the use of the tutorial in those manuals. This allows the users to pace their own education while sitting at a PC in the terminal room or in their own offices. STL received a large shipment of PCs, all at one time, and set up a series of classes to quickly train the programmers who were going to use those systems. That worked well at STL because they were programmers and they were all going to use the PCs in a consistent manner. At San Jose, the only consistency is the users inconsistency of use and skill level. This inconsistency has made it more practical, at this time, to use the tutorial method and provide consulting.

The Manufacturing representative is the consultant for the PC in Manufacturing. A consultant in a PCIC should be conversant with the users applications, the software available with the PC, and most importantly, the products available in the IC. It would be counterproductive for the PCIC consultant to have the PC as a single solution to the users problems. Many times a user will come to the PCIC with a problem that is better solved by the host IC.

In the area of applications, it is stressed that all shared and common data must be maintained on the host systems. By shared data, it is data that is used by more than one department or organization. Accounts Payable and Production Parts Inventory files might be examples of shared data. Common data is data that is used by common or cross-divisional purposes. This data and/or format of the data is controlled by the corporation. Examples of common data are payroll, personnel, and general ledger files. If properly authorized, a user may use this data or download this data, but the official copy of this data is always maintained on the host. Local data, which is data maintained and controlled by a single department or function, may be maintained on any medium and may be uploaded to the host, sent PC to PC, or downloaded to the PC. Examples of local data are department budgets and memos.

The use of the PC in GPD is extensive and the applications are varied. Examples of these uses are:

.Managers are using the PC as an administrative tool. The manager can put the departmental budgets and personnel tracking systems on the PC using spread-sheet models. They use word-processing packages for memos, letters, employee performance plans, and other textual documents. The annual salary projections are now done using a BASIC program, and communication to the host is accomplished through the PC.

.The PC is being used in Manufacturing as a controller for robotics and various process control and measurement systems. The spread-sheet models are being used in product planning and long-range planning tools. The editors and word processors are being used in procedural manuals and procedural instructions.

The PCIC will many times be involved with the initial discussions on new applications, PC configurations, and use of non-IBM products.

c. Ordering, distributing, and servicing

Anyone in Manufacturing who requires a PC for business purposes must justify that need to their functional management. If the functional organization determines that a PC is justified, the functional coordinator submits an order to the Organizational representative in the PCIC. Along with the order, the function must commit to a reduction of dollars from their budgets equal to three times the cost of the PC. The first 100% pays for the PC and the other 200% is the cost savings a department must realize to justify a PC. During 1982 Manufacturing installed a significant number of PCs without any additional cost to the Manufacturing product cost.

All Manufacturing PCs are sent to the PCIC. As each shipment is received, they are allocated to the functional coordinators who in turn allocate them to the specific users. The users themselves put the units together and the PCIC is used as a trouble resolver. If a user gets into trouble, the PCIC will provide hands-on support. This procedure has worked well, and even with an increase in trouble calls, it has been a time saver on the PCIC.

The first line of defense on service calls for the PC hardware and software is the PCIC. Early experience is showing that the vast majority of the service calls are user-related problems, not hardware or software problems. Calls that relate to the program packages not working are sometimes caused by the user not putting DOS on the disk, or the user trying to format the program disk. Disk or display problems are sometimes incorrect dip switch settings or not making a good electrical connection during installation. When a hardware or software problem does occur, the failing unit or board is isolated and returned to the IBM repair facility.

d. Informational focal point

One of the major concerns inherent in distributed computer resources is duplication of effort. Sometimes the duplication is trivial, such as each area creating a VisiCalc department budget model. However, sometimes the duplication is major, such as creating a major process-control network. Another major concern is the potential opportunity lost by the user because that user did not know that a specific application existed or a software package was available. The PCIC is always attempting to reduce the amount of duplication or lost opportunities occurring at the San Jose site. The PCIC is doing this by keeping the user informed as to what is occurring at the site and what is occurring outside of the site.

An informal application notebook is maintained of all "submitted" applications being processed. The users are encouraged to inform the PCIC of their work, and the notebook, in turn, is available to all users. The notebook contains a sheet for each application. The sheet contains a brief description of the application, system configuration, and the person to contact for more information. It has been difficult to get people to contribute to this notebook, but a continuing effort is starting to pay off.

The San Jose site sponsors a monthly PC users forum. This forum provides a means for information exchange between the organizational representatives and the PC users on site, presentations by the users on their business applications, and a question-and-answer period. The format of the forum is strictly IBM internal business. The types of topics discussed include security procedures, new announcements, PC futures at San Jose, and new application that may have either general usage or general techniques.

The PCIC distributes a newsletter to supplement the forums. These newsletters go to each manager who has a PC and to the functional coordinators. The newsletter contains the minutes of the forum and other information deemed appropriate at the time.

To keep aware of what is occurring outside the San Jose site, a PCIC consultant belongs to the Share PC task force and attends other PC-related meetings both inside and outside of IBM. These meetings are very important on keeping aware of what products and concerns exist in the PC world.

Another type of informational focal point, though unofficial, is the informal exchange of information between users and the PCIC. At the San Jose site, the PCIC has developed a good rapport with the users and, as a result, the users feel free to come in and discuss what is happening in their areas. In turn, the users can find out what is happening in other areas. This exchange keeps the PCIC in the forefront of information on the PC and helps keep current on what is critical to the PC users.

e. Auditing and security

Within IBM, managers of those who use IBM-owned PCs must comply with certain audit and security guidelines. The PCIC has the responsibility of auditing the Manufacturing PCs and being sure that the appropriate managers are aware of the security procedures governing the PCs.

Auditing the Manufacturing PCs consists of controlling the serial numbers and hardware/software items; including conducting a physical audit of all PCs annually. The PCIC is responsible for allocating the PCs to the users who ordered systems through their functional coordinators. When the PC is picked up by the user, an inventory control sheet is prepared with all appropriate serial numbers and items received being recorded. This sheet is signed by the user and the PCIC coordinator. This becomes the official transfer of the PC from the PCIC to the user manager. The data from this sheet is recorded on a VisiCalc program that keeps track of all the PCs under control of the PCIC. As the user requires additional items, the sheet and program are updated. Annually, the PCIC conducts a physical audit of all systems and software packages within the control of the PCIC.

Security of the PCs as a physical unit is important to the IBM corporation. All PCs must be secured in a locked environment during nonworking hours. The lock may be key, badge, or combination. All data used on the PC must be properly classified and the user must protect that data based on its classification. Also, it is important to protect the data by being sure that the data can be reproduced if a disaster occurs. This can be accomplished by backing up the data and, if necessary, putting the data into vital records.

The PCIC consultant works closely with security and other departments concerned with home terminal usage. The objectives of these meetings are to resolve security issues and to develop a PC/terminal usage agreement. Security issues include the physical link between the home user and the host systems, the password or other protection levels, the type of data being accessed and security of that data, and the physical security of the data in the user's home. The Terminal-Usage Agreement is an agreement between the home terminal user and the user's manager. This agreement spells out the costs and obligations of each party and is signed by both parties.

6. SUMMARY

The mission of the PCIC, (as well as the IC) is to provide the San Jose Manufacturing community with tools, resources, training, and consultation which allow the user to become self-sufficient and, in turn, will reduce the demand for AD programming resources.

The PCIC supplies the users with tools by providing a mechanism for ordering, distributing, and servicing the PC hardware and software products. The users must justify the need for the PC and its related products within their own function. That function can determine the value of the PC against other needs that compete for their financial resources.

Resources are made available to the users through the establishment of the PC terminal room, PC software library, and the information channels. The PC terminal room can be used as a resource prior to the receipt of their own systems, to handle overload situations, and to experiment with new products and configurations. The software library is used both as a source of software for the terminal room and as a lending library. The potential user can check out the material from the library for a period of time to read the documentation, and to determine if the package will satisfy the user's requirements. The information channels such as the PC forum and newsletters have been very well received.

Training and education is provided in a variety of ways, from the self-teaching instructional material to the teaching of classes and participation in outside programs. The informal training which occurs as a result of one-to-one activity is very important to the overall understanding of the product by the user community.

The PCIC provides consultation to the users by developing itself as the center of competency and the focal point for all PC-related information. The PCIC can serve the user only as long as the user continues to regard the center as a reliable source of information.

The PCIC is at the forefront of two new and exciting concepts of data processing. The first is the concept of the user becoming self-sufficient and employing user-friendly tools to reduce the workload on AD. The second is the use of the PC as a low-priced productivity tool that can be located in the office of the user. What has been described in this report is but the first step of a journey into the future of the Information Center and the IBM Personal Computer.

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The intent of this paper is to outline how PC's can be supported by the EPNG Computer Center. The primary emphasis will be on the technical requirement of PC's and the areas of management concerns. A management policy should be stated early on how and when we will support PC's. My recommendations will be based on connecting the PC to the EPNG Computer Center. With this outline I feel there are three primary areas of support:

A) Stand-alone:

Will the user's PC expand into Terminal or full Capability Mode? The user should consider if his PC will be supported by EPNG Computer Center. Knowing the growth and potential use of his PC, the user could then make the correct decision. If the user's PC has no need of corporate data or EPNG's Computer Center services, then our recommendations would have an insignificant minor impact. I believe most PC's will grow into Full Capability Mode. Our recommendations for any Stand-alone PC should include the following features to allow for growth/expansion to Terminal/Full Capability PC mode:

1. Communication Support choices:

a) ASYNC

ASYNC communication offers the most extensive hardware selection at the most attractive prices. Practically every PC manufacturer offers some type of ASYNC hardware interface and limited software support. The disadvantage of ASYNC communication is that there is no error recovery for data that is transmitted over public telephone networks. Users are limited by transmission speeds (usually 300 bits per second). This becomes apparent when trying to transmit a full screen of data. The ASYNC protocol has a lot of ambiguities (such as number of bits per character, number of start/stop bits and even/odd/no parity) and different manufacturers will implement them in different ways.

b) Synchronous (SYNC):

SYNC communications offers the user error recovery. SYNC communication costs are normally higher than ASYNC communication. With synchronous communications we have two choices:

1) Synchronous Data Link Control (SDLC):
This is our preferred method of synchronous communications. EPNG Computer Center Network consists of primarily SDLC communications. A SDLC network has performance advantages over a BSYNC network. The disadvantage of SDLC is the limited vendor support and complexity of the protocol.

2) BSYNC:
This method of communication is the more available of the synchronous communication methods in the area of vendor support. There are more network management facilities with SNA devices, than there is with BSYNC.

2. Hardware Characteristics

a) Screen Size

The early Cathode Ray Tubes (CRTs) for PC's were 40 columns, mono-chrome and no graphics capabilities. This was adequate in the beginning. From our experience most users want 24X80 (24 rows by 80 columns) CRTs with multi-colors (at least 8) and graphics capability. The 24X80 CRT would also allow the CRT to access EPNG Interactive Systems.

b) Modem Control

The modem for the PC system can cost more than the PC itself. This depends on the requirements that the PC will serve.

1) ASYNC

Normally, the modems offered by the PC manufacturers are limited in speed capabilities (usually 300 bits per second) and signal to noise ratios. Communication clocking will be provided by the Data Terminal Equipment (DTE). If the user can survive with the limitations of PC manufacturer modems, these inexpensive devices should serve them well.

- 2) SYNC
This type of modem is expensive due to its improved capabilities. The modem provides the following: clocking, greater speed capability, and improved signal to noise ratio.
- 3) Speed
Modems can run from 150 bits per second all the way up to 9.6k bits per second. Most PC hardcopy devices (printers) can operate in the area of 300 bits per second satisfactorily. If the communication device is a CRT, 300 bits per second would not be satisfactory for most users.
- c) Disk facilities:
- PCs will support two basic types of disk philosophy removal and non-removal. The user can intermix these two different methods depending on their requirements. The two types of disk facilities for PCs are:
- 1) Floppy Disk (removal):
This was the first type of disk facility that was made available to the PC user. Floppy disks come in various sizes, capacity and recording techniques. The floppy offers the user essentially unlimited disk capacity at a reasonable cost. The hardest decision is which one to select. This becomes even more important if the users would like to exchange floppy disks with each other. There is a proposed standard before the American National Standards Institute (ANSI) for the 5 1/4 floppy to address the difference in manufacturing and recording techniques.
- 2) Hard Disk (non-removal/Winchester):
Winchester offers a higher capacity and faster access than floppys. The Winchester has similar options as floppys concerning capacity and size. The disadvantages of the Winchester are the fixed capacity and no backup capability. The cost of Winchester disks is considerably more expensive than the floppys.
- d) 8 or 16 Bit CPU:
- The advantage of the 8 bit CPU (Z80/8088) is the availability of software and the disadvantage is in the direct memory addressing limitations. The 16 bit CPU (MS68000/8086) relieves the memory constraints, for applications such as graphics, data bases, dictionaries, word processing, and etc.

e) Printer Types:

This device will probably be the second most expensive peripheral that the PC will require.

- 1) Thermal:
This printer requires a special type of paper and is an inexpensive device. Normally, this type of device has limited print capabilities.
- 2) Dot Matrix:
For all around use (graphics, word processing, and etc.) this type of printer is the best suited for PC's. The price range is from moderate to expensive depending on the options.
- 3) Daisy Wheel:
This type of printer is primarily used for text/word processing applications. Usually, this printer is the most expensive one.

f) Graphics:

Graphic support comes in several different flavors from inexpensive business graphics to very expensive high resolution graphics. If the user needs only simple bar charts then an inexpensive graphics terminal would satisfy the users' requirements. If the user needs arc's or circles for his charts then a more expensive terminal would be required. The users should be aware that it takes sophisticated software to take full advantage of the higher resolution graphics terminals.

III) Operations Software:

- a) Recommend/select which type of operating system for the PC (UNIX, CP/M, CP/M-86, MS-DOS, PICK, etc.). The choice of operating system will be based on the hardware and functions required by the user. Just about every vendor supplies some type of operating system. There are enhanced operating systems like UNIX and PICK which are quite expensive. CP/M based systems have a lot of software available for the users. Most PC operating systems are single task, and the growth is toward multi-task operating systems.
- b) Programming Languages
Programming languages can either be compilers or interpreters. The compiler offers program execution speed over interpreters. The interpreters offer ease of program debugging when developing software. COBOL, FORTRAN, PASCAL, FORTH, and BASIC are just some of the programming languages offered by PC vendors. The programming languages availability depends on the PC and its configuration. Practically every PC vendor offers some type of

BASIC programming language support. All of these BASICs may or may not be compatible with each other. The selection of the programming languages should be based primarily on the user requirements.

- c) Utility programs
Numerous programs are available for PCs, but each user will need at least the following types of software:

- Editor
- Word Processing
- Dictionary
- Report Writer
- Data Base System
- Graphics System
- Printer Spooling System

The selection of these packages will be based on the type of hardware and software system the user has.

Stand-Alone Recommendations

My recommendations are based on seeing the stand-alone system grow into at least the Terminal Mode. The first recommendation would be for SYNC communications with SDLC as the preferred line protocol. The error recovery and transmission speed make this a more logical choice. The CRT recommendation is for a 24X80 screen size with color and graphics support. I strongly believe that 90% of the graphics requirement could be met by a terminal with a pixel size of 690(H)x480(V) line resolution and 8 colors. This would allow the user to build professional looking graphs within a reasonable price range. Especially important is the 24X80 screen size as this will be required for any EPNG Computer Center support. The choice between Floppy and Winchester disk should be evaluated based on the amount of data, access time, and cost requirements. I recommend at least 256K bytes for floppys and 10M bytes for Winchester disk systems. The PC's should have compilers for what ever language the user requires. The user should bear in mind some languages (FORTH, C, and etc.) are not supported at the Computer Center. All users probably will need the utility programs listed above at some time. EPNG should consider limiting these packages to a selected group so that we could take advantage of volume purchase discount. With our recommendation of a Bell 212A type modem we will be able to support either the ASYNC or SYNC communication protocol. I feel that to adequately serve the user now and in the future, they will need a modem with speeds of 300 and 1200 bits per second. I recommend that the Telecommunication Section select the modems and set them up for the user. The Telecommunication Section would provide the user a simple operational procedure. Requiring the user to re-strap a modem is dangerous. PCs should have the minimum capacity of 64K memory and a 16 bit CPU. The flexibility of the Dot Matrix printer should meet all of our user requirements.

Limit the number of vendors for the advantage of quantity discount purchases. With a limited vendor population the PC support facility could be enhanced.

B) Terminal Mode:

The two modes supported will be Interactive and Batch. There will be no enhancements to the software/hardware offered in this mode. In the interactive mode the Computer Center will support only PC's that will interface to the Network Session Controller. If the PC is not on the company premises, support will be the same as our "Dial SNA Users". PC batch mode must conform to EPNG dial Remote Job Entry (RJE) system. PC users may use the batch mode (2780, 3780, etc.) to down load only character data. There will be no selection facilities to down load a file. It will be the responsibility of the PC user to supply the PC RJE software support. We will assist the PC user in evaluating and testing PC RJE software.

I. ASYNC Terminal Support:

Currently we are supporting a limited number of ASYNC terminals through a PCI 1076 protocol converter. The PCI 1076 will convert ASYNC Terminals to an IBM 3278 terminal. Should the ASYNC area of our network increase to approximately 30% of our network, re-evaluation of our method of supporting ASYNC device will be required. Methods to be re-evaluated:

- a) Protocol Converts
- b) Network Terminal Option (NTO) via 3705
- c) ACF/TCAM

II. SYNC Terminal Support:

CRT and RJE device type support will remain at our current level. It will be the responsibility of the PC vendor to provide the PC and Host Interface software.

Terminal Mode Recommendations

Currently we support ASYNC/SYNC CRT terminal mode of operations. RJE support for PC's will require some type screen or 328X capture program resident in the PC. There are several products available on the market to accomplish this. We should be involved in any evaluation of PC RJE software, to ensure that the package can be supported by our network. I believe that in the near future (6-12 months) we will NOT have to change our technique for supporting ASYNC terminals. Full Terminal Mode support can be accomplished with an expenditure of approximately 60 manhours.

C) Full Capability Mode:

A generalized host software program to selectively up/down load all types of data will be required. This program must be able to handle ASYNC or SYNC line protocols with error corrections features. The second program the user will need is a generalized PC program that will communicate with the host program. The PC program must be able to execute on numerous different systems. Users will require from the Computer Center PC-to-PC support without concern of how

data is moved. We agree with the users definitions of Full Capability Mode. These capabilities are not yet fully available. The implementation of these ideas and how we will accomplish them is another matter. Listed below are our implementations and recommendations:

I. Data Management

File transfers (up/down) will be supported if the users have selected a SYNC Line Protocol (SDLC or BSYNC). With ASYNC protocol there is no way to ensure that the data has NOT been polluted. Down loading will be allowed only for character data with the ASYNC protocol.

a) Down Loading Files

There are two types of data down loading: Character data (source code, listing, test data and etc.) and binary data. Down loading of character data can be addressed by the Terminal Mode. Binary data offers further restrictions that must be placed on the users (such as sync protocol).

b) Up Loading Files

This area will cause the most concern from a technical and management viewpoints. Listed below are options on how to up load files:

- 1) Each interactive system (IMS, TSO, ROSCOE, VSPC, and etc.) must supply some type of support to the PC's. This method is probably the easiest to implement but each sub-system must provide PC support. Currently, there are vendors supplying such software.
- 2) The user would prefer a single PC to Host sub-system supporting either ASYNC or SYNC protocol.

II. P.C. to P.C. Support

There are two methods of interconnect PCs: Local Area Network (LAN) and RS232 Interface. PCs remaining on EPNG premises (CC and PK Complex) could be interconnected through a LAN. PCs that are vastly dispersed would use the RS232 interface for their communications.

Recommendations:

Our preferred PC-to-PC communication method is LAN. Due to the limited number of PCs, LAN hardware, LAN software and cost this will probably not be available at EPNG for at least 2 to 3 years. Until we have a LAN in place we will use the RS232 Interface. For on premise ASYNC PC-to-PC support we should consider using the SL/1 PBX.

D) Management Issues:

The areas outlined below will have a MAJOR impact on how technical issues are resolved. Security and Support issues will either make us or break us. When the decision is made the conviction must be as strong as "Nathan Hale" when he said "I regret that I only have but one life to give to my company".

I. Security:

- a) Access control to Host, Applications, and Data
- b) Ownership of data
- c) Verification
- d) Location of Hardware
 - 1) Home
 - 2) Office
 - 3) Portable

II. Types of Support:

a) CCO PC Support Organization

- 1) Hardware Support
First level problem determination to determine failing sub-system or component. Interface with vendor maintenance staff for problem resolution.
- 2) Software Support
We should not maintain user PC program libraries. Provide a bulletin board service so that users can swap programs.
- 3) Ordering Equipment and Vendor Interface Central point to maintain inventory control over equipment and supplies.
- 4) Training & Education Support:
This area will consume the largest amount of manhours. Normally the users would be first time users and would require an extensive amount of personalized training. Evaluate new products hardware/software for users.

b) Information Center:

This would be the logical area for providing support to the PC user community. Technical personnel from the CCO would support the Information Center whenever a major technical opportunity presented itself.



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III) Budget:

- a) Expendables (paper, floppy disk, ribbons, etc.)
- b) Accounting method (Averages, User Dept?)
- c) Hardware and Software purchases
- d) Support cost

Management Recommendations

This area must be addressed first because of its high impact on how technical areas will be implemented. We must establish and publish a policy, before we are placed in another "Reactionary Mode" situation.

61 SHARE NO.	M378 SESSION NO.	Product Selection & Products In Use SESSION TITLE	135 ATTENDANCE
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PRODUCT SELECTION AT KINNEY SHOE

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Information Center Project

M378

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