small computer support group

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EDITOR'S COLUMN

This fifth issue of the Small Computer Support Group Newsletter includes a wide variety of articles related to microcomputing and small machines. As eloquent testimony to the range of small computers used at Indiana University, this issue has articles about Apple, Exidy, and DEC with comments about IBM, Televideo, Superbrain, and CP/M microcomputers in general. This reflects only a fraction of the small computing interests of faculty, staff, and students at IU. Because the Newsletter exists for the users of small systems, I am delighted to welcome articles such as these and I hope that others will be encouraged to submit contributions.

This issue begins a new policy of accepting acticles in camera-ready form. The standard SCSG Newsletter format specifications are included at the end of this issue. The camera-ready policy is designed to permit the display of graphic, print, and wordprocessing features. This issue includes an article on the Epson MX-80 that demonstrates print quality and graphic features possible with the printer, and it also also includes two articles on wordprocessing systems that display a variety of features unavailable on my Apple wordprocessor. However, contributors who do not wish to submit camera-ready copy can always send in articles as reasonably clean manuscripts.

As the Newsletter continues to prosper, thanks to the authors of the various contributions, the Small Computer Support Group would be very interested in any suggestions or comments about content, style, or philosophy. We would also be pleased to receive suggestions for articles. For example, I am most interested in discussions of microcomputer database systems, especially those available for CP/M machines and Apple IIs. In addition, special small computer applications often have a broader appeal than their users realize, so if you are using small machines in teaching or research, please call me to talk about an article.

The Newsletter is especially interested in discussions of the relative merits of various hardware and software solutions to small computer tasks, and thus we welcome discussion, controversy, and contradiction. For example, the small computing philosophy articulated in the article on "How to Select a Personal Computer" might easily elicit a critical response from readers better informed or wiser than the editor. I would be delighted to see such a response.

J.V. Lombardi
Editor

HOW TO SELECT A PERSONAL COMPUTER

In an average week, I have about three major conversations devoted to the advantages of different microcomputers, the virtues of various wordprocessing programs, and the best solution for a variety of small computing problems. This experience can be duplicated by anyone who has the slightest experience with microcomputers. It doesn't take much to become an expert. Because of the interest in this topic, the Small Computer Support Group Newsletter is interested in articles on the general theme of how to buy a personal computer. Because there is no universal solution to every small computing requirement, the SCSG does not endorse recommendations and ideas presented in this article. Most of the machines available today will do a fine job with some specific problem. Moreover, the differences between competing computers and terminals are, in many cases, quite minor. Unless the requirements for use are highly specialized, many of the machines on the market are virtually interchangeable.

The first step in selecting a personal computer is to determine whether you need one at all. Many people, enthralled with the notion of owning their own computer, lose sight of what I call the utility function. The utility function is determined by comparing the total time and energy required to solve a problem with a microcomputer with the time and energy required to solve the problem using other forms of computing or non-computing solutions.

In general, there are two major alternatives for IU faculty, students, and staff who need computing, whether for wordprocessing, database management, or number-crunching. The cheapest by far is to acquire a Wrubel Computing Center job number and use a terminal at one of the public terminal clusters on campus. This costs nothing but time.

The second alternative, which is really a derivative of the first, is to purchase a terminal and an acoustic coupler, take it home or to the office, dial the IU computer on the phone, and work as if you were at one of the public terminal clusters. This costs something on the order of $700 to $900 depending on the terminal purchased and gives access to a powerful set of computing resources.

The disadvantages of this solution to computing are various. The WCC timesharing system is currently not very efficient for interactive users. At peak times it is difficult to get access. At the end of the semester, it is almost impossible to be assured of access. As the new computing network is constructed during the next two or three years, this situation is likely to improve significantly, but for the present, the WCC timesharing system is not always available when you want it.

Another disadvantage is that WCC computing is not designed to be easy for the user. Because the system is complex, flexible, and powerful, it is also complicated to learn. Although it is possible to learn a little, and use the machine, serious users of computing, whether for

textprocessing or number-crunching, will have to become rather adept at the various arcana associated not only with the software they need (SPSS, BMD, TFORM, UCEDIT, SORT-MERGE, INFOL) but also with the peculiarities of the operating system. Our operating system may well be a marvel of software and hardware engineering, but it is tricky for the non-computer specialist to master. The WCC has bundles of excellent documentation to explain everything, but you do have to read it and discover whether it applies to your problems or not. In short, working with the WCC on a terminal has a significant entry barrier in the amount of time you need to spend to learn how to use it, and some serious inconveniences in terms of accessibility. How serious these are depends on individual work habits. It must also be said, however, that most applications, outside of some scientific experiments, can be handled, if not always with the greatest efficiency, with the WCC's complement of software and hardware.

There is another consideration besides cost and convenience that may make the WCC-terminal the best solution to a computing requirement. That is memory and storage. Most microcomputers have only limited storage. While it is possible to handle very large files on floppy disks, it is clumsy and often inefficient to do so. The WCC, however, has virtually unlimited file space on disk or tape. Similarly, although the immediately accessible storage at WCC on disk is limited, in microcomputer terms it is very large. If the application at hand involves the management of large files, a microcomputer may be more trouble than it is worth.

Having said all this about the WCC, and no doubt earned the wrath of my colleagues there, let me turn to the microcomputer possibilities.

These are legion, but in practical terms there appears to be two major solutions to microcomputing that satisfy most IU users. These are the Apple II solution and the CP/M solution. The Apple solution involves the purchase of some configuration of an Apple II, at a cost that ranges in the $2000 to $6000 range depending on accessories and printer. The CP/M solution is more complex, for it involves purchasing any one of a large number of microcomputers that can run the CP/M operating system. First a summary of the the CP/M and Apple solutions and then, in the next article, a look at how to buy an Apple.

The CP/M operating system is the closest thing available to a microcomputer industry standard. CP/M is a control program that handles all the housekeeping chores of managing files, input-output, and the like required for the efficient operation of the microcomputer. Other programs that run under this operating system can be made compatible with a wide variety of microcomputers, all with the same operating system. This means that the installed base of microcomputers using CP/M is very large, although the number of micros from any one manufacturer is quite small. The larger the installed base for a microcomputer, the larger the number and quality of programs that are available for it. The appearance of IBM and Xerox microcomputers which can use versions of this operating system appears to indicate that CP/M will continue to be a standard operating system for some time. Even the Apple II can be set up to run CP/M programs, although normally that is not the best way to manage an Apple.

The purchase of a CP/M compatible microcomputer is much like the acquisition of a component stereo system with a large range of

accessories. In general, a CP/M computer consists of three pieces. The main board of the computer itself with the central processor chip, the memory, input-output facilities, and a provision for add-on equipment is the heart of the machine. The second piece of the equipment is the keyboard and video screen (or terminal). These permit you to talk to the machine and the machine to talk to you. It is usually possible to use a terminal identical to those used for timesharing at WCC for communicating with a microcomputer of this type. The third component is composed of the disk drives. These come in a wide variety of sizes and styles, the most common being a pair of 5-1/4" floppy disk drives. The amount of storage availabe on these drives varies from manufacturer to manufacturer, but the most popular size at the moment appears to be about 1 million characters for the two drives. That, of course, is 1 million characters available on call without changing disks. Some computers have these essential components packaged together in various combinations. Computers such as the Superbrain or the Heath/Zenith or the Radio Shack TRS-80 III have everything in one package. Others, such as the Televideo, package the drives and the main board in one box and use a regular terminal for keyboard and screen. Some computers put drives, main board, keyboard, and screen all in separate boxes.

The price range for this set-up runs anywhere from about $3000 to over $8000 depending on the sophistication required. Most microcomputer users can get organized for between $3000 and $4000 without a printer.

However, none of these prices includes software. CP/M software is not cheap, major packages for wordprocessing and accounting being in the $300 per item category. There are large amounts of pirated software around as well that cost considerably less because these illegal copies avoid royalty and distribution payments to authors and publishers. These machines can usually access at least 64,000 characters (64K) in the computer's memory as well as a lot more on disk.

IU does not yet have a recommended CP/M computer, although the IBM machine is one of the most attractive microcomputers being evaluated. Because it is still new, there is not very much software available for it. But every indication is that there will shortly be a great deal of software useable on this machine.

What about the Apple? This popular microcomputer has a host of features not easily or cheaply available on many of the CP/M machines. Few microcomputers will do all the things that the Apple will at the same price. But the Apple will rarely do anything as elegantly or as efficiently as some other computer will do it. The Apple has several major characteristics that interest potential users. It is a very adaptable machine, it has respectable color graphics, it is somewhat cheaper to purchase, and its software tends to be a bit cheaper. The Apple II has an installed base of something over 250,000 units which provides the necessary incentive for continued high-quality software and hardware accessory development. The Apple can be adapted to run CP/M at considerable expense, but if the programs available with CP/M are what you need most, you should get a CP/M machine. Apple also has a wide range of educational software at the elementary, secondary, and collegiate levels.

Then there is Radio Shack's TRS-80 series. There is no single Radio Shack computer, and the various models are not all mutually compatible. The Model II, which is a business computer with an 8" disk drive, costs

at the high end of the CP/M machines. The Model III, which is a two-disk personal computer has some advantages, but because it costs about the same as a CP/M machine and has an output screen only 64 characters wide, the CP/M machines are usually preferred. Of course, it is possible to purchase a software option that allows CP/M programs to be run on some of the Radio Shack computers.

In the subsequent issues of this Newsletter others may choose to argue the merits of particular strategies for choosing microcomputers. In all cases you should check with the SCSG staff and experienced users. Beware of micro-addicts, however. These individuals believe that their machine is the solution to all problems, is most cost-effective, and provides evidence of the owner's mental and moral superiority. Also beware of the speed freaks. These experts evaluate all microcomputers on how fast they perform their internal operations such as transfering data and executing instructions. In many cases, this is not a significant criterion. If you don't know whether speed is important, the odds are it isn't.

Finally, it must be said that almost all of the current crop of personal microcomputers will do 90% of what any other microcomputer will do. The main differences are related to price, availability, looks, prejudice, and the ease of accomplishing a specific task.

J.V. Lombardi
Editor

HOW TO BUY AN APPLE II

The popularity of the Apple II microcomputer has spawned a wide range of hardware and software prepared for this machine. Anyone approaching the Apple for the first time finds a bewildering array of products, all of which are advertised to solve every problem with the utmost efficiency. What follows here is one set of opinions on how to buy an Apple II computer. Certain assumptions guide this discussion. The first is that this Apple is for general purpose use. Those interested in Apples for laboratory purposes will know best what specific requirements need to be met, and for them this article is mostly beside the point. Users who are considering Apple II microcomputers for wordprocessing applications should also know that the Apple II is not the optimal microcomputer for wordprocessing, although it can be made to do a reasonable job. Before buying any microcomputer, users should consider many alternatives, discuss needs and uses with the Small Computer Support Group staff and with other microcomputer users. Most microcomputers designed for general purpose use represent compromises that increase the generality of application at the expense of efficiency. Some compromises are better for some users than others. The motto that must always be remembered is: There is no perfect computer.

One of the first caveats mentioned above is that the Apple is not the best computer for wordprocessing. Superbrain, Televideo, Blackhawk, IBM, Xerox, or almost any other machine that runs under CP/M will do a better job of wordprocessing. This is not because of any inherent problem with the Apple's microprocessor but because the Apple's keyboard has only the bare minimum of keys and the Apple will not normally display 80 columns or lower case. These defects can be remedied at a price, but the resulting configuration costs as much as a CP/M machine designed for 80 columns with lower case and operates less efficiently. However, if educational uses or games are a major consideration, then the Apple is by far the machine of choice, for it will do professionally acceptable wordprocessing along with its superb games and its extensive educational software library.

To begin, you will need the Apple computer. This comes in two varieties: The Apple II and the Apple II+. The II+ comes with Applesoft Basic as standard equipment and the II comes with Integer Basic as standard. Most people purchase the II+ because Applesoft is a much more versatile dialect of the Basic language. However, some games are available only in Integer Basic. You can get Integer Basic at a cost of another $200, but it may not be necessary. The cost of an Apple II or II+ is about $1630 list, but by mail or through the University the base machine runs about $1100 to $1200. Apple Computer is trying to prevent mailorder sales of Apple equipment. All Apples should be purchased with 48K of memory and most are now sold that way.

The RF Modulator

This is a device that allows a TV to be used with the Apple as a monitor. The advantage of using a TV is that most people have one which

eliminates the need to purchase a separate video monitor. Also, if the machine is hooked to a color TV, the outstanding Apple graphic games can be seen in full color. A color video monitor costs as much as the equivalent sized TV set. However, TV sets are not good enough to show 80 columns of characters, especially color TVs. If you expect to get 80 column capability for your Apple, you will need to consider a monitor. The RF Modulator is about $35 list.

A Lower Case Display Adapter

This permits your programs to output 40 columns of upper/lower case characters on the screen. Many programs also use this adapter to permit the input of lower case characters. Many Apple programs will allow the shift key to be used like a typewriter shift for upper case entry. Other programs, however, require the use of the escape key which is ok but clumsy. The enabling of the shift key involves adding a wire to the Apple and should be done by a qualified service person so as not to void the Apple's warranty.

The Dan Paymar LCA-1 or LCA-2, one of the more popular, is about $60. For about $130 Videx has a lower case adapter that permits direct lower case input into the Apple without special software. For $149 Videx has a replacement keyboard encoder board with lower case plus other features.

The Disk II with Controller

Every Apple system requires a disk drive to be useful. Although it is possible to run an Apple using only a cassette recorder, it is more trouble than it is worth. A single-disk system can be upgraded to a double-disk system later. Disk capacity is about 140K. The first disk with its controller costs about $650 list.

A Printer

Most computer users find a printer essential. Although in theory you could do everything on the screen and only dump occasionally to a printer, perhaps one owned by IU, this is a poor strategy. There are a bewildering variety of printers available. They are usually not dependent on the computer that drives them and will work with any computer. If you pay less than about $600-$800 you will be unhappy with the printer. A good printer of the dot-matrix variety costs about $900 with graphics capability. The IDS Paper Tiger line, the Epson MX-80, and the Centronics printers are well-know and have their devotees. Dot-matrix printers make their characters with columns of dots. Some are of such quality that they almost look as good as Selectric copy. These printers can usually be fitted with graphics options that allow them to reproduce anything the Apple screen can show. This is useful for graphs and charts. Most dot-matrix printers use only fan fold paper with a tractor feed, although some can be adapted to take single sheets like a typewriter.

For high-quality output, a letter quality printer is required. These printers use an element with typefaces to produce the characters in much the same fashion as an IBM Selectric. These printers are usually slower than dot-matrix printers but give a much higher quality output. They also tend to be more durable because they are made for office use. The price ranges from a low of about $2100 on up depending on speed,

accessories for paper handling, and graphics. The SCSG recommends the Diablo 630 made by Xerox. Daisywheels are about $7 to $8 apiece. Ribbons vary depending on whether they are carbon, fabric, multistrike, or single strike. All are easily available supplies.

The daisywheel printer as delivered will be equipped for single-sheet operation with a platen. Fan fold paper can be used, but long uninterrupted runs are not possible because the platen does not pull fan fold paper through evenly. If long runs are frequent, a forms tractor may be added at a cost of about $250.

Printer Interface Cards

To connect the computer to the printer you need an interface card. There are two basic kinds: serial cards and parallel cards. Serial interfaces are the most common, although many dot-matrix printers use parallel cards. A good serial card can be used for other devices such as modems to connect the micro to a main frame computer. The SCSG recommends the California Computer Systems 7710A Serial Card at a list price of about $170.

Color Television or Monitor Display

This can be any size, but 9 to 15 inch screens are generally optimum. Monitors are expensive if in color. Depending on the size they run from $370 to over $500. Black-and-white or green-screen monitors cost in the $130 to $225 range. Black-and-white televisions also work well. None of the televisions will accept 80 columns with satisfactory legibility.

The Joystick and Game Paddles

The joystick is a bi-directional game device that is essential for the better Apple games. The computer comes with two game paddles which work fine for two-person games. The joystick combines the functions of the two paddles into one hand-held device. It costs about $50 list.

A Paddle Swith Box

This permits both the two game paddles and the joystick to be plugged into the Apple at the same time. A switch selects which will be used. This eliminates the need to open the Apple and plug and unplug the game paddles to change devices. The Expandaport costs about $60 and has some other extra features. A bare-bones switch box can be had for about $30 dollars.

Wordprocessing Software

There is a wide range of software on the market for the Apple computer. At the moment, the best wordprocessing package for the Apple (if double-strike characters with justified margins at the same time are not required) is Programma's PIE + Format ($130). However, Programma is currently in receivership and the fate of PIE+Format is as yet unclear. If double-strike characters in justified text is essential, then Super Text II ($150) is probably the best, although its typing speed is very slow and may require the purchase of some kind of type-ahead buffer. Some users find SuperScribe from On-Line Systems, or Letter-Perfect, or the Executive Secretary, or EasyWriter Professional adequate to their needs. Wordprocessing packages for the Apple run in the neighborhood of

$100 to $250. One very interesting package is the Correspondent from Southwestern Data Systems which sells for under $100 and has been very highly rated.

Other Recommended Software

Most Apple users find that they need a variety of other software to make their machine useful. Aside from games listed below, the first software package purchased after the wordprocessor should probably be Visicalc. This is an electronic worksheet that permits a wide variety of calculations and other financial modeling, including home finances, grade sheets, and similar activities. Anything that can be put on a graph-paper like format can be manipulated in Visicalc ($200).

Because much software like Visicalc is not copyable using normal procedures, many owners purchase what are called bit-copy programs that can copy most protected disks. These programs, such as Locksmith, are relatively expensive in the range of $100. Protected software generally has replacement policies or comes with a backup disk. The decision to purchase a bit-copy program is, then, not all that clear cut, but many Apple owners want the security of being able to make their own backup copies of protected software. The PIE+Format is not copy protected and can be backed up by normal Apple copy routines. Super-Text II is copy protected as is Visicalc.

There is a large amount of public domain software available for the price of a diskette. Some of this is very useful and some is junk. By trial and error plus the advice of other Apple owners, a significant library of useful programs can be compiled at a relatively low cost.

The Games

Apple games are legion. There are lots of simple games available free in the public domain. But the really flashy ones are in the $30 to $35 range. They are mostly well done. You should try out some to see what kind you like. Apple Invaders, ABM, Space Eggs, Phantoms Five, are good representatives of the action, shoot-em-up type of game. Raster Blaster is one of the finest demonstrations of sophisticated Apple graphics in a pinball simulation that is extraordinarily accurate.

There are also the adventure games which for some can become very adicting. The Wizard and the Princess and Odessy are examples of this genre.

Finally, there are the computer versions of the standard board games such as chess, checkers, Othello, and the like. These tend to be very sophisticated and will test the skill of all but the most expert player.

Supplies for the Computer

Purchasing a computer also implies the purchase of a variety of supplies to feed it. These are mostly disks and computer paper. Disks run in the neighborhood of $3 to $5 dollars depending on the location and quantity of purchase. Type wheels and ribbons for the printer have been mentioned above. Printer paper of the plain, fan fold variety sells for $36 a box more or less. A box has 3,200 sheets. Computer paper is used much more wastefully than typewriter paper, so 3,200 sheets is not as

much as it appears.

As you use the machine, you accumulate disks which must be housed in cases of some kind. These cost about $3 for a box that holds 10 or $30 for a box that holds 50. It is often prudent to keep the children's games and the parents wordprocessing disks in different boxes.

Some Other Useful Hardware

The hardware available for the Apple is endless. Some upgrades, however, are fairly easy to recommend. Beyond those, the expertise necessary to use the new hardware is such that no advice from me would be pertinent.

Display Boards for 80 Columns

Because the Apple screen is only 40 columns wide, there is a big market for accessories that will give the Apple II a standard computer screen of 80 characters. These boards sell for something in the $380 range. They vary in their features and solutions to technical problems. All require the purchase of a monitor as described above. The black-and-white monitor is, of course, not as satisfactory for most games. The 80 column display boards are not all compatible with all software written for the Apple. You must check to see that your programs will run with the 80 column board you will have. This is especially so with wordprocessing programs. Super Text II, for example does not support any 80 column boards. PIE+Format supports most 80 column boards. But even when they support a board, it may be necesssary to purchase an upgraded version of the software. EasyWriter has a 40 column version at about $100 and an 80 column version at about $250. The utility of the 80 columns is debatable. Unless a wordprocessing package actually gives you the image of what you will see on paper, the extra 40 columns are not very helpful. However, if you expect to use your Apple extensively as a terminal with WCC or other timesharing systems that expect the terminal to have 80 columns, the 40 column Apple format is something of a nuisance. The presence or absence of 40 or 80 columns on the screen will not, of course, have any effect on the appearance of the printed output from a wordprocessing program.

Memory Boards

It is possible to bring the Apple up to its potential of 64K of continuously accessible random access memory by the purchase of a 16K memory board. This plugs into the Apple and allows programs another 16K of memory. Not all programs can use this memory, but most can. However, most Apple programs do not need the extra memory. The memory boards are in the $145 range.

In addition, memory boards in multiples of 16K are available. These are relatively new and not much software is yet available for them. However, one of these boards has the ability to put the contents of an entire disk into the Apple memory and use it as if it were on the disk except at a much higher rate of speed. These expanded boards are mostly useful for special applications.

Pascal Language System

This is an Apple accesory board in the $495 range that converts Apple

into a Pascal language machine by adding an extra 16K of memory and supplying the software to do Pascal. Pascal is a very popular language that is supposed to be easier to learn than Basic and is billed as teaching better programming technique. It runs faster than Basic in many instances. If programming languages are of interest, then this may be a good accessory.

A Second Disk Drive

Most Apple users think that two disk drives are necessary. For Pascal and some database management systems, a second disk drive is virtually essential. A second disk costs about $525. Many Apple users consider the second drive to be the highest priority add-on after purchasing a system. But for many applications the second disk is a convenience not a necessity.

A Communications Modem

For users who expect to communicate with other computers, whether Apple or mainframes, a communications device for the telephone hook-up is necessary. The most popular has been the D.C. Hayes Micromodem, at $375. Other versions of modems are available with different features at much the same price.

Z80 Softcard

There is a large amount of excellent software available for microcomputers that use the Z80 computer chip as the central processing unit. The Apple uses the 6502 chip. The Z80 Softcard is a $350 accessory that turns the Apple into a Z80 machine running the CP/M operating system. This makes most, but not all, CP/M software available to the Apple owner without losing any of the Apple's own 6502 capability. The Softcard works best with the addition of the 80 column board, monitor, and second disk drive listed above. An Apple with Z80 Softcard should not be purchased if your primary interest is CP/M software.

Clock Calendar Cards

These cards will give the Apple a regular clock and a calendar. The card is battery powered when the Apple is not on. It will put time and date on documents and it can be used for programming applications that require timing, such as benchmark tests of software speed or environmental control of heating and lighting. Clock Calendar Cards cost about $130 depending on the features.

Where to Purchase an Apple

Apples, accessories, and software can be purchased through the university, from retail outlets, and by mail (although Apple Computer is attempting to to eliminate mail order sales of Apple products). The mail order prices tend to be significantly lower than the store prices. For an initial purchaser who has little experience with computers, the services offered by a fully equipped dealer may be worth the money. Cables, connectors, and possible hardware defects can cause the neophyte user incredible headaches. Mail order houses, at least the reputable ones, will accept the return of defective merchandise, but that of course takes quite a bit of time.

Once the basic system is up and running and you feel confident about your computer knowledge, you will be able to determine how much the backup services of a dealer are worth. Dealer service shops are, of course, available to the public, whether or not you bought your equipment at the store. But the amount of free service and support is closely related to how much business you do with the local store.

Software purchases by mail entail much fewer risks than hardware purchases, especially if you know what you want. If the disk is bad or the software is not what you expected, the mail order store will usually but not always make adjustments. Retail stores will generally let you try out software packages and games to see if they are what they are supposed to be, and that may well be worth the higher prices.

Indiana University has arrangements with wholesalers and dealers that can be used to signficantly reduce the cost of hardware, software, and supplies. The University buys Apples only through regular university accounts. Individuals in the university can often purchase equipment from the same dealers at the same price without going through the university purchasing system.

In most cases, you can usually do better if you know what you want and buy in as large quantities as possible. The customer that comes into a retail store, knows exactly what he wants, and has a $5000 order may well get a discount that is almost as good as a mail order firm. Such an approach also allows you to do comparison shopping.

J.V. Lombardi
Editor

UNIX* AND THE 11/44 AT ISR

The System

The early summer of 1981 marked the beginning of a new era for the Department of Sociology and the Institute of Social Research. It was at this time that a new computer system was first brought on line. Purchased with funds provided by the National Science Foundation, the system consists (in its current configuration) of a DEC PDP 11/44 computer (a fourth generation PDP11 machine which has a very improved price/performance ratio over earlier machines), 2 RL02 10.4 Mbyte disks, an 800/1600 bpi Kennedy tape drive, five Mime 2a CRT terminals, an NEC spinwriter, and a Scientific Micro Systems dual floppy disk drive. Currently, there are in addition two Racal-Vadic telephone dial-up ports which operate at 300/1200 bps. The operating system being used is UNIX which was developed at Bell Labs.

The major reason behind the proposal to NSF which resulted in the ultimate purchase of the above equipment was to enhance basic research projects now underway (1) in the sociology of science, (2) the accomplishment of leadership in small groups, (3) on student-teacher interaction, (4) on children's language and culture, and (5) on adults' verbal strategies of manipulation. All of these projects involve the analysis to large databases of textual material. The proposal outlined a number of tasks which the above projects had in common for which the minicomputer was required:
* Constructing data files of transcript text [in one project, for example, this amounts to about four million characters].
* Updating and correcting (editing) files.
* Coding transcripts and incorporating codes into transcript files.
* Analyzing text and codes.

Additional needs outlined in the proposal included (1) the ability to generate and edit interview schedules used each year by the Indianapolis Area Project, a major, annual research project of the Institute of Social Research that is central to graduate training; (2) to collect data generated in small group experiments; and (3) to draft reports of research from projects that do not use textual data, but still are based at ISR.

From the above needs several criteria were used in selecting the equipment configuration that we ultimately settled on. These included the following:
* The system must have a software utilities package available which includes a versatile line and string oriented editor.
* The system must have at least a four port multiple user access system given the expected demand on the system.
* The system must allow each user to do different tasks simultaneously.
* The multiple-user/multiple-task functions must be performed without significant deterioration in response time for any of the users.

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*UNIX is a Trademark of Bell Laboratories.

● The system must have sufficient word-processing capability to allow for the generation of research manuscripts.
  ● The system must be able to operate without an operator.
  ● The system must allow for growth with relative ease.

From these criteria we ultimately selected the PDP 11/44 operating under UNIX.

In their book <u>Software Tools</u>, Kernighan and Plauger say[1], "Of all the operating systems we have used, UNIX is the only one which has been a positive help in getting a job done instead of an obstacle to be over- come." This, I think, summarizes the responses of people who have been using our system over the past several months that we have had it up. Since most people have been using the word processing capability of UNIX to produce research papers, reports and grant proposals, let me begin by outlining some of the general features of UNIX and then describe how UNIX has been helpful for the text processing work. Other uses will be described more briefly subsequently.

General Features of UNIX

The UNIX operating system provides an especially congenial programming environment, in which it is not only possible, but actually natural, to write programs quickly and well. Several characteristics of the UNIX system contribute to this desirable state of affairs. Files have no type or internal structure, so data produced by one program can be used by another without impediment. The basic system interface for input and output provides homogeneous treatment of files, I/O devices and pro- grams, so programs need not care where their data comes from or goes to. The command interpreter makes it convenient to connect programs, by arranging for all data communication. It is easy and natural to have input and/or output file redirection or to construct pipes between pro- grams or processes. For example the command LS lists files in the current directory. Redirecting the output with

    ls >filelist
collects the list in a file. The text editor is called ED;
    ed <script
runs it from a script of previously prepared editing commands. The pro- gram WHO prints a list of currently logged-on users, one per line. The program WC prints the number of lines (also words and characters) in a file. Constructing a pipe between the two programs

    who | wc
provides a count of the number of users currently logged on. Another example of the use of a pipeline to connect simple programs to achieve a more complex result is

    rev <dictionary | sort | rev >rhymingdict
which provides a rhyming dictionary by taking words from a dictionary (stored one per line) reversing each line, sorting the result, re- reversing each line and storing the final result in the file rhyming- dict.

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1. Kernighan, Brian W and P. J. Plauger, <u>Software Tools</u>, Addison- Wesley Publishing Company, Reading, Mass. (1976).

Thus, complex procedures can be and are created not by writing large programs from scratch, but by interconnecting relatively small components. These programs are small and concentrate on single functions, and are therefore easy to build, understand, describe, and maintain. They form a high level toolkit whose existence causes programmers to view their work as the use and creation of tools, a viewpoint that encourages growth in place of reinvention.

Text Processing and Document Preparation

Text Processing can be divided into two phases on the UNIX system: Document Preparation and Document Formatting. With respect to Document Preparation, several programs exist, the most important of which is ED, the editor which may be described as a very fast interactive context editor which provides random access to all lines in a file. It is a line oriented rather than a character oriented editor with the following features:

 ● Find lines by number or pattern. Patterns may include specified characters, don't care characters, choices among characters, repetitions of these constructs, beginning of line, and end of line.
 ● Add, delete, change, copy, move or join lines.
 ● Permute or split contents of a line.
 ● Replace one or all instances of a pattern within a line.
 ● Combine or split files
 ● Escape to Shell (command language) during editing. This allows other files to be searched, copied, read, edited, programs to be run, or whatever, without leaving the editor.
 ● Do any of the above operations on every pattern-selected line in a given range.
 ● Optional encryption for extra security.

A second program which has been a boon to all users is SPELL. This program looks for spelling errors by comparing each word in a document against a word list or "dictionary." The dictionary that is provided with the system consists of about 25,000 words including proper names. However, the program works by having a knowledge of common prefixes and suffixes which are stripped from the word if it is not initially found on the list thus checking the word in parts of prefix stem and suffix. A second list of stop words exists which contains words that could be made from the prefix and suffix rules but which are not accepted as correct spellings. Finally, it is possible to easily add words to the dictionary, and the dictionary automatically collects words to facilitate this task. Another useful program related to SPELL is LOOK which searches for words in the dictionary that begin with a specified prefix. This can be used even while in the editor to check the spelling on a particular word before it is typed in.

Document Formatting

The main document formatting programs are NROFF and TROFF. TROFF drives a Graphic Systems phototypesetter, and NROFF drives ascii terminals of all types. NROFF is a fairly complicated program which allows a great deal of control over all aspects of the text formatting process. It has the following features:

 ● Justification of either or both margins.

- Automatic hyphenation.
- Definable macros for frequently used control sequences.
- All four margins and page size are dynamically adjustable.
- Hanging indents and one-line indents.
- Absolute and relative parameter settings.
- Optional legal-style numbering of output lines.
- Multiple file capability.
- Computation and printing of numerical quantities.
- Conditional execution of macros.
- Positions expressible in inches, centimeters, ems, points, machine units or arithmetic combinations thereof.
- Access to character-width computation for unusually difficult layout problems
- Overstrikes, built-up brackets, horizontal and vertical line drawing.
- Can exploit the characteristics of the terminal being used, for approximating special characters, reverse motions, proportional spacing, etc.
- Can produce multi-column output.

It is obvious that high programming skill is required to exploit the formatting capabilities of NROFF, however unskilled personnel can easily be trained to enter documents according to canned formats such as those provided by MS.

MS is a standardized manuscript layout package for use with NROFF or TROFF. This document was formatted with MS. Among its features are:

- Page numbers and draft dates.
- Automatically numbered subheads.
- Footnotes.
- Single or double column.
- Paragraphing, display and indentation.
- Numbered equations.

Other preprocessors for NROFF include the following: NEQN, which is a mathematical equation typing preprocessor which prepares formulas for display on any terminal that NROFF knows about, for example, those based on Diablo printing mechanism. This processor translates easily readable formulas, either in-line or displayed, into detailed typing instructions. Formulas are written in a style like this:

    sigma sup 2 ~=~ 1 over N sum from i=1 to N (x sub i - x bar) sup 2

which produces:

$$\sigma^2 = \frac{1}{N} \sum_{i=1}^{N} (X_i - \overline{X})^2$$

Other features of NEQN include:
- Vocabulary of Greek letters and special symbols.
- Automatic calculation of large bracket sizes.
- Vertical "piling" of formulae for matrices, conditional alternatives, etc.
- Diacriticals: dots, double dots, hats, bars, etc.
- Easily learned by nonprogrammers and mathematical typists.

TBL is a preprocessor for NROFF that translates simple descriptions of table layouts and contents into detailed typing instructions. Its features include:

  • Computes column widths.
  • Handles left- and right-justified columns, centered columns and decimal-point alignment.
  • Places column titles.
  • Table entries can be text, which is adjusted to fit.
  • Can box all or parts of table.

REFER is a preprocessor which fills in bibliographic citations in a document from a data base. Citations are given in the text of the document in an abbreviated "key-word" form. The program uses these key-words to search the database, retrieve the full citation, and add it in a form ready for the text formatter to handle. For example,

.[
Burke Reitzes 1981
.]

would produce the full citation given in the footnote[2].

  • References may be printed in any style, as they occur or collected at the end. Currently formats meeting the style specification of any of the major sociology journals may be selected by specifying an optional parameter.
  • May be numbered sequentially, by name of author, etc.

Current Use

Finally, a couple of words about the current usage of the system. There are at this point about 25 active users from the Department of Sociology. This number is increasing steadily as more and more of the Faculty, Students and Staff in the department become familiar with the system. In the last two weeks the total amount of login time over 26 users was a little over 550 hours. The most active user had 109 hours (I don't know when that person sleeps) and there were nine users with over 18 hours each of use in this time. As indicated above most of the use is currently in the production of research manuscripts and in the creation and analysis of text files (most dealing with transcripts of verbal interaction, though one of the faculty members is currently analyzing the nature of scientific communication). Finally, at this point about 10 or 15 percent of the usage involves such system work as testing features of the system, fine-tuning the system to the needs of the department, and developing additional software that is of use for research being carried out by faculty and students in the department.

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2.   Burke, Peter J. and Donald C. Reitzes, "The link between identity and role performance," Social Psychology Quarterly Vol. 44, pp.83-92 (1981).

MORE ON WORD PROCESSING: WORD 11

This is a word processing program designed by Data Processing Design, Inc., for DEC computers using the RSTS/E operating system. It is currently "up" on the PDP 11/44 which was recently acquired by the Department of Political Science. This short report will describe the main features of the system, concentrating on applications that are of special interest in academic word processing.[1]

WORD 11 is a screen-oriented, menu-driven word processor. In the words of a previous contributor to this series, "What you see is what you get." However, it is also possible to display on the screen the text plus all the control characters which will not appear on a hard copy.

Most of the editing and formatting operations require two key strokes: you press the function key (the "Gold" key on the VT-100 terminal), and then a letter key on the main keyboard which signals the operation you want. Generally speaking, the operations are easy to identify from the keyboard symbol, as the following examples show:

Gold-B: position the cursor at the Bottom of the document.

Gold-T: ditto for the Top of the document.

Gold-P: insert a Page marker at the cursor (the printer will do a page eject at that point).

Gold-C: Center the line on the page.

Gold-D: cancels the Gold key (D is for "dead"; this is a useful function in case you change your mind).

Gold-5-R: Insert Ruler No. 5 at the cursor.

In word processing a "ruler" is an instruction which defines the margins and tab settings. In WORD 11 the ruler also determines whether the text will be single- or double-spaced. This feature allows you (for example) to shift back and forth, using a single command, between (a) double-spaced text with normal margins, and (b) single-spaced text with indented margins.

For the academic user, one of the advantages of word processing is the ability to edit a document using "electronic cut and paste." This allows blocks of text to be deleted or shifted to other parts of a manu-

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1. By "academic word processing" I mean word processing which is used for writing, re-writing, and editing monographs--as distinct from "administrative word processing," which is concerned with essentially secretarial chores.

script. In WORD 11, a block of text that is "cut" is stored in a "paste
buffer" until the user is ready to insert it. The system will handle 25
paste buffers simultaneously, and this is a useful feature in editing a
monograph. A paste buffer can also be used to transfer blocks of text
from one WORD 11 file to another. When you log off, the paste buffers
are lost. But any paste buffer can be saved, if you wish, by making it
a separate WORD 11 document.

WORD 11 does not have an automatic hyphenator. But the user has a
variety of options to deal with hyphens. You can insert a "ghost"
hyphen in a word which will appear only if the word is actually broken
between lines. There is a "hyphen pass" routine which reads through the
text and marks each line where the final word might need to be hyphen-
ated.

WORD 11 allows you to backtrack and strike over a character to insert an
accent or other mark. But as John Lombardi points out in the last issue
of the Newsletter, a line containing a strikeover will not be justified
at the right margin. WORD 11 has not solved this problem. (The best
solution would be for the printwheel manufacturers to provide the
necessary characters so that there is no need for strikeovers.)

The documentation is good. There is a reference guide which covers all
WORD 11 operations in detail, a user's guide written for the novice, and
also a smaller "pocket guide." I have found the pocket guide useful,
although it does omit some important information.

The system allows the user to define and store up to 100 special
functions. Each function is a series of key strokes which is activated
by Gold-n-U, where U means "User Defined Key" and n is the number of the
function assigned by the user. Many of the options available on other
word processors can easily be created with the U key. For example, WORD
11 does not come with a global search-and-replace function. But this
function is easy to create as a UDK. The user can also store print
instructions, rulers, and "library documents" which can be recalled and
inserted into other documents.

In computer jargon, WORD 11 is a "friendly" system. The menus describe
all the available options in fairly clear language. If you use the
"delete" command to purge a document, the system responds with "Are you
sure you want to delete [name of document]?" The user must answer with
"yes" or the document will not be deleted. The menu does not identify
the keys needed to perform a specific operation. However, miniature
decals are available which fit on the front of each key and identify the
editing function associated with that key.

WORD 11 comes with several utility programs which allow the user to do
such things as: display the print queue, remove a file from the queue
(if it is your own file), or copy non-WORD 11 files from disk or tape.
There are also several features which I have not used and cannot report
on. These features include a spelling dictionary and a report generator
which performs certain mathematical operations.

Some functions (such as moving the cursor) are performed by keys on the editing keypad. It takes experience to use this keypad correctly. On the editing keypad, the "Gold" key cancels a function. For example, you use the UNDERLINE key to underline text; Gold-UNDERLINE will remove the underlining. This use of the Gold key can be confusing for the new user. You may underline text when you thought you were removing under-lining. Some of my colleagues who have used WORD 11 find it incon-venient that the cursor is always on the last line of the text on the screen. WORD 11 will not display any line of text beyond the cursor.

Except for the last item, these shortcomings will probably not trouble the experienced user. The only skill required to use WORD 11 is the ability to type. I found that I needed only a little practice to be able to use WORD 11 to write a conference paper. I suspect that most writers who have a chance to use WORD 11 will find it a quite efficient system.

How does WORD 11 compare with WordStar (probably the most widely used word processor at IUB)? The design philosophy of the two programs is essentially the same. For preparing short documents (letters and memoranda) there is not much difference between the two word processors. For academic word processing, I believe that WORD 11 offers some signi-ficant advantages.

Footnotes. In WORD 11 you can insert footnotes in the text. When the document is printed, the system will number the footnotes consecutively, and place them at the bottom of the appropriate page. If any footnotes are shifted around or deleted while editing a monograph, WORD 11 will renumber the footnotes when printing.

Indexing. WORD 11 will prepare an index of a document, as well as a table of contents.

Re-formatting. If text is added or deleted in an editing session, WORD 11 will automatically re-format a paragraph to fill up spaces and provide even margins.

Printing. WORD 11 files can be printed on either a lineprinter or letter quality printer. The user needs only to specify the printer to be used.

Moving the cursor. If you are accustomed to WordStar, you would miss the ability to move the cursor in four directions. In WORD 11 the cursor can be moved by character, by word, by line, by paragraph, and by page--but it cannot be moved vertically except to the beginning of a line.

Aside from these technical points, the real difference between WORD 11 and WordStar is the difference between time-sharing and using a micro-computer. One obvious advantage of the DEC mini-computer is storage space for files. There is no need to rely on diskettes. The Political Science system has two disk drives with a capacity of 132MB, and a tape drive is on order.

On the other hand, "time-sharing" means terminal-sharing, too, and the WORD 11 user cannot always get access to a terminal. I think that most of us who have used WORD 11 have found this to be the most serious problem with the system.

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USER REPORT: THE EPSON MX-80 PRINTER

Some remarkable printers have appeared in the last couple of
years, but perhaps none has caused a greater stir than the Epson
MX-80.   When introduced, its price-performance ratio was enough
to make it noteworthy. It was one of the first inexpensive
printers to have a nine pin print head, and the first to make the
print head user replacable.   The MX-80 was reasonably fast,
sporting bi-directional printing and control logic which cut down
on non-printing head travel time. Finally, the need for high
quality text was met by using multi-strike printing. The result
was a printer which combined essential, deluxe and a few unique
features into an attractive, affordable package.

So well did Epson design this, their first printer, that several
firms have chosen to adopt the MX-80 into their product lines
rather than developing a low-end printer of their own. Examples
of such firms are Sharp, Heath-Zenith, and IBM. Surely a major
reason for this wide acceptance was the extraordinary Epson
reliability--Epson claims a failure rate of less than .5%.   But
the features themselves, even though over a year old, are quite
formidible, especially when amplified by the new Graftrax 80
graphics chips.   I have just added Graftrax to my MX-80. Later
on, I will discuss its features.

Externally, the MX-80 has a clean, attractive case which is well
made of heavy guage plastics. A chromed wire guide is provided
to keep ingoing and outgoing paper separated.   Choice   of
materials seems everywhere to be excellent; plastics, aluminum,
brass, and chromed steel each are used appropriately. Nowhere is
there any indication of corner cutting.   There is a general
feeling of solidity to the MX-80, coupled with an apparent
simplicity of design which should guarantee infrequent but easy
servicing.

Three buttons and four status lamps appear on the top panel. One
button allows the printer to be placed on or off-line. When
off-line, the other two buttons allow selection of form feeds or
line feeds; while a typewriter-style knob is provided to allow
manual paper advance, this may be used only when the printer is
switched off.   Depressing the line feed button while turning on
power will initiate a self test sequence during which the printer
will print its entire character set.   The lamps are used to
indicate power, paper out, on-line status, and readiness for
data.

Inside will be found a microprocessor and 2K of firmware.   This
is an intelligent printer, incorporating many advanced features.
Three expansion IC sockets are included which may be filled with
updates of firmware from Epson or from other sources. The new
Graftrax 80 package is one such firmware update.

A significant advantage of the microprocessor controlled MX-80 is
its optimized bi-directional print head control.   The printer
constantly seeks to reduce the time spent just moving the head
around; thus more time is spent printing and less in idle head

motion.

As mentioned, the print head has nine pins and produces nicely formed characters which have true descenders. My overall impression is that the print quality, while not the best dot matrix stuff around, is entirely acceptable. Better formed characters can be found, but at suitably higher prices.

Four print densities are available: 40, 66, 80, and 132 characters per line (5, 8.25, 10, and 16.5 characters per inch). These are related into two groups, with 40 cpl characters being double wide versions of the 80 cpl characters, while 66 cpl characters are double-wide 132 cpl characters. This can result in some very nice print effects, but there is one major limitation.

Print from the 40/80 cpl group cannot be mixed with the 66/132 line group on the same line, which is unfortunate. Frequently, I would line to insert a word of 66 cpl characters in an 80 cpl line. Also, a minor complaint: the Expanded mode, which prints 40 and 66 cpl characters, stays on for only one line at a time. This can get a bit old after a while. Most printers seem to execute wide characters in this way, but the reason for this design philosophy escapes me.

Two double-strike modes are available. One mode, simply called Double-Strike, strikes each dot twice as it is printed; this is intended to provide the extra impact need for carbons and multi-part forms. (This mode is not available in 66 or 132 cpl print densities. The manual indicates that it would tend to tear up ribbon, paper, and printer.) I rarely use this mode alone. More useful is an Emphasized mode which restrikes the entire line after first moving the paper up a fraction. This helps to fill in the dots somewhat, resulting in better formed characters. In the standard MX-80, double strike modes and standard print modes may not be mixed on the same line.

My favorite method of printing final drafts is to turn on both of these modes. Very nice text results, but the printing process is considerably slowed. A one page document which prints in just over a minute in Single Strike mode requires over four minutes with both Double Strike and Emphasized modes engaged. Not only is all of that double striking costly of time, but the bi-directional printing must be turned off to insure precise alignment of the restruck lines. For important documents, the results are quite worth it, however. All of my papers and memos for the last few months have been printed in this way without any complaints from the recipients.

In addition to the standard (U.S.A.) font, the MX-80 provides TRS-80 graphics characters and four other alphabets: France, England, Germany, and Japan. These other fonts are selected by switches inside the printer. While the switches are accessable from the outside, the power must be turned off before resetting them. This will make it hard to mix different fonts.

These switches are also used to configure the printer to various computers; this is necessary since some computers--such as the

Apple--automatically send line feeds with carriage returns, whereas others--such as the Atari--do not.

Most such features are manipulated by control characters and escape sequences which may be included in the output to the printer. This may be done, for example, with the CHR$ function in BASIC; also most word processors allow escape and control codes to be embedded in their text files. There are 15 Escape codes, although only 11 of these are readily available. Escape codes control such things as vertical and horizontal tabs, double strike modes, form length, and line spacing. Control codes change print density, and initiate such functions as line feeds, carriage returns, and top of form.

Some of these options I have been unable to use. For example, I have been unable to make the horizontal or vertical tabs function. The reason for this lies in the fact that the Apple will not send ASCII codes greater than 127. Such codes are required in order to activate many of the MX-80 features. (Incidentally, unlike some printers such as the DEC LA34, the Epson-Apple combination does function properly in response to the Applesoft TAB() function, so the loss of horizontal tabs is not too serious.)

Several solutions to the ASCII problem are available. The Tymac PPC-100 Parallel Printer Card ($139, Tymac Controls Corp., 127 Main Street, Franklin, N.J. 07416) allows the user to select the high half of the ASCII set with memory pokes. Also, Computer Corner of New Jersey (439 Route 23, Pompton Plains, N.J. 07444) will reportedly modify Epson or Apple parallel interfaces to allow the same control. Orange Micro, Inc. (3150 E. LaPalma Suite I, Anaheim, CA 92806) markets the Grapler, an interface which allows transmission of all ASCII characters and in addition contains firmware to facilite hi-res graphics dumps. Unfortunately, few of these solutions promise to work with any wordprocessor, since I know of none that can poke memory addresses.

Graftrax also allows access to the higher ASCII characters. Since this is manipulated by escape codes, this feature would be available with most word processors. Since most users will probably wish to own Graftrax anyway, this would appear to be the most cost effective solution to the ASCII problem. Graftrax is the only solution I know of that will function with a serially interfaced MX-80.

Many features, however, are readily available to the Apple user. I have mentioned the wide variety of print densities, and the double strike modes. Also available are variable line spacing and variable form length. Line spacing may be easily set to 6, 8, or 10 lines per inch. In addition, nonstandard line spacings may be selected by 72nds of an inch; that is to say, from one dot high to one line per inch.

So, the Epson MX-80 is far more than a stripped-down printer, suitable only for utilitarian applications. Unless one is trying to pretend that the printout came from a Selectric or a Qume, the print quality is quite acceptable and is certainly highly

legible. One potential disadvantage is the lack of friction feed for sheet paper. To get this feature, I suggest that the purchaser consider buying the Epson MX-80 F/T for about $100 more; the F/T has all of the features of the MX-80 plus interchangable pin feed and friction feed. I tried one of the adapter kits which is supposed to outfit the MX-80 for friction feed and did not find it satisfactory. It appears that the best way to go is to purchase friction feed with the printer if you expect to need it.

Graftrax 80

The Graftrax 80 option significantly enhances the functions of the MX-80. The foreign character sets have been deleted, but after that capability goes nowhere but up.

Installation is relatively easy. Graftrax consists of three EPROMs which must installed on the circuit board inside the printer. This is fairly simple and should take at most a half hour. However, anyone not used to handling integrated circuits should probably get the help of someone who is, since Epson makes no mention of procedures to replace chips damaged during installation.

Of course, dot graphics are now possible; you will, however, need to write or purchase software to actually perform the graphics dump. All Graftrax does is to allow the computer to control each pin of the print head independently. The control itself must be done in software. Software to accomplish this costs about $40. The Apple Pickers newsletter for October 1981 reprinted a machine language program which will perform a simple graphics dump. The graphics dump that follows this article was produced with this program.

There are actually two graphics modes. The 480 mode prints dots at normal spacing, while the 960 mode will overlap the dots horizontally. Thus, the 960 mode is capable of higher resolution, but it will also require much more sophisticated software. Programming for either of these modes is a bit involved; the Apple Pickers article will provide a good starting point for programmers just starting out with printer graphics.

Graftrax allows the MX-80 to backspace the print head. This allows underlining and double striking of composite characters such as slashed 7s or Zs. In more sophisticated printers, the head may be backspaced exactly one space. With Graftrax, the head is returned completely to the left upon a backspace; it then is moved right to the desired position. Talk about slow! But then, without Graftrax there was no underlining at all, so let's just count this as a mixed blessing. One other catch is that the Emphasized print mode cannot be engaged, since the paper will be moved up after each character, causing a long book title to trail off down the page.

However, since one is often underlining as a substitute for italics, the fact that Graftrax includes an italics character set helps to alleviate this problem. Italics may be used with all print styles and may be switched on and off in midline.

Further, with Graftrax print densities and modes may themselves be changed in midline. Now the user can insert darker or lighter characters for emphasis, or can mix in wider or narrower characters. Be aware, however, that software such as word processors may put limitations on your ability to use control characters. For example, Apple Pie will not let you embed control characters in text that is to be fill justified. If you want to use all of these features, be sure that your word processor will let you.

Many creature comforts are included. The original 3 second bell has been shortened to one third second. Instead of printing zeros that are just "squished" letter Os, slashed zeros may be selected. The user has the option of redefining the printer control codes if he doesn't like the ones Epson selected. Escape codes may be used to turn on or off the high bit of the input data. This eliminates many of the problems involved in using an Apple with the MX-80; now, for example, I can print TRS-80 graphics from my word processor. (See Figure 1. Please note that production of this figure required features of both Graftrax and my Tymac parallel card; Graftrax alone could not have mixed block graphics and text as freely as I have done.)

If I have a complaint about Graftrax, it concerns the documentation which assumes that the user is familiar with the manual shipped with the MX-80. The catch is that this manual, written by the same David Lien who wrote most of the TRS-80 manuals, is overly cute and generally deficient of clear instruction and information. Moreover, it is written specifically for the TRS-80 and is misleading, or downright wrong at times, for the Apple. A two page appendix is the sum of the material devoted to the Apple. Thus, one must occasionally experiment and guess in order to nail down a particular feature. Surely, Apple owners have purchased enough MX-80s to deserve a manual of their own. The Graftrax manual itself, while complete, is best read by fairly experienced persons; the newcomer to computers probably find it confusing.

Frankly, I would hate to live without Graftrax and wish that Epson would just include it as standard in the MX-80. As a guess, it seems likely that more users will require the underlining and other capabilities of Graftrax than the foreign alphabets which are standard. While this might result in a slight increased cost for the printer, it should result in a net savings for most users.

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Education 210

This is the standard print mode: AaBbCcDdEeFf12345#$%
Standard print, Emphasized mode: AaBbCcDdEeFf12345#$%
Standard print, Double Struck: AaBbCcDdEeFf12345#$%
Emphasized and Double Struck: AaBbCcDdEeFf12345#$%

Standard Print Produces 10 characters per inch
Or 5 cpi if Double Wide

Compressed Print produces 16.5 characters per inch which lets you get 132 characters per line
Or 8.25 cpi if printed in Double Wide

Graftrax allows you to print *italics* or to underline
You can also mix print strike modes on the same line.
That goes for mixing character sizes too.

With backspacing, print composite characters: 7 or Z
Also included are block style graphics:

Figure 1

Figure 2

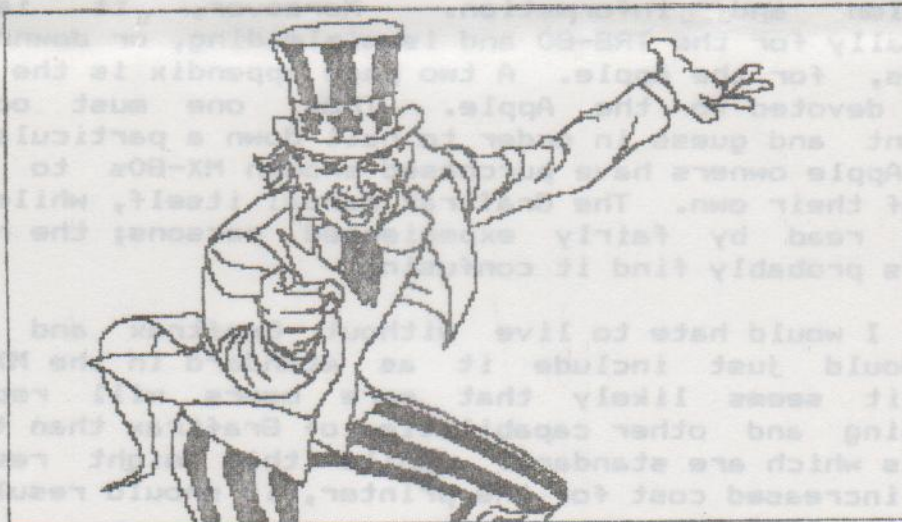Andrew L. Berentes
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EXTENDING PRINTER RIBBON LIFE

Some time ago a little item in Byte suggested a method of rejuvenating fabric printer ribbons. Well, I've tried it, and it works surprisingly well.

On most printers, only a small portion of the ribbon is actually used. While some ink diffuses from the unused to the used portions, most of it seems to stay where it started. This procedure uses a light lubricant to stimulate unused ink to migrate to the depleted areas. The recommended lubricant is aerosol WD-40.

Open up the ribbon cartridge, taking careful note of parts layout. My Epson cartridge ejected a little guide the first time I opened it, and some trial and error was required to fit it back in. Then spray the ribbon lightly with WD-40. The trick seems to be not in the quantity of oil applied but in the evenness with which it is spread. You can always go back later and repeat the treatment. Then set the ribbon aside for at least a day.

The result, while not so good as a new ribbon, is quite usable. It does take a few days for the oil to reach all areas of the ribbon, so don't be surprised if the first few uses produce uneven print density. Things should even out after the ribbon has rubbed around for a bit. While I have not done this more than once to any one ribbon, the article in Byte suggested that the treatment could be repeated four or five times.

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MORE THAN 64K RAM FOR THE APPLE II

Apple II microcomputer owners who want to increase their
random-access-memory (RAM) beyond the usual 48K should be aware of an
option which adds 64K at less than twice the cost of many of the 16K
boards now on the market. Besides providing space for user-written
machine language routines, the Legend Industries 64KC board is available
with an optional software package called Disk Emulator. This will
transfer one-half of a DOS 3.3 disk into each 64K board where the
programs/files may be accessed almost instantly.

The standard Apple II memory configuration contains 48K of RAM on the
motherboard. The top 16K (hex addresses $C000-$FFFF) are dedicated.
The first 4K ($C000-$CFFF) are the addresses for the seven I/O slots
used for peripheral options, such as disk drives and printers. The
other 12K is used for either the Integer or the Applesoft (floating
point) Basic. These are on read-only-memory (ROM) and may be switched
between by software.

When Apple Computer, Inc., introduced their Pascal the 48K of RAM
limited the compiler and program size. During the use of this language
the ROM memory space containing Basic is wasted. So Apple designed the
Language Card, a memory card which is placed in slot #0 and which
contains 16K of RAM in the form of eight 16 kilobit chips. Special
hardware and software permits using both a full 64K of RAM and the 4K of
memory mapping for the I/O slots. To accomplish this there are two
banks of 4K starting at address $D000 leaving the 4K at $C000 for the
I/O. Pascal and Basic users are unaware of these internal
complexities.

The introduction of the Microsoft Z-80 microprocessor interface card for
the Apple II created a demand for a 16K RAM card to allow running large
CP/M programs. Prior to that time Apple had sold their Language Card as
part of a Language System package which included Pascal and sold for
about $500. Since then numerous firms have started selling 16K RAM
cards, without Pascal, at prices from $135 to $195. More recently some
firms are selling 32K RAM cards for about $250. These have either 8 or
16 memory chips with 16 kilobits each.

In October 1981 Legend Industries of Pontiac, Michigan, started selling
their 64KC board which contains eight of the new 64 kilobit RAM chips on
a card which appears similar to the 16K RAM cards. This sells for $349
and comes with supporting software and a users manual. (Hardware and
software distributed by: Great Lakes Digital Resources, P.O. Box 32133,
Detroit, MI 48232)

The 64KC board can be used interchangeably with the usual 16K RAM
boards. The modified DOS 3.3 which is supplied, called Memory Master,
has several special features. These include the ability to put the DOS
software on either a 16K RAM board or in one of the four 16K banks of
the 64KC board. By moving this code out of the bottom 48K, the user has

an additional 10K of memory available for Basic programs.

As an illustration of the utility of the 64KC board, the supplied documented software includes machine language code which loads eight 8K binary files of digitized pictures (the old Apple Slide Show) from disk into the 64K of RAM. These are then moved rapidly in succession to the Hi-Res area of the bottom 48K of RAM, a dramatic demonstration of the rapid availability of this 64K.

Machine language programmers can access subroutines and data arrays in this upper memory, but it requires attention to details as to which 16K bank is being accessed as the upper 16K of the Apple's normal 64K of address space. Furthermore, it must not be forgotten that there are two 4K subbanks having the same address at $D000-$DFFF since the first 4K is the memory-mapped I/O. The documentation will be understood by anyone capable of writing machine language code.

The easiest way to make use of the full 64K is to purchase the additional software package called Disk Emulator. This allows a single 64K card to become a selected disk slot/drive with a very rapid access time. One card will handle one-half the capacity of a single Apple DOS 3.3 diskette. Two cards, which would be accessed as two drives, handle the full capacity of a single diskette. As many as six 64KC cards may be in the Apple at once, giving almost instant access to over 300K of characters.

The Disk Emulator makes it easy to bootstrap in a turnkey program which moves all files from a disk into the upper memory and then chains to an initial menu program. The menu can rapidly call in any of the remaining programs or data files just as if they were on a disk. Upon conclusion all files may be moved back to diskette for a permanent copy. All of this can be done without machine language routines, just in the normal way that disk files are run and saved.

Although there is not yet a disk emulator for CP/M on the Apple, when one is written, it will materially speed up compiling and wordprocessing which contain many disk accesses -- without the mechanical wear.

In conclusion, it must be emphasized that the additional memory is not contiguous. Rather the top 16K is switched in a bank at a time. This means that software must be broken up into segments or subroutines. Machine code routines can easily navigate between the different banks. Loaders for use with compilers are not currently capable of making full use of this space. If a combination of programs and data files can function using a floppy disk, the 64KC board(s) and Disk Emulator will do it faster without requiring programming skills.

James E. Randall
Medical Sciences Program

EXIDY SORCERER PART 2

This is the second in a series of articles concerning the Exidy Sorcerer computer. This time we'll discuss the virtues of the Sorcerer word processor and compare it to several other familiar programs for other machines.

I purchased the Sorcerer computer in 1978 with the intention of buying word processing whenever it would be available. At the same time I bought the IDS IP-125 line printer with upper/lower case and expandable print styles. In the fall of 1980 the word came that Exidy indeed had developed a capable word processor for a reasonable price of $190.00. Needless to say, I purchased the program in short order. I was not disappointed, the long wait was worthwhile. Since that time I have used my Sorcerer for little else.

General Features

Allow me to review a bit of my last article describing some of the features of this machine that lend themselves to the word processing function. The following comparison table illustrates the difference between the Sorcerer, Apple and TRS-80 Model 3.

Function	Sorcerer	Apple	TRS-80
Lower Case	Yes	Extra	Yes
Video Display	30 X 64	24 X 40	16 X 64
Shift Lock Key	Yes	Non-normal	No
Parallel Port	Yes	Extra	Yes
Serial Port	Yes	Extra	W/Disk
Numeric Keypad	Yes 16	No	Yes 12
ROM Pacs	Yes	No	No
Programmable Graphics	Yes	Yes	No

The Apple can be equipped similarly to the Sorcerer at extra cost. Forty column video is its biggest drawback. The TRS-80 only displays sixteen lines but is better equipped with standard features.

The Sorcerer word processor is contained in ROM and housed in one of Exidy's removable ROM-Pacs. As far as I can tell it is the only word processor for a personal computer that has this feature. I have heard rumors that the Radio Shack Color Computer will use ROM for word processing. Compare the start-up procedure for the Exidy with the word processor of your choice. Most require loading an operating system, initializing, ect.... The Sorcerer requires that you turn on the power and "presto", you are ready to go. With the word processor in ROM, te entire amount of user memory is available for text. Therefore, with only a 32K machine the Sorcerer has more usable memory than a 48K Apple or TRS-80 using disk.

The Edit Mode

Two modes of operation exist in the Sorcerer word processor, command and
edit. The edit mode is used to enter and modify text on a rather micro
level. Edit commands use one keystoke only and are contained on the
Sorcerer's numeric keypad. Compare this with the two, three or four
keystrokes needed to set anything done in WORDSTAR, SCRIPSIT or
PIE+FORMAT. The edit commands follow the KISS principle of keeping it
simple. See Figure 1 for the layout of the commands on the numeric
keypad. The Sorcerer does not provide a key for everything under the
sun. Instead the basic functions of insert, delete, cursor control, soft
hyphen, indent, clear, and mode change are provided on the keypad. Nine
other commands relating to printer control and macroprograms are entered
into the text with screen visible graphics characters created by
pressing the GRAPHIC key and the appropriate number. Underlined or
boldfaced text appears in reverse video on the screen. The cursor
appears as a blinking white box. Characters under the cursor appear in
reverse video. The programmers have used the Sorcerer's graphics to
create an entire character set in reverse video.

INDENT	CURSOR UP	
EXPAND	CURSOR LEFT	CURSOR RIGHT
SCAN	CURSOR DOWN	
MODE	SOFT-HYPHEN	CLEAR	DELETE

Figure 1. Edit Commands on Numeric Keypad

The Sorcerer word processor is screen oriented. 29 lines of text appear
on the screen with a command line at the top. The command line contains
what mode the processor is in, the line number of the cursor and the
column number of the cursor. Both the line and column numbers are
updated as the cursor is moved through the text. The cursor does not
move up and down the screen but rather stays at a fixed level on the
middle line. The text is scrolled upward and downward instantaneously to
provide vertical cursor movement. In this way the text before and after
the cursor is always displayed. Eye strain is reduced due to the fact
that the viewing level is always at the same place on the screen.

Any line length from 15 to 132 characters can be specified. For line
lengths greater than 64 characters the text window instantaneously
shifts right when the cursor reaches the right side of the screen. The

window shifts far enough that the right margin is visible after the shift as a column of dots on the right side of the screen. Usually the shift leaves about 15 columns of text on the left so that the immediate context of what you were typing can still be viewed. This function happens so fast that you won't catch it as it happens. A key is provided on the keypad to shift quickly from left to right margin. This key will also affect the window function and will cause the shift to occur for viewing text on the right side of te window. Tabs can be set at any interval even if the line length exceeds the screen size.

The Command Mode

The command mode can be reached by using the mode key on the keypad. Press once and you are in the command mode. Press again and you return to edit. All commands are entered on the command line at the top of the screen. The popular commands are all present including line or block delete, print formatting, setting line length of screen, search and replace, save and load files, print text, hold text, insert text, cursor movement, enter the Sorcerer Monitor, autocommand and macrocommand.

Autocommand allows the user to create a list of commands to be executed in order and repeated a certain number of times. This is very useful for special printing needs. Macrocommand allows the word processor to be programmed with a program of commands up to 512 characters long. Since most commands are only a few characters long, very powerful programs can be created. Macroprograms provide the Sorcerer with the flexibility that costs extra with WORDSTAR and other word processors. For example, most of the functions of the MAILMERGE utility with WORDSTAR can be simulated using a macroprogram.
The Sorcerer word processor will write files on cassette tape or any of four CP/M disk drives. CP/M is not included in the ROM nor are the disk drivers. The disk drivers are available from Exidy and CP/M is available for a variety of Sorcerer/disk configurations. The cassette drivers include motor control which makes it easy to read and write files while using a macroprogram.

Printing

A variety of print drivers are included in the ROM including Centronics parallel, Diablo serial, Qume or other serial ASCII printers and RAM patchpoints for custom print drivers. Virtually any printer can be interfaced to the Sorcerer with the proper custom print driver. All of the special features of the Diablo printer are supported such as boldfacing, underlining and proportional printing. Print options for use with any printer include margin settings, page titles and numbering, right justification, column printing, carriage returns per line, character size and line length. The command to print is line oriented which makes it easier to print a variety of formats. Printing can also be controlled by graphic "marks" placed in the text as stop points. Finally, the printing can be controlled by a macroprogram which allows for a huge variety of print formats such as two or three columns of text on a page or margins form letters with address lists.

The power of the Sorcerer word processor is significantly affected by

choice of Printer. Without a custom print driver a variety of features will not work on a given printer. Fortunately, many of these problems can be solved with an inexpensive overlay program called WORD PAC PLUS from triangle Systems in Columbus Ohio. The small machine code program loads in the top of RAM and provides many new features such as support for most popular printers, auto centering, decimal formatting, subscript, superscript, shadow, boldface, alternate page headers and footers, and column math with 16 digit precision and 26 registers. The program costs $49.95 and is worth every penny.

Accessories

Many individuals here at IU use micros to communicate with Wrubel and the Prime. Quality Software offers a program called SMART TERMINAL which provides for true intelligent terminal functions such as block transfer of ASCII files, printing, saving files on tape, changing baud rates and modifying hookup parameters. Files can be transferred to and from the Sorcerer word processer and the SMART TERMINAL. The program works with almost any modem through the RS-232 port. At a cost of $49.00 it's a steal. The savings in connection time to the SOURCE would easily pay for the software and part of your computer in a short while. Long files can be dumped onboard and reviewed at your leisure using the word processor.

Unlike other word processors, the Sorcerer version cannot be used to edit Sorcerer BASIC. This is due to the fact that word processor files are ASCII and BASIC files are compressed with single character commands and functions. This is not a big drawback due to the fact that several companies offer editors for BASIC that use the same edit keys as the word processor. The best of these is SYSTEM 3 from System Software in Australia.

Final Notes

The Sorcerer word processor is a capable program implemented on a most capable machine. It will do almost anything that other word processors will do with a simplicity that is enviable. It is the only program of its kind that is contained in ROM. It is probably the lowest price program in its capability class when you consider it only costs $190.00 and provides features usually found on disk based programs. By the way, the Sorcerer itself is lower priced feature for feature than the Apple, TRS-80, PET and other micros.

Many people have been writing off the Sorcerer computer due to a dismal level of support from Exidy and a variety of other problems including a very weak local marketing effort. Things are beginning to look a lot brighter. Exidy Systems (new name) has just introduced a new hard disk networking system using the Sorcerer as the elemental unit. Its called Multi-Net 80, has a minimum of 35 megabytes of Winchester storage, 16 station capability, runs MP/M, CP/NET, CP/NOS, and in general looks like a very capable little machine. Details are very sketchy right now, more on this in a later issue. See November Creative Computing page 131 for latest Exidy ad.

John Dodrill
Real Estate Department

BOOKS OF INTEREST ON SMALL COMPUTERS

The increased interest in small computers has generated not only a proliferation of software but also an explosion of books. Everyone is publishing something on small computers from cookbooks for Basic to highly technical programming manuals. This section of the Newsletter is designed to bring some of the more interesting items to your attention. If you have other books that should be mentioned in this column, please send a short note to the editor including the title, author, price, and place of purchase, along with a brief review of the book's merits. We will publish these notes as space permits.

Starting FORTH by Leo Brodie of FORTH, Inc., Prentice-Hall, 1981, $15.95 (The Data Domain).

This is an outstanding introduction to the Forth language which belongs to that class of computer languages known as threaded interpretive languages. The book is essentially a tutorial and description of the Forth system with special reference to polyFORTH. The book assumes very little previous knowledge about computers or programming and includes many examples and programs to illustrate the major points. The book is written in a clear and careful style and is the best book I have yet seen on Forth.

Computer Programs in Basic by Paul Friedman, Spectrum Book, 1981, $10.95 (The Data Domain).

With the many public domain programs available in magazines devoted to small computers, a guide such as this is quite handy. Divided into sections focused on business, finance, games, mathematics, science, and education, the book lists over 1600 programs. Each entry includes the location of the program, a short description of what it does, an indication of the hardware required, and a note on the kind of Basic used. The programs come from such journals as Byte, Compute, Creative Computing, Dr. Dobb's Journal, Interface Age, Kilobaud, Micro, Recreational Computing, Personal Computing, and '68' Micro Journal. Many of these programs are included in computer club libraries, but this guide is a most useful way to find out what is available.

Apple II Word Processing, Business Software Evaluations, Que Corp., 1981, $19.95 (The Data Domain).

This book is a comprehensive survey of wordprocessing as it relates to the Apple II computer. Although the book is focused on the Apple, much of what is there about wordprocessing is generally applicable. The text assumes no prior knowledge about computing, Apples, or wordprocessing. It has an excellent section on the limitations of the Apple II and on the various solutions devised to get around those limitations. In evaluating various programs, the book demonstrates a healthy respect for the importance of personal preference and style in the selection of a wordprocessing program. The evaluations are generally good covering the

following programs: Apple Writer, EasyWriter Pro, Magic Window, PIE/Format, Selector, Spellbinder, Super Text II, VTS-80, WordStar, and the spelling programs, MicroSpell and Spellguard. There is also a brief discussion of printers. The book is an excellent introduction to Apple wordprocessing.

Local bookstores with unusually good stocks of books on small computers:

   IU Bookstore
   The Data Domain
   B. Dalton (College Mall)

J.V. Lombardi
Editor

STANDARD PAGE FORMAT FOR SCSG NEWSLETTER

Introduction

The Small Computer Support Group Newsletter will be accepting articles in camera-ready form. This change will make possible the presentation of articles that demonstrate the capabilities of various word and textprocessing programs and the characteristics of a variety of printers. To give the Newsletter a reasonable appearance the following guidelines should be followed whenever possible. Variations are always possible, of course, but these guidelines establish the standard format for the Newsletter.

Newsletter Page

The Newsletter's page will have the following characteristics:

    line length: 72 characters
    character pitch: 12 characters inch
    line pitch: 6 lines per inch
    page length: 58 lines per page
    preferred typestyle: Qume Letter Gothic 12
    margins: justified margins preferred

Titles and Subheads

Newsletter articles will each begin on a new page. The title should be on line 7, centered, all caps, underlined, and followed by two blank lines.

Subheadings within the article should be left justified, upper/lower case, underlined.

Spacing

Text should be single-spaced, block format with no indent for paragraphs, one-blank line between paragraphs.

Author's Name

Articles should be signed at the end in block format, left justified as follows:

First Middle Last
IU Department or School
Campus Address

Paper, Ribbons, Typefaces

Articles should be produced on white, 8-1/2" X 11", plain paper without page numbers.

Type faces other than the Letter Gothic recommended are acceptable, especially if the article is demonstrating special printer capability or is produced on a dot-matrix printer. The final, camera-ready, article should be produced with a new, black ribbon.

Adherence to these format standards will make the production of the Newsletter much easier and the appearance of the publication much better.

J.V. Lombardi
Editor
Bryan Hall 205

If you received this Newsletter you are on the mailing list. If you or a friend would like to be put on the mailing list, please send the form below to the editor.

Name_____

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Special Interests_____

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Small Computer Support Group
NEWSLETTER
Bryan Hall 205 IUB

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