

The ACSS

# Newsletter

University of Minnesota  
Twin Cities  
March 1986

## Computing Reflections

### **Another Column: The Macintosh and Human Factors**

*Lawrence Liddiard*

I have promised to write a computing column every month for the next year, my twenty-sixth with the University. You might ask why another columnist has taken up microprocessor to inflict his views upon a captive audience.

There are three answers to that question. First, computing at the University is changing: Over the next several years, a time-sharing,

centralized, and departmentalized service combined with stand-alone microprocessor computing is going to be transformed into workstation-based computing, interconnected by local area networks (LAN's) and data-switched phones to other workstations and special-purpose computing centers. A number of issues need to be discussed during this period of change.

Second, numerous University committees have taken up the issues of computing policy, resource allocation, planning, telecommunications, and funding. The recommendations of these committees deserve analysis and broader dissemination.

Third, I believe that academic computing centers should give advice, promulgate policy,

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## Attention All Users

### **General Users Meeting**

There will be a General Meeting for all ACSS users on March 20, Thursday, from 2:00 to 4:00 p.m. in 337 Coffman Memorial Union (the Mississippi Room).

ACSS Acting Director Michael Skow and Deputy Director Lawrence Liddiard will present the direction of ACSS for 1986 -1987. There will then be a period for questions followed by a discussion period to give users an opportunity to talk with staff regarding their computing plans.

We encourage all users to attend.

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implement constructive suggestions, and answer criticisms.

This column is one contribution toward accomplishing these things.

### Workstations and the Future

After my November *Newsletter* article, "Selecting a Microcomputer: An 18-Month Adventure with the Apple Macintosh," I received a letter, addressed to the *Microcomputer Newsletter* and me, suggesting that ACSS favored the Apple Macintosh and neglected the ever-popular IBM PC. Mark McCahill, the editor of the *Microcomputer Newsletter*, replied, showing that his publication had given fairly equal coverage to the IBM PC and the Macintosh between July 1985 and January 1986.

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**U of M computing will be transformed into workstation-based computing, interconnected by LAN's and data-switched phones to special-purpose computing centers.**

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I believe that it is ACSS's duty to continue to support the excellent computing systems we have provided in the past, such as the CYBER systems with their fast scientific computation using large exponent ranges, and IBM PC's

with their open architecture, permitting expansion with other vendor's circuit boards. Meanwhile, we also have the responsibility to offer new systems to our users to improve our services. Recently, for example, ACSS installed a VAX 8600, because its scientific computation now matches the previous CYBER's exponent range standard and there is a broad selection of excellent software available for it.

As good as all these computers are, however, the systems that will dominate workstation computing in the future will, I believe, be *graphics-based*, unlike these previous *text-based* systems.<sup>1</sup> That is, instead of typing in commands and parameters to communicate with computers, you will manipulate images (or *icons*) on the computer screen—as you do now, for example, with the Apollo workstation, the Macintosh, and some other recent micro systems.

### Some History: XEROX PARC

The concept of the powerful personal workstation was originated, perfected, and implemented at the XEROX Palo Alto Research Center (PARC) in the 1970's. Out of this center came the concepts of Ethernet, SmallTalk, the mouse, pull-down menus, and multiple windows, all combined with large memory, bit-mapped graphics, and fast processor(s) in a single-user desktop system. To experience how exciting it was to use this new machine, we quote Pascal's inventor, Niklaus Wirth, who encountered the system in the mid-1970's during a sabbatical year at PARC:

*Instead of sharing a large, monolithic computer with many others and fighting for a share via a wire with 3KHz bandwidth, I now*

*used my own computer placed under my desk over a 15MHz channel. The influence of a 5000-fold increase in anything is not foreseeable; it is overwhelming. The most elating sensation was that after 16 years of working for computers, the computer now seemed to work for me. For the first time, I did my daily correspondence and report writing with the aid of a computer, instead of planning new languages, compilers and programs for others to use.<sup>2</sup>*

Wirth seems to have been particularly impressed with using "the new high-resolution bit-mapped display and the small miracle called *Mouse* as a pointing device."

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### **Graphics-based systems will dominate computing in the future.**

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These ideas from PARC spread to other computer manufacturers—especially Apple, who initially brought out the Lisa systems and then followed with the popularly priced Macintoshes in 1984.

### Human Factors

It was recently reported that Carnegie-Mellon University had at least 4200 personal computers in use among 5400 students and 500 faculty members.<sup>3</sup> Some 2000 were IBM PC's, XT's, and AT's while another 2000 were Macintoshes. Seventy percent of the IBM's were donations or institutional purchases and 30

percent were purchased by individuals. The percentages were reversed for the Macintosh: When they were spending their own money, individuals preferred to buy graphics-based rather than text-based systems for their personal use. In the first year and a half, the micro discount program at the University of Minnesota has delivered at least 4400 personal computers, with approximately the same percentages and splits.

To explain what makes a graphics-based system so attractive, I'll borrow a set of concepts from Bob Stuhl, who summarizes them like this: "We will use the acronym TROPICS, which stands for *transparency, resilience, orientation, productivity, integrity, control*. The S, of course, is reserved for future use. Each of the TROPICS categories describes a quality that is important to software usability."<sup>4</sup>

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### **Wirth was particularly impressed by the high-resolution display and "the small miracle called Mouse."**

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The Macintosh's **transparency** results from the icon-based operating system that quickly allows the new user to do "real" work rather than concentrate on how to use the software. Following Apple's prescribed design, the commands on the menus, such as CUT, COPY, PASTE, and INSERT, have consistent actions and results across all the software—word

processing, spreadsheet, graphics, and data base programs. Its **resilience** resides in the system's ability to "watch" users in two dimensions (as they move the cursor across the screen with the mouse) and, through the well-organized menus, anticipate the user's needs and purposes.

Stuhl's category of **orientation**—answering user's questions such as "What can I do from where I am?"—is answered very nicely by the Macintosh's pull-down menus, in which the currently active options are shown in bold type and the inactive options appear at half intensity. The orientation question "Where am I?" is answered by a blinking cursor or the mouse's symbol, while the question "Where can I go?" by the mouse-manipulated window bars and pointer symbol. **Productivity** is enhanced by short, easily remembered pull-down menus for casual users combined with consistent keyboard commands (usually requiring just two key-strokes) for expert users. Most prompts and error messages suggest steps that the user might take next.

The Mac accomplishes **integrity**, the preservation of the user's work, in a number of ways: by requesting the user to confirm potentially dangerous actions (e.g., the final request confirmation before the permanent file copy is updated with the latest changes), by the UNDO command, and by selective help options for packages. With the mouse, graphic windows, and interruptible long operations, the Mac user not only *feels* but *is in control* of the computer.

Thus the most "user-friendly" computing interfaces in the next several years will be based on

systems like the Macintosh. If you are designing research or instructional computing programs, I believe that the clarity and effectiveness of graphics-based systems are the best path to excellence.

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**When spending their own money, individuals preferred graphics-based to text-based systems for their own use.**

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Next month I'll write about Seymour Cray's machines and parallel processing.

### **Notes**

<sup>1</sup> On this topic, see also Cary Lu's "The State of the Micro," *High Technology*, January 1986.

<sup>2</sup> Niklaus Wirth, "From Programming Language Design to Computer Construction," 1984 ACM Turing Award Lecture, *Communications of the ACM*, vol. 28, February, 1985.

<sup>3</sup> Dennis Livingston, "Computerizing the Campus," *High Technology*, November 1985.

<sup>4</sup> Bob Stuhl, "Friendly mainframe software guides users toward productivity," *Computerworld*, February 3, 1986.

# Using the Laser Printers: The PRINT Command

Parker Johnson

ACSS has recently installed a new laser printer at the Lauderdale location, and another will soon be operating in Lind Hall. As announced in the February *Newsletter*, these laser printers will become the default printers for all CYBER jobs; all printed CYBER output will come from these machines unless you specify otherwise. You can continue to use the NOS 2 ROUTE command as you have in the past to get your output printed. In addition, ACSS has installed a new PRINT command on all three CYBER machines to help you take advantage of the special capabilities of the laser printers. The PRINT command now works for files printed at Lauderdale, and will also work on the laser printer to be installed at Lind Hall. More information about the Lind Hall printer will appear in next month's *Newsletter*.

Using the PRINT command, you can now get output oriented either horizontally or vertically on the page (landscape or portrait), 66 or 88 lines per page, single or double-sided printing (simplex or duplex), three-hole punched paper, output shifted one-quarter inch to allow for the three-hole punch, lines at intervals across the page, and reduced printing (about 50 percent). If you want to use any combination of these printing options, you should use the PRINT command.

If you PRINT in portrait mode with 66 lines per page, you are limited to 90 printing characters per line. In portrait mode at 88 lines per page, you may have 102 printing characters per line. In landscape mode, or with reduced output, you may have 136 characters per line. Lines longer than these will be truncated.

The ROUTE command is still the usual way to get printed output, but your output will now be printed by default on the laser printer, on 8 1/2 by 11-inch plain paper, one-sided, in landscape mode, with 66 lines per page. You may not ROUTE a file with 88 lines per page to the default laser printer. If your file has 88 lines per page, you must use PRINT or else you must ROUTE the file to a conventional printer. Also, if you need multiform paper, colored paper, or special forms for your printing, you have to contact the ACSS Services Supervisor (638-0522) to set up the forms code, and you will use the ROUTE command with that forms code to get your file printed.

**Note:** If you want to print output on a line printer, on the familiar 11 by 14-inch computer paper, you now have to specify FC=LP on the ROUTE command.

Getting output from the VAX is not affected by the installation of the new printers. VAX users still get output from a conventional line printer or from the Xerox 9700 printer as before, with the VMS commands PRINT or ENQUEUE.

## Format

The PRINT command has all the parameters of the ROUTE command, excluding DC and FC, plus the options for special printing on the laser printers. The format of the PRINT command is

*print, filename, options*

where *filename* is the name of the file you want to print. (This is required.) The *options* are listed below. Where two options are given, the second is the default value. You can explicitly select these defaults by including them in your PRINT commands, or implicitly select them by omitting the option from your PRINT command.

<b>DEF</b>	defers the routing until the end of your job; the default is that the printing is not deferred. This option does not work with the <b>EC=A9</b> parameter.
<b>EC=xx</b>	specifies the "external characteristics" of the file. The two possibilities are A6 (uppercase only) and A9 (upper and lowercase). The default is A6.
<b>REP=n</b>	specifies the number of repeated copies printed (use only when printing at site BC); the default is 0.
<b>UN=xx</b>	specifies, with a 2-character site code, the site at which your file will be printed. The default is BC. Lind Hall, site EA, is currently the only other option.
<b>UJN=xx*xxx</b>	specifies, with a site code and bin number, the site and bin to which your output is delivered. The site codes and bin numbers of each site are listed later in this article.
<b>88, 66</b>	specifies 88 or 66 lines per page; the default is 66 lines per page.
<b>P, L</b>	specifies "portrait" or "landscape" output; the default is "landscape."
<b>D, S</b>	specifies duplex output (printed on both sides of a page) or simplex (printed on one side); the default is simplex.
<b>B, NB</b>	specifies bars across page; the default is no bars.
<b>3P, NP</b>	specifies three-hole punched or plain paper; the default is plain paper (NP-No Punch).
<b>SH, NS</b>	specifies output that is shifted for three-holepaper or not shifted ; the default is not shifted.
<b>R, N</b>	specifies reduced or normal output; the default is normal.

You still use the **UJN** parameter to have output delivered to a specific bin at either site. Open bins at Lauderdale are numbered 97 to 144; open bins at Lind Hall are 401 to 448.

### Invalid Combinations

Certain combinations of output parameters are not valid on the **PRINT** command. For example, the printer can only reduce the output for landscape pages. If you select incompatible parameters, you receive an error message. The invalid parameter combinations are listed below:

<u>Invalid combinations</u>	<u>Explanations</u>
<b>R, P</b>	Reduction only works for landscape.
<b>R, 88</b>	Reduction only works for 66 lines per page.
<b>B, P</b>	Lines can only be drawn in landscape mode.

### Examples

In the past, when you used a **ROUTE** command to get your CYBER text file called MYFILE printed in upper/lower case on a conventional line printer at the Lauderdale site, the command looked

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something like this:

```
route,myfile,dc=lp,ec=a9,un=bc,ujn=ea*436
```

This command will now produce output on 8 1/2 by 11-inch plain paper, one-sided, in landscape mode. Your output will be printed at Lauderdale and delivered to bin 436 in our Lind I/O station.

If you wanted to print the same file in portrait mode, on three-hole punched paper, shifted to the right, and double-sided, you would use the following PRINT command:

```
print,myfile,ec=a9,un=bc,ujn=ea*436,p,d,3p,sh
```

If MYFILE is a long output listing, you might want to reduce the image, and print it duplexed on three-hole punched paper, both to reduce the bulk of the listing and to place it in a three-ring binder. The PRINT command would look like this:

```
print,myfile,un=bc,ujn=ea*436,3p,sh,r,d
```

You should note that the carriage control characters R, S, and T in column 1 of a line will keep the rest of the line from being printed. Other carriage control characters recognized by the laser printer are 1 (page eject), + (overprint), - (triple-space), and 0 (double-space).

### Costs

You will be charged 4 cents per image printed on the laser printers. This is an increase of 1/2 cent over the present conventional printer rate of 3 1/2 cents per page. An image is defined as the printing on one side of a page. Thus, users with output of 10 duplex pages will be charged for 20 images.

### Documentation

This same information is now available on-line as `writeup, print` on all CYBERs.

VAX News

## VMS 4.2 Conversion To VAX 8600

*Marisa Riviere*

As previously announced in our Newsletter, ACSS will soon upgrade its VAX/VMS system from the present VAX 11/780 running VMS operating system version 3.6 to a VAX 8600 running VMS version 4.2.

The target date for the upgrade is April 15. Starting March 1, ACSS

will offer a limited VMS 4.2 service on the VAX 8600 while continuing its VMS 3.6 service on the VAX 11/780. Initially, this service will be the standard VMS 4.2 system provided by Digital. The ACSS additions to VMS (currently available on the VAX 11/780) will be transferred to the VAX 8600, and be available later in March as

they are converted. VMS 3.6 service will **not** be available after April 15.

All users' accounts and files—with the exception of supercomputing front-end accounts—will be transferred to the VAX 8600. (The VAX 8600 system will not be a supercomputer front-end.) Your

passwords on the VAX 8600 will be the same you are using on the VAX 11/780 at the time of the transfer.

We expect that jobs you run on the VAX 11/780 will cost 20 to 30 percent less on the VAX 8600.

Not all the software available on the VAX 11/780 will be transferred to the VAX 8600. A major system upgrade like this one and the overall change in the function and purpose of our VMS service implies that some software will be discontinued.

#### **Discontinued Software**

The CRAY-1 station will not be available as part of ACSS VMS services. REI (Research Equipment Inc.) will assist CRAY-1 VMS users in converting to other REI front-ends. The ARPANET Communications Network, used to support NSF CRAY-1 users, will also continue as a UNIX front-end for the NSF users on the CRAY-2.

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**We will transfer all accounts and files except super-computing front-end accounts to the VAX 8600.**

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The MNCORE Metafile system will not be available. The ISSCO graphics packages, DISSPLA and TELLAGRAF will still be available, but will no longer be interfaced with the locally-produced MNCORE software. The PRINTRONIX dequeuer, which supported only MNCORE metafiles, will also be

discontinued.

The UNITY subsystem used mainly for system maintenance will be discontinued. ACSS plans to offer a UNIX system on the VAX 11/780 after we have completed the 8600 upgrade.

The ACSS VMS queues available on the VAX 11/780 as well as the ENQUEUE command will be reviewed. The only queue mechanisms we will transfer to the VAX 8600 are those for the CALCOMP, SPINWRITER, and X9700 queues. We will add other VAX 8600 queues when different output devices become available on the new mainframe.

#### **Compatibility**

Although VMS 4.2 is supposedly upward-compatible with VMS 3.6 (the version of VMS now offered on the VAX 11/780) we encourage all VMS users to take advantage of the March 1 to April 15 test period to test their programs on the new system. A change to new versions of compilers (FORTRAN 4.3, Pascal 3.0, and COBOL 3.2) may also require some programs to be compiled and linked again.

#### **New Software**

Several new pieces of software will be available on the VAX 8600 system, such as: LSE, a language sensitive editor; ALL-IN-1, an office automation package; DECSPELL, a spelling utility; and DECTALK, an application for telephone voice messages. In addition to Precision Visual Inc.'s DI-3000 and Metafile System graphics software, we will add the Grafmaker, Contour, and PicSure packages. Several data base packages and languages are also in our plans; new languages planned for the 8600 include VAX Common LISP, OPS5, and ADA. ACSS has also applied to be a

"server" on the national BITNET network. Descriptions of all the new products will be presented on-line and in future issues of this Newsletter.

#### **VMS 4.2 Help**

An abridged VMS 4.2 HELP library is now available on the VAX 11/780; you can access this library by typing the command

**v4help**

while logged on to the VAX.

Although this library describes only Digital Command Language (DCL) commands, it can help users obtain information on new commands and new parameters for existing version 3.6 commands.

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**We encourage all VMS users to test their programs during the March 1–April 15 test period.**

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Information on the differences between version 3.6 and 4.2 and on the state of the conversion to the VAX 8600 will be available on both VAXes. Type the command

**type sys\$writeups:vms 42**

to read an on-line copy of this information.

This information will be upgraded periodically. Please call the ACSS HELP-Line for any questions you may have about the VMS conversion.

# Computing and the New Phone System

Mark McCahill

You have probably heard rumors that the University will soon have a new phone system, and that the new system may affect how you use microcomputers and terminals. Well, these rumors are true; the University *is* installing a new phone system and it will enable you to use microcomputers (and dumb terminals, for that matter) to communicate with ACSS computers *without using modems*. In this article we will discuss how this change affects microcomputers and terminals connected to the University's phone system. If your computer (or terminal) isn't connected to a University phone, these changes won't affect you.

## Types of Phones

To communicate without modems, you must have the proper equipment installed. There are two types of phones you can have installed as part of the new phone system. One type of phone uses a digital phone line. (The telecommunications people refer to a digital phone as an ITE or Integrated Telephone Equipment.) As an option on the ITE, you can get a Data Option Board (also known as a DOB). If you have an ITE with a DOB, the data option board replaces the modems you have been using. To use the DOB, you will connect your microcomputer (or terminal) to the DOB connector on your new telephone. The high-speed communications available through the new phone system—typically 960 characters per second (CPS) or 9600 baud—is one of the reasons that using a digital phone

line and a DOB, instead of a modem, is so attractive. The modems you have now probably have a top speed of 120 CPS (1200 baud).

High-speed communications will be possible because most of the phone lines in the new phone system are digital. When you are talking (using your voice) over a digital phone line, your voice is translated into a digital stream of information, and this digital stream is transmitted through the phone system. Since the phone system is dealing with voices as digits, it is easy for the phone system to send computer data (since computer data is also a stream of digital information).

## Outside the U

So far we have talked only about communications within the University phone system. You will also want to communicate with computers that are located outside the University, or call computers inside the University from home.

If you think about it, when a computer needs to communicate with another computer and the call crosses the boundary between the University phone system and the rest of the world, some *magic* must happen. The rest of the world is not necessarily using a digital phone system, so if you have a digital phone system, some translation from non-digital to digital and back (i.e., magic) must occur. The magic is accomplished by having a pool of modems that are connected to the outside world. Whenever you use your

microcomputer to call a computer in the outside world from a digital phone line, one of the modems in the modern pool will be used, so the computer in the outside world gets what it is expecting: a modem signal. When a computer from the outside world calls a DOB on a digital phone line, one of the modems in the modem pool is used as an intermediary between the University phone system and the incoming call. We told you it was magic, right?

The good part of this magic is that digital phone lines give you high-speed communications within the University, and you are still able to communicate outside the University. If you have a DOB, all these good things happen, and you don't need to have a modem between your microcomputer and the new University phone system.

Alas, magic always has a few cases it doesn't cover, and this is also true of the new phone system. First, the characteristics of a digital phone system are such that the modem you already own won't work over a digital phone line because direct-connect modems expect to be connected to analog phone lines. So, if you want high-speed communications, it is likely that you will stop using the modem you have now and start using a digital phone line and a DOB once the new phone system is operational. There is an alternative to using a digital phone line that allows you to use the modem you already have: If you get an analog phone line, you will be able to use your modem. The drawback to analog phone lines is that the communications speed you are

limited to is the top speed your modem will handle (probably 120 CPS). The type of phone you will get if you have an analog line is called an STE or Standard Telephone Equipment.

### Potential Problems

There are a few unresolved issues on which we and the Telecommunications Department are currently working. One potential annoyance is that you might need to purchase a different cable to connect your microcomputer to the DOBs on the new telephones. (The cable you

use now to connect to your modem may not work.) If new cables are necessary, we will make the cables available through the Minnesota Book Center.

Another potential problem will affect people who get digital phone lines (and DOBs) and use software that relies on having a D.C. Hayes (or compatible) modem. The D.C. Hayes modem won't work over a digital phone line, and quite a bit of the software that is written for the D.C. Hayes modem expects to use the Hayes modem to automatically dial the phone (from program control). While the new phone system has

the capability of automatically dialing the phone from program control (or from a terminal keyboard), the protocol used to tell the DOB to dial a number is incompatible with the D.C. Hayes protocol. It may be possible to make the new phone system's automatic dialing commands compatible with the Hayes protocol. We are looking into the issue.

As the new phone system gets closer to becoming operational, we will have more information for you in future issues of the *ACSS Newsletter* and the *Microcomputer Newsletter*.

### Artificial Intelligence

## Videotape of AI Symposium

*Tom Rindflesch*

The Learning Resource Center in the basement of Walter Library (Room 15) has four videotapes of a symposium entitled *Knowledge-based Systems and their Application*. These are of interest to anyone considering using artificial intelligence (AI) techniques in research or instruction. The symposium, held on November 11, 1985, was sponsored by Texas Instruments, Inc. and originated in their video center in Dallas. The symposium was broadcast by satellite to a number of college campuses throughout the country, including the University of Minnesota.

After some introductory material, the symposium begins with four lectures on various aspects of AI techniques in expert systems, with a question-and-answer period following each lecture (Tapes 1 and 2). These lectures do not assume any prior knowledge of AI

and serve as an introduction to expert systems. They are:

- "AI: An overview": knowledge engineering and expert systems (by Edward A. Feigenbaum of Stanford University).
- "Problem solutions with expert systems": approaches, tools, how to begin (by Randall Davis of the Massachusetts Institute of Technology).
- "Knowledge-based systems": guidelines for selection, knowledge acquisition, and validation (by Bruce G. Buchanan of Stanford University).
- "Knowledge-based systems applications in the industrial environment" (by Mark S. Fox

of Carnegie-Mellon University).

Following the lectures and associated question-and-answer periods, there are case studies of a number of AI projects. These consist of discussions both with the people involved in building the systems and with those who use them (Tape 3).

The symposium ends with a panel discussion by the four lecturers and moderator Harry Tennant (Tape 4).

The call number of the tapes is VT K878.1-4. They are on half-inch VHS format. Unfortunately, Walter Library does not have VHS equipment, but the tapes can be checked out for the day and viewed in the Learning Resources Center in the basement of Diehl Hall.

## Mac Plus, Laser Plus, Upgrades Available Soon

*Mark McCahill*

As we go to press, ACSS has learned that sometime in March the Macintosh Plus and LaserWriter Plus should be available through the University Microcomputer Discount Program.

The Mac Plus features one megabyte of memory (eventually expandable to four megabytes), 800K double-sided internal disk drive (twice the capacity of present drives), 128K read-only memory (twice the size of present ROM) and an improved keyboard and an SCSI interface to storage devices (like hard disk drives). The expected price for the Mac Plus (with MacWrite and MacPaint software) through the Discount Program is \$1580 (plus tax).

The LaserWriter Plus also has an expanded ROM containing a number of new fonts. The price is \$4210 plus tax.

You can try out a Mac Plus in the Micro Lab in 125 Shepherd Labs.

You should discuss your plans with the Micro Group staff in the Lab before ordering your micro at the Electronics Desk in the Minnesota Book Center in Williamson Hall. Also, see the March issue of the ACSS *Microcomputer Newsletter* for a much more detailed description of the Mac Plus.

### Upgrades

If you want to upgrade your present Mac and LaserWriter, you will be able to purchase upgrade kits sometime in March. You can then make an appointment to have ACSS Engineering Services Group install the upgrades for the Macintosh and Laserwriter.

The prices are:

- \$225 for the 800K disk drive and new ROM
- \$90 for the new keyboard (with numeric key pad)

- \$425 for the one megabyte Mac+ logic board (for 512K Macs only)
- \$565 for the one megabyte Mac+ logic board (for 128K Macs only)

You can save \$25 if you upgrade both the disk drive and logic board at the same time.

LaserWriter upgrades are \$540. All prices quoted here include installation.

Fat Macs (with 512K memory), ImageWriter II printers, and the original LaserWriter are still available in the Discount Program. The 512K Mac (with MacWrite and MacPaint) now costs \$1060.

Only University departments and full-time students, faculty, and staff are eligible to purchase micros through the Microcomputer Discount Program.

## AT&T PC 6300+ Available

*Mary Dickel*

You can now order the AT&T PC 6300+ (an IBM-AT compatible) in any of three configurations at the Minnesota Book Center. All configurations include an 80286 CPU, 512K RAM, keyboard, monochrome monitor, MS-DOS 3.1, and GW BASIC. The basic configuration, with two floppy

drives, costs \$3275 through the Micro Discount Program. Hard drives and color monitors are also available.

The Micro Group hopes to have a 6300+ in the Micro Lab (125 Shepherd Labs) soon. Meanwhile, see the fuller description in the

March issue of the *Microcomputer Newsletter*.

Only University departments and full-time students, faculty, and staff are eligible to purchase micros through the Microcomputer Discount Program.

# HELP! Student Programmers Needed!

*Mark McCahill*

From time to time the Microcomputer Systems Group receives requests for referrals of student programmers. Typically, these requests come from University faculty and departments who need some programmers to complete their software projects. We are establishing a data base of University students who are interested in this type of work. If

you are interested in being included in this *programmer pool*, visit the Microcomputer HELP-Line (125 Shepherd Labs) and fill out our questionnaire.

*Note: We do not guarantee that work will be available, only that we will add your name to the pool of student programmers who are interested in work.* We expect that

most of the requests for referrals will come from groups working on software as part of Project WOKSAPE, so knowledge of IBM PC equipment and programming languages will be a definite plus. However, if you are interested in programming other microcomputers, you are more than welcome to add your name to the data base.

*Campus Services*

## Data Entry Services

The Data Entry Section of the St. Paul Computing Services is open from 8:30 to 4:30, Monday through Friday, in 6 North Hall.

Services include:

1. Punching and verifying data from most types of source documents (i.e., coding sheets, questionnaires, etc.). If needed, 80-column coding sheets may be obtained from the Data Entry Section.

2. Providing assistance in preparation of source documents for acquiring the most efficient data entry.
3. Conversion of cards to tape or tape to cards.
4. Hard copy available from tape or cards.

Jobs are done on a first-come, first-serve basis. Turnaround time may vary with the workload. Output is available on cards or on 800, 1600, or 6250 bpi tape, which will run on

IBM, CYBER, and other mainframe computers. Special arrangements may be made to purchase tapes, or tapes are to be returned to the Data Entry Section as soon as you are finished with them.

For information about current turnaround time, cost estimates, or other questions, contact Linda Pichner or Cleo Medlock at 376-9222. Account numbers for services may be obtained at 50 Coffey Hall, or call Diane Suski at 373-0987.

*Math and Statistics Packages*

## SPSS, McGraw-Hill Split

*ACSS staff*

SPSS Inc. has announced that it will publish and distribute all the documentation to its data analysis and graphics software, including the widely used manuals *SPSS: Statistical Package for the Social Sciences* and *SPSS Update 7-9*. The announcement ends a 15-year arrangement with McGraw-Hill, who previously published the manuals.

Robert Gruen, manager of SPSS publications, explained the change: "Since we began over one year ago to publish software for microcomputers, the difference between who uses our software and who purchases it has narrowed," Gruen said. "Customers now have only one stop to make for SPSS software, technical support, and manuals."

SPSS does not anticipate major changes in the look or content of their manuals.

You can obtain an up-to-date catalog of SPSS publications by calling (312) 329-3600 or writing:

SPSS Publication Sales  
444 N. Michigan Ave.  
Chicago, Ill. 60611

## Project Woksape

*Don Riley, Project Director*

On August 1, 1985, IBM announced a three-year grant of \$7.5 million in hardware and software to the University of Minnesota for research and development of educational software. At IBM's request, four colleges (Agriculture, Education, Institute of Technology, and Liberal Arts) participated in writing the original proposal and are currently participating in the first year of the grant. Over the three years of the grant, it is expected that all of the collegiate units on the Twin Cities campus will become part of the grant, on a competitive proposal basis. Unfortunately, IBM stipulated that the grant was for the Twin Cities main campus only.

Within the next month, information will be provided to the collegiate offices on the type of projects that will be considered, the procedure for submitting proposals, and the evaluation criteria. In general,

acceptable proposals will be those for small, pilot projects for innovative use of computers in education at the University. Proposals whose main purpose is to merely satisfy a resource or funding problem will not be considered. In general, the vast majority of projects will involve software development. Proposal submission will be from the college office, through your college computing coordinator—not directly to the Project. I ask that anyone interested should wait until that information gets to the college office, rather than calling my office.

To provide technical support for Project Woksape, IBM has two full-time staff, Mr. Al Becker and Mr. Bob Heggestuen, assigned to the University and located in the project office. The project office and mailing address is

Project Woksape  
139 Shepherd Labs  
100 Union Street SE.  
(612) 376-2390.

### Advisory Board

I have formed and have been meeting with a Project Woksape Advisory Board, to serve in an overall project advisory capacity, to assist in proposal solicitation and review, etc. Currently this group includes: Keith Wharton, Agriculture; Carol Carrier, Education; Russ Hobbie, I.T.; Jean Cameron, Liberal Arts; Shih-Pau Yen, Academic Computing Services and Systems; and Mary Marshall, IBM. As we begin to solicit proposals for the next phases, I expect to expand this group to include representation from other college units.

## PILOT Authoring System

*Don Riley*

The University has obtained a site license for PC/Pilot, an authoring system from the University of Washington. IBM has a license to market this software under the name IBM/PILOT.

Pilot was designed to provide capabilities for the presentation of instructional material. One of the most useful features that provides

tremendous flexibility is that compiled programs can be called by a Pilot program. The Pilot program can be used as a flexible command interface to "front-end" existing stand-alone programs.

Copies of the software can be obtained from either the Micro

HELP-Line or the Learning Resources Center in Diehl Hall—bring two formatted disks. Manuals must be ordered directly from the University of Washington. They cost \$25 with a blue binder that says *Pilot* on the outside or \$18 without a binder.

# Free Documents for Users, Instructors

*Steven Brehe*

ACSS publishes a number of short printed documents that are available to users at no charge. You can pick up single copies of any of these free documents in the ACSS Reference Room, 128A Lind Hall. Some documents are also available in campus labs.

## **Ordering Quantities for Classes**

University instructors may order any of these documents or *Newsletter* articles in quantities for their classes; call Paula Goblirsch,

ACSS Publications Editor, at 376-1491. (Order the *Micro Newsletter* from the Micro Group.) We will send the documents you request through campus mail. Please allow three to four days for handling and delivery.

The following documents are free from ACSS:

**Welcome:** An introduction to the MERITSS interactive instructional system.

### **Briefs:**

Getting Started (for CYBER CA users)  
VAX/VMS Access  
Liberal Arts Computing  
Math and Statistics Routines  
Reference Room and Documentation Services  
Short Course Schedule  
WRITEUP Information  
EXPLAIN Information  
Using MAIL  
A Short Guide to LISP Facilities at the University of Minnesota  
Central Configuration Diagram

**The Documentation Directory:** A guide to ACSS documentation for beginning and experienced users.

**ACSS Sites Map:** A map of Twin Cities campus computing facilities, with lists of equipment in each campus lab.

### **XEDIT 3.1 Reference Summary**

**Consulting Schedule:** Hours, locations, and phone numbers.

**ACSS Newsletter:** Published monthly, subscriptions are free. Call 376-1491 or get a subscription form at the ACSS Reference Room.

**Microcomputer Newsletter:** Also a monthly, free subscription publication. Call 376-4276 or write the ACSS Micro Group, 125 Shepherd Labs, 100 Union Street SE, Minneapolis, MN 55455.

# Using MAIL

*Steven Brehe*

One of the most popular utilities on the CYBER CA, ME, and MD machines is MAIL, with which you can send messages to and receive messages from other users on your system. Every user of the CYBERs can use MAIL; ACSS is exploring the possibility of offering special, inexpensive MAIL accounts for University students and personnel who do not otherwise use our systems but would like to use MAIL.

## Joining MAIL

To use MAIL, you have to enter the MAIL utility and join MAIL. First you type the MAIL command:

```
/mail
MAIL Version 2.1 Mon Feb 24, 1986 9:39 a.m.
Command? join
Enter the codename you wish to use
(up to 10 characters)
? codename
Enter the password for your codename
(up to 10 characters, C/R if none)
XXXXXXXXXX
Enter your real name (up to 24 characters)
? your name
Welcome new user! Please remember your password.
```

After you type **mail**, the system displays the MAIL header, which gives the version of MAIL currently running on the system and the date and time.

Then MAIL's Command? prompt appears. You respond with the **join** command, and MAIL asks you to enter a codename and password of your own invention, and then your name. (You need not type in your real name.) As always, MAIL keeps your password secure with the X string shown above.

You have joined MAIL. Hereafter, whenever you enter MAIL, the utility will prompt you for your MAIL password and tell you how many MAIL messages you have received.

Having joined, you can make more information about yourself available to other users with the **setinfo** command:

```
Command? setinfo
Enter information text. Hit C/R when done.
    1? Your interests, student status, etc. <CR>
    2? More information. <CR>
    3? <CR>
Information text entered.
Command?
```

In response to the prompts, you can type in as much—or as little—information about yourself as you wish to make public. It is *unwise* to enter too much personal information (your home address and phone number, etc.) here; this information will be available to every other MAIL user. By typing only a carriage return—**<CR>**—in response to a prompt, you end the SETINFO prompts and the Command? prompt returns.

To read an information text about another user, type **info codename**. Typing **status codename** produces more information about that user.

### Sending and Receiving Mail

To send a message to another MAIL user, use the **send** command. MAIL will prompt you for the codename of the person you are writing to and the subject of the message. Numbered prompts will permit you to enter each line of the message. End each line with a carriage return, and type only a carriage return when the message is finished:

```
Command? send
Send to? jjp
Last accessed: Mon Feb 24, 1985 3:38 p.m.
Subject? CSci assignment
Enter your message. Hit C/R when done.
 1? Did you get the assignment today? If <CR>
 2? so, please tell me what it is because I <CR>
 3? missed class. <CR>
 4? Thanks, ABB <CR>
 5? <CR>
Sent to: JJP
```

To read messages sent to you, use the **read** command, as shown here:

```
Command? read
Enter your password
XXXXXXXXXX
Last accessed: Mon Feb 24, 1986 3:30 p.m.
2 Message(s), 2 new.
U 1 JJP 86/2/28 16:11 "Assignment"
U 2 SOH 86/2/28 16:21 "Whiteout"
Command? <CR>
```

MAIL will prompt you for your password and tell you how many messages you have received. It displays the messages in the order received, numbered consecutively (as shown in the second column above), the sender of the message (senders' codenames are in the third column above), the date and time of sending (fourth and fifth columns), and the subject of the message (sixth column). (This same information is displayed whenever you enter MAIL).

To begin reading messages, press RETURN. With each <CR>, MAIL will display each new message or response received, beginning with Message 1, until it has displayed all of them. Alternatively, you can display your messages one by one by typing **next**.

You can also display all your messages, old and new, by typing **print \***. To print a particular message, type **print n**—where **n** is the message number MAIL assigned to the message, as shown in the second column above.

If you have no messages, MAIL will tell you so:

```
Command? read
Enter your password
XXXXXXXXXX
Last accessed: Mon Feb 24, 1986 9:39 p.m.
No messages.
```

If you like, you can write MAIL messages to a local file with the **write** command. For example, typing

```
write, mailfil, 1, 2, 5
```

*Continued on page 40*

will write your MAIL messages 1, 2, and 5 to the local file `mailfil`.

If you want to respond to a message you have just read, you can use the `reply` command, instead of `send`. When you use `reply`, MAIL assumes your message will go to the sender of the message you just read, and will have the subject of that message. MAIL, therefore, does not prompt you for this information; instead, it lets you enter your message immediately. If you are reading messages in a MAIL topic, `reply` will send to the topic message you just read.

MAIL has editing commands with which you can edit a message. To learn about these, use the `help` command, as explained below. Meanwhile, ACSS is considering expanding MAIL's editing capabilities to make message editing easier.

### On-Line HELP

To use the on-line HELP facility within MAIL, you can simply type `help`. MAIL HELP will display more information about the HELP facility. To get information about a particular command, type `help`, a comma, and the command. MAIL HELP responds with a brief entry on the command, including the command's abbreviated form, purpose, and format.

For a complete list of MAIL commands, type `help, dir`. For a list of MAIL's editing commands, do `help, editing`.

### Other Useful Commands

We cannot describe all of the commands in this article, but here are a few other MAIL commands and their functions:

Type `users` to see a complete list of MAIL users, in alphabetical order by codename. To begin the list at a particular place—say, at the letter L—type `users, l`.

Type `headers` to display a list of message information, including sender's codename, date, and time of sending, and the subject of the message.

Use the `login` command to inform MAIL of your codename and password. (This is an alternative to using the `read` command to enter the same information.) Type `login, codename, password`.

To interrupt a display, type `s`.

If you decide you no longer want to belong to MAIL, type `unjoin`.

Type `quit` to leave MAIL. To leave MAIL and log off from the system with a single command, type `bye`.

### For More Information

There is now an indexed WRITEUP on all CYBERs that includes the introductory information provided here and a list and descriptions of all MAIL commands. Type `writeup, mail`. There are also chapters on MAIL in the new *Introduction to MERITSS Computing* and *Introduction to CYBER Computing*. A free *Brief* on MAIL is now in our Reference Room, 128A Lind Hall. For multiple copies, call 376-1491.

## SYSTEM 2000 3.0 Release

Peter Oberg

We have recently installed release 3.0 of the System 2000 data base management system and have run tests to ensure its integrity. The new release supports all documented features and is now available as FUTURE,S2000 on the CYBER 845 (the CA machine). Existing PLX programs must be recompiled using the new PLEX

precompilers, but no changes to actual code should be necessary.

FORTRAN users should use the FTN4 or the FTN5 compilers; MNF and M77 are not supported for use with System 2000 (they can produce unpredictable results). COBOL5 users should continue to use the COBOL5 compiler.

The new version is available on the CYBER 845 with the following commands:

**\$FUTURE, S2000  
S2000**

**\$FUTURE, PLXFOR  
PLXFOR**

**\$FUTURE, PLXCOB  
PLXCOB**

---

### Correction

## 30 CPS Continues;

## Outside 10 CPS Will Disappear

Our February article on "Lower Connect Time Charges" misleadingly indicated that ACSS plans to discontinue 30 character per second (CPS) service (also known as 300-baud service).

Please be assured that in the future you will be able to use ACSS systems at 30 CPS. As we install our new network and integrate our systems with the University's new

phone system, we will discontinue internally the separate phone number for 30 CPS computing. Instead, our new network, with automatic baud detection, will recognize the speed your terminal requires and adjust itself accordingly.

Thus there will not be a separate charge category for 30 CPS computing under the new IBX

phone system. Instead, all users will be charged at a uniform rate.

The only service that we will discontinue is the non-IBX 10 CPS service, since the modern pools for the new IBX do not support speeds below 30 CPS.

If these changes cause you problems, please contact Lawrence Liddiard at 3-5239.

# The ACSS Central Configuration

*Lawrence Liddiard*

In this issue we are publishing the latest version of our configuration diagram, illustrating the present ACSS central configuration—our mainframe computers with attached storage and communications devices—plus some planned additions. Though some of this information is of interest only to more technically informed readers, the diagram gives everyone an overview of present ACSS systems and provides a preview of some future improvements.

The key in the upper right of the diagram explains the content of the five large rectangles representing five mainframe systems: our present three CYBER computers, the VAX 8600 that we are now installing, and a UNIX system we plan to add in the future. (The UNIX machine will be the VAX-11/780 that now provides our VMS service.)

Briefly, each of the five large rectangles contains the following information:

At the *bottom center*, in bold type, is a two-letter mnemonic ID—**MD**, **ME**, **CA**, **VX**, and **UX**—by which each system is identified.

At the *top left*, in bold type, is a brief indication of the **service** provided by each system. At the *top right*, also in bold type, is the operating system. Reading the diagram from the left:

- The first three systems (the MD, ME, and CA) are Control Data Corporation (CDC) CYBER systems running the NOS 2.4 operating system. The MD provides CAD/CAM (computer-aided design and manufacture) service for the MERITSS instructional computing service.
- The ME, the main MERITSS computer, provides general instructional computing service.

In the future, ACSS hopes to combine the MD and ME into a single, larger CYBER system.

- The CA provides computing services for researchers.
- The next two systems (VX and UX) are Digital Equipment Corporation (DEC) VAX systems running, respectively, the VMS 4.2 and UNIX 4.2 operating systems. They will provide both research and instructional computing services.

To the *left* in each rectangle, beneath the service description, is the name and model number of each machine's **central processing unit**, or CPU. The CPU is a high-speed processor that—in the CYBERS—communicates only with central memory.

Also to the *left*, beneath the CPU entry, is space for other information: Here we provide the number of **peripheral processing units**, or PPU's, that each CYBER has. PPU's are auxiliary computers that perform input and output operations, control job flow, and perform other "bookkeeping" functions. (The DEC systems use the central processors to perform these auxiliary operations.)

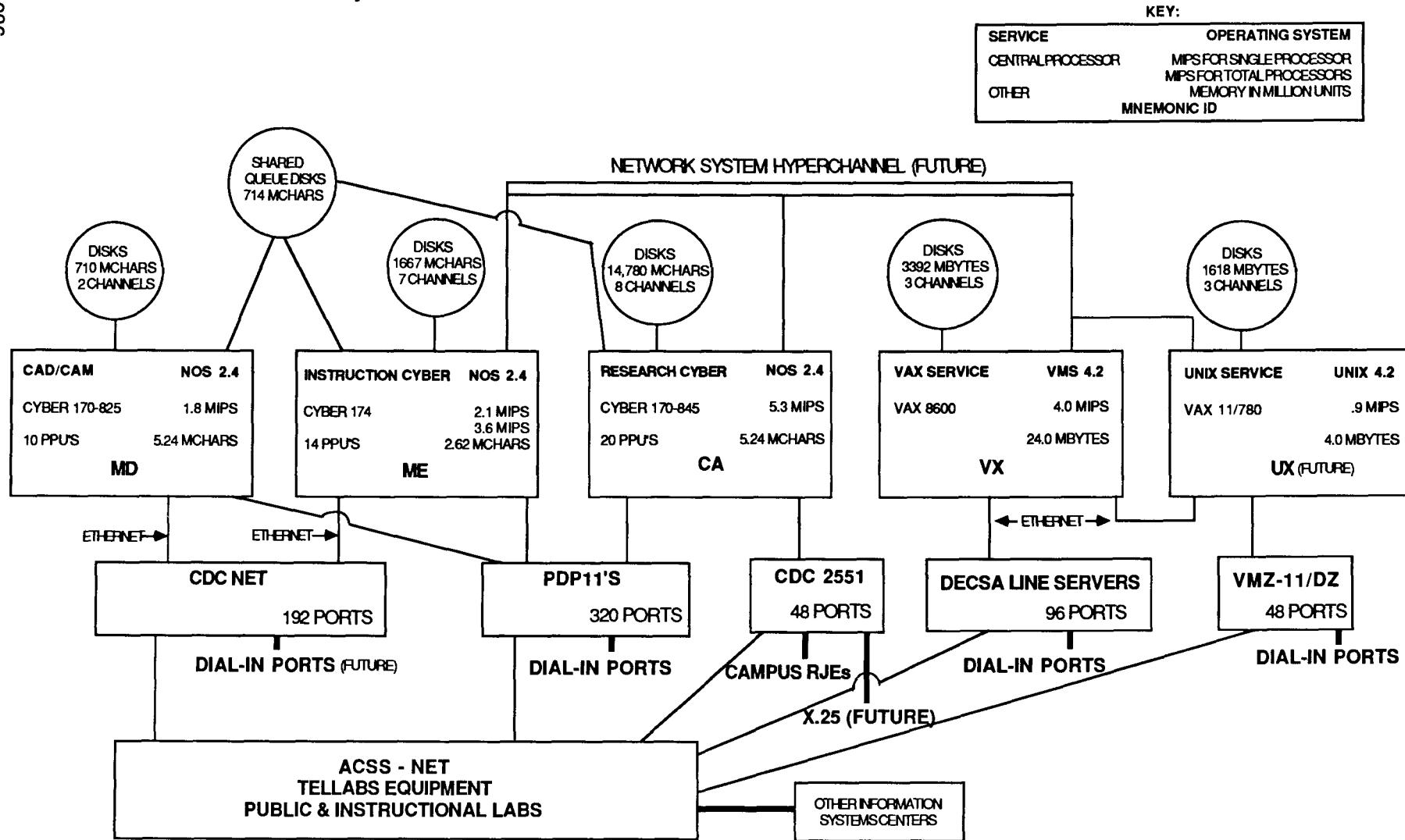
To the *right*, beneath the operating system, is a line indicating the approximate **speed** of the central processor, measured in millions of instructions per second (or **MIPS**). For multiple processor systems we add a second line for total processing speed, also in MIPS.

The *bottom* line on the right gives the size of each machine's central **memory** in millions of units—megacharacters or megabytes, as appropriate for each system.

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# ACSS Central Configuration

Academic Computing Services and Systems  
University of Minnesota



*Continued from page 42*

Other parts of the diagram represent devices attached to our mainframes:

The *circles* represent **disk drives** attached to each computer, giving total disk capacity in millions of units.

The *smaller rectangles* represent **communications controllers** that enable users to communicate with the central systems. Of special interest are the new CDCNET communications software and hardware that we are now installing, beginning with the MD, and the PDP-11's, which have long been the communications devices for the CYBERs. (When CDCNET installation is complete, we will no longer need the PDP-11's.) As shown in the diagram, all these devices are connected to the ACSS-net network (represented at the bottom of the diagram) and our campus labs.

Single copies of the Central Configuration diagram are available at the ACSS Reference Room, 128A Lind Hall. For multiple copies, call 376-1491.

---

## Short Course Registration Information

**REGISTRATION:** Registration is located at the ACSS Reference Room, 128A Lind Hall. (Hours: 8:00 a.m. to 4:30 p.m., Monday-Friday). Deadline for registering is 4:15 p.m. on the last working day **before** the class begins. If you need more information on short courses, call Jerry Stearns at 376-8806.

**FEES:** Fees are listed above in order for the following groups: 1) University students, 2) faculty and staff, and 3) non-University persons. Course fees may be paid by cash or check or with a signed University journal voucher. Short courses can no longer be charged to ACSS user accounts. **No refunds will be made after the class has begun.**

**NOTE:** Monday, May 26, is a University holiday. No classes will be held.

# Spring Quarter Short Courses

1986

## INTRODUCTORY COURSES

Introduction to Computers	McAllister	April 7-18	(MWF)	2:15-4 pm	\$15,\$25,\$35
Beginning NOS 2 (Cyber OS)	Krmpotich	April 21-May 2	(MWF)	3:15-5 pm	\$15,\$25,\$35
Introduction to VAX/VMS	Stearns	April 22-May 8	(TTh)	2:15-4 pm	\$15,\$25,\$35
Graphics Packages at ACSS	McAllister	May 5-14	(MW)	2:15-4 pm	\$15,\$25,\$35

## ELECTIVE COURSES

SPSS-X (Statistics Package)	Alberg	May 19-23	(MWThF)	2:15-4 pm	\$25,\$35,\$60
Magnetic Tapes in NOS 2	Oberg	May 20-29	(TTh)	2:15-4 pm	\$25,\$35,\$60
Beginning FORTRAN Programming	Kovarik	May 23-June 6	(MWF)	2:15-4 pm	\$25,\$35,\$60
SIR DBMS Seminar	Oberg	June 11-13	(WThF)	9 am-4 pm	\$100,\$100,\$150

## MICROCOMPUTER APPLICATIONS COURSES (Limited to 10 per class, unless otherwise specified.)

Introduction to Micros: MS-DOS, Section 1		April 8-10	(TTh)	9:30-noon	\$25,\$35,\$60
Introduction to Micros: MS-DOS, Section 2		April 21-23	(MW)	1:30-4 pm	\$25,\$35,\$60
Introduction to Micros: MS-DOS, Section 3		May 13-15	(TTh)	1:30-4 pm	\$25,\$35,\$60

*(Introduction to Micros or equivalent knowledge is required for courses listed below.)*

Beginning WordStar		April 29-May 1	(TTh)	1:30-4 pm	\$25,\$35,\$60
Introduction to Word Perfect, Section 1		April 15	(Tu)	9:30-noon	\$25,\$35,\$60
Introduction to Word Perfect, Section 2		April 28	(M)	1:30-4 pm	\$25,\$35,\$60
INtroduction to Word Perfect, Section 3		May 20	(Tu)	9:30-noon	\$25,\$35,\$60
Interm. Word Perfect for Office Applications		May 13	(Tu)	9:30-noon	\$25,\$35,\$60
Interm. Word Perfect for Authors		May 28	(W)	1:30-4 pm	\$25,\$35,\$60
Introduction to dBase II & III, Section 1		April 22-24	(TTh)	9:30-noon	\$40,\$50,\$80
Introduction to dBase II & III, Section 2		May 12-14	(MW)	1:30-4 pm	\$40,\$50,\$80
Beginning Lotus 1-2-3, Section 1		April 17	(Th)	9:30-noon	\$25,\$35,\$60
Beginning Lotus 1-2-3, Section 2		May 5	(M)	1:30-4 pm	\$25,\$35,\$60
Advanced Lotus 1-2-3		May 21	(W)	9:30-noon	\$25,\$35,\$60

*(The courses listed below are overviews only for the Apple Macintosh. Limited to 20.)*

Microsoft Word for the Macintosh		April 9	(W)	1:30-4 pm	\$15,\$25,\$40
Beginning MacDraw and MacDraft		April 25	(F)	9:30-noon	\$15,\$25,\$40
Microsoft Excel (Spreadsheet)		April 30	(W)	9:30-noon	\$15,\$25,\$40
Preparing Dissertations Using a Macintosh		May 7	(W)	9:30-noon	\$15,\$25,\$40
Preparing Newsletters & Brochures*		May 22	(Th)	1:30-4 pm	\$15,\$25,\$40
(*includes overviews of PageMaker, ReadySetGo, & MacPublisher programs)					
Statistical Programs for the Mac		May 30	(F)	1:30-4 pm	\$15,\$25,\$40
Omnis 3		June 3	(Tu)	1:30-4 pm	\$15,\$25,\$40
Developing Macintosh Software in TML Pascal		(Limited to 10.)		2:00-4 pm	\$25,\$35,\$60
(A knowledge of Pascal is required.)		May 19-23	(MWF)		

\*

# Conventions

Throughout the ACSS *Newsletter*, and in a growing number of recent ACSS publications, we have adopted these conventions:

- Messages and prompts from the ACSS computers appear in plain type, like this.
- Words that the computer systems replace with a specific name, value, or other information appear in *italic type*, like this.
- Commands you type at your terminal keyboard appear in **bold face type**, like this.
- Words that must be replaced by a specific name, value, or command that you type in appear in **bold italic type**, like this.
- Comments to interactive sessions and program files are enclosed in { curly braces, like this}.

Here's an example:

**save, filename**

is a command you type in. You type **save** and replace *filename* with the name of your file. The system may respond with the message

*filename* ALREADY PERMANENT { An example of a system message. }

where *filename* will be replaced by the name of the file you attempted to save.

- The symbol <CR> refers to the carriage return (or RETURN) key on the terminal. The <CR> serves as a terminator for commands you type at your terminal. In most cases we do not show <CR>; we assume you know to type it after every command.
- 

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## PHONE NUMBERS

**Access:**

CYBER(CA)—10, 30 cps ..... 376-5730  
 —120 cps ..... 376-5706  
 MERITSS(ME)—10, 30 cps ..... 376-7730  
 —120 cps ..... 376-7120  
 VAX/VMS(VA)—(autobaud) ..... 376-8070

**Accounts:**

MERITSS ..... 373-7745  
 User Names ..... 373-4548  
 Computer-Aided Instruction ..... 376-2975  
 Computer Hours (recorded message) ..... 373-4927  
 Consulting:  
 HELP-Line ..... 376-5592  
 8 a.m.-5 p.m., Monday-Friday  
 Statistics Packages ..... 376-1761  
 1-2 p.m., Monday-Friday  
 Data Bases ..... 376-1761  
 10-11 a.m., Monday-Friday  
 Microcomputers ..... 376-4276  
 9:30 a.m.-noon and 1:30-4 p.m.,  
 Monday-Friday  
 Text Processing & Analysis,  
 Artificial Intelligence ..... 376-2944  
 3-4 p.m., Monday-Friday  
 Contract Programming ..... 376-1764

Data Base Applications ..... 376-1764  
 Engineering Services ..... 376-1023, 376-8153  
 Equipment Purchase/Information ..... 376-8153  
 Lind Hall I/O ..... 373-4596  
 Graphics Software ..... 376-5592  
 HELP-Line ..... 376-5592  
 8 a.m.-5 p.m., Monday-Friday  
 HOURS-line (recorded message) ..... 373-4927  
 Information, Wulling Hall ..... 373-4360  
 Information, Lauderdale ..... 373-4912  
 Instructional Labs ..... 376-2703  
 Instructional Services ..... 373-7745  
 Lauderdale Computer Room ..... 373-4940  
 Lauderdale Services ..... 638-0523  
 Newsletter Subscription ..... 376-1491  
 Permanent File Restoration ..... 376-5605  
 Professional Services Division ..... 376-1764  
 Project Assistance ..... 376-1764  
 Reference Room ..... 373-7744  
 Remote Batch (RJE) Services ..... 376-2703  
 Short Courses ..... 376-8806  
 Shuttle Bus Service ..... 376-3068  
 System Status (recorded message) ..... 373-4927  
 Tape Librarian: see Lauderdale Services

## OPERATING HOURS

	CYBER (CA)	Low rate	MERITSS (ME & MD)	VAX (VA)
M-F	7 a.m.- 4 a.m.	8 p.m.- 4 a.m.	7:45 a.m. - 3:30 a.m.	7 a.m.- 4 a.m.
Sat	4 a.m.- 5:15 p.m.	4 a.m.- 5:15 p.m.	7:45 a.m. - 3:30 a.m.	4 a.m.- 5:15 p.m.
Sun	4 p.m.- 1 a.m.	4 p.m. - 1 a.m.	4 p.m. - 3:30 a.m.	4 p.m.- 1 a.m.

## PUBLIC LABS – TWIN CITIES CAMPUS

Location	Batch	Interactive	Micro	Location	Batch	Interactive	Micro
<i>East Bank</i>							
Arch 148			X				X
CentH		X					
ComH		X					
DiehlH 207		X					
EltH 121, 125		X					
EltH N640	X						
FolH 14, 14a	X	X*	X				
FronH		X					
LindH 26		X					
LindH 128B		*					
LindH 306B			X				
MechE 308		X					
Physics 69		*					
PiH		X					
SaH		X					
TerH		X					
VinH 4		X					
				<i>West Bank</i>			
				BlegH 25		*	
				BlegH 90		X	
				BlegH 140		X	
				MdbH		X	
				OMWL 2		X	
				SocSci 167			X
				<i>St. Paul</i>			
				BaH		X	
				CentLib B50			X
				ClaOff 125	X		

\* Research cluster; access to CYBER CA and VAX/VMS  
 X in interactive column indicates access to MERITSS

For more information see WRITEUP(LABS)

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**The ACSS Newsletter**  
March 1986  
Volume 20, Number 3

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