# SPCS Newsletter

March 1987

St. Paul Computing Services                    University of Minnesota

## CONTENTS

## Distributed Printing

SPCS is piloting a facility to allow our users to send printouts to public instructional laboratory sites. This distributed printing capability will be available during a test period only (through April 30, 1987). Use of the facility will be monitored and the feasibility of continued use will be decided upon in May, 1987.

PRINTTO, a new exec, is available to route a printout to a public laboratory (e.g., 125 Classroom Office Building, 140 Blegen Hall). The syntax of the PRINTTO command is identical to that of the PRINT command, except, for the second parameter, which must be a site-id. The syntax of the PRINTTO command is as follows:

PRINTTO SITE-ID FILENAME FILETYPE < FILEMODE (OPTIONS

The filemode is optional (as designated by the < symbol). The options are the same as the ones that are available for the PRINT command (e.g., cc, hex, linecount). For example, for file FEB YLD87 A to be printed at the 125 Classroom Office Building site, the command would be:

PRINTTO R5 FEB YLD87

Site-ids are posted in each of the public labs.

If the communication link between SPCS and the CYBER is down, the file will be stored, and it will printout when the line comes back up. Users may have to reset the printers at the remote sites if they are offline. There are instructions on the wall of each lab near the printers. We recommend that you send printouts only to the site where you logged on, so you can set up the printer and retrieve your printout.

There is currently a 2,000 line limit for the printouts. If you send a larger file, it will be returned to your virtual reader.

The sites currently accessible are:

Anderson 170
Blegen 140
Classroom Office Building 125
Lind Hall 128
Lauderdale
O M Wilson Library 2

We stress that this is a pilot test. SPCS reserves the right to withdraw the PRINTTO facility at any time during the test period. Please let us know your comments and suggestions (send a MAIL note to IJAN).

You may access SPCS from a Public Instructional Laboratory by selecting IB at the ACSSNET prompt. See Documentation Note 16, Connecting a Terminal through the Public Instructional Laboratories to SPCS, for a description of the terminals and a keychart.

## TAPEMAP - A Tape Utility

TAPEMAP is a utility program, available from CMS, that examines and describes the contents of a magnetic tape. This program was developed at the University of Kentucky and has been adapted for use at SPCS. TAPEMAP recognizes and identifies

tapes in any of the three common formats for CMS: tape dump format, IBM standard labeled format and non-labeled format.

Among the tasks that you can accomplish with TAPEMAP are: listing the standard labels from an IBM standard labeled tape, and getting a description of the files on a non-labeled tape (includes density, blocksize, record format, total number of blocks, and the amount of tape used).

TAPEMAP is documented in Documentation Note 19, TAPEMAP - A CMS Utility (free) and TAPEMAP User's Guide and Reference ($1.00). Both documents are available in 50 Coffey Hall. The Documentation Note is also available in 90 Coffey Hall.

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# Passwords - your security

Your logon password is the key to your SPCS computer account. Your userid is an address that many other computer users may know (so they can send you mail, tell when you are logged on, etc.) but your logon password keeps others from accessing your computer account, that is, running their programs from your account, gaining access to any and all of your data, or destroying your files. While SPCS is very lucky to have a very lawful user base, security must be the watch word.

Your logon password must be changed at least once every 365 days or it will be changed for you by the system and you will not be able to access the computer (more on what you can do if this happens, later). There is a fairly simple procedure to change your password. Type in CHANGEPW and press ENTER. You will be prompted for a new logon password; type one in (it may be three to eight characters) and press ENTER. You will be prompted for your current logon password. Type in the current logon password and press ENTER. The next time that you log on, use your new logon password. See Documentation Note # 2, Changing Passwords (Logon and Disk) for instructions on changing your password.

Some precautions:

• Don't share your password with anyone else.

• Choose passwords that you can remember without writing them down.

• When you change your password, type in the new password slowly and carefully so that you will be sure of what it is.

• Don't leave printouts around that contain your 201 multi password.

• Don't follow any convention in setting up passwords (i.e., the month, your name, your initials, your logon password preceded by r, w, and m for minidisk passwords, etc.).

If you are locked out of your account or forget what you changed your password to, you must come to the SPCS Main Office (50 Coffey Hall), and you will be requested to fill out a form. The user who opened the account must provide a signature before a new password will be assigned. A new password will be randomly assigned to your account as soon as possible. Password information will not be distributed over the phone.

# Using the PC SAS System With a Ramdisk

In the past few months, the Technical Support Department of SAS Institute has received a number of inquiries about running the PC SAS system with a ramdisk or vdisk. This article discusses how to configure the SAS System to run with a ramdisk.

Ramdisks and vdisks are generally faster than hard disks, but the differences in speed depend on the type of ramdisk and the type of hard disk. Two rules of thumb are that ramdisks are generally faster than vdisk and that the higher capacity hard disks are generally faster than the lower capacity disks. The performance gain depends on the performance difference between the hard disk and the ramdisk. Thus, a ramdisk used on an IBM PC XT with a 10 meg hard disk can achieve very good performance improvements while a vdisk on an IBM PC AT with a 30 meg hard disk may only slightly improve performance. Precise performance gains are very difficult to predict.

To install the SAS System on a ramdisk, two things need to be accomplished: the paths need to be reset and some SAS system files need to be copied to the ramdisk.

Changing paths

The CONFIG.SAS file sets the internal paths in the SAS System and it will require modification. The default CONFIG.SAS file should be modified as follows(the ramdisk is D:):

| DEFAULT CONFIG.SAS | MODIFIED CONFIG.SAS |
|---|---|
| -SASHELP #SAS#SASHELP | -SASHELP #SAS#SASHELP |
| -SASUSER SASUSER | -SASUSER SASUSER |
| -WORK SASWORK | -WORK SASWORK |
| -MSG #SAS#SASEXE | -MSG #SAS#SASEXE |
| -PATH #SAS#SASEXE | -PATH D:#SAS#SASEXE |
| | -PATH C:#SAS#SASEXE |

This modification consists of adding another -PATH directory to the file and using explicit drive names on all -PATH statements. When the SAS supervisor requests a module, it searches -PATH directories in the order they appear on the CONFIG.SAS file. Since the ramdisk appears first, a requested module that resides on it will be used first. If the requested module is not found on the ramdisk, the hard disk will be searched. If the D: disk does not exist, the supervisor will simply ignore the D: disk and go directly to the C: disk. Therefore, with this CONFIG.SAS file, the SAS System will work with or without a ramdisk installed.

Further modification can be made by moving the -SASHELP, -SASUSER, -WORK, or -MSG directories to the ramdisk. But, if that is done, the SAS System will not work without the ramdisk. If a directory is moved to the ramdisk, the files in that directory must be copied to the ramdisk (except the -WORK directory).

Copying files
 The directories in the CONFIG.SAS file represent categories of files:

| -SASHELP | - | the on-line HELP facility file size: approximately 450K |
|---|---|---|
| -SASUSER | - | individual user session attributes (screen color and so on) size: approximately 7K |
| -WORK | - | the SAS session work data sets size: varies |
| -MSG | - | the SAS message file size: approximately 250K |
| -PATH | - | the SAS executable (.EXE) module size: approximately 3 meg for base SAS software, plus 2.5 meg for SAS/STAT |

We recommend that you initially configure your ramdisk by using the modified CONFIG.SAS file above and copying some of the .EXE files to the ramdisk. The following may be inserted into your AUTOEXEC.BAT file or run as a stand-alone .BAT file:

```
MKDIR D:#SAS#SASEXE
COPY C:#SAS#SASEXE#SASZ*.EXE       D:#SAS#SASEXE#*.*
COPY C:#SAS#SASEXE#SASXSUPV.EXE    D:#SAS#SASEXE#*.*
COPY C:#SAS#SASEXE#SASMDS.EXE      D:#SAS#SASEXE#*.*
```

This .BAT file copies all window files(SASZ*), the SAS supervisor(SASXSUPV), and the DATA step(SASMDS) to the ramdisk. It will consume about 1 meg of the ramdisk. If you have additional space on the ramdisk, you can experiment with different configurations. Procedures that will be frequently used should be moved to the ramdisk.

There are several points to consider:

-   moving the -WORK files to the ramdisk should bring about a significant increase in speed, but can cause the system to run out of disk space
-   moving the -MSG file to ramdisk should bring about a modest increase in performance
-   moving the -SASHELP or -SASUSER files to ramdisk will result in very little increase in performance.

Remember, any time you use a .BAT file to copy a file to ramdisk, you must also alter the path in the CONFIG.SAS file. When modifications are made to this file beyond adding a -PATH statement, the SAS System will no longer work without the ramdisk.

The best configuration for the SAS System depends on the size of the ramdisk and the work being done. A large ramdisk can probably hold your SAS work files (be careful of PROC SORT), while a small one may only be able to hold a few procedures. Try several configurations to see what works best for your needs.

## SOFTWARE:

## PC SAS Fixes

SAS Institute has distributed a zap diskette (Z02) which contains a replacement module with several changes to your software, including fixes for packed decimal (Pw.d), positive integer binary (PIBw.d), and integer binary (IBw.d) informat bugs. There is also a change to the internal expiration date. Currently release 6.02 of base SAS software for personal computers contains an embedded date of July 1, 1987.

Regardless of your license agreement expiration date (i.e., SETINIT), your base SAS software for personal computers will expire on July 1, 1987 - - unless the zap diskette is installed. In the future, this date will be updated as a standard part of new releases. If you do not receive the zap diskette by late April, please contact the SPCS Main Office (624-7788).

# Improving the Performance of PC SAS

The following is a discussion of methods for improving performance of the PC SAS system. This article summarizes material presented in Efficiency and Performance Considerations for the SAS System Under PC DOS, by Gorden Davis and Scott Sweetland, and How to Hotrod your PC, by Dave Brumitt and Mark Cates. Both of these papers were presented at SUGI 12.

## Memory

Memory is a limited resource on a micro computer, you should be aware of how it is used by the PC SAS system. The amount of memory available to your application program is dependent on how the system is invoked. The SAS system running the display manager uses approximately 135 K more memory than the system running in batch mode. This means that a batch submitted program will have 135 K more memory to work with than a program submitted from the display manager. While the display manager is an excellent tool for developing SAS applications, a significantly larger analysis task can be performed by a batch submitted program.

The PC DOS operating system was originally designed for the 8088/8086 series of CPU's. Those chips could only address 1 megabyte of memory, and there is a section of memory that needs to be reserved for system-related tasks such as video. This reserved area is the range from 640 K to 1 M. The area from 0 to 640 K is available for programs and data. PC DOS has not yet been revised to address more than 640 K, even though the 80286 and 80386 chips will address much more. There are indications that release 6.03 of PC SAS (expected out late this Fall) will be able to access more than 640K. They say that it will support boards which conform to EMS standards.

The PC SAS system requires that your machine have at least 512 K of memory. Under certain program loads, however, 512 K is not sufficient to support the SAS system. Given the current prices of RAM chips and memory expansion boards, the expansion to 640 K is definitely worth the investment.

## Buffers

A buffer is a block of memory that DOS uses to hold data being read from, or written to a disk. Before DOS reads or writes a record to disk, it checks to see if the sector containing that record is already in a buffer. If not, it must read the sector. DOS then locates the correct data in the buffer, and moves the data into the application's area of memory. The more buffers DOS has, the more data is in memory. Therefore, the likelihood of finding the correct record already in a buffer increases if DOS has more buffers to work with. This can increase performance by speeding up the access time.

Buffers should be set in the range of 15 - 20 for optimal performance. Keep in mind that each buffer uses 512 bytes of main memory, so if memory is critical, they can be set as low as four.

## Ramdisk

Performance of PC SAS can also be improved by using additional memory to create a RAMDISK to hold SAS system files. A RAMDISK is simply a simulation of a disk in RAM that is much faster, because data in memory can be accessed much faster than data on disk. Instructions on how to use a RAMDISK with PC SAS are presented in the preceeding article in this newsletter.

## Fixed Disk

A fixed disk is one of a micro computers most important resources and is often a determining factor in the performance of the overall machine.

Without proper maintenance, fixed disks can quickly become so overcrowded that programs requiring room for temporary output files may abend due to lack of available storage space. You should take steps to guard against loss of disk space because of system resets during execution of application software like the PC SAS system. Such a reset can cause the disk File Allocation Table (FAT) to lose its pointers to chains of clusters that hold files being used by the program. The DOS CHKDSK command can be used to retrieve these clusters. Entering the CHKDSK command with the '/F' option along with the 'N' response will return lost clusters directly to the FAT.

PC DOS often fragments files on the disk. This means that the data comprising the file is not held in contiguous sectors, but may be held in sectors widely separated on the disk. Accessing such a file would require the disk head to locate each of the file's fragments, and this can greatly increase the time required to execute a program.

A disk optimizing program solves this problem by physically rearranging the files on a disk so that they occupy logically contiguous clusters as defined by the rate of interleaving. Thus only one search operation is necessary to locate a file.

An optimizer will probably produce its greatest improvement in an environment where there are very

large data sets that are repeatedly modified during the execution of the programs and, therefore, highly fragmented.

## Math Coprocessor
Math coprocessors are chips designed specifically to do floating point arithmetic. When a floating point arithmetic instruction is given to the CPU, it is passed off to the math coprocessor which executes it and passes the result back to the CPU. The result is an increase in the speed at which the microcomputer performs floating point calculations.

## Turbo Boards
Another way to increase performance is to install an add-in turbo board. These generally fall into two types:

1.) Some turbo boards replace the old CPU with a new and faster CPU and a faster clock.

2.) Other turbo boards add a faster CPU, clock, and usually more memory, while retaining the old CPU and memory. In this case, the old CPU is used to process disk I/O and the old memory is used for disk caching. Disk caching greatly speeds up disk based operations by placing into buffers large amounts of data that happen to be located contiguous to data that has already been requested. This data is then extracted from the buffers much faster than it would have been from a disk. Disk caching is a method of enhancing disk performance by keeping the most-used sectors in memory, rather than retrieving them from disk.

# New version of SCA installed

Version III of the SCA Statistical System has been installed and is available for use.

SCA provides extensive capabilities for time series analysis and forecasting. Information on the updates to the system may be obtained by asking at the Help Desk (90 Coffey Hall) . New Reference Manuals are also available; request information from the SPCS Main Office (50 Coffey Hall).

# TINCAN Available

TINCAN 2.01, unlike some of the other Macintosh communication software pakages is tailored for the St. Paul Computing Services computing environment. It provides fundamental services: terminal emulation and file transfer. When your MAC is connected to the SPCS IBM 4381 computer (the host), it can act like one of the terminals that the host is accustomed to talking to. TINCAN 2.01 also provides file transfer between the Macintosh and the SPCS computer. The program uses the PCTRANS transfer protocol for error-free file transfer.

## Features
   *Full screen terminal emulation
   *Fully error correcting file transfer
   *Local printing
   *Run Macintosh applications while connected to the mainframe
   *Semi-automatic logon script
   *Full automatic logon script
   *Journaling that converts a semi-automatic logon script to a full automatic script
   *Scrolling that allows text-only files to be retrieved for viewing
   *Quick print that allows text-only files to be printed
   *Key Caps-like keyboard maps
   *Extensive on-line help

## What you need
   *128K MAC, 512K MAC, or a MAC Plus
   *System 3.1 or later; a printing resource must be present and in the same folder as the System
   *ITE phone or a phone and a modem
   *Cable to connect the ITE phone or modem to your Macintosh

## How to obtain your copy of TINCAN 2.01
Applications for TINCAN are available in the SPCS main office (50 Coffey Hall; 624-7788). You must fill out an application and sign a license agreement to obtain your copy of TINCAN.

SPCS is distributing TINCAN for $7.00 to University of Minnesota full time students, and faculty and staff with at least a 50% appointment. Those not qualifying above, will be required to pay $7 + 20 (total = $27)to cover the Yale University royalty charge. Requests for mailing the materials will be charged an additional $5.00.

# Computer Rate Changes

As stated in the last newsletter, SPCS has installed a much larger and faster computer system, an IBM 4381-R14. All of the new hardware features for this upgrade are now installed and are in effect. Extensive benchmarking has shown a 31% improvement in processor execution speed.

New rates reflecting the processor improvement are being placed into effect immediately. The rates reflect only a 25% change, thus users will benefit from an overall 6.0% reduction in CPU time charges. The new rate schedule is posted on the system (type in **help um rates**).

Look for another processing improvement and rate change, later this year, when the High Performance Option (software) is installed.

# COMPUTER SHORT COURSES

The following short courses will be offered by St. Paul Computing Services during the Spring Quarter.

| SHORT COURSE NAME | DATE | DAY | TIME |
|---|---|---|---|
| User Orientation | Apr 16 | (Th) | 3:00-5:00 |
| Introduction to CMS* | Apr 20,21,24,29 | (M,T,F,W) | 3:00-5:00 |
| CMS Mail and BITNET | Apr 23 | (Th) | 3:00-5:00 |
| YTERM Demonstration | Apr 22 | (W) | 3:00-4:00 |
| TINCAN Demonstration | Apr 27 | (M) | 4:00-5:00 |
| SAS (Statistical Analysis System) | Apr 30, May 5,7 | (Th, T, Th) | 3:00-5:00 |
| PC SAS Overview | May 6 | (W) | 3:00-5:00 |
| CMS Advanced Topics | May 11 | (M) | 2:00-5:00 |
| Introduction to NOMAD2 | May 12 | (T) | 3:00-5:00 |

* Additional Introduction to CMS classes will be scheduled depending upon user demand. Look for announcements of extra classes in the SPCS User Room (90 Coffey Hall). If the listed course schedules are not convenient, please let us know of better times and days.

## User Orientation
The User Orientation presentation will introduce new and prospective users to the SPCS facility with a brief description of the hardware and software available, and a short tour of the Computer Center. Refreshments will be served.

## Introduction to CMS (Operating System)
This short course will introduce the Conversational Monitor System, an operating system that allows one to edit and save files, submit batch jobs, and run jobs interactively. SAS and NOMAD2 (a data base management system) may be accessed interactively through CMS.

## Introduction to NOMAD2
The Introduction to NOMAD2 demonstration will introduce a Data Base Management System. NOMAD2 is a fourth generation language, which may be used for data management, retrievals, application programming, report writing, and graphics.

## YTERM Demonstration
The YTERM Demo will introduce YTERM, a micro computer system package that provides terminal emulation and file transfer utilities. SPCS distributes YTERM for a small charge and highly recommends its use with IBM PCs and compatibles for accessing the SPCS mainframe. The demonstration will cover installation, execution and use.

## TINCAN Demonstration
The TINCAN Demo will introduce TINCAN, a micro computer system package that provides terminal emulation and file transfer utilities for the APPLE Macintosh. SPCS distributes TINCAN for a small charge and highly recommends its use with Macintoshes for accessing the SPCS mainframe. This demonstration will cover installation, execution and use.

## SAS (Statistical Analysis System)
The SAS course will cover the Statistical Analysis System, a comprehensive statistical package that provides software tools for data storage and retrieval, report writing, general programming, and graphics.

## PC SAS Overview
The PC SAS Overview will cover some of the basic features specific to the PC version of SAS.

## CMS MAIL and BITNET
This demonstration will cover CMS commands to send messages and files to other computer users at SPCS and, through BITNET, to other universities. BITNET is an international network of over 400 research and educational institutions through which

electronic mail, files and messages may be sent.

## CMS Advanced Topics

The CMS Advanced Topics class will present information on the use of tapes at SPCS, commands to request information about the user's computing environment, and the SPOOL command.

User Orientation will be held in 125 Coffey Hall, with no registration required.
Note: For the SAS and CMS Advanced Topics, you don't need programming experience, but previous registration in a CMS class or permission of the instructor is required.

Note: For the PC SAS Overview class, either previous registration in a SAS class is required or permission of the instructor. Because of our contract with SAS Institute for the PC SAS product, this class is open only to University of Minnesota faculty, staff, and registered students with a current fee statement.

To register for the short courses, please obtain and complete a registration form from SPCS (624-7788; 50 Coffey Hall). Return it to the Main Office, 50 Coffey Hall, prior to the start of the class. Most short courses have a modest fee associated with them and require full payment with registration. Sorry, no refunds are made after the class begins.

If you have questions about short courses, their cost, or registration, please call Janice Jannett or Diane Suski (624-7788).

# Project ASSIST

Project ASSIST is offering the following workshops during Spring Quarter.

| | | | |
|---|---|---|---|
| Introduction to PLATO | Apr 14 | 9:30-10:30 | 206 Appleby Computer Lab |
| Introduction to PILOT | Apr 21 | 2:30- 4:30 | 335 Peik Hall |
| CBI in Higher Education A Guided Tour of Possibilities | Apr 29 | 9:30-11:30 | 335 Peik Hall |
| Instructional Tools for the Future: The Use of the Amiga for CBI | May 20 | 9:30-11:00 | 335 Peik Hall |
| Evaluation of Software for Instruction | May 28 | 2:30- 4:30 | 335 Peik Hall |
| Introduction to PLATO | June 2 | 2:30- 3:30 | 206 Appleby Computer Lab |

Persons on the Project ASSIST mailing list will be receiving registration forms and the full Spring calendar shortly. If you are not on our mailing list, but wish to register for one of these workshops, please call 626-1090.

# Statistical Clinic

Room: 125G COB
Phone: 625-3121

The Statistical Clinic, on the St. Paul Campus, is staffed by graduate students of the School of Statistics, and supervised by faculty members of the Applied Statistics Department. The Statistical Clinic provides statistical consulting to researchers at the University of Minnesota, generally without charge. Assistance on appropriate experimental designs and methods, data analysis, and the interpretation of results are part of the mission of the Clinic.

Many statistical problems can be handled completely by the personnel in the Clinic. However, more difficult problems will be referred to an Applied Statistics faculty member.

# CONSULTING CORNER

Last quarter's newsletter had a question and answer column about electronic mail and BITNET. This newsletter's questions come straight from the Help Desk.

**Q**: Do I have to run all of my PC SAS programs from the Display Manager? (See the PC SAS efficiency article earlier in this newsletter.)

**A**: You can run PC SAS programs through batch mode as well as from the Display Manager. You will gain about 130K of RAM by not invoking the Display Manager, so you can run larger programs. To use batch mode for PC SAS type in

    sas prgname.sas

The SASLOG output will be in a file named PRGNAME.LOG, and the printed output will be in a file named PRGNAME.LST. Both files will be in the same directory as PRGNAME.SAS.

**Q**: Can I get a printed output of my PC SAS output window?

**A**: You can print the contents of any of the windows from the Display Manager by issuing the following command from the command line.

    file 'prn'

The entire contents, not just what you see on the screen, will be dumped to the printer.

**Q**: I know that SPCS has an IBM PC directly linked to the mainframe to provide fast uploading and downloading for IBM PC users, is there a similar machine available for Macintosh users?

**A**: Yes, the St. Paul Micro Lab in B50 of the St. Paul Campus Library has Macintoshes, ITE phones and the TinCan communications software package. Using TinCan, Macintosh users can dial in to the IBM mainframe, logon to their userid, and transfer files (text only, applications, or binary files) from Macintosh to mainframe or visa versa. If you cannot use the Micro Lab, but need to transfer Macintosh files, see the Help Desk in 90 Coffey Hall.

**Q**: How can I RECEIVE correspondence files (NOTES) to my minidisk and put them into a file other than ALL NOTEBOOK?

**A**: The RECEIVE command has a NOTEBOOK option that determines the filename of the notebook that the file is to be brought into. From RDRLIST, move the cursor to the line that represents the file you wish to RECEIVE, and issue the following RECEIVE command:

    receive / (notebook notebook-name

Substitute the notebook name of your choice (limit is eight characters). Press the ENTER key. The note above would be brought into a file with a filename of the notebook name that you specified and the filetype of NOTEBOOK. You can use the MAILBOOK command to manage the NOTEBOOK files.

**Q**: When I am in XEDIT it would be helpful to use a tab key, is there a way to setup tabs to enter my data?

**A**: Yes, from within XEDIT, you can set a function key to be a TAB key and define what column(s) you wish to have as tab stops.

From the command line in XEDIT, issue the command

    set pfn tabkey

You could choose any function key that you like by substituting the corresponding number for 'n' (for example, 12, to set up PF12 as the TAB key).

Next set up the tab stops. From the XEDIT command line, issue the following command

    set tabs n1 n2 ...

The n1 , and n2 represent column numbers. When the specified tabkey is pressed, the cursor will be moved to the next tab column.

## St. Paul Microcomputer Lab
Room B50 Central Library
Phone: 624 - 3269

The St. Paul Computing Services Microcomputer Lab is open to U of M students, staff and faculty. Access to the lab requires a Microcomputer Access Card which is available from the St. Paul Bursar's office. The cost of the card is $20.00 per quarter.

Laser Printing is available to our users on the Apple

LaserWriter Plus and HP LaserJet Plus. A Printer Access Card (available at the St. Paul Bursar's office for $1.00 and good for 10 pages) is required in addition to the Microcomputer Access Card.

The Microcomputer Lab is operated on a first-come, first-serve basis. Each user is limited to 2 hours per session, with a 2 hour waiting period between sessions. (More time is allowed if there is no demand' for the machines.)

### System Configuration

13 IBM PCs (8 - 256K, 2 - 512K and 3 - 640K). Each PC has 2 disk drives and is connected to a Epson FX80 printer via a switch box. Some PCs have an 8087 Math Co-processor and Graphics capabilities.

1 IBM PC/AT with 2 disk drives (360 and 1.2 M), 512 K.

6 Macintosh (2 - Plus, 4 - 512K). Each Mac has an external disk drive and is connected to an Imagewriter printer via a switch box.

2 Apple //e with 128K, 2 disk drives and are connected to an Imagewriter printer via switch box.

### Software (Available for in lab use only)

| IBM | Type |
|---|---|
| Minitab | Statistical |
| Statistix | Statistical |
| (Requires a PC w/8087 Math Co-processor) | |
| WordStar | Word Processor |
| WordStar 2000 | Word Processor |
| (Requires a PC w/512K or more memory) | |
| WordPerfect | Word Processor |
| Lotus 123 Release 1A & 2 | Spreadsheet |
| dBase III | Database |
| Turbo Pascal | Programming |
| Language | |

| Macintosh | Type |
|---|---|
| MacWrite | Word Processor |
| MacPaint | Graphics |
| Word | Word Processor |
| File | Database |
| Chart | Graphics |
| Multiplan | Spreadsheet |
| MacPascal | Programming Language |
| TinCan | Telecom-munication |
| MacTerminal | Telecom-munication |
| MS-BASIC | Programming Language |
| MacSpell+ | Spelling Checker |

| Apple //e | Type |
|---|---|
| Appleworks | Word Processor, Spreadsheet,Data base |
| MousePaint | Graphics |
| MouseWrite | Word Processor |

### Lab Hours

**Regular School**

| M-Th | 8:00am-8:00pm |
|---|---|
| F | 8:00am-5:00pm |
| Sat | CLOSED |
| Sun | 6:00pm-10:00pm |

**Summer & Quarter Break**

| M-F | 9:00am-4:30pm |
|---|---|
| S-S | CLOSED |

# Data Entry Services

The Data Entry Section of St. Paul Computing Services is open from 8:00 to 4:30, Monday through Friday, in Room 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 tape to cards or cards to tape (depending upon card condition).

4.) Hard copy available from tape or cards (depending upon card condition).

Jobs are done on a first-come, first-serve basis. Turnaround time may vary with the workload. Output is available on cards or on 800/1600/6250 bpi tapes, which will run on an IBM, CYBER, or other mainframe computers. Unless special arrangements have been made to purchase tapes, 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 624-7297. Account numbers for services may be obtained at 50 Coffey Hall or by calling Diane Suski at 624-7788.

# General Information

The University of Minnesota is committed to the policy that all persons shall have equal access to its programs, facilities, and employment without regard to race, religion, color, sex, national origin, handicap, age, or veteran status.

**St. Paul Computing Services**
50 Coffey Hall
University of Minnesota
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