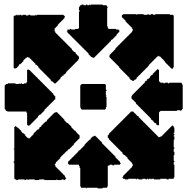
University Computer Center Newsletter

University of Minnesota
Twin Cities
Minneapolis, Minnesota



May 1981
Volume 15
Number 5

Contents

NEW LOG-IN PROMPT .....p. 58
FAMILY prompt to distinguish files on the Cyber 74 and on the Cyber 170-730
SECURITY ENHANCEMENTS .....p. 58
we will help keep your passwords more secure
APPLICATIONS PACKAGES .....p. 59
two new User Manual Supplements
DMS-170 .....p. 59
its support to terminate
FOR SALE .....p. 59
PDP-11/40 computer system and Data General NOVA 1220
MICROCOSM .....p. 59
new Terak editor; new Apple Pascal; buying a printer?
BMDP .....p. 60
three new programs for testing
SIR .....p. 60
version 1.1K FUTURE
REMAINING SHORT COURSES .....p. 60
ENGINEERING SERVICES .....p. 61
as part of our continuing feature on who we are, meet the engineering group!
STATISTICS .....p. 66
OPERATIONS .....p. 67
PHONES .....p. 68

Director: Peter C. Patton
Editor : Naomi Miner

Comments about the content of this newsletter, or suggestions for changes may be directed to the editor, 235a Experimental Engineering, or call 612/376-4668.

new log-in prompt

We will make some relatively small changes to the system on June 14, 1981. These changes will affect interactive users on our Cyber 74 and 170-730 systems and on the MERITSS system.

In last month's Newsletter, we mentioned that eventually interactive processing would be removed from the Cyber 74. Those of you who use the Cyber 74 will still be able to access your permanent files interactively, but the interactive processing will actually take place on a Cyber 730.

At that time there will be a Cyber 730 family and a Cyber 74 family of permanent files and you will have to select which family you want to use. If you do interactive processing, you will select the family at log-in; if you do batch processing, you will select the family on the USER statement in your job. On Sunday, June 14, 1981 (after spring quarter finals week), the system will begin issuing a FAMILY message at log-in on the Cyber 74 and the Cyber 730. The FAMILY message will begin to be issued on MERITSS at the end of the second summer session.

When you dial up or otherwise activate an interactive terminal, the message

FAMILY:

will be issued. In response to the FAMILY prompt, simply press the carriage return key. This will select the "default" family for whatever machine you are logging in on, or the set of files you are used to finding on your catalog on that machine. After you press the carriage return, the familiar

USER NUMBER:

prompt will be issued. Then log-in will proceed in the manner we are all accustomed to. Some of you receive the SELECT MACHINE prompt -- it will appear before the FAMILY prompt is issued.

Remember though, someday this summer, those of you who use the Cyber 74 will have to specify an actual family name in order to log-in. Details will follow in an article later this spring.

K. C. Matthews, 376-5602

security enhancements

There are several processes, apart from the obvious case of log-in, when our system requires a password. For example, the USER and SEND statements can be entered without a password and the system will then ask for it. This can also happen if the PW parameter is used by itself on permanent file statements like GET, SAVE, and so on. The security enhancements I am about to describe attempt to make the passwords entered in these cases more secure.

When the system asks for a password it overprints a variety of characters to render unreadable whatever you enter. Overprinting, however, does not help the user of a CRT terminal because each line of entry clears out the preceding one. We will solve this security problem in two ways.

full duplex

If your terminal is in full duplex mode, the system echoes back to the terminal each character you see. We usually appreciate this because we have verification that the character we entered actually made it to the host computer. But it does present the security problem we mentioned before. Hence, in the system changes we will implement on June 14, 1981, we will cease echoing back the password when it is entered as part of a secure entry. For full duplex terminals then, we will eliminate transmission of overprinted characters.

half duplex

For half duplex terminals, the terminal itself echos back each character entered. As this occurs without operating system involvement, overprinted characters should still be issued after the PASSWORD prompt to camouflage what you enter. We will send an additional line of characters to the terminal after the password has been entered to obliterate the password. This change will benefit those of you who use half duplex CRT's more than those of you who use half duplex printing terminals, but the system cannot tell which kind you are using.

other considerations

When we talk about full and half duplex, we only mean whether the system echoes back characters entered. You can check your default setting by using the LIMITS control statement, paying close attention to the PX (plex) value. You can change your default value with the SETVAL control statement. You can also change the mode of your terminal for a particular session by using the FULL and HALF commands. The full/half switch that you may find on your terminal or modem should be set for the work the system expects you to do. If not, you either see no characters or two characters printed for each character you type. Realize that the system cannot determine how you have set those switches.

During log-in, until you have successfully entered your user number and password, the system does not yet know whether your user number has a full or half duplex mode by default. So it never echoes back the password entered and it always prints an additional line after the password is entered keeping the password secure in either case.

One more caveat, for those of you who use full duplex, the system will switch you to half duplex mode for password entry. If you stop the process requesting the password with the STOP command, your terminal will be left in half duplex mode by the system. You will have to type FULL to return your terminal to its normal operation.

K. C. Matthews, 376-5602

applications packages

Two new User Manual Supplements describing applications programs on our systems are now available in the Computer Store. The Guide to Applications Packages, volumes 1 and 2 treat statistical applications (volume 1) and mathematical and engineering applications (volume 2). Avoid the summer rush by picking one up today!

J. T. Jaynes, 376-9490

DMS-170

We have decided to terminate support of DMS-170 at the end of spring quarter. Because of this, we are also cancelling the Query Update short course scheduled for May 19 and 21. If this causes any inconvenience please call our data base consulting line at 376-1761.

for sale

As one unit

Data General NOVA 1220 mini-computer with:

- 32K x 16-bit memory
- serial I/O port
- parallel printer interface
- parallel punch interface
- parallel reader interface
- 16-bit parallel I/O interface
- real time clock
- (2) 2.5 megabyte cartridge disk drives, with power supply and controller
- RDOS real time operating system
- FORTRAN compiler
- ALGOL compiler
- BASIC interpreter
- linking loader
- macro assembler
- text editor
- utility programs

Separately

- Grason-Stadler model 829C electronic switches
- Hewlett-Packard model 2000CDR oscillators
- Hewlett-Packard model 450AR amplifier
- Dykor model 2540EP high-speed paper tape reader MAC panel
- Hewlett-Packard model 350D attenuator set
- Hewlett-Packard model 400LR vacuum tube voltmeter
- Tektronix model 4501 scan converter with interface

Call

S. Tursich, 376-7125
Department of Psychology, 373-5302

Complete PDP-11/40 computer system. Will sell only to a buyer from the University and at a very reasonable price. Interested parties should get in touch with

Professor Steven C. Bruell
Computer Science Department
123A Lind Hall
376-3958 or 373-0132

microcosm

A new release of the Terak A system editor is now available. We suggest users come by the Micro office (210 ExpEng) and get the new version; there is no charge when you bring your old disk. This version is primarily a cleaner version of the last one. A number of small problems in setting margins, deleting, copying, and replacing text have been corrected. The most noticeable improvement is the insertion of two spaces after question and exclamation marks.

We strongly urge all Apple users to upgrade to the new Apple Pascal (version 1.1). There are many significant improvements, most notably MUCH faster disk access, that make this upgrade attractive. Also, we will be doing all our future work with the new version, and it will become the default operating system for software we sell in the Computer Store. Systems purchased since September 1, 1980 can upgrade to the new version without charge; purchases made prior to that date will cost $50.00. Remember these prices will not last forever. Call the Micro Help-line for more information.

We would like to warn you that code files compiled under the old operating system generally will not run under the new system. In most cases, however, recompilation under the new system is all that is required.

Thinking about buying a printer for your micro?

We have been examining and testing many of the more popular, inexpensive graphic printers that might be used with a micro. If you are contemplating buying a printer check with us for print samples, descriptions of capabilities, interfacing possibilities and price information.

We now sell a plotter library for the Houston Instruments Hi-Plot. This is a re-release of the plotter library we had out last fall; it now works properly.

Also we now have a digitizer library package for the Houston Instruments Hi-Pad digitizer.

Call the Micro Help-line for more information.

M. D. Collins, 37M-ICRO

BMDP

We now have three new BMDP programs available for you to test on the Cyber 74+172:

BMDPKM K-means clustering of cases

BMDPLR Stepwise logistic regression

BMDP8V General mixed model ANOVA - equal cells

To access these programs use the following control statement:

BMDPxx.

where xx is KM, LR or 8V.

S. P. Yen, 373-4886

SIR

SIR recently released version 1.1K and a seven-page supplement to the SIR user's manual. You can access this new version of SIR by issuing the control statement:
FUTURE,SIR.

To obtain a copy of the supplement, ask the Computer Store for a copy of the February 1, 1981 version C SIR manual supplement.

S. P. Yen, 373-4886

remaining short courses

Advanced COBOL 3:15-5pm, 28 Apr-14 May (tth), MechE 302

SIR 3:15-5pm, 28 Apr-14 May (tth), ForH 40

Introduction to System 2000 3:15-5pm, 29 Apr-15 May (mwf), Arch 45

Advanced FORTRAN 3:15-5pm, 5-14 May (tth), AkerH 319

$System 2000/RW 3:15-5pm, 19-21 May (twth), Arch 30

Query/Update 3:15-5pm, 19-21 May (tth), AkerH 319

System 2000/PLEX (PLI) 3:15-5pm, 26-28 May (twth), Arch 30

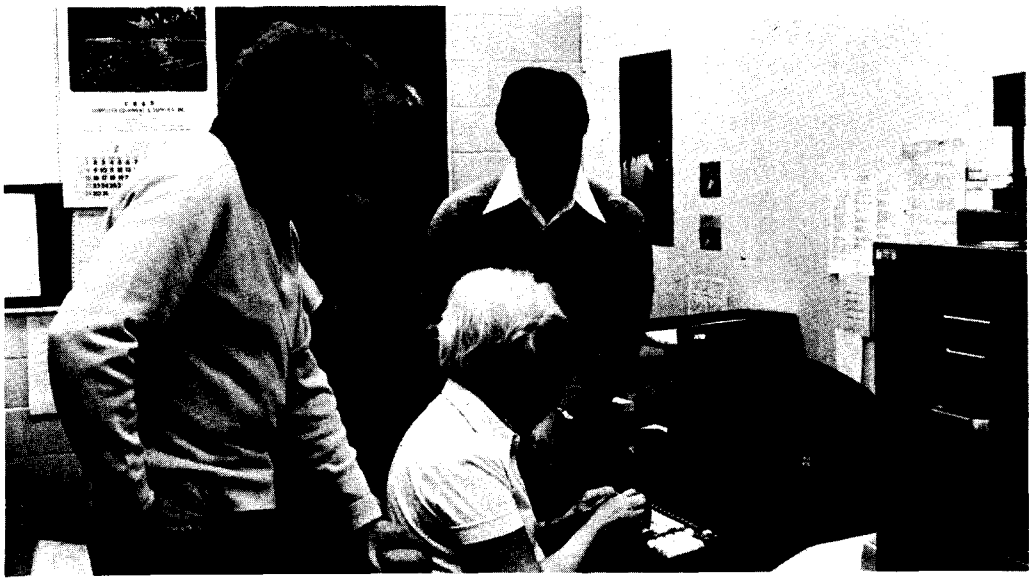
May 25th is a University holiday; no classes will be held.

$: indicates a change in the schedule since first publication.

For more information concerning these short courses, see WRITEUP(CLASSES) or call

L. Fetcher, 376-1637

One of the two Engineering Services shop areas. Foreground, Dick Emery repairing PDP-11. Background, Pat Snyder.



Doug Parkes, Abe Franck, Joyce Johnson, Dan Whealdon, Alice Cahill (L-R) examining status of equipment.

engineering services

historic and present role

The current Engineering Services Department was established in July 1971. The need for this department resulted from a development effort to utilize Univac 1004's (purchased about this time) as remote job entry stations throughout the University of Minnesota campuses. The 1004's were to communicate through a DEC PDP-11, used as a front end controller, interfaced to a CDC Cyber computer channel. An interface was needed between the PDP-11 and the Cyber giving rise to an engineering effort for a design, development, and production project. Further, a similar project was initiated not only to develop a communication line controller for the Univac 1004's, but also to refurbish and maintain the 1004's. The Engineering department was given the responsibility for this hardware program. Later Engineering Services became involved in the logistics required in evaluating new interactive terminals as well as asynchronous and synchronous communication equipment. Interfacing with members of our Center, other University users and departments, vendors, equipment manufacturers, as well as the Purchasing Department is essential to a smooth operation of Engineering Services. The department is managed by Dr. Abe Franck.

Although in the past we have been involved in communication and hardware system design for our Center, we are now primarily concerned with the maintenance and service of a wide variety of digital equipment, purchased by University Computer Services for the instructional needs of the University, as well as for the internal needs of our Center. We also offer maintenance service to various University departments for a wide variety of terminals, microcomputers and mini-computers under a service agreement program. In addition to these duties, we have acted as a bidding agent for a number of low-speed terminal devices and microcomputers required by University Computer Services, our Center, and other University departments. We offer systems and hardware advice to University departments on many digital devices.

library, parts, duties

Engineering Services maintains a technical library consisting of documentation for specific terminals in use within the University, reference catalogs for integrated circuits and other electronic components, vendor source directories and other material specifically related to the maintenance of terminals and computer equipment. We also maintain an extensive parts inventory containing over 2000 types of parts used to support the equipment we maintain. A System 2000 data base controls the inventory and typically is used to generate reports on parts inventory and equipment location.

more from engineering services

Among our duties is maintenance of low-speed terminals (10, 30, 120 cps) in the Instructional Computer Labs, and the maintenance of Univac 1004 RJE stations located throughout the Twin Cities campuses and the Waseca campus. We also maintain digital equipment in the Image Processing Center and microcomputers as well as the mini-computer processors used as front-end systems at the computer site at Lauderdale, including the front-end system at Duluth. A summary of the various equipment locations and types which we maintain follows. The service of equipment described under "UCS/UCC owned" is supported by our Center. The service of equipment listed under the heading "Not Owned by UCS/UCC" is supported by service agreements contracted with the various University departments that own this equipment.

The equipment supported at these sites include: 11 PDP-11 minicomputer systems; 26 RJE stations; 387 interactive terminals and data sets; 2 printer/plotters; 45 Apple and 34 Terak microcomputer systems.

Sites Covered by Service Agreements

No.	Sites	Major Equipment Type at Site
5		PDP-8 mini-computer systems
23		PDP-11/LSI-11 mini-computer systems
138		Interactive terminals
57		Apple microcomputers
20		Terak microcomputers
3		Univac 1004 remote job entry station

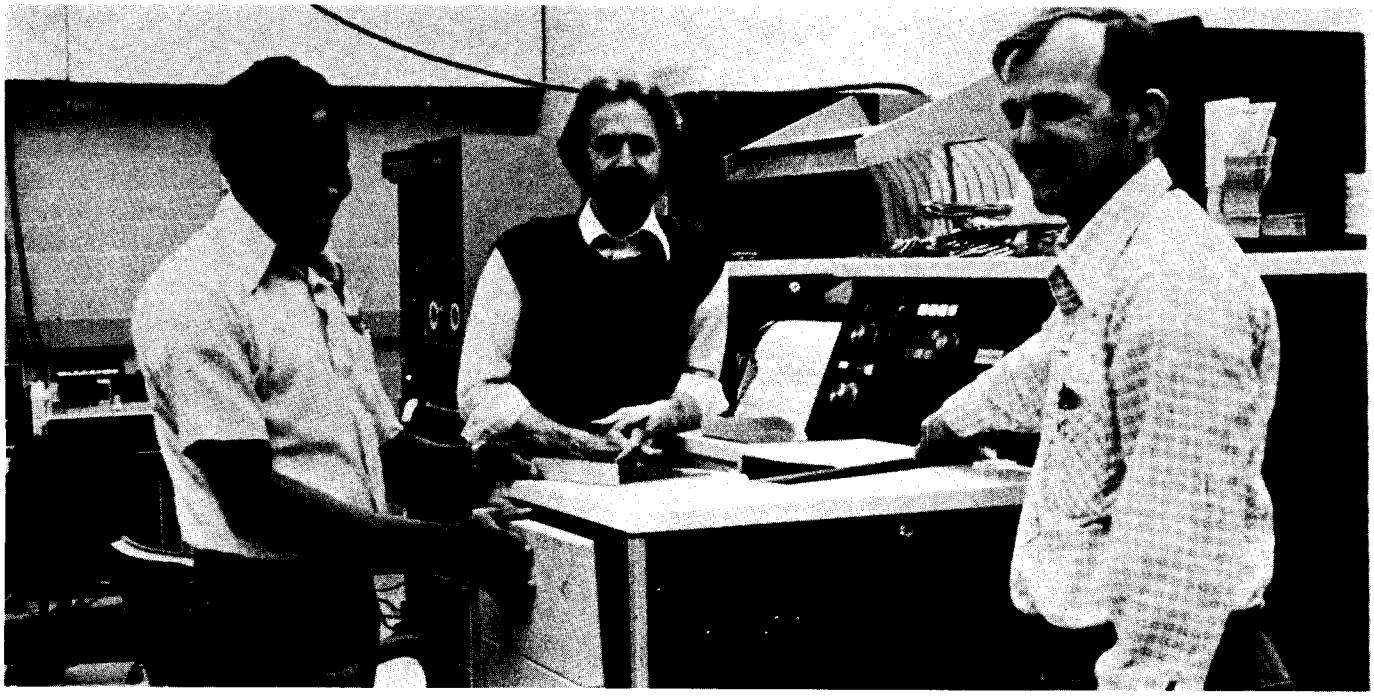
DEC maintenance group (L-R Pat Snyder, Ed Edmundson, Don Williams and Gene Kath (Dick Emery missing).

UCC/UCS Supported Sites

No.	Sites	Major Equipment Type at Site
9		DEC PDP-11 mini-computer systems
3		New RJE systems (UCC packaging)
16		Instructional Computer Labs (ICL)
30		Interactive terminals - not ICL
4		Apple microcomputers
5		Terak microcomputers
23		Univac 1004 remote job entry stations

The equipment covered by the service agreements includes: 23 PDP-8 and PDP-11 minicomputer systems; 3 RJE stations; 278 interactive terminals and data sets; 90 Apple and 40 Terak microcomputer systems.

Thirty-three percent of these latter sites are departments related to Health Sciences or to the University Hospitals. The Institute of Technology follows with almost 21 percent. The Agriculture schools, Soil Science, Forestry, and Veterinary schools combined represent another 17 percent of the sites. The rest of the sites are widely distributed among other University departments.



Sunday Alabi, Mike Carpentier, Univac 1004, Ed Edmundson (from L-R) with a PDP-11 in background.

field engineering

Engineering Services includes members of the Field Engineering group, managed by Ed Edmundson, the Logistics and Support group, managed by Dan Whealdon, and the Technical Specialist, Doug Parkes. Field Engineering maintains and services the previously described equipment. Maintenance includes equipment repair as well as preventive maintenance performed on a periodic basis to anticipate equipment failure. This group maintains the equipment within University Computer Services and within our Center, but also equipment under contract on the Twin Cities campuses and on the Duluth, Waseca and Morris campuses. Equipment is either repaired on-site by replacing a defective component or defective module or, if the equipment cannot be repaired in a timely fashion, it is returned to the shop for repair. A replacement unit may be provided.

By integrating off-the-shelf equipment, Field Engineering has packaged a new RJE system to replace the Univac 1004. Typically a PDP-11 or an LSI-11 based Terak has been used as the processor, and a Documation card reader and Data Products or Printronics line printer are used as the associated input/output devices. Field Engineering will maintain the new RJE's and will provide contract service for such equipment for other University departments.

The staff of Field Engineering includes: Sunday Alabi, Michael Carpentier, Richard Emery, Mike Holmgren, Gene Kath, Curt Lehrke, Pat Snyder, Alan Weyhrauch, Don Williams, and Mark Zierdt.

logistics and support

The Logistics and Support Group maintains an extensive spare parts inventory for the repair of equipment under maintenance. They expedite orders, receive and stock spare parts and components. A service line coordinator answers calls for service and initiates the appropriate service request. A data base keeps track of spare parts inventories, equipment under service agreement as well as expense budget information and service histories.

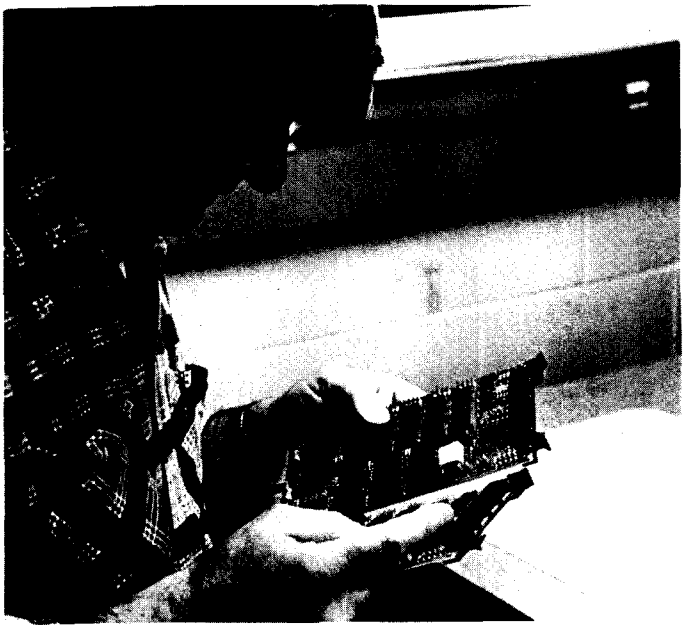
The Logistics and Support Group is involved in bid procedures for the purchase of components and new equipment and deals with over 300 vendors ranging from small electronic parts suppliers to companies such as CDC and Digital Equipment Corporation. We developed a bid format for the purchase of small scale computer-related equipment that has gradually become a model used throughout the University. Two conditions within the bids which we developed have been particularly beneficial to the entire University: the "lemon" clause -- which defines acceptance terms and conditions during a warranty period, and delivery penalties -- that encourage vendors to be more timely in meeting their delivery schedules. The staff includes Alice Cahill and Joyce Johnson.

technical specialist

The Technical Specialist provides technical support to Engineering Services, to our Center, and to other departments at the University in the following: project coordination, application engineering, interface evaluation, resolution of technical hardware problems, and evaluation of computer-related equipment for the University in terms of ease of maintenance.

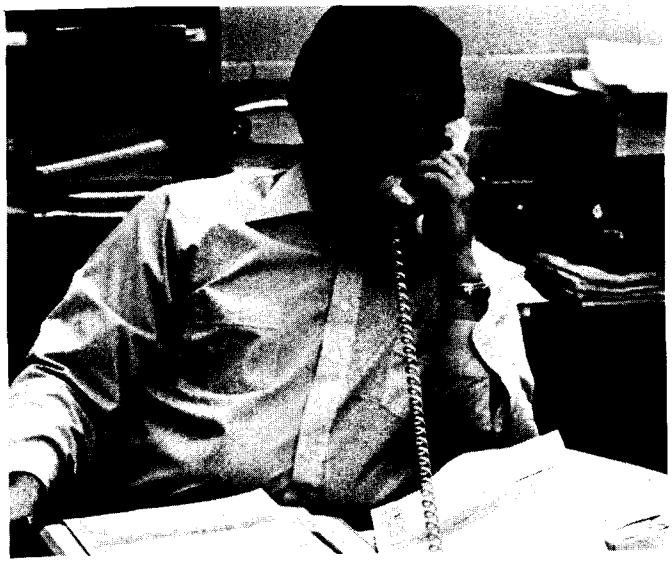
Our staff also provides on request limited consulting services on hardware matters, to other branches of our Center and to other University departments regarding the purchase of or bid on computer terminals, microcomputers, mini-computers, and peripherals. Some limited design work has been done by this group for departments outside of our Center.

A. Franck, 376-7291
Engineering Services Staff



Don Williams matching circuit boards.

Interactive Terminal Group (L-R). Mike Holmgren, Curt Lehrke, Al Weyrauch, Mark Zierdt.



Dan Whealdon talking with a) University purchasing, b) vendor, or c) user -- take your pick!

Photos by A. Franck.

Mike Carpentier refurbishing a Univac 1004 card reader. Background, Mark Zierdt repairing Apple.

Mark Zierdt -- our Apple man.

field engineers

Al Weyrauch checking out Teletypes 43.

statistics

***PRODUCTION USAGE SUMMARIES: Cyber 74+172

	March, 1981	March, 1980	% Change
System resource units (SRU)	1,495,810 (1,899,300)	1,176,940 (1,468,211)	27.1 (29.4)
Batch jobs and MIRJE sessions	122,162 (135,260)	118,624 (128,679)	3.0 (5.1)
Total central processor (CP hours)	189/213 (203/349)	141/222 (153/324)	(34 /- 4.1)
DELAY queue CP hours	53/ 47 (56/ 75)	31/ 41 (33/ 49)	(71.0 / 14.6)
NO FRILLS queue CP hours	25/ 8 (25/ 8)	8/ 24 (8/ 24)	(312.5 /-66.7)
Mass storage transfers (KPR)	491,034 (609,582)	434,197 (523,369)	13.1 (16.5)
Magnetic tape transfers (KPR)	10,483 (15,524)	9,681 (15,388)	8.3 (0.9)
Pages printed, charged from UCC	952,870 (1,100,936)	1,168,238 (1,289,105)	-18.4 (-14.6)
Cards punched	234,666 (244,674)	383,913 (444,326)	-38.9 (-44.9)
Microfilm frames produced	33,350 (580,921)	12,902 (481,231)	258.5 (20.7)
MIRJE terminal hours	18,409 (21,510)	14,963 (17,258)	23.0 (24.6)
Number of terminal sessions	48,890	35,231	38.8
Statos plotting production (feet)	9,159	7,605	20.4
Tapes mounted	12,331	12,032	2.5
Average file storage (char)	3,582.4 million	2,789.7 million	28.4
Mean time between failures	76.9/76.9 hours	49.8/ 62.2	54.4 / 23.6
Available during scheduled hours	99.1/98.5 percent	97.6/ 98.0 percent	1.5 / 0.5

(totals in parentheses include staff development, accounting, and maintenance runs)

DOWNTIME SUMMARY: April, 1981 (Column 1, Cyber 74 : Column 2, Cyber 172)

	0800-1800 M-F		other		total	
Total possible scheduled uptime hours	220.0	220.0	309.0	309.0	529.0	529.0
Total downtime hours (see Schedule A)	.9	.8	2.2	2.2	3.1	3.0
Total uptime hours	219.1	219.2	306.8	306.8	525.9	526.0
Uptime (percent)	99.6	99.6	99.3	99.3	99.4	99.4
Average downtime per occurrence (min)	10.4	12.5	66.0	32.8	26.3	22.6
Mean time between failures (hours)	36.7	44.0	103.0	61.8	66.1	58.8
Subsystem failures						
SUPIO	4	-	0	-	4	-
TELEX	1	0	0	0	1	0
EXPORT	1	-	0	-	1	-

Schedule A: downtime hours

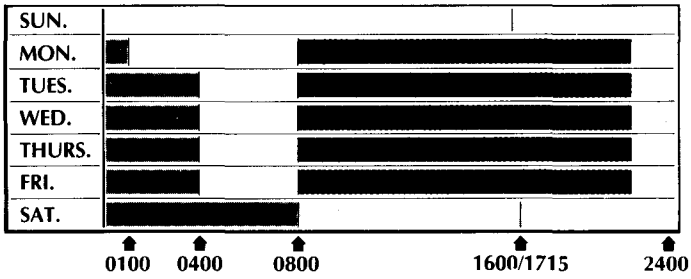
	Number		Total hours		Average minutes	
(1) Preventive maintenance over-runs	0	0	0.0	0.0	0.0	0.0
(2) Software related problems	3	5	0.2	0.2	3.0	2.8
(3) Hardware related problems	3	3	0.8	0.8	15.3	16.0
(4) Indeterminate problems	0	0	0.0	0.0	0.0	0.0
(5) External Problems	1	1	2.2	2.0	129.0	121.0

***PRODUCTION USAGE SUMMARIES: Cyber 170-720 (MERITSS)

	March, 1981	March, 1980	% Change
Number of jobs run	285,062	209,034	36.4
Central processor hours	229	181	26.5
MERITSS terminal hours	32,687	28,956	12.9
Number of terminal sessions	70,138	51,444	36.3
Maximum number of simultaneous users	168	140	20.0
Average file storage (char)	457.1 million	477.6 million	-4.3
Mean time between failures	71.3 hours	95.3 hours	-25.2
Available during scheduled hours	99.6 percent	99.2 percent	.4

operations

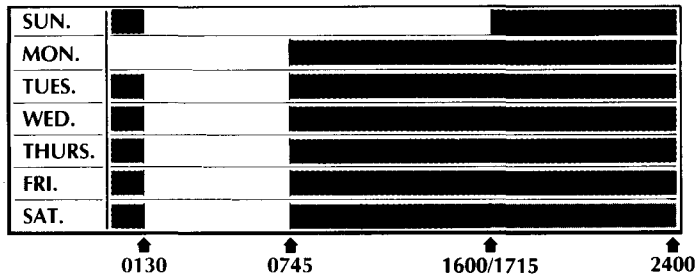
CYBER 74 + 172 OPERATING HOURS



Lauderdale, ExpEng, NORMAL rate
Lauderdale, ExpEng, DELAY rate
Lauderdale only, DELAY rate

See WRITEUP(HOURS) for schedule of batch job pickup/delivery service.

CYBER 720 OPERATING HOURS



Up, not attended
Up, attended

See WRITEUP(LABHOUR) for a schedule of open hours in the student computer laboratories.

TWIN CITIES CAMPUS PUBLIC REMOTE JOB ENTRY SITES

SITE	ID	SUPERVISOR	PHONE
		East Bank	
ElectE 38	4V	V. Zahhos	373-5346
EltH N640	4W	D. Anderson	373-5827
ExpEng 130	3L	I/O Coordinator	373-4596
ExpEng 130	4B	I/O Coordinator	373-4596
ExpEng 130	4N	I/O Coordinator	373-4596
FrontH	4E	D. Schumacher	373-2740
HSUnitA	4C	L. Croatt	373-7714
KoltH S191	4Z		
MinMet 321	41	R. Larson	376-2668
102 OMWL	29	H. Young	373-5370
Physics 69	44	L. Whitney	376-7627
TerrH W106	41	B. Hackett	373-6621
D388 Mayo	24	L. Croatt	373-7714
Zoology 314	4J	E. Cushing	373-2232
		West Bank	
SocSci 167	4X	D. Lund	373-3608
SocSci 1009	4K	M. Mongiat	373-0168
		St. Paul	
BioSci 257A	47	M. Simmons	373-1961
ClaOff 125G	48	C. Bingham	373-0988
McN H	42	G. Wahlert	373-0939
NorH 24	4G	J. Colten	373-0990
NorH 24	40	J. Colten	373-0990
		Lauderdale	
User's Room	49	Secretary	373-4912
User's Room	3F	Secretary	373-4912

Keypunches provided at each site.

TWIN CITIES INSTRUCTIONAL COMPUTER LABORATORIES

SITE	SUPERVISOR	PHONE	EQUIPMENT
	East Bank		
CentH	R. Rickgarn	3-2289	TTY33(2)
ComH	C. Youngdale	3-2453	TTY43(1)
DiehlH 535	N. Sauro	6-7005	CRT(2)
EltH 121, 125	D. Anderson	3-5827	TTY33(6) CDC713(1) Hazeltine(3) Teleray(1)
FrontH	D. Schumacher	3-2740	TTY33(1)
HS-A 1-752	L. Ellis	3-0331	TTY33(3) TTY43(2) Teleray(1) Decwriter(1)
LindH 25	T. Chan	3-7580	CDC713(6) Decwriter(5) Tektronix4013(1) Teleray(1) TTY43(11)
MechE 308	D. Riley	3-0340	TTY33(4) Teleray(3) Decwriter(5)
SanfH	M. Kilbury	3-3434	TTY33(1)
TerrH	B. Hackett	3-3567	TTY33(1)
VincentH 4	W. Stenberg	3-2586	TTY33(2) CDC713(2) Decwriter(7) Teleray(2)
WaLib 204	R. Estelle	3-2538	TTY43(10) CRT(2)
	West Bank		
BlegH 140	D. Lund	3-3608	TTY43(13) Teleray(1)
MdbH	R. Baker	3-9818	TTY33(1)
SocSci 167	D. Lund	3-3608	TTY33(5) Teleray(3) Decwriter(2)
	St. Paul		
ClaOff 125	C. Bingham	3-0988	TTY33(6) Hazeltine(2) Decwriter(4)

phone numbers

Accounting	373-4548
Computer-Aided Instruction	376-2975
Computer Hours (recorded message)	373-4927
Computer Store	373-4877
Consulting	
HELP-line	376-5592
9 AM—5 PM, Monday—Friday	
Business Data Products	376-1761
10-11 AM and 1-3 PM, Monday—Friday	
Statistics Packages	376-5062
1-2 PM, Monday—Friday	
Data Bases	376-1761
10-11 AM and 1-2 PM, Monday—Friday	
Microcomputers	376-4276
10-12 AM and 2-4 PM, Monday—Friday	
Humanities	373-5780
10:30-11:30 AM, Monday, Wednesday, Friday	
Contract Programming	376-1764
Data Base Applications	373-7878
Educational Services	376-3963
EDUNET Interface	373-7745
Equipment Purchase or Lease	376-8153
Experimental Engineering I/O	373-4596
Field Engineering	376-7584
Graphics Software	376-1636
HELP-line	376-5592
9 AM—5 PM, Monday—Friday	
HOURS-line (recorded message)	373-4927
Image Processing Center	373-7878
Information, Experimental Engineering	373-4360
Information, Lauderdale	373-4912
Information Systems	373-7878
Instructional Labs	373-5754
Job Status, ExpEng (recorded message)	373-4994
Lauderdale Operations	373-4920
Lauderdale Services	373-7538
Lauderdale Users Room	373-4921
MECC Interface	373-4573
Microcomputers	376-8806
Microfilm Operator	373-4995
Newsletter Subscription	376-4668
Permanent File Restoration	376-5605
Professional Services Division (PSD)	376-1764
Project Assistance	376-1764
Program Librarian	376-1636
Programming Languages	376-7290
Reference Room	373-7744
Remote Batch (RJE) Services	373-5754
Short Courses	376-1637
Shuttle Bus Service	376-3068
System Status (recorded message)	373-4927
Tape Librarian and EBR Operator	373-4995
Technical Writing	373-2522
User Numbers	
Instructional Batch	373-2521
Instructional Timesharing	373-7745
Research Batch	373-2521
Research Timesharing	373-2521
User Services	373-4599

University Computer Center Newsletter

User Services
227 Experimental Engineering
University of Minnesota
208 Union Street SE
Minneapolis, Minnesota 55455