University Computer Center Newsletter

UNIVERSITY COMPUTER CENTER   UNIVERSITY OF MINNESOTA-TWIN CITIES   MINNEAPOLIS, MINNESOTA 55455

contents

WE WELCOME YOUR ARTICLES

DEADLINE MAY 21

bulletins

Worried about costs? See next page.

MASS STORAGE RATES WILL DECREASE

UCC newsletter

Volume 14   Number 4   April, 1980

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 612/373-7744.

The University of Minnesota adheres to the principle that all persons shall have equal opportunity and access to facilities in any phase of University activity without regard to race, creed, color, sex, or national origin.

rate increases set

As we reported in the February newsletter, increases in supply costs and standard salaries have necessitated some Cyber 172/74 rate increases for fiscal year 1980-1981. We considered the following factors in determining where increases were justified.

We anticipated that users will request that Cyber rates for individual services or supplies correspond more accurately to the cost of providing those services.

We felt a revised research computing grant program must include the online related cost of various supplies in addition to the system resource unit (SRU).

We realized the need for an amortization fund for hardware replacement representing approximately 5% of our total income. The annual University computer equipment fund has been reduced in a series of budget retrenchments to 20% of its amount of one decade ago. Since hardware represents approximately 35% of our operating cost, the 5% should cover the 7 year life of most computer equipment we use.

We needed to take a conservative view of projected income increases for 1980-1981 since users may spend less on computing due to the high inflation rate and because we expect some users to do computing on the new IBM 4331 computer on the St. Paul campus, some at a new Health Science facility and and some on the DEC VAX and Cyber 203 used by members of the Institute of Technology.

If, however, revenues increase through November 1980 over the inflation rate, we plan to restore the SRU rate to the current rate. If the new mass storage modules are installed (they are four months overdue from the original delivery date) we plan an additional 16% reduction from $0.024 KSH to $0.020 KSH for mass storage use, also in January of 1981.

developed a detailed cost breakdown for each item In this process, we on the Cyber rate sheet that had a proposed increase.

For example, for the high speed printers the cost per page was broken down in the following manner:

1. Supplies	
printer paper	$.0132/page
ribbons	$.0006/page
Paper includes 10% loss due to tests, headers, jams, and scrap	
2. Maintenance	$.0033/page
controllers, printer and printer trains	
3. Labor	$.0070/page
paper and ribbon changing, job separation, delivery to user	
supervision	$.0029/page
4. Storage and paper movement	$.0002/page
5. Amortization	$.0043/page
TOTAL	$.0315/page

UCC has strived to slightly under recover costs and thus the 1980-1981 rate for high speed printing was set at $.0300/page.

The University Computer Services Advisory Committee established a task force to review the proposed changes. The task force agreed that the proposed rate structure seemed reasonable in light of the information we presented. They approved the following changes in rates, scheduled for 1 July 1980.

All SRU rates are INCREASED by $.01 for the general amortization fund
Mass storage is REDUCED from $0.027/KSH to $0.024/KSH

The following INCREASES will be made for the new year for online related costs incurred while running a job or during a terminal session:

Printer paper	from $0.02	to $0.03/page
Punched output	from $0.003	to $0.008/card
Varian setup	from $0.25	to $0.50/setup
Varian paper	from $0.20	to $0.25/foot
Microfilm setup	from $0.25	to $0.75/setup
Microfilm frame	from $0.0067	to $0.008/frame
Tape Mounting		
Labeled	from $0.10	to $0.40
Unlabeled	from $0.20	to $0.60
Transient	from $0.50	to $1.00

Off-line related charges will increase or decrease corresponding to the new costs incurred in the bidding currently underway. As of this date the off-line charges for magnetic tapes are expected to increase in January 1981. Tape storage will go to $0.75/tape/month in July 1980. Disk unit rental will decrease by 5% per month starting July 1980.

Copies of the new Cyber rate sheet and the revised computing grant program will be sent to everyone on the newsletter mailing list. Copies may be obtained by calling Jack Schwab at 3-2521.

L. Liddiard,3-5239

estimates

We are developing a WRITEUP to assist you in estimating computer costs for some frequently used processes and packages. You have asked for this kind of guidance in the past, but because it is easy to underestimate the size of a job and difficult to estimate charges for inadvertent errors, we have been reluctant to offer such advice.

However, we are willing to provide a set of typical jobs with their actual costs as a means of helping you calculate your own approximations.

Watch for WRITEUP(COSTEST) which should be available around April 21.

T. Hodge,3-4599

ARCHIVE problem

If you have tried to CATALOG an ARCHIVE tape recently you may have noticed that comments are not appearing correctly on the CATALOG report. The CATALOG utility was recently revised by Control Data to look in a new place for comment data and ARCHIVE has not been updated to correspond to this change.

ARCHIVE writes a qualifier and comments beginning in the 4th word since CATALOG, originally, began looking for comments in this word of the prefix table. Now, however, CATALOG begins looking for comments in the 10th word, so it is only printing the last 6 words of the comment field (missing the first 5 words of comments and the qualifier), when you attempt to CATALOG an ARCHIVE tape.

On March 29 ARCHIVE was updated to Version 4.0. Version 4.0 does offer some new directives, but retains the comment problem. Anyone who is now using FUTURE(ARCHIVE) would be in trouble if we fixed the problem at this point. However, during Spring Quarter break ARCHIVE 4.1 will become the current version of ARCHIVE. It will convert old archive tapes, when updated, so that the comments begin in the 10th word and eliminate the problem with CATALOG. Of course any new tapes written by ARCHIVE 4.1 will have the comment data in the proper location.

Y. Murray,6-5604

system 2000

The System 2000 control statement provides an alternate way of calling System 2000 with four parameters: IA, CT, PG and UN. A UCC BRIEF on the use of the control statement is available in 140 Experimental Engineering.

A word of caution, you must specify the name of the data base when using the IA parameter in the following manner:

```
S2K,IA=dbname. or S2K,IA.dbname.
```

Questions? Call

J. Cosgrove,6-1761

data base management

After some confusion over meeting times, the DBMS user's group met on March 21 in Room 35 of the Law School Building. Five attended. Dale Trippler (Water Planning Board) chaired the meeting. A brief discussion concerning the poor attendance preceded the main presentation. Members will be contacted by telephone several days before the next meeting.

Elaine Tourville (DNR, Division of Water) brought word that John Cosgrove will give the April presentation on system error processing in data base management. The talk will provide a general survey and introduction to the process with special references SIR, Record Manager, and System 2000.

Norman McNeal of the Minnesota Pollution Control Agency reviewed their data base management programs. These include STORET (Storage and Retrieval) a national data base of water samples that is maintained by the Environmental Protection Agency; MEDVETS, a DBMS to measure waste discharges in Minnesota; SWFIMS (Solid Waste Fills Information Management System); and GICS (Grants Information Control Systems). A discussion followed.

The next meeting is scheduled for April 17, Room 35, Law School Building at 3:30 PM.

M. Dunham,3-7744

writeupdate

March has been a busy month for writeups, with many new texts being brought up and a few old ones purged. The following is a brief list of some of the most noteworthy additions.

ON THE CYBER 74/172

CAL	An explanation of the use of the Pascal program CAL for creating personalized calendars on the Varian electrostatic plotter.
COPYU	An explanation of the COPYU control statement used for copying/skipping/counting unit records (lines of text).
DELAY	An explanation of the delay input queue feature for postponing job submission until non-prime hours of operation.
QUEUE	An explanation of the QUEUE feature used to check on jobs submitted to the delayed input queue.

ON THE CYBER 74/172 and MERITSS

IMSLFIX	Changes to the IMSL library, received last month from IMSL Inc., which are now installed on the current version of IMSL.
SETVAL	An explanation of user-definable validations. It's worth a look to see what you can set yourself.
UNPAGE	An explanation of the UNPAGE control statement for editing carriage control characters in a file.

J. Jaynes,6-5262

lab apple-cations

For several years I have been doing research on the single celled algae called Gonyaulax polyedra. This remarkable little creature has two outstanding features of research interest: the capability of giving off light; and an internal clock that governs its daily life.

The clock closely governs when light emission occurs. A great deal of experimentation has been done with these clocks using strip chart recorders to collect the data. I have always been frustrated by this process because of failing ink pens, jamming chart paper and reams of difficult data to analyze. In the past, the cost made it impractical to dedicate a computer to this task. Now, with an inexpensive microcomputer and the more readily available analog to digital (A-D) and D-A conversion units, I am now able to measure three different luminescent parameters (glow, flashes, and total light) where before it was only practical to measure one (glow).

The microcomputer easily sorts out the data of 30 different samples; previously this had to be done manually from the chart paper. The microcomputer is able to give me an instant update of the progress and results of the experiment, thereby giving information regarding the need to adjust experimental conditions, when to terminate, and to help develop ideas for the next immediate experiment. Under actual experimental conditions the system has been highly reliable, with the logging of about 400 hours without a miscue. The data are conveniently stored on a floppy disk. The data are readily available to the computer capabilities for curve fitting analysis. Plotting and formatting data is greatly simplified and involves responding correctly to the queries of the plotting and formatting program.

Once the microcomputer and the A-D, D-A converter were introduced into the laboratory, many other uses were discovered. For example, I quickly found I could rescind a $10,000 request for a digital oscilloscope as the microcomputer could perform the oscilloscope's functions and in addition provide hard copy output using a strip chart recorder. The output can even be modified so that an integrated, differentiated, or logarithmic trace can be obtained. The microcomputer system also has been hooked up to an inexpensive spectrophotometer, yielding digital readout and hard copy traces of transmittance, optical density and chemical concentrations. My next project is to tie a thermistor into the system thus simulating a highly precise and versatile digital thermometer.

We selected the Apple II microcomputer because of its low cost, good reputation, availability, good maintenance sources, and the ever growing availability of software and hardware. The A-D, D-A system was specially designed by Steve Wilson in Dr. Hasting's laboratory at Harvard University, where similar research is being conducted. This system has 5 channels of 12 bit A-D and 2 channels of 10 bit D-A and includes its own power supply. I found this system preferable over other systems available at the time of purchase, particularly because of the greater resolution of a 12 bit, compared to an 8 bit, A-D converter.

Programming was relatively straightforward, but, for purposes of speed, all of the applications described invariably required machine language in conjunction with Applesoft programming. For graphics, I found it most convenient to use the high resolution graphics software package provided by Apple; however it sits so low in memory (3072) that corresponding Applesoft programs (starting at 2048) have to be kept very short. To produce time dependent graphics, a hardware clock with 1 ms resolution is used. The only disadvantages of doing this are low time scale resolution and unavailability of the clock for other purposes during an experiment.

In short, because it is reliable, versatile, and affordable the Apple II and the A-D, D-A converter has been a tremendous success in both the research and classroom laboratory.

Van D. Gooch
Science and Mathematics
U of M, Morris

statistics

***PRODUCTION USAGE SUMMARIES: Cyber 74/172

	February, 1980	February, 1979
System resource units (SRU)	1,285,606 (1,597,761)	1,197,409 (1,566,966)
Batch jobs and MIRJE sessions	134,604 (144,282)	111,269 (121,759)
Central processor hours inc. DELAY	180/197 (190/312)	194/100 (210/219)
DELAY queue processor hours	50/42 (50/54)	71/20 (72/30)
NO FRILLS queue processor hours	14/13 (14/13)	( )
Mass storage transfers (KPR)	432,230 (547,487)	360,631 (462,143)
Magnetic tape transfers (KPR)	12,590 (16,900)	7,523 (12,489)
Pages printed, charged from UCC	1,109,560 (1,221,341)	1,030,681 (1,141,221)
Cards punched	284,477 (355,568)	352,516 (470,186)
Microfilm frames produced	37,259 (490,470)	18,403 (375,425)
MIRJE terminal connect hours	14,573 (16,768)	10,402 (12,220)
Number of MIRJE terminal sessions	33,906	24,627
Statos plotting production (feet)	10,194	7,165
Tapes mounted	12,767	11,912
Average file storage (char)	2,997.0 million	2,032.0 million
Mean time between failures	252.5/126.3 hours	160.0/239.5 hours
Available during scheduled hours	99.6/99.3 percent	99.8/99.9 percent

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

***DOWNTIME SUMMARY: March, 1980 (Column 1, Cyber 74 : Column 2, Cyber 172)

	0800-1800 M-F		other		total	
Total possible scheduled uptime hours	209.5	209.5	288.0	288.0	497.5	497.5
Total downtime hours (see Schedule A)	0.7	0.7	11.2	9.1	11.9	9.8
Total uptime hours	208.8	208.8	276.8	278.9	485.6	487.7
Uptime (percent)	99.7	99.7	96.1	96.8	97.6	98.0
Average downtime per occurrence (min)	14.0	13.7	96.0	109.4	71.4	73.5
Mean time between failures (hours)	69.8	69.8	41.1	57.6	49.8	62.2
Subsystem failures						
SUPIO	2	-	2	-	4	-
TELEX	0	0	1	2	1	2
EXPORT	1	-	1	-	2	-

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	2	0	0.5	0.0	16.0	0.0
(3) Hardware related problems	8	8	11.4	9.8	85.3	73.5
(4) Indeterminate problems	0	0	0.0	0.0	0.0	0.0
(5) External Problems	0	0	0.0	0.0	0.0	0.0

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

	February, 1980	February, 1979
Number of compilations or executions	271,023	267,365
Central processor hours	201	161
MERITSS terminal connect hours	32,787	31,037
Number of MERITSS terminal sessions	62,362	60,987
Maximum number of simultaneous users	146	146
Average file storage (char)	490.6 million	378.3 million
Mean time between failures	201.1 hours	148.2 hours
Available during scheduled hours	99.1 percent	99.9 percent

short courses

UCC Short Course Schedule for Spring 1980

$	Computing: What is it?......	2:15-4pm	Apr 7-10 (mtwth), Aero 317, LF/SG
	Beginning COMPASS...........	3:15-5pm	Apr 7-18 (mwf), Arch 30 JJD
$	COBOL.......................	3:15-5pm	Apr 7-23 (mwf), Aero 309, DR
	Intro to Record Manager.....	3:15-5pm	Apr 7 (m), Arch 45, SAR
	Linear Programming Packages.	3:15-5pm	Apr 8-10 (tth), ForH 130 JCC
	Record Manager/BAM..........	3:15-5pm	Apr 9-11 (wf), Arch 45, SAR
	Introduction to UCC.........	3:15-5pm	Apr 11 (f), ForH 130 RTF
	NOS (system configuration)..	3:15-5pm	Apr 14 (m), Ph 166, RTF
	NOS (files/jobs)............	3:15-5pm	Apr 15-16 (tw), Ph 166, RTF
	NOS (permanent files).......	3:15-5pm	Apr 17 (th), Ph 166, RTF
	NOS (program execution).....	3:15-5pm	Apr 18 (f), Ph 166, RTF
	NOS (intro to tapes)........	3:15-5pm	Apr 21 (m), Ph 166, RTF
	NOS (misc statements).......	3:15-5pm	Apr 23 (w), Ph 166, RTF
	Record Manager/AAM..........	3:15-5pm	Apr 14-18 (mwf), Arch 45, SAR
	PLOTPAC.....................	7:30-9:30	Apr 14-16 (mtw), Laud*, KMM
	XEDIT.......................	2:15-4pm	Apr 21-25 (mwf), MinMet 124, MB
	Introduction to System 2000.	3:15-5pm	Apr 21-May 2 (mwf), Arch 60, JCC
	Sort/Merge..................	3:15-5pm	Apr 21-25 (mwf), Arch 30 SAR
	Interactive System Commands.	3:15-5pm	Apr 22-24 (tth), Ph 166, RTF
	Batch Introduction..........	2:15-4pm	Apr 22 (t), LindH 203, MB
	BASIC.......................	3:15-5pm	Apr 28-May 2 (mwf), Arch 30 MT
	SNOBOL......................	3:15-5pm	Apr 28-May 9 (mwf), Arch 45, ABM
	Advanced FORTRAN............	3:15-5pm	Apr 28-May 9 (mwf), ForH 130 RTF
	SPSS (SPSS basics)..........	2:15-3:30	May 5 (m), Ph 166, BH
	SPSS (data manipulation)....	2:15-3:30	May 6 (t), Ph 166, BH
	SPSS (SPSS files)...........	2:15-3:30	May 7 (w), Ph 166, BH
	SPSS (workshop).............	2:15-3:30	May 9 (f), Ph 166, BH
	System 2000/RW..............	3:15-5pm	May 5-9 (mwf), Arch 30 SPN
$	Advanced COBOL..............	7:15-9pm	May 5-21 (mw), MinMet 124, DR
	System 2000 User Aids.......	3:15-5pm	May 6-8 (tth), ForH 130 JCC
	System 2000/PLI.............	3:15-5pm	May 12-16 (mwf), Arch 30 JCC
	FORM........................	3:15-5pm	May 12-16 (mwf), Arch 60, SAR
$	SPSS (procedures)...........	2:15-3:30	May 12-14 (mw), MinMet 116, BH
$	SPSS (On-Line)..............	2:15-3:30	May 16 (f), MinMet 116, BH
	Intermediate FORTRAN........	6:15-8pm	May 13-Jun 5 (tth), MinMet 124, RTF
$	Pascal Data Structures......	3:15-5pm	May 20-29 (tth), ForH 130 LF
	SIR.........................	3:15-5pm	May 20-29 (tth), ForH 150, JCC
	Intro to Microcomputers.....	3:15-5pm	May 27-28 (tw), BlegH 150, GG
	Using Micros (TERAK)........	3:15-5pm	May 29-30 (thf), BlegH 150, GG
	Using Micros (AppleII)......	3:15-5pm	Jun 2-4 (mw), BlegH 150, MT
	DMS-170.....................	3:15-5pm	Jun 2-3 (mt), Ph 166, JCC
	Query/Update................	3:15-5pm	Jun 4-5 (wth), Ph 166, JCC
$	Comparative DBMS............	3:15-5pm	Jun 6 (f), Ph 166, JCC

* Lauderdale Conference Room, Lauderdale Computer Site, 2520 Broadway Dr., Lauderdale, Mn

NOTE: dollar sign ($) indicates change since first publication.

operations

CYBER 74/172 OPERATING HOURS

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S|                                   |$$$$$$$$$$$$$$$|
M|*|               |<><><><><><><><><><><><><><><><$$|
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W|*******|         |<><><><><><><><><><><><><><><><$$|
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F|*******|         |<><><><><><><><><><><><><><><><$$|
S|*****************|$$$$$$$$$$$$$$$$$|               |
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    ^     ^        ^                  ^              ^

0100  0400     0800                 1715          2400
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<><><><> Lauderdale, ExpEng, NORMAL rate
$$$$$$$$ Lauderdale, ExpEng, DELAY rate
******** Lauderdale only, DELAY rate

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

CYBER 170-720 OPERATING HOURS

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S|                                       |><><><><><>|
M|                 |><><><><><><><><><><><><><><><><>|
T|<>|              |><><><><><><><><><><><><><><><><>|
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S|<>|             |<><><><><><><><>|*****************|
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 0130        0730/0745          1600    1800     2400
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****** 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	2
EltH N640	4W	D. Anderson	373-5827	2
ExpEng 130	4B	Shift Supervisor	373-4596	1
ExpEng 130	4N	Shift Supervisor	373-4596	1
FrontH	4E	D. Schumacher	373-2740	1
KoltH S191	4Z			4
HS-A 1-752	4C	L. Ellis	373-0331	1
MinMet 321	41	R. Larson	376-2668	3
Physics 69	44	L. Whitney	376-7627	3
SpaSci 134	43	A. Perandi	373-7881	1
TerrH W106	4I	B. Hackett	373-6621	1
D388 Mayo	24	L. Croatt	373-7714	1
M39 MasonH	2D	L. Croatt	373-7714	1
Zoology 314	4J	E. Cushing	373-2232	1
>>>West Bank<<<				
SocSci 167	4X	D. Lund	373-3608	2
SocSci 1009	4K	T. Kroening	373-0168	1
>>>St. Paul<<<				
BioSci 257A	47	M. Simmons	373-1961	1
ClaOff 125G	48	C. Bingham	373-0988	3
McN H	42	G. Wahlert	373-0939	1
NorH 24	4G	J. Colten	373-0990	1
NorH 24	40	J. Colten	373-0990	1
>>>Lauderdale<<<				
User's Room	49	Secretary	373-4912	5

*--indicates keypunches at each site. Additional keypunches in 131 ExpEng, 86 BlegH, 140 ExpEng, and 90 BlegH.

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) Hazeltine(3) Teleray(1)
FrontH	D. Schumacher	3-2740	TTY33(1)
HS-A 1-752	L. Ellis	3-0331	TTY33(4) TTY43(2) Teleray(1)
LindH 25	M. Schneider	3-0137	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	3-2538	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)

*for CAI use only

phone numbers

Accounting 373-4548, 373-2521
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 1-2 PM, Monday - Friday
  Statistics Packages 376-5062
    1-2 PM, Monday - Friday
  System 2000 376-1761
    10-11 AM and 1-2 PM, Monday - Friday
  Microcomputers 376-4276
    10-12 AM and 2-4 PM, Monday - 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
Information, Experimental Engineering 373-4360
Information, Lauderdale 373-4912
Information, SICL 373-9751
Information Systems 373-7878
Instructional Labs 376-8806
Job Status, ExpEng (recorded message) 373-4994
Lauderdale Operations 373-4920
Lauderdale Services 373-7538
Lauderdale Users' Room 373-4921
MECC, University 373-4573
Microcomputers 376-4276
Microfilm Operator 373-4995
Newsletter Subscription 373-7744
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

RETURN TO:
User Services
University Computer Center
227 Experimental Engineering
University of Minnesota
208 Union Street SE
Minneapolis, Minnesota 55455