

MASSACHUSETTS INSTITUTE OF TECHNOLOGY  
INFORMATION PROCESSING CENTER

July 12, 1973

RATES FOR COMPUTER SERVICES

Addendum 2 - 6180 Multics Rates

Interactive Usage

Shift	CPU	Memory	Connect	Terminal I/O*
1	\$270/hr.	\$15/Kmu	\$1.25/hr.	\$0.00/K lines
2	\$210/hr.	\$15/Kmu	\$1.25/hr.	\$0.00/K lines
3	\$120/hr.	\$15/Kmu	\$1.25/hr.	\$0.00/K lines
4	\$180/hr.	\$15/Kmu	\$1.25/hr.	\$0.00/K lines

Absentee Usage

Queue	CPU	Memory
1	\$210/hr.	\$15/Kmu
2	\$180/hr.	\$15/Kmu
3	\$120/hr.	\$15/Kmu

I/O Daemon Usage

Queue	Print	Punch**
1	\$3.00/1000 lines	\$5.00/1000 cards
2	\$1.80/1000 lines	\$3.60/1000 cards
3	\$1.50/1000 lines	\$3.00/1000 cards

Tape Usage\*\*\*

Tape Usage	\$1/tape mounted + \$25/hour
Tape slot	\$1/month
Tape rental	\$1/month

\* Charges for Terminal I/O will be published at a later date.

\*\* The I/O Daemon currently does not distinguish, for charging purposes, between cards punched and lines printed, and must estimate the number of lines (or cards) by dividing the number of bits transferred by 700.

\*\*\* Charges for tape usage will be published after the tape handling package is available to users.

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Addendum 2

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Disk Usage

\$0.50/page-month

Other Charges

Connect time on 1200 baud channels will be \$2.50/hr.

Retrievals not caused by system error will be charged \$10.

General Information Series  
GI-7 revision 10

MASSACHUSETTS INSTITUTE OF TECHNOLOGY  
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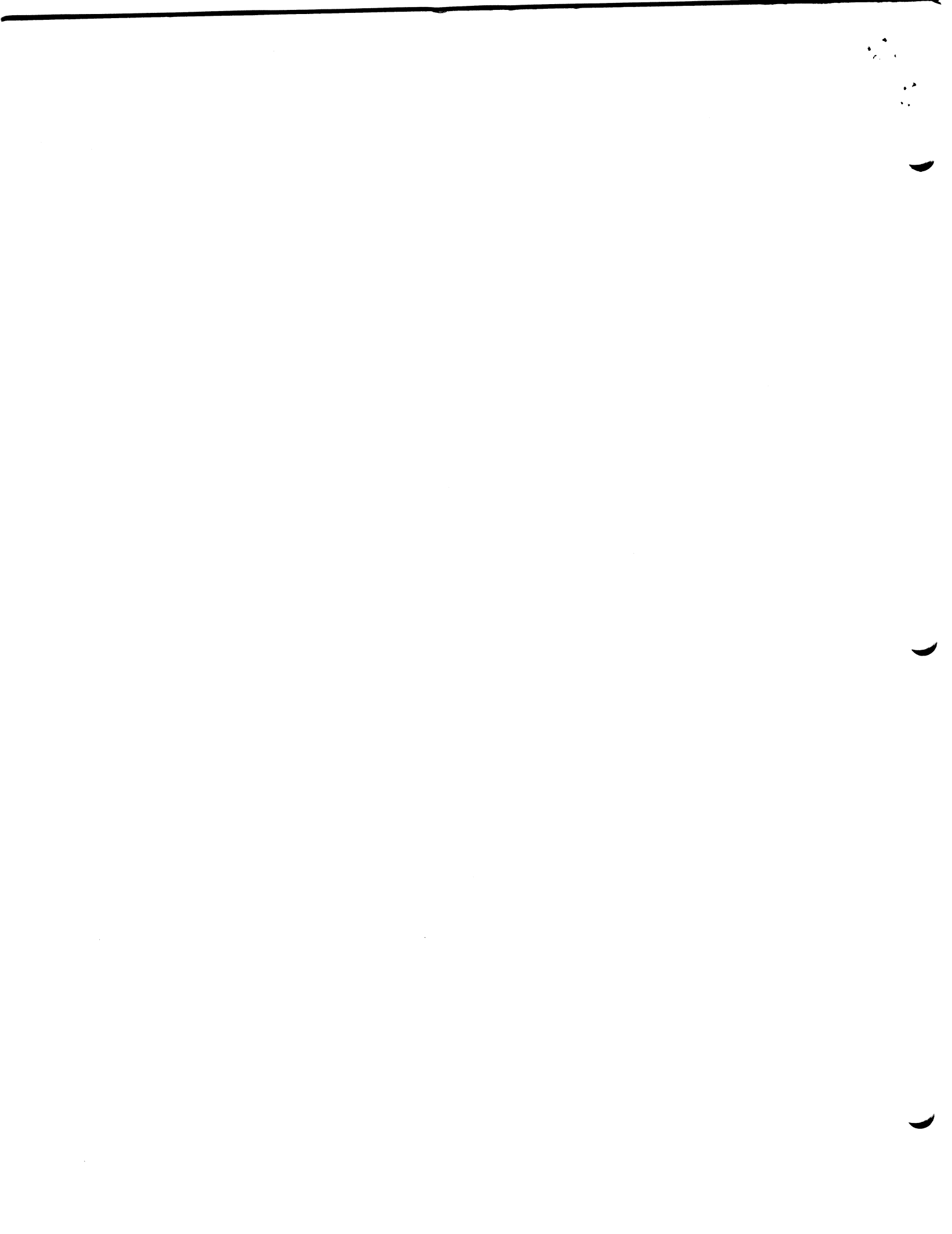
June 30, 1973

RATES FOR COMPUTER SERVICES

Addendum 1 - New JPS CPU Rates

The CPU price given on page 3 has been changed to a per-step graduated rate as shown below.

CPU Time Interval	CPU Rate Per Minute
first minute	\$7.00
second minute	\$6.00
third to fifth minutes	\$5.00
all time over five minutes	\$2.00



MASSACHUSETTS INSTITUTE OF TECHNOLOGY  
INFORMATION PROCESSING CENTER

March 1, 1973

RATES FOR COMPUTER SERVICES

This memorandum describes the rate structure for all of the computer services offered by the M.I.T. Information Processing Center.

Rate adjustments in response to improved equipment and techniques and changes in user demand are normal occurrences. Recognizing the troublesome effect on planning that frequent revisions of rates can create, the Center will endeavor to make changes as infrequently, and with as much advance notice, as possible. Nevertheless, the user should expect rate changes to occur from time to time, as it is only in this manner that we can equitably distribute the costs of the services to those using them.

Job Processing System

For all of the Center's services, every effort is made to charge users according to their actual usage of the system. On the job processing system we are running in a multiprogramming environment. This means that several different jobs may reside in the main memory at one time. Each job uses the central processing unit (CPU) and input-output (I/O) equipment as it needs it and it becomes available. With a good mix of jobs sharing the resources there will be a great deal of overlap or simultaneous use of equipment providing for its most efficient use.

Even with the best mix there will be times when jobs will be found to be in "involuntary wait" because the resources they require are in use. Although these jobs are occupying and thus using main storage at this time, the involuntary wait period is a consequence of the multiprogramming technique of improving efficiency and not something the programmer has control over.

The best accounting technique would be one that not only charges a job for the resources it uses and does not charge it for the resources it does not use, but which also does not charge it for the resources it uses involuntarily, such as the main storage used during periods of involuntary wait. This requires that the accounting routines keep careful track of the use of the various resources.

Most of the resource use is accounted for by counting, such as the I/O operations; some is accounted for by time measurements, such as the CPU time; some is accounted for by a time estimate called job run time. Job run time is an estimate of the elapsed time required to run the job excluding the involuntary wait time. It should approximate the time the job would take if run alone in the system. Main memory charges and device use charges are based on this estimate.

Our routines account for five subcosts: processor time, read and write operations, main storage requirements, device use, and peripheral operations. In addition, per job, per setup device, and per job step charges are levied to recover handling and software support costs. After the subcosts for a job are summed, this figure is multiplied by the SRI factor to determine the total charge for the job. (See GI-24 for a description of the SRI.)

The charge for a job, then is the SUM of  
the CPU charge

CPU time x the CPU price x the CPU CLASS factor + any surcharge  
plus the I/O charges

the number of tape I/O events (reads and writes) x the tape I/O price + the number of disk I/O events x the disk I/O price + the number of channel-to-channel I/O events x the channel-to-channel I/O price

plus the main storage charges

the number of K bytes of main storage x job run time x the core price

plus the device use charges

the number of tapes x (job run time x the tape price) + the number of setup disks x (job run time x the disk price)

plus the peripheral operations charges

the number of lines x the line price +  
the number of cards read x the card input price +  
the number of cards punched x the card output price

plus the handling charges

the number of devices set up x the setup handling charge + the number of steps x the step software charge +  
the job handling charge

MULTIPLIED by the job's SRI factor.

Where

the CPU price = \$420 per hour (subject to the CLASS factor below)  
 the disk I/O price = \$1.00 per thousand events  
 the tape I/O price = \$1.20 per thousand events  
 the channel-to-channel I/O price = \$0.30 per thousand events  
 the tape price = \$60.00 per hour  
 the disk price = \$50.00 per hour  
 the card input price = \$1.50 per thousand cards  
 the card output price = \$3.00 per thousand cards  
 the line price = \$1.50 per thousand lines  
 the core price is based on the table

first 64K (minimum allowable)	\$32.00 per hour
+ 66K to 400K @ \$ 0.50 per K byte hour of run time	
+402K to 500K @ \$ 0.60 per K byte hour of run time	
+502K to 600K @ \$ 0.70 per K byte hour of run time	
+602K to 700K @ \$ 0.90 per K byte hour of run time	
+702K to max. @ \$ 1.30 per K byte hour of run time	

and job run time is computed as

CPU time + (4 seconds per thousand channel-to-channel I/O events)  
 + (25 seconds per thousand tape I/O events)  
 + (30 seconds per thousand disk I/O events)

and the CPU CLASS factor is

1.0 for CLASS A or B (J or K) jobs and 0.8 for CLASS C (L) jobs.  
 Jobs which specify CLASS incorrectly receive a surcharge of 40 percent of the CPU charge as indicated in the following table.

(CPU Time) ÷ (Run Time)	Surcharge	
	User Specified CLASS	
	A or B	C
0 - 61%	0	40%
62 - 71%	0	0
72 - 100%	40%	0

Thus correctly specified CLASS A or B jobs are defined as those whose CPU time to run time ratio is less than 66 percent and CLASS C jobs are those in which this ratio is greater than or equal to 66 percent. (The actual job class is reported for each step and for the job on the job's accounting sheet.) Because of normal variations in CPU times from run to run, a 5 percent buffer is provided on each side of the 66 percent line.

and

setup handling charge = \$1.00 per device  
 job handling charge = \$0.50 per job  
 step software charge = \$0.10 per job step

and the SRI factors are

SRI	Factor
LOW	0.85
STANDARD	1.00
HIGH	2.00
EMERGENCY	6.00

ASP Utilities Rates

The rates on the preceding page for cards read, cards punched and lines printed also apply to the ASP background utility functions /\*PROCESS PRINT and /\*PROCESS PUNCH. (See OS-28.) Jobs to reproduce or print decks of cards should be submitted as regular jobs and are scheduled automatically according to the SRI scheduling algorithm.

ASP utility functions requiring tapes and operator intervention must be submitted as special jobs and are scheduled by the operator. The four types of functions in this category are transferring cards to seven-track or nine-track unlabeled tapes, punching unlabeled tape files onto cards, printing seven-track or nine-track tapes and duplicating tape files. The rates for these services are:

card-to-tape	\$10 plus \$0.50 per box (2,000 cards)
tape-to-card	\$10 plus \$2.00 per box (2,000 cards)
tape-to-print	
one-ply paper	\$10.00 per tape plus \$1.00 per 100 pages
three-ply paper	\$10.00 per tape plus \$2.00 per 100 pages
tape-to-tape	\$10 per tape mounted

Charges for any one utility request will be rounded up to the next highest dollar.

The rate for pressure-sensitive address label printing is 2.6¢ per label plus a per job handling charge of \$1.00.

Rates Associated with On-line Storage

The Center offers permanently mounted on-line storage space on IBM 3330 disk drives. The price for this storage space is one and two-thirds cents (5/3¢) per allocated track per day. The physical characteristics of the disk are as follows:

Average access time	30 milliseconds
Average rotational delay	8.4 milliseconds
Transfer rate	806,000 bytes per second
Track capacity	13,030 bytes

Charges are based on the allocation of the datasets appearing in the U (or USERFILE) catalog. (See OS-2 for a description of the Center's dataset naming and cataloging conventions.) These charges are computed each day.

Rates Associated with Off-line Storage

The Center will rent magnetic tape reels and 2314 disk packs to users for use as setup devices. The Center also will store user-owned packs or reels for a storage and handling charge. The rates are:

	<u>User-owned</u>	<u>Center-owned</u>
Tape Reel	\$1 per month	\$2 per month
2314 Disk Pack	\$5 per month	\$20 per month



In addition, the Centers sells 2400-foot reels of magnetic tape for \$14 each and cartridges for self-loading tapes for \$4 each, although these prices may vary occasionally.

All volumes that are to be used on the computer must be associated with a storage "slot number." Because the operator is instructed by the system to set up a volume by slot number, the volume is expected to be in that slot when the operator looks for it. If the user wishes, he may rent a single slot and rotate several volumes through it, although he must be careful that only one volume per slot is at the Center at a time.

#### Time-Sharing Option (TSO) Service

On the job processing system the Center also provides a typewriter-terminal oriented time-sharing system called the IBM Time-Sharing Option or TSO. The charges for this system are based on those for the job processing system and are as follows.

CPU time at \$420 per CPU hour,  
Disk I/O operations at \$1.00 per thousand events,  
Interactive memory charges at \$0.75 per "average K byte hour,"  
Teleprocessing I/O charges at \$1.00 per thousand events,  
Connect time charges at \$1.25 per hour.

CPU and Disk I/O accounting is done as on the job processing system. Connect time is the elapsed (clock) time between LOGON and LOGOFF. The "average K byte minute" is based on the actual main memory usage at the times of sampling. This sampling is done frequently enough to provide a reasonably representative figure. TSO files are on-line datasets and are charged for at on-line storage rates.

#### APL/360 Service

APL/360 service is provided under TSO and the charges are computed as TSO charges. APL "workspaces" are 4-track on-line storage datasets and are charged for at on-line storage rates.

#### Remote Job Entry Service

Jobs can be submitted both locally, by submitting them at the Dispatch Counter in Building 39 or at the IPC East Campus Facility, and remotely at several facilities connected to the computer via telephone or microwave facilities. To the extent that these remote facilities do not use the Center's equipment and personnel they are not charged for them. In particular the rates for the peripheral and handling services are as follows.

Remote cards read, lines printed, or cards punched: \$0.25 per thousand  
Remotely submitted jobs: \$0.25 handling charge

Remotely submitted jobs which direct their output to the local printers or punches will be charged for these services at the local rates.

Multics Service

Multics (Multiplexed Information and Computing Service) is a general purpose time-sharing system developed at M.I.T.'s Project MAC on a GE 645 in cooperation with General Electric and the Bell Telephone Laboratories. Development of the system is continuing through the cooperation of M.I.T. and Honeywell Information Systems on an HIS 6180 computer. This system is intended to be a "computer utility," extending the basic concepts and philosophy of CTSS in many directions. The Multics Programmers' Manual and other related documents are available at the Publications Office, Room 39-483.

The following rates for use of Multics are in effect.

CPU Time (Usage is charged to the shift during which the resources are consumed.)

Shift 1	(0800-1800 weekdays)	\$480/hour
Shift 2	(1800-2400 weekdays)	\$360/hour
Shift 3	(0000-0800)	\$150/hour
Shift 4	(0800-2400 weekends)	\$240/hour

Terminal Connect Time \$1.25/hour

Secondary Storage \$1.00/page/month

## Absentee Usage

Queue	CPU rate	Plus
1	\$360/hour	\$1/hour real time
2	\$240/hour	\$1/hour real time
3	\$150/hour	\$1/hour real time

## I/O Daemon

Queue	Rate
1	\$2.00/1000 lines*
2	\$1.80/1000 lines*
3	\$1.50/1000 lines*

## Retrievals

Due to user error \$10/tape reel set up  
 Due to system error no charge

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\*For accounting purposes a line is 700 bits.

### Programming Services

The Center provides programming and analysis services when appropriate. Charges for the service vary depending on the particulars of the task and the type of service being provided. The actual terms and an estimate of overall costs can usually be worked out beforehand.

### Other Services

#### CalComp Plotter

Plot tapes prepared on the S/370 must be processed through the CalComp Plotter as a separate operation. The rate for this operation is \$10 per hour of plotting time.

#### Stromberg-Carlson 4020 (SC-4020)

The SC-4020 is a cathode ray tube plotting device that provides high-speed plotting capability, which in many cases has advantages of flexibility and resolution over the CalComp facility. The SC-4020 may be used to produce both graphical and textual output on either 8½ by 11 paper or 35 mm. film.

Low-volume users can purchase either frames of output or time on the SC-4020. The rates for frames of output are:

<u>Output</u>	<u>Price per Frame</u>
paper only	\$0.50
film only	0.50
paper and film	0.65

The rate for SC-4020 time is \$50 per hour. Because of the setup and breakdown requirements, there will be a minimum charge of \$15 for this service. An additional charge of \$30 per roll of film will be made if the film is supplied by the Center. Rates do not include developing the film. This hourly service is intended primarily for those creating animated films.

Users with high volume per run requirements may choose an alternative charging rate by scheduling this service with the Computer Operations Supervisor at least one day in advance. These rates can only be applied when processing a user-supplied tape.

<u>Output</u>	<u>Price per Run</u>	+	<u>Price per Frame</u>
paper only*	\$20.00		\$0.10
film only*	20.00		0.10
paper and film**	20.00		0.15

### Mohawk Data Sciences 6405

The Mohawk Data Sciences (MDS) 6405 is a paper-tape to magnetic-tape converter. This device is available in two ways: either the user can run the equipment himself and pay an hourly rate or he can submit his tapes as a utility request for the Center to process. The rates are:

Hourly rate with the user operating the equipment:  
\$12 per hour, with a minimum charge of \$3

Utility request with the Center processing the job:  
\$0.20 per 1000 records (100 characters per record)  
+\$0.25 per paper tape  
+\$0.50 per magnetic tape

### Keypunching and Verifying

Keypunching and verifying services are available at the following rates:

Keypunching	\$4.75 per hour (1 hour minimum)
Verifying	\$3.00 per hour (1 hour minimum)

### Storage Lockers

Storage lockers in Room 39-240 can be rented at the following rates:

\$1.00/month for one locker  
\$3.00/month for two lockers

See the tape librarian in Room 39-285 to make rental arrangements.

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\*The break-even point is at 50 frames.

\*\*The break-even point is at 60 frames.