VI.   BUDGET

EXPENDITURE DETAILS

Direct Costs Only

		August 1, 1970- July 31, 1971	August 1, 1971- July 31, 1972
1.	Personnel		
	Director's Office	46,597	48,645
	Systems Programmers	78,379	76,213
	Applications Programmers	41,749	47,315
	Research Assistants	6,940	7,394
	Operations	51,953	54,948
	Secretarial & Administrative	12,355	13,220
	Subtotal Salaries	237,973	247,735
	Staff Benefits	32,942	37,384
	TOTAL PERSONNEL	270,915	285,119
2.	Consultant Services	800	1,000

VI. BUDGET

EXPENDITURE DETAILS

Direct Costs Only

		August 1, 1970- July 31, 1971	August 1, 1971- July 31, 1972
3. Equipment			
IBM Rentals			
IBM 360/50			
1052	Console Typewriter	635	635
1403	Printer 600 LPM	8,397	8,397
2050	Additional CPU (F)	97,348	97,348
2314 #1	Dir. Acess Storage	52,920	51,720 (2319)
2314 #2	Dir. Acess Storage	52,920	51,720 (2319)
2361	Core Storage	76,161	76,161
2401	Mag. Tape Unit	3,377	3,377
2403	Mag. Tape Unit Control	8,971	8,971
2540	Card Reader Punch	6,653	6,653
2701	Data Adapter Unit	10,332	10,332
2702	Transmission Control	16,834	16,834
2821	Control Unit	10,937	10,937
	Subtotal 360/50	345,485	343,085
Disk Packs (IBM 2316/3-M)	(16)	3,226	(25) 2,100
Terminals (2741)	(12)	12,167	(7) 7,436 *
IBM 1800 add. units			
1442		2,591	2,591
1826		7,691	7,691
1856		1,663	1,663
	Subtotal, 1800	11,945	11,945
Unit Record 029		1,192	1,259
	TOTAL, IBM RENTALS	374,015	365,825
Miscellaneous Rentals			
Hazeltine Displays (excluding interface)		1,239	---
	Subtotal, main resource rentals	375,254	365,825

*includes 1 month overlap of replacement of four IBM 2741's
by purchased Beehive alphanumeric terminals

VI. BUDGET

EXPENDITURE DETAILS

Direct Costs Only

	August 1, 1970- July 31, 1971	August 1, 1971- July 31, 1972
Purchased Equipment		
IBM 1801 core	18,734	
Prentice Data Couplers - 2	626	
Textronix Scope Carts	333	
Prentice Modems	4,182	
Litton Printer (for Drug-Interaction)	4,053	
Litton Printer (for Drug-Interaction)	4,053	
Alpha-numeric Displays (Beehive) (D-1)	7,270	(4) 16,936
DEC Disk Drive	15,120	
Less portion of proceeds from sale of 270 x/y	(15,120)	
Electronic Testing Equipment		1,000
Two 1200 baud data sets/interfaces for portable graphics		3,200
Small computer equipment pool		40,000
	39,251	61,136
Data Set and Line Rentals	10,120	8,382
Maintenance (under outside contract)	6,559	8,670
Total Equipment	431,184	444,013
4. Consumable Supplies		
Office	3,500	4,000
Computer	8,500	10,250
Cables (Core Research Interface)	1,500	2,000
Total Consumable Supplies	13,500	16,250

5. Travel

Jamtgaard--IBM Class, S.F., 7/14-21	37	
Wiederhold-ACME Seminar, U. of Minn., 7/29	67	
Jamtgaard--Wash. Univ., Computer Labs, 7/29-30	304	
Frey --SHARE, Montreal, 8/17-20	574	
Crouse --U. of Calif., Irvine, 9/18	70	
Jamtgaard--U. of Texas Med. Center, 11/17-19	379	
Wiederhold-AAAS Conf. & ASSA Conf., Chicago & Detroit, 12/26-28	382	
Frey --SHARE Conf., L.A., 3/8-12	240	
All Other Travel	1,547	
	3,600	4,000

EXPENDITURE DETAILS

Direct Costs Only

		August 1, 1970- July 31, 1971	August 1, 1971- July 31, 1972
6.	Engineering Services	25,200	30,000
	Less portion of proceeds from sale of 270 x/y	(7,390)	
		17,810	30,000
7.	Publication Costs	4,000	4,000
8.	Computer Services		
	360/67	8,000	5,000
	IBM Education Courses	1,660	2,000
	Total Computer Services	9,660	7,000
9.	Other Expenditures		
	Books and Periodicals	400	500
	Postage and Freight	600	600
	Telephone	6,500	6,500
	Physical Plant	200	718
	Technical Services	200	300
	Total Other Expenditures	7,900	8,618
GRAND TOTAL -- DIRECT COSTS		754,502	800,000

ARRYTHEMIA DETECTIONS *

Personnel

Systems Programmer, one man-year	16,000
Systems Programmer, one-half man-year	6,500
Research Associate, three man-months	5,000
Subtotal Salaries	27,500
Staff Benefits	4,562
Total Personnel	32,062
Technician Engineering Services	10,000
Supplies	1,000
Total estimated costs of core project	43,062

* Example of a medical computation application ACME would like to fund
  from revenue from fees for service.

VI. BUDGET

B. Summary of Resource Funding

	BUDGET PERIODS		
	Actual Previous Budget Period	Current Budget Period	Estimated Next Budget Period
Source of Funds			
Computer Equipment - Service	$ 178,252	$ 160,000*	Approx. $ 250,000
Biotech. Resources Branch Support			
Amount of Current Award: Line (5) of Award Statement	712,689	675,747	713,342
Adjustment from prior periods: 1. Line (4) of current Award statement	0	76,459	17,883
2. ROE Adjustment	(76,459)	(17,883)	
Total BR Support	$ 636,230	$ 734,323	$ 731,225
TOTAL FUNDING	$ 814,482	$ 894,323	(Dependent on Income & Policy)

* Extrapolation from funds from service charges August, 1970 through April, 1971.

VI. BUDGET

C. Resouch Equipment List

RENTAL EQUIPMENT

360/50 Configuration

TYPE-SERIAL	DESCRIPTION	RENTAL START DATE	MONTHLY RATE	E/A%	EDUCATIONAL ALLOWANCE	TAX	NET RENTAL
1052-50618	Console Typewriter	12-13-66	63.00	20	12.60	2.52	52.92
1403-14708	Printer 600 LPM	"	833.00	20	166.60	33.32	699.72
2050-11047	Additional CPU (F)	"	1,600.00	25	400.00	60.00	1,260.00
2050-11047	CPU	"	10,040.00	35	3,514.00	326.30	6,852.30
2314-11149	DIR ACESS STGE	4-12-68	5,250.00	20	1,050.00	210.00	4,410.00
2314-12326	DIR ACESS STGE	1-6-69	5,250.00	20	1,050.00	210.00	4,410.00
2361-10102	Core Storage	7-1-68	10,990.00	45	4,945.50	302.23	6,346.73
2401-10877	MAG TAPE UNIT	12-13-66	335.00	20	67.00	13.40	281.40
2403-70738	MAG TAPE UNIT CONTROL	"	890.00	20	178.00	35.60	747.60
2540-12531	CARD READER PUNCH	"	660.00	20	132.00	26.40	554.40
2701-11144	DATA ADAPTER UNIT	12-13-66	1,025.00	20	205.00	41.00	861.00
2702-20185	TRANSMISSION CONTROL	12-13-66	1,670.00	20	334.00	66.80	1,402.80
2821-12464	CONTROL UNIT	"	1,085.00	20	217.00	43.40	911.40
360/50 Configuration Total			30,691.00		12,271.70	1,370.97	28,790.27

Supporting Equipment Rentals

| 16 units 2316 | DISK PACK (IBM) * | 4-12-68 | (@ 20.00) 320.00 | 20 | 60.00 | 12.00 | 272.00 |
| 8 units 2741 | Communication Terminal | various | (@ 100.50) 804.00 | 20 | 160.80 | 32.16 | 675.36 |

* to be changed to 3-M

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VI. BUDGET

RENTAL EQUIPMENT (Cont.)

Supporting Equipment Rentals (Cont.)

TYPE-SERIAL	DESCRIPTION	RENTAL START DATE	MONTHLY RATE	E/A%	EDUCATIONAL ALLOWANCE	TAX	NET RENTAL
3 units 2741	Communication Terminal	various	(@ 105.50) 316.50	20	63.30	12.66	265.86
1 2741	Communication Terminal	8-1-70	113.50	20	22.70	4.54	95.34
1800 Rental Equipment							
1826	Data Adapter Unit	9-22-66	640.92	none	--	--	--
1442	Card Read Punch	"	215.92	none	--	--	--
1856	Analog Output Terminal	6-24-70	69.34	none	--	--	--
Other Rented Equipment							
Card Punch	IBM (Model 029/P4202)	9-21-70	104.87	--	--	--	--
5 Data Sets	Westinghouse Electric (Model 103A2)		193.50	--	--	--	--

PURCHASED EQUIPMENT

Period Covered -- 8/1/67-4/30/71

DESCRIPTION/IDENTIFICATION	MANUFACTURER	MODEL NO.	PURCHASE PRICE	SOURCE OF FUNDS
1800 System			2,908.00	Genetics I.R.L.
Process Controller	IBM	1801		
Printer Keyboard	"	1816		
Enclosure	"	1828		
Analog Input Terminal	"	1851		

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VI. BUDGET

PURCHASED EQUIPMENT (Cont.)

DESCRIPTION/IDENTIFICATION	MANUFACTURER	MODEL NO.	PURCHASE PRICE	SOURCE OF FUNDS
			(1)	
Digital Display	ACME		1,500.00	SRR
Oscilloscope	Hewlett-Packard	139B	1,275.00	Macy Grant
Pulse Generator	E. H. Research Labs	2B	18,753.00	Macy Grant
Conversion 1801	IBM	PDP-11	17,891.00	
PDP-11 System	Digital Equip.	547	3,253.00	
Oscilloscope	Textronix	30	4,053.00	
Printer	Litton Industries	800/LDA-1	2,972.00	
Module/Packs	Prentice	130	309.00	
Oscillator/Generator	Wavetek	DC 22	939.00	
Couplers (2)	Prentice	LDA 1	383.00	
Module	Prentice		4,182.00	
Cabinet	Prentice			

(1) Fabricated and assembled by ACME staff.

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D.   Budget Justification

The budget does not reflect the shift in emphasis which is highlighted
throughout this report, that ACME will give top priority in the coming
year to designing and implementing a transitional system.   After various
preliminary studies have been completed, budget adjustments to accommo-
date the needs as then forseen will be requested.   Another significant
point is the disposition of income earned through fee-for-service charges.
ACME is proposing that the income revert to the Stanford medical communi-
ty to support extensions of ACME's core research efforts.   This item will
be the topic of further discussion with NIH.

Direct Costs

An increase in direct cost of slightly less than $40,000 is requested
for the next fiscal year, bringing the total direct cost base to $800,000.
The increase over the current year will be used to create a small machine
equipment pool, provide slightly more engineering services, and cover
normal cost escalation.   No new positions are requested in the budget al-
though a part of the numerical analyst position is shown in the NIH
budget for the first time.   ACME has used a faculty member on a half-
time basis during the past year using University funds.   The presence of
high level help in mathematics and numerical analysis has been helpful
to both ACME staff and users.   The expense associated with this 25% of
full time salary commitment is less than the terminal leave funds ex-
pended during the current year for David Cummins and Serge Girardi.
The only other changes in the personnel budget are for merit increases.

Equipment

The equipment budget (lease and purchase) calls for a $13,000 net in-
crease.   The details supporting this estimate include two significant
purchases.   First, ACME intends to form a small machine equipment pool
as described in Section III of this report.   The $40,000 shown for
this new activity will be supplemented in future years as the pool ex-
pands.   The second major equipment acquisition involves four alphanumeric
displays with upper and lower case.   The cost estimate is based upon
Beehive Model 3 units plus $800 per terminal for interface cards to the
PDP-11, drivers, receivers, and cables.   These units communicate with
the PDP-11 at 4800 baud via an 8-bit serial interface.   Two other equip-
ment items are identified in the budget: engineering test equipment
for the maintenance of existing equipment and two data sets which will
permit data rates of 1200 baud between ACME and the 611 "add-on" dis-
plays over normal telephone lines.   Lease of the 360/50 system will
cost less in the next fiscal year due to replacements ordered for disk
drives and packs.   An order has been placed to replace two 2314's with
two 2319's at a monthly savings of roughly $100 each.   During May, 1971.
all IBM disk packs were replaced by 3M packs at a rental cost savings

of roughly 50%. The complete savings is not apparent as nine of the packs which are actually part of the basic system have been charged in the past to a University account; next year's grant account will be paying for all packs.

Finally, IBM rental costs will be decreased by five 2741 typewriter terminals four of which will be replaced by the alphanumeric displays. The fifth 2741 is being cancelled in order to keep the direct cost total within the $800,000 ceiling recommended by NIH Research Council.

One change made this year in the equipment configuration will have neg-ligible effect on next year's budget, but it has materially affected service levels. The 270X and three 270Y's were purchased in conjunction with funds from the Genetics Department's Instrumentation Research Lab-oratory and the Chemistry Department in ACME's second year. This equip-ment was intended to serve as the medium rate interface between data gathering realtime users and the IBM 360/50 system but did not live up to ACME's expectations. This year IBM bought the unit from Stanford. NIH grant's share of the proceeds from this resale was $27,802. These proceeds are being used this year to procure:

RK-11, DEC Pack Disk Cartridge Drive Controller and DEC Pack Removable Disk Cartridge System	$ 15,120
Interface to replace 270X/Y's	5,120
Engineering services for interface between PDP-11 and IBM 360/50	2,270
Total	22,510

Each of these items filled a need which the 270X7Y would have done if it operated satisfactorily. Since the sstimated cost of these items exceeds the sale proceeds, funds for part of the engineering services have been supplied from the general budget line item for engineering services. This leaves $5,292 in equipment sale proceeds which will be carried for-ward to next fiscal year to fund replacements for other 270X/Y functions.

Supplies

The supplies budget includes some increases. Comsumption of printer paper has risen sharply in recent months due to announcement of new printing services for users. The budget for 360/67 services has been reduced from $8,000 to $5,000 in hopes that fewer core dumps and such servinces will be used. We have made no attempt to include /67 charges for mounting an interactive PL language.

VI. BUDGET

Arrhythmia Detection

The last item in the detailed budget presentation is a cost estimate for
the first year of the Arrhythmia Detection Development Program. Note
that these costs are considered incremental over the $800,000 direct cost
base budget. This extension to the ACME core research activity appears
to present an improvement to medical care which can be justified by com-
munity hospitals on a cost/performance basis. We hope that this work
will be funded either through an increase in the base ACME budget of di-
rect cost or through a new arrangement with respect to income from ACME
users.

Stanford has adopted a new basis for calculating indirect costs to be
effective September 1, 1971. Modified direct costs will be used for ap-
plying indirect costs. Since ACME charges a fee for services, there are
questions of whether the full impact of the indirect costs should be levied
on the RR-311 grant or be passed on to users. There will be no pyramiding
of indirects. This budget assumes that users will be charged indirects
on top of their ACME computer service charges. Therefore, the indirect
rate of 46% of modified direct costs has been applied to ACME's estimated
direct costs. This indirect figure of $171,085 will by reduced by 46%
of the estimated income for FY1972. The conversion to this new method
of applying indirect costs has raised numerous questions within the Stan-
ford family. NIH will be notified promptly of any changes to the plan
outlined here.

E.   Income Basis for Extension Request

ACME requests an extension of 15 months in the three year grant expiring
July 31, 1972. The basis for this request is twofold. First, additional
time is required to raise income; second, transition time is needed

Income in the current year for ACME services will be approximately $160.000
to $170,000. The value of services provided by ACME to it's user community
is far greater. For example, excluding utilization by ACME staff, income
in the month of March would have been an excess of $60,000 if all users
had been charged 2-1/2¢ per pageminute. The 2-1/2¢ per pageminute rate in-
cidentally is considered to be a full cost recovery rate and also a rate
which would be competitive with other timesharing services. Thus, the prob-
lem is to encourage current unfunded users to obtain University or outside
funding for their research and teaching work. Furthermore, the subsidized
users of ACME who now pay roughly 25% of the value of the services received
will need to obtain enough incremental funding from their sponsoring agen-
cies to continue these services. An estimate of income is attached which
assumes that users will be successful in obtaining funds to support con-
tinued use at higher rates (factor of 2 to 3 growth over present subsi-
dized rates). These growth rates would still be less than estimated full
cost recovery yet competitive rates.

VI. BUDGET

F. ACME Estimated Income Rate by End of FY1973

Category	Funded Projects Description	Present Rate(per pgmin.)	April '71 Act. Income	Approximate Growth of Service Rate	Approximate Loss From Increased Rate	Est. Net Income
1	Real time, Medical School	1/2¢	$4356	3X	30%	$ 3,000
2	Research, Medical School	1¢	8624	2X	25%	13,000
3	Non Medical	2¢	498			500
8	Hospital Administration	1 1/4¢	2769	2X	55%	2,500
9	Stanford Campus	2 1/2¢	2421			2,500
						27,500/mo. x12
					Sub-total	$330,000/yr.

Core Research Projects (currently unfunded)

Category	Description	Present Rate(per pgmin.)	April '71 Act. Income	Approximate Growth of Service Rate	Approximate Loss From Increased Rate	Est. Net Income
5	Real time, Core Research	1/2¢	320	3X		1,000
6	Medical Research, Core Research	1¢	4531	2X		9,000
						10,000/mo. x12
					Sub-total	$120,000/yr.

Currently Unfunded Projects

.Student computing programs

.Computing instruction for students   } See note 1

.Unsponsored research for faculty

.Pilot projects (old and new) and new users   Sub-total $50,000/yr.

TOTAL $500,000/yr.

Note 1: We have not identified a future source of funding for these users.

VI. BUDGET

Taking the availability of funds within the community into account, income from ACME users is more likely to be around $250,000 to $300,000 in FY1972 and less than $500,000 in FY1973. Although this level of income will not be adequate to support the present cost of offering ACME service, it is a significant level of computing support to be provided from the Stanford community. If the income rate in the summer of 1973 were to exceed $650,000, the Stanford Medial School could likely affort to maintain a stand alone facility offering services exclusive of system development very similar to those now provided.

If, on the otherhand, the total income from the medical community is less than 1/2 million dollars per year beyond July, 1973, mergers or joint ventures must be designed and implemented to be ready by that point in time. These will be explored over the next several months.

VII. UTILIZATION DATA

A. Interpreting ACME Utilization

The terms used to discuss ACME utilization involve charging units and
categories of users.

1. Charging Units

The computer service units for which ACME charges are:

- pageminutes
- terminal access hours
- blocks of disk storage
- terminal service charge

A pageminute is defined as occupancy of ~~16,000~~ 4k bytes of core for 1 minute.
A user's program which occupies 10 pages of core would result in a charge
of 10 pageminutes per minute of terminal access time. Terminal access
time is the total number of minutes that a user's terminal is connected
to the system in a logged-on condition. A block of disk storage is a
fixed length block of 2,000 bytes of 2314 disk storage. The terminal
service charge covers monthly terminal rent plus other services offered
by the ACME staff to it's user community. This service charge is handled
by the University independent from the ACME Grant. At the present time
ACME does not charge for related services such as card reading, printing,
and use of graphics terminals.

2. User Categories

This table shows the Category identifier, rate, and definition of each user
category at ACME. The rate charged per pageminute varies by user cate-
gories and some categories are subsidized 100% by the ACME Grant. An
asterisk next to the category identifier (*4) designates those so sub-
sidized. All other categories are paying. There is a distinction be-
tween realtime and non-realtime users. Realtime users use the 1800 pro-
cessor or 2701 data adapter for data collection or process control func-
tions in addition to the terminals. Category pairs 1 and 2, 5 and 6, 10
and 11, 12 and 13, and 14 and 15 differ from each other in only that one
respect.

VII. UTILIZATION DATA

Category	Rate/Pageminute	Definition
1	1/2¢	Biomedical Research, Realtime.
2	1¢	Biomedical Research.
3	2¢	Non-Stanford Medical Clinics and Research Foundations.
*4	1¢	Medical Student education; includes graduate students and fellows.
*5	1/2¢	Core Research, Realtime: Projects designated by the principal investigator.
*6	1¢	Core Research.
*7	1¢	ACME Staff.
8	1-1/4¢	Medical School and Hospital Administration.
9	2-1/2¢	Non Medical: Stanford University.
*10	1/2¢	Pilot projects, Realtime.
*11	1¢	Pilot Research.
*12 and 13		Extended non funded: Extension of Categories 10 and 11.
14 and 15		Suspended pending individual Institute approval (as of March 31, 1971, this category was merged with categories 1 and 2 respectively).

B.   Utilization Trends

The graph in Section VIIC. includes a six month moving average for page-minute utilization. This average has been hovering about 12 million page-minutes per month for the past year. In the month of April 1970, more than 2.5 million pageminutes were delivered. Taking into account the plans of various major users, we expect monthly utilization to average 2.5 to 2.8 million pageminutes per month for the next several months. This would represent approximately 20% growth over utilization figures for the past year. There is also additional utilization which this measure does not show: ACME has improved it's system efficiency and fewer pageminutes are required now to provide the same level of computing service as a year ago.

The six month moving average for terminal hours has increased from 3100 hours in April 1970, to more than 3700 hours in April 1971. Despite wide monthly fluctuation, it appears that terminal usage is growing at the rate of approximately 20% per year. In February 1970, ACME announced a rate reduction to it's users but at the same time, started to charge for terminal assess time. Each terminal connected to the ACME system ties up a 2702 transmission control port. Since there are only 31 such ports in the ACME system, a pricing mechanism was needed to ration the resource. Terminal hours have increased despite this new accounting method.

There is another change in utilization of ACME; one year ago one could commonly find 20 or more users logged-on during daytime hours with 30% to 40% of the users in execution. Today, when 20 or more users are logged-on, it is common to find 50% to 60% of them in execution. One might infer from this that users are doing less program development and more application work which is to be expected as the computing system matures.
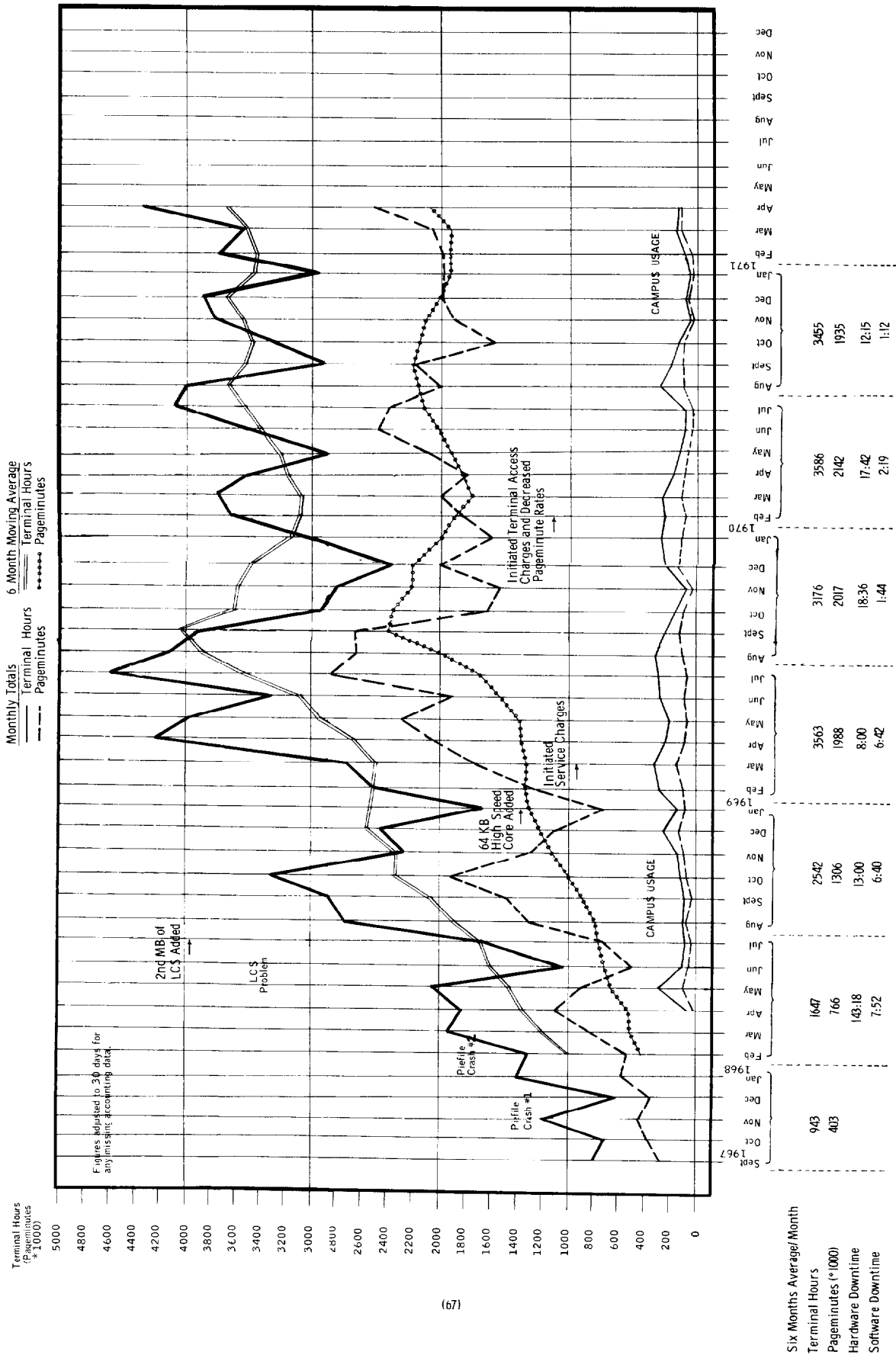
Use of the system during evening hours (8:00 - 10:00 p.m.) has increased by about 50% during this past year. As daytime utilization of the system increased, some users found computer service far better during the evening. Summer utilization generally exceeds winter utilization. June, July, and August are historically the periods of heavy use.

Future computing requirements are not well defined. Last October and November, a survey which indicated a broad spectrum of requirements was conducted in the Stanford Medical Center. The results of the survey are presented in Part 3.

The system has had 365 pages (4,000 bytes each) available for users since the last increment of core was added in January 1969. As of November 1970 the network included 53 2741 terminals.

Monthly Totals
Terminal Hours
Pageminutes

6 Month Moving Average
Terminal Hours
Pageminutes

Terminal Hours
(Pageminutes ×1000)

Chart annotations:
- Figures adjusted to 30 days for any missing accounting data.
- 2nd MB of LCS Added
- LCS Problem
- Piefile Crash #2
- Piefile Crash #1
- 64 KB High Speed Core Added
- Initiated Service Charges
- Initiated Terminal Access Charges and Decreased Pageminute Rates
- CAMPUS USAGE

Six Months Average/Month						
Terminal Hours	943	1647	2542	3563	3176	3586	3455
Pageminutes (×1000)	403	766	1306	1988	2017	2142	1935
Hardware Downtime		143:18	13:00	8:00	18:36	17:42	12:15
Software Downtime		7:52	6:40	6:42	1:44	2:19	1:12

2. ACME Utilization By Department

March 1971

Department	# of Terminals	PAGEMINUTES students	PAGEMINUTES non-chargeable	PAGEMINUTES chargeable	BLOCKS students	BLOCKS non-chargeable	BLOCKS chargeable
Anesthesia	3	53,626		24,027	2627		4806
Biochemistry	2	15,270		2593	267		574
Bio Sciences	1			19,932			287
Cardiology	1	7483			957		1264
Cardiovasc Surgery	2		17,806	83,955	185	649	2469
Chemistry	2		69,793	267,377		3668	5199
Comm & Prev Med	1			17,233	348		2603
Dermatology	0					431	131
Genetics	7	25,228	98,618	143,797	1941	772	7658
Gyn/Ob	0			4864			114
Infectious Dis	1			35,218	153		1283
Lipid Research	1			16,806			479
Medicine	2	5050		50,139	232		2334
Med Micro	1			32,666	86		1122
Neurology	0		13,237		85	2332	
Pathology	2			58,360	114		569
Pediatrics	1	1356	9149	4312	2017	1628	439
Pharmacology	2		81,321	5464		4522	147
Psychiatry	2	1152	5610	21,699	2001	167	2802
Radiology	2	10,330		56,165	2189		2619
Spch & Hearing	0		25,656		52	1426	
Surgery	1			2021	327		449
Urology	1		50,615	2871		1579	40
Admissions Comm	0			7932			248
Regional Med Prog	1			16,377			786
Clinic Billing Office	1			137,599			8152
Private Clinics	0			14,241			477
Other	3			48,085			2621
TOTALS	40	119,495	371,805	1,052,034	13,561	17,174	49,472

3. ACME Facility Income
(April 16, 1970 – April 15, 1971)

A. Chargeable Categories	1970 May	June	July ||	August	Sept	Oct	Nov	Dec	1971 Jan	Feb	March	April
1 - Real-time, med school	$ 994	$1625	$1733	$2159	$1812	$1275	$2230	$2134	$2172	$2187	$3603	$4356
2 - Research, med school	3568	4429	8768	4203	4868	4411	4013	3807	4982	5472	4790	8624
3 - Non Medical	131	222	270	712	278	403	342	229	191	339	332	498
8 - Med School and Hospital Administration	2205	2635	2430	2369	2419	2713	3039	2628	1795	2410	2535	2769
9 - Stanford campus	2230	1721	1349	3459	1283	750	521	1328	934	1260	4209	2421
14 - Real-time, suspended	1627	1646	2593	1205	101	94	70	84	81	138	186	
15 - Research, suspended	3583	3706	2353	1985	2220	1727	1646	1685	763	433	452	
MONTHLY TOTALS	$14,338	$15,984	$19,496	$16,092	$12,981	$11,373	$11,861	$11,895	$10,918	$12,239	$16,108	$18,668
(69)											TOTAL FOR YEAR	$171,953
B. Income Reported and Later Credited*					$1901	$2233	$493	$811				
											TOTAL FOR YEAR	$5,438
C. Terminal Charges and Engineering Services Rebilled**	$8346	$8100	$7768	$6739	$8216	$9097	$8440	$8665	$8100	$9618	$7439	$8400***
											TOTAL FOR YEAR	$98,928

* This entry is shown to permit easy reconciliation to University financial statements.

**This income is not associated with the ACME grant. It is an offset to cost incurred by the University for terminal
rental, engineering services, and other miscellaneous services provided to the ACME community.

***Estimated figure

PART 4:   REFERENCE DATA

VIII. REPRESENTATIVE SAMPLE OF USER PROJECT DESCRIPTIONS

Category 1

Name: Dong, E.   Project: PATIENT

Department: Cardiovascular Surgery

Project Description: ACME has been used in collecting data from over
    1300 patients. Data from cardiac surgery patients are entered and
    examined for survival, disease category electrocardiographic abnor-
    malities. Patients may be monitored on a PDP-12, with data then
    being transferred to ACME for storage.

Name: Glick, D.   Project: LASER

Department: Pathology

Project Description: The ACME Facility is needed to provide the computa-
    tional requirements of the laser microprobe analytical system which
    we have designed, and are continuing to develop, for elemental analysis
    of microscopic biological samples down to the single cell and very
    small volumes of fluids. The applications of the system to biological
    and medical research and clinical medicine obviously have impressive
    potential. ACME is involved in data calculation for definition of
    sample size as well as content and concentration of elements. Statis-
    tical evaluations include calculation of F-ratio, T-test, U-test,
    population means and also linear regressions, graphical interpolations
    and curve fitting. A second system has been built so that one can be
    devoted to applications and the other to continued technological
    development. Eventually we expect to automate the system, which
    would further increase our dependence on ACME.

Name: Harrison, D.   Project: CATHLAB

Department: Cardiology

Project Description: ACME is being used to analyze data for cardiac output
    using indicator dilution curve formularies, a variety of statistical
    analyses, text editing, and documented programs which are utilized on
    smaller computer systems. ACME is also being used to develop programs
    for the recognition of abnormal blood pressure and EKG complexes.

    Future use of ACME will involve the development of a software-hardware
    system for clinical monitoring of critically ill patients in a coronary
    care unit. ACME is intended to be employed as a source to document
    programs developed on a small medical system in a clinical environment.

(71)

VIII. REPRESENTATIVE SAMPLE OF USER PROJECT DESCRIPTIONS

Name: Reynolds, W. (P.I.: Lederberg, J.)   Project: SOO7

Department: Genetics

Project Description: This project supports the basic development of automated mass spectrometer and other instrumentation systems.

The mass spectrometer has become of interest in the biochemistry field. In the case of DNA and related structures, the basic principles involved are common to at least the Genetics Department and to the Organic Chemistry Department. Hence the efforts of this project span over five mass spectrometers in three diverse locations on the Stanford campus. The technical development consists in the origination of instrumentation concepts and the realization, in both hardware and software, of complete operating systems.

These systems are intended to automate the mass spectrometers and to provide the following benefits to the biological user-researcher:

1) Saving of the researcher's time in instrument operation and data reduction;
2) Improvement in the quality of the data;
3) Improvement in the presentation of the data;
4) Fostering of computer files of pertinent data.

Category 2

Name: Assaykeen, T.   Project: RENIN

Department: Urology

Project Description: Previous research reported shows that in dogs insulin-
    induced hypoglycemia significantly increases plasma renin levels. These
    studies are being continued in order to attempt to determine what the
    stimulus to renin secretion is under these conditions and how this
    stimulus is transmitted to the juxtaglomerular cells.

    There is good evidence that the sympathetic nervous system can influence
    renin secretion but how this occurs is not known. This project is an
    attempt to establish whether catecholamines stimulate renin secretion
    through alpha or beta receptors, whether cyclic 3', 5' -AMP is involved
    and whether the effects of the catecholamines on renin secretion can be
    separated from the effects of these compounds on renal hemodynamics and
    function.

    The results of such studies may lend support to existing theories regard-
    ing the control of renin secretion or may give new insight concerning
    the physiologic control of this important endocrine system.

Name: Bodmer, W.   Project: POPGEN

Department: Genetics

Project Description: ACME is used for the analysis and interpretation of
    data on human white cell antigens. A secondary use is for the analysis
    and simulation of population genetic models. A series of programs have
    been developed to facilitate the storage of data with appropriate edit-
    ing at the time of input and to facilitate a read interaction between
    the experimental worker and the computer. This allows one, at short
    notice, to do small scale 2 x 2 analyses for serum characterization,
    selection of appropriate individuals for absorbtion, and automatic
    typing according to complex patterns of serum reaction. These increased
    opportunities for interaction with the computer have been a great help
    in day-to-day work and in establishing new relationships amongst sera.
    Future plans include the development of programs for the systematic
    analysis of family data.

Name: Forrest, W. (P.I.: Bellville, W.)   Project: ANALGESI

Department: Anesthesia

Project Description: The 360/50 time-sharing real time system is used
    to research the management and statistical application of methods to
    the Cooperative Study. Problems of pilot studies, data validity,
    quality, cost of clinical trials and useful reduction of data for
    active sane management are constantly evaluated and updated. The
    plan is to develop an inexpensive system of quality and quantity
    control of large masses of clinical data from several sources so that
    diarrhea and "gigo" are diagnosed properly and treated prophylactically
    rather than symtomatically.

Name: Friedland, G.   Project: SLING_FI

Department: Radiology

Project Description: The purpose of this study was to determine the action
    of the gastric sling fibers. Radiopaque tantalum wire was inserted
    into the distal esophagus and gastric sling fibers in eleven cats.
    Subsequently, simultaneous biplane radiographs were obtained of the
    esophagus and stomach in the unanesthetized cats following installa-
    tion of barium into the upper esophagus. From these radiographs, the
    three dimensional movement of the markers was reconstructed using
    computer analysis. In two cats, two markers were placed on the anterior
    wall of the stomach close to the sling fibers in the direction of the
    long axis of the stomach, determining the relationship between move-
    ment of the gastric wall and the sling fibers. All cats were autopsied
    immediately following the radiographic examination to determine the
    position of the markers.

    The sling fibers lengthened with distal esophageal opening in eight
    cats with correctly placed markers. In five of the eight cats, the
    distal esophagus closed within the time of the examination and the
    sling fibers shortened simultaneously. There was no relationship
    between movement of the anterior wall of the stomach and the sling
    fibers. This study demonstrated for the first time that the gastric
    sling fibers act in concert with the distal esophagus.

Name: Herzenberg, L.   Project: LAB

Department: Genetics

Project Description: Studies in immunology, genetics, and maternal fetal
    immunologic relationships in the mouse require the collation of many
    experimental observations on a given serum sample or individual. Since
    such data is accumulated over long periods of time, frequent interim
    reviews must be made to determine new directions, etc. Currently, most
    data collation in the laboratory is done by hand incompletely, inadequate-
    ly and infrequently, thus hampering the process of the research. To
    overcome these difficulties, the process of changing data storage pro-
    cedures to utilize the ACME capabilities has begun. For example, all
    breeding records for the inbred nucleus of our mouse colony are stored
    in ACME. Approximately once a month ACME is called upon to draw updated
    pedigree charges, so that breeding decisions may be made.

    Programs have been written to collate multiple immunoglobulin level
    determinations done on individual serum samples, returning histories
    of immunoglobulin level changes with time in treated animals. ACME is
    being used to store data and direct antiserum production in the labora-
    tory.

    In addition to the data storage aspects of ACME, the computer is used
    in this laboratory for a number of routine calculations on data sets,
    e.g., per cent antigen precipitated, geometric means of plaque events,
    etc.

Name: Lamb, E.   Project: EMPIRE

Department: Gynecology and Obstetrics

Project Description: ACME is being used for the following studies:

    1) Calculation of relative potency and confidence limits of total
    gonadotropin activity of human urine extracts. These calculations
    have been used in a research project correlating the results of the
    total gonadotropin bioassay and an immunologic assay for LH using
    hemagglutination inhibition.
    2) Calculation of results of chemical determinations of estriol in
    urine from women treated with gonadotropins for ovulation induction
    (research) and from pregnant women (service laboratory).
    3) Calculation of conception rates using a modified life table method
    for estimating the prognosis for infertile couples.
    4) Calculation of correlation between various parameters measured in
    the semen analysis with subsequent conception rates and with the
    result of a test for sperm agglutinins.
    5) Tabulation of evaluations of student performance submitted by a
    large number of attending clinical faculty members.