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ABSTRACT

The needs of Saddleback College for computer facilities were assessed to develop a master plan for an integrated data processing system that would satisfy both student educational needs and the administrative needs of the community college district. An analysis of computer facilities indicated that each individual division of the college had computer systems dedicated to its own needs, which resulted in duplication of equivalent hardware and software. The following alternatives were studied: purchase of a large main frame computer system; development of such a system from the NCR Century 200 System; and development of a distributive computer system which would consist of a number of minicomputers, located in one area or throughout the district, that would be connected with each other via telephone lines or hand wires. Based on the results of the study, a decentralized approach with physical separation between administrative and educational computer systems was recommended as the overall goal of the district. Specific recommendations for the immediate future involved making major decisions about upgrading the NCR Century 200 System and ways to get maximum advantage from the Data General Eclipse C150, and the purchase of a minicomputer system for administrative functions.

(Author/MER)

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THE NEXT STEP:

A COMPUTER FACILITIES MASTER
PLAN FOR SADDLEBACK COLLEGE*

by

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Thomas Meyer

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*Partially funded by N.S.F. Grant No. SED 78-09687

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INTRODUCTION

The goal of this assessment is to develop a master plan for the expansion of Saddleback College instructional computer facility. The Administrative computer needs have been included for completeness; although they were not in the original scope of the project.

BACKGROUND

Saddleback College serves the central and southern regions of Orange County, a district which covers 370 square miles and includes some of the newest communities in the United States. The population of Orange County has expanded faster than any other area of California and is still growing; 80-85% of this growth falls into Saddleback's district and college development has kept pace with that of the community. In 1968, enrollment in the first class was 1500. At the end of its first decade enrollment was 17,000 and still growing; and 60% of these students will transfer to four-year institutions. The student population is extremely diverse - "traditional" 18 - 20 year olds, vocational students, returning veterans, re-entry women, military personnel from nearby bases, handicapped and many senior citizens (Leisure World, a retirement community of 18,000 sits at the college's doorstep). Currently, the minority enrollment is 6.5%. All commute, and some from as far as 45 miles away. A satellite campus was opened in Spring 1979, to serve those who live in the northernmost sections of the district.

DISTRICT NEEDS

There are two basic requirements that must be considered in any comprehensive plan to resolve the computer information processing problems at Saddleback College. The first requirement is satisfying student educational needs in today's rapidly changing technology. The second requirement is district-wide administrative needs.

The first requirement of meeting the educational needs of the students can best be accomplished by continuing with the present philosophy of trying to provide easy access to the many types of computer systems that students will encounter outside of Saddleback College. These computer systems include batch processing, time share, large mainframe computers, mini-computer systems and the personalized stand-alone micro-computers that are presently the rage of the computer industry. The degree of sophistication which Saddleback College intends to meet these needs is primarily a function of economics; and we must constantly strive to run a cost effective operation.

All of the above different systems are made available to the students in the Computer Learning and Information Center of the Science/Mathematics Building. The ease of use, quality, and quantity of the equipment at the center is debatable, but the center does provide the student the opportunity to use a variety of systems. The present average cost of hardware and software for this unit is about \$68,851 per year.

The Computer and Information Science courses taught by the Business Division have access to a batch processing system on the lower campus. The cost of this system is approximately \$12,000 per year. The availability, to the Business

Division, of the other systems in the Science/Mathematics Building is inconvenient at best.

The second requirement is to provide district administrative support. Because of the present and future requirements for various types of information on enrollment (i.e., students shifting from one campus to the other and back, veterans, grants, counseling, etc.) it is imperative that Admissions and Records information on all campuses of this district access the same computerized data base. Definitely, this concept of one data base will be easier to maintain with only one district-wide Admissions and Records Office under one director.

Similarly, we must maintain a district-wide Business Office with its own computerized data base. But, the day is fast approaching when State and/or Federal reports will require a mixture of information from both the Admissions and Records data base and the Business Office data base. A case in point is the present existence of a committee to set up a standard Data Element Dictionary for the California Community Colleges Chancellor's Office. It is very likely that on some of these reports a time frame requirement will be given that will make it impossible for Saddleback College, in its present mode of operation, to complete the reports because of the lack of communication between these different computerized data bases.

Hence, we must begin working towards a computerized information system for the administrative areas (Business Office, Counseling, Student Affairs, Instruction Office, Admissions and Records, etc.) that will be able to share, with some restrictions, their different data bases.

SUMMARY OF PRESENT COMPUTER CONFIGURATIONS

The present computer configurations at Saddleback Community College, South Campus, consists mainly of four different computer systems. The systems not owned but used by Saddleback College include a UNIVAC 1110 System located at the North Orange Community College District Office, Fullerton, California, and a PDP 11/70 System at Turner Data Systems, Inc. Irvine, California. The other two systems owned by Saddleback College located on the main campus consist of a Keronix 16/8 System and a NCR Century 200 System.

The UNIVAC 1110 System is used by two units of Saddleback College. One of the units consists of the Counseling Office, Office of Instruction and the Office of Admissions and Records. Since these three use the same data base and some of the same hardware they are grouped together as a unit in this report. This is a time share operation with the following hardware owned by Saddleback College: a modem, multiplexer, three controllers, two printers and thirteen video terminals. This hardware is located in the Admissions Office in the library of the main campus. The hardware at the North Campus consists of a modem, controller, printer, and two video terminals. At the present time, the average cost of operation for this unit, excluding salaries and facilities, is approximately \$26,800 per year in hardware and \$76,000 per year in services for a total cost of \$102,800 per year. In particular, the most recent yearly cost from April, 1978, to March, 1979, is \$122,883.

The second unit using the UNIVAC 1110 System consists of the Computer and Information Science area. It is used for batch processing of application programs and instruction of computer science courses in FORTRAN, COBOL, RPG, ASSEMBLY, etc. The hardware owned by Saddleback College consists of a UTS-BC/700 mini-computer system located in the Science/Mathematics Building on the main campus.

The hardware cost for this unit is about \$23,000 per year. The service costs require another \$15,000 per year for an approximate total of \$38,000 per year.

It should be recognized that the hardware costs of buying the UNIVAC equipment for the above two units will be completed by June, 1982. Also, the service cost will continue to increase because of inflation, larger enrollments, increased commitment to a growing computer science curriculum, and the use of more application programs.

Turner Data Systems, Inc. provides both the PDP 11/70 Computer System and the software programs used by the Business Office. The hardware bought for the Business Office by Saddleback College to time share the programs on the PDP 11/70 includes a Printronix Line Printer, a LS 120 DECwriter, and seven video terminals. The total average yearly cost for both the software and hardware is approximately \$100,000 per year.

The Keronix mini-computer located in the Computer Learning and Information Center of the Science/Mathematics Building is used primarily by the Computer and Information Science, Mathematics, and Science areas for the instruction of Computer and Information Science courses and for application programming required for classwork. The cost of this system excluding salaries and facilities runs approximately \$30,309 per year.

The NCR Century 200 System is located on lower campus in Building H. Its main use is for Computer and Information Science courses such as programming in COBOL, Computer Operator Training, Business Applications Procedures, etc. The total cost of the NCR system excluding that of facilities and salaries is approximately \$12,000 per year.

From the above information, we see that the average total cost to Saddleback College, South Campus, for hardware and software is about \$284,000 per year.

Recently, the North Campus purchased a Data General Eclipse C150 processor with 512 KILO-BYTES of main memory. The peripherals include: a 180 CPS Printer, 20 MEGA-byte disk, software, and 6 terminals. The total cost of this package is \$85,703. The system has not been installed at this time.

YEARLY AND CUMULATIVE COST
 BREAKDOWN FOR COMPUTER LEARNING
 AND INFORMATION CENTER (S/M 348)

	Hardware	Repair and Maintenance	Software	Services	Supplies	Totals
1969-70	\$8,835.86	\$21.73	\$0.00	\$100.00	\$207.39	\$9,164.98
1970-71	\$30,784.51	\$2,798.00	\$1,500.00	\$660.73	\$585.52	\$36,328.76
	\$39,620.37	\$2,819.73	\$1,500.00	\$760.73	\$792.91	\$45,493.74
1971-72	\$12,750.00	\$3,645.00	\$1,500.00	\$346.00	\$810.24	\$19,051.24
	\$52,370.37	\$6,464.73	\$3,000.00	\$1,106.73	\$1,603.15	\$64,544.98
1972-73	\$20,972.00	\$6,953.53	\$8,450.00	\$101.35	\$455.57	\$36,935.55
	\$73,342.37	\$13,421.36	\$11,450.00	\$1,208.08	\$2,058.72	\$101,480.53
1973-74	\$16,852.15	\$7,233.30	\$2,332.00	\$1,745.00	\$2,201.84	\$30,364.29
	\$90,194.52	\$20,654.66	\$13,782.00	\$2,953.08	\$4,260.56	\$131,844.82
1974-75	\$6,233.00	\$8,628.00	\$0.00	\$5,102.80	\$477.00	\$20,440.80
	\$96,427.52	\$29,282.66	\$13,782.00	\$8,055.88	\$4,737.56	\$152,285.62
1975-76	\$8,097.53	\$11,616.72	\$0.00	\$2,700.00	\$1,248.04	\$23,622.29
	\$104,525.05	\$40,899.38	\$13,782.00	\$10,755.88	\$5,985.60	\$175,947.91
1976-77	\$41,603.45	\$15,720.00	\$0.00	\$1,000.00	\$952.12	\$59,275.57
	\$146,128.50	\$56,619.38	\$13,782.00	\$11,755.88	\$6,937.72	\$235,223.48
1977-78	\$67,784.37	\$5,077.05	\$0.00	\$7,162.36	\$1,958.48	\$81,982.26
	\$213,912.87	\$61,696.43	\$13,782.00	\$18,918.24	\$8,896.20	\$317,205.74

Saddleback Cost For UNIVAC Computer At
North Orange Community College

	Math Dept	Vocational Tech	Admissions Records	Instruction Office	Total Cost
1977 Jul, Aug, Sep	\$24,255.73	\$	\$15,167.39	\$ 1,470.19	\$ 40,892.95
Oct, Nov, Dec	5,000.13		11,201.88	910.19	17,112.20
1978 Jan, Feb, Mar	7,173.64		26,613.08	1,869.19	35,655.91
Apr, May, Jun	7,990.64	1,173.70	8,941.02	1,360.29	19,465.70
Jul, Aug, Sep	10,869.88	840.00	44,292.19	1,980.00	57,982.07
Oct, Nov, Dec	6,518.04	367.50	21,287.69	2,040.00	30,213.23
1979 Jan, Feb, Mar	5,642.54	150.00	36,831.03	3,620.00	46,243.57
TOTALS	\$67,450.24	\$2,531.25	\$164,334.28	\$13,249.86	<u>\$247,565.63</u>

Cost and Time Demands On The UNIVAC

	Math Hours	Math Cost	A&R Hours	A&R Cost	Instruct Hours	Instruct Cost	Total Hours	Total Cost
1977 Jul, Aug, Sep	13.0	\$2,600	55.0	\$11,000	5.0	\$1,000	73.0	\$ 14,600
Oct, Nov, Dec	15.0	3,000	48.0	9,600	1.0	200	64.0	12,800
1978 Jan, Feb, Mar	16.5	3,300	40.5	8,100	5.0	1,000	62.0	12,400
Apr, May, Jun	29.0	5,800	40.5	8,100	5.0	1,000	74.5	14,900
Jul, Aug, Sep	10.4	2,080	149.7	29,940	9.9	1,980	170.0	34,000
Oct, Nov, Dec	27.3	5,460	63.5	12,700	10.2	2,040	101.0	20,000
1979 Jan, Feb, Mar	22.5	4,500	123.4	24,680	18.1	3,620	164.0	32,800
Apr, May, Jun								
Sub Totals	133.7	\$26,740	520.6	\$104,120	54.2	\$10,840	708.5	\$141,400
TOTALS								

ALTERNATIVE SOLUTIONS

The summary of the present computer configurations at Saddleback College indicates that we are attempting to solve our information processing problems in a somewhat uncoordinated method. Provided the funds are available, this method of approaching the computer information processing problem does provide many benefits. It allows each individual unit of the district a computer system dedicated to that unit's needs. This method gives each unit almost complete control over its computer configuration. Theoretically, few if any inter-unit rivalries should exist in such a method of handling the computer information processing at Saddleback College. But, complete funding for such a method is extensive because of the duplication of equivalent hardware and software. In this growing district, duplication will continue with the inclusion of more units, such as Classroom Aided Instruction, into computer information processing. Even though hardware costs are decreasing the cost of computer information processing is definitely going to increase at Saddleback College because of inflation, growth of the district, and the necessity of computerizing information processing. In the shadow of Proposition 13, it would be irresponsible for us to continue this duplication where it is not essential to the administration and to the educational needs of the district.

One other possible approach to this problem is either the purchase of a large mainframe computer system, or the development of one from the NCR Century 200 System. The plan to develop an integrated data processing system using the NCR Century 200 System, prepared by Robert W. Bliss of the Business Department, is included in the appendix as a mainframe alternative. Some of the benefits, in either case, that should accompany such a computer configuration would include the following:

1. The main part of the computer hardware (i.e. CPU, Main Memory, Disk Storage, etc.) would all be at one location thus minimizing space requirements.
2. Control of the system would be centralized under one Data Processing Manager.
3. It would provide a greater opportunity to the entire district for large application uses such as Classroom Aided Instruction.
4. The school would have direct control over the operation of the system as compared with the contracting of services from other districts or from private firms.
5. This type computer configuration would facilitate the gathering of data for State and/or Federal reports that require information from both the Admissions Office and the Business Office data bases.

Some of the negative aspects of such a large mainframe computer configuration are listed below.

1. If the system is purchased, other than evolved from the NCR system, the original cost of purchasing the hardware would be significant.
2. Such a purchased system would not initially utilize the system to its full extent but would only become fully efficient after the software becomes developed.
3. At some point in the future the utilization will exceed the capacity of the system for efficient throughput. At that point in time the cost of past development would most likely lock us into an expensive solution to the problem.
4. The cost of hardware usually accounts for one third of the total cost of operation. The other two thirds would include the space needed, supplies, maintenance, and salaries of expensive personnel needed to effectively run such a large operation.
5. With so much of the districts needs dependent upon one computer configuration, down time would be a serious problem. It might be possible to contract a compatible system at a private firm, or at another school

district, but the loss of time, data, and cost would be a significant consideration.

6. The security problem would be complicated having both student users and administrative personnel on the same system. It is desirable to have physical separation between administrative data bases and student users.
7. Even though control of the system would be in this district, the various units throughout the district would be in competition for utilization of the system. The politics involved in this situation is one of the major problems experienced by neighboring school districts.

Another method that may be feasible is to develop a distributive computer system. This would consist of a number of mini-computers located in one area, or throughout the district, that would be connected with each other either via telephone lines or hard wired. Listed below are some benefits/difficulties of this configuration.

1. The main part of the computer hardware (i.e. CUP's, Main Memory, Disk Storage, etc.) could be located in one area, thus minimizing space requirements, or it could be spread throughout the district.
2. Control of the entire configuration could be centralized under one data processing manager, or each mini-computer could be controlled by a unit with a committee directing the entire system development.
3. As its size increased it would provide a greater opportunity to the entire district for large application uses such as Classroom Aided Instruction.
4. The school would have direct control over the operation of the system as compared with the contracting of services from other districts or from private firms. If the mini-computers are spread throughout the district, local control could be given to the individual units.
5. This type computer configuration would facilitate the gathering of data for State and/or Federal reports that require information from both the Admissions Office and the Business Office data bases.

6. The system could grow in proportion to the demand and available financing by upgrading the central processing unit or adding a new mini-computer to the system.
7. The cost of development of the total system would be less than a new large mainframe computer configuration; and the cost would be in smaller increments and at a time easily dictated by the district.
8. This system would resemble a large mainframe computer in speed of operation and capacity of storage. The speed of throughput would be a factor of the number of CPU's (i.e. mini-computers) on the system and the capacity of storage would, in either case, be a function of the size of disk storage purchased.
9. The demand, during down time of any one mini-computer, could be automatically taken care of by the rest of the distributive computer system. The probability of shutdown of the entire system would be minimal as compared to the large mainframe computer system.
10. A prescribed number of mini-computers and storage areas could be dedicated to administrative functions and the rest dedicated to educational functions thus alleviating the security fears of student access to administrative information.
11. Decentralization requires that maintenance be performed at several locations.
12. More advanced software must be purchased to enable the machines to "talk" to each other.
13. Decentralization may involve duplication of some personnel to "watch" each facility.
14. The administration of a distributive system requires the cooperation of all in-house groups.

RECOMMENDATION

The first item that must be accomplished before any more final decisions relative to computers are made is to make a resolution relative to the philosophy of computer information processing at Saddleback College. We believe that this resolution should be a committee decision, encompassing all parties affected by major decisions in computer facilities.

The following is our recommendation for what we think is the best possible, cost effective, computer configuration that we can aspire to at Saddleback, given where we are today (July, 1979).

I. General Philosophy

We recommend a decentralized approach and a physical separation between administrative and educational computer systems. Thus, a minimum of two computer systems should be maintained. The first would be an on line data base management configuration to aid Admissions and Records, Counseling, Instructional Office, etc. The data base should be jointly accessible between this system and the Business Office.

The second system should operate in both a batch and on line mode that will satisfy all educational needs. The software and hardware should be configured to allow maximum compatibility. The computers should be networked together to allow any function of a down system to be handled by the remaining computer. The combined system should be maintained by a small staff of highly qualified personnel.

The above recommendation represents what we feel is the overall goal which this District should be striving towards during the next five years. This plan

is modular in design and allows us a number of different courses of action in attempting to approach this goal. As new technology develops, we must continue to re-evaluate and adapt our plans to utilize that new technology. The above modular plan facilitates this never-ending changing of plans.

II. Specific Recommendations For This Year.

For the immediate future, there exists two major decisions that must be made. The first being the upgrading of the NCR Century 200 System and the other is to get maximum advantage from the North Campus' recent purchase of a Data General Eclipse C150.

1. The cost of upgrading the NCR System from 32K-bytes of main memory to 128K-bytes of main memory, the addition of 62 printed circuit cards to enable partitioning and on line operations, and the adding of a multiplexer for the on line usage is given as between \$10,780 and \$20,280. Provided this figure is within reason, we feel that the school should decide in favor of this plan. Even if no future improvement of this system beyond this point were approved, this system would provide those added educational benefits indicated in Phase 2 of the plan submitted Robert Bliss (see Appendix A).

The second decision relative to the purchase of a computer by the North Campus offers several excellent choices. The following is specifically recommended.

2. By purchasing a similar Data General Eclipse CPU for the Computer Learning and Information Center (S/M 348) and networking it to the North Campus, we would have a greatly enhanced capability at minimal cost. The current Keronix CPU is Data General compatible and "plugging" in an Eclipse CPU would entail only minor modification and all existing peripherals could be fully utilized. This distributive network would

enable the parcelling of jobs to either machine depending on availability. And, of course, if one went down the other could handle both campuses at a slower throughput.

In our estimation the distributive system of two eclipses and supporting peripherals should be able to provide excellent educational services for at least 5 years.

III Recommendation For 1 - 3 Years

For the longer view, we should seriously consider buying a compatible mini-computer system (maybe a Data General C350) for administrative functions. At this point we could network all three computers together and have the advantages of triple back-up, similar hardware and software, and the cost savings associated with this approach.

We do not recommend the physical mixing of administrative and educational functions on the North Campus' computer, nor on the eventual educational distributive system. Although, there should be a controlled link between the administrative and educational systems to allow sharing of resources. Upon resolution of the immediate needs, a District Data Processing Committee should oversee the orderly development of facilities from our current base.

APPENDIX A

PROPOSED PLAN FOR THE DEVELOPMENT OF
AN INTEGRATED DATA PROCESSING SYSTEM
FOR SADDLEBACK COMMUNITY COLLEGE DISTRICT

Prepared by Robert W. Bliss

June 8, 1979

- FOREWORD -

This document represents one possible approach to developing a comprehensive data processing system in Saddleback Community College District within two years. A basic concept in the design philosophy has been to expose the District to the minimum possible risk, both financial and organizational.

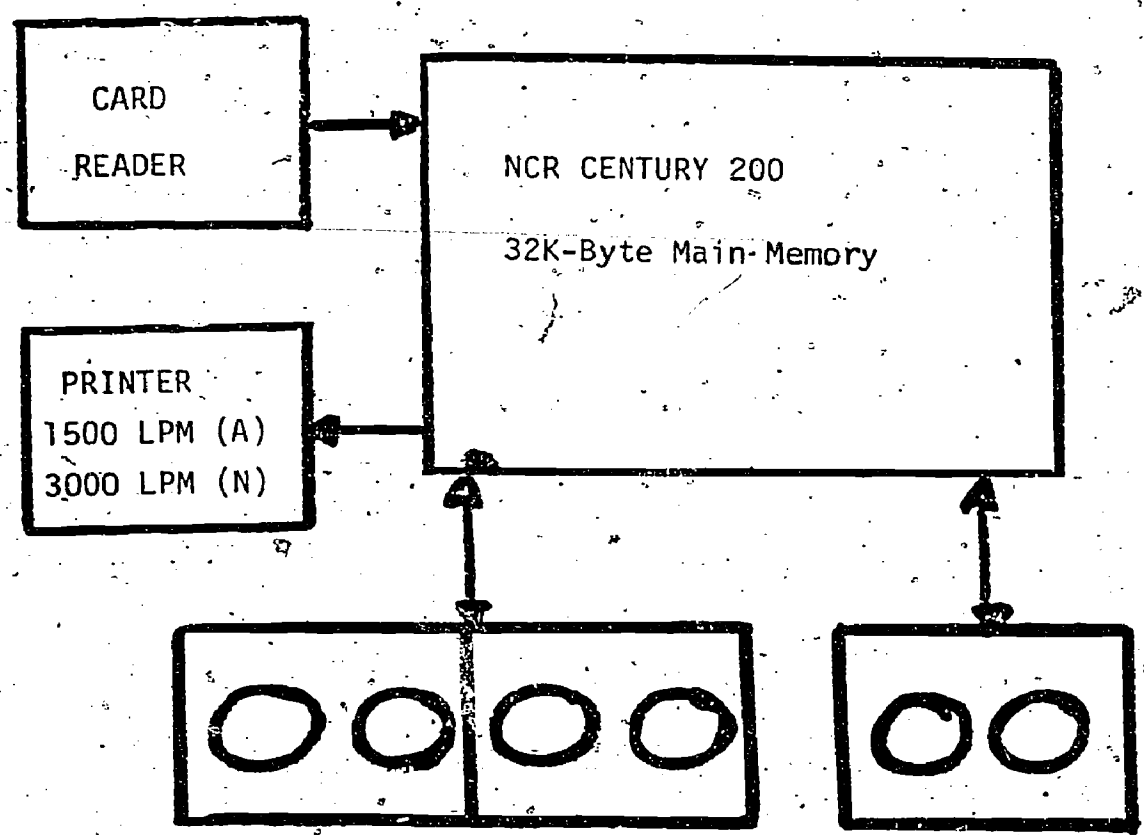
The plan is divided into four phases, and presently describes hardware, software, users, non-recurring costs, and a schedule. Still to be developed are re-curring costs, which will include: staffing, facilities, and expendable supplies.

It is hoped that this preliminary effort will not answer many questions, but rather will produce many questions; and that future revisions of this plan will bear not one, but the names of many members of the Staff. And that working as a team, all Administrators, Staff and Faculty, who are vitally concerned with Computers and Data Processing, can develop an integrated data processing system, which will meet all of the needs of our Community College District - at minimum cost to the tax payers who support us.

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PHASE 1 HARDWARE



MODEL 655 DUAL DISC DRIVES
16.6 Megabytes - Student Use

655 DUAL DISC DRIVE,
8.3 Megabytes
(Not maintained during
1978-9 school year)

LEGEND

Byte = The basic unit of computer memory sizing. One byte contains eight bits, or binary digits.

K = Kilo (approx 1,000 in computer memory sizing.
Ex: 32K = 32,768 bytes of memory)

LPM (A)= Lines per minute of alphabetic characters

LPM (N)= Lines per minute of numeric characters

M = Mega (approx 1,000,000 in computer memory sizing.
Ex: 1M = 1,048,576 bytes of memory)

PHASE 1 USERS & SOFTWARE

USERS

STUDENTS: CIS-115 COBOL, CIS-150 Computer Operator Training,
MGT-202 Business Applications Programming

COMMUNITY SERVICES: Mailing List (Realtors)

OFFICE OF INSTRUCTION: Instructor Evaluations (being developed during
Summer session 1979 for both campuses).

PROGRAMMING LANGUAGES

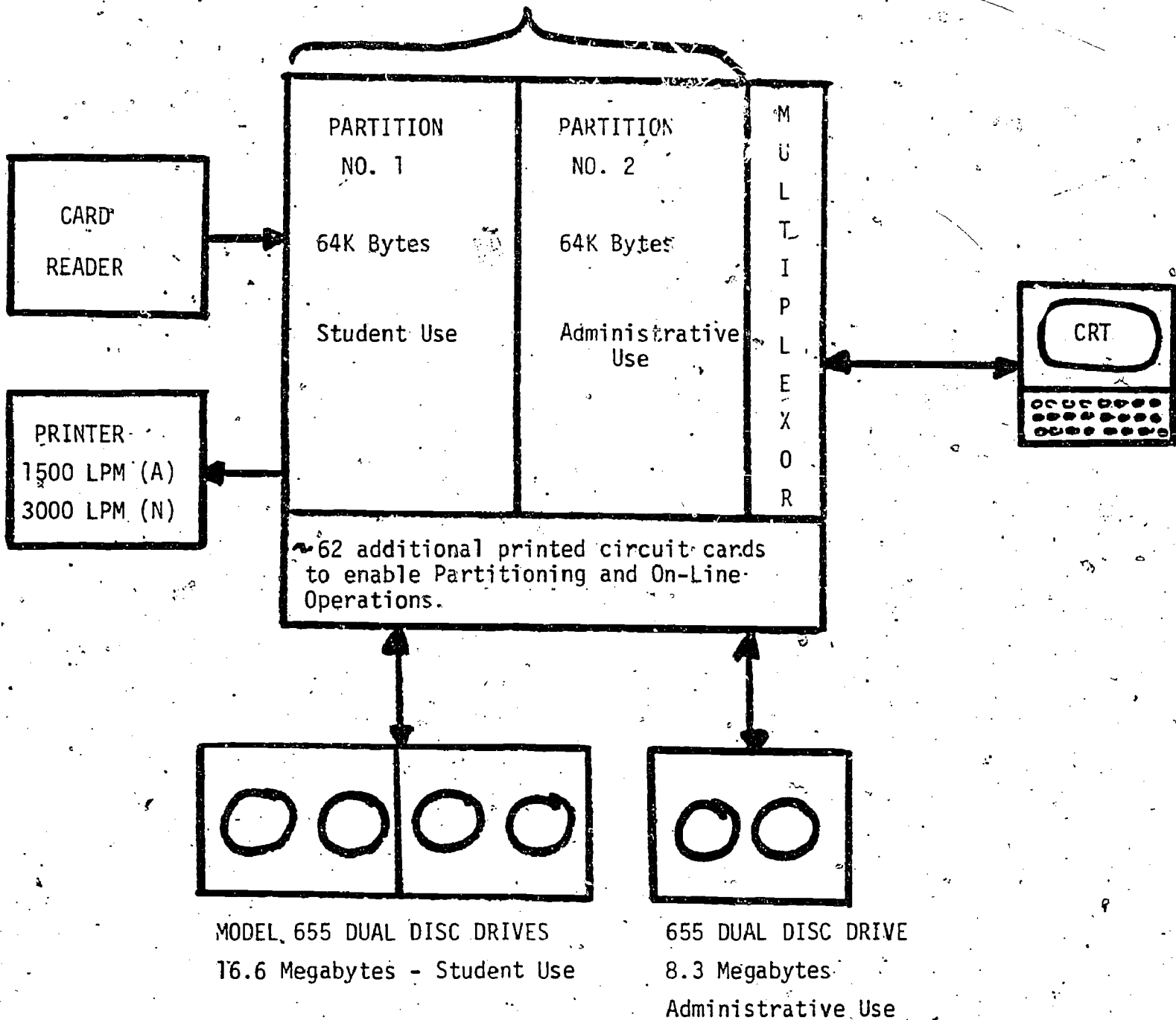
COBOL-S. Student COBOL. Average turnaround time: 1 minute.

COBOL-STG-II. Business Compiler having approximately 95% of instructions
of ANSI COBOL - (American National Standards Institute)
COBOL. Average turnaround time: 6 minutes.

FORTTRAN-I. Engineering and Scientific Compiler having approximately
75% of the instructions of FORTRAN IV. Average turnaround
time: 6 minutes.

PHASE 2 HARDWARE

NCR CENTURY-200
128K-Byte Main Memory



PHASE 2

USERS & SOFTWARE

USERS

STUDENTS: CIS-115 COBOL, CIS-116 Advanced COBOL, CIS-120 FORTRAN, CIS-130 RPG, CIS-140 Operating Systems, CIS-150 Computer Operator Training, and MGT-202 Business Applications Programming.

COMMUNITY SERVICES: On-line Registration, Accounting, Mailing Lists

OFFICE OF INSTRUCTION: Instructor Evaluations

PROGRAMMING LANGUAGES

COBOL-S. Student COBOL. Average turnaround time: 1 min.

COBOL-STG-III. Full-scale Business Compiler. Average turnaround time: 3 min.

FORTRAN-E. Educational FORTRAN. Average turnaround time: 1 min.

FORTRAN-F. Full-scale Engineering and Scientific Compiler. Average turnaround time: 3 min.

NEAT-3. Business-oriented language similar to COBOL having extensive library of developed software available thru NCR users (Ex: Kern County Community College On-line Registration).

RPG II. Report Program Generator. Excellent for file manipulation and business report preparation.

PHASE 2 UPGRADE

Expand Main Memory to 128K Bytes	\$ 10,000.00 ¹
Multiplexor and dual communication adapter	9,500.00 ²
CRT Terminal, SOROC IQ 120 (or equiv)	780.00
Approximately 62 Printed Circuit Cards to enable Partitioning Main Memory, and On-Line Mode of Computer Processing	N/C ³
TOTAL	<u>\$ 20,280.00</u>

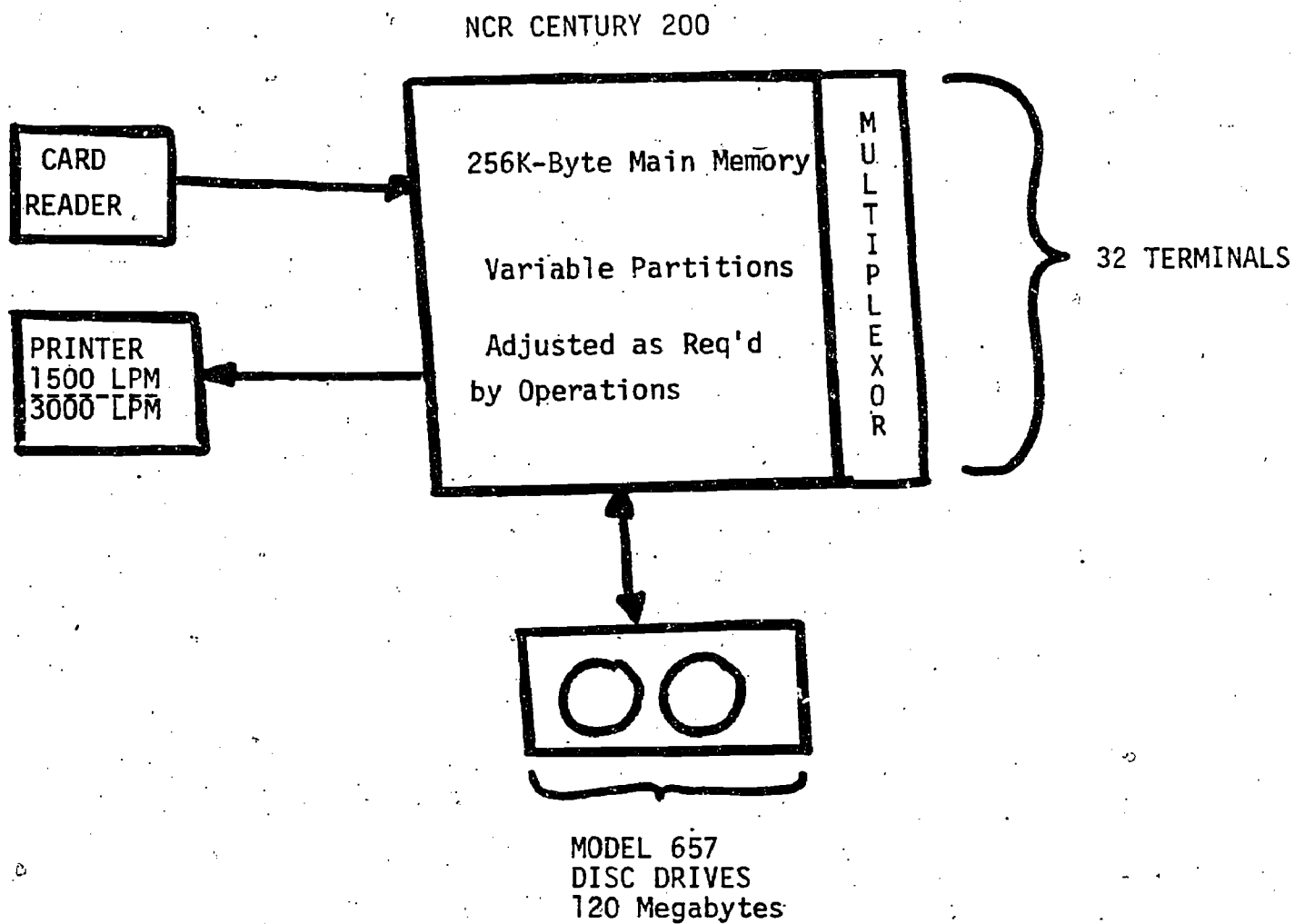
1 = Represents a purchase of 32K Bytes of new core memory, and a donation of 96K-Bytes of new core memory from Computer Enhancement Corporation, Costa Mesa, CA. Existing 32K of short-rod memory will be traded-in toward this purchase.

2 = Assumption is made that this unit will not be donated. This is full retail price quoted by Harwood Associates, Chatanooga, Tenn.

3 = Printed circuit cards have been offered for donation to Saddleback College by Hines Wholesale Nursery, Irvine, CA. Installation and checkout services have been offered as a donation by Mr. Joseph Kunsch, NCR Field Engineer responsible for maintaining this system.



PHASE 3 HARDWARE



PHASE 3

USERS & SOFTWARE

<u>USERS</u>	<u>TERMINALS</u>		
	<u>CRT</u>	<u>H/C</u>	<u>TOTAL</u>
<u>STUDENTS:</u> Same as PHASE II except add CIS-100 Intro. to CIS	8	2	10
<u>ADMISSIONS & RECORDS</u>			
Registration	10	4	} 15
Grade Reporting		1*	
<u>OFFICE OF INSTRUCTION</u>			
Class Scheduling	2	1	} 4
Instructor Evaluation		1*	
<u>COMMUNITY SERVICES:</u> Same as Phase II except add two terminals	<u>2</u>	<u>1</u>	<u>3</u>
TOTALS	22	10	32

PROGRAMMING LANGUAGES

Same as Phase II except add BASIC-M (ANSI Standard Minimum BASIC).

* Scantron Optical Mark Reader

CRT = Cathode Ray Tube (TV Screen) Terminal

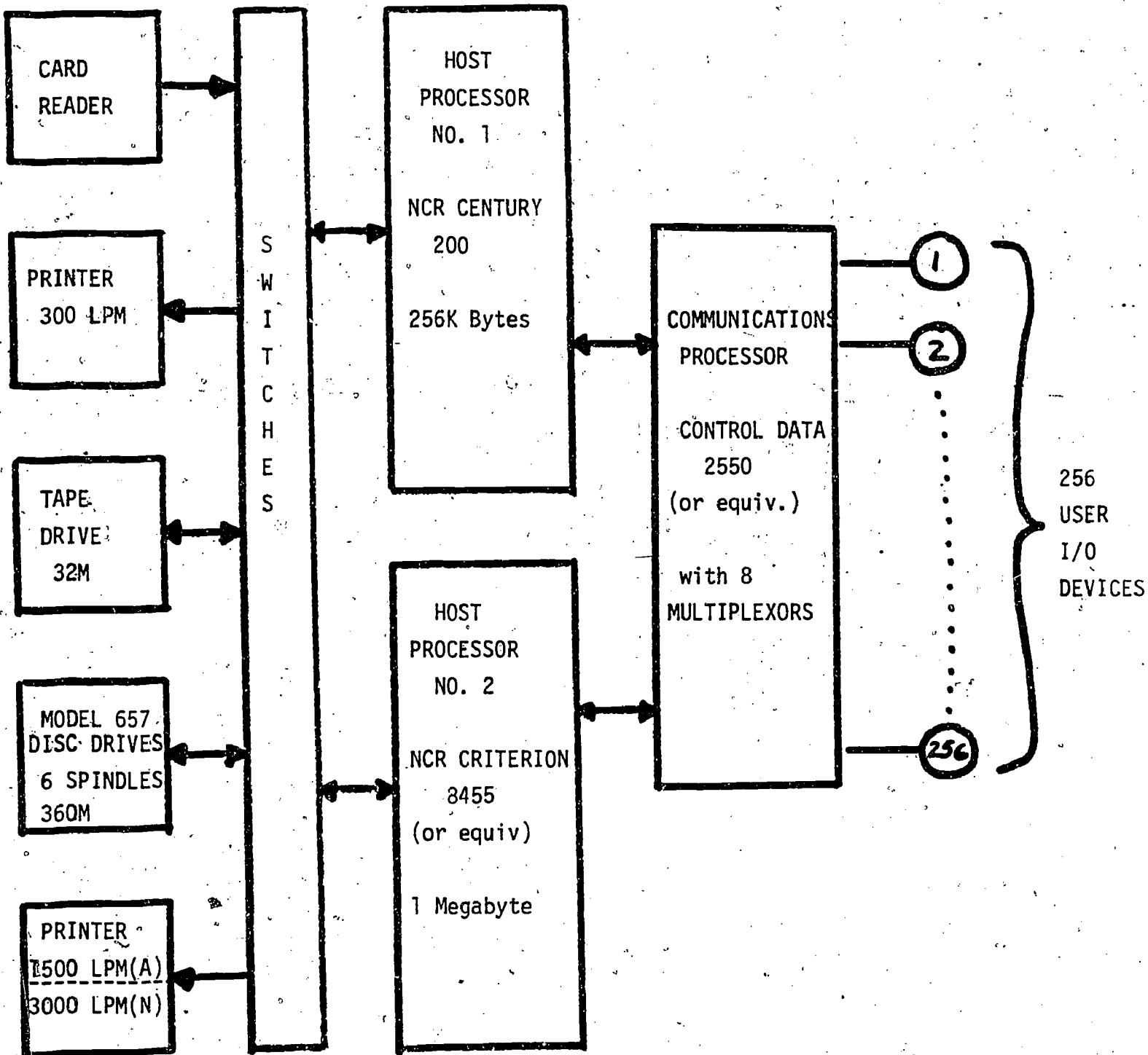
H/C = Hard-copy (Paper Output) Terminal

COST DATA PHASE 3 UPGRADE

Expand Main Memory to 256K Bytes	\$ 10,000.00 ¹
15 Dual Communication Adapters	15,000.00
21 CRT Terminals	N/C ²
8 Hard-copy Terminals	N/C ²
2 Optical Mark Readers, Scantron Model 2000 (or equiv.)	6,500.00
Disc Drive, 2-spindle, high-density, Total: 120 Megabytes NCR Model 657 (or equiv)	10,000.00
Disc Controller, NCR Model 625 (or equiv)	<u>17,000.00</u>
TOTAL	\$ 58,500.00

- 1 = Represents a purchase of 32K Bytes of new core memory, and a donation of 96K Bytes of donated of new core memory from Computer Enhancement Corporation, Costa Mesa, CA.
- 2 = Assumption is made that existing terminals in Instructional and Admissions Departments will be connected to this system.

PHASE 4 HARDWARE



PHASE 4 USERS

<u>INSTRUCTIONAL USERS</u>	<u>CRT</u>	<u>H/C</u>		
Business Science	32	8	}	120
Math/Engineering	32	8		
Natural Science	24	6		
Social Science	8	2		
<u>LIBRARY</u>				
Catalog	16	4	}	60
Data Retrieval	32	8		
<u>ADMINISTRATIVE USERS</u>				
Admissions & Records				
Registration	10	4	}	15
Grade Reporting		1*		
Assistant Superintendent, Business				
Accounting	6	2	}	17
Purchasing	4	1		
Receiving	1	1		
Stores	1	1		
Administrative Services				
Personnel	1	1	>	2
Instruction, Office of				
Curriculum/Catalog	1	1	}	6
Class Scheduling	2	1		
Instructor Evaluation		1*		
Instruction, Division Directors (9)	9	9	>	18
Operations & Maintenance	1	1	>	2
Community Services	3	1	>	4
Guidance & Counseling	8	2	>	10
CETA	1	1	>	2
TOTALS	192	64	>	256

CRT = Cathode Ray Tube (TV Screen) Input/Output Device

H/C = Hard-copy (Paper) Input/Output Unit

ERIC cantron Optical Scanning Input Device

COST DATA

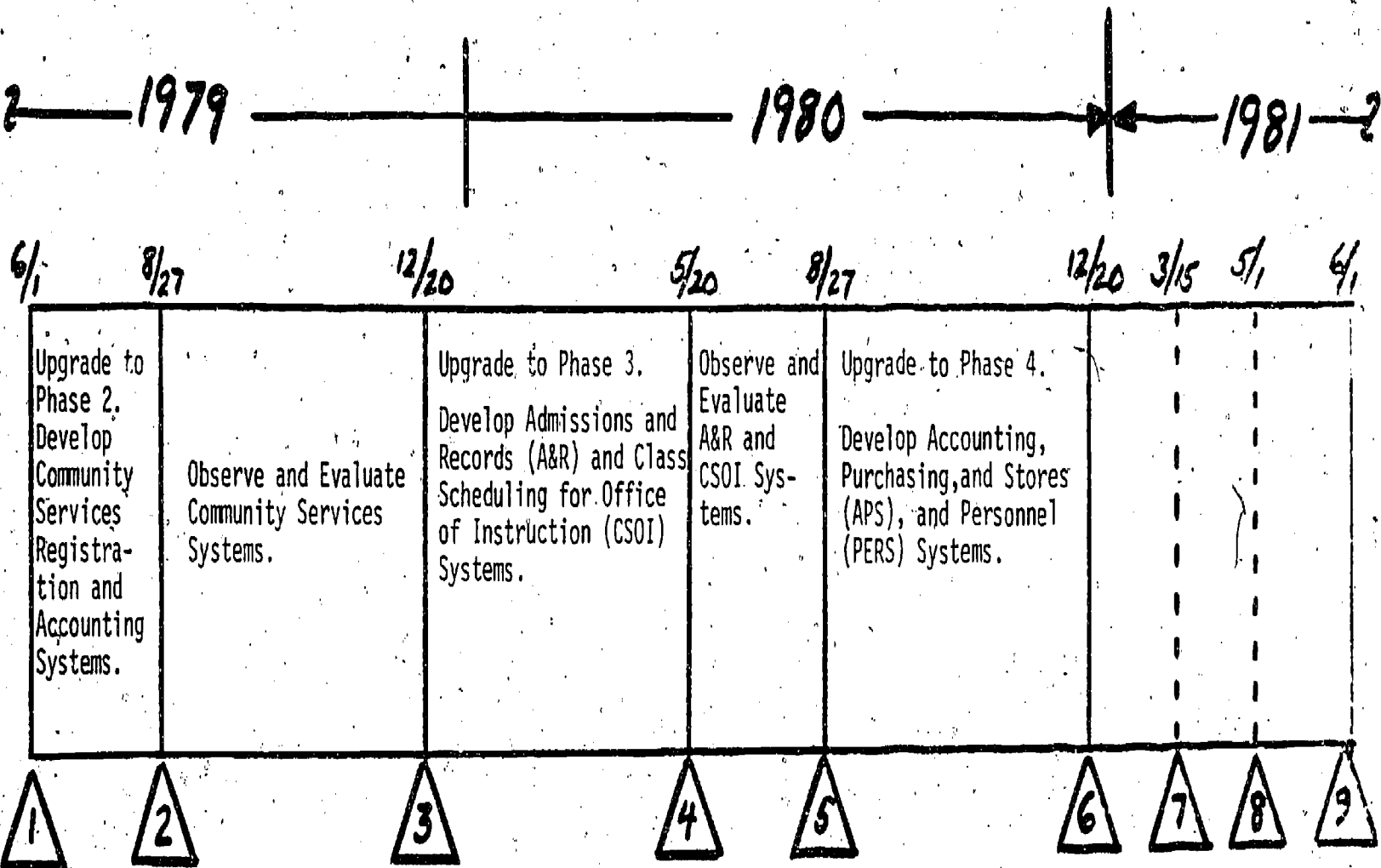
PHASE 4 UPGRADE

New Host Processor with 1 Megabyte Main Memory NCR Criterion 8455 (or equiv)	\$ 70,000.00
Disc Drives, 4-spindles, high-density, Total: 240 Megabytes, NCR Model 657 (or equiv)	20,000.00
Magnetic Tape Drive, Reel-to-Reel, 32-Megabyte reel, NCR Model 633 (or equiv)	N/C ¹
Magnetic Tape Controller, NCR Model 624 (or equiv)	N/C ¹
Communications Processor, with 7 additional multiplexors, and 112 dual communication adapters, Control Data 2550 (or equiv)	N/C ²
SUB-TOTAL, COMPUTER SYSTEM UPGRADE:	\$ 90,000.00
170 CRT Terminals, SOROC Model IQ 120 (or equiv)	122,400.00 ²
54 Hard-copy Terminals	67,200.00 ²
SUB-TOTAL, ADDITIONAL TERMINALS:	189,600.00
TOTAL	\$ 279,000.00

1 = Assumption is made that these units will be donated by Southern Service Co., Pomona, CA. This donation is not firm at this time.

2 = Assumption is made that this unit will be donated by Control Data Corporation, Anaheim, CA. This donation is not firm at this time.

SCHEDULE



CRITICAL MILESTONE DATES

- 1 Decision Point to Upgrade to Phase 2.
- 2 Turnover Community Services System to Operational Personnel.
- 3 Decision Point to Upgrade to Phase 3.
- 4 Turnover A&R and CSOI Systems.
- 5 Decision Point to Upgrade to Phase 4.
- 6 Turnover Accounting System.
- 7 Turnover Purchasing System.
- 8 Turnover Stores System.