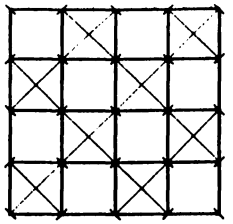
The Computer Museum



The Computer Museum's symbol is a core memory. Core memories provided computers with the first random access, high speed, reliable storage. This allowed computers to meet their potential as tools for amplifying the abilities of human beings. Many inventions spurred the Information Revolution, but none with the same profound effect.

The Computer Museum
Museum Wharf
300 Congress Street
Boston, Massachusetts 02210
(617) 426-2800

C II INSIDE FRONT COVER

The Computer Museum

an international museum for the history of information processing

The Computer Museum is the only institution of its kind in the world, chronicling the evolution of information processing through exhibitions, publications, archives, historical research and programs.

It covers the ideas and inventions leading to the Information Revolution. It explores the Information Age—an age where computers spawn discoveries in the sciences, the arts and the humanities. It collects and exhibits original artifacts from exquisite, hand-made 17th century calculators to modern computers, software and applications.

The Museum's goal is to educate, inspire and inform—to share the history of information processing with the millions who are playing a role in making computer history.

Through its explorations of the past, the Museum offers a glimpse of the future. The exhibits, programs, publications and archives provide an international resource for learning about and interpreting the Information Age.

In 1971, we decided to start a museum to house the still available, but fast disappearing artifacts from the still young computer industry, and from that much older history of computing. Our main motivation was to prevent these artifacts from getting lost to posterity. For a number of years, we accomplished little more. Then in 1979, Gwen and Gordon Bell developed a staff and created a real museum in one of our buildings in Marlboro, Massachusetts.

The response was great. It was clear we really had a need for a computer museum to allow for charitable gifts. In order to broaden the organizational participation, we made it a non-profit organization with a broad-based board of directors. We changed the name from the Digital Computer Museum to The Computer Museum so that it was clear it was not a company museum, but an industry-wide museum. The interest, growth, and enthusiasm about the exhibits have been very satisfying.

"We look forward to broad participation in the funding of the new facilities in the same way that we have enjoyed broad participation in the management of the Museum. . . ."

The next step for the growth of the Museum was to separate it from our facilities and any hint of control by one corporation. We also had to think about moving it to the center of a large city that already attracts large numbers of people because of its historic interest and museums. Museum Wharf, in downtown Boston, was chosen for the Museum's new quarters following a comprehensive feasibility study.

We are in the midst of gathering funds to finance the future of the Museum. We look forward to broad participation in the funding of the new facilities in the same way that we have enjoyed broad participation in the management of the Museum, and in the collection of historically significant and interesting artifacts.

Kenneth H. Olsen
First Chairman of the Board, The Computer Museum
President and Chief Executive Officer, Digital Equipment Corporation

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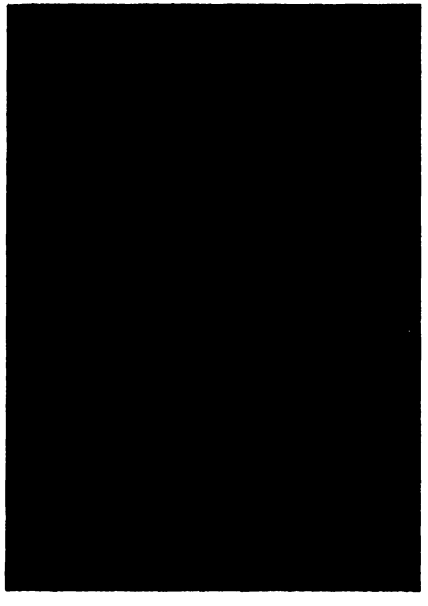


"The computer industry is of such size, interest and importance that it deserves its own museum . . . one of the scope and quality that The Computer Museum will ultimately provide."

The present world of computers and information processing cannot be properly appreciated, leave alone understood, without at least some knowledge of how things came to be the way they are. The story of the events, the people, the organizations, and the technical achievements involved in the invention and the development of the computer is truly a fascinating one. Happily, The Computer Museum now exists to preserve and portray the history of information processing, both to the general public and to people actively involved in the computer industry.

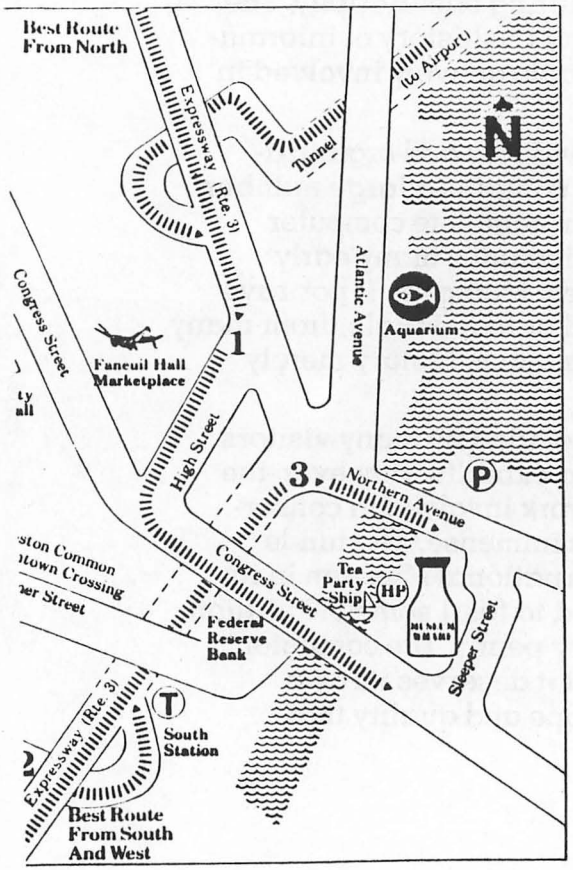
Through the assistance and generosity of many individuals and organizations, the Museum's international collection already contains a large number of items of great historical significance, ranging from complete computer mainframes to tiny electronic components, and also includes many early calculating machines and other pre-computer devices. Moreover, it portrays the work of organizations both large and small, and of individuals, from many places around the world—not for The Computer Museum is history merely "the propaganda of the victorious."

Even in its initial temporary location the Museum provided its many visitors with an unparalleled collection of expertly presented exhibits. However, the Museum's collection is expanding rapidly, and the work involved in conservation, cataloging and the preparation of exhibits is immense. The funds necessary to complete the establishment of this international Museum in its new home on Boston's Museum Wharf are estimated to total some $10 million. The end result will, it is already clear, be worth every penny. The computer industry is of such size, interest and importance that it deserves its own museum, and in particular it deserves one of the scope and quality that The Computer Museum will ultimately provide.

Brian Randell
Chairman, Exhibitions and Collection Committee
The Computer Museum

Professor of Computer Science
University of Newcastle upon Tyne, England

The location of The Computer Museum on Museum Wharf in downtown Boston is ideal for an international museum on information processing.



Boston is the largest single center in the world for training computer scientists, engineers, managers, and technical leaders.

Students and faculty at MIT, Harvard, Boston University, Northeastern, The University of Massachusetts, Babson College, The Wang Institute, Worcester Polytechnic Institute, and dozens of other New England colleges will now have access to this major new educational institution.

Boston is on "the beaten path" of the information processing industry.

The high technology companies of Massachusetts employ one-quarter of the state's working population, attract customers from around the world, and make the city a center for professional and technical meetings.

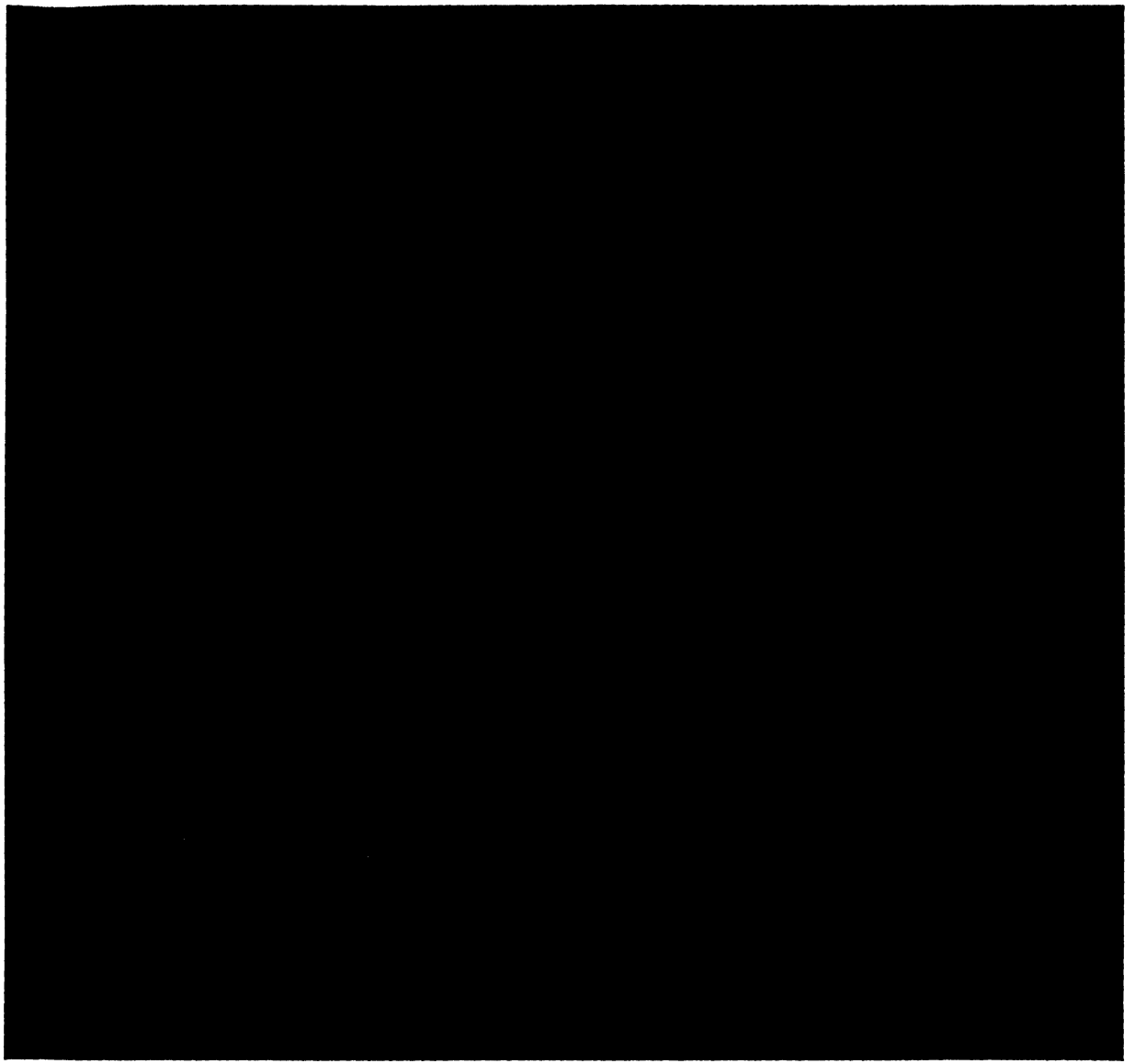
Logan International Airport, the gateway to Boston, is only minutes from Museum Wharf.

Its close proximity to an international airport will make the Museum easily accessible to residents and the 5.1 million visitors that tour Boston yearly.

Museum Wharf is conveniently located in downtown Boston.

It is just a short walk from Boston's financial district and such historic landmarks as Faneuil Hall and the Freedom Trail. Only two blocks from the Museum is South Station, Boston's transportation center that provides visitors with subways, buses and trains.

The location makes it reasonable that everyone in computing can conceive of visiting The Computer Museum at least once.



Museum Wharf was built as a wool warehouse in 1888 and renovated in 1979 to house two museums. The picturesque, six-story brick building sits on a quarter-acre waterfront park that overlooks downtown Boston and Fort Point Channel. The Computer Museum will be a joint tenant in the 144,000-square-foot facility with the Boston Children's Museum.

The building is structurally-sound with spacious, adaptable rooms ideally suited for exhibits. For example, the Children's Museum has reconstructed a 16th-century Japanese house with special humidity and climate controls for its preservation.

Centralized facilities and established services provide economical management of the entire building. The building is three-times more energy efficient than the average office building according to a 1983 energy audit.

More than 100,000 visitors are expected to visit The Computer Museum in its first year at Museum Wharf, and the facility can handle triple that number. The neighboring Children's Museum receives 400,000 visitors per year.

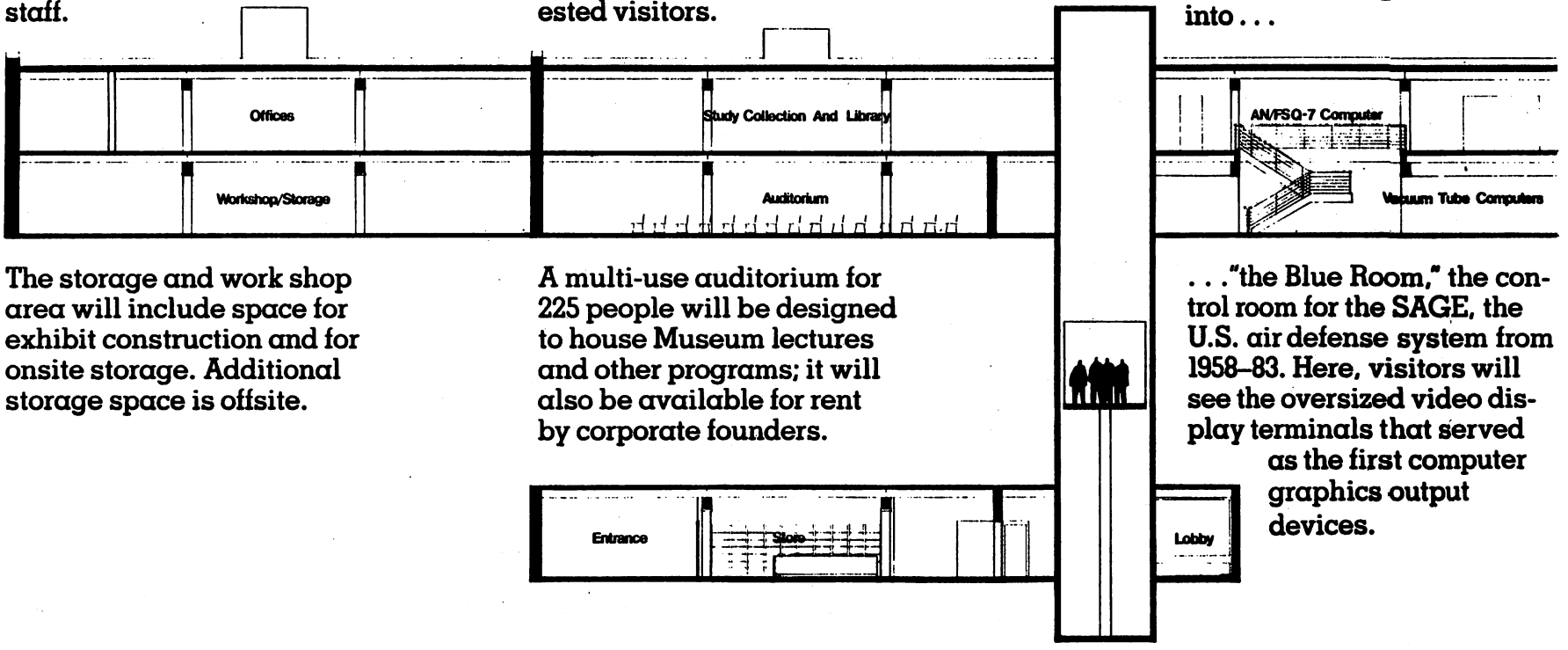
Exhibitions

The Computer Museum is designing exhibits that will dramatically illustrate the story of the Information Revolution and its roots. Through videotapes, interactive displays, and recreations of vintage computer installations, the Museum will bring its priceless collection to life.

The Museum offices for the exhibit, program, membership and administrative staff.

The study/storage and library room will provide a quiet area where archival materials and part of the collection will be accessible to scholars and interested visitors.

The first exhibit will be a reconstruction of the AN/FSQ-7, a 55,000 vacuum tube computer. It will illustrate the fundamental components of computation and introduce the vacuum tube technology era. Museum visitors will be able to walk through sections of this giant machine and see its eight-foot high arithmetic units and room-sized operator's console. Then they will walk down a flight of stairs into . . .

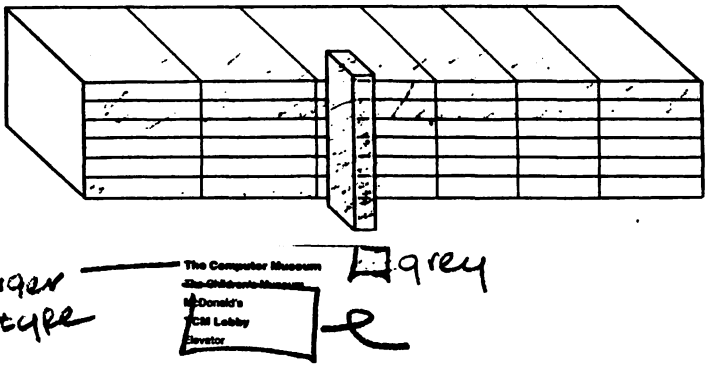


The storage and work shop area will include space for exhibit construction and for onsite storage. Additional storage space is offsite.

A multi-use auditorium for 225 people will be designed to house Museum lectures and other programs; it will also be available for rent by corporate founders.

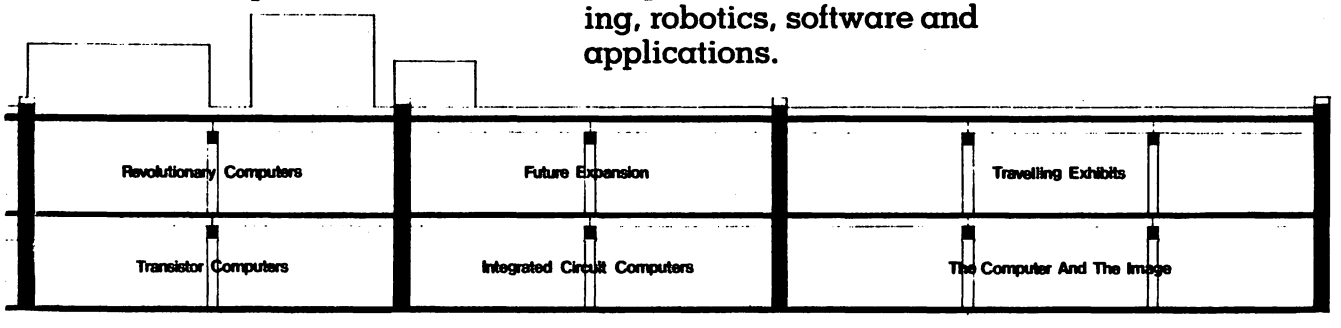
. . . "the Blue Room," the control room for the SAGE, the U.S. air defense system from 1958–83. Here, visitors will see the oversized video display terminals that served as the first computer graphics output devices.

The Museum selected the architectural firm of Crissman and Solomon to design its new exhibits and other spaces in conjunction with Museum staff. Stuart Solomon is chief architect; his other projects have included renovation of Ames Courtroom at Harvard Law School and design of the award-winning Charleston Museum in South Carolina.



The Revolutionary Computers exhibit will feature one-of-a-kind machines, from Atanasoff's ABC to England's Pilot Ace and the ENIAC, that each played a role in creating the computer era.

A variety of groupings from the collection suggest themes for this area. New exhibits in this area could include pre-computing calculating devices, memory components, card computing, robotics, software and applications.



The exhibition on the transistor computer era will feature mainframes through a life-like exhibit of a 1965 business computer center; minicomputers through an operational computer that explains its own software code; and supercomputers through an exhibit on renowned supercomputer designer Seymour Cray.

The Integrated Circuit exhibit will trace the making of a modern computer from sand to silicon to board manufacture and final product. The evolution of personal computers (pc's) will be represented by a "mountain" of outmoded pc's including the Altair, the Xerox Alto and the Apple I, surrounded by state-of-the-art operational machines.

This 4,000-square-foot exhibition hall will be designed to present a variety of travelling exhibitions from computer art shows to science and technology exhibits on information processing.

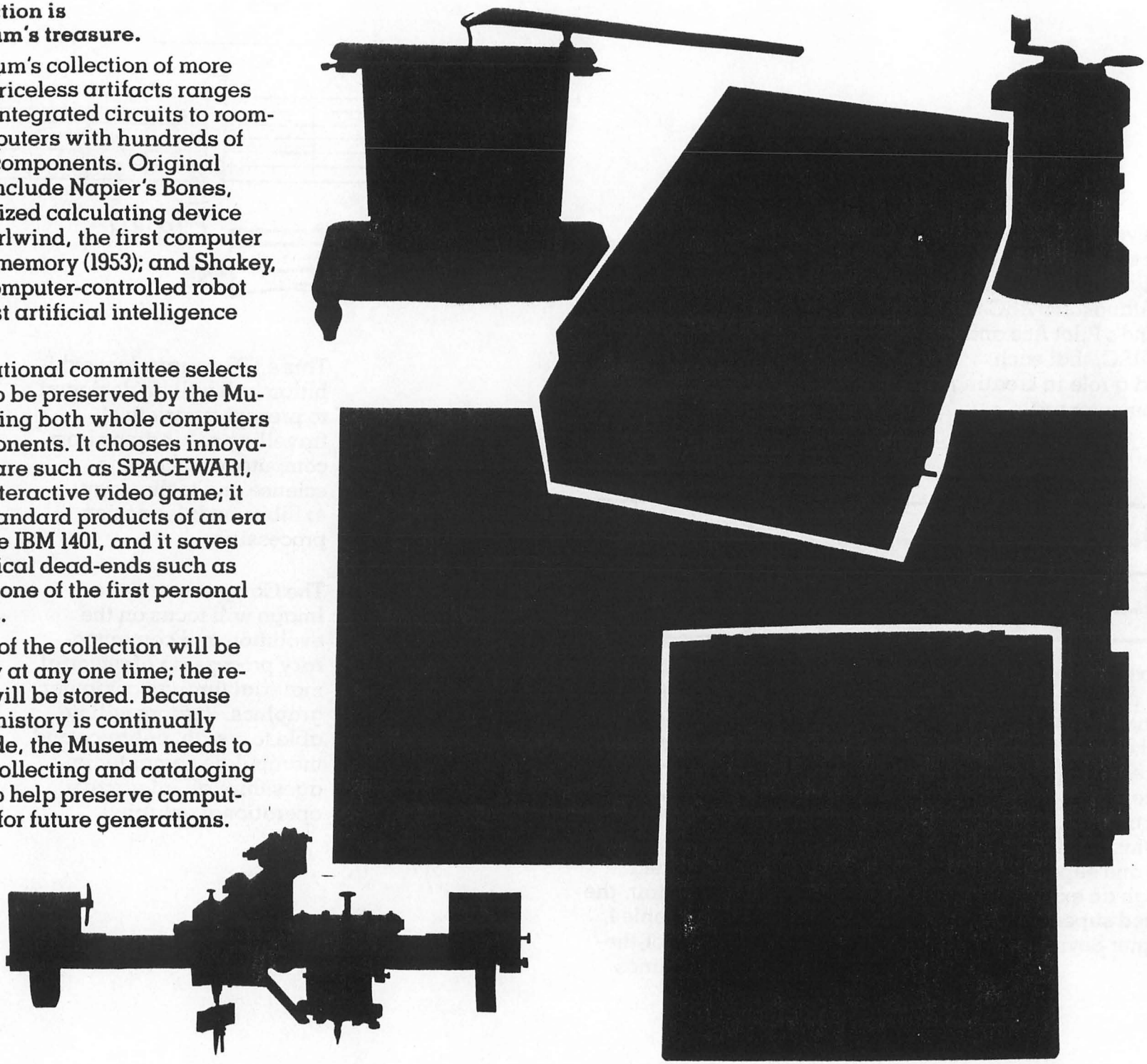
The Computer and the Image will focus on the evolution and contemporary processing of pictorial material through computer graphics. Visitors will be able to create, enhance and manipulate computer images through interactive, operational exhibits.

The collection is the Museum's treasure.

The Museum's collection of more than 700 priceless artifacts ranges from tiny integrated circuits to room-sized computers with hundreds of separate components. Original artifacts include Napier's Bones, a pocket-sized calculating device (1617); Whirlwind, the first computer with core memory (1953); and Shakey, the first computer-controlled robot built to test artificial intelligence (1969).

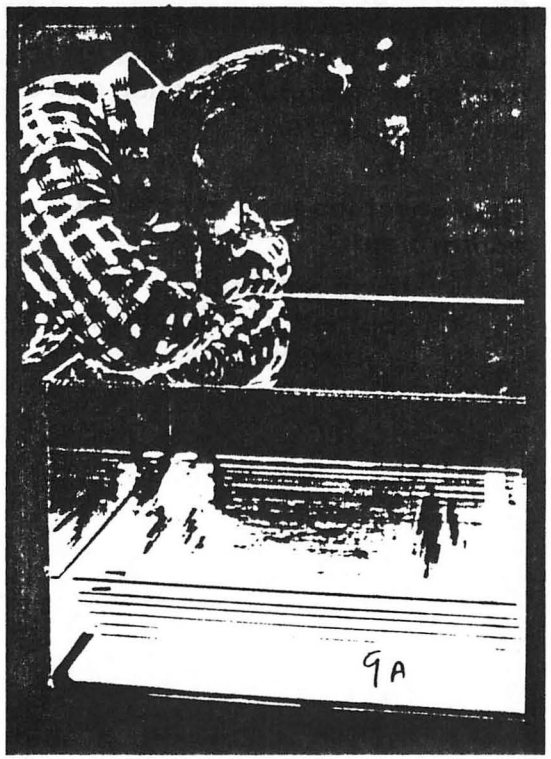
An international committee selects artifacts to be preserved by the Museum, saving both whole computers and components. It chooses innovative software such as SPACEWAR!, the first interactive video game; it collects standard products of an era such as the IBM 1401, and it saves technological dead-ends such as the Altair, one of the first personal computers.

Only part of the collection will be on display at any one time; the remainder will be stored. Because computer history is continually being made, the Museum needs to continue collecting and cataloging artifacts to help preserve computer history for future generations.



Historic research lies behind exhibit development.

The Museum sponsors research to create historically accurate exhibits and other educational materials. Present research focuses on completing the inventory and specifications of all vacuum tube computers. In addition, work continues on the revolutionary computers and is starting on the role of women in programming.



The archives enable historic research.

Each artifact is supplemented with the records that pertain to it: manuals, design drawings, software, documentation about use, articles, books, photographs and films. The machine only tells part of the story —the records reveal another part of the scenerio. Together, they provide a comprehensive resource for historians, scholars and curators.

Publications reach an international audience.

The quarterly magazine, **The Computer Museum Report**, chronicles the activities of the Museum, providing transcripts of historic lectures, and articles on programs, exhibitions and research activities. It is distributed to subscribers in 14 countries and 47 states.

The Computer Museum Store and its catalog are a service.

The Museum Store was established as a retail and mail-order store for educational materials. Its goals are to offer the world's most complete collection of computing history books and to develop a profitable business that will generate income for the Museum. Original computer components, video materials and computer-related gifts will also be distributed through the store.

Programs bring out the human element.

Museum visitors will be able to hear lively reminiscences by the inventors, programmers and entrepreneurs who sparked the Information Revolution. A new auditorium and video-terminals in the galleries will allow the Museum to bring such oral history programs to a larger audience. The lectures and gallery talks are taped for future reference and stored in the Museum's archives.

$10,000,000 is needed for:

The Building

$3,000,000 to purchase one-half interest in Museum Wharf, which includes 75,000 square-feet of superb exhibition space and half of a picturesque quarter-acre park on Fort Point Channel.

"The building is a good buy in every sense."

John William Poduska, Sr.
Apollo Computer

Exhibitions

$3,000,000 to build the exhibitions and public spaces.

The funds will be used to create a library, an auditorium and 30,000 square-feet of involving, explanatory, interactive exhibitions.

"Exhibitions need to reflect the quality of the industry."

Patrick J. McGovern
CW Communications, Inc.

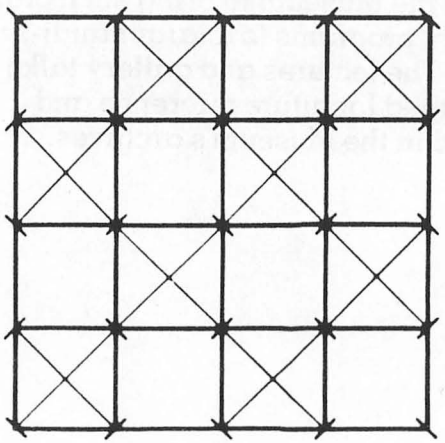
Endowment

$4,000,000 to create an endowment fund.

To fulfill our fundamental goal of preserving the history of information processing, an endowment is essential to ensure the future of this new institution. It will help underwrite ongoing research, collection and archival programs.

"It is never too soon to have an endowment."

Ivan Sutherland
Sutherland, Sproull and Associates, Inc.



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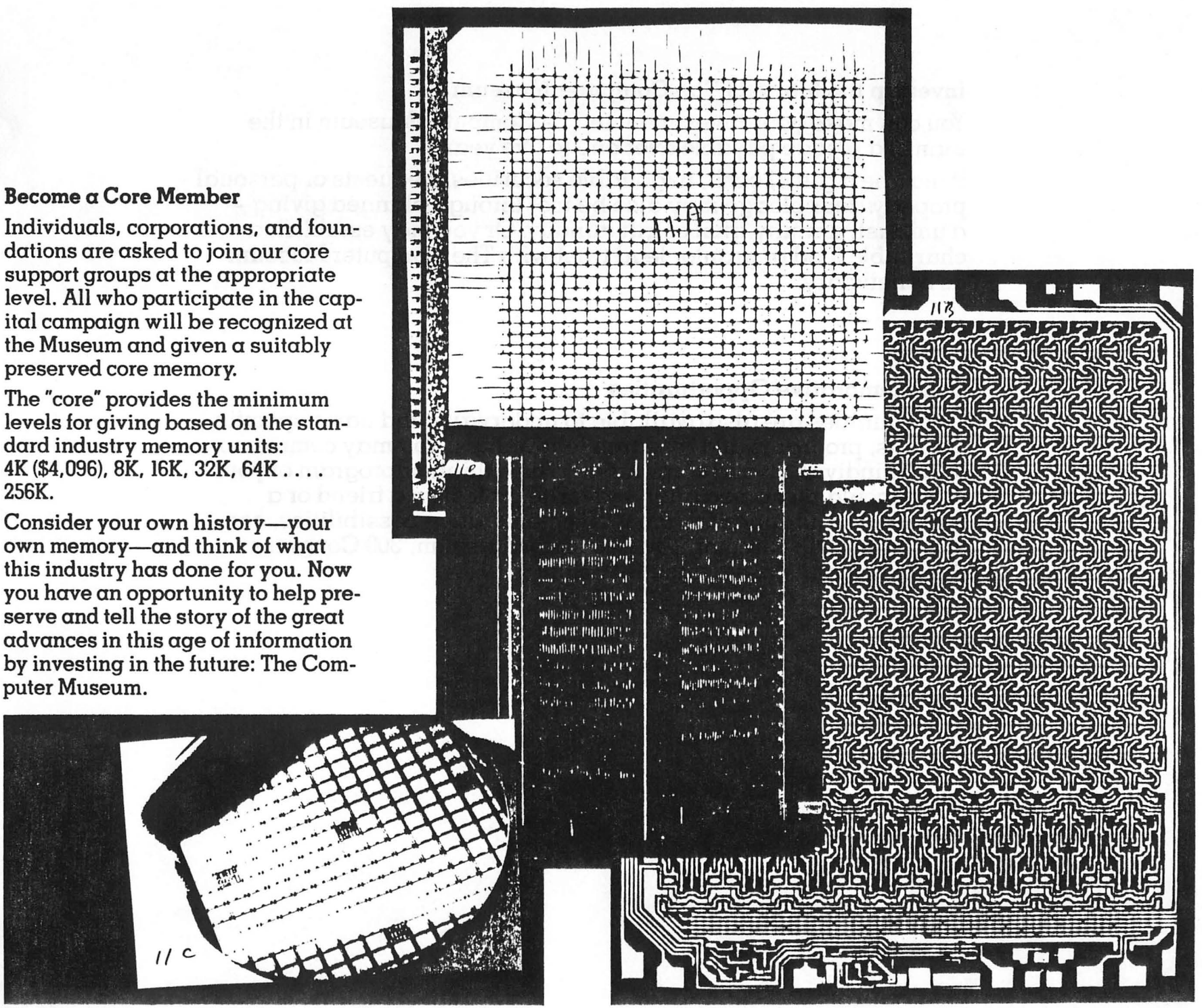
Become a Core Member

Individuals, corporations, and foundations are asked to join our core support groups at the appropriate level. All who participate in the capital campaign will be recognized at the Museum and given a suitably preserved core memory.

The "core" provides the minimum levels for giving based on the standard industry memory units: 4K ($4,096), 8K, 16K, 32K, 64K . . . . 256K.

Consider your own history—your own memory—and think of what this industry has done for you. Now you have an opportunity to help preserve and tell the story of the great advances in this age of information by investing in the future: The Computer Museum.



Invest in the future of The Computer Museum

You can make your investment in The Computer Museum in the form of a pledge payable over one to five years.

It may be a gift of cash, negotiable securities, bequests or personal property. Your pledge may also be met through planned giving—a unitrust, annuity trust or gift annuity. Or you may establish a charitable lead or grantor lead trust with The Computer Museum as beneficiary.

Commemorative Opportunities

Opportunities are also available to underwrite and name specific exhibits, programs and research fellowships. You may commemorate an individual or a corporation. The exhibit or program of your choice could be named after a favorite professor, a friend or a relative. For information about commemorative possibilities, contact Gwen Bell, Director, The Computer Museum, 300 Congress Street, Boston, Massachusetts 02210.

C. Bell 31 Mar. 1984

COMPUTER TYPE TAXONOMY

Single C (10-100us.) (1 cabinet)	1 Pc (uniprocessor)	1 Bus	Pc + nK's	Unibus-type
		P-M Bus	Pc + nK's	traditional mini
			Pc + nPio	360
			Pc + nCio	6600
		attached P|C	C + Pf|Cf*	eg. array proc.
	n Pc (multi-P)	1 bus n(P + C) (eg. Multibus)	functional mP	Plexus
			symmetric mP	
		S.gen, symm.mP (for perf. & high avail.)	ssmP (2-10)	Elexsi
			msmP (10-100)	C.mmp, Cm*
			lsmP (100-1K)	Cedar
			vlmP (1K-10K)	
			ulmP (>10K)	Ultra-C
	multi-instr/data		Dataflow architectures	
	fault-tolerant		duplex C	
Close Area Net (.1-1ms.) (1 room)	reg. connect	memory	grid	
		links	tree	DADO
			binary n-cube	Caltech 64 C
	ad hoc connect	via P or M	closenets	flight simulators
	switched	bus	functional cluster	LLL Octopus
			CAN high avail cluster	Tandem
			backpanel cluster	CT
Local Area Net(1-100ms.) (1 building or campus)	spanning tree, ring, central topologies		LAN cluster, fmC\functional multiC	
			Cambridge Ring Computer	
			homogeneous cluster	Xerox STAR
			heterogeneous network	
Wide Area Net (.1-10s) (global)	fixed connect		multidrop	
			tree	SNA
	store & forward		Hybrid	DECnet
			seperate network	ARPAnet,Telenet
	seperate switch		PABX etc.	common carriers

C := Computer; P := Processor; K := Controller
Cluster := collection of C's acting as a single C
(interprocessor communication times) determine parallel processing grain
*function := arithmetic, array processor, signal processor, communication (front end), database (back end), display, simulation

C. Bell; 31 March 1984

PROCESSOR-TYPE TAXONOMY

single instr- single data	hardwired	simple	minimal	eg. PDP-8, NOVA
			complex	
		pipelined	load/store	eg. RISC
			" + multifunction units	eg. 6600
	microprog.		simple	eg. 8086
			CIS	eg. 360, VAX
			user microprogramming	
			P.language	LISP
			P.gp emulator	
			Descriptor/capabilities	
single instruction, single data, high availability			voting (detect)	
			dup. vote (det./corr.)	eg. Stratos
			TMR (det./corr.)	
single oper., multi data	microprog.		pipeline	
			systolic array	
single instruction, multi-data		open microprog	array processor	eg. FPS-164
			many functions	eg.ELI
		hardwired	vector	eg. CRAY 1
		structural analog	tree	non-VON
			associative Memory	STARAN
			array/grid	Illiac IV
			grid + n-cube	Connection Mach.

THE COMPUTER MUSEUM
MEMBERS MEETING
FRIDAY, MAY 11, 1984
AGENDA

9:30 AM I. NOMINATING COMMITTEE RECOMMENDATIONS FOR NEW MEMBERS AND DIRECTORS/VOTE

II. NEW CHAIRMAN OF MEMBERS AND DIRECTORS/VOTE

III. PERMANENT MEMBER AND DIRECTORSHIP POSITION FOR PRESIDENT/VOTE

10:00 AM IV. ADJOURNMENT

retiring board
Charles Bachman
Gwen Bell
Andrew Knowles
Robert Noyce
Michael Spock
Paul Tsongas

(1987)
Jean Sammett
Sid Fernbach
Eric Block
Jas. McKinney

new board (1988)
Wm Poduska
K. Kobayashi
Art. Mollela
An Wang
Mitch Kapor

(1985)
H. Cragon
R. Everett
G. Michael
K. Olsen
E. Tomash

(1986)
Lee Hogan
Ted Johnson
John Lacey
Pat McGovern
B. Bandell
Ed Schwartz

TRANSISTOR ERA COMPUTERS
Draft: 5/3/84

OVERVIEW

This paper outlines the basic presentation of the Transistor Generation Exhibit at The Computer Museum.

The exhibit's backbone, will be a time-line covering the period 1959-1968. This will present the important events of the era with respect to hardware, software, the industry, and applications. The time-line will be an open case arrangement containing artifacts and photos arranged upon the thematic lines mentioned above. Paul Ceruzzi will develop this exhibit with the help of Gordon Bell and a research assistant.

The body of the exhibit will be developed by Greg Welch, and be composed of two primary sections: "Types of Computers", and "Seymour Cray".

The first section, "Types of Computers", will illustrate to visitors how distinct varieties of computers evolved during the Transistor Era, with characteristics geared towards specific markets, users, and applications. The second section, "Seymour Cray", will examine the development of computing during this era through a study of one of the field's leading computer designers.

The "Types of Computers" section will be developed around the three basic varieties of computers: mainframe computers (represented by an IBM 1401); super computers (the IBM 7030); and the first minicomputers (the PDP-8).

The 1401 will be installed in a life-like situation representing a Travelers Insurance Co. installation circa 1965. As the largest-selling computer of its time, the 1401 will illustrate the qualities of a typical transistorized computer, and the tremendous proliferation of computers during the Transistor Era. Among other things, the exhibit will present business uses of computers in the sixties, and how batch processing affected the use of computers. The isolation of the computer from its users will be a very important aspect of this exhibit.

The Stretch display will consist of two or three bays and the console placed in front of a life-sized photo-mural of a full installation. This should get across the incredible size of the 7030. The distinguishing features of supercomputers will be presented by the characteristics of the Stretch, its users, and applications. For example: weather forecasting by the National Weather Bureau.

The PDP-8 will be running a program which illustrates the difference between machine and symbolic levels of languages. The on-line use of minis by individuals will be stressed, as well as the decreased cost of computation power which helped expand the application of computers.

The second section, "Seymour Cray", will look at the career of the renowned computer designer, as a micro-cosmic illustration of the trends of computing during the Transistor Era. The exhibit will trace Cray's early career at Sperry-Univac, through CDC and Cray Research. A representative selection of his designs, including the Sperry Univac CP-642, the CDC "Little Character", the CDC 160 A, and the CDC 6600, will be accompanied by

a video tape of Cray discussing his work. His genius at packaging components, and utilizing standard technologies will be stressed.

A theater showing films of "Computing Through The Ages" will also be located in the Transistor Generation bay. Films will include: "Introduction to Punched Card Accounting", circa 1928, and "Stretch: The Technological Link Between Yesterday and Tomorrow", among others.

INTEGRATED CIRCUIT ERA COMPUTERS
Draft: 5/3/84

OVERVIEW

This paper describes the basic presentation of the Integrated Circuit Generation exhibit.

Three main sections compose the foundation of the exhibit, "The Chip Story," developed by Beth Parkhurst, "The Manufacture of an Integrated Circuit Computer," developed by Greg Welch, and "The Personal Computer Invasion," developed by Bill Wisheart and Meredith Stelling. Also included in the exhibit, will be the tail-end of the trans-generational time-line (1969 to 1973), and the Illiac IV.

The introduction to the exhibit will be incorporated in "The Chip Story. This section will show the invention of the microprocessor, classic chips, and chip production. The "Manufacture..." exhibit will then trace the construction of a IC computer from its basic components. The "Personals" exhibit will present the historical development of the concept of the personal computer through examples of the actual machines.

A "high-tech" case exhibiting the Apollo Guidance Computer will draw visitors into the exhibit and function as an introduction to the "Chip Story." (The case will also contain a Hewlett-Packard PC with touch-sensitive screen reproducing the console of the AGC.) The first area in "The Chip Story" will use artifacts to elaborate the invention of the microprocessor. In the next area, a projection microscope will allow visitors to view classic IC's in detail. Last, a multi-projector slide show and artifacts, including a diffusion furnace and a crystal extraction arm, will demonstrate how a chip is manufactured. Issues that will be addressed include two of the underlying factors in the "second industrial revolution": use of computers to build computers and the substitution of the microprocessor for many specialized circuits.

The manufacture of the IC will lead into the "Manufacture of an Integrated Circuit Computer." Using as an illustrative example the Data General Eclipse, the exhibit will follow the manufacture of a complete computer from its most basic components. Efforts will be made throughout the exhibit to incorporate artifacts, photos, and sound to recreate the atmosphere of the manufacturing sites as realistically as possible. Some of the artifacts which will be included in the exhibit are: a wave-solder machine, an automatic IC insertion machine, and parts of a chassis assembly line. The role of computers and automated machinery in the manfacturing process will be contrasted with the still extensive use of manual labor. Parallels will also be drawn between the complex structure of the production process and the function of the computer itself. The production of the computer's software and the unique degree of testing will also be focussed upon. The final step will be a completed machine running some sort of interesting program to demonstrate its capabilities.

The "Personals" exhibit will center around a "burial mound" of personal computers. These will be a wide variety of PC's, covering the development of the personal concept from its beginnings in the LINC. Surrounding the "burial mound" will be a ring of functioning, contemporary PC's from a representative group of vendors. These machines will be running programs which will be accessible to visitors and give further information on the

exhibit. Ideas for these programs include: a CRT display diagram of the burial mound which, when the visitor touches the picture of a specific machine, would give additional information about it; and a survey which would query visitors about their experience/exposure to PC's and then show them where they stood in relation to others who had answered the survey.

Aside from the above, the IC exhibit will also contain the Illiac IV as a demonstration that simply because circuits got smaller computers did not necessarily follow suit.

THE HISTORY OF WOMEN IN COMPUTER PROGRAMMING

NATIONAL ENDOWMENT FOR THE HUMANITIES PROPOSAL SUMMARY
THE COMPUTER MUSEUM AND BROWN UNIVERSITY PEMBROKE CENTER

The Computer Museum, in association with Brown University's Pembroke Center for Research and Teaching on Women, proposes a pilot study of the history of women in computer programming in the United States. We will use an interdisciplinary approach, combining history of science and technology with social history. The study will provide a narrative account of both the achievements of the most eminent women in programming and the experience of the typical woman programmer, correcting misconceptions about the role of women in programming. It will illuminate debates on the interaction of technology and culture, and the impact of changing technology on traditional gender roles. The project is intended to serve as the basis for a major, multi-year study.

The history of technology and the history of women are fraught with generalizations about the impact of scientific development on the status, job possibilities, and economic security of women. Recently, extravagent claims about the impact of computer technology have been added to this discussion. Such claims are based on little concrete evidence, and are the product of an underlying technological determinism. The proposed study is based on the hypothesis that traditional cultural values are an important mediator in the adoption of new technology. We will investigate the influence of images of femininity and of the women computer programmer, family formation, formal education and the informal education of the computer "hacker" culture, and changes in the structure of the programming profession. We will supplement written sources by consultation with computer professionals.

Products will include one or more scholarly articles, a final report, and a plan for a full-scale study. The principal expense will be for salaries. The study will be used as a model for further interdisciplinary research in computer history.

Q-7: PROFILE OF A VACUUM TUBE COMPUTER

The Q-7

The Q-7 computer was the largest and longest-running production-line electronic computer of the vacuum tube computer era (1950-1960). Designed to meet the extensive data processing needs of the SAGE air defense system, the Q-7 serves as a classic example of how military needs supported the development of the fledgling computer industry of the 1950's.

The Exhibit

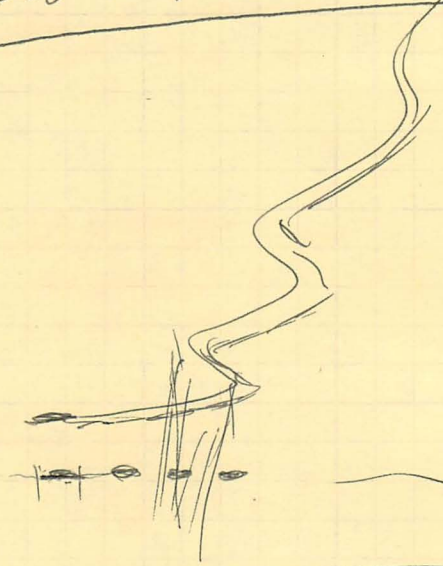
The Q-7 computer will be used to provide the naive visitor with a basic understanding of what a computer is, as well as to educate all visitors about vacuum tube technology and the vacuum tube computer. Comparisons of the components of the vacuum tube computer in size, speed and reliability with contemporary computer components will increase the visitors understanding of these early computers.

The exhibit "Q-7: Profile of a Vacuum Tube Computer," located on floor 6, bay 4, contains two major displays; the first, "Vacuum Tube Technology," explores the fundamental electronic construction of the computer while the second, "The Stored Program Computer," illustrates the fundamental conceptual organization of the computer. The visitor will actually walk through a stored program computer -- the arithmetic units, the memory devices, the control and input/output devices. In a area devoted to the programming of the Q-7, a stack of punched cards will rise from the floor to the ceiling with text explaining that this stack is only one of 160 such stacks (3 million punched cards) needed to program the SAGE system.

5/10/84

Ship
Bryant Dish
Lots of films (documented)
" " slides
PDP-1 Eyeball
find out when Cal Comp 563, 565, are.
maybe flat bed.

5/12/84
Sat: noon see Greg.



The Computer Museum
300 Congress St.
Boston, MA 02210

See Jim Boswell re IRMA etc.

THE COMPUTER AND THE IMAGE

OUTLINE FOR A NEW GALLERY AT THE COMPUTER MUSEUM

Oliver Strimpel
April 1984

INTRODUCTION

Computer imaging is an exploding field. The price of hardware has sunk to the point where pictures at good resolution can be stored and manipulated by equipment costing thousands rather than hundreds of thousands of dollars. This brings graphics within reach of almost all types of users, from the home hobbyist to the professional businessman, artist and scientist.

Why is computer imaging so popular? The reason must be linked to the fact that vision is our dominant sense. We think of the world primarily as images and we interpret information most readily in graphical form. With the computer harnessed to this medium powerful applications emerge. The flexibility familiar in word-processing can be used to paint pictures. Fast computation can be used to enhance raw images and reveal features invisible on the original. Flexibility and fast computation combined make interactive computer-aided design possible. Objects that do not exist can be displayed looking real enough to touch. Lighting, texture and viewpoint can all be chosen to help our imagination.

The aim of the exhibit "The Computer and the Image" is to convey to the interested public some of the power and sense of opportunity that this new form of imaging holds. The exhibit will display many types of imaging, from the light-hearted world of games to the serious number-crunching world of digital image-processing of satellite images. Wherever possible, displays will be interactive so that the visitor can experience for himself some of the versatility of the medium.

But the exhibit should do more than present marvellous results. Many of these can be seen at trade shows, computer stores or at conferences. It should make an attempt to get behind the results to reveal the process. Simple processes often have dramatic effects on an image. For example,false colouring and spatial filtering, though straightforward as ideas, can radically alter a picture. The public should be able to interact with the process to affect an image and thus grasp the concept involved. This demystification can be applied to most forms of imaging, even the realistic scenes generated on large mainframes for motion pictures.

The exhibit will start with pioneering efforts in computer graphics, both as films and pictures of results as well as hardware. The evolution of graphics will be set in the context of the wider development of computing which will be displayed in adjacent galleries at the Museum.

A section on the nature of the computer image will introduce the types of image - vector and raster - and allow visitors to alter spatial and contrast resolution of images. Hardware for displaying, storing, inputing and outputing images will be on show. The aim is get over the idea of an image as a form of

information, like numbers or letters, and of how such information is handled by the hardware.

Examples of computer imaging can be divided into those that start with an image and manipulate it and those that synthesise an image from scratch. The former will include image-processing, from the Voyager Mission to Jupiter and Saturn to the view of downtown Boston from the gallery's window. In the latter category, the steps towards photographic realism will be shown as well as the use of images in design, simulation and the visualisation of invisible objects from molecules to the hypercube.

The exhibit should appeal to the curious layman, with information presented on several levels of sophistication. The expert should not feel that information is sparse but the superficially interested person should not be put off by dry blocks of text.

The following pages give an outline of the proposed exhibits. The story line presents the main message of each section while the 'material' column lists proposed display material explicitly.

SECTION	STORY LINE	MATERIAL
beginnings	When computers reached a certain power, images could be made. Link up with the evolution of computers exhibited in adjacent galleries and give a feel of late 1950's and early 1960's computing.	image of Jacquard woven on Jacquard loom; 19th century Jacquard demonstration model; films: SAGE Sketchpad ESL ('Kludge') GRAIL objects: first tubes or prototypes SAGE console Kludge globe Rand tablet ARDS terminal early mice, light pens PDP-1 & space-war
making a computer image	Computer images are composed of lines or of coloured squares. The realism depends on spatial and colour resolution. The importance of our perception of edges enables us to make sense of vector drawings but emphasises jagged edges in raster images.	large pixellated image of familiar figure eg Lincoln; working program displaying image of user's face at different spatial resolutions and with varying numbers of grey levels; hardware pan and zoom on an image compared to similar process using 19th century drawing instruments first surface models with Coons patches
displaying an image	To display an image electrons and phosphors, light and film, ink and paper and other recently developed display technologies are used.	the hardware of graphic output devices: exposed CRT, plotter, film-writing device, liquid crystal, gas plasma. Parts labelled and principles explained. Early or prototype tubes and links to other fields eg flight control use of storage tube

storing an image	A picture really is worth thousands of words. Large capacity devices are needed to store the bulk of information. Tape, video disc and RAM are convenient media for computers to read. The image itself is usually convenient for the human eye alone.	model of pitted video-disc surface, of iron oxide elements in tape, of RAM with examples of the real thing. Computer controlled video-disc (Aspen sequence?)
inputting an image	Interfaces allow graphical information to be input by touch, pen and tablet, mouse, scanning digitising devices and TV cameras.	examples of the different input devices in interactive operation with programs explaining the process. Paint system. Armouring will be needed for many devices: touch-sensitive screen; tablet; mouse; digitiser; TV camera. Film of AI scene recognition.
movement	A sequence of slowly changing images creates the illusion of motion. Computer images for animation are usually generated slowly and strung together by time-lapse photography. Fast computers can show images in real time and for simple scenes even compute the images in real time.	zoetrope, arcade game with variable speed, animation and in-betweening- either interactively or with a film.

manipulating an image enhancement	Images, photographically or electronically produced can be enhanced to reveal structure not initially visible. Usually it is known what is "wrong" with an image. It takes number-crunching to correct it. Explain processes of contrast stretching, false colouring, deblurring, spatial filters and mathematical transformations such as the hue, saturation, intensity transform.	first work in mid-50's on SEAC; development of image-processing shown through Surveyor, Mariner, Landsat, Voyager, and radar images from Seasat and of Venus from Pioneer. Interactive control of contrast, colour, filters on a stored images form Landsat and Voyager with process explained.(MIPS) medical images: X-ray, tomograms. astronomical, forensic and art applications. sonar, seismic and infrared images
creating special effects	Once inside a computer, simple mathematical rules can alter an image in fantastic ways.	video tape of view out of window distorted, spun, zoomed ...
synthesising an image from scratch the quest for photographic quality	To see things that never existed as if they were real the eye has to be supplied with cues: perspective, lighting, colour, near objects obscuring far objects. Why is it so difficult to approach the photograph? What is it for?	object shown at increasing levels of quality, from lines to antialiased, realistically illuminated texture; ray tracing. frontiers of image quality; SIGGRAPH slides and films. the entertainment and advertising industries: the use of fractals for irregular objects. cinema showing extracts of computer-generated scenes from a Voyager spacecraft simulation to Tron. state-of-the-art video game.

synthesising an image from scratch continued: an aid to visualisation	How do materials or artifacts behave under conditions too extreme to be reproduced in reality? What shape do molecules have? What does a hypercube look like?	films and still pictures: molecular biology topology particle physics galaxy models
		interactive program to manipulate a hypercube
	Computer-synthesised images can lead our imaginations into new domains.	town planning: plotter showing plan of Boston with and without new development scheme
	Real time simulations are valuable training tools and also make excellent games.	product designed by computer such as aircraft wing or turbine blade with CAD program drawing variations
	Computer-aided design - the exploration of possibilities with no commitment.	design a car program from Ontario Science Centre and film of GM DAC-1- early use of CAD
		examples of CAD in computer design
		interactive rug design program
		interactive flight simulator

END

THE COMPUTER MUSEUM
EXHIBITS DEPARTMENT

STAFF MEMBER	EXHIBIT	LOCATION
Paul Ceruzzi, Research Associate (summer staff)	"Timeline: 1950-57"	F5-B4
	"Timeline: 1958-68"	F5-B3
	"Timeline: 1968-73"	F5-B2
Beth Parkhurst, Research Fellow	"The Chip Story"	F5-B2
Meredith Stelling, Coordinator	"Q-7: Profile of Vac. Tube Computer"	F6-B4
	"Q-7: The SAGE Computer"	F5-B4
	"The Personal Computer Invasion"	F5-B2
Oliver Strimpel, Curator	"The Computer and the Image"	F5-B1
Greg Welch, Research Assistant	"Seymour Cray"	F5-B3
	"Types of Computers (Transistor)"	F5-B3
	"The Manufacture of an IC Computer"	F5-B2
Bill Wisheart, Registrar	"The Personal Computer Invasion"	F5-B2

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can we find a ~~lot~~ any things (from Univac) laying around.

THE COMPUTER AND THE IMAGE

Desired films made by Nelson Max

1. Zooms on self-similar figures
2. Turning a sphere inside out
3. Carla's island
4. DNA and Enzyme Reaction

Oliver Strimpel
May 11 1984

5. Bell Labs 2 Paradoxes
6. H. Linden Inverse Force
7. NCAR film by W. Washington

A. are there any DD80's left

B. contact John Whitney, Jr; re obtaining film clips.

THE COMPUTER AND THE IMAGE

POSSIBLE FILMS AND VIDEOS

Historical

✓ Sketchpad on the TX-2 - film in the collection of the Museum

✓ SAGE the use of graphics in pointing to aircraft tracks and absorbing radar data: clip from film already in Museum collection.

✓ Apollo LEM on the Adage Graphics Terminal 1967 - 1st real time graphics.

GRAIL - Graphical Input Language using the Rand Tablet mid 60's

✓ General Motors DAC-1 - design augmented by computer - 1960's

Simulation

Galactic Collision by Alar Toomre

Two self-consistent clouds of stars collide and pull out long trails of matter. Wisps thus produced are reminiscent of photographs of interacting galaxies.

Galactic Dynamics by Rick Miller, Dept of Astronomy, University of Chicago, 5640 Ellis Ave, Chicago, Ill 60637 312-753 1234

Self-gravitating discs of particles break up into instabilities but if there is a massive halo they form spiral-like patterns.

✓ Voyager Flight Simulation by Charles Kohlase and James Blinn, Jet Propulsion Laboratory 264-443, 4800 Oak Grove Drive, Pasadena, CA 91103

Synthesised Voyager spacecraft travels past Jupiter and Saturn and their moons. A number of versions were made as new data from the actual mission enabled the planets and moons to be modelled more accurately.

DNA and Enzyme Reaction by Nelson Max, Lawrence Livermore Laboratory

L-73, Livermore, CA 94550

Shaded sphere representation shows interlocking of enzyme with DNA.

Crystal Growth and Nucleation on a Crystal Surface by George Gilmer, Bell Labs, 600 Mountain Ave, Murray Hill, NJ 07974

Simulated crystal growth phenomena.

Visualisation

Zooms on Self-Similar Figures by Nelson Max, obtainable from International Film Bureau Inc, 332 South Michigan Ave, Chicago, Ill 60604

Shows snowflake, Peano and Sierpinski curves.

Turning a Shere Inside Out by Nelson Max, source as above

Shows smooth motion which turns a sphere inside out by passing the surface through itself without making any folds or creases. Shows wire mesh, opaque surfaces and exploded views.

Powers of Ten by Ray and Charles Eames, Pyramid Films, Box 1048, Santa Monica, CA 90406

Shows structure visible on scales of size from that of subnuclear particles to clusters of galaxies using a mixture of photography and well blended computer animation.

One Dewey Square by Jung Brannen Associates, 177 Milk Street, Boston, MA 02109 contact Bruce Forbes

Video to be prepared for the Museum showing views of the site with and without the new development and going inside building showing details.

Turbine Blade by General Electric, 1000 Western Avenue, Lynn, MA 01910 contact Bill Blundell

Use of CAD in design of critical component in aero engines using vector, 2 and 3d, and shaded raster images

Fantasy

Vol Libre by Loren Carpenter, Lucasfilm, PO Box 2009, San Raphael, CA 94902

Simulated flight past mountains and lakes with pseudo-rugged mountains.

Carla's Island by Nelson Max, Monaco Film Lab, San Fransisco, CA

Realistic waves on the ocean as the sun rises and sets, followed by the Moon.

Hunger by Peter Foldes, Images, 300 Phillips Park Road, Mamaroneck, NY 10543

Line drawings interpolated by computer of man with insatiable appetite swelling to enormous proportions, haunted by nightmare of starving people consuming him.

Tron by Information International Inc, Corporate Communications Dept, 5933 Slausen Avenue, Culver City, CA 90230

Computer-syntheisised sequence in the motion picure.

Advertising

Digital Scene Simulation by Information International Inc, Corporate Communications Dept, 5933 Slausen Avenue, Culver City, CA 90230

Sample reel with logos and advertising clips. Realistic three-d objects, illuminated and spun at very high resolution.

NYIT sequence by NYIT, Computer Graphics Lab, Old Westbury, Long Island, NY 11568 contact Louis Schure

PROPOSED MAY 1984 MEMBERS VOTE

New Members and Directors:

The Nominating Committee nominated, and after discussion and upon motion, duly made and seconded, it was voted:

- That the following persons are hereby elected as additional Members and Directors of the Corporation, each person to serve in such capacity commencing upon adjournment of the 1984 Annual Meeting and continuing through the Annual Meeting in the year specified after his or her name and until his or her successor is duly elected and qualified:

1. Mitch Kapor / Lotus 123 — 1988
2. Kuji Kobayashi / NEC — 1988
3. Art Mollela / Museum of American History Smithsonian — 1988
4. William Poduska / Apollo — 1988
5. An Wang / Wang Computer Corp — 1988

5/11/84
EC:21

PROPOSED MAY 1984 MEMBERS VOTE

Chairman:

Upon motion, duly made and seconded, it was voted:

- That William Podurska is hereby elected as Chairman of the Members and of the Board of Directors of the Corporation to serve commencing upon adjournment of the 1984 Annual Meeting, through the next Annual Meeting, and until his or her successor is duly elected and qualified.

PROPOSED MAY 1984 MEMBERS VOTE:

Member and Directorship Position

Upon motion, duly made and seconded, it was voted:

- That a Member and Directorship position be established for the President of The Computer Museum, Inc., and that the Member and Directorship positions shall be automatically renewed at the end of each four-year term, except that an individual may only serve in the positions created hereby for so long as that individual serves as President, but this provision shall not operate to prevent any such individual from otherwise being a Member or Director pursuant to a separate appointment.

PROPOSED MAY 1984 DIRECTORS VOTE

Nominating Committee:

Upon motion, duly made and seconded, it was voted:

- That the following persons are hereby elected to the Nominating Committee to serve through the next annual meeting and until their successors are duly elected and qualifed:

  1. Chairperson: Theodore Johnson
  2. John Lacey
  3. George Michael

PROPOSED MAY 1984 DIRECTORS VOTE

History and Collections Committee:

Upon motion, duly made and seconded, it was voted:

- That the following persons are hereby elected to the History and Collections Committee to serve through the next annual meeting and until their successors are duly elected and qualified:

1. Chairperson: Brian Randell
2. Charles Bachman
3. David Chapman
4. Harvey Cragon
5. Sydney Fernbach
6. Kuji Kobayashi
7. George Michael
8. John Payne
9. Douglas Ross
10. Jean Sammet

PROPOSED MAY 1984 DIRECTORS VOTE

Finance Committee:

Upon motion, duly made and seconded, it was voted:

- That there shall be a Finance Committee which shall review and advise as to financial matters relating to the Museum, and the following persons are hereby elected to serve through the next annual meeting and until their successors are duly elected and qualified.

1. Chairperson: James L. McKenney
2. Nick Pettinella
3. Eva L. Radding
4. Roger Barton

PROPOSED MAY 1984 DIRECTORS VOTE

Development Committee:

Upon motion, duly made and seconded, it was voted:

- That the following persons are hereby elected to the Development Committee (formerly the Fund Raising Committee) to serve through the next annual meeting and until their successors are duly elected and qualified:

1. Chairperson: Robert Everett
2. Charles Bachman
3. Gordon Bell
4. Erich Bloch
5. Robert Chinn
6. Robert Claussen
7. Robert Everett
8. Douglas Drane
9. Tom Franklin
10. C. Lester Hogan
11. Pat McGovern
12. Jim McKenney
13. William Mercer
14. Tim O'Neill
15. William Poduska
16. Michael Spock

		12	MR. JOSEPH ABELY (DELOIT, HASKINS, & SELLS) MRS. JOSEPH ABELY	
X		1	RUSTY AERTSEN (VP, BANK OF BOSTON)	
X			MARGARET AERTSEN	
X		31	DAVID ANGST	N/A
X		2	BACHMAN	CHARLES BACHMAN
X	B		CONSTANCE BACHMAN	
X		1	BEN BAILEY (VP, BANK OF BOSTON)	
X			BARBARA BAILEY	
X		3	DAVID BARBER	
X			MAXINE BARBER	
X		17	RUSS BARBOUR (APOLLO)	
X			JACQUELINE BARBOUR	
X	B	4	GORDON BELL	
X	B	5	GWEN BELL	
X		28	FRANK BENESH (SHAWMUT BANK)	
X			MARTHA BENESH	
X		32	MR. RICH BILLEG (ENCORE)	
X			GUEST	
X		30	BOB BILLHIMER (COMPUTER DESIGN MAGAZINE)	
X			FRITZ LANDMANN	
		2	DICK BLOCH	
			RUTH BLOCH	
X		8	TED BONN (SPERRY DEFENSE ELECTRONICS)	N/A
X			EDITH BONN	
	S	16	JANA BUCHHOLZ	
			RAUL NIEVES	
		24	HENRY BURKHARDT III	
			SANDRA BURKHARDT	
X		4	WALTER M. CARLSON (IBM CALIFORNIA)	
X		2	RICH CARPENTER	
X			JOANNE CARPENTER	
NC		27	MIKE CARR	
X		13	DR. JAMES I. CASH	
X			CLEMMIE CASH	
X		29	MR. CHAPIN	

X			MRS. CHAPIN	
X		17	THOMAS C. CHASE	
X		12	STEVE CHEHEYEL (V.C.; PLEDGED 4K)	
X			MAUREEN CHEHEYEL	
		23	BOB CHINN (CDC-BATON R. MINNEAPOLIS)	
X	S	31	MARGHERITA CIAMPA	
X			NICHOLAS J. TUPLIN	
		11	DICK CLAYTON (TMI)	
			NANCY CLAYTON	
		29	BOB CLAUSEN	
			NORMA	
X		23	HARRY COCHRAN	
X			PAT COCHRAN	
	S	24	LEA COHEN	
			RON ROSENBAUM	
X		23	DR. KAREN COHEN	
X			DR. NATHAN COHEN	
X		17	MR. ROBERT CORCORAN (CORCORAN ASSOCIATES)	
X			MRS. ROBERT CORCORAN	
X		8	JAMES CROKE	
X			LILLA CROKE	
X		33	MR. MICHAEL CRONIN	
X			MRS. MICHAEL CRONIN	
X		4	ALEXANDER D'ARBELOFF	
X			BRITT D'ARBELOFF	
X		23	RANDALL DAVIS	
X		16	GREG DEL SESTO	
X			JANICE DEL SESTO	
X	B	20	DAVID M. DONALDSON (ROPES AND GREY)	
X			LYNN B. DONALDSON	
X		4	DOUGLAS DRANE (GAVE $25K)	
X			SANDRA DRANE	
X		10	DAVID B. ELSBREE	
X			ROSEMARY ELSBREE	
	S	30	BRENDA ERIE	
			BILL NICHOLS	
X		31	SCOTT ESTON (COOPERS AND LYBRAND)	
X			PAT ESTON	X
X	B	8	ROBERT EVERETT (MITRE)	

X		ANN EVERETT
X	17	MR. H. MASON FACKERT (PENNWELL PUBLISHING)
X		MRS. H. MASON FACKERT
X	25	MR. DAVID G. FALWELL (BANK OF NEW ENGLAND)
X		MRS. DAVID G. FALWELL
NC B	32	SYDNEY FERNBACH
	7	BARRY FIDELMAN
		ODILE FIDELMAN
X	31	DICK FINIGAN
X		SHIRLEY FINIGAN
X	16	READ FLEMING (CADRE TECHNOLOGIES)
X		MARGARET L. MILLER
X	16	WILLIAM E. FLETCHER
X		JUDY FLETCHER
X	20	MARY JANE FORBES X
X	30	NED FORRESTER (MIT)
X		JANICE STONE
X	20	TIM FRANCIS (SIPPICAN OCEAN SYSTEMS)
X		NANCY FRANCIS (MORGAN HOLLAND)
X	14	J. THOMAS FRANKLIN (GASTON AND SNOW) -MCKENNEY
	23	DR. WILLIAM FRAWLEY (GTE)
		MRS. WILLIAM FRAWLEY
X	26	SAM FULLER (DEC)
X		CAROL FULLER
X	7	MR. J.J. GAL
X		MRS. J.J. GAL
X	21	DAVID GAFFREY (VP STATE STREET BANK)
X		NANCY GAFFREY
X	32	STEVEN M. GARFINKLE (RICHARDS CONSULTANTS)
X		BARBARA GARFINKLE
	15	MR. ROBERT GEORGE
		MRS. ROBERT GEORGE
X	9	JEFF GILBERT
X		JOANNE FIELD
X	11	ROSE ANN GIORDANO (DEC)
X		WENDL THOMIS

X		4	BERNARD M. GORDON (ANALOGIC)
X			SOPHIA GORDON
X		6	MIKE GREATA
X			CAROL GREATA
X		18	DANIEL GREGORY (GREYLOCK INVESTMENTS)
X			MADELINE GREGORY
X		2	CHRIS M. GREJTAK
X			NANCY S. GREJTAK
X		11	PETER GYENES
X			DEBORAH GYENES
	S	1	STEPHANIE HAACK
			TOM CHARLAND
X		25	SHERYL HANDLER (THINKING MACHINES)
X			JAY PELL, M.D.
X		28	TARIG HASSAN (SHAWMUT BANK)
NC		17	MIKE HATHAWAY (SECURITY)
X		19	FRANK HEART (BBN)
X			JANE HEART
X		5	GARDNER HENDRIE (STRATOS)
X			KAREN JOHANSEN
X		25	DANIEL HILLIS (THINKING MACHINES)
NC		3	PETER HIRSCHBERG
X		14	RICHARD N. HOEHN
X			ELEANOR HOEHN
X		1	CURTIS P. HOFFMAN (PRES,SYNTEST CORPORATION)
X		24	MR. WILLIAM J. HUNCKLER (1ST CAPITAL CORP. OF CHGO)
X			MRS. WILLIAM J. HUNCKLER
X		17	JOHN JEWETT
X			ISABEL JEWETT
X		11	DAVID R. JOHNSON
X			PATRICIA L. JOHNSON
X	B	15	TED JOHNSON
X			RUTH JOHNSON
X		5	MITCHELL KAPOR (LOTUS)
X			ELLEN POSS
X		28	DEBRA KEENAN (SHAWMUT BANK)
		6	ROSALIE KERR

X	B	11	ANDY KNOWLES (LEXIDATA)
X			MARY ANN KNOWLES
X		25	DAVID J.A. KOOGLER
X		10	KRAMER (DEC)
X			DEBBIE KRAMER
NC		12	BILL KRASNOW (DEC)
NC			JAMIE KRASNOW
X		5	DEAN LACOE (AUTOMATIX)
X		31	HANS LARSEN
X			LYNN SCHMITT
X		16	LAWRENCE S. LIEBSON (XYVISION)
X			KAREN GUIDE
X		29	RALPH LINSALATA
X			LINDA LINSALATA
X		7	DAVID LUBRANO (APOLLO)
X			JEAN LUBRANO
X		15	KATHERINE LYLE
X			BRIAN BAILEY
X		15	SI LYLE
X			JOAN LYLE
X		21	DAVID MALLERY (DEC PROFESSIONAL)
X			MARGARET LEIBY
X		21	CARL MARBACH
X			HELEN MARBACH
X		10	JULIUS MARCUS (ENCORE)
X			KAY MARCUS
X		6	ANDREW MARCUVITZ
X			EILEEN MARCUVITZ
X		19	TOM MARRIL (COMPUTER CORPORATION OF AMERICA)
X			MARIAN MARRIL
X		1	BARBARA T. MASTRO (BANK OF BOSTON)
NC		12	PAT MATHEWS (DEC)
NC			SHARON MATHEWS
X		24	KEVIN MCCAFFERTY (1ST CAP. CORP. OF CHGO)
X			LESLIE MCCAFFERTY
X		30	ROGER MCCORD (OMNI MAGAZINE)
X		26	MR. MALCOLM MCFARLANE
X			MRS. MARCOLM MCFARLANE

	B	5	PATRICK MCGOVERN (COMPUTERWORLD)
X	B	13	JAMES MCKENNEY (HARVARD)
X			MARY MCKENNEY
X		15	GEORGE MCQUILKEN, CHRMN SPARTACUS
X		8	MR. KEN MCVICKAR(MITRE)
X			MRS. KEN MCVICKAR
NC	B	25	GEORGE MICHAEL (LAWRENCE LIVERMORE)
X		28	GENE MILLER
X			DAVID MILLER (SHAWMUT BANK)
X		22	MR. MICHAEL MOODY
X			MRS. MICHAEL MOODY
X		32	DR. NASSI
X			MRS. NASSI
NC		25	NORMA NATHAN
X		12	JACK NEISES
X			GRACE NEISES
X		7	DAVE NELSON (APOLLO)
X			PAT NELSON
X		24	DARIUS NEVIN (1ST CAP. CORP. OF CHGO)
X			MARIVI NEVIN
NC		30	BOYD NORCROSS
		4	BILL NOYCE
			JONI LABOMBARD
	B	5	ROBERT NOYCE (INTEL)
		32	PHYL O'CONNELL
X		19	OLIVER OLDMAN (HARVARD)
X			BARBARA OLDMAN
X		9	STAN OLSEN
X			BETTY OLSEN
X	X	32	BETH PARKHURST
X			GREG DUCKWORTH
X		22	MR. ANTHONY PELL (PELL-RUDMAN)
X			MRS. ANTHONY PELL
X		10	MR.CORNELIUS PETERSON
X			MARILYN PETERSON
X		27	LINDA J. PHILLIPS
X			MICHAEL S. OLDFIELD

X		34	JUAN PINEDA GUEST	X
X		14	DAVID E. PLACE	
		6	BILL PODUSKA (APOLLO) SUSAN PODUSKA	
X		31	MICHAEL POE	
		7	LARRY PORTNER (DEC) JOAN PORTNER	
X		13	PHILIP PYBURN (INFORMATION SYSTEMS STRATEGIES)	
X			PAULINE PYBURN	
X	S	12	EVA RADDING	
X			ALAN RADDING	
X		14	CAMERON READE (GASTON AND SNOW)	
X			GAY READE	
X		20	NICHOLAS REINHARDT	
X		26	AUDREY REITH	
X		25	DR. HOWARD RESNIKOFF (THINKING MACHINES)	
X			MRS. HOWARD RESNIKOFF	
X		3	FONTAINE K. RICHARDSON (EASTECH MANAGEMENT)	
X			JUDY RICHARDSON	
X		6	BEN ROBELAN	
X			MAUREEN ROBELEN	
X	X	9	GERI ROGERS	
X			DICK ROGERS	
X		14	WILL ROGERS	
X			SHERRY ROGERS	
		2	DOUG ROSS (SOFTECH) PAT ROSS	
X		19	JAMES ROTHNIE	
X			MARIANNE ROTHNIE	
		27	DAVID ROWE (INTERLAN) PATSY ROWE	
		27	MR. EDWARD RUDMAN (PELL-RUDMAN) MRS. EDWARD RUDMAN	
NC		28	CHRIS RUDOMIN	
X			MIKE RUDOMIN	
X		29	MR. CHARLE RUPP	
X			MRS. CHARLE RUPP	

	B	33	JEAN SAMMET (IBM)
X		10	GRANT SAVIERS (DEC)
X			DORRIT SAVIERS (DEC)
X		29	MR.DAVID SCHANIN
X			GUEST
X		33	PAUL SCHMITZ
X			JOANNE SCHMITZ
X	B	21	EDWARD A. SCHWARTZ (DEC)
X			LINDA K. WASHBURN
X		23	OLIVER SELFRIDGE (GTE)
X	B		KITTY SELFRIDGE
		27	PAUL SEVERINO (INTERLAN)
			KATHY SEVERINO
X		3	MICHAEL SHANAHAN
X			MARY SHANAHAN
X		22	HAL SHEAR
X		14	WILLIAM SHERRY
X			DONNA SHERRY
X		34	RON SMART (DEC)
X			DOROTHY PITMAN
X		13	GEORGE SOUTHWICK (ARTHUR YOUNG)
X			MIMI SOUTHWICK
X	B	22	MICHAEL SPOCK (THE BOSTON CHILDREN'S MUSEUM)
X			JUDY SPOCK
X		6	MICHAEL SPORER
X		20	MAX J. STEINMANN
X			NANCY STEINMANN
	S	15	MEREDITH STELLING
X		33	BICK STEVENS
X			LORING STEVENS
X		26	BILL STRECKER
X			CAROLE STRECKER
	S	33	DR. OLIVER STRIMPEL
			HARRIET STRIMPEL
X		3	W.R. SUTHERLAND
X			SILVYA STUHR

X		3	STEPHEN SWERLING (MENTOR GRAPHICS)
		27	GEORGE SYMULA (INTERLAN)
			TERRY SYMULA
X		26	DEL THORNDIKE (DEC)
X			STEVE TEICHER (DEC)
X		34	MICHAEL G. TOMASIC
X			BEVERLY F. TOMASIC
X		28	MARK H. TRACHY (SHAWMUT BANK)
X			MS. LINDA TUFO
X		30	JEFF VONFREYMANN (INGALLS ASSOCIATES)
X			CINDY VONFREYMANN
X		8	NORM WAKS
X			CHARLOTTE WAKS
X		34	EDWARD S. WALTER
X			MAILA S. WALTER
X		9	STEVE WATSON (COMPUTERLAND)
X			BEVERLY WATSON
X		27	GREG WELCH
X		33	DAVID P. WHEATLAND (HARVARD)
X		19	MARY ALLEN WILKES
X			PETER R. WILKES
X		20	CHRISTOPHER S. WILSON (BANK OF AMERICA)
X			MEG WILSON
X		13	FREDERIC G. WITHINGTON (ADL)
X			ROBIN H. WITHINGTON
X	S	34	BILL WISHEART
X			MARIANNE CIARLO
X		21	JIM WOODWARD (VP STATE STREET BANK)
X			MRS. J. WOODWARD
X		9	PETER WORRELL
X			KAREEN KENDRICK
X		1	MICHAEL YAHANG (VP, BANK OF BOSTON)
X			SUSAN YAHANG
		35	CARL YOUNG
			MARY YOUNG
X		5	DR. RICHARD W. YOUNG (HOUGHTON MIFFLIN)
X			MRS. RICHARD W. YOUNG

FRIDAY, MAY 11, 1984 (continued)

6:30	BOB NOYCE TALK
7:30	RECEPTION
8:30	DINNER/ANNIVERSARY PARTY

SATURDAY, MAY 12, 1984

10:00-NOON	DEVELOPMENT COMMITTEE
10:00-4:00 PM	EXHIBITS & COLLECTION COMMITTEE

PROPOSED MAY 1984 DIRECTORS VOTE

Operating Budget FY85:

Upon motion, duly made and seconded, it was voted:

- That the Operating Budget for fiscal year end June 85 as presented and discussed be, and hereby is approved.

a balanced budget.

PROPOSED MAY 1984 DIRECTORS VOTE

Increase Capital Campaign to $10,000,000:

Upon motion, duly made and seconded, it was voted:

That The Computer Museum and the President and those under the direction of the President, with the assistance of the Executive Committee, be and hereby are authorized to:

- Continue the Capital Program and raise $10,000,000 to enable The Museum to best achieve its goals and serve its constituency, with the space, facilities and accessibility necessary to be the premier, international museum of its kind.

- Pursuant to the terms of The Museum's Sub-sublease and Agreement with Digital Equipment Corporation ("Digital") exercise at any time if and as appropriate The Museum's option to purchase Digital's leasehold interest in Museum Wharf subject to appropriate mortgage or other security interests in favor of Digital.

- Be guided by The Computer Museum's desire to operate as a publicly-supported charity, particularly where arrangements with affiliates may be involved in operating at, or purchasing an interest in, Museum Wharf and where restrictions may be imposed upon the activities of tax-exempt organizations.

- Enter agreements, contracts, and arangements; commit and pay funds; retain, hire, and employ architects, general contractors, consultants or employees; purchase goods and services; and generally do all other things necessary or appropriate and incidental to the aforementioned.

- Accomplish the above in a manner and pursuant to a time table which is reasonable in light of fund-raising progress and amounts raised or anticipated and changes therein.

PROPOSED MAY 1984 DIRECTORS VOTE

Ratification of Executive Committee Actions:

Upon motion, duly made and seconded, it was voted:

- That the Board of Directors hereby ratifies, confirms, and approves all acts of the Corporation, all acts of any Officer taken on its behalf, and all acts of the Executive committee prior to this Meeting.

PROPOSED MAY 1984 DIRECTORS VOTE

Officers:

Upon motion, duly made and seconded, it was voted:

- That the following Officers of the Corporation are hereby elected to serve through the next annual meeting and until their successors are duly elected and qualified:

  President: Gwen Bell

  Treasurer: James L. McKenney

  Clerk: James S. Davis

PROPOSED MAY 1984 DIRECTORS VOTE

Executive Committee:

Upon motion, duly made and seconded, it was voted:

- That the following persons are hereby elected to the Executive Committee of the Corporation to serve through the next annual meeting and until their successors are duly elected and qualified:

  1. Chairperson: David Donaldson

  2. President

  3. Ronald G. Smart

  4. Chairperson of Development Committee, or his or her Representative from the Committee.

  5. Chairperson of Finance Committee, or his or her Representative from the Committee.

  6. Chairperson of Members Association, or his or her Representative from the Committee.

  7. Chairperson of Nominating Committee, or his or her Representative from the Committee.

  8. Chairman of History & Collections Cmte or his/her designee

PROPOSED MAY 1984 DIRECTORS VOTE:

Trustees:

Upon motion, duly made and seconded, it was voted:

That the Executive Committee be and hereby is authorized:

- To establish an advisory body of trustees comprised of Directors of The Computer Museum, Inc. ("Museum") whose terms as Directors have expired, commencing with and including those whose terms expire in 1984,

- to provide that a trustee shall serve as such permanently, subject to mutual agreement by the trustee and the Museum,

- to establish an organization for the trustees, and develop objectives, projects and programs for them,

- to take all related action necessary or appropriate and incidental to the above.

- it is understood that trustees have no legal responsibilities

PROPOSED MAY 1984 DIRECTORS VOTE

Next Annual Meeting:

Upon motion, duly made and seconded, it was voted:

- That the next Annual Meeting be held on May 3, 1985.

THE COMPUTER MUSEUM
OPERATING PROJECTION COMPARED TO BUDGET
YEAR ENDED JUNE 30

	FY 1983 ACTUAL	FY 1984 ESTIMATED	FY 1984 BUDGET
SUPPORT AND REVENUE			
MEMBERSHIPS	$ 124,125	$ 132,700	$ 177,500
CONTRIBUTIONS FROM DIGITAL	188,259	240,000	240,000
AUXILIARY ACTIVITIES	79,756	95,700	122,000
INVESTMENT INCOME	3,760	6,400	3,000
OTHER (BENEFIT)	0	30,000	
TOTAL	$ 395,900	$ 504,800	$ 542,500
EXPENSES			
PROGRAMS	$ 54,208	$ 47,700	$ 55,000
EXHIBITS	98,672	89,100	150,000
SUPPORT SERVICES			
FUND RAISING	26,953		
MEMBERSHIP		37,500	25,000
MANAGEMENT & GENERAL	183,500	185,800	205,000
AUXILIARY ACTIVITIES	31,849	84,200	93,000
TOTAL	$ 395,182	$ 444,300	$ 528,000
EXCESS OF SUPPORT AND REVENUE	$ 718	$ 60,500	$ 14,500

THE COMPUTER MUSEUM
OPERATING BUDGET
JULY 1, 1984 - JUNE 30, 1985

ANNUALIZED VISITORS	85,000	125,000	200,000
VISITORS, 11/14/84-6/30/85	50,000	78,000	125,000
REVENUE			
CONTRIBUTIONS FROM DIGITAL	$ 240,000	$ 240,000	$ 240,000
MEMBERSHIPS	350,000	400,000	475,000
ADMISSIONS	124,800	187,500	310,000
EARNED INCOME	9,600	14,800	17,800
OTHER (INTEREST, BENEFIT)	28,000	34,000	34,500
NET FROM STORE	(20,000)	0	18,000
TOTAL REVENUE	$ 732,400	$ 876,300	$ 1,095,300
EXPENSES			
PERSONNEL	$ 392,600	$ 453,600	$ 481,200
ADMINISTRATIVE EXPENSES	121,100	130,300	141,900
OTHER EXPENSES	263,100	292,400	299,700
TOTAL EXPENSES	$ 776,800	$ 876,300	$ 922,800
EXCESS (DEFICIT) OF REVENUE OVER EXPENSES	($ 44,400)	$ 0	$ 172,500

ASSUMPTIONS:

1. ADMISSION IS $4 FOR ADULTS, $2 FOR STUDENTS AND SENIOR CITIZENS. 40% OF VISITORS WILL PAY $4, 40% WILL PAY $2, AND 20% (INCLUDING MEMBERS) WILL BE ADMITTED FREE OF CHARGE.

2. MEMBERSHIP FEES RANGE FROM $20 TO $5,000 FOR INDIVIDUALS AND FROM $125 TO $5,000 FOR CORPORATIONS. THE MIDDLE PROJECTION ASSUMES 2.5 TIMES THE NUMBER OF MEMBERS THE MUSEUM CURRENTLY HAS IN VARIOUS CATEGORIES.

3. THE ABOVE FIGURES DO NOT INCLUDE DIGITAL'S CONTRIBUTION OF $100,000 THROUGH THE COST CENTER, AND DO NOT INCLUDE THE OPERATING COSTS OF MUSEUM WHARF (SECURITY, MAINTENANCE, ETC.) THAT THE MUSEUM MUST ASSUME IN 1988.

ER1.32
5/10/84

THE COMPUTER MUSEUM
PROJECTED OPERATING BUDGET
FY 1985 - FY 1988
(IN THOUSANDS)

	FY 1985	FY 1986	FY 1987	FY 1988
ANNUAL VISITORS	78,000	125,000	140,000	140,000
SUPPORT AND REVENUE				
MEMBERSHIPS	$ 400.0	$ 425.0	$ 475.0	$ 500.0
ADMISSIONS	187.5	300.0	336.0	340.0
DIGITAL GRANT	240.0	240.0	240.0	240.0
OTHER GRANTS	0.0	75.0	100.0	175.0
EARNED INCOME	14.8	20.0	40.0	50.0
NET, AUXILIARY ACTIVITY	0.0	10.0	15.0	20.0
OTHER INCOME	34.0	30.0	40.0	40.0
ENDOWMENT INCOME	0.0	0.0	0.0	125.0
TOTAL	$ 826.3	$ 1,100.0	$ 1,246.0	$ 1,490.0
EXPENSES				
EXHIBITS	$ 225.2	$ 409.0	$ 470.6	$ 541.2
PROGRAMS	58.1	63.0	85.0	97.8
FUNCTIONS	22.5	24.0	27.4	31.6
MEMBERSHIP	28.2	30.0	48.8	56.2
COMMUNICATIONS	183.9	190.0	200.5	230.6
ADMINISTRATION	265.2	275.0	282.0	324.3
DEVELOPMENT	93.2	109.0	150.7	173.3
TOTAL	$ 826.3	$ 1,100.0	$ 1,265.0	$ 1,455.0
EXCESS OF SUPPORT AND REVENUE	$ 0	$ 0	$ 31	$ 35

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THE COMPUTER MUSEUM
PROJECTED OPERATING BUDGET
FY 1985 - FY 1988
(IN THOUSANDS)

	FY 1985	FY 1986	FY 1987	FY 1988
ANNUAL VISITORS	125,000	200,000	240,000	240,000
SUPPORT AND REVENUE				
MEMBERSHIPS	$ 475.0	$ 500.0	$ 640.0	$ 770.0
ADMISSIONS	310.0	480.0	576.0	550.0
DIGITAL GRANT	240.0	240.0	240.0	240.0
OTHER GRANTS	0.0	125.0	200.0	250.0
EARNED INCOME	17.8	30.0	60.0	100.0
NET, AUXILIARY ACTIVITY	18.0	25.0	35.0	50.0
OTHER INCOME	34.5	40.0	60.0	120.0
ENDOWMENT INCOME	0.0	0.0	50.0	250.0
TOTAL	$ 1,095.3	$ 1,440.0	$ 1,861.0	$ 2,330.0
EXPENSES				
EXHIBITS	$ 257.8	$ 428.0	$ 550.0	$ 660.0
PROGRAMS	59.2	86.0	120.0	144.0
FUNCTIONS	23.1	28.0	35.0	42.0
MEMBERSHIP	28.3	46.0	70.0	84.0
COMMUNICATIONS	185.4	200.0	220.0	264.0
ADMINISTRATION	275.4	285.0	295.0	344.0
DEVELOPMENT	93.6	100.0	160.0	192.0
TOTAL	$ 922.8	$ 1,173.0	$ 1,450.0	$ 1,730.0
EXCESS OF SUPPORT AND REVENUE	$ 172.5	$ 267	$ 411.0	$ 600.0

THE COMPUTER MUSEUM
PROJECTED OPERATING BUDGET
FY 1985 - FY 1988
(IN THOUSANDS)

	FY 1985	FY 1986	FY 1987	FY 1988
ANNUAL VISITORS	105,000	180,000	210,000	210,000
SUPPORT AND REVENUE				
MEMBERSHIPS	$ 450.0	$ 475.0	$ 575.0	$ 625.0
ADMISSIONS	252.0	362.0	504.0	504.0
DIGITAL GRANT	240.0	240.0	240.0	240.0
OTHER GRANTS	0.0	100.0	150.0	225.0
EARNED INCOME	16.0	25.0	50.0	75.0
NET, AUXILIARY ACTIVITY	8.0	20.0	22.0	30.0
OTHER INCOME	34.0	40.0	50.0	80.0
ENDOWMENT INCOME	0.0	0.0	50.0	150.0
TOTAL	$ 1,000.0	$ 1,262.0	$ 1,641.0	$ 1,929.0
EXPENSES				
EXHIBITS	$ 241.0	$ 418.0	$ 510.0	$ 600.0
PROGRAMS	59.0	74.0	102.0	121.0
FUNCTIONS	23.0	26.0	31.0	37.0
MEMBERSHIP	28.0	38.0	59.0	70.0
COMMUNICATIONS	185.0	195.0	210.0	247.0
ADMINISTRATION	270.0	280.0	288.0	334.0
DEVELOPMENT	93.0	105.0	155.0	182.0
TOTAL	$ 899.0	$ 1,136.0	$ 1,355.0	$ 1,591.0
EXCESS OF SUPPORT AND REVENUE	$ 101.0	$ 126.0	$ 286.0	$ 338.0