THE COMPUTER MUSEUM

The Computer Museum is the only museum of its kind in the world. It dramatically illustrates the impact of the Information Revolution through interactive exhibits of state-of-the-art computers, films, and creations of vintage computer installations. The Museum's hours will be: 11 a.m. - 6 p.m. Wednesday, Saturday and Sunday and 11 a.m. - 9 p.m. Thursday and Friday. It will be closed Mondays, Tuesdays, Christmas, New Years and Thanksgiving. Its new location at 300 Congress Street is minutes from Logan International Airport and just a short walk from Boston's financial district and such historic landmarks as Faneuil Hall and the Freedom Trail.

The Museum offers individual memberships for $30. Other membership categories are available for corporations and those individuals seeking a higher level of participation. All members receive a free subscription to The Computer Museum Report, a 10% discount on merchandise from The Computer Museum Store, free admission and invitations to Museum previews.

For more information, contact Jana Buchholz, Membership Coordinator at The Computer Museum, 300 Congress Street, Boston, MA 02210, (617) 425-2900.

THE COMPUTER MUSEUM REPORT
(ISSN 0736-5436)

The Computer Museum Report is published quarterly by The Computer Museum, 300 Congress Street, Boston, MA 02210. A yearly subscription to The Computer Museum Report is free with membership. Individual issues can be purchased through The Computer Museum Store for $3 apiece.

The Museum staff is responsible for the contents of the Report. The views expressed do not necessarily represent those of The Computer Museum or its Board of Directors.

Design and production of the Report is done by Benson and Clemens.

STAFF

Director
Dr. Gwen Bell

Administration
Geri Rogers

Business
Eva Raddatz

Communications
Stephanie Hazek

Brenda Erie

Development
Michael Oleksiew

Exhibits and Archives
Meredith Stelling

Paul Cerruzzi

Andrew Kirstoff

Beth Farkhurst

Katherine Schwartz

Dr. Oliver Stroupel

Gregory Welch

Bill Wasehr

Membership
Jana Buchholz

Programs
Mary Cooper

Store
Lea Cohen

BOARD OF DIRECTORS

John William Poduska, Sr., Chairman
Apollo Computer, Inc.

C. Gordon Bell
Encore Computer Corporation

Dr. Gwen Bell
The Computer Museum

Erich Bloch
International Business Machines

Harvey D. Cragon
Texas Instruments

David Donelson
Rheem and Gray

Robert Everett
The MIFPE Corporation

Dr. Sydney Fernbach
Computer Consultant

C. Lester Hogan
Fairchild Camera and Instrument Corporation

Theodore G. Johnson
Lotus Development Corporation

Mitchell Kapor

Dr. Koji Kobayashi
NEC Corporation

John Lacey
Control Data Corporation

Patrick J. McGovern
CW Communications, Inc.

James L. McKenney
Harvard Business School

George Michael
Lawrence Livermore Laboratories

Dr. Arthur P. Molella
The National Museum of American History, Smithsonian Institution

Kenneth R. Olsen
Digital Equipment Corporation

Brian Randell
University of Newcastle upon Tyne

Jean E. Sammet
International Business Machines

Edward A. Schwartz
Digital Equipment Corporation

Kitty Selfridge
Henso Software, Inc.

Erwin Tomash
Dataprodux

Dr. An Wang
Wang Laboratories, Inc.

Photocredits:
Boyd Norcross pp. 4, 5, 6, 7, 9, 10, 12, 13, 14, 15

© 1984 The Computer Museum
In our countdown to opening the Museum, I am pleased to have the opportunity via the report to reflect on the evolution of the Museum. Five years ago, I was charged with the task of creating a “computer museum.” The only models at that time were IBM’s dismantled history wall done by Charles Eames in the sixties, the small exhibit of historic machines at the Smithsonian, and the interactive and historic collections at the Science Museum in London. None of these could be collected and brought back. And I felt as though I had been told to “Go fetch a rock.” Every time I brought an idea back, the feedback was quick: “That’s not the rock,” or “How did you ever get that—it’s just great.”

Two and a half years ago, on June 10, 1982, The Computer Museum opened its doors for the first time: we had 50 Founders, 200 members and 3,000 square feet of dedicated exhibit space. Our goals were to develop an international collection, create exciting exhibitions, sponsor educational programs, and attract a worldwide membership. On June 24, 1984, at the end of our Founding period, we will boast 504 individuals and corporate Founders. I am glad to extend special thanks to the individuals listed on the front cover and the corporations listed on the back cover helping to found the Museum.

The Second Opening

On Wednesday, November 14, 1984 at 11:00 a.m., the Museum will formally open its doors a second time to the public. This time we will have 16,000 square feet of exhibitions of both historic computers and state-of-the-art interactive displays; another 6,000 square feet of exhibit space and 4,000 square feet for library/study collections will be developed later. As we approach our opening we can be pleased that we have by far the largest exhibition area devoted to computing and information processing at any museum.

Let me give you a brief tour of our plans for the exhibitions: After rising to the Museum on a large, glass-enclosed elevator overlooking downtown Boston, the visitor is confronted by the Whirlwind, a vacuum tube computer that seems to go on forever.
Going around the corner, the visitor enters the SAGE computer room. Here the major components of the world's largest and longest-lived computer simulate their installed environment. The visitor can "start" the console and see its banks of lights cycle-up. Beside each component, such as the 30-foot-long accumulator, today's equivalent chip (or part of a chip) has been placed for comparison. This arrangement reinforces an awareness of decreasing size and power and increasing programming capabilities.

For the history buff, a year-by-year timeline from 1950 to 1970 shows the fundamental inventions, the major computers, the major software developments and benchmark applications.

The CW Communications "See It Then" theater shows films of operational computers, starting in the 1920's and ending in the 1960's with the IBM Stretch. The films are complemented by a 1965 IBM 1401 computer room, where the visitor can punch cards, and an operating PDP-89, the classic (but now very slow) minicomputer.

The evolution of Seymour Cray's work illustrates a single hardware contributor and his philosophy. The story begins with the NTDS-17 that he built for the Navy at UNIVAC in Minneapolis, which Greg Mellen, who is still at Sperry Univac, helped the Museum acquire; after that Cray built the Little Character, his first machine at CDC, presented by Control Data Corporation; then to the 6600, Serial Number I, presented by Lawrence Livermore Laboratories; and finally to components of a Cray I, presented by the Cray Corporation. We have two videotapes of Seymour Cray, one from Lawrence Livermore Laboratories and another given to us by Joe Clarke, a former employee of CDC, who bought a two inch video tape player at a company sale and found on it a tape of Seymour Cray.

The next gallery focuses on chips and their place in the computer revolution, and the process of manufacturing computers. The inside of the "black box" is revealed, and an important, hidden part of the process is illustrated.

This collection of personnel computers goes back to the very first one, the 1962 LINC, and extends to the latest models. The ring of live machines, each showing off an aspect of its special input/output, include DECTALK, a touch sensitive screen HP 150 and others.

The final gallery is devoted to "the computer and the image." Here, the visitor will be able to explore image processing by computer, such as evaluation of Landsat data, and image creation by computer, such as computer-aided design. Without much trouble, the visitor could spend two hours in this room experimenting and viewing.

The exhibits are only the tip of the iceberg of our collection of artifacts, working machines, software, documentation, photographs and films. The listing in this report represents one year's accumulation and the collection is rapidly growing.

The Evolving Board of Directors

At the first meeting of the board of directors in 1982, two decisions were made: one was to have non-renewable four-year terms and the other was to limit the number to 24 people. This year five directors retired, I was made an ex-officio director, and five new directors were elected.

The five retiring directors each played a significant role in our growth to date: Charles Bachman served as chairman of the executive committee through our critical first two years; Andrew Knowles provided our initial space in Marlboro; Robert Noyce was key in starting our semiconductor collection and gave a wonderful lecture at our pre-preview party; Michael Spock, director of the Children's Museum, had the idea of our move to the Wharf and continues to counsel us on a day-to-day basis as our closest neighbor; and the Honorable Paul Tsongas helped bring us recognition at a national level.
The new directors bring a new set of talents. Bill Poduska, the new chairman of the board, is chief executive officer and chairman of the board of Apollo Computer, Inc. which he founded in 1980. He came to MIT as an undergraduate and stayed through a Ph.D. in electrical engineering, which he taught for four years. Then he went on to become the director of the Honeywell Information Science Center before founding Prime Computer and Apollo Computer.

Mitch Kapor, president and co-founder of Lotus Development Corporation, looks at the role of computers from the point of view of a non-technical user. A psychology major from Yale with what he calls "three-quarters of a masters degree" from MIT's Sloan School of Management, he developed VisiPlot and VisiTrend for VisiCorp before working on "1-2-3," the business applications program for personal computers, that became the basis for Lotus. Mitch has expressed his concern for the end user, saying, "When we stop listening we will cease to be viable." This is equally true for the Museum when we open our doors to the public.

Dr. Koji Kobayashi, chairman and chief executive officer of NEC Corporation, began his life-long career with them in 1929. NEC preserved Japan's first transistor business computer the NEAC 2201 which they agreed to give to the Museum. This represents an important acquisition in our goal to develop an international collection. Dr. Kobayashi is also interested in the current technology, especially communications and computers, and will provide an important link to Japan.

Dr. Arthur P. Molella is chairman of the history of science and technology department at The National Museum of American History, Smithsonian Institution. Specialized museums, such as ours, have an important symbiotic relationship with the Smithsonian. We can focus on a single subject, collect, carry out research and prepare exhibitions. At the Smithsonian, Arthur has to trade off all aspects of science and technology and allocate appropriate space and personnel.

We intend to help each other, the Smithsonian has already loaned several important pieces from their collection for our opening exhibition. And when the new Smithsonian exhibit on computing opens, we will help them.

Dr. An Wang, chairman of the board and chief executive officer of Wang Laboratories, Inc., is one of the computer pioneers. He invented the magnetic pulse controlling device for the Harvard Mark IV which will be on display in the timeline planned for our opening exhibition. Wang not only founded Wang Laboratories, Inc. but also the Wang Institute of Graduate Studies in 1979.

Since 1982, the course of The Computer Museum has changed in ways that I would never have predicted, but new directions that, in retrospect, always made sense. This distinguished new class of directors will help the Museum become a strong institution as it opens to the public.

Gwen Bell
The Collection

The following listing of the Museum's collection includes all new artifacts and archival material received between April 10, 1983 and June 13, 1984. The number of artifacts and films has grown to 900 catalogued items. The artifacts range from a single chip to the multiple components of a single large-scale computer. In addition, the document and photograph collection has also increased dramatically. Archival donations are catalogued as complete collections.

Artifacts

Each artifact is described according to its manufacturer, date, and characteristics according to the PMS notation system developed in Computer Structures by Gordon Bell and Allen Newell. The PMS notation divides computer structures into processors (calculators), memory, links and switches, transducers, and control devices. Robots have been added. This system was then used to divide the list of artifacts in order to provide a better picture of the collection.

Archives

The archives supply supporting materials for the artifacts. They help the scholar reconstruct the development and use of any of the artifacts. For example, old textbooks provide significant insight into the principles and uses of a machine from the same period. Similarly, films and photographs often illustrate the working environment of artifacts.

Micro-bit Electron Beam Access Memory. This memory device is Microbits Electron Beam Access Memory affectionately known as ALICE. Although this device was never marketed, it got up and running at the end of December 1971. It took, recorded and played back the following message: "Merry Christmas. Send more money."
Apple Computer Company
Apple II (X210.83)
Gift of Dyson Corporation

Burroughs Corporation,
Burroughs B-500 (X312.84-X321.84)
Loan from Design Pak, Inc.

Burroughs Corporation,
Burroughs TC500 (X309.84)
Gift of LADDIS Corporation

Digital Equipment Corporation,
DEC Digital Trainer (X220.83)
Gift of Jerrold Petrosky

Digital Equipment Corporation,
Digital Music Synthesizer (XD388.83)
Gift of Digital Equipment Corporation

International Business Machines,
IBM 083 Sorter (X291.83), IBM 088
Collator (X290.83), IBM 519
Reproducer (X262.83), IBM 557
Interpreter (X289.83)
Gift of Burndy Corporation

International Business Machines,
SAGE: AN/FSG-7 Duplex and
Simplex Maintenance Consoles
(X363.83), (X361.83), Left Arithmetic
Unit (X274.83), Magnetic Drum
Unit (X261.83), X273.83), 64K Core
Memory Frame (X272.83), IBM 728
Tape Drives (X263.83), IBM 716
Printer (X262.83), IBM 20 Card
Punch (X265.83), IBM 753 Card
Reader (X267.83), IBM Card
Reader (X270.83), Display and
Auxiliary Consoles (X266.83)
(X264.83) (X265.83) (X271.83)
Gift of National Museum of Science
and Technology, Ottawa

International Business Machines,
SAGE: AN/FSG-7 Left Arithmetic
Unit (X311.83), Core Memory Stack
2 (X310.83)
Gift of Hancock Field Air Force
Base, New York

International Business Machines,
IBM System 3 (SYS/3) (X192.83)
Gift of Hesser College

International Business Machines,
IBM System 4 (X323.83)
Gift of American Computer
Group, Inc.

Kurzweil Computer Products,
Inc.,
Kurzweil Reading Machine
(X236.83)
Gift of Kurzweil Computer
Products, Inc.

Mathatronics, Inc.,
Mathatron (X283.83),
Gift of Yukata Kobayashi

MITS
MITS CT 256 (X334.84)
Gift of Geof Feldman

Olivetti Underwood, Inc.,
Olivetti-Underwood Programma
101C (X300.83)
Gift of GTE

Sperre Rand Corporation,
UNIVAC 494 (X343.84)
Gift of Travelers Insurance
Company

Sphire Corporation,
SPEHERE System 320 (X297.83);
SPEHERE System (X330.229.83)
Gift of Roger J. Spott

Tandy Corporation,
TRS-80, Model I (X348.84)
Gift of Samuel M. Gerber

Terak Corporation,
Terak Model 8510 (X351.84-X353.84);
Terak Model 8512 (X354.84)
Gift of Douglas Ross

Valtron Computer Systems
Corporation,
Valtron System 21 (X350.84)
Gift of Fred De Bros

---

TRS-80. The TRS-80 Model IIs, like the one
documented here, were introduced by Tandy
Radio Shack Corporation in 1977. During
that same year the Apple II and the
Commodore PET-2001 were introduced,
establishing the first three personal
computer designs to come assembled
with BASIC built into the firmware,
which allowed them to achieve a BASIC
operating mode on power up. The TRS-
80 Model I is one of several PCs that
will be featured in the Personal Com-
puter exhibit when the Museum opens
November 14, 1984.
USSR GOVERNMENT, MINSK-2 Logic PC Board. Introduced in 1962, the MINSK-2 became one of the most heavily used general-purpose computers in Russia. Each computer had a set of 107 two-address instructions and a word length of 97 bits. Their computing speed was 8,000 instructions per second and a floating-point addition took 72 microseconds. The main memory on the MINSK-2 was on ferrite cores, with either 4,000 or 8,000 words and secondary memory was on magnetic tapes.

IBM SSEC Wire Contact Relays. The wire contact relays pictured here are from IBM SSEC (Selective Sequence Controlled Electronic Calculator). The IBM SSEC was the first machine that could control its calculating sequence by modifying its own instructions. However, it was disputed whether or not the IBM SSEC was wholly electronic, because the machine had 13,300 vacuum tubes and 21,400 electromechanical relays.

BIZMAC Clock. The BIZMAC was the result of an early attempt by RCA to produce a large-scale general-purpose computer for business applications. With its 29,000 tubes and 63,000 diodes, it was certainly one of the largest first generation computers ever built. The BIZMAC was one of the first commercial computers to use magnetic core memory. Later computers with full-scale core memories made BIZMAC obsolete.
Memories

Analex Corporation, Analex Core Drive 200 Module (X234.81)
Gift of Digital Equipment Corporation

Cambridge University, Computation Laboratory,
EDSAC Memory Driver (X355.84);
EDSAC Memory Memory Tank Cover (X336.83)
Gift from Science Museum, London

Control Data Corporation, Microbit Division,
Electron-beam Access Memory Tube (X215.83)
Gift of Charles A. Brown

Digital Equipment Corporation, Magnetic Tape Unit (D380.83);
Tape Drive (D395.83)
Gift of Digital Equipment Corporation

Digital Equipment Corporation, PDF-10 Core Memory Board (X268.83)
Gift of Systems Concepts

Digital Equipment Corporation, PDF-12 Core Memory Stack (X223.83)
Gift of Peter Svedlovic

Digital Equipment Corporation, Plasma Cell Memory (X206.83)
Gift of Ron Nuebling

Digital Equipment Corporation, Read Only Rope Memory (X294.83)
Gift of G.B. Westrom

Goodchild, C.W., "Complete Mathematical Chart" (X245.83)
Gift of University of Illinois, Department of Computer Science

Hewlett-Packard Company, Fixed-head Drum Memory 2771A (X207.83)
Gift of TSC Computer Ltd.

International Business Machines, IBM 610 Programmable Calculator
Drum (X197.83)
Gift of Richard E. Smith

Institute for Numerical Analysis, National Bureau of Standards,
SWAC Williams Tube (X227.83)
Gift from The Smithsonian Institution, National Museum of American History

Micro-bit Corporation, Electron Beam Access Memory:
ALICE I (X258.84)
Gift of Micro-bit Corporation

MIT Instrumentation Laboratory,
Apollo Memory Stack Module (X386.83)
Gift of Boguslaw Frackiewicz

Multicard Ltd., Ferrite Core Memory from Elliot
803B British Germanium Transistor
Computer, (X277.83)
Gift of Mr. Soper

Rand Corporation, Johnnie Selectron Tube (X281.83)
Gift of Fred Gruenberger

Radio Corporation of America, Electron Tube (X301.83)

Radio Corporation of America, RCA 5068 Magnetic Cards (X220.83)
Gift of Daniel Klein

Radio Corporation of America, RCA 128 x 136 3-wire Core
Memory Plane (X190.83);
RCA 64 x 64 4-wire Core
Memory Plane (X189.83) (X191.83)
Gift of Boguslaw Frackiewicz

Remington Rand, Inc., Eckert-Mauchly Division, Uniserv (X284.83)
Gift of R. S. Nelson

Roman Art Company, Punch-card tape from contemporary Jacquard loom
(X276.83)

Scheutz, George and Edward, Specimens of Tables, Calculated,
Stereomoulded, and Printed by
Machinery, (X187.83)
Gift from Frederick J. Beutler

Union Label Company, McBee Keycriptors and Punch (X328.84)
Gift of Gordon Bell

Unknown, Mercury Delay Line (X282.83)
Gift of Arthur Uhlir

Transducers

Anderson Jacobson, Anderson Jacobson Acoustic Data Coupler 260
(D392.83)
Gift of Digital Equipment Corporation

Cowherd Corporation, Ralip C., Vortu CAMERA (X240.83)
Gift of Lee Swanson

Friden Corporation, Flexwriter (X325.81)
Gift of Digital Equipment Corporation

Harvard University, Division of Applied Science,
Color Viewing Helmet for the
Space Pen (X397.83)
Gift of Harvard University, Division of Applied Science

International Business Machines, IBM 01 Typewriter (X195.83)
Gift of Richard Boylan

International Business Machines, IBM 26 Printing Card Punch (X222.84)
Gift of Design Pak, Inc.

National Data Industries, Inc., DIABLO HYTYPE I Daisywheel
Printer (X295.83)
Gift of Roger I. Spott

Sanders Technology, Inc., Sanders Media 107 Printer (X355.84)
Gift of Douglas Ross

Southwest Technical Products, Corporation,
Alphanumeric Parallel Printer PII-40 (X238.83)
Gift of Roger I. Spott

Sperry Rand Corporation, UNIVAC keyboard (D394.83)

Telesensory Sytems, Inc., Optacon Print Reading System (X229.83)
Gift of Telesensory Systems, Inc.

Teletype Corporation, Bell System Model 12 Page Printer (X202.83)
Gift of John LeProux

Acoustic Data Coupler. This Anderson Jacobson Acoustic Data Coupler 260 (circa 1963) is one of the earliest modems. A modem is an acronym for MODulator DEModulator, a device that converts data from a form that is compatible with data processing equipment to a form that is compatible with transmission facilities, and vice-versa.
Planimeter. This exquisite Keuffel & Esser Planimeter is one of many fine drafting and drawing instruments donated to The Computer Museum by the Computer Science Department at the University of Illinois. Planimeters were used to determine the area of a closed curve.
Ashtray. This aluminum ashtray donated by Douglas Ross, was made in February 1959 at MIT and is the first object produced using computer-aided design. Upon its announcement, the New Yorker ran this quote from the San Francisco Chronicle:

"The Air Force announced today that it has a machine that can receive instructions in English, figure out how to make whatever is wanted, and teach other machines how to make it. An Air Force general said it will enable the United States to build a war machine that nobody would want to tackle. Today it made an ashtray."

ALEXANDER VANDERBURGH, JR.

SAGE Programmer Cards. These cards are from the SAGE, the U.S. air defense system from 1958-1983. Museum member Alexander Vanderburgh Jr. recalls that these cards were used to interpret memory dumps that could be translated from numerical format to command format. They also contained the mnemonic code for the instruction set.
Film:
...from one John V. Atanasoff,
Iowa State University Media Services, 1983.
Gift of Iowa State University
Gift of Automatix
Gift of Ford Motor Company
Gift of Apple Video Services
Gift of Fujitsu
Gift of Willis Ware
"Hollerith Punched Cards."
"Punched Cards"
Gift of Bill Luebbert
Gift of Brian Randell
Gift of Willis Ware
"SHAKEY: Experimentation in Robot Planning and Learning,"
SRI International ca. 1970.
Gift of SRI International
"UNIVAC..." Seymore Zwiebel Production for Remington Rand's Eckert-Mauchly Division.
Gift of Sperry Rand Corporation
Investigating Computer Systems. 16mm films and 10 Card Computing Films.
Gift of the Charles Babbage Institute, (84.10)
Newsclip of CDC 7600 announcement with Norris.
Cray, et. al.
Gift of Joseph Clarke, (84.27)

Photographs:
Harold Cohen, photographs (84.12)
Gift of Harold and Denice Cohen
Cray Seymour, CDC 6600
Gift of Lawrence Livermore Laboratories
Ford Tempo Ads
Gift of Ford Motor Company
Pilot Ace
Gift of National Physical Laboratory
Punched Card Room,
2 bw photographs.
Gift of The Travelers Insurance Company
US Navy
Gift of Naval Tactical Data Systems
JSS ROCC System:
5 color transparencies.
Gift of Computer Systems Division, Griffiss Air Force Base, (84.13)

SAGE, 19 photographs.
Gift of System Development Corporation, (84.21)
SAGE, 4 photographs and
LIFE magazine 2/11/57.
Gift of IBM Communications. Kingston, (84.19)
SAGE-North Bay Installation,
5 photographs.
Gift of Hanscom Field Air Force Base, (84.14)
Stibitz, George
Gift of Bell Labs
TRADIC Computer
Gift of Bell Labs
UNIVAC 494, 2 color photographs.
Gift of The Travelers Insurance Company, (84.15)

Equipment:
Sony BVU 200B videotape player.
Gift of Sony Corporation of America, (84.22)

Pioneers. This photograph is part of The Computer Museum's archival collection. Pictured are British computer pioneers and other distinguished guests at the opening of the Science Museum's computing gallery in London, December 1975.

Back row, left to right: Donald Davis, Tom Flowers, Grace Hopper (USA), Jim Wilkinson, Tom Kilburn, Raymond Thompson, Maurice Wilkes, Cecil Marks, Allen Coombs. Front row: Mrs. Douglas Hartree, Fred Williams, Max Newman, David Wheeler, Konrad Zuse (Germany).
The Apple I

by Brenda A. Erie

When the Museum opens at its new quarters in downtown Boston on November 14th, 1984 an Apple I board will be part of the Museum's Personal Computer exhibit. Surrounded by a ring of state-of-the-art operational machines, the Apple I board will be exhibited with other personal computer ancestors such as the Altair and the Xerox Alto.

It is too difficult to put a price tag on the Apple I's current value because "only 210 to 220 Apple Is were ever manufactured," according to Stacey Farmer, of Apple Computer, Inc. This reliable microcomputer, which needed little assembly, was built in 1975 by Apple co-founders Steven P. Jobs and Stephen G. Wozniak. Primarily bought by computer experimenters and home computer novices the Apple I could be used for developing programs, playing games or running BASIC.

When the Apple I was inaugurated into the marketplace, the "two Steve's," (as they were nicknamed by their employees) had already established a design philosophy that still exists today at Apple—dedication to making their computers easy to use, understandable and inexpensive. They also recognized the need to incorporate suggestions from Apple I users to improve the production and sales of the machine.

The home computer market liked the Apple I because it was easy to assemble unlike some of the kits that were around in the mid-1970's. Rich Travis, a sales representative at the Sunshine Computer Company in Southern California did not directly promote the Apple I in 1977, but made the machine "easy to buy" for his customers because they were "looking for a complete, ready-to-run system that was inexpensive."

The Apple I was sold at computer stores throughout the United States. In 1977, Kilobaud Magazine ran an article by Sheila Clarke a computer hobbyist writer who found that owning the Apple I did not "require you to be either an electronics buff or a millionaire."

For instance if you had walked into the Byte Computer Store in San Jose, California to purchase an Apple I in 1977, you would have gotten a fully-guaranteed computer kit for $666.66 that included: a printed circuit board with video terminal electronics, 8K bytes of RAM, 4 regulated power supplies, a keyboard interface and a hex monitor in PROM.

However, other purchases were also required in order to get your Apple I operating. These totaled $122.00 and included: an ASCII keyboard, a video monitor (if you didn't use your own TV set), and two transformers. If you did use your own television, a simple modification was required like a Pixe-verter or switch box and an rf modulator. In order to store programs, a two inch high cassette interface (ACI) was also available which came fully assembled and burned-in with a tape of APPLE BASIC for $75.00. Jobs and Wozniak both agreed
that BASIC at this time was the language of the people because it was easy to use.

In 1977, Apple I advertisements claimed that, "unlike many other cassette boards on the marketplace, ours works every time." So if you also bought a tape recorder you were in luck because the Apple I worked reliably with almost any inexpensive audio-grade cassette recorder. Your total cost for the machine, $903.66.

Relatively few Apple I's were sold compared to personal computers on the market today. However, the Apple I gained enough popularity because it was essentially "hassle free" and could be purchased for under $1,000. Hobbyists, home computing novices and the computer store dealers themselves applauded its reliability.

It was this microcomputer, the Apple I that enabled Apple Computer, Inc. to quickly turn from a small, single-product private company to the multi-product, multi-national, public company that it is today. As the Apple I's sales increased in 1977, Jobs and Wozniak began to spend much time perfecting the design of the Apple I and their future product the Apple II. But as the company bloomed, it was necessary for Jobs and Wozniak to go to the outside for help.

They recruited A.C. Markkula who had been marketing manager at Intel. He was fascinated with what both Jobs and Wozniak had already accomplished. To show his confidence in the duo he put up $91,000, secured a credit line, and then found $600,000 from other venture capitalists to help put Apple Computer Company on its feet. Shortly after, in May 1977, Markkula became chairman of the board, and Michael Scott, who took a 50 percent pay cut to join Apple from National Semiconductor became the company's first president.

The Apple I. This Apple I board will be part of the Museum's Personal Computer exhibit opening November 14, 1984. Apple Computer, Inc. co-founders Steven P. Jobs and Stephen G. Wozniak designed the Apple I in 1975 to meet the requirements of computer hobbyists. Priced at $666.66, it met their needs as an easy-to-use computer system that was inexpensive.
The Computer Museum held a Pre-Preview Party on May 11 at its new location in downtown Boston. The festive evening commenced with a talk on the invention of the integrated circuit by Intel founder Dr. Robert N. Noyce. Dancing and a screening of the film "Metropolis" followed dinner for party guests from industry and Museum Members.

Pre-Preview Party Lecture. Talking on the invention of the integrated circuit, Intel's Dr. Robert N. Noyce recalled,

"When I was in college, I could slave over something, finally get the right answer, hand in my paper and it would come back with these big red markings on it. My physics professor would say I did it the hard way. Then he'd jot down a couple of sentences which clearly made it much easier for me by using some other method. I guess that is what stuck with me, because one of the characteristics of an inventor I think is that he is lazy and doesn't like to do it the hard way."
Ascending to the sixth floor. Attendees at The Computer Museum's May 11 Pre-Preview Party climb the new central stairway between the fifth and sixth floors. The stairway was completed just days before the party. The $100 benefit dinner kicked off The Computer Museum's $10,000,000 capital campaign.

Multiwire machine. Barbara T. Mastro and Curtis P. Hoffman familiarize themselves with a recent gift to the Museum from Kollmorgen's PCK Technology Division during the Pre-Preview Party. The Multiwire machine can "write" wire patterns at rates of 100 inches per minute making it possible to reduce the size of computers.

Computing Relic. Talking by the 1958 SAGE display console are Peter Hirschberg (left) and Michael Poe. The console is part of the SAGE, the U.S. air defense computer that could use a light gun to track down enemy bombers.
Admiring the SAGE's duplex maintenance console during the pre-preview of the Museum's new 55,000-square-foot facilities in downtown Boston are Mr. and Mrs. Strump.

Janice Stone and Ned Forrester examine the core memory stack from the Whirlwind, an early vacuum tube computer developed at MIT. Forrester's father Jay W. Forrester directed the design of the computer which was the first to use magnetic core memory.

The mini-museum. Stephanie Haack, (right center) communications director at The Computer Museum explains to party guests the concept behind the Museum's 20,000 square feet of exhibits scheduled to open on November 14.

Dear Editor:

I've enjoyed reading the Computer Museum Report for the past few months. It's good to see that people are preserving the older computers so that others will have an understanding of the family tree of today's Apples and IBM PCs.

Your note in "The End Bit" in Volume 9 noted that the MITS Altair was the first computer to use cassette tape as auxiliary memory. I don't think this is correct. I remember using several PDP-8 minicomputers in the 1971-1973 period and an 8-track audio cassette was used to save programs. The cassette unit was manufactured by Tennecomp and I think it was basically the type of cassette or cartridge system used by radio stations for advertisements or other short messages. It was an endless loop cassette and worked quite well. We had many programs stored on it and it was much, much easier than loading (and reloading) paper tapes.

There were several other microcomputer-based computers available to hobbyists and experimenters prior to the MITS Altair. One of the better known units was the Mark-8, a 8008-based computer that I designed and that was described in Radio-Electronics magazine in July 1974. After being available for several months, a group of experimenters in the Denver area came up with a modem board that allowed an audio cassette recorder to be used for program storage. This group eventually formed themselves into the Digital Group, which manufactured several types of computers. I think they were the first ones to use an audio cassette for storage of programs as modem tones.

I have a packet of information that the Digital Group published and distributed. It is undated, but I recall that it was put out in late 1974 or early 1975. It includes a schematic of the modem used for the cassette storage. The modem was made available prior to the publication of this technical information. The modem board is small, measuring 4 1/2 by 2 inches.

There may have been other systems that used a cassette recorder for data and program storage at about this time. I know that Scelbi Computer Consulting, Milford, CT put together an 8008-based computer but I don't know if it had a cassette add-on. The early documentation I have does not show one.

With best wishes,
The Blacksburg Group, Inc.
Jonathan A. Titus, Ph.D
President

In the Spring issue of The Computer Museum Report, Number 9 the Museum printed a transcript of a lecture on the IBM System/360 given by Bob O. Evans, IBM vice-president of engineering, programming and technology. The conclusion was inadvertently left out. It follows:

Immediately other companies thought they had been damaged too and filed their own lawsuits—TransAmerica, Memorex, Calcomp, and others. So, with much senior management and lawyers time expended, IBM went through the gauntlet of several anti-trust trials. That story is over for now, and I hope forever. We won every case on the merits and, recently, the last one, the TransAmerica case went to the Supreme Court which refused to hear it, thus upholding the lower court's decision. And a little over a year ago, the government dropped their anti-trust suit as being without merit. So that enormous weight has been lifted and we are back to getting on with life.

Yet the debate goes on that, had we not standardized and designed the System/360, we would not have had these kinds of copies, and we would have had those lawsuits, and thus would not have had such difficulties. Thus, was it all worth it?

Of course my bias is that the driver of our products is the end user, and we have an accountability to that user. We also have an accountability to conduct ourselves in an ethical manner. Overall I believe devotedly the 360 decision was the right decision.

I can tell you that if I were faced with that decision today, we would make the 360 decision again, although I am certain it would be much tougher these days.

The net is: System/360 was conceived, born of a need, weathered a lot of tough gauntlets and went on to be a success for IBM and to be a significant part of the computer industry.
Museum Offers New Membership Categories

To celebrate its fall opening, the museum is offering new membership categories and benefits for individuals and corporations. All individual members receive: a 10% discount on catalog purchases, a year's subscription to the Museum's quarterly magazine, invitations to openings, free admission to the Museum, notification of events, priority admission to special lectures and full library privileges with access to the Museum's extensive print and video archives.

Check the appropriate membership category:

- Individual Member $30
  All benefits listed above.

- Double Member $40
  Individual benefits for two people at the same address.

- Participating Member $100
  Invitations to two "meet the speaker" receptions following major lectures plus Double Member benefits.

- Micro Patron $250
  Recognition in the Museum Report plus Participating Member benefits.

- Mini Patron $500
  A guided tour of the Museum by the Director plus Micro Patron benefits.

- Mainframe Patron $1000
  Mainframe Patrons receive an original, signed computer generated drawing by artist Harold Cohen plus Mini Patron benefits.

- Super Patron $5000
  Recognition in the Museum as a "core contributor to the capital campaign and Mainframe Patron benefits.

Name
Address
City/Town
State Zip

Gift Membership from:
Name
Address
City/Town
State Zip

☐ Enclosed is a check or money order
☐ Please charge my membership to:
  ☐ Visa ☐ MasterCard ☐ Amex
  Number
  Expiration
  Signature

Corporate Memberships

For information concerning corporate membership contact Michael Oleksiw, Development Director. New corporate benefits include free admission tickets for employees, rental privileges of Museum facilities, and eligibility to participate in the Museum's Collection Loan program.

Museum Hours

On Wednesday November 14, when the Museum opens its doors to the public at Museum Wharf in downtown Boston the hours will be: 11 a.m. to 6 p.m. Wednesday, Saturday and Sunday and 11 a.m. to 9 p.m. Thursday and Friday. It will be closed Mondays, Tuesdays, Christmas, New Years and Thanksgiving.

Upcoming Events

November
November 7—Members Association Meeting, 7 p.m.
November 13—Member's Preview
November 14—Public Opening

December
December 5—Members Association Meeting, 7 p.m.
December 13—Engelman lecture on Artificial Intelligence 7:30 p.m.

January
January 2—Members Association Meeting, 7 p.m.

The Computer Museum Report/Fall 1984 17