Silicon Sailing

Members Priority 10AM-NOON Sundays in August

> "Technology is the key to the America's Cup race. You can't win with a slow boat, and the only way to get a fast boat is to use the best technology available [with] the best computers and software."
>
> **Bill Koch, America³ Skipper**

The America³ Foundation test-runs one of their racing yachts, designed and tested with the help of computers.

Photograph: ©1992 Ralph Dormitzer

Silicon Sailing, an interactive display exploring the computer technology behind the new 1992 America's Cup Defender, America³, is now on exhibit at the Museum through Labor Day, September 7, 1992.

The exhibit enables visitors to design and race their own boat against other visitors' designs in a simulated competition under existing weather conditions. *Silicon Sailing* features three interactive DECstation 5000 workstations for design of the boat and a DECstation 425 personal computer, on which the simulated race runs. Visitors design their boat by choosing from among nine hulls, four keels, and nine sails. The computer then statistically evaluates their selection for performance against a benchmark racing yacht. If the performance is unacceptable, they can redesign their boat.

Then, the race begins! Visitors "sail" their boats on a simulation of the America's Cup course, using the actual winds outside the Museum, which have been measured by a wind detector on the roof. "The America's Cup is a dramatic example of the importance of computers in solving complex physical problems," says Director of Exhibits Gregory Welch. "Computers play a critical role in gaining that fractional percentage of performance advantage that is the difference between winning and losing."

The new Cup Defender, America³, is one of four 75-foot, 11-story high sloops built by scientist-sailor-businessman Bill Koch, 51, in his campaign to defeat veteran America's Cup contender Dennis Conner. Koch went on in May to defend the America's Cup successfully against the challenge from Italy's Il Moro di Venezia.

In pursuit of sailing's oldest trophy, Koch's syndicate, the America³ Foundation, used $500,000 worth of the latest computer equipment and services, donated by Digital Equipment Corporation, and a Digital VAX 9000 mainframe at MIT to prepare for the race.

Silicon Sailing is based on an interactive exhibit Digital created for DECWORLD, the company's annual display of products, after consulting with the Museum. "I'd never done an interactive demo and I needed help to make it user-friendly," explains Ivan Kristoffy, the Digital engineer, who with Ralph Dormitzer and Gwyn Thakur at Digital was responsible for the demo.

Kristoffy, whose son Andy had worked at the Museum when it was in Marlboro and later in Boston, sought the advice of Museum staff. "They showed us the Museum's interactive exhibit on designing a car. 'That's it exactly,' " thought Kristoffy.

Greg Welch then worked with Digital and America³ over six to eight weeks to define the architecture of the display. According to Kristoffy, it was a great success. "While people quietly explored one of Koch's boats that was also on display, the computer exhibit was where the action was. People were really excited to be able to design a boat and then see on a big computer screen how it actually sailed," he said.

Wow! What Volunteers!

Almost every aspect of The Computer Museum is made possible by the support we get from an extraordinary set of volunteers.

Our Board of Directors, with over thirty people led by our Chairman Gardner C. Hendrie, gives expert guidance and considerable time to the strategic direction of the Museum's programs, as well as leading our fundraising efforts.

The Computer Bowl's dramatic success (see pages 4-5) owes a great deal to over 50 volunteers on both East and West Coasts. From the East, I'd like to single out one of them for special recognition— Michael Callahan, President of Museum Technology Source, Inc. His enormous experience and ingenuity are already reflected in the video and special effects used throughout the Museum. In the 48 hours leading up to the Bowl, Michael successfully dealt with the
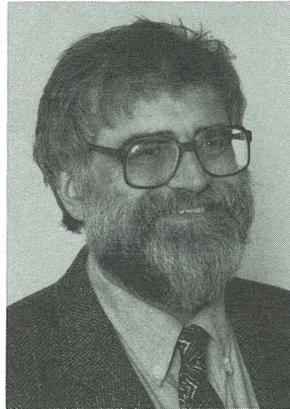
Computer Museum volunteer par excellence Michael Callahan is also President of Museum Technology Source, Inc., which manufactures electronics exhibit equipment such as controllers for video discs and CDs.

challenge of installing a sophisticated sound system in the cavernous Park Plaza Castle.

From the West, I especially want to recognize Linda Lawrence,

Chairperson of the West Coast Computer Bowl Committee. With more than a dozen other high-powered volunteers, she staged the satellite-linked fundraiser, giving the guests great entertainment and the Museum a net profit.

Thanks to Armando Stettner, another tremendous volunteer, the Museum is now on the Internet. This means that if you can access one of the wide area networks, such as the Internet, Usenet, Bitnet, CompuServe, you can communicate with us directly via electronic mail. Send me email at: Strimpel@tcm.org.

If you want to help the Museum by volunteering, please contact me. Your help will make a real difference!

Dr. Oliver Strimpel
Executive Director

Silicon Sailing (continued from P.1)

HOW COMPUTERS HELPED WIN THE AMERICA'S CUP

Design Analysis

In designing the keel—the most secret physical component of the America's Cup contenders—Koch's design team at MIT performed numerical hydrodynamics analysis —a form of computational fluid dynamics (CFD)—on a VAX 9000 computer equipped with two vector processors. This allowed analysis of the lift and drag forces exerted on sections of the hull/keel assembly under varying water and wind conditions. As many as 10 keels were tested at once.

A good keel is heavy enough to provide stability, yet small and sleek enough to minimize drag. Some designs provide better maneuverability; others, more straight line speed. A successful hull balances stability, weight and in-water drag and performance in a variety of wind and water conditions. The longer the hull, the less the drag, though short hulls do better in light winds and heavy hulls, in heavy winds.

America³ analysts ran Finite Element Analysis (FEA) on a DEC Station 5000 to determine the strongest and stiffest design at the

lowest weight. This testing helped designers maximize strength and minimize weight, while conforming to America's Cup rules. FEA software simulated rig forces, mast compression, keel torque, and wave (hydrostatic) pressure effects, offering key data for placement and structural attachment of the keel. Computers made it possible to test over 20 keel designs in only two months.

Mast-top mounted cameras videotaped sails. The images of sail shapes were then digitized into PC-screen images. Personal computers equipped with color graphics hardware and special digital signal processing circuits used the images to measure sail shape changes exactly. This enabled analysts to correlate sail shape with boat speed to determine if and how sails should be recut.

Performance Analysis

The effect of hull, keel and sail on real world performance was computed by America³'s Velocity Prediction Program (VPP). This powerful modeling program "sailed" the hypothetical boat in

various wind and wave conditions, analyzing design choices in search of the fastest boat. Running on personal computers and Digital workstations, VPP calculated performance based on hull shape and size, sail shape and size, wind speed and direction, and crew weight.

Via networking, test results in San Diego could be sent to MIT for overnight processing by VPP. Analysts in San Diego often worked at personal computers and used Ethernet-attached workstations as servers. This reduced the design test cycle time.

Race Management

During the race, Matasail, a powerful race management program running on a DECstation 425 personal computer below deck, tracked the boat's exact position via satellite feeds, monitored wind and water conditions, and supplied data on boat performance. Updated every two seconds with data from the boat's 24 sensors, the program helped the crew make real-time tactical or sail-trimming decisions. Using a voice-recognition system, the navigator could input data, call up windows, and activate commands without a keypad or mouse that might get wet.

WAVE OF THE FUTURE

"Our Museum is dedicated to inspiring young and old alike about the technology of today and tomorrow— a mission that fits well with the spirit of this dynamic new project and its giant 'wave' of the future."

Oliver Strimpel

This model shows the giant "wave."

The Children's Museum— in partnership with The Computer Museum—has announced plans to construct a $10-million waterfront project in front of the Museums' shared building on Boston's Fort Point Channel. This unusual joint project will include a 45-foot-tall wave-shaped structure, a public park featuring free festivals and exhibits, and a floating urban education center. The announcement was made at a joint press conference in April, attended by Boston Mayor Raymond Flynn.

Internationally acclaimed architect Frank Gehry designed the project. His latest work includes the American Center in Paris and the Family Entertainment Center at the Euro Disney theme park near Paris.

Both Museums will build the waterfront park and wave-shaped building, while The Children's Museum will construct the floating education center.

"We want to give Boston a new, exciting and vibrant public space—a place where children and adults can come together to enjoy and interact with the urban world around them," said Children's Museum Director Ken Brecher.

The Museums hope to secure city and state approval of the project by late 1992, begin the 14-month construction phase in fall 1993, and stage a grand opening in late 1994.

"The alliance between The Children's Museum and The Computer Museum is remarkably fitting," noted Strimpel. "No one knows children better than The Children's Museum. And nowadays no one knows computers like children! Today, computers are the tool and the toy of choice for children from age 3 and up. As a leader in interactive computer exhibit design, The Computer Museum understands the interaction of young people and computers like no one else.

"At a time when children's issues are at the forefront of the national agenda—when there is a national crisis in education, especially science education—the great hope for the future of our young people may well be the kind of exciting informal interactive learning that is the specialty of both our institutions and which this dynamic new structure stunningly symbolizes.
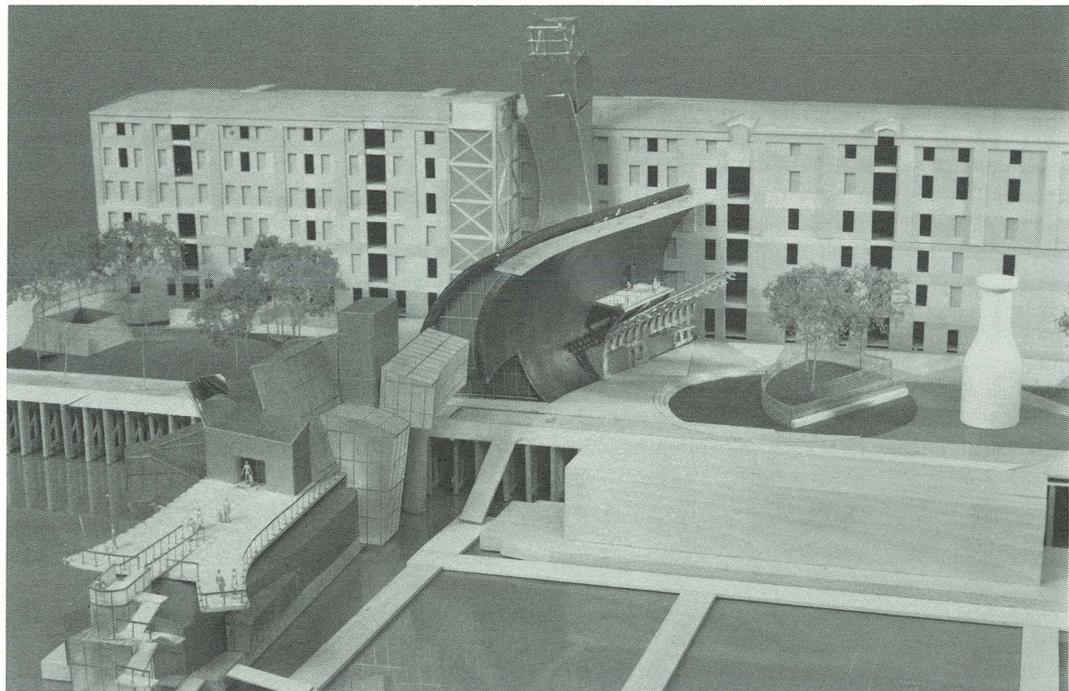
"The new 'wave' will enable both institutions to enhance significantly the experience of their visitors, offering them a dramatic new approach to our Museums and bringing excitement to Boston's waterfront," added Strimpel.

When the project is completed, visitors will enter both Museums through the "wave," a dynamic four-story, skylit, contemporary structure. The 5,900-square-foot wave will provide an expansive indoor space—free and open to Museum and non-Museum visitors alike—that will feature art, exhibits, an indoor/outdoor cafe, and public seating.

A pedestrian bridge 12 feet above the entrance area will offer views of the harbor, skyline and public space below. The bridge will connect The Children's Museum to a new "urban exhibition and harbor education center" that will float on Fort Point Channel.

Once inside each Museum, visitors will walk into newly reno-vated lobbies. In The Computer Museum, the lobby, expanded to 4,200 square feet, will better serve the 150,000 people who visit annually from around the world.

The new public waterfront park—about three-quarters of an acre—will stretch out on both sides of the wave. Both Museums will keep the park as a free open public space. "We hope the park will help tourists—who make up half of The Computer Museum's visitors—experience Boston as a wonderful place to live, work and play," Strimpel remarked.

The West Coast wrested the title "Computer Masters of the Universe" from their East Coast rivals in The Fourth Annual Computer Bowl, May 1, 1992, at Boston's Park Plaza Castle. The score was 320 to 240. The East and West are now tied at two wins each.

The Computer Bowl trophy now travels to the West Coast until April 1993, when the West will co-host The Fifth Annual Computer Bowl with The Computer Museum. This tie-breaker will be the final contest leading to The Championship Computer Bowl in 1994. That contest will be played by the Most Valuable Players (the highest individual point scorers) of the five previous Bowls. The 1992 Bowl was beamed live by satellite to California's Xerox Palo Alto Research Center and to Microsoft Corporation, Redmond, Washington. The award-winning TV show *Computer Chronicles* aired the Bowl nationwide on PBS in two parts during May.

A fundraising event for the Museum's education programs, the Bowl has raised $2.2 million in cash, products and services since 1988. It attracts the support of hundreds of sponsors and volunteers, as well as media coverage around the world.
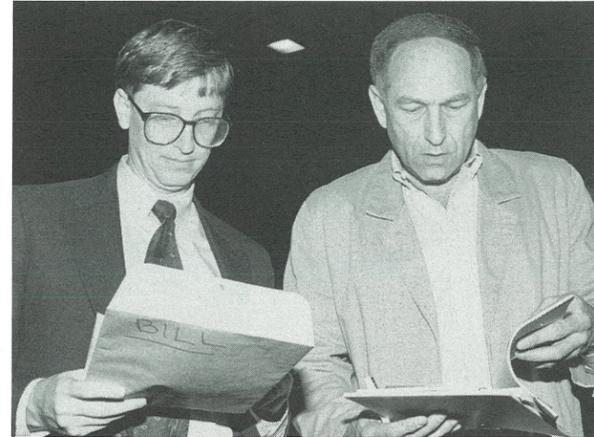

Bowl "Examiner" Bill Gates, Chairman of Microsoft Corporation, and Computer Chronicles Executive Producer Stewart Cheifet get ready for the 1992 Bowl.

John Walsh (far right) of Price Waterhouse, the Bowl's Official Accounting Firm, presents the diskette of questions to Pre-Game Warm-up Show hosts Peter Hirshberg, of Apple Computer, Inc. (far left), and Chris Morgan, of Christopher Morgan Communications (center). Official keepers of the Oscars, Price Waterhouse also safeguards the Bowl questions until Bowl night.

F. Grant Saviers of Digital Equipment Corporation, Underwriter of the Most Valuable Player Awards, gives 1988 East Coast MVP Mitchell Kapor, President, Electronic Frontier Foundation, Inc., his award. The East won this year's Pre-Game match 60-30.
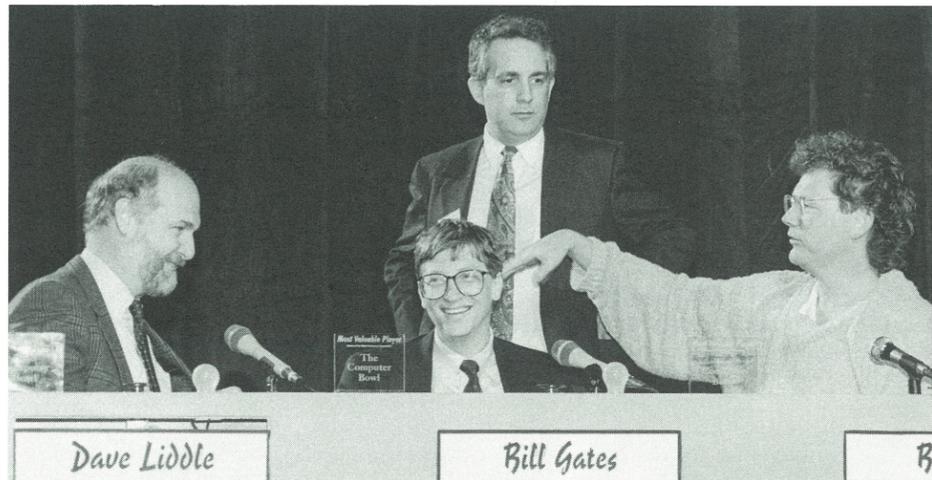

East Coast MVP Mitchell Kapor watches West Coast MVPs Dave Liddle, President, Interval Research Corporation, Bill Gates, and Bill Joy, Vice President, R&D, Sun Microsystems, warm up for The 1994 Championship Bowl. This year's West Coast MVP, Jeffrey C. Kalb, President, MasPar Computer Corporation, will join them in the 1993 Pre-Game warm-up, while 1992 East Coast MVP Dr. David L. Nelson, Chairman, Fluency, Inc., will join Kapor, and East Coast MVPs Bob Frankston (1990), Product Creator, Slate Corporation, and author Pamela McCorduck (1991).

Computer Bowl: West best
A Byte Fight in Boston
West wins '92 high-tech trivia crown

The headlines above ran in Newsweek, The Boston Globe and The San Jose Mercury News.
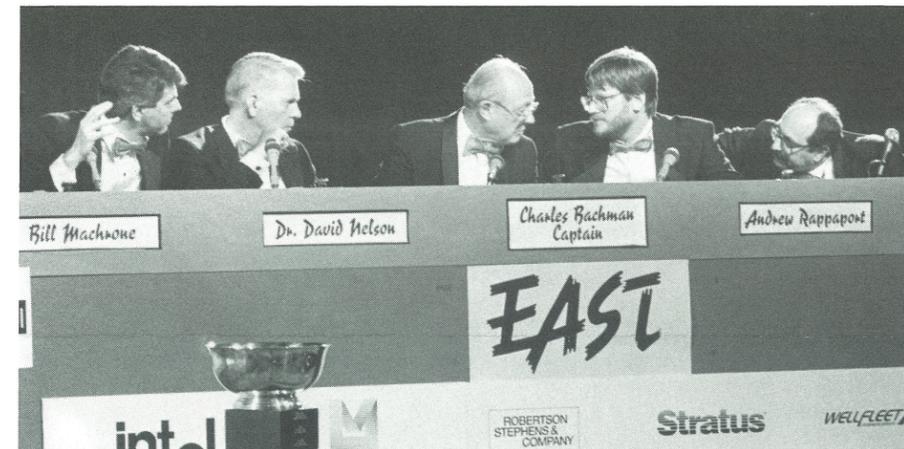
With the West ahead 210-180 at the start of the last round, East Coast Captain Charles W. "Johann Sebastian" Bachman, Chairman, Bachman Information Systems, Inc. (center), confers with his team. From the left, they are: Bill "The Elbow" Machrone, Vice President, Technology, Ziff-Davis Publishing Company; Dr. David L. "Half" Nelson, Chairman, Fluency, Inc; Andrew S. "M.C." Rappaport, President, The Technology Research Group, Inc.; Paul "Bearer" Severino, President, Wellfleet Communications, Inc.

"It's no surprise the West Coast team, so clearly superior in bytes, brains, and brawn, has captured the Computer Bowl," claimed West Coast Captain John F. "Future" Shoch, General Partner, Asset Management Company (hoisting the Bowl trophy). "We're taking the Bowl back to Silicon Valley," he said. Joining Shoch from the left: Vern L. "The Ace" Raburn, Chairman/CEO, Slate Corporation; Jeffrey C. "The Killer" Kalb, President, MasPar Computer Corporation; Ruthann "The Mighty" Quindlen, Principal, Alex. Brown & Sons; Dr. John E. "Knock Knock" Warnock, Chairman and CEO, Adobe Systems, Inc. While the West Coast team dressed in black, swigging Jolt cola for energy, the East Coast team wore elegant tuxedos with blinking red bow-ties.

Photographs: Ed MacKinnon

Bowl Bloopers
by Chris Morgan, President Christopher Morgan Communications

With a crew of computer people as clever as our East and West Coast teams, you expect controversy, rivalry —and the revelation of an occasional goof on our part. Thanks to our tenacious team members for righting our wrongs.

First, we salute Mitchell Kapor, President of the Electronic Frontier Foundation, Inc., longtime Bowl veteran and East Coast MVP, for correcting us on the question of the random number sieve that came up during the Pre-Game warm-up. His response of "Eratosthenes" was indeed the only right answer.

Second, thanks to 1992 West Coast Captain John Shoch, General Partner, Asset Management Company, for correcting the answers to two questions in the Bowl Game. As *PC Magazine Guide to Using Windows 3.1* indicates, XGA means "Extended Graphics Adapter," not "Extended Graphics Array," as we had it. Also "worm" was a code name for a computer developed at Xerox, not Hewlett-Packard, as we had claimed.

Finally, thanks to Lee Gomes of the *San Jose Mercury News*, we discovered the ERASE command does exist in some forms of DOS.

Tools & Toys at Work

In the new *Tools & Toys: The Amazing Personal Computer* exhibit, visitors can now see the Museum's own staff hard at work at a station called "Tools & Toys at Work." In the "Where Do I Go From Here?" area, the station lets visitors see real computer work in action and engage in dialogue with the Museum's Visitor Assistants (VAs) about that work.

At scheduled times, the VAs will use the station to make signs, develop educational materials, and test new software. Visitors can ask the VAs about what they are doing and request more in-depth information on software from any of the exhibit's other areas. Museum Education and Exhibit staff developed "Tools & Toys at Work" because of the interest expressed by many visitors in Exhibit Engineer Steve Snow's work setting up computer stations, as well as in the works-in-progress of other Museum staff.


TOOLS & TOYS AT WORK

Huge Slide Rule Streamlines Insurance Industry

The New England recently donated an 1869 spiral slide rule, the Arithmeter, to the Museum. One of 14 made, the Arithmeter was devised by Elizur Wright, Massachusetts Insurance Commissioner in the 1850s and 1860s. Wright, an abolitionist, social reformer and mathematician, encountered many financial irregularities caused or masked by poor calculating methods. He established a register of all insurance policies and insurance companies in the state. The Arithmeter was designed to calculate the tables used to regulate the amount of money insurance companies kept in reserve to pay for claims.

Wright also convinced insurance companies that the Arithmeter could improve the efficiency of their operations. He sold 14 of the devices for $600 each, including one to his son, the chief actuary at The New England. While less expensive slide rules and calculating machines soon outsold the Arithmeter, Wright's regulatory initiative helped create a market for business machines in the insurance industry.
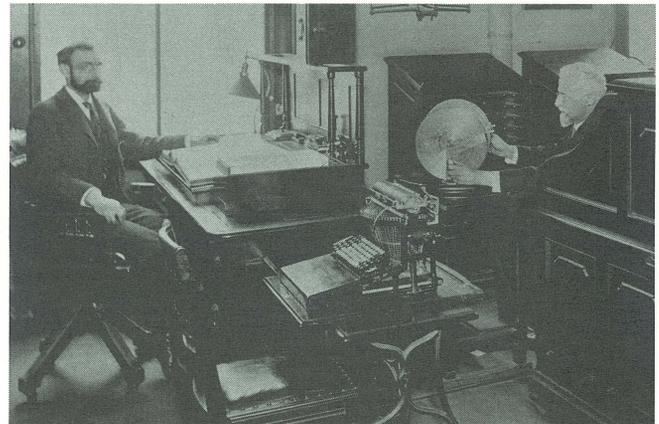
This photo shows the 1869 Arithmeter, serial number 11 (the large cylindrical object held by the man on right), in use at The New England.

Courtesy: The New England, Corporate Library

Bell Gives Award to Museum

Computer Museum Board Member C. Gordon Bell was awarded the first IEEE John von Neumann Medal for his "innovative contributions to computer architecture and design." He has given the $10,000 grant accompanying the medal to the Museum to endow the Computer Architecture Collection.

The award, named in honor of the eminent mathematician whose seminal work defined computer architecture, is sponsored by International Business Machines Corporation. Bell was cited for his contributions to the industry, academia and government.

Courtesy: IEEE

The IEEE (Institute of Electrical and Electronics Engineers Inc.) Medal was established in 1990 and was presented for the first time this year to Bell.

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Events

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`IN AUGUST: MEMBERS PRIORITY SUNDAYS 10AM-NOON`

SILICON SAILING
Explore the technology which helped America³ win the America's Cup. Using DEC workstations, visitors can choose a hull, keel and sail design and "race" their boats against other visitors' designs. A wind detector on the Museum's roof provides weather information allowing the boats to race under real conditions.
Free with Museum admission.

Thursday, July 2-Tuesday, July 6, 1992
(Harborfest)
Saturday, July 11-Thursday, July 16, 1992
(Sail Boston)
11:15am and 2:00pm daily

"Sail Wars"
This *NOVA* film shows how the American team used computers to redesign the hull and sails of their boat for the 1987 America's Cup Race.
In the 5th floor auditorium.
Free with Museum admission.

Saturday, July 25, 1992
Session A: 9:00am to noon
Session B: 1:30pm to 4:30pm

LEGO/Logo Workshop
Teams of one adult and one child, aged 8 to 13, learn how to build, program, and operate a robot. Using specially designed plans, LEGO blocks, motors, gears and lights, teams can build a robot, which can be programmed using Logo computer language to walk or roll. Each team can pose with their robot for a photo to take home. Workshop fees are $25. Member Discount: 10%. Space limited. To register, call the Museum's Education line at (617)426-2800 ext. 626 and leave a message.

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ADMISSION: Adults $6.00, students and seniors $5.00. Half price Saturday 10am-noon. Free to Museum Members and children under five. For more information on exhibits or special events, call our talking computer at (617) 423-6758.

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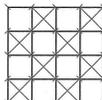Company Name _____
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