



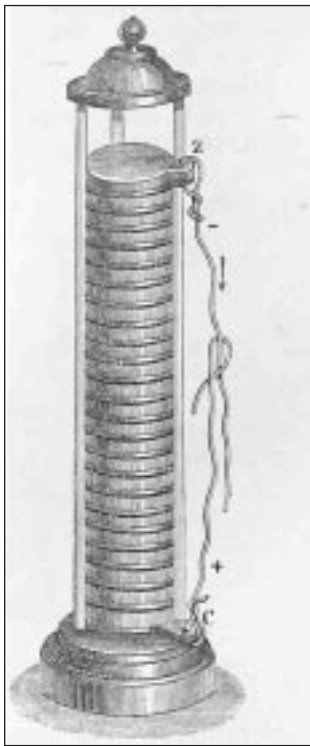
IEEE HISTORY CENTER



Preserving, Researching, and Promoting the Legacy of Electrical Engineering and Computing

STATIC FROM THE DIRECTOR

I want to keep my column short this issue because, as you will see, we have a great deal of activity to report. By the time you receive this issue, the new century and millennium, as popularly defined, will be almost upon us! As you



Volta's Electric Pile from 1799

know, this calendrical artifact has caused the general media to undertake a great deal of reflection about the history of the past 100 years. It is gratifying to those of us currently at the IEEE History Center, as it should be to those of you who have supported the Center's activities for its 19+ years of existence (yes, in addition to all the other hoopla, 2000 will be the 20th anniversary of the Center, and the 10th anniversary of our move to Rutgers! More next issue 52), that many of these journalists

are finding out what the History Center has been saying all those years: We must define this just-ending century in terms of electricity, electronics, and computing. A glance at our bibliographic reviews (page 4) and Things To See and Do (page 6) will illustrate my point. As another example, we are currently supporting the IEEE History Committee in preparing nominations to the National Academy of Engineering for the top engineering achievements of the 20th century across all disciplines. By the time you receive this, you should be able to check our Web site to see what achievements IEEE forwarded to NAE on behalf of our disciplines. The NAE's selections will be announced by them during Engineers Week 2000, and we will have coverage next issue.

In the meanwhile, the Center does not intend to rest on its laurels. We are continuing to work on Society anniversary projects, on our Sloan Project (see page 6), on the Milestones Program (see sidebar), and on the new IEEE Virtual Museum initiative (see page 2), as well as a host of smaller undertakings (see Center Activities, page 2). I hope you will continue to follow our activities through our Web site and this newsletter, and that you will continue your generous support of these endeavors. ♦

MILESTONES UPDATE MILESTONES PROGRAM REACHING NEW LANDMARKS



William DeFotis, Eric Smith, Charles Wright, Stanley Merrill, John Martin, and Harlan Harlness at the Merrill milestone dedication.

As has been reported, the IEEE History Center has been working with the IEEE History Committee on enhancing IEEE's Program of Milestones in Electrical and Computing History. This work is beginning to bear fruit. Just between this issue and last, a period of about four months, five Milestones were dedicated, bringing the program's total to 32. Two Milestones announced in previous issues had their actual ceremonies, the Georgetown Steam/Hydro Generation plant in Georgetown, Colorado, USA, in July, and the Marconi Milestone in Capetown, South Africa, in September. Now we are pleased to announce that the following Milestones have also been approved by the IEEE Executive Committee, and their dedications have been held by the appropriate Section:

Merrill Wheel-Balancing System,
1945 Denver, CO, USA Dedicated
September 1999
(Joint IEEE Milestone and ASME Landmark)

In 1945, Marcellus Merrill first implemented an electronic dynamic wheel-balancing system. Previously, all mechanical methods were static in nature and required removing the wheels from the vehicle. Merrill's innovative balancing system came to be

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IEEE HISTORY CENTER

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Staff Activities

Center Director Michael Geselowitz has been busy attending meetings, presenting papers and networking in the areas of the preservation and promotion (including teaching) of the history of technology, in addition to his activities at The IEEE Virtual Museum Workshop (see below), IEEE ISTAS'99 (see page 3), and IEEE Sections Congress'99.

In June, immediately before the Virtual Museum Workshop, he chaired a panel and gave a talk on "Teaching History of Technology in the Formal Classroom Setting" at the "Intersociety Cooperation Meeting." This almost nameless, relatively informal gathering is organized once a year by the Founding Engineering Societies, and brings together their staff and volunteers responsible for historical activities, along with similar individuals from other technical and scientific societies, from museums, and from government. The focus in the past has been preservation and landmark (e.g., Milestones) programs, but this year, hosted by ASME in New York City, offered somewhat of a transition. The IEEE

History Center is due to serve as the main host next year, and we plan even more coverage of educational initiatives.

Immediately after the workshop, in a related vein, Geselowitz delivered a paper at the Liberal Education Division of the American Society for Engineering Education (ASEE)'s annual meeting in Charlotte, NC, USA, entitled "A VIEW FROM THE (OLD) BRIDGE: HISTORICAL APPROACHES TO TEACHING SCIENCE, TECHNOLOGY, AND SOCIETY TO ENGINEERING STUDENTS." A follow-up session is planned at next year's ASEE, which he will chair.

Finally, in August after ISTAS, Geselowitz traveled to the Washington to do oral history interviews for the Aerospace and Electronic Systems Society, and to visit the Archives Center of the National Museum of American History of the Smithsonian Institution as part of the Sloan Project and to build relationships with the Lemelson Center.

Mary Ann Hoffman and Rob Colburn received promotions in August. They are both remaining at the History Center and will be carrying out their same duties, but the position parameters have been adjusted to reflect what they really do for us and the Institute as a whole. Mary Ann's new title is "Manager,

Archival and Web Services." Rob's title remains "Research Coordinator," but it has been properly shifted from a nonexempt position to an exempt position.

New GAs

The IEEE History Center is pleased to welcome **Yutaka Ito** and **Dina Lowy** as new GAs for the 1999-2000 academic year. Yutaka Ito is a fifth-year history graduate student, who is currently working on his dissertation *Ernest F. Fenollosa: The Life and Thought of An Activist Thinker*. Dina Lowy is a PhD candidate working on a dissertation entitled *The Japanese 'New Woman': Contending Images of Gender and Modernity*. In her spare time, she keeps herself busy with ballroom dancing, knitting baby clothes for friends' children, and planning her summer 2000 wedding.

In addition, we are pleased to welcome back returning GAs Christopher Fisher and Frank Freyre.

Marc Lasowsky is our new undergraduate research assistant. Marc is a Rutgers College Senior majoring in Philosophy with a minor in Political Science. He hopes to become a philosophical or political consultant, after getting a masters in one of those disciplines. He also enjoys biking and playing his saxophone. ♦

The newsletter reports on the activities of the Center and on new resources and projects in electrical and computer history. It is published three times each year by the IEEE History Center.

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IEEE History Committee
1999

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Center Activities

Virtual Museum Workshop

How does one define a Virtual Museum? Who would your audience be? Is it a virtual tour through an actual Museum? Or is it a tour of a "museum" without walls? Is it really a museum at all, or simply a "center" of information? Will the IEEE History Center take an active role in its development? It was these and other questions that prompted a Virtual Museum Workshop to be held in June 1999. Hosted by the Smithsonian Institution's National Museum of American History (thanks Barney and Hal), the History Center conducted a two-day workshop bringing together some of the greatest minds, from around the globe, in the area of Museums and the Web. They addressed these issues and potentially develop a plan to

"build" a Virtual Museum. In conclusion it was noted that the Museum should have two main complementary missions: To increase public knowledge and appreciation of the history of IEEE technologies and their impact on society, and to increase public understanding of how those IEEE technologies work (i.e., promote technological literacy). The site needs to be both international and multicultural in nature. And its primary audience should be 10-18 year old students and their teachers.

The History Center will present a funding proposal to the IEEE Foundation at its November 1999 meeting. We will provide regular updates on the development of the Virtual Museum in our Newsletter.



SHOT Best Paper Prize Announced

The winner of the 1999 IEEE Life Member Prize in Electrical History for best article published in 1998 on

electrical and computer history is Trent Mitchell for his article "The Politics of Experimentation in the Eighteenth Century: The Pursuit of Audience and the Manipulation of Consensus in the Debate over Lightning Rods," *Eighteenth Century Studies*, 31:3. Trent Mitchell is in the Department of Geological Sciences at the University of Saskatchewan.

From Our Reference Case Files: On the Trail of Dahlander

As part of the Center's mission, we provide reference help to scholars, educators, the media, and members of the general public. Sometimes these questions take us on a longer trail than expected. In July, an electrical engineering teacher in France asked us for help finding information on the particular Dahlander who invented and gave his name to a type of three-phase motor. At first we thought that anyone famous enough to have a motor named after them ought to be easy to find. However, the trail was more tangled than that. Our search would lead us almost to the Arctic Circle, nearly into the Palace at Stockholm, and not quite all the way to Conshohocken.

None of our usual biographical sources mentioned Dahlander at all. We contacted the extremely helpful American Society of Swedish Engineers in Philadelphia, where their editor, Gunnar Asker was able to tell us that there was not one but two engineers named Dahlander who might be candidates: Magnus (or Martin) Dahlander, b. 1862, who worked in the US and returned to Sweden to become the city architect of Orebro in 1899, and a Gustaf Dahlander, a physicist born in 1834. Interestingly, both were at Gothenburg, at Chalmers, and at the Technical High School in Stockholm at some points in their lives. The ASSE meanwhile had referred us to the Swedish Royal Institute of Technology, and from thence to the Orebro city archives. Thanks to the alertness of Leif Persson, a volunteer student assistant at the archives in Orebro who put the last pieces of the puzzle together, we learned that the inventor was Robert Dahlander, b. 1870, the son of the earlier Gustav, and the second cousin of Magnus.

Staff Activities — Rutgers Courses

For the Fall 1999 Semester, Center staff are teaching two courses at Rutgers. Post-Doc David Hochfelder is teaching an upper-division course, Technology and Society in America. Director Michael Geselowitz is teaching Introduction to Science, Technology, and Society, a survey course. Next semester he will be teaching "Special Top-

ics in Technology and Society," which will enable him to focus the students on issues involving IEEE-related technologies.

ISTAS 1999

The History Center participated as a technical co-sponsor in this year's International Symposium on Technology and Society (ISTAS), which took place July 29-31 in New Brunswick. The symposium, which is the annual meeting of the IEEE Society for the Social Implications of Technology, addresses a new theme each year. This year, the SSIT, the History Center, and the IEEE Women in Engineering Committee organized ISTAS '99 with the theme "Women and Technology, Historical, Societal, and Professional Perspectives." The symposium was a great success, and all three of the co-sponsors benefited greatly from their participation. It was the largest SSIT conference ever, with more than 150 participants, and it represented the first annual congress of the IEEE Women in Engineering membership.

The symposium was enthusiastically supported by the Rutgers University administration (which provided a grant) and the community of U.S. and international scholars. The event also received funding from the National Science Foundation, and was featured in several local newspapers and television programs. The IEEE Life Members Committee provided a large grant to support the attendance of IEEE Graduates of the Last Decade (GOLD members).

Speakers at the conference addressed a range of issues, some historical and some related to current conditions and problems for women engineers. Historical highlights of the symposium included Thomas Jepson's talk on women telegraphers in the 19th century; Julian Reitman's multimedia demonstration on early 20th century production at Westinghouse; Martha Sloan's address on women leaders in technical societies; Jonathan Coopersmith on pornography and the development of home videotape; Rachel Maine's presentation on the history of the electromechanical vibrator; Amy Bix's talk on the first women to enter engineering schools; Karl Stephan's study of domestic refrigeration technology; Christina Lindsay's work on the gendering of home computing, and many others. Most of the historical presentations are available in expanded form as articles in the ISTAS '99 Conference Proceedings, which is available from the IEEE Press.

ICOHTEC 1999

The two most important annual conferences on the history of technology are the conference of the Society for the History of Technology (SHOT) and the conference of the International Committee for the History

of Technology (ICOHTEC). The vast majority of SHOT members live in North America, while most ICOHTEC members are Europeans. ICOHTEC has, in addition, many members from North America and Asia and some members from South America and Africa. The 26th annual ICOHTEC conference took place from 16 to 21 August 1999 in Belfort, France at the University of Technology of Belfort-Montbéliard. The theme of the conference was technological choice, which was explored in a series of sessions in each of eight areas, including: the Industrial Revolution, military technologies, and the natural environment. The distinguished historian (and former member of the IEEE History Committee) Thomas P. Hughes delivered the Kranzberg Lecture.

Two historians from the IEEE History Center participated. Frederik Nebeker presented a paper on technological choice in military history, examining the case of ground telegraphy as a communications option in World War I. (Ground telegraphy, a technique of sending Morse code signals through the ground without wires, became important in the fighting on the Western Front because artillery constantly disrupted wired communications. The new availability of the electron tube as an amplifier gave this technique a much greater range than it otherwise had, but the electron tube also led to portable radio transceivers which soon proved more effective than ground telegraphy.) While in the Belfort area, Nebeker arranged a meeting with Robert Chapuis, historian of telephone switching, and Michel Simeon, conservator at both the Ampere Museum (near Lyon) and the Branly Museum (in Paris). David Hochfelder gave a paper which compared the British and American movements to nationalize the telegraph in the nineteenth century. He will be presenting a revised version of the paper at the Business History Conference in March 2000, and he plans to revise the paper for publication in a history of technology journal.

Sections Congress: They came, they saw, and they "Designed the Next Century"!

Sections Congress 1999, held 8-11 October in Minneapolis, MN, USA, brought together the grassroots leadership of the IEEE, namely its Section leaders, to develop the course of the IEEE over the next century. (Well, maybe not the entire century; however, the recommendations developed by the Delegates will have long-lasting effects on the Institute over the next several years.)

Center Activities

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The dedication of the First Wearable Cardiac Pacemaker as an IEEE Milestone at the Bakken Library and Museum in Minneapolis was the kickoff event of Congress. The IEEE History Center was proud to lead off such an important IEEE event as Congress! Over 30 individuals attended the Dedication Ceremony, including Staff at the Bakken, representatives of Medtronics, as well as Dr. Samuel Hunter, whose new lead made long-term pacing possible. We were graced with the presence of Mrs. Lillehei, wife of the late Dr. Walter Lillehei, who requested that Mr. Bakken develop a Wearable Cardiac Pacemaker.

At Sections Congress, the History Center's exhibit featured its web site and the numerous services now provided on-line. History Committee members helped to staff the Exhibit, along with staff members Mike Geselowitz and Mary Ann Hoffman, and explained the programs of the History Center to the Section leadership. They were successful in promoting the Milestones Program and introduced a new web site called "Going Digital", which will develop the history of speech synthesis and digital audio recording, utilizing the Web (see the associate article entitled *Going Digital*). We truly enjoyed attending Congress and look forward to the next Sections Congress, planned for October 2002 in Washington, D.C. ♦



Newest IEEE Milestone: First Wearable Pacemaker Display

Bibliography

RIGHTER, ROBERT E., *Wind Energy in America: A History*

As a work of history, Righter's excellent book is also a springboard to the future. By examining the history of a technology which is becoming increasingly important in today's energy-strapped world, Righter objectively highlights the potential of what wind energy may be expected to do, as well as the unrealistic expectations people had for it, especially in the 1970s and 1980s. "If we had not stopped building them thirty years ago, we would not have problems today," he quotes wind energy expert James Schmidt as saying, and in some sense this is the telling quote of the book. In the 1920s and 1930s, the United States had a vibrant windpower industry, serving particularly the farming community before the Rural Electrification Administration brought centralized power out of the cities. One company alone, the Jacobs Wind Electric Company, built an estimated 30,000 wind turbines from the 1930s to the 1950s. One went to Antarctica with Admiral Byrd in 1933; in 1955 Byrd returned to the site to find the blades still spinning. The chapter on Palmer C. Putnam's 1.5MW wind turbine in Vermont, which began generating power for the AC grid in 1941 makes fascinating reading about lost opportunity for a successful early commercial application. Despite this encouraging start, interest in wind generation of electricity in the US lapsed in the face of the REA, centralized power interests, and — after World War II — the overly-optimistic promises of nuclear power. Denmark, however, persevered, which is why, so much of the installed wind generation capacity is Danish-built turbines.

Righter is particularly good at showing how economic forces affect engineering and

development choices, and how those economic choices can both foster an infant technology and divert it. His point about what would have been accomplished by tying tax credits to the amount of energy *produced* rather than amount of money invested, as was done in the 1980s, is very well taken. Righter's book ends with a optimistic view of wind energy's future in the United States and in the world, noting that, in 1993, the province of Alberta installed more wind generation capacity than the entire United States.

Available from University of Oklahoma Press, Norman, OK, fax: +1 405-364-5798, <http://www.ou.edu/oupress>, \$34.95, hardback, ISBN 0-8061-2812-7, 361 pp

JANET ABBATE, *Inventing the Internet*, MIT Press, Cambridge, 1999, 264 pp.

Former IEEE History Center Post-Doc has published perhaps the best history of the Internet to date. Based on her dissertation from the University of Pennsylvania and subsequent work at the Center and elsewhere, the work covers the entire history of this exciting new technological phenomenon, from the earliest work by Paul Baran in 1959, through the beginnings of the World Wide Web, almost up until today. Other recent works have discussed the social, economic, and political impacts of the Internet on its *users*, including to greater and lesser extents how these factors might feed back upon the technology itself, but none have discussed the technology in this detail. Furthermore, the book takes the "Social Construction of Technology" approach prevalent among historians and sociologists of science. This means that, using a wide array of primary documents including oral history interviews from the Center, the Charles Babbage Institute and elsewhere, technical articles, and even pages from the

World Wide Web itself, Abbate focuses instead on the social, political, and economic forces affecting the *builders* of the Internet — the engineers and scientists who made it a reality. Such an approach gives a whole new angle to the story, for at times these engineers were not considering the end user, not getting feedback from the endusers, or actually had the wrong set of endusers in mind. Though it might be read in conjunction with some of those other, more popularly written works, Abbate summarized their arguments sufficiently that this monograph stands on its own.

The book is well-written and the technical matters clearly explained and illustrated. One small drawback is that, given that the engineers and scientists are set up as the "players," and that the story is sometimes told in their voice, it might have been nice to see illustrations of them and their work environments. Still, that is a minor point as this book is a must-read for any layperson interested in the Internet and how we got here, and for all historians, sociologists, and anthropologists of science and technology.

Available from The MIT Press, Cambridge, MA, 800-358-0343, fax: +1 617-625-6660 <http://mitpress.mit.edu>, \$27.50, cloth, ISBN 0-262-01172-7, 264 pp

JEFF HECHT, *City of Light: The Story of Fiber Optics*, Oxford University Press, 1999, xii+316 pp.

This latest entry in the Sloan Technology Series, by engineering-trained science journalist Jeff Hecht, is a layperson's complete account of the history of fiber optics from their pre-electric beginnings as an adjunct to physics experiments until their use in 1996 as a telecommunications medium capable of

transmitting one trillion bits per second. Most simply put, fiber optics rely on the property of refraction and total internal reflection in materials (i.e. glass fibers) otherwise transparent light of appropriate electromagnetic wavelength (be it visible or no) to guide that light along the length of the material and even around corners. Like someone actually working with fibers, Hecht weaves multiple threads into his story. First there was the discovery by the Swiss physicist Daniel Colladen, in 1841, that, using focussed sunlight, the internal reflections of a stream of water enabled him to make visible the properties of those streams to his students. However, the entertainment value of such demonstrations soon took over. At the same time, for use in other forms of decoration, glassmakers were attempting to produce longer and longer and finer and finer glass fibers. And, incredibly, two developments that began in two different artistic realms joined to form a major scientific and technological tale for our times. In well-written and clear language, Hecht tells his story. These two plotlines are so fascinating, that we summarize their beginning here as in a film review, without giving away too many details, nor the ending!

Soon after his discovery, Colladen and others utilized the newly invented arc lamp to pursue both the mechanics of water flow and the optics of water. At the same time, more applied individuals realized a use for this phenomenon — entertainment through the illumination of elaborate fountains. In 1853, Colladen had been asked to design such a fountain as a “special effect” for the Paris Opera. The “fairy” or “Colladen” fountains graced many a Victorian exhibition, culminating in the 1889 Paris Universal Exposition which also brought us the Eiffel tower, and earned Paris, and this book, the title :City of Light.” By the way, these fountains crossed the Atlantic to the 1894 Columbian Exposition in Chicago, and are still, in use today, for example at the “Festival of Fountains” at the Longwood Gardens, a former Dupont estate in suburban Philadelphia.

Hecht rightly points out, with an unusually broad view for a modern journalist/historian of technology, that glass is at least 4000 years old, and that as early as Roman times, short, coarse glass rods were drawn. The Roman technology continued into the Medieval period in Europe, and although the keeping of glass technology as trade secrets has left few if any written records, Hecht intuits that the glass makers must have observed the refractive properties of glass, owing to their techniques. In the Renaissance and beyond, however, the emerging scientists became more interested in the optical properties of glass, as in Newton’s prism experiments, while the artificers continued to try to improve its production, and glass fibers were commonly used in both endeavors. The earliest mention

that Hecht could find of glass fibers (based on secondary sources) was 1612. It may interest him and you to know that at the Center we have recorded a mention in Biringuccio’s *Pirotechnia*, published in 1540, a year before the author’s death (and two years before Newton’s birth!), of “a single fiber like a thread, more than 30 braccia (1.75 meters!) long, all in one piece like gold or silver drawn through a drawplate” (translated by C.S. Smith and M.T. Gnudi, MIT Press, Cambridge, 1959, 2nd edition, p. 132). In any event, by the late 19th century and the age of fairy fountains, glass could be spun to the length of three meters and finer than silk, and was used in wigs, fabrics, and perhaps Cinderella’s shoe, while by this time, the nature of total internal reflection was understood, although who was first to publish definitively on the matter is unfortunately not made clear by Hecht.

In any event, it was left as always for the artificers and technologists — the engineers — to take scientific ideas and make something of them, using both other principles and techniques from wherever they needed to be drawn. Although both lighting and glass technology were still limited, already in 1880 the American inventor William Wheeler had patented the idea of glass pipes incased in mirrors for illuminating homes with a single arc-lamp, safely stowed in the basement. By 1899, an American dentist had patented a dental illuminator which used a curved glass rod to deliver light into a patient’s mouth without exposing them to the heat of an incandescent bulb. By 1930 several patents were issued on what would now be called an endoscope, but none were reduced to practice, limited by the technology of the day.

However, in the 1930s Corning developed fiber glass, while Dupont perfected Lucite. After the interruption of the war, the quest for optical transmission and imaging for medical and related applications picked up again, and the war had also sparked an interest in optical, encoded communication systems, though these threads are not well-detailed by Hecht. The second half of Hecht’s book reveals how these two elements came together finally once and for all, along with a new unexpected thread — the laser — to lead to a commercial race for the practical fiber optic communication system.

To learn this final story, read the book, which is certainly worthwhile. The book is written for the public, with the scientific principles simply explained and well-illustrated. The inclusion of a large number of photographs of the players and their apparatus adds to appeal of the story, as do a timeline and “dramatis personae” included as appendices. For the more technical reader, the work is still worthwhile and enjoy-

able, and is thoroughly footnoted with technical literature, despite its populist bent. Once again the Sloan Technology Series has contributed to our understanding of the history of a modern technology.

Available from: Oxford University Press, New York, NY, +1 800-451-7556, <http://www.oup.com>, \$29.95, hardback

CERUZZI, PAUL E. *A History of Modern Computing*.

Not surprisingly, the early history of computing is much better covered in the existing historiography than is the development of computing in the past half-century. The publication of Paul Ceruzzi’s *A History of Modern Computing*, which deals almost entirely with the post-World-War-II story, is therefore particularly welcome. An addition to the distinguished MIT Press series on the history of computing, this book begins by considering how ‘computer’ is defined and by setting forth certain themes that recur in the roughly chronological narrative that follows. Among the themes are the following: the persistence, through various hardware implementations, of the von Neumann architecture; the embeddedness of computer development in the history of the Cold War; the dominant role of IBM; the increasing prominence of software; and the relationship between computers and the functions of information in a democratic society.

The narrative begins with the transformation of the computer, in the late 1940s and early 1950s, from a specialized scientific instrument into a commercial product. The continued growth of the computer business and the early history of software are the subjects of the next two chapters. The fourth chapter explains the emergence of small systems in the 1960s, which the author regards as a key transition in computer history. The IBM System/360 is the main subject of the next chapter, which is followed by the story of the microprocessor and, in a separate chapter, the personal computer. The eighth chapter, entitled “Augmenting human intellect, 1975-1985”, describes a wide range of products, including VAX, word-processing, MS-DOS, and the Macintosh. The spread of networking after 1985 is the subject of the final chapter. Most attention is given to events in the United States, but European and Japanese contributions are not ignored. The book is effectively illustrated, and sources of information are abundantly, but unobtrusively, given in endnotes.

Available from: MIT Press, Cambridge, MA.: 1998. xi + 398 pp.; 1-800-358-0343, fax +1-617-625-6660, <http://mitpress.mit.edu> ISBN: 0-262032554

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Funding a Revolution: Government Support for Computing Research (National Academy Press, 1989)

Funding a Revolution uncovers the relationships between the U.S. computer industry and the Federal government, demonstrating quite convincingly that Federal money has made an enormous difference in the development of computing. The book presents the results of a project that sought to identify key trends in the computer industry over the years, and identify the contributions made by the United States government through funding of research, standards-setting, or other activities. It also includes historical case studies of five specific areas, including relational databases, the internet/world wide

web, theoretical computer science, artificial intelligence, and virtual reality. The book itself was funded by the National Research Council, and its contributors include prominent scholars and engineers.

NYE, DAVID E., *Consuming Power: A Social History of American Energies*

David Nye, an American working at Odense University in Denmark, has become one of the most widely read historians of technology since the publication of his *American Technological Sublime* in 1994. His latest book focuses on the way that the people of the United States became the leading consumers of energy. He does this by examining the daily activities of ordinary people as they lived and worked, rediscovering the ways that they

adopted or accommodated more energy-intensive technologies. The book spans the period from the colonial era to the present, and treats wind, water, fossil fuel, and electric power.

Cambridge, MA: MIT Press, 1-800-358-0343, fax +1-617-625-6660, <http://mitpress.mit.edu> ISBN: 0-262640384.

PUBLICATION NOTE: Christopher Sterling and George Shiers's book *History of Telecommunications Technology: an Annotated Bibliography* is being republished in an updated and revised edition. The authors have added new subjects and expanded the existing ones. For more information contact Shirley Lambert at Scarecrow press at slambert@scarecrowpress.com or tel. +1 301-459-3366, or fax. +1 301-459-2118 ♦

Things to See and Do

New Exhibits at Corning The Corning Museum of Glass has opened a new Glass Innovation Center which includes exhibits on glass applications in electronics such as optical fibers for communication. For more information, contact the museum at One Corning Glass Center, Corning, NY 14830-2253, +1 607-937-5371

A call for papers. The University of St. Louis is cosponsoring a conference, *Writing the Past, Claiming the Future: Women and Gender in Science, Medicine, and Technology*. It will be held 12-15 October 2000 at the University of St. Louis. Conference themes will include personal and external factors that empower or inhibit women's participation in the scientific, medical, and technological disciplines; scientific, medical, and technological ideas which have influenced ideas about gender and gender roles in the disciplines and in the wider society; and the relationship between gender and conceptions of knowledge and then practice of science, medicine, and technology. Papers should explore the interdisciplinary relationships of women and gender and science, medicine, and technology. Paper proposals are due by 31 December 1999. For more information please contact Charlotte Borst, Dept. of History, Saint Louis University, 3800 Lindell Blvd., St. Louis, MO 63156

Evolution of Modern Electronics. A one-day meeting sponsored by the Civil Engineering Dept. of Imperial College, London, England, will be held 4 March, 2000. Papers are sought which deal with the evolution of electronics systems in measurement of time, space, mass, physical quantities, biological activities, etc. For more information, contact: Dr. M. C. Duffy, Edinburgh Building, University of

Sunderland, SR1 3SD, tel 0191 515 2856, michael.duffy@sunderland.ac.uk

Eye on the Web Going Digital

Going Digital is the newest web site to be launched by the IEEE History Center. We know that since the beginning of the 1960s, there have been more advances in engineering and technology than in any previous period in recorded history. However, many of these engineering achievements remain poorly documented, owing to the nature of the corporations in which they were produced and other factors. Moreover, the individuals who pioneered these advances are aging. The intent of this site is to collect the history of Automatic Speech Synthesis & Recognition and Digital Audio Recording utilizing the Web. Funded by a grant from the Alfred P. Sloan Foundation, it is an online forum to develop timelines, major events and setbacks in the development of these technologies and a resources for future historical research.

We encourage you to visit the site at www.ieee.org/organizations/history_center/sloan/sloan_index.html. And if you know someone who worked on the development of these technologies, please pass along the URL.

Our project is just a small part of a very large undertaking by the Alfred P. Sloan Foundation to encourage the documentation of history utilizing the Web. Their initial project is entitled STIM: Science and Technology In the Making. The URL of the main site is sloan.stanford.edu. Hosted by Stanford University, the site is tracking the

history of such exciting technologies as the history of the Mouse, the electric vehicle, the New York City Blackouts and more. It's definitely worth a visit!

In each issue of the Newsletter we like to feature Web Sites that will be of interest to our readers. Here are a few we came across in our surfing:

Transistorized: In conjunction with its program on the transistor, PBS has launched a new site entitled "Transistorized", which tracks the history of the transistor. Engineers could hardly argue with a quote on this site: "The Transistor was probably the most important invention of the 20th Century..." (www.pbs.org/transistor/index.html).

Smithsonian Without Walls: Another site we strongly recommend is new from the Smithsonian Institution entitled "Smithsonian Without Walls". This site is still under development, but the graphic imagery is both attractive and attracting to the viewer (www.si.edu/revealingthings/).

The Science Museum, London: From a new gallery dedicated to the history of industrialization to the Apollo 10 Mission in 1969, this site is well rounded for engineers, scientist and historians alike. A new feature on this site is called *Exhiblets*, which are digital exhibitions that use the museum's collections, to describe important events, discoveries and personalities in science and technology. (www.nmsi.ac.uk/welcome.html)

Links to all of these sites can be found on our "Related Sites" section of the History Center's web site. Visit often, we are always enhancing our site!!! ♦

Edison Recording Equipment Back in Use

George Spadaro, mayor of Edison, New Jersey, believes that the residents of his city ought to be proud of the technological contributions of Thomas Edison. With the help of Jack Stanley, curator of the Edison Tower and Museum, Spadaro arranged for a band from one of the city's middle schools to make a recording on turn-of-the-century equipment manufactured by Edison's National Phonograph Company. The Jefferson Middle School Band played as loudly as possible into a large brass horn and then were delighted to hear their music played back (at a much lower volume). This at a time when other school bands are using MP3 and the Internet to distribute their music.

National History Day Prizes

The IEEE History Center was pleased to see that today's secondary school students are actively interested in the history of technology. Several of the category prizes for US National History Day went to entries studying the history of technology. The 2nd place prize in the Junior Group Performance category went to Shelly Arner et al for "We Interrupt This Broadcast: Radio's Impact on the 20th Century"; 3rd place in Junior Individual went to Helen Comber for "From South to Sunbelt: The Effects of Air Conditioning on Southern Life"; 2nd place in Junior Individual Documentary went to Bryan Mochizuki for "A Spark of Genius That Electrified the World"; 2nd place in Senior Individual performance went to Lillian Azevedo for "Petticoats to Punchcards"; 2nd place in Senior Group Exhibit went to Erin Tanaka et al for "Out of the Darkness, Into the Light"; 1st place in Senior Group Documentary went to Nathaniel Duca and James Kirschener for "Information.Com: Product of the Net Revolution". The Junior Division Special Prize was won by Katie Madsen et al for "REA: Electrifying the Rural Area", and the Senior Division Special Prize was won by Joy Henderson for "TVA: A New Deal for the Old South".

Smithsonian Resident Scholar Programs

The Smithsonian Institution Libraries Resident Scholar Programs offer short-term study grants during the year 2000 with stipends of \$1,800/month for durations of one to three months. Historians, librarians, doctoral students, and other scholars are invited to apply. For applications and more information, visit: <http://www.sil.si.edu/Information-Files/dibner-fellowship.htm>

Bakken Visiting Research Fellowships

The Bakken Library and Museum in Minneapolis offers visiting research fellowships for the purpose of facilitating scholarly research in its collection of books, journals, manuscripts, prints, and instruments. The focus of the Bakken's collection is on the history of electricity and magnetism and their applications in the life sciences and medicine. Related materials include mesmerism and animal magnetism, 19th-century ephemera concerning alternative electromagnetic therapies, letters of various scientists, and trade catalogues. The instruments include electrostatic generators, magneto-electric generators, induction coils, physiological instruments, recording devices, and accessories.

The fellowship is a maximum of \$1,300 and is to be used for travel, subsistence, and other direct costs of conducting research at The Bakken. The minimum period of residence is one week. **The next application deadline is March 1, 2000.** For further information, please contact: David J. Rhees, Executive Director, The Bakken Library and Museum, 3537 Zenith Avenue South, Minneapolis, MN 55416, USA, (telephone: +1 612-926-3878, extension 213; fax: +1 612-927-7265; e-mail: rhees@thebakken.org; www.thebakken.org)

Hagley Museum/Rutgers University Postdoctoral Fellowship

The Hagley Museum and Rutgers University-Camden jointly will serve as one of fifteen sites for the new postdoctoral fellowship program of the Woodrow Wilson National Fellowship Foundation. Fellowships will provide the time and resources necessary to continue research, turn a dissertation into a publica-

tion, and broaden teaching experience. For more information, see the web site at: http://www.woodrow.org/academic_postdoc

Henry Belin Du Pont Dissertation Fellowship

This fellowship at the Hagley Museum is designed for graduate students who have completed all course work for the doctoral degree and are conducting research on their dissertation. This is a residential fellowship for a 4-month term; it provides \$6,000, free housing on Hagley's grounds, use of a computer, email and internet access, and an office. <http://www.hagley.lib.de.us>

TEPCO Looking for Donations of Electronic Equipment

To commemorate the 50th anniversary of Tokyo Electric Power's (TEPCO) founding, TEPCO is planning to build an *Electric Power History Museum*. Arthur D. Little, global technology consulting firm is one of the several firms working with TEPCO on the project. TEPCO's specific role is to locate power equipment in Europe that would be suitable for inclusion in the museum's exhibits. The equipment should have been manufactured prior to 1960 and would ideally represent new technology and its application in the power industry. If you own or have knowledge of retired power equipment that could potentially be loaned, rented, or sold to TEPCO, please contact Kathryn Fry at fry.kathryn@adlittle.com or tel. +1 617-498-6438, fax. +1 617-498-7007 or via mail at Arthur D. Little, Inc., Acorn Park 35-276, Cambridge, MA 02140-2390, USA ♦

Milestones Update:

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widely used internationally. Elements of the dynamic balancing systems are still used today, primarily for industrial and automotive production applications.

Volta's Electrical Battery Invention, 1799 Como, Italy Dedicated September 1999

In 1799, Alessandro Volta developed the first electrical battery. This battery, known as the Voltaic Cell, consisted of two plates of different metals immersed in a chemical solution. Volta's development of the first continuous and reproducible source of electrical current was an important step in the study of elec-

tromagnetism and in the development of electrical equipment.

First Wearable Cardiac Pacemaker, 1957-1958 Minneapolis, MN, USA Dedicated October 1999

During the winter of 1957-58, Earl E. Bakken developed the first wearable transistorized pacemaker, at the request of heart surgeon, Dr. C. Walton Lillehei. As earlier pacemakers were AC-powered, this battery-powered device liberated patients from their power-cord tethers. The wearable pacemaker was a significant step in the evolution to fully-implantable units.

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Milestones Update

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This is an outstanding achievement, as the previous record for shortest time span for the dedication of five Milestones was 12 months, set way back in May 1987 to May 1988. Moreover, the true measure of the Milestone program is quality not quantity. While the key to the program is the interest and support of the local IEEE Section, a glance at these Milestones and the way they were dedicated underlines their broader significance: To attend the Georgetown event, IEEE History Center Research Coordinator Rob Colburn, Members of the Denver Section, and other dignitaries braved a landslide; the Capetown event, held by the South Africa Section in conjunction with IEEE AFRICON'99, was given high visibility in Region 8 and was actually tele-linked to the Smithsonian Institution in Washington, DC; the Volta dedication was the North Italy Section's gift to the international celebrations of Volta's centennial that are being held throughout the year in Italy and elsewhere; and the Bakken Milestone was featured by the Twin Cities Section as part of IEEE Sections Congress'99 (see page 4). The joint dedication of the Merrill Milestone by the IEEE Denver Section and by the ASME as one of their Landmarks in Mechanical Engineering, well attended by representatives from both societies, shows its importance. We may be able to present some more details about some of these ceremonies in future issues, accompanied by photographs. In the meanwhile, these new Milestones raise some points about the direction of the overall program.

Despite the excitement about Merrill, only five of the 32 Milestones are joint dedications, the last of which was Mill Creek No. 1 Hydroelectric Plant in Redlands, CA, USA, with the ASCE more than two years ago. One of the areas we are working on is to build more bridges to the historic programs of other engineering societies, and this is a good start.

Another area of concern is geographical distribution. Of the first 22 Milestones, only three were outside of Regions 1-6. Of the last 10, five are from outside the United States. The eight current non-U.S. Milestones represent the countries of Canada, England, Denmark, Japan, South Africa, and Italy. Thus, among the ten IEEE Regions, only Region 9 lacks a Milestone. We are currently working with proposals or nominations from several of what we consider previously unrepresented areas, including France, Ireland (part of the IEEE UKRI Section, but a separate nation), and Hawaii (part of Region 6, but geographically isolated). We feel this is a good start, and we hope that the exposure of the Program at IEEE Sections Congress will help us continue to improve the program. Keep your eyes peeled for announcements in future newsletters. ♦



Left to Right: Duncan Baker, Reuben September, Nico Beute, Braam Esterhuysen at dedication of Capetown, South Africa.



Tony Voorveld, University of the Witwatersrand, demonstrates Herz and Marconi experiments at the milestone celebration on apparatus dating from the period. Capetown, South Africa.



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