

IEEE History Center

ISSUE 68, July 2005

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STATIC FROM THE DIRECTOR

It's all about power. As summer arrives in the northern hemisphere, those of us in certain areas of the globe wonder if our electric power will hold out all season. I hope that without resorting to anything as dramatic as a blackout, the IEEE History Center can continue successfully to carry out its mission to raise in the minds of the public the importance of electricity to their lives—and to get them to understand the role of engineers and engineering in discovering, inventing, and developing the electrical, electronic and computer technologies on which their society and their lives have come to depend.

Of course, the IEEE History Center endeavors to preserve, research, and promote all technical areas represented by IEEE members. But none of those other technologies, no matter how sophisticated—artificial hearts, nanobots, wireless internet, even computer software!—will work if the juice is not flowing. Therefore, we have decided that the History Center's next international symposium, which we are planning

for summer 2007, will be on the history of power generation, distribution and use. Look for updates in coming newsletters and on our website as plans evolve.

Meanwhile, a quick perusal of this issue of our newsletter helps to drive home the point that we are already thinking about this important technical area as part of our ongoing programs. On page 9, the Center's Senior Research Historian Frederick Nebeker, in his "EE in the Movies" feature, demonstrates how Hollywood has already gotten—and exploited—the message of the importance of

the delivery of electricity. On page 3, we report on an interesting reference request on electric sockets. Also on page 3 you will see that some of our interesting archival material relates to power.

Most importantly, a glance at our latest Milestones—yes, the program is still moving ahead at a record-breaking pace [see page 7]—shows the importance that local IEEE Sections place on power genera-



Transformers at Norris Dam Substation.
Ellenberger collection photo

CENTER ACTIVITIES

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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"CSI: CRIME SCENE INVESTIGATION" TURNS TO THE HISTORY CENTER; SO DO REAL CASE INVESTIGATIONS

When the scriptwriters for the television show "CSI: Crime Scene Investigation" need help with technical accuracy, they turn to the IEEE History Center's reference service for answers. Last February, the writers needed help in the technical accuracy of a crucial scene where an important piece of evidence is recovered. While we can't give

away the details, the scene involved acoustic signal processing.

The IEEE History Center has also recently assisted with a real-life cold case investigation to help identify the type of recorder needed to play back a coroner's notes off of an obsolete tape format.

STATIC FROM THE DIRECTOR *(continued from page 1)*

tion and transmission in their areas. As I write, the Vuče Power Plant in Yugoslavia and the Nelson River HVDC Transmission System in Manitoba, Canada, are about to be dedicated, and the Taum Sauk Pumped-Storage Plant near St. Louis, MO, USA was recently approved.

Bringing up the Milestones Program also strikes a sad chord, as we note the passing of Charlie Wright [page 4]. Charlie did a lot of things for a lot of organizational units at IEEE, but probably no one was more important to the growth of the Milestones Program. Charlie, a life-long power guy, of course wanted to see all technical areas honored by Milestones, but he himself had a strong hand in the recognition of the Ames Hydroelectric Plant, the Shoshone Trans-

mission Line, and the Georgetown Steam/Hydro Plant (where he also helped to found a museum). He will be greatly missed. His widow has graciously suggested that donations can be made to the History Center in his memory, through the Trustees of the IEEE History Center Fund, overseen by much-decorated Trustees Chair Wally Read—himself a power guy [page 5]. May the power be with you.

The IEEE History Center Newsletter Advertising Rates

The newsletter of the IEEE History Center is published three times per annum with a circulation of 10,700 of whom approximately 7,100 reside in the United States. The newsletter reaches engineers, retired engineers, researchers, archivists, and curators interested specifically in the history of electrical, electronics, and computing engineering, and the history of related technologies.

	<u>Cost Per Issue</u>
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Full Page	\$250

Please submit camera-ready copy via mail or email attachment to ieee-history@ieee.org. Deadlines for receipt of ad copy are 2 February, 2 June, 2 October. For more information, contact Robert Colburn at r.colburn@ieee.org.

IEEE ARCHIVES – WONDERFUL THINGS COMING TO LIGHT

The IEEE Archives, located at the IEEE Operations Center in Piscataway, NJ, maintains the historical records of the IEEE as well as its predecessor societies, the American Institute of Electrical Engineering (AIEE) and the Institute of Radio Engineers (IRE.) For more than a year, Mary Ann Hoffman, Archival and Web Services Manager, has been going through all the material that was placed in the Archives, and entering the information in the History Center's database. She has discovered a number of very interesting artifacts in the process. One such example is the "IRE President's Book." The IRE started publishing the *Proceedings of the IRE* in 1913. The Book is a reproduction of the first issue of Proceedings. Each page is signed by a president of the IRE, from Robert Marriott (1912) to Patrick Haggerty (1962). Look for an article on this artifact in an upcoming issue of the *IEEE Proceedings*. All the original Minute Books from the AIEE are in the Archives, dating back to 1884. They are handsomely hand written accounts of that Society. In the beginning, the meetings were both business (membership, meetings) and technical. Papers were presented at each meeting.

Mary Ann found an original study done by Charles Steinmetz on the electric car in 1920. Its cover is signed and dated by Steinmetz. Look for an article on this study in the *IEEE Power and Energy Magazine*!

The Archives also maintains the Centennial gifts from 1984 and the Merger documents from the early 1960s. Through this process, Mary Ann discovered a great deal of material that should not have been placed in the Archives. Through outreach, she was able to find more appropriate repositories, including the Federal Communications Commission, New Jersey Antique Radio Club and organizational units of the IEEE, among others. The original minutes of the AIEE Toronto Section, dating back to 1903 were returned to the Section.

A valuable resource in the Archives is *Electrical World* dating back to 1894. The Archives also maintains some very small artifacts, including a Bunnell Repeater and an Edison Phonograph. Mary Ann hopes to have this work complete by the end of the summer, with the help of summer intern Tracy Eddy.

NATIONAL GEOGRAPHIC ARTICLE ON ELECTRIC SOCKETS AND PLUGS WORLDWIDE

The June 2005 issue of *National Geographic* contains a short article and very useful map of the different electrical sockets in use in different parts of the world, together with a brief outline of the history of the adoption of various types. IEEE

History Center staff assisted with the research for the article, "Plugged In" by Peter Gwin in the Geographica section (the section does not have page numbers).

2005 LIFE MEMBER INTERN

The History Center is pleased to announce that Graduate Assistant Tracy Eddy is the 2005 Life Member Intern. Tracy is a Rutgers alumna in the Rutgers History Department graduate program. Her research interests focus on 20th century American political history, and her dissertation examines H.R. Haldeman's role in the Nixon White House. Her minor field is the history of technology and the environment. During her past three years at the Center, Tracy has assisted in Center projects such as the Marconi Foundation project, and has written articles for *Today's Engineer* and *The Institute* about

topics in the history of electricity, including, "Electronics in the Olympics" and the upcoming "The Bass Drum Heard 'Round the World': Telarc, Frederick Fennell, and an Overture to Digital Recording." This summer, she will be assisting Archival & Web Services Manager Mary Ann Hoffman with the reorganization of the History Center Archive, among other projects. Tracy will also be continuing her work at the Center this upcoming academic year as a fourth-year Graduate Assistant.

TRUSTEE EMERITUS CHARLES TOWNES WINS TEMPLETON PRIZE



Charles Townes, Trustee Emeritus of the IEEE History Center has won the 2005 Templeton Prize. The prize, valued at more than \$1.5 million, was announced on 9 March at a news conference at the Church Center for the United Nations in New York. The Templeton Prize for Progress Toward Research or Discoveries about Spiritual Realities

was founded in 1972 by pioneering global investor and philanthropist Sir John Templeton. Given each year to a living person to encourage and honor those who advance knowledge in spiritual matters and valued at 795,000 pounds ster-

ling, the Templeton Prize is the world's best known religion prize and the largest annual monetary prize given to an individual.

Townes' investigations into the properties of microwaves resulted first in the maser, a device which amplifies electromagnetic waves, and later his co-invention of the laser, which amplifies and directs light waves into parallel direct beams. His research, for which he shared the Nobel Prize in Physics in 1964, opened the door for an astonishing array of inventions and discoveries now in common use throughout the world in medicine, telecommunications, electronics, computers, and other areas.

CHARLIE WRIGHT, 1918-2005



He had the "wright" stuff! Charlie Wright, a longtime supporter of the IEEE History Center, passed away on 11 May 2005 in Colorado Springs, CO. He was 87 years old.

Charlie was born on 17 March 1918 in Missouri and received his degree in Education in 1941 from Pittsburg State University, Pittsburg, Kansas, including two years of pre-engineering. He taught one semester in the Lamont, KS high school and served four years in the Army Air Corps. He was employed by the Public Service Company of Colorado in October 1946. At that time he enrolled in the School of Electrical Engineering at Colorado University. He was appointed to an engineering position in 1953 in the Transmission, Substation and Distribution Standards Department. The same year he joined the AIEE as an Affiliate member. He retired from the company in January 1983.

His IEEE volunteer activities are too numerous to list. Charlie served on dozens of boards and committees for more than 50 years. He served on the IEEE Board of Directors in 1984-1985. He served on the IEEE History Committee in the 1980s, and was responsible for numerous IEEE Milestones. Charlie also worked to establish the Georgetown Energy Museum. Charlie and his wife Catherine met in a high school physics class and were married for more than 60 years.

In 1996 Charlie received the RAB William W. Middleton Distinguished Service Award for "for outstanding service to Regional Activities and exemplary contributions in preserving the History of Electrical Engineering and presenting it to the public."

Charlie is survived by his wife Catherine, one daughter and two grandchildren.

At the request of Mrs. Wright, donations can be made in memory of Charlie to the IEEE History Center. Memorial gifts can be made payable to the IEEE Foundation-History Center Fund. The mailing address is IEEE Foundation Development Office, 445 Hoes Lane, Piscataway, NJ 08854.

READ WINS IEEE STEINMETZ AWARD



Dr. Wallace (Wally) S. Read, 2005 Chair of the IEEE Trustees of the IEEE History Center was awarded the 2005 IEEE Charles P. Steinmetz Award "for sustained leadership in organizing IEEE standards activities to be responsive to industry and the global marketplace." During his tenure as vice president of the IEEE Standards Activities (1993-94) he played a key role in strengthening relations with the International Electrotechni-

cal Commission (IEC), the International Telecommunications Union (ITU) and the International Organization for Standardization (ISO).

Wally, an IEEE Life Fellow, served as the 1996 IEEE President. He is a recipient of many other honors, including the IEEE Power Engineering Society's Power Life Award and Member of the Order of Canada (see Newsletter #63) The Steinmetz Award was created by the IEEE in 1979 and is presented each year to an individual for exceptional contributions to the development and/or advancement of standards in electrical and electronics engineering.

INFOAGE RECEIVES MAJOR CONTRIBUTION

13 April 2005 was a banner day for InfoAge Learning Center in Wall Township, NJ. Harris Corporation donated \$15,000 for the restoration of the historic Silent Sentinel Satellite Tracking Antenna.

InfoAge Learning Center, located in central New Jersey, sits on the old Camp Evans site, a 37-acre former military installation. What started out as a Marconi Wireless Station in 1913 evolved into a Navy installation during World War I. After the war it was turned back over to Marconi, until the start of the World War II. Now used by the Army, it was on this site that engineers assisted in the development of radar. After the war it had many different roles, including a training center and research laboratory. It was on this site in the late 1950s that the US Signal Corp constructed a 60-foot dishshaped antenna, Space Sentry, to pick up the signals from the TIROS 1 weather satellite. The antenna was manufactured by Harris Corporation. Camp Evans received the first weather satellite photographs on 1 April 1960. These photographs were immediately flown to Washington, DC where the head of NASA presented them to President Eisenhower for public release.

Today InfoAge is committed to the preservation of the enormous amount of history that was made over its 80-year presence in Wall Township. It is on the National Register of Historic Places and has been proposed as an IEEE Milestone. They are now preparing the buildings on the site to house museum exhibits and a science center so that school children may have first hand knowledge of history. This will also be a living memorial to all who served the United States during World War II. Visit www.infoage.org to learn more.



REMEMBERING YOUR PROFESSIONAL HERITAGE WITH A BEQUEST

By: Karen Galuchie, IEEE Development Office

One of the simplest and most rewarding gifts you can make to the IEEE History Center is a bequest in your will or living trust. Many of us want to provide generously for the organizations we cherish, in addition to our loved ones. A bequest of any size in your estate plans will help the IEEE History Center continue its important work of preserving, researching, and promoting the history of electrical engineering and computing for generations to come.

There are three different bequest options for you and your family to consider when deciding how best to remember the IEEE History Center in your plans.

A. General bequest. You designate a specific dollar amount or percentage to the IEEE Foundation for benefit of the IEEE History Center.

B. Residuary bequest. After all other specific bequests, debts, taxes and expenses have been paid, you designate the IEEE History Center to receive the “rest, residue and remainder” of your estate.

C. Contingent bequest. You request that the IEEE History Center receive all or a part of your estate if certain circumstances were to occur, such as all other named beneficiaries pre-decease you.

In addition to deciding which type of bequest will fit best into your plans, you should also consider how you would like the IEEE History Center to use your gift.

§ An Unrestricted Bequest provides the Center with the resources it needs to support the wisest and most pressing need at the time of receipt. An unrestricted bequest would read:

“I give the rest, residue, and remainder of my estate (or a dollar amount) to the IEEE Foundation, Incorporated, New York, NY for the benefit of the IEEE History Center.”

§ A Restricted Bequest allows you to specify how the funds are to be used. Perhaps you wish to designate one of the Center’s programs for which you have a fondness, such as the Oral History Program, IEEE Virtual Museum, or Milestones. A restricted bequest would read as follows:

“I give the rest, residue, and remainder of my estate (or a dollar amount) to the IEEE Foundation, Incorporated, New

York, NY to be used for the (named program or project, such as Oral History Program, IEEE Virtual Museum, etc) of the IEEE History Center.”

§ An Endowment Bequest restricts the principal of your gift, requiring the Center to hold the funds permanently and use only the investment income they generate. Creating an endowment in this manner means that your gift can continue giving indefinitely. To establish an endowment fund, the terms of your will or living trust might read:

“I give the rest, residue, and remainder of my estate (or a dollar amount) to the IEEE Foundation, Incorporated, New York, NY to establish an endowment fund, the principal of which shall be invested as the IEEE Foundation Board of Directors may deem best and the income only used for (if you wish - named program or project) of the IEEE History Center. In the event that such use shall, in the judgment of the Board of Directors, become unnecessary or impracticable, then for such purposes as the Board of Directors in their discretion shall determine.”

It is our hope that you will consider including the IEEE History Center in your estate plans, thereby perpetuating the professional heritage of electrical engineering and computing. If you decided to name the IEEE History Center as a beneficiary of your will or living trust, we hope you will share the good news with us. This will allow us to thank you for your generosity and recognize you during your lifetime by adding you to the roster of “Goldsmith League,” the IEEE’s legacy giving recognition group. If you prefer to remain anonymous, we will honor your wishes and include you as an anonymous member.

If you are interested in learning more about how to include the IEEE History Center in your plans, or wish to notify us of a legacy gift you have already established, please contact the IEEE Development Office at +1 732.562.5550 or supportieee@ieee.org. As always, thank you for supporting the IEEE and its efforts to preserve the history of our technology.

MILESTONES UPDATE

Two new Milestones in the history of IEEE technologies have been dedicated, and a third is about to be dedicated as this issue goes to press.

On 19 May 2005, Alexander Popov's contribution to the development of wireless communication, (1895) was commemorated by the dedication of a Milestone at the St. Petersburg State Electrotechnical University, Russia by the IEEE Russia Northwest Section in conjunction with the International Scientific Conference "The 110th Anniversary of Radio Invention."

Popov constructed a portable device which, being sensitive to Herz waves, responded to electrical oscillation by ringing a bell. Using the device, it was possible to transmit short, continuous signals across a distance of up to sixty-four meters. In March of 1896, Popov demonstrated his device, signaling "Heinrich Hertz" in Morse code across a distance of 250 meters.

The citation of the Popov Milestone reads:

"On 7 May 1895, A. S. Popov demonstrated the possibility of transmitting and receiving short, continuous signals over a distance up to 64 meters by means of electromagnetic waves with the help of a special portable device responding to electrical oscillation which was a significant contribution to the development of wireless communication."

The IEEE Santa Clara Section dedicated a Milestone to RAMAC (Random Access Method of Accounting and Control), at Santa Clara University's Bannan Engineering Center. The Center contains the Magnetic Disk Heritage Center, in which a RAMAC in the process of restoration is located. Eventually, the Milestone plaque and the RAMAC will be relocated to 99 Notre Dame in San Jose (where the original RAMAC research laboratory was established), as part of the plan to establish a San Jose technical history museum.

The citation of the RAMAC Milestone reads:

"Developed by IBM in San Jose, California at 99 Notre Dame Street from 1952 until 1956, the Random Access Method of Accounting and Control (RAMAC) was the first computer system conceived around a radically new magnetic disk storage device. The extremely large capacity, rapid access, and low cost of magnetic disk storage revolutionized computer architecture, performance, and applications."

In addition, the Vučje Hydroelectric Plant in Serbia is scheduled for 25 June, as this issue goes to press. We will report on the dedication in the next issue.



Vučje Powerplant #2 as it looked when it was built

MISCELLANEOUS

PAUL BUNGE PRIZE 2006

The German Chemical Society (Gesellschaft Deutscher Chemiker) extends an international invitation for applications for the Paul Bunge Prize 2006 awarded by the Hans R. Jenemann Foundation. The € 7,500 prize, named for an important designer of analytical, assay, and high-performance precision balances in the second half of the nineteenth century, honors outstanding publications

in German, English, or French in all fields of the history of scientific instruments. Deadline for nominations is 30 September 2005. Gesellschaft Deutscher Chemiker, Abt. Preise und Auszeichnungen, PO Box 90 04 40, D-60444 Frankfurt/Main, Germany, ehrungen@gdch.de

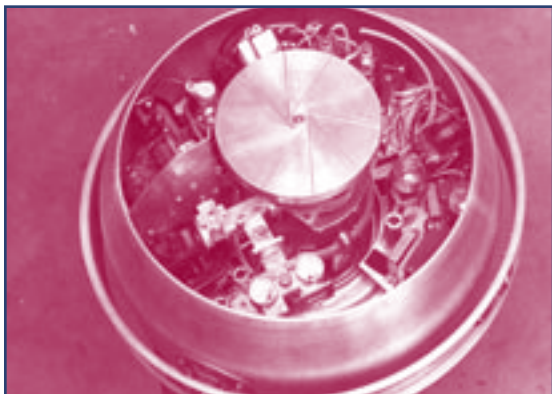
THINGS TO SEE AND DO

CONFERENCES IN COMPUTER HISTORY

The International Federation for Information Processing sponsors frequent events in computing history. So far, there are four planned for 2006; "History of Russian Computing" [Petrozavodsk, Russia 3-5 July 2006], "Future of Russian Computing" [Petrozavodsk, Russia, 5-7 July 2006], "History of Computing

in Education" [Santiago, Chile, 20-25 August 2006], and "Pioneering Software in the 1960s" in the Netherlands, Germany, and Belgium [Amsterdam, Netherlands, 2-4 November 2006]. For more information on these conferences and other Computing History Events, go to <http://Comphist.org>

MYSTERY PHOTO CHALLENGE #18



The IEEE History Center maintains a photographic archive of more than 4,300 images. From time to time images are donated without any identification. Can you help identify this photograph? We are interested in any details such as name, approximate dates, place, and anything else of historical interest you would like to tell us.

The IEEE History Center has a web page that features the mystery photograph. You may email us your answer at ieee-history@ieee.org, or you can fill out an on-line form. http://www.ieee.org/organizations/history_center/mystery_photo.html

SURF CITY

AMERICANHISTORY.SI.EDU

The Smithsonian's National Museum of American History has launched a revitalized Web site, at americanhistory.si.edu, with new features and an easier-to-use and more attractive interface. The new and improved site allows the museum's 10 million annual online visitors greater access to the collections through expanded content and accessibility.

The highlight of the new site is a section called "History Explorer," which places hundreds of the museum's objects into

a timeline ranging from 900 B.C. to the present. Visitors scroll through 10 historical eras and click on specific objects—for example, the 1945 ENIAC computer. A window then opens to reveal a larger image, a brief description and history of the object, as well as links to other museum resources on the site with more information about that specific artifact, collection or exhibition. Users may also find listings for related public programs where the artifact or collection will be discussed or displayed.

WWW.FCC.GOV/OMD/HISTORY

While working in the IEEE Archives in Piscataway, material relating to the early development of television was uncovered (see related article on page 3). In trying to find a proper repository for the material we discovered the FCC History Project. The web site was established as part of a history project the FCC has undertaken to highlight the technological heritage

of today's communications industry. The web site provides in-depth information on the history of television and radio, as well as links to related resources. It has on-line video of events important to television history and links for student to explain how television works. www.fcc.gov/omd/history/

EDISON.RUTGERS.EDU

The Edison Papers launched a redesigned and very professional looking web site in February 2005. They added new biographical material on Edison, including a section on his inventions. They also added a new Outreach section with Learning Resources, information about Edison, the Edison

Papers in the press, and a new Newsletter. The project's web-site (edison.rutgers.edu) now contains more than 180,000 document images, as well as a searchable database of 121,000 document records and 19,250 names.

POWER OUTAGES

The loss of electric power is a plot device in hundreds of movies. Certainly the visual impact of a blackout is attractive to filmmakers. Think of the aerial view of a progressive power outage in "Close Encounters of the Third Kind" (1977) or the blackout of a large part of Manhattan during a thunderstorm in "Ghost Breakers" (1940). But for dramatic effect, the social disruption usually attendant on a power outage is even more valuable.

Spike Lee's "Summer of Sam" (1999) shows looting and vigilante policing in New York City during the 1977 blackout, and "The Trigger Effect" (1996) depicts the spread of uncivilized behavior when there is a long-lasting power outage. Two early Alfred Hitchcock movies concern the danger to society of power loss: in "Sabotage" (1936) intentional damage to the generators at the Battersea power station causes a London blackout, and in the wartime movie "Saboteur" (1942), Hoover Dam, the source (we are told) of 75 percent of the power to the L.A. area, is targeted by enemy agents.

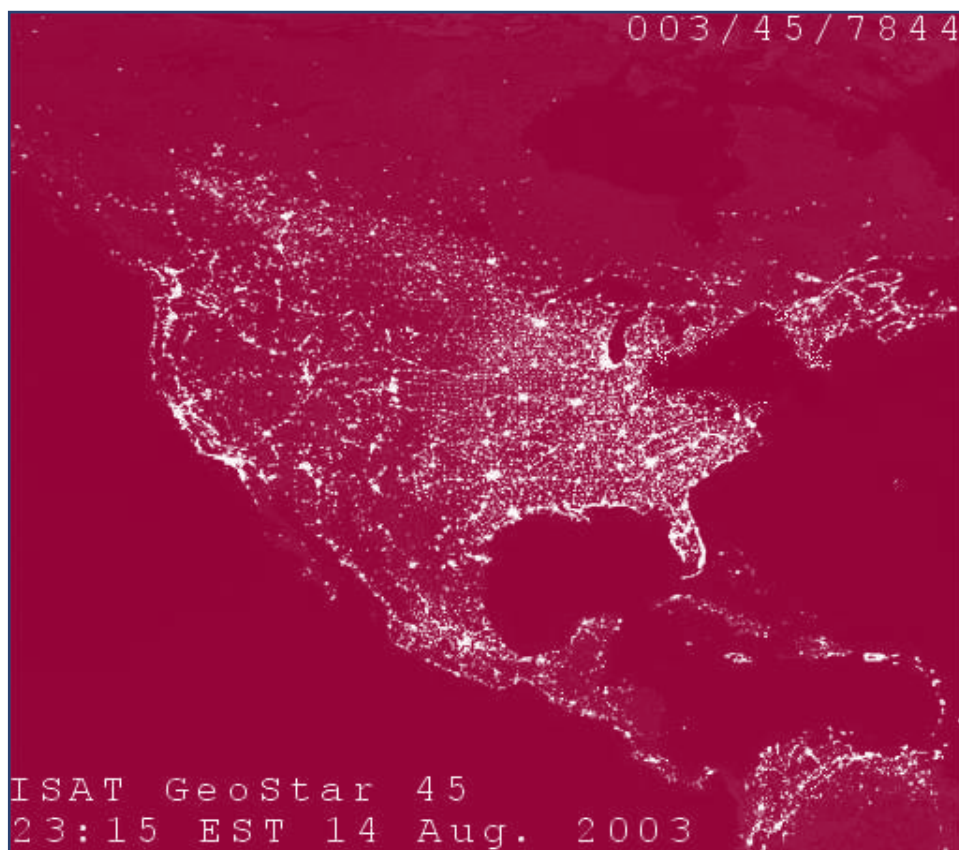
On a smaller scale, loss of electric power creates suspense in "The Birds" (1963), "Night of the Living Dead" (1968), and other thrillers. (The telephone is usually also out of commission.) In "Titanic" (1997), as the ship is sinking, the loss of electrical power, first fleetingly then permanently, heightens the sense of doom. In a similar way, the power loss during a hurricane creates an ominous mood in the hotel visited by Frank McClellan (Humphrey Bogart) in John Huston's "Key Largo" (1948). Unreliability of electrical power, such as brownouts and intermittent outages, can be a significant aspect of the social setting of the action of a movie, as in "Up at the Villa" (2000), which takes place in Italy in 1938, and in "Dancer Upstairs", which takes place in South America in the 1990s.

There are many movies in which someone cuts off the power to a building for criminal or other purposes. Some examples are "Pink Panther" (1963), "Terminator" (1984), and "Matrix Reloaded" (2003). In "Tomorrow Never Dies" (1997), James Bond (Pierce Brosnan) shuts off the power, to good effect, in a media-mogul's building, but when an earlier Bond (Sean Connery) tried the same trick in "Thunderball" (1965), he was thwarted because the villain had a back-up generator.

In "Dinner Rush" (2000) a Manhattan restaurant loses its electricity. The restaurant staff carry on—presumably the cooking is done by gas—and put candles on all the tables, creating a romantic mood; when the electric lights come back on later, someone comments that it was better without them. The same thing happens in at least two other movies: Woody Allen's "Husbands and Wives" (1992) and Joe Mantello's "Love! Valour! Compassion!" (1997).

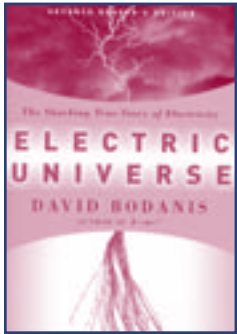
Engineers can be proud of the fact that, almost always, electric power is taken for granted and that it is an outage that is news. In the Steven King miniseries "The Stand" (1994) it is the restarting of a power station that is news: after a global catastrophe, the small number of survivors achieve a major victory by returning a power station to operation. And after citing so many examples of power failures, we might recall a movie scene where it is surprising that the power has not failed: in the 1959 movie "On the Beach" a power station near San Diego is still operating long after everyone has been killed in a nuclear war.

As always, we would be grateful for reports from readers of other interesting cinematic depictions of power outages. You may contact us at iee-history@ieee.org.



Former IEEE Life Members Fellow in Electrical History, Leslie Berlin, Publishes Biography of Robert Noyce

We are very excited to report that Leslie Berlin, who was the 2003-2004 Life Members Fellow in Electrical History, has published her book *The Man Behind the Microchip: Robert Noyce and the Invention of Silicon Valley*. In her research, Berlin drew upon interviews with dozens of key players in modern American business—including Andy Grove, Steve Jobs, Gordon Moore, and Warren Buffett: Their recollections of Noyce give readers a privileged, first-hand look inside the dynamic world of high-tech entrepreneurship. The book is available in bookstores or at www.amazon.com.



BODANIS, DAVID, *Electric Universe: The Shocking True Story of Electricity*, Crown Publishers, New York, 2005.

David Bodanis is a science writer known for his 2001 book *E = mc²: A Biography of the World's Most Famous Equation*. In *Electric Universe* Bodanis provides an episodic account of the increasing understanding of electricity and development of electrical technologies. The book is divided into five parts. The first part, entitled "Wires", consists of a chapter on the telegraph, a chapter on the telephone, and a chapter on early applications of electric power, especially the light bulb and the electric motor.

The second part, entitled "Waves", covers Michael Faraday's investigations of electricity and magnetism and his postulation of force fields. A second chapter tells the dramatic story of Cyrus Field's efforts to lay a telegraph cable across the Atlantic. "Wave Machines" is the title of the third part, which consists of three chapters. The first concerns Heinrich Hertz's demonstration of electromagnetic waves, and it consists largely of selections from Hertz's diary and letters. The

second and third deal with World War II and radar, especially the work of Robert Watson-Watt, a 1942 British raid to seize an advanced German radar, and the 1943 bombing of Hamburg.

The last two parts, each consisting of two chapters, are entitled, respectively, "A Computer Built of Rock" and "The Brain and Beyond". Alan Turing, especially is conception of a "universal machine" and his work on an electronic computer, and the invention of the transistor are the subjects of the former. The latter concerns electrophysiology and how nerves work. Throughout the book, Bodanis explains how the technologies work, briefly relates important events in their adoption, and includes human-interest stories connected with the technologies.

Available from Crown Publishers, a division of Random House, New York, www.randomhouse.com, \$24.00, hardcover, ISBN 1-4000-4550-9, 296 pp. Also available as an e-book and an audiobook.



CHERTOK, BORIS, *Rockets and People: Volume I, NASA History Series*, Washington, DC, 2005

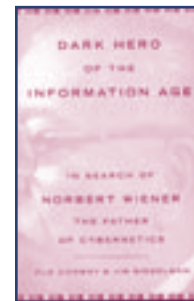
Boris Chertok began his career as an electrician in 1930 at Factory 22 outside Moscow working on the electrical bomb release and radio systems for the long-range Tupolev aircraft then being built, including the planes later used for the famous transpolar flights. As World War II approached, he was assigned to work on power systems for heavy bombers. While doing so, he also took part in the work to produce what was intended to be the Soviet Union's first rocket-powered fighter plane.

As the Germans approached Moscow, Chertok's factory, along with many others, was packaged up and moved east to the Urals for safety. This was an enormous feat of logistics and resilience on the part of the Soviets, and Chertok provides an invaluable eyewit-

ness account of the way it was accomplished. As the tide of war shifted in the allies' favor and the Red Army entered Poland and Germany, Chertok was one of the aviation experts sent with them to the missile sites of Peenemünde and Nordhausen to collect and assess the V1 and V2 technology, on occasion with bullets whistling around him. He and a colleague were among hundreds of Soviet troops who scrawled their initials on the still smoldering Reichstag while an SS contingent continued to hold out in the cellar. Thus, his memoir is a unique view not only of Russian avionics and rocket development, but of Germany's efforts in that area as well. He chronicles the horrors of the Dora death camp whose inmates were forced to work on the V2 rockets, and who often sabotaged them at the cost of their own lives.

Chertok had personal contact with many of the great people of Russian aviation and space development, so his book contains intimate portraits of these towering figures.

Rockets and People is a thrilling adventure story, as well as a detailed account of the solving of many difficult electrical engineering problems.



CONWAY, FLO and SIEGELMAN, JIM, *Dark Hero of the Information Age: In Search of Norbert Wiener, The Father of Cybernetics*, Basic Books, New York, 2004.

Journalists Flo Conway and Jim Siegelman present a detailed biography of Norbert Wiener (1894-1964), the "father of the information age" and "one of the most brilliant minds of the twentieth-century." Their work is mainly based on archival material from the Institute Archives and Special Collections at MIT, Wiener's family private papers, FBI records, as well as Norbert Wiener's own works, and interviews with Wiener's family members, friends, and colleagues. Conway and Siegelman start their account with Wiener's precocious childhood and

young adulthood. Norbert Wiener spent his first school years at home educated by his iron-fisted father, Leo Wiener. This situation had profound effects in Wiener's personality, who suffered turbulent emotional states throughout his life. Norbert Wiener entered college at eleven years old and earned his Ph.D. in 1913 at the young age of eighteen. In 1932, he became a full professor at MIT where he worked for 45 years. Conway and Siegelman discuss Wiener's contributions during World War II, which included his innovative electronic circuits and filters and significant contribution to anti-aircraft fire control. The authors devote considerable attention to Wiener's international travels where he spoke at conferences, taught, and made innumerable friends and contacts. Interestingly, Wiener wrote the manuscript of his 1948 *Cybernetics: or Control and Communication in the Animal and the Machine* at Mexico City's Instituto Nacional de Cardiología.

Importantly, Conway and Siegelman underline Wiener's mindfulness about the perils of the new cybernetic technologies to the working class. In 1950, Wiener met with the president of the United Automobile Workers, UAW, Walter Reuther to warn him about automation. Wiener also refused to cooperate and participate in some of the US government's projects and declined offers to advise corporations on the design of the automated factory. The FBI opened a file on him and, for some time, he was known to be a "very strong communist." The FBI claims were bogus; the agency did not find any evidence to support these accusations against Wiener.

In addition to highlighting Wiener's scientific innovations, the authors discuss Wiener's difficult relationships with family, friends, and colleagues. In these authors' views, Wiener's wife, Margaret, played a negative role in his already troubled life. Her fabricated story that Wiener's colleagues had seduced Wiener's eldest daughter was responsible for his severing all relations with his colleagues and MIT in November 1951, to the great detriment of cybernetic research. Norbert Wiener died on 18 March 1964 during a trip to Sweden.

The authors end the book with the discussion of the fate of cybernetics in the United States after Wiener's death, offering a moralistic assessment of the ways cybernetics has been used and abused. This book is easy reading for a wide audience who may be interested in the life of this understudied pioneer.

Available from The Perseus Books Group, Customer Service Department, 2300 Chestnut Street, Suit 200, Philadelphia, PA 19103, www.perseusbooks-group.com \$27.50, hardcover, ISBN 0-7382-0368-8, 423 pp., index



MORTON DAVID L. Jr., and JOSEPH GABRIEL, *Electronics: The Life Story of a Technology*, Greenwood Press, Westport and London, 2004.

Former IEEE History Researcher, David L. Morton Jr., and Joseph Gabriel, a doctoral candidate of History at Rutgers University, offer a concise history of the important electronic devices of the 20th century. The authors begin their introduction by explaining that their study is aimed at an audience with little knowledge of physics and electrical circuits, and that their work will reveal little new information to scholars with advance knowledge in these fields.

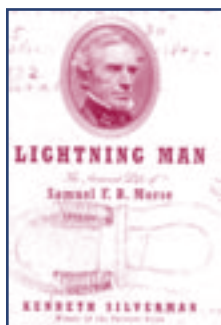
Divided into six tightly-presented chapters, Morton and Gabriel cover their subject chronologically and topically, and include a helpful glossary. They present many pictures and diagrams, which complement the text and offer useful visuals for the lay reader. It is also worth noting that the authors constantly place inventions within a broader historical context. They do a fine job emphasizing the crucial links between companies, the military, and the consumer market while never losing sight of changes in the international arena that directly or indirectly shaped the invention and development of electronic devices.

Roughly speaking, each chapter

covers individual decades, highlighting the key inventions of the period. Chapter one traces the history of electron devices, especially vacuum tubes, up to 1948, the year when the transistor was announced by Bell Laboratories. In chapter two, the authors focus mainly on the different kinds of transistors that were produced during the 1950s, reminding the readers of the progress and transformations of vacuum tubes such as the 'shadow mask' tube, which remained in use for many decades to come. Integrated circuits and lasers in the 1960s are the focus of chapter three. Chapter four highlights the politically and economically challenging 1970s, a time marked by a series of geopolitical crises to which electrical engineers were not immune. This was a time, the authors remind us, of high rates of unemployment, caused in part by the globalization of manufacturing. During this period, the IEEE-USA was created. In the 1970s, engineers invented the microprocessor and oversaw the commercialization of personal computers. Chapter five demonstrates how inventors helped create different electronic devices for products and services that many of us take for granted today: ATMs, cash registers, microwaves, cell phones, CD players, and the internet.

Throughout most of the book, the authors concentrate overwhelmingly on inventions and innovations that took place in the US. They devote only a few pages to Japanese and European technological achievements. This geographical imbalance leaves readers wondering. In what ways did Asian and European inventors and governments contribute to electronic innovations? Additionally, some may be disappointed by the lack of bibliographical references, although the authors do provide a list of further reading. These shortcomings are nevertheless minor in light of Morton and Gabriel's remarkable ability to clearly synthesize a century of electronic inventions.

Available from: Greenwood Press, www.greenwood.com, \$45.00, hardcover, ISBN 0-313-33247-9. xiii + 216 pages, 25 illus., index



SILVERMAN, KENNETH, *Lightning Man: The Accursed Life of Samuel F.B. Morse*, Alfred A. Knopf, New York, 2003.

Kenneth Silverman is professor emeritus of English at New York University and Pulitzer-Prize winning author. In the course of his career he has written a number of histories and biographies that are both scholarly and interesting enough to attract a large audience. This account of the life of Samuel F.B. Morse covers all aspects of the inventor's life.

After Morse graduated from Yale University in 1810, he studied painting, gained some success as an artist, helped found the National Academy of Design, and became professor at New York University. Natural philosophy was a strong interest of his, and in the early 1830s he began working on a magnetic telegraph. After a decade of effort and after receiving important help from Alfred Vail, Morse convinced Congress to fund the famous 1844 trial of his tele-

graph. His system was rapidly adopted in the United States and abroad, and, at a rather advanced age, Morse felt he had at last achieved some success.

Silverman describes Morse's family background, his youth, his education, and his social and intellectual environment. His artistic career is sympathetically described before the telegraph becomes the main interest. Especially detailed is Silverman's account of the struggle to make the telegraph a practical success. Finally, Silverman describes the changes in commerce, journalism, diplomacy, and other aspects of life that the telegraph caused.

The book contains several dozen illustrations, many of them reproductions of portrait photos. Besides an index and photo credits, there is an 8-page listing of documentary and secondary sources on the life of Morse. This is followed by 28 pages of reference notes, each keyed to the associated paragraph in the text.

Available from Alfred A. Knopf, www.aaknopf.com, \$35.00 cloth, ISBN 0-375-40128-8, vi + 503 pp., index.

Progress in Defense and Space donated to History Center Library

The IEEE History Center's library has recently been enhanced by the donation, by the author of *Progress in Defense and Space: A History of the Aerospace Group of the General Electric Company* by Major A. Johnson. This comprehensive 656-page book is a detailed history of the aerospace electronics programs of GE, and it will be a useful reference tool for Center staff, as well as visiting scholars and researchers. The Center is grateful to Major Johnson for his generosity in assisting the Center in its mission of preserving, researching and promoting electrical history.



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