IEEE History Center

ISSUE 67, March 2005

STATIC FROM THE DIRECTOR

The year 2005 has begun with the Milestones program in full swing (see back cover). Not only does local interest continue to increase, but at the IEEE History Center we intend to work with IEEE organizational units to fill in some of the obvious gaps on the Milestone roster of accomplishments of global importance. The approach of round anniversaries (25th, 50th, 100th and so forth) is often what sparks local IEEE Sections to propose Milestones, and at the History Center we also find them useful in our efforts to publicize and promote the historical importance of IEEE technologies.

Interestingly, 2005 represents a bit of a lull, but 2006 will bring an embarrassment of riches. First – although we at the Center tend to focus on the anniversaries of events, discoveries, and inventions – birthdays and death anniversaries often generate attention. The big newsmaker in 2006 will be the tercentenary (300th anniversary) of the birth of Benjamin Franklin, pioneering electrical scientists and engineer (among his many, many other achievements). Worldwide celebrations are planned (see **http://www.benfranklin300.com/**), and the IEEE History Center will certainly take part. Other notable birthdays in 2006 include Sir William Fothergill Cooke (200), Nikola Tesla (150), Sir Joseph John Thomson (150), Granville T. Woods (150), Philo Farnsworth (100), and Grace Hopper (100). The most import invention anniversary will be the centennial of de Forest's audion, but also of note are Faraday's discovery of electromagnetic induction (175) and Zworykin's iconoscope (75).

Promoting these birthdays and events through lectures, conferences, Milestones, exhibits, oral histories, and so forth will help remind the public of the role of electrical and computer scientists and engineers in the development of 21st century civilization. Through the IEEE Virtual Museum, young people can be made part of this outreach effort as well.

Finally, let me once again remind you that it is the individual generosity of you, our supporters, that makes such outreach possible. This is our annual honor roll issue where we recognize our donors (see page 8), but let me add my personal gratitude for your continued support!

Benjamin Franklin, by Edward Savage, after Benjamin West, after David Martin, mezzotint, 1793. National Portrait Gallery, Smithsonian Institution, Washington, D.C.

THE STATE UNIVERSITY OF NEW JERSEY
RUTGERS

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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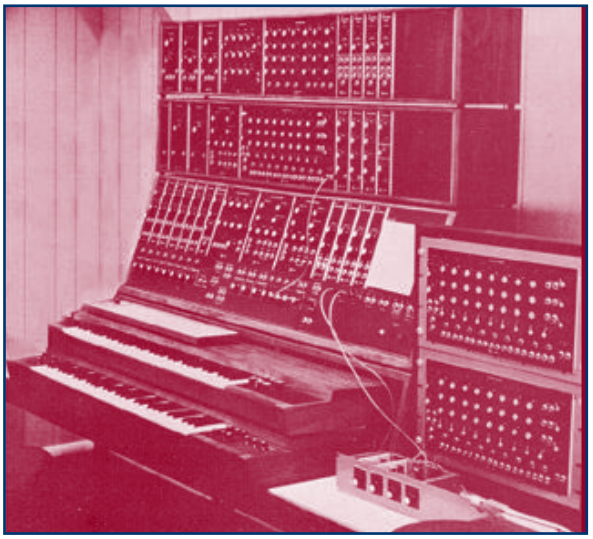
IEEE VIRTUAL MUSEUM

***Songs in the Key of E* – IEEE Virtual Museum Exhibit on Electronic Music**



An example of a late 1960s Moog

The IEEE Virtual Museum has launched its latest exhibit, *Songs in the Key of E*. As the title hints, this, the eigth Virtual Museum exhibit, discusses the various ways electronics have been used to create music. We all know how electrification changed music (insert name of your favorite guitarist here), but there's a whole other range of instruments that rely on electronics to work. From the sounds of William Duddell's Singing Arc to the spooky tunes of the Theremin to the techno pop of the synthesizer, electronic instruments have long married the interests of engineers and musicians. *Songs in the Key of E* examines this link of art and technology, charting the history of this unique genre of music.

While most of us think of electronic music as materializing in the 1960s or even later, its roots actually date from the 1870s. It was then that Elisha Gray, a famous inventor in the telegraph and telephone fields, took the hum a telegraph sometimes made and built an instrument around it. By the first quarter of the 20th century other instruments, such as the Telharmonium and the Theremin, were on the scene. Even famous inventors, such as Lee de Forest, who invented the Audio Piano in 1915, got into the act. Throughout the years other inventors such as Lauren Hammond, Harry Olson, and Robert Moog and other inventions such as the Clavioline, the Vox, and the Mellotron changed the very nature of music and performance.

Songs in the Key of E takes a look at these people and these instruments. Rich in audio clips that give users an idea of what these different instruments sound like, the exhibit can be viewed at **www.ieee.org/museum**.

E. H. ARMSTRONG LABORATORIES DESIGNATED NATIONAL HISTORIC LANDMARK

On 14 December 2004, Columbia University, New York, U.S.A. and the United States Department of the Interior together honored the legacy of one of the giants of the field of electrical engineering, E. H. Armstrong. Armstrong invented the regenerative circuit, the superheterodyne circuit, and frequency modulated radio, as well as making contributions to the development of radar. Without Armstrong's contributions, radio and its allied devices such as cellular telephones, would not be possible. Many of these inventions, as well as much of the development work needed to make them practical, were conceived in the Hartley-Dodge Laboratories on the second floor of Philosophy Hall at Columbia University.

Based on the nomination written by IEEE History Center staff, the Secretary of the Interior designated the Philosophy Hall building as a historic landmark. Among those in attendance at the ceremony were two of E. H. Armstrong's descendents, his niece Jeanne Hammond and grand-nephew, Adam Brecht. Hammond shared her reminiscences of working for her uncle, handling the payroll of the laboratory workers, and her memories of the work at the transmitting antenna at Alpine, NJ. Alan Brinckley, Provost of the University, spoke of Armstrong's contribution to every branch of communications, and about the honor the Landmark designation represented.

Armstrong's Laboratory in Philosophy Hall, Columbia University

STAFF NOTES

HISTORY CENTER INTERN MATTHEW EISLER RESEARCHES FUEL CELL TECHNOLOGY

Dissertation research can be an exercise both in planning and improvisation. Doctoral students are by nature peripatetic; their quest for research materials leading them to interesting locales all over the world. Careful planning of these trips is essential, but often serendipity plays an important role. As a doctoral student of the history of science and technology at the University of Alberta, my experience on the research trail was a lesson not only in careful research, but how to improvise solutions when the occasion warrants. My experience as the 2004 Life Members Intern at the IEEE History Center in the fall of 2004 was especially useful in this regard. I began my research on the history of fuel cell development immediately after completing comprehensive exams last summer, and with only a vague idea of the archives I would need to visit. Interning at the History Center gave me the opportunity to process the mass of data and notes that I had collected during a previous research sojourn at the Chemical Heritage Foundation (CHF) of Philadelphia, which consisted mainly of a review of the proceedings of symposia dealing with fuel cell research sponsored by the American Chemical Society and U.S. Army between 1959 and 1970. Working with History Center Director Mike Geselowitz and other staff members, I was able to develop research leads and identify useful archives. The internship also allowed me to complement my work on the technical aspects of fuel cell operation begun while at the CHF, facilitating a closer analysis of the relationship between the design of electrical and electronic appliances and power sources.

What impressed me most about this literature was the important role played by the U.S. Army in directing the course of fuel cell research during the Cold War. Though the Army had not defined a mission for fuel cells vis-à-vis the service's specific mission objectives by the late 1950s, it was sufficiently interested in their potential to fund the efforts of a number of researchers including Broers and Schenke. By the mid 1960s, the Army began to see fuel cells in more practical terms and identified possible power

continued on page 4

HISTORY CENTER INTERN MATTHEW EISLER RESEARCHES FUEL CELL TECHNOLOGY *continued from page 3*

source roles in the context of the service's technological base and organizational structure as it existed in the early 1960s. Army planners initially saw fuel cells as a way to reduce the logistical footprint of the large mechanized forces developed for the conditions of conventional warfare on the Central European battlefield. Large multi-kilowatt fuel cells were envisioned as vehicular power sources in the long term and mobile power generators in the near term. Efforts were made to develop designs that could efficiently use a wide variety of carbonaceous "logistic fuels," primarily kerosene-based JP-4, but also whatever fuels happened to be available on the battlefield, including captured stocks. However, Army priorities changed as the war in Vietnam intensified. Mechanized forces were used in this conflict, but combat often involved rival small infantry units. In the trackless jungle wilderness, radio communication was indispensable and small multi-watt fuel cells were seen as a potential lightweight, long-lived replacement for the heavy radio batteries soldiers were forced to pack. Research emphasis consequently moved from the large semi-mobile kilowatt-class to portable multi-watt class designs, particularly those using hydrazine for fuel. Such potassium hydroxide systems marked a departure from the trend in the early 1960s of funding acid electrolyte and molten carbonate fuel cells, which were better able to handle impurities in the fuel and oxidant, a requirement for hydrocarbon operation.

The History Center's proximity to Fort Monmouth was fortuitous because this base had been the nexus of the U.S. Army's fuel cell program in the 1960s. After a few false starts on New Jersey's labyrinthine freeway system in a rental car, I made several visits to the base archive, which yielded a number of important primary sources including fuel cell technical reports, annual Command histories, and executive summaries. This helped shed light on how organizational changes, specifically the evolution of the U.S. Army Signal Research and Development Laboratory into Electronics Command between 1959 and 1965, shaped changing research priorities and the character of fuel cell research in the context of the escalating war in Southeast Asia. I was also able to obtain from this archive digital reproductions of a number of rare photographs of some of these fuel cells, including an early hydrazine test model powering an AN/PPS-4 tactical ground surveillance radar. Additionally, the History Center's proximity to Rutgers University allowed me to make use of the library resources of this state university. By late December, I was able to fill a small box with research material I had collected while in the United States. All told, my experience as an intern at the IEEE History Center was central to the launching of my dissertation research, laying the groundwork for a thesis outline and a program of future research.

FORMER HISTORY CENTER GAs CONTINUE TO PUBLISH

Many of the IEEE History Center's Graduate Assistants have gone on to distinguished careers after working with us. Although their research might not be directly related to the history of electrical technology, we are delighted to hear of their success and are proud to let our readers know. Melissa Klapper, who was a History Center GA in 2000-2001, as well as our summer intern in 2001, has recently published *Jewish Girls Coming Of Age In America, 1860-1920* at New York University Press.

According to the review in Editor's Press Weekly: "Drawing on diaries and magazines, historian Klapper recreates the world of Jewish girls in late 19th- and early 20th-century America. These were years of massive immigration, expansion of the secondary school system and an increased sense of "the... importance of youth in modern society."… This book's charm lies in its innovative and engaging focus on girlhood."

RUTGERS SENIOR TAKES INTERNSHIP AT HISTORY CENTER

Joe McKenna, a Rutgers Senior, is interning at the IEEE History Center for the Spring 2005 semester. He is majoring in Philosophy and History. During the semester, under the guidance of staff member Mary Ann Hoffman, he will be working on a variety of different tasks. Among them are producing an inventory of materials from the Cardwell Condenser Company, updating the contents of the History Center database and assisting in the archiving of the contents of the IEEE Archives. He and Mary Ann will also be producing a new exhibit at the IEEE Operation Center in Piscataway. The exhibit, to be installed by March, will feature antique radios.

SURF CITY

Google Scholar

Recently, Google announced a new search tool, Google Scholar (beta). Google Scholar enables readers to search specifically for scholarly literature, including peer-reviewed papers, books, preprints, abstracts and technical reports from many areas of research. This search includes materials from IEEE, Nature, the Online Computer Library Center, the Association for Computing Machinery and numerous other academic, technical and scientific publishers. **www.scholar.google.com**

Radio History Society

The Radio History Society (RHS) was established to preserve radio and television history. In June, 1999 it opened the Radio-Television Museum in Bowie, Maryland, U.S.A. The museum features hundred of artifacts relating to the history of radio and television. Its website (**www.radiohistory.org**) also maintains a nice array of radios and an extensive bibliography of books and magazines on these topics.

Scanning Software

Wikipedia.com defines spyware as "computer software that gathers and reports information about a computer user without the user's knowledge or consent." Spyware will slow down the performance of your computer and may cause unwanted pop up advertisements. New shareware is now available that can detect and remove spyware of different kinds from your computer. If you see new toolbars in your Internet Explorer that you didn't intentionally install, if your browser crashes, or if your browser start page has changed without your knowing, you may have spyware. Two of the most popular software applications are AdAware (**www.lavasoftusa.com/support/download/**) and Spybot (**www.spybot.info/en/index.html**). Both can be downloaded for free.

MYSTERY PHOTO CHALLENGE #17

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, biographic information, 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**

BAKKEN ARTIFACTS NOW ACCESSIBLE ONLINE

The Bakken Library and Museum has announced the availability of a new online database of its outstanding collection of artifacts relating to the history of electricity and magnetism, and their uses in medicine and the life sciences. Records for approximately 90 percent of the Bakken's unique collection of roughly 2,000 artifacts have been entered into the database, along with images of almost every item. The information provided typically includes description, remarks, and an image, as well as materials, date, size and weight, and a list of accessories.

The database is located at **http://thebakken.org/artifacts/database/** and is organized by the Bakken's accessioning categories. A person interested in plate electrostatic generators, for instance, would first click on "Electrostatics". Under "frictional generators", click "plate". The result will be a list of the plate electrostatic generators in the collection. Clicking the hyperlinks will then lead you to an image and description of the generator in question. The Bakken hopes to implement more sophisticated search functions in the near future.

The instrument collection focuses on the history of electricity and magnetism in the life sciences. It includes electrostatic generators, magneto-electric generators, induction coils, physiological instruments, recording devices, and accessories. There are hundreds of pacemakers and defibrillators, and dozens of magnetic devices.

A partial online catalogue of The Bakken's extensive book collection has been available for a number of years at **http://www.thebakken.org/library/library.htm#BooksAndManuscripts**. Plans are being made for an online public access catalog of the entire collection.

The artifact database is a work in progress and the Bakken welcomes feedback from researchers. Please direct comments and questions to Ellen Kuhfeld, Curator of Instruments, at **Kuhfeld@thebakken.org.**

A THOUGHTFUL WAY TO SHOW YOU CARE

By: Karen Galuchie, IEEE Development Office

Looking for a meaningful way to honor someone special while simultaneously supporting the IEEE History Center? The IEEE Foundation encourages you to consider a Tribute Gift. You can honor the memory of a loved one, celebrate a special occasion, acknowledge a colleague or client…all of this while preserving the history of technology with your special gift.

How does Tribute Giving work? Every year, the IEEE Foundation receives Tribute Gifts in memory or in honor of a special someone. Many of these gifts celebrate a special occasion in the life of a loved one, friend, or colleague, such as holidays, birthdays, graduation, retirement, or a special award. No matter what the occasion, such gifts remind those closest to us that they are remembered in a thoughtful way. Just as thoughtful are the many gifts we receive in memory of a loved one. Some of our donors tell us that they receive tremendous satisfaction in making memorial gifts because they know that, in addition to perpetuating the memory of the deceased, they are also helping the IEEE History Center preserve the history of technology.

How can businesses participate in this opportunity? Tribute Gifts are not just given by individuals. Businesses find that giving gifts in honor of their clientele at special occasions such as holidays, birthdays, or office opening is an excellent way to acknowledge a valued relationship.

Whether your intention is to honor or memorialize, when the IEEE Foundation receives tribute gifts, the name of the person to be commemorated, along with the name of the donor, will be listed in the annual Honor Roll of Donors. In addition, the individual, or family named by the donor, will receive a special acknowledgement.

If you are interested in learning more about this giving opportunity, or in making a tribute gift, please contact the IEEE Development Office at +1 732.562.5550 or **supportieee@ieee.org**. As always, thank you for supporting the IEEE.

MISCELLANEOUS

ELECTRIFICATION, URBANIZATION, AND SOCIAL INEQUALITY

Moses Chikowero, a historian of electric power distribution, has completed his thesis, Electrification, Urbanization and Social Inequality in Southern Rhodesia: The Case of Bulawayo, 1894-1945 at Dalhouise University, Halifax, Nova Scotia. Partly funded by a research grant from the IEEE Life Members, Chikowero's thesis "demonstrates that pubic electricity development started in 1894 in Bulawayo, at the same time as in most developed countries." Chikowero analyzes how electricity and the electrification process shaped urban Bulawayo's development.

IEEE HISTORY CENTER RESEARCHER SEEKING HELP TO TRACK DOWN RARE DOCUMENTS ON FUEL CELLS

Matthew Eisler, the IEEE History Center Intern (see article on page 3) is looking for help in finding the location of sources important to his research. He is looking for access to:

1) A complete set of "Proceedings, Annual Battery Research and Development Conference," Fort Monmouth, NJ, Power Sources Division, U.S. Army Signal Research and Development Laboratory (1946-1958). So far he has been able to find only partial holdings of it in the archives he has searched.

2) A copy of Electronics Command's "Project Engineers Design Guide," which has major information on power sources. This is the rarer of the two sources, only 575 copies printed.

IEEE LIFE MEMBERS' PRIZE IN ELECTRICAL HISTORY

The IEEE Life Members' Prize in Electrical History was established by the IEEE Life Members Committee, who funds the prize out of the IEEE Life Members Fund. The Prize is administered by the Society for the History of Technology (SHOT), in consultation with the IEEE History Center. The prize recognizes the best paper in electrical history published during the previous year, in this case 2004. Any historical paper published in a learned journal or magazine (including technical magazines, proceedings and transactions—the overall journal need not be historical in nature) is eligible if it treats the art or engineering aspects of electrotechnology and its practitioners in historical perspective. Electrotechnology encompasses all technologies of interest to IEEE members. The prize consists of a cash award of $500 and a certificate. Through its support of this prize, the IEEE Life members Committee ensures that those researching history remain sensitive to the role of IEEE technologies in the rise of modern society.

SHOT is currently inviting submissions for the 2005 prize (for the best paper published in 2004), which will be presented at the Society's annual meeting in Minneapolis, November 3-6, 2005. For more information (including a list of previous winners), contact Amy Bix, SHOT Secretary,603 Ross Hall, History Department, Iowa State University, Ames, IA 50011. FAX: 515-294-6390, **shot@iastate.edu**; Phone: 515-294-8469 or visit **http://shot.press.jhu.edu/Awards/IEEE.htm**

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STREETCARS

In 1842, just a dozen years after the opening of the first public steam-powered railway, Robert Davidson demonstrated a battery-driven electric locomotive on the Edinburgh-Glasgow line. It proved, though, too expensive for commercial use. In 1881 Werner von Siemens opened a public electric railway in Lichterfeld, near Berlin. Siemens's train drew power from an electrified rail, and it was soon clear that this was too dangerous for street railways. However, in the next half dozen years two engineers in the United States, Frank J. Sprague and Charles Van Depoele, developed a practical and safe streetcar system, with power provided by an overhead wire.

Because most cities already had horse-powered streetcar systems, it was relatively easy to adopt the new technology, and in the years 1888 through 1891 more than 100 U.S. cities did so. By 1902 ninety-four percent of urban transit lines in the U.S. were electrified, and in the mid 1930s about forty percent of the urban working class took the streetcar to work. But in the 1930s and 1940s streetcars gave way to the automobile and, indeed, disappeared from almost all U.S. cities. Fortunately we have movies to provide us a view of yesteryear's streetcar city.

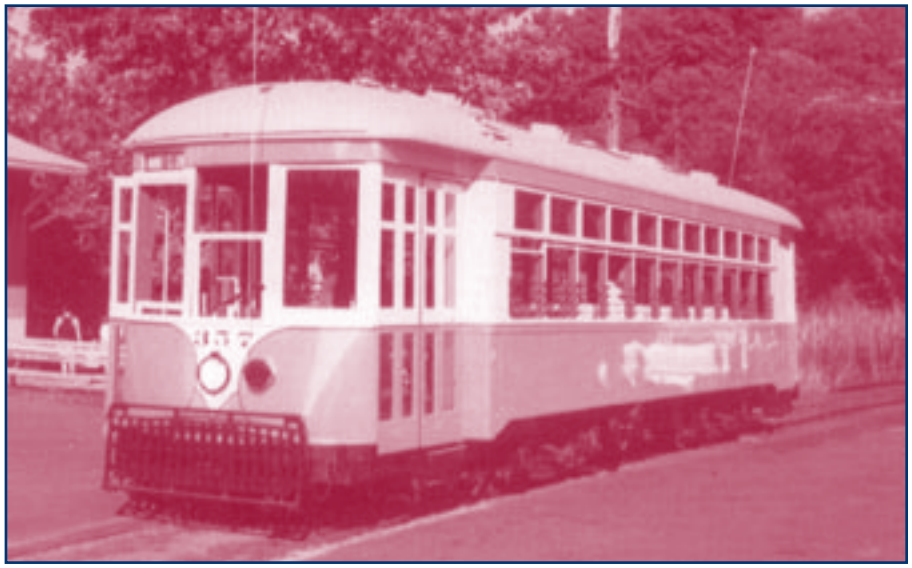
The most famous streetcar may well be the one shown in the 1951 movie "A Streetcar Named Desire" based on the Tennessee Williams play. One line of the New Orleans transit system was named Desire, after Desire Street, and in the movie we see a streetcar with this sign on front. The most famous song about streetcars is probably "The trolley song", written by Hugh Martin and Ralph Bane and sung memorably by Judy Garland in the 1944 Vincente Minnelli movie "Meet Me in St. Louis". The most foolish way to ride a trolley, on the top of the car, is demonstrated by Don Lockwood (Gene Kelly) in "Singin' in the Rain" (1952).

Charlie Chaplin's last and perhaps best short-movie was "Pay Day" (1922). In a long sequence it shows the Chaplin character trying to ride—overcrowding makes it difficult—and then finally riding the streetcar. The Fred Astaire and Ginger Rogers movie "The Story of Vernon and Irene Castle" (1939) shows streetcars in use in New York City in 1911. The trolleys of another part of the city are shown in the 1945 movie "A Tree Grows in Brooklyn"; from this movie we learn that it cost a nickel to ride the trolley, and doing so was regarded as a luxury, at least for children. The very recent movie "Bobby Jones: Stroke of Genius" shows the streetcars of Atlanta in about 1918. We can see Baltimore's trolleys in "Avalon" (1990), where a streetcar comes off the tracks and crashes into a car, and in "Liberty Heights" (1999), where we are given a close-up of the overhead contact and of the wheels and brakes.

The forerunner technology can be seen in many movies, such as the 1942 Orson Welles film "The Magnificent Ambersons" (1942), which shows a horse-drawn streetcar in use in the 1870s, and "Hello, Dolly!" (1969), which shows horse-drawn trolleys in New York City in 1890. In the "The Great Jasper" (1933) the main character, at the beginning of the 20th century in New York, drives a horse-drawn trolley at the time it is being replaced by an electric system. Half a century later, the trolley system of Los Angeles was being decommissioned. In the 1988 movie "Who Framed Roger Rabbit" this is presented as the result of a conspiracy among automobile interests; the down-at-the-heels private eye Eddie Valiant, after hitching on a ride on the back of a trolley, comments "We've got the best public transit system in the world."

In many foreign cities the streetcar systems have remained in heavy use for more than a hundred years. Particularly good depictions are in "Temptress Moon" (1996), which shows Shanghai streetcars in the 1920s, and "The Pianist" (2002), where we see Warsaw streetcars during World War II. In Luis Buñuel's 1954 movie "Illusion Travels by Streetcar" ("La ilusión viaja en tranvía"), two transit workers, learning that their favorite streetcar is to be decommissioned, take the car out for an all-night and all-day final trip around Mexico City. The main character of "Black Orpheus" (1959) is a streetcar driver in Rio de Janiero; we see him at work and at the end of the day, when he disengages the pantograph from the electric lines.

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



BERTOLOTTI, MARIO, *The History of the Laser, Institute of Physics Publishing*, Bristol and Philadelphia, 2004.

The *History of the Laser* might be more aptly titled, the history of light and the physics of light. The first 175 of the 295 pages of text cover the history of the study of light, beginning with the theories of the Greek philosophers, and progressing through Newton, Maxwell, spectroscopy, quantum physics, microwaves, Einstein, atomic clock, the book lays the foundations for the reader to understand some very complex physics which are fundamental to how a laser works.

Having laid the foundation for the theory of the laser, Bertolotti describes the history of the maser and laser from Charles Townes' seminal paper which led to the building of the maser, to the gains in operating temperature, miniaturization, and operating life which allowed lasers to become practical components in communication, medicine, and entertainment.

Available from Institute of Physics Publishing, **www.bookmarkphysics.iop.org**, $55.00, ISBN 0-750-30911-3, 295 pp, cloth, index, illus.

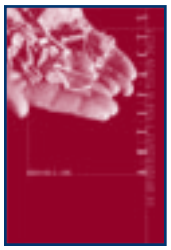
BURNS, RUSSELL W., *Communications: An International History of the Formative Years*, Institution of Electrical Engineers, London, 2004.

This is a well-written scholarly review of the history of communications from prehistory to the 1940s. The text is divided into 23 chapters, most of them devoted to a particular technology, such as submarine telegraphy and maritime wireless telegraphy. An opening chapter surveys telecommunications in the ancient world. After a chapter on the visual telegraph, three chapters tell the story of the electric telegraph. There follow chapters on the telephone, visual communications, images by wire, and early attempts at television. The remaining 14 chapters concern mainly radio and television, with particular attention to the development of television in the 1920s and 1930s. There is a chapter on long-distance telephony, including the development of shortwave beam systems.

The book is handsomely produced. A lively writing style, abundant biographical information, and the inclusion of interesting facts make the book a pleasure to read. There are numerous well-chosen illustrations. The sources of information, both primary sources, such as patent records, and secondary sources, are referenced as endnotes to each chapter.

Russell Burns worked for the Royal Naval Scientific Service and has held academic appointments at several institutions in the UK and other countries. For more than 30 years he has been researching and writing about the history of electrical engineering. This is volume 32 in the IEE History of Technology Series, and it is the fifth in the series that Burns has contributed.

Available from Institution of Electrical Engineers, London, **www.iee.org**, paperbound, ISBN 0-86341-330-7, xi + 639 pp., index.



FINN, CHRISTINE A., *Artifacts: An Archaeologist's Year in Silicon Valley*, MIT Press, Cambridge, Mass., 2001.

Christine Finn, archaeologist and journalist, has written a personal account of time spent with the high-tech denizens of Silicon Valley just prior to, and during, the bursting of its economic bubble. Although the journalistic approach is emphasized over the archaeological one (despite the subtitle), some important points are made about the relationship between material culture and society. It is explicitly not a history of the computer, but the reader will encounter some important figures in the development of modern information technology. The most interesting chapters concern amateur collectors who are attempting to preserve objects from the past (the artifacts of the title) in a field that values constant change and newness.

Available from The MIT Press, Massachusetts Institute of Technology, Cambridge, MA 02142 USA, +1 800 405 1619, **http://mitpress.mit.edu**, $50.00, hardcover (also available in paper), 288 pages, illus.

HUGHES, THOMAS P., *Human-Built World: How to Think about Technology and Culture*, University of Chicago Press, Chicago, 2004.

Thomas Hughes is a scholar who is one of the founders of the history of technology as an academic discipline, and who has been a seminal presence in the history of electrical technology within that field (serving, among other capacities, as a member of the IEEE History Committee). Now, among other titles, Mellon Professor Emeritus in the Department of the History and Sociology of Science at the University of Pennsylvania, Hughes has summarized his vast experience in the field of the history of technology into a thought-provoking, book-length essay. The book covers Western society rather than global technology, and it focuses on the emergence of large-scale technological systems in the past two centuries, but it is still amazing for its breadth of coverage.

Every discipline that has considered the social nature of technology, from anthropology and literature to sociology and economics is woven into a seamless vision of the nature of the human condition. Sources range from Toynbee's *Study of History* to the Disney movie "Toy Story." To Hughes, humans are a unique species whose creative urge combines with physical need to cause us to build the world around us, rather than to be built by it. Anyone with an interest in technology and society or the history of technology—which should be all of the subscribers to this newsletter—ought to read this engaging work.

Available from The University of Chicago Press, 1427 E. 60th Street, Chicago, IL 60637 USA, +1 773 702 7700, **http://www.press.uchicago.edu**, $22.50, hardcover, ISBN 0-226-35933-6, 223 + xii pages, 42 illus.

The Radio & Television Museum

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RECENT IEEE MILESTONE DEDICATIONS

The last three months of 2004 were an especially active time for IEEE Sections commemorating their electrical heritage. On 1 October, the IEEE Boston Section commemorated the first municipal electric fire alarm system to use call boxes with automatic signaling to indicate the location of a fire. Invented by William Channing and Moses Farmer, and placed in service on 28 April 1852, this system was highly successful in reducing property loss and deaths from fire. The first alarm was received over the system on 29 April, 1852 at 8:25 p.m.

The following day, 2 October, the IEEE Berkshire Section commemorated William Stanley's system for providing electrical illumination using alternating current with transformers to adjust voltage levels of the distribution system. Stanley's system began providing electricity to the offices and stores along Main Street in Great Barrington, Massachusetts, U.S.A. on 20 March 1886.

The IEEE Boston Section celebrated a second milestone on 10 November, commemorating the first citywide electric traction for a large-scale rapid transit system. Safe, economically viable, and reliable electric power for Boston's rapid transit was provided by the West End Street Railway Company, beginning in 1889. The company's pioneering efforts provided an important impetus to the adoption of mass transit systems nationwide.

On 25 November 2004, the IEEE Tokyo Section dedicated a milestone for the first quartz wristwatch to be made available for sale to the public. Accurate to within five seconds per month, the Seiko Quartz-Astron 35SQ was introduced in Tokyo on 25 December, 1969.

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