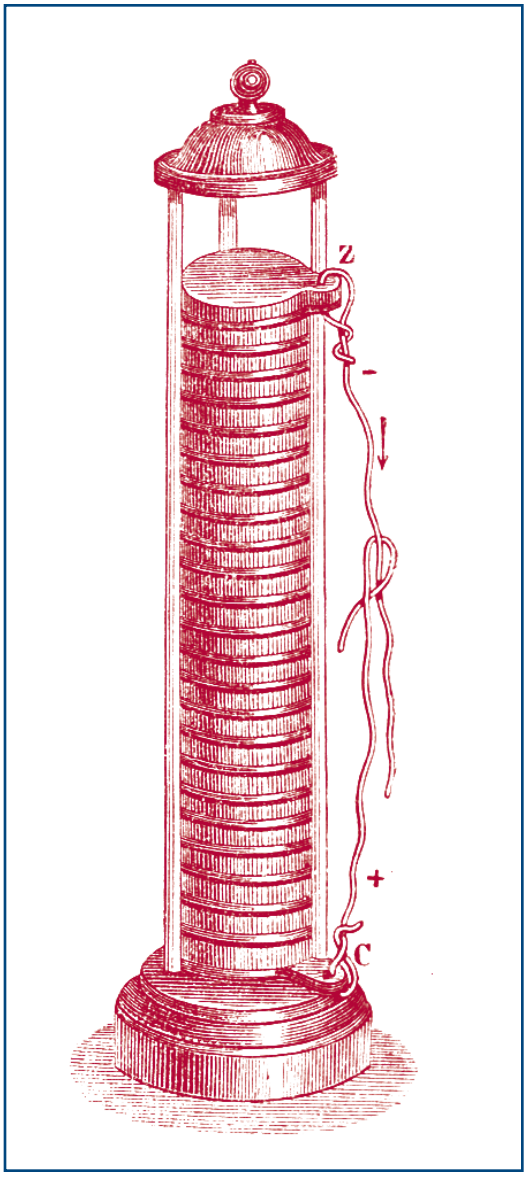
IEEE History Center

ISSUE 76, March 2008

STATIC FROM THE DIRECTOR

For the IEEE History Center, 2008 looks to be a landmark year. The project to build an IEEE Global History Network (GHN) is starting to pick up momentum, and Dr. John Vardalas has been brought onboard to oversee the project (p. 4). In September we plan to preview the GHN at IEEE Sections Congress, and plans have also begun for our 2009 conference which will be tied into the 125th anniversary of IEEE and where we will do the major public launch of the GHN. We have completed our conversion from purely audio oral histories to video oral histories, and the first of our programs for IEEE.tv have been posted to IEEE's web site (p. 3). The Milestones program continues to maintain its record pace. You will be able to continue to follow the progress of these and our programs on our web pages and in the pages of our newsletter.

Of course, all of these wonderful activities require a great deal of resources. The IEEE and the IEEE Foundation have somewhat increased their support, but we still rely to a great degree on gifts from individual donors such as you. That is why it is our privilege and pleasure every March to recognize all of our generous supporters from the previous year. The 2007 Donor List begins on page 6, and I again want to thank you personally. I hope we will continue to earn your trust and confidence that your gifts will enable us to continue preserve, research and promote IEEE's rich technological heritage. Please enjoy this issue of the newsletter, which is dedicated to YOU.



A March electrical engineering triumph, and an IEEE Milestone: Volta's pile, 1799

RUTGERS
THE STATE UNIVERSITY OF NEW JERSEY

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

Mailing address:
Rutgers University
39 Union Street
New Brunswick, NJ 08901-8538 USA
Telephone: +1 732 932 1066
Fax: +1 732 932 1193
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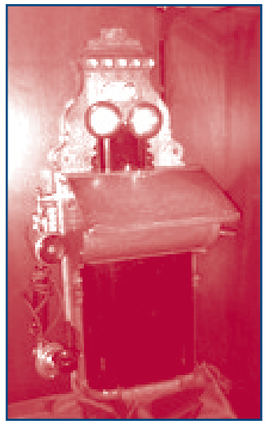


The IEEE History Center received an email last August from a man in California, Tom Potworowski, asking if we could help him find an appropriate museum or archive for this artifact. We always first ask for the dimensions, as space is very limited in the IEEE Archives. When we found out it was only 28.5" high and 10 inches wide/deep, we asked him to ship it to us.

It took him a while to get us the dimensions, stating "it meant opening a case stored at the bottom of a pile in a limited space in order to measure the instrument."

It arrived at the Center on Monday, 3 December 2007. Archivist Mary Ann Hoffman asked for help from our fall intern, David Halik, and Graduate Assistant, Meagan Schenkelberg. You just imagine the excitement here at the Center when we opened the box and discovered this beautiful telephone. Mary Ann immediately knew that it had to be put on display at the Operations Center and was hoping that it would fit in that display case in the IEEE Main Lobby. By placing it in our display case, hundreds of volunteers and staff will now be able to appreciate this beautiful instrument.

Here are some of the general details of the telephone:
The case was usually made of oak, but occasionally it was walnut, and the dimensions are 28.5 inches high, 13.4 inches wide, and 9.75 inches deep (72.4^{cm} x34^{cm} x 24.8^{cm}). The phones were made in Stockholm, Sweden and used as far away as Australia. The black cover concealed two batteries to operate the circuit and ringers, and it was fitted with a four-way cord. It was manufactured in the late 1800's, by Ericsson, and later models were made specifically for Australia's weather conditions, specifically lightning strikes.

This particular instrument was recovered after many years of use from a winery in the province of Mendoza in Argentina in the process of a conversion of rural lines to dial service in the early 1980's by the Compañia Argentina de Télefonos.

NEWSLETTER SUBMISSION BOX

The IEEE History Center Newsletter welcomes submissions of Letters to the Editor, as well as articles for its "Reminiscences" and "Relic Hunting" departments. "Reminiscences" are accounts of history of a tchnology from the point of view of someone who worked in the technical area or was closely connected to someone who was. They may be narrated either in the first person or third person. "Relic Hunting" are accounts of finding or tracking down tangible pieces of electrical history in interesting or unsuspected places (in situ and still operating is of particularl interest). Length: 500-1200 words. Submit to **ieee-history@ieee.org**. Articles and letters to the editor may be edited for style or length.

"VIDEO KILLED THE RADIO STAR"

The very first video played on MTV in 1981 was "Video Killed the Radio Star" by The Buggles. But maybe it should have been entitled Video Killed the Audio Star. These days we are turning to the web and streaming video to get our news, learn about history and even listen to our favorite music.

The IEEE History Center, since the 1980s, has conducted audio oral histories. We have more than 400 oral history tapes in the IEEE Archives, in various formats, including reel-to-reel and standard cassette. As of March 2007 we too converted to the digital image and are now conducting video oral histories. There are many positive aspects to doing the video oral histories and we well try to cover as many as possible.

We invested in a high definition camcorder to record the oral histories, and also worked with IEEE.tv to use a professional film crew, when available. For the staff, there was a learning curve, and we are now adapting. We wanted to make sure that we captured the traditional oral history, but wanted to make sure that we are filming segments that can be used for the Web.

The camcorder we purchased was the Canon HV20, which has mini DVs and records in high definition. The first video oral history was done by Center Staff Director Michael Geselowitz with Jerry Minter of Denville, New Jersey, U.S.A.

Jerry B. Minter was born in 1913, and became interested in radios at an early age. In 1922, he saw an early crystal set, and in high school he was already helping to install and service radio sets. He studied for one year at North Texas Agricultural College in Arlington and then went to MIT where he graduated in 1934 with a degree in electrical engineering. In his interview, Minter discusses many aspects of his long, and still very active, career. He explains how one of his signal generators was at Pearl Harbor on the day of the attacks, and the controversy over mechanical versus human failure. He also talks about the formation of the North Jersey Subsection, working with J.W. McRae, and the later merger of AIEE and IRE into the IEEE. Throughout the interview, Minter discusses the difficulties of military work and the issue of classified information particularly during the war. Minter also shares his experiences with Governor Charles Edison, son of Thomas Edison, and the stories Edison told him about his father and Henry Ford.

The second video oral history was done with Earl Bakken, inventor of the first implantable pacemaker. Rik Nebeker, Senior Research Historian at the History Center and Noel Bryson, IEEE.tv Producer, traveled to Minneapolis to film the oral history at Medtronics and at the beautiful Bakken Library. They were able to capture the beginnings of Medtronics and Mr. Bakkens work with Dr. Lillihei. As a side note, the invention of the first implantable pace maker is an IEEE Milestone. The Bakken Library was gracious to allow IEEE.tv to film "b-roll" or extract footage within the Bakken, to incorporate in future IEEE.tv segments.

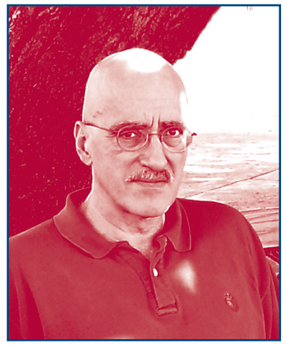
We Serve Many Masters

Once it was decided to change formats for our oral histories, many problems arose. The first of which was: who is our audience? Of course, first and foremost are the historians, scholars and researchers interested in the history of technology. But we also have a large and eager audience who view IEEE.tv. And, as we discovered, individuals who view IEEE.tv are not going to watch an entire hour of an oral history. So it was decided that we would make excerpts available for the IEEE web site. And this is where the real work comes in. There are many steps to making these pieces ready for IEEE.tv (more than thirty in all). First we need to identify engineers to interview. We thank our technical societies for providing the names. The first two to approach us were the IEEE Signal Processing Society and the IEEE Ultrasonics, Ferroelectrics, and Frequency Control Society (UFFC). We then started contacting the engineers to determine their availability. Next we set up dates, but first we checked with IEEE.tv to see if a professional film crew would be available for the taping. We also took into account the location of the engineers. If there were clusters, in let's say New England or Southern California, we would determine if it was financially possible to call in a professional film crew, or if we would use our own equipment. One other option is to use a media lab at a local University (which we did with two subsequent video oral histories.) We then proceed with processing the video oral histories as we did with the audio, which is "stripped out" and transcribed in the traditional format. The entire video will be archived and excerpts will be extracted for IEEE.tv.

One of the next steps is to identify those short pieces to be used by IEEE.tv and a script is written and a professional announcer is hired to record it. It is all pieced together and we now have a new history piece for IEEE.tv. One other thing we are very proud of it that we have our own separate History category within IEEE.tv. "Stay tuned" for more!

JOHN VARDALAS NEW OUTREACH HISTORIAN

The History Center is pleased to announce the appointment of Dr. John Vardalas to the position of Outreach Historian at the History Center. John has extensive experience as a scientist and many years' experience in the history of science and technology in academic as well as corporate settings. He has served as the Rutgers postdoc and a visiting scholar at the History Center, and was a fellow at the Rutgers Center for Historical Analysis.



John has a B.S. in physics, an M.Sc. in mathematical physics, an M.A. in geography (economic), and a Ph.D. in history. His 1996 doctoral dissertation was awarded the best thesis award by the Canadian Historical Association. With Dr. Norman Ball, Dr. Vardalas wrote *Ferranti-Packard: Pioneers in Canadian Electrical Manufacturing*, (Montreal: McGill-Queens University Press, 1994). His second book, *A History of the Computer Revolution in Canada: Building National Technological Competence* (Cambridge, Mass: The MIT Press, 2001), won the American Association for History and Computing best book award for 2002.

John will assume overall responsibility for the new IEEE Global History Network initiative, which will be a crucial organizing principle for the History Center moving forward.

THINGS TO SEE AND DO

"How Edison Are You?" an exhibit at the Prudential Arena Center, Newark, New Jersey, U.S.A. introduces the works of the United States' prolific inventor to the sports and entertainment audience via a series of four murals. The Prudential Arena Center is one forty meters away from the site of one of Edison's workshops, and the subjects of the murals emphasize technologies which Edison either invented or improved, and which are used at the arena: e.g. light bulb, phonograph, motion picture camera, and early motion pictures on sports and entertainment subjects. See related Web site below.

Minicomputer Software Meetings: 3-4 and 5-6 June 2008
The Software Industry SIG (as part of the Computer History Museum) is planning its next industry pioneer meetings at the Computer History Museum in Mountain View, California, U.S.A. The sessions of 3-4 June will focus on software developed primarily for DEC and DG minicomputers, and those of 5-6 June will concentrate on software developed primarily for HP minicomputers.

The Software Industry SIG welcomes suggestions of subjects for discussion in the workshops and of people to be scheduled for oral history interviews. For more information, Burt Grad, 5 St John Place, Westport, CT 06880, U.S.A., Tel and Fax 203-222-8821, **burtgrad@aol.com**

Region 8 Eurocon 2009, 18-23 May 2009, 150th Anniversary of Alexander Popov
IEEE Region 8 EUROCON 2009, to be held in St. Petersburg, Russia will include a session on the History of Electrical Engineering. The deadline for the reception of full papers is 30 September 2008. EUROCON 2009 Office, St. Petersburg Electrotechnical University, 5 Professor Popov ul., St. Petersburg, 197376, Russia, **eurocon.09@gmail.com**, **www.ieee.org/go/eurocon2009**

SURF CITY

Ben Tongue
Blonder Tongue Labs is a New Jersey based company, founded in 1950, and specializing in the design, manufacture, and supplier of a line of broadband systems equipment and technical engineering services for voice, video and data service providers. Ben Tongue, one of its founders, established a Web site that highlights crystal radio design, late 1920's TRF Radios, antique hearing aids and Blonder-Tongue Labs. Ben is a Life Senior Member of the IEEE. (Ike Blonder is also a Life Member.) **http://www.bentongue.com/**

The Edison Innovation Foundation established a fantastic web site to educate the public about Thomas Edison, "How Edison Are you?" they ask. It is Flash based and jam packed with wonderful information on Edison, his life and inventions, also education and endowment. **thomasedison.org**

Minter Oral History: Early last spring the IEEE History Center conducted its very first video oral history with Jerry Minter of Denville. (See related story, page 3) A 10-minute long piece now appears on IEEE.tv and we are all very proud of it. The description on the web site reads: The History Center conducted it's very first video oral history with Jerry Minter of Denville, NJ on 13 March 2007. Minter owns Components Corporation which makes printed circuit card connectors, and is a Life Fellow of the IEEE and a graduate of MIT. He holds twenty-six patents and received his most recent patent two years ago on flight crash avoidance systems. Numerous products of his have been used by NASA, UNIVAC and other military programs. He is a founding member of the IEEE North Jersey Section, a past President of the Radio Club of America and a past President of the Audio Engineering Society. At the end of the oral history he provided a few delightful anecdotes about Thomas Edison and Henry Ford. **http://www.ieee.org/web/membership/IEEEtv/about.html**

NEW LIFE FOR OLD POWER PLANTS

Buildings may stand for hundreds of years and be used for many different purposes. Power plants are no exception. One such example is the power plant in Baltimore Harbor. It was built in 1895 as the Pratt Street Power Station-Pier 4 to supply power to street cars. Today it houses entertainment establishments as well as restaurants and a great night club. Another such example is the Powerhouse Eatery in White Haven, Pennsylvania. Do you know of others? We would love to hear from our readers who may know of old electrical engineering sites which have been adapted for another use. You may email us at **ieee-history@ieee.org**.

EE IN THE MOVIES

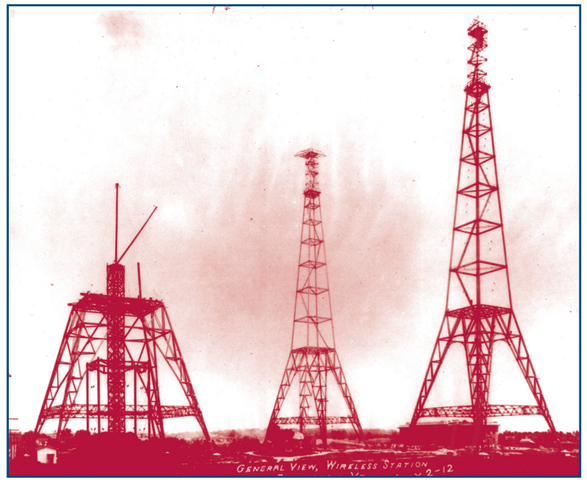
ANTENNAS

Traditional electrical engineering, which emerged as a discipline in the last half of the 19th century, consisted of the exploitation of electrical flows in metal conductors. James Clerk Maxwell, Heinrich Hertz, Guglielmo Marconi, and others expanded traditional EE to include electromagnetic waves traveling in space. The coupling of these two realms—electromagnetic waves in space and wired circuits—is achieved with antennas, and in the past hundred years a great variety of antennas have been developed. Because antennas are often fairly large and noticeable features of the human environment, they can serve as time markers in movies that depict the past.

The greatest change occurred in the early 1950s: in the United States very few people had a TV set in 1947, but half of all households did in 1955. Most people installed a roof-top antenna, so any view of houses or apartment buildings in the 1950s is likely to show antennas. The classic Elia Kazan movie "On the Waterfront" shows the roofs of apartment buildings in Hoboken, New Jersey in 1954, and there are antennas everywhere. In the 1955 movie version of "Guys and Dolls" we see a stage setting for a nightclub show that is a city skyline with lots of TV antennas and little else. In the early years of television many people used the set-top rabbit-ears antenna, as seen for example in the 1955 Marilyn Monroe movie "Seven Year Itch". Set-top antennas continue to be used; we see them in "Requiem for a Dream" (2000) and in "The Good Girl" (2002).

In the 1960s microwave-relay towers, with horn-reflector antennas, became common; an angel stands on such a tower in the 1998 movie "City of Angels". When François Truffaut was making "Fahrenheit 451" in the mid 1960s, antennas were still a sign of modernity, so this depiction of a future society opens with a long sequence showing one antenna after another. As of 1964, by FCC mandate, TVs had to be equipped with UHF receivers, and the arrow-shaped Yagi-Uda antennas, which could be aimed at local UHF transmitters, came to be common. Antennas began to disappear from housetops as cable TV spread, reaching 20 percent of households in 1980 and 60 percent in 1990. A familiar figure of these years was the cable guy, depicted in a 1996 movie of that name by Jim Carrey. In the 1990s a new type of antenna—small parabolic satellite-TV antennas—appeared on houses and apartment buildings. Also in the 1990s, cell-phone antennas, on towers and on buildings, became noticeable.

There was, of course, radio before there was television, but the majority of people did not have an exterior antenna for radio



U.S. Navy Radio Antennas at Arlington, Virginia, U.S.A. in 1912.
Image courtesy of the Smithsonian Institution

reception. Amateur radio hobbyists were, however, an exception. A large amateur-radio antenna is shown in "Frequency" (2000); in this movie, hams conquer not only distance, but also time, as they communicate between 1969 and 1999. A transmitting tower for broadcast radio is prominent in "King Kong" (1933)—Kong holds onto one on the top of the Empire State Building—and in "Wings of Desire" (1987), where we see a cluster of antennas atop Berlin's radio tower as we hear bits from several broadcasts. In "American Graffiti" (1973) there is a slow pan up the tower of Wolfman Jack's radio station.

Perhaps the most impressive antennas are those used by radio astronomers. The world's largest single-dish radio telescope is the Arecibo Observatory in Puerto Rico. It appears in the 1997 movie "Contact" and, as the setting for a fight to the death, in the 1995 James Bond movie "GoldenEye". "Contact" shows also the Very Large Array, a dispersed set of twenty-seven separate radio antennas. Also impressive are the antennas used to communicate with spacecraft. "GoldenEye" shows steerable parabolic-antennas, one of which crashes through the roof of a building. Quite a few other Bond movies, including "You Only Live Twice" (1967), "Moonraker" (1979), and "Tomorrow Never Dies" (1997), show antennas for communicating with spacecraft.

A great many other types of antennas are seen in movies.

continued next page

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In many World War II movies one can see radar antennas, especially on ships and at airfields, even when radar is not part of the story, as it is, for example, in "Guns of Navarone" (1961), where the eponymous guns are radar controlled, or "Pearl Harbor" (2001), where some important radar sightings are ignored. The 1995 movie "Crimson Tide" shows an ELF antenna extended from a submarine, also a VLF antenna that can be used when the sub moves up to periscope depth. The prisoners of "Stalag 17" (1953) use chain-link fencing as an antenna for a clandestine radio receiver. Vehicle-mounted antennas used to locate illicit radio-users are seen in Brian De Palma's "Obsession" (1976) and in Krzysztof Kieslowski's "Red" (1994). In "Octopussy" (1983) Bond uses to good effect the whip-type antenna on an airplane: he pulls it back and releases it in the face of the villain, causing him to fall from the airplane. "Fantastic Voyage" (1966) shows an impressive array of eight tiny antennas used to track the minuscule vehicle injected into the diplomat's bloodstream.

As always, we would be grateful for reports from readers of other interesting movie scenes that involve electric power. You may contact us at **ieee-history@ieee.org**.

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PRESERVING HISTORY FOR THE NEXT GENERATION

John R. Treichler remembers the bittersweet moment when he was named an IEEE Fellow. "It was not even a month after my father died and the first thing I thought when I opened the envelope was how proud he [a chemical engineer!] would have been," Treichler says. As a third generation engineer, Treichler understands how important it is to preserve the history of engineering. "All engineers stand on the shoulders of those who came before," he says. Treichler began supporting the IEEE History Center to help preserve this history so that each generation of engineers may benefit from the ones before them and have the opportunity to learn about the history of their profession. He continues to support the IEEE History Center because he says, "the job is never done."

EXPRESSING GRATITUDE BY SUPPORTING HISTORY

For IEEE Fellow Misao Kobayashi, giving back to the IEEE History Center is a way of thanking the profession for honoring him. Kobayashi first started supporting the Center when he received awards for his work with Metal Oxide Gapless Surge Arrester. "I wanted to express my gratitude for the recognition and to give a little support for past technology and future new technology," he says. He believes it is important for the IEEE History Center to continue its work to research, describe, and present the impact electrical technology has had on society, and he considers the Milestones Program to be particularly important. The Milestones Program celebrates the ingenuity of engineers and their achievements by working with IEEE geographical units to recognize local historical achievements, and to promote them to the public and local preservation officials.

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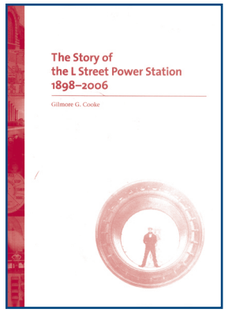


COOKE, GILMORE G.

The Story of the L Street Power Station, 1898 – 2006,
Exelon Corporation, 2007

In the 1890s, the Boston Electric Light Company vacated its electric generating station on Gilbert Place in Boston to make room for a major new railroad terminal. A new, replacement generating station was constructed on L Street in South Boston. This site offered ready access to Boston Harbor with its plentiful supply of condenser cooling water and mooring sites for colliers delivering coal to fuel the new generating station. The L Street Power Station first went into service in 1898. In 1902, the Boston Electric Light Company was acquired by the Edison Electric Illuminating Company of Boston (EEI), later becoming known as the Boston Edison Company.

The 1898 power station incorporated then state-of-the-art steam boilers and reciprocating prime movers. Since that date, the station has often been expanded, upgraded, and redeveloped. The then revolutionary Curtis vertical steam turbines were introduced in a major expansion beginning in 1903. A further expansion beginning in 1916 used horizontal steam turbines. After being the first utility in the United States to use 1,200-psi high-pressure steam boilers and turbines in the early 1920s at its Weymouth generating station, EEI used advanced high pressure steam equipment in a major 1939 L Street Power Station expansion. Also, the late 1930s saw the installation of flue gas scrubbers and electrostatic stack precipitators, two early forms of pollution control, at the L Street Power Station.

The most recent major redevelopment and modernization of the L Street site took place during the 1960s with the construction of the New Boston Generating Station. The first of two 380-MW (maximum claimed capability) generating units went into service in 1965, and the second unit entered service in 1967. With the completion of the second unit, the station became the largest generating station in the six-state surrounding area. Originally fueled by number 6 fuel oil as its primary fuel, the New Boston Generating Station now uses natural gas as its fuel. The station was sold to Sithe Energies Corporation in 1998 and later acquired by Exelon Power Corporation in 2002.

Throughout its long history, the L Street Power Station has used and has often pioneered the use of the newest and best technologies. As a result, its evolution over more than a century demonstrates and parallels the development and evolution of the entire United States steam electric power generation industry.

The author, drawing upon his extensive professional experience in providing engineering, construction, and start-up services to electric generating station projects throughout North America and his interest in electrical engineering history, has produced a comprehensive and intricately detailed history of the remarkable L Street Power Station. The book is divided into five parts, each devoted to a particular period of major expansion or redevelopment at the site. Cooke covers important engineering, design, construction, operation, and staffing aspects of each major phase in the history of the site. The book is richly and thoughtfully illustrated with seventy-six black and white and thirty-six color photographs as well as thirdy-four engineering drawings, diagrams, elevations, and charts. The images include pictures of early and later construction activities, views of the elaborate architectural style typical of industrial buildings of an earlier age, boiler house and turbine room scenes, and photographs of a number of the present staff members at the New Boston Generating Station. All 146 images are of high quality and are well organized and presented. Many are from the author's personal collection.

This book will appeal especially to those interested in the history of technology, to power generation engineers and related professionals, and to those seeking information specifically on the L Street Power Station, or more generally on the evolution of the United States power generation industry since its infancy.

In writing this book, Gilmore Cooke has rendered an important service in the ongoing effort to collect, organize, understand, and preserve the history of technology. He plumbed a large number of sources to bring us an outstanding textual and pictorial history of an important part of the history of electrical engineering and design. Cooke has put between two covers much valuable and interesting information that might otherwise remain scattered and eventually lost to posterity.

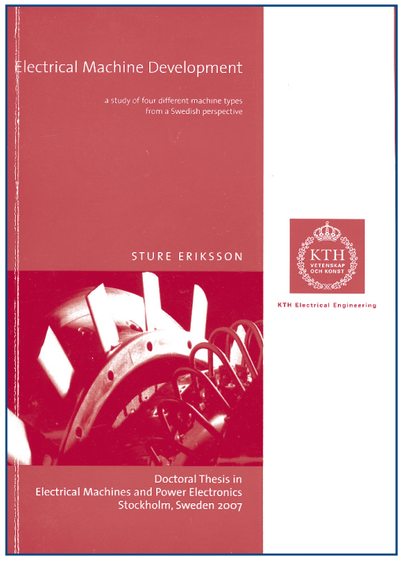
When the author first told this reviewer about this project, he said that he had just published his first book. The electrical engineering community and historians everywhere can hope that *The Story of the L Street Power Station, 1898 – 2006,* is but the first of many books authored by Gilmore Cooke, P.E.

Published in 2007 by Exelon Corporation, Kennett Square, PA. Available from the author, **gilcooke@ieee.org**, $40.00 plus postage; paper, ISBN 978-0-9795355-0-5, vi + 105 pages, 146 illus.

ERIKSSON, STURE

Electrical Machine Development: A Study of Four Different Machine Types from a Swedish Perspective,
KTH, 2007.

Sture Eriksson's doctoral thesis, published by KTH in its original format, is an ambitious work in which business case histories, history of technology narratives, and technological expositions intersect. As evident from the title, Erikksson is concerned with the historic development and technological innovations of what he includes under the category of electrical machines. His objects of investigation—the broadly defined electric machines--are divided into two main groups: the first of which are the small standard induction and electric vehicle machines; and the second of which are large turbo-generators and extra-high voltage machines. Throughout, he maintains a historical perspective reaching back to the electric machine's nineteenth-century origins and traces its chronological development up to the present.



Eriksson makes clear from the first that this is also a case study of the Swedish power company ABB, and he draws extensively from that firm's archives in presenting its historical trajectory. As the author observes, this aspect of his work may limit its appeal and lessen its relevance for an international audience. Among the most successful chapters of the thesis is that which deals with the development of the extra-high voltage Powerformer generator. This chapter represents, in Eriksson's estimation, the first

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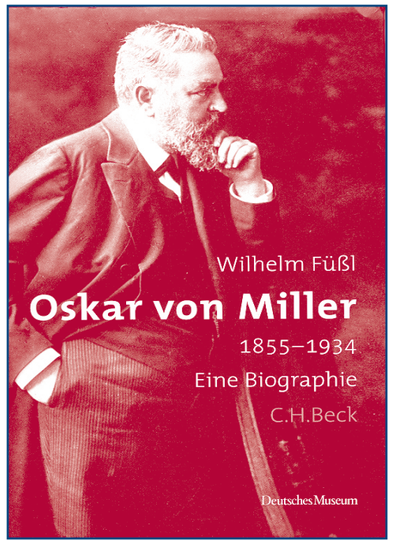
comprehensive account of this large-scale project. The strongest chapter, that on electric vehicle motors, expands past the Swedish national boundaries to include European, Asian, and American involvement and recent advances in electric car technology.

Eriksson offers a concise and informative overview of the development of the electric car and the search for a replacement for the combustion engine. Here, the author is able to explore the history and impact of this multi-national project beyond the Scandinavian case, and to place the quest for a viable economic substitute into international perspective. Of special note is his reading of the the involvement of German motor companies. For those with an interest in automotive history, this chapter, especially the evidence drawn from personal interviews conducted by the author, will likely be the most satisfying.

The author bases his work on a range of archival and printed materials. As noted above, one of his main sources has been the ABB company archives in Sweden, but he has also made use of documents housed at the Deutsches Museum in Munich, and a variety of theses and papers in English, German, and Swedish languages. Eriksson skilfully synthesizes sources from different fields and specialties, and presents their conclusions clearly. Added to these published and printed sources are Eriksson's own oral histories and interviews, as well as the insights and experiences he himself gained in his forty years of engineering. Eriksson was an engineer with ABB during the years when it was building on and enhancing its expertise in induction motors, and thus offers a privileged perspective.

The thesis is accessibly written and copiously illustrated with photographs, graphs, and tables. It will be of use primarily to those whose research is concerned with electrical machine development or for those whose interests may benefit from a comparison with the Scandinavian case. Students of business history, automotive history, and European electrification efforts in the twentieth century will also find its tightly organized structure and citations beneficial for future research, but for the general reader, this work, like most doctoral theses in their natural state, will have only limited appeal.

KTH Press, Stockholm, Sweden] Paperback, ISBN 978-91-7178-617-3, 484 pages.



FÜSSL, WILHELM

Oskar von Miller, 1855-1934, Eine Biographie, C.H. Beck, 2005.

Visitors to Munich's majestic Deutsches Museum may be forgiven for not knowing much about the founder of that landmark museum of science and technology. Oskar von Miller is somewhat an obscure figure even in his German homeland, and he is largely unknown to most others. In this superb biography, Wilhelm Füßl, a historian of technology and the head of the archives at Deutsches Museum does a fine job of bringing Miller to the public.

Füßl has earlier written on the founding of the museum, notably with colleague Helmuth Trischler, in their 2003 edited collection, but here Füßl's interest is in Miller. And while the founding and building of the museum is indeed a highlight of the book, Füßl shifts the emphasis in this work to other of Miller's achievements, notably his involvement in the construction of the German power grid. Though well-known in his day, Miller's influence has faded from memory.

As Füßl maintains, however, Miller is inseparable from much of the early twentieth-century modernization and development of Germany—from his dream of sozialen Stroms (social electric) and Strom für alle (electricity for all), to his ideas about raising the profile of engineers and the place of engineering in the culture—Miller was a visionary and a "man of action".

Born into a noble Bavarian family, and educated at Munich Polytechnic, Miller had a knack for cultivating friends and acquaintances in high places. He counted among them Emil Rathenau, Thomas Edison, Max Planck, and members of the Bavarian brewing family Sedlmayr. Depicted in a 1907 caricature as "the begging monk" his fund-raising acumen was profound, with much of the necessary material for the building of the Deutsches Museum having been donated.

Though Füßl describes his book as a biography, it does not follow the contours of biography as usually presented. In the main, personal details about the family life of Miller, including his marriage, his children, and his Catholicism, are confined to the final chapter. Instead, the book may be viewed as a history of the late nineteenth- and early twentieth-century German efforts at building both infrastructural and cultural institutions, and which uses Miller's life as a lens through which to view that story.

As its director, Füßl is deeply familiar with the archives at Deutsches Museum and has drawn both from within his own institution, and from others across Germany as well. Many private and archival papers had been destroyed during the Second World War and in its aftermath, but Füßl is nonetheless able to assemble from the widely scattered sources a large amount of material, much of it previously untapped, and it yields impressive results.

Füßl lays out Miller's life story in the context of the tumultuous events of Germany's early twentieth century. From his visit as a young man to France, during which he was "overwhelmed" by the sights at the Paris Electro-technical Exhibition of 1881and determined to bring this grand vision to his homeland in the form of similar exhibitions, to the penultimate chapter, titled "Resignation" in which the elderly Miller grapples with his own retirement and the spread of National Socialism's evil stain, Miller's signature is, as Füßl's writes, inscribed on his country and his century.

Although Miller is perhaps best remembered as the founder of the Deutsches Museum, the story of the museum is not the sole focus here. Nevertheless, Füßl includes a rich chapter on the development of the twentieth-century museum—tracing its ideological origins as far back as the French Revolution and to the curiosity cabinets of wealthy collectors, which typically contained an unsystematic jumble of natural artifacts. The story of Miller's intellectual contribution to the "Deutsches Museum system" makes for fascinating reading. This chapter will be especially rewarding for those with interests in public history as it details the ways in which the Deutsches Museum emerged as a cultural institution, and is today regarded by many as the finest museum of its type in Europe, and perhaps the world.

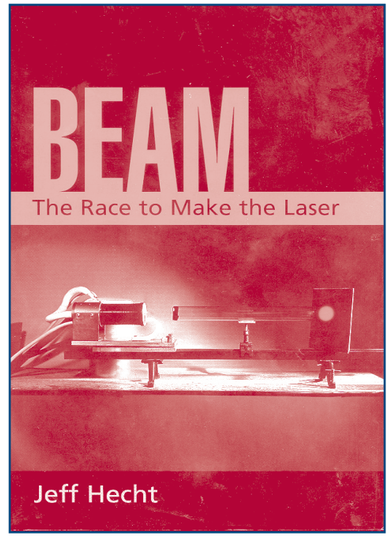
The book is handsomely produced by its German publisher, with many illustrations embedded throughout the text. A full bibliography, multiple indexes, and thorough citations make it a treasure trove for future researchers, and it will appeal to many readers with interests in the history of technology (particularly of early electrification efforts), and to specialists in museum history, as well as those readers whose field is the history of modern Germany. It will also be of interest to those concerned with Germany's rapid modernization during the Weimar period.

Available from C.H. Beck, Munich, Germany, **www.beck.de**, hardcover, euro 30.80, ISBN: 3-406-52900-3, 454 pages, photos, index.

HECHT, JEFF

Beam: The Race to Make the Laser, Oxford University Press, 2005

Jeff Hecht's history of the building of the first working laser serves as an excellent addition to the books on the subject, especially as it emphasizes with the very great practical difficulties involved. Hecht gives detailed and very accessible explanations of the physics and optics underlying the laser at appropriate points in the narrative so that the reader can have them in mind while reading about the obstacles (among



them crystal imperfections, difficulties in aligning mirrors sufficiently precisely, difficulties in measuring results from experiments, etc.) to constructing a working prototype. The laser was not simple, and the reader is given a profound respect for the intellects of the people who solved its enormous problems.

Hecht's book is also fascinating as an examination of the ways differing research cultures at different labs can foster or delay innovation. The mid-1950s to May 1960 in the United States, the period addressed by the book, was a period of suspicion and Cold War paranoia, where the persecutions of McCarthy's House Un-American Activities Committee had stripped certain labs of their brightest minds or made certain scientists unwilling or uncomfortable working under the military. Military spending and contracts drove much of the research and development work, a state of affairs which could foster new technologies as well as deflect or divert others. Bell Laboratories' urgent efforts to get certain papers on optical maser research published to head off the possibility that the U.S. government might classify it. Gordon Gould, one of the originators of laser theory, was denied a security clearance, and was thus not allowed to see his own notebooks (which the U.S. government had classified and confiscated), or discuss his own work with colleagues.

The core of Hecht's narrative is Theodore Maiman's struggle and eventual triumph in constructing the first working laser, working with a much smaller budget at Hughes Aircraft than competitors such as Bell Labs and TRG, yet beating them to the goal. Maiman deserves, and receives, credit for being willing to go against the conventional wisdom which had dismissed ruby as a workable source for emission for so long.

Oxford University Press, **www.oup.com**, $39.95, hardcover, ISBN 0-19-514210-1, vii + 274 pages, 44 illus., index, appendices.

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