Center for the History of Electrical Engineering

Newsletter No. 32 Spring 1993

ENGINEERS AS EXECUTIVES

Top leadership of technological businesses requires both business and technical acumen. It is not strictly necessary, of course, for a company leader to understand the details of a particular technology upon which the company's products is based, and there are successful technological businesses that are run by executives whose backgrounds are in sales or finance rather than engineering. However, there is a common perception in the engineering community that technological businesses are run differently — and perhaps better — when they are run by people with engineering experience.

The Center has recently begun a moderate-sized project, under the direction of William Aspray, to examine engineers as executives. Interviews are being conducted with ten to twenty executives of businesses in the electrical, electronics, and computer industries to determine the effect that their engineering experience has had on their managerial practice. For a comparative analysis, the companies chosen range from small entrepreneurial firms to the largest industrial firms, and include software houses, electronics components manufacturers, systems manufacturers, and others. To determine national differences, interviews are being conducted in Germany, Japan, and the United States.

The first product of the project will be a set of edited transcripts of the oral histories. A second will be a smaller number of videotaped interviews. Some comparative analytical writing based on the interviews, further examination of historical episodes within the companies, and published and company literature will appear at the end of the project — probably in mid-to-late 1994.

This project continues the Center's program to apply history to contemporary engineering and social issues. The first major project of this sort, a conference on Technological Competitiveness, was held in October 1990, and the results of that conference will appear this April in a book published by IEEE Press. Dr. Aspray has continued this program through a graduate course at Rutgers University comparing the Industrial Revolution and twentieth-century high technology and through some initial examinations of the history of industrial research laboratories. His ultimate goal is to write a history of high technology, illuminating various aspects including technological management and organizational structure, research and development laboratories, the patent system, venture capital, automation and advanced manufacturing technologies, technology transfer, and academic-government-industry interactions.

The first set of interviews for the Engineers as Executives Project were conducted in Japan this February, with the following business leaders:

Katsutaro Kataoka, a highly individualistic corporate leader who as a WW II veteran built up a small firm to manufacture variable capacitors into Alps Electric, one of the world's leading, horizontally diversified, secondary components manufacturers. Alps built many of the television tuners that enabled the Japanese to dominate the television manufacturing industry, developed a major car stereo business (Alpine) out a supply relationship with Honda Motors, and is today a leading manufacturer of floppy disk drives for Apple, IBM, and other companies.

Koji Kobayashi, Chairman Emeritus of NEC Corporation, which during his tenure as company leader became the largest supplier in the world in computer and telecommunications. NEC's activities were shaped by Dr. Kobayashi's vision of the integration of computer and communications technologies into what he has called C&C.

Kazuhiko Nishi, the inventor of the first laptop computer and the joy stick used in millions of Nintendo video games, whose company, the ASCII Corporation, today has a surprisingly integrated and future-oriented set of business activities in personal computing, entertainment, business workstations, semiconductor design, and on-line services.

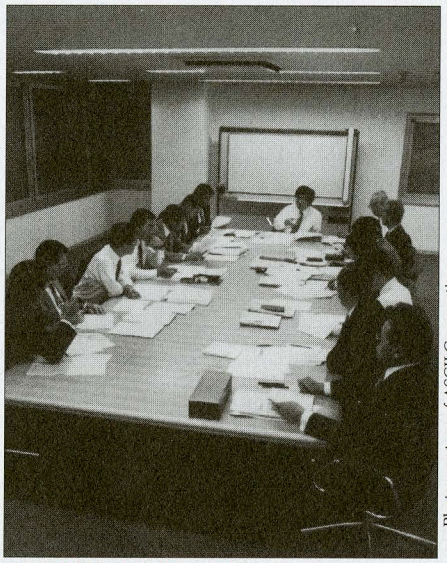

Photo courtesy of ASCII Corporation

Kazuhiko Nihi at ASCII Corp

Takashi Sugiyama, the first president of Yokogawa Medical Systems, which is a joint venture between Yokogawa Electric and General Electric to manufacture medical diagnostic systems such as CT, nuclear medicine imaging, and ultrasound systems. Begun as a marketing arm for General Electric, through strong production engineering and an emphasis on service, Yokogawa Medical Systems has become a leading worldwide producer in this market area.

Takashi Yamanaka, the president of Yokogawa Electric Corporation, a leading worldwide supplier of measurement and control instrumentation and information management systems. Yokogawa Electric is a particularly interesting company for the success of its joint ventures with western companies such as Hewlett Packard and General Electric.

Interviews in Germany and the United States, and perhaps additional interviews in Japan, are now being scheduled. Results will be announced in subsequent issues of this newsletter. ⊣

STAFF NOTES

Radar History Workshop

An international workshop on the history of radar was held 13-16 December 1992 at the Deutsches Museum in Munich. The purpose of the meeting was to bring together distinguished engineers and historians from Germany, the United Kingdom, and the United States interested in radar history in order to assess the current state of the field and determine needs and opportunities for future research.

The conference arose as a result of an effort to design an international exhibit on the history of radar, which would be shown in the three countries represented at the workshop. At an earlier meeting, representatives of the IEEE Center for the History of Electrical Engineering, the Smithsonian Institution, the Deutsches Museum, the Science Museum of London, the MIT Museum, and the Historical Electronics Museum had determined that further research was needed before an exhibit could be planned. As a result of the workshop, curatorial staff of several of these institutions are beginning to lay plans for a major exhibit several years in the future.

The workshop focused on research rather than an exhibit. Louis Brown, John Becklake, and Ulrich Kern provided

Photo: Carol Voelker

Louis Brown of the Carnegie Inst.

overviews of the state of historical research on radar in the three countries. Charles Susskind, John Bryant, Arthur Norberg, and Sean Swords gave comparisons of developments across nations. David van Keuren, Herbert Kümmritz, Tony Devereux, and Louis Brown presented papers on radar and World War II. Walter Kaiser, Hartmut Petzold, David Barton, and Werner Gerlitzki discussed components and systems in different contexts. Richard Trim, Paul Forman, Eryl Davies, and Robert Buderi lectured on post-war radar. Alan Beyerchen and Michael Dennis presented historiographic papers, and William Aspray and Oskar Blumtritt led a final discussion.

The proceedings from the conference, including revised papers from most of the lecturers, are being readied for publication by the IEEE Press. ⊢

IEEE FELLOWSHIP

The 1993-94 IEEE Fellowship in Electrical History has been awarded to Mary Ann Hellrigel, a student in the doctoral program at Case Western Reserve University. Hellrigel's project, entitled "The Quest to Be Modern: The Adoption of Electric Light and Power Technology in Small Town America, 1880-1920", is a social, economic, and business history of electrification in the United States during the pre-network era. In a series of case studies, she will examine the the electrification experience in the Pennsylvania cities of Harrisburg, Lancaster, and Williamsport.

Sungook Hong, the Center's 1992-93 Fellowship holder, recently won the 1992 Ida and Henry Schumann Prize, awarded annually to the year's best original essay written by a graduate student in the history of science. Hong's paper, "Forging the Scientist-Engineer: John Ambrose Fleming (1849-1945) and the Ferranti Effect," contrasts how in the late 19th century Fleming, a scientific engineer, and James Swinburne, a leading practical engineer of the day, approached the Ferranti effect (an inexplicable rise of voltage in high-voltage AC systems.) Hong concludes that the preference given to Fleming's theory about the phenomenon indicates a new recognition of the social and technological role of the scientist-engineer. ⊢

Aspray Lectures in Japan

Center Director William Aspray gave an invited lecture at the Engineering Academy of Japan in Tokyo on February 17. Eighty distinguished engineers and engineering managers attended his lecture on "Technological Competitiveness Historically Observed." The talk explained the reasons why history is important to engineering, summarized the history of high technology in America since the late nineteenth century, and drew some lessons about contemporary technological competitiveness from historical case studies. Plans are being discussed for publication of the lecture in the Academy's journal. ⊢

Slotten Lectures on Radio History

The Center's postdoctoral Fellow, Hugh Slotten, presented an invited paper at Iowa State University entitled "Creating 'Radio Paradise': Radio Engineers and Public Policy." Slotten discussed the role of electrical engineers in the regulation of radio broadcasting during the 1920s and early 1930s. He specifically analyzed the involvement of radio engineers, including members of the Institute of Radio Engineers, in the policy decisions of the Department of Commerce and the Federal Radio Commission. ⊢

The Newsletter reports on the activities of the Center and on new resources and projects in electrical history. It is published three times each year by the Center for the History of Electrical Engineering.

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STAFF NOTES

Center Staff Present Papers at HSS

Two staff members presented papers at the 1992 annual meeting of the History of Science Society, held in Washington DC in December. Rik Nebeker presented a paper entitled "Experimental style in high-energy physics: the discovery of the upsilon particle," in which he examined one important series of experiments to elucidate the style of colloborative research—involving dozens or even hundreds of physicists, engineers, and technicians—that has evolved over the past several decades in high-energy physics. Loren Butler, speaking on "Mathematical physics and the American mathematics profession to World War II," discussed efforts of mathematicians, such as E.H. Moore and Oswald Veblen, to prevent disciplinary isolation by fostering the types of mathematics important in physics and engineering. ⊢

Mathematics in Electrical Engineering

Center Director William Aspray presented an invited lecture at a conference on the Interaction between the History of Mathematics and Mathematical Learning in Essen, Germany in November 1993. The title of his talk was Mathematics, Computing, and Practical Engineering: The Case of Electric Power Engineering. It explored the interplay between mathematics, computing, and practical engineering through an examination of electric power engineering. Examples were drawn from the work of James Maxwell, Lord Kelvin, Oliver Heaviside, Charles Steinmetz, Vannevar Bush, and Edwin Harder. Discussions are underway for publication of the conference proceedings by Vandenhoeck & Ruprecht publishers of Göttingen. ⊢

Aspray to Speak in the Netherlands

Center Director William Aspray will be giving two invited lectures in the Netherlands. The first is a lecture on the history of theoretical computer science in the Colloquium on History of Computing at the Mathematical Center (CWI) in Amsterdam on May 12. The second is a talk a week later on the history of informatics in a Workshop on the History of Office Automation at the Technical University in Delft. For further information, contact Dr. Jan van den Ende, Faculteit der Wijsbegeerte en Technische Maatschappijwetenschappen, Technische Universitei Delft, Postbus 5050, 2600 GB Delft, Netherlands or telephone (015) 78 71 05. ⊢

Slotten Publishes

The Center's postdoctoral Fellow, Hugh Slotten, has published an article in the March 1993 issue of *Isis* (the Journal of the History of Science Society), entitled "The Dilemmas of Science in the United States: Alexander Dallas Bache and the U.S. Coast Survey." It analyzes the strategies Alexander Dallas Bache (Benjamin Franklin's great-grandson) used to gain support and maintain control of the U.S. Coast Survey, the most important scientific institution in antebellum America (1840s and 1850s). Bache used his position as superintendent of the Coast Survey to become the central leader of the American scientific community. Slotten argues that Bache successfully negotiated particular dilemmas inherent in the practice of science in the United States. ⊢

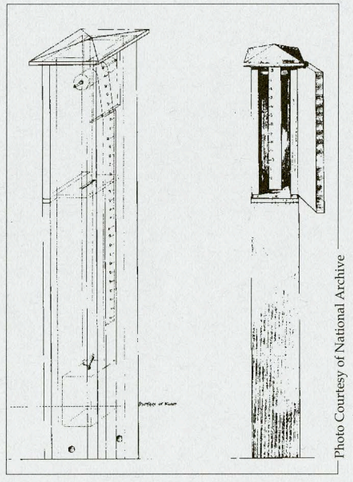


Photo Courtesy of National Archive

A tide gauge used by A. D. Bache

Archival Research

Two papers by Research Historian Frederik Nebeker were recently published by the Center for History of Physics of the American Institute of Physics (AIP). "Report on Upsilon Probe" and "Report on subcontracting and the LeCroy Electronics Corporation" appeared in Report Number 4 of AIP Study of Multi-Institutional Collaborations, Phase I: High-Energy Physics (American Institute of Physics, New York; 1992). Both of these papers deal with the important role of electrical engineering in high-energy physics. The Center is participating as a subcontractor in the AIP study. ⊢

Historical Session at Electro/93

Frederik Nebeker has organized a historical session at the upcoming Electro/93 Electronics Conference and Exposition (in Edison, New Jersry, April 27-29, 1993) entitled "Topics in the History of Communications, Computer, & Microwave Technologies. The session, to be held on Wednesday, April 28 between 9:00 AM and 11:00 AM, will feature three papers by Center staff: Nebeker will speak on the importance of Charles Townes' engineering experience for his invention of the maser; Andrew Goldstein will discuss John Pierce's technical and organizational contributions to satellite communications; and William Aspray will talk about the programs of the National Science Foundation for computing in science and engineering education. ⊢

Tesla Society Award

On Saturday, January 16, 1993, William Aspray was recognized by the Tesla Memorial Society for "continued support of the name and ideals of Nikola Tesla through historical research and maintenance of the IEEE Archives." The award was one of many given at the 50th anniversary Tesla memorial service held at the St. Sava Serbian Orthodox Cathedral in New York City. Other notable citations included one to William Terbo, the Honorary Chairman of the Tesla Memorial Society, for organizing the service, Margaret Cheney for her biiography Tesla: Man Out of Time, and Lubomir Vujovic, for his work on the video documentary "Nikola Tesla, the Genius Who Lit the World" (see article an page 9.) ⊢

HISTORICAL SPEAKERS BUREAU

Historical Speakers Bureau

The Center for the History of Electrical Engineering established the IEEE Historical Speakers Bureau in 1991. The primary purpose of this program is to make it easier for Sections, Chapters, and other IEEE entities to identify and locate qualified speakers on historical topics of interest to electrical engineering professionals and students. The program also enables the IEEE to spread the word about electrical engineering history outside its membership.

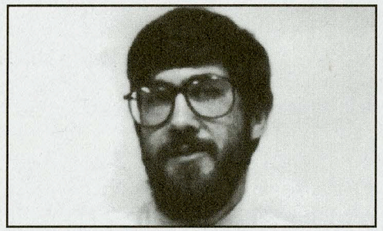
The speakers are professional historians or engineers who have volunteered their time to share their knowledge of history. Each of them has a strong knowledge in the area of electrical engineering history covered in their lecture. Effort is taken to provide speakers from many different geographic regions of the United States and Canada. We plan eventually to expand the program to other parts of the globe where there is IEEE activity.

How The Bureau Works

Listed below are the speakers who have agreed to serve in 1992-93. If your IEEE organization is interested in scheduling a lecture, you should contact the speaker directly. The group sponsoring the lecture is responsible for the speaker's travel and *per diem* expenses. You may contact the speakers at any time, but we recommend booking three months in advance.

Organizations not affiliated with the IEEE may also use the Historical Speakers Bureau. However, an honorarium is customary in these cases. (An honorarium is optional when the lecture is sponsored by an IEEE entity.)

In order for the Center to monitor the program, assure its quality, and better determine historical interests of IEEE members, we ask that each IEEE group that engages a speaker inform us of that fact. The Center would like to learn also about the attendance at each lecture and how it was received.



Jonathan Coopersmith is a historian of technology. He received his B.A. from Princeton University and his D.Phil from Oxford University. He is currently an assistant professor of history at Texas A&M University. Cornell University Press published his *The Electrification of Russia, 1880-1926* in 1992. He is now exploring the history of the facsimile machine from the first patent in 1843 to the present.

Lecture topics:
- The history of the fax machine, 1843-1993.
- The state and technological choice: the electrification of Russia.

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Gabrielle Hecht is a historian of technology and science. She is currently Acting Assistant Professor in the Department of History at Stanford University. She holds an S.B. in physics from the Massachusetts Institute of Technology and a Ph.D. in history and sociology of science from the University of Pennsylvania. Her dissertation, "The Reactor in the Vineyard: Technological Choice and Cultural Change in the French Nuclear Program, 1945-1969," is currently being revised for publication. She has held fellowships from the IEEE, the National Science Foundation, and the Mellon Foundation and has been a visiting scholar at the Royal Institute of Technology in Stockholm, Sweden and the Ecole des Mines in Paris, France.

Lecture topics:
- The development of nuclear technology in France.
- Comparative perspectives on the emergence of a "high tech" labor force in the 1960s and 1970s in France.

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HISTORICAL SPEAKERS BUREAU

W. Earl Long is a transportation planning/policy advisor with a specialty in urban rail and "peoplemover systems." His research interest is the impact of demographics and public policy on the development of alternative transportation technologies. He received a B. Architecture degree from North Carolina State University and a M. Regional Planning degree from the University of North Carolina. He was a transportation planner for Fairfax County, VA before becoming urban planner (for Northern Virginia) with the Washington Metropolitan Area Transit Authority (METRO). Subsequently he became Transportation Coordinator for the City of Richmond, VA. Most recently he was appointed as a policy advisor by the Lt. Governor of Virginia to develop statewide transportation legislation. He prepared the research study that resulted in the award of an IEEE International Electrical Engineering Milestone for Frank Sprague's Richmond Union Passenger Railway of 1888 - the world wide prototype for electric street railways and Light Rail Transit.

Lecture topics:
- 1888: Dawn of the Electric Street Railway Era.
- Underground Washington: Building the Electric METRO Subway System in the Nation's Capital.
- Monorail to Maglev: Development of Electric Automated Guideway Transit Technologies.

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Robert W. Merriam is an electrical engineer specializing in marine electronics and is currently the President of Merriam Instruments, Inc. He is also an historian of electrical and mechanical engineering and is Director of the New England Wireless and Steam Museum, East Greenwich, Rhode Island, which was recently recognized by the ASME as an International Mechanical Engineering Landmark.

He holds an S.B. from Harvard College in Engineering Sciences and Applied Physics and an S.M. from Harvard Engineering School in EE. During World War II he served in the U.S. Army Signal Corps in the European Theater. He has taught EE at Swarthmore College. He is an amateur radio extra class, a Fellow of the Radio Club of America, an Honorary Member of the National Association of Power Engineers, a director of the National Marine Electronics Association and a Life Member of IEEE and ARRL.

Lecture topics:
- Wireless Telegraph Operating Companies in the U.S. before World War I.
- The overlooked engineering sophistication found in spark, arc, and alternator radio transmitters.

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Anne Millbrooke is a historian of science and technology who has worked in government, industry, and academe, as well as in consulting. She earned her B.A. from Boise State College, M.A. from the University of Wisconsin-Madison, and Ph.D. from the University of Pennsylvania. While in graduate school, she was both a Mellon Fellow and a Smithsonian Fellow. At the National Bureau of Standards, she worked with historical and contemporary exhibits. At United Technologies Corporation, she managed the Archive and Historical Resource Center, and she wrote histories of the Otis Elevator Company, Mostek Corporation, and other subsidiaries and divisions of United Technologies. She has taught at the University of Hartford and Wesleyan University, including courses on the history of manufacturing and on the American century of science and technology. For three years she edited the Business Archives Newsletter, and she served on the national editorial board of The Public Historian.

Lecture topics:
- Technological Competition at Otis: Hydraulic cersus Electric Elevators.
- Illustrated History of the Otis Elevator Company, 1953-1976.

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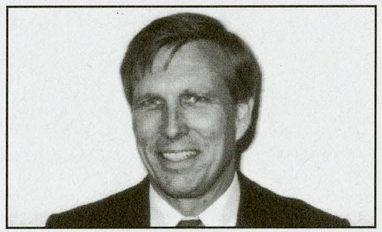
HISTORICAL SPEAKERS BUREAU



Frederik Nebeker is a historican of science and technology, who has been Research Historian at the IEEE Center for the History of Electrical Engineering since September 1990. He received B.A. and M.A. degrees in mathematics from, respectively, Pomona College and the University of Wisconsin, then an M.A. in history of science from the University of Wisconsin and a Ph.D. in the History of Science Program at Princeton University. His dissertation was a study of the role of calculating technology in the history of meteorology. While at Princeton, he was editor of a major oral-history project, The Princeton Mathematics Community in the 1930s, and he worked as instructor in the History Department. As postdoctoral researcher at the American Philosophical Society, he studied materials in the manuscript collections of the APS Library concerning geodesy, cartography, hydrography, meteorology, the study of terrestrial magnetism, and related sciences, and completed a bibliographical monograph, The Geophysical Tradition in 19th-Century America. Dr. Nebeker has worked also as historian at the Center for History of Physics of the American Institute of Physics, where he carried out research on the history of experimental high-energy physics. His work at the AIP included study of the role of engineering in high-energy physics.

Lecture topics:
- The history of the technologies of weather forecasting (from the telegraph to supercomputers, satellites, and Doppler radar) .
- The importance of test-and-measurement techniques in the development of radio.

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Emerson W. Pugh is an author or coauthor of three books on the history of computers and the computer industry: *Memories That Shaped an Industry* (1984), *IBM's Early Computers* (1986), and *IBM's 360 and Early 370 Systems* (1991). All were published by The MIT Press. He has a Ph.D. in solid-state physics from Carnegie-Mellon University where he served as an assistant professor prior to joining IBM in the Research Division. He has initiated and managed research and development projects in IBM laboratories in the United States, Switzerland, and Japan, including the development of the highest performance memory array used in the System/360 computers in the late 1960s. He held the position of director of technical planning for the IBM Research Division and, while on leave from IBM in 1974, served as executive director for the National Academy of Sciences study of automobile emissions and fuel economy. Dr. Pugh is a Fellow of the IEEE, the American Physical Society, and the American Association for the Advancement of Science. He was president of the IEEE in 1989.

Lecture topics:
- IBM's biggest product development failure.
- Computer industry origins: reality versus myths.

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Michael R. Williams is a computer scientist and historian with a special interest in the history of computation. He received his BSc, in Chemistry, from the University of Alberta in 1964 and a Ph.D. in Computer Science, from the University of Glasgow in 1969. He has lectured in Europe, China, North America, and currently holds the position of Professor of Computer Science at the University of Calgary. He has been an author of 8 books, 29 academic papers, 83 other publications, and has given over fifty invited talks to academic and professional groups throughout the world. He is currently the Assistant Editor-in-Chief of *IEEE Annals of the History of Computing*, a journal devoted to the history of the computer and other topics in computation.

Lecture topics:
- Early Computers: ENIAC, EDVAC, and EDSAC.
- Who Really Invented the Computer.
- The Work of Charles Babbage.
- Dem Bones.
- How To Avoid Computing.

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1992 Speakers Bureau

The Center would like to thank those individuals who participated in our Historical Speakers Bureau program in 1992:

Albert Abramson
Jane Mork Gibson
Stephen L. Johnston
Henry E. Lowood
C. Dianne Martin
Eric Schatzberg
Bayla Singer
Charles R. Wright

BIBLIOGRAPHY

The Newsletter's *"Bibliography" section was prepared with the assistance of Prof. Thomas J. Higgins of the University of Wisconsin-Madison.*

Brittain, James E., *Alexanderson: Pioneer in American Electrical Engineering* Baltimore MD: Johns Hopkins University Press, 1992, xv + 381pp.

Brittain's biographical study of Ernst Alexanderson (1878-1975) not only thoroughly analyzes one of the most important electrical engineers of the twentieth century but also explores major themes in the history of technology and science. Brittain provides a detailed discussion of Alexanderson's wide-ranging engineering contributions, including developments in radio, television, electric railways, computers, and power engineering. Most of this work was completed at GE and RCA, where Alexanderson was appointed chief engineer. Alexanderson's radio alternator was the major component of a worldwide radio system operated by RCA.

Brittain perceptively analyzes such themes as the relationship between science and engineering, the growth of electrical engineering in a corporate structure, and the connections between technological and social and political systems. Brittain emphasizes that Alexanderson's innovations resulted from a dialectical interchange of ideas and concepts between power and radio engineering. Alexanderson's important innovations depended less on specialization and compartmentalization than on his ability to move creatively between different fields and disciplines. Brittain's study, because it enhances our understanding of important historiographic themes in the history of technology, should be recognized as a major contribution to the profession. ⊢

Carlson, W. Bernard, *Innovation as a Social Process: Elihu Thomson and the Rise of General Electric, 1870-1900* Cambridge: Cambridge University Press, 1991, xxii + 377pp.

Elihu Thomson's story is one that any member of the IEEE would be interested to hear. Thomson distinguished himself as a giant among electrical engineers of the nineteenth century, inventing crucial improvements to ac lighting and distribution technologies, arc lighting systems, ac motors, electric welding equipment, and the recording watt meter. He was a successful entrepreneur, founding the company that would eventually become General Electric. And his interest in the profession of electrical engineering led him to not only sign the original call to organize the AIEE in 1884, but also to serve as the Institute's president in 1889. In this exceptional volume, historian W. Bernard Carlson applies his formidable skills in narration and analysis to present compelling details about Thomson's career, while drawing some stimulating conclusions about the nature of technological innovation.

Carlson explores two important themes in his book: the role of different types of knowledge for the engineer, and the social processes associated with technological innovation. He shows that, although Thomson was the archetype, in training and disposition, of the new breed of scientific engineer who emerged in the last half of the 19th century, he relied upon the more traditional craft knowledge (that tacit understanding gained through intimate familiarity with artifacts, using mental models and mechanical representations) for his inventing. Furthermore, Thomson was a "heterogeneous engineer." He not only designed artifacts, but he also built the social context in which they were possible. This meant creating a vital business that could supply the capital and resources he needed to innovate and a marketing strategy for his products so that they were both coveted by, and accessible to, potential customers. Carlson stresses how Thomson's professional partnerships were critical in forming these social structures. Calling Thomson "the original corporate engineer," Carlson positions the individual's relations with others at the nexus of technological innovation. ⊢

Israel, Paul, *From Machine Shop to Industrial Laboratory: Telegraphy and the Changing Context of American Invention, 1830-1920* Baltimore MD: Johns Hopkins University Press, 1992

In this book, Paul Israel constructs "a new history of American invention." He approaches this task by tracing the evolution of American invention from the nineteenth century machine shop to the twentieth century industrial research laboratory via the quintessential case study, telegraphy.

Israel argues the importance of the workplace in the history of invention. More specifically, he focuses on the machine shop as the central institution for the development of new technology in the nineteenth century. He seeks to replace the traditional American image of the lone heroic inventor with cooperative invention in the machine shop. He also argues that corporate strategies, viewed largely through decisions made by Western Union and its competitors, created new patterns in telegraph shop culture and that many of those decisions were shaped by larger cultural perceptions such as those embedded in the American patent system. Finally, Israel poses that the twentieth century industrial research laboratory is an outgrowth of the nineteenth century machine shop and that it continues to feel its influence even today.

This book is valuable not only because it adds to a limited pool of sources in telegraph history, but also because it provides the historical backdrop for the various histories (e.g. Leonard Reich, Stuart Leslie) of the industrial research laboratory that have already been written. In order to understand how research and development was reorganized into its current state, one must understand telegraphy and its position at the center of emerging corporate capitalism in the nineteenth century.

Israel investigates the role of labor, women, social structures, education, and technology in the development of telegraphic invention. He provides relevant information to set the stage for the rise of the machine shop and uses a variety of primary and secondary sources to undergird his solidly constructed arguments. ⊢

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Camras Archives

A project to assemble the papers of Marvin Camras, a prolific inventor who pioneered magnetic recording, has concluded at the Illinois Institute of Technology. Historian Thomas Misa, working with financial support from the IEEE, has produced a well-organized archive of Camras's papers, preliminary documentation on three dozen of his machines, and a transcribed oral history. For more information about the collection, contact Anita Anderson, Special Collections, Galvin Library, IIT, Chicago IL 60616, Tel. (312) 567-3355. ⊣

Computer Papers

A microfilm archive on relay computers has been compiled from records stored at the Special Collections Archives of Dartmouth College. The microfilm contains material on a series of binary computers designed and built under the auspices of the Bell Telephone Laboratories and the Office of Scientific Research and Development between 1937 and 1945. It also includes an inventory of the papers of computer pioneer George Stibitz. For more information, please contact the Center or George Stibitz, Dartmouth Medical School, Department of Psychology, Hanover NH 03756. ⊣

Telecommunications Reference Book

The AT&T archives has just released *Events in Telecommunications History*, a chronological record of important dates in the history of telecommunications. This softbound book is a complete revision of the original reference guide of the same title. In its 225 pages, the researcher can find information on the events leading to Bell's 1876 patent for improvements in telegraphy, the latest transatlantic cables, TAT-10 and TAT-11, and everything that has happened in between. For more information, contact Events, AT&T Archives, PO Box 4647, Room WV A102, Warren NJ 07059-0647. ⊣

Tesla Videotape

The Tesla Memorial Society, working in collaboration with the Nikola Tesla Museum in Belgrade, has released a video documentary on the great Serbian inventor, Nikola Tesla. The documentary, entitled "Nikola Tesla: The Genius Who Lit the World" has been seen on Yugoslavian and American television. It is available in VHS format. For more information, contact the Tesla Memorial Society, 453 Martin Road, Lackawanna NY 14218. ⊣

Brazilian Power

The Centro da Memória da Eletricidade no Brasil, a research organization studying electrical history in Brazil, has released an English translation of one of their reference works entitled *Panorama of the Electric Power Sector in Brazil*. The book treats the institutional history of the Brazilian electric power system, noting the role of independent producers, foreign capital, and the Brazilian governement in the gradual formation of Brazil's generating and transmitting systems. For more information, contact Mr. Paulo Silveira Martins, Memória da Eletricidade, Av. Rio Branco, 52-4, Rio de Janeiro, Cep. 20090-002, Brazil. ⊣

IEEE/SHOT Prize Offered

Submissions are now being accepted for the IEEE Life Member Prize in Electrical History. Administered by the Society for the History of Technology, the Prize is supported by the IEEE Life Member Fund. A cash award of $500 and a certificate are presented annually for the best paper in electrical history published in the previous year. Any historical paper published in a learned journal or magazine is eligible if it deals with the art or engineering aspects of electrotechnology and its practitioners. Nominations shoube be submitted to the Center in triplicate by May 15, 1993. ⊣

Ontario Conference

The 8th Kingston Conference on the theme of the history of science and technology education in Canada will be held by the Canadian Science and Technology Historical Association on October 15-17, 1993 at Kingston, Ontario. For more information, please contact Dr. Marianne Ainley, Simone de Beauvoir Institute, 1455 de Maisonneuve Blvd. W., Montreal, Quebec, H3G 1M8, Canada, telephone (514) 848-2374.

Price Guide for Center Products

	1-5 copies	6 copies or more
Sources in Electrical History		
Volume 1: Archives and Manuscripts	$27.50/copy	$22.50/copy
Volume 2: Oral Histories	$17.50/copy	$14.50/copy
Both Volumes	$38.50/set	$33.00/set
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Oral History Transcripts	$5.00 + $.15/page	
Recent Titles in Electrical History	$6.00	
Reference Requests	Free (Photocopying fees or staff charges may be assessed on large jobs)	
Rad-Lab Oral History Book	Available summer 1993	
CHEE Oral History Guide	Available summer 1993	

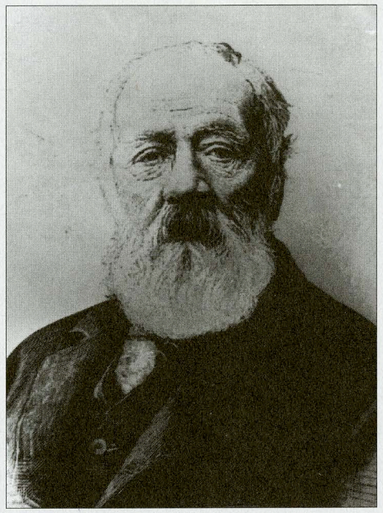
IEEE members eligible for 10% discount

MIT Papers

Historians of technology interested in MIT's role in national policy decisions will be interested in the release of Science, Education, and Defense: The MIT Presidents' Papers 1930-1958. This microfilm edition of the papers of Karl Taylor Compton (President of MIT, 1930-1948) and James Rhyne Killian (President of MIT, 1949-1958) includes papers, correspondence, reports, memoranda, minutes, research data, and notes from the two scientist-administrators. The vast collection comprises almost 200,000 documents on 200 reels of 35mm microfilm. Libraries or individuals may order it by contacting Sal J. Capozzi, Research Publications International, 12 Lunar Drive, Woodbridge CT 06525, tel (800) 444-0799.

Interest in Meucci Thrives

A legion of steadfast supporters have been fighting hard to win a place in telephone history for Antonio Meucci, an Italian immigrant to America who they say has been robbed of proper credit for inventing the telephone. Most telephone historians dismiss the claims made on behalf of Meucci, but several recent works documenting Meucci's involvement with telephony beginning in the 1840s seek to publicize his story.



Antonio Meucci

In the bibliography Newsletter #31, we listed a biography of Meucci, written in English by Nese and Nicotra (Antonio Meucci, 1808-1889, Rome: Italy Italy Magazine Publishers, 1989.) In the bibliography of the present issue, we include a listing for an article, in Italian, by Dr. Basilio Catania. Another work is an unpublished manuscript, deposited with the Center by Dr. Pier Bargellini. Dr. Bargellini critically evaluates the evidence presented at an 1885-7 litigation over American Bell Telephone's patents, concluding that ethnic prejudice contributed to Bell's victory in the case. The Center can offer copies of Doctor Bargellini's manuscript, written in English, to interested researchers

A videotape, entitled "Antonio Meucci: The Father of the Telephone" recreates the world of 1847 as it tells the story of Meucci's emigration to North America and his experiments with electric transmission of speech. At 14 minutes, the tape is suitable for use in schools and other educational environments, stimulating discussion questions such as "Why do some consider Meucci to be the father of the telephone to some people?", and "How did Meucci's migration influence his creative career?" Ages 8 to adult can appreciate the tape. For more information, contact Tony De Nonno, De Nonno Productions, 7119 Shore Road, Brooklyn NY 11209, tel. (718) 745-3937.

Electronics Museum Expands

The Historical Electronics Museum has acquired two new radars to add to its already extensive collection. The new units are an AWG-10 airborne radar and an APQ-120 airborne radar. Both models were built by Westinghouse for the F-4 Phantom. The APQ-120 was for fire control while the AWG-10 was a multimode radar with pulse doppler look-down capabilities.

The radars are displayed at the Historical Electronics Museum's new site in Linthicum, Maryland. The new facility, located close to the Marriot Hotel, gives the museum three times as much floor space as it had in its former home. For more information, please contact the Historical Electronics Museum, Box 746, MS 4015, Baltimore, MD 21203, tel. (410) 765-2345.

New Journal

The Johns Hopkins University Press and Georgia Institute of Technology announced the launch of a new journal for studies in literature, science, and technology. The journal, called "Configurations", will probe the texture of scientific practice and knowledge, including the role of technology and instruments in theoretical, experimental, field, and clinical research, and the impact of such evolving forms of technical embodiment on society and culture; examine the differences and similarities between the human and the natural sciences and the function of creativity and invention in each; and address a wide variety of issues associated with the historical production, cultural dissemination, and social uses of "technical" knowledge and practices. For more information, contact The Johns Hopkins University Press, Journals Publishing Division, 701 West 40th Street, Suite 275, Baltimore MD 21211-2190.

Radio Journal

For the first time, the Newsletter bibliography includes articles printed in *The Old Timer's Bulletin*. This publication, the official journal of the Antique Wireless Association (AWA), is a handsome production, printed on high quality paper with a full color cover. The AWA prints four issues a year, each approximately 50 pages long.

The Antique Wireless Association comprises 4000 individuals with an interest in the history of electronics technology. In addition to publishing *The Old Timer's Bulletin*, the AWA prints longer historical articles in an annual called *The AWA Review*, and sponsors an electronics communication museum. Exhibits at the museum feature tubes, radios, military hardware, bulbs, and a wide assortment of other electrical and electronic artifacts. There is also a book store and gift shop. The museum's hours are May 1-October 31: Sunday, 2-5 PM; June 1-August 31: Saturday, 2-4 PM; Wednesday, 7-9 PM. Admission is free. The museum is located at Village Green, Rtes. 5 & 20, Bloomfield, New York, tel. (716) 657-6260. For other information about the AWA, please contact Joyce Peckham, Antiques Wireless Association, Inc., Box E, Breesport, NY 14816, tel. (607) 739-5443.

Motorola Museum

The Motorola Museum of Electronics opened in September in the corporate complex at Schaumburg, Illinois. It is housed in a building with a 50-foot vaulted ceiling and 20,000 sq. ft. of exhibition space with a 220-seat auditorium. Historical exhibits include "Radio Reigns, 1928-48", "Electronics and the Good Life, 1947-74", "Revolution in Miniature, 1949-74". The material follows the history of Motorola, from battery eliminators to car radios, home sets, police and other land-mobile equipment, the SCR-536 AM handie-talkie and SCR-300 FM walkie-talkie, television sets, cellular phones, chips, etc. There is a strong emphasis on user-participation displays.

The museum is open to the public from 9:00-4:30 on weekdays except holidays and the last two weeks in December. There is also a corporate research archive, accessible by appointment. For more information, contact the museum at 1297 E. Algonquin Rd. at Meacham Rd, Schaumburg IL 60195, tel. (708) 576-8620.

The preceeding article is reprinted with permission from The Old Timers Bulletin vol. 32, no. 4 (February 1992)

Peper Institute

Heinz Peper, born in Waterloo, Ontario in 1930, started his own electrical contracting company at age 21. In 1959 he formed Canadian Neutronics, which soon became a leading manufacturer of electrical apparatus for high schools and colleges. In the 1980s Peper established a center for instruction in electrical skills at Conestoga College in Kitchener, Ontario. His aim was to teach electrical knowledge and skills through extensive, hands-on experience with electrical apparatus of many types and sizes, from portable meters to large industrial generators. The photo shows the Tesla Digital Laboratory, one of the classrooms of the center.

From his boyhood, Peper has had the hobby of acquiring and refurbishing electrical apparatus. When he was about 21 years old, he built his own functioning power plant from disused equipment acquired inexpensively: a 7-ton synchronous generator and a 150 horsepower single-cylinder diesel engine. His collection today includes several large steam engines (including a 700 horsepower double-expansion engine weighing 27 tons and a steam turbine), AC and DC generators (including a Crocker-Wheeler 400 kilovolt alternator), and a variety of large electric motors (including a 12,000 horsepower, 6600 volt synchronous machine designed for marine service).

It is, then, not surprising that Peper has a strong interest in the history of electrical technology. In addition to acquiring electrical machinery, he has assembled a large collection of historical photographs and compiled information on thousands of people who have contributed to the advance of the electrical power industry. He plans to use the equipment in the training to be offered at a private electric-power school he plans to establish in Vermont. He has already developed a great deal of curricular material for this school, and in this material he makes extensive use of the historical information he has collected. For more information, contact the Center.

The Tesla digital laboratory

Unusual Systems

The Unusual Systems Collection of Computer Control Panels (USCCCPC) is preserving an important icon of the computer age: the control panels and consoles of digital electronic computers built between 1950 and 1979. These instruments have undergone significant change as software has eclipsed hardware in importance to computer users during the last forty years. Once the chief way of observing and influencing what was occurring inside a computer, control panels and consoles are now largely absent from modern systems.

The USCCCPC holds approximately 50 panels and consoles, including specimens from machines built by DEC, IBM, GE, Singer, and Xerox. The curator, Kevin Stumpf, performs necessary restoration on artifacts, catalogs them, and places them in storage. He is preparing an audio/visual history of the artifacts, a public exhibit, and a reference guide to all digital electronic computers used for commercial and industrial applications built in North America between 1950 and 1979.

The control devices the USCCCPC collects present the history of computing from an unusual perspective, giving insight into the complications of operating early computer equipment. The artifacts also reveal much about industrial design and ergonomics.

The USCCCPC is located in Ontario, Canada. For more information, contact Kevin Stumpf, USCCCPC, 220 Samuel Street, Kitchener, Ontario N2H 1R6, tel. (519) 744-2900.

Information Please!

One correspondent asks if any of our readers can supply information about "Tek Talk", a newsletter published during the 1950s and '60s by the American Dynamics Corporation in Cambridge, Massachusetts. If anyone is familiar with this publication, please contact either the Center or Lorraine Nazzaro, Rm C-212, MIT Lincoln Labs, PO Box 73, Lexington MA 02173, tel. (617) 981-0344.

Isaac Auerbach

The Center is saddened to report the death of a member of its Friends Committee, Isaac Levin Auerbach, on December 24, 1992. Born October 9, 1921, Auerbach had a distinguished career as a computer engineer, entrepreneur, and consultant. He was a member the team at the Eckert-Mauchly Computer Corporation that developed UNIVAC, the world's first commercial computer. Later, Auerbach worked for Burroughs Corporation and a variety of businesses he founded concerning technical design, consultation, investment, and publishing.

Auerbach was especially active in professional and historical activities. In addition to his work for the history center, Auerbach was chairman of the Philadelphia section of the IEEE in 1957. He was a founder of the International Federation for Information Processing and a co-founder of the American Federation for Information Processing Societies. He also was involved in the founding of the Charles Babbage Institute for Information Sciences. He was elected a Fellow of the IEEE in 1958 for his contributions to the development and application of computer techniques.

Isaac was a valuable friend to the History Center and we will miss him dearly. ⊣

New Partner

The Center is pleased to note our newest Partner, Dr. Takashi Sugiyama. Following graduation from Tokyo Imperial University, at which he wrote a prize-winning dissertation on the application of pulse modulation to precise analog measurement, Dr. Sugiyama has had a distinguished career at Yokogawa Electric Corporation and Yokogawa Medical Systems, a joint venture of Yokogawa Electric and General Electric that is at the cutting edge in the manufacture of medical diagnostic systems. He is currently Senior Technical Advisor to the two companies, having previously served as Executive Vice President at Yokogawa Electric and as President and Chairman at Yokogawa Medical Systems.

The Partnership program is a way for individuals, companies, foundations, and other organizations to support the activities of our Center with major, lifetime donations. ⊣

Partnership Program

We are grateful to the organizations and individuals listed below who provide generous support to the center in the form of operating, endowment, and project funding. If you or your organization are interested in joining our Partnership Program, please contact the Director, Dr. William Aspray.

Founding Partners:	IEEE Rutgers University IBM Corporation IEEE Foundation - General Fund Alfred P. Sloan Foundation
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We are also grateful to the thousands of individuals who make annual contributions to our Friends Fund.

Telephone History Conference in Dallas

Telephone Collectors International Inc. announces a two day symposium for all who are interested in the origins and development of the telephone. The symposium will be held at the Telephone Pioneer Museum in Dallas Texas on June 16 and 17, 1993. An antique telephone show will be held on the same site the following two days.

Sessions will include papers and discussions on telephone inventions; the founding and growth of telephone companies; telecommunications science; the role of public and private enterprise; monopoly vs. competition; histories of companies throughout the world; the lives of telephone pioneers; organizing a telephone museum; identifying telephone artifacts; and locating archives and research materials. For more information, contact Cindy Hancock at the Telephone Pioneer Museum of Texas, One Bell Plaza, Dallas TX 75265-5521, tel. (214) 464-7556. ⊣

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