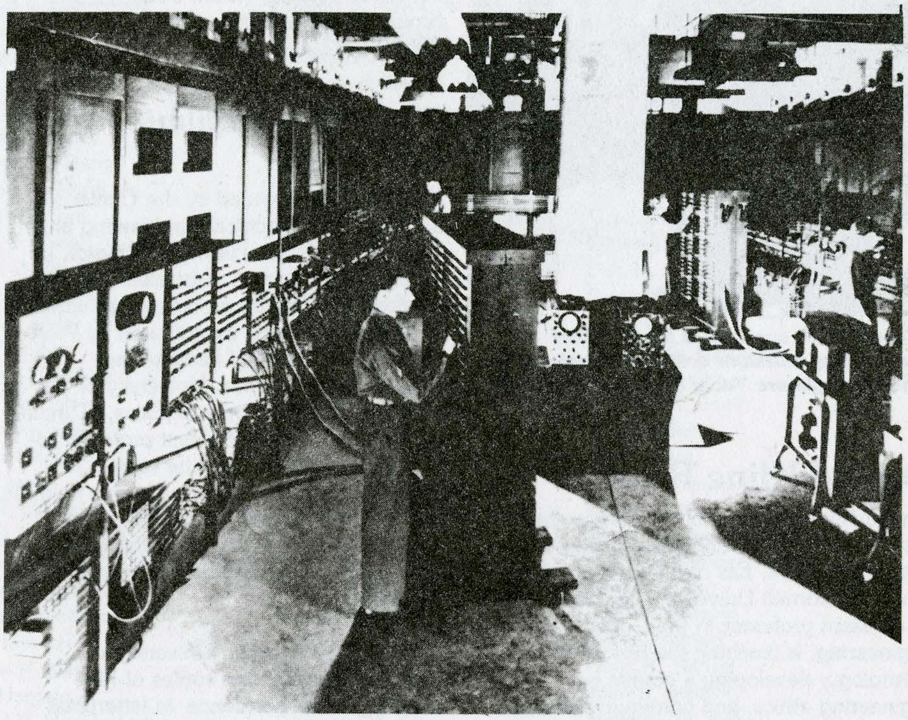
IEEE CENTER FOR THE HISTORY OF ELECTRICAL ENGINEERING

Newsletter Number 16 Fall 1987

ENIAC Milestone Dedicated

At a ceremony held on 22 September at the Moore School of Electrical Engineering, University of Pennsylvania, the Electronic Numerical Integrator and Computer, better known as ENIAC, was dedicated as an IEEE Electrical Engineering Milestone. The ENIAC was one of the first machines to use electronics to perform calculations, and it led the way to the faster and more complex computers of today.

The Moore School of Electrical Engineering and the U.S. Army Ordnance Department Ballistic Research Laboratory, located at the Aberdeen Proving Ground in Maryland, began working together in the 1930s. Their first joint project was the construction of two differential analyzers, similar to Vannevar Bush's machine at MIT. By the beginning of World War II, these machines were carrying out most of the computations needed for the Ballistics Laboratory's preparation of ballistic trajectory tables. But the differential analyzers, supplemented by hundreds of human computors, could not cope with the need for accurate tables that was brought on by the war.


Sperry Corp.

The ENIAC employed 18,000 vacuum tubes, weighed 30 tons, and measured 8 feet high, 3 feet wide, and nearly 100 feet long.

On 9 April 1943, a meeting was held to discuss ways of speeding up the calculations. John Brainerd, J. Presper Eckert, and John Mauchly of the Moore School met with Lt. Herman H. Goldstine, an assistant professor of mathematics before the war, at the Aberdeen Proving Ground. The Moore School contingent described a machine they called the "Electronic Numerical Integrator," based on a 1942 paper by Mauchly on "The Uses of High Speed Vacuum Tube Devices for Calculating." Because the Integrator would also have more general applications, an Army colonel added the words "and Computer," and approved the ENIAC project.

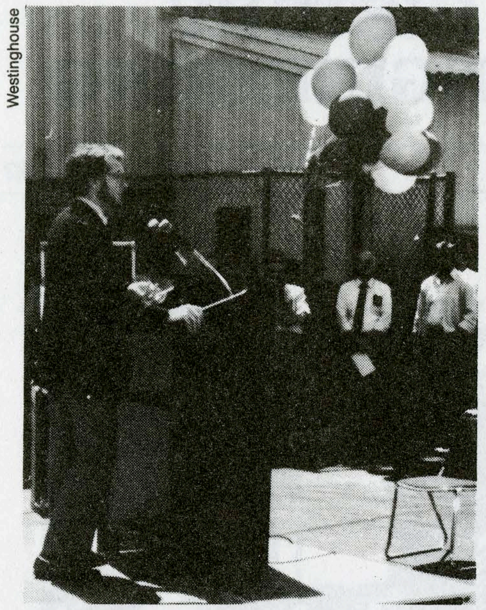
Work began on 31 May 1943. Mauchly was in charge of the conceptual design, Eckert designed the individual circuits, Joseph Chedaker headed the construction team, Arthur Burks and Kite Sharpless served as senior engineers, and Brainerd acted as project supervisor. Goldstine represented the Ballistics Laboratory. The ENIAC had to become operational quickly and then be able to work long hours with little chance of failure. To achieve this, circuit design was kept straightforward, with inexpensive tubes mounted in plug-in units, built to tolerate fluctuations in voltages and conductivity.

By July 1944, two accumulators, a power supply, and a signal generator were carrying out elementary calculations. As additional units were added, the machine's performance steadily improved and, by the following spring, ENIAC was producing ballistics tables, carrying out computations for Moore School scientists, and assisting atomic energy researchers at Los Alamos. The machine had outgrown its original design of 5,000 vacuum tubes to become an accumulation of 70,000 resistors, 18,000 vacuum tubes, 10,000 capacitors, and 1,500 relays. It was 8 feet high, 3 feet wide, and nearly 100 feet long, weighed 30 tons, and used 140 kilowatts of power.

About a year later, the ENIAC was moved to the Ballistics Laboratory. Modifications were made to the machine over the next several years – a magnetic drum storage unit, a converter unit which allowed the ENIAC to act as a stored-program computer, and a core memory were added. On 2 October 1955, the ENIAC was switched off for the last time.

The Milestone plaque placed at the Moore School reads, in part, " . . . the ENIAC established the practicality of large-scale, electronic, digital computers and strongly influenced the development of the modern stored-program, general-purpose computer." Participating in the dedication ceremony for the ENIAC were Merrill W. Buckley, Jr., Executive Vice President, IEEE; Henry Bachman, President, IEEE; and Joseph Bordogna, Director, Moore School, and Chairman, IEEE Philadelphia Section. The speakers included John G. Brainerd, Supervisor of the ENIAC project; J. Presper Eckert, co-inventor of the ENIAC; K.R. Anderson, Vice President, IEEE Computer Society; and Hollis L. Caswell, Senior Vice President, UNISYS.

The IEEE Electrical Engineering Milestones Program serves to foster awareness of electrical engineering history and to preserve and document significant achievements in electrical and electronics engineering through Milestone site dedications. The Program is supervised by the IEEE History Committee and administered by the Center for the History of Electrical Engineering.



Westinghouse

Ronald Kline, speaking at the Electrical Engineering Milestone dedication ceremony for the Westinghouse "Atom Smasher," May 1985.

Ronald Kline Resigns

Ronald Kline, Director of the Center for the History of Electrical Engineering since September 1984, has resigned to join the faculty of Cornell University. Dr. Kline, now an assistant professor in the College of Engineering, is teaching the history of technology, developing a course on engineering ethics, and continuing work on his book on Charles Steinmetz. In addition, he is also a member of the graduate faculty of the history and philosophy of science.

A search committee has been formed by the IEEE History Committee to assist in appointing a new Director for the Center. Dr. Bernard S. Finn, search committee chairman, invites inquiries from qualified applicants. Candidates should have a Ph.D. in the history of science or technology, or its equivalent, and an ability to promote the activities of the Center by working effectively with a variety of interested parties. Salary is commensurate with qualifications. The IEEE, a not-for-profit professional organization, is an equal opportunity employer. For more information, contact Dr. Bernard S. Finn, Division of Electricity, National Museum of American History, Room 5025, Smithsonian Institution, Washington, DC 20560 (202-357-1840).

Threlfall Microfilming Project

With funding provided by the Center for the History of Electrical Engineering and the AIP Center for History of Physics, a collection of letters of Australian physicist Sir Richard Threlfall is being microfilmed. The project is being coordinated by Prof. R.W. Home, Dept. of History and Philosophy of Science, University of Melbourne. Prof. Home explains, "Threlfall was Sydney University's first professor of physics, at a time when the subject was being reconstructed worldwide. He held the appointment for 13 years, 1886-1898, before returning to England where he became a leading figure in British industrial research."

During his term at the University of Sydney, Threlfall kept copies of his outgoing correspondence in letterpress books. These letters, writes Home, "say much about the state of the physics discipline in general at the time and especially about its relationship with the newly-emerging discipline of electrical engineering. Threlfall was closely involved as a consultant with the electrification of Australia's major urban centres and also with the development of the first Australian courses in electrical engineering."

Due to the inherent fragility of the letterpress paper and the extreme sensitivity of the inks to light, Home sought funding to microfilm this material. In this way, the information will reach a wider audience, while the originals receive greater protection. The letters are being indexed as well as microfilmed, and the Center will receive a copy of the end product.

Update on Laser History Project

The Laser History Project was founded in 1982 to document the scientific, engineering, commercial, and military aspects of the history of lasers and their parent devices, masers. It is jointly sponsored by the American Physical Society, the IEEE Lasers and Electro-Optics Society, the Laser Institute of America, and the Optical Society of America, with the cooperation and support of the American Institute of Physics Center for History of Physics, the IEEE Center for the History of Electrical Engineering, and the Smithsonian Institution's Dept. of Science and Technology at the National Museum of American History. Since its inception, the Project has been directed by Dr. Joan Lisa Bromberg, historian of science and technology. The Laser History Council and an Advisory Committee of laser specialists, historians and archivists have provided further guidance.

Programs have included oral history interviews with scientists, engineers, science administrators, and business leaders, and solicitation of autobiographical memoirs from laser pioneers in the U.S. and Canada. An archival program was initiated to identify historical materials and to work actively with members of the laser community to help them evaluate and preserve records and choose repositories. Classified work was documented as well, to ensure the preservation of these materials for eventual declassification and use by historians. "The Laser at 25," a traveling exhibit produced in cooperation with the Smithsonian Institution Traveling Exhibition Service, has been circulating since 1985 to museums across the U.S. A book-length history of lasers, laser applications, and the laser industry in the U.S. is in preparation. A catalogue is also scheduled. This will describe the Project's collections, as well as source materials housed elsewhere.

The work of the Laser History Project is approaching its conclusion. All current programs are expected to be completed within the next 12-18 months. Arrangements are being made for the deposit of the Project archive at that time; probable repositories are the University of Illinois archives and the AIP and IEEE Centers.

Friends!

As the Friends of the IEEE Center for the History of Electrical Engineering ends its second year, we would like to thank you for your support.

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We hope that we will be able to welcome many more of you as Friends of the IEEE Center for the History of Electrical Engineering in 1988.

BRIEFS

History Paper Prize

In a presentation made at the annual meeting of the Society for the History of Technology (SHOT), the first IEEE Life Members' Prize in Electrical History was awarded to Thomas J. Misa. His paper, "Military Needs, Commercial Realities, and the Development of the Transistor, 1948-1958," appeared in *Military Enterprise and Technological Change*, edited by Merritt Roe Smith (Cambridge, MA: MIT Press, 1985, pp. 253-287). The Prize, which is administered by SHOT, was established by the IEEE History Committee and is supported by the IEEE Life Member Fund.

A cash prize of $500 and a certificate are awarded annually to 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. Electrotechnology encompasses power, electronics, telecommunications, and computer science. The cash portion of the Prize will be shared among all joint authors; individual certificates will be presented to each joint author.

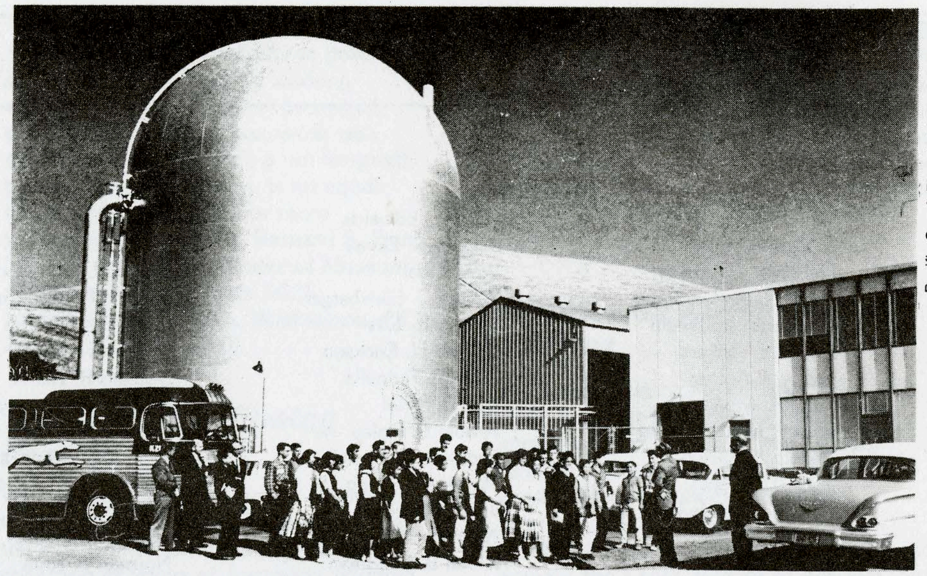
Anyone, including authors, may nominate papers for the Prize. Submit three copies of papers published in 1987 by 15 May 1988 to Prof. James Brittain, Chair, IEEE Life Members' Prize in Electrical History Committee, Georgia Institute of Technology, Atlanta, GA 30332.

Call for Papers—*Technology & Society Magazine*

The December 1988 issue of IEEE *Technology and Society* magazine will be devoted to reviewing past interactions between society and electrotechnology. Papers are invited which deal with topics including, but not limited to, those listed below.

- Influence of specific technical developments upon society (e.g., power distribution, computers, household appliances, telecommunication systems)
- Influence of specific individuals upon society (e.g., Edison, Steinmetz, Bush, Terman, Packard)
- Professional issues (e.g., how professional codes of ethics have reflected societal concerns)
- Interaction of electrical engineering with social or political systems during notable projects of the past (e.g., the Atlantic telegraph cable, Niagara Falls power, radar in WWII, TVA)
- Transfer of electrical systems across regional or national boundaries; examination of social or cultural factors that affected the process.

Those interested in writing a paper in one of these areas, or on another topic in the history of societal aspects of electrotechnology, should contact the guest editor for the issue, Dr. James E. Brittain, School of Social Sciences, Georgia Institute of Technology, Atlanta, GA 30332 (404-894-7448). Initial contributions should be received by Dr. Brittain by 15 April 1988; final version deadline is 1 June 1988.



Pacific Gas & Electric History Collection

A student group tour of the Vallecitos Boiling Water Reactor, 5 December 1958.

ASME Honors Vallecitos Reactor

The American Society of Mechanical Engineers has named the Vallecitos boiling water reactor, near Pleasanton, CA, an International Historic Mechanical Engineering Landmark. The experimental nuclear reactor produced the first significant quantity of electricity for a public utility and was a test bed for fuel, core components, controls, and personnel training from 1957 to 1963. Engineers supplied electricity in megawatt quantities to the utility grid in the San Francisco Bay area, marking a key advancement in the development of nuclear power as a practical energy technology.

The plant was a collaborative effort of the General Electric Co. and Pacific Gas and Electric. GE designed the reactor in late 1955 as a research facility and as a pilot plant for the Dresden project, a Commonwealth Edison plant built in Illinois five years later. Major construction on Vallecitos began in mid-1956 and the plant began operating in October 1957, producing its first electricity for Pacific Gas and Electric's power grid by 20 October. The reactor was deactivated in 1963 after the withdrawal of funding from the Atomic Energy Commission.

Northern Virginia Section Publishes History

In commemoration of the 10th anniversary of the IEEE Northern Virginia Section, Vernon Gardner, William LaPlant, James Strother, and Malcolm Uffelman have compiled a history of the Section. The 12-page booklet is divided into four chronological sections and includes information on events leading to the formation of the Section and a listing of all elected officers of the Northern Virginia Subsection and Section. A copy of the booklet has been deposited with the Center for the History of Electrical Engineering.

New Archives

Ameritech, one of the communications and technology companies created by the divestiture of AT&T, has established an archives. For more information, contact Linda Edgerly, Consulting Archivist, or Martha Briggs, Project Archivist, 370 Central Park West #140, New York, NY 10025 (212-865-6181).

The *National Archives for the History of Computing* has been founded in Great Britain. Based at Manchester University, the Archives will become the central repository for materials documenting the British computer industry. For more information, contact Dr. Geoffrey Tweedale, National Archives for the History of Computing, Centre for the History of Science, Technology & Medicine, Dept. of Science and Technology Policy, Manchester University, Manchester M13 9PL, England.

NEW PUBLICATIONS

The Newsletter's "Publications" section was prepared with the assistance of Thomas J. Higgins of the University of Wisconsin.

Books

Albert Abramson. *The History of Television, 1880 to 1941*. Jefferson, NC: McFarland & Co., Inc., 1987. 354 pp.

In the introduction to his book, Albert Abramson states, "No one person invented television; most of the inventors were ahead of their time and technology; some were idle dreamers, others were practical men who could turn their ideas into machinery. Ideas did not always occur in logical order. So I decided to present the actual facts from primary sources as they appeared chronologically and let the reader vicariously participate in the medium's progress." (p. *xiii*)

Abramson opens by tracing television's roots in the development of motion pictures, beginning with the magic lantern of the late-17th century. He continues with a discussion of the early devices either described, patented, or built between 1900 and 1911, most of which incorporated a selenium cell and rotating mirror or disk. Abramson sees as pivotal a system described by Alan Archibald Campbell Swinton in 1911. He writes, "Not only was there a description of a receiver using a version of the Braun tube, but for the first time a description of a camera tube which not only used cathode ray scanning but also depended on the storage principle." (p. 38)

He then goes on to describe the early work of Jenkins, Baird, Zworykin, Farnsworth, Alexanderson, and many more, in chapters devoted to early camera tubes, mechanical systems, early color television systems, and the beginnings of electronic television. Abramson cites the 1929 disclosure of Zworykin's kinescope as the next milestone in the development of television. "For Zworykin," he states, "had produced a simple but ingenious picture tube which made it possible to have a practical receiver in the home of the viewer, a device which the average person could operate, that required absolutely no technical knowledge to run, and could be viewed under almost normal lighting conditions. Zworykin's tube was the most important single technical advancement ever made in the history of television." (p. 145) Abramson concludes his *History* with chapters on the development of the iconoscope tube, on the London Television Service, 1936-39, and on the first National Television Standards Committee.

Albert Abramson is a television engineer with CBS-TV in Los Angeles, California.

Bruce H. Bruemmer. *Resources for the History of Computing – A Guide to U.S. and Canadian Records*. Minneapolis, MN: University of Minnesota, Charles Babbage Institute, 1987. 187 pp.

This guide grew out of a documentation project begun by the Charles Babbage Institute in 1985. The project, still in progress, seeks to define a national collecting strategy for records in the history of computing in the United States. To determine present strengths and weaknesses in this documentation, a survey of records already placed in archives was undertaken. The results of that survey have been published in this guide.

In describing the scope of the guide, Bruemmer states, "This guide focuses on manuscript and archival sources directly relating to the development of the electronic computer and its application in the United States and Canada. Most of the sources relate to the electronic digital computer, though the guide does include information about analog, electromechanical, and to a lesser degree, mechanical devices. Accordingly, most of the collections date after 1935. The guide includes some entries more directly related to communications and electronics when there was evidence of direct connections to computing." (p. 5)

The guide contains abstracts of about 425 collections, but does not include records held by either the National Archives and Records Administration or the Public Archives of Canada. Entries are arranged geographically by state or province, and alphabetically by repository within locality. A list of repositories that maintain oral history collections relevant to the history of computing, a select bibliography, and a list of repositories whose holdings appear in the guide comprise the guide's three appendixes. A subject index is also provided.

Bruce Bruemmer is the Archivist at the Charles Babbage Institute.

Other Recent Books

Keith Geddes and Gordon Bussey. *Television: The First 50 Years*. Bradford, UK: National Museum of Photography & Philips Electronics, 1987. 36 pp.

Brian Henry. *British Television Advertising – The First Thirty Years*. London: History of Advertising Trust & Century Benham, 1987. 528 pp.

Eric Laithwaite. *A History of Linear Electric Motors*. London: Macmillan, 1987. 389 pp.

David E. Lundstrom. *A Few Good Men From Univac*. Cambridge, MA: MIT Press, 1987. 277 pp.

Robert P. Multhauf and Gregory Good. *A Brief History of Geomagnetism and a Catalog of the Collections of the National Museum of American History*. Smithsonian Studies in History and Technology, No. 48. Washington, DC: Smithsonian Institution, 1987. 87 pp.

Peter Townsend. *The Odds Against Us*. (an account of the Battle of Britain, including the use of radar and electronic systems) London: Morrow, 1987. 234 pp.

Articles

Allibone, T.E. "The AEI Long-term Research Laboratory: An Industrial Experiment," *IEE Proceedings*, 134, Pt. A, No. 7 (July 1987) 619-632.

Aschoff, Volker and Hans Dieter Lüke. "Noch Einmal Gauss und Weber," *Nachrichtentechnische Zeitschrift*, 40, No. 6 (1987), 442-483.

Barton, Robert S., and Henri Berce. "Discussion: The Burroughs B5000 in Retrospect," *Annals of the History of Computing*, 9, No. 1 (April 1987), 37-92.

Barus, Carl. "Military Influence on the Electrical Engineering Curriculum Since World War II," *IEEE Technology & Society Magazine*, 6, No. 2 (June 1987), 3-9.

Brooks, Randall C. "Magnetic Influence on Chronometers, 1798-1834: A Case Study," *Annals of Science*, 44 (1987), 245-264.

Butrica, Andrew J. "The First International Colloquium on the History of Electricity – Paris, April 15-17, 1986." *Technology and Culture*, 28, No. 2 (April 1987), 337-339.

Cohn, Nathan, "Elihu Thomson: Citizen of Swampscott," *IEEE Power Engineering Review*, PER-7, No. 6 (June 1987), 19-20.

de Cogan, Donard. "Development of the Distributed Sea Earth in Transatlantic Telegraphy," *IEE Proceedings*, 134, Pt. A, No. 7 (July 1987), 619-632.

Flandera, Frantisek and Vaclav Hampl. "History of the Construction of Skoda Locomotives," *Skoda Review*, 2 (1987), 4-11.

Fuhrman, Peter. "Do it Big Sammy" (Samuel Insull), *Forbes*, 140, No. 1 (13 July 1987), 278-280.

Furness, R.A. "Developments in Pipeline Instrumentation," *Measurement & Control*, 20 (February 1987), 7-17.

Hendry, John. "The Scientific Origins of Controlled Fusion Technology," *Annals of Science*, 44 (1987), 143-168.

Henning, Dietmar. "The German Rontgen Museum," *Materials Evaluation*, 45 (May 1987), 536-537.

Herbert, R.M. "Historic Baird TV Transmission from Aircraft," *Television: Journal of the Royal Television Society*, 24, No. 2 (March-April 1987), 92-94.

Herbert, R.M. "The Baird Intermediate Film Process," *Television: Journal of the Royal Television Society*, 24, No. 3 (May-June 1987), 134-137.

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Hofmann, James R. "Ampere, Electrodynamics, and Experimental

NEW PUBLICATIONS (cont.)

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Holmes, Lewis M. "Richard T. Daly, Laser Industry Pioneer, Assesses the Past and Future of Solid-State Lasers," *Laser Focus/Electro-Optics*, 23 (Sept. 1987), 82, 84, 86.

Ihrig, Elizabeth. "*De Magnete* of Peregrinus," *Electric Quarterly* (of The Bakken), 9, No. 3 (Summer 1987), 2.

Kipnis, Naum, "Luigi Galvani and the Debate on Animal Electricity, 1791-1800," *Annals of Science*, 44 (1987), 107-142.

Kline, Ronald R. "Electricity and Socialism: The Career of Charles P. Steinmetz," *IEEE Technology & Society Magazine*, 6, No. 2 (June 1987), 9-17.

Kline, Ronald R. "Science and Engineering Theory in the Invention and Development of the Induction Motor, 1880-1900," *Technology and Culture*, 28, No. 2 (April 1987), 283-313.

McCloskey, Joseph F. "The Beginnings of Operations Research: 1934-1941," *Operations Research*, 35, No. 1 (Jan.-Feb. 1987), 143-152.

Moss, Nicholas. "A New Terror for Those Who Do Not Want to Be Found Out" (an account of the first demonstration of television), *Television: Journal of the Royal Television Society*, 24, No. 3 (May-June 1987), 156-162.

Mothersole, Peter L. "Evolution of the Domestic Receiver – The Coming of Colour," *Television: Journal of the Royal Television Society*, 24, No. 2 (March-April 1987), 97-100.

Mothersole, Peter L. "Evolution of the Domestic Receiver – Future Trends," *Television: Journal of the Royal Television Society*, 24, No. 3 (May-June 1987), 147-153.

Needell, Allan A. "Lloyd Berkner, Merle Tuve, and the Federal Role in Radio Astronomy," *Osiris*, 2nd Series, 3 (1987), 261-288.

Reingold, Nathan. "Vannevar Bush's New Deal for Research: Or the Triumph of the Old Order," *Historical Studies in the Physical Sciences*, 17, No. 2 (1987), 299-344.

Rogalski, James E. "Evolution of Gigabit Lightwave Transmission Systems," *AT&T Technical Journal*, 66, No. 3 (May-June 1987), 32-40.

Singleton, Thomas. "The Tavistock Diary – Men of Their Time," *Television: Journal of the Royal Television Society*, 24, No. 2 (March-April 1987), 59-60.

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Weaire, Denis and Colin Windsor. "The History of Solid State Physics," *Physics Bulletin*, 38 (1987), 64-67. (This article is an abridged version of the introductory chapter of the book *Solid State Science: Past, Present and Predicted*. Philadelphia, PA: Taylor and Francis Inc., 1987. 336 pp.)

Williams, Kevin. "Sebastian Ziani de Ferranti, 1864-1930 – Pioneer of Electrical Power Systems," *Electronics & Power*, 33 (August 1987), 493-494.

Unpublished Manuscripts

Presented at the Pica '87 meeting, Montreal, 20 May 1987, commemorating the 60th anniversary of the first automatic generation control at Harriman Station, New England Power Co.

Cohn, Nathan. "The Way We Were."

Presented at the 1987 Society for the History of Technology/History of Science Society annual meeting, Raleigh, NC, 29 October-1 November 1987.

Bryant, John H. (University of Michigan) "An Engineering and Scientific Look at the 'Etheric Force' Episode."

Burke, John E. (Johns Hopkins University) "The Birth of the American Computer Industry, 1946-1952."

Carlson, W. Bernard (University of Virginia) "A Social and Professional Interpretation of the Etheric Force Controversy."

Cohen, I. Bernard (Harvard University) "Howard Aiken's Computers: Were New Ideas Encased in Traditional Technology?"

Hausman, William J., and John L. Neufeld (College of William and Mary) "Engineers and Economists: Historical Perspectives on the Pricing of Electricity."

Hirsh, Richard F. (Virginia Polytechnic Institute and State University) "Engineers as Managers: The Electric Utility Industry Experience."

Hunt, Bruce (University of Texas) "The Maxwellians and Telegraphy: The Interaction of Science and Technology."

Kipnis, Naum (Bakken Library) "High Technology on Government Demand: The Case of Soviet Computers, 1946-1956."

Loebner, Egon E. (Hewlett Packard Laboratories) "From Maxwell's Art of Theorizing to Pupin's Art of Inventing."

Lowood, Henry (Stanford University) "Steeples of Excellence and Valley of Silicon: Origins of the University Connection at Stanford, 1937-1958."

Norberg, Arthur L. (Babbage Institute) "The Perils of Companies on Technological Frontiers: Designing and Manufacturing Electronic Computing Machines in the 1940s."

Owens, Larry (University of Massachusetts) "The TVA meets MIT: Federal – Private-Sector Cooperation in R&D in the 1930s."

Pang, Alex Soojung-Kim (University of Pennsylvania) "Edward L. Bowles and Radio Engineering at MIT, 1920-1940."

Todd, Edmund N. (University of New Haven) "The Politics of German Electrification: Regional and National Systems, 1918-1923."

Williams, James C. (California History Center) "Purveyors of Technology: The California Electrical Cooperative Campaign, 1917-1930."

Wise, George (General Electric Co.) "Why the Robots Didn't Devour Schenectady."

Special Issues

IEEE Journal of Quantum Electronics

Vol. QE-23, No. 6, June 1987. This special issue on semiconductor lasers includes a historical section with seven papers on the invention and development of semiconductor and injection lasers.

1880-1980—Un Siecle d'Électricité dans le Monde.

The proceedings of the first international colloquium on the history of electricity, organized by the *Association pour l'histoire de l'électricité en France* and held in Paris in April 1986. The French-English volume was compiled and edited by Fabienne Cardot.

IEEE History Fellowship

Applications are currently being accepted for the 1988-89 Fellowship in Electrical History. Funded by a grant from the IEEE Life Member Fund, the Fellowship is for either one year of full-time graduate work in the history of electrical science and technology at a college or university of recognized standing, or for the support of up to one year of research for a recent Ph.D. graduate in the same field. For a pre-doctoral recipient, the Fellowship stipend is $9,000, with an additional amount of up to $2,000 to pay academic tuition and fees. The stipend is $11,000 for a post-doctoral recipient.

The recipient is selected on the basis of a complete description of the proposed research, college transcripts, letters of recommendation, and additional information supplied on the application form. For pre-doctoral candidates, the award is conditional on acceptance of the candidate into an appropriate graduate program in history at a school of recognized standing. Students with undergraduate degrees in engineering as well as those having degrees in the sciences or humanities are invited to apply. The deadline for receipt of applications for the 1988-89 academic year is 1 February 1988. Application forms may be obtained from the Center for the History of Electrical Engineering.

Research Support Available from CBI, Hagley

The Charles Babbage Institute and the Hagley Museum and Library are offering financial support to researchers. CBI is sponsoring two forms of assistance, a Predoctoral Fellowship and a Professional Internship, to support the study of the history of computers and information processing. The Hagley will provide advanced research fellowships and grants-in-aid. Both will fund independent study in Hagley's field of interest, either at its Center for History of Business, Technology, and Society, or in Hagley's research collections.

The Babbage Institute is accepting applications for its 1988-89 Predoctoral Fellowship which will be awarded to a graduate student whose dissertation deals with the history of computers and information processing. Acceptable topics include the technical history of hardware or software, economic or business aspects of the information processing industry, and the social, institutional, or legal history of computing. The Fellow will receive a stipend of $6,000 plus an additional amount of $2,500 for tuition, fees, travel, and other approved expenses. Applicants should send biographical data, a research plan, three letters of reference, certified transcripts of college credits, and GRE scores directly to CBI.

CBI will also award a Professional Internship, available to professional staff interested in an introduction to the history of information processing. The Internship will be awarded for a period of three to nine months between 1 June 1988 and 31 May 1989. Interns are required to reside at the Babbage Institute on the University of Minnesota campus and to conduct a research project under the direction of the Institute staff. A stipend of $1,000 per month is provided. Applications should include biographical data, a statement of interests, a proposal with dates during which the internship would be held, and the names (with telephone numbers and addresses) of three references.

The deadline for completed applications for either the Fellowship or the Internship is 15 January 1988. For further information, contact the Charles Babbage Institute, University of Minnesota, 103 Walter Library, 117 Pleasant Street S.E., Minneapolis, MN 55455 (612-624-5050).

The Hagley is accepting applications for advanced research fellowships to support independent study at the Center for the History of Business, Technology, and Society. Scholars working in the humanities or in those aspects of the sciences that employ historical or philosophical approaches are encouraged to apply. Fellowships are offered for a period of six to twelve months work, with a maximum stipend of $27,000. These fellowships are restricted to individuals pursuing advanced research; awards will not be made to degree candidates. Completed applications must be received by 15 February 1988; awards will be announced by 1 April 1988.

The Hagley will also award grants-in-aid for short-term (two to eight weeks) study in Hagley's research collections. The grants are available to degree candidates as well as advanced scholars. Applications are accepted throughout the year; 1988 awards will not exceed $750 per month of study.

For additional information on the Hagley advanced research fellowships and grants-in-aid, contact Elizabeth Gray Kogen, Center for the History of Business, Technology, and Society, Hagley Museum and Library, P.O. Box 3630, Wilmington, DE 19807 (302-658-2400, ext. 244).

The Newsletter of the IEEE Center for the History of Electrical Engineering is sent three times a year free of charge to engineers, historians, and others with an interest in the history of electrical science and technology. If you wish to be certain of receiving later issues, please take the time to fill out the form below and stamp and mail it to the Center (if you have not yet done so).

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EXHIBITIONS AND MUSEUMS

Magyar Elektrotechnikai Muzeum

The former 30/10 kV transformer station of the Budapest Electricity Works is the home of the Magyar Elektrotechnikai Múzeum (Hungarian Museum of Electrotechnics) in Budapest. Built in 1933, the station has served as exhibition space for the Hungarian Electrotechnical Collection since 1975, and the site of the museum since 1982. The museum is sponsored by the Magyar Elektrotechnikai Egyesület (Hungarian Electrotechnical Association).

The exhibits are particularly rich in 19th-century electrical apparatus. Both arc and incandescent lighting are represented by such objects as an 1890 Körting-Mathiesen AG 42-volt dc arc lamp, a decorative bronze ceiling fixture, fitted with carbon-filament lamps, and rotary and tumbler light switches made from a variety of materials. Ganz and Siemens transformers, a Bláthy ac watt-hour meter, the switchboard used for excitation of the generators at Hungary's first hydroelectric station at Ikervár, and an 1890 dc dynamo manufactured by Béla Egger and Co., are some of the items in the electric power collections. The museum also has material relating to Hungarian physicist Ányos Jedlik, who described the principle of self-excitation in 1861.

For further information on the museum, contact Árpád Király, Director, Magyar Elektrotechnikai Múzeum, 1075 Budapest, Kazinczy u. 21, 1364 Pf. 163, Hungary.

French Cable Station Museum

The French Cable Station Museum in Orleans, Massachusetts, was purchased from the French Telegraph Cable Co. in Paris in October 1971 by a group of nine Orleans individuals. The building was erected in 1890 to house the extension of the St. Pierre cable from Eastham, MA. This cable was originally laid in 1879 from the French coast near Brest to Eastham by way of the French island of St. Pierre-Miquelon off the coast of Newfoundland. The cable was moved to Orleans to enable the operators who worked there to reach the station more easily.

The station also housed "le directe" cable from France – completed in 1898 and over 3,000 miles long – and a cable to New York. The station was not operated during World War II, closing in 1940. However, it reopened in 1952, only to close permanently in 1959, due to improvements in transatlantic communication which made the cables obsolete. The museum displays the station as it appeared at the time of its closing in 1959. Working exhibits are also included, simulating the operation of the original equipment.

For more information, contact the French Cable Station Museum, Corner of Cove Road and Route 28, Orleans, MA 02653 (617-255-2509).

Muzej Nikole Tesle

The Muzej Nikole Tesle (Nikola Tesla Museum) in Belgrade, Yugoslavia, was founded in 1952. After his death in New York in 1943, Tesla's belongings were transferred to the museum, as stipulated in his will. The collection includes a wealth of archival material – more than 150,000 documents pertaining to Tesla's life and work. Manuscripts and drawings, correspondence, his personal library, and clippings from periodicals and newspapers which published articles about Tesla or about the scientific and technical problems on which he worked, are available to researchers in the museum's archives.

This archival material is also used in the museum's exhibits. Letters, patents, and photographs are combined with working models to illustrate Tesla's work in the field of generating, transmitting, and using polyphase alternating currents. Tesla's inventions using high-frequency and high-voltage currents and his experiments with wireless transmission are also represented. Selected characteristic personal belongings assist in understanding Tesla's personality, his way of life, and his relations with other people.

For more information, contact the Muzej Nikole Tesle, Proleterskih brigada 51, Beograd, Yugoslavia.

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