IEEE CENTER FOR THE HISTORY OF ELECTRICAL ENGINEERING

Newsletter Number 12 Summer 1986

The IEEE History Fellows

One of the most successful IEEE history programs has been the Fellowship in Electrical History. Established in 1978, the Fellowship, which now has a stipend of $11,000, is funded by the Life Member Fund and administered by the IEEE History Committee, which selects the Fellows. The annual Fellowship supports Ph.D. students specializing in electrical history, or recent Ph.D. graduates continuing their research in this field.

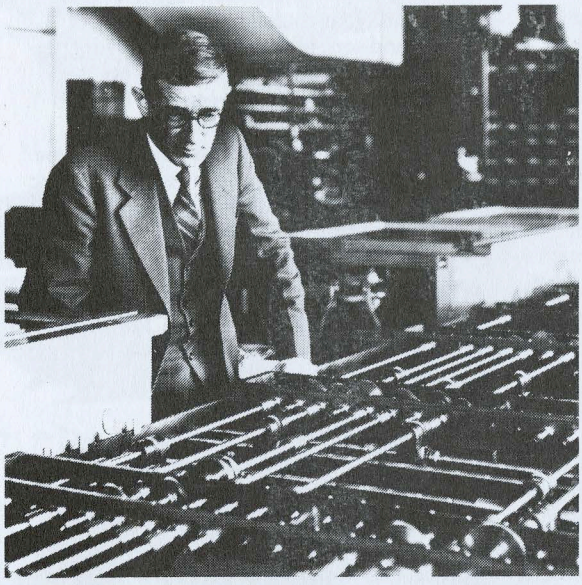
The "track record" of the IEEE History Fellows has been remarkably good. All but one of the eight Fellows selected thus far are working as professional historians and doing research in electrical history. No award was made for 1982-83. The seven Fellows are:

• *Ronald Kline* (1979-80), Director of the Center for the History of Electrical Engineering, finished a Ph.D. at the University of Wisconsin in 1983, writing a thesis on "Charles P. Steinmetz and the Development of Electrical Engineering Science." He has an article on the history of the induction motor in press and is completing a biography of Steinmetz.

• *W. Bernard Carlson* (1980-81), Assistant Professor of History, University of Virginia, completed a Ph.D. at the University of Pennsylvania in 1984, with a dissertation on "Invention, Science and Business: The Professional Career of Elihu Thomson, 1870-1900." His major research projects are a biography of Elihu Thomson and a study, co-authored with Andre Millard, of Edison's West Orange Laboratory.

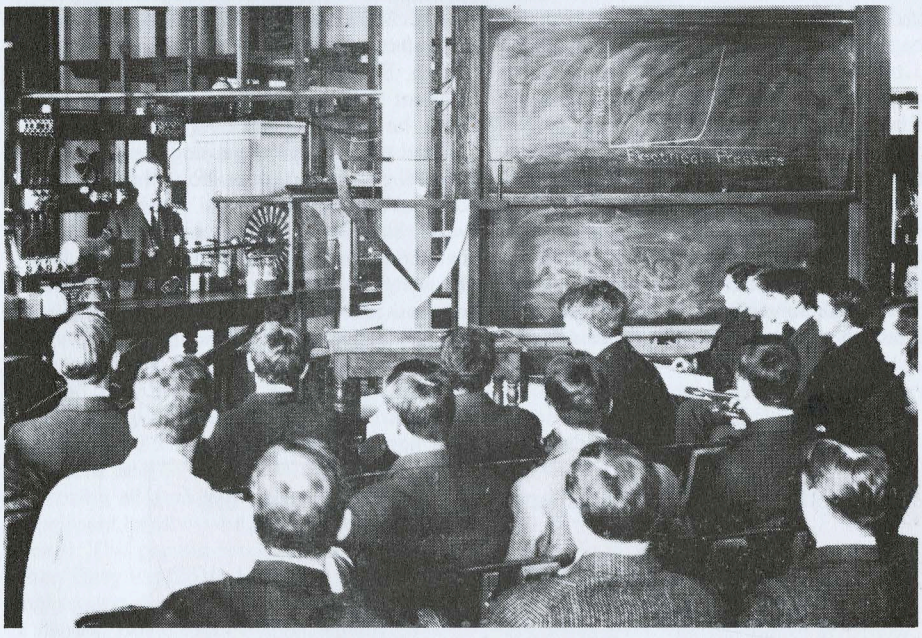
• *Robert Rosenberg* (1981-82), Editorial Associate, Edison Papers Project, Rutgers University, is completing a Ph.D. at Johns Hopkins University, with a dissertation on "The Early Development of Electrical Engineering Education as a Discipline in America." He has published several articles on the history of electrical engineering education.

• *Lawrence W. Owens* (1983-84), Assistant Professor of History, University of Massachusetts, is completing a Ph.D. at Princeton University, with a dissertation on the early career of Vannevar Bush. He has published a major article on Bush's differential analyzer and is writing another on patent policy at MIT.



MIT Museum

Dissertation topics of IEEE Fellows in Electrical History have included the work of Vannevar Bush, who appears at left with the differential analyzer, and electrical engineering education. Harris Ryan's classroom at Cornell University, around 1915, is pictured below.



Cornell University Libraries

• *Andrew J. Butrica* (1984-85), Assistant Editor, Edison Papers Project, has just finished a Ph.D. at Iowa State University, with a thesis entitled "From *inspecteur* to *ingénieur:* Telegraphy and the Genesis of Electrical Engineering in France, 1845-1881." He has an article in press on electrical engineering education in France.

• *Paul B. Israel* (1985-86), Assistant Editor, Edison Papers Project, is working on a Ph.D. at Rutgers University on "Industrial Research in the Age of Invention: Technological Innovation in the Telegraph Industry, 1866-1909." He spent his Fellowship year doing extensive research in the little-used archives of Western Union and other telegraph companies.

• *Jonathan C. Coopersmith* (1986-87) is completing a book on the electrification of Russia, 1880-1925, the subject of his 1985 thesis. See the story on page 2.

We would like to thank the Life Members for sponsoring this program, and we encourage qualified candidates to apply for future Fellowships.

WORK IN PROGRESS

Judith R. Goodstein (Archives, California Institute of Technology) is writing a history of the California Institute of Technology, emphasizing the era that George Ellery Hale, Robert A. Millikan, and Arthur A. Noyes created in the 1920s. The extensive records of the Rockefeller Archive Center, in addition to those at Caltech, have been of particular importance to her research.

Maria Osietzki, Michael Eckert, and Helmut Schubert (Deutsches Museum, Munich) are working on a team project regarding the transfer of information between scientific and technological communities. Funded for three years by the Stiftung Volkswagenwerk, the team will investigate this transfer in the areas of nuclear physics and electronics, in Germany from 1945 to the present. They will also consider the roles of government and private industry in funding and directing research in these areas. Scholarly and perhaps popular publications are expected from the project.

Harold Platt (Department of History, Loyola University) is continuing his research on the history of the electrification of the Chicago area. Utilizing the vast records of the Commonwealth Edison Company of Chicago and its predecessor organizations, Platt has a book-length manuscript in preparation that deals with the social and urban aspects of this major electrification effort.

Mark H. Rose (Program in Science, Technology, and Society, Michigan Technological University) is preparing a book-length manuscript on the relationship between electric and gas service and social and urban change, from 1880 to 1940. The book will analyse developments in a number of gas and electric companies by drawing on traditional literature. But Rose is also using such material as the files of merchandisers who advertised and sold irons, stoves, and refrigerators, as well as the records of the engineers who directed the construction of the utility systems. Additionally, Rose takes into account home builders who installed appliances and electric lighting. Throughout the book, Rose seeks "to lodge technological change within a framework of cities, group experiences, and popular ideas regarding comfort and conveniences – a controlled environment."

Oral History Survey

This year's Graduate Summer Intern, supported by the IEEE Life Member Fund, is conducting a survey of oral history collections in the United States relating to electrical science and technology (see *Newsletter* No. 11, Spring 1986). The intern, Edward Sowders, is a graduate student in history at Rutgers University. To date, he has identified over 600 interviews related to electrical technology, as well as several oral history collections that may contain additional material. The survey, when completed, will result in a published catalogue. Individuals and institutions knowing of relevant oral histories are encouraged to contact the Center for the History of Electrical Engineering.

IEEE History Fellowship Awarded

The 1986-87 IEEE Fellow in Electrical History is Dr. Jonathan C. Coopersmith, the first post-doctoral candidate to receive the Fellowship. After completing a Ph.D. thesis at Oxford University in 1985, entitled "The Electrification of Russia, 1880 to 1925," Dr. Coopersmith spent the academic year of 1985-86 doing research in the Soviet Union as an International Research Exchanges Board (IREX) Fellow. He is now completing his research on the electrification of Russia and intends to publish a book on the topic. In addition to holding the IEEE Fellowship, Dr. Coopersmith will be in the Soviet Union from September to October 1986, on a continuation of the IREX fellowship, and will spend the remainder of the academic year of 1986-87 as a Fellow at the Russian Research Center, Harvard University, and at the Science, Technology, and Society Program at the Massachusetts Institute of Technology.

Applications are currently being accepted for the 1987-88 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 1987-88 academic year is 1 February 1987. Application forms may be obtained from the Center for the History of Electrical Engineering.

Papers of Ernst Berg Transferred to Union College

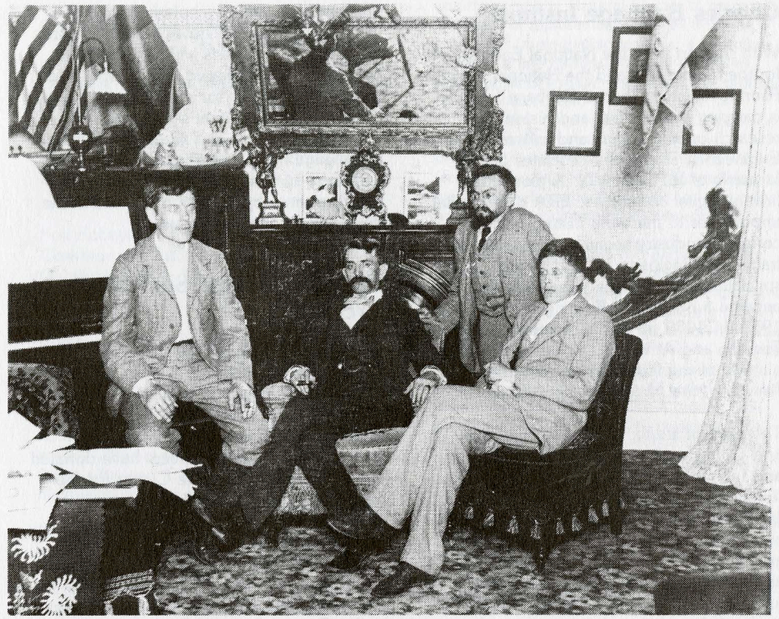
Two boxes of unpublished papers belonging to Ernst Julius Berg (1871-1941), a prominent electrical engineer and educator, resided for many years in the stacks of the Engineering Societies Library (ESL) in New York City and were little known to researchers. The papers were given by Helen C. Farone, Berg's former secretary, to the Schenectady, NY, Section of the IEEE in 1963. In 1984, the boxes were transferred from the ESL to the Center for the History of Electrical Engineering. In accordance with its policy of locating repositories for non-IEEE archives and manuscript collections, the Center arranged for the IEEE to donate the papers this summer to the Schaffer Library of Union College, Schenectady, as an addition to its large collection of Berg manuscripts.

A professor of electrical engineering at Union College for 30 years, Ernst Berg was a noteworthy figure in the early history of the General Electric Company and made major contributions to electrical engineering theory. Born in Oestersund, Sweden, in 1871, Berg graduated from the Royal Polytechnicum in Stockholm with an M.E. degree. In 1892, he emigrated to the United States and took a job with the newly-formed General Electric Company, which then had its headquarters in Lynn, MA. There he met Charles P. Steinmetz (1865-1923) and began a life-long friendship and lengthy technical collaboration with the hunchbacked "electrical wizard."

Union College

Ernst Berg, around 1930

Union College



Ernst Berg (left), Charles Steinmetz (standing), and Berg's brother, Eskil (far right), at their Schenectady boarding house, c. 1895.

Berg and Steinmetz moved with GE to Schenectady in 1894, where they completed the classic *Theory and Calculation of Alternating Current Phenomena* (1897). The title page describes their partnership: Steinmetz, the main author, "with the assistance of Ernst J. Berg." Recent research in the Schenectady archives indicates that Berg was Steinmetz's right-hand man in this and other projects. In 1899, for example, he effectively ran Steinmetz's department at GE, which had responsibility for designing advanced alternating-current machines, approving all design changes to ac equipment, and developing theories of design. The partnership ended in 1909, when Berg left GE to head the electrical engineering department at the University of Illinois. But he returned to Schenectady in 1913, replacing Steinmetz as head of the electrical engineering department at Union College, a post Berg held until his death in 1941.

During those years, Berg kept in close touch with his mentor, Steinmetz, but departed from his teachings in significant ways. The most important of these involved the calculation of alternating-current circuits. Steinmetz was a pioneer in this field, having developed and popularized, through numerous papers and books, the method of solving ac-circuit problems by means of complex algebra. Although applicable to steady-state conditions, this method could not handle transient phenomena, for which Steinmetz employed classical differential equations. Berg's major accomplishment was to revive the work of Oliver Heaviside, originally published in the late 1880s, and apply his operational calculus to both steady-state and transient conditions. The publication of *Heaviside's Operational Calculus* by Berg in 1929 established him as one of the new masters of electrical engineering theory.

The Berg papers given by the IEEE to Union College document part of this story. In addition to newspaper clippings and photographs, the collection contains notebooks from Berg's courses at Union College where he introduced Heaviside's mathematics. Correspondence with Heaviside and Albert Einstein reveals how these influential mathematicians received his work. The letters from Heaviside are also quite touching, revealing the difficult conditions under which Heaviside lived during his last years and the efforts by Berg to ease these hardships for his new mentor.

For more information on the entire Berg collection, contact Ellen Fladger, Archivist, Schaffer Library, Union College, Schenectady, NY 12308 (518-370-6278).

BRIEFS

Charles Babbage Institute

With support from the National Endowment for the Humanities and the National Science Foundation, the Charles Babbage Institute is carrying out archival and historical research on the origins and influence of Engineering Research Associates (ERA), formerly of St. Paul, MN. A pioneering firm in digital computers, ERA is of special importance to the early history of the computer industry because many companies trace their origins to ERA. The firm, which specialized in magnetic-storage drums, became a division of Remington Rand in 1951. In 1979, two ERA veterans – Erwin Tomash and Arnold A. Cohen – published a study of the founding of ERA in the *Annals of the History of Computing.*

The present study, entitled "Computers and Commerce: A History of the Role and Influence of ERA," will focus on the "interaction between ERA and industrial, environmental, and academic scientists, engineers, entrepreneurs, and managers engaged in computer research, development and marketing." The Babbage Institute further reports that this "will be a case study of the relations between government and high-technology industry in the post World War II period. The work will result in two major products: the newly acquired and processed manuscript collections and oral histories; and a scholarly history that will characterize the strategy and structure of ERA. An emphasis will be placed on how this firm developed its concepts and allocated resources for research and development, historical significance of ERA, the diffusion and reception of new knowledge having its origins in ERA's activities, and the role of government in this firm, and, by extension, its role in the developing computer industry."

Control Systems Society Archives

The IEEE Control Systems Society History Committee, chaired by Dr. Jane Cullum (see *Newsletter* No. 10, Fall 1985), has been locating CSS archives not at IEEE headquarters with the help of Society members. Thus far, members have donated two sets of records to the Center for the History of Electrical Engineering.

The first of these is a letter notebook belonging to Robert Wilcox, one of the founders of the IRE Professional Group on Automatic Control (PGAC), the predecessor to the Control Systems Society. Dating from 1954 to 1956, the notebook contains letters and other records documenting the founding of the PGAC, as well as the organization of the Group's first Chapter in Dallas-Fort Worth and other Chapters in Los Angeles, Minneapolis-St. Paul, Boston, and Baltimore. The second set of records consists of a consecutive run of the *Newsletters* of the PGAC and the CSS, dating from December 1961 to October 1980. Donated by Dr. Stephen Kahne, the *Newsletters* fill in many gaps in the collection of Societies newsletters in the IEEE archives.

Anyone knowing of similar records is encouraged to contact Dr. Jane Cullum, Manager, Applied Mathematics, IBM Thomas J. Watson Research Center, P.O. Box 218, Yorktown Heights, NY 10598.

International Colloquium on the History of Electricity

An International Colloquium on the History of Electricity took place in Paris over three days, 15-17 April, and concluded with a visit to the nuclear power center at Nogent-sur-Seine on 18 April. Participants came primarily from France and Italy, though most of Western Europe, Hungary, Japan, and the United States were represented. The *Association pour l'Histoire de l'Électricité en France* (see *Newsletter* No. 5, Summer 1984) hosted the conference, with support from the French electric company, *Électricité de France.*

The conference papers were organized under three headings: the history of electrification; electrical technology and engineering; and electricity, industry, and society. Papers were presented dealing with electrification in France, Italy, Germany, Belgium, Switzerland, Spain, Hungary, Finland, Sweden, Great Britain, and Canada. Among the 31 papers presented were those by Fabienne Cardot on the history of electricity in France, Robert Fox on Edison's exhibit at the 1881 Paris Electrical Exposition, Anna Guagnini on electrical engineering education in Milan and Turin, Yuzo Takahashi on electrical engineering education in Japan, Lenore Symons on the archives of the IEE, Thomas Hughes on electrical power and social transformation, and Andrew Butrica on the Edison Papers Project.

The published papers of the conference will be available by the end of this year. Those interested in obtaining copies or further information may write the *Association pour l'Histoire de l'Électricité en France,* 47 rue de Monceau, 75008 Paris, France.

(Adapted from a report on the conference prepared by Andrew J. Butrica.)

GE Test Course Recollections

William J. Ellenberger, a retired electrical engineer who graduated from the Test Course of the General Electric Company in the early 1930s, has completed the first installment of reminiscences of his 55-year career (1928-1983). Entitled "General Electric Days: Recollections of a Test Man (Student Engineer)," the 135-page manuscript provides a detailed account of the 14 months he spent in the course during 1931-1932 at GE plants in Schenectady, NY; Fort Wayne, IN; Bloomfield, NJ; and Philadelphia, PA. In addition to describing the classes he took at GE and his technical work testing mercury-arc rectifiers, electric refrigerators, industrial controls, automatic switchgear, and steam turbines, Mr. Ellenberger portrays the human side of being a Test Man – the social and economic aspects of attending this influential post-graduate training program.

The account is unusually rich in detail because it is based on 105 letters written home during this period (in lieu of keeping a diary), four Test Course notebooks, and the memories these items evoked. Mr. Ellenberger has donated the letters to the Special Collections Department at Schaffer Library, Union College, Schenectady, NY, and the notebooks to the Center for the History of Electrical Engineering. Copies of the "Recollections" have been deposited with the Center and Schaffer Library for use by researchers.

IEEE, Ellenberger Collection

This photo of William Ellenberger was taken in April 1932, when he was working on the GE Bldg. #60 turbine test.

NEW PUBLICATIONS

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

Books

Charles J. Bashe, Lyle R. Johnson, John H. Palmer, and Emerson W. Pugh. *IBM's Early Computers*. Cambridge, MA: The MIT Press, 1986. 716 pp.

IBM's Early Computers is a solid technical history of the evolution of the firm's computers up to System 360. The four authors, all long-time IBM employees, were first-hand participants in many of these developments. Their access to IBM's internal documents and their interviews with dozens of IBM employees provide a firm basis for this detailed account of the company's influential technology.

Although focused on the technical story, the book also explores the role of management in planning and decision-making at crucial stages of the company's development. The interactions between people who started, altered, or terminated important technical innovations and affected company decisions are featured. The authors also describe the tension between the internal engineering pressure to innovate and the external forces of management control and the marketplace.

The book begins with a brief account of the card-machine era, then discusses electronic calculation, the magnetic-drum calculator, the Defense Calculator, and other first-generation products. These topics are followed by chapters on ferrite-core memories, magnetic-tape and disk-storage development, transistorized computers, "Project Stretch," high-speed printers, research, and new product-line considerations. By blending descriptions of IBM's landmark technologies with stories of the engineers and scientists who created them, the authors have written a readable and well-balanced account of an important era in the history of computing.

Charles J. Bashe, Lyle R. Johnson, John H. Palmer, and Emerson W. Pugh are senior staff members at IBM's Thomas J. Watson Research Center. *IBM's Early Computers* is the third book in the MIT Press Series in the History of Computing, edited by I. Bernard Cohen and William Aspray.

Joseph J. Corn (ed). *Imagining Tomorrow: History, Technology, and the American Future*. Cambridge, MA: The MIT Press, 1986. 237 pp.

Five of the ten essays in this provocative book on past perceptions of the future relate to electrical science and technology. Included are Paul Ceruzzi's "An Unforseen Revolution: Computers and Expectations, 1935-1985"; Steven L. Del Sesto's "Wasn't the Future of Nuclear Engineering Wonderful?"; Susan J. Douglas on "Amateur Operators and American Broadcasting: Shaping the Future of Radio"; Nancy Knight on " 'The New Light': X Rays and Medical Futurism"; and Carolyn Marvin on "Dazzling the Multitude: Imagining the Electric Light as a Communications Medium."

Joseph J. Corn is a lecturer in the Program in Values, Technology, Science, and Society at Stanford University.

Koji Kobayashi. *Computers and Communications: A Vision of C & C.* Cambridge, MA: The MIT Press, 1986. 190 pp.

Computers and Communications is both the biography of a successful communications company and the autobiography of a visionary in the world of computer communications. The book describes the emergence of the concept of "C & C" (a term the author introduced), the present status of this technology, and projections for an advanced "C & C" network, the "automatic interpretation telephone system."

Dr. Kobayashi describes the advent of "C & C" as the logical consequence of his company's history. After discussing the early years of the Nippon Electric Corporation (NEC), which began as a joint venture with the Western Electric Company and Japanese investors in 1899, he explains how events in national and world history – in wartime and peacetime – influenced the company's technical development and management style, and established NEC as a world leader in the field of computers and communication.

This book, which was originally published in 1985 (in Japanese) under the title *C & C Modern Communications: Development of Global Information Media*, is based on a series of published speeches given by Dr. Kobayashi at international telecommunications conferences and symposia. The book's English translation is strong and effective, and its many graphs and illustrations provide a clear understanding of current communications capabilities and the global system Dr. Kobayashi envisions for the future. The heart of this network is the automatic telephone interpretation system, which "would make it possible for any person in the world to communicate with any other person at any place and any time." Dr. Kobayashi believes that such a system would, by transcending national boundaries and language barriers, help create the global "knowledge and information society" he envisions for the 21st century.

Koji Kobayashi is Chairman and Chief Executive Officer of NEC Corporation.

David E. Nye. *Image Worlds: Corporate Identities at General Electric.* Cambridge, MA: The MIT Press, 1985. 188 pp.

Image Worlds explores the beginnings of corporate image-making and communications at the General Electric Company, a pioneer in the use of commercial photography for public relations. The concept for the book emerged in 1979 when the author, then on the faculty of Union College in Schenectady, NY, was commissioned by General Electric to prepare a catalogue of representative images from the company's photographic archives, a collection of more than one million negatives and prints. With the aid of a team of students, Nye produced a catalogue of 7,000 images in 1981. In surveying the entire collection, Nye began to realize that the evolution of commercial photography as a profession, paralleled with the technical development of the photographic arts, was a major factor in the creation of corporate advertising and communications programs.

The book is divided into two parts. Part One looks at the "Senders"– General Electric as a communicator using commercial photography as the medium to create and transmit the desired images. Part Two examines the "Receivers"– the audiences defined by General Electric (engineers, factory workers, managers, consumers, and voters) and the development of techniques and publications used to reach these groups. The concluding chapter deals with photography as ideology – its evolution in modern society and its credibility as an effective and trustworthy means of communication.

David E. Nye is Associate Professor of American History at Odense University in Denmark.

Other Recent Books

Rodney Dale. *The (Sir Clive) Sinclair Story*. London: Duckworth, 1985. 184 pp.

Henry B.O. Davis. *Electrical and Electronic Technologies: A Chronology of Events and Inventors from 1940 to 1980.* Metuchen, NJ: Scarecrow Press, 1985. 321 pp.

Michael S. Malone. *The Big Score: The Billion-Dollar Story of Silicon Valley*. New York: Doubleday, 1985. 456 pp.

F.M. Smits (ed). *A History of Engineering and Science in the Bell System: Electronics Technology (1925-1975).* Indianapolis, IN: AT&T Bell Laboratories, 1985. 370 pp.

Michael R. Williams. *A History of Computing Technology*. Englewood Cliffs, NJ: Prentice Hall, 1985. 432 pp.

G. Wunsch. *Geschichte der System Theorie.* Munich: Oldenbourg – Verlag, 1985. 205 pp.

Articles

Abramson, Albert. "Pioneers of Television – Charles Francis Jenkins," *SMPTE Journal,* 95, No. 2 (Feb. 1986), 224-238.

Anderson, A.F. "A Chance Encounter with William Sturgeon," *Electronics & Power*, 32, No. 2 (Feb. 1986), 129-131.

NEW PUBLICATIONS (cont.)

Bamford, W. "Industrial Electrical Measuring Instrument Makers, 1890-1960: Reminiscent Review," *IEE Proceedings*, 133, Pt. A (March 1986), 125-128.

Bindon, F.J.L. "The Fiftieth Anniversary of the National Grid (in Britain)," *The Nuclear Engineer*, 26 (Nov.-Dec. 1985), 163-164.

Bride, Harold. "Bride's Story (about Radio Communications during the Titanic Disaster)," *Oceanus*, 20, No. 4 (1985/86), 48-51.

Cabanes, Jean. "Essai sur l'histoire de l'electropathologie," *Revue generale de l'electricite*, 11, (Nov. 1985), 809-816.

Carlson, W. Bernard and A.J. Millard. "Edison as a Manager of Innovation: Lessons for Today," *New Jersey Bell Journal*, (Winter 1985/86), 24-32.

Duthie, Frederick W. "George Forbes: Carbon Brush Inventor," *IEEE Aerospace and Electronics Systems Magazine*, 1, No. 4 (April 1986), 2-7.

Eckert, Robert P. "History of Ground Wave Propagation Prediction Curves for AM Standard Broadcast," *IEEE Transactions on Broadcasting*, BC-32, No. 1 (March 1986), 1-4.

Fanning, A.E. "La Navigation Astronomique depuis 1884," *Navigation*, 34 (Jan. 1986), 102-110.

Fellgett, P.B. "Origins of the Usage of 'Q'," *Journal of the Institute of Electronic and Radio Engineers*, 56, No. 2 (Feb. 1986), 45-46.

Friedel, Robert. "Sic Transit Transistor," *American Heritage of Invention & Technology*, 2, No. 1 (Summer 1986), 34-40.

Fuller, A.T. "James Clerk Maxwell's Cambridge Manuscripts: Extracts Relating to Control and Stability – V," *International Journal of Control*, 43 (1986), 805-818.

Fuller, A.T. "James Clerk Maxwell's Glasgow Manuscripts: Extracts Relating to Control and Stability," *International Journal of Control*, 43 (1986) 1593-1612.

Furfari, F. Anthony. "Westinghouse Electric Commemorates Centennial," IEEE Industry Applications Society *Newsletter*, 27, No. 2 (March/April 1986), 12-14.

Graham, David M. "Dr. Harold E. Edgerton – Sonar & Photography Cult Hero," *Sea Technology*, (Jan. 1986), 54.

Hasse, Peter & Johannes Wiesinger. "100 Jahre ABB (Ausschuss für Blitzschutz und Blitzforschung des VDE)," *Elektrotechnische Zeitschrift*, 127, No. 1 (1986), 4-5.

Hills, Raymond C. "Fifty Years of High-Definition Television Transmission," *Journal of the Institution of Electronic and Radio Engineers*, 56, No. 1 (Jan. 1986), 1-15.

Hurt, R. Douglas. "REA: A New Deal for Farmers," *Timeline*, 2 (Dec. 1985-Jan. 1986), 32-47.

Kan, Hisao. "One Hundred Years of Transformer Development – Report on Centenary Jubilee Conference of Transformer Invention," *Denki Gakkai Zasshi*, The Journal of the Institute of Electrical Engineers of Japan, 105, No. 12 (Dec. 1985), 1201-1204 (in Japanese).

Keith, S.T. & Paul K. Hoch. "Formation of a Research School: Theoretical Solid State Physics at Bristol, 1930-54," *British Journal for the History of Science*, 19 (1986), 19-44.

Krátký, Vladislav. "Czechoslovak Electrical Locomotives – History and Present," *Czechoslovak Heavy Industry*, 2 (1986), 2-7.

Lazarus, M.J. "Electromagnetic Radiation: Megahertz to Gigahertz – A Tribute to Heinz Rudolf Hertz and John Turton Randall," *IEE Proceedings*, 133, Pt. A (March 1986), 109-118.

Li, C.C.; R.L. Kashyap; and T. Pavlidis. "King-Sun Fu (1930-1985): A Biography," *IEEE Transactions on Pattern Analysis and Machine Intelligence*, PAMI-8 (1986), 291-294.

Lord Marshall of Goring Kt. "The 1985 Lord Nelson of Stafford Lecture: Electricity in the UK," *IEE Proceedings*, 133, Pt. A (March 1986), 119-124.

Myers, Edith D. "(Jean D. Ichbiah:) The Spirit behind ADA (Programming Language)," *Datamation*, 32, No. 7 (1 April 1986), 101.

Olsen, Michael L. "But It Won't Milk the Cows: Farmers in Colfax County Debate the Merits of the Telephone," *New Mexico Historical Review*, 61 (Jan. 1986), 1-13.

Owens, Larry. "Vannevar Bush and the Differential Analyzer: The Text and Context of an Early Computer," *Technology and Culture*, 27 (1986), 63-95.

Rubin, Israel. "Thomas Alva Edison's 'Treatise on National Economic Policy and Business'," *Business History Review*, 59 (1985), 433-464.

Seeberger, Reni. "History and Applications of Capacitance and Dissipation Factor Measurements," *IEEE Electric Insulation Magazine*, 2, No. 1 (Jan. 1986), 27-36.

Shiraishi, Yuma. "History of Home Videotape Recorder Development," *SMPTE Journal*, 94 (Dec. 1985), 1257-1263.

Trenn, Thadeus. "The Geiger-Muller Counter of 1928," *Annals of Science*, 43 (1986), 111-135.

Waddell, Peter. "The Frith Street Connexion (of John L. Baird)," *Television*, Journal of the Royal Television Society, 23 (11 Feb. 1986), 38-39.

Zames, George. "Remembrance of Things Past," *IEEE Control Systems Magazine*, 6, No. 2 (April 1986), 31-32.

Zemanek, Heinz, "A Quarter Century of IFIP," *Abacus*, 3, No. 2 (1986), 28-33, 57.

Special Issues

IEE Proceedings

Vol. 132, Part A, No. 6 (Oct. 1985). A special issue on the history of radar in World War II. Contains thirteen articles on such radars and associated equipment as the H2S, TRE, ASV, centimetre AI, Oboe, IFF, D-13, and the evolution of radar in the Royal Navy (1935-1944).

Vol. 132, Part A, No. 8 (Dec. 1985). A special issue on electrical engineering history. Contains thirteen articles covering such subjects as Nicholas Callan, the history of wiring regulations, oscillographs (optical, chemical, and capillary), early electrical service fees, the Schuster Effect and the validity of Ohm's Law, early distribution networks, the origin of systems modelling, public cinema television in Britain, the history of electrical units and standards, *The Electrician* and *The Electrical Review* journals during the 1880s, the Ronalds and Thompson libraries at the IEE, Victorian electrical engineering education, and a description of papers presented at various IEE History Weekend meetings.

GEC (General Electric Co., Britain) Journal of Research

Vol. 3, No. 2 (1985). A special issue concerning the history of radar. Contains articles on radar's first 50 years, the first functioning radar, research and development of microwave magnetrons, the history of radar guidance, Martello, the Foxhunter Interceptor Radar, and the ERS-1.

Unpublished Manuscripts

Butrica, Andrew J. "From *inspecteur* to *ingénieur:* Telegraphy and the genesis of electrical engineering in France, 1875-1881," Ph.D. dissertation, Iowa State University, 1986.

First Regional Milestone Dedicated

The IEEE's first regional Electrical Engineering Milestone was dedicated in a ceremony held on 24 July in Charleston, SC. The Milestone, the first central station to supply incandescent lighting in South Carolina, was constructed in 1882 by the United States Electric Illuminating Company with a capacity of 60 arc and 200 incandescent lamps. The central station went into operation in October 1882, only one month after Edison's Pearl Street station began operating in New York City. The USEL was founded in 1878 and was for many years a strong competitor of the Edison Companies. Although the Charleston central station building was recently converted into an apartment complex, the exterior still retains much of its original appearance.

Speakers at the dedication ceremony, held at the nearby auditorium of the Preservation Society of Charleston, were Dr. Louis Dornetto of the IEEE Coastal South Carolina Section, and Professor James Brittain of the Georgia Institute of Technology and member of the IEEE History Committee. Assisting in the unveiling of the plaque placed at the site

(Left to right) George Abbott, Melvin Brown, and Louis Dornetto posed with the regional Milestone plaque in front of the former USEL central station, during the dedication ceremonies on 24 July.

were George Abbott, Director of IEEE Region 3; K. Reed Thompson, Chairman of the Region 3 Long-Range Planning Committee; Melvin Brown, one of the owners of the building; and representatives of historic preservation groups in Charleston.

MEETINGS

HSS and SHOT Annual Meetings

A joint meeting of the History of Science Society, the Philosophy of Science Association, the Society for the History of Technology, and the Society for Social Studies of Science will be held in Pittsburgh, PA , 23-26 October 1986. Preliminary program announcements indicate that several papers will be given on matters of interest to *Newsletter* readers. Among the topics to be covered are the electrification of Germany, telegraphy, William Gilbert's researches, animal electricity, radio astronomy, radio research at the Naval Research Laboratory, the Space Telescope, and engineering R&D at the Westinghouse Company.

For more information on the meeting, contact Peter Machamer, Dept. of History and Philosophy of Science, 107 Cathedral of Learning, University of Pittsburgh, Pittsburgh, PA 15260.

International Conference on the History of Television

The Institution of Electrical Engineers will sponsor an International Conference on the History of Television, to be held in London, England, on 13-15 November 1986. Papers will be presented on the history of pick-up and display devices, receivers and transmitters, antennas, television sound, lenses, standards conversion, telecine, television waveforms, professional and domestic recording, signal distribution, lighting, electronic effects, digital techniques, and microelectronics.

For more information, contact the Conference Service Dept., IEE, Savoy Place, London WC2R OBL, UK.

Computing in the Twenty-First Century

The Charles Babbage Institute is sponsoring a symposium on the history, growth, and future of computer technology, to be held in Bloomington, MN, 9-10 September 1986. Presentations will cover the topics of Engineering Research Associates, Inc., current applications for futuristic technology, ciphers, computers in businesses, foreign competition, software engineering, artificial intelligence research, one-half micron limitations, and supercomputing.

For more information on the symposium, contact LaVonne K. Molde, Charles Babbage Institute, University of Minnesota, 103 Walter Library, 117 Pleasant Street SE, Minneapolis, MN 55455 (612-624-5050).

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

MTT Society Exhibits Artifact Collection

Since 1980, the IEEE Microwave Theory and Techniques (MTT) Society has mounted a comprehensive historical exhibition at the annual International Microwave Symposium. The core of the exhibit is a collection of nearly 100 microwave devices assembled by Theodore Saad, President of Sage Laboratories and Historian of the MTT Society. However, Saad also makes arrangements with local microwave companies near the convention city to participate in the exhibit.


J.E. Bedi

J.E. Bedi

The MTT Historical Exhibit was a feature of this year's MTT-S International Microwave Symposium

The latest of these exhibitions was held at the 1986 MTT-S International Microwave Symposium held in Baltimore. The MTT artifacts ranged from a late-1920s power pentode, to klystrons and magnetrons from the 1940s, to a GaAs dual-gate FET, c. 1980. The devices, donated to the MTT by its members and other interested parties, are international in origin, with items from the United States, Germany, Japan, and the Peoples Republic of China. Complementing this display were several large pieces of radar equipment and a series of display panels from the nearby Baltimore Electronics Museum.

The MTT artifact collection traces its origins to 1980, when Saad first borrowed items from the MIT Museum and microwave companies to display at that year's Symposium. The MTT then began receiving artifacts for its permanent collection, gathering 19 devices that first year. The collection now contains 91 artifacts, 60 books on the history of microwave science and technology, and 15 miscellaneous items, including patent records and photographs. A copy of the unpublished catalogue of the collection, containing detailed descriptions of each piece, is available for research use at the Center for the History of Electrical Engineering.

The care of the collection, which has been Mr. Saad's responsibility, will be transferred to Dr. John Bryant, University of Michigan, at the conclusion of next year's Symposium in Las Vegas. Dr. Bryant is one of the two Distinguished Microwave Lecturers appointed by the MTT Society for 1986-1987. His lecture on "The First Century of Microwaves – 1886-1986" is available for bookings by IEEE Chapters and Societies between July 1986 and June 1987. In his talk, Dr. Bryant will describe Hertz's historic experiments of 1886-1888, which verified Maxwell's electromagnetic theory. He will also talk about the advancement of microwave techniques and technology after Hertz, and will conclude with a discussion of the development of systems applications in microwave technology. Because of his keen interest in the history of microwaves, Dr. Bryant was selected to take over the responsibility for the MTT artifact collection.

For more information on the MTT artifact collection, contact Theodore Saad, Sage Laboratories, 3 Huron Drive, Natick MA 01760 (617-653-0844). Arrangements for Dr. Bryant's lecture should be made directly with him, c/o Dept. of Electrical Engineering and Computer Science, University of Michigan, Ann Arbor, MI 48109.

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