IEEE CENTER FOR THE HISTORY OF ELECTRICAL ENGINEERING

Newsletter Number 15 Summer 1987

The Center's Photograph Collection

One of the Center's most frequently-used resources is the photograph collection. These images, dating from the 1870s to the present, have been gathered from many sources and are regularly featured in a variety of publications (including this *Newsletter*), exhibits, and slide presentations. The demand, like the collection, continues to grow.

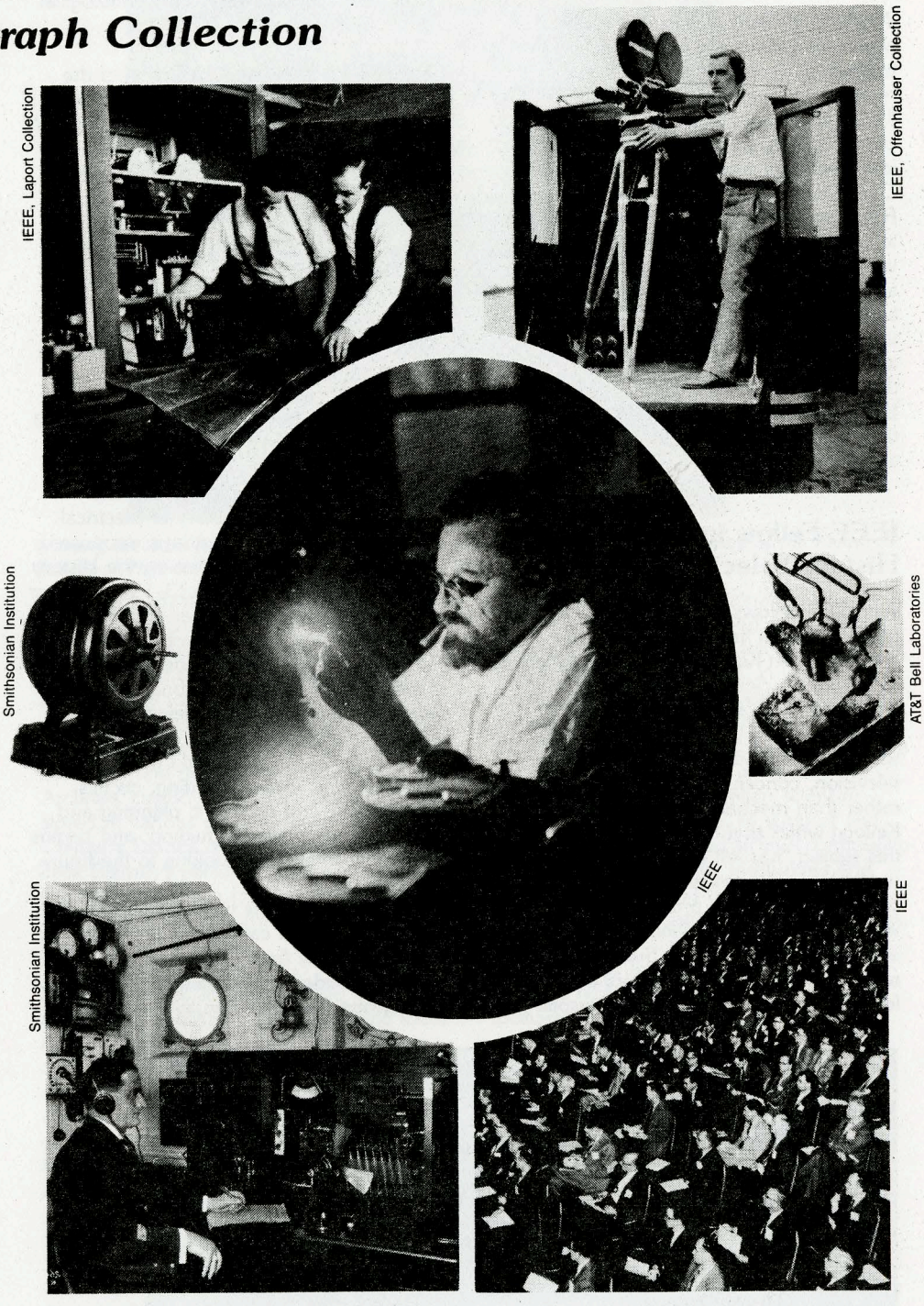
Portraits make up a substantial portion of the approximately 10,000 photos in the collection. "Giants" in electrical history, such as Edison, Steinmetz, Faraday, and Maxwell, are well-represented, as are past officers of the American Institute of Electrical Engineers (AIEE), Institute of Radio Engineers (IRE), and the IEEE. In addition to formal sittings, more candid shots are often available, too.

The collection also includes images related to the organizational history of the IEEE and its predecessors. These range from the historic (attendees at the AIEE 10th anniversary meeting in Philadelphia, 1894) to the humorous (IRE staff members at their 1948 Christmas party). The photos cover such activities as meetings, committees, and special events for all three organizations as well.

Researchers interested in more general topics in electrical history are also served by the collection. Whether searching for an image of Faraday's induction ring, the 1893 World's Columbian Exposition, or the first implantable pacemaker, the Center can help. The collection is particularly rich in the areas of 19th-century electric light and power and early radio.

Photos donated to the IEEE by its members form a unique segment of the collection. These one-of-a-kind images cover a broad range of topics, including radio, sound-on-film, power engineering, and mechanical television. Historians today are interested in documenting the lives of working engineers, and these personal snapshots can offer valuable assistance. *Newsletter* readers interested in donating their photographs to the IEEE are encouraged to contact the Center.

The Center's photographic reference service is provided both by mail and over the telephone. The Center also provides referrals to other collections if a researcher's needs are not met. Copies of the Center's photographs may be ordered through its photo reproduction service, the proceeds from which support the preservation of the collection. Advice on the preservation needs of personal photograph collections is also part of our service. For more information or for reference assistance, contact the Center's Curator.



A sample of the Center's photograph collection (clockwise, from upper left): John Collins & Victor Isaac, RCA Victor, Montreal, working on the RCAF GT-24 5kW power amp, 1943; RCA Photophone apparatus for recording sound on film, ca. 1930; the first transistor, 1947; AIEE/IRE members' symposium on the proposed merger, 1962; radio room of the S.S. Providence, *ca. 1920; and Tesla's induction motor, ca. 1890. Charles Steinmetz is at center.*

BRIEFS

Brittain Elected IEEE Fellow

James E. Brittain, Associate Professor of history of technology at the Georgia Institute of Technology, was elected to the membership grade of Fellow in the IEEE in 1987 "for development of the field of electrical history." Former chairman and a long-term member of the IEEE History Committee, Professor Brittain is the first Fellow selected specifically for contributions to electrical history. He has published widely in the history of electric power and electronics (including a forthcoming biography of Ernst F.W. Alexanderson) and is now working on the history of microwave technology. Howard Hamilton, chairman of the IEEE History Committee, presented Brittain's Fellow certificate at a meeting of the Committee at the Smithsonian Institution in April.

IEEE Fellow in Electrical History Selected

The IEEE Fellowship in Electrical History for 1987-1988 has been awarded to Nelson Robert Kellogg. A doctoral candidate in history of science at Johns Hopkins University, with a B.A. in physics from Brigham Young University, Kellogg plans to write his dissertation on the early history of television, concentrating on electronic, rather than mechanical, systems. Mr. Kellogg writes that historical research on this subject "has left some questions largely untouched. The research and development of television systems proceeded with great vigor in the corporate laboratory and the entrepreneur's workshop. Substantial resources were dedicated toward overcoming formidable engineering hurdles despite the very uncertain market value of the final product. Economic models for technical innovation cannot tell the whole story; technological choices were also conditioned by cultural expectations. The history of early television must attempt to explain both poor business decisions and technological adventurism."

Mr. Kellogg is the ninth recipient of the Fellowship, which is sponsored by the IEEE Life Member Fund (see *Newsletter* No. 12, Summer 1986). Persons interested in applying for next year's Fellowship should contact the Center for the History of Electrical Engineering for application materials. The application deadline is 1 February 1988.

History of Television Conference

The Institution of Electrical Engineers (IEE) in London, in association with the Royal Television Society, the Society of Motion Picture and Television Engineers, the IEEE Center for the History of Electrical Engineering, and other groups, sponsored an International Conference on the History of Television in London on 13-15 November 1986. Engineer-historians and participants in the early history of television presented 41 papers at the well-attended conference. Sessions were held on national histories; television systems; color television; measurements and control of standards; pick-up devices and electron guns; telecine and cine film; video recording; circuits, transmitters, and receivers; planning and standards; program production; and origins of current trends and looking to the future.

Most of the speakers were from the United Kingdom, but six came from the United States and one from West Germany. The papers included J. Kniestedt, "Historical Background of Television in Germany," William N. Parker, "Personal Experiences with Early Television in Chicago and Philadelphia, 1926-1941," and W.J. Bray, "Post Office Contributions to the Early History of the Development of Television in the United Kingdom." The Chairman of the Organising Committee, Professor R.W. Burns, is the author of a recent book on the history of British television (see the "New Publications" section).

The proceedings of the conference have been published as *The History of Television: From Early Days to the Present*, IEE Conference Publication No. 271, and is available in the United States from Mimi Chapman, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854.

MEETINGS

Society for the History of Technology

The annual meetings of the Society for the History of Technology (SHOT) and the History of Science Society will be held jointly in Raleigh, NC, 29 October-1 November 1987. For more information, contact SHOT program chair Larry Owens, Dept. of History, University of Massachusetts, Amherst, MA 01003.

Conference on the History of Technology

The University of Surrey will be holding a conference on the history of technology on 3-5 August 1987. Papers to be presented at the conference will discuss such topics as the relationship between science and technology, milestones in the development of transport, technology in medicine, and ethical and social considerations in technological development. For more information contact either Patricia Smart, Dept. of Educational Studies, or Edward Wilson, Dept. of Mechanical Engineering, both at the University of Surrey, Guildford GU 2 5XH, Great Britain.

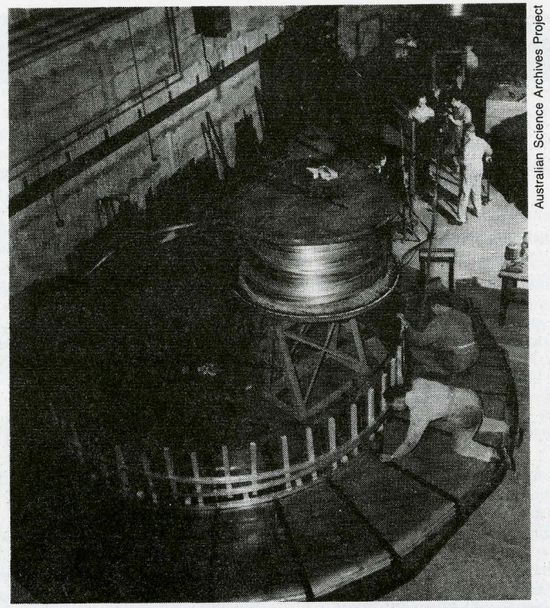
The International Union of Geodesy and Geophysics

A general assembly of the International Union of Geodesy and Geophysics will be held in Vancouver, Canada, in August 1987. A call for papers has been issued for sessions on "Past, Present, and Future Trends in Research in Aeronomy and Geomagnetism." Papers may discuss the influence of past people, programs, and institutions on geophysics or the use of historical data in geosciences. For more information write Dr. W. Schroeder, Hechelstrasse 8, D-2820 Bremen-Ronnebeck, Federal Republic of Germany.

Australian Homopolar Generator Records Saved

Gavan J. McCarthy

The Australian National University (ANU) Homopolar Generator (HPG), an extraordinary engineering achievement weighing 2,400 metric tons and designed to produce a current of 1.6 megamps at 900 volts, was the final functional result of a research program initiated in the late 1940s by Professor Mark Oliphant, the inaugural director of the Research School of Physical Sciences at the ANU. The original aim, concomitant with the establishment of the ANU, was to build a "cyclosynchrotron" of world standing that would allow Australian physicists to make a significant contribution to the burgeoning field of particle physics. For many technical, financial, and political reasons, this goal was never realized, although the HPG functioned effectively for over 20 years, providing current for such projects as plasma research using tokamaks, high strength magnetic field investigations, and rail-gun experiments.



Australian Science Archives Project

Winding the coils for the large HPG electromagnet, "Heracles," in the workshop of the Research School of Physical Sciences at the ANU, ca. 1953.

In September 1985, the Australian Science Archives Project (ASAP) became aware that the HPG, in Canberra, the national capital, was soon to be decommissioned, so we began investigations into the planned fate of both the machine itself and any records still in existence. Unfortunately, it quickly became apparent that the HPG was destined to be sold for scrap and that the unique records generated by the project were of precarious disposition. The successful location and identification of records during the initial survey work was made possible through the active assistance of Jack Blamey, who had been one of Oliphant's original appointments. He stayed with the HPG until his retirement and maintained regular contact thereafter. The records, which were not part of the University's file registry system, were found scattered in many offices and unusual storage areas. They included correspondence, plans, a comprehensive photographic record, technical and experimental notebooks, reports, minutes, publications, notes and operational records including ultraviolet record sheets for every pulse noting the changes in the relevant parameters.

With the decommissioning of the HPG came the restructuring of the department and the reallocation of resources, including offices. It was imperative that those records at risk be collected together as soon as possible to avoid loss or accidental destruction. The ANU, without an archivist or an archival repository, was not in a position to do this; nor were the departmental staff who had neither the time nor the expertise to deal with the archives. The records were collected by the ASAP and Jack Blamey and placed in the HPG control room. The Australian Archives had legal responsibility for the records, so its staff was made aware of the records' disposition and consequently sent out a team to register, accession and transfer the collection to the Archives' custody. The documents are now stored at various repositories of the Canberra Branch of the Australian Archives. Jack Blamey's personal papers were also transferred with the HPG records. Sadly, Jack died before the Australian Archives had commenced work.

In this particular instance, it was not possible for the ASAP to be anything more than a catalyst to ensure the preservation of a valuable archival resource. The small staff of the ASAP, one full-time professional with casual assistants from within the Dept. of History and Philosophy of Science, University of Melbourne, was not able to handle a project the size of the HPG without significant outside support which was not forthcoming. It was found that neither the scientists nor the administrators at the ANU were willing to take responsibility for the records and were not aware of the possibilities for preservation and storage. It is hoped that the Australian bicentenary, to be celebrated in 1988, will mark a new era of archival awareness among scientists and engineers.

The ASAP was established in March 1985 by Professor R.W. Home of the University of Melbourne in response to concerns expressed by various national bodies interested in the history and archives of Australian science. It was felt that Australia, like England and the USA, could not rely on the present, already overtaxed, archival structure to preserve an adequate record of activities in science. The ASAP was therefore set up to locate, sort, list and index the records of selected Australian scientists and scientific institutions, to support and encourage the established archival community with respect to scientific institutions and scientific records, and to facilitate the use of these records by historians and researchers. The collections handled by the ASAP are transferred to an appropriate permanent archival repository in agreement with the donors. The Project is funded chiefly by grants from private trusts, although some funding has also been provided by the University of Melbourne.

To date, the ASAP has registered 25 collections covering a variety of disciplines, including physics, medical research, biochemistry, mineral chemistry, geology, entomology, genetics and zoology. Where possible, listings of collections are published. A progress report is produced twice yearly and distributed free of charge to those interested. For more information, contact the ASAP at the Dept. of History and Philosophy of Science, University of Melbourne, Parkville, Victoria 3052, Australia (03 334 6557).

Gavan McCarthy is the Senior Archivist of the Australian Science Archives Project.

NEW PUBLICATIONS

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

Books

R.W. Burns. *British Television: The Formative Years.* London: Peter Peregrinus Ltd., 1986. 488 pp.

British Television is the seventh book in the Institution of Electrical Engineers History of Technology Series. It covers in detail the history of British television broadcasting (both mechanical and electronic systems) from experiments in the early 1920s to 1939, when service was suspended for the duration of World War II.

The book concentrates on the development of British television prior to 1935, when the London Station was established. Burns begins with John Logie Baird's experiments from 1923-26. He then focuses on events of the late 1920s, including television demonstrations for the public, the formation of the Baird Television Development Co., relations between Baird and the BBC, and the inauguration of experimental service in 1929. Chapters dealing with television from 1930-35 address such topics as financial difficulties of the Baird company, commercial possibilities for television broadcasting, the emergence of a competitor company, EMI (Electric and Musical Industries, which later became Marconi-EMI), and the formation and work of the government's Television Committee.

Burns then describes the establishment of the London Station and regular television broadcasting service. He discusses how the provision of service was initially divided between Baird Television Ltd. and Marconi-EMI, and how the latter company's system was eventually adopted exclusively because of its higher resolution. The final chapter provides a description of the service provided from 1936-39.

R.W. Burns is a retired Dean of the School of Engineering at Trent Polytechnic in Nottingham. He is a Fellow of the Institution of Electrical Engineers and a Member of the Institute of Physics.

James G. O'Hara and Willibald Pricha. *Hertz and the Maxwellians: A Study and Documentation of the Discovery of Electromagnetic Wave Radiation, 1873-1894.* London: Peter Peregrinus Ltd., 1987. 154 pp.

Hertz and the Maxwellians is the eighth and most recent volume in the Institution of Electrical Engineers History of Technology Series. It provides an interesting account of Heinrich Hertz's verification of the existence of electromagnetic-wave radiation and his involvement with the "Maxwellians" in Ireland and Britain who further developed the theories of James Clerk Maxwell.

The prologue of *Hertz and the Maxwellians* provides the reader with a general overview of Hertz's experimental and theoretical investigations into electromagnetic waves and how these investigations were received by British and Irish scientists. From here on the book consists primarily of correspondence between Hertz and prominent Maxwellians. Entire chapters are devoted to correspondence between Hertz and George Francis FitzGerald, Oliver Heaviside, Oliver Lodge, and William Thomson (Lord Kelvin). Further chapters provide correspondence concerning Hertz's visit to London and Cambridge in 1890, and his first investigation into electrodynamics in 1879. *Hertz and the Maxwellians* concludes with photographs of Hertz apparatus located at the Deutsches Museum in Munich.

James G. O'Hara is a research associate in the history of technology at the University of Hamburg. Willibald Pricha is a specialist at the Deutsches Museum in the study and publication of manuscript papers of well-known physicists.

Wilbert F. Snyder and Charles L. Bragaw. *Achievement in Radio: Seventy Years of Radio Science, Standards, and Measurement at the National Bureau of Standards.* Washington, DC: U.S. Government Printing Office, 1986. 842 pp.

Achievement in Radio offers substantial coverage of the work of the National Bureau of Standards (NBS) in the field of radio. It includes both work accomplished by the NBS in Washington, DC, and in Boulder, CO. The book begins with the founding of the NBS in 1901 and the beginning of its involvement in radio in 1911.

A variety of topics concerning NBS radio activities in wartime are covered in chapters on the two World Wars. The chapter on World War I mentions NBS work in the development of electron tubes, antennas, direction finders, aerial navigation, and cathode-ray oscillographs. The World War II chapter addresses the development of radar and radar countermeasures, the Vortex generator, radio proximity fuzes, and quartz crystal research.

Considerable attention is directed toward the development of radio standards. An entire chapter is devoted to time and wavelength frequencies. It opens with J. Howard Dellinger's first wavemeter and closes with the first 25 years of the atomic clock. Other chapters on standards discuss such topics as microwave standards, the Electronic Calibration Center, computerization and automated measuring systems, and the applications of radio standards to attenuation, power, voltage, and electromagnetic fields.

A substantial portion of *Achievement in Radio* deals with NBS research on radio waves and the ionosphere. Included are early experiments verifying the existence of the ionosphere, fading tests, studies in radio wave transmission, the work of Theodore Gilliland in measuring the ionosphere, and probes of the various layers and phenomena present in the ionosphere. An additional chapter discusses NBS radio research beyond the ionosphere. Several chapters are devoted to radio wave propagation, including the topics of radio tropospheric research, transmission loss, radio meteorology, and atmospheric noise.

Achievement in Radio also describes how the NBS's work has changed with technology. A chapter discusses the influence of plasma and quantum physics on radio standards development. Topics include plasma physics, theoretical astrophysics, and the laser. A series of helpful appendices is found at the end of the book. An appendix on the career of J. Howard Dellinger is of particular interest.

The authors are retired from the National Bureau of Standards.

Other Recent Books

Christopher Armstrong and H.V. Nelles. *Monopoly's Moment: The Organization and Regulation of Canadian Utilities, 1830-1930.* Philadelphia: Temple University Press, 1986. 393 pp.

Carolyn Caddes. *Portraits of Success: Impressions of Silicon Valley Pioneers.* Palo Alto, CA: Tioga Publishing, 1986 (distributed by William Kaufmann, Inc., Los Altos, CA). 138 pp.

Richard Rudolf and Scott Ridley. *Power Struggle: The Hundred-Year War over Electricity.* New York: Harper & Row, 1986. 305 pp.

Robert Sobel. *RCA.* New York: Stein & Day, 1986. 282 pp.

Articles

Anderson, Herbert L. "(Nick) Metropolis, Monte Carlo, and the MANIAC," *Los Alamos Science*, No. 14 (Fall 1986), 96-107.

Anderson, Herbert L. "Scientific Uses of the MANIAC," *Journal of Statistical Physics*, 43 (1986), 731-748.

Anon. "Peter Bellaschi: 60 Years of Contributions to the Electric Power Industry," *IEEE Power Engineering Review*, PER-7 (March 1987), 14-16.

Anon. "The 100th Anniversary of Dr. William Bennett Kouwenhoven's Birth, 1886-1986, First Recipient of the Power-Life Award," *IEEE Power Engineering Review*, PER-7 (Jan. 1987), 18.

Atherton, W.A. "Gray, Stephen (c. 1666-1736): Discoverer of Electrical Conduction," *Electronics & Wireless World*, 93 (Jan. 1987), 100-102.

Baldwin, John L.E. "Digital Television Recording: History and Background," *SMPTE Journal* (Dec. 1986), 1206-1214.

Barret, E.C. and M.J. Beaumont. "The University of Bristol Remote Sensing Unit: History, Equipment and Activities," *Journal of the British Interplanetary Society*, 39 (1986), 515-516.

Chiles, James R. "The Road to Radar," *American Heritage of Invention & Technology*, 2, No. 3 (Spring 1987), 24-33.

Chrishop, I.F. "Close Encounters of an Electrical Kind: Electrical Science, Education and Training Technology in the Royal Navy – a Personal View," *IEE Proceedings*, 134, Pt. A, No. 1 (Jan. 1987), 18-26.

Coltman, John W. "The Westinghouse Atom Smasher – An IEEE Historical Milestone," *IEEE Transactions on Education*, E-30 (Feb. 1987), 37-42.

Egeland, A. and E. Leer. "Professor Kr. Birkeland: His Life and Work," *IEEE Transactions on Plasma Science*, P-S 14 (Dec. 1986), 666-677.

Flanagan, T.P. "History of SIRA (Scientific Instrument Research Association)," *Physics in Technology*, 17 (1986), 265-272.

Hendry, John. "The Teashop Computer Manufacturer: J. Lyons, Leo and the Potential and Limits of High-Tech Diversification," *Business History*, 29 (1987), 66-72.

Huff, J. Roddy. "The First Dynamo of Dixie," *IEEE Power Engineering Review*, PER-7 (Jan. 1987), 24-25.

Ivall, T. "50 Years of Computer Science," *Electronics and Wireless World*, 92, No. 1609 (Nov. 1986), 52-62.

Johnson, W. "The Magnus Effect – Early Investigations and a Question of Priority," *International Journal of Mechanical Sciences*, 28, No. 12 (1986), 859-872.

Kagaku, Denki. "Historical Note Relating to Electro Chemistry of Corrosion," *Go Okamoto*, 54, No. 8 (August 1986), 671-674.

Kunzii, M. "100 Jahre Abteilung für Elektrotechnik am Technikum Winterthur Ingenieurschule: Rückblick und Ausblick," *Association Suisse Electrics Bulletin*, 77 (8 Nov. 1986), 1360-1361.

Leggatt, D.P. "Broadcasting Technology – The Major Landmarks," *Journal of the Institution of Electronic and Radio Engineers*, 56 (Oct.-Dec. 1986), 303-310.

Leschiutta, Sigfrido and Giovanni Moro. "Raccolte elettriche esistenti nell'area di Torino," *Atti Rassegna Tecnica Società Ingegneri e Architetti in Torino*, n.s., 40 (Sept.-Oct. 1986), 314-316.

Longo, Lawrence D. "Electrotherapy in Gynecology: The American Experience," *Bulletin of the History of Medicine*, 60 (Fall 1986), 343-366.

Lynch, A.C. "Sylvanus Thompson – Teacher, Researcher, Historian," *Electronics and Power*, 33 (March 1987), 173-175.

Mackintosh, Allan R. "The First Electronic Computer (Work of John V. Atanasoff)," *Physics Today*, 40, No. 3 (March 1987), 25-32.

Malik, M.C. "Chronology of Developments of Wireless Communication and Electronics," *IETE Technical Review*, 3 (1986), 479-522.

Mayadas, A.F. "The Evolution of Printers and Displays," *IBM Systems Journal*, 25, Nos. 3&4 (1986), 399-416.

McColl, J.D. "The Evolution of the Transidrive," *GEC Review*, 2 (1986), 171-179.

Mosher, R.E. "Evolution of Subscriber Loop Systems – The History of ISSLS Technical Issues," *IEEE Communications Magazine*, 25, No. 3 (March 1987), 7-12.

Pfisterer, H. "(A History of) Siemens Research Laboratories," *Physics in Technology*, 18 (1987), 32-40.

Pickett, William B. "Homer E. Capehart: Phonograph Entrepreneur," *Indiana Magazine of History*, 82 (Sept. 1986), 264-276.

Pumfrey, Stephen. "Mechanizing Magnetism in Restoration England – The Decline of Magnetic Philosophy," *Annals of Science*, 44 (1987), 1-22.

Shorm, Rudolf. "Development of Radioelectronics in the Czechoslovak Socialist Republic," *Radioelectronics and Communications Systems*, 29, No. 5 (1986), 3-12.

Swann, Peter. "A Decade of Microprocessor Innovation: An Economist's Perspective," *Microprocessors & Microsystems*, 11 (Jan./Feb. 1987), 49-59.

Tang, W.V. "ISDN Evolution: From Copper to Fiber in Easy Stages," *IEEE Communications Magazine*, 24, No. 11 (Nov. 1986), 11-16.

Tengdin, J.T. "Distribution Line Carrier Communications – An Historical Perspective," *IEEE Transactions on Power Delivery*, PWRD-2 (April 1987), 321-326.

Thrower, K.R. "Evolution of Circuit Design for A.M. Broadcast Receivers, 1900-1935," *Journal of the Institution of Electronic and Radio Engineers*, 56 (Oct.-Dec. 1986), 325-341.

Tsukuda, Sakuro. "Development of Current Collection System for Speed-Up: History of Contact System," *Denki Gakkai Zasshi* (The Journal of the Institute of Electrical Engineers of Japan), 106 (Sept. 1986), 899-902.

Vu, T.B. "Antennas for Satellite Communications – Some Highlights in Past Development and Future Trends," *Journal of Electrical and Electronic Engineers, Australia*, 6 (Sept. 1986), 226-233.

Wiedenhof, Niels. "The Philips Research Laboratories – An Evolutionary Perspective," *Physics in Technology*, 18 (1987), 25-31.

Special Issues

Siemens Research and Development Reports

Vol. 15, No. 6 (1986). Eight papers presented at a special colloquium held on 23 July 1986 at the Siemens Research Center in Munich-Perlach to commemorate the 100th anniversary of the birth of Walter Schottky. Includes papers on Schottky's life and work, semiconductors, solid-state research, and the evolution of electronics since Schottky.

The First Dynamo of Dixie

Ten-page booklet written by J. Roddy Huff and published by the IEEE Chattanooga Section to commemorate the initial operation (6 May 1882) of the first central station for electric lighting in Chattanooga. Includes information on the Brush Electric Light Co. of Chattanooga; the installation, testing, and operation of the arc light equipment used; and biographical sketches of the company's founders.

Unpublished Manuscripts

Renaud, J.L. "The Changing Dynamics of the International Telecommunications Union: An Historical Analysis of Development Assistance," Ph.D. dissertation, Michigan State University, 1986.

Presented at the meeting of the Organization of American Historians, Philadelphia, April 1987.

Carlson, W. Bernard and A.J. Millard. "Heroic Inventors and the Evolution of Industrial Research: Thomas Edison and his West Orange Laboratory, 1887-1931."

Israel, Paul Bryan. "From Public Vision to Corporate Strategy: The Telegraph Industry and the Changing Context of American Invention."

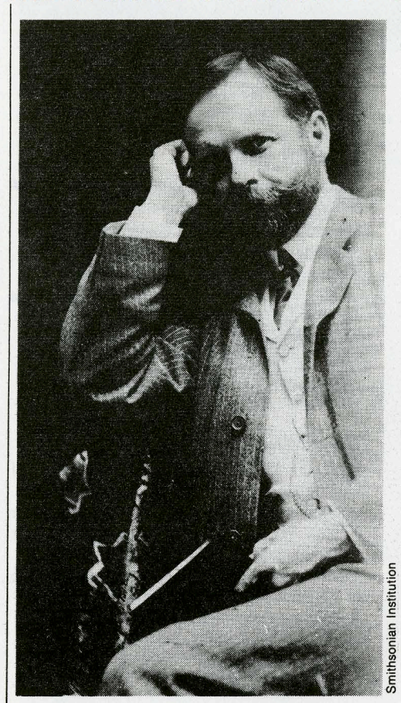
Presented at "L'Électricité et ses Consommateurs," an historical colloquium sponsored by l'Association pour l'histoire de l'électricité en France, 19-21 May 1987.

Cardot, F. "Les premiers consommateurs d'électricité à travers la littérature de vulgarisation."

Carlson, W.B. "Seeing the Light: Elihu Thomson and the Arc Light Exhibits at the Paris Exposition of 1878."

Muller, M. "La nationalisation de l'électricité en Lorraine."

The William J. Hammer Collection



Smithsonian Institution

William J. Hammer

Robert S. Harding

In the course of his career, William Joseph Hammer (1858-1934), an assistant to Thomas Edison and experimenter with radium, amassed a rich body of primary and secondary sources of interest to students of the history of science and technology. Information on this material, which is part of the collections of the Archives Center, National Museum of American History, Smithsonian Institution, is now readily available to researchers in the recently-published *Register of the William J. Hammer Collection, c. 1874-1935, 1955*-1957 by Robert S. Harding (Washington, DC: Archives Center, National Museum of American History, Smithsonian Institution, 1986).

William Hammer was born at Cressona, PA, on 26 February 1858. After attending private and public schools in Newark, NJ, and university and technical school lectures abroad, Hammer became a laboratory assistant to Thomas Edison at Menlo Park, NJ, in December 1879. He participated in experiments on the telephone, phonograph, electric railway, ore separator, and other developing inventions. His primary focus, however, was the incandescent electric lamp and he was placed in charge of tests and records on that device.

Edison appointed Hammer chief engineer of the Edison Lamp Works in 1880, and then sent him to London in 1881, as chief engineer of the English Electric Light Co. In London, Hammer supervised construction of the Holborn Viaduct Central Electric Light Station. This demonstration plant included three, thirty-ton "Jumbo" steam-powered dynamos (generators), and operated 3,000 incandescent lamps. Hammer put the station in operation on 12 January 1882 – nine months before Edison's Pearl Street station in New York City was started up. Hammer also installed large Edison isolated lighting plants at the Crystal Palace Exhibition and at the Edison exhibit at the Paris Electrical Exhibition. In 1883, Hammer became chief engineer of the German Edison Co., laying out and supervising the installations of all Edison plants in Germany.

Returning to the United States in 1884, Hammer's career with Edison continued. He became chief inspector of central stations for the parent Edison Electric Light Co., and, during 1886-87, he was chief engineer and general manager of the Boston Edison Electric Illuminating Co. Edison made Hammer his personal representative at the Paris Exposition of 1889, in charge of the demonstrations of Edison's inventions which embraced nineteen departments of the Exposition and covered 9,800 square feet. But when Hammer returned to the United States in 1890, he opened an office as a consulting electrical engineer. He was in private practice until 1925, conducting tests, making reports, and giving expert testimony in patent suits.

Hammer's work with radium began with his 1902 visit to Pierre and Marie Curie, during which the Curies gave him nine tubes of radium and one of polonium. In his experiments, he mixed the radium with sulfide of zinc, producing a luminous powder, and then mixed the powder with Damar varnish to produce radium-luminous paint. He wrote *Radium and other Radioactive Substances*, published in 1903. He proposed and used radium for cancer and tumor treatment, successfully treating and curing a tumor on his own hand in July 1903. He was probably the first to suggest wartime uses for radium-luminous materials in instruments, markers, barbed-wire, and landing fields. Hammer also did important work with selenium, inventing selenium cells and apparatus, and suggesting industrial uses for selenium and other light-sensitive cells.

Throughout his lifetime, Hammer collected and saved materials documenting his activities and developments in the fields in which he worked. In addition to the written material that he gathered, Hammer also put together comprehensive collections of autographed portraits of eminent men of electrical science and of incandescent lamps. While the "Historical Collection of Incandescent Electric Lamps" eventually went to the Edison Institute in Dearborn, MI, a large portion of Hammer's wealth of material, including the portrait collection, was acquired by the International Business Machines Corp. and donated by IBM to the Smithsonian in 1962.

The William J. Hammer Collection at the Archives Center is housed in 100 document boxes, occupying about 30 linear feet and is organized into four series: Series 1 contains 22 boxes of the William J. Hammer Papers, including both biographical and autobiographical material; Series 2 has 20 boxes of material on Edison; Series 3 consists of 33 boxes of reference material; and Series 4 holds 21 boxes of photographs and portraits. The collection consists of original documents and papers generated by Hammer and various companies and individuals with whom he was associated. It also includes secondary sources assembled by Hammer between 1874 and 1934. Hammer's lifelong association with the foremost inventors and scientists of his day – Edison, Bell, Maxim, the Curies, the Wright brothers, and others – afforded him a unique opportunity to collect materials about the development of science and technology along many lines.

This collection includes rare historical, scientific, and research materials. It documents the beginnings of electrical technology in photographs, manuscripts, notes, books, and pamphlets. Hammer also did original laboratory work on selenium, radium, cathode rays, x-rays, ultraviolet rays, phosphorescence, fluorescence, cold light, and wireless. The articles, notes, diagrams, sketches, graphs, correspondence, magazines, newsclippings, pamphlets, and technical writings included in the collection reflect the many aspects of Hammer's career.

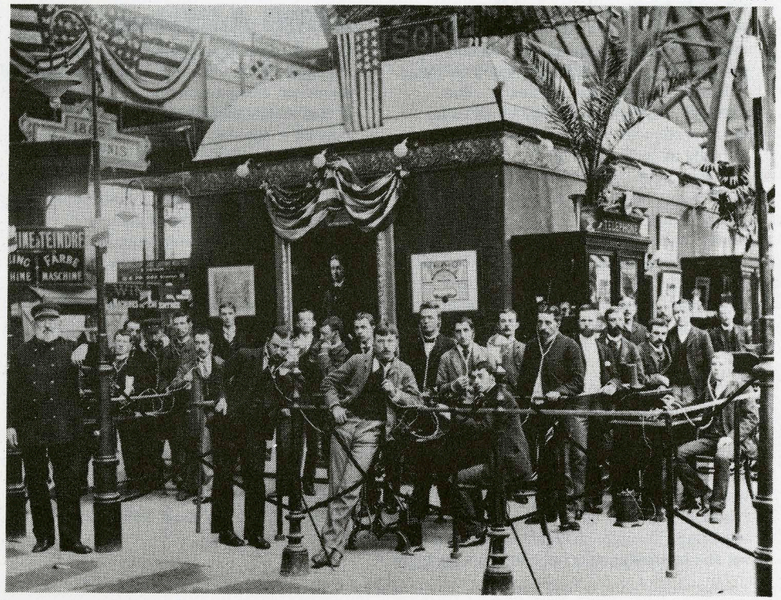
The correspondence in the collection is particularly rich. The letters relate to Hammer's research, including his work on selenium and radium, and to his work as a consultant on electrical engineering, patent coding, and patent litigation. There are also letters to and from Hammer regarding his collecting project of 34 years, the "Historical Collection of Incandescent Electric Lamps." Also included is correspondence with numerous individuals associated with Thomas Edison, including Francis Robbins Upton (1852-1921), Francis Jehl (1860-1941), and Charles W. Batchelor (1845-1910). A few letters are directed to or signed by Edison. The correspondence mainly concerns Edison's businesses, although references to personal matters are interspersed. There are also notes and diagrams describing electrical research and development work done by Edison and his associates.

Researchers interested in the Hammer Collection should contact the Archives Center, Room C 340, National Museum of American History, Smithsonian Institution, Washington DC 20560 (202-357-3270). A limited number of copies of the *Register of the William J. Hammer Collection* are available without charge upon request.

Robert Harding is Head of Manuscript Collections at the Archives Center.

CENTER FOR THE HISTORY OF ELECTRICAL ENGINEERING

Smithsonian Institution



The Edison phonograph exhibit at the 1889 Paris Exposition. Hammer stands eighth from the right.

"Electrical Diablerie"

On New Year's Eve 1884, William Hammer threw a party in his all-electric house in Newark, NJ. His showmanship was reported in the New York *World* and Newark, NJ, *Daily Advertiser and Journal* of 3 January 1885.

"The invitations which were sent out were written upon Western Union telegraph blanks with an Edison electric pen. When the guests arrived and entered the gate, the house appeared dark, but as they placed foot upon the lower step of the veranda a row of tiny electric lights over the door blazed out, and the number of the house appeared in bright relief. The next step taken rang the front door bell automatically, the third threw open the door, and at the same time made a connection which lit the gas in the hall by electricity. Upon entering the house the visitor was invited to divest himself of his coat and hat, and by placing his foot upon an odd little foot-rest near the door, and pressing a pear-shaped pendant hanging from the wall by a silken cord, revolving brushes attached to an electric motor brushed the mud and snow from his shoes and polished them by electricity . . . Upon the evening referred to nearly every piece of furniture in the parlor was arranged to play its part. Sit on one chair and out went the gas, take another seat and it would light again; sitting on an ottoman produced a mysterious rapping under the floor; pressure on some chairs started off drums, triangles, tambourines, cymbals, chimes and other musical instruments; in fact, it seemed unsafe to sit down anywhere."

Dinner included "Ohm-made Electric Current Pie" and "Incandescent Lemonade," and, of course, more electrical prestidigitation. When the evening came to a close with a display of fireworks (ignited by electricity) on Hammer's front lawn, " the guests departed with a bewildered feeling that somehow they had been living half a century ahead of the new year."

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 future 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

National Museum of Electricity Proposed

Baltimore Gas and Electric's historic Westport Station, completed in 1906, has been targeted as the site of a future National Museum of Electricity. In a proposal prepared by Massey Maxwell Associates, Historic • Preservation Consultants, James Massey states, "Americans tend to accept the great modern miracle of electricity without pausing to realize the importance of the contribution that electric power has made to the development and progress of American life." A museum of electricity in the Westport Station, therefore, "splendidly sited on Baltimore Harbor's middle branch, with its early and historic equipment still in place, offers . . . the powerful experience of a real power plant replete with its historic equipment and with ample space for new displays as well . . . Thus, the public will be able to learn at first hand the power generation process from coal delivery via the cable drawn wooden gondola car 'railroad' to the storage chutes, boilers and fly ash removal below, then to the steam driven turbines, and finally transmission from the plant. Each part is important for the complete story."

The approximately 120,000 square feet of exhibits would focus on power generation, transmission, and consumption, the history and science of electricity, and energy conservation, and include a children's museum and discovery room. Domestic appliances, meters, switches, wires and cables, lights, fuses, and the station's generating turbines are just some of the types of artifacts being considered for the displays.

Another 20-28,000 square feet has been set aside for an archives and library. Massey states, "A museum today must be much more than a group of collections interpreted to the public or stored in study collections behind the scenes . . . the National Museum of Electricity must be an institution for research and scholarly pursuits as well as for public enjoyment and education. A key feature of such an institution would be a central national library of the electric industry, with historical books, documents and research papers, and trade catalogs. It should also include a nationwide archives for electric power and equipment companies' materials, including drawings, photographs, printed matter and files."

It is anticipated that funding for the development of the museum will come primarily from contributions from the electric power industry. In addition, close professional coordination with other museums, especially the Smithsonian's National Museum of American History, is expected. Though no dates have been set for the implementation of this plan, possible artifacts for the museum are already being identified. For further information on the National Museum of Electricity, contact James Massey, Massey Maxwell Associates, P.O. Box 263, Strasburg, VA 22657 (703-465-4566).

AMMI Additions

Over the past few months, the American Museum of the Moving Image has received important additions to its growing collection of film and television apparatus. These include a donation, made by the family of sound engineer Jack C. Jacobsen, of 21 microphones, nine photograph albums, 1,400 slides documenting Jacobsen's work, two early audiotape recorders, and a collection of books and technical manuals. Two early broadcast television cameras, an IVC one-inch video recorder/reproducer, and a collection of historic microphones were received from Thomas Hanlon, while Merlin Engineering donated a restored Ampex VR-1000B videotape recorder.

Anyone with materials relating to the history, technology, and art of film and television is invited to contact the Museum. The American Museum of the Moving Image is located at 34-12 36th Street, Astoria NY 11106 (718-784-4520).

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