

IEEE CENTER FOR THE HISTORY OF ELECTRICAL ENGINEERING

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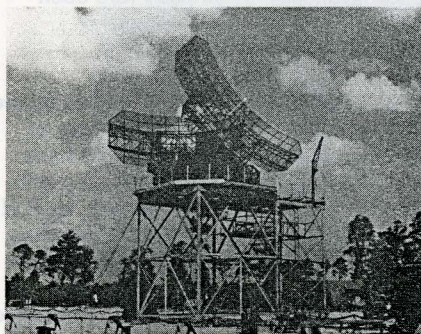
A Century of Electrics — IEEE Centennial Exhibit Debuts

One of the primary products of the IEEE's 1984 Centennial efforts is the exhibit, "A Century of Electrics," prepared by the Center for the History of Electrical Engineering. The exhibit, sponsored by the IEEE Centennial Task Force, is part of a much expanded IEEE major conferences exhibit. It made its first appearance at the 1983 WESCON in San Francisco in early November, and will appear at several other major IEEE meetings in the United States. Copies of the exhibit's panels are available for much wider use by IEEE sections, museums, colleges and universities, and other appropriate institutions.

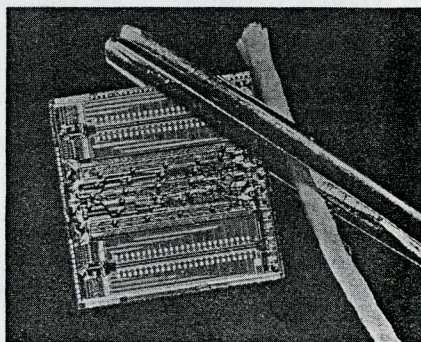
"A Century of Electrics" is an attempt to convey a sense of how the electrical engineering profession has changed during the past century. Rather than being an exhibit about the development of electrical technology, it is concerned with the kind of people that have made up the profession and with the factors — social, technical, economic, and political — that have shaped the experiences of individual electrical engineers and of the profession as a whole.

The exhibit's 25 panels are organized around four rough chronological divisions, covering the periods 1884-1912, 1912-1939, 1939-1963, and 1963-1984. The first section deals with the founding of the American Institute of Electrical Engineers, particularly in conjunction with the Philadelphia Electrical Exhibition of 1884. The state of the electrical art at the AIEE's founding and the rapid changes in electrical technology that occurred in the next decades are the subjects covered by other parts of this section. Finally, an effort is made to suggest how some engineers, such as Charles P. Steinmetz, tried to cope with social and ethical concerns relevant to the new profession.

The exhibit then shifts its focus to the early years of the radio engineers, beginning with the founding of the Institute of Radio Engineers in 1912. The youthful men who shaped radio engineering in its first days are featured both in the context of their rapidly advancing technology and in light of their role in shaping society's use and control of "wireless," both in the pursuits of peace and the waging of war.



MIT Museum



IBM

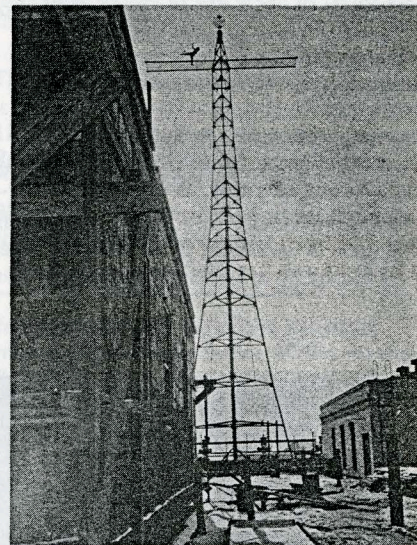
The Second World War represents another demarcation in the exhibit, since it brought about enormous changes both in the status of electrical and radio engineers and in the ways in which they worked. Of particular concern in this section is the close relationship between technological progress and military needs, as well as the growing importance of industrial research.

The final section of the exhibit covers the two decades since the formation of the IEEE by the merger of the AIEE and the IRE in 1963. The meaning for the profession of a period of accelerating technical progress, paced by the rapid rise of microelectronics and computers is looked at from a number of perspectives. This portion of the exhibit ends with a brief reminder of the importance of preserving the evidence of electrical engineering's past as part of our preparation for the future.

Franklin Institute



From "A Century of Electrics," clockwise from top: International Electrical Exhibition poster, 1884; Edwin Armstrong atop WJZ transmitter, New York City, 1923; IBM 64 kB random access memory, 1978; V-Beam radar, 1940.



Smithsonian Institution

The exhibit is carried completely on 25 poster-panels, printed in two colors on sturdy poster stock, measuring 39 inches high by 22 inches wide. These posters are available for purchase from the IEEE (\$80.00 per set for IEEE members, \$150.00 per set for institutions and non-members; overseas shipping extra). Inquiries should be directed to the Center.

European Efforts in the History of Electrical Engineering

Both engineers and historians in Europe have for some time been active in the study of the history of electrical science and technology. In recent months the Center has been in contact with an number of organized European efforts, including those in France, West Germany, and Great Britain.

In France, electrical history is promoted by the Societe des Amis d'Andre-Marie Ampere. The Societes primary activity is the operation of a museum dedicated to the life and work of Ampere, situated at Ampere's birthplace in the village of Poleymieux, near Lyon. The President of the organization is currently Raymond Pelletier (SM IEEE), who expresses the hope that the "Musee Ampere et de l'Electricite" will be included on the itinerary of European travelers. Correspondence to the Societe can be addressed to the Secretariat, EDF-DR 19, 5 Place Jules-Ferry, 69006 Lyon, France.

In West Germany, the history of electrical engineering is actively promoted by the Ausschuss "Geschichte der Electrotechnik" (Committee for the History of Electrical Engineering) of the Verband Deutscher Elektrotechniker (VDE). From time to time the Ausschuss organizes colloquia for the presentation of historical papers on electrical topics. The last of these was held in Frankfurt-am-Main in April 1981, and the proceedings, "Elektrotechnik im Wandel der Zeit," are now available from the VDE (Stresemannalle 21, D-6000 Frankfurt-am-Main 70, Fed. Rep. of Germany).

A variety of activities in the history of electrical engineering in Great Britain have come to our attention, thanks to communications from Robert Winton, IEEE Region 8 Secretary, Brian Bowers, Keeper of Electricity at London's Science Museum,

and Jonathan Coopersmith, who is completing his dissertation on Russian electrification (1880-1925) at Oxford University. Coopersmith has kindly provided us with the following overview of current British work in the field.

The IEE also supports an Archives Department, headed by Lenore Symons. The collections include IEE records, manuscript materials from the 14th to early 20th centuries, and some recent records from modern electrical manufacturing firms, as well as the Sir Francis Ronalds and Silvanus P. Thompson rare book collections on the development of magnetism and electricity.

The Peter Peregrinus Press, owned by the IEE, is currently publishing a history of technology series. Three volumes have appeared so far—*Measuring Instruments: Tools of Knowledge and Control*, by P.H. Sydenham; *Early Radio Wave Detectors*, by V.J. Philips; and *A History of Electric Light and Power*, by Brian Bowers. Forthcoming are volumes on the history of linear motors by Eric Lathwaite and electric cables by R.M. Black. The IEE has also commissioned a history of itself, authored by William J. Reader, a business historian, with Sheila Nemet and Geoffrey Tweedele. The scheduled completion date is 1985.

Several other organizations have inherent interests in electrical engineering which they express through exhibits. Both the South Eastern Electricity Board and the Southern Electricity Board maintain company museums, while the Electricity Council is working with the Greater Manchester Museum of Science and Industry on electrical exhibits in the Museum. In addition, London's Science Museum and Victoria and Albert Museum have devoted significant exhibition space to the subject.

Milestones Program

One of the goals of the Center for the History of Electrical Engineering during the upcoming IEEE Centennial year is the establishment of a program for identifying and designating significant accomplishments in electrical engineering history.

While the IEEE carries on many historical activities, the Institute at present has nothing comparable to the extensive landmarks programs of the American Society of Mechanical Engineers and the American Society of Civil Engineers. In these two societies such programs have galvanized members into activities that include historical research, cooperation with local educational, cultural, and civic institutions, organization of commemorative events, and extensive media contacts.

Because electrical devices are often less monumental than pumping engines, cog railways, bridges, or dams, the typical landmarks of mechanical and civil engineering, the IEEE takes a different approach in its program. Key contributions will be eligible for designation as "IEEE Electrical Engineering Milestones," a term thought more appropriate than "landmarks" since it will encompass achievements that are not necessarily related to a building or other large physical structure.

IEEE sections and branches will be encouraged to nominate particularly important works that can be closely identified with their locality. Such works may be an important invention, a project of lasting technical significance, or some other achievement that represents a contribution of broad and permanent value. Detailed criteria for Milestone designation are available from the Center.

Milestones will be associated with appropriate physical locations that can be permanently marked for public recognition. Designations will normally be celebrated by ceremonies, publications, and other activities directing public attention to engineering contributions. IEEE sections will have the primary responsibility for such arrangements.

The Milestones program will be supervised by the IEEE History Committee and administered by the Center. All designations will be subject to approval by the IEEE Executive Committee. Once procedures for designation have been approved, it is hoped that approximately a dozen Milestones will be designated in 1984.

U.S. ARMY COMMUNICATIONS-ELECTRONICS MUSEUM

J. E. Bedi

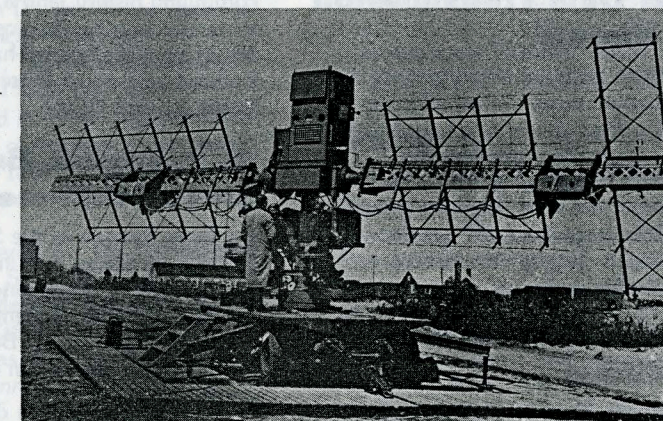
The development of military communications, especially the work of the U.S. Army Signal Corps, is the focus of the U.S. Army Communications-Electronics Museum at Fort Monmouth, New Jersey. The permanent exhibition of artifacts, papers, and photographs dates roughly from the Civil War to the 1960s and covers the varied aspects of communications, from the heliograph to the telegraph, from carrier pigeons to radio. One of the earliest pieces on display is a Beardslee Magneto-Electric Military Telegraph from 1859. The Beardslee telegraph, a portable system which used an alpha-numeric transmitting code and generated its own current, eliminating the need for batteries and trained telegraphers, was employed by the Signal Corps throughout the Civil War.

The museum's collection of vacuum tubes includes an original Fleming valve, DeForest audion, klystron, and 1936 handblown Zahl tube, important in the development of radar. Early experimental equipment from the estate of Edwin H. Armstrong is on display while Armstrong



U.S. Army

Maj. Edwin H. Armstrong (right) with French and American officials, Paris, 1918



U.S. Army

SCR-268 radar, Sandy Hook, NJ, 1940

papers form a significant part of the museum's document collection. The papers of Brigadier General Albert Myer, founder, organizer, and first Chief Signal Officer of the Signal Corps, are another important collection and are available on microfilm. The museum also holds approximately 4,000 photographic images, a collection especially strong in the areas of radio and radar development.

The Communications-Electronics Museum is open to the public Monday-Friday from 12-4 p.m. For further information, contact Robert Cannon, Director, U.S. Army Communications-Electronics Museum, Bldg. 275, Kaplan Hall, Fort Monmouth, NJ, 07703 (201-532-2445).

Electrical History in Britain

The study of the history of electrical engineering in Great Britain is more closely associated with the professional electrical engineering organizations than, as is the case in the U.S., with history of technology groups. The overall emphasis, therefore, has tended to focus more on the actual technologies than on the societal contexts of their development and use.

The Institution of Electrical Engineers (IEE), founded in 1872, is the center of activity in the history of electrical engineering. The Institution's most active component is the History of Technology Group (known

colloquially as S7) of the Science, Education and Technology Division, established in 1966. In addition to sponsoring lectures throughout the year, presented mainly in London, S7 holds an annual summer conference, attended by 50-60 people. The program for the 1983 Birmingham conference was published in the last *Center Newsletter*.

Ongoing research projects are diverse. At Oxford University, Margaret Gowing is continuing her work on British atomic energy history. At Newcastle, R.P. Tarkenter is investigating the role of electrical engineering in mining. James Foreman-Peck is compiling quantitative

data on the efficiency of the electrical engineering industry in the 1930s. At the University of Loughborough, Andrew Wilson is writing an economic history of the gas and electrical industries. Gary Wersky of Imperial College, London, is researching both the way in which electrical engineers were trained and industry-academic relations. Brian Bowers of the Science Museum is editing the reminiscences of A.P. Trotter, an editor of *Electrician* and prominent member of the IEE. Leslie Hannah of the Business History Unit of the London School of Economics, having published his second book on British electrification, is now working on a history of pension funds.

The Institute of Electrical and Electronics Engineers

IEEE History Committee - 1983

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Center for the History of Electrical Engineering

Robert D. Friedel, *Director*
 Robert H. Casey, *Assistant Historian*
 Joyce E. Bedi, *Photographic Curator*
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 Address: 345 East 47th Street, New York, NY 10017
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BRIEFS

Associate Director of Babbage Institute Named

William F. Aspray, Jr. joined the staff of the Charles Babbage Institute this summer as Associate Director. The Institute is devoted to encouraging the study of the history of information processing, promoting and developing national collections of historically significant materials, and bringing a historical perspective to the study of information processing's impact on society.

Dr. Aspray earned his Ph.D. in the history of science from the University of Wisconsin-Madison in 1980. He has taught in the mathematics department of Williams College and the history of science department of Harvard University, has served as an editor for publications on the history of computing, and is active in several professional and scientific associations. His forthcoming book on the origins of computer science in mathematical logic is to be published by the Greenwood Press.

AEC History

The U.S. Nuclear Regulatory Commission's history program (founded 1977) is preparing its first volume on licensing and regulatory activity covering the period 1946-1962, when these functions were performed by the Atomic Energy Commission. For further information on the publications and programs of the history office, contact: George T. Mazuzan, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555

Computer Systems Patent Abstracts

Patent Data Publications, Inc. (901 North President Street, Wheaton, Illinois 60187) has published seven volumes of patent abstracts encompassing all patents issued by the U.S. Patent Office 1931-1982 that relate to electronic digital data processing and calculating systems and associated software.

A Canadian Collection in Electrical History

Hobbies sometime have a way of turning into vocations, which is what has happened to IEEE member Heinz Peper of Kitchener, Ontario. For more than 20 years, Peper has been collecting electrical machinery which he says has now "grown to a 'pile' of over 300 tons..." His oldest piece is a 40 kilowatt Edison bi-polar

generator, dating from the 1880s. In addition to generators, the collection also includes switchboards, meters, breakers, transformers, arc lamps, and the complete physical assests of the now-defunct National Table Co., a furniture factory. This latter acquisition was used by Peper to build the house in which he now lives.

Peper is currently in the process of putting his collection to active educational use. With the support of the Canadian federal government and private industry, Peper's apparatus will form the core of an extensive training center in the field of electrical machinery and apparatus, to be established in 1984. This center will have a special focus on rotating machinery and will include work with both historical and state-of-the-art industrial equipment. A rewinding facility teaching the latest technology and methods and an area devoted to electronics training, focusing on machine control, microprocessors applications, and power electronics, are also parts of the plan.

Hoover Dam Transmission Lines History

1983 marks the fiftieth anniversary of the first construction work on the 287.5 kv transmission lines connecting Los Angeles to Hoover Dam. The Los Angeles Department of Water and Power has commissioned Dr. Paul Soifer to write a history of the project, which was the highest voltage, longest commerical operation in the world.

Inventor's Environment Symposium

On September 21, the History Center sponsored a symposium at the Smithsonian Institution in conjunction with the issuance of four postage stamps honoring electrical inventors Nikola Tesla, Philo Farnsworth, Charles Steinmetz, and Edwin Armstrong. Entitled "The Inventor's Environment," the symposium explored the relationships between inventions and the settings in which those inventions are developed. Participating were two historians, James Brittain and Ronald Kline, and four distinguished electrical engineers, Nathan Cohn, Anthony J. DeMaria, Jerome J. Suran, and Charles H. Townes. Kline and Brittain presented papers on Steinmetz and Armstrong, respectively, discussing the ways in which each was affected by the environment in which he worked. The four engineers then commented on the papers and on their own experiences as practicing engineer-inventors. The symposium was

hosted by Bernard S. Finn, Curator of Electricity at the National Museum of American History, and was moderated by James B. Owens, President of the IEEE.

MSM/UM-Rolla History

Professor J. B. Ridley of the Missouri School of Mines/University of Missouri-Rolla is preparing a history of electrical engineering at that school. The electrical engineering department at Rolla dates from 1924, but the roots of the discipline go back to 1889, when those pursuing a degree in mathematics and physics could specialize in electricity. Professor Ridley's book is scheduled for publication shortly.

IC Calendar

A calendar celebrating the 25th anniversary of integrated circuits is available from the Computer Museum. The calendar is illustrated with photographs of chips in production and photomicrographs of historic and contemporary chips, and includes dates of major 1984 computer conferences, significant events in computing history, and a glossary of computer jargon. The cost is \$6.95 plus \$1.50 for shipping and handling, from The Computer Museum Store, One Iron Way, Marlboro, MA 01752.

A. P. Trotter, British Electrical Pioneer

Dr. Brian Bowers of the Science Museum, London, is editing and indexing the *Reminiscences* of Alexander Pelham Trotter, a nineteenth century British electrical engineer. Dr. Bowers sends us the following description of Trotter and his work:

A. P. Trotter is not one of the well known names in electrical engineering history. He was a British engineer, born in 1857, whose career began just as electric lighting and public electricity supply were getting off the ground. After being apprenticed to a mechanical engineering firm he worked in the manufacture of electric generators and as a consultant on electric lighting. He became Editor of the important London journal *The Electrician* for a few years, and then entered Government service, first as electrical adviser to the Government of the Cape Colony, South Africa, then as Adviser to the Board of Trade in London. In the course of his work Trotter met many of the pioneers of electrical engineering and influenced the development of the supply industry in Britain. The manuscript of Trotter's *Reminiscences* is in the archives of the IEE.

NEW PUBLICATIONS

The Newsletter's "Publications" section is prepared by Ronald R. Kline of the University of Wisconsin - Madison, and Robert Casey of the Center staff, with assistance from Thomas Higgins and John Neu, also of the University of Wisconsin.

Articles

- Carlson, W. Bernard. "Elihu Thomson: Man of Many Facets," *IEEE Spectrum*, 20, No. 10 (Oct. 1983), 72-75.
- Chandler, W. W. "The Installation and Maintenance of Colossus," *Annals of the History of Computing*, 5 (1983), 260-262.
- Chestnut, E. F. "Little Rock Gets Electric Lights," *Arkansas Historical Quarterly*, 42 (1983), 239-253.
- Coomber, R. E. "The Early Stages of Broadcasting," *Electronics and Power*, 29 (1983), 129.
- Coombs, Allen W. M. "The Making of Colossus," *Annals of the History of Computing*, 5 (1983), 253-259.
- Devine, Warren D., Jr. "From Shafts to Wires: Historical Perspective on Electrification," *Journal of Economic History*, 43 (1983), 347-372.
- DuBoff, Richard B. "The Telegraph and the Structure of Markets in the United States, 1845-1890," *Research in Economic History*, 8 (1983), 253-277.
- Fleckenstein, Karen J. "The Rheoscopic Frog and the Study of Animal Electricity," *Medical Instrumentation*, 17 (1983), 235-236.
- Flowers, Thomas H. "The Design of Colossus," *Annals of the History of Computing*, 5 (1983), 239-252.
- Gudmundsson, Jon Steinar. "Geothermal Electric Power in Iceland: Development in Perspective," *Energy*, 8 (1983), 491-513.
- Hunt, Bruce J. "'Practice vs. Theory'—the British Electrical Debate, 1888-1891," *Isis*, 74 (1983), 341-355.
- Laughlin, John S. "History of Medical Physics," *Physics Today*, 36, No. 7 (July 1983), 26-33.
- Morlee, Dennis. "Cabling Britain—The Historical Background," *Electronics and Power*, 29 (1983), 461-462.
- Mukaibo, Takashi. "Development of Nuclear Science and Technology in Japan," *Electronics and Power*, 29 (1983), 551-554.
- Nahin, Paul J. "Oliver Heaviside: Genius and Curmudgeon," *IEEE Spectrum*, 20, No. 7 (July 1983), 63-69.
- Prosser, Owen H. "Centenary of Effective British Electric Traction," *Electronics and Power*, 29 (1983), 289-290.

Rosenberg, Robert. "American Physics and the Origins of Electrical Engineering," *Physics Today*, 36, No. 10 (October 1983), 48-54.

Schopman, Jacob. "Philips' Antwort auf die neue Halbleiterara Germanium und Silicum (1947-1957)," *Technikgeschichte*, 50 (1983), 146-161.

Senior, John E. "Hauksbee's Prototypical Electrostatic Generator," *Medical Instrumentation*, 17 (1983), 126-127.

Taylor, Eugene. "The Electrified Hand—Psychotherapeutic Implications," *Medical Instrumentation*, 17 (1983), 281-282.

Vogt, K. "100 Jahre elektrischen Maschinen in Lehre und Forschung in Dresden," *Elektrie*, 37 (1983), 117-120.

Dissertations

Ronald R. Kline. "Charles P. Steinmetz and the Development of Electrical Engineering Science." Ph.D. Dissertation. University of Wisconsin, Madison, 1983.

Books

James W. Cortada. *An Annotated Bibliography on the History of Data Processing*. Westport, Conn.: Greenwood Press, 1983. 216 pages.

Dr. Cortada has compiled nearly fifteen hundred titles in this survey, including biographies, memoirs, histories of computers and institutions, key technical papers, and contemporary analyses of the industry. The book is divided into four chapters, arranged chronologically, and includes an author index. Cortada's introduction discusses the numerous opportunities for research available in the relatively new field of

computer history. James W. Cortada holds a Ph.D. in history and is a marketing representative for IBM. He is the author of *EDP Cost Controls* and has edited several books on Spanish history.

Paul E. Ceruzzi. *Reckoners: The Prehistory of the Digital Computer, From Relays to the Stored Program Concept, 1935-1945*. Westport, Conn. Greenwood Press, 1983. 240 pages, illustrated.

Paul Ceruzzi's study focuses on four projects that paved the way for the digital computers of the post-war period. He looks first at three groups of electromechanical devices: the machines produced by Konrad Zuse in Germany before and during World War II: Howard Aiken's Automatic Sequence Controlled Calculator, or Mark I; and the telephone relay computers developed at Bell Laboratories by George Stibitz between 1930 and 1946. Finally, Ceruzzi moves on to discuss ENIAC, the first fully electronic computer. Dr. Paul E. Ceruzzi is Assistant Professor of History at Clemson University, Clemson, South Carolina. He has previously published in the *Annals of the History of Computing*.

Ruth Schwartz Cowan. *More Work for Mother*. New York: Basic Books, 1983.

The industrialization of the home—which depended to a great extent on the production and distribution of cheap electric power and the availability of fractional horsepower electric motors—was regarded as a labor-saving advance. Dr. Cowan's book, which is subtitled "The Ironies of Household Technology from the Open Hearth to the Microwave," shows that the workload for women has actually increased with the introduction of each new invention. While the new appliances have raised our standard of living, they have also made women's work in the home more complex and diversified. Dr. Ruth Schwartz Cowan is Associate Professor of History at the State University of New York at Stony Brook. She is also a housewife and working mother.

MEETINGS

5 December 1983, 6:00 PM
"Christopher Strachey (1916-75): Life of a Computer Scientist," Dr. M. Campbell-Kelly (University of Warwick)

The Institution of Electrical Engineers, U. K. The Science, Education and Technology Division of the IEE continues its active programs in the history of electrical engineering. The following meetings will be held at the IEE, Savoy Place, London.

23 January 1984, 5:30 PM
"From Electrical Quackery to the Gramophone: A Contemporary View of Electrical Engineering in the 1880s Provided by *The Electrician and Electrical Review*," Dr. P. Strange (Nottingham University)

Bell Laboratories Archives: Collector and Collections

Marcy G. Goldstein

Marcy G. Goldstein is the Archivist of the Bell Laboratories Archives.

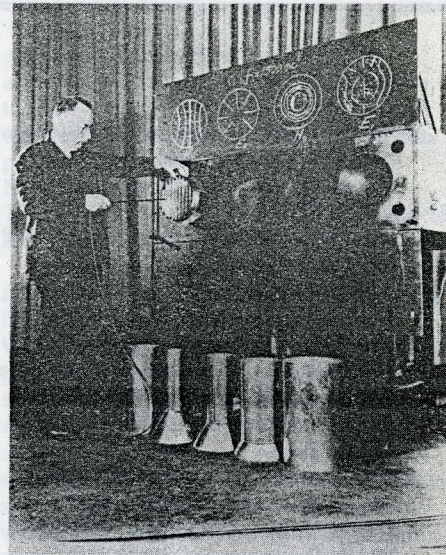
In its corporate beginning, the Bell System recognized the need to preserve and protect its records. AT&T and its predecessor companies accomplished this (prior to the formation of Bell Laboratories in 1925) through a series of directives which amounted to an early records management program before that term came into vogue and by the hiring of corporate historians. The mission of the Bell Laboratories Archives was and continues to be to preserve and provide systematic and continuous access to those records and to document the origin, purpose, and growth of Bell Laboratories.

The sequence of most of the collections in the Archives follows the organizational changes within the development and research area in the Bell System. For example, the Engineering Department (development and research) of American Telephone and Telegraph maintained its headquarters in Boston from 1882 to 1907. Headed by Hammond V. Hayes, and later by John J. Carty, the department moved to New York City in 1907. Here it coexisted with the Engineering Department of its sister company, Western Electric. This time period represents our earliest collection, the Boston Files, covering the years when the company was headquartered in that city. Together the two research departments (AT&T and WECo) produced the second chronological grouping of papers, the Joint Files, dating from 1907 to 1925, when Western Electric's Engineering Department was reorganized into Bell Laboratories. Frank B. Jewett, former vice-president of Western Electric, became president of the new company, Edward B. Craft became executive vice-president, and Harold D. Arnold became director of research. The Engineering Department of AT&T remained a separate entity until 1934 when it merged into Bell Laboratories with Edwin H. Colpitts becoming the new head of research.

The Executive collection contains the papers of many top administrators such as Frank B. Jewett, Oliver E. Buckley, John J. Carty, Edward B. Craft, and Edwin H. Colpitts.

The Laboratory Notebook Collection of scientists and engineers contains the day-to-day accounts of much of the research done at Bell Laboratories. There are also supporting collections of notable scientists such as Lester Germer, who, working with

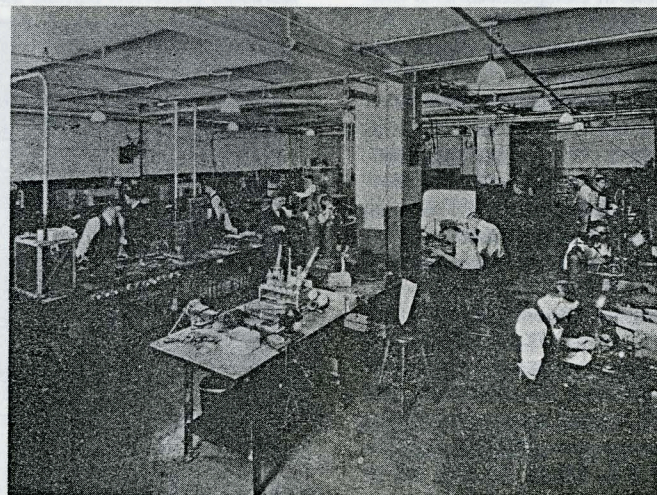
Bell Laboratories



Dr. George C. Southworth demonstrating waveguide transmission, 1930s

C. J. Davisson on the wave nature of matter, devised methods using electron diffraction to study the crystalline structure of surface films. Here also are the papers of H. D. Arnold whose insightful work on the audion created a high vacuum electron tube that made transcontinental telephony possible and opened a new era in electrical communications, and George Southworth who, along with a small group of associates, discovered the broad principles of waveguide transmission.

The paper documentation is supplemented by the Artifact Collection, a growing area containing prototypes developed at the Laboratories as well as those artifacts used in support of research. Early examples of relays date back to the 1880s. Later items include traveling wave and laser tubes, magnetrons, zone refined germanium and other items developed at Bell Laboratories.



Vacuum tube research lab, Bell Laboratories, 1924

Bell Laboratories

Some of the artifacts in our collection never came into production and exist only as prototypes, such as the barrier grid tubes and flying-spot store plates used in memory storage in the early electronic switching systems tests, an alarm call forwarding system and early pushbutton phone models. The Archives also maintains an Oral History Collection of over fifty tapes of interviews with notable employees including J. R. Pierce, H. S. Black, and M. J. Kelly.

Searching for a better understanding of speech and hearing, Bell engineers made a series of experimental records of orchestral and theatrical programs during the late twenties and early thirties. As a result of these experiments, Bell Laboratories developed a record production process using gold sputtered copper masters to produce distortion free sound reproductions, introduced vinyl plastic records, stereophonic sound and thirty-three-and-a-third RPM as the standard for long playing records. The metal masters remain as part of our Audio Collection with over six hundred items in a variety of sizes and materials including gold, nickel, and copper.

The most current efforts in the Archives have been directed toward enhancing access to our collections with computerized indexes. The Archives is also seeking relevant materials from retired employees as well as outside institutions and individuals. The material is available for use by scholars, students and serious researchers.

Those desiring further information should contact:

*Marcy G. Goldstein, Archivist
Bell Laboratories
101 John F. Kennedy Parkway
Short Hills, New Jersey 07078
Phone (201) 564-3978*

The Archives are open to researchers by appointment.

Computer Museum Maintains Film & Video Archives

The Computer Museum, in Marlboro, MA, has a growing collection of films and videotapes documenting the history of computers. The collection is divided into three parts: vintage films, historical documentaries, and lecture and conference videotapes.

The vintage films were made about contemporary computing to reach audiences of their time. They include such films as "Machines that Think" (1922) and "Introduction to Punched Card Accounting" (1928).

Historical documentaries are films made to preserve history. Some, like "STRETCH: The Technological Link between Yesterday and Tomorrow," record equipment (in this case an IBM 7030) at the end of its useful life. Others, such as "A CAM (Computer-Aided Manufacturing) Update," are educational films documenting current developments.

Two-thirds of the Museum's film and videotape collection consists of tapes of lectures given at the Museum and sessions at various History of Computing Conferences. The museum lectures are important primary sources on the history of computing. They include Grace Hopper's description of the building of Mark I during World War II and first hand accounts by German pioneer Konrad Zuse, who believed that with the development of the stored program "the devil entered the machine." There is a total of 56 conference tapes, 23 from the History of

Programming Languages (HOPL) Conference (1978), and 33 from the International Research Conference (IRC) on the History of Computing (1976). Further information is available from the Computer Museum, One Iron Way, Marlboro, MA 01752, (617) 467-4036.

Saving Local Records

A continuing problem for organizations such as the IEEE is the retention of records generated by the various organizational entities. Sections, chapters, societies, and branches generally do not have central offices where records can be kept. Institutional papers are often kept in the personal or business files of the volunteers who serve as officers, and often remain there long after the officers' terms are over. The deficiencies of this system become apparent when members of the entity desire to retrieve information about their organization, only to discover that the pertinent records are scattered or perhaps gone completely.

Irwin S. Boak, Historian of the IEEE's Connecticut Section, has reported to the Center on the policy his section has developed for dealing with this problem. The Section has made arrangements to deposit its records in the library of the Hartford Graduate Center, Hartford, Connecticut. Documents on deposit include agendas and treasurer's reports, personal records of past chairmen, and material relating to the merger of the American Institute of Electrical Engineers and the Institute of Radio Engineers to form the IEEE. Pertinent records are regularly sent to the chapter historian, who catalogs them and adds them to the archives.

As the IEEE Centennial draws near, many entities wanting to investigate their own history are discovering that the records of that history are scattered or lost. Now is the time to make provisions for the permanent retention of such documents. The cooperation between the Connecticut Section and the Hartford Graduate Center could serve as a model for other IEEE entities, which might make similar arrangements with local libraries, colleges, or historical societies.

Records of AIEE/IRE Merger

When one looks back upon the history of the Institute of Electrical and Electronics Engineers, three dates stand out: 1884, the year the American Institute of Electrical Engineers was founded; 1912, the year of the formation of the Institute of Radio Engineers; and 1963, the year those two organizations merged to form the IEEE. While the records documenting the events of 1884 and 1912 are often sketchy and incomplete, the same is not true for the records of the 1963 merger. The Center for the History of Electrical Engineering has nearly six hundred documents relating to the joining of the AIEE and IRE.

The material in the merger archives includes minutes of the meetings of the fourteen-man merger committee, special publications informing members about the merger, and correspondence relating to all aspects of the question. These documents are supplemented by a transcribed interview with Ronald L. McFarlan, a member of the merger committee, and taped interviews with committee members John D. Ryder and Richard B. Teare.

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 mail it to the Center (if you have not yet done so).

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**HISTORY OF SCIENCE
SOCIETY
1923-1983
AN INVITATION**

During its 60th anniversary year, the History of Science Society would like to invite Newsletter readers to join this exciting organization.

The Society's dedication to the advancement of research and teaching in the history of science, technology, and medicine is reflected in *Isis*, the Society's international quarterly review. Subscriptions to *Isis*; the quarterly *Newsletter*; and *Critical Bibliography*, an annual guide to over 3,000 publications worldwide relevant to the history of science and technology, are just a few of the benefits of membership in the History of Science Society. The Society also holds an annual meeting at which members assemble to present papers, join in workshops, view book and film exhibits, and honor those who receive the Society's prizes.

Annual membership is \$29 for one year or \$52 for two, while Sustaining Members (a donation of \$1,000 or more) receive lifetime membership. The History of Science Society sincerely hopes that you will take advantage of this unique opportunity to become part of this essential professional endeavor.

Memberships and inquiries should be sent to Memberships/Donations, History of Science Society, 215 South 34 Street D/6, University of Pennsylvania, Philadelphia, PA, 19104.

EXHIBITIONS AND MUSEUMS

Getting the Picture

SITES, the Smithsonian Institution Traveling Exhibition Service, has announced a new exhibit, "Getting the Picture: The Growth of Television in America." Dealing with history, technology, and social implications of television, the exhibit is in the form of 16 exhibition posters, priced for sale at \$200.00 per set. Inquiries and orders should be sent to SITES, P.O. Box 1949, Washington, DC, 20013.

IBM Exhibit

"Innovation in IBM Technology," at the IBM Gallery of Science and Art (590 Madison Ave., New York City) from 5 October-19 November, features over 300 machines, devices, software, and manufacturing developments reflecting IBM's contributions in overall computer research and development. Beginning with Herman Hollerith's punched card machine, employed in the 1890 U.S. Census, the exhibit traces computer history through electromechanical and vacuum tube machines to developments in solid state technology and magnetic storage. The exhibit concludes with state-of-the-art equipment, including a word processor designed for use in Japan, CAD/CAM (Computer-Aided Design/Computer-Aided Manufacturing) demonstration, and an interactive display of IBM personal

computers which allow the visitor to participate in activities ranging from grocery shopping via computer to landing a lunar module.

The IBM Gallery of Science and Art is open Tuesday-Friday, 11-6, and Saturday, 10-5.

Elmuseet

Elmuseet, the Danish museum devoted to electricity, physics, technology, and cultural history, is celebrating its first anniversary. Founded in November 1982, the museum is located in the buildings of the hydroelectric power station in Jutland. For further information, write Elmuseet/Gudencentralen, Postbox 51, DK-8850 Bjerringbro, Denmark.

Antique Telephones

A permanent exhibit of antique telephone equipment is being organized by the Vermont Council of the Telephone Pioneers of America to be installed at the Shelburne Museum, Shelburne, Vermont. The Pioneers are currently in the process of identifying, restoring, exchanging, and purchasing telephone artifacts and urge anyone with items for donation or sale to this project to contact Thomas Hutchinson, New England Telephone, 99 High Street, Room K303, Boston, MA, 02110 (617-743-1167).



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