IEEE CENTER FOR THE HISTORY OF ELECTRICAL ENGINEERING

Newsletter Number 8 Spring 1985

Summer Intern to Survey Wheeler Gift

A library of special interest to electrical history will be the focus of this year's summer-intern project. The "Wheeler Gift" of books and pamphlets, now held by the Engineering Societies Library, has long been recognized by historians and rare-book dealers as the most complete collection of its kind in the United States. Assembled in the nineteenth century by Josiah Latimer Clark, a noted English telegrapher and bibliophile, the original Gift contained several thousand volumes, spanning four hundred years of electrical science and technology. Because the collection was dispersed throughout the Library more than seventy years ago, it is unknown how many books have been lost or have deteriorated through normal use over the years. The survey, pending support by the IEEE Life Member Fund, will bring the status of the collection up to date and document the value of this important resource for the history of electrical engineering.

A short treatise on magneticall bodies and motions by Mark Ridley is just one of the volumes on magnetism in the Wheeler Gift

Clark's library came to the United States through the efforts of Schuyler Skaats Wheeler, an American electrical manufacturer. When Clark's collection went on the market in 1901, Wheeler purchased the library and donated it to the American Institute of Electrical Engineers. In the Deed of Gift, Wheeler stipulated that the AIEE catalog the collection and maintain it as the nucleus of a reference library. Andrew Carnegie matched what Wheeler had paid for Clark's library to fund the cataloguing, and donated one million dollars to construct a building for the national engineering societies and their libraries. The Wheeler Gift made up the bulk of the AIEE's library for a few years, but then was merged with the holdings of the other societies to form the Engineering Societies Library in 1913 (see *Newsletter* No. 5, Spring 1984).

Wheeler's Gift is impressive by any standard of measure. According to the *Catalogue*, the main part of the collection contains nearly three thousand books published in Latin, French, German, Italian, and English from the late fifteenth to the late nineteenth centuries. The earliest works, numbering about two hundred, recount the magical powers of the lodestone, the vagaries of the mariner's compass, and theories of electricity and magnetism from Pliny to Descartes. Eighteenth-century electricians are well represented by about four hundred books, among whose authors are Franklin, Priestly, Aepinus, and Coulomb. The strength of the collection lies in the nineteenth century – over two thousand volumes covering both science and technology. The standard treatises of electrophysics from Volta to Maxwell are here, as well as books and articles by hundreds of lesser known physicists. The material on British telegraphy is especially rich, given Clark's particular interest and expertise in this field. But he did not neglect telephony, nor the early history of electric insulation, electroplating, and electromagnetic motors. Of particular interest to historians of electrical engineering are the more than one hundred sets of electrotechnical periodicals published in Europe and the United States from the 1840s to the end of the century.

The remainder of the collection holds special value because of the scarcity of many of the items. The *Catalogue* lists well over three thousand entries for this part of the library, about half of which are articles reprinted from periodicals. But the other half includes such rare "near print" material as regulations, reports, and prospectuses of telegraph companies, reports of early electric lighting firms, trade catalogs and price lists, and exhibition brochures.

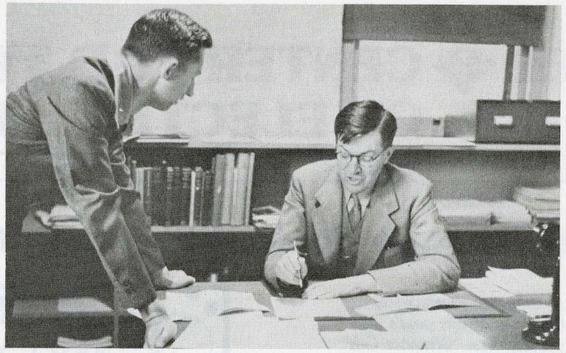
The Wheeler Gift compares very favorably with a similar collection held by the Institution of Electrical Engineers (IEE) in London. Assembled in the mid-nineteenth century by Sir Francis Ronalds, an early telegraph inventor, the Ronalds Collection is somewhat richer in Continental treatises, especially the works of Volta, but it has few books published after the 1860s. Consequently, the Wheeler Gift covers the development of electrical science and technology more completely, and it has better holdings in telegraphy, electrotechnical periodicals, and near print material.

Latimer Clark, who was a trustee of the Ronalds Collection for the IEE, thought his library would be of more use to researchers outside Britain. Thanks to Wheeler's foresight, we now have an opportunity to fulfill Clark's wishes more completely through a survey of the Wheeler Gift.

Terman Oral History Project

A project to interview former associates of the noted electronics engineer and educator, Frederick E. Terman, has recently been completed by Dr. A. Michal McMahon. Supported by a grant from the IEEE Life Member Fund, McMahon conducted oral histories in California and New York with six men well-acquainted with Terman's career: Marvin Chodorow, retired professor of physics at Stanford University; Edward L. Ginzton, retired chairman of the board of Varian Associates; William R. Hewlett, co-founder of the Hewlett-Packard Company; William R. Rambo, emeritus professor of electrical engineering at Stanford; C. Guy Suits, retired director of research for the General Electric Company; and Oswald G. Villard, retired professor of electrical engineering at Stanford.

The interviews, each about one and one-half hours in length, focus on the multifaceted relationships between these men and Terman at the Radio Research Laboratory at Harvard University during World War II and at Stanford University before and after the War. Most of the interviewees knew Terman at both institutions. Rambo and Villard, for instance, were graduate students of Terman, worked under him at the Radio Research Laboratory, and later served as professors at Stanford when Terman was Dean of Engineering. Two interviewees, Hewlett and Ginzton, participated in the cooperative ventures Terman encouraged between Stanford and Bay Area electronics firms. Of particular interest to the history of electronics are the discussions of the organizational and technical aspects of the Microwave Laboratory, the Radio Science Laboratory, and the Stanford Electronics Laboratories under the directorships of Chodorow, Ginzton, Rambo, and Villard.



Stanford University

Frederick Terman in his Stanford University office

In addition to gathering material for a biography of Terman, McMahon queried each interviewee about his education and career, regardless of whether it involved Terman. Much of the interview with Suits, for example, covers his tenure at the General Electric Research Laboratory, first as an associate of William Coolidge, Irving Langmuir, and Albert Hull, and then as the director of the Laboratory from 1945 to 1965. Similarly, the interviews with Ginzton and Hewlett pertain to the early years of Varian Associates and Hewlett-Packard, in addition to the later growth of microelectronics companies in "Silicon Valley." A common theme of all six oral histories is the rapid development of government-sponsored research after World War II.

Copies of the interview tapes have been deposited with the IEEE Center for the History of Electrical Engineering, which will have them transcribed as funding permits.

WORK IN PROGRESS

Bruce J. Hunt (National Museum of American History, Smithsonian Institution) is continuing his study of the history of electromagnetic field theory begun in his Ph.D. dissertation, "The Maxwellians," by considering the role of electrotechnology in the formulation of that theory in Britain. Dr. Hunt has found that the "field theory developed by British engineers and physicists was shaped in important ways by the phenomena and problems presented by submarine telegraphy. In particular, the distortion signals suffered when sent along submarine cables led British physicists to focus far more closely on field effects and electromagnetic propagation than was required of their counterparts in Germany and America, where overhead land lines presented much simpler electrical problems." Dr. Hunt has traced this influence in the work of Oliver Heaviside and plans to extend his research to earlier British physicists and engineers.

Lawrence Owens (History Department, University of Massachusetts-Amherst) is investigating how patent policies helped preserve a place for individual inventors in the increasingly corporate economy of the twentieth century. As part of his continuing research on Vannevar Bush, Professor Owens is concentrating on Bush's role in establishing the patent policies of the Massachusetts Institute of Technology in the 1930s, in addition to considering Bush's own career as an inventor.

Robert L. Frost (History Department, Wabash College, Crawfordsville, IN) is extending the research begun in his Ph.D. dissertation, "Alternating Currents: Technocratic Power and Workers' Resistance at Electricité de France, 1946-1970," with several studies focusing on particular aspects of French electrification after World War II. One of Dr. Frost's chief concerns is the influence of non-technical factors, such as political ideology, organizational structure, and workers' attitudes, in shaping the development of national systems of electric power supply.

CENTER FOR THE HISTORY OF ELECTRICAL ENGINEERING

At the "Invention Factory"

J.E. Bedi

Thomas Edison was one of America's most creative figures. The holder of 1,093 patents, Edison could count the phonograph, the practical incandescent lamp, the improved storage battery, the fluoroscope, cement houses, and natural rubber from goldenrod plants among his many contributions. Seemingly, the "Wizard of Menlo Park," as he was dubbed by the popular press, could do anything. He boldly claimed that the "invention factory" he set up in Menlo Park, New Jersey, in 1876, would produce "a minor invention every ten days and a big thing every six months or so."

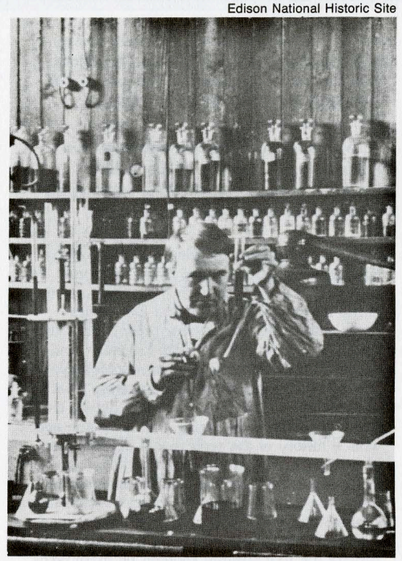
In 1887, Edison moved his lab to West Orange, New Jersey, and this complex quickly began to expand. Factory buildings were added to the laboratories, one of the largest being devoted to the production and testing of storage batteries, and both recording and motion picture studios were established. During his lifetime, Edison was responsible for starting nearly 200 companies and corporations.

Thomas Edison died on 18 October 1931 at the age of 84. His son Charles immediately closed down the main laboratory complex upon his father's death, with the intention of eventually opening it to the public as a museum. This occurred in 1948 when the laboratory was re-opened by the Thomas A. Edison Foundation. The site was transferred to the National Park Service, US Dept. of the Interior, in 1956 and operates as the Edison National Historic Site (ENHS) under that organization today.

The Wizard's legendary energy is reflected in the current work of the ENHS museum staff and of the Thomas A. Edison Papers Project. Long-term projects dealing with the approximately 3½ million pages of archival material, 50,000 artifacts, twenty buildings, and 60,000 photographs which form the collection documenting Edison's life and work are aimed at improving the visibility, research value, and preservation of this rich historical resource.

For example, the collection of Edison recordings (approximately 7,000 cylinders and 20,000 discs) was featured last fall in Sony Corporation's introduction of compact digital audio discs made in the United States. "The Edison CD Sampler" includes examples of the different recording formats and the variety of subject material produced by the Edison studios. All known recordings of Edison himself, including such unreleased material as Edison telling a joke and playing a piano, are on the disc, along with selections from Sophie Tucker, P.T. Barnum, and William Jennings Bryan, and such all-time hits as "Alexander's Ragtime Band," "I Wanna Be Loved By You," and, Edison's personal favorite, "I'll Take You Home Again Kathleen." The "Sampler" is available for educational use only, free of charge: contact Edward Jay Pershey, Supervisory Museum Curator, ENHS, for details. In addition to this special project, the Edison recordings are steadily becoming available to researchers through a program of converting them to tape.

Edison National Historic Site



Edison in his chemistry lab, c. 1890

In the main laboratory complex, Edison's three-floor library, rich in complete runs of technical journals and other literature, is undergoing its first cleaning in many years. This process is yielding a great deal of archival material which is being removed, inventoried, and incorporated into the Site's document collection.

The photograph collection at ENHS documents all aspects of Edison's personal and professional life, from advertising photos of storage batteries to snapshots of Edison with his children. During the past two years, this fascinating collection has been reorganized and will eventually be made available to researchers in the form of microfiche cards. The first pilot batch of around 1,000 photos has been produced and the microfiche is expected to be a valuable complement to the microfilm edition of the Thomas A. Edison Papers.

The heart of the ENHS collection, however, is the written record, consisting of laboratory notebooks, correspondence, patent materials, financial records, scrapbooks, legal records, and technical drawings. In the mid-1970s, concern regarding the inaccessibility of this record and the lack of scholarly attention to it led Rutgers University, the National Park Service, the New Jersey Historical Commission, and the Smithsonian Institution to agree, in 1978, to cosponsor the Thomas A. Edison Papers Project. The Project was charged with three main tasks – to publish around 10% of Edison's papers as a microfilm edition of approximately 400,000 pages, to publish a 15-20 volume book edition to serve general scholarship on Edison, and to prepare more popular, highly illustrated publications and audiovisual presentations.

The selection and preparation of materials for Part I of the microfilm edition had significant consequences for archival management at the Site. The Papers Project staff, in coordination with the ENHS archivists, thoroughly surveyed and inventoried the document collection for the first time, developed organizational guidelines for the archives, and began the reorganization of the files to be microfilmed, based on these guidelines. In this way, not only were the needs of researchers addressed, but improved preservation standards for the documents were implemented. Part I, covering the years 1850-1878, is now available through University Publications of America, Inc. (44 N. Market St., Frederick, MD 21701, 301-694-0100).

The vast and varied record left by the prolific Wizard provides unique opportunities for historians of electrical science and technology. The current and projected work of the ENHS museum staff and the Edison Papers Project in preserving and interpreting this record shows a strong commitment to enhancing the quality and quantity of scholarship in this field.

For further information on the Edison National Historic Site or the Edison Papers Project, contact Edward Pershey, Supervisory Museum Curator, or Mary Bowling, Archivist, Edison National Historic Site, Main Street & Lakeside Avenue, West Orange, NJ 07052 (201-736-0550), or Prof. Reese V. Jenkins, Editor-in-Chief, Thomas A. Edison Papers Project, Van Dyck Hall, Rutgers University, New Brunswick, NJ 08903 (201-932-8511). Readers are also referred to "A Record for Invention: Thomas Edison and His Papers," by Reese Jenkins and Keith Nier, which appeared in the *IEEE Transactions on Education*, Vol. E-27, No. 4 (Nov. 1984), pp. 191-196.

NEW PUBLICATIONS

The Newsletter's "Publications" section was prepared by Ronald Kline and Anne C. Benson with the assistance of Thomas J. Higgins of the University of Wisconsin.

Books

Jeremy Bernstein. *Three Degrees Above Zero: The Bell Labs in the Information Age.* New York: Charles Scribner's Sons, 1984. 256 pp.

Bell Labs has been a world leader in scientific and technological research since its founding in 1925. This book addresses both its past and future, examining its many contributions, the people responsible, and the possible effects of the AT&T divestiture on the future of Bell Labs.

The book is divided into four sections, each discussing very diverse topics. The first section, entitled "Bits," covers computers, artificial intelligence, and computation. For the first time since the divestiture, Bell Labs is now able to conduct research relating to the commercial computer market. The second section, "The Solid State," examines the physics research conducted at Bell Labs, including the invention and development of the transistor by physicists who were awarded the Nobel Prize for their discovery. "Telephony" deals not only with the art and science of the telephone, but with other advancements, including lasers and fiber-optics for telecommunications. The final section is entitled "Three Degrees Above Zero." It provides the accounts of two radio astronomers, Arno A. Penzias and Robert W. Wilson, who discuss their research in satellite communication. Penzias, vice-president in charge of research, also gives his optimistic outlook for the future of Bell Labs.

Jeremy Bernstein is a science writer for *The New Yorker.* He is the author of numerous books, including *Science Observed: Essays Out of My Mind,* and *The Analytical Engine: Computers – Past, Present, and Future.*

Gerard H. Clarfield and William M. Wiecek. *Nuclear America: Military and Civilian Nuclear Power in the United States, 1940-1980.* New York: Harper and Row, 1984. 518 pp.

Clarfield and Wiecek provide a comprehensive account of U.S. nuclear policy, both civilian and military, from the Manhattan Project to the demise of the Salt II treaty.

Nuclear America describes the early years of atomic research; the personal and political attitudes of U.S. presidents towards the bomb's role in national defense and arms control negotiations; the development of commercial nuclear power; the rise of public awareness to potential dangers, such as the Three Mile Island accident; and public resistance to further growth of both civilian and military nuclear power.

Gerard H. Clarfield teaches diplomatic history at the University of Missouri. William M. Wiecek holds the Congdon chair in Public Law at the College of Law of Syracuse University.

A. Michal McMahon. *The Making of a Profession: A Century of Electrical Engineering in America.* New York: IEEE Press, 1984. 304 pp.

McMahon's long-awaited Centennial book addresses an important gap in the historical literature. The book is much more than a history of the Institute of Electrical and Electronics Engineers and its predecessor organizations (the American Institute of Electrical Engineers and the Institute of Radio Engineers). McMahon attempts to do for electrical engineering what Daniel Calhoun and Monte Calvert did for civil and mechanical engineering over a decade ago: write a history of the professional development of a major branch of American engineering. Additionally, McMahon places his story in the wider context of electrotechnical history, military sponsorship of research and development, and electrical engineering education. In order to explore the vast territory covered by these fields, he selects representative episodes to discuss in detail. Such selectivity enables him to present many of the relationships between the IEEE, innovation, the military, and the universities in "making" the electrical engineering profession.

David F. Noble. *Forces of Production: A Social History of Industrial Automation.* New York: Alfred Knopf, 1984. 409 pp.

Many *Newsletter* readers are familiar with Noble's previous book, *America by Design* (1977), which presents a detailed history of industrial electrical engineering education as part of his broader thesis of the corporate control of American science and technology. *Forces of Production* has a similar theme: the corporate control of industrial automation. In this detailed history of computer-based automatic machine tools (numeric control), Noble describes the perfection of this technology at an MIT laboratory and the vital role of the US Air Force, which underwrote most of the research and development costs. The Air Force also created a market, through government contracts, for the less economic numeric control. Noble contends that large industrial corporations chose this technology over traditional machine-shop techniques and less automated forms of numeric control (record-playback), not for economic or technical reasons, but chiefly to transfer the control of production from skilled workers to managers and programmers.

Articles

Auerbach, Isaac L. "Eloqe: Niels Ivar Bech, 1920-1975," *Annals of the History of Computing,* 6 (1984), 332-334.

Bickford, Lawrence R. "Magnetism during the IEEE's First One Hundred Years (1884-1984)," *IEEE Transactions on Magnetics,* MAG-21 (1985), 2-9.

Brittain, James E. "The Alexanderson Radio Alternator and the Distinction between Engineering and Science." In *Technology and Science: Important Distinctions for Liberal Arts Colleges,* ed., John N. Burnett, Davidson, N.C.: Davidson College, 1984, pp. 60-69.

Brown, Gordon S. and Norbert Wiener. "Automation, 1955, A Retrospective," *Annals of the History of Computing,* 6 (1984), 372-383.

Carlson, W. Bernard, "Industrial Research in America: A Select Guide to Historical Studies," *History of Science in America: News and Views,* Nov.-Dec., 1984.

Court, Mike. "An Evolutionary History of the R.C.C.B. (Residual Current Circuit Breaker)," *Electrical Review,* 215, No. 18 (Dec. 7, 1984), 38-40.

Davies, Richard. "The Sizewell B Inquiry: An Analysis of Public Participation in Decisionmaking about Nuclear Power," *Science, Technology and Human Values,* 9, No. 3 (Summer 1984), 21-32.

Davis, Janet M. "Charles LeGeyt Fortescue: The Man and His Work (at Westinghouse)," *IEEE 1984 Frontiers in Education Conference,* 296-299.

Feldtkeller, Ernst. "100 Years' Magnetic Contributions to Electrical Engineering," *IEEE Transactions on Magnetics,* MAG-20 (1984), 2057-2090.

Fleckenstein, Karen. "The Early ECG in Medical Practice," *Medical Instrumentation,* 18 (1984), 191-193.

_____. "Etienne Marey and the Electric Torpedo Fish," *Medical Instrumentation,* 18 (1984), 288-289.

Geddes, L.A. "The Beginnings of Electromedicine," *IEEE Engineering in Medicine and Biology Magazine,* 3, No. 4 (Dec. 1984), 8-23.

Greatbatch, Wilson. "Implantable Pacemakers: A Twenty-Five Year Journey," *IEEE Engineering in Medicine and Biology Magazine,* 3, No. 4 (Dec. 1984), 24-26.

Friedel, Robert. "IEEE – A Hundred Years of Organizational Development," *IEEE Power Engineering Review,* PER-4, No. 3 (March 1984), 4-13.

Hecht, Jeff. "Victorian Experiments and Optical Communication," *IEEE Spectrum,* 22, No. 2 (Feb. 1985), 69-73.

Hendry, John. "Prolonged Negotiations: The British Fast Computer Project and the Early History of the British Computer Industry," *Business History,* 26 (1984), 280-306.

NEW PUBLICATIONS (cont.)

Huskey, Harry D. "From ACE to the G-15," *Annals of the History of Computing,* 6 (1984), 350-371.

"Interview (on Engineering Education): Mr. William J. Ellenberger," *Mecheleciv* (George Washington University), 31, No. 3 (Fall 1984), 8-13.

Jenkins, Reese V. and Paul B. Israel. "Thomas A. Edison: Flamboyant Inventor," *IEEE Spectrum,* 21, No. 12 (Dec. 1984), 74-79.

Kersey, Lorne R. "A History of the Vancouver Section (of the IEEE)," *IEEE Power Engineering Review,* PER-4, No. 11 (November 1984), 6-9.

König, Wolfgang. "Retrospective Technology Assessment – Technikbewertung im Rückblick (for the Atlantic cable of 1866)," *Technikgeschichte,* 51 (1984), 247-262.

Lang, Norbert. "C.E.L. Brown, Pionier des schweizerischen Elektromaschinenbaus," *Ferrum,* 55 (1984), 27-30.

Minozuma, Fumio. "Radio Noise Interference Activities in Japan, Historical Review," *IEEE Electromagnetic Compatibility Conference,* Oct. 1984, 1-17.

O'Hara, James G. "Gauss' Method for Measuring the Terrestrial Magnetic Force in Absolute Measure: Its Invention and Introduction in Geomagnetic Research," *Centaurus,* 27 (1984), 121-147.

Palladino, Grace. "Building a Union: The Early History of the UE (United Electrical, Radio, and Machine Workers of America) Local 610," *Western Pennsylvania Historical Magazine,* 67 (Jan. 1984), 1-15.

Silag, William. "The Invention of the Electronic Digital Computer at Iowa State College, 1930-1942," *The Palimpset* (Iowa State Historical Society), 65 (Sep./Oct. 1984), 150-164, 173.

Steward, Stanley. "The Astonishing Career of A.P. Trotter," *Electrical Review,* 215, No. 18 (Dec. 7, 1984), 27.

Strobel, Albrecht. "Die Entwicklung der Aluminiumelektrolyse am Hochrhein von Heroult bis Kiliani (1885-1893)," *Ferrum,* 55 (1984), 31-35.

Strum, Harvey. "Eisenhower's Solar Energy Policy," *Public Historian,* 6, No. 2 (Spring 1984), 37-50.

Townsend, B.S. "Distribution (of Electric Power in the Southwest of England): The Years of Change," *IEE Proceedings,* 132-C, No. 1 (Jan. 1985), 1-7.

Tropp, Henry S. "Grace Hopper: The Youthful Teacher of Us All," *Abacus,* 2 (Fall 1984), 6-18.

Wiedmann, S.K. "Advancements in Bipolar VLSI (Very Large Scale Integration) Circuits and Technologies," *IEEE Journal of Solid-State Circuits,* SC-29 (1984), 282-291.

Woolf, Arthur G. "Electricity, Productivity, and Labor Saving: American Manufacturing, 1900-1929," *Explorations in Economic History,* 21 (1984), 179-191.

Wortman, Ruth Ballengee, ed. "A Burlington Railroad Telegrapher, Joseph Harmon Ballengee," *Nebraska History,* 65 (1984), 221-244.

Young, Gayle. "Hugh Le Caine: Pioneer of Electronic Music in Canada," *Scientia Canadennis,* 111, No. 1 (June 1984), 20-31.

Unpublished Manuscripts

Hunt, Bruce J. "The Maxwellians," Ph.D. dissertation, Johns Hopkins University, 1984.

Gibson, Jane Mork. "The International Electrical Exhibition of 1884 and the National Conference of Electricians: A Study in Early Electrical History," M.A. thesis, University of Pennsylvania, 1984.

The IEEE Center for the History of Electrical Engineering has recently received several unpublished manuscripts on electrical history:

Bennett, Stuart. "Harold Hazen and the Theory and Design of Servomechanisms," 1984, 43 pp.

Chadbourne, H. Lincoln. "William J. Clarke and the First American Radio Company," copyright 1982, 41 pp.

_____. "Leonard D. Wildman and the First Alaskan Radio," copyright 1984, 241 pp.

Greatbatch, Wilson. "Early People and Early Systems (in the History of Pacemakers)," in *Implantable Active Devices* (Clarence, NY: Greatbatch Enterprises, Inc., 1983), chap. 1, 16 pp.

Special Issues

IEEE Transactions on Aerospace and Electronic Systems, AES-20, No. 4 (July 1984). Centennial issue on the history of systems engineering, space activities, radar imaging, aerospace guidance and control, commercial satellite communications, the US Navy in space, digital avionics, power electronics in space, and the Kalmann filter applied to aerospace and electronic systems.

IEEE Denver Section, *Western Engineer,* Vol. 68, No. 9-11 (Sept.-Nov. 1984). Contains a three-part article by Lawrence M. Robertson, entitled "The Birth and Growth of Electricity in Colorado," which pays particular attention to high-voltage transmission.

IEEE Control Systems Magazine, 4, No. 4 (Nov. 1984). Centennial issue on the history of control engineering in Japan, the automatic steering of ships, control system theory in Germany, feedback control, dynamic programming, and servomechanisms.

IEEE Transactions on Biomedical Engineering, BME-31, No. 12 (Dec. 1984). Centennial issue with articles on the history of the biomedical engineering profession in the United States and the impact of biomedical engineering on health care in the last thirty years.

Thomas A. Edison's Papers

A ceremony held at the Edison National Historic Site in West Orange, New Jersey, on 11 February (Edison's 138th birthday), celebrated the official publication of Part I of the Thomas A. Edison Papers microfilm edition.

Part I of the microfilm edition covers the years 1850-1878 and is available through University Publications of America, Inc., 44 North Market Street, Frederick, MD 21701 (301-694-0100). It deals with Edison's chemical experiments, his observation of "etheric force," his work on the telegraph, the electric pen, the carbon-button transmitter, and the phonograph, and the beginnings of his development of the incandescent lamp. The 28 reels of microfilm come with a printed guide which includes short histories of both the Thomas Edison Papers Project and of the papers themselves, the editorial procedures followed, series notes, and indexes. *A Guide to Thomas A. Edison Papers: A Selective Microfilm Edition: Part I (1850-1878)* can also be purchased separately.

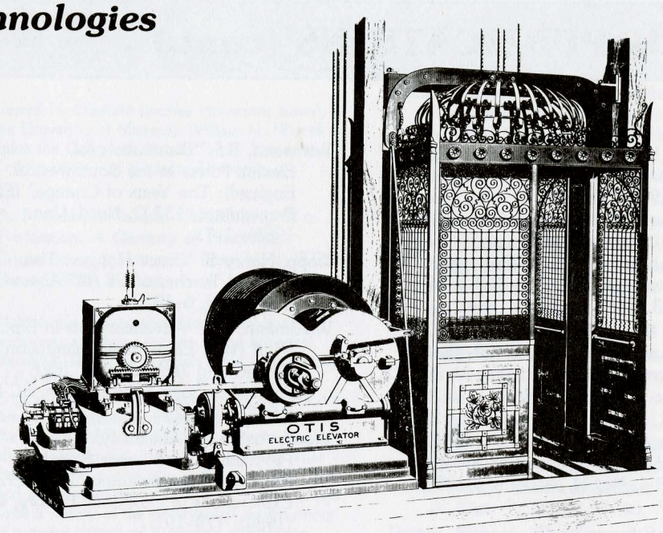
History and United Technologies

Anne Millbrooke

United Technologies appreciates the value of managing information, including historical information. It thus created an Archive and Historical Resource Center in 1972. The archival collections and reference services reflect the evolution of the Corporation, which traces its origins to 1925, but which has acquired organizations that date as far back as 1853.

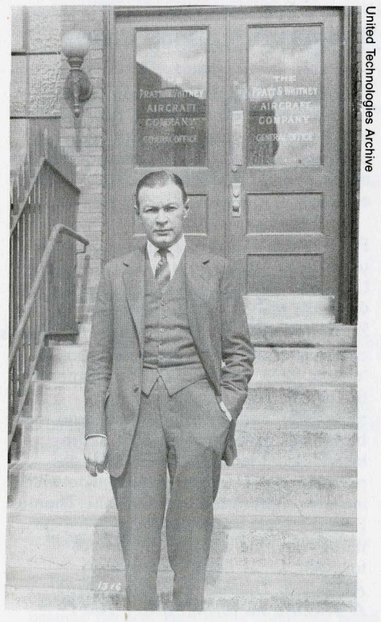
In 1925, Frederick B. Rentschler founded Pratt & Whitney, a manufacturer of aircraft engines. Four years later, Pratt & Whitney joined several other aviation firms in the newly created United Aircraft & Transport Corporation. When national air mail scandals upset the aviation industry in 1934, United Aircraft & Transport Corporation reorganized. Out of it emerged three major companies: Boeing, United Airlines, and United Aircraft.

The new United Aircraft Corporation consisted of Pratt & Whitney and its Canadian subsidiary, Chance Vought Corporation, Hamilton Standard Propeller Company, Sikorsky Aircraft Corporation, United Aircraft Exports Corporation, and United Airports of Connecticut. As the central repository for the historical records of the Corporation, its divisions, subsidiaries, and predecessors, the Archive and Historical Resource Center acquired



United Technologies Archive

The Otis Double Screw Electric Elevator, 1890s. The Otis Brothers & Company installed its first electric elevator in the Demarest Building in New York City in 1889.



United Technologies Archive

Frederick B. Rentschler standing before the Pratt & Whitney Aircraft Co. that he founded in 1925

records of these early companies and their successors (except Chance Vought which left the Corporation before the Archive was established).

Retaining its aviation character, the Corporation in 1958 acquired Norden, an electronics firm famous for its bombsight. Later acquisitions – notably Essex International in 1974, Otis Elevator in 1975, Ambac Industries in 1978, and Carrier Corporation and Mostek Corporation in 1979 – broadened the Corporation's scope. To better reflect the expanding base of products, United Aircraft changed its name in 1975 to United Technologies.

Gradually, the Archive and Historical Resource Center assumed responsibility for the historical documents of the acquired organizations. The office holds records dating from 1853 when Elisha G. Otis established his elevator works, though most of the holdings pertain to 20th-century companies and technologies. For example, Willis H. Carrier invented his first air conditioning system in 1902, the Essex wire company was created in 1930, and Mostek Corporation formed in 1968. Of course, the office retained its historical and archival functions in the aviation field.

What is collected? The goal is to acquire the 1-2% of the records that serve as the best source of information about the technical and business history of the Corporation and its products. The archival collections include company magazines, sales literature, technical manuals, engineering drawings, parts lists, press releases, financial statements, minutes of meetings, correspondence, photographs – any type of document that contains information of historical value.

The Archive and Historical Resource Center also maintains reference collections that contribute directly to an understanding of the history of the Corporation. The focus is on the Corporation and the industries in which it participates. Books and articles form the bulk of the reference collections. Video disks, acquired from a commercial house and the Smithsonian Institution, have greatly increased the amount of photographic materials in the reference collections.

A corporate archive is a corporate resource. In other words, the primary audience for the Archive and Historical Resource Center is the Corporation. Executives, lawyers, writers, advertising personnel, financial managers, marketing representatives, and others in the corporate office and the operating divisions request historical information pertinent to their work. Though created and maintained for internal use, the Archive and Historical Resource Center is open, by appointment, to the public. Magazine writers, professors, and students are among the general public served.

Anne Millbrooke is the Corporate Archivist for United Technologies Corporation. She may be contacted at the Archive and Historical Resource Center, United Technologies Corporation, 400 Main Street, MS 124-22, East Hartford, CT 06108 (203-565-5401).

CENTER FOR THE HISTORY OF ELECTRICAL ENGINEERING

BRIEFS

Historical Studies in Industrial Innovation

Innovation in science-based industries is the subject of a new project recently begun by the Business History Unit of the London School of Economics. As part of the Unit's growing concentration on the history of commercial science and technology, the project, under the direction of Dr. Mari Williams, will undertake a cross-national study of innovative processes within high technology firms since the 19th century. The initial focus on scientific instrument makers, specialist chemical producers, and other firms for which rapid change was a commercial necessity, will allow Dr. Williams to study the structure of early industrial R&D as well as to examine such issues relevant to the innovation process as the intellectual and social resources available to commercial scientists and technologists, the nature of creative processes within firms, and the ability of companies to utilize innovations.

Werkgroep Geschiedenis der Elektrotechniek

In 1978, four sections of the Department of Electrical Engineering at the Technische Hogeschool in Delft, the Netherlands, established the Study Group on the History of Electrical Engineering. The Study Group supervises graduate students working on both the technical and social aspects of electrical history. Some of the topics investigated have been the introduction of cable television in the Netherlands; the evolution of the compensation method for voltage measurements; and the historical development of small electric motors, their implementation in vacuum cleaners, and the social implications of the introduction of the vacuum cleaner into family households. In addition, the Study Group is collecting historical electrical equipment, instruments, and documents for the Electrotechnical Study Collection, which is open to researchers.

For further information, contact Werkgroep Geschiedenis der Elektrotechniek, Technische Hogeschool, Mekelweg 4, 2628 CD, Delft, The Netherlands (015-78-5757).

MEETINGS

National Computer Conference

The National Computer Conference will be held this year from 15-18 July in Chicago, Illinois. A prominent feature of past conferences has been Pioneer Day, which honors computer inventors. The theme of this year's Pioneer Day will be early computer developments in Illinois, specifically the work on the ORDVAC, AVIDAC, and ILLIAC at the University of Illinois and the Argonne National Laboratory.

For further information on the conference, contact John Gilbert, American Federation of Information Processing Societies, 1899 Preston White Drive, Reston, VA 22091 (703-620-8900).

Hagley R&D Pioneers Conference

On 7 October 1985, the Hagley Museum and Library will present "The R&D Pioneers: A Critical Look at General Electric, Du Pont, AT&T Bell Laboratories, and Eastman Kodak, 1900-1985." The conference will deal with the perennial issues of research management in papers by David Hounshell, University of Delaware; George Wise, General Electric Company; John K. Smith, Hagley Museum and Library; Jeffrey Sturchio, Center for the History of Chemistry; and Richard S. Rosenbloom, Harvard Business School.

The speakers will address such questions as why GE, Dupont, AT&T, and Kodak establilshed R&D programs and why they continue to be among the leaders in R&D expenditures; what aspects of R&D management have changed and which have remained the same since the founding of their programs in the early years of this century; and how changes in public policy have shaped the research strategies of these firms.

Of particular interest to historians of electrotechnology are the papers by George Wise and Neil Wasserman. In "General Electric, the First R&D Pioneer in Twentieth Century America," Wise will discuss changing policies at GE since the directorships of Willis R. Whitney and William Coolidge. Wasserman, in "AT&T Bell Laboratories," will compare the success of Bell Labs in regulated and deregulated environments.

For more information and registration materials, contact Hagley R&D Pioneers Conference, P.O. Box 3630, Wilmington, DE 19807 (302-658-2400, ext. 236).

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

Computer Museums in the US and Canada

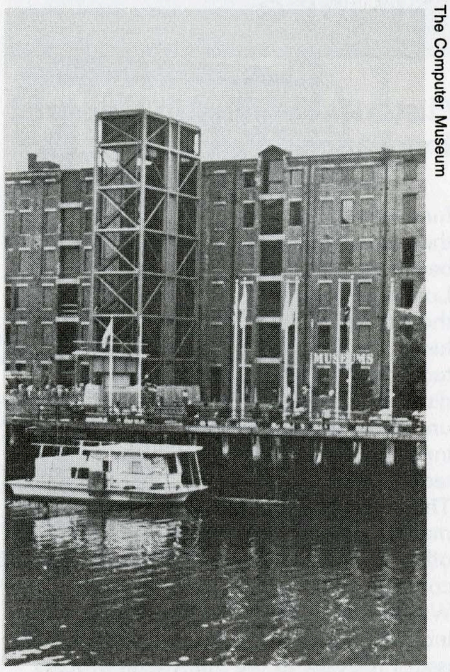
The computer is one of the most pervasive pieces of electrical technology in society today. To explore the development and impact of the computer, two museums, one in Boston, Massachusetts, and the other in Toronto, Ontario, have been established.

On 14 November 1984, The Computer Museum opened in its new home at Museum Wharf, a renovated waterfront warehouse near Boston's financial district. The new space is divided into four major galleries, each combining artifacts, audiovisuals, and interactive displays. In "The Vacuum Tube Era," visitors can learn about the Whirlwind, the UNIVAC I, the Bendix G-15, and the role of the AN/FSQ-7 in the SAGE (Semi-Automatic Ground Environment) air defense system. "The Transistor Era" includes a recreation of an IBM 1401 room at the Travelers Insurance Co.; the first "minicomputer," Digital's PDP-8; a look at Seymour Cray's contributions to computing; and the "See It Then Theatre," showing vintage film on computer technology. Visitors next move on to "The Integrated Circuit Era" in which they see the Apollo guidance computer, displays on both the integrated circuit printing process and the steps in manufacturing a computer; NASA's scientific computer, the ILLIAC IV; and various machines illustrating the evolution of the personal computer. Finally, in "The Computer and the Image," image processing and computer graphics are presented.

The Computer Museum also maintains an archive of videotapes, films, printed materials, and photographs on the history of computing, publishes quarterly *The Computer Museum Report*, and runs lectures series featuring speakers important to the history and the current technology of computing. The Computer Museum is open Wednesdays, Saturdays, and Sundays from 11 am to 6 pm, and Thursdays and Fridays from 11 am to 9 pm.

In June 1984, another museum devoted to the computer was founded, the Computer Museum of Canada. The personal vision of Abe Schwartz, co-founder, president, and chief executive officer of Polaris Technology Corporation of Toronto, the new museum is scheduled to open in mid-1986. A futuristic, steel-and-glass structure is planned to house both the museum and computer corporations.

Exhibits will focus both on the history of computers and on the explanation of how computers work, their current and future uses, computer-generated art, and such technology-related issues as privacy, job displacement, and artificial intelligence. Temporary exhibition galleries will rotate more detailed displays on specific topics, and audiovisuals and interactive exhibits will play a major role in the museum. Some of the exhibits presently planned are a walk-through model of a microprocessor chip, where visitors can learn what the various circuits do, and visitor-operated robots and computer controlled manufacturing machinery. Travelling exhibitions and special school group educational programs are also planned to increase the museum's impact.



The Computer Museum

The Computer Museum's new home at Museum Wharf, Boston

For more information on either of these museums, contact The Computer Museum, 300 Congress Street, Boston, MA 02210 (617-426-2800), or the Computer Museum of Canada, 160 Bloor Street East, Suite 920, Toronto, Ontario M4W 1B9, Canada (416-920-6888).

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