
Center for the History of Electrical Engineering

Newsletter No. 30 Summer 1992

ORAL HISTORY GUIDE

The center's staff has just put the finishing touches on the second volume in the "Sources in Electrical History" series. The new book, entitled *Sources in Electrical History 2: Oral History Collections in U.S. Repositories*, is now available to researchers to use as a guide to find oral history interviews with engineers, scientists, politicians, industrialists, laborers, and others that contain information on electrical, electronics, or computer technology. The book joins the first volume of the series, *Archives and Manuscript Collections in U. S. Repositories* (published by the IEEE Center in 1989, see Newsletter #21), in providing a ready reference of primary sources available to the researcher of the history of electrical and electronics technologies.

Sources 2: Oral History Collections summarizes the contents of over 1,000 taped interviews, stored in 63 repositories. Entries list basic information about the interviews, such as the interviewee, the interviewer, the date and place the interview was conducted, the length of the interview, and details about the existence of a transcript and index for the interview. An extensive index lists the subjects and proper names about which information can be found. An index of the repositories which are included in the guide outlines the holdings of each repository, and provides a complete address with phone number to aid the researcher contact the archive. This index is arranged geographically, so a researcher may quickly ascertain which regions of the country have the richest holdings and plan efficient research tours.

Many of the interviews listed in the guide were conducted as portions of large-scale oral history projects. These projects, collections of numerous interviews that focus on a single subject or

theme, are a highly concentrated source of information on particular subjects, with multiple voices providing the different perspectives that is so valuable to objective history. The guide lists 57 such projects, covering a wide range of topics that concern historians of electrical technology. Some oral history collections address specific technical histories, e.g. the "Burroughs B 5000 Project", a set of interviews with the individuals responsible for the development of the Burroughs

technological development, technology and the environment, and the growth of particular corporations, such as Hewlett-Packard and Honeywell.

Sources in Electrical History 2: Oral History Collections in U.S. Repositories was prepared over a span of several years by the staff of the Center for the History of Electrical Engineering. Sharing credit for the fundamental work of research, compilation, and writing are Joyce Bedi,

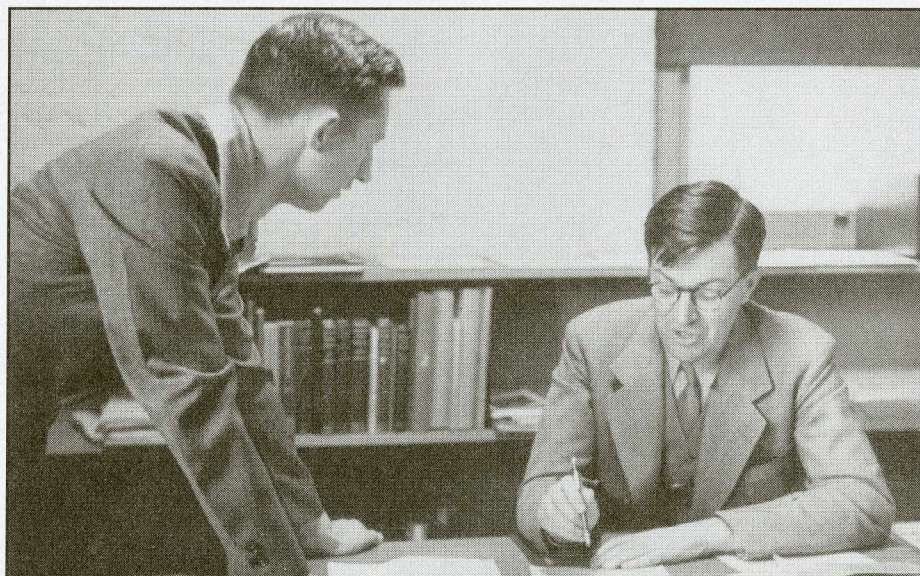


Photo courtesy of Stanford University.

Frederick Terman, seated at desk, is the subject of several oral histories.

5000 computer series from 1957 through the 1960s, or the "Klystron Development Project", in which the history of this critical microwave tube is discussed by its developers. Other projects, such as the "Communications Workers of America Project", a fully transcribed and indexed collection of 84 oral histories with individuals who were involved in the foundation of this important union, offer perspective on how labor relations affect the history of technology. Still other oral history projects listed in the guide treat the role of federal funding in

Debra Braskett, Charles M. Dwight, Ronald Kline, Craig Semsel, and Edward Sowders. Editing and indexing of the manuscript was the responsibility of William Aspray, Andrew Goldstein, and David Morton. The guide is being published by the Center for the History of Electrical Engineering. It is available at a cost of \$15.00, prepaid. Please send a check or money order made payable to "IEEE" to Center for the History of Electrical Engineering, Rutgers University, 39 Union Street, New Brunswick, NJ 08903. ■

STAFF NOTES

EE History Taught

Center staff contributed another class offering to the Rutgers catalogue this past semester. Frederik Nebeker, the center's Research Historian, taught a course entitled "History of Electrotechnology" in the spring of 1992—the first time our subject has been given at Rutgers. Nebeker's class, which considered the interrelated development of electrical technology and American society, was offered by the history department, but the material was sufficiently technical to attract engineering students. Topics included:

- Types of electrical engineering knowledge (e.g. physics-based, empirical quantitative theory, empirical qualitative theory, EE experience, craft skill).
- The relationship between the science of electrical engineering and the electrotechnology.
- The invention-development-innovation process.
- Competition within a high-tech industry (including competition between rival technologies).
- The importance of non-electrical technologies and the synergy of new technologies.
- The importance of social factors in the development of technologies (including the roles of industry, government, the military, and academia).
- The social impact of technology.
- Types of engineers (amateur, professional, entrepreneur, scientific, tinkerer, system-builder) and collaborative engineering.
- The dependence of technological improvements on scientific progress and the contribution of electrotechnology to advances in science. ■

History Session at Wescon

Frederik Nebeker, the center's Research Historian, has organized a historical session for the 1992 annual meeting of Wescon in Los Angeles, November 17-19. The session, entitled "The Early Days of Computers, Transistors, Radio Test-and-Measurement, and Space-Program Antennas," concerns four episodes in the history of electrical engineering, each occurring during the formative stage of a new technology. Nebeker will describe how the design of radio receivers was transformed from an

New Post-Doc

Eric Schatzberg, the center's Postdoctoral Fellow, will be leaving the center this fall to accept a tenure-track Assistant Professorship in the History of Science Department at the University of Wisconsin at Madison. In his two years with the center, Dr. Schatzberg delivered papers at three major conferences, participated in the center's Historical Speakers Bureau, prepared articles on the role of ideology in engineering for both popular and scholarly journals, wrote on the social and technical history of the electric trolley, and introduced the history of technology to Rutgers students by teaching four high-level seminars. We congratulate Dr. Schatzberg and wish him luck in his new appointment.

The center was fortunate to find a worthy successor to fill the position that Schatzberg is leaving behind. Beginning with the fall semester, the center's Postdoctoral Fellow will be Dr. Hugh Sloten. Sloten holds a B.A. in physics from Earlham College, an M.A. in meteorology from the University of Wisconsin, and a Ph.D. in history of science, also from the University of Wisconsin. His dissertation on nineteenth-century American science and politics has been revised and accepted for publication by Cambridge University Press. Sloten's other writings on the cultural history of American science and technology in the nineteenth and twentieth centuries includes a paper on the American response to the German use of poison gas in the First World War which appeared in *Journal of American History*. He leaves his current job as Assistant Professor of history in the Lyman Briggs School at Michigan State University to join the center's staff. ■

art to a science through the development of appropriate techniques of test and measurement. Center Curator Andrew Goldstein will discuss the early history of the transistor, focusing on the work of Gordon Teal. Erwin Tomash will explain how printing technology was important in shaping the computer industry. And Craig Waff will describe the design and installation of antennas for the U.S. space program in the late 1950s. The session will be held Thursday, November 19. ■

IEEE Oral History Project Update

The August issue of *Proceedings of the IEEE* will contain the first biographical article resulting from the IEEE Oral History Program (described in Newsletter #28). The article, written by the center's Research Historian, Frederik Nebeker, is entitled "Harold Alden Wheeler: A Lifetime of Applied Electronics." Nebeker traces Wheeler's career as an engineer and manager at Hazeltine Corporation and as director of his own company. Wheeler's diverse contributions in radio, television, radar, antenna technology are placed in the context of his own life and his social and technological environment.

The IEEE Oral History Program is supported by a generous grant from the IEEE Life Member Fund. ■

The Newsletter reports on the activities of the Center and on new resources and projects in electrical history. It is published three times each year by the Center for the History of Electrical Engineering.

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Museums in Japan

We have recently learned that several Japanese industrial firms have undertaken efforts to promote understanding and appreciation of electrical and electronic technology by organizing museums on their corporate campuses. These museums enrich their visitors with a feeling for the history of the electrical industry in Japan as well as astound them with state-of-the-art technology and demonstrations of scientific principles.

• Toshiba, Japan's oldest manufacturer of electrical technology, runs a three-story Science Institute in Kawasaki city. Among the array of high-tech exhibits there, such as a working model of a magnetically levitated train and a HDTV home theater, is a history room with an exhibit that chronicles Toshiba's product line over the past 100 years. Vintage electrical equipment to be seen includes early lamps, televisions, refrigerators, and washing machines.

• Matsushita Electric, a large consumer goods manufacturer which recently merged with Panasonic and acquired MCA, Inc., operates a House of History in Kadoma, Osaka. The attractions there include a replica of the 1918 workshop of the firm's founder, Konosuke Matsushita, who was featured on the cover of Time magazine in 1962 as an exemplar of Japanese businessmen; and a gallery of Matsushita products throughout the years.

• At its plant in Namazu City, Fujitsu, a large computer firm, maintains the Ikeda Memorial Room, named after Toshio Ikeda, a former director of Fujitsu. It contains the early relay-type FACOM 128B computer, as well as memory and logic units from other computers. Balancing the historical display, the installation also has a high-tech corner with exhibits that anticipate the most exciting computer technologies of tomorrow.

• The often overlooked history of electrical instrumentation is represented at The Japanese Electric Meters

Inspection Corporation's (JEMIC) museum in Tokyo. JEMIC's predecessor, the ETL, was formed in 1911 when Japan passed its first law concerning testing of electric meters. From that early era comes artifacts such as a 1898 Thomson polyphase meter, the oldest induction-type meter in Japan, a ballistic galvanometer from 1913, a Kelvin balance for measuring current, and a power-factor meter. They also preserve several historical electrical standards, including a standard voltage cell (which had a potential of 1.0186 V), standard resistors (.1 ohm and 10 ohm), and a standard capacitor (1000pF).

The Japanese government participates in the country's efforts to celebrate its national electrical heritage:

• At the National Science Museum in Ueno Park, Tokyo, energy and power engineering are featured in permanent exhibits in the science and technology building. The museum boasts an Edison dynamo which, introduced in Tokyo in 1887, generated 25 kW at 220 V DC. More modern technologies are also represented with equipment such as a scanning electron microscope, a



The NTT exhibit includes the first telephone model manufactured in 1877. Photo courtesy of NTT.

gyroscope, wind tunnels, flight simulators, and jet engines.

• The Japanese Ministry of Posts and Telecommunications, working collaboratively with industrial partners, Nippon Telegraph and Telephone Corporation (NTT), Japan Broadcasting Corporation (NHK) and Kokusai Den Shin Denwa Co., Ltd. (KDD), sponsor a Communications Museum in Tokyo. Here, visitors find displays on the history of international communication technologies from its pre-electronic era to the present day, showing artifacts such as early telegraphs and telephones.

Any of these museums would make an informative and enjoyable stop for adults and children traveling in Japan. For more information, contact the center. ■

Partnership Program

We are grateful to the organizations and individuals listed below, who provide generous support to the Center in the form of operating, endowment, and project funding. If you or your organization are interested in joining our Partnership Program, please contact the Director, Dr. William Aspray.

Founding Partners: IEEE

Rutgers University
Alfred P. Sloan Foundation
IEEE Foundation - General Fund

Senior Partners: IEEE Foundation - Life Member Fund
National Science Foundation

Associates: Electro-Mechanics Company
Environmental Research Institute of Michigan
Sematech
Microwave Theory and Techniques Society

Thanks to the Microwave Theory and Techniques Society for providing money for the Rab-Lab Oral History Project.
We are also grateful to the hundreds of individuals who have contributed to our Friends Fund.

PUBLICATIONS

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

Douglas, Alan, *Radio Manufacturers of the 1920's*, 3 volumes (The Vestal Press, Vestal NY), 1988-1991, approx. 250, 270, and 290 pp. respectively. (These volumes are available in both paperback and hardcover from The Vestal Press, Ltd., P.O. Box 97, Vestal NY 13851.)

The development of radio technology has held the attention of a number of historians. So has the beginnings of radio broadcasting in the 1920s. But before the appearance of these three large volumes, the story of the companies that produced radios had not, except for a few cases, been told. Here are accounts of seventy of the most important radio manufacturers in the United States in the 1920s (including, according to the author, almost every company in business three years or more). A short history of each company is followed by clear black-and-white reproductions of carefully selected contemporary material: advertisements from such publications as *Saturday Evening Post*, technically detailed advertisements and short articles from such magazines as *Radio News* and *QST*, and photographs of radios (both exterior and interior views). Sources of information and illustrations are given, as are references to other relevant information. ■

Inglis, Andrew F., *Behind the Tube: A History of Broadcasting Technology and Business*, (Focal Press, Boston MA), 1990, xx + 527 pp.

This book tells the story of radio and television broadcasting from the turn of the century to the late 1980s, combining, in a continuous narrative, technical history, biography, and business history (including the history of government regulation of these media). The topics covered are AM and FM radio, monochrome and color TV, video recording (both its great importance within the broadcast industry and its emer-

gence as a consumer product), cable TV, and satellite program distribution. An exceptional feature of the book is how well the technology itself is explained, often in boxes separated from the narrative and usually with the help of perspicuous line-drawings. There are also many photographs of people and devices, and these assume greater interest as the motives of the people and the workings of the devices are discussed in the text. A glossary and a bibliography enhance the usefulness of the book. ■

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TV Museum Moves

If you have been trying to visit the Museum of Broadcasting, but not been able to find it, do not despair. The popular New York museum has not closed its doors. It has simply changed its name and move its location to more spacious accommodations. The museum, now called the Museum of Television and Radio, recently vacated its 53rd Street site and began operations in a new seventeen-story building at 25 West 52nd Street.

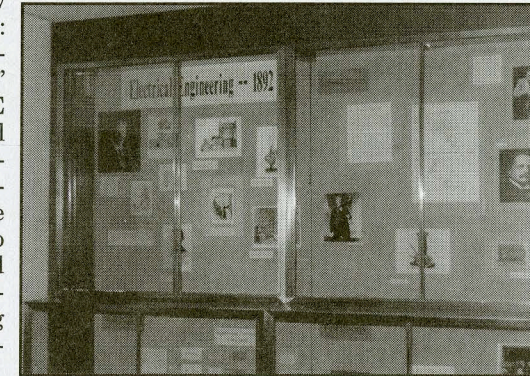
The new building, designed by noted architect Philip Johnson, has two large theaters, two smaller screening rooms, and 96 individual consoles on which patrons may watch any broadcast held in the museum's extensive archives. A listening room provides equipment for visitors to hear classic radio recordings. Scholars can make appointments to examine the museum's library of over 10,000 books and one million microfiche pages. There is also gallery space for three exhibits of radio and television artifacts. ■

ASTC

The Association of Science-Technology Centers, a not-for-profit organization of over 400 museums and affiliated institutions dedicated to increasing public understanding and appreciation of science and technology, is holding its 1992 annual conference October 3-6 in Toronto. The conference will feature panel, roundtable, and showcase sessions; a complete day at the Ontario Science Centre; the ASTC job bank; an exhibit hall; and post-conference trips to regional attractions including the IMAX Technology Centre and the Royal Ontario Museum. ASTC members and non-members can register by mail until September 11. After that date, all registration will be on-site. For more information, contact Kim Thomas, ASTC, 1025 Vermont Avenue, NW, Suite 500, Dept. 45, Washington, DC, 20005-3516, (202) 783-7300. ■

EXHIBITS

The center has recently opened two exhibits in the lobby of the IEEE executive offices at the United Engineering Building in New York City: "Electrical Engineering—1892" and "The IEEE Centennial Gifts." Members and non-members alike are invited to stop in and examine the displays during week-day business hours.



Electrical Engineering - 1892

"Electrical Engineering—1892" surveys major events and experiences that concerned the electrical engineer of a century ago. Four panels recreate the world of the electrical engineer in 1892. A large portrait of Frank J. Sprague, president of the AIEE in 1892, dominates a montage of photographs that sets the milieu of the late 19th century electrical engineer. More detailed attention is given to important business developments, technological breakthroughs, and

educational theories of that year. 1892 saw the merger of the Edison General Electric Company with the Thomson-

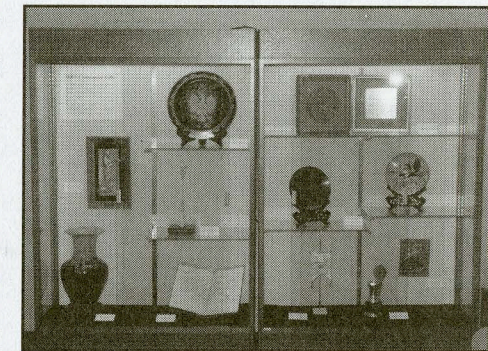
Houston company to form the General Electric Company, with profound consequences for the then-contentious "battle of the currents." Almon Strowger introduced the first automatic telephone exchange that year; and the first call from

New York to Chicago, a distance of over 1000 miles, doubled the range of existing long-distance service. And Dugald Jackson, a future chairman of the MIT electrical engineering department and president of the AIEE, brought education issues to the attention of the AIEE for the first time with a paper on the electrical engineering curriculum he had established at the University of Wisconsin which he read at 1892's annual meeting. The exhibit explicates these four events with text and illustrations. "Electrical Engineering—1892" will remain on dis-

play through the end of 1992.

Centennial Gifts

The other exhibit, "The IEEE Centennial Gifts," displays some of the gifts presented to the IEEE by other professional societies from around the world on the occasion of IEEE's centennial in 1984. These artifacts include commemorative plates from Beijing and Warsaw, bas reliefs from Tokyo and Stockholm, a model of a gas street lamp from Frankfurt, and a banner from Esbo, outside of Helsinki. The exhibit is on permanent display in the reception area of the New York offices. ■



Centennial Gifts exhibit.

Briefs:

Exhibits

Two museum exhibits will be of interest to our readers:

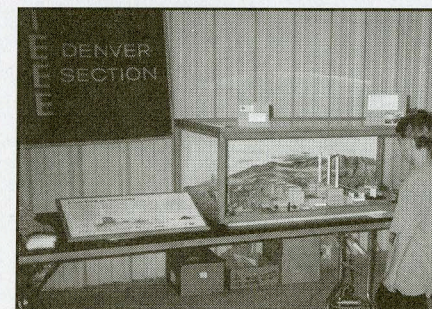
- The Computer Museum in Boston has assembled *People and Computers: Milestones of a Revolution*. The exhibition is accompanied by a catalogue and educational programs on the history of the computer in America from the 1930s through the 1980s.

- The Henry Ford Museum and Greenfield Village in Dearborn, Michigan, will open its exhibit *Made in America: The History of the American Industrial System* in December, 1992. The exhibit will be on the history of American manufacturing and power generating systems from the 18th century to the present. ■

Denver Section Exhibits

The center seeks to encourage involvement in history by IEEE members and interest in electrical engineering among the general public. Thus we applaud the activities of the Denver Section, who have been drawing approving crowds at public gatherings with two recent exhibits, one historical, the other modern.

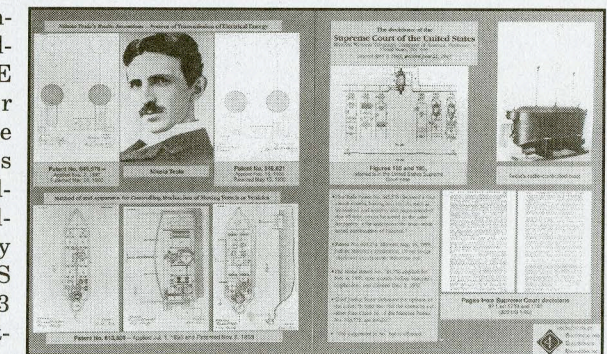
At the May 1992 Conference of the IEEE Vehicular Technology Society, the Region 5 History Committee was invited to add a



Model of Laramie River Generating Station.

history exhibit to the usual Denver Section exhibit. The challenge was taken up by IEEE History Committee member Charles Wright. Since the theme of the conference was communications, Wright decided to prepare an exhibit detailing the controversy over early radio patents and the U.S Supreme Court decision of 1943 which ended the long court battles of Tesla, Marconi, Stone, and Lodge. The exhibit presents examples of Tesla's work and culminates with the court decision to uphold the priority of Tesla's patents for basic radio circuits.

The Denver section is circulating Wright's exhibit to lectures, conferences, and other meetings, together with a model of the present-day Laramie River Generating Station. The model station, which comes complete with an operating model



Radio Patent exhibit.

train and a larger-scale model steam generator, was built by Larry Svacina, a local engineering contract drafter, at the suggestion of IEEE Life Senior Member John Tary.

The two exhibits have together proven to be a popular attraction for both engineers and non-engineers. Plans are being considered for the fall to package the combined exhibit as a traveling show. ■

EE History in Cuba

For a decade, the Centro de Estudios de Historia y Organizacion de la Ciencia (CEHOC) of the Cuban Academy of Sciences has undertaken systematic research on the introduction and subsequent development of electrical technology in Cuba. Its efforts have improved the literature on this subject, which was previously slender, journalistic, and often misleading.

Although Cuba is a small, developing country which for centuries has been an importer, rather than a creator, of hardware and engineering know-how, the researchers at CEHOC have found an interesting story about electrical history in their country. They explain, for example, the reasons for the early association of Cuba with various advanced electrical and electronic technologies.

The initial research concentrated on electric lighting in Cuba. In published papers and an unpublished book, the CEHOC has surveyed this topic, paying close attention to economical, political, and cultural issues alongside technical details. Later papers investigated the introduction of the telephone and radio communications technologies and university courses in telecommunications and electronics.

Perhaps the story with the widest historical interest is that of telecommunications systems in Cuba. The deep-sea submarine cable between Havana and Florida, laid in 1867, was the first telegraphic link between two nations of the western hemisphere. The telephone cables, which were brought into service in 1921, establishing an 8,800-kilometer

telephone connection between the islands of Santa Catalina and Cuba across the U.S. mainland, were, at the time, the longest and most deeply submerged in the world. Deep-sea telephone cables, equipped with repeaters, were laid between the U.S. and Cuba in 1950 as a trial for the design of the first transatlantic telephone cables in 1956. All these technological "firsts" were no accident. CEHOC research has revealed that the transnational corporation ITT preferred to use Cuba as a proving grounds for new technologies until the late 1950s.

Senior members of the national electrical engineering community who are among the pioneers in particular areas of technological endeavor in Cuba have agreed to record their recollections

about rural electrification, radio and television broadcasting, computer technology, and other technical fields. Study of these sources, which supplement others at the Cuban National Library, the National Archives, and local or specialized museums and archives, will contribute to a better understanding of Cuba's history as well as enrich the cultural background of Cuban electrical and electronics engineering professionals and students.

Plans for a conference on Cuban electrical history are being made by Bernard Finn, the Curator of Electricity at the Smithsonian Institution, and Joan Lisa Bromberg. Any person with ideas for sessions, etc. are invited to contact Drs. Finn and Bromberg, either directly or through the center. ■

Fellowship Offered

Applications will be accepted beginning in October for the 1993-94 Fellowship in the History of Electrical History. The Fellowship, which is funded by a grant from the IEEE Life Members Fund, is for either one year of full-time graduate work in the history of electrical science and technology at a college or university of recognized standing, or for up to one year of independent research for a recent Ph.D. graduate in the same field. The stipend is \$14,000.

The Fellowship Committee evaluates

applicants on the basis of a complete description of the proposed research, college transcripts, letters of recommendation, and additional information supplied on the application form. Students with undergraduate degrees in engineering as well as those having degrees in the sciences or the humanities are invited to apply. The deadline for receipt of applications is 1 February, 1993. Application forms may be obtained from the Center for the History of Electrical Engineering. ■

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