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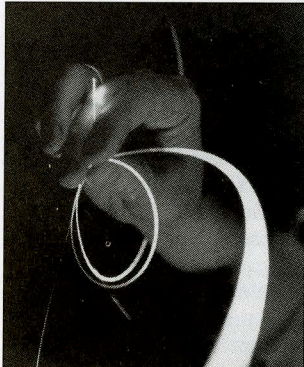
IEEE HISTORY CENTER

THE STATE UNIVERSITY OF NEW JERSEY
RUTGERS

STATIC FROM THE DIRECTOR

Owing to IEEE publication schedules, it has not been that long since I addressed you in the last issue. I was gratified to learn that many of you actually read the issue carefully, and I am grateful for all the feedback I have received. The responses to the humor piece on the last page will be posted as a thread to our ECHOES electronic bulletin board.

Meanwhile, despite the short time period, developments at the center have continued apace. As promised last issue, we welcome some new faces, those of our Post-doc, our Intern, and our Graduate Assistants [see page 2]. Unfortunately, we do not as yet have a new Archivist. This lack is due somewhat to the fact that the position has become a moving target. The Archivist



represents the central information manager at the Center, and even as I seek to fill the position we are evolving, as are many institutions these days, away from traditional paper archives and toward a greater and greater role for electronic reception, storage, and transmission of this information.

We are doing more and more on our Web site, such as ECHOES mentioned above. As a backdrop, IEEE as a whole is working on migrating to a new Web site structure, while we at the Center are working with both IEEE and Rutgers to improve our individual connectivity to the relevant resources. We have just been awarded a grant by the Sloan Foundation to conduct still more research on-line (see box to right). Finally, at an IEEE Foundation retreat in September to explore worthwhile educational programs for IEEE and its Foundation to pursue in the new millennium, a top idea that emerged is that of an IEEE Virtual Museum. While the final form of, and participants in, such an enterprise are not clear, there is consensus that the History Center is the IEEE unit best positioned to explore the definitions and possibilities of this Museum, and we will be undertaking this exploration in the coming months.

In other areas, activities also continue. We teach our Rutgers courses, attend conferences, and pursue research. I am still working with the IEEE History Committee on improving the Milestones Program, including its geographical scope. To that end, I am pleased to report a new Milestone in Region 8 [see page 9], and other interesting proposals are in the works. With the completion of the IEEE Signal Processing Society project [see last

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CENTER WINS SLOAN GRANT

The IEEE History Center has been awarded a grant from the Alfred P. Sloan Foundation of \$138,000 (\$69,000 per year in 1999 and 2000) to explore the on-line documentation of the recent history of electrical engineering and computing.

For a few years now, the Sloan's HOTNet (History Of Technology on the InterNET) program has sought consortia of qualified institutions to establish Web sites about specific recent advances in technology, in order to explore a methodology for doing such research on-line as well as to attack specific historical issues. The cases chosen are meant to be new enough that the original participants in the technological development are largely able to cooperate with the historical research, but old enough that the importance of the new technology is clearly established. Each partner in the consortium picks one or two areas, and while the funding and Web sites are kept separate, the partners work together to solve technical and methodological problems.

Basically, the idea is to establish a Web site and post initial material, then solicit comments and additional material from the original participants, and build up a record of the technological achievement. In the previous waves, the areas covered by members of a single consortium were quite diverse. Individual topics have included the "Development of the Polymerase Chain Reaction Technique" and the "Construction of the Trans-Alaska Pipeline."

The IEEE History Center will be leading the fourth 'wave' of this program with an intentional focus on one area of technology: electrical engineering and computing. Our partners are the Department of Electricity and Modern Physics at the National Museum of American History (NMAH), Smithsonian Institution, and The Computing History Museum, Ameri-

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Staff Notes

Comings and Goings

We are pleased to announce several additions to the IEEE History Center family. As promised last issue, I can first welcome to the Center our new Post-doc, **David Hochfelder**. David has come to us fresh from defending his dissertation—"Taming the Lightning: American Telegraphy, 1832-1910"—at the History Department at Case Western Reserve University under the direction of world-renown historian of technology Carroll Pursell. In addition to his historical training, David holds a B.S.E.E. from Northwestern University (1987). He is an important addition to the team. He will be teaching our Rutgers course "The Electric Century" in the Spring, and contributing to our ongoing and newly developing programs.

Another important addition is **Atsushi Akera**, who is with us this fall in our internship that is generously sponsored by the IEEE Life Members Fund. Like David Hochfelder and particularly like Center Director Michael Geselowitz, Atsushi is doubly trained, with two S.B. degrees from

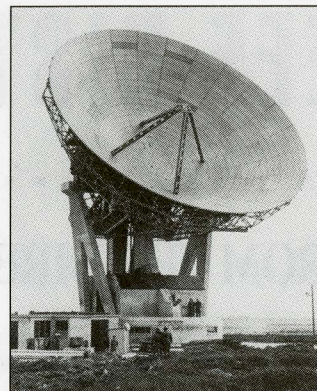
M.I.T. (EECS and STS), and a Ph.D. in History and Sociology of Science from the University of Pennsylvania. Atsushi will be editing and preparing for publication the proceedings of our 1997 Williamsburg Conference on the History of Computing.

We are also welcoming back this semester **David Pompeo**, our Rutgers undergraduate work-study student.

Finally, we would like to welcome our five Graduate Assistants from the Rutgers Department of History: **Christopher T. Fisher** is a sixth-year graduate student in the Rutgers History Department. His dissertation focuses on the relationship between the Civil Rights movement and the Vietnam War. **Frank Freyre** is writing a biography of Cuban dictator Fulgencio Batista, who was toppled by the Cuban revolution. Frank lives in Freehold, NJ with his wife, Cary and three-year-old daughter, Amanda. Frank and Cary are expecting their second child in the spring. **Theresa Napoleon-Williams** is a graduate student interested in Twentieth Century American history, and the history of African Americans and women. Her dissertation examines the social and legal response to the rape of black women by white men in the Twentieth Century. **Don Neske**, who has recently returned to graduate school at his alma mater after working in the computer industry, is interested in military history and in the Holocaust. Lastly and especially we would like to welcome back **Charles S. 'Chip' Young**, our former GA and Intern. Chip has recently published "Missing Action: POW Movies and the Korean War" in *Historical Journal of Radio, Film, and Television*, March, 1998. ♦

Geselowitz Attends Shannon Commemoration

Fifty years ago, (October 1948) saw the publication of Claude E. Shannon's "A Mathematical Theory of Communication." This seminal paper spawned a whole new discipline — Information Theory — and has had a profound impact on many other fields, including communications engineering, signal



processing, cryptography, statistics, and even economics.

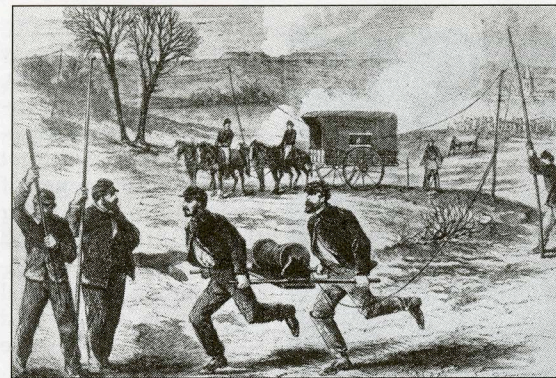
As part of a series of celebrations throughout the world, the IEEE Information Theory Society (IT-S) organized a commemorative International Symposium on Information Theory at MIT, Cambridge, MA during August 16-21, featuring a special History and Reminiscences session. The session began with a 1950s

Bell Labs film clip of Shannon with his famous maze-solving mouse, and then proceeded with presentations by IEEE Life Fellows Peter Elias, David Huffman, Jim Massey and David Slepian. This group was then joined by a broader panel of distinguished international engineers and scientists who gave brief reminiscences and fielded questions from the audience and each other. Director Michael Geselowitz was able to attend on behalf of the IEEE History Center, and also had an opportunity to address the IT-S Board of Governors. The entire session was enthusiastically received by the hundreds who attended.

The IT-S also produced a CD-ROM containing the complete contents of the IEEE Transactions on Information Theory from 1953 through 1987, which was given to all ISIT attendees. Attendees also received a reprint of Shannon's paper and a special "Golden Jubilee" issue of the IT Newsletter, guest-edited by James Massey and IEEE Fellow and IT-S Historian Anthony Ephremides. The Newsletter included personal reflections by thirteen recipients of the IT-S Shannon Award, and the announcement of special Golden Jubilee awards for both outstanding papers and technological achievement.

In addition, IT-S published in October a special issue of the IEEE Transactions on Information Theory, guest-edited by IEEE Fellow Sergio Verdu, which includes 25 invited retrospective articles from some of the foremost authorities in the fields of coding theory, Shannon theory, digital communications, data compression, networks, signal processing, statistical inference and pattern recognition.

The 50th anniversary of Shannon's paper has also been celebrated this year by a Shannon Day on May 18 at Bell Laboratories, Murray Hill, NJ, at a special symposium June 17-19 at the Royal Netherlands Academy of Science, Amsterdam, and at the International Symposium on Information Theory and its Applications in Mexico City in mid-October. ♦



Laying Telegraph lines during the Civil War.

"I'm Ready For My Close-up, Mr. Demille"

Also in August, David Morton participated in a videotaped interview on the subject of Dr. Semi Joseph Begun, a pioneer in the field of magnetic recording and 1998 inductee to the National Inventors Hall of Fame in Ohio. Begun was a long-time employee of the Brush Development Corporation of Cleveland, and developed

magnetic tape, wire, and disk recorders. The video segment, along with several others, will be shown to a special audience at the Hall of Fame later this year. ♦

Land of 1000 Lakes

In September Center historian Nebeker traveled to Minneapolis, where he gave talks for the local chapter of the IEEE Magnetics Society (on the role of magnetics in World War II) and for the local chapter of the IEEE Instrumentation and Measurement Society (on the beginnings of the electronics industry). The main purpose of the trip was to participate in a 3-day workshop on the history of computing organized by the Charles Babbage Institute; Nebeker presented a talk on "Discipline Boundaries: The Case of Signal Processing and Computer Science and Engineering". While in Minneapolis Nebeker also met with David Rhees and other staff of the Bakken Museum and Library, devoted to the study of the role of electrical and electronic technologies in biology and medicine. ♦

Nebeker at ICIP

The International Conference on Image Processing (ICIP) is one of two major annual conferences that the IEEE Signal Processing Society organizes. This year ICIP took place in Chicago in early October. Because 1998 is the 50th anniversary of the founding of the Society, the history of the field and the history of the Society received considerable attention at the conference. All attendees received a 50th anniversary booklet, prepared by the Center and published by the Society, and had an opportunity to order the two historical monographs and the poster published by the Center (described in the last newsletter). The conference opened with a special panel discussion on the greatest achievements to date of image processing, and all four plenary talks, presented over the next three days, were, in part at least, retrospectives. Center historian Nebeker attended ICIP, where he conducted oral-history interviews to add to the Center's impressive collection of interviews with the founders of signal processing, and he also spoke at the conference banquet about the history project. ♦

Center Activities

IEEE Prize Announced at SHOT

David Morton and David Hochfelder both represented the IEEE History Center at the 1998 annual meeting of the Society for the History of Technology (SHOT) in Baltimore, held October 15-17. Electrical history was well-represented on the program, with historians presenting papers on such topics as early sound recording in motion pictures (Dr. Emily Thompson, Univ. of Penn.), and the history of Heathkit (Dr. Linda [sic] Caporael, RPI). Dr. Julian Reitman (U. Conn.-Stamford) was also there demonstrating his progress on his CD-ROM based on the 1904 Westinghouse films. In September Julian had given a preview to the IEEE History Center staff, since we are advising him on his project, which is sponsored in part by the IEEE Life Members Fund.

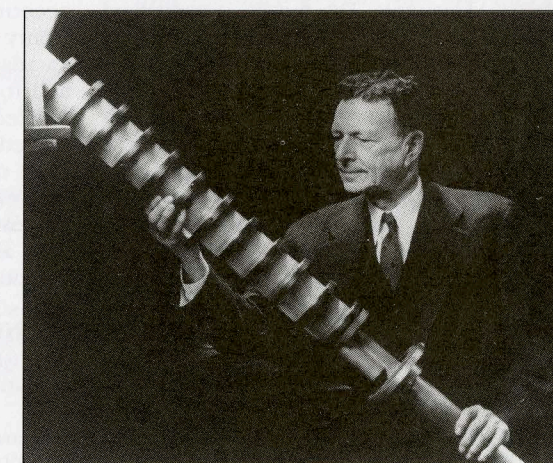
In addition, the meeting featured the presentation of the IEEE Life Member Prize in Electrical History. The Prize is funded by the IEEE Life Members, awarded by SHOT, and administered by the IEEE History Center. This year's winner, for the best article published in 1997 in the field of electrical and computer history, was Robert G. Arns for his paper "The High-Vacuum X-Ray Tube: Technological Change in Social Context," *Tech-*

nology and Culture 38 (October 1997):852-890. Our congratulations go out to Dr. Arns. ♦

Rutgers Courses

This Fall, David Morton is teaching a course entitled **Technology and Society in America**. This course, traditionally taught by History Center staff, emphasizes the role of technology and engineering in American history from the colonial period to the present. The course is a part of the History Center's mission to educate the public as to the central role of technology in society.

At the same time, Center Director Michael Geselowitz has designed a new course for Rutgers University called **Introduction to Science, Technology, and Society** (STS). This extradepartmental course is meant to be the centerpiece of a revamped STS minor. Using cases from electrical history and other scholarly approaches to engineering and science, and drawing on the expertise of guest lecturers available at Rutgers through the IEEE History Center, the Edison Papers Project and other units, the



William Coolidge with X-Ray tube.

course seeks to expose students from a wide range of backgrounds to the critical issues involving technology in society. The course is being offered this semester for the first time, and initial enrollment was 20 students, 12 from engineering (4 from electrical and computer engineering), and 8 from a variety of other disciplines. Geselowitz has also been named the Program Advisor for the STS Minor, and has been working with a variety of faculty members to promote STS studies at Rutgers. ♦

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 IEEE History Center.

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Societies have always had "knowledge workers" such as priests, medicine men, lawyers, or teachers. In the 20th century, however, a large part of the workforce can be so classified, as more and more people provide information or intellectual activity rather than material products or physical services, and in the 1990s in the United States, knowledge workers make up half of the workforce. This economic change has, of course, been intimately related to technological changes, such as new forms of manufacturing, communication, and control. This new book by James Cortada tells the story of this transformation. Its focus is not the hardware or the software involved, though these are not left out of the story, but rather the "wetware" of the knowledge workers. It is a collection of articles, written by historians, sociologists, and economists, which appeared originally in academic publications and government reports.

The book is divided into three parts. The first addresses the question of where the knowledge workers have come from; an important partial answer is that many new information-handling technologies, such as typewriter or telephone or computer, have created new classes of workers. The second is concerned with the recognition of new professions and explores changes in the classification of the workforce over time. The third part deals with social and personal consequences, such as how work is organized and how the tasks of the individual have changed. The principal aim of the book is to give managers a better understanding, through historical perspective, of the economic role of knowledge workers, but it is an excellent introduction for anyone with an interest in the rise of knowledge workers.

MOYER, ALBERT E. *Joseph Henry: The Rise of an American Scientist*. Washington and London: Smithsonian Institution

Press, 1997.

Albert Moyer, a leading historian of American science, has written a clear and engaging biography of Joseph Henry, the most eminent American scientist of his day. Electrical engineers will of course be familiar with Henry, after whom is named the SI unit of inductance. Henry made important discoveries in the field of electromagnetism between 1827 and 1846, many of which had practical applications in telegraphy and electrical motors and generators. As testimony to his international scientific stature and to the esteem in which the nation's leaders held him, the Board of Regents of the newly founded Smithsonian Institution chose him as its first secretary. He held this position until his death in 1878.

Moyer concentrates on the years when Henry was an active scientific researcher at the Albany Academy and Princeton University before 1846. Readers interested in the early history of electrical science and technology will particularly enjoy Moyer's account of the friendly rivalry between Henry and the British electrician Michael Faraday as both men raced to investigate and to publish fundamental breakthroughs in electromagnetic induction. Henry also played an important role in the development of Morse's telegraph in the late 1830s and early 1840s, and Moyer provides an interesting discussion of their initial friendship and later enmity over credit for the invention of the telegraph.

KEONJIAN, EDWARD. *Survived to Tell: The Autobiography of Edward Keonjian*. Santa Fe, NM: Sunstone Press, 1997.

Edward Keonjian, microelectronics pioneer and IEEE Life Fellow, has published the autobiography of a remarkable 20th century life. Anyone who survived direct contact with any of the great wars and associated horrors of the past 100 years probably has a unique story that should be heard, and Keonjian has seen more than most. Born into an Armenian fam-



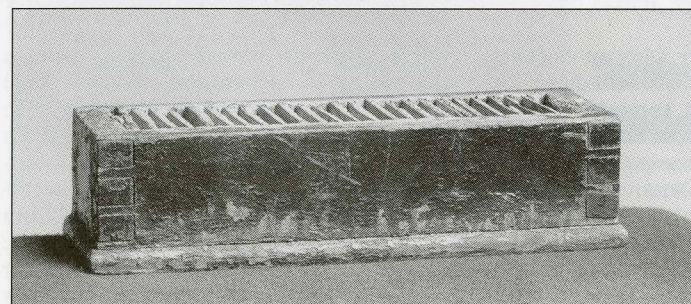
Joseph Henry

ily in Tbilisi, Georgia, in Tsarist Russia in 1909, he witnessed and survived the Russian Revolution, the Stalinist purges, the siege of Leningrad in World War II, a German forced labor camp, and a difficult journey to eventual freedom in a new land — America — where he did not speak the language and had no contacts. Yet in the end he triumphed. It is an incredible personal and historical story, well-

written and riveting. From a historical point of view it could have used more balance and context — because of his personal experiences Keonjian tends disturbingly to play down the evils of Nazi Germany so as to play up the evils of the Stalinist Soviet Union — but the story is a compelling one none the less.

From the point of view of interest to the readers of this newsletter, more description of his technological exploits would have been appreciated. However, despite the lack thereof, and the idiosyncrasy of the tale, there are two interesting general observations that can be made. First, it is fascinating to observe how many individuals from all over the world — and various sides of the different conflicts — came through the crucible of those times to become leading engineers, often sharing in the Fellowship of IEEE. He tells an anecdote of two engineers in his carpool at GE in the 50s — one American born who had been a bomber pilot in World War II, the other a German-born U-boat commander — who got to talking and realized that the former had bombed and damaged the latter's ship. This story is not unique.

The other pattern to which Keonjian conforms, and one which the History Center has documented in its oral histories and other research, is the role of early radio in bringing these pioneering electrical engineers into the field. Keonjian reports that he was 14 when the first radio transmitter came to Tbilisi and he writes, "I felt instantly that this infant technology would be my destiny." Over the objections of his parents he became a tinkerer and eventually an engineer. It is hard for us born in the modern era to imagine the hold that this new magical science exerted over the right sort of mind. Keonjian tells that and his other stories well, and they are worth hearing. ♦



Henry's trough battery

The Newsletter's "Bibliography" section was prepared with the assistance of Prof. Thomas J. Higgins of the University of Wisconsin-Madison, who passed away in September (see page 9)

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(Note: New Dates)

THE IEEE HISTORY CENTER WILL BE COSPONSORING AND HOSTING AN EXCITING CONFERENCE IN 1999. HERE IS THE CALL FOR PAPERS:

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The roles of women in technology are more diverse, controversial, and important today than ever before. Historically, women's involvement in the creation, manufacture, and use of new technologies has been seriously neglected. Even today, the public has an understanding of society that usually treats women as "technological illiterates" with little stake in any aspect of new technologies. Yet since the 1950s women have tried to technologically empower themselves, particularly by entering the engineering profession. They have done so in great numbers, although today it is glaringly obvious that women are still underrepresented in engineering. Women in the field still face gender-based obstacles, expectations and biases despite decades of efforts to eradicate these problems.

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To submit a one page abstract for a paper or poster, or a proposal for a paper session or panel discussion, or to get more information, contact:

David Morton, Program Co-Chair, IEEE History Center, Rutgers University, 39 Union St., New Brunswick, NJ 08901-8538, d.morton@ieee.org

DEADLINES:

Proposals for Sessions: January 1999; Abstracts of individual papers: March 1, 1999; Your Notification of Acceptance: April 15, 1999; Your Manuscript for the Conference Proceedings: June 1, 1999.

ROSS, IAN M., "The Foundation of the Silicon Age." *Bell Labs Technical Journal* 2, no. 4 (Autumn 1997):3-14.

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Things to See and Do

Historic Speedwell Opens a WebSite

Historic Speedwell is a museum located in Morristown, New Jersey, on the site where Marconi and Alfred Vail first perfected the electro-magnetic telegraph. It also commemorates the Vail family and their iron works, but it is the telegraphy connection that caused the site to be named an IEEE Milestone in 1988. Now the museum staff have established a fascinating Web site at <http://www.speedwell.org>. Check it out!

Rand Opens Its Archives

The RAND Corporation marks its 50th anniversary in 1998. A non-profit institution dedicated to research and analysis in the public interest, RAND takes this occasion not only to look to the future, but also to broaden its effort to document its first half century. RAND's aim is to see this documentation appear as a group of scholarly publications available to all who have an interest in the institution, its work, and the broad variety of subjects in which it has been engaged.

RAND is therefore inviting academic historians and analysts in the field of science and technology studies to help achieve this

objective. Participating scholars will be offered access to RAND's newly opened archives, which are rich and diverse in content. RAND has conducted research across a broad spectrum of scientific, methodological and policy issues — concentrating on matters at the leading edge of public concern.

Those interested in learning more about the RAND history project are encouraged to access the RAND website at www.rand.org or to contact Gustave H. Shubert, the RAND Senior Fellow who is coordinating this activity, at RAND (1700 Main Street, P.O. Box 2138, Santa Monica, CA 90407-2138, 310-451-6947), or via the internet (shubert@rand.org).

APS to Celebrate 100 Years

Keep your calendar clear. The American Physical Society will celebrate its centennial in Atlanta in March 1999 with the largest physics meeting ever held in the world. As part of the Centennial Celebration, APS is planning an exhibition, "Nobel Discoveries." More information will be forthcoming.

Radar Reunion

The Commonwealth WW2 Airforces (RCAF-RAAF-RNZAF) will be holding their

Radar Reunion in Bournemouth, UK, on 13-16 May 1999. For more information contact Jo Whitehouse, 11 Richmond Close, Sale, Cheshire M33 2PX, UK, Tel. 0161-962-4984.

Engineering Heritage

An international conference on — Preservation of the Engineering Heritage—Gdansk Outlook 2000 — is being planned for 7-10 September 1999 in Gdansk, Poland. More information is available from the Web site, <http://www.pg.gda.pl/~pehgo2000>.

European Physical Society Doubles the Voltage

Finally, the APS celebration in Atlanta in March is important, but on 11-15 September 1999, in Como-Pavia, Italy, the European Physical Society is using its 4th Conference on the History of Physics to commemorate "Volta and the History of Electricity" on the occasion of the 200th anniversary of Volta's invention of the battery. Anniversaries in electrical history don't get much older than that. Paper submissions are due 1 May 1999. For more information, refer to the conference Web site, <http://www.cilea.it/volta99> or email volta99@pv.infn.it. ♦

satisfactory academic performance is required. These restrictions do not apply to post-doctoral applicants.

The Fellow is selected on the basis of the candidate's potential for pursuing research in and contributing to electrical history. For more information and an application packet, contact The Chairman, IEEE Fellowship in Electrical History Committee, IEEE History Center, Rutgers University, 39 Union Street, New Brunswick, NJ 08901-8538, USA, history@ieee.org. The deadline for receipt of applications is 1 February. Applicants will be notified of the results by 15 April.

The IEEE Fellowship in Electrical Engineering History is administered by the IEEE History Committee and supported by the IEEE Life Member Fund.

Bakken Library

The Bakken Library and Museum in Minneapolis offers visiting research fellowships for the purpose of facilitating research in its collection of books, journals, manuscripts,

prints, and instruments. The focus of the Bakken's collections is on the history of electricity and magnetism and their applications in the life sciences and medicine. Related materials include mesmerism and animal magnetism, 19th-century ephemera concerning alternative electromedical therapies, miscellaneous scientists' letters, and trade catalogues. The instruments include electrostatic generators, magneto-electric generators, induction coils, physiological instruments, recording devices, and accessories.

The fellowship is a maximum of \$1,300 and is to be used for travel, subsistence, and other direct costs of conducting research at The Bakken. The minimum period of residence is one week. The grants are open to all researchers. The application deadline for 1999 is March 1, 1999. For further information, please contact:

David J. Rhees, Executive Director
The Bakken Library and Museum
3537 Zenith Avenue South
Minneapolis, MN 55416
USA

(telephone: 612-927-6508;
fax: 612-927-7265) ♦

South Africa Milestone

We are pleased to announce that the IEEE has approved another IEEE Milestone in Electrical and Computing History, this one in Cape Town, South Africa, in IEEE Region 8. It commemorates the first practical use of the Marconi system at the beginning of this century, and the citation reads as follows:

First Operational Use of Wireless Telegraphy

The first use of wireless telegraphy in the field occurred during the Anglo-Boer War (1899-1902). The British Army experimented with Marconi's system and the British Navy successfully used it for communication among naval vessels in Delagoa Bay, prompting further development of Marconi's wireless telegraph system for practical uses.



Marconi on wheelhouse of Elettra.

The dedication is being planned for African '99 next September, and we will be sure to bring you updates in our "Things to See and Do" section. ♦

Static *continued from page 1*

issue], we are exploring areas of cooperation with other IEEE Technical Societies. The IEEE Life Members Committee has generously granted us up to \$10,000 to visit the AdComs of IEEE Technical Societies this year and next.

Finally, in the area of fundraising, I am

pleased to announce a \$100,000 donation from the IEEE Life Members Fund to our endowment fund. The Life Members Committee has always been among our most ardent supporters, and this gift at this time will strengthen the hand of the Trustees of the IEEE History Center when they seek endowment funds from IEEE Technical Societies and other entities inside and outside IEEE. As I said last issue, however, it is you

our individual Friends who really make our program work. This is the season of the IEEE membership renewal/profile letter where you have an opportunity to designate funds for the IEEE History center, among other causes, and you will be receiving an individual letter from me as well. I am grateful for your past donations, and I hope you will continue to support the programs we all believe in — the preservation, research and promotion of the legacy of electrical engineering and computing. ♦

THOMAS J. HIGGINS, AGE 87

We regret to announce the death, on September 11, 1998, of Thomas James Higgins. Thomas, who was 87, was a Life Fellow of IEEE and had a long, active career in industry, consulting, and education, eventually ending up as Professor Emeritus of Electrical Engineering at the University of Wisconsin. It was in engineering education that he will perhaps be best remembered in the world at large - his AIEE Fellow citation in 1957 already cited, among other things, "his leadership in electrical engineering education." However, to readers of this Newsletter, his name will be recognized from the credit given to him each issue - each issue since #3 in June 1983! - for his assistance in preparing the "Bibliography" section (see page 5). According

to his daughter, Janet Higgins, Professor of Art at Middle Tennessee State University, "Dad loved teaching - his primary focus - but history and books were a close second love." Thomas faithfully and diligently scoured the literature to help us strive to keep our running bibliography as complete as possible. He was a Friend of the IEEE History Center in the literal sense, but he was also a good friend and good correspondent to the staff. He will be missed in many ways. In addition to his daughter, he is survived by his wife, Professor Mary Ellen Roach; a son, James, an electrical engineer for Boeing; and a brother Francis of Lockport, NY. He was predeceased by his first wife, Eva Louis Logan Higgins, in 1963. ♦

Sloan Grant *continued from page 1*

can University. The Center will be covering "Automatic Speech Synthesis and Recognition" and "Digital Audio Recording." The topics of the NMAH will be "Recent Developments in Electric Lighting" and "Alternative Methods of Power Generation." The Computing History Museum will tackle "Programming Languages" and "Software Engineering Methods."

Readers of this newsletter will be kept apprised of developments in the project, especially when it comes time to reach out and contact the original engineers involved in these various important areas of technological development. We are very excited about the prospects. ♦

Fellowships Available IEEE

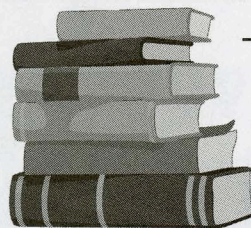
The IEEE Fellowship in Electrical History supports either one year of full-time graduate work in the history of electrical and computing science and technology at a college or university of recognized standing, or up to one year of post-doctoral research for a scholar in this field who has received his Ph.D. within the past three years.

Candidates with undergraduate degrees in engineering, the sciences, or the humanities are eligible for the Fellowship. For pre-doctoral applicants, however, the award is conditional upon acceptance of the candidate into an appropriate graduate program in history at a school of recognized standing. In addition, pre-doctoral recipients may not hold or subsequently receive other fellowships, but they may earn up to \$5,000 for work which is directly related to their graduate studies. Pre-doctoral Fellows must pursue full-time graduate work and evidence of

AND DON'T MISS...

Arc welding and other electrical welding techniques (such as resistance welding, induction welding, flash welding, electron-beam welding, and laser-beam welding) have played a large role in this century's spectacular increases in manufacturing capability. For example, the adoption of arc welding for shipbuilding during World War II meant that one person could do the work of a 4-man riveting crew; Henry Kaiser used this and other methods to reduce the time needed to build a standard cargo vessel (called the Liberty Ship) from 1.4 million man-hours and 355 days in 1941 to 500,000 man-hours and 41 days in 1943. A new edition of *Jefferson's Welding Encyclopedia* (American Welding Society, 1997) contains, besides historical information in many of the individual articles, a 16-page appendix on the history of welding, including a chronology of welding milestones. ♦

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(source: SPENCER, DONALD, *Dictionary of Computer Quotations*, Ormond Beach, FL, Camelot Publishing Company, 1997 ♦

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