



HISTORY OF COMPUTING CONFERENCE

A technology that is as important as the computer instantly raises questions in the minds of the curious: Where did it come from? What can it do? How have people interacted with it over the years? Historians and computer professionals have tackled some of these questions, but the impact of the computer on society has been so multifaceted that it has been hard for any single author to address all of the issues in any one place. The history of computing is being told in pieces.

In an effort to put those pieces together, the IEEE History Center, with project support from the IEEE Foundation, recently organized a conference on the history of computing. Attended by about 40 people,



The 1997 Conference on Computer History

it was held at William and Mary College in Williamsburg, Virginia from Friday 13 June through Sunday 15 June. A series of 14 invited lectures provided an overview of the development of computing and an introduction to the literature and methodologies of computer history. In addition, there were nine papers presenting current research and a panel discussion on making history interesting.

The first day of the conference featured five invited lectures. Michael Williams, professor at the University of Calgary, surveyed the development of computing technologies up to World War II. James Cortada, historian and IBM manager, told how an information-processing industry, producing adding machines, cash registers, and punched-card equipment, grew in importance in the first half of the 20th century. Brian

Randell, professor at the University of Newcastle, recounted some of his experiences in writing computer history and told something about the development of computer technology after World War II. The emerging computer industry was described in two lectures: Arthur Norberg, professor at the University of Minnesota, analyzed the business of computing, focusing on three companies (Eckert-Mauchly, Engineering Research Associates, and IBM), and Robert Seidel, director of the Charles Babbage Institute, explained the important roles government had in promoting the computer industry.

Also on the first day was a session of participants' papers. Sue Barnes, assistant professor at Fordham University, explained how many of the things Web users in the late 1990s take for granted were pioneered by Doug Engelbart in the 1960s when he worked to develop what he called "interactive computing," which included windowed screen design, hypertext linking of documents, the mouse, collaborative computing, and multimedia. Colin Burke, associate professor at the University of Maryland, Baltimore County, discussed postwar government policies for generating and distributing scientific information, which involved automated bibliographic retrieval and other library systems. Martha Sloan, professor at Michigan Technological University, gave an overview of computer engineering education as it evolved in the 1960s, 1970s, and 1980s. The emergence of the software industry in the 1960s was the subject of the talk by Luanne Johnson, a software entrepreneur herself. Andrew Goldstein, Center manager and curator, reported on his study of a cyber start-up company.

The second day of the conference also featured five invited lectures. William Aspray, executive director of Computer Research Association, gave an account of the emergence of academic computer science in the United States. He pointed out that in 1946 five major research universities (MIT, Harvard, Columbia, Pennsylvania, and Princeton) had direct involvement with advanced computing, but that only one of them (MIT) took advantage of this early entry to establish a strong position in computer science. He reviewed how in the 1950s and 1960s colleges acquired computing facilities and how a curriculum for computer science emerged. Mike Mahoney, professor at Princeton University, outlined the history of efforts to get computers to program themselves, giving most attention to programming languages and compilers. Paul Ceruzzi, historian at the National Air & Space Museum, provided a historical overview of software

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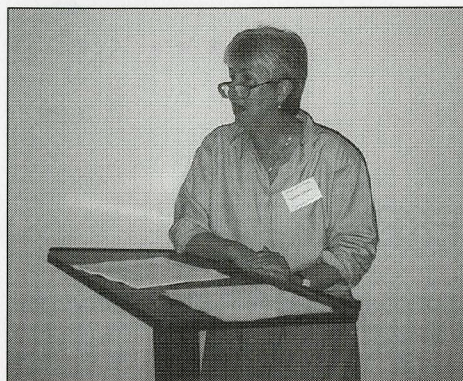
CENTER FOR THE HISTORY OF ELECTRICAL ENGINEERING

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History of Computing Conference

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Luanne Johnson

for the personal computer, and Earl Swartzlander, professor at the University of Texas, surveyed the long history of calculators. Janet Abbate, postdoctoral historian at the Center, spoke on the development of computer networks, from early data communications experiments, to the ARPANET, local

area networks, and the World Wide Web.

The session of participants' papers on the second day began with a talk by David Grier, director of the honors program at George Washington University, on the Mathematical Tables Project of the Works Progress Administration, an effort of the 1930s to use large numbers of human computers to carry out large calculations. In the electromechanical era, National Cash Register had established a commanding position in the cash register market; its transition to the electronic era was the subject of a paper by Richard Rosenbloom, professor at the Harvard Business School. David Morton, research historian at the Center, talked about the beginnings of automation in processing and manufacturing industries, and Aristotle Tympas, Ph.D. candidate at the Georgia Institute of Technology, examined the analog-digital demarcation in the history of computing.

The final day of the conference was a workshop in writing computer-history. Henry Lowood, bibliographer at Stanford University, provided an overview of both archival and on-line sources for the history of computing.

ing. Rik Nebeker, research historian at the Center, talked about oral history as a source of information. Two historians, Martin Campbell-Kelly of the University of Warwick and Eda Kranakis of the University of Ottawa, gave talks on contextualizing history, Campbell-Kelly on the economic context and Kranakis on the social context. Following lunch there was a panel discussion on making history interesting. Panelists were Martin Campbell-Kelly, Arthur Norberg, Frank S. Preston (an engineer whose career in computers began in 1941 with Vannevar Bush's machines at MIT and included design of both analog and digital computers with Norden and later United Technologies), and Emerson Pugh (IBM engineer and author of four books on the history of IBM). The conference closed with an ice-cream party in honor of William Aspray, former director of the Center and the person who originally designed the conference.

The Center is working to produce a short book that will be an introduction to the history of computing. Most of the chapters will be revised versions of the invited talks, and several other chapters have been commissioned.

Staff Notes

New Director Hired

On May 5, Michael N. Geselowitz joined the IEEE History Center as its new director. Mike holds Ph.D. and master's degrees in Anthropology from Harvard University, with a focus on the anthropology and archaeology of technology, and bachelor's degrees in electrical engineering and in humanities and science from the Massachusetts Institute of Technology. His research interests are in the historical and social aspects of technology, industrial archaeology, and material culture.

He has held teaching and research positions at MIT, Harvard, and Yale University. He has also served as an assistant collections manager and curator at Harvard's Peabody Museum. He is the author of several scholarly and popular publications, and has served as a consultant on public programs for various museums.

Immediately prior to joining the Center, he was group manager at Eric Marder Associates, Inc., in New York, a market research firm where he supervised Ph.D. scientists and social scientists undertaking marketing analyses for Fortune 500 high-tech companies. He is also a registered patent agent with the Patent and Trademark Office of the U.S. Department of Commerce.

Center Personnel in Japan

At the invitation of the conference organizers, Emerson Pugh, IEEE History Committee Chairman, and Frederik Nebeker, Center research historian, will participate in the International Conference on Electrical Engineering 29-31 July in Matsue, Japan. In addition, Pugh and Nebeker have been invited to address, respectively, the Engineering Academy of Japan and a joint meeting of the Tokyo Sections of the IEEE and the IEEJ (the Japanese electrical engineering society).

Staff works with Volunteers

David Morton, Center research historian, attended the Society for the Social Implications of Technology (SSIT) Advisory Committee meeting that was held on Saturday April 12, 1997 at Columbia University in New York City to discussed possible collaborations between SSIT and the History Center. Also, Mike Geselowitz, the Center's new director, introduced himself to the IEEE Board of Director's Executive Committee at their June 30th meeting in Cleveland. Geselowitz helped History Committee chairman Emerson Pugh update the Ex-Com on the Center's status.

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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Center Activities

CENTER DONATES ARTIFACT FOR CRT EXHIBIT

Karl Ferdinand Braun (1850-1918) is credited with inventing the modern CRT in 1897 while he was a professor of physics at the University of Strasbourg. Braun's tube contained all of the basic functions of today's CRT, and, unlike most of its predecessors—notably those built by Sir William Crookes and Wilhelm Roentgen—Braun's tube had a purpose beyond that of a laboratory research device. With the rise of alternating-current power systems at the close of the 19th century, and the heightened demand for measurements of voltage, current, and phase, Braun saw the possibilities for an inertialess beam of electrons to replace the mirrors and light beams used in mechanical oscillographs.

Braun's invention, and the CRT technology it spawned, was the subject of an exhibit entitled "From the Braun Tube to the Infor-

mation Age, 1897-1997" sponsored by the Society for Information Display, May 13-15 in Boston, Massachusetts. The exhibit, curated by CRT-history authority Peter Keller, presented the history of this important technology with a display of more than 40 display devices, including a Braun CRT, (circa 1897); a pre-Braun Crookes tube; Western Electric's 224A CRT (c. 1921), the first commercial CRT in the U.S.; General Radio's Cathode-ray Oscillograph (c. 1932), the first commercial oscilloscope in the U.S.; the first commercial shadow-mask color CRT; the first trinitron; and an impressive variety of additional landmark items.

One item on display, the Aiken Thintube (c. 1950s)—an early flat CRT—was supplied to the exhibit by the IEEE History Center. The tube was a gift of its inventor William

Ross Aiken to the IEEE in the 1970s and has been stored in the History Center archive room. After its successful appearance at the centennial exhibit, the tube was deaccessioned from the IEEE's collection and transferred to Harvard University's Collection of Historical Scientific Instruments, where it is accessible to wider audience.

For more information about the exhibit, contact the Society for Information Display, 1526 Brookhollow Road, Suite 82, Santa Ana, CA 92705-5421. For more information about the Aiken Thintube, see Aiken's article "History of the Kaiser-Aiken Thin Cathode Ray Tube" in *IEEE Transactions on Electron Devices* 31, no. 11 (November 1984): 1605-1608, or the article by Peter Keller listed in the bibliography of this issue of the History Center newsletter.

IEEE EDUCATIONAL ACTIVITIES DEPARTMENT HAS INCREASED INTEREST IN HISTORY

On May 20, IEEE History Center director Michael Geselowitz and curator Andrew Goldstein met with IEEE Educational Activities managing director Peter Lewis and continuing education manager Peter Wiesner to discuss increased involvement of the History Center in IEEE educational activities.

The Educational Activities Department, whose activities have mainly focused on supporting the efforts of the IEEE Educational Activities Board in the accreditation of college-level engineering programs, and assisting in continuing education for IEEE members beyond the college-level, has seldom sought historical content for their products (although there have been exceptions. In 1991, they released an interesting video tutorial titled "History of Land, Mobile, and Personal Communications." It has since been discontinued, but the History Center has a copy in our library.) Recently, however, with the emphasis on an integrated studies approach that is widespread in K-12 education in the United States, Educational Activities has moved to increase their involvement in precollege engineering-related education, an initiative that was kicked off at the IEEE Vision 21 Precollege Education Workshop in San Antonio last February. The goals of the precollege programs include: increasing public awareness of the importance of IEEE technologies and their historical and continuing role in society; attracting top students to the electrical engineering professions; and improving technical education at the precollege level. With their new mandate, Educational Activities has recognized that the history of IEEE technologies—the purview of the IEEE History Center—will have to figure in their pro-

grams. It is obvious that the History Center has a role to play in these endeavors.

The History Center is already working to supply historical "factoids" for a multimedia electrical and computer engineering career guide that Educational Activities is producing under the auspices of the Sloan Foundation. The May 20 meeting was a wide-rang-

ing discussion of the ways that the History Center and Educational Activities could continue to increase their cooperation, in order to carry out the objectives of both. We at the History Center look forward to working with Educational Activities and increasing our precollege outreach in order to further the appreciation of electrical and computer engineering among the general public.

Other IEEE History Activities

MTT-S FEATURES HISTORY AT ANNUAL MEETING

At their 1997 International Symposium, the IEEE Microwave Theory and Techniques Society (MTT-S) featured a number of historical events. For the centenary of Sir Jagadis Chandra Bose's presentation of his quasi-optical studies of 60 GHz to the Royal Institution of London, the J.C. Bose Museum of the Bose Institute of Calcutta sent Bose's original equipment. This equipment was featured in a special historical exhibit on Bose, and used in demonstrations of 19th century millimeter-wave instruments. In conjunction, a special session was dedicated to Bose to accompany the exhibit. In addition, a local microbrewery brewed 2000 bottles of custom-labeled ale, "Bose CentennialAle," which was served at Symposium receptions.

At the same time, a focused session was held entitled "Microwave Metrology and Standards: A Historical View." This session was likewise accompanied by a special exhibit of early reference standards of power, attenuation and noise plus standard gain horns developed by the National Bureau of Standards (now the U.S. National Institute of Standards and Technology).

Meanwhile, Charles Wright, the Coordinator of the IEEE Electrical Milestones Program brought to the exhibit area the Milestones Exhibit that was exhibited last year by the History Center at IEEE Sections Congress in Denver.

Finally, the MTT-S set up a historical-event Web page at <http://www.boulder.nist.gov/ims/historic.htm> to bring these items to a broader public. The IEEE History Center is always gratified when an IEEE society devotes so much energy to the history of electrical technology and practice.

GRS-Society History

A detailed organizational history of the IEEE Geoscience and Remote Sensing Society (GRSS) is now available. The history, compiled by Keith Carver, traces the society's history back from its origins as the Group on Geoscience Electronics, founded in 1961 as part of the Institute of Radio Engineers. It includes comprehensive lists of the society's officers, publications, and meetings, which together provide a complete picture of the society's activities and its role in the promotion of its technologies.

Carver writes in the preface "...[This history] is actually a story about the people connected to and through this technical society: the engineers, scientists, academic faculty, program managers, graduate students, and technicians, as well as their wives and husbands. This is then about our extended professional family, and our common interest in the topics of geoscience and remote sensing." The human note he strikes here is sustained throughout the text, revealing the author's fondness for, and dedication to, the society.

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Things to See and Do

Sputnik Anniversary

This year marks the fortieth anniversary of the Sputnik 1, the world's first artificial satellite, which was launched on 4 October 1957. The NASA History Office, the National Air and Space Museum of the Smithsonian Institution, the Kennan Institute for Advanced Russian Studies at the Woodrow Wilson Center, and George Washington University's Space Policy Institute are pleased to co-sponsor "Reconsidering Sputnik: Forty Years Since the Soviet Satellite," a two day symposium analyzing the importance of this event. This symposium is set to take place in the Smithsonian's Ripley Center on 30 September-1 October 1997. It will explore the preparations, immediate ramifications, and long-term consequences of Sputnik on American and Soviet societies and space programs. The organizers anticipate that a book containing revisions of the papers presented will be issued after the symposium. For more information, contact Dr. Roger D. Launius, NASA Chief Historian, Code ZH, NASA Headquarters, Washington DC 20546, email roger.launius@hq.nasa.gov

Software History

The Software History Center has created a web site for the purpose of collecting information about the history of software, the people who created it and the companies that marketed it starting from its beginnings in the 1950s. The founders of the Software History Center believe that the history of computing, as a history of business, science and social transformation, is incomplete unless it includes the history of software which, after all, is what makes computers useful tools instead of just boxes full of wires and silicon.

Yet, to date, very little has been done to preserve the history of software and some of the most important materials are in danger of being lost for good unless they are identified and archived within the next few years. The small entrepreneurial software firms of the sixties and seventies played an extremely important role in developing new kinds of software, making computers increasingly useful and expanding the market. Many of these firms are long gone and the records of their technical achievements and business successes, to the extent that they still exist, are most likely to be found among the personal files of the individuals who founded these companies and worked for them.

The Software History Center is asking anyone who has a personal knowledge of software development and the emergence of

the software industry prior to 1980 to visit its web site at www.softwarehistory.org and contribute to its collection of information about the history of software. Or for further information call 914-631-1129.

Computer History in Prague

The year 1997 marks two significant anniversaries for the history of computing in the Czech republic: forty years since the development of the SAPO, the first electronic computer in Czechoslovakia; and the ninetieth birthday of Antonín Svoboda, the engineer who designed and built it. In recognition of Svoboda's birthday, the Society for the History of Science and Technology in the Czech Republic, and the Czech National Technical Museum are hosting an international symposium on November 11-14, 1997, at the Museum in Prague. The symposium, to be conducted in English and German, will bring together Svoboda's pupils, colleagues, and partners, as well as other specialists in this field, to discuss the past and future of computers and technology. The deadline for paper submissions is August 30 and the registration deadline is September 30. For more information, contact Jaroslav Folta, "Past-Future", National Technical Museum, Kostelní 42, Cz-170 78 Praha 7, Czech Republic; fax (42 2) 379151, email: iso@ntm.anet.cz.

Telecomm History in Canada

The Association for Research in Telecommunications History announces the 5th International Symposium on Telecommunications History will be held at the Military Communications & Electronics Museum in Kingston, Ontario on September 26-27, 1997. Participants will include academics, graduate students, authors, museum curators, collectors of telecommunications artifacts, and telephone company employees; the symposium is open to anyone interested in telecommunications history. Suggested topics for papers include: inventions and inventors; biographies of historically important people in telecommunications; historical perspectives on telecommunications engineering, economics and finance, competition, regulation, legal conflicts, manufacturing and operating companies; sources of historical information including archives and museums, artifact and antiquarian literature; and social changes brought about by advances in the art and science of telecommunications.

A record of proceedings from the 3rd symposium—an illustrated volume of over 300 pages—is available. For more information, contact Russell A. Pizer, 305 Cooper Rd., North Babylon, NY 11703-4430; fax (516) 422-2324, or visit www.cics.bsu.edu/History/history.htm

Radio History Web Site

The earliest history of radio is largely unknown to the general public, and even, perhaps, to many educated engineers. Even if people recognize the names of early radio pioneers, such as Marconi or Lodge, how well do they understand the nature of the technology these men worked with? Do they appreciate, for example, that early radio was limited to wireless telegraphy, and transmission of voice was a hard-won technological feat?

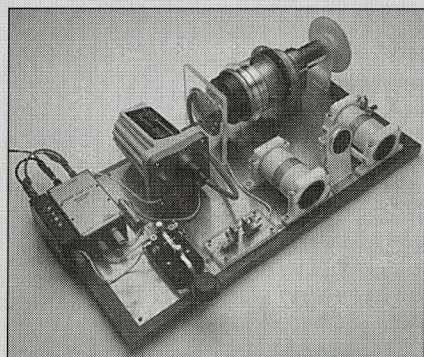
A web site authored by John Belrose calls this early era of radio history vividly to life. It provides extensive details about the spark transmission systems that preceded the continuous wave technology that made voice over the radio a reality. As Belrose writes "The distinctive sound of spark is not easily forgotten, yet I suppose the

vast majority of modern radio scientists and operators have no knowledge of how the spark transmitters used from about 1900 to about 1925 sounded, when received on the simple crystal receivers of the day. Or what the first crude attempts of Fessenden to transmit

voice on a spark transmitter might have sounded like." The site contains illustrations of a reconstruction of a spark transmission set, along with circuit diagrams and a description of its operation. Taking full advantage of the Web's capabilities, Belrose also includes audio samples of that

"not-easily forgotten" sound that can be quickly downloaded by any visitor to the site. Ample historical notes contribute to the experience.

The URL for this unique radio history resource is <http://newton.otago.ac.nz:808/ursi/belrose/spark.html>.



Spark Transmitter Reconstruction

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Proposals for television systems emerged in the U.S. and Europe almost at the same time as radio, but the lack of way to transmit "high resolution" images remained a daunting obstacle for many years. By the early 1920s, as radio became a major medium of communication, dozens of inventors and corporations were rapidly discovering new and better ways to transmit wireless pictures. RCA, for example, had a wireless facsimile system in commercial service by the end of the 1920s. But the wireless transmission and reproduction of moving images proved more difficult, and inventors tried various electric, electro-mechanical, and electronic techniques, each with its own strengths and drawbacks. After much experimentation with various systems, particularly those employing a rotating "scanning disk," all-electronic systems won out worldwide. Along with this convergence of technology in the 1930s came the centralization of television research in just a few institutions, and official (or commercial) broadcasting was underway in Europe and the U.S. Television, particularly in the United States, was not so much a story of entrepreneurial success as it was one of leadership by dominant electrical manufacturers and radio networks.

Historians have been exploring the early history of television for years—given the lack of fresh sources, it is surprising that anyone would try to write yet another popularization of the tale. Yet that is exactly what the father-and-son team of David and Jon Fisher have set out to do in *Tube: The Invention of Television*. David Fisher is a scientist who has written several novels and popular books on technical subjects. Son Jon writes magazine articles and children's books.

Tube is written mainly from the perspective of independent inventors, such as John Logie Baird, Paul Nipkow, C. Francis Jenkins, Philo Farnsworth, who struggle against the power of huge corporations, represented by Vladimir Zworykin (of Westinghouse/RCA), David Sarnoff (RCA), Ernst Alexanderson (GE). The authors provide lively sketches of the personalities and eccentricities of the men who formed the jealous community of inventors working in this field in the 1920s and 1930s. It is a popular rather than a scholarly book, and breaks little new ground, but it is engaging and, at times, even humorous.

ZIMMERMAN, DAVID. *Top Secret Exchange: The Tizard Mission and the Scientific War*. Montreal: Alan Sutton

Publishing and McGill-Queen's University Press, 1996. xx+252 pp.

Though little known to the general public, one of the most important episodes of World War II was the 1940 mission headed by Henry Tizard that shared British technological secrets with the United States military. This scholarly book, the first major study of that mission, is based mainly on primary sources (documents at the British Public Records Office, the U.S. National Archives, the Canadian National Archives, and many other archives). It tells a fascinating story of technology, diplomacy, and international cooperation that was central in forging the great Anglo-American alliance, important not only for winning the war, but also in shaping the postwar world.

Zimmerman examines the Anglo-American technological exchange of World War I, which ended after the war, and explains why efforts in the late 1930s to revive that exchange on a quid pro quo basis achieved little success. (The British were mainly interested in the Norden bombsight, about which the Americans were extremely secretive.) The book provides a picture of Henry Tizard, one of the century's great scientific administrators. At his urging the British decided in 1940 to offer to the Americans, with no preconditions, almost all of their technological secrets. It was the opinion of British military experts at the time—and of historians since—that the most important technical secrets imparted by the Tizard Mission were those relating to radar, notably the cavity magnetron.

In addition to explaining how the mission came about and describing it in detail, Zimmerman also analyzes its effects on the war and on the postwar world. Notable also is the treatment this book gives to the substantial role Canada played in this technological cooperation.

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

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INTERPRETING EDISON — A CONFERENCE REPORT

In recognition of the 150th anniversary of the birth of Thomas A. Edison, the National Park Service, in cooperation with the Organization of American Historians, the New Jersey Studies Academic Alliance, the Friends of Edison National Historic Site, and the Eastern National Parks and Monuments Association, held a conference June 25th, 26th and 27th at Rutgers-University Newark. IEEE History Center staff members Michael Geselowitz and Frederik Nebeker were among the almost 200 attendees from across the country and around the world.

As announced in our last newsletter, the conference sought to bring together educators, museum professionals, academics and interested lay persons to examine how Edison has been interpreted over time, and his importance for today in academic scholarships, at museums and historic sites, and in the classroom.

The opening plenary session on "Edison in U.S. History" featured several leading historians of technology, including IEEE History Committee member Ruth Schwartz Cowan, who spoke on "The Ironies of Thomas Edison." Ruth tied the Edison reality and the Edison myth into her own work on women and technology.

SLOTTEN, HUGH RICHARD, "Rainbow in the Sky: FM Radio, Technological Superiority, and Regulatory Decision Making." *Technology and Culture* 37, no. 4 (October 1996): 686-720.

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And Don't Miss...

A new edition of an old book on Nikola Tesla was released in 1992 by Barnes & Nobel Books of New York, NY. The book, entitled *The Inventions, Researches, and Writings of Nikola Tesla*, was written by Thomas Commerford Martin, a name that some might

recognize as the 3rd president of the American Institute of Electrical Engineers, the society that would merge with the Institute of Radio Engineers to form the IEEE.

The University of Pennsylvania has prepared the proceedings of the ENIAC 50th Anniversary Symposium that was held at the Conference on the History of Computing and Information Processing, 16-18 May 1996. This is a limited edition publication and is not available for general circulation. For more information, contact the Moore School of Electrical Engineering at the University of Pennsylvania.

The October 1996 issue of the magazine *Computer* is a special issue dedicated to 50 years of computing. Its treats for the reader include articles on various aspects of the history of computing, each with a timeline of significant milestones, and copious illustrations. The guest editor for the issue is Stephen S. Yau.

Although much of the content of *Amazing Light: A Volume Dedicated to Charles Hard Townes on his 80th Birthday*, edited by Raymond Chiao (New York: Springer, 1996) is technical, the book contains several historical items about this nobel-prize winning pioneer.

The conference then broke into a series of concurrent sessions and other Edison-related activities in all media imaginable, such as showing of films and performances by Edison impersonators. Highlights included a "virtual tour" of the Menlo Park Laboratory reconstruction at the Henry Ford Museum in Michigan, and a real tour of the Edison National Historic Site in West Orange, New Jersey.

The conference ended with a summary keynote by former Edison staffer Edward

Jay Pershey. Overall, it was a great success in bringing together a wide range of professionals and interested amateurs, and in making a number of important points—the most interesting of which is that Edison can be considered a key American icon in a way usual reserved for the Founding Fathers and major political figures such as Lincoln, and, as such, the study and presentation of his life and work will continue to be important in ongoing social, political and educational debates into the 21st century.

Other IEEE History Activities
continued from page 3

The GRSS has done an admirable job in compiling their own history. This will be a valuable tool for the staff at the IEEE History Center and an inspiration for other IEEE societies. The history is available on the Web at www.ecs.umass.edu/temp/GRSS_History

UFFC History
The IEEE Ultrasonics, Ferroelectrics, and Frequency Control (UFFC) Society has included a fascinating area on their Web site dedicated to the history of frequency control and modern time-keeping. The selection of articles includes inviting titles such as "A History of the quartz crystal industry in the USA", "Brief History of the Development of Ultra-precise Oscillators for Ground and Space Applications", "A Historical Review of Atomic Frequency Standards Used in Space System", "Fifty Years of Progress in Quartz Crystal Frequency Standards (illustrated)", and "The Influence of Amateur Radio on the Development of Commercial Market for Quartz Piezoelectric Resonators in the United States." There is also the introduction to the historical session at the 1996 IEEE Frequency Control Symposium, and notes from early frequency control symposia (program booklets and abstracts predating the first published proceedings), and dates of all leap second insertions, and the differences between UTC and TAI time, since 1972.

The site is the work of frequency control webmaster John Vig. The URL is http://bul.ecs.umich.edu/uffc/uffc_fc.html

John Bryant, 77

The IEEE History Center is saddened to announce the death of one of its most valued supporters, John H. Bryant, on June 10, 1997. Bryant, who was a pioneer in the miniaturization of microwave systems, had an active interest in the history of radar and other electrical technologies.

Bryant was born in Baird Texas on April 15, 1920, and received a Bachelor of Science degree from A&M University of Texas in 1942. He did graduate work at the University of Illinois, receiving a Master's degree in 1947 and a Ph.D. in 1949. He worked for IT&T and the Bendix Corporation until 1962 when he cofounded Omni Spectra, Inc. (now part of AMP, Inc.) In 1978 he joined the University of Michigan's Department of Electrical Engineering and Computer Science. Bryant was a fellow of the IEEE, winner of the 1996 Microwave Theory and Techniques Society's Career Award, the Aerospace and Electronics Systems Society's 1997 Pioneer Award, and holder of 14 U.S. patents.

Bryant, a long-time member of the IEEE History Committee, was one of

the Institute's most active volunteers in history. He was the driving force behind the History Center's 1993 publication *Rad Lab: Oral Histories Documenting World War II Activities at the MIT Radiation Laboratory*, and was instrumental in executing the project through his efforts at planning, interviewing, and editing. He published a book on Heinrich Hertz and was also heavily involved with the Historical Electronics Museum in Baltimore, Maryland.

Bryant was an inspiration for the staff at the IEEE History Center and we will miss him dearly.

Tympas Wins 97-98 Fellowship

The 1997-98 IEEE Fellowship in the History of Electrical Technology has been awarded to Aristotle Tympas, a graduate student writing his Ph.D. dissertation at Georgia Institute of Technology's School of History, Technology, and Society.

Tympas's research concerns the transition from analog to digital computing. Noting the long standing goal of computing historians to explain the success of IBM over

business firms that were early leaders in computing technology in the period immediately following World War II, Tympas questions what he describes as "the standard assumption that considers tabulators and desk calculators as representative of the whole of computing technologies during the first half of the twentieth century." He focuses instead on computing technologies used in the context of telegraphy, telephony, electrification, and gunnery. His analysis of these devices, and the technical writing about them, has stimulated another theme in his research: the evolution of the analog/digital demarcation in computing, which Tympas argues is a recent development not predicted by pre-war ideologies of computing.

Tympas has published portions of his research in the *IEEE Annals of the History of Computing* and was a participant at the History Center's recent conference on the history of computing held in Williamsburg, Virginia (see pg. 1)

The IEEE Fellowship in the History of Electrical Technology is made possible by a grant from the IEEE Life Member Fund.

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