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STATIC FROM THE DIRECTOR

As should be clear from a mere glance at this cover, the changes I alluded to last issue are starting to occur. Some, while important, are technically speaking aesthetic, while others I hope have some substance. IEEE has officially changed our name to the IEEE History Center. While this is how we have been informally known for years, the formal designation

emphasizes our commitment to preserve, research, and promote the heritage of all IEEE-related technologies. I am further pleased to announce that Rutgers has agreed to this name change, provided their share in our identity is also promoted, and has signed a new contract that will keep us on their campus through at least June 2003!

Andy Goldstein has decided to leave the Center to pursue other opportunities, as has Research Assistant Sheila Plotnick. Andy will of course be sorely missed, and I was put in the position of trying to replace an invaluable member of the community at the same time I am seeking to find our next Post-doc (the incumbent's term expired in June). I am happy to be able to report that a new Research Coordinator has started at the Center as of August 3rd (see page 2), and next issue I will be able to report on the archivist and the new Post-doc. Still, despite the unrest, a number of exciting initiatives in all three of our mission areas—preservation, research, and promotion—are gaining momentum.

On the preservation front, I have a mandate from the IEEE History Committee to reexamine the IEEE Electrical Engineering Milestones Program and to suggest ways to invigorate it. As part of that effort we have been trying to get the word out about the Program to interested parties who might be able to give us valuable feedback and work with us in the future to preserve sites of importance to the history of electrical and computer engineering. As a result, the Program has been recognized and publicized by the National Park Service, and I was asked by them to participate in panels on preserving technological heritage (see page 4).

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Turning to our programs, this is a time of adjustment at the Center. I have been Director for just over a year, and long-time Center Manager

Completion of the Signal Processing History Project

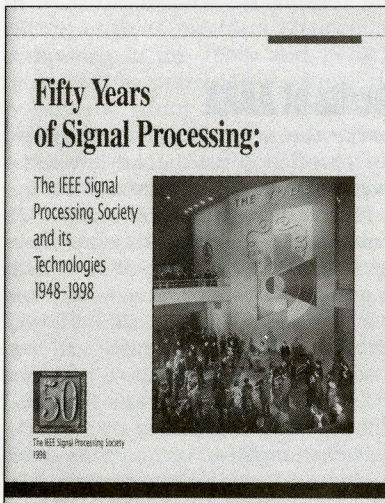
Fifty years ago, on 2 June 1948, the Executive Committee of the Institute of Radio Engineers (IRE) approved a petition for the formation of the Professional Group on Audio. Over the years this organization changed its name several times: Group on Audio and Electroacoustics (1965), Group on Acoustics, Speech, and Signal Processing (1974), Acoustics, Speech, and Signal Processing Society (1976), and Signal Processing Society (1992). Also, the IRE merged with the American Institute of Electrical Engineers to form the IEEE in 1963, and the Group became part of IEEE and is today the Institute's fourth largest Technical Society.

The organizational history is closely tied to the exciting story of the emergence of a new engineering discipline. Signal processing, which concerns the changes made to signals so as to improve transmission, storage, or use, is today pervasive in communications, control systems, computing, and instrumentation. What sparked the formation of the new discipline was the re-discovery in 1965 of the fast Fourier transform (FFT), an algorithm that greatly speeded the computations typically involved in digital signal processing. At about the same time, advances in microelectronics began making digital circuits much more affordable.

Over the next decades the techniques of digital signal processing improved drastically and proliferated widely. The Signal Processing Society was an important part of this growth, notably through its publications—journals, books, and newsletters—and its conferences, workshops, and meetings.

In association with the 50th anniversary of the IEEE Signal Processing Society (and with substantial support from the Society), the IEEE History Center has worked over the past two years to preserve, research, and disseminate the history both of the Society and the new discipline. This major project, described in detail in Newsletter 42 (Summer

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provided their share in our identity is also promoted, and has signed a new contract that will keep us on their campus through at least June 2003!

IEEE HISTORY CENTER

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Staff Notes

Comings and Goings

As mentioned in "Static from the Director," Center Manager Andy Goldstein has moved on from IEEE, followed by Research Assistant Sheila Plotnick and Post-doc Janet Abbate. We wish them all well. Andy is relocating to Statesboro, Georgia, to pursue computer consulting and Sheila hopes to find herself in the entertainment industry. Janet will be starting a new job at the University of Maryland. In addition to teaching courses in the history of science and technology, she will be participating in the Gemstone honors program, which brings together humanities and engineering students to work on team-based engineering projects. Abbate recently completed a book on the history of the Internet, and she is beginning a new research project on the history of women in computing.

In their stead, we are pleased to welcome to the IEEE History Research Coordinator Robert Colburn.

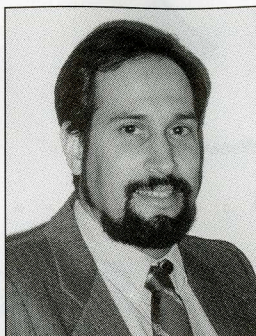
We are fortunate in Rob to be inheriting a wealth of IEEE experience. He joins the

Center from the IEEE Publications Department, where he worked for 14 years providing support for the Publications Board. He has also been involved in improvements to the IEEE renewal process, and has won two Bright Ideas awards.

In addition to these additions and subtractions, we are pleased to announce a change: Frederik Nebeker was recently promoted to Senior Research Historian. With a Ph.D. in history of science and technology from Princeton University and experience at the Center for History of Physics of the American Institute of Physics, Rik came to the Center in September 1990. Since then he has authored, co-authored, or edited seven books and numerous articles and reviews. His book *Calculating the Weather: Meteorology in the 20th Century* (Academic Press, 1995) is a study of the impact of the computer on the science and practice of meteorology. In addition to the work on the Signal Processing History Project, he has been writing a book on electrical technologies in the shaping of the modern world in the period 1914 to 1945.

(television), Alexander Sawchuck (optical signal and image processing), Paul Lauterbur (magnetic resonance imaging), and Tom De Fanti (virtual reality). As was done at ICASSP, the 50th anniversary booklet (prepared by the Center and published by the Society) will be distributed to all ICIP attendees.

Center historian Nebeker attended ICASSP, where he conducted oral-history interviews with four prominent engineers to add to the Center's impressive collection of interviews with the founders of signal processing. For the same reason, he will attend ICIP in October.



Dr. Michael N. Geselowitz,
Director of the IEEE History
Center

Geselowitz at AAAS

1998 marks the sesquicentennial of the American Association for the Advancement of Science (AAAS). Their Annual Meeting, held in Philadelphia 12-17 February 1998 was promoted as a 150th anniversary meeting, and featured a number of historical sessions and displays, as well as a keynote address by President Clinton. IEEE History Center Director Michael Geselowitz attended part of the meeting to observe how science and technology history was observed and promoted, and to take the opportunity to create and strengthen contacts with other individuals and institutions interested in electrical and computer history.

The session of most interest to readers of this Newsletter was "Atmospheric Electricity and the Legacy of Benjamin Franklin." Although held in the last time slot on the last day, this excellent session was well attended by scientists, engineers, historians, and journalists. After an introduction by well-known historian of science I. Bernard Cohen, three atmospheric scientists discussed current issues in atmospheric electricity, and showed how they were fore-shadowed by the work of Franklin.

No Bull in Durham

In April Janet Abbate attended a conference on "Technological Futures—Urban Futures" in Durham, United Kingdom. This interdisciplinary workshop brought together two dozen scholars from Europe and North American to discuss the impact of modern technology on urban life. Abbate presented

the paper "Virtual Space, Real Space, Urban Space: Some Perspectives on the Social Geograph."

History Center Celebrates 75th Anniversary of the Neutrodyne

On April 29th, the IEEE History Center participated in a commemorative event at the Stevens Institute of Technology in Hoboken, N.J., celebrating the 75th anniversary of Professor Alan Hazeltine's invention of the Neutrodyne receiver circuit. This well-attended event, organized by Ramakrishna Nunna of Stevens' EE Department, featured an address by Dr. David Morton, IEEE History Center Research Historian, as well as several prominent IEEE members who were associates of Hazeltine from Stevens.

Louis Alan Hazeltine was a Stevens graduate of 1906 who returned after a year in industry as assistant professor of EE. By 1915, Hazeltine had developed an interest in radio—or wireless, which was then at the cutting edge of electrical engineering. Like computing in the 1960s and 1970s, radio's most visible practitioners were amateurs hobbyists, often in their teens or even younger, giving the impression that radio technology was dominated by mere tinkers. In the background were corporations like AT&T, Westinghouse, and GE—hardly mere tinkers—but also individuals like Alan Hazeltine. As one of the few experts in radio engineering at the outbreak of World War I, Hazeltine was asked in 1918 to serve as a consultant for the radio laboratory of the U.S. Navy Yard near Washington, D.C. It was here that Hazeltine developed the concept of using neutralizing capacitors in a radio receiver to in effect siphon off the high pitched squeals that plagued electronic amplifiers of the day. In this work, Hazeltine pioneered the use of mathematical analysis in conjunction with electronics design.

He returned to Stevens the next year to continue his teaching and research, and in 1922 he used his Navy inventions to design a new radio receiver circuit which he called the "Neutrodyne." Although Hazeltine was by then well-known in engineering circles, this circuit made Hazeltine famous and launched the company that he named.

The Neutrodyne circuit was patented and offered to manufacturers

under license as a way to provide consumers with an improved radio set. But radios bearing the Neutrodyne label would come to have a significance beyond their technical advances. Hazeltine successfully commercialized not through the giants of the radio industry, but instead through the so-called Independent Radio Manufacturers, a trade group unable or unwilling to buy into RCA's virtual monopoly on the best receiver patents. In a sort of David-and-Goliath way, Hazeltine made it possible for some of the most fondly remembered early radio manufacturers to stay in the running—companies like Freed-Eisemann, Fada, and Garod.

Many of the larger firms in the industry used patents licensed by RCA, particularly the so-called regenerative circuit invented by another famous independent inventor, Edwin Howard Armstrong. In fact, the regenerative circuit dominated the market from 1920 to 1923. But the Neutrodyne receiver in 1923 immediately captured the market in its price class and the royalty payments spurred the formation of Hazeltine, Inc. in 1924. The commercial viability of the Neutrodyne lasted only until the introduction of an improved vacuum tube called the screen grid tube, and the development of the super-heterodyne circuit (still used today) a few years later. The last Neutrodyne receivers were designed in 1927 and sold through about 1928. But the Neutrodyne's fame and reputation are still alive today, due mainly to the efforts of amateur radio enthusiasts and collectors. It is truly one of the classic electronic designs of the century.

School's In!

Center Director Michael Geselowitz had two opportunities to speak to elementary school students on electrical history. On March 10th, he spoke to the entire 4th grade at the Brandeis School in Lawrence, New York. On April

23rd, he addressed a more age-diverse group at IEEE's Operations Center in Piscataway, as part of IEEE's participation in national "Take Our Children to Work Day." These were two tough audiences, but, judging from follow-up letters, many children came away with an increased appreciation with the role of electricity in the past and in their lives today.

MIT's Building 20: The Magical Incubator

Built in 1943 on an emergency building permit to house part of the Radiation Laboratory for the war effort, the Massachusetts Institute of Technology's Building 20 (all buildings at MIT have numbers and even for those that have names as well, the number is often used) was meant to be torn down six months after the war ended. Instead, it became an MIT institution, home for the Research Laboratory of Electronics and then for any other department or program that fit in nowhere else. Its ramshackle plywood and asbestos construction and piano-key ground plan allowed its inhabitants unparalleled freedom to make their own workspace and interact with one another. What it lacked in beauty, and perhaps safety (the asbestos, the exposed wiring) it made up in character and inspiration. The nine resident Nobel laureates (past and future) represented by the Rad Lab were eventually joined by at least four others.

All good things must come to an end however, and MIT has raised the funds to tear down Building 20 (an expensive proposition, given the asbestos) and replace it with a modern glass-and-steel center for information technology, and has found alternate space for the displaced inhabitants. Demolition is scheduled soon, but on March 26 and 27 it was given a rousing send-off in a special symposium entitled "MIT's Building 20: The

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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IEEE History Center

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Aerial View of MIT

Staff Notes *continued from page 3*

Magical Incubator," where various of its past inhabitants remembered their times there and discussed the important discoveries and inventions made there. The event, with over 200 attendees, was covered not just in the MIT and Boston press, but nationally, including a feature story in The New York Times.

Many IEEE members have been associated with Building 20, and the IEEE was well represented at the event. History Center Director Michael Geselowitz attended as an official IEEE representative, but he himself had an office in Building 20 in the early 1990s. The symposium's Committee Chair was IEEE Life Fellow Prof. Paul Penfield. MIT Provost and IEEE Fellow Joel Moses introduced the proceedings. The lead-off speaker, describing the building's very first years as the Rad Lab, was IEEE Life Fellow Ted Saad, Chairman of the Trustees of the IEEE History Center. Of course, the Rad Lab was one of the first IEEE Milestones in Electrical History, but Ted had the foresight to have the plaque placed at the original Rad Lab office in the permanent (we hope) main MIT building complex. The History center has also published a collection of oral histories of Rad Lab veterans.

Other IEEE speakers included Life Fellow

Peter Elias and Life Fellow Walter E. Morrow, Jr. IEEE Member Gill A. Pratt, an MIT Assistant Professor, introduced one of the panels which included his former advisor, Jerome Y. Lettvin, MD. Jerry, a pioneer in bioelectrical engineering is not an IEEE member, but it must be admitted he stole the show with his eloquent reminiscences. It was very clear that a good, if bitter-sweet, time was had by all.

In conjunction with the program, the MIT Archives collected photographs, memorabilia and oral histories, and prepared an exhibition. The material will now become part of MIT's permanent collections. Although the building is lost, important history has been preserved. It is a good sign that MIT as an important institution in the history of electrical engineering and computing showed an interest in this preservation, even if it didn't lead them to try to save the building itself. The IEEE History Center hopes to work with units like the MIT Archives and the MIT Museum in the future, to further the preservation and dissemination of the history of electrical engineering and computing.

Those wishing to read some of the reminiscences, including those of Mike Geselowitz, or to learn more about Building 20 are invited to visit the symposium's web site at: <http://www.eecs.mit.edu/building/20>.

Morton shows pride

On February 12, staff Research Historian David Morton presented a lecture entitled "The History of Engineering and Engineering Education: Molding the Engineer" as part of Rutgers University's 1998 Pride in Engineering Day. The event, sponsored by the engineering honor society Tau Beta Pi, was aimed at exposing students to emerging technologies and broadening their perspective on the engineering major. The lecture briefly summarized the history of engineering as a profession, focusing on the evolution of the meaning of "engineering" from ancient to modern times. Morton then turned to the history of engineering education since the 18th century, showing how engineering educators created the engineering curriculum. The education of today's engineering students, he argued, represents the culmination of a long struggle among educators to balance out contradictory demands and goals. Universities strive to produce engineers with a well-rounded education, but employers often require people with very specific skills. Morton's lecture was complemented by a presentation called "The Future of Engineering" and other activities highlighting the many facets of the profession. The audience included several of the deans of the engineering college.

advanced electron tubes, discrete transistors, an early integrated circuit, and a VLSI wafer. Several documents and publications are used to tell the history of the Signal Processing Society.

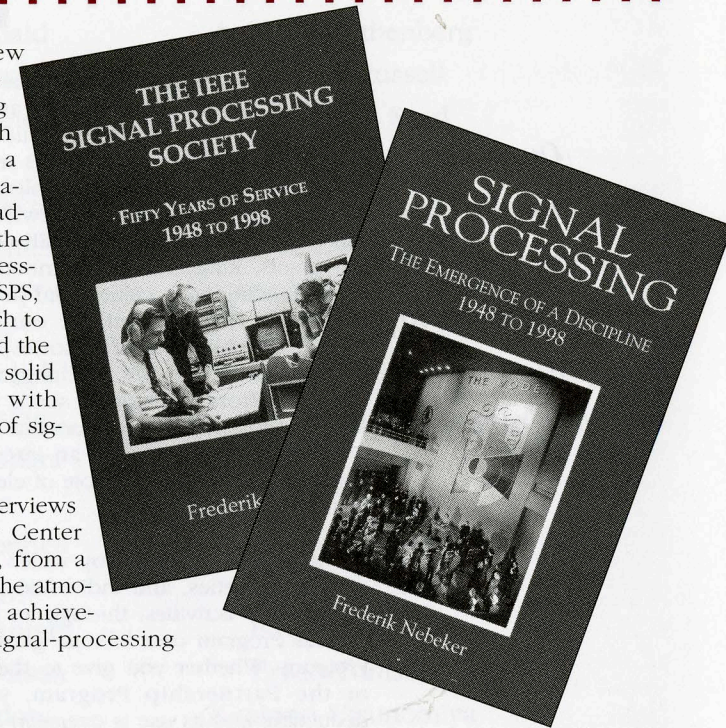
To advertise the exhibit, the Center has produced a poster. It features photos, with accompanying text, of 14 artifacts representing important areas of signal processing, such as analog signal processing, digital filters, image processing, and DSP and control systems. [see picture] bottom of page 4

Two Monographs Published

The Center has just published two monographs, both by Frederik Nebeker. The first, entitled *Signal Processing: the Emergence of a Discipline, 1948 to 1998*, is a narrative history of the creation of a new branch of engineering. The second, *The IEEE Signal Processing Society: Fifty Years of Service, 1948 to 1998*, tells the story of the principal profes-

sional society for the new technology. According to the IEEE Signal Processing Magazine (July 1998), "[both books] are presented in a style that provides information through entertaining reading. The books describe the foundations of signal processing technology and of the SPS, and the contributions of each to the scientific community and the public at large. Nebeker's solid research is interspersed with quotes from the 'pioneers' of signal processing.

"Excerpted from taped interviews conducted by the History Center staff, these quotes convey, from a first-person point of view, the atmosphere of excitement and achievement that led to major signal-processing developments." [see picture]



Static *continued from page 1*

And, speaking of Milestones, MIT has finally decided to tear down its "temporary" Building 20, built in World War II to house the Radiation Laboratory, though not without fanfare (see page 3). The Rad Lab was one of the first IEEE Milestones, but we had the forethought to place the plaque not in Building 20, but at the original Rad Lab Office in the main MIT building complex. Still, the incident points to importance of preserving electrical and computing history.

Also in the preservation arena, in response largely to a piece on our services in the IEEE Life Members Newsletter, we have seen increased requests for help in archival placement. In fact, requests to all of our reference services have been running at record levels.

On the research side, the big push has been to complete the large project we are doing for the IEEE Signal Processing Society (see front page sidebar and related articles). SPS is commemorating its 50th anniversary, and held a major celebration at its Spring meeting. IEEE History Center Research Historian Frederik Nebeker spearheaded a two-prong research project into the history of the Society and the history of signal processing as a discipline. This work resulted in several products for the Society and for the Center. We are now looking to apply this model with other IEEE Technical Societies who may have upcoming anniversaries.

Finally, in the area of promotion, IEEE History Center staff continue to make the rounds among all our varied constituents inside and outside of IEEE. We are particularly focused on continuing to educate cosponsor Rutgers University on the importance of our electrical and computer history programs to their overall educational mission. In addition to our usual activities such as working with the GAs and teaching history of technology courses—this term ably handled by outgoing IEEE History Center Post-doc Janet Abbate (see page 4)—we sent IEEE History Center Research Historian David Morton to address Rutgers' "Pride in Engineering Day (see page 4)." According to all feedback I have gotten, his presentation was extremely well received. Another good sign is that I have been asked to teach an interdisciplinary, extradepartmental course this fall on science, technology and society.

I know you share my enthusiasm for the Center's programs. As I mentioned in the last Newsletter, this current issue brings us the opportunity to thank our supporters individually and publicly for supporting this program year (see page 6). Although we receive funding from IEEE, the IEEE Foundation and Rutgers, as well as other entities inside and outside IEEE, the donations of individuals are important to us not just in themselves, but because they show the commitment of engineers, historians, educators, and the general public to our mission of preserving, researching and promoting the history of electrical and information technologies and sciences. And, as you will

see from the list of names, this support is growing. We received a record response to our direct mail campaign, both in terms of the number of donations and total amount, and we hope to do even better in the campaign to support our programs for 1999, which will be kicking off shortly.

In terms of approaching organizations, I am continuing to work with the IEEE fundraising team to build awareness of and interest in the IEEE History Center. While several foundations, including the Sloan Foundation and the Dibner Fund, have expressed preliminary interest in supporting our programs, there is a consensus among our supporters that IEEE must reconfirm its internal commitment to the Center before we do massive external fundraising—and that is starting to happen! If you look carefully among all the other tumultuous changes I have outlined, you will notice on the masthead that the IEEE Foundation has changed the name of the Friends Committee to the Trustees of the IEEE History Center. This gesture came along with a challenge to us to raise money from the IEEE Technical Societies, with the IEEE Foundation offering to match such donations up to a total of \$1,000,000! Given the response from the Signal Processing Society, I am optimistic about our chances to build an endowment that will guarantee continuity of funding of our core activities. I thank you all again for your help in this area.

Center Activities

Overflow at Rutgers

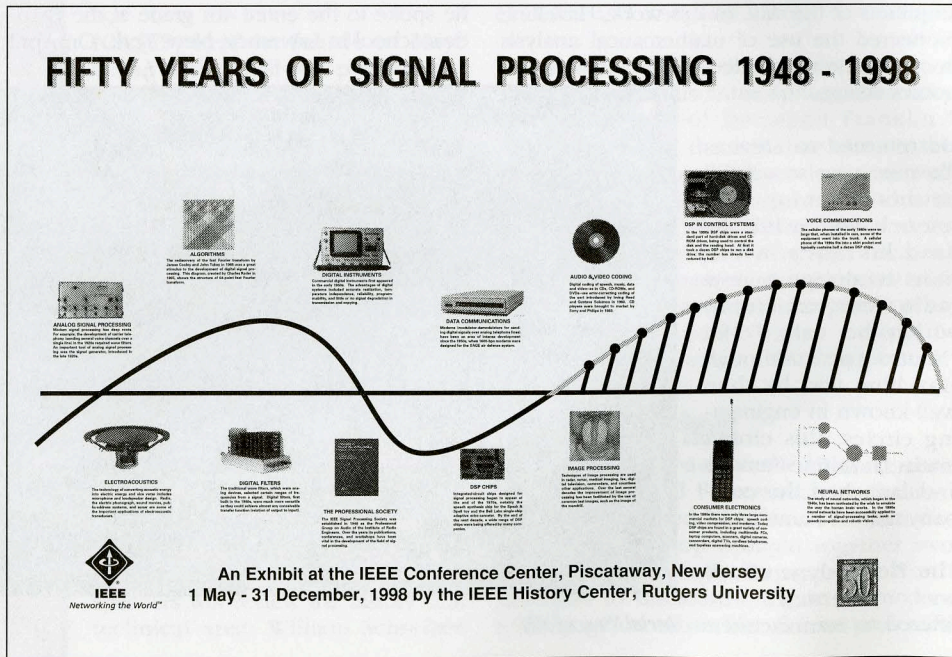
As part of our continuing commitment to teaching the history of technology at Rutgers, Janet Abbate gave a course on "Technology and Society in America." It was attended by nearly 100 students!

in 1976 so that merchants could verify credit information; also, an early digital filter, several modems, and an equalizer circuit from an early digital cable system. Several artifacts suggest how wide the range of applications of signal processing have been: a

disk-drive control system using DSP chips, seismic traces used in oil exploration, a digital instrument, and a circuit pack from a secure communications systems. The evolution of the underlying technology is shown in a replica of a 1909 Audion, more

Exhibit on the History of Signal Processing

In two tall display cases at the IEEE Conference Center in Piscataway, New Jersey is an exhibit entitled 'Fifty Years of Signal Processing'. With the assistance of AT&T archivist Sheldon Hochheiser and several members of the Signal Processing Society, Frederik Nebeker collected some 50 artifacts exhibiting the history of the field. There is a frequency-shift keyer from World War II (along with its original schematic), and this is compared in size and complexity with a modern cellular phone (whose schematic, if drawn to the same scale, could cover the building). Subject areas represented include: analog signal processing and consumer electronics—displaying respectively, an early signal generator and a noise-reduction microphone—and pagers and a tapeless answering machine, among other artifacts. There is a transaction telephone, introduced



Donors

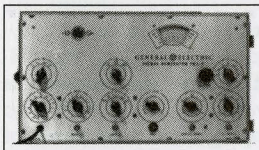
Our sincere thanks to everyone who contributed to the Center to support our 1998 program year.

The Center continues to work hard to preserve the history of electrical engineering and computing and spread the word to engineers, students, and the general public. Great progress was made in achieving financial stability with the establishment of the Center's quasi-endowment (see Newsletter #41). But we still depend heavily on the IEEE General Fund, project grants, Rutgers, and contributions from companies, foundations, societies, and people like you. We need your help to continue our work developing archives, exhibits, oral histories, popular articles, conferences, milestones, teaching, and research. Contributions from individuals sends the clearest message possible to larger donors that the Center's work is valued by people with an interest in deepening our understanding of the role of electrical technology in shaping today's world.

We have two programs by which companies, foundations, societies, and individuals can help support the Center's activities: through an annual gift to the Friends Program or a lifetime gift to the Partnership Program. Whether you give to the Friends Program or the Partnership Program, your gift is tax-deductible and its use is overseen by the Trustees of

the IEEE History Center, a group of distinguished electrical engineers appointed by the IEEE Foundation. Partnership donations not earmarked for a specific project are channeled to the quasi-endowment, as a means to provide continuing support to the Center. Partnership contributions may be fulfilled over several years. A list of the Center's partners can be found on the back cover of all issues of the History Center's newsletter. All donations to either the Friends Program or the Partnership Program should be made payable to the "IEEE Foundation Friends Fund."

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An early analog signal generator, from the 1920s.

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P Shaad

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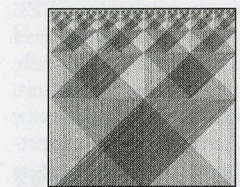
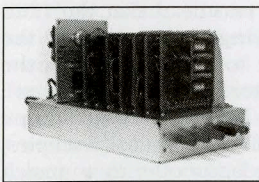


Diagram of 64-point fast Fourier Transform, created by Charles Rader in 1965.



Early digital filters, from the 1960s.

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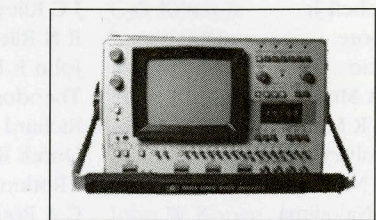
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Bibliography

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Solid-state electronics is perhaps the most momentous technological development of the last half of the 20th century. The invention of the transistor in 1947 and its commercialization a few years later unleashed an explosive development. This book, while focusing on a specific part of the story, does much to illuminate the broader technical and cultural changes.

This book about the transistor radio as a technical and cultural phenomenon is subtitled "The transistorization of radio- and television-receivers in the German radio industry from 1955 to 1965." It tells an important story of how engineering design responded to new technical possibilities in the context of postwar Germany, by exploring both how the setting shaped the technical development, and how the transistor radio influenced German culture.

A description of the state of radio broadcasting in Germany immediately after the war is followed by an account of the development of the transistor. Next, in the largest chapter of the book, is the story of the

adoption of the transistor by the radio and television industry, described as having occurred in two waves, in the periods 1955 to 1959 and 1960 to 1965 respectively. Chapter 5 is a case study of the development by Siemens & Halske of two particular transistors (AF 106 and AF 139), and Chapter 6 examines the cultural impact of the transistor radio.

This scholarly book draws on a wide range of sources: archival (from the Siemens Archive), primary, and secondary. It also presents, in an appendix, new source material in the form of interviews with three people well placed to observe the changes first hand: Hans Rebstock, who was a researcher at Siemens, Walter Klein, who was a researcher at Grundig, and Karl Tetzner, who was editor-in-chief of *Radio Magazin*.

Violette, Alderick O. *Merrimack County Telephone Company: The First 100 Years*. Contoocook, NH: MCT, Inc., 1997. xxvi + 622. [The book may be ordered from MCT Telecom, 11 Kearsarge Ave., Contoocook NH 03229; 603 746-9000, fax 603 746-3567.]

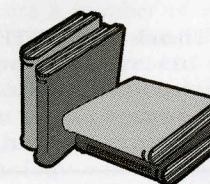
Merrimack County Telephone, now known as MCT Telecom, is an independent telephone company that was established in 1896 to provide telephone service to Bradford, Sutton, New London, Newbury, and other towns in the New Hampshire county

of Merrimack. The story actually began in 1884, when the first telephone service came to the area. The expiration of Bell patents in 1893 and 1894 stimulated the formation of this and many other independent telephone companies. Over the next century Merrimack County Telephone prospered and retained its independence. The author, who has worked in the company for more than 50 years and is now Chairman of the Board, describes the growth of the business through social, economic, and technological changes. The reader learns much about the work lives of managers, switchboard operators, linemen, installers, and the many others involved in telephone service. Conversion to dial telephones, the arrival of electronic switching, and the introduction of cellular-phone service are among the technological changes described. The book is handsomely produced in large format and includes many illustrations.

Stephen Graham and Simon Marvin. *Telecommunications and the City*. Routledge, 1996. 434 pages.

Telecommunications and the City examines the many issues that modern communications and computing technologies pose for the people who plan, manage, and live in the world's urban areas. Stephen Graham and Simon Marvin, based at the Centre for

continued on page 18



◆ Engineers as Executives: An International Perspective (1994)

Edited in-depth interviews with thirteen senior executives from major technology companies based in the United States, Germany, and Japan. These executives speak candidly and thoughtfully about their management philosophies, the problems they confront in their work and the importance of having an engineering background to do their job effectively.

Available through IEEE Customer Service (IEEE Order No. PC4564-QAJ)

◆ The Evolution of Electrical Engineering: A Personal Perspective (1994)

A concise historical overview of electrical engineering told by Ernest Weber, the IEEE's first president and one of the 20th century's most distinguished electrical engineers. With a unique personal touch, Weber blends his own illustrious career at Siemens and Polytechnic University with the international story of the development of the electrical engineer's science and profession.

Available through IEEE Customer Service (IEEE Order No. PP4200-QAJ)

◆ Facets: New Perspectives on the History of Semiconductors (1997)

Edited volume of six papers on issues relating to the history of semiconductor technology and systems, from the conceptual foundation for the transistor to the corporate strategy behind marketing the microprocessor. The historiographic introduction underscores the wide range of thematic and methodological approaches taken by the volume's authors.

Available by direct order from History Center

◆ The IEEE Signal Processing Society: Fifty Years of Service (1998)

A short narrative history of the IEEE Signal Processing Society. Formed in 1948 as the Professional Group on Audio of the Institute of Radio Engineers, the Society has evolved into the leading professional organization for signal processing, helping through its many activities to establish that rapidly growing branch of engineering.

Available by direct order from History Center

◆ Signal Processing: The Emergence of a Discipline (1998)

A narrative history of the creation of a new branch of engineering. Signal processing, which concerns the changes made to signals so as to improve transmission, storage, or use, is vital to a wide range of modern technologies. This extensively referenced account draws upon the published literature and oral-history interviews of dozens of pioneers of the new discipline.

Available by direct order from History Center

IEEE HISTORY CENTER FALL 1998 BOOK SALE

◆ Sources in Electrical History:

Volume 1: Archives and Manuscript Collections in U.S. Repositories (1989)

Volume 2: Oral History Collections in U.S. Repositories (1992)

Volume 3: Corporate Records and Archives (1995)

Guides to primary sources in electrical history. Volume I is detailed descriptions of the paper records of over 1,000 significant people and institutions in electrical history. Volume 2 summarizes the contents of over 1,000 taped interviews concerning electrical technologies and the social systems in which they function. Volume 3 describes the archival holdings of over 150 corporations in the electrical, electronics, and computer industries. Extensive index to facilitate researching specific topics.

Available by direct order from History Center

◆ Sparks of Genius: Portraits of Electrical Engineering Excellence (1993)

The stories of eight distinguished electrical engineers. Casts light on the emergence of new branches of engineering — microwave engineering, television engineering, analog and digital computing, solid-state electronics, quantum electronics, and biomedical engineering — as well as the continued advance of older branches — radio engineering, power engineering, and telephone switching.

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◆ Technological Competitiveness: Contemporary and Historical Perspectives on the Electrical, Electronics, and Computer Industries. (1993)

Eighteen essays, by leading historians and engineers, considering the nature of competitiveness on technological development. Assessments of past and contemporary situations in Japanese electronics, U.S. electronics, computing, telecommunications, industry and commerce, consumer products, and electric power in France.

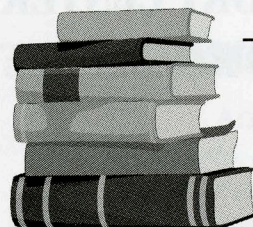
Available through IEEE Customer Service (IEEE Order No. PC3244-QAJ)

◆ Tracking the History of Radar (1994)

Nineteen essays by engineers and historians describing the different periods of radar development in Europe and America. This book provides the military and political contexts for radar development, investigates the science-technology relationship in various institutional and cultural environments, and raises some historiographic questions. Includes extensive bibliography.

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People who have contributed to the Friends Fund at the Friends (\$35-99), Sustaining Friend (\$100-249), Senior Friend (\$250-999), or Patron (\$1000-2499) level since August of last year are entitled to receive the Friends discount. Donors who have given to the Partnership Program (\$2500 or more) are entitled to one free copy of each publication plus extra copies at the Friends discount. Contributions to the Friends Fund are tax deductible in the United States.

Things to See and Do

Upcoming Conferences:

There are a number of interesting conferences coming up this fall. **Computers in Europe Past, Present and Future: An International Symposium on the Contribution of Europeans to the Evolution and the Achievements of Computer Technology** will be held in Kyiv (Kiev), Ukraine, 6-8 October 1998. The conference, "dedicated to the pioneers Charles Babbage, Konrad Zuse, Alan Turing, Maurice Wilkes, Sergei Lebedev, J. Lyons & co., and many others," will seek to highlight the contributions made by Europeans to the evolution of computer technology and its effective use in many applications. More information can be had from T. Malashok, ICFST House of Scientists, Vladimirska Street 45a, 252034 Kyiv, Ukraine, fax +380 44 2 255 185, icfct@icfct.freenet.kiev.ua.

The **Society for the History of Technology** (SHOT) will hold its annual meeting in Baltimore 15-18 October 1998. You can reach the conference web site through the secretary's web page at <http://www.auburn.edu/shot>.

ASIS (the American Society for Information Science) has announced a satellite conference for their annual meeting, on **History and Heritage of Science Information Systems**, to be held 23-25 October 1998 in Pittsburgh. Held in conjunction with the Chemical Heritage Foundation, it will explore the history and heritage of the nature, development, and influence of all types of science information systems worldwide. For further details, contact: Robert V. Williams, Conference Chair, College of Library and Information Science, University of South Carolina, Columbia, SC 29208, tel. 803-777-2324, FAX (803)-777-7938, bobwill@sc.edu.

The Society for the Social Study of Science (4S) is co-sponsoring with the Environmental Studies Association of Canada (ECAS) a joint meeting on "**Science, Technology and the Rise of Nature**," 26 October - 1 November in Halifax, Nova Scotia. More information is available at <http://plant.mta.ca/~ssss/>

Finally, for Graduate Students, **Mephistos 1998 (The 17th Annual Graduate Student Meeting for the History, Philosophy, and Sociology of Science, Technology and Medicine)** will be held 17-20 September 1998 in Minneapolis. For more information, contact: Mark Largent, Program in History of Science and Technology, Tate Laboratory of Physics, 116 Church Street S.E., Minneapolis, MN 55455, tel. 612-626-8722, FAX (612)-624-4578, larg0007@tc.umn.edu.

Exhibits:

IEEE Life Member Thomas E. Lynch has written in to remind us that the Naval Undersea Museum, Box 408, Keyport, Washington, 98345-7610, directed by William Galvani, has a focus on electronic technology. Check out their Website at <http://www.tscnet.com/tour/museum/index.htm>

Last year we noted with regret the passing of John Bryant. Now the **Historical Electronics Museum** has announced that they have received John's files and have added his collection of books on radar history to their library and his papers to their archives. In addition to its library and archive, the museum maintains a large and excellent collection of electronic equipment, much in operating condition, such as the SCR-584, the outstanding radar set of World War II. The Museum can be contacted at P.O. Box 746, M.S. 4015, Baltimore, Maryland 21203, (410)-765-2345, radarmus@erols.com.

We have also learned of a current exhibit at the **Arkwright Museum** of the Georgia Power Company entitled Round the Home: Appliance Sales and Home Service at Georgia Power. The exhibit tells the story of the organization of the Home Service Division within the Sales Department of the Georgia Power Company. Its roots were in the local gas company, which was owned by Georgia Power from 1903-1929. The original purpose of Georgia Power Home Service was to promote the use of electrical appliances. The primary reason for generating appliance sales was to increase the use of electric power rather than to profit from merchandise sales. The Home Service Division of the company was one of the most successful in the electric industry, and the company was one of the last utilities to eliminate the service. Georgia Power excelled in comparison to other companies in appliance sales. In 1934, Georgia Power ranked first in the sale of refrigerators, second in electric range sales and third in the sale of electric water heaters out of the one hundred power companies in the United States providing electricity to more than ten million customers. All of this was accomplished in the midst of the depression, and ensured the company's survival.

Notable artifacts in the exhibit include the first electric iron General Electric produced (1905), the first toaster model Westinghouse manufactured (1914), a circa 1940 electric razor and a hand-held vacuum produced by Graybar Electric, circa 1925, which appears to be a forerunner of the "dust buster" of today. The exhibit will run through October 1998. The Arkwright Museum is located near the lobby of the Connec-

tor Building of the Georgia Power Corporate Headquarters, 241 Ralph McGill Boulevard, NE, Atlanta, Georgia. For further information call (404)-506-2242.

Calls for help:

National History Day is an annual competition in history similar to a science fair. Middle and High School students compete with history projects at the local, state and, ultimately national level for recognition and scholarships. The theme for 1998-1999 is "Science, Technology, Invention in History: Impact, Influence, Change." The IEEE History Center has already helped National History Day, Inc., a nonprofit organization, put together the guide for this upcoming year. If any of our readers wish to serve as a resource or mentor for students, they might wish to contact their state coordinator. Contact and other information can be obtained from National History Day, 0119 Cecil Hall, University of Maryland, College Park, Maryland 20742, hstryday@aol.com, <http://www.thehistorynet.com/NationalHistoryDay>

The **IEC** (International Electrotechnical Commission) will be celebrating its centennial in 2004, and plans to publish a collection of historical material. Anyone who has access to pertinent items, especially from the early years, is requested to contact Leendert van Rooij, Generaal Foulkesweg 359, Wageingen, 6703DP Netherlands, +31 317 472 359.

Finally, what should be done with a little known New Jersey site that has quietly been on the cutting edge of wireless communications and then electronic warfare since it was constructed in 1914, now that it is being given up by the army? Turn it into an **InfoAge Learning Center**.

First, a short and quick overview of the site's history. As the Marconi Wireless Telegraph Company of America Belmar Station, with 400 ft. tall antennas, it was the site where Edwin Armstrong tested his famous regenerative radio circuit. The station was seized by the U.S. Navy during WWI and used as a major military communications link for U. S. troop movements. The station participated with sister station New Brunswick in the transmission of President Wilson's fourteen points to Germany. With the close of the Marconi station in 1924, there was no engineering activity there until 1939, when the U.S. Army Signal Corps, needing to expand its secret radar development program, purchased the site. Hundreds of SCR-268, 270 and 271 radar units were fabricated there for deployment everywhere allied troops needed electronic protection. As the army vacuum tube develop-



Project Diana staff at Ft. Monmouth, NJ

ment center, the site supplied prototypes to industry for wartime production. Army scientists started work in the ever increasing, ever more complex international contest of electronic warfare and surveillance. For a short time in 1946 the site was world famous for Project Diana: Army scientists using a SCR-271 radar unit modified by Edwin Armstrong bounced a radar signal off the moon, thereby opening the space age. Sputnik was tracked from there, as well as all future U.S. and Soviet launches. In secret, the electronic payloads for early satellites Vanguard I, Vanguard II, Courier IB, Score and Tiros I were in large part developed there.

But what to do now that the U.S. Army is decommissioning fifteen acres, five masonry buildings built by Marconi and three built by the army all in excellent condition with over 75,000 square feet of space? The

answer, according to some local engineers, is to preserve the site for its historic value while using it as the focal point to preserve New Jersey's rich communications and electronic past, present and future. They plan to turn it into a hands-on science center focused on electrons and waves and the inventions that exploit them. By having such focus, and by incorporating history directly into the program, they hope to complement the other science and technology centers in the New Jersey area.

Anyone wishing for more information on the center or how to help to make it a reality should visit the center's web site (www.infoage.org), email them at infoage@infoage.org, or write to them at InfoAge Learning Center, 2201 Marconi Road, Wall, New Jersey 07719-3919.

Other News:

Long-time IEEE History Committee member John Martin was honored for his local activity on behalf of engineering heritage by IEEE Region 5. The award was presented to John at the spring 1998 History Committee meeting by Committee Chairman Emerson Pugh.



John Martin (left) with Carlton Bayless at the 1990 dedication of the IEEE Milestone in Ft. Laramie, CO

Bibliography *continued from page 14*

Urban Technology at the University of Newcastle, bring together the disciplines of urban studies and technology studies in this timely and wide-ranging book, which provides the first comprehensive survey of research on the relations between telecommunications and city life.

The book is divided into ten chapters. The first three survey the recent growth and convergence of information and communications technologies and discuss the merits and drawbacks of current frameworks for studying urban technology. The remaining chapters address specific topics. The section on "Urban Economies" notes that cities are investment hubs for information infrastructure, and considers the impact of new media on economic activities such as banking, manufacturing, and home shopping. "The Social and Cultural Life of the City" explores new forms of social interaction and their possible impact on older spatially-based types of community. The chapters on "Urban Environments," "Urban Infrastructure and Transportation," and "Urban Physical Form" look at how electronic media shape the material environment of the city. "Urban Planning, Policy and Governance" discusses existing and proposed approaches to guiding the development of telecommunications so as to encourage economic investment and ensure public access to new media. The concluding section notes that telecommunications will continue to change cities in many ways, but not make them obsolete: "Clearly, the growth of electronic spaces is not somehow leading to the dissolution of cities, as so often argued by futurists and utopianists. . . . [Cities] are of fundamental importance as the terrain for social and cultural life; they house the vast majority of our population; and they seem likely to remain the key economic, social, physical, cultural, and political concentrations" (377).

Telecommunications and the City succeeds in demonstrating the many ways in which new communications and information technologies are reshaping urban life, and predicts "a new type of urban world, not a post-urban world"—a world that urban policy makers must plan for now if we want our future cities to be productive and livable places (377). Graham and Marvin offer a rare combination of technical understanding and a grasp of urban social issues in a book that is both informative and readable.



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

Women and Technology: Historical, Societal, and Professional Perspectives

August 2-5, 1999

Rutgers University
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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.

WE ENCOURAGE CONTRIBUTIONS FOR TOPICS RELATED TO THIS GENERAL THEME:

- Impact of Information Technology on women and women's work
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- Women in the Engineering Workforce
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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.

EE IN THE MOVIES

Movies can be a vivid source of information about the cultural meaning of electrical technologies, as, it is hoped, these few observations about recent movies suggest.

The pervasiveness of computers is emphasized in the movie *The Matchmaker* (1997): in a village of western Ireland a genealogist, whose office is filled with old papers and books, tries to hide that he has all his information on a computer.

In the movie *Sliding Doors* (1998) the automatic doors of a subway, of elevators, and of an office building are significant. Also in this movie, the return-call feature of a telephone (one enters a code in order to call back the person who last called) is used to unveil a boyfriend's deception, and there is a comment about the phone company making unfaithfulness more difficult.

The main character in the movie *Box of Moonlight* (1997) is an electric-power engineer. (Is this true of any other movie?) He is compelled to spend time with a Hippie-type who is living "off the grid", though making much use of electricity.

The Global Positioning System (GPS) features in the recent James Bond movie *Tomorrow Never Dies* (1997). As part of his plan to trigger a war between Britain and China, a media mogul tampers with GPS signals so that a British warship unwittingly sails into Chinese waters. For more than three decades James Bond movies have been impressing audiences with remote-control devices, new means of communications, and surveillance-and-control centers, not to mention electrocutions, intense electromagnetic fields, and electrical detonations.

Completion of the Signal Processing History Project *continued from page 1*

1996), is now complete. Among its many products are several dozen oral-history interviews with founders of the field, a 56-page highly-illustrated booklet distributed at both of the major annual conferences of the Society, a Center monograph on the history of the discipline, a Center monograph on the history of the Society, an exhibit at the IEEE Conference Center, and a poster. These products are described elsewhere in this newsletter.

A RECENT LETTER TO *THE ECONOMIST* BY ONE PAUL WESEL OF BOSTON:

Sir—Engineers...will never make as much money as business executives. A rigorous mathematical proof explains why this is true:

Postulate 1: Knowledge is power

Postulate 2: Time is money

As every engineer knows: $\text{Power} = \text{Work}/\text{Time}$

Since: $\text{Knowledge} = \text{Power}$ and $\text{Time} = \text{Money}$, then: $\text{Knowledge} = \text{Work}/\text{Money}$

Solving for money, we get:

$\text{Money} = \text{Work}/\text{Knowledge}$

Thus, as knowledge approaches zero, money approaches infinity regardless of work done.

Conclusion: The less you know, the more you make (but then you probably knew that already).

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