IEEE History Center

ISSUE 86, July 2011

Electrical Detection and Warning of Natural Disasters in History – A Tornado over Lebanon, Kansas in 1902. (see page 3)
Photo courtesy of the Library of Congress.

RUTGERS
THE STATE UNIVERSITY OF NEW JERSEY

IEEE History Center

The newsletter reports on the activities of the IEEE History Center and on new resources and projects in electrical and computer history. It is published three times each year by the IEEE History Center.

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LETTER TO THE EDITOR

I would like to thank you for your recent article entitled "The History of Making the Grid Smart," wherein you credited Theodore Paraskevakos with playing a significant role in the development of the automatic meter reading and smart grid technologies. Mr. Paraskevakos' contributions and achievements to society are many, varied and significant as evidenced by his 60+ patents. His inventions are used in nearly every country in the world and have benefitted society in many ways: the technology behind Caller ID, automatic meter reading and load management, digital alarm systems, and the tracking and tracing of the criminal use of cash. – Steven J. Cramer, General Counsel, iCVn, Inc.

The IEEE History Center Newsletter welcomes letters to the editor. Letters may be edited for length and style.

Subscription Information

The IEEE History Center newsletter is available free to all persons interested in technological history – whether engineers, scholars, researchers, hobbyists, or interested members of the public. It is published in hard copy in March, and in electronic form in July and November of each year.

To subscribe to the IEEE History Center's free newsletter, please send your name, postal mailing address, e-mail address (optional if you wish to receive the electronic versions), and IEEE member number (if applicable – non-members are encouraged to subscribe as well) to **ieee-history@ieee.org**

Current and past issues of the newsletter can be accessed at: **www.ieee.org/about/history_center/newsletters.html**

The IEEE History Center is a non-profit organization which relies on your support to preserve, research, and promote the legacy of electrical engineering and computing. To support the Center's projects – such as the Global History Network, Milestones, and Oral History Collection, please click the "Donate Online" tab at **www.ieee.org/donate** or **http://www.ieeefoundation.org/**

NEWSLETTER SUBMISSION BOX

The IEEE History Center Newsletter welcomes submissions of Letters to the Editor, as well as articles for its "Reminiscences" and "Relic Hunting" departments. "Reminiscences" are accounts of history of a technology from the point of view of someone who worked in the technical area or was closely connected to someone who was. They may be narrated either in the first person or third person. "Relic Hunting" are accounts of finding or tracking down tangible pieces of electrical history in interesting or unsuspected places (in situ and still operating is of particular interest). Length: 500-1200 words. Submit to **ieee-history@ieee.org**. Articles and letters to the editor may be edited for style or length.

The IEEE History Center Newsletter Advertising Rates

The newsletter of the IEEE History Center is published three times per annum; one issue (March) in paper, the other two (July and November) electronically. The circulation of the paper issue is 4,800; the circulation of the electronic issues is 22,500. The newsletter reaches engineers, retired engineers, researchers, archivists, and curators interested specifically in the history of electrical, electronics, and computing engineering, and the history of related technologies.

	Cost Per Issue
Quarter Page	$150
Half Page	$200
Full Page	$250

Please submit camera-ready copy via mail or email attachment to **ieee-history@ieee.org**.
Deadlines for receipt of ad copy are 2 February, 2 June, 2 October.
For more information, contact Robert Colburn at **r.colburn@ieee.org**.

By Michael Geselowitz, Ph.D.

The present has a way of becoming the past. In this issue we note the retirement of the longest-ever -serving staff member of the IEEE History Center, Rik Nebeker (p. 5) and we note the death and honor the memory of stalwart volunteer and supporter Paul Baran (p. 10). By helping to preserve, honor and interpret the past of technology, the History Center gives the IEEE the bedrock on which it stands when it shapes the future by advancing technology for humanity.

Recently, the IEEE and the IEEE Foundation have decided to place greater emphasis on the use of technology to solve humanitarian problems by joining an initiative, begun by our sister society ASME, called Engineering for Change (**www.engineeringforchange.org**). As the lead article in this issue points out (p. 3), history teaches that the detection, prediction and warning of natural disasters is potentially even more important than reacting to them.

Without repeating much that is in the article, I would like to point out that one way that IEEE honors the past is through its Milestones program. This program allows IEEE organizational units to involve, interest, and excite their members while informing both the local and global media and public about the long-running role of engineers in advancing technology for humanity.

I am happy and proud to note that the program continues to grow at a record rate (p. 6). If you look at the complete list of dedicated IEEE Milestones on the IEEE Global History Network (**http://www.ieeeghn.org/wiki/index.php/Milestones:List_of_IEEE_Milestones**), you will see that many involve directly or indirectly ways of predicting disasters and warning the public.

Telegraphy, telephony, wireless telegraphy and wireless telephony—each of which is represented by several Milestone events—in turn expanded the ability to detect disasters and to warn of their existence. An explicit and early Milestone example is the Boston, Massachusetts, USA Electric Fire Alarm System of 1852. Increasing computing power—also represented by multiple Milestones—led to better ability to predict the course of nature. Also multiply–recognized is radar, a 20th century technology that was developed largely for military applications, but soon found a key role in detecting and predicting dangerous weather. The Mount Fuji Radar System, 1964, is a key, early manifestation of this application. Finally, space systems such as the TIROS-1 Weather Satellite of 1960 advanced detection and early warning even further. Many more similar Milestones are in the pipeline to be approved.

Therefore, as the Milestones and our other programs to preserve, honor and interpret the past continue to thrive, let me take this additional opportunity to thank you, our readers and supporters, who make these programs possible.

DETECTION AND WARNING OF TORNADOES AND TSUNAMIS

175 YEARS OF ELECTRICAL DETECTION AND WARNING OF NATURAL DISASTERS

Electrical and computing technologies have greatly advanced the ability to understand, detect, and warn of impending natural disasters. Prior to the invention of electrical communications, a severe storm, or the tsunami from an earthquake, travelled faster than observers could warn of its formation. The invention of the telegraph stimulated the formation of networks of weather observers. Suggested in 1837 by James Espy of the Franklin Institute, one was initiated in the United States in 1847. The French government began issuing daily weather maps in 1863. Joseph Henry of the Smithsonian persuaded telegraph companies to transmit weather reports from volunteer observers at no cost. In May of 1868, Cleveland Abbe, Director of the Cincinnati Astronomical Observatory, suggested issuing storm warnings: three days advance warning for extended storms and six hours for violent hurricanes. 1883, astronomer Edward Holden proposed an automated electrical tornado warning system. His system would consist of an arc of telegraph poles to the south and west (i.e. the directions tornadoes appeared from) of towns and cities in tornado-prone areas. A wire would be strung along them, terminating in the town's telegraph office. Local connections from the office would reach into each home in the town. A current would hold a magnet open as long as the wire were intact. If an approaching tornado snapped the wire, the current would cease, and a clapper would ring a bell in each home, warning the residents to take shelter.

The use of the word "tornado" in weather forecasts was banned however in the United States from 1885 to 1938 for fear of panicking the populace, or that it might discourage people from settling in tornado-prone areas. "Forecasts of tornadoes are prohibited" stated the Weather Bureau Stations regulations of 1905, and the prohibition was reiterated in 1915 and 1934. Business owners complained of the financial losses tornado warnings caused when customers and employees stayed home because of inclement weather.

Even after an experimental tornado warning program began using radio in St. Louis, Kansas City,

TOTO – Totable Tornado Observatory – an instrument package designed to be placed in the path of tornadoes. Photo courtesy of National Oceanographic and Atmospheric Administration

Continued on Page 4

MO and in Wichita, KS, in the spring of 1943, H. M. Van Auken —General Manager of the Wichita Chamber of Commerce —took the Wichita Weather Bureau to task for creating "unfavorable publicity" and jeopardizing the community's industrial development by using the word 'tornado.' This despite the fact that the warning of 21 June 1948 had undoubtedly saved many lives. The tornado had touched down in a residential area of Wichita and had caused much destruction; however there were no fatalities and only twelve injuries. Even after the Weather Bureau lifted its restriction, the Federal Communications Commission continued to bar television and radio from broadcasting tornado warnings until 1954.

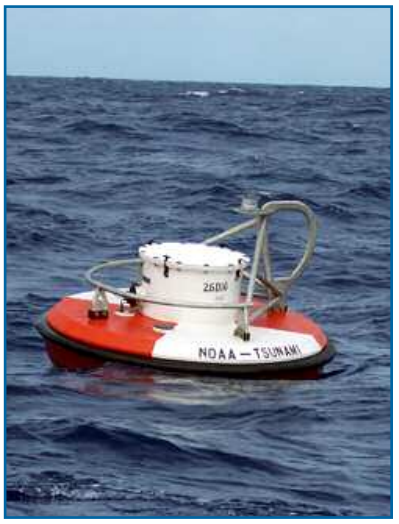
Radar and computer modeling proved to be the next major advances in the detection and warning of severe weather. In 1946, the Army Signal Corps began modifying surplus World War II gunlaying radars for use in weather detection, and the Weather Bureau commissioned its first weather radar on 14 February 1947. On 25 March 1948, noting a similarity to weather conditions which had spawned a tornado, and tracking an approaching storm on radar, US Air Force Captain Robert Miller and Major Ernest Fawbush made the first official tornado forecast and warning. As weather radar improved, it was able to show tornadoes themselves. On 9 April 1953, Glenn Stout and his colleagues at the Illinois State Water Survey, noticed a distinctive hook-shaped echo on their radar screens and were able to correlate it with a tornado. **http://climateillinois.wordpress.com/2010/04/21/first-documented-radar-hook-echo/**

The Mount Fuji Weather Radar, which is an IEEE Milestone, is an example of a sophisticated detection and warning system. No sooner had it begun operation in October 1964 than it detected an approaching typhoon. In 1971, 10-centimeter pulsed Doppler radars became operational. Doppler radar is able to detect tornadoes even when the hook signature itself is not visible because Doppler radar measures relative wind velocities. However, Doppler radar could not show whether the vortex was aloft or touching the ground. However, seismographs – devices long used for the detection of another kind of natural disaster – were being developed which could detect the vibrations produced by a tornado funnel in contact with the ground.

Luigi Palmieri invented an electric seismograph 1855. His seismograph used cups of mercury which – upon being shaken – would break an electric current to stop a clock to record the time of the earthquake while pendulums and pencil marks on a revolving paper drum recorded the strength of the shaking. **http://inventors.about.com/od/weirdmuseums/ig/History-of-Seismometry-/Mercury-Seismometer.htm**

Because electric signals travel faster than the seismic waves through the ground, a J. D. Cooper proposed in a November 1868 editorial that an electrical early-warning system ought to be constructed to warn San Francisco of impending earthquakes using seismographs set up in Hollister, California (120km away). The seismographs were to send an electric signal via telegraph wires, which would have rung a warning bell in City Hall.

An electromagnetic seismograph was invented by Boris Golitsyn in 1906. Tremors from an earthquake moved a coil through a magnetic field, thus producing current. As seismographs developed and increased in sensitivity, the data they collected was used to understand the different movements in an earthquake – the P-waves, the S-waves, and the surface waves – and how they propagated. Later, this knowledge would be the basis of computer models to attempt to understand earthquakes and how the different movements affected the ground and the buildings standing on them. Computer simulation of earthquakes, and of sea floor displacement likely to produce tsunamis, enabled earthquake-resistant buildings and tsunami barriers to be built.



A tsunami monitoring buoy. Photo courtesy of International Tsunami Information Centre

The 1 April 1946 earthquake off of the Aleutian Islands in Alaska, U.S.A. and the resulting tsunami led to the creation of the Pacific Tsunami Warning System **http://www.drgeorgepc.com/TsunamiPWarningSystem.html** In 1949, the Seismic Sea Wave Warning System (SSWWS) was created with its command center in Ewa Beach, Oahu, Hawaii, U.S.A, and the first tsunami warning in Japan was issued on 28 February 1950, after an earthquake under the Sea of Okhotsk. On 4 February 1975 the successful prediction of the Haicheng earthquake in China (7.3 on the Richter scale), and the evacuation of a million people from the city saved thousands of lives. Scientists had noticed the correlation between heavy autumn rains and winter earthquakes in folk tradition, but it was the spacing of the foreshocks measured on seismographs which convinced them and the civic authorities that an earthquake was imminent. Unfortunately, the pattern of foreshocks that foreshadowed the Haicheng earthquake does not always occur ahead of every earthquake, and the goal of being able to predict earthquakes reliably is still elusive.

Real-time mathematical analysis of seismic information was another key component of being able to issue earthquake and tsunami warnings. The Pacific Tsunami Warning Center acquired a computer in the 1970s which helped automate the process of locating an earthquake's epicenter and reduce the time between an alarm and sending a message to about an hour. Satellite measurements, which became more available in the 1980s, have also been major advances in the detection and warning of tsunamis.

IEEE HISTELCON 2012 TO BE HELD IN PAVIA, ITALY

The next IEEE International Conference on the History of Electrotechnology will be held at the University of Pavia, in Pavia, Italy on 5-8 September 2012. The conference, known as IEEE HISTELCON 2012 is being sponsored jointly by the IEEE Italy Section and IEEE Region 8, and the IEEE History Center is serving as a technical co-sponsor and as the technical program coordinator.

The theme of the 2012 conference is "The Emergence of Electrotechnology". The University of Pavia houses the original laboratory of Alessandro Volta and is the perfect venue for a discussion of this theme. Topics will include: Inventors as national heroes, early 19th century electrical science and technology, presenting electrotechnology in museums and using artifacts to advance historical understanding of technology, and using the narratives related to the emergence of electrotechnology to enhance educational curricula

The Call for Papers will be going out in the fall of 2011. In the meanwhile, the sponsors invite Universities, Research Institutes, Museums, and Learned Societies to technically cosponsor this Conference, by participating in the setting up of the program and the reviewing of provided presentations. All advance activities will be performed by e-mail.

Queries about technical co-sponsorship or other preliminary aspects of the Conference can be addressed to Dr. Michael N. Geselowitz, Staff Director, IEEE History Center, **m.geselowitz@ieee.org**.

HISTORY COMMITTEE MEMBER PETER C. J. HILL WINS 2011 SECTION VOLUNTEER AWARD

The IEEE United Kingdom and Republic of Ireland Section awarded History Committee member Peter C. J. Hill its 2011 Section Volunteer Award "for his outstanding contributions to the work of the Life Members Affinity Group, including the organization of the GCHQ IEEE Milestone event and his leadership in history projects." The GCHQ Milestone was for the invention of Public Key Cryptography.

CENTER ACTIVITIES

RIK NEBEKER RETIRES

The 2010-2011 academic year at the IEEE History Center began and ended on momentous notes. It began with a commemoration of the 20th anniversary of the arrival of the Center at Rutgers, which had occurred in September 1990. It ended with the retirement of Senior Research Historian Dr. Frederik (Rik) Nebeker.

Many of our readers are familiar with Rik and his work, and it is with mixed feelings that we report this news. We wish Rik well, but he also will be greatly missed. Rik was the longest ever serving staff member of the IEEE History Center.

Rik was hired by IEEE in 1990, just after the History Center relocated from IEEE Headquarters in New York to Rutgers University, but before the Center moved into its building at Rutgers (See p. 5 of Rik's oral history). Over the years Rik was instrumental in a number of the Center's teaching, research and outreach programs. He developed and taught for years to rave reviews a popular history course in the Rutgers History Department about the history of IEEE technologies in the 20th century (called "The Electronic Century" in its current incarnation) and participated in the team-teaching of others. He wrote innumerable articles and papers, and four books: *Calculating the Weather: Meteorology in the 20th Century* (Academic Press, 1995) based on his earlier dissertation research; *Signal Processing: The Emergence of a Discipline 1948 to 1998* (IEEE History Center, 1998) and *The IEEE Signal Processing Society: Fifty Years of Service, 1948 to 1998* (IEEE History Center, 1998), both based on an anniversary project for the IEEE Signal Processing Society; and the culminating work, *Dawn of the Electronic Age: Electrical Technologies in the Shaping of the Modern World, 1914 to 1945* (Wiley/IEEE Press, 2009) based on his work at the Center throughout the years. He also edited *Sparks of Genius: Portraits of Electrical Engineering Excellence* (IEEE Press, 1994) based on our oral history collection; edited and co-wrote, with Ernst Weber, *The Evolution of Electrical Engineering: A Personal Perspective* (IEEE Press, 1994); and co-edited From *0 to 1: An Authoritative History of Modern Computing* (Oxford University Press, 2002) based on one of our conferences. In the past several years, he took the lead in organizing that successful series of conferences, culminating in the IEEE 125th Anniversary History Conference in Philadelphia in 2009. He presented papers at those conferences and papers and talks at countless venues both

Continued on Page 6

within IEEE and elsewhere. Even beyond *Sparks of Genius* he was active in our oral history program, often training others to conduct interviews, and he was one of the Principle Investigators on "Rad Lab: Oral Histories Documenting World War II Activities at the MIT Radiation Lab" (IEEE History Center, 1993). Most recently, he was the founding editor of the new STARS program on the IEEE Global History Network.

Prior to coming to IEEE, Rik worked as an historian at the Center for History of Physics. Before that, he was a postdoctoral researcher at the American Philosophical Society. Rik received B.A. and M.A. degrees in mathematics from, respectively, Pomona College and the University of Wisconsin. He received an M.A. in history of science from the University of Wisconsin and a Ph.D. in history of science and technology from Princeton University. While at Princeton, he was editor of a major oral-history project, "The Princeton Mathematics Community in the 1930s" (Princeton University, 1985), and worked as instructor in the History Department.

His will be difficult shoes to fill. In the meanwhile, Rik and his wife Birthe (who retired as the Library Director at Raritan Valley Community College) have moved back to Birthe's native Denmark, and we wish them much luck and happiness.

ARCHIVES RESEARCH: THE CONVOLUTED HISTORY OF AIEE SERIALS


Published Monthly by
American Institute of Electrical Engineers

Electrical Engineering

January 1934
Volume 53
No. 1

The Official Monthly Journal and Transactions of the A.I.E.E.

This Month—*Winter Convention Issue*

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17,500

Recently, Elizabeth Moscara, Senior Information Specialist in the IEEE Publications Department, came to Sheldon Hochheiser, IEEE Archivist and Institutional Historian, for assistance with the history of several serial publications of the American Institute of Electrical Engineers (AIEE), one of IEEE's two predecessors. The numbering and relations among three separate titles, the *Transactions of the American Institute of Electrical Engineers*, the *Journal of the AIEE*, and *Electrical Engineering* (the predecessor of *Spectrum*) were not clear. This caused problems, especially because only the first publication was available through IEEE Xplore. She hoped that examining the original paper copies of the publications in the IEEE Archives would should light on the relations, and enable her to construct a clear chart of the history of the two publications. Together, Elizabeth and Sheldon put together the following history:

First, they resolved the confusing numbering—the first issue of the *Journal* appeared in 1905, under the title of *Proceedings of the AIEE*, but carried the volume number 24. Volume 24 was also the volume number for *Transactions* for 1905. Hence, the AIEE decided to adopt the numbering of *Transactions* for *Proceedings*, instead of starting the *Proceedings* with volume 1. This may have been because *Proceedings* contained categories of material that previously appeared in *Transactions*, such as news of the Institute. *Proceedings* also contained abridged versions of some of the articles from *Transactions*. *Proceedings* became the *Journal of the American Institute of Electrical Engineers*, in 1920, and *Electrical Engineering: The Journal of the American Institute of Electrical Engineers* in 1931.

In 1934, things became even more confusing: AIEE, likely because of financial problems during the Great Depression, merged the two publications. The title page of at least the bound copies of the publication bore the title *Transactions*, but the table of contents bore the title *Electrical Engineering: The Official Journal and Transactions of the A.I.E.E.* The merged publications published material that would previously had been included in either publication. Finally, in 1947, with both the Depression and World War Two in the past, the AIEE re-established the two as distinct publications, with the *Transactions* and *Electrical Engineering* both publishing a volume 66.

GLOBAL HISTORY NETWORK UPDATE

IEEE Medal of Honor

Following their 2009 article on the IEEE Edison Medal, David and Julia Bart have written a lengthy history of IEEE's highest award, the IEEE Medal of Honor. Originating in the IRE as a response to the Edison Medal, AIEE's highest award, the Medal of Honor was established in 1917 as a way to recognize the prominent advances made in radio telegraphy and radio telephony. The article outlines how the medal was created, including details on the graphic design of the medal, the criteria for eligibility, and the IRE's selection for its first recipient, Edwin H. Armstrong. Early conflicts and controversies are also documented; the patent battle between Armstrong and Lee de Forest over credit for the regenerative radio circuits lasted over twenty years. When the Supreme Court decided in favor of de Forest in 1934, Armstrong was crushed and decided to return his medal to the IRE at the IRE's ninth annual convention. IRE President Charles Jansky, Jr. addressed Armstrong saying that the board of directors strongly reaffirms the original award, which caused the convention to give Armstrong a standing ovation, recognizing him as the inventor of the regenerative circuit.

Various prominent medal winners such as Goldsmith, Zworykin and Fleming are briefly highlighted, and the article traces individuals who have won both the Medal of Honor and various other prominent medals including the Edison Medal, the John Fritz Medal, the Nobel Prize and the Radio Club of America's Armstrong medal. After the merger with AIEE in 1963, the medal's name became the IEEE Medal of Honor, and the article explains the current selection process and gives a list of all of the medal's past winners.

To view the full article, go to the following URL: **http://www.ieeeghn.org/wiki/index.php/IEEE_Medal_of_Honor**

Transformers at Pittsfield

Originally published in 1997, "Transformers at Pittsfield" is a lengthy and detailed book by Thomas Blalock about the history of the Large Power Transformer Plant in Pittsfield, MA which was operated by General Electric and closed in 1986. The plant was a direct result of William Stanley's work on transformers in Great Barrington, MA in 1886. Posted by Rutgers University School of Communication and Information volunteer Lauren Antolino, and processed by History Center graduate assistant Christopher Hayes, the book not only provides an extensive account of the history of the plant and the transformers manufacturing industry, but lends a unique first person insight into the operations of the plant.

The book contains more than two hundred photos and illustrations, which helps in bringing the detailed story to life. Due to the book's length, we broke the text up into three different pages on the Global History Network, which can be viewed here:

http://www.ieeeghn.org/wiki/index.php/Archives:Transformers_at_Pittsfield%2C_part_1

http://www.ieeeghn.org/wiki/index.php/Archives:Transformers_at_Pittsfield%2C_part_2

http://www.ieeeghn.org/wiki/index.php/Archives:Transformers_at_Pittsfield%2C_part_3

Saving the Transistor Symbol

Sorab (Soli) K. Ghandhi shares his experiences with the 1961 International Standards Meeting, where Bell Labs proposed a graphic symbol for the depiction of a transistor that was largely objected to by the international community. Ghandhi provides for a historical background on the invention of the transistor, and the factors leading up to the 1961 International Standards Meeting and the resolutions which came out of it.

Ghandhi's article can be viewed here:

http://www.ieeeghn.org/wiki/index.php/First-Hand:Saving_the_Transistor_Symbol

Over 50 Years in Computing

Written in 2002 after his retirement, Ray Miller's memoirs on his career in the computing industry were recently posted on the Global History Network. A detailed and rich account which describes his childhood, schooling, entrance into the engineering field through courses with IBM and his career beginnings with the United States Government as a "defense calculator" through his experiences in the Korean War, a return to IBM, and his teaching at Georgia Tech, Miller's experiences provide a unique insight into the early computing industry and are a valued addition to the Global History Network.

Miller's memoirs can be viewed here:

http://www.ieeeghn.org/wiki/index.php/First-Hand:Over_50_Years_in_Computing

Memoirs and First Hand Histories like this add a personal touch to the history of technology, and the History Center encourages IEEE Members to share their experiences on the Global History Network. To contribute your experiences, log on with your IEEE Web Account at **http://www.ieeeghn.org** and click on the "First Hand Histories" tab.

Video Content

A number of archival videos have been added to the Global History Network including two dedication ceremonies of IEEE Milestones; the NAIC/Arecibo Radiotelescope and the First Transatlantic Television Signal via Satellite at Goonhilly Downs, which can be viewed on their respective Milestone pages:

http://www.ieeeghn.org/wiki/index.php/Milestones:NAIC/Arecibo_Radiotelescope,_1963

http://www.ieeeghn.org/wiki/index.php/Milestones:First_Transatlantic_Television_Signal_via_Satellite,_1962

Highlights from other videos we have posted include an interview with IEEE Past President Harold Chestnut, interviews with control engineer Nathaniel Nichols, Arthur Collins, founder of Collins Radio Corporation, James Weldon, who worked on super power broadcast stations, and various videos on continuing education. The full list of archival videos can be viewed here:

http://www.ieeeghn.org/wiki/index.php/Archives:IEEE_Archives

WHAT HAS HISTORY OF TECHNOLOGY MEANT TO YOU?

Perhaps it was the story of an inventor or a technological breakthrough which sparked your interest in engineering. Perhaps the methods used to solve a past technical problem were applicable to a project you were working on. Perhaps a course in the history of technology helped inspire your passion or gave an additional facet to your ways of thinking.

The IEEE History Center staff are interested in writing an article on the ways that the study of the history of technology assists engineers in their careers, and we would like to assemble anecdotes and examples from our readers of ways that the history of technology advances the engineering profession. Anything from a couple of sentences to a couple of paragraphs on the topic will be welcomed for this upcoming article. Contributions may be edited for length. Please email your comments and answers to: **ieee-history@ieee.org**

MATTHEW FRIEDMAN IS 2011 LIFE MEMBER SUMMER INTERN

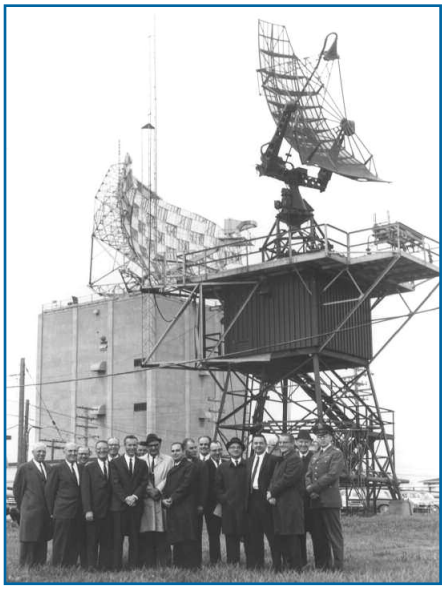
Matthew Friedman, who served as a Rutgers University History Department Graduate Assistant at the History Center for the academic years 2009-2011 has been named the 2011 IEEE Life member Summer Intern. Matthew Friedman is a graduate student in history at Rutgers University. His research focuses on postwar modernity, noise and the destabilization and production of subjectivity in the United States in the 1950s and 1960s. A native of Montreal, Matt worked as a journalist for a decade, for publications as diverse as the *Montreal Gazette*, the *National Post* and *NetGuide* and *InternetWeek* magazines. He is the author of three books on information technology electronic commerce, one of which was published just in time for the dot-com crash of 2000.

THINGS TO SEE AND DO

MYSTERY PHOTO

The IEEE History Center maintains a photographic archive of more than 4000 images. From time to time images are donated without any identification. Can you help identify this photograph? We are interested in any details such as type of equipment, approximate dates, manufacturer, how/where used, and anything else of historical interest you would like to tell us.

The photo shows a group of men standing in front of what the submitter believes to be the US Army anti-ballistic missile radar at Selfridge Air Force Base, Michigan. On the back of the photo is a stamp that reads "Official U.S. Airforce Photo". Also, hand written are "IEEE 10/67". We believe the person second from left in the front row is Dearl O. Morrison, who at the time, was the engineer in charge of the radio communications network in Macomb County, Michigan...the county in which Selfridge field resides. Perhaps one of our readers will recognize this event and be able to shed some light on what was transpiring, and who was there.



Please email any ideas you might have to: **ieee-history@ieee.org**

IEEE MEMBERS INVITED TO PARTICIPATE IN THE "REINVENTION" OF THE MENLO PARK IEEE MILESTONE SITE

By Nancy L. Zerbe, *EMTC President*

On September 9, 2006, the IEEE designated Thomas Alva Edison's Menlo Park laboratory (37 Christie Street, Edison, NJ) as an IEEE Milestone to honor the site where Edison established the world's first industrial research and development laboratory, developed the first system of incandescent electric lighting and electric power generation, invented recorded sound, and produced a commercially successful telephone transmitter.

Subsequent to the site's designation as a Milestone, the New Jersey Department of Environmental Protection, the Township of Edison, and the non-profit Edison Memorial Tower Corporation (EMTC) have been working hard to improve this very important historic site, known today as the Thomas Edison Center at Menlo Park. Work underway that IEEE members can participate in includes:

- The museum at the site is currently undergoing renovation, including work to provide access for persons with disability. During the renovation, the museum exhibits on Edison's

accomplishments at Menlo Park are being totally re-worked by a professional exhibit designer in order to improve the historic interpretation of this important site. Please see **www.menloparkmuseum.org** for updates on the renovation progress and the date of the Grand Re-opening in the fall of 2011.

- After many years of planning and fundraising, the 131' high Art Deco Edison Memorial Tower is being restored. The public is invited to learn about the tower and its history through a variety of on-site educational programs (see below).
- The EMTC has conducted conceptual planning to lay the groundwork for a new larger educational facility at the site. The vision is to build a museum that combines science, technology and history: one in which Thomas Edison's remarkable achievements at Menlo Park serve as the foundation of an interactive, inviting community science/technology center. The EMTC Board believes that a greater emphasis on the science, technology and innovation involved in Edison's Menlo Park work will better honor Thomas Edison and address our country's need for a greater appreciation for science and innovation.

IEEE members who would like to become involved in this exciting initiative should contact the EMTC. Your participation is welcomed!

Upcoming Educational Programs

- Children are invited to spend a morning at the Edison Memorial Tower this summer to learn about Thomas Alva Edison and the tower and participate in a related craft project (from a safe distance away from the restoration work!). Sessions will be held:
  - Ages 5-8: 26 July or 2 August, 10:00-11:30; $15 per child.
  - Ages 9-12: 27 July or 3 August, 10:00-12:00; $20 per child.

  As space is limited, pre-registration is required. Each child needs to be accompanied by an adult.
- Adult brown-bag lunch sessions, Fridays in August, 12:00-1:00. Adults are encouraged to bring a brown bag lunch and observe / learn about the tower restoration.
- Tuesdays at the Tower (9/13, 9/20, and 9/27, 7:00pm). The EMTC will hold a series of 5 lectures on the tower's significance, design, and current restoration efforts.

For more information about the site or the educational programs – or how to support the Thomas Edison Center at Menlo Park – contact the EMTC at 732-494-4194 or go to the EMTC website, **www.menloparkmuseum.org**.

CALL FOR PAPERS: THE PUBLIC HISTORY OF SCIENCE AND TECHNOLOGY, UNIVERSITY OF SOUTH CAROLINA, 11-14 SEPTEMBER 2011, COLUMBIA, SC

By The Society for the History of Technology (SHOT)

What role does history play in the general public's understanding of science and technology? History is often the tool for hooking audiences and making science relevant to daily life. From anecdotal introductions to sidebars in science textbooks, history plays an important, but often unexamined role, in explaining science to broad audiences. Most people first encounter the history of science and technology in their K-12 science classes – their only formal science training – even if it is incidental and unrecognized. They continue to encounter the history of science and technology through a variety of informal venues: museums, libraries, television documentaries, and popular science writing.

The University of South Carolina will host a conference September 11-14 to address the interaction of history, science, and the public. This conference seeks to examine: What role does the history of science play in the public's understanding of science and technology? What is the role of museums, libraries, television documentaries, and popular writing in educating audiences about science? How can historians of science and technology best interact with science policy makers? What can university history departments and public history programs do to teach future science popularizers and educators?

The conference will open on Sunday afternoon with a reception and exhibit opening at McKissick Museum. The conference will continue on Monday and Tuesday with traditional paper panels and roundtable discussions. Topics that may be addressed include:

- History of Science and public policy
- History of scientific education and scientific literacy
- Library collections and the history of science
- Technologies of conservation of museum artifacts
- Opportunities for digital technologies in public history
- Journalism and writing in the history of science for the "general," non-academic audience
- The role of federal government agencies in supporting the history of science
- The value of internships in training scholars to use material culture in their research
- How does the history of medicine affect current decisions about care?
- The place of history in discussions about emerging technologies in policy and public understanding contexts

Keynote speakers include:

- Robert Bud, The Science Museum, London
- Sharon Babaian, Canada Science and Technology Museum
- Peter Liebhold, National Museum of American History
- Zuoyue Wang, California State University, Pomona

The conference website is:
http://www.cas.sc.edu/hist/conf/pbst/index.html

Conference Organizers: Ann Johnson and Allison Marsh.

We would also like to draw your attention to the Atlanta Conference on Science and Innovation Policy, September 15-17, 2011 at Georgia Tech's Global Learning Center. Atlanta is only a 3 – 4 hour drive or short flight from Columbia. For more information about the Atlanta conference, see their website at **www.atlantaconference.org**.

LAIRD RESEARCH GRANT

The Mercurians, a Special Interest Group of the Society for the History of Technology (SHOT), is offering the Pam Laird Research Grant, a travel grant of US$1,000 to defray the cost of travel and housing to use a research collection.

The Mercurians began meeting in 1986 for the purpose of generating networks between people who share work and interests in the history of communication technologies, defining the field broadly. Activities include publishing a semi-annual newsletter, Antenna, meeting during annual SHOT conferences, organizing paper sessions for SHOT meetings, and pursuing contacts between meetings via Google Groups list.

The Laird Grant encourages and rewards high-caliber research in the history of communication technologies. One of the Mercurians' missions is to encourage scholarship in the history of communication technologies. The travel grant is awarded in alternating years.

The grant is intended for and limited to junior scholars--meaning either current graduate students or recent postgraduates (no more than three years beyond the terminal degree in their field). Only travel to an appropriate archival collection to carry out research on an aspect of the history of communication technology, broadly defined, will be supported. The archive can be open to the public, private, or even closed, provided that necessary permissions have been obtained from the archive.

The application form is available at: **http://www.mercurians.org/grant-form.doc**. It, and a curriculum vitae (no longer than 3 pages), may be emailed as attachments to the Mercurians c/o **abutrica@earthlink.net** The CV should include pertinent publications, fellowships, or accomplishments relevant to the proposed research, and professional societies and affiliations. The deadline for submitting an application for the inaugural grant is 31 August 2011. Please contact Andrew Butrica at **abutrica@earthlink.net**

OBITUARIES

REMEMBERING PAUL BARAN

The IEEE History Center lost a strong supporter and friend last March in the death of Paul Baran. Paul Baran was famous for his invention of packet switching – one of the technologies which made ARPANET and its successor, the Internet possible – as well as for crucial inventions in airport security. His 1964 doorway gun detector was the ancestor of the metal detectors used in airports and other sensitive sites throughout the world.

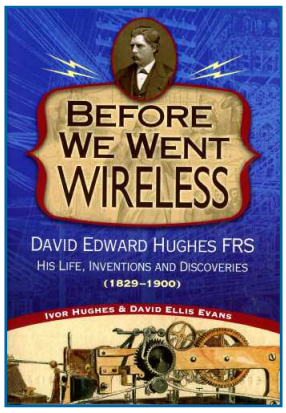
Paul Baran served diligently as a Trustee of the IEEE History Center from 2000 to 2003, benefiting the Center greatly from his wise council. He was also among the Center's strongest financial supporters. In August 2000, Paul Baran, pledged to match all donations to the Center's Friends program for one year, up to a total amount of $100,000. This was a huge help in raising funds to preserve the history of electrical and computing engineering at a time when the Center was broadening its efforts to do so. Paul Baran was named as one of the IEEE Foundation's Honored Philanthropist. His ongoing financial commitment to programs of the IEEE Foundation placed him in the Thomas Alva Edison level of the IEEE Heritage Circle.

JOEL SNYDER, 39TH PRESIDENT OF IEEE

The IEEE History Center regrets that Joel Snyder, the 39th President of IEEE, has passed away at the age of 75 just as this issue was going to press. Joel Snyder worked in removable media disk memories, voice-over-data modems, speech compression techniques, nonlinear sampling techniques, redundant and parallel computer systems, and powered prosthetics. He held several patents on video piracy prevention techniques. Mr. Snyder served as IEEE President in 2001. His oral history, as well as those of other IEEE presidents, can be found on the IEEE Global History Network at **http://www.ieeeghn.org/wiki/index.php/Oral-History:Joel_Snyder**

The staff of the History Center sends sincere condolences to his family and friends.

HUGHES, IVOR, AND DAVID ELLIS EVANS, *Before We Went Wireless: David Edward Hughes FRS, His Life, Inventions, and Discoveries (1829 – 1900),* Images From the Past, 2011



It is not uncommon in our field for avocational historians (particularly those with a technical background) to fix upon an obscure figure from technological history and over-promote their contributions. Every now and then, however, such avocational historians can discover a hidden treasure which benefits the both the history of technology profession and the general public. That is the case with this book.

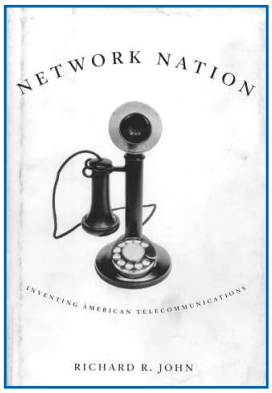
David Edward Hughes should not be obscure—the Royal Society of London still gives a medal in his name, and he is considered a sort of national hero by the Welsh—yet somehow his story had been largely forgotten along with the stories of many 19th century inventors whose contributions enabled modern technology but who for one reason or another did not reach the historical "canon." Prominent in his day as an experimental physicist, Hughes had a measurable impact on the growing field of telecommunications, inventing both a printing telegraph and an improved microphone. Now thanks to Ivor Hughes (no relation, according to the Forward) and David Ellis Evans, the record has been corrected and the knowledge of David E. Hughes restored.

These two avocational historians—Hughes is a retired electrical engineer and Evans is a retired material manager for engineering concerns with roots in and knowledge of the same Welsh region that produced David Hughes—have done outstanding archival research and written a thorough and technically astute but enjoyable and accessible treatment of David Hughes' life and work. Furthermore, not only is the work important for our full understanding of the inventive spirit of the nineteenth century, but the life is a fascinating one. Emigrating to America from the UK with his family at age seven, David Hughes moved with his family all around their adopted country while being privately tutored and self-taught. He was also a musical prodigy whose first adult job was teaching music to young southern women at a private academy.

To reveal in this review how this teacher and musician came to be an important inventor would be to spoil the fun of discovery to be found in reading this fine book for oneself. It is highly recommended for readers of the *IEEE History Center Newsletter.*

Available from Images from the Past, Bennington, Vermont, USA, **www.imagesfromthepast.com**, Paperback, $35.00, ISBN 978-1-884592-53-9, Hardcover, $49.50, ISBN 978-18-84592-54-6, illustrations, xiii + 386 pages.

JOHN, RICHARD R, *Network Nation: Inventing American Telecommunications,* 2010



In this book, Richard John does more than simply retell the story of telegraph and the telephone in the United States from 1840 to 1920, he fundamentally transforms our understanding by placing the technologies in the contexts of American political thought and practice as it evolved, and by bringing to his broad subject not only a masterful understanding of American civilization, economy and intellectual thought, but also careful examination of archival sources that had not previously been used.

After a discussion of the development and patenting of Samuel F. B. Morse's telegraph system, John explains why Morse wanted the government to purchase his patent, and own the telegraph system. Government ownership seemed to Morse the only way that the telegraph could be used equally by all who might benefit from the ability to transmit commercial information quickly, rather than favoring those with connections to private developers. John further explains why Morse failed to convince Congress to go further than to finance — as a demonstration project — the initial 1844 Washington-Baltimore line. The nation's political economy had turned against federal public works program after the panic of 1837, and the most important venue for government regulation had shifted to the individual states. Morse and his backers then built some lines, licensed others, and saw others go into business without respect to Morse's patents, leading ultimately to rapid commercial development, and then after the civil war, the domination of the interurban telegraph market by one company — Western Union. John emphasises how the telegraph remained— at least until 1910— on the one hand a "spatially extensive and temporally intensive network" but on the other, a specialty service for an exclusive clientele consisting largely of merchants, journalists, and lawmakers. The telegraph for the first time allowed for the efficient coordination of business and prices between the cotton port of New Orleans, the brokers and merchants of New York, and — after the transatlantic telegraph cable of 1866— London. Not only did sending a telegram remain relatively expensive, but Western Union's management did not believe that the general population would be interested in sending a telegram even if the cost were reduced. The post office remained the medium of choice for personal communication.

John then turns his attention to the telephone. John notes that the telephone business — as it developed during the era of Bell Telephone's patent monopoly (to 1894) — had its roots as much in the mass-media of the post office as it did in the telegraph, and that the business had its strength in local franchises that operated under municipal charters in the nation's cities. The nexus of regulation which helped shape this system was municipal franchise law, in large part because — even with the advent of long distance — telephones were overwhelmingly used for local

Continued on Page 12

communications only. He also notes that beginning in the 1880s, Bell's strategy went from reliance on protecting inventor Alexander Graham Bell's patents, to relying on technical improvements, especially to the switchboard, the most complex piece of equipment in the system.

Chapter 8 is the central and most original chapter in the book. Here John convincingly reinterprets our understanding of the transformation of the telephone in the United States in the twenty years following the expiration of Alexander Graham Bell's second patent in 1894. As is well known, during this period thousands of independent companies — that is, not affiliated with the Bell System — began offering telephone service in different locations, and the number of telephones in use exploded. The number of telephones in Chicago alone increased from 40,000 in 1893 to 250,000 in 1911. In the end, the Bell Companies triumphed, establishing the nationally sanctioned private monopoly that controlled American telephony until the 1970s.

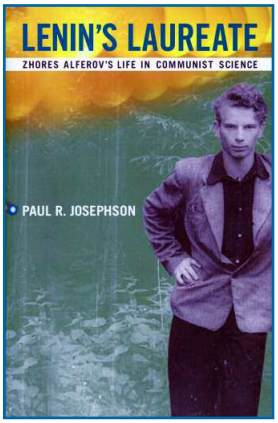
What John did, that no one before him had, was to study this period not through the records of the parent holding company, AT&T, but rather through local Bell operating company records, chiefly those of the Chicago Telephone Company. Angus Hibbard, the company president, saw popularization of telephone service as a way to transform his company's rocky standing with the city council; to accomplish this, he introduced a variety of new, less expensive classes of service, accompanied by improved switchboard designs. Measured service, in which the phone service was charged by the number of calls, rather than a flat monthly rate, greatly reduced the total bill for all but the heaviest users. He introduced party lines and nickel-in-the-slot telephones, so service could be paid by the call rather than the month. 40,000 thousand of the latter were installed in boarding houses, apartment buildings and bungalows. He encouraged the use of telephones for social interaction, rather than just business. And with these innovations he won widespread citizen's support, leading to the renewal of his company's municipal franchise, and soundly defeated a competing company that had focused on flat-rate business service.

John follows this with a discussion of the independent companies, which he emphasizes were very varied, but generally technically backward and not interested in popularization, and for the most part in decline after 1907. Then he turns to holding company AT&T's embrace of popularization, with the catch phrase "universal service" after 1908, and the realization on the part of the federal government — whose role had become more expansive with the rise of progressivism — that competition had failed, leaving two alternatives—government regulation or government ownership. He then reinterprets the Kingsbury Commitment of 1913, an agreement between AT&T and the US Department of Justice to settle an antitrust suit, as the cartelization of the nation's telephones between Bell and the surviving, largely small town and rural, independents. Finally, he shows how the widely perceived failure of the World War I experiment in federal takeover of the telephone and telegraph systems ended all American inclination toward government ownership of the telephone and telegraph, establishing the system of privately-owned, regulated telephony, dominated by AT&T, that began to change only in the 1970s. Thus, the particulars of the political economy of the United States explains why — unlike in most of the rest of the world — telecommunications remained privately operated, and not a government agency.

Network Nation is likely the most important work on the telegraph and telephone in the United States in many years, and is therefore now the place a reader should begin who wishes to learn about its subject.

Available from Harvard University Press, Cambridge MA. **http://www.hup.harvard.edu/** 800-405-1619 FAX: 800-406-9145. $39.95. ISBN 978-0-674-02429-8.

JOSEPHSON, PAUL, *Lenin's Laureate: Zhores Alferov's Life in Communist Science, (Cambridge, MA: MIT Press, 2010)*



Zhores Alferov, a solid-state physicist, is one of the last great scientists to have emerged during the reign of Stalin. In 2000, he shared the Nobel Prize in Physics for his hand in discovering the semiconductor device known as a heterojunction, which has since launched production of light-emitting diodes, rapid transistors, and the microchip. Continuing work on superconductivity and nanostructures keeps Alferov at the forefront of modern science and technology. He is today one of the leading spokesmen for Russian science and remains Chairman of the Leningrad (now St. Petersburg) Scientific Center, a post he has held since 1989, the end of the Communist era.

In Lenin's Laureate, historian Paul Josephson paints an intimate dual portrait of Alferov and the Soviet intelligentsia itself during the last half century of the Soviet regime and into the post-Soviet era. It is filled with sweeping historical movements and scientific breakthroughs—the legacy of World War II and Stalin's Five-Year Plans, "hero projects" like the massive hydropower stations of the late Stalinist period, the birth of the transistor, Perestroika—as well as with miniature portraits of key members of the Soviet scientific community like Abram Ioffe, founder of the vanguard Leningrad Physical Technical Institute (LFTI) in 1918 in which Alferov began his early career in the 1950s.

A tutorial in rectifiers and p-n junctions is not necessary to understand or enjoy this capacious book, although those tutored in the development of semiconductors should gain extra purchase. Indeed, although a book about science and the life of a leading physicist, Lenin's Laureate places a heavy stress on what's "communist" in "communist science." The book is as much a survey of political culture from the early years of Stalin's reign, through the "Thaw" under Khruschev in the late 1950s, to the reversals of the Brezhnev regime in the 1970s, to perestroika and glasnost under Gorbachev's 1980s, on into the post-Soviet era of Yeltzhin and Putin, in which economic difficulties and an uncertain national identity posed new challenges to the scientific community.

Merging politics and science, Josephson focuses on the lives of Soviet scientists and engineers as they negotiated the slippery, at times perilous, terrain between basic research and Soviet orthodoxy. Heterojunctions, it might be said, were good, but heterodoxy was not.

Although the book is not a comparative study, the level of freedom enjoyed by researchers at institutions like Bell Labs and Westinghouse is nevertheless put in stark contrast to the pressures of the Soviet system to conduct groundbreaking and speedy research while at the same time pushing industry to rapidly assimilate these innovations into mass production. Marking the tenuous exchanges between Soviet and American science in the heart of the Cold War, Josephson recounts Alferov's experience during the Brezhnev Era touring the key American sites of research and development (Bell, RCA, GE, IBM, the Naval Research Lab) and serving a semester at the University of Illinois in 1970 (one of the hotbeds of university physics along with MIT, Cal Tech, and University of Chicago). Here he met John Bardeen, father of the transistor, and worked with Nick Holonyak, a founder of optical electronics. A short middle chapter details the science at hand, the electrotechnological developments—silicon diodes, rectifiers—leading up to the discovery and innovation of light, small, durable semiconductor heterostructures which launched the widespread industrial application of lasers, light-emitting diodes, and solar photoelements that have impacted everything from the CD to solar cells in space. Following this, the narrative veers back to political reforms and the impact of Gorbachev and the collapse of the Cold War on Soviet science.

Throughout the sweeping saga of Soviet politics and its bearing on the status, perils, and opportunities of Soviet science—seen as integral to state-building projects and national identity alike—Zhores Alferov remains the touchstone, the scientist and humanist who negotiates and thrives against difficult odds. It is both a sympathetic portrait and one that does not stray from addressing the stubbornness of Alferov's continued defense of the Soviet system as uniquely conducive to scientific innovation and national pride. Josephson makes a comparison between Andrei Sakharov, the conscience of perestroika, and figures like Alferov, who, while advocating reforms beneficial to the research community, remained members of the establishment. Alferov is portrayed as romantic at heart: an internationalist, a cultured man of arts and letters, with a yen for satire, a friend of reform and academic freedom whose rise to the top of the scientific establishment traced Gorbachev's rise to power and the era of "new thinking" (*novoe myshlanie*); but he is also shown to be a patriot, an ideologue in a pinch, and heavily indebted to, and defensive of, the Soviet system which, he believed, allowed him to flourish.

Josephson does a fine job interweaving the science, the biographies (replete with small details), and the larger political narrative. There is much to be gleaned here for students of Cold War politics and scientific innovation, the link between state policy and science in Soviet Russia, political ideology and its impact on the research community, and for engineers and physicists intrigued by truly pioneering research in a historically unique system and working environment.

(The Stalinist system opened the 1930s with a series of show trials designed, among other things, to castigate engineers as "wreckers" of state designs, and/or spies working for foreign powers and "to subjugate the scientific and engineering community to state economic-development programs," (34) a policy revisited, with admittedly less blood and vitriol, in the Brezhnev era.) On the plus side, compliant engineers and scientists were given rigorous, state-funded training and rapid advancement. Federal support and institution-building surpassed that of the United States, as "Bolshevik leaders believed that somehow, under socialism, science and innovation would be more closely linked than under capitalism [despite the great envy of U.S. labs at Westinghouse, General Electric, and DuPont], and the proletariat would experience the benefits in higher quality of life and work almost seamlessly." (49-50) Indeed, while this book celebrates and elucidates Alferov's sizable scientific achievements, politics inevitably joins forces with physics in Alferov's personal life as it routinely did in the Soviet experiment more generally. It was ordained from birth; Alferov's older brother received a "red baptism" in 1924, making him an honorary member of a local trade union.

This book should delight historians with or without technical expertise. Josephson provides a long chapter on the precocious Alferov's peripatetic childhood that traces his parents' lives in the context of political and social developments from the first cracks in imperial authority in 1905 through the Bolshevik Revolution and the rise of Trotsky and Stalinist dictatorship, to the incredible devastation, especially to Jews within the Pale of Settlement, of the Nazi siege of 1941. (Alferov's father was a hero of both World War I and, on the side of the Bolsheviks, the civil war of 1918; his mother was one of 5 million Jews residing in the Pale of Settlement prior to WWII).

Available from The MIT Press, Cambridge, MA, 800-358-0343, fax: +1 617-625-6660 **http://mitpress.mit.edu**, $29.95, cloth, ISBN-978-0-262-01458-8, 313 pp., 17 illus., index

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