NEWSLETTER NO. 58 MARCH 2002

IEEE HISTORY CENTER

THE STATE UNIVERSITY OF NEW JERSEY RUTGERS

Preserving, Researching, and Promoting the Legacy of Electrical Engineering and Computing

STATIC FROM THE DIRECTOR

Let me start with the big news—by the time you receive this newsletter, the IEEE Virtual Museum will be live (see box at right)! I am extremely proud of this Web site, and grateful for the hard work done by Project Manager Kim Breitfelder, the rest of the staff of the IEEE History Center, our Rutgers GAs, our design partner SciencCentral, and IEEE volunteers led by the IEEE History Committee's Virtual Museum Oversight committee, chaired by Ken Laker. Although the target audience is the non-engineering public, I hope you will all take the opportunity to visit the site.

The Trustees of the IEEE History Center, those distinguished volunteer names on the masthead who aid us in our fundraising, believe that the IEEE Virtual Museum is a program which will attract donor interest, and I agree. However, we will not expand the IEEE Virtual Museum at the expense of our other programs. It is the very existence of a vibrant IEEE History Center which enables us to be the IEEE staff unit which can successfully pull off the IEEE Virtual Museum.

The March issue is the issue of our newsletter traditional for publishing our honor roll of donors (see pages 7-15). As you will see, even before the addition to our services of the IEEE Virtual Museum, support for the Center remains strong, and we are extremely gratified.

In fact, recently at the behest of — and funded by — the Trustees, we conducted a survey of IEEE Society leaders to determine which of the Center's programs are of greatest interest to IEEE members and to IEEE Societies, and therefore worthy of support. The IEEE Virtual Museum, although it was at that time only a virtual virtual site (pardon the expression), scored highly when it was explained. Three existing programs, however, scored even higher: The Milestones Program; the oral history program; and supplying historical content for IEEE Society publications such as newsletters.

continued on page 3

IEEE HISTORY CENTER

Issue 58 March 2002

IEEE VIRTUAL MUSEUM

Thomas Edison didn't invent the lightbulb, so why does everyone think he did? What was the first computer? How did the patterns in a Utah cornfield lead to the development of TV? What is the "x" in "x-ray"? Why are Alvin and the Chipmunks part of a museum about technology?

If your curiosity is piqued and you're eager for answers, you'll have to visit the IEEE Virtual Museum (http://www.ieee.org/museum) to get them.

After being in development for a year and a half, the IEEE Virtual Museum (VM) was launched in February.

Developed by engineers and historians, the IEEE VM is premised on the belief that examining what was increases our understanding of what is. Aimed at pre-college students and their educators, the IEEE VM explores the global social impact of electrical and informa-

continued on page 5

Center Activities

Teaching "The Electric Century" at Rutgers

Rik Nebeker is again teaching the course "The Electric Century", which in 1992 he added to the course offerings of the Rutgers History Department. The course surveys the historical development of the full range of electrical technologies of the 20th century—electric power, the telephone, radio and television, home appliances, scientific instruments, computers, and so on—giving most attention to how society has shaped, and been shaped by, the new technologies. Three books are required reading: David Nye, *Electrifying America* (1990), James Beniger, *The Control Revolution* (1986), and Martin Campbell-Kelly and William Aspray, *Computer: A History of the Information Machine* (1996).

Post-Doctoral Fellowship in Electrical History—Academic Yr. 2002/2003

The History Department and the IEEE History Center of Rutgers University announce a post-doctoral position for one year, renewable up to three additional years, in the history of electrical engineering and computing, beginning Fall 2002.

The post-doc will participate in the IEEE History Center's program of preserving, researching, and promoting the history of electrical engineering and computing and will be expected to conduct original research in related topics. In addition, the post-doc will teach undergraduate courses in the area of the history of technology for the History Department, typically one or two courses per year, and will participate broadly in the intellectual life of the Department, a top-rated program which features a new graduate major field in the history of technology, the environment, and health.

Candidates must hold a Ph.D. in the history of technology or a related field, and must demonstrate the potential to conduct professional-quality scholarship in the history of electrical or computer technologies, broadly defined. Teaching experience and a background in communicating with engineers or a non-academic audience are all desirable.

Applicants should submit a letter of interest, including a description of areas of research interest, curriculum vitae, writing sample (article or dissertation chapter), and three letters of recommendation. The deadline for completed applications is 1 April 2002.

IEEE and Rutgers are AA/EO employers. Women and minorities are encouraged to apply for all positions. ♦

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

Mailing address:
Rutgers University
39 Union Street
New Brunswick, NJ USA 08901-8538
Telephone: +1 732 932 1066
Fax: +1 732 932 1193
e-mail: history@ieee.org
http://www.ieee.org/history_center

IEEE History Center
Michael Geselowitz, *Director*
m.geselowitz@ieee.org
Frederik Nebeker, *Senior Research Historian*
f.nebeker@ieee.org
David Morton, *Research Historian*
d.morton@ieee.org
Mary Ann Hoffman, *Manager, Archival and Web Services*
m.a.hoffman@ieee.org
Kim Breitfelder, *Manager, Virtual Museum Project*
k.breitfelder@ieee.org
Robert Colburn, *Research Coordinator*
r.colburn@ieee.org

Visit our website
http://www.ieee.org/history_center

Mystery Photo Challenge

The IEEE History Center maintains an image archive of more than 3,300 images. From time to time, images are donated without specific identification. Can you help us identify these images? The IEEE History Center now has a webpage which features a mystery photograph challenge every month. You may email us your answer at history@ieee.org, or you can fill out an on-line form. **http:// www.ieee.org/organizations/history_center/mystery_photo.html** ♦

SCANNING THE PAST

Last year, the History Center undertook a very large project to digitize its entire photographic collection. With the help of some very dedicated Graduate Assistants, the Staff now has more than 3,300 photographs in electronic format. All are in TIF format, which allows for the highest resolution, and therefore quality. Our collection includes photographs of engineers, equipment, and historic locations.

We receive numerous requests for photographs each year. Having them digitized allows us to send these electronically, thereby reducing the response time. Our next goal is to give access to them on our website. We are working towards having the Center's database available on the web. We anticipate this to be completed in 2003/2004. Stay tuned! ♦

Static from the Director

continued from page 1

As regular readers of this newsletter know, the Milestones have continued to grow in quality, quantity, and geographic scope. We have several more in the pipeline that we should be able to write about next issue. The respondents were particularly interested in having Milestones linked to the preservation of important sites in the history of engineering. As reported last issue, this is what we are attempting with our National Historic Landmark Survey project, and we hope to soon be able to report final success.

As for the oral histories, for the past few years we have mainly collected batches of oral histories in connection with anniversary projects undertaken for IEEE Societies. This has given us strength in some technical areas, and weaknesses in others, and also not enabled us to collect interviews with certain key engineers, such as IEEE Medal of Honor Winners. Moving forward, it is likely that our work with Societies will more often involve exhibits for the IEEE Virtual Museum, but the IEEE Life Members Committee has given us a grant to try to fill some of the holes in our collection. Keep watching our Web site as exciting new interviews are posted.

Finally, in the area of content for Societies, we have for some time been supplying a "This Week in Electrical History" feature for *IEEE Spectrum On-line*. This year we are piloting a program to make the items available to the IEEE Communication Society for their newsletter, and we hope to expand this service to other Societies.

We may in the future conduct surveys among other constituencies. In the meanwhile, I hope it is clear that we always welcome feedback from you, our loyal supporters and readers. Thank you again for all your support, and I look forward to continuing to work with you and for you in the future on the IEEE Virtual Museum, and on all the Center's wonderful programs to preserve, research, and promote the legacy of electrical engineering and computing. ♦

NEW MUSEUM ON THE HISTORY OF ELECTRIC POWER

On the occasion of its 50th anniversary, the Tokyo Electric Power Company (TEPCO) inaugurated an Electric Power Historical Museum on 15 December 2001. Ten years in preparation, the museum is housed in a handsome 2-story building at the TEPCO Research and Development Center in Yokohama City, just outside Tokyo.

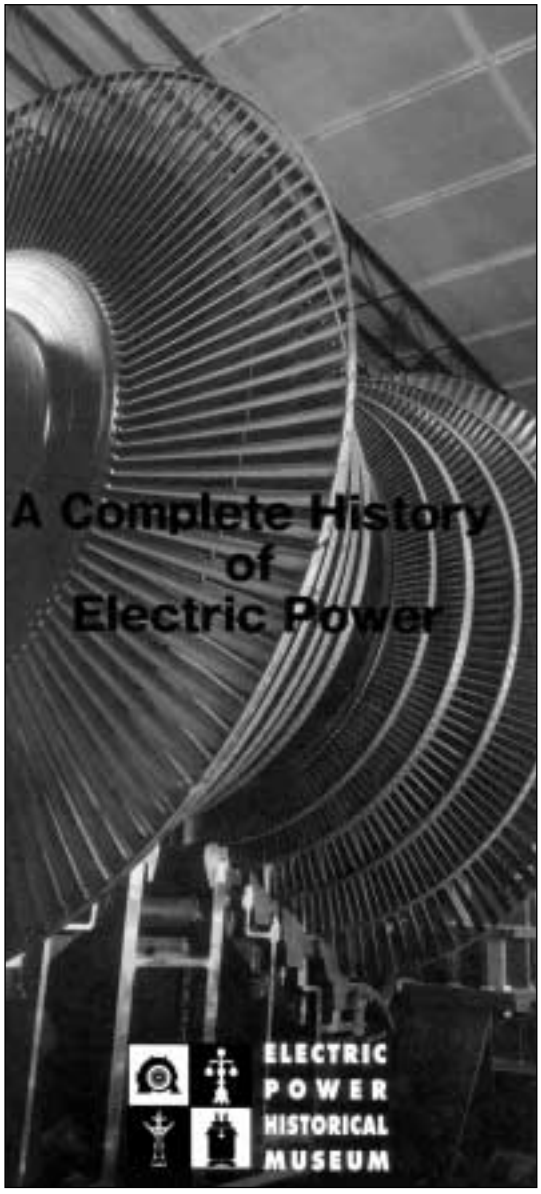
The objective of the museum is to acquaint present and future generations with the history of the production and distribution of electric energy in Japan, showing the many human activities involved (including design, construction, maintenance, and application) and the great importance of electricity in the development of Japan since the early 1880s. The story is told through a variety of artifacts, together with text, images, and graphics.

Especially well represented in the museum collection are electric generators, not only ones imported to Japan (which was usual in the early years of the industry) but also ones designed and built in Japan. Examples include an Edison DC generator from about 1890, a Westinghouse steam-engine and generator from 1904, a Siemens hydroelectric generator from 1908, the turbine generator built in 1957 for the Chiba Thermal Power Station, and the 1983 engineering model of a nuclear power station.

The transmission and distribution of electricity is also well presented. The main switchboard of the 1889 Kojimachi lighting station has been reproduced. There is a so-called Banzai tower for a 60-kV transmission line from 1911, also the V-type suspension insulator for a 500-kV line. And a replica of a brick manhole shows how, in 1925, underground power cables were accessed.

A variety of artifacts, such as electric appliances, show some of the many uses of electricity over the years. Particularly noteworthy are an ornamental electric-lamp which was installed in 1888 on the stone bridge in front of the Imperial Palace, and an electric vehicle from 1907.

The museum is wheelchair accessible, and there is a museum shop and a museum café. For those driving to the museum there is an underground car-park, and for those taking public transportation there is a free shuttle from the nearest station. In the adjacent TEPCO Research and Development Center there is the Electric Power Library, which is open to the public. The museum's address is 4-1, Egasaki-cho, Tsurumi-ku, Yokohama City, Kanagawa, Japan; the telephone is 045 613 2400, fax 045 613 2499, and



Turbine on Display at TEPCO Museum

HELP FOR LIBRARY OF ASMARA

Among the many roles of the IEEE History Center is to match prospective donors of artifacts and books with appropriate institutions. The needs of the Library of Asmara have recently been brought to our attention.

During the war with Ethiopia, the library at the University of Asmara was looted and the books destroyed. Presently, there is a librarian and a library building, but no books. Back issues of journals, science and technology books, history books would be welcome. From the US the least expensive way to send books is by SACK mail - package the books, a minimum of 11 pounds, at $1 per pound. University Librarian, University of Asmara, P.O. Box 1220, Asmara, Eritrea. ♦

The Virtual Museum

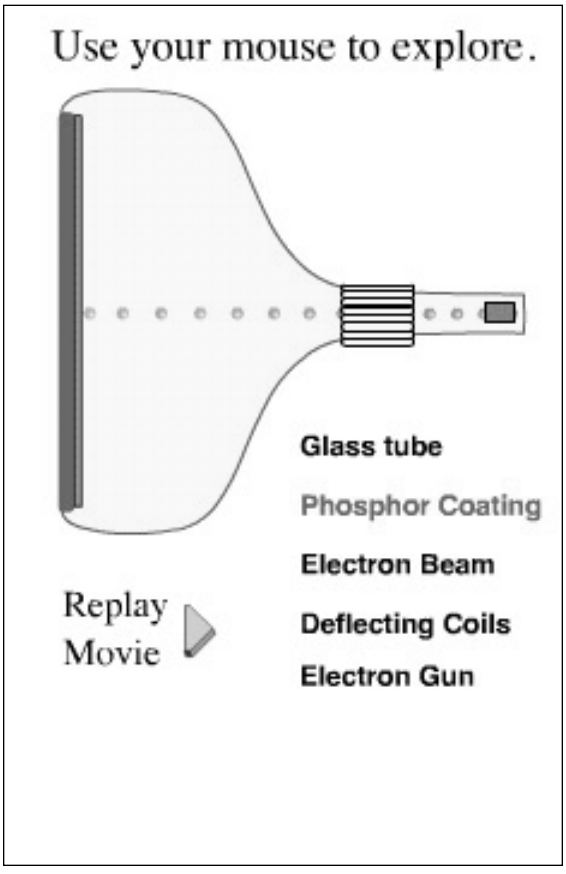
continued from page 1

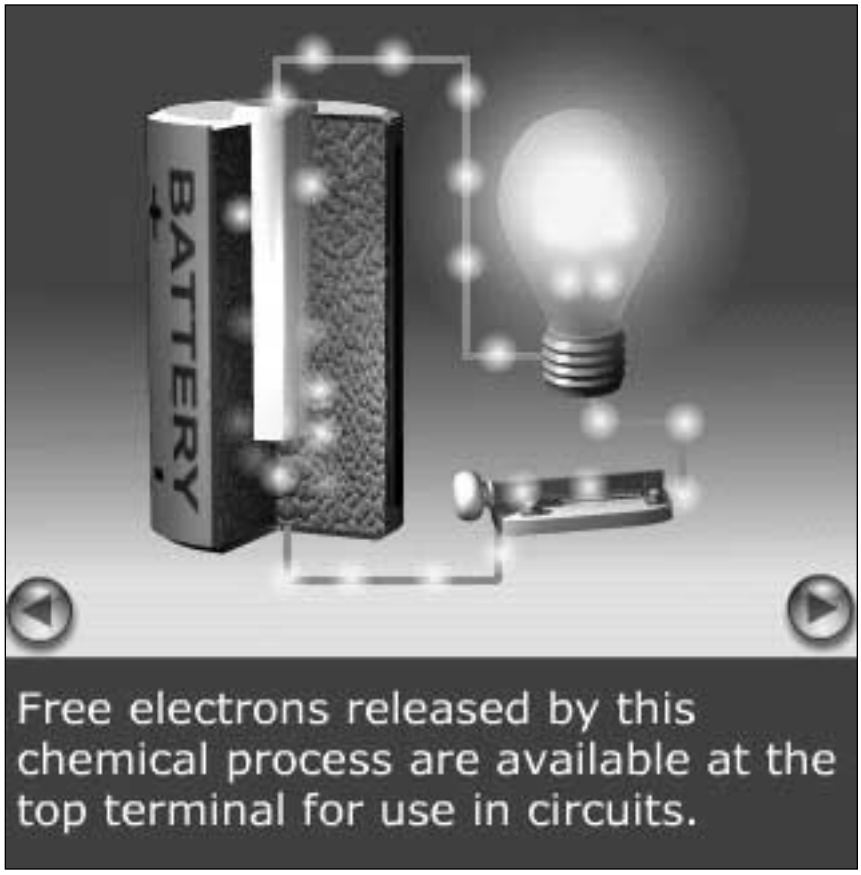
tion sciences and technologies and demonstrates the relevance of engineering and engineers to society.

To make learning about science and technology stimulating and fun, the IEEE VM illustrates technical material with engaging and interactive features while displaying unique historical artifacts from science and technology museums around the world.

The main exhibit in the IEEE VM is Socket to Me!: How Electricity Came to Be. This exhibit provides students with a background of the different fields affected by our understanding of electricity, and it features early innovations and discoveries by researchers such as Ampère, Faraday, Franklin, and Volta as well as later technologies such as television, computers, and the laser.

The second exhibit, The Beat Goes On: How Sounds are Recorded and Played, charts technological innovations in the field of sound recording. Topics include early work such as the phonograph, wax cylinders, and vinyl records (remember those?), as well as later innovations such as magnetic and digital recording. Three more exhibits are currently in production. These include exhibits exploring the different applications of microwaves, the works of Thomas Edison, and an exhibit focusing on the contributions women have made to electrotechnology. Look for these in the late spring and the early summer. ♦





Things to See and Do

IEEE Life Members' Prize In Electrical History, 2002
Society For The History Of Technology

The IEEE Life Members' Prize in Electrical History was established by the IEEE Life Members Committee, who fund the prize, and is administered by the Society for the History of Technology. The prize recognizes the best paper in electrical history published during the previous year, in this case 2001. Any historical paper published in a learned journal or magazine is eligible if it treats the art or engineering aspects of electrotechnology and its practitioners.

Electrotechnology encompasses power, electronics, telecommunications, and computer science. The prize consists of a cash award of $500 and a certificate. The committee invites submissions for the 2002 prize which will be presented at the Society's annual meeting in Toronto Canada, 17-20 October, 2002. Please send a copy of the paper to EACH member of the prize committee by 1 May 2002.

For more information contact Stuart W. Leslie, Department of History of Science, 216B Ames Hall, Johns Hopkins University, Baltimore, MD 21218; FAX: 410-516-7502; email: **shot@jhu. edu;** phone: 410-516-8349. ♦

ELECTRICAL TECHNOLOGIES IN THE MOVIES: ENGINEERING IN MEDICINE

One of the more common ways people encounter electrical and computer engineering is through medical technologies, and movies illustrate this as they employ medical devices to impress, amuse, or horrify viewers. A person's precarious health can be emphatically shown by the presence of monitoring or assisting equipment, as with an iron lung in "The Big Lebowski" (1998) or the life-support devices in "Roseanna's Grave" (1997). (The latter movie contains the gallows humor of this equipment being repeatedly unplugged and plugged in.) In "Father of the Bride Part II" (1995) the fetal monitoring of two births prompts, in one case, an emergency cesarean.

The defibrillator—with its ominous paddles and the jolt it delivers to the body—is certainly one of the more vivid medical technologies. We see it in "Breaking the Waves" (1996), "City of Angels" (1998), and many other movies. In "Flatliners" a group of medical students deliberately subject themselves to clinical death (to experience near death or life after death) and are revived by means of a defibrillator. This movie, like many others, makes use also of an oscilloscope portrayal of the heartbeat, with the steady signal indicating death (hence the title of the movie). The heartbeat signal is typically accompanied by sound, with a steady tone indicating no heartbeat; "Bullitt" (1968) provides an early example of this.

Medical imaging is frequently encountered in movies. X-ray imaging and fluoroscopy are shown in many movies of the 1930s and 1940s, such as "The Thin Man" (1934), where a fluoroscope reveals a piece of shrapnel in a skeleton, and "Pride of the Yankees" (1942). Krzysztof Kieslowski's 1993 movie "Blue" shows a clear ultrasound image of a moving fetus.

Hearing aids have been a source of humor in movies. Pre-transistor hearing aids, often suspended from the neck, are shown in "After the Thin Man" (1936), "Some Like It Hot" (1959), and "The Producers" (1968). In "Some Like It Hot"—the action takes place in 1929—a mobster carries his hearing aid on a front pocket, and when gunfire breaks out he turns down the volume. "Sound and Fury" (2000) considers the issues raised by cochlear implants, especially the fear, within the deaf community, that this technology will obliterate deaf culture and sign language.

Many movies show laser surgery. In "Face/Off" (1997) lasers are used both for removing a person's face and for reconstructive surgery. Indeed, lasers can represent the wonders of modern medicine. In the Woody Allen movie "Deconstructing Harry" (1997), Harry Block tells a friend something like, "You think you're dying, but you're not. Today they've got lasers … you've got nothing to worry about." (Perhaps the first appearance of a laser cutter in movies was in "Goldfinger" (1964), where it threatens Bond and elicits the following classic repartee: Bond, "Do you expect me to talk?"; Goldfinger, "No, Mr. Bond. I expect you to die.")

As always, we would be grateful for reports from readers of other interesting cinematic depictions of medical technology. You may contact us at **history@ieee.org.** ♦

Donors

Our sincere thanks to everyone who contributed to the Center to support our 2001 program year or to increase our endowment.

The IEEE History Center in the snow.

The Center continues to work hard to preserve and research the legacy of electrical engineering and computing and to reach out to engineers, students, journalists, decision makers, and the general public. Great progress has been made in achieving financial stability with the establishment of an endowment for the Center. While we are working at further building the endowment, we still depend heavily on operating funds from our two main sponsors, IEEE and Rutgers University, and on project grants and annual contributions from companies, foundations, IEEE entities, and people like you. We need your ongoing support to continue our work on collecting oral histories, publishing technical and popular articles, organizing conferences, designing exhibits, recognizing milestones in electrical and computer history, and working with the media to reach a broader audience. Contributions from individuals send the clearest possible message to institutional donors that the Center's work is valued by people with an interest in deepening our understanding of the role of electrical and information technologies in shaping today's world.

We have two programs through which individuals and organizations can help support the Center's activities: The Friends Program and the Partnership Program. The Friends Program is for annual gifts of $25 to $2499. These gifts, unless otherwise specified, are divided about equally between the endowment and the Center's operating budget, and make the donor a member of the Friends Program for the operational year for which the donation is received. The Partnership Program is for one-time pledges of $2,500 and more, and go directly to the Center's endowment. Partnership pledges can be paid in up to five annual installments, and the donor is a member of the Partnership Program throughout the period when the pledge is being fulfilled or until the completion of the current endowment campaign at the end of 2004, whichever is later.

Whether you give to the Friends Program or the Partnership Program, your gift is tax-deductible in the United States and its use is overseen by the Trustees of the IEEE History Center, a group of distinguished individuals appointed by the IEEE Foundation [see masthead, page 2]. The categories of giving are as follows:

Partnership Program	
Founding Partners	$ 500,000 or more
Keystone Partners	100,000 - 499,999
Distinguished Partners	50,000 - 99,999
Senior Partners	25,000 - 49,999
Partners	10,000 - 24,999
Associates	2,500 - 9,999
Friends Program	
Patrons	$1000 - 2499
Senior Friends	250 - 999
Sustaining Friends	100 - 249
Friends	25 - 99

Founding Partners

IEEE Incorporated

IEEE Foundation

Keystone Partners

Paul and Evelyn Baran Fund

IBM Corporation

IEEE Communications Society

IEEE Life Members Committee

Harold. W. Lord

IEEE Microwave Theory and Techniques Society

IEEE Power Engineering Society

Distinguished Partners

IEEE Electron Devices Society

IEEE Signal Processing Society

IEEE Solid-State Circuits Society

Senior Partners

Frank A. Brand

IEEE Laser and Electro-Optics Society

IEEE Magnetics Society

John Meggitt

Emerson Pugh

Partners

IEEE Electromagnetic Compatibility Society

Emerson and Elizabeth Pugh Fund of the Fidelity Investments Charitable Gift Fund

Joseph Keithley*

Nippon Telegraph and Telephone Corporation (NTT)

Associates

Laurence R. Avins

Earl Bakken

John Bryant*

Central Japan Railroad

Central Research Institute of the Electric Power Industry

Charles A. Eldon

Electric Power Development Corporation, Tokyo

Electro-Mechanics Company

GE Yokogawa Medical Systems, Ltd.

Hitachi, Ltd.

IEEE Antennas and Propagation Society

IEEE Circuits and Systems Society

IEEE Denver Section

Susmu Kobayashi

Kenneth R. Laker

John K. Menoudakas

NEC

Jun-ichi Nishizawa

Thomas F. Peterson, Jr.

Theodore S. Saad

Sematech

Takashi Sugiyama

Tokyo Electric Power Company

Topol Family Fund at the Boston Foundation

Toshiba Corporation

Rudolf A. Wassmer

Yokogawa Electric Company

Patrons

A. K. Al-Ghunaim

Susumu Kobayashi

Joseph A. Saloom

Bruce Gilchrist Fund of Fidelity Investments

Senior Friends

The Armer Family Trust
Rolland B. Arndt
Leo L. Beranek
Michael D. Brown
Harold F. Cobin
Jules Cohen, P.E.
Lawrence E. Crooks
Robert F. Duston
George A. Etzweiler
John Impagliazzo
Thomas Kailath, Sc.D.
Philip M. Klauber
Dr. Kenneth R. Laker
John K. Menoudakos
Jun-Ichi Nishizawa
A. Michael Noll, Ph.D.
Eiichi Ohno
Paul I. Pressel
The Richard Rosenbloom Charitable Fund Fidelity Fund
Daniel J. Senese
George F. Smith
Robert D. Smith
Arthur and Edith Stern
Charles H. Townes
Wirtanen Electric Ltd.

Sustaining Friends

Lucien Abraham
Michele Aldrich
Walter L. Anderson
Anonymous
Archer Daniels Midland Foundation
Art Technology Group
Henry L. Bachman
David L. Bailey
David K. Barton
Dwight C. Baum
Orlien N. Becker
Luc Berger
Walter H. Bigger
William C. Billingsley
Lloyd I. Biscomb, Jr.
Joseph Bordogna
Benson B. Boss
Myron J. Boyajian
Eneida I. Breaux
Willam B. Bridges
Katy Brocksmith
H. W. Brown, Jr.
J. H. Brown
William L. Burns
Newton A. Campbell
Robert T. Cavanaugh
John C. Champeny
Wan S. Chan
Charles W. Chandler
Gerald D. Chandler
Dale N. Chaynes
Russell D. Coan
Addison D. Cole
Jonathan Coopersmith
Anthony C. Cowin
C. Chapin Cutler
Lyell C. Dawes, Jr.
Frank J. De Stasi
S. Dejonge
Bryan J. Dietz
Joseph F. Douglas
Dominic F. Dunlop
William J. Euske
Hansford W. Farris
Leonard W. Finnell
Brian P. Fischer
Mark A. Fleming
Nicholas J. Fodor
Herbert Freeman
Robert Garner
David B. Geselowitz, Ph.D.
Sorab K. Ghandhi
Clinton R. Gilliland
Philip E. Goodrich
F. Cecil Grace
David A. Grier, Ph.D.
James L. Guilbeau
Richard U. Guth
Mr. Jerrier A. Haddad
Charles E. Hartman
Donald N. Heirman
James L. Higgins
Katsuhiko Hirai
Robert C. Howard, Ph.D., PE
Joseph F. Importico
Fred H. Irons
Charles B. Izard
David R. Jackson
John L. Jenkins
Amos E. Joel, Jr.
A. H. Jones, Esq.
Thomas J. Kane
Walter R. Keevil
Jack S. Kilby
Patricia King
Misao Kobayashi
John M. Kopper
Arden K. Kossuth
Tod S. Kovara
Kelly J. Krick
Almon E. Larsh, Jr.
Jay T. Last
Gregory S. Leach
Norman H. Lehrer
Peter A. Lewis, PE
Floyd V. Lewis
Laurance H. Lloyd
Neal E. Lockwood
Chris A. Mack
Howard A. Maddox
Atsuya Maeda
Thomas J. Marlowe
John E. Martin
Samuel H. Maslak
Albert E. Mason
Magnacomp, Inc.
Joseph E. Mayes, Jr.
Iain K. McCracken
Troy L. McDavid
Robert W. McKnight
Hugh McLachlan
Charles E. McMurdo
A. H. Mendel
Dion Messer
David Middleton
Greg Minshall
Steven C. Moss
H. Deon Murphy
Shoichi Nakayama
James W. Nilsson
Robert B. Northrop
Noboru Okamoto
Albertus Oosenbrug
John D. Peebles, USNR(ret)
Bernard L. Pfefer
Brian Pinkerton
Roland Plottel
William R. Pond
C. Spencer Powell
Robert L. Pritchard
R. Craig Ramsey
Donald B. Reid
Alexander L. Richardson
John S. Rostand
William F. Roth
Joseph E. Rowe
R. Eric Russell
Anonymous
Robert D. Sansom, Ph.D.
Richard D. Schwartz
Buck Scott
Merritt E. Scoville
Bruce Seddon
Stephen S. Selkirk
Lyle D. Sheckler
Ludwell A. Sibley
Sigma Dynair, Inc.
Richard Silberstein
Bernard J. Skehan
Kenneth A. Skrivseth

Martha Sloan
Walter J. Smith
Ellis F. Smith
George M. Sommerman
Peter W. Staecker
Gordon E. Stewart
Hiroshi Suzuki
Shiro Suzuki
Earl Swartzlander
Morris Tanenbaum
J. V. Terry
Donald E. Tesko
Arun M. Thomas
Richard M. Thomas, II
Daniel D. Thompson
Jonathan H. Thorn
Ben H. Tongue
Christophe Tronche
Jose F. Valdez C.
Arthur Van Gelder
Richard P. Waltermeyer, Jr.
J. Claude Williamson
James G. Winnette
Robert C. Winton
Ernest E. Witschi
Martin Wolf
John P. Wood
Craig A. Woodworth

Friends

Einar A. Aagaard
Jules Aarons
O. R. Abernathy
Mohammad A. Abou-Rayan
Janne L. Ackerman
George B. Adams, III
George P. Adams
William G. Adaway
Ken R. Adcock
Kirkwood E. Adderley
Syed F. Ahmed
David D. Aitken
Masami Akaike
G. M. Alatas
Mark Alexander
Robert K. Alexander
John R. Alger
Donald P. Allan
Johnathan Allen
Leland J. Allen
Robert W. Allington
Eric Alliot, Jr.
John C. Alrich
Dietrich A. Alsberg
H. Louis Althaus
Edward E. Altshuler
John B. Anderson
Ted W. Anderson
Warren R. Anderson
John M. Anderson
Lawrence K. Anderson
O. E. E. Anderson
Richard J. Anderson
Richard W. Anderson
Robert E. Anderson
Ross Anderson
Roy E. Anderson
Tore N. Anderson
Howard W. Andrews
Oliver L. Angevine
Anonymous
Anonymous
Anonymous
Anonymous
Anonymous
Michael M. Anshel
Gary A. Anwyl
Tomos L. Ap Rhys
Marc T. Apter
Francisco A. Arce
Robert W. Archbald
Luis A. Arenas Vega
Jason Ares
F. C. Arnoult
A. Donald Arsem
James R. Atkinson
Robert G. Atkinson, Jr.
John G. Atwood
Walter O. Augenstein
Robert J. Averill
William C. Bachtel
William C. Bagley
K. D. Baker
Milton E. Ballard
Charles L. Ballentine
Leslie Balter
Glenn C. Bandy
David L. Barber
Robert A. Barden
Richard A. Barker
Robert C. Baron
Jesus J. Bartolome
Frederick R. Bartram
Henry L. Bassett
William Batalis
John K. Bates, Jr.
Arthur R. Bauer
W. Baumann
Arthur E. Baumgart
Richard A. Baumgartner
Fred W. Baumgartner, P.E.
James W. Bayne
William R. Beckman
Brian C. Belanger
Warren G. Bender
Eric E. Bennett
Robert F. Benningfield, Jr.
C. A. Bergard
Layton A. Bergen
Berkshire Technical Devices
Theodore Bernstein
Frederick C. Berry
L. H. Bettenhausen
Wlodzimierz Bilecki
John D. Bingley
Maurice W. Bizzarri
Bruce A. Blackman
Terence G. Blake
Allan L. Blanchard
Nicolaas Bloembergen
Isaac S. Blonder
John A. Board, Jr.
Neal A. Bodin
Donald M. Bolle
Tom C. Bonsett
Gary Boone
R. C. Booten, Jr.
Ulrich Borkenhagen
Richard L. Borst
D. R. Bosse
Charles W. Bostian, Ph.D.
S. Bouma
Frank J. Bourbeau
M. W. Bouwensch
Richard P. Bowen
James R. Bowen, PE
Lancelot L. Braitwaite
Emanuel L. Brancato
Marshall K. Brandon
David W. Braudaway
William D. Breingan
Gerhard L. Bremer
Donald R. Brennan
J. Brian
Alejandro Briano
James D. Brobst
M. N. Brodie
Ralph W. Bromley
Alex T. Brown
D. R. Brown
G. K. Brown
Kristy Brown
Victor J.G Brown
Wyatt Brown Jr.
Vern J. Brownell
Harvey M. Brunner, Jr.
R. G. Bryson
T. T. Nelson Bucher
Werner Buchholz
William Buchman
Pablo Luis Bucich
Arnold M. Bucksbaum
David G. Burks
Anson C. Burwell, Jr.
Stephen F. Bushman
Herbert I. Butler
Eric Cachin
Dr. James T. Cain
Milton D. Calcamuggio
Edwin T. Calkin
Edgar H. Callaway, Jr.
James C. Campbell, Jr.
Frank J. Campisano
James H. Cannon
David C. Carbonari
Herbert R. Carleton
B. Leonard Carlson, Jr.
John B. Carr, Jr.
John W. Carson
Philip S. Carter, Jr.
Steven M. Carter
Joseph Caschera
Gilbert S. Case
Frank L. Cash
Paul Casowitz
Ralph Casper
James P. Cassidy
David H. Castleman

William J. Cavanaugh
Ellis K. Cave
Michael W. Ceigler
Maciej T. Chachulski
Ramon P. Chambers
Webster M. Chandler, Jr.
Andrew C. Chang
Harry F. Chapell
O. B. Charlton
Ronald J. Chase
Naftali Chayat
James Cheal
Chao-Rong Chen
Russell B. Chorpenning
Ernst Christen
Svend Christensen
Michael J. Chu
Robert J. Clare, IV
Stephen C. Clark
Richard L. Clarke
Arthur Claus
Kenneth W. Clayton
Edwin R. Cole
Charles H. Coleman
Harley L. Collins
John W. Coltman
Kenneth A. Connor, Ph.D.
Earl P. Cook
James M. Cook
Gordon Cooper
H. Warren Cooper, III
James E. Cooper, Jr.
William L. Corcoran
Burton L. Cordry
Alfred E. Corduan
Wells M. Corliss
Sergio D. Cova
Edward J. Coyne
Robert P. Crago
John P. Craig
George F. Cremer
Douglas E. Criner
O. M. Cromer
Clarence R. Crowell, Ph.D.
Charles L. Cudlipp, Jr.
Michael J. Cullen
Paul J. Curran
William E. Currie
Ced G. Currin
Prentice Cushing, Jr.
Paul G. Cushman
Ed C. Cwiklo
G. Conrad Dalman
George F. Dalrymple
Alberto Dams
H. T. Darlington
James R. Davey
Charles M. Davis
George G. Davis
Edsel H. Davis
Donald L. Dawes
Douglas C. Dawson
Juan Daycard
Donald R. Daykin
Douglas F. De Boer, Ph.D.
Felicio L. De Franca
John J. De Franco
John L. De Grandpre
Chris L. Demarco, Ph.D.
Charles W. Dement
Jack B. Dennis
Anonymous
Jean Desaulniers
G. R. Desmarais
Charles G. Devoe
Clement L. Dickey
Stanley R. Dickstein
Manfred W. Dietrich
Robert W. Dietrich
Hans G. Dill
Rick Dill
Robin A. Dillard
B. L. Dillinger
David W. Doerr, Ph.D.
Hideo Dohmeki
Walter Domorod
Kevin D. Donahue
Richard Donkin
Julius Dorfman
G. Dorizas
Paul E. Dorvel
Nicholas J. Doto
James B. Dowling
John H. Dubois, III
Sherman W. Duck
Robert E. Dudley
Robert S. Duggan, Jr.
Michel A. Duguay
Harry B. Dulmage
Egons K. Dunens
J. R. Dunki-Jacobs
Jean-Luc Dupraz
Charles B. Dupuis
Kenneth M. Duvall
Lester D. Earnest
Cheryl A. Ebel
F. Neal Eddy
Murray Eden
Saw Edison
James M. Edwards
Charles W. Eichhorn
Irwin A. Einsohn
Thomas H. Einstein
James C. Elder
William J. Ellenberger
William C. Ellis
John N. Ellis
Rutherford L. Ellis, Jr.
Dale L. Embry
R. H. Engelmann
Richard F. Evans
Robert R. Everett
Juan R. Falcon
Ernest C. Farkas
John E. Farley
Ghaffar Farman-Farmaian
William B. Farmer
Sherman B. Farnham
Matthew Fassett
Lyle D. Feisel
Sidney Feldman
Warren A. Felt
Robert E. Fenton
Paul M. Ferguson
Donald A. Ferrett
M. Ferris
Marvin Fields
David M. Findling
Anselmo Fini
Patrick J. Finnigan
Dennis M. Fischette
David L. Fisher
Arthur O. Fitzner
Read T. Fleming
Daniel J. Fleming
Carl Flick
John D. Fogarty
John J. Foley
Harold C. Forst
Patrick W. Foster
Alton E. Foster
Charles A. Fowler
Myron E. Fox
Konrad Frank
George S. Franke
Enoch D. Frankhouser
Gene F. Franklin
Gerald G. Frick
Walter C. Frick, Jr.
E. M. Friedl
Donald C. Friedmann
Charles L. Frush
Francisco Fuertes
Osamu Fujiwara
Robert J. Fulmer
Jonathan W. Fulton
K. E. Fultz
Joseph W. Gagne
McMurray Gaines, Jr.
Roy A. Gallic
James E. Galloway, USN(ret)
Edgar O. Galyon
Francisco S. Garcia, Jr.
Thomas E. Gardner
Thomas F. Garrity
Henry W. Gayek
Mark Geary
Carl C. Gebhardt
Edward Gee
Alan Gehami
Gerard F. Geiran
C. Daniel Gelatt
Ralph S. Gens
Glenn A. Gerdin, Ph.D.
Horst W. Gerlach
Ivan A. Getting
Adolf J. Giger
Josef Giglmayr
Elmer G. Gilbert
Michael J. Gill
Edmond S. Gillespie
P. Roger Gillette
Everett L. Gilman
George Glan
A. N. Glazzard
Raymond R. Glenn
M. Goldberg
Arthur Goldsmith
Moshe Goldstein
Keith W. Golke
Steven E. Golson
David E. Good
Robert L. Goodwin
Gerald W. Gordon, PE
Michael J. Gorman
Richard J. Gorzegno
Gilbert Gould, Ph.D., P.E.
George E. Gourrich, M.D.
Byron J. Graff, Jr.
Anders Granhall
Fred L. Granville
V. Graziano

Alden F. Greenlaw
Charles E. Griffith
Richard W. Griffiths
Leonard L. Grigsby
Thomas N. Grigsby
Francis J. Grill
Mogens P. Gronlund*
Bernard P. Gropp
William A. Gross
M. Grossman
Francis B. Grosz, Jr.
Calvin E. Grubbs
John J. Guarrera
Myron E. Gudz
Chris G. Guenther
Lynn G. Guthrie
Hammond H. Haas
Klaus Haase
Kohei Habara
Marion Hagler
Chris Hall
Henry P. Hall
Charles E. Hamilton
R. T. Hanger
Alexander Hanna
M. William Hans
Karl C. Hansen
John M. Harker
George G. Harman
R. Amos Harold, Jr.
John A. Harr
Edgar D. Harras
David J. Harriman
Ernest R. Harris
James S. Harris
Jochen Hartmann
Susan Hassler
Hiroshi Hatafuku
James C. Hathaway
Michael Haupt
Clark M. Hay
Walter C. Hay, Jr.
Izuo Hayashi
Michael R. Hayes
Jeffrey C. Hecht
Charles L. Heimbach
J. Thomas Heislein
Norris C. Hekimian
Benjamin J. Hemmen
Kenneth D. Hendrix, P.E.
Roy R. Herbst
Luc M. Hermans
Dor H. Hesselgrave
Daryl T. Hester
Richard A. Hieber
Edward J. Hilliard, Jr.
James Hillier
Frank Himmer
John R. Hines
John Hirner
Theodore W. Hissey, Jr.
James Hobbs
Alan E. Hochhalter
David M. Hodgin, Jr.
Irvin L. Hoechner
Holger V. Hoepfl
James H. Hoffman
David C. Hogg
Vincent R. Hohman
Frank J. Hollenbach
D. L. Hollway
Andrew G. Holmes-Siedle
Donal K. Holway
Jack W. Homeyer
Soon Chan Hong
M. A. Honnell
Keith N. Hood
Mark A. Hopkins
Toshio Hori
Steven C. Horii, M.D.
W. Henry Horne
Masaaki Hoshi
Alfred Hotvedt
David Hounshell
Jack S. Howard
Philip L. Hower
Joseph J. Howes
Stephen B. Howlett
Mark W. Hrabe
Rick Hubbard
William J. Huck, Jr.
James D. Huddleston, III
Robert V. Hugo*
Harvey D. Hunkins
Paul C. Hunt
David O. Hunter
Marcel Hupperich
Mark S. Hutchenreuther
Robert L. Hutchins
Joseph R. Hyer
Roy K. Idehara
Makoto Ihara
Donald A. Ingels
Thomas M. Injeski
Hikaru Inooka
Hirosei Inuzuka
Katsuyoshi Ito
Henry F. Ivey
Kenichi Iwai
Isao Iyoda
Joseph Jackson
Daniel W. Jackson
George T. Jacobi
George Jacobs
Ira Jacobs, Ph.D.
Sudhanshu K. Jain
Leah H. Jamieson
Uwe Jansen
Hugh F. Jenkins
Thomas C. Jepsen
J. Ralph Johler
Arthur E. Johnson, Jr.
Eric L. Johnson
Robert M. Johnson
Clifford W. Johnson
Dean H. Johnson
M. C. Johnson
Milton R. Johnson, Jr.
Robert T. Johnston, Ph.D.
A. Jokl
Russell E. Jones
Leon T. Jones
Edwin C. Jones, Jr.
Curtis A. Jones
George W. Jones
Merrill C. Jones
Edward J. Joscelyn
J. William Jost
James W. Joyner
Norbert Juffa
Kenneth Kable
M. J. Kabrisky
John Kacerek
James F. Kaiser
Ivan Kalastirsky
Carroll F. Kane
Leonard J. Kaplan
Elmer F. Kaprielian
Karrol L. Karr
Peter Kartaschoff
Paul W. Kaseman
John W. Kasten
Joseph Kaszycki
Gerhard H. Kaufmann
Hirokazu Kawabata
Everett L. Keener
Shewell D. Keim
Frank J. Keim, Jr.
William R. Kelley
T. B. Kelley
William E. Kelley
P. G. Kendall
Bruce R. Kendall, Ph.D.
Warren A. Kernaghan
Robert W. Kerney
Warren A. Kesselman
Richard F. Kessen
A. R. Keyser, Jr.
Carroll G. Killen, Jr.
E. Kimura
Lyle D. Kipp
Robert A. Kipp
Peter Kirchhofer
Xavier Kirchner
Peter E. Kise
Nobu Kitakoji
Satoshi Kitani
Raymond A. Kjar
Rolf D. Klein
Barry S. Kleinman
Brian W. Kline
Eugene A. Klingshirn
James C. Klouda
Marian J. Kloza
William H. Kmetz
Bernd Knorr
Richard F. Koch
Alfred R. Koelle
Paul D. Koerber
Tosiro Koga
Paul R. Korney
Pierre C. Kotchop
Nobuo Kotera
Peter A. Kreider
Francis X. Krier
F. A. Kuhlemeier
Hans Kull
Ben E. Kullerd
W. H. Kummer
Albert T. Kundig
Michael E. Kunsman
Arthur Kunst
Stuart Kuo
Genzaburo Kuraishi
Noriyoshi Kuroyanagi
L. W. Kurtz, Jr.
Jun-Ichi Kushibiki
Tetsuzo Kusuda
Wong Kwok-Ho
James M. Lafferty
Anil Lal
Jefferson P. Lamb
Robert D. Lambert, Jr.
Mark A. Landguth
Robert J. Landman
Robert M. Landsman

G. Gordon Lange
Arvid G. Larson
A. A. Lassila
James W. Laughlin
Irwin L. Lebow
Albert C. Lee
Seong-Hee Lee
Agus Lee
Patrick E. Lejoly
Eric G. Lemmon
Cecil C. Lencioni, Jr.
W. Grant Leslie
Harry K. Lesser, Jr.
Harry Letaw, Jr.
Oskar N. Leuthold
Walter A. Levy
Winston D. Lew
John G. Lewis
W. M. Lewis, Jr.
Edwin R. Lewis, Ph.D.
I-En Liao
Jesse R. Lien
Robert K. Likuski
H. C. Lin
Jens C. Lindof
William B. Lindsay
August J. Link
William F. List
John K. Livingstone
J. G. Llaurado
Harry H. Lockhart
J. L. C. Lof
Marvin O. Loftness
Warren A. Lombard
Stephen M. Lott
Jack M. Loudon
Karl G. Lovstrand
John L. Lowrance
John P. Lozes, Jr.
M. S. Lucas
John W. Luce
Edward N. Luddy
Paul M. Lundquist
H. Douglas Lung
Michael Luwish
George E. Lyness
Gordon Lyon
Thomas L. Lyon
R. R. MacGregor
Slava C. Mach
Richard B. Mack
J. S. MacKelvie
Roderick G. MacKinnon
George H. MacMaster
Ronald H. MacPherson
Gregory A. Magin
Philip C. Magnusson
William F. Mahn
Andrew Malcolm
Sutham Malila
John F. Malm
Ralph F. Manfreda
J. A. Mann
William M. Mannel
Linda S. Manning
John Mannion
Richard E. Manwaring
Roger A. Mao
Emmanuel Marazakis
William C. Marchand
Steven Markman
John E. Marqullan
E. Masada
Berna L. Massingill
Clyde E. Mathews
Joseph W. Mathews
Wolfgang M. Mathis
Hideshi Matsumara, M.D.
Hirofumi Matsuo
Tron McConnell
Gordon P. McCouch
Ernest A. McCurley
Art E. McDole
Vincent T. McDonough
H. F. McGaffey
William McMurray
Wayne H. McQuerry
Joseph W. McReynolds
Sidney Meadow
H. E. Meadows
W. G. Mecklenbrauker
Homer L. Medlin
Victor A. Meeldijk
A. M. Meisel
Edward G. Menaker
George E. Merrill
John Merrill, Sr.
Sidney Metzger
Andrew W. Meyer
J. A. Meyer
Lothar E. Meyer
George W. Meyer
Raymond E. Micheletti
Marlin H. Mickle
William V. Middough
G. L. Miller
Norman Miller, P.E. Aus-Ret.
William Miller, Ph.D.
Douglas L. Miller
John W. Miller
Marvin I. Mindell
Glenwood J. Mitchell
Jerry D. Moench
J. Roger Moody
Richard K. Moore
Harold R. Moore
H. McVay Moore
Kenneth E. Mortenson
Raymond Moses
Peter J. Mucci
John W. Mueller
Jishnu Mukerji
Dr. James A. Mullen
Sherman N. Mullin
Michael J. Munroe
Kendall H. Murakami
Hiroshi Murata
J. Muroga
W. F. Murphy
Alan G. Murray
William E. Murray
Christopher B. Mushenski
Yasuto Mushiake
Leonard T. Mygatt, III
Christian W. Myrstad
Suzanne R. Nagel
Hideto Nakajima
Hideo Nakano
Anthony P. Napikoski
Francis J. Nardi
Roger A. Neidel
Charles M. Nelson
Elmer Nelson
R. I. Nerenberg
Robert L. Nevin
Saum Tet Ng
Mr. and Mrs. Richard S. Nichols
Edward Niemann, Jr.
Motonao Niizuma
Toshio Nishikawa
Paul N. Nix
J. Noordanus
Andrew E. Nordloef
Anders E. Nordsjo
Robert B. Nourse
Andrew G. Nugent
Paul C. Nurches
Edward H. Oakley
Timothy W. Oakley
Kiyoshi Oda
Akiko Ogawa
Hiroyoshi O'Hara
Keishi Ohashi, Ph.D.
Katsuhiko Ohsaki
Yasumitsu Okabe
Naohiko F. Okuma
Toru Okumura
Michael D. Oliver
Melvin I. Olken
Anders Olsson
Robert J. O'Malley, Jr.
Henry Oman
Morry Oppenheim
Angelo F. Orazio
H. John Orchard
Michael R. Osborne
Robert L. Osborne, Ph.D.
Karle S. Packard, Jr.
Carmine N. Pagano
Charles E. Pagano
Gerald Page
Daniel R. Paige
Gary M. Palter
Frank R. Paolini
Bruce J. Pardus
E. C. Park
R. G. Parker
Renzo F. Parodi
Jay T. Patchell
Donald A. Patterson
W. A. Patterson
J. O. Patton
R. R. Paul
David R. Payne
Don E. Peck
Joseph A. Pecon, Jr.
Charles J. Peplinski
Lloyd J. Perper
Robert G. Pessler
Sandra Peters
Robert S. Petit
Robert J. Pettersen
Bernard L. Peuto
Wayne Pfeiffer
Glenn A. Phillip
Edward V. Phillips
Timothy Piekarski
Paul R. Pierce
Victor J. Pietkiewicz
Orfeo G. Pinton
Jaime C. Plana
Andres Poch
J. Cameron Poffenberger, Jr.
R. V. Pohl
Edwin C. Polke, Jr.
Roger D. Pollard

Donald N. Pontsler
William H. Potter
Neils R. Poulsen
Edward U. Powell
Wilmer S. Powell
Allan Powers
John H. Powers
Lee M. Pratt
Suzan G. Preiksat
Ralph J. Preiss
James E. Pressey
J. Henry Primbsch
M. David Prince
Sam J. Procopion
J. F. Prorok
Thomas H. Putman
Tania L. Quiel
W. P. Quintin, Jr.
Heinz Raillard*
Delvan A. Ramey
Herbert E. Rauch
John E. Rawson
Gordon H. Raymond
James P. Raymond
R. A. Read
Wallace S. Read
Henry J. Reed
Earle B. Reese
Philip J. Reich
Alvin Reiner
Robert J. Renfrow
Peter H. Reynolds
Chester T. Rice
Marvin O. Richter
H. H. Rickert
C. O. Riddleberger
Charles Riedesel
Robert L. Riemer
Robert N. Riley Fund of the Baltimore Community Foundation
Kathryn J. Rinehart
Charles L. Rino
Marlin P. Ristenbatt, Ph.D.
John R. Roberts
George D. Robertson
Frank F. Robison, Jr.
William E. Romans
Dennis L. Ross
Hugh C. Ross
Jesse E. Roth
Milton Rothstein
Rodney S. Rougelot
Charles A. Rousselet
Boris Rubinstein
Milton Ruderman
Robert W. Ruedisueli
Guy H. Ruggles, Jr.
Anne Rumfelt
Randy J. Rumley
Ilan Rusnak
Dale W. Rusnell, PE
John F. Rutter
R. D. Ryan
Chandos A. Rypinski, Jr.
Herbert Kenneth Sacks
J. Sada-Gamiz
Mary A. Sager
T. Y. Sakaguchi
Washington D. Salaberry
George E. Saltus
James J. Sanders
Ralph P. Santoro
Eugene W. Sard
Hajime Sasaki
Yasuhiro Satoh
Henry E. Sauer
John S. Sawvel, Jr.
William A. Scanga
R. E. Scarbrough
David H. Schaefer
Lee M. Schaff
Carolyn J. C. Schauble
Frank E. Schink
Kurt Schlacher
S. Schneider
W. H. Schneider
Lawrence C. Scholz
W. W. Schramm
Victor K. Schutz
Richard F. Schwartz
Mischa Schwartz
Hugh L. Scott
Norman R. Scott
Luiz M. Seabra
David A. Seamans
Richard E. Seely
Samuel Sensiper
Mario Sforzini
Charles K. Shanks, P.E., NSPE
Oscar Shapiro
L. Dennis Shapiro
John J. Sheehan
Daniel H. Sheingold
Edward L. Sheldon
Edmund M. Sheppard
Irving J. Shepperd
E. A. Sheridan
Seiya Shima
Roger M. Shimada
Daniel W. Shimer
Susumu Shinohara
Fred E. Shoemaker
Rudolf H. Siegert
Peter M. Silverberg
James M. Simmers
Willis N. Skiff
James J. Skiles
Bernard Sklar
Merrill I. Skolnik
Milton G. Slade
Leo Slobodin
Nicholas K. Smalley, Ph.D.
George B. Smith
Lanny L. Smith
Edward H. Smith, Jr.
Newland F. Smith
Richard F. Smith
Richard M. Smith
Friedolf M. Smits
T. Louis Snitzer
Thomas D. Snyder
Harold Sobol
Ercuement Soenmez
Jerzy K. Soldek
In memory of Karl Solomon
Attila Soltesz
Euan Somerscales
Robert D. Sommer
Hideaki Sone
Rodolfo M. Soria
Marc Standaert
Thomas O. Stanfield
Lisa M. Stanley
Fred M. Staudaher
William L. Staudenheimer
J. Eldon Steelman
Peter M. Stefan
William Y. Stevens
D. Stewart
Thomas L. Stewart
Steven N. Stitzer
Elbridge F. Stockwell, Jr.
John R. Stoltz
W. T. Storey
Fred J. Stover, Jr.
Loran W. Stringer
Vincent P. Stulginskis
Mark A. Sturza
Robert J. Sublett
Roger W. Sudbury
Antoni Sudria
Tadasi Sueta
Shoji Sugawara
Seiji Sugiyama
Dennis J. Sullivan, Jr.
Robert W. Summerville
Hiroshi Suzuki
C. B. Swan
Robert S. Swanstrom
Carey T. Sweeny
James Morris Swiger
Monte R. Szendre
Chen-To Tai
Kuniaki Tanaka
Mitsuhiro Tani
Tatsuo Taniguchi
Shigeru Tanimoto
Peter P. Tarjan
Boyd C. Taylor*
Bruce C. Taylor, Ph.D.
Laurence R. Taylor
Clifford J. Tedder
Ir R. Tedjapranata
Howard A. Teitelbaum
Charles Tepper
Kenbu Teramoto
Edward J. Terhaar
Lewis M. Terman
James Thayer
Paul W. Thiede
Richard A. Thomas
Charles E. Thomas
Homer V. Thompson
T. N. Thompson
John R. Thompson
Richard P. Thurston
Gustav H. Till
Odd Tjore
Koutaro Torii
Leonard P. Trombetta
Henry J. Trussell
P. S. Tschang
Kin-Kau Tsui
Yoshihiro Tsujino
K. Tsukada
Toshio Tsurushima
William M. Tucker
John Tulloch
Howard L. Turetzky
C. W. Turner
Michiyuki Uenohara
Marc A. Ullman

Werner Ulrich
Teruhiro Umezu
James B. Unkefer
Lewis E. Unnewehr
John G. Van Bosse
Louis Van Der Brooke
Rob L. Van Der Valk
John P. Van Duyne
Maxwell Van Horne
William B. Van Lennep
Edward F. Vance
Steven L. Vanderlinden
Pedro Vaquer-Comas
Chris Vecchio
Anonymous
J. P. Vergez, Jr.
George C. Verghese
C. M. Veronda
N. G. Vershuren
Percy B. Vinet, Jr.
Herbert B. Voelcker, Jr.
Uriel Vogel
Alexander Volk
Willi G. Vollemweider
Paul S. Vydareny
Glen Wade
Katsumi Wakatsuki
Emil Walder
Edward Walentynowicz
Christian Walker
James T. Walker
Walter Wallin
Robert M. Walp
John B. Walsh
Ralph E. Walter
Albert E. Ward
Philip C. Warder
Schuyler C. Wardrip
Clayton A. Washburn
Ronald A. Waxman
Ben M. Webberman
Jay E. Webster
Charles M. Weems, Jr.
Che-Ho Wei
Frode Weierud
Timothy R. Weil
I. M. Weilerstein
Frank C. Weimer
Gerald Weiss
Max Tibor Weiss
Philippe F. Wendling
Russell G. West
Stephen R. West
John R. Whinnery
Nicholas R. White
Howard E. Whitston
Tracy Wichmann
Edwin A. Wiggers
George L. Wilcox
Franz Wildner
George O. Wilkinson
Deke Williams
Michael L. Willis
Eric l. Wilson
F. J. Wilson
C. N. Winningstad
David C. Winslow
Lauriston P. Winsor
Robert A. Wise
John F. Wittibschlager
Peter M. Wolter
Harris O. Wood
J. Waiter Woodbury
Joseph E. Woodward*
W. P. Worley
J. Cullen Wright
Goro Yabe
Sakae Yamamura
Katsumi Yamazaki
H. Yanofsky
Hyo Sub Yoon
Isami Yoshihara
Mamiro Yoshizawa
Ray J. Zeliff
Donald A. Ziemer
Ruben Zimering
Eric Zischkau
John A. Zulaski

* Deceased

IEEE FOUNDATION FRIENDS FUND

Donation Form

NAME_____

ADDRESS _____

_____

_____

I have enclosed a check for $ _____

I pledge $ _____ per year for _____ years.

❑ *I would like my donation to go to the History Center endowment*

Please mail to: **IEEE Development Center**
445 Hoes Lane
PO Box 1331
Piscataway, NJ 08855-1331

IEEE Membership No. (if applicable - one need not be a member to become a Friend) _____

❑ Please add my name to the list to receive the Center's newsletter (published 3 times a year at no charge)

❑ I would like to receive further information about the Partnership Program

❑ I would like to receive further information about the Friends Program.

Please make checks payable to:
IEEE Foundation Friends Fund

Partnership Program	
Founding Partners	$ 500,000 or more
Keystone Partners	100,000 - 499,999
Distinguished Partners	50,000 - 99,999
Senior Partners	25,000 - 49,999
Partners	10,000 - 24,999
Associates	2,500 - 9,999
Friends Program	
Patrons	$1000 - 2499
Senior Friends	250 - 999
Sustaining Friends	100 - 249
Friends	25 - 99

Bibliography

ARENAS VEGA, LUIS ALBERTO. *Electromagnetismo en la Antiguedad clasica (Volumen I)* (*Electromagnetism in the Classical Age (Volume I)*) Colombia: Editorial Rosa de los Vientos, 1993.

This book argues that the origins of intellectual thought on electromagnetism can be found in the classical age. Offering a broad survey on thought during the time, Arenas Vegas presents the general and scholarly reader with the basic tenets of classical thought and how they gave rise to intellectual inquiry on the workings of matter. Given the critical importance of electrical technology for modernity and modernization, the author explains that the search for its origins is an important exercise for understanding how we got where we are today.

The work is divided into two parts. The first section—the longest and most developed of the two—explores classical thought in ancient Greece and Rome, discussing the familiar figures of Socrates and Aristotle. The second section briefly explains the origins of thought on matter in Chinese culture, making subtle comparisons with thought in ancient Greece. After introducing basic terms—such as electricity and magnetism—the author moves on to explain the basic methods of inquiry practiced in ancient times. Two ways of understanding prevailed during the classical era: myth-making and observation. The first was manifested in obscure rituals and tales meant to explain and affect the natural world; in contrast, observation required practitioners to simply observe the natural world and come up with logical explanations for its workings. The second of these methods—observation—allowed intellectuals to move beyond myths and begin formulating logical explanations for the ways things were; this method, in other words, enabled science and a science of electricity to take hold. What's more, this new step in intellectual thought was taking place thousands of miles away—in China. Hence, the classical age in both the Western and Eastern world saw the emergence of critical inquiry—a development that would radically transform the way humans live.

This book is written in wonderfully lucid prose, which makes it inviting for those with a love for technology, history, and an interest in practicing their Spanish reading skills. The author's inclusion of China is instructive, reminding us to acknowledge the sophistication of ancient Chinese culture, as well as the fact that significant intellectual innovations occurred outside the Western world.

BRIAN AUSTIN. *Schonland Scientist and Soldier. From Lightning on the Veld to Nuclear Power at Harwell: the Life of Field Marshal Montgomery's Scientific Adviser.* Bristol and Philadelphia: Institute of Physics Publishing, 2001.

Brian Austin's study is a professional biography of a South African scholar, Basil Ferdinand Jamieson Schonland (1896-1972), famous for his achievements at home and in Great Britain, his adopted fatherland. With a career and interests somewhat akin to Schonland's, the author is well qualified for the task of portraying the complex life of his remarkable countryman. Austin's book offers a broad and detailed panorama of Basil Schonland's numerous occupations—scientist, inventor, experimenter, soldier, educator, researcher, administrator. Schonland became well-known for his roles as an intermediary between, and as an active participant in, scientific and military communities in South Africa and in Great Britain.

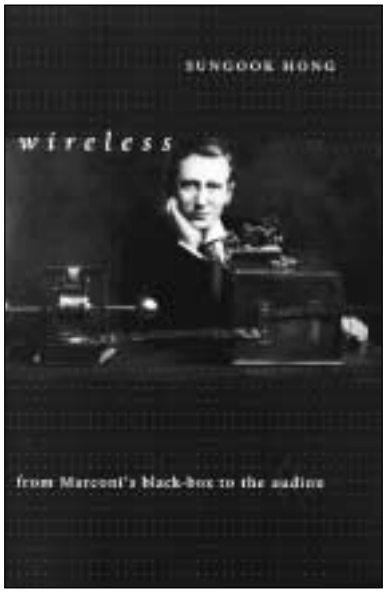
A son of a German Jewish scholar, Basil Schonland from his early youth was a diligent and talented student. After graduating from Rhodes University College in his native Greshamstown, in the Eastern Cape, he moved to Britain to study physics, receiving a B.A. (1914) and a Ph.D. (1924) from Cambridge University. Austin traces a number of major steps in Schonland's career as a scholar-administrator: his involvement in atomic physics at the Cavendish Laboratory (Cambridge University) in the early 1920s, subsequent posts in South Africa as Director of the Bernard Price Institute of Geophysical Research (1936) and as President of the Council for Scientific and Industrial Research (1945-1950), and, finally, leadership of the Atomic Energy Research Establishment at Harwell. Schonland's biography reveals his evolving interests and research in nuclear physics, lightning (thundercloud and lightning discharge), radar technology, and energy sources. Austin also documents other important aspects from Schonland's scholarly life, including scientific projects and conferences, awards, publications, lectures and scientific cooperation with numerous individuals, including Lord E. Rutherford, Sir E.V. Appleton, and Sir J. D. Cockcroft.

Schonland's scientific expertise also became useful in military affairs. During the First World War he participated in the Corps for Royal Engineers Signal Service,

providing army communication, and spent a few years in France. During the Second World War, Schonland served in the British forces again and was occupied with the development of radar technology. For his military-scientific accomplishments throughout the two global conflicts, Schonland graudually rose in ranks from Lieutenant to Brigadier. He served as a scientific adviser to two Field Marshals: Sir Bernard Montgomery (a leader of the allied invasion in Europe in 1944) and South African Prime Minister J.C. Smuts in 1945. Schonland continued to play a scientific-advisory role on South Africa's defense matters in the post-World War Two era.

Available from Institute of Physics Publishing, Bristol and Philadelphia, http://www.iop.org. ISBN 0-7503-0501-0 xviii + 639 pp. Images, photographs, notes and sources, index.

HONG, SUNGOOK, *Wireless: From Marconi's Black-Box to the Audion*, MIT Press, 2001.



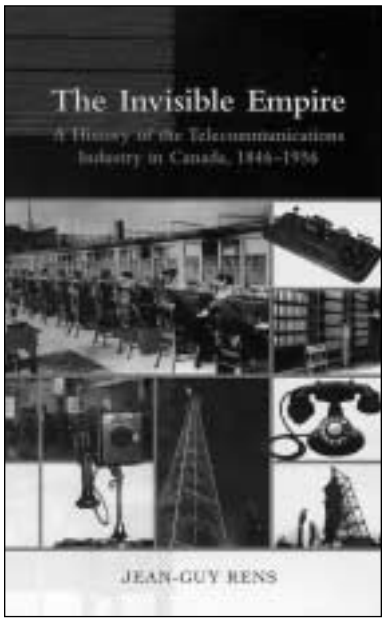
A quarter century separates the demonstration of electromagnetic waves by Heinrich Hertz in the late 1880s and the routine use of radiowaves to convey human speech. This book recounts the events of these years. Beginning with experiments in "Hertzian optics" and ending with the successful efforts to employ the Audion (the 3-element electron tube invented by Lee de Forest) for radio telephony, it contains especially detailed treatment of the work of Guglielmo Marconi, John Ambrose Fleming, and de Forest. The book is especially valuable in clarifying the complex process of invention, notably of the diode by Fleming and of the triode by de Forest. Both inventors in later years offered highly simplified (or even distorted) accounts of these events.

A special feature of the book is a detailed treatment of what has become known as the Maskelyne affair. In June 1903 Fleming gave a public demonstration at the Royal Institution in London of Marconi's "syntonic" (that is, tuned) system. Nevil Maskelyne, a leading critic of Marconi, worked to disrupt the Royal Institution demonstration by sending interfering (and disrespectful) messages. Sungook Hong uses this episode to illuminate the technical capabilities at the time, the opposition to Marconi, and Fleming's role as public witness for the Marconi system.

The book, which draws abundantly upon archival sources as well as the published record, is carefully documented (in unobtrusive endnotes). It is also well illustrated, particularly with diagrams of apparatus.

Available from MIT Press, Cambridge, MA, 800 356-0343, fax 617 625-6660, http://mitpress.mit.edu, $34.95, cloth, ISBN 0-262-08298-5, xv + 248 pp., index.

RENS, JEAN-GUY, *The Invisible Empire: A History of the Telecommunications Industry in Canada, 1846-1956*, McGill Queen's University Press, 2001.



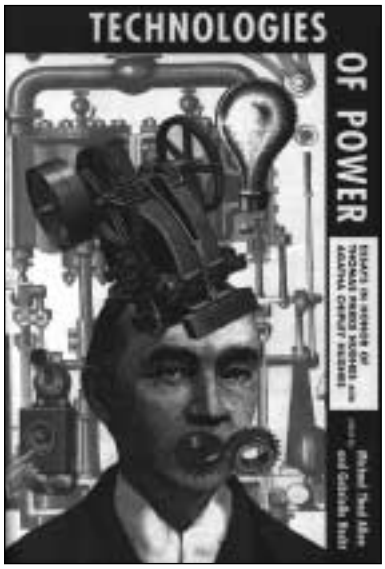
The telecommunications network is everywhere, it envelops our entire life. Rens looks at this "Invisible Empire" within Canada. You cannot understand Canadian history without understanding the history and development of its telecommunications industry.

Mr. Rens begins this history in 1846, when telegraphy linked Toronto to the United States. He reviews the telegraph, the telephone, and radio through the decades. Canada has one of the highest telephone-penetration rates in the world.

Rens also looks at the human side of the industry, such as the working conditions of the telephone employees. He ends this history in 1956, for two specific reasons. First, it was in 1956 that the Consent Decree between AT&T and the United States Department of Justice, which terminated the privilege links that kept Canadian main manufacturer Northern Electric dependent on the U.S. manufacturer Western Electric. Second, the first transcontinental telephone cable between North America and Europe was put into service.

Available from McGill Queen's University Press, Toronto, Ontario, Tel: (607) 277-2211 Fax: (800) 688-2877; $49.95, cloth, ISBN: 077352052X; 410 pp, index

ALLEN, MICHAEL and GABRIELLE HECHT, Eds, *Technologies of Power*, MIT Press, Cambridge, 2001



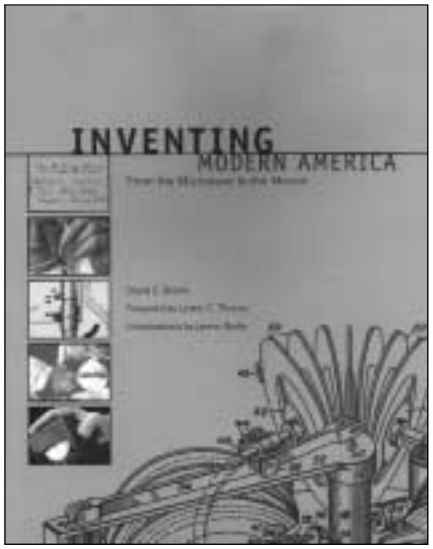
Technologies of Power is a collection of eight essays exploring "how technologies become forms of power, how people embed their authority in technical systems, and how the machines and the knowledge that make up technical systems strengthen or reshape social, political, and cultural power." Given the profound effect which technology and its use have on modern culture, the theme is well-chosen and important. New technologies are often heralded as equalizers and promoted as playing field levelers, inevitably, however the choices of designers and builders become imprinted on the end users. The essays are:

- The Telephone as a Political Instrument: Gardiner Hubbard and the Formation of the Middle Class in America
- Culture and Technology in the City: Opposition to Mechanized Street Transportation in Late-Nineteenth Century America
- The Hidden Lives of Standards
- Engineering Politics, Technological Fundamentalism, and German Power Technology, 1900-1936
- Modernity, the Holocaust, and Machines without History
- Technological Systems, Expertise, and Policy Making: The British Origins of Operation Research
- Technology, Politics, and National Identity in France
- The Neutrality Flagpole: Swedish Neutrality Policy and Technological Alliances, 1945-1970

Readers may feel the lack of an essay exploring the embedding of authority within Soviet technologies – the *ne plus ultra* of authority embedding – or the uses of technology in Japan. However, the essays included do examine the relationship among state, expertise, and authority, in European and US societies — a relationship which we as citizens need very much to understand. The essays also show the (usually negative) effects on technology when the decisions made by its engineers are influenced by external (i.e. political) considerations.

Available from the MIT Press, Cambridge, MA, 800-356-0343, fax 617-625-6660, http://mitpress.mit.edu, $24.95 paper, ISBN 0-262-51124-X, 339 pp., index, 19 illus.

BROWN, DAVID E., *Inventing Modern America: from the Microwave to the Mouse*. MIT Press, Cambridge, 2001



This book features 35 US inventors who have changed the world in a positive way. The five areas covered are Medicine & Healthcare, Consumer Products, Transportation, Energy & Environment, and Computing & Telecommunications. Each biography is three to four pages in length and many contain side-stories. One such example is Jerome Lemelson, who holds more than 500 patents. He and his wife, Dorothy, founded the Lemelson Foundation, which is also featured in this book.

Other engineers featured in the book include Jacob Rabinow, Wilson Greatbatch, Philo T. Farnsworth, Douglas Engelbart, Al Gross, and Grace Murray Hopper. Each biography consistently starts with the inventor's childhood, and provides insights into his or her quest to invent. *Inventing Modern America* is richly illustrated with historical photographs, diagrams, and patent drawings which illustrate the inventors' lives, their inventive processes, and their creations—some well-known, others more obscure.

The book also contains anecdotes about the inventors. Did you know that the first "patient" to receive a pacemaker was a dog? Or that Al Gross appeared on "To Tell the Truth" in 1977?

Available from the MIT Press, Cambridge, MA, 800-356-0343, fax 617-625-6660, http://mitpress.mit.edu, $29.95 cloth, ISBN 0-262-02508-6, 210 pp., index, 250 illus.

VARDALAS, JOHN N., *The Computer Revolution in Canada: Building National Technological Competence* Cambridge: MIT Press, 2001.

Canada's reliance on foreign capital has been well documented and has led to a "nationalist historiography that argues that Canada's dependence on foreign companies has precluded the growth of native industry." According to Vardalas, this historiographical approach overlooks the very real technological innovations that have been developed and put to use in Canada. This book contests the dependency perspective by telling the story of the computer industry in Canada from 1945 until the end of the 1970s.

Canada's computer industry, the author explains, has its origins in post-WWII economic and military strategies. With the end of the war and the emergence of U.S. hegemony, countries sought ways to develop their economies and to compete with U.S. industries. A group of entrepreneurs viewed digital electronics as the most exciting of technological investments, one which might best return profits in the near future. On the other hand, the government viewed digital electronics as a possible generator of economic growth. Given that digital electronics had become of mutual interest to the state and entrepreneurs, it made sense for private and public sectors to work together.

The main argument of the book is that the military went far in developing digital electronics after the war, creating a pool of native knowledge and resources. Once military development waned, the private sector sustained and further developed Canada's computer industry and know-how. Most illuminating is the author's discussion of foreign-owned industries, as he shows that, contrary to dependency analysts' perspectives, these industries actually helped develop computer knowledge that then facilitated economic growth.

The book is very well argued, as the author makes use of a wide range of sources, from personal letters and interviews to institutional documents from the Department of Defense and various companies. Vandalas' prose is accessible, and the story compels one to think of the unpredictable relationship between public investment and corporate profits. For anyone interested in the history of computers, military history, or the history of Canadian development, this book should be worth reading.

Available from the MIT Press, Cambridge, MA, 800-356-0343, fax 617-625-6660, http://mitpress.mit.edu, $45.00 cloth, ISBN 0-262-22064-4, 409 pp., index ♦

THE MEANING OF 'AMERICA'

From its beginnings in the 19th century, the development of electrical technologies has been a highly international undertaking, with continual sharing of expertise across national borders. Any listing of the leading figures in this development makes clear its transnational character:

Volta, Oersted, Ampère, Faraday, Gauss, Morse, Maxwell, Hertz, Edison, Marconi, Tesla, Zworykin, and so on. For this reason—and because the IEEE is an international organization—the IEEE History Center, though situated in the United States, attempts to maintain a transnational perspective in its work.

The words 'America' and 'American' pose a problem: in the United States and in certain parts of Europe they are usually taken to refer to the United States only. People living in other parts of North and South America may understandably feel slighted. This, of course, is not a new problem. In 1820 the Dominican friar Servando Teresa de Mier, born in what is today Mexico, described the situation well: each European country used the term 'America' for that part of the New World with which it was most concerned, and this confusing practice was carried to the colonies. Servando wrote, "The people of the United States follow [the English] usage and they are offended when we, in order to distinguish them, call them Anglo Americans. They wish to be the only Americans …."

The staff of the IEEE History Center believe it better to bear all Americans in mind when referring to nations. When the United States is meant it is easy, in most contexts, to use 'United States' and 'U.S.' rather than 'America' and 'American'. When 'American' is used as a noun, meaning a person from the United States, a phrase, such as 'U.S. citizen', may serve instead. ♦

The staff of the History Center are always on the lookout for ways in which the history of technology is made accessible to engineers, students, scholars, and interested laypeople by means of the web. Here are some websites we have consulted recently, and which we hope will be of interest to our readers. Readers who are interested in exploring even more history of technology websites are encouraged to check the "Related Sites" link on the IEEE History Center web site at: **http://www.ieee.org/organizations/history_center/related_sites.html.** Presently, there are more than **260** links to technology and history of technology websites. In 2001, the History Center website had more than 111,000 visitors.

Lemelson Center

http://www.si.edu/lemelson/index.html
The Lemelson Center is located at the Smithsonian Institution's National Museum of American History. The Center was created by Jerome and Dorothy Lemelson in 1995. The Center's mission is to document, interpret, and disseminate information about invention and innovation, to encourage inventive creativity in young people, and to foster an appreciation for the central role invention and innovation play in the history of the United States. The website contains outstanding "centerpieces" on inventors!

United States Early Radio History

http://www.ipass.net/~whitetho/index.html
This very focused website contains history of radio from 1897 to 1927. Mr. Thomas White provides a great deal of detailed information on the early history of radio. His web site is well designed, and very easy to navigate.

MarconiCalling

http://www.marconicalling.com/
A new web site honoring the brilliance of Guglielmo Marconi was launched last year. It is a comprehensive site. MarconiCalling is designed as a highly interactive site and provides a number of intuitive ways of accessing information. It requires the latest version of the Flash plugin. ♦

IEEE

IEEE History Center
Institute of Electrical and Electronics Engineers
445 Hoes Lane, P.O. Box 1331
Piscataway, NJ 08855-1331

Non Profit Org.
U.S. Postage
PAID
Easton, PA
Permit No. 7