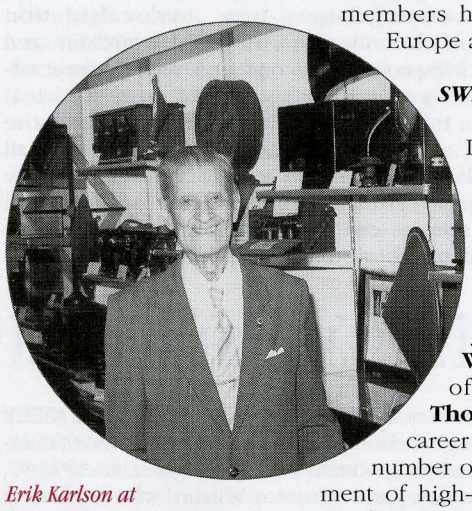
ELECTRICAL ENGINEERING
Center for the History of

NEWSLETTER NO. 43 FALL 1996

ORAL-HISTORY INTERVIEWS IN EUROPE AND ASIA

In 1993 the Center received a major grant from the Andrew W. Mellon Foundation to allow several significant enhancements to a major project (the History of IEEE Technologies Project) that the Center had then just undertaken. (The principal objective of the project is to write, in three volumes, a comprehensive history of the development of electrical technology; see Newsletters 31 and 33.) One of the enhancements provided by the Mellon grant is the addition of more than a hundred oral-history interviews with leaders of electrotechnology outside the United States. As part of this effort, four staff members have conducted 37 interviews in Europe and Korea in recent months.



Erik Karlson at his museum in Jönköping, Sweden.

SWEDEN AND DENMARK

In a trip to Sweden and Denmark, Research Historian Frederik Nebeker conducted 12 interviews. In Sweden he talked with **Janis Bubenko** and **Lars Zetterberg**, both of the Royal Institute of Technology, with **Johan Schleimann-Jensen** of Jensen Electronik, with **Torkel Wallmark** of the Chalmers Institute of Technology, and with **Bertil Thorén** formerly of ASEA. Thorén's long career at ASEA put him at the center of a number of pioneering projects in the development of high-voltage power transmission. In the city of Jönköping Erik Karlson (see illustration), founder of the Radio Museum, gave Nebeker a tour of that outstanding collection of radios, televisions, and phonographs (some 3000 in all, one third of them on display).

In Denmark Nebeker interviewed **Gunnar Pedersen**, long-time head of the Danish Post and Telegraph Administration. Pedersen talked about his father, P.O. Pedersen, who worked closely with Valdemar Poulsen on two outstanding achievements: the magnetophone, which was the first magnetic recording device, and the arc transmitter, the first practical continuous-wave radio transmitter. Gunnar Pedersen talked also about the development of radio and television broadcasting in Denmark—a development in which he played a major role. Nebeker interviewed both **Per Brüel** and **Viggo Kjaer**, the two founders of one of the leading instrument manufacturers in Europe (Brüel & Kjaer). He talked also with three former directors of the consumer electronics company Bang & Olufsen: **Jens Bang** (son of the founder Peter Bang), **Knud Holst**, and **Keld Harder**. Nebeker interviewed also **Jacob Jensen**, the famous industrial designer who for many years was the principal designer for Bang & Olufsen.

AUSTRIA AND ITALY

Research Historian David Morton spent approximately 10 days in Vienna and Milan. His Viennese interviews were concentrated in two areas, consumer safety testing and the Austrian electronics manufacturing facility of Philips Corporation. Interviewee **Norbert Adler**, who heads the main Austrian industry association for electrical appliances, discussed the formation of the consumer rights movement in Austria after World War II. A second interviewee, **Gottfried Biegelmeier**, is the director of a laboratory dedicated to destructive testing of domestic electrical equipment. This interview concluded with a fascinating tour of the laboratory and Dr. Biegelmeier's "torture devices."

Morton completed several interviews with current or former employees of Philips Electronics, which maintains a major manufacturing plant in the outskirts of Vienna. Interviews of **Erich Länger** and **Rudolf Drabek** focused on the development of audio and video recording devices.

The next stop was Milan, where IEEE members and Italian corporations generously arranged for interviews with a variety of leading figures in several fields. Morton met with **Virgilio Floriani**, retired founder of the transmission equipment maker Telettra. Morton also spoke with **Guido Vannuchi** of RAI (the Italian Broadcasting Company), **Paolo Gazzana-Priaroggia** of Pirelli Cable, Ottorino Beltrami of

continued on page 12

CENTER FOR THE HISTORY OF ELECTRICAL ENGINEERING
Issue 43 Fall 1996

Staff Notes

Brownlee Departs

The Center's Assistant to the Director, Nichole Brownlee, has transferred to a new position in the IEEE Technical Activities department. Nichole's hard work at the center for the past two years is greatly appreciated. We wish her well in her new position.

HOT Courses at Rutgers

Members of the Center's staff are teaching several courses in the history of technology (HOT) at Rutgers University in the 1996-1997 academic year.

David Morton's class, "Inventors and Invention", uses historical examples to teach students how to interpret contemporary technological change. Some of his students' research projects explore developments in electrical technology such as the computer input device known as the mouse, the television remote control, and thin video displays. He has intrigued his young audience with displays of artifacts such as the 8" floppy disk, a common tool in personal and mini computing in the 1970s and early 80s, but one largely unfamiliar to the under-20 set. This fall, Janet Abbate is teaching a seminar on material culture in America and in the spring she will teach Rutgers' history of technology survey class.

The Center's goal for these classes is to heighten students' awareness of the nature of design and the engineering process, as well as introduce them to historically sound methods for understanding the life cycle of technologies.

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

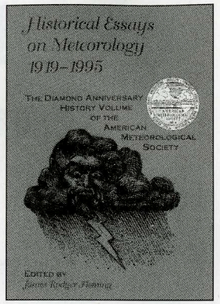
Mailing address:
Rutgers University
39 Union Street
New Brunswick, NJ 08903
Telephone: (908) 932-1066
Fax: (908) 932-1193
e-mail: history@ieee.org
http://www.ieee.org/history_center

Center for the History of Electrical Engineering

David Morton, *Research Historian*
d.morton@ieee.org
Frederik Nebeker, *Research Historian*
f.nebeker@ieee.org
Andrew Goldstein, *Manager and Curator*
a.goldstein@ieee.org
Janet Abbate, *Postdoctoral Fellow*
jea@rci.rutgers.edu

Nebeker Publishes

At the invitation of the American Meteorological Society, Nebeker contributed a chapter to the AMS diamond anniversary volume. The book, edited by James Fleming and entitled *Historical Essays in Meteorology 1919 - 1995*, has just been published by the American Meteorological Society. Nebeker's chapter, "A History of Calculating Aids in Meteorology", discusses the use by meteorologists of numerical tables, mechanical calculators, graphical techniques, punched-card machines, analog computers, and digital computers. Since the 17th century (when instruments were invented to measure temperature, atmospheric pressure, humidity, wind direction, and wind force) meteorology has been a quantitative science generating huge volumes of data. Operations such as conversion of units, corrections applied to observed readings, and reduction to standard conditions placed great calculational demands, as did the efforts of meteorologists from the late 19th century onward to relate laws of physics to observed readings. Nebeker's chapter documents the proliferation in meteorology of calculating aids from the early 19th century to the mid 20th century (as calculation assumed a greater and greater role in forecasting and in theoretical meteorology) and the replacement of almost all other calculating aids by the electronic digital computer in the 1970s and 1980s.



Graduate Assistants

As the new school year begins, the History Center once again, through the IEEE's relationship with Rutgers University, is benefiting from the services of four talented research assistants from the university's graduate history program. In 1996-97, Jill Anderson will begin her third year here, and Veronica Wilson, who worked at the Center as a research assistant in 1994-95 and as a summer intern in 1995, will also return. The Fall semester will see two new faces in the Center's graduate student squad:

- **Stasia Ananson** received a B.A. in history from Rutgers College. She is currently planning her dissertation on conceptions of time and progress in seventeenth and eighteenth-century Europe.

- **Jill Anderson** received a B.A. in history from Carleton College and an M.A. in American history from Vanderbilt University. She recently began her dissertation on relationships between poetry, aesthetics, and masculinity in the early nineteenth century.

- **Rosanne Currarino** received a B.A. in history from Swarthmore College and an M.A. in public history from Northeastern University. She is writing her dissertation on the "Labor Question" and changing cultural meanings of work in turn-of-the-century America.

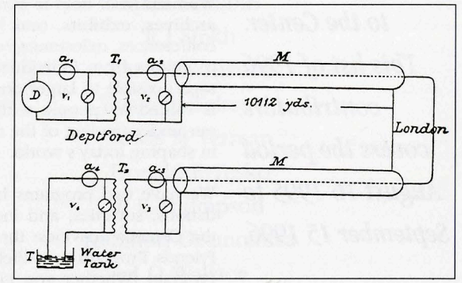
- **Veronica Wilson** received a B.A. in history and political science from Kansas State University and attended the 1989 United Nations Semester. She is beginning her dissertation on espionage during the early Cold War, with an emphasis on relationships between political subversion and gender.

Center Activities

HONG WINS 1996 LIFE MEMBER PRIZE

Each year the Society for the History of Technology (SHOT) presents an award for the best paper on the history of electrical technology published during the preceding year. The award is sponsored by the IEEE Life Member Committee and administered by the Center. At the recent SHOT meeting in London the award for 1996 was presented to Sungook Hong for his article "Forging Scientific Electrical Engineering: John Ambrose Fleming and the Ferranti Effect" published in *Isis: An International Review Devoted to the History of Science and Its Cultural Influences*, vol. 86 (1995), pp. 30-51.

In the article Hong examines a major shift in the theories, practices, and participants in late 19th-century British electrical engineering by focusing on the generation and resolution during the 1890s of a highly visible and disruptive controversy surrounding the 10,000-volt Deptford power station near London. Designed and built by the chief engineer Sebastian de Ferranti for the London Electric Supply Company in 1890, the Deptford station was unique in its huge size, high voltage, great transmission distances, and enormous cost. The station became the focal point for a public dispute when a mysterious fire damaged much of the power plant and a rumor circulated that a spontaneous increase in voltage in the main lines was accountable. John Ambrose Fleming, professor of electrical engineering at University College London, and James Swinburne, a practicing engineer, spearheaded the debate over this counterintuitive increase in voltage with distance from the power source, later known as the Ferranti effect, and the practical means for eliminating it from the power system. Fleming's skillful adaptation of theoretical physics to such huge alternating-current systems and his use of data from controlled field experiments, which together provided a practical approach to the problems of the Deptford station, persuaded other engineers of the value of scientific theory in electrical engineering practice. By the end of the dispute Fleming had clarified the Ferranti effect and also created a new professional niche for scientist-engineers.



Fleming's controlled field experiment on the Ferranti Effect. From Journal of the Institution of Electrical Engineers *1891, 20: 389.*

In Hong's view this controversy epitomized the period's contentious interactions between practicing engineers, with expertise from the workshop and actual systems, and university-based scientist-engineers, with expertise in mathematics and in theoretical and experimental physics. Each group saw itself as better able to solve the practical problems of electric-power engineering. Hong, who draws heavily on archival as well as published sources, weaves together details of the machinery, the electrical phenomena, and problems of measurement with consideration of the business and professional environment in which the Ferranti effect was identified and debated.

BELLASCHI COLLECTION

In May, the Center received a collection of more than 400 lantern slides and other types of images of electrical technologies. The objects represented in the collection include test equipment, transformers, power lines and towers, lightning & discharge equipment, insulators, switching equipment, capacitors, and vehicles. There are also assorted maps, and pictures of people.

The collection came from Peter L. Bellaschi, a recently deceased IEEE Fellow who was an internationally recognized expert in the field of lightning research. Dr. Bellaschi was born on February 13, 1903 in Piedmont, Italy. He came to the United States in 1913, and studied at MIT, earning his Bachelor's degree in Electrical Engineering in 1926, and his Master's in 1928. Employed by Westinghouse between 1928 and 1939, Bellaschi worked on high voltage engineering, lightning research, and transformer insulation design. Among his many accomplishments, Bellaschi has been credited with being the principle technical contributor to the team that developed the machinery to create the first man-made lightning stroke, at Westinghouse's Sharon, PA high-voltage laboratory in the mid-1930s. During the 1943-1947 period, he worked on the TIDD Project, which brought extra high voltages (345 kV and 500 kV) to the United States. Working as a consultant to the Bonneville Power Administration (BPA) in the northwest United States, he played a major role in the development and design of the BPA 500 kV main grid and in advancing studies of 1200 kV. Bellaschi is the 1982 recipient of the IEEE's William M. Habirshaw award for outstanding contributions in the field of the transmission and distribution of electrical power, and the author or co-author of over 44 papers published in IEEE/AIEE journals.

The transfer of Bellaschi's materials to the History Center was arranged by Ralph Lee Bunnell.

Peter Bellaschi

Donors

Our sincere thanks to everyone who contributed to the Center. This list of 1996 contributors covers the period August 16 1995 to September 15 1996.

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

We have two programs by which companies, foundations, societies, and individuals can help support the Center's activities: through an annual gift to the Friends Program or a lifetime gift to the Partnership Program. Whether you give to the Friends Program or the Partnership Program, your gift is tax-deductible and its use is overseen by the IEEE Friends Committee, a group of distinguished electrical engineers appointed by the IEEE Foundation. Partnership donations not earmarked for a specific project are channeled to the quasi-endowment, as a means to provide continuing support to the Center. Partnership contributions may be fulfilled over several years. A list of the Center's partners can be found on the back cover of all issues of the History Center's newsletter and near the front of all of its books. All donations to either the Friends Program or the Partnership Program should be made payable to the "IEEE Foundation Friends Fund."

Friends Program	(annual giving)
Patron	$1000 - 2499
Senior Friend	250 - 999
Sustaining Friend	100 - 249
Friend	35 - 99

Partnership Program	(lifetime gift)
Founding Partner	$100,000 or more
Senior Partner	50,000 - 99,999
Partner	25,000 - 49,999
Colleague	10,000 - 24,999
Associate	2,500 - 9,999

Patron

Susumu Kobayashi

Senior Friends

R V Allen
W F Auerbacher
Michael D Brown
R B Dudley
George W. Hails
N C Hekimian
Gerhard A Liedholz
Steven A Rogers
P Shaad
Guido Van den Berghe
Robert M Walp

Sustaining Friends

Warren R Anderson
F T Andrews Jr
William Aspray and Carol Voelker
Dwight C Baum
Christian D. Berger
Theodore Bernstein
Bas H Den Boer
R B Bonney
D R Bosse
James E Brittain
Edgar H Callaway Jr
G M Campbell
A D Cole
Gilmore G Cooke
H W Cooper
Jonathan C Coopersmith
Frank J De Stasi
Albert R Domanico
Joseph F Douglas
R F Duston
Charles A Eldon
Thelma Estrin
George H Fathauer
N J Fodor
John J Foley
Shigeru Fukuda
Henry W Gayek
Joseph A Giordmaine
Louis Rogers Gray
J. Scott Hamilton
C E Henson
Katsuhiko Hirai

Robert F Holtz
M D Horton
Hao Huang
Fumio Ikegami
Koji Imai
Amos E Joel Jr
Don H Johnson
Keniti Kido
C G Killen Jr.
Joao P Kitajima
Raymond A Kjar
H Letaw Jr
John L Loeb
Steven J London
Stephen M Lott
Kon Lovett
D A Macdonald
Carl Machover
William M Mannel
Carl Marguerite
J E Martin
Michael Maschek
Suehiko Matsuda
Matsunaga Matsui
John C McPherson
Victor Meeldijk
Jan Mevis
William W Middleton
Noboru Miyauchi
J Muroga
Yasuto Mushiake
Shinichi Nagahara
Masayuki Nago
Shoichi Nakayama
Motonao Niizuma
Kuniomi Oguchi
Henry A Pahl
J D Peebles
Thomas F. Peterson Jr.
C S Powell
R L Pritchard
Public Service Company of Colorado
Arthur E Rothenberg
Robert E Russell
Theodore S Saad
Helmut R. Schmeer
Mark Schubin
R J Smith
Tsuyoshi Takebe
Yasuhito Takeuchi
Lewis M Terman
Donald E Tesko
E E Thompson
Kiminori Utsunomiya
J D Wallace
Wagih G Wazer
W B Wells
J P Wood
Charles R Wright
Sakae Yamamura

Friends

A J Affrunti
Jon Agar
Michele Aldrich
John R Alger
Paul N Alito
R W Allington
Adolph Amend Jr
A E Anderson
K O Anderson
O E E Anderson
Weston Anderson
Philippe A Angelle
M G Angerame
David A Angst
Robert E Ankers
Ignacio A Arias
Paul Armer
H B Backenstoss
R H Baer
David L Bailey
Nancyjane Bailey
K D Baker
Robert S Banks
Jerad H Barnhart
H L Bassett
H C Bauman
Richard A Baumgartner
Louis A. Beauchesne
Bill Beck
Brian C Belanger
J M Bennett
Gustavo Amilcar Bisaccio
James J. Bohning
R C Booton Jr
Benson Boss
Charles W Bostian
Raymond T Boute
M W Bouwensch
Richard P Bowen
John C. Bownds
John C Bownds
Myron J Boyajian
Guenther Brandenburg
Eneida I Breaux
W B Bridges
R G Bullock
Kenneth R Burch
David G Burks
Donald Burnham
William Burns
David W Burow
C M Burrill

L-R: Donald Fink, Ray Sears, Harold Chestnut, and Ed Opitz at 1973 groundbreaking for the IEEE Service Center in Piscataway.

Andrew A Butler
Eric Cachin
E C Callahan
Alexandre D Caminha
Hubert Carbonnelle
Herbert R Carleton
G Carley
B L Carlson Jr
John Joseph Cassidy III
William J Cavanaugh

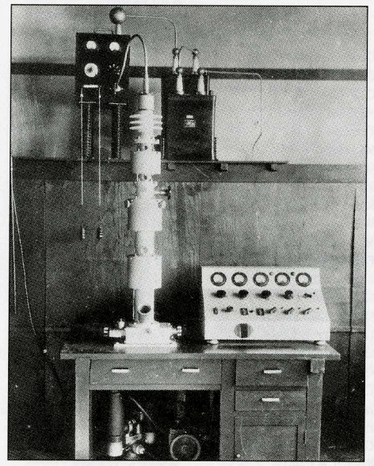
Friends

Wei-Chung Chao
John F Chappell
Robert J Chapuis
O B Charlton
M Chase
Gary C Chatters
Harold Chestnut
Stanley M Clasen
Arthur Claus
Harold F Cobin
Robert J Collins
D Conger
Gary G Conrad
A Coppins
M P Cornelius Jr
L P Cornell Jr
Almer Crawford
W J Cunningham
James R Davey
Douglas C Dawson
F P Dean
Harry B. De Groot
Chris L Demarco
Frank Di Iorio
H O Dietze
Frederick Dill
Hans G Dill
Kenneth K Dols
Nicholas J Doto
Edward M Duffy
Irvin D Dunmire
Cheryl A Ebel
W A Edson
Sture Ekstrand
Adolph C Ekvall
George R Elder
William J Ellenberger
George V Eltgroth
R H Engelmann
Osamu Enomoto
Donald H Erickson
C J Essel
Albert R Evans
Pieter Eykhoff
Carl B Felien
A Fini
Bernard S Finn
L W Finnell
D L Fisher
Michael J Fitzmorris
F R Fluhr
M E Fox
E D Frankhouser
F A Furfari
Joseph W Gagne
Alessandro Gandelli
P E Gannon
Wilfried Gappmair
Carmelo A Garcia
W R Giedt
E S Gillespie
Victoriano C Go
Robert J Goebel
J A Goetz Jr
Arthur Goldsmith
Charles D Goodman
Leo Gorin
George E Gourrich
Richard I Grady
J W Graham
Willard S Grant
J P Green
W L Green
Thomas N Grigsby
J J Guarrera
Klaus P Gungl
Allan S. Hadfield
Howard H Haglund
Owen P. Hall III
H B Hamilton
Carl Hammer
E L Harder
Ernest R Harris
Charles E. Hartman
J Paul Hartman
Kenneth R. Hartzell
Hiroshi Hatafuku
B F Hatfield
M L Henderson
F L Hermach
J K Hicks
Thomas Higgins
Asa H Hill Jr
O T Hinton Jr
Makoto Hirano
T W Hissey Jr
Marvin Hobbs
Milton Hollander
Werner E Honisch
Keith N Hood
A J Hoover
Toshio Hori
Russell C Houldin
D W Howe Jr
Charles F Huber
James D Huddleston III
Cuthbert C Hurd
Robert E Hurlston
Hasrin Hutabarat
Mark S. Hutchenreuther
W R Hutchins
Hiroshi Ichise
Shozo Ishii
Yasuo Ishii
Isao Iyoda
George T Jacobi
Donald C Jameson
R M Johnson
Richard L Johnson
Adam A Jorgensen
O M Julson
Douglas R Kanitz
Elmer F Kaprielian
Kermit B Karns
P W Kaseman
Kazuo Kato
Masayuki Kawamata
J W Kearney
Walter R Keevil
T B Kelley
P G Kendall
James W Kerr
Yohsuke Kinouchi
Nobu Kitakoji
Myoung S Ko
Misao Kobayashi
Teruo Kobayashi
Alfred R Koelle
John W Kopec
Stephen Kozich
Peter A Kreider
N B Krim
B E Kullerd
Per A Kullstam
Genzaburo Kuraishi
Shih-yin Lan
Arvid G Larson
J W Laughlin
Norman H Lehrer
K K Leithold
S B Lent
Ronald J Lepkowski
Sigfrido Leschiutta
Jesse R. Lien
William B Lindsay
Clovis E Linkous
John G Linvill
Kenneth Lipertito
Neal E Lockwood
M O Loftness
H W Lord
A Lovoff
Alvon F Lowe
M J Lowenstein
J P Lozes Jr
A Luedtke
Frank L. Lyons
Haruo Maeda
R F Manfreda
R Mansfield
A F Manz
Joel W Masters
I S Mayer
John L McKinley
Robert W Mcknight
W H McQuerry
H E Meadows
H L Medlin
George Merrill
John Merrill
Hans R Meyer
Harold Meyers
W V Middough
H L Miller
N D Miller
N D Mishra
Robert D Misner
H R Moore
Shunji Mori
W C Morris
Vladimir Muljevic
Sherman N Mullin
H Deon Murphy
Stephen T Murphy
Christopher B. Mushenski
Minoru Nagata
Takehiro Nakagawa
Tomoharu Nakahara
Hideto Nakajima
Toru Nakamura
Takashi Nakashima
B J Nankervis
Robert L Nevin
New York Section, IEEE
A E Newlon
Cho Y Ng
Quang M Nguyen
Richard S Nichols
Mark J Nietubyc
Ravi Nigam
N Joergen A Nilsson
Donald W Novotny
Sumio Ohkawa
Katsuhiko Ohsaki
Sogo Okamura
Robert J O'Malley Jr
Russell D. O'Neal
Eugene O'Neill
Kimizo Ono
K S Packard Jr
Leonello Paoloni
J T Pardovich
Norman W Parker
Renzo F Parodi
G F Paskusz
H R Patterson
S H Pearsall
J R Petrak
Edward V Phillips
W F Pickard
V J Pietkiewicz
Edwin C Polke Jr
H W Prai
Donald H Preist
Bruce G Prior
Lee B Randall
H J Rathbun
Bruno A Regno
Robert Reid
Chester T Rice
R N Riley
Theodore Rockwell

Robert Rosenberg
George E Roush
C A Rousselet
Boris Rubinstein
Darcy E Ruff
William I Rumer
Robert Sackman
J Sada-gamiz
Mary A Sager
Hiroshi Sakemoto
Gentei Sato
Robert M Saunders
R Sawada
Ira Saxe
Albert Schapiro
Joseph A Schindler
R O Schlegelmilch
George R Schmidt
L C Scholz
R B Schroer
H P Schwan
Mischa Schwartz
Norman R Scott
R B Seals
E M Selle
S Sensiper
E D Sharar
J M Sharp
Roger Shimada
Lawerence H Slaughter
G B Smith
Robert D Smith
Elias Snitzer
Harold Sobol
Robert A Soderman
E F C Somerscales
George M. L. Sommerman
H F Spain
James G Spaulding Jr
L H Sperow
James M. Spitze
Marc Standaert
F R Stansel
R M Starnes
William Y Stevens
Allen H Stix
John R Stoltz
F Strauss
L D Strom
R Stuber
Robert J Sublett
Hiroshi Suzuki
Hitoshi Takagi
Tasuku Takagi
Yuzo Takahashi
Kuniaki Tanaka
Rudolf K Tenzer
C Tepper
Leonard W Thomas Sr
William D Tibbetts
Osamu Tomisawa
Hideo Tomita
C T Tsitsera
Takashi Tsuda
Robert W Turner
Michiyuki Uenohara
Masami Uno
B U Vainik
John P Van Duyne
Lambertus J Van Loon
Edgar W Van Winkle
Wouter F G Vander Elst
Carol Veronda
Herbert Voelcker Jr
Robert H. Voelker
J H Vogelman
D L Waidelich
E Walder
Ralph E Walter
Richard P Waltermeyer
Ronald L Ward
Neil H Wasserman
Tomoyuki Watanabe
Ben M Webberman
Gerald Weiss
Max T. Weiss
Duane J Wenzel
S E Wenzel
Harold A Wheeler
Warren D. White
Tracy Wichmann
Don Wick
W Willendrup
Eric L Wilson
W Winglar
George Wise
Mathis Wolfgang
L M Wolman
Peter M Wolter
David R Wood
Harris O. Wood
Bernard T Wooters
Jens J. Wurtenberg
Mitsuyoshi Yamamoto
Fumihiko Yanagawa
Hiromichi Yokoyama
C H Zierdt Jr

Other Contributors

J Aarons
G P Adams
Andreas N Adraktas
Francisco J Aguilar
Tsunehiro Aibara
Makoto Aihara
Yoshihiko Akaiwa
Hirotaka Akisada
Yasuhiro Akita
Gerald Aksherian
Osama R Al-amri
Jorge W Alcantara
Swen F Alfas
Wilbur L Allain Jr
A H Alnajdi
Dietrich A Alsberg
D A Altmos
Edward Altshuler
Markus C Amann
Lauris C Ames
David L Anderson
Gary A Anderson
Henry N Anderson
John M Anderson
R E Anderson
Ross Anderson
S H Anderson
Paul S Anderssen
Erick S S De Andrade
Howard W Andrews
James T Andrews
John H Andrews
Louis Angermeyer
Derrill C Angst
Souguil J M Ann
Michael M Anshel
York D Anthony
Henry J Antosz
Tomos L Ap Rhys
Peter L Apolito
Ravi M Apte
Mituhiko Araki
J Arasim Jr
Francisco J Ares
Toshiyuki Arima
E Arjeski
Marvin P Arluk
John R Armstrong
Fritz Arndt
F C Arnoult
Juan Peire Arroba
Alfredo J Arrueta
Juan J Artigas
Beat Von Arx
Hideyuki Asada
Yoshimi Asada
R Peter Aschenbrenner
Jim Asleson
Reilly Atkinson
Robert G Atkinson Jr
Ralph S Averitt
Jack S Avrin
C Merrifield Ayala
W T Ayer
Yoshihiko Azuma
W C Bachtel
Ronald R Badamo
Jose C Baella
Mirza F Baig
Samuel Baker
Dennis J Baksa
Edgar F Balbastro
Robert E Baldy
Gregory J Ball
J V Ball
Richard L Balluff
Manzoor A R Baloch
D S Banks
Adir Bar-lev
Paul Baran
David L Barber
Hal T Barraclough
M N Barry
Patricia L Barry
Peter G Barta
Herbert M Baruch Jr
Theodore Bashkow
Tibor T Bauerhuber



An early Japanese electron microscope, the JEOL DA-1, 1947.

Arthur E Baumgart
Hans E Baumgartner
Barbara K Beauchamp
James C Beck
George E Becker
O N Becker
W R Beckman
Matthew R Bedosky
Robert H Beeman
Walerian A Belik
Ray Bendett
Nigel A Benfield
Lim Kee Beng
Lionel C Bening Jr
Eric E Bennett
Robert F Benningfield Jr
Howard G Berg
Luc Berger
J J Bermudez
Gabriel O Bernal
Victor M Bernin
Andrew E Bernstein
Lawrence Bernstein
N M Bernstein
Nathanael W Berry
Thomas R Bertolino
S Bertram
Robert J Best
Amit Bhati
Bashir Muhammad Bhatti
M H Bickelhaupt Jr
Edwin Biefer
John G Bingham
Michael Birkett
L I Biscomb Jr
George A Bishop III
Loran R Bittman
Sandra J Bittner
Maurice W Bizzarri
B A Blackman
C W Blake
Terence G Blake
Thomas P Blinn
E Bloch
A Blokdijk
Peter F Blomley
P Bobrek
Ronald P Bohl
Clifton De Bois
M Pilar Bombin-Ballano
J Bonar
D E Bone
Tom C Bonsett
Gary Boone
Michael Borek
Paul V Borlaug
David Borst
Richard L Borst
Andrew L Bosch
Hermann F Boss
James N Boston
Scott E Boswell
Philip A Bottini
Fernando H Bouche
Daniel Bowden
Keith Bowdler
Derek F Bowers
John C Boyd
Douglas B Boyle
Frank A Brand
Gerhard L Bremer
Donald R Brennan

Other Contributors

S T Brewer
Mark F Briana
Alejandro Briano
E Bridges
N A Bries
Charles D Briner
J D Brobst
Richard G. Broden
M N Brodie
Wesley G Brodsky
George Broomell
G L Brown
John S Brown
Lewis F Brown
P G Brown
Peter J Brown II
William C Brown
Joe Bruce
W B Bruene
Charles Brugger
J S Brugler
R N Brumfield
Mark S Brunner
Gene Bruschke
Eugene H Brussel
T T Bucher
M W Buckley Jr
E R Bunker Jr
J H Bunting
R M Burger
Thomas G Burket
Frederick K Burt
Joseph W Burton
A C Burwell Jr
Chris T Bush
Jonathan B Butterworth
Kenvyn M Bwye
Luis F Cacho
J L Cadick
Edward W Calhan
E T Calkin
Chinn Callan
Neilor F Camargo
J Cammarata
William W Campbell Jr
Angelo Camplani
Gilberto M Campos
C H Mc Cann Jr
P G Mc Cann
Josue M Cantu-Saldana
Ibrahim Canturk
John P Cappello
John I Cardenas
Samuel J Cardman Jr
Douglas F Carey
Noel C Carneiro
William F Carnes
Victor S Carrano
Chuck Carroll
J W Carson
J E Carter
Steven M Carter
Martin A Carts
Joseph Caschera
Francis X Casey
David C Casler
Paul A Casparro
Melvin E Cassidy
D H Castleman
M Castro
Manuel Castro
Patricio M Castro
Stephen R Catto
Phil L Cenicola
Frank J Cervenka
Ben N Ceschi
Jerzy R Cewe
W L Chadwick
Henri Chandran
Jonathan A Chandross
Shun H Chang
Tinjin P Chang
Tsin Y Chang
Donald E Chapman
Henry G Chatroop
Kwok Wing Chau
Richard Cheatham
Chang-Chi Chen
Jwu E Chen
Shuenn-Shi Chen
E R Chenette
Hing W Cheng
Tung P Cheng
William C Chesney
Lawrence P Chew

The Power Engineering Society's Power-Life Award.

Giovanni Chianello
Goh Siow Chiang
Akira Chiba
David Chilenskas
R T K Ching
Terrence K J Ching
Howard H Chiu
Linda C Chock
Ernst Christen
Mark Christensen
Richard J Christensen
Svend Christensen
C L Christiansen Jr
Charles N Chu
Alan G Chynoweth
William R Chynoweth
Dennis J Cirrone
S Clair
Robert J Clare IV
J R Clark
Derek Clarke
Richard C Clarke
William J Clarke
Clifford B Cloonan
Derek C Cowley
Bryan Cox
C W Cox
Michael J Cox
Thomas L Cox
Michael Coyer
William Craft
R P Crago
Robert L Craig
William M Crampton
M C Creusere
Finbarr J Crispie
L Crittenden Jr
O M Cromer
James A Cronvich
Lawrence E Crooks
Carlton E Cross
Gregory P Crump
C E Culberson
James R Cunningham
Paul J Curran
C G Currin
Robert A Curtis
C C Cutler
Russell D Coan
Geoffrey G Cochrane
Linda Cochrane
Jules Cohen
Gabriel D Colef
Frank H Coleman
Mark E Collins
T W Collins
John T Compton
D C Comstock
Esther M Conwell
A R Cook
James M Cook
Louis H Cook Jr
Jerome T Coonen
Gordon Cooper
F M Corbett
Peter F Corbett
Wells M Corliss
Peter A Cosmai
R F Cotellessa
Don E Cottrell
Thomas P Coughlin
M D Cousins
Anthony C Cowin
C I Cutler
E C Cwiklo
David Dahlbacka
Terry J Dahlquist
Alberto Dams
Brian H Darley
Warren M Dasczynski
Jonathan B David
R C Davidge
H J Davidson
I T Davies
J N Davis
P R Dax
Ana De La O Cerna
Robert H De Nie
Georges J Decock
Richard J Delanis
Charles W Dement
Isao Dendo
Wayne Dernoncourt
G R Desmarais
Tim Desmond
D Dettinger
Scott Deuty
Charles G Devoe
Srinivasa Dhruvan
Didimo E Diaz-Hernandez
Mikael Dich
Clement L Dickey
Bradley W Dickinson
Stanley R Dickstein
Robert F Dielsi
Fred G Dietz
Eugene J Dieulesaint
Gareth Digby
Thomas G Digby
Tjeero M Dijkstra
Robin A Dillard
B L Dillinger
Daniel E Dimmock
David E Dixon
Ping-wah Djen
Arnold Djiwatampu
W E Dobbins
Steven R Doctor
David L Dodge
Walter Domorod
J E Donaghy
John S Donegan
B F Doolin
Richard J Dorin
Kevin J Dorrell
Paul E Dorvel
Rui-hua Dou
Apostolos G Doukas
Douglas E Dow
Donald A Draper
Douglas M Dreher
Hans J Du Bois
John H Dubois
Ernest M Duckworth Jr
John P Ducroiset
Robert Duggan
Kim D Duk-Gyoo
J R Dunki-Jacobs
M E Dunlap
Dominic F Dunlop
G K Durfey
Richard V Dutchik
Kenneth M Duvall
Bob Dwyer
Benjamin L. Dyner
Edward W Early
Hermann Ebenhoech
Robert C Eckardt
Frank A Eckert
Eugene V Edelstein
Charles M Edwards
Tsutomu Eguchi
Alan M Ehrlich
Stanley L Ehrlich
Richard L Eilbert
Morton Eisenberg
C H Elbert
R D Elbourn
G O Elliott
S J Elliott
W C Ellis
Dale L Embry
David E Emery
Lori A Englund
E W Ernst
Murat N Eron
James D Ervin
Gerald Estrin
Michael Evan
David C Evans
E Robert Evans
Richard J Evans
Franklin F Everts
L H Ewald
W H Falls
Gilles Falquet
John C Fan
J R Fancher
Peter Farleigh
W S Farley Jr
Ghaffar Farman-Farmaian
Hansford Farris
D K Fast
Guy C Fedorkow
John R Fehling
R K Feist
Samuel Feldman
Sidney Feldman
Wu-Shiung Feng
Weston A Fenner
Stanislaus E Fenyi
D R Ferguson
Joseph M Ferguson
Maria B Fernandez
Richard Louis Ferranti
Thomas K Ferrell
Javier E Ferrer Rivera
Donald A Ferrett
Marcos Ferretti
John L Fetter
Marvin Fields
W C Fifer
Igor Filanovsky
Andrew E Finkelstein
Fred I Finkelstein
R H Fish
H G Fisher
Morton D Fisher
William E Fisher
Ronald E Fisk
Lewis T. Fitch
C H Fleming
Read T Fleming
C Flick
J R Flick
Joseph Fouad
P E Fox
Sol Fox
B Frackiewicz
John E Frank
Konrad Frank
Thomas P Frank
Gene F Franklin
B Freeman
A R Fremineur
C G French
W W Frey
G G Frick
Walter C Frick Jr
Michael Friedewald
E M Friedl
F J Friedlaender
Charles L Frush
Satoshi Fujii
Hiromichi Fujisawa
K Fujita
Osamu Fujiwara
Tadashi Fukao
Yukio Fukayama
Masashi Fukuda
Hatsuaki Fukui
Hajime Fukushima
K E Fultz
Sandra S Furman
Hirosuke Furuta
Garabet J Gabriel
R A Gallic
James E Galloway
Jack A Gammon Jr
Thomas E Gardner
J T Garrard
Michael J Gay
Carl C Gebhardt
James Gee
Alan Gehami
Gerard F Geiran
Robert M Geisel
C Daniel Gelatt
I Gellen
Atha D Georgopoulos
Glenn A Gerdin
R Gerhard-Multhaupt
Horst W Gerlach
M B Geronimo
E P Gertsch
Stanley W Gery
John W Gesink
Emad L Ghattas
S P Giambra
Evangelos M Giannos
Adolf J Giger
Josef Giglmayr
Harry W Gill
P R Gillette
Ames F Giordano
Grace E Giras
Dr A N Glazzard
Paul Gleich
Raymond R Glenn
Paul J Goble
William L Goddard
Mark A Godlesky
Daniel F Goessling
Daniel L Goldberg
E Goldberg
M Goldberg
Erich Goldbohm
S Goldfarb
Philip Goldstein
Keith W Golke
Steven E Golson
M Del R Sandoval Gomez
Octavio Larios Gonzalez
Charles A Good
David E Good
David J Goodman
James F Goodrich
Kenneth R Goodwin Jr
Robert L Goodwin
Gerald W Gordon
Jacob V Gore

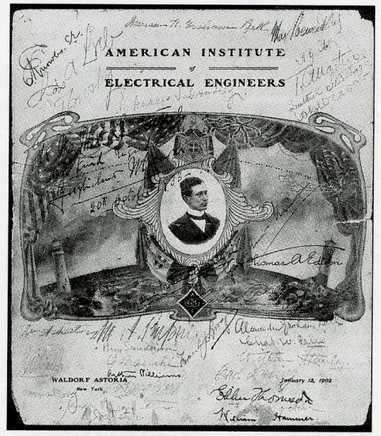
Michael J Gorman
Richard J Gorzegno
Robert O Gosswiller
Masuo Goto
Mitsuhiko Goto
F Cecil Grace
Donald A Grandis
Anders Granhall
James E Grant
Robert S Gray
V Graziano
Leonard N Green
M J Green
J C Greene
John C Greene
Alden F Greenlaw
S Greenwald
Paul H Greer
Garabed A Grehian
Gordon P Gretton-Watson
J E Griffith
Richard Griffiths
William W Griffiths Jr
Carl Grindle
Mogens P Gronlund
B P Gropp
William A Gross
Ramon N Grossi Jr
Tim P Groth
Myron E Gudz
Chris G Guenther
Charles S Guenzer
J O Becerra Guerrero
David R Guevara Jr
James L Guilbeau
George Guinther
John N Gundersen
Denise M Gurer
Robert D Gustafson
Lester Haaker
David Haccoun
Wm S Haddock Jr
Hugh J Hagel
Carl A Hagson
Jongsik Hahm
G A Hajek
Michael J Hale
Chris Hall
H P Hall
Phyllis J Hall
Robert B Hall
Nagaharu Hamada
Jerome S Hamerman
Herbert B Hamilton III
R E Hamilton Jr
Oliver Hammerschmidt
Tod M Handera
Eric W Hands
A Hanna
M William Hans
Yoshinori Haraguchi
John M Harker
Edgar D Harras
Kurt Harriman
Brian Harrington
James R Harris
Wesley M Harris
A L Hart
J S Hart Jr
M E Hartl
Jack H Hartley
Mr Haryono
Minoru Hasegawa
Donald J Haskell
Jawad E Hassan
M Tony Hassegawa
C J Hasser
Edward J Hatfield Jr
Tetsuo Hattori
Bruce L Havlicsek
A K Hawkes
Clark M Hay
P C Hayden
H T Hayes
Michael R Hayes
Peter F Hays
D M Hayter
Earl Hazen
Howard Hazzard
Eugene J Hebert Jr
Mark D Heckendorn
Frederick V Heitkamp
Charles L Heimbach
Wayne R Heinmiller
Steven J Heinrich
J Thomas Heislein
Carl A Helms
Wayne A Hembree
Raymond A Hendel
K W Henderson
C J Henrich
Francis J Henry
Hanspeter P Hentzschel
Harry E Herchert
Eberhard Herter
Dor H Hesselgrave
Daryl T Hester
Karlene Hewan-Lowe
John D Hibbs
James L Higgins
T J Higgins
James M Higgins-Thomas
Hiroomi Hikawa
E A Hilberg Jr
Vincent M Hiligsmann
Thomas J Hill
Jorge Him
Frank Himmer
Takashi Hirakawa
Yukio Hiramatsu
Nobu Hirano
John Hirner
William L Hix
Masao Hiyane
Mark Ho
C F Hochgesang
Alan E Hochhalter
Irvin L Hoechner
R Hoekstra Jr
James H Hoffman
James P Hofmeister
Andrew J Hogan
D C Hogg
W G Holcomb
D L Hollway
John A Holly
Frederick R Holt
Peter J Holzer
Makoto Honda
Masashi Honda
Li P Hong
Kim Hongbae
M A Honnell
Peter J Hoogenboom
Satoshi Hori
Shoji Horiguchi
Semmatsu Horii
Steven C Horii
Chris K Horne
Mong F Horng
Benjamin Horowitz
R T Horsfall
Toshio Hosono
Eiki Hotta
R D Hough
Keith B Houser
Walker G Howard
Chester A Howe
Henry H Howell Jr
Joseph J Howes
Stephen B Howlett
Frederick B Hoyle
Shou Jung Hsiao
Fang Hsu
Chien-T Huang
Edward Huang
Qiuting Huang
C I Hubert
William J Huck Jr
Michael R Hugger
Patricia M Hughes
Andy C Hung
David K Hunter
R P Hunter
George P Hyatt
Barry D Hyman
Ayman A Ibrahim
Koji Ibuki
Kato Ichiro
Masafumi Ide
R K Idehara
Masanori Idesawa
Kenichi Iga
Hiromasa Ikeda
Masao Ikeda
Tadao Ikeda
Takehiro Ikeuchi
Haruzo Imai
Donald A Ingels
J J Ingram
Maxwell Ingram
Takahiro Inoue
Hirosei Inuzuka
W Irrazabal
M M Irvine
Ken Ishihara
Junya Ishii
Koji Ishikawa
Masayuki Ishikawa
Boyd P Israelsen
Kenichi Iwai
Shun-ichi Iwasaki
Koshiro Iwaya
R D Jablonsky
Clifford L Jackson
Daniel W Jackson
David R Jackson
Joseph Jackson
Seth G Jakel
I J James
H G Jared
Mark W Jarvis
Greg R Jaspers
William W Jeffers
Shang S Jeng
Hugh Jenkins
S C Jenkins
H H Jensen
Jae-Yong Jeong
Mark A Jerve
M M Jesurun
Judy M Jiru
J Normann Johnsen
A R Johnson
A W Johnson Jr
Brian W Johnson
Clark E Johnson Jr
David C Johnson
Dean H Johnson
John P Johnson
Loering M Johnson
Noel H Johnson
Oscar F Johnson
Steven D Johnson
Richard R Johnston
Curtis A Jones
G W Jones
Leon T Jones
Robert L Jones
Hirokazu Kawabata
Sadanobu Kawabe
Kazuhiko Kawahara
T Kawahashi
Kensuke Kawai
Atsushi Kawamoto
Ietoshi Kawano
Shoichiro Kawashima
S Kazama
F C Keller
W E Kelley
E F Klein
H J Klein
W J Klein
E J Klein-Lebbink
Brian W Kline
Franz Kloucek
James C Klouda
Ronald O Knecht
Bernd Knorr
Paul G Knutson
Kaname Kobayashi

Longtime IRE Executive Secretary George Bailey at his station W2KH, 1956.

John F Jordan
E J Joscelyn
Vipin Joshi
J William Jost
J W Joyner
Hans H Jucker
Mohamed Juman
Lien David Jung-Lung
Arthur Jurszewicz
M J Kabrisky
Michael J Kaelbling
J J Kahgan
Martin F Kail
James F Kaiser
Hideaki Kakefuda
Konstantin A Kalafatis
G C Kalander
Manfred Kaltenbacher
E Y Kameda
Atsushi Kameyama
Yoshio Kami
Tomonori Kamikawa
Luiz S Kanda
Takanori Kanno
Sadahiko Kano
Fred Kappelmann
R J Karazia
D J Karbo
Naoki Kasahara
Hideaki Kashihara
Joseph Kaszycki
Makoto Katsurai
A Katz
Robert B Katz
Fred L Katzmann
Ilia Kaufman
Noah Kaufman
G H Kaufmann
Jason L Kaufmann
Roland F Kaufmann
Thomas J Kausek
John C Kavanaugh
W R Kelley
Alex C Kelly
William J Kelly Jr
Stanley F Kemp
Bruce R Kendall
John J Kennedy
George Keremedjiev
Joseph F Kessler
Tee K Ket
P M Ketchum
A R Keyser Jr
Hayat M Khan
Tjong T Khian
Wan-feng Kiang
Dwight Kibler
B Kidorf
Harald G Kiel
Mark Kieler
Gi Y Kim
Myung Soo Kim
Suk K Kim
Taejin Kim
Lawrence W Kimball
Rinjiro Kimura
David L Kindred
W C King Jr
William King
Eugene L Kingsbury
Robert A Kipp
Peter Kirchhofer
Dieter Kirchner
Xavier Kirchner
Rod A Kirk
J H Kirkpatrick Jr
Peter E Kise
Yasuchika Kishimoto
Tamas A Kiss
Takashi Kitagaki
Kazuhiro Kitagawa
Yukio Kito
Bruce B Kittams
Robert B Kjelgaard
Hiroshi Kodera
James S Koford
Ryuji Koga
Tomohisa Kohiyama
Ikutaro Kojima
Keiji Kojima
Masahiro Kojima
Jan K Kok
P L Kolarik
Erik L Kollberg
David P Koller
Harwood G Kolsky
E R Kooi
E M Kooker
Michael W Koop
Eugene H Kopp
Clinton H Kopper
J M Kopper
Steven S Kornak
Kazunori Kotani
Nobuo Kotera
Spiros J Koutsoukis
Alan Krauss
Seymour Krevsky
C G Kristenson
Burton M Kuck
Victor Kuczynski
Ed A Kuijpers
Kirsi Kukkasniemi
James M Kulaga
Takeshi Kumagai
Hiromitsu Kumamoto
Ranjan Kumar
W H Kummer
Michael E Kunsman
Morihiko Kurata
Kiyohiro Kurisu
Sadao H Kuwamoto
Linda S Kuzniar
Ching P Kwong
R L Kyhl
John W La Londe

Other Contributors

Timo I Laakso
H A Lachoski
Wai S Lai
Yinchieh Lai
Eugene H Laird
Bruce M Laitinen
Vincent R Lalli
Michael R Lamartina
Jefferson P Lamb
R D Lambert Jr
George L Lang
P Lang
W W Lange
Beril J Lapson
G J Largess
Charles L Larocca
Thomas W Larsen
Scott E Larson
A A Lassila
Michael J Lastella
M H Latour
Kalevi Laukkanen
D R Lautzenheiser
Robert Lawrence
Robert W Layman
G L Le Baron
James F Le Brun
R H Lea
Curtis E Leach
Gregory S Leach
Jack Lebid
Irwin L Lebow
David J Leciston
Barry Lee
Choo Hie Lee
Gregory Lee
Jeewon Lee
Seong-hee Lee
Suk Won Lee
Wei Shun Lee
Knut R Leer
David M Legate
E E Lehtola
Will E Leland
D J Lemens
Cuauhtemoc Lemus
C C Lencioni Jr
Rodney M Lenz
Kenneth E Leonard
Louis G Leonard
Andre C H Leong
W Leonhard
Michael Leskela
W G Leslie
Louis W K Leung
Waiming Leung
Harry K Lesser R
Morton S Levin
N M Levine
Sam Levine
Harry Levitt
Winston D Lew
F V Lewis
H L Lewis
John G Lewis
Martin B Lewis
Peter A Lewis
Gang Li
Kwan Chi Li
Ng Yew Liam
George Liebler
Tom Lieu
G M Lilly
Hua-Eng Lim
Hui Chun Lin
W P N Lind
Ismo V Lindell
Arno Linder
F H Lindheim
Jens C Lindof
Stacy L Lindsey
Ming-Lee Ling
M F Lippincott
W G Little
David J Livigni
Julian R Livingston
L H Lloyd
Francis C Lo
Anthony S Locker
John L C Löf
Abelardo Lopez-Lagunas
F A Lotte Jr
J M Loudon
Russell W Lovins
Karl G Lovstrand
Robert G Low
Lester H Lowe Jr
Jih-Kae Lu
Gustavo A Luaces
M Luangcharuthorn
Michael D Lucey
G W Lucky
Vasilije P Lukic
C F Luscombe
Michael Luwish
Yi-tung Lyou
Deuk-su Lyu
J S Mac Kelvie
Ronald H MacPherson
Randall Maddox
Charles L Maddux
Atsuya Maeda
Junji Maeda
Gregory A Magin
P C Magnusson
J P Maguire
Austin J Maher
Christoph E Mahle
W F Mahn
William E Maier Jr
Rahul Majumdar
Roger J Malik
J F Malm
Rebecca L Malmleaf
C T Maloney
T C Maloney
Thomas E Mancino
V J Mancino
Jayashree Mani
J A Mann
John Mannion
Roger A Mao
Vincent S Marciante
D F Marcks
Richard S Marcus
John Marczewski
Michael C Mardis
E E Martin
Earl O Martin
Frederick L Martin
G E Martin
J A Martin
Hidajat Maruta
Nabeel H Maskati
P E Massie
Alfredo P Mateos-Papis
Clyde E Mathews
J W Mathews
Kazuyuki Matsui
Keiju Matsui
Akihiro Matsumoto
Hiroshi Matsuo
A J Mattes
George L Matthaei
Philippe Mavoungou
Henry S Maxson
Eugene L Maxwell
C L Mayeshiba
William T Mayhew
Frank L Mc Connell
Tron Mc Connell
Gordon P Mc Couch
Vincent T Mc Donough
J L Mc Kelvie
John D Mc Kendree
A N Mc Quown Jr
Edward F Mcclain Jr
Ernest A Mccurley
Mark D Mcdonald
Thomas Mckay
Hugh J Mclarty
Robert A Mcphee
John L Mcrae
William T Mcshea
Philip L Medley
D Melcher
Leslie M Melenchuk
W P Melling
Carl W Melone
Irving M Meltzer
Edward G Menaker
D Mercado Jr
Manuel H Mere
Randy T Merkel
Rollie B Merrick
S Metzger
George W Meyer
Robert H Meyer
Javeed I Mhar
R D Middlebrook
David Middleton
H S Mika
C M Miller
D R Miller
Frank D Miller
John Miller
John W Miller
Myke Miller
Thad A Miller
Joseph A Minahan
David A Mindell
M I Mindell
Hiroyuki Mino
Ray F Missert
G J Mitchell Jr
Shoji Miyaguchi
Shunji Miyahara
Makoto Miyake
Shoichi Miyashiro
Hajime Miyauchi
Malcolm B Mladenovic
Jerry D Moench
A D Molinaro
John Moll
Bertalan J Molnar
Timothy J Moloney
Mark W Monaghan
Adrian Monk
George L Monkovic
Owen Monroe
G A Montgomerie
Masahide Monura
H M Moore
James H Moore
James L Moore
Maurizio Morabito
James A Moran Jr
Michael J Moran
Michael W Moran
Howard G Morgan
Sidney A Morgan
Allen G Morinec
Yuji Morita
James G Moroz
James R Morrison
E A Moser
Ryohei Motegi
J H Moulton
Edward C Mozley
John W Mueller
Marino H Mueller
Allan J Mui
James A Mullen
Conrad R. Muller
Kazuhito Murakami
Takamori Murakami
C R Murray
W Mc Murray
W E Murray
M P Musick
S S Mustafa
Benjamin R Myers
Richard Myers
Ware Myers
Leonard T Mygatt III
Christian W Myrstad
M H Naeseth
Shoji Nagasaki
Suzanne R Nagel
Akira Nakamura
Kazunari Nakane
Takashi Nakano
Yukio Nakano
Toshio Nakazawa
Moon-Hyon Nam
Yoshinori Namihira
Anthony P Napikoski
Ramesh Narayanaswamy
Kotaro Narita
R A Naue



Program from the AIEE's annual dinner at the Waldorf Astoria, 1902. It is signed by many of the era's leading figures in electrotechnology.

Juan L Navarro
John A Neddoff
Gerhard J Neidhoefer
J B Nelson
Joseph V Nelson
William A Nesheim
George W Neuner II
Lionel M Newall
Lee A Newcomb
Akio Nezu
Chung D Ng
Minh Nguyen
T Nguyen
C Nichols
Per Nielsen
Takahide Niimura
Nils A Nilsson
Yoshio Nishimura
Daniel Nitka
Moty Nitzan
Paul N Nix
R Eugene Nix
Kenroku Nogi
Yasumasa Noguchi
John F Nolan
J Noordanus
Isami Norigoe
Anton S Noz
Sean E O'Fallon
Roy D Odhner
E E Odohi
Geir S Oestrem
Kenji Ogata
Hiroyoshi Ohara
Eiichi Ohno
Chiharu Ohuchi
Yasumitsu Okabe
Masaji Okada
Hidetaka Okamoto
Hideyuki Okamoto
Teiji Okamoto
Seichi Okamura
Mikio Okawa
Katsuhiro Okubo
J L Oldenkamp
Robert R Olds
T. Sumner Oliver
Melvin Olken
Mertanen Olli
Gregory R Ollick Sr
A G Olsen
Gary R Olsen
Shoichi Ono
Takao Ono
Toshio Onodera
Morry Oppenheim
Yuk Kwan Or
A F Orazio
Dmitry Orlovsky
R L Osborn
Peter Osvath
Jorge C Ovando
Edward L Owen
Minoru Ozawa
Ahmet Ozcan
Mehmet C Ozturk
Denis E Paddock
John R Padilla
G Page
Walter Pagels
Miodrag D Pajkovic
Paul D Palmer
R K Pandey
Frank R Paolini
Bruce J Pardus
Chongkug Park
R G Parker
Susan J Parker
Earl L Parks
Roger Partridge
L E Paschal Jr
J J Patay
Philip Paterno
John J Paull
Robert W Paulsen
D M Payne
David R Payne
Mark H Pearce
Don E Peck
J A Pecon Jr
Nahum Peleg
Erik M Pell
Alecos Pelopidas
William F Peoples
C D Pepe
David C Perez
Jorge A Peri
R E Perliss
Robert G Pessler
James E Peters
Ronald G Peterson
Richard L Petritz
R T Petruzzelli
Robert J Pettersen
B L Pfefer
Tsang Y Philip
David M Phillips
Luigi Pick
Paul R Pierce
John F Piersa
R Piloty
H J Pinczower
W H Pindell Jr
Orfeo Pinton
James W Piper
Robert L Pique
Mark E Pittelkau
A Plait
Jaime C Plana
Stefan Platzek
Thomas F Poland
Franklin C Poley
Frank J Ponzio Jr
Frank B Pope Jr

Warren M Porter
N R Poulsen
E U Powell
L E Powell
John H Powers
Robert Powers
Robert E Pownall
Sound Prabhakaran
Jean F Pradurat
Donni Prananto
Ralph J Preiss
P I Pressel
Leo L Preti
Robert Prevaux
Vernon G Price
Keith Pritchard
George N Protogerou
Daniel A Puszka
Howard T Pyle
Thomas J Quinlan
W P Quintin Jr
Enrique C Quispe Oquena
Herbert Raabe
Habib Rahman
H Raillard
Delvan A Ramey
Mohamad Ramlan
Isidro Ramos
R W Ramsey Jr
Shrikant T Ranade
David R Rankin
Mark Ransom
Richard R Rau
Gordon Raymond
Jon Rea
Alvin A Read
Eduardo F Rebaza
Bruce L Redlien
Dave L Reece
E B Reese
Robert K Reich
Konrad Reichert
Richard J Reiman
Alvin Reiner
Kirk Reinholtz
Bodo Reinisch
J Reitman
Fernando A Relloso
Ernie M Reyes
P H Reynolds
A L Richardson
Marvin O Richter
Stephen L Richter
H H Rickert
F M Riddle
C O Riddleberger
Borge Riis-Vestergaard
Charles L Rino
John K Rivoldini
D D Robb
Diana Robba
Guenther P F Robbel
J D Robbins
J Robert
John R Roberts
G D Robertson
Don G Robinson
James G. Robinson
A Gregory Rocco Jr
Carlos E Rodriguez
David Rodriguez
Juan V Rodriguez
John S Roe
D A Rogers
Stacey A Rogers

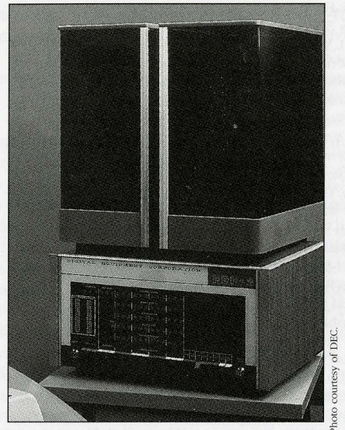


Photo courtesy of DEC.

The PDP-8.

Hans G Rolfes
William E Romans
Gary T Rose
I Rotkin
R V Row
S Rubin
John R Ruckstuhl
M Ruderman
Robert Rudolph
G H Ruggles Jr
J Rungrangpitayagon
D W Rusnell
F A Russell
Mark D Rustad
William G Ruthenberg
V F Ryan Jr
William Ryan
Eugene Rymaszewski
Ken-Ichiro Ryono
C A Rypinski
H Ryser
Herman S Sachs
Gregorio M Sadorra
S Saithanya
Osamu Saito
Yo Sakaki
Ichiro Sakuraba
Peter F Salamon Jr
Saiyyad M Saleem Moini
Charles M. Salina
Mohd W El Sallal
Richard W Samms
Mitsunobu Samoto
Gordon T Samuels
Jan O Samuelsson
Henry Samulon
Alton F Sanders
G F Sandy Jr
G G Santaella
Michael A Santangelo
D Sarina
John E Sartelle
Hajime Sasaki
Hisashi Sasaki
Yoshinobu Sasaki
S D Savic
W A Savory
Yoshio Sawaji
Kunio Sawaya
Mehmet R Sayan
George T Scache
Thomas M Scally
D H Schaefer
Edward R Schaefer
Lee M Schaff
Rafael Schapiro
John L Scharf
E H Scharres
Gary W Scheer
Russell R Scheer
P O Scheibe
Mark S Scher
Powell A Scheumack
Herbert W Schilling
Kurt Schlacher
Ulf Schlichtmann
W R Schlinger
Dean J Schmidlin
Chris O Schmidt
Herman A Schmidt Jr
W M Schmidt
Rolf Schmutz
D A Schneebeck
Karl W Schneider
R L Schneider
S Schneider
B J Schochet
Wayne S Schoeppach
W Schreuer
Hans Schroeder
T W Schroeder
Richard D Schwartz
Richard F Schwartz
Roland Schwerdtfeger
Octavian Scortea
Luiz M Seabra
D A Seamans
Bruce Seddon
Kiyoshi Segawa
Tadashi Sekiguchi
Stephen S Selkirk
Wm J Sen
Miguel A Seoane
Mutsumu Serizawa
Walter Serniuk
Chuk-Lam F Seto
Arthur G Settle
Elias G Sevilla
Ronald Seville
Daniel G Shade
David C Shafer
John P Shanklin
C K Shanks
Claude E Shannon
L Dennis Shapiro
O Shapiro
E D Sharp
Guy B Shaw
J J Sheehan
Abusalmaan Sheikh
William G Shepherd
Bruce A Sheppard
E A Sheridan
Yasutsugu Shigeta
Pan S Shin
Kobayashi Shinichi
Hiroshi Shintani
Hiromu Shioyama
William K Shirado
Lee A Shombert
O L Shorter
John O Shotwell
Teck-Seng Shuan
Skuli Sigurdsson
R Silberstein
Guillermo J Silva
Romel F Silva
Michael D Silver
Peter G Simpkin
J R Singer
James J Skiles
Shelley M Skinner
Merrill I Skolnik
Greg Skyles
Barry L Slattery
C J Sletten
L M Small
Cynthia J Smith
Frederick F Smith
Jay C Smith
John Smith
K W Smith
Kelvin C Smith
M G Smith
Mark J Smith
N F Smith
W J Smith
Erik L Soderburg
Chuichi Sodeyama
K Solomon
A Soltesz
Aykut Somer
Hideaki Sone
Ashok K Sood
Edmund L Soohoo
R W Sorensen
Rodolfo M Soria
Juan C Soto Merino
Paolo Spagni
T G Spargo
Michael Spencer
Charles J Spiteri
J F Spivey
M Springel
G A Squires
Mark R Stacey
Forrest L Staffanson
John C Stamatiou
Alec G Stanculescu
Thomas O Stanfield
Lisa M Stanley
Paul C Stanton
A J Stanziano
Robert J Starr
Thomas L State
J E Steele
J H Steele
J E Steelman
Thor J Steenland
Rene A Steigerwalt
Juergen Stenzel
Karl D Stephan
Brad Stephens
D H Stephens
Fritz Steudel
Frederick Stevens
William G Stevens
D Stewart Jr
G E Stewart
Harry C Stewart Jr
Robert W Stewart
V N Stewart
Steven N Stitzer
D C Stock
E F Stockwell Jr
Fred J Stover Jr
Charles P Stromp
Douglas Strother
Carl F Stubenrauch
Oskar E Stuerzinger
Branislav Stupar
James C Sturm
Roger W Sudbury
L Sues
Yoshitaka Suezawa
Koji F Suginuma
Torahiko Sugiura
Seiji Sugiyama
Patrick D Sullivan
Timothy J Sullivan
T S Sunderam
Koeng M Sung
Jon M Surprise
Hironori Susaki
Hiroshi Suzuki
Shiro Suzuki
Serge Svedcenko
Paul Svetz
George R Swain
E L Swallow
Robert S Swanstrom
J N Sweeney
Mark S Swiecicki
J T Synnott
Bohdan J Sypniak
Thomas L Szabo
George B Taack Jr
Gary S Tahlmore
Bok Ah Tak
Makoto Takahashi
Masaaki Takahashi
Shigeru Takahashi
Yasuhide Takeda
Ken Takeya
H J Talbot
Roger J Talish
Jaime Tamarit R
Shojiro Tanaka
Shuzo Tanaka
Takeshi Tanaka
Teruaki Tanaka
Kuoe I Tang
Glenn M Tanimura
Shigeru Tanisawa
Oscar Tapia
Renold Tarkenter
P Tarrodaychik
John J Tary
M B Tatonetti
B C Taylor
Chester C Taylor
L A Taylor
Thomas R Taylor
Clifford J Tedder
Howard A Teitelbaum
A Teitler
B H Temple
Paolo Tenti
George E Thaller
S N Thanos
James Thayer
Ole Z Thogersen
P A V Thomas
Charles E Thomas
Aidan A Thompson
David H Thompson
John R Thorpe
S H Thuresson
Richard P Thurston
Steven J Tilidetzke
William F Tinney
Laode W Tjahjadi
Makoto Tobari
David N Todd
Yasuko Togashi
Tatsuo Togawa
Kay Tohyama
Tsuneo Tokumitsu
Brin A Tolliffe
Alexander S Tom
Musfik Tomacoglu
Willis J Tompkins
Melvin F R Torres
Santos B Torres
Joseph V Toscano
Selina M Tourjee
Bob Tousey
J W Trank
Kit Transue
Corey R Trapp
Myron Tribus
David I Troxel
David E Truax
Anhi Truong
Henry J Trussell
E A Tschumper
A Tsoularis
Kiichiro Tsuji
Toshio Tsurushima
John A Tucker
W M Tucker
Howard L Turetzky
K J Tyssen
Giovan B Uasarri
Susumu Uchiyama
Kazuhiro Ueda
Yasutaro Uesaka
Hiroshi Ui
Raetz H Ulrich
T Ulrich
Haruo Uoki
Pentti T Uuspaa
Harri J Vahatalo
Patrick J Vail
Frank C Valentino
Jorge Valerio
Edward J Van Beever
Arthur Van Gelder
Maxwell Van Horne
William B Van Lennep
Johannes G Van-Wijk
Larry D Vandendriessche
V C Vanderbilt Jr
Christine G Vangelatos
Hubert J Vanooteghem
F J Vaquero Esparza
Alan L Varney
Dan I Vasilache
C Vecchio
Maribel Velez

Other Contributors

Theodore C Viars
Frank S Vigilante
Genee C Villere
Robert S Vincent
Robert M Volk
Walter W Vollenweider
Willi G Vollenweider
Richard W Voreck
John F Voss
Richard K Wade
Thomas O Wade
Katsumi Wakatsuki
Emil J Walcek
Jack M Walden
Stephan E Walder
Edward Walentynowicz
Perry S Wallia
Jack R Walsh
John B Walsh
E J Warchol
Craig E Ward
Paul T Ward
C A Washburn
Robert T Watson
Michael E Webber
Bruce D Wedlock
Evroyd G Weeks
Charles W Weesner
Che-Ho Wei
R J Weideman
Scott J Weikel
Herschel Weil
Frank C Weimer
Iram Weinstein
Knud-V Weisberg
F D Wells
Lee O Welter
Raymond T Wensley
Walter J Weppler
Cecil D West
L E West
Stephen R West
R E Wetmore
J R Whinnery
David J White
Kenneth L White
Philip W White
Willis S White Jr
John P Whitley
G L Wilcox
Robert G Wilhelm Jr
Michael E Wilhoyte
Robert H Wilkinson
Brian A Williams
Christopher P Williams
J C Williamson
F J Wilson
Frank A Winiger
Jan C Van Winkel
Daniel G Wise
E E Witschi
Barnet A Wolff
C M Wolff
Derek Y Wong
Edward Wong
Kevin C Wong
Kwok-Ho Wong
James B Wood
Neal L Wood
J W Woodbury
A J Woodley
C A Woodworth
C N Works
W P Worley
B E Wrensch
Malcolm T Wright
Hsien Tsai Wu
Long Wu
Robert S Wu
F F Wuestenhagen
Kris H Wulteputte
James P Wurm
Ronald J Wylde
Kongshi Xu
Goro Yabe
Hatsuo Yabe
Takashi Yahagi
Shuzo Yajima
Atsushi Yamada
Hisafumi Yamada
Koichi Yamada
Yasuhiro Yamada
Takahiro Yamaguchi
Takehiko Yamaguchi
Lawrence M Yamashiro
Kimio Yamashita
Tunenori Yamauchi
H Yanofsky
Daniel F Yaw
J A Yeates Jr
Kuo S Yeh
Swee-Ping Yeo
Bunkichi Yoda
Han Soo Yong
Ong K Yong
Kazuhiro Yoshida
Ken-ichi Yoshida
Takashi Yoshida
Ryuichi Yoshioka
Makoto Yoshizaki
Mamiro Yoshizawa
George Yossif
George W Younkin
Cheng-Cheh Yu
Juebang Yu
Young-Uk Yu
Ho Yu-Tak
Mehmet S Zaim
Nick Zajerko-Mckee
Raymond A Zalewski
Marijan Zapusek
David J Zawislak
A C Zeis
Joseph F. Zelle
D S Zervas-Lakoutsis
Ningyan Zhu
Max R Ziegler
Eugene S Zimmer
W O Zimmerman Jr
Pavel Zivny
Hans Zschintzsch
F J Zupancic
R Zweigler

NAME _____

ADDRESS _____

_____

Partnership Program	(lifetime giving)
❑ Founding Partner	$100,000 or more
❑ Senior Partner	50,000 - 99,999
❑ Partner	25,000 - 49,999
❑ Colleague	10,000 - 24,999
❑ Associate	2,500 - 9,999

Friends Program	(annual giving)
❑ Patron	$1000 - 2499
❑ Senior Friend	250 - 999
❑ Sustaining Friend	100 - 249
❑ Friend	35 - 99

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

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

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

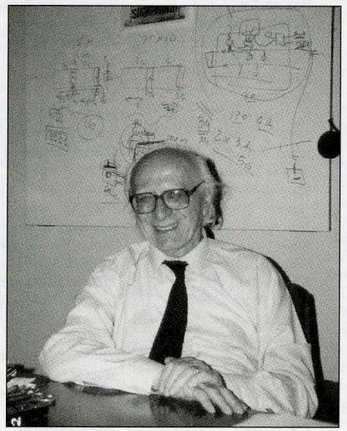
❑ I would like to receive further information about the Friends Program.

Make checks payable to:
IEEE Foundation Friends Fund

Please mail to: IEEE Center for the History of Electrical Engineering, Rutgers University, 39 Union St., New Brunswick NJ 08903

ORAL-HISTORY INTERVIEWS IN EUROPE AND ASIA

continued from page 1



Luigi Dadda

Olivetti computer, and **Luigi Dadda**, a computer scientist at the Polytechnic of Milan.

FRANCE

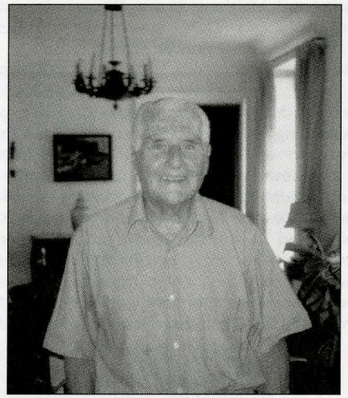
Postdoctoral Fellow Janet Abbate interviewed engineers in France, where she found a diversity of experiences. **Ferdy Mayer** described his unique position as one of the few "research entrepreneurs" in France. He founded a company called LEAD that investigates problems at the intersection of solid state physics and electromagnetics; this research then becomes the basis for patents that LEAD licenses to companies in France, the United States, and elsewhere. Mayer spoke of the challenges of establishing a private-sector research base in France, where R&D tends to be concentrated in government-sponsored institutions and a few large companies; he contrasted this situation to the more receptive environment for entrepreneurship in America. At the other end of the spectrum, **Jacques Cladé** devoted his career to the French electrical utility, EDF, specializing in transmission line design and rising to become a high-level manager. Similarly, **Gèrard Lehmann** worked for the giant electrical equipment firm Alcatel-Alsthom, where he helped develop high-voltage power equipment, uranium enrichment facilities, and the TGV, the French high-speed train. Lehmann recalled how his interest in electrical engineering was sparked as a child when he built a crystal radio set to receive broadcasts from the Eiffel Tower.

Two of the French engineers devoted much of their careers to power engineering. Professor **Michel Poloujadoff** represents the academic side, having taught and developed techniques for the mathematical analysis of linear induction motors and transformers. On the industrial side, **René Bidard** designed turbogenerators for the French electrical equipment company CEM. In recalling a lifetime of engineering, several interviewees described using their professional skills to serve the nation during the Nazi occupation; Bidard, for instance, worked on a top-secret project to develop gas propulsion turbines for the Navy. Most of the engineers maintained close contact with the work of their American colleagues through the IEEE and other channels, and technology was often transferred across the Atlantic; **Pierre Lapostolle**, for instance, developed theoretical and mathematical models for linear accelerators at CERN that he then brought to the United States as a consultant to Los Alamos. Most of those interviewed felt that France is committed to technological progress, and all of the engineers agreed that, for better or for worse, the French government is more closely involved in the education and practice of engineering than in the United States.

KOREA

At the end of August, Center Manager and Curator Andrew Goldstein spent ten days in Seoul, South Korea recording oral-history interviews with some of that country's most prominent figures in electrical technology. Through the assistance of professor Sougil Ann, a fellow of the IEEE and former Director and Secretary of Region 10, and Yung-Kwon Kim, the Chairman of the IEEE Korea Council, Goldstein conducted interviews with ten Korean electrical engineers. The interviewees were **Hong Eu** (Shinwoo Telecom), **Ki Sun Han** (Samsung), **In-Ku Kang** (LG Yonam College of Engineering), **Jin Ku Kang** (TriGem Microsystems), **Duck-Jin Kim** (Korea University), **Jae Kyoon Kim** (KAIST), **Yong Sun Kim** (LG Academy), **Hee Chong Lee** (LG), **Tae-Won Rhee** (Korea University), and **Jung Uck Seo** (Korea Mobil Telecom). These interviews, in addition to an interview Goldstein conducted last May with Ki-Dong Kang, who lives in California, represent a substantial wealth of information about a wide variety of topics connected with the growth of electrical technology in Korea.

Korea is well known as one of the four "Asian dragons"—the east Asian nations whose economies have shown stunning growth in recent years, particularly in high-tech areas such as electronics. So dramatic has Korea's recent development been, however, that it is perhaps too easy to lose sight of the country's modest state of just two generations ago. Handicapped by decades of Japanese colonial rule and then devastated by the all-consuming conflict of the Korean war, Korea emerged into the mid-1950s as a poverty-stricken and highly dependent nation. Korea's transformation into a modern, self-sufficient country, a transformation that was intimately connected with the development of electrical technology there, was the inevitable subject of the Korean interviews.



René Badard

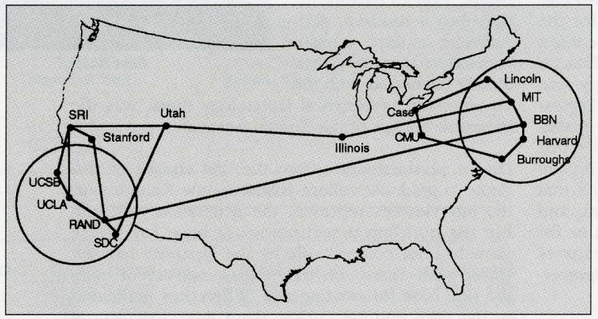
Drawn predominantly from the first classes of students to graduate college following the Korean war, the interviewees represent the generation responsible for building a technological base for future growth. Prior colonial rule by the Japanese had left Korea with almost no indigenous industry or even the skill base for creating one. When they graduated in the mid- and late 1950s, there were few private sector jobs for electrical engineers. Many worked for government agencies such as the Ministry of Communication or the Korean Broadcasting System; or continued their studies, perhaps in America (as through a particularly successful cooperative program run with the University of Minnesota); or joined the military. At that point, the stories begin to diverge. Some continued on in education, bringing modern methods and equipment to a country with a traditional reverence for learning. Others took up the challenge of private enterprise, seeing Korean industry through the age when it either licensed or reverse-engineered other countries' technologies to the day when it would contribute its own leading-edge innovation. Taken together, they all tell a single story of rapid change. The interviews try to document critical episodes in this story, as well as find the basic patterns and lessons that can be drawn from it.

As with all other interviews conducted by the Center, these interviews will be transcribed, and the transcripts edited, abstracted, and indexed. The Mellon grant provides also for transcription and editing of oral-history interviews. The Center has begun making oral-history interviews available on Internet; of some 300 oral-history interviews, approximately 112 are already available on the Internet.

Bibliography

Hafner, Katie, and Matthew Lyon. *Where Wizards Stay Up Late: The Origins of the Internet.* New York: Simon & Schuster, 1996. 304 pp.

Katie Hafner and Matthew Lyon have written an entertaining and fact-filled account of the early years of the Internet. Relying largely on interviews with the participants as well as documents from the networking projects, the authors recount the history of the ARPANET and its transformation into the Internet. They describe the origins of the Advanced Research Projects Agency (ARPA), the innovative Defense agency that built the ARPANET and was instrumental in funding related computer science developments such as time sharing and graphics. They follow the planning and development of the ARPANET, focusing particularly on how the network's packet-switching computers, called IMPS, were developed by the consulting firm Bolt Baranek and Newman. (BBN sponsored the writing of the book.) The authors show a good grasp of the design issues involved in employing experimental techniques such as packet switching and remote network maintenance, and they manage to provide many technical details while also conveying the excitement of building a cutting-edge system. The book is often heroic in tone, celebrating the insights and hard work that resulted in the networking technologies we now take for granted.



The ARPANET in 1971 (illustration courtesy of Janet Abbate)

Later sections of the book describe the emergence of email and related "social" uses of the network such as Adventure games. The development of internetworking techniques, including the TCP/IP protocols, and the growth of other networks such as the NSFNET, which eventually replaced the ARPANET, are also covered, though in less detail than the early history of the ARPANET. There is very little discussion of events since the mid-1980s, such as the commercialization of the Internet or the emergence of the World Wide Web. As the title indicates, the focus of the book is largely on the origins, rather than the subsequent development, of the Internet.

The authors are journalists rather than historians, and the style is journalistic. The narrative is peppered with anecdotes and colorful quotations that enliven the technical account and capture the feeling of being a direct participant in these events. The general reader will be able to follow the sometimes complex development of the ARPANET and Internet without being overwhelmed. The book's sparse documentation makes it less helpful to historians, however. Brief "Chapter Notes" at the end of the book give a general sense of where the authors got their information, but there are no footnotes to indicate the source of specific facts, interpretations, or quotations, and the authors sometimes fail to identify the speakers being quoted. As a historical source the book is more suggestive than authoritative. However, those wishing an introduction to the origins of the Internet and its technology will find this a highly readable volume.

Jäger, Kurt, ed. *Lexikon der Elektrotechniker.* Berlin: VDE Verlag, 1996. 478 pp.

This book consists of 653 biographical sketches, which range in length from half a column of text to four columns. All people who contributed to electrotechnology —whether they were engineers, scientists, inventors, or industrialists—were considered, though only those no longer living. The book is international in scope, with good coverage of the engineers and scientists of Europe and the United States. Each entry outlines the person's career, describes his or her most important contributions, and lists other sources of information. There are photographs of 185 of the subjects. Name and subject indexes enhance the usefulness of the book. This is the first fairly comprehensive biographical dictionary for the contributors to electrical technology. As encyclopedias and other readily available reference works provide information about only a minority of the people included in this volume, it will be of great value to everyone interested in the history of electrical technology, electronics, and computing.

Millard, Andre, *America On Record: A History of Recorded Sound.* Cambridge: Cambridge University Press, 1995. ix+413 pp.

Andre Millard, an associate professor at the University of Alabama, Birmingham, has recently published a richly detailed history of the phonograph. Millard, who is already well known for his works on Thomas Edison, has extended his study of Edison's "favorite invention" to encompass the shift from cylinders to disks, from 78-rpm records to LP's, and finally to the current proliferation of formats. He also devotes considerable attention to cinema sound technologies. Writing that "the development of recorded-sound technology was often the result of the diffusion of ideas and techniques between film makers and record companies", he sees movie studios as the hot house for many of the significant innovations in recorded sound technology.

Millard organizes his presentation around technical issues, dividing the history of recorded sound into three distinct phases: the acoustic era, the electrical era, and the digital era. Interspersed with his technical history, however, is a concise synthesis of the cultural history of sound recording, concentrating on the interaction between artists and consumers. Of particular interest to him are various African-American musical forms, including jazz and the blues. The rock'n'roll revolution, with its new use of the recording studio as a musical instrument, is an important subject of his later chapters.

Millard draws on a wide variety of sources for his analysis, including contemporary accounts, hobbyist literature, and scholarly works in business history and the history of technology. Much of his archival research appears to have been done at the Edison National Historic Site in West Orange, New Jersey.

Rhoads, B. Eric. *Blast from the Past: A Pictorial History of Radio's First 75 Years.* West Palm Beach, FL: Streamline Press, 1996. 463 pp.

This large-format book reproduces more than 900 black-and-white photographs that vividly recall the personalities and events of 75 years of radio broadcasting. (A large fraction of the photos come from the collection of the Broadcast Pioneers Library in Chicago.) The book is organized as nine chapters: one covering the period before 1920, each of the others covering one of the decades since then. Each chapter contains a narrative account of broadcasting in that period but consists mainly of photographs and captions. Emphasis is on the broadcast personalities, though many photos show the technologies involved. Following the main chapters are a bibliography, descriptions of the Radio Hall of Fame and the Broadcast Pioneers Library, and listings of museums, archives, clubs, and other organizations.

Rutland, David, *Behind the Front Panel: The Design and Development of 1920's Radios* Philomath, OR: Wren Publishers, 1994. viii+158 pp.

True to its title, "Behind the Front Panel: The Design and Development of 1920's Radios" by David Rutland takes the reader inside the workings of early radios, and into an area that is often unreached in writing on the history of radio. This is a book clearly aimed at those with an innate curiosity about the nuts and bolts of radio technology. Concentrating directly on technological milestones, the book rarely shifts its focus outside the radio chassis.

Rutland concentrates on several representative designs to illustrate the most significant radio developments. Discussed here are classic models such as the RCA Radiola III, Grebe MU-1, King 80, Atwater Kent 20, along with many others. He proceeds logically from chapter to chapter, taking on, in turn, all the fundamentals: detectors-crystal and tube; RF amplifiers-regenerative circuits, neutrodynes, and multi-stage TRF's; reflex circuits; screen grid tubes; the superheterodyne; and the introduction of AC. In one particularly interesting section, Rutland explores the mechanical and electronic requirements for single-knob control, an important development for bringing radio home to the general public.

The book's discussion, while unfailingly technical, assumes little prior knowledge of radio circuitry. It can serve, then, as a handy introduction to landmark technologies that the less-technically oriented historian frequently encounters in the literature on radio history. Rutland introduces the reader to now-unfamiliar components such as the variometer and the variocoupler, as well as dated circuits such as the technidyne, and "lossers"—imaginative circuits that worked around the critical neutrodyne patent. The explanations are supplemented by plentiful circuit schematics that are stripped down to highlight only the most salient features and an illuminating series of photographs. The photos, avoiding the familiar shots of cabinet work and speaker grilles, truly illustrate the circuit component being discussed. Careful readers might notice an occasional proofreading error or two in the readable text, but these should not detract from the enjoyment of this informative book.

NEW WEB SITE FOR HISTORY OF PHYSICS

A site featuring the history of physics and allied sciences is now available on the Internet's World Wide Web, mounted by the AIP Center for History of Physics. Use of the Web was originated by physicists but is spreading explosively among the general population. The most eager users are young people with an interest in technology and the future—exactly the sort of people who should be exposed to the real story of science as a human enterprise. The Web is an outstanding new way to advance public understanding of the physical sciences and their relationship to society, and the AIP Center has moved aggressively to take advantage of the opportunity.

The address (URL) is http://www.aip.org/history/

Users entering the site will find a number of options:

• Pages about the Center for History of Physics with information on the programs and services, for example grants-in-aid and advice on oral history interviewing.

• Information on the AIP's Niels Bohr Library, including general descriptions of the holdings, a sample of finding aids to archival materials and abstracts of oral history interviews in the Library's collections, and information on how to get access to the materials (in person or by mail or e-mail).

• An introduction to the Emilio Segrè Visual Archives, including a sample of photographs—some of them enlivened with quotes or vignettes—and forms that can be submitted to request copies of pictures.

• A variety of Web links to other sites useful to anyone interested in the history of physics and allied sciences such as astronomy, geophysics and optics. There are sites for societies, organizations, exhibits, institutional histories, and so forth.

• Pages for the Friends of the Center for History of Physics, including "plaques" honoring past donors, and information on programs such as the donation of bookplates to honor or memorialize colleagues.

• The AIP History of Physics Newsletter with information on current work, bibliography of books and articles, reports of new archival deposits in the field, photographs, etc.

• A featured Web exhibit: *Einstein: Image and Impact,* using photographs, quotes, and text to present highlights of Albert Einstein's life. By the end of the year this will be expanded to a major site including over 80 photographs and 70,000 words of text.

Besides expanding the Einstein exhibit, during the coming year Center staff will mount a number of additional finding aids to collections and hundreds of additional photographs from the Visual Archives. Under development is a major search engine to support on-line access to abstracts of all the Library's archival holdings (published in the 1994 Guide to the Archival Collections in the Niels Bohr Library, but including more recent accessions), the Library's catalog of books, and—not least—the entire International Catalog of Sources for History of Physics and Allied Sciences.

Authors Sought

James Brittain and Frederik Nebeker are planning a book of contributed papers on engineering science and engineering practice in the early history of electronics. The idea is to consider the use by engineers of methods commonly associated with science—quantification, experimentation, theorizing—and the relationship between these methods and practical engineering in the pre-transistor era of electronics. This is the intersection of two extremely important, yet neglected topics: electronics in the tube era and the science-practice relationship. The objective is to illuminate the half century of the electronics industry before the solid-state era began, and to seek to understand, in one important area of work, how modern engineering derives its great effectiveness from the interplay between a mental world of theories and calculations and a physical world of devices. The editors invite proposals for papers to be included in this book; proposals may be sent to the Center.

New Oral Histories on Web Site

On October 1 the Center added 25 new oral history transcripts to its web site, bringing the total to 112. Along with the transcripts, abstracts for the interviews and tables of contents are also available on-line.

Seventeen of the interviews were part of a 1994 project jointly conducted by the IEEE History Center and the History Committee of the IEE Japan (see newsletter #35). William Aspray recorded conversations in English with distinguished Japanese electrical engineers and managers. The other eight interviews are from the Center's general collection, and include figures such as Nick Holonyak and Harold Beverage.

The preparation of these oral histories for the Web was made possible by a grant from the IEEE Foundation. Before the end of the year, at least seven additional transcripts will be made available through Foundation support. The URL for the Center's web page is http://www.ieee.org/history_center.

Computing History Conference Rescheduled

The Center's conference on the history of computing, originally scheduled for June 1996, will be held on 13, 14, and 15 June 1997 (Friday through Sunday). The site will be the beautiful campus of William & Mary College in Williamsburg, Virginia. More than a dozen distinguished historians of computing have agreed to give invited talks, which will collectively provide an overview of the development of computing and of the methodology of computer history. Many attendees will have the opportunity to give short talks on their own research. More information and a registration form will be contained in the next newsletter.

PARTNERSHIP PROGRAM

We are grateful to the organizations and individuals listed below who provide generous support to the center in the form of operating, endowment, and project funding. If you or your organization are interested in joining our Partnership Program, please contact the center.

Founding Partners:
IBM Corporation
IEEE
IEEE Foundation - General Fund
IEEE Foundation - Life Member Fund
Andrew W. Mellon Foundation
Rutgers University
Alfred P. Sloan Foundation

Senior Partners:
National Science Foundation
Signal Processing Society

Partners:
AT&T Foundation • Electron Devices Society
Power Engineering Society

Colleagues:
Control Systems Society • Microwave Theory and Techniques Society • Emerson W. Pugh

Associates:
Antennas and Propagation Society • Laurence R. Avins • Earl Bakken • John Bryant • Central Research Institute of Electric Power Industry • Denver Section, IEEE • Electric Power Development Corporation, Tokyo • Electro-Mechanics Company • Environmental Research Institute of Michigan • GE Yokogawa Medical Systems, Ltd. • Hitachi Ltd. • KBR Foundation • Joseph F. Keithley • Magnetics Society • NEC • Eiichi Ohno • Sematech • Takashi Sugiyama • Tokyo Electric Power Company • Toshiba • Yokogawa Electric Company

We are also grateful to the thousands of individuals and institutions who make annual contributions to our Friends Fund.

IEEE

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

Non Profit Org.
U.S. Postage
PAID
IEEE
Permit #52
Piscataway, NJ