

# Center for the History of Electrical Engineering

Newsletter No. 37 Fall 1994

## Engineers as Executives

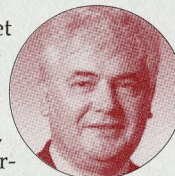
Managers of technological businesses face great challenges. They must not only be able to make difficult decisions faced by any business leader operating in a highly competitive international market, but also handle technologies that are often arcane, expensive, and rapidly changing. What qualifications prepare someone for this kind of executive position, and what kinds of challenges do they face every day? What impact does an engineering background have on their management philosophy and practice? Are these experiences universal, or do they vary from continent to continent, and from country to country?

In order to try to gain insight into these questions, the Center conducted oral histories with thirteen senior executives from the computer, electrical, and electronics industries in Germany, Japan, and the United States. Through an examination of their personal histories, we investigated general issues about the challenges and styles of managing technological businesses. These interviews have been published by IEEE Press as William Aspray, ed., *Engineers as Executives: An International Perspective*.

The transcripts that appear in this volume have been edited by both the Center's staff and the executives themselves. As an aid to the reader, each transcript is preceded by a brief history of the principal company under discussion in the interview. Each interview also includes a portrait photograph of the executive.

The first section of the book includes interviews with four German executives, beginning with Herbert Bruch, a member of the Management Committee that runs the Grundig Company. Grundig is a worldwide producer of consumer electronics, such as televisions, compact disk players,

video recorders, upmarket hifi components, world-band radios, car radios, and telephones, as well as industrial electronics, office electronics, and information technologies. Bruch discusses the way in which research and development, manufacturing engineering, and product development are organized within Grundig. Other topics include the strong position of European companies in logistics and customer service, the value of joint ventures, the relations between Grundig and its parent company Philips, the importance of continuing education, and the difficulty of training engineers to be managers. He gives special emphasis to the importance of maintaining engineering capability within Grundig and the need for senior operations managers to keep track of what is happening on the factory floor.

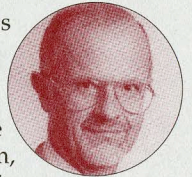


Herbert Bruch

### Help Us Meet Our Challenge Grant

In our last newsletter we mentioned the IEEE Foundation has kindly set aside up to \$50,000 for a challenge grant to help build up the Friends Fund. For every two dollars donated by an individual or non-IEEE organization, the Foundation will donate one dollar. As of 1 November, thanks to your generosity, we had already received \$36,000 in qualifying contributions from individuals and organizations. If you have not given yet, you still have a chance to contribute, either through your 1995 IEEE Dues Bill or by sending the Center a check (or credit card authorization) payable to "IEEE Foundation-Friends Fund". Please help us to take full advantage of the IEEE Foundation's challenge grant, which ends February 21, 1995.

The second interview is with Ernst Denert, Managing Director and one of the co-founders of sd&m, a leading custom software design and consulting firm, with a distinguished client list that includes Lufthansa, AEG, Siemens, Thyssen, TUI, BMW, and the Deutsches Bundesbahn (national railway). One of the most interesting topics discussed in this interview is how Denert's participation in the Berlin student protests of 1968 shaped his career and the culture of the company he founded. Denert also discusses how his philosophy of software design and management have shaped his company's operating practices. He considers the "software crisis", the tools and methods developed to overcome it, and why universities have difficulty providing adequate training in software engineering. Other topics include the lack of risk in custom software entrepreneurship experienced by Denert, the ethical responsibilities of spinoff companies to their parent organizations, the strengths and limitations of being a small company, and strategic reasons for opening a small business to new partners.



Ernst Denert

The next interview is with Kurt Schips, a member of the Management Committee that runs Robert Bosch GmbH, an international company with more than 180,000 employees that has been a leader in the automotive components industry since the nineteenth century and today produces mechanical automotive equipment, communications technology, power tools, household appliances, thermal technology, plastic products, packaging machinery, industrial equipment, and hydraulic and pneumatic machinery. Schips discusses competition among Germany, Japan, and the United States and some of the factors that affect the outcome, such as the tension between short-term return on investment and market share, and the effect on research and development of the comparatively longer Japanese work year. He considers at length the organization of research and development, manufacturing



Kurt Schips

Continued on page 2

## Engineers as Executives

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engineering, and product development. Other topics include decentralization, the importance of building new market areas on existing expertise, the value in early market entry, training engineers to be managers, and the importance of technical training for senior managers.

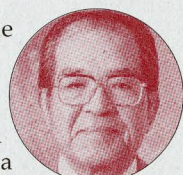
The final German interview is with Arno Treptow, a member of the Management Committee of AEG. AEG has more than a century of experience in the electric power business and today, as one



Arno Treptow

of the Daimler Benz companies, has international businesses in power transmission, automation, railroad systems and components, domestic appliances, and microelectronics. The first part of the interview discusses the structure of the international market in electric power, the shake-out in that industry over the past forty years, and the particular importance of customer-supplier relationships in this market. Treptow considers the changes that occurred in management philosophy when Daimler acquired AEG, and the ways in which various functions are centralized or vested in the divisions today. Other topics include the effect of the breakdown of the Iron Curtain on European business, the training programs at AEG for teaching engineers to manage, and the backgrounds found among senior managers.

The first interview in the second section is with Katsutaro Kataoka, a highly individualistic corporate leader who as a WWII veteran built up a small firm manufacturing variable capacitors into Alps Electric, one of the world's leading,



Katsutaro Kataoka

horizontally diversified secondary components manufacturers. Alps built many of the television tuners that enabled the Japanese to dominate the television manufacturing industry, developed a major car stereo business (Alpine) out of a supply relationship with Honda Motors, and today supplies floppy disk drives for Apple, IBM, and other companies. Much of the interview concerns how Kataoka was able to build his small post-war venture into a major, independent supplier of electronic components, especially in the face of the strong hold that the large Japanese systems manufacturers have over their suppliers. Of particular interest is Kataoka's explanation of how he learned his operating principles and his commitment to quality manufacturing in the 1950s and 1960s from American companies, which themselves later abandoned these principles. Other topics include the value in situating factories in rural areas, managing rapid growth, the move from customized to standardized products in order to remain competitive, the Viet Nam war as a watershed in Japanese-American business relations, and the future importance of China as market and producer.

The next interview is with Koji Kobayashi, Chairman Emeritus of NEC Corporation, which during his tenure as company leader became the world's largest producer of computing and telecommunication technologies. NEC's activities were shaped by Dr. Kobayashi's vision of the integration of computer and communications technologies into what he has called C&C. In the interview Dr. Kobayashi discusses the importance of this integrated approach to technology, the problems of building up a business after the Second World War, the difference between a technical and a financial mindset in the leadership of technological businesses, and how



Koji Kobayashi

to operate a multinational company in countries other than that of the home office.

The third Japanese interview is with Kazuhiko Nishi, the inventor of the first laptop computer and the joy stick used in millions of Nintendo video games. His company, the ASCII Corporation, today has a well-integrated and future-oriented group of business activities in personal computing, entertainment, business workstations, semiconductor design, and on-line services. In this wide-ranging interview, Nishi discusses many aspects of his business philosophy: communication between



Kazuhiko Nishi

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.

### CHEE

Rutgers University  
39 Union Street  
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## New Staff

We are pleased to announce the appointment of Nichole Brownlee as the Center's new Assistant to the Director. Ms. Brownlee received her bachelor's degree in sociology from Rutgers in 1992. She will have responsibility for managing the office, supervising the clerical staff, and serving as executive assistant to the director.

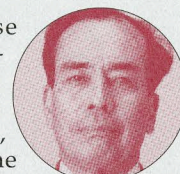
We apologize for an error in the article on Lexikon Services' computer history which appeared in the last newsletter. The correct number for credit card orders is (800) 414-4268.

## Life Member Support

Due to an oversight, we neglected to thank the IEEE Life Member Fund for its generous support of the Center's Fellowship and Summer Internship in the last newsletter. Neither of these programs could exist without the Life Member Fund's contributions.

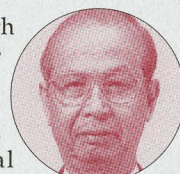
senior and middle-level managers, decentralization and optimal size of profit centers, importance of research and development to long-term growth, joint ventures as a way to overcome lack of mobility of Japanese engineers, integrating business areas intelligently for long-term growth, rating an engineer's skills, recruitment of software designers, the importance of constant product enhancement when product cycles are short, difficulties of fast-tracking employees in Japan, and the importance of dominating one's market niche.

The final two Japanese interviews are with executives from the Yokogawa family of companies. One is with Takashi Sugiyama, now the Chairman of the Board of Yokogawa Research Institute Corporation. He was the first president of Yokogawa Medical Systems, a joint venture between Yokogawa Electric and General Electric to manufacture medical diagnostic systems such as computer-aided tomography, nuclear medical imaging, and ultrasound systems. He discusses how the company was formed as a marketing arm for General Electric, but through strong production engineering and an emphasis on service became a leading worldwide producer in this market area. Other topics include organization of R&D, the research planning process, Just-In-Time and Total Quality Control manufacturing systems, academic-industry alliances, and continuing education.



Takashi Sugiyama

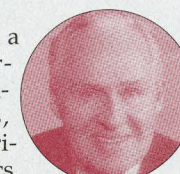
The other interview is with Takashi Yamanaka, the president of Yokogawa Electric Corporation, the parent company, which is a leading international supplier of measurement and control instrumentation and information management systems. Mr. Yamanaka discusses how to achieve successful joint ventures, such as Yokogawa Electric has attained with Hewlett Packard and General Electric. He also considers strategies for managing overseas subsidiaries, the growing market in China, Japanese-American business relations, American strength in innovation versus Japanese strength in production engineering, and the "boomerang effect" that occurs when developing nations begin to export technology they had previously imported.



Takashi Yamanaka

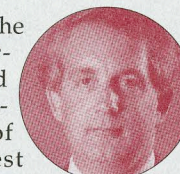
The third section includes four interviews with American executives. The first is with Robert Galvin, the Chairman of the Executive Committee at Motorola, one of the leading worldwide manufacturers of

semiconductors and a major supplier of information systems, communications technologies, and automotive, industrial, and defense electronics. Galvin discusses such topics as the importance of integrated management and engineering, the role of quality as a principal organizing force within a technological business, the importance of the Malcolm Baldrige Award, and international competition, especially with the Japanese.



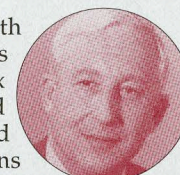
Robert Galvin

Mitchell Kapor, one of the founders of Lotus Corporation, is the second American executive interviewed. Lotus is one of the largest and fastest growing software companies in the world, known for its integrated products for microcomputers. Kapor's main topic of discussion is the problems of managing hypergrowth when a small start-up firm is wildly successful. In this context he discusses the particular difficulties with scaling up marketing and development, the kinds of technical, people, and communication skills desirable in the chief executive officer, and the problems of corporate culture clash that can occur when people with different backgrounds are thrust together so rapidly. Other topics include the differences of operating in an emerging versus a mature industry, how to design a successful product, the importance of timing in market entry and product delivery, the differences in managing small-scale and large-scale organizations, and the classic mistakes made by entrepreneurs when they start their second company.



Mitchell Kapor

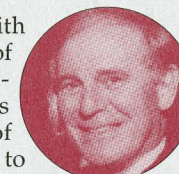
The next interview is with Arthur Stern, who was President of Magnavox Advanced Products and Systems Division and who held senior positions prior to that in General Electric, Martin-Marietta, and Bunker-Ramo Corporation. Magnavox, now owned by North American Philips Corporation, is a major consumer electronics manufacturer, the world's leading supplier of handheld radios, and a major producer of military and commercial products in communications, anti-submarine warfare, infrared systems, satellite navigation, and tactical information systems. Stern discusses the relationship of the parent company to its subsidiaries, the need for and problems in technological forecasting, assessing customer needs to improve product acceptance, customer lock-in and bid-



Arthur Stern

ding practices in the defense electronics industry, and the difficulties of converting defense operations to commercial activities.

The final interview is with Erwin Tomash, founder of DataProducts Corporation, one of the world's leading manufacturers of computer printers. Prior to founding DataProducts, he held senior management positions at Telemeter Magnetics and Ampex. The interview considers issues confronted by small engineering firms in new technology areas, such as transforming a project team into a business with marketing and financial capabilities; establishing methods to achieve performance, uniformity, and reliability in new products; moving from innovative design to volume manufacturing; the problems in obtaining effective middle managers to run projects; and the need for senior managers to have good technical training until the technical area matures. Other topics include establishing budgets and product pricing, relations between suppliers and systems purveyors, tension between capital investment and short-term return in publicly held companies, differences between manufacturing engineering and development engineering approaches to product development, shortcomings of the venture capital system in America, and the role of the government in American high-technology.



Erwin Tomash

Many people have assisted with this project. Andrew Goldstein conducted the interview with Mitchell Kapor. James Gover, an IEEE Congressional Fellow, helped to formulate the basic question sets. Research assistant Jill Cooper prepared the company histories that precede each interview and edited most of the transcripts. Oskar Blumtritt of the Deutsches Museum spent many hours identifying executives and arranging my interviews in Germany; and Yuzo Takahashi of Tokyo University of Agriculture & Technology played a similar role in Japan. Eiju Matsumoto of Yokogawa Electric, Kiyoshi Yamauchi and Michiyuki Uenohara of NEC, Noriko Kase of ASCII, and Hirotohi Okamura of Alps Electric all provided valuable assistance within their companies. Thanks also to Liz Roach and Colleen O'Neill for their outstanding job with transcription and to Michael Ann Ellis for her work on editing and administration.

The Center is most grateful to these thirteen executives for making time in their busy schedules to be interviewed. Finally, we wish to thank the IEEE Foundation and the AT&T Foundation, which generously provided the funding for this project.

## DONORS

The Center continues to work hard to preserve the history of electrical engineering and spread the word widely to electrical engineers, students, and the general public. Only about half of our funding comes from the IEEE General Fund. The rest comes from Rutgers, project grants, and contributions from companies, foundations, and individuals like you. We need and appreciate your help to continue our work developing archives, exhibits, oral histories, popular articles, conferences, milestones, teaching, and research.

We have two programs by which companies, foundations, and individuals can help

to 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 Friends Committee, a group of distinguished electrical engineers appointed by the IEEE Foundation. Partnership donations not earmarked for a specific project are treated like endowment funds, as a means to provide continuing support to the Center. Partnership contributions may be fulfilled over several years. Some Friends contributions are used for current projects, while others are treated like

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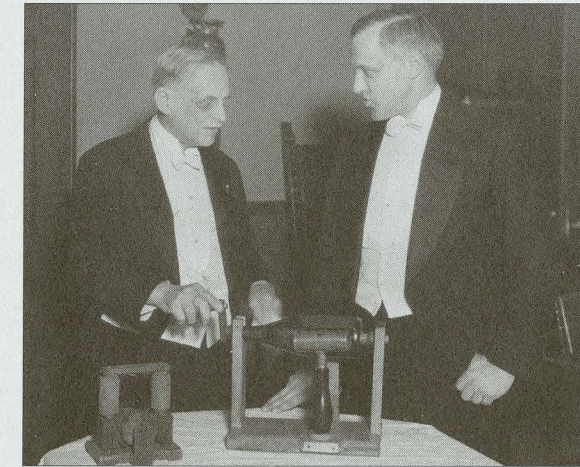
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Thomas H Elieff  
F J Ellert  
S J Elliott  
Jerry W Ellis Pe  
John N Ellis  
W C Ellis  
Dale L Embry  
R H Engelmann  
Lori A Englund  
Charles L Enomoto  
Hajime Enomoto  
Osamu Enomoto  
Christina M Enright  
Barry M Epstein  
S Epstein  
Hubertus W Erbe  
Mustafa Erdem  
Donald H Erickson  
P M Erlandson  
Murat N Erran  
Ashok C Eramilli  
Ali Ersen

Willis M Ertman  
C J Essel  
Gerald Estrin  
G A Etzweiler  
Albert R Evans  
Carlisle E Evans Jr  
David J Evans  
Richard J Evans  
Robert R Everett  
J S Exall  
Timothy Fagan  
P F Fago  
W A Fails  
John C Fan  
Herman Farber  
Ghaffar Farman-  
Farmaian  
Frank X Farmar  
Guy C Fedorkow  
K A Fegley  
Steven K Feiner  
John L Feldman  
Samuel Feldman  
James W Feltes  
Wu-Shiung Feng  
Weston A Fenner  
Stanislaus E Fenyi  
Justiniano E Fernandez  
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Read T Fleming  
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Yukio Fukayama  
Hiroyuki Fukuchi  
Masashi Fukuda  
Seth A Fuller  
F E Gabler  
Howard D Gage  
Juan Gaidimauskas

**Other Contributors:**

Djunardi Abdulgani  
Mohammad A  
Abourayan  
Takehiko Adachi  
G P Adams  
Jerry L Adams  
Gina M Addeo  
Andreas N Adraktas  
Daniel M Agun  
B T Ahlport  
J B Aidala  
Valerio Aisa  
Yoshihiko Akaiwa  
Shigeru Akamatsu  
Mehmet Akbaba  
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Eyup Akpinar  
Gerald Aksherian  
Amer S Al-Yahmadi  
J A Caceres Alderete  
Sven F Alfaz  
Lazaro E Alfonso  
Paul N Alito  
Donald P Allan  
A I Almand Jr  
Hissa A Alotaiba  
A E Althebaity  
Edward Altshuler  
Markus C Amann  
Adolph Amend Jr  
Alejandro E Ancajima

A G Anderson  
C E Anderson  
David V Anderson  
Dennis L Anderson  
Douglas R Anderson  
Gary A Anderson  
Harley J Anderson  
John M Anderson  
K O Anderson  
R L Anderson  
S H Anderson  
Manuel Ando  
J C Andreas  
F T Andrews Jr  
James T Andrews  
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A Angeloglu  
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Tuptim Angkaew  
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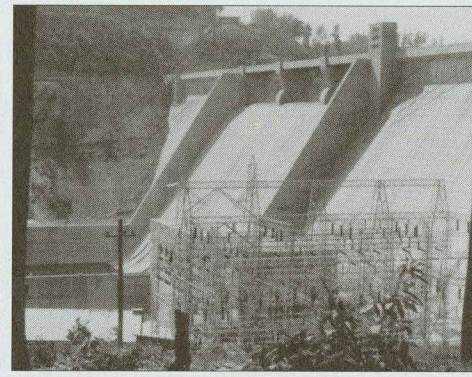
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Raymond Gaillard  
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Ken Ishihara  
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Koji Ishikawa  
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Kenneth S Julien  
Mohamed Juman  
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Peter Kabal  
M J Kabrisky  
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G C Kalandar  
Ton A Kalker  
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Edward Kaminski  
Michael G Kaminski  
Mokhtar Kamli  
Keigo Kamozaaki  
Luiz S Kanda  
C F Kane  
Seiichi Kanema  
Pen-Chang Kang

Douglas R Kanitz  
Takanori Kanno  
R I Kaplan  
Sidney M Kaplan  
D J Karbo  
Kermit B Karns  
N J Kasdin  
P W Kaseman  
Hideaki Kashiwara  
Kazuo Kato  
Toshio Kato  
Takayoshi Katori  
Makoto Katsurai  
L D Kovach  
Fred L Katzmann  
Maxime G Kaufman  
Roland F Kaufmann  
Hirokazu Kawabata  
Takao Kawabata  
Hideki Kawahara  
T Kawahashi  
Tatsuo Kawamura  
Shoichiro Kawashima  
Osamu Kawata  
Guy P Kayes  
S Kazama  
James J Keenan  
Eugene O Keizer  
W E Kelley  
Kenneth R Kelly  
William J Kelly Jr  
Klaus W Kelting Dr  
P G Kendall  
James C Kennedy  
John J Kennedy  
K K Kennedy  
Gordon Kent  
Ernest G Kenward  
Neal Kenyon  
Yan K Keong  
Jeffrey S Kern  
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Esa J Kerttula  
Paul D Kervin  
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B Kidorf  
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Kwan M Kim  
Rinjiro Kimura  
Simon G King  
Eugene L Kingsbury  
Shigenori Kinjyo  
Yohsuke Kinouchi Dr  
Richard C Kirby  
Anil Lal  
Vincent R Lalli  
Andy C Lam  
Jefferson P Lamb  
Craig B Lankford  
Berthold Lankl  
John Kline  
E A Klingshirn  
Franz Kloucek  
Karl C Kluge  
Ronald O Knecht  
Charles P Kneeter  
Shawn D Knight  
Bernd Knorr  
Paul G Knutson  
Harvey W Ko  
Kaname Kobayashi  
Misao Kobayashi  
Magnus Koch  
Joseph M Kocheril

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Bruce Kopp  
Steven S Kornak  
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J Kostalos Jr  
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Yinchieh Lai  
Anil Lal  
Vincent R Lalli  
Andy C Lam  
Jefferson P Lamb  
Craig B Lankford  
Berthold Lankl  
John Kline  
E A Klingshirn  
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Bernd Knorr  
Paul G Knutson  
Harvey W Ko  
Kaname Kobayashi  
Misao Kobayashi  
Magnus Koch  
Joseph M Kocheril

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John F Longley  
Abelardo Lopez-Lagunas  
H W Lord  
J M Loudon  
Kon Lovett  
Karl G Lovstrand  
Lester H Lowe Jr  
M J Lowenstein  
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R V Lowman  
J P Lozes Jr  
Stephen J Lucci  
Larrondo H Luciano  
Allan Ludbrook  
A Luedtke  
Andrew Luk  
George E Lund

Giuseppe Luoni  
Gerald Lyman  
R C Lyman  
Kenneth D Lyon  
Yi-Tung Lyou  
Hing C Ma  
Lung-Chang Ma  
John Maccormack  
Slava C Mach  
David Mackie  
Hideaki Maeda  
Junji Maeda  
P C Magnusson  
Peter P Magyar Dr  
James A Mahoney  
G Wilmer Mailh  
Rahul Majumdar  
Nicolas Makarenco  
Yasuo Makino  
Richard W Malchow  
Roger J Malik  
Sharad Malik  
Varghese M Maliyil  
John Mallett  
Neil J Malloy  
Eli Mamula  
Thomas E Mancino  
V J Mancino  
Jayashree Mani  
J A Mann  
William M Mannel  
F W Manning  
R Mansfield  
A F Manz  
Roger A Mao  
Richard S Marcus  
Joseph A Margevicius  
Marcus C Maranh  
Huber Markus  
Amelia A Marlowe  
Robert A Marshall  
Curtis S Martin  
Earl O Martin  
James Martin  
James O Martin  
Tom J Martin  
Sam P Martinovich  
Hidajat Maruta  
Masanori Maruyama  
Donald H Marx  
Ken P Masaki  
Bill M Masamoto  
Nabeel H Maskati  
W D Mason  
Joel W Masters  
R W Masters  
Shigeru Matsubara  
Kazuyuki Matsui  
Keiju Matsui  
Toshihiro Matsui  
Jun Matsukata  
George L Matthaei  
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Steven E Mavis  
S Mayburg  
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Tron McConnell  
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Thomas Melchiorre  
Robert J Melford  
Janos Melis  
Carl W Melone  
Donald W Melvin  
Manuel H Mere  
Rollie B Merrick  
M F Messa  
Stephen Messenger  
S Metzger  
G E Meyer  
Lee D Meyer  
Michael E Meyer  
Javed I Mhar  
Drew L Michel  
W V Middough  
H S Mika  
Tetsuya Miki  
J E Mikkali  
Daniel D Milano  
R L Miles  
Joseph R Miletta  
Michael D Mille  
C M Miller  
H L Miller  
N D Miller  
R J Miller  
J W Millington  
Harold J Mills  
Joseph A Minahan  
Mak Chai Ming  
Robert D Misner  
Mahendra R Mistry  
David B Mitchell  
Hayao Miyagi  
Makoto Miyake  
Masayasu Miyake  
Shohachi Miyamae  
Hirosaki Miyashita  
Masachika Miyata  
Ryuichi Mizumo  
Paul J Mobus  
Kennon J Moen  
Jerry D Moech  
Siu-Chuen Mok  
Nina H Moldt  
C J Mole  
Timothy J Moloney  
Mark W Monaghan  
Guy E Mongold Jr  
George L Monkovic  
Jose M Monroig  
Masahide Monura  
H R Moore  
Maurizio Morabito  
Michael J Moran  
Hiroyuki Mori  
Dornis C Morin  
Allen G Morinec  
Chester R Morris  
G W Morris  
W C Morris  
David Morton  
John A Mosier

Lyle C Motley  
Tetsuro Motoyama  
Nasser Mroueh  
Arthur J Mueller  
John W Mueller  
Marino H Mueller  
William M Mueller  
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Casey T Mulcihy  
Kazuhiro Murakami  
Ichiro Murase  
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B J Nankervis  
Anthony P Napikoski  
Sundar Narasimhan  
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Kotaro Narita  
Safwan Natanagara  
Juan L Navarro  
David Navas  
Mehrdad Negahban-Hagh  
Tom Neidecker  
Gerhard J Neidhoefer  
John M Neilson  
Gregory L Nelson  
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Mark L Neudorfer  
Lionel M Newall  
F Mitchell Newcomer  
A E Newlon  
A W Newman  
James M Newman  
G N Newsam  
M Ney  
Alberto Chin Ng  
Cho Y Ng  
Kwok H Ng  
Paulino Ng  
Dan V Nguyen  
Quang M Nguyen  
C Nichols  
Lee L Nichols Jr  
Richard S Nichols  
John P Nicolosi  
Guy E Mongold Jr  
George L Monkovic  
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Masahide Monura  
H R Moore  
Maurizio Morabito  
Michael J Moran  
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Dornis C Morin  
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Chester R Morris  
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J Noordanus  
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Isami Norigoe  
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Eiichi Ohno  
Katsuhiko Ohsaki  
Motoichi Ohtsu  
Kazuo Okada  
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Hideyuki Okamoto  
Seichi Okamura  
Herman C Okean  
Remy F Okekearu  
Tsuneo Okubo  
J L Oldenkamp  
Nile M Oldham  
Robert R Olds  
Melvin I Olken  
A G Olsen  
Takashi Nakashima  
B J Nankervis  
Anthony P Napikoski  
Sundar Narasimhan  
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Kotaro Narita  
Safwan Natanagara  
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Hiroyoshi Ohara  
Hideo Ohba  
Sumio Ohkawa  
Eiichi Ohno  
Katsuhiko Ohsaki  
Motoichi Ohtsu  
Kazuo Okada  
Hidetaka Okamoto  
Hideyuki Okamoto  
Seichi Okamura  
Herman C Okean  
Remy F Okekearu  
Tsuneo Okubo  
J L Oldenkamp  
Nile M Oldham  
Robert R Olds  
Melvin I Olken  
A G Olsen  
Takashi Nakashima  
B J Nankervis  
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F J Nardi  
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Richard S Nichols  
John P Nicolosi  
Guy E Mongold Jr  
George L Monkovic  
Jose M Monroig  
Masahide Monura  
H R Moore  
Maurizio Morabito  
Michael J Moran  
Hiroyuki Mori  
Dornis C Morin  
Allen G Morinec  
Chester R Morris  
G W Morris  
W C Morris  
David Morton  
John A Mosier

Other Contributors

*cont.*  
 Alecos Pelopidas  
 Fang-Zheng Peng  
 William F Peoples  
 C D Pepe  
 Alfredo J Arrueta Peredo  
 Helder G Pereira  
 David C Perez  
 Jesus Perez  
 Peter E Perkins  
 L Perper  
 David Perreault  
 E D Perry  
 Robert G Pessler  
 C Peter  
 Edward C Peter  
 Sandra Peters  
 Ronald G Peterson  
 Athina Petropulu  
 Robert J Pettersen  
 George W Petznick  
 R F Pfost  
 H W Phair  
 Anil V Phatak  
 W C Phillips Jr  
 W F Phillips  
 T F Piatkowski  
 W F Pickard  
 Charles H Pickman  
 George Pida  
 Timothy Piekarski  
 David J Pierce  
 C W La Pierre  
 V J Pietkiewicz  
 Donald H Pile  
 Manu R Pillai  
 A L Pincombe  
 Paul J Pinkstaff  
 Orfeo Pinton  
 F J De Piola  
 A Plait  
 Gene G Plichota  
 Knoland J Plucknett  
 Hugo K Podhrzaky  
 Joseph E Poekert  
 Hans D Polaschegg  
 Franklin C Poley  
 Edwin C Polke Jr  
 Carlos Ponce  
 Frank B Pope Jr  
 Thomas Porskievies  
 David D Porter  
 David A Potterton  
 N R Poulsen  
 Alan J Powell  
 C S Powell  
 Kenneth R Powell  
 John P Powers  
 John H Powers  
 Robert Powers  
 Robert E Pownall  
 H W Prai  
 Lawrence A Prather  
 J C Presley  
 James E Pressey  
 Leo L Preti  
 M D Prince  
 Marco Principato  
 Wilbur L Pritchard  
 S J Procopion  
 Duard L Pruitt  
 Goran Prvulovic  
 Howard T Pyle  
 Hoang K Quan  
 Thomas J Quinlan  
 W P Quintin Jr  
 Harry K Lesser R

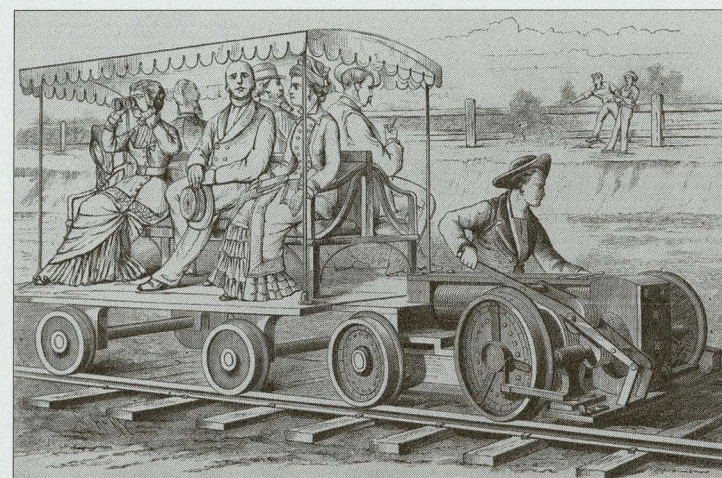
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 Lisa M Stanley  
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 Clifford M Stein  
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 Ken Stevens  
 William Y Stevens  
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 Ghana A Stewart  
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 Carl M Stillebroer  
 Larry L Stine  
 John T Stinnett  
 Steven N Stitzer  
 Allen H Stix  
 A J Stole  
 John R Stoltz  
 C H Storey Jr  
 Fred J Stover Jr  
 Scott D Strand  
 F Strauss  
 Stephen J Strobel  
 C A Strom Jr  
 L D Strom  
 David A Stuart  
 Carl F Stubenrauch  
 Gordon H Stuck  
 James C Sturm  
 Juing Huei Su  
 Roger W Sudbury  
 K S Summerhays  
 Jiaping Sun  
 Jon M Surprise  
 Hironori Susaki  
 C Susskind  
 L E Sutton 3rd  
 Hiroshi Suzuki  
 Hiroshi Suzuki  
 Robert B Swanson  
 Mark S Swieciński  
 J T Synnott  
 Dragan D Tabakovic  
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 Victor Taft  
 Gary S Tahlmore  
 Katsubumi Tajima  
 F Takacs



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 Robert W Saunders  
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 Luiz M Seabra  
 D A Seamans  
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 Shunji Seki  
 George B Seliga  
 Faith Worzaia Sell  
 Warren A Sensenig  
 Rodolfo Serna-Guevara  
 Walter Serniuk  
 Chuk-Lam F Seto  
 Abdullah M Shaalan Dr  
 L Dennis Shapiro  
 J M Sharp  
 Edward A Sharpe  
 Frank A Sheehan Jr

Jeff Shumate  
 Vincent J Shuta  
 Hsuen C Shyu  
 W M Siebert  
 Paul W Siggins  
 Bencar L Siliceo  
 David Sillman  
 E Silva  
 Guillermo J Silva  
 J Michael Silva  
 Manuel Silva  
 E A Simkins Jr  
 James M Simmers  
 J R Singer  
 Amarjit Singh  
 Manmohan Singh  
 Richard R Sitko  
 Jerry C Sitzman  
 James J Skiles  
 Frederick J Skinner  
 B Sklar  
 M Skoller  
 C D Sloan  
 Martha Sloan  
 Cynthia J Smith  
 G B Smith  
 Gregory M Smith  
 Jack X Smith  
 Kelvin C Smith  
 Leonard R Smith  
 M G Smith  
 Peter W Smith  
 Robert J Smith  
 Scott C Smith  
 Will R Smith  
 Benjamin B Snavely  
 Charles M Snow

Masaaki Takahashi  
 Yasuhide Takeda  
 Yasutsugu Takeda  
 Shinichi Takeuchi  
 Makoto Takizawa  
 H J Talbot  
 Jaime Tamarit R  
 Kevin S S Tan  
 Shigeru Tanimoto  
 Zuxun Tao  
 Oscar Tapia  
 John J Tary  
 M B Tatonetti  
 B C Taylor  
 Bruce C Taylor  
 Earle A S Taylor  
 L A Taylor  
 Richard R Taylor  
 Ir R Tedjapranata  
 Howard A Teitelbaum  
 A Teitler  
 B H Temple  
 R K Templeton  
 David L Tennenhouse  
 Paolo Tenti  
 Ronald G Tenty  
 Rudolf K Tenzer  
 Harvey Teplitz  
 E J Terhaar  
 Yoshimi Teshigawara  
 James Thayer  
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 Mathis Thoma  
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 H H Thomas  
 Huey L Thomas  
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 John R Thompson  
 Noel P Thompson  
 Richard P Thurston  
 Steven J Tilidetzke  
 William F Tinney  
 C H Titus  
 Tsuneo Tokumitsu  
 Antonio Tollis Jr  
 Alexander S Tom

Osamu Tomisawa  
 Charles C Tonies  
 Fridoon Toomazi  
 Mark Torre  
 Santos B Torres  
 Douglas S Townsend  
 Corey R Trapp  
 Peter J Tremblay  
 Robert Tremblay  
 R A Trenkle  
 David I Troxel  
 C Troxell  
 Bangjuh Tseng  
 T J Tsevdos  
 C T Tsitsera  
 Yannis P Tsvivdis  
 A Tsoularis  
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Oral History

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been mainly in the area of microwave techniques, worked for ten years in industry before becoming director of the Institute of High Frequency and Microwave Technique at Ruhr University in 1965. At the Technical University in Aachen, Nebeker interviewed Herbert Döring, whose prolific career in radio and microwave engineering began in the early 1930s. Nebeker next interviewed Karl Ganzhorn at his home outside Stuttgart. Ganzhorn, now retired, had a distinguished career with IBM, both as researcher and administrator, at a variety of positions, including Director for Science and Technology of IBM Europe and Vice President of IBM Systems Communications Division. In Freiburg Nebeker visited the Fraunhofer Institute for Solar Energy Systems, where he interviewed its recently retired director Adolf Goetzberger. From 1958 to 1963 Goetzberger worked closely with William Shockley at the latter's company in Palo

Alto; in 1968 he became director of the Fraunhofer Institute for Applied Solid-State Physics, a position he held until moving in 1981 to the directorship of the Institute for Solar Energy Systems.

In London Nebeker interviewed Eric Ash, another recent retiree. Ash had a distinguished research career both in industry and academia, working in the areas of microwave acoustics, integrated optics, and ultrasonic and thermal imaging, before becoming rector (president) of Imperial College. In Denmark Nebeker conducted two interviews. The first was with Aage Pedersen, whose work on many topics related to electrical insulation was honored in a festschrift published in 1991 by the IEEE Dielectrics and Electrical Insulation Society. The second was with Jørgen Palshøj, Director of Corporate Identity of Bang & Olufsen, a worldwide leader in consumer electronics. Just across the sound from Copenhagen, Nebeker visited the Department of Automatic Control at Lund

Institute of Technology, where he interviewed Karl Åström, well known for his work in stochastic control theory and winner of the IEEE Medal of Honor in 1993.

The trip also furthered the Center's efforts to strengthen ties to the Institution of Electrical Engineers, with headquarters in London, and the Verband Deutscher Elektrotechniker (VDE), with headquarters in Frankfurt am Main. While in London, Nebeker met with several IEE staff members and volunteers, including Lenore Symons, IEE archivist, and Keith Thrower, chairman of both the IEE History Committee and the IEE Archives Committee. Plans were made for continued collaboration on exhibits, conferences, and archives. The selection of subjects for oral-history interviewing in Germany was done after consultation with the VDE History Committee and with historians at the Deutsches Museum. Preliminary steps were taken toward greater collaboration between VDE and IEEE on oral history efforts.

## European Oral Histories

As part of the Power and Control Project, Frederik Nebeker conducted thirteen oral-history interviews of outstanding European electrical engineers. One interview was conducted in New Jersey, the others during a ten-day trip to northern Europe. The work was supported by a grant from the Andrew W. Mellon Foundation, which has permitted the Center to take a more international approach with the Power and Control Project.

The first of nine interviews of German engineers was with Manfred Schroeder, a leading researcher in electroacoustics and architectural acoustics. The second interview was with Konrad Zuse, who designed and built an electronic digital computer during World War II; the interview focussed on the immediate postwar years, when Zuse established his own computer company. The third interview was with Dieter Kind, President of the Physikalisch-Technische Bundesanstalt (Germany's bureau of standards). Kind, whose research interests include dielectric strength of insulating systems and high-voltage power transmission, is the first engineer ever to head that illustrious institution. One of the world's leading researchers in digital image processing, H.G. Musmann at the University of Hannover, was the subject of the fourth interview. Nebeker interviewed two outstanding engineers at Ruhr University. Berthold Bosch, contributor to many areas of microelectronics, is perhaps best known for his development of Gunn-effect electronics. Hans Severin, whose research has

*Continued on page 11*

## 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 Director, Dr. William Aspray.

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

## New Associate

We welcome Joseph F. Keithley as the newest member of our Partnership Program. Mr. Keithley is the founder of Keithley Instruments Company of Cleveland.

Center for the History of Electrical Engineering  
Institute of Electrical and Electronics Engineers  
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