

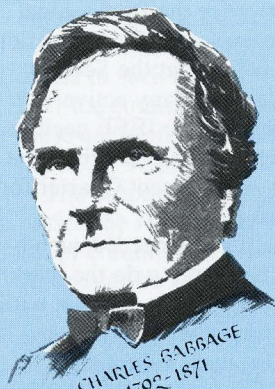
F. X. TIMMONS



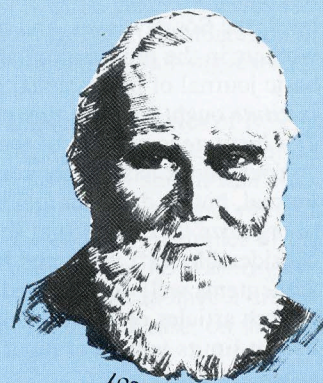
MICHAEL FARADAY
1791-1867



CHARLES P. STEINMETZ
1865-1923



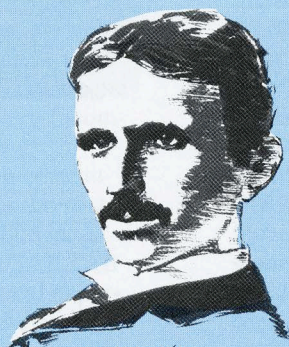
CHARLES G. BAGGAGE
1792-1871



LORD KELVIN
1824-1907

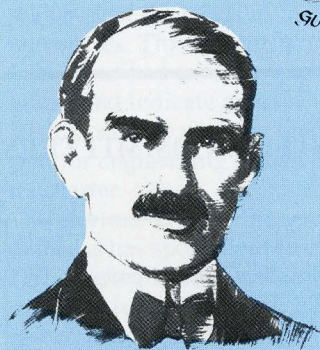


GUGLIELMO MARCONI
1874-1937



NIKOLA TESLA
1857-1943

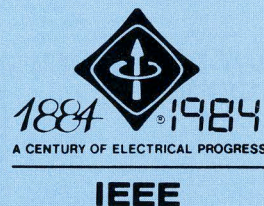
100 YEARS



LEE DE FOREST
1873-1961

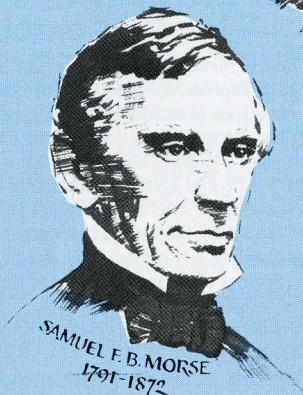


ALEXANDER G. BELL
1847-1922



IEEE Proclamation Page 5

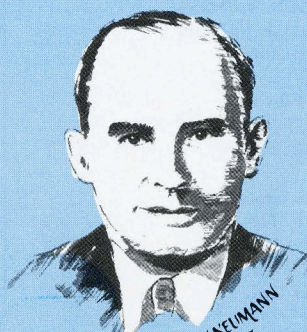
White House Proclamation Page 15



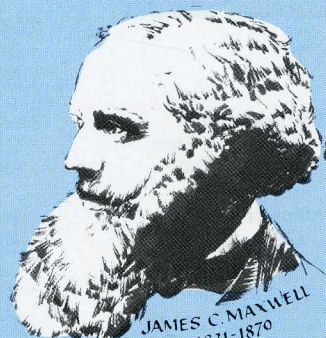
SAMUEL F. B. MORSE
1791-1872



THOMAS A. EDISON
1847-1931



JOHN VON NEUMANN
1903-1957



JAMES C. MAXWELL
1831-1879

USAB Magazine or PACE Newsletter?

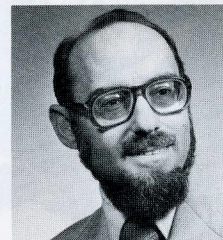
IMPACT was created as a newsletter for the Professional Activities Committee Chairmen. We expanded its circulation to include virtually all of the IEEE officers at the Section level, the Society level, and higher levels. Many active workers in the professional arena feel that the IEEE needs a basic journal of professional activities. Some think that *The Institute* ought to serve this purpose. The present Charter for *The Institute* is not that of the desired journal.

Your Editor has felt for some time that we needed such a journal, but he does not feel that he has time to do the work to organize it. The Journal should be volunteer-run, but with considerable staff input and help to have the Washington scene items well documented. We also need volunteer-written articles on professionalism. The present *IMPACT* budget limits volunteer input to, at most, two pages per article.

Last month, we produced a special issue on the problems of primary and secondary math and science education and their impact on society. This is a professional issue of concern to all of us in IEEE. We had articles by our own volunteers and by various well-known figures, most edited from remarks made at special meetings and published elsewhere.

That issue, plus the news items we always publish in *IMPACT*, taken together, constitute the substance of a regular magazine. If you like it, let us hear from you. If you don't, we need to know that, too. If there is real interest, we might budget for a better professional publication next year.

—B.J. Leon



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How important is research in engineering?

To many of our members, this question has an obvious and highly positive response. To others, it may be of only marginal interest, and something for the academics among us to debate. In Washington lately this question and other related issues have become the subject of some controversy between the science and engineering communities as a result of positions taken with respect to proposed legislation to change the charter of the National Science Foundation (NSF). The change in question would expand the charter of NSF to include, explicitly, support for engineering as well as scientific research. It is a matter that involves us in the IEEE, no matter where our primary interests lie—whether in industry, government, or academia.

It may seem incredible that an issue such as support of engineering research should be controversial at this stage in our history, especially with broad public recognition of the importance of advanced technology to our economic health and national security. The fact is that the understanding of what constitutes engineering research, its importance to the field, and the nature of the Federal role, is still very incomplete.

This poses a challenge to us in the engineering community, one that the USAB has been addressing over the past several years, particularly in Congress on R&D budget issues. Much of this testimony comes from joint USAB-TAB technology-oriented committees, in which technical expertise is melded with policy considerations to yield views which meet the needs of the Congress or Executive Branch authorities. Through the work of these committees, the USAB has had an opportunity to support Federal R&D programs and indicate areas where there are special priorities. In this context, we have testified in favor of additional support for engineering research in the NSF and the change in its charter.

Unfortunately, the President of the National Academy of Sciences has spoken out in opposition to the change in the NSF charter, claiming that it threatens "to dilute the fundamental mission for which NSF was created—to support basic research in all the sciences" (emphasis added). In particular, it was his concern that as support for engineering would grow, it would be competitive with science programs, and that they might suffer. Through this rather narrow view of engineering and the efforts that the engineering community has been undertaking to increase engineering support, the NAS has risked a science vs. engineering confrontation, which could work to the detriment of both.

Fortunately, Dr. Lewis Branscomb, Chairman of the National Science Board, which is the governing body of the NSF, has responded to the NAS challenge with a vision and blueprint for an approach that is intended to bring both communities together in a cooperative and positive way that recognizes our differences but also emphasizes our common heritage. His response, which was printed as an editorial in the April 27 issue of *Science* magazine, calls on the engineering community to assist the NSF in refining "the re-

search and education strategy that best fulfills the NSF mission in engineering" and to "support the study of engineering research priorities now under way at the National Academy of Engineering." We in USAB intend to respond to such a request, and we will be generating inputs over the coming months. I encourage your consideration of these questions and your communicating your suggestions to the IEEE Washington Office.

The proposed legislation to change the charter of NSF has passed the House, and similar legislation has been reported out of committee in the Senate. So it does appear that our voice and the voices of others in the engineering community have been heard! This is only one of many examples of the way in which USAB has been working on the Washington scene. It illustrates how our involvement can have a direct impact upon many of our members; in this case, on those in academia.

In a much broader sense, however, the strength of the research that is carried out in our engineering discipline feeds the entire profession and makes possible the advances that keep our jobs exciting and challenging. In fact, through its contribution to the economic health of the industries in which we work, this research enables us to work in our profession and thus is vital to our professional interests. This, it seems, is the bottom line response to the question I raised at the start of this piece. It is with this in mind that we will continue to pursue a strong program of Federal support for engineering research in your interest. ♦

—Russ Drew



IEEE and USAB, according to President Gowen, have two major priorities before them this year: pre-college math and science education, and the restructuring of AAES. I wrote a few lines of each of these issues in the April issue of *IMPACT*. The special May issue of *IMPACT* on pre-college math and science education should have reached you by now and illustrates well the leadership role IEEE and USAB are playing in this crucial area of national interest.

In view of the IEEE Section Congress held in the middle of May, and the USAB Centennial PACE Conference to be held during Labor Day weekend in Phoenix, Arizona, it is appropriate for me to talk about other issues as well, which are listed below. We need your responses to these questions as early as possible, so that they may be compiled for discussion at the Phoenix Conference:

- A. What issues do you think USAB has and has not handled well?
- B. What would you like to see USAB do in the next decade?
- C. What changes, if any, would you like to see in the USAB organization, operation, and/or method of handling issues or its responsiveness to members?

Answers to these questions should be discussed with your Section Executive Committee for its input, and with as many members as possible. Raise these questions at one of your Section meetings and your Society Ad Com meetings.

Those of you planning to attend the 1984 PACE Conference should book special low fares to Phoenix now, using airlines such as People's Express, Continental and Southwest. All Section PACE Chairmen are also reminded to consult with their Regional PACE Coordinators about PACE funding for travel, in case your company is not going to pay the bill. IEEE depends largely on the good will of industry to help our volunteers defray travel expenses to meetings. As usual, PACE travel funds are limited, and therefore, we must make the best use of available resources.

USAB has another major goal for 1984, and that is to establish a viable two-way communication link between our members and USAB. I am very pleased with the response so far and hope to triple this in the coming months with your support. In addition to this, we would like to see most of the states establish State Legislative Advocacy/Advisory Committees in order to establish an effective interaction with our political leaders at the local and state level. A formal charter for such committees is essentially ready and will be made available to you shortly for adoption.

PACE is still being confused with Political Action Committees. PACE has never functioned as a PAC, since we do not give any financial support to any legislators. We do attempt to influence their thinking in regard to technology-related bills affecting our members and the industries which employ them.

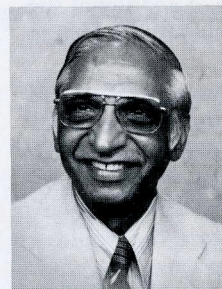
I, along with my colleagues on USAB, am available to address your Section or Society meetings and would be delighted to assist you in getting a speaker on a topic of interest to you. Please do not hesitate to contact me personally or the USAB staff in Washington, D.C.

Another matter of direct interest is that there are pockets of unemployment or underemployment in the country, as well as areas where there are jobs available with local companies. We would like to hear from you about any particulars you know of, so that we can connect the two. USAB offers employment assistance to members through the PEER program. Interested members may telephone the Washington Office at (202) 785-0017 to give their names and addresses. PEER mails the necessary forms for registration and connects these applicants with employers nationwide. I would appreciate hearing from those applicants who have gotten jobs through PEER, in order to report on its effectiveness. Your help is sincerely appreciated.

Finally, we are preparing a set of questions for the IEEE Presidential candidates, and we would appreciate your sending any questions you would like them to answer, and which, in your opinion, would be of interest to our members in general. I would be delighted to include these in my composite set of questions concerning USAB and professional activities.

Wishing you all a good summer and looking forward to seeing most of you in Phoenix. ♦

—Harb S. Hayre
National PACE Chairman
P.O. Box 19756
Houston, TX 77224
(713) 747-6753



On May 13, 1884, a group of the outstanding electrical inventors, engineers, and industry leaders of the then emerging profession of electrical engineering met in New York to form the American Institute of Electrical Engineers (AIEE). The circular calling for the formation of this society noted:

The rapidly growing art of producing and utilizing electricity has no assistance from any American national society. There is no legitimate excuse for this implied absence of scientific interest, except that it be the short-sighted plea that everyone is too busy to give time to scientific, practical and social intercourse, which, in other professions, have been found so conducive to advancement.

The circular further noted that:

An international electrical exhibition is to be held in Philadelphia next autumn, to which many of the famous foreign electrical savants, engineers, and manufacturers will be visitors; and it would be a lasting disgrace to American electricians, if no American national electrical society was in existence to receive them with the honors due from their co-laborers of the United States.

The first President of this, the predecessor organization to the Institute of Electrical and Electronics Engineers (IEEE), was Norvin Green, President of Western Union Telegraph Company, perhaps the company most representative of the leading technology of that day. The six founding Vice Presidents included Alexander Graham Bell, the inventor of the telephone; Charles A. Cross, developer of the first electrical engineering college program; Thomas Alva Edison, electrical inventor; George A. Hamilton, Western Union Telegraph Company; Charles H. Haskins, Western Electric Company; and Frank L. Pope, Western Union Telegraph Company.

This group held the first electrical engineering technical meeting on October 7-8, 1884 at the Franklin Institute, at which ten papers were presented and followed by vigorous discussion. The commercial development of electric power, the telephone and the wireless all followed within a few short years. As the profession of electrical engineering continued to grow, the discoveries of science became increasingly available to the marketplace through the application of engineering. The result has been a dramatic improvement in the quality of life throughout the world.

In recognition of the developing technologies of electronics and radio, the Institute of Radio Engineers (IRE) was formed in 1912. On January 1, 1963, the AIEE and the IRE merged to become the Institute of Electrical and Electronics Engineers, Inc. (IEEE). The IEEE has continued the proud heritage of exchange of technical information and has grown to be the largest professional-technical organization in the world with nearly 250,000 members in 132 countries. As such, it focuses on the professional and technical interests of those engaged in all facets of electrical, electronics, and computer engineering and related arts and sciences.

In this Centennial Year, the IEEE pauses to honor the giants of electrical engineering who have given us a proud "Century of Electrical Progress." These engineers have electrified the world; brought to us the live picture of the "one giant step for mankind" on the face of the moon; linked our continents with instantaneous communications; and created the computer technology of this, the information age with its per-

sonal computers in our offices, schools, and homes, medical computers that can produce images of organs deep within us, and supercomputers with their promise of artificial intelligence to improve our quality of life further.

In this Centennial Year, it is also fitting that we reflect upon the issues and concerns of today as we prepare to enter our second century of service to mankind. The heritage of the IEEE is one of dedication to the development of both technologies and the professionals who create such technologies. Accordingly, we share with our fellow citizens and colleagues the following concerns, because of their importance to the continued achievement of a better life for all people.

INNOVATION

We encourage the Congress to act decisively, if the United States is to increase its leadership in technology and industrial competitiveness. We urge the highest priority be placed on enhancing the process of innovation.

In examining the achievements of IEEE's first century, we especially note the importance of engineering to the process of innovation. Breakthroughs in the products we use today were achieved through the efforts of engineers in translating the discoveries of science into the technologies of the marketplace.

This nation must encourage engineering innovation fundamental to the development of products whose quality and reliability exceeds that of our competitors. We must encourage innovation in the management of the development of technology that is both responsive to the needs of consumers and also maintains control of costs.

We encourage leaders to remain mindful that the need now is to focus on the process of translating the discoveries of R&D into the technologies needed for products. There remains a need to continue to nurture the "tree of science" to produce basic research, but today there is an even greater need to support the innovation in engineering necessary to create the "fruits of science"—the new technologies essential to regaining our competitiveness in the world marketplace.

We appreciate the support that has been provided to electrical and computer engineering within the National Science Foundation. There remains a need to move beyond this modest start and provide increased funding for engineering research to continue to improve our productivity so that we can manufacture products that are competitive in both quality and price.

We urge decisive action now to support incentives for innovation, including the improvement of patent laws and laws to recognize the rewards and risks of the development of needed new technologies.

EXCHANGE

The goal of the founders of the IEEE, to encourage the exchange of technical information, remains important today. This tradition of sharing of technical and educational information binds our members together. Technical exchange is vital for the continued growth of the knowledge base essential to the development of technology.

There is much to be gained by sharing with our engineering and scientific colleagues around the world. We urge all countries to support open scientific inquiry and the freedom of individual expression that are the fundamental principles of technical exchange. We remain mindful of the need to maintain technical exchange in balance with needs of com-

continued p. 6

petitive product development and the mutual defense of nations. But, we urge that this nation continue to support true technical exchange, whereby we both give and receive.

Many of our members see the universal language of engineering and science as an important means of achieving greater understanding among people throughout the world. They believe that through technical exchange we will be able to solve such global problems as the development of clean and reliable sources of energy. Many also believe that it is through advances in technology and exchange that the world will achieve the peace we all seek.

EXCELLENCE

There is a growing recognition of the need to re-emphasize excellence. The IEEE is known for the excellence of the achievements of its members. The men and women we honor during our Centennial Year for their achievements in electro-technology are so recognized because of their personal dedication to excellence. These are the "best of the best."

We urge all leaders to speak out in support of the proud heritage of dedication to excellence. We of the electrical engineering profession, a profession in which the abbreviation "EE" means not only electrical engineering, but engineering excellence, pledge ourselves to maintain the excellence that has earned us the trust of our fellow citizens and you, the leaders of this nation. Ours is a profession of trust: trust that we will engineer the best possible products and services.

In this time of explosive technological growth, a time in which Congressional and other leaders of government are involved in resolving highly complex technical problems, engineers and scientists alike are ready to assist in developing solutions that will result in a prosperous, secure, and bright future not only for this nation, but the entire world.

EDUCATION

There is growing concern about the quality of education within our schools, colleges, and our profession. We have repeatedly heard of the alarming state of such important elements of education as the teaching of pre-college mathematics and sciences. The problem has been studied and identified—now is the time for action.

We call for all engineers and scientists to join together in a voice of unity to alert this nation to the dangers inherent in neglecting the mathematical and scientific education we provide to all children, not just the college-bound. Nearly 200 years ago, Thomas Jefferson reminded us of the importance of an informed citizenry. We must be prepared to function in an increasingly technologically complex society. We must better prepare all students to understand the changes in technology that have the potential of changing society and our very way of life. Our students must be prepared to guide the ever-increasing changes brought about through the wonders of technology.

We urge the Congress to provide support to the states and local school districts so that they may move ahead with vigor to improve the education provided to our children.

We urge engineers and scientists to work with the leaders of industry, government and education, to develop new programs that will help children gain the confidence essential to applying the principles of mathematics and science to build the industries of the information age.

We urge that action be taken now to provide critical increases in the salary of mathematics and science teachers to

the level at which they will be comparable to those of industry. Thus, we may be able both to retain teachers of excellence and to attract future generations of mathematics and science teachers.

We encourage engineers and scientists to assist local educators in obtaining the information, personnel, and equipment needed to improve our pre-college mathematics and science educational programs.

We also note that much has been said concerning the crisis in engineering education, and leaders of industry and government are responding. However, much still remains to be done to improve our engineering colleges so that they will be able to provide educational opportunities necessary to prepare the innovative engineers essential to the continued growth of technology.

It is true that there are increasing numbers of students to be taught by decreasing numbers of faculty using equipment that is no longer representative of that which graduates will be expected to use as they enter industry. Many of us see this as a crisis in engineering education.

But perhaps the real crisis is that engineering education itself must change, if we are to meet even partially the demands for engineers as forecasted by leaders of the electrical, electronics and computer industries. There is an urgency to find new ways of increasing the productivity of existing engineers to be able to support the needs of the expanding economy.

We urge the Congress to take action to pass legislation that will encourage the investment of resources from industry in both pre-college and college education. Our companies are recognizing the need to support the continued availability of technologically-educated manpower and have contributed both equipment and personnel to educational programs. Such efforts should continue to be recognized and encouraged through the provision of appropriate economic incentives.

We must examine the change in the practice of engineering that have taken place throughout history. The electrical engineer of today is a manager of technological development. The theories and technologies of yesterday are simply not adequate to design and develop the highly complex products of today. We of the IEEE pledge to continue to work to provide the technical and professional information essential for engineers and scientists to remain current with the rapidly expanding knowledge base of technology.

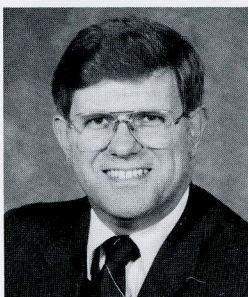
SUMMARY

The concerns of the members of the Institute of Electrical and Electronics Engineers, as we are about to enter our second century, may be summarized as Innovation, Exchange, Excellence, and Education, the initial letters of which, when taken together, form the acronym IEEE.

We recognize and appreciate the dedication to public service so often demonstrated by government and industry leaders.

As we enter our second century of service, we pledge to continue the heritage of the outstanding achievers of our first century, which we call "The Century of Electrical Progress." We pledge ourselves to continue to improve the quality of life for all mankind.

—Richard J. Gowen
IEEE President, 1984



IM SOCIETY SPONSORS PACE SESSION AT TECHNICAL CONFERENCE

The Instrument and Measurement Society Technical Conference (IMTC'84), held January 17 and 18, 1984 in Long Beach, California, featured a session entitled Government Influences on Technological Innovation. Lecturers were Ben Leon, Professor and Chairman of Electrical Engineering at the University of Kentucky and Editor-in-Chief of *IMPACT*; Russ Drew, President of Viking Instruments and Chairman of USAB; and Gunther Sorger, Director of the Research and Development Center of Eaton Corporation's Electronic Instrumentation Division. They were joined for a panel discussion by Jerry Hayes, Chief Scientist for Metrology at Science Applications International, and Bruce Brandt, Associate Head, Instrumentation and Operations Division of the Francis Bitter National Magnet Laboratory at MIT and PACE Coordinator for IEEE Division II. The session was organized and chaired by Dr. Brandt.

The aim of the session was to further communication between the councils and committees of the United States Activities Board on the one hand and the members of the I&M Society on the other. PACE (Professional Activities Committee for Engineers) is the part of the USAB Members Activities Council charged with enabling communication. PACE therefore sponsored the session at IMTC'84 to inform I&M Society members of specific Federal government actions that affect the instrumentation industry and to hear from members about their concerns and suggestions for USAB actions. Judging from the spirited discussion that followed the talks, the mission was accomplished.

Ben Leon discussed government export and publication restrictions aimed at stopping the flow of information of potential military significance to potential enemies. He pointed out that considerable flow of secrets through illegal channels over the years has been documented and that some attempts to transship equipment illegally have been discovered, but nobody has hard evidence of flow via publications or technical meetings. Nevertheless, the Department of Defense (DOD) suspects that such a flow exists and is trying to prevent it. IEEE has been working with DOD and the Commerce Department for some time to seek ways to achieve the DOD's goals without hampering legitimate exports and the free flow of technical information that is crucial to maintaining the technological advantage that we have. The IEEE believes that technology transfer should be as free as possible, and USAB has proposed guidelines for any restrictions that DOD may deem necessary. USAB puts forward its policy whenever possible in meetings within DOD and before legislative committees and is keeping abreast of the issue.

Russ Drew outlined the history of Federal support for R&D starting in 1915 with support for agricultural research and aid to the aircraft industry. Recent support for industrial R&D has been through institutions, such as research reporting or abstracting services and generic technology research. Most of these institutions have withered under the present Administration. But we now have the Small Business Innovation Act of 1982 (SBIA). It sets aside 1.25% of the outside research budgets of eleven agencies to support R&D by small

businesses (fewer than 500 employees). It is a three-phase program as follows: Phase I provides up to \$50,000 for six months to define the project; Phase II, up to \$500,000 for twenty-four months to develop a prototype; and Phase III, funding by private or non-SBIA government funds to produce a product. Nine thousand proposals have been received; seven hundred have been funded. A recent change in patent laws aid businesses that want to make a product based on an invention by a government agency. Whereas before, government patents were available free for anyone's non-exclusive use, now one can get exclusive use for a time for a fee. Dr. Drew finished by describing a precision, portable gas chromatograph/mass spectrometer that his company has de-engineered from the "gold plated" version developed by NASA for the Viking lander. (See separate story in this issue.)

Gunther Sorger discussed several ways in which the Federal government can support the R&D efforts of US instrumentation manufacturers. He favored increased support for education of both engineers and technicians with emphasis on practical training in production, testing, and metrology. Changes in antitrust laws to permit joint R&D effort would also be helpful, as would tax incentives for R&D and equipment modernization.

The Federal laboratories, in the opinion of Dr. Sorger and others, are no longer strong centers of innovation due to funding cutbacks and distracting, time-consuming management requirements. For example, the strong team of RF and microwave measurement scientists that was at the National Bureau of Standards (NBS) labs in Boulder, Colorado in the 1960s and 70s has been dispersed, in spite of an urgent present need for measurement standards at those frequencies.

Dr. Sorger discussed the reasons why the current method of government buying of instruments is unsatisfactory. When the government specifies an instrument entirely and buys a large number under a fixed-price contract, the resulting instrument is usually not as close to the state of the art and narrower in applicability than a commercial instrument. Furthermore, the economic risk to the developing company is just as great as for a commercial instrument. Dr. Sorger proposed that there be closer cooperation between instrument buyers in Federal agencies and the marketing and development groups of instrument manufacturers. That way, prototypes could be altered to include the government's requirements among those of other potential buyers; and negotiations to purchase a number of instruments would provide the company the comfort of "certain" sales. Such a cooperative approach would require carefully worked out procedures to work well when several companies compete vigorously in the same market; but the potential benefits of such an approach are appealing.

The panel discussion session focussed mainly on standards-setting but touched on several other issues.

The decline in funding and other support for the National Bureau of Standards has undercut its ability to define needed standards in several areas and has created serious problems. For example, electromagnetic interference (EMI) is an in-

continued p. 8

creasing problem and federal agencies are setting limits on EMI emissions by electronic devices. But EMI is very complex. Field strength measurement is difficult, the available instruments are poor, and defining emission standards is therefore impossible in the absence of measurement standards. Government and IEEE technical committees have not done adequate jobs and NBS is just now starting to work on this problem. The current administration's philosophy of letting the interested industrial parties pay for the research needed for measurement standards is difficult to put into practice. Manufacturers are reluctant to spend money for research before they need it, and they lack the needed expertise. The resulting delays and confusion slow innovation, decrease productivity, and diminish the competitive position of the manufacturers and potential users of the affected instruments.

There was considerable discussion of Federal government (mostly military) procurement policy. Much costly time is spent on micro-management of projects because of lack of trust between buyer and developer. Mistrust also interferes with communications among the armed services and therefore with mission success. A related problem arises from the prohibition against using procurement money for the development of the instrument being bought. Support for measurement technology research that precedes and parallels instrument development and procurement is needed. Russ Drew described the new mission of the redirected USAB Task Force on Service Contracts, now the Task Force on Federal Procurement; several members of the audience volunteered to work on it.

Several people expanded Gunther Sorger's remarks about the shortage of skilled instrument engineers to include a shortage of skilled technicians. The shortage was attributed to various causes, including the technical illiteracy of the U.S. population as a whole, lack of math and hard sciences in high school, and absence of hard sciences from current definitions of a liberal education. Ben Leon pointed out that these problems are being addressed by several task forces within USAB and are often discussed in *Spectrum* and other IEEE publications. A special issue of *IMPACT* (May, 1984) is devoted to this topic.

The discussion was spirited throughout and ended reluctantly. Members of the audience heard directly from well-informed representatives of USAB about what USAB was doing about problems they cared about. But perhaps the most important communications went in the other direction. Well-informed members of the instrumentation industry spoke of their needs for USAB assistance in dealing with the Federal government and the U.S. public at large. In return, they heard how they could use USAB to meet their needs; several people signed up as volunteers. ♦

—Bruce L. Brandt
PACE Coordinator
Division II

Note: Although serving on this professional panel, Mr. Brandt also acted as reporter for IMPACT because, as he put it, "Society PACE Chairmen will begin to see that such sessions are possible and well received."—Eds.

PACE LEADERS, DON'T MISS



in Phoenix, Arizona, on Labor Day weekend, September 1-3, 1984.

Mark your calendars now for the 1984 National PACE Workshop, to be held again at The Pointe, over Labor Day weekend.

The 1984 Workshop is an **IEEE/USAB Centennial Event**. And, for the first time, a meeting of the United States Activities Board will take place in conjunction with a National PACE Workshop. Get to The Pointe in September!

PROGRAMS DESIGNED TO HELP SMALL BUSINESSES COMMERCIALIZE DEVICES INVENTED BY NASA, DOD AND OTHER FEDERAL AGENCIES: A CASE HISTORY

by Russell C. Drew
Viking Instruments Corporation

At the 1983 National Pace Workshop in Phoenix, Arizona, a resolution asked USAB to set up a Task Force on Entrepreneurial Business Venture Opportunities for IEEE members. Such a task force was formed under the chairmanship of Ronald J. Wojtasinski. At the IEEE Instrumentation and Measurement Society Technology Conference, Russ Drew presented a paper on small business opportunities during the PACE session. That paper, with some editing, is reproduced here for the benefit of our PACE leaders.

—Ed.

Abstract

Government interest in small business is not new, but there is a new direction for Government attention—high technology developments which are aimed at commercialization of the resulting new products and services. The set of new initiatives covers a variety of incentives and direct funding mechanisms, most of which are too new to evaluate. The result is an unparalleled opportunity for entrepreneurs with engineering or scientific backgrounds and ideas for new enterprises to receive support for Government sources, as well as the more traditional private capital sources. The nature of current Government efforts and the likely future evolution of these programs will be explored in this paper, and an example of how they work will be provided from Viking Instruments Corporation.

Government and High-Tech Industry

With the advent of the U.S. space program and the simultaneous growth of solid state electronics in the Sixties, the public perception of the impact of scientific and technological progress was heightened, and public attitudes about high technology were positive. During the Sixties, awareness of environmental effects of industrial development and the lifestyle of U.S. society at the time led to widespread disaffection with what was considered the fruits of technology with the consequence that Government became preoccupied with a variety of environmental control measures and new regulations.

During this period, Government support for high technology was concentrated in the R&D programs of the Department of Defense, the Atomic Energy Commission (AEC), and the National Aeronautics and Space Administration (NASA). In addition, support for more fundamental science, which underlies the technology, was also being provided by the National Institutes of Health and the National Science Foundation. There was relatively little attention paid to the area of "civilian" technology, the general premise being that the technology base was adequately supported with private investment, and there was sufficient spin-off from other Government technology investments to keep domestic industries competitive.

The oil embargo in 1973 and the termination of U.S. involvement in Vietnam set the stage for public policymakers to re-focus their attention on domestic matters, and particularly the national economy. The formation of the Energy R&D Administration and then the Department of Energy expanded the former AEC charter to include a major increase in Government support for civilian energy technology developments, which had as their ultimate objective the commercialization of the most attractive products. Part of the energy-oriented support was directed at large firms and included construction of full-scale demonstration plants. Part of the support, however, particularly in alternative energy areas, went to small firms, many of them new start-ups in response to Government and market interests. In addition, inventors were encouraged to bring their ideas to the Government as part of the very wide-spread support being given to all energy areas. But, like many national concerns, as soon as the sense of crisis abated, the energy programs were cut back.

A principal example of the on-again, off-again nature of Government policy during this period can be taken from the history of the Stevenson-Wydler Technology Innovation Act of 1980, passed by Congress and signed into law by President Carter. This legislation had its genesis in a series of hearings conducted over the 1976-1978 period, in which the impact of foreign competition and the rate of innovation in U.S. industry was examined. At the time, the sizeable impact of a wide array of products from Japan—ranging from automobiles to cameras and consumer electronics—was becoming more obvious to lawmakers, as well as the analysts who had been sounding much earlier warnings. One of the conclusions reached from these hearings was that a traditional strength of the U.S., that is, the development and commercialization of new products and services, was lagging. Together with a badly needed renaissance in production technology, consumer-oriented design and marketing, there appeared to be a need for Government assistance in removing some of the barriers to increased high technology developments in the U.S.

The Stevenson-Wydler Act addressed these problems on several fronts. Shortly after the Stevenson-Wydler Act was passed, however, the Reagan Administration began, and their philosophy disagreed with most of its provisions. As a consequence, implementation was mostly ignored. But events in the industrial sector and the dynamics of the interactive economies of the industrialized world forced some reassessment of this position and a resurgence of interest in Government support mechanisms—often included as part of a larger package called a "national industrial policy."

A major theme of current Government involvement is encouragement for innovation, with emphasis upon high technology areas and with a concurrent side theme of support for small businesses. This is expressed in several ways. There are both direct support mechanisms, such as Government funding for R&D, and such indirect mechanisms as tax credits and preferential patent licensing procedures.

continued p. 10

Legislation to Stimulate Small Business Innovation Research

One of the most revolutionary steps was taken in 1982, with the passage of the Small Business Innovation Development Act, P.L. 97-219, which established the Small Business Innovation Research (SBIR) Program. This program has as its objective the promotion of innovation in high-tech areas through direct Government funding of research in small businesses (fewer than 500 employees) that is intended to yield a commercializable product or process. Government funding is being used to complement the alternative mechanisms of private capitalization of start-up costs associated with the conversion of a new idea into a practical, salable product. The rationale is that the current needs of the U.S. economy for revitalization of our export markets and increased competitiveness in meeting domestic market demands requires more stimulus than private funding sources are likely to generate. The intent in SBIR is to provide very early stage incentives; that is, support for the feasibility, testing, and concept development phases through prototype construction; that is, up to the point at which a production decision can be made on the product. At this point, it is expected that private capital would take over and continue with the project, thereby providing a test of the likely commercial success of proceeding into production.

The SBIR program involves eleven Federal agencies (those with over \$100 million in external research each year) and, when fully phased in, will call for 1.25% of their external research budgets to be devoted to SBIR projects. This is expected to be on the order of \$500 million annually by FY 1987. Each sponsoring agency issues periodic solicitations indicating the nature of the technologies they believe to be of concern in their respective areas. Projects are funded in two phases: phase I, which takes the idea and develops it to the stage in which its technical and economic feasibility can be assessed and a development program can be prepared, and phase II, in which the development program is carried out to the stage where a production decision can be made. Phase I is typically of six- months duration at \$50,000, while Phase II can be as long as two years and up to \$500,000. Proposals are limited to 25 pages or less, in a prescribed format intended to give even the smallest new start an opportunity to participate, *provided* they have a better new idea than their competitors. In general, the provisions for participation in SBIR have been made as compatible with new, small business as possible. The success of this legislation is indicated by the fact that in the first year of operation of the SBIR program there were over 9,000 proposals submitted, although the funds available would only permit about 700 projects to be funded. At present, the SBIR program is authorized only through FY 1989, at which time it will presumably be reviewed for possible extensions.

The National Science Foundation, which has had a program in being for a number of years upon which SBIR is modeled, has reported great success in stimulating an array of very high quality and innovative projects on the basis of its competitive solicitations, and early comments by other agencies newly beginning SBIR activity seem to confirm this assessment. Whatever the final evaluation of this program may be, it is clear that the Government has taken a

very interesting step to expand opportunities for high tech developments. This should be of great interest to those engineers who are looking for ways in which they may take their new ideas and convert them into new products.

Patents and Other Incentives

A traditional way for a company to acquire access to a technology that it needs for its products is to negotiate a patent license agreement with the inventor or holder of the technology, permitting its use under certain conditions. The Government, which has a large and growing portfolio of patents produced as a result of Government R&D, has until recently permitted non-exclusive, royalty-free licenses to its patents. But under these conditions (and for reasons having to do with the commercializability of many Government patents) the use of this Government-produced technology base has languished. With this state of affairs, and given the interest in promoting development and use of new technology, Government patent policy has been changed to permit Federal agencies to grant exclusive royalty- bearing licenses to Federal patents to small businesses, not-for- profits, and universities. (Legislation to extend this feature to large businesses has also been introduced.) Thus, this places the Government in a posture more closely akin to the private sector, where exclusive rights to an invention are a normal part of a product development effort.

Another form of incentive that is intended to encourage innovation is the establishment of special tax benefits for R&D and accelerated depreciation or other tax credits for the purchase of new equipment. In the tax reform legislation in 1982, a number of such provisions were inserted, again as a reflection of the growing perception that more Government support was needed to promote greater growth in high-tech areas. Currently, the Congress is considering legislation to make these provisions permanent, make them more applicable to small, new start businesses, and provide additional incentives to firms to donate recent vintage equipments such as computers and test instruments to colleges and universities. The IEEE is expected to support this legislation. The direct revenue loss is relatively small and the incentive can be very significant in stimulating additional industrial R&D support.

The Outlook for Government Policy

The measures that have been cited are part of a pattern of U.S. Government measures that have been intended to boost commercialization in high-tech areas. The international competition in these areas is also aware of the need to innovate and to keep abreast of the frontiers of technology, and their Governments are also providing direct and indirect support for their efforts. The U.S. has important resources, such as its strong university-based research system, skilled work force, generally good natural resource and energy supply bases, and the tradition of entrepreneurial activity. In addition, we have a very large national market for high-tech goods and services that provides its own incentives. Thus, it would appear that the U.S. is in a good position to compete very successfully in any high-tech race, *provided* we do not allow barriers or unfair foreign practices to interfere with our inherent strenghts.

continued p. 19

HOW TO ESTABLISH ACTIVE STATE INTERSOCIETY LEGISLATIVE ADVISORY GROUPS (SILAs) IN STATES WITHOUT THEM

As the newly appointed Government Action Facilitator, my primary goal for the coming year is to assist every state possible in forming a legislative advisory group. For those states that already have functioning SILAs, or Scientific Advisory Groups that serve a technical-resource role to legislators, or related organized legislative programs, perhaps we can establish a communication line whereby Regional Government Action Coordinators can share experiences on common legislative issues and approaches to SILA activities.

For other states heretofore inactive in the legislative arena it will be critically important that they reassess their involvement. Since attending IEEE's U.S. Technology Policy Conference in Washington, D.C., during late February, my understanding of the importance of being involved in the political process has grown appreciably. No longer can we engineers hide behind our well-known "technical facade," if we are to organize formidable legislative efforts in each state.

In order to implement a legislative program in your Section, Division, or Region, here is one effective way to start. First, create a liaison group by contacting the leaders of other technical and professional organizations (*e.g.*, ACEC, NSPE, AIA, ASME, Land Surveyors, etc.) in your geographic area in an attempt to consolidate resources. You will be pleasantly surprised to find how compatible IEEE's interests are with these other organizations.

Once a Charter Group has been established, each component organization should be assessed a minimum contribution of, say, \$1,500 annually to participate with a vote.

Other organizational steps that follow are:

1. Election of officers.
2. Formulation of task forces in legislative issues of primary concern (*e.g.*, public works, taxes, energy, product liability, education, etc.) with representatives from each participating organization.
3. Retention of a part-time legislative consultant for the mutual benefit of all organizations.
4. Regular meetings to review legislation and to direct efforts of retained legislative consultant. (Note that a commitment to weekly meetings during the legislative session is almost a "must.")
5. At these meetings set priorities for legislation and, as required, initiate new legislation, white papers, strategies, etc.
6. In establishing IEEE legislative priorities to consolidate efforts with those of other organizations, consider the benefits of:
 - a. A networking system between Sections within a state.
 - b. A listing of IEEE members by legislative district, emphasizing those who have developed a personal relationship with their District legislators and Congressmen and women.
 - c. Testifying at legislative hearings representing from 10,000 to 50,000 engineers, depending on the size of your state.
7. Solicitation of feedback from legislators after the legislature adjourns to find out how you might be more effective during the next session.

Nominal support is available from PACE if "Project GAC Plans" are submitted to your Regional Government Action Coordinator and approved by your Regional PACE Coordinator.

Regional Government Action Coordinators

- | | |
|------------------------------------|--|
| a. Irving J. Gabelman
Region 1 | (O) (315) 336-8073
(H) (315) 336-8073 |
| b. George Poletti
Region 2 | (O) (609) 778-3802
(H) (609) 786-1181 |
| c. Arthur Greene
Region 3 | (O) (305) 867-2520
(H) (305) 452-3789 |
| d. David W. Ford
Region 4 | (O) (219) 429-5481
(H) (219) 485-9159 |
| e. George R. Dean
Region 5 | (O) (316) 681-7155
(H) (316) 267-6009 |
| f. Glenn R. Heidbreder
Region 6 | (O) (805) 961-3672
(H) (805) 964-1495 |

If you desire any further assistance whatsoever during the formulation stages of a SILA in your area, please call me in Seattle at (206) 453-8092 during business hours or at (206) 643-6560 during evening hours. ♦

—Kenneth L. McGowan
PACE Government Action Facilitator

WASHINGTON SCENE

Pre-College Math and Science Education Legislation

PACE leaders were sent a *Legislative Alert* asking for their support in urging their Senators to work toward passage of S. 1285, the Education for Economic Security Act. The proposal authorizes \$425 million in 1984 and \$540 million in 1985 for teacher training and other programs to improve instruction in science, math, and foreign languages (see box). The House has already approved a companion bill.

S. 1285 was approved by the Senate Labor and Human Resources Committee, chaired by Senator Orrin Hatch (R-Utah) in June 1983, but action on it by the full Senate has been delayed by a controversial amendment offered by Senators Eagleton (D-Mo.) and Moynihan (D-NY), authorizing additional aid and funds for schools undergoing desegregation. However, the Majority Leader, Senator Howard Baker (R-Tenn.), has assured members that he intends to bring the bill to a floor vote during this session.

PACE leaders and all IEEE members can help by urging their Democratic Senators to persuade Senators Eagleton and Moynihan to work with Senator Hatch in harmonizing their differences over the amendment. Republican Senators can be asked to work with Senator Hatch in helping to bring the bill to the floor.

Restored Funding for ACTS Program Urged

Speaking before the Senate Subcommittee on HUD and Independent Agencies on May 7, Theodore R. Simpson, Vice Chairman of the IEEE Research and Development Committee, and Richard G. Gould, Vice Chairman of the IEEE Communications and Information Policy Committee, urged that funding for NASA's Advanced Communications Technology Satellite (ACTS) Program be restored. They claimed that the ACTS program will provide the knowledge and, more importantly, the practical space experience with frontier communications satellite technologies. "Our experience has indicated that these technologies will be needed and that our foreign competitors are seeking a technological edge that will position them to become preferred suppliers of such advanced systems." Copies of the testimony can be obtained from the IEEE Washington Office.

Department of Energy R&D Programs Reviewed

William D. Lang and Dr. Charles F. Lawrence appeared before the Senate Subcommittee on Energy Research and Development on behalf of the IEEE Energy Committee on April 24, urging that the Senate subcommittee adopt the funding levels already approved by the House Science and Technology Committee for the Department of Energy Research and Development programs for FY 1985. The House Committee approved funding for Solar, Conservation, Fusion, Electric Energy and Energy Storage Systems research programs at levels no higher than seven percent over FY 1984 authorizations. The issues of increasing energy efficiency and diversifying energy sources were addressed in the statement, which said, in part, "Along with the established industries there are important energy alternatives which re-

quire strong Federal research support. It is important that such technologies are available when the economic need develops to avoid economic disruptions." Copies of the testimony can be obtained from the IEEE Washington Office.

FACTS ABOUT S. 1285, EDUCATION FOR ECONOMIC SECURITY ACT

by George R. Dean, USAB Government Activities Council Chairman

Title I: Authorizes \$45 million in FY 1984 and \$80 million in FY 1985 for programs to be carried out by the National Science Foundation, including teacher institutes, materials development, graduate fellowships, undergraduate scholarships, and discretionary projects.

Title II: A formula grant administered by the Department of Education, carrying an authorization of \$350 million for FY 1984 and \$400 million for FY 1985. Of these funds, 10% will be held by the Secretary for discretionary projects and 90% allocated to states on a formula basis. Of the funds allocated, 70% will be passed through to local education agencies within the state. Funds for this title will be used primarily for teacher traineeships, and retraining and in-service training of current teachers.

Title III: Provides opportunities for the private sector and educational institutions to form partnerships for special projects in math and science education. This title authorizes \$30 million in FY 1984 and \$60 million in FY 1985 for these projects, which will require a 50% match. Awards under this title will be made by the National Science Foundation.

Title IV: Authorizes the President to make awards for teaching excellence to elementary and secondary classroom teachers.



Funding (In Millions of Dollars)

Program	Fiscal Year	
	1984	1985
National Science Foundation:		
Teacher institutes	20	20
Materials development	0	20
Congressional merit scholarships	5	15
Director's discretionary	0	4
Graduate fellowships	20	21
Subtotal	45	80
Department of Education:		
Secretary's discretionary (10%)	35	40
Suballocated to LEAs (70%)	220.5	252
State higher education agency (30%)	94.5	108
Subtotal	350.0	400
Partnerships in education (NSF)	30	60
Subtotal	30	60
Total authorization	425	540

IN MEMORY OF MELVIN N. ABRAMOVICH

The United States Activities Board and the IEEE Washington Office note with deep sadness the passing of Melvin N. Abramovich, who died on March 30, 1984.

"His good advice and ready smile will be missed by all who knew him," according to Jim Arnold, Chairman of the Washington Section.

Tom Doeppner, Vice Chairman of the Washington Section, wrote, "The IEEE has lost one of its most devoted and productive elder statesmen; I, and many others have lost a close personal friend."

"Mel was many people to me. He was one of the most dedicated (while self-effacing) IEEE members and workers that I have known; he toiled endless hours to assist—in any way he could—the furtherance of the IEEE and what it stands for," wrote Dave Dobson, who worked with him on the IEEE Aerospace and Electronic Systems Society newsletter.

Mel was the editor of *Scanner*, the joint publication of the Washington and Northern Virginia sections. He was the Editor-in-Chief of the Aerospace and Electronic Systems Society's newsletter and contributing editor of the Engineering Management Society's newsletter. He had been editor of the Washington Section *Bulletin* for twenty years and had, just before his death, agreed to serve as an Associate Editor of *IMPACT*. He was called "the Jack Anderson of the IEEE" by a former IEEE President.

Mel was also the Task Force Leader of the USAB *Legislative Report*, and author of the first "IEEE Handbook for Professional Activities." These are only a few of the jobs he performed for IEEE.

Mel received his B.S. in electrical engineering from the University of Minnesota, continued his education at MIT, Georgetown University, NYU, and the Air University, and graduated from the Industrial College of the Armed Forces. He was a registered Professional Engineer in Washington, D.C. and was also a member of the American Association for the Advancement of Science, the Armed Forces Communications Electronics Association, and Sigma Xi. He was a retired Colonel with 25 years of service in the U.S. Air Force. He had also done consulting work in the Washington area.

Mel received the USAB Regional Professional Activities Award for Region 2 in 1980, the National AESS Award in 1980, and an IEEE Centennial Medal in 1984.

A new IEEE scholarship has been set up in his memory. Contributions may be sent to the Washington Section in his name to Dr. Jeanne M. Murray, Treasurer, 2915 North 27 Street, Arlington, Va. 22207. ♦



Melvin N. Abramovich 1912-1984

Advanced Technology Foundation Act Examined

Dr. Russell C. Drew, speaking before the House Subcommittee on Economic Stabilization on March 28, agreed in principle with the thrust of H.R. 4361, the Advanced Technology Foundation Act, although he expressed some reservations about its details and how the proposal would relate to existing legislation. He discussed arguments for and against establishing a separate "technology foundation" stating, "The issue is what to do about the factors that limit the full realization of our technological potential, and what the Government's role should be in aiding the development of solutions to our current problems." He addressed two major provisions of the current bill, and how they would be implemented. Copies of the testimony are available from the IEEE Washington Office.

Defense Department's R&D Budget Examined

Dr. Harvey C. Nathanson, Chairman of the Defense Subcommittee of the IEEE Research and Development Committee submitted testimony on March 21 to the House Research and Development Subcommittee on the proposed Department of Defense R&D budget for FY 1985. Dr. Nathanson examined such key funding areas as the DoD Technology Base, University Research Instrumentation Program, Faculty and Graduate Student Exchange Program, Engineering Fellowships, Increased Support for University-Industry IR&D, and Support for Superintelligent Computers. His statement can be obtained from the IEEE Washington Office.

IEEE Is Among Exhibitors at Energy Technology Conference

The 11th Energy Technology Conference, the largest energy trade show in the U.S., was held March 19-21 in Washington, D.C., and had more than 5,000 registrants. An IEEE exhibit booth was sponsored by the IEEE Energy Committee and the Power Engineering Society. The booth was organized by the Energy Committee and the Washington Office staff, and members of the Washington and Northern Virginia Sections served the booth, providing information about IEEE in general, its Centennial, and its energy program activities. The new edition of the slide presentation, "Energy in Perspective," was shown continuously. More than 200 registrants visited the booth and picked up materials, including 50 who took membership applications.

"Energy in Perspective" Publication and Slide Presentation Available

The IEEE Energy Committee has prepared an updated version of its slide presentation entitled "Energy in Perspective." It has been distributed to Section and Subsection Chairmen in Regions 1-6. Additional slide kits, or quantities of the "Energy in Perspective" flyer for mass distribution, may be requested free of charge from the IEEE Washington Office.

The new show updates the data contained in the first presentation, which has been shown to many general and technical audiences over the past two years. Members are encouraged to make the presentation as often as opportunities arise. Each slide kit, available free on a temporary loan

continued p. 14

basis, consists of a set of 80 slides, an audio-cassette taped narration, a speaker's guidebook, and a quantity of flyers for distribution among the audience. Included in the speaker's guide is the script, for those who wish to narrate the show themselves.

Single copies or a quantity of the flyers may also be requested. The flyer summarizes the key points in the show, using graphics from the slides, and reflects IEEE positions on a number of energy issues. While it is an adjunct to the slide presentation, it may also be distributed independently.

Position Paper Round-Up

Keeping its USAB and PACE leadership informed, *IMPACT* publishes a semi-annual update of all IEEE Position Papers and Entity Position Statements relating to professional activities that have been approved by the IEEE Board of Directors and the United States Activities Board respectively. Copies of these positions are available from the IEEE Washington Office.

IEEE Position Papers

- Age Discrimination (September 1975)
- IEEE Members' Professional Needs (September 1975, December 1976, July 1977)
- Energy: The Need for Nuclear Power (January 1976)
- The Role of the U.S. Government in Civilian Communications Satellite Research and Development (February 1977)
- Energy: Electricity in the United States Economy (April 1977)
- Energy: Fusion Power (September 1977)
- Energy: Solar Power (December 1978)
- Energy: Municipal Solid Waste (December 1979)
- Energy: Solar Power Satellite (December 1979)
- Energy: Breeder Reactors in the United States (May 1980)
- Nuclear Waste Management (August 1981)
- Engineering Technology (August 1981)
- Human Exposure to Microwaves and Other Radiofrequency Electromagnetic Fields (January 1982)
- Engineering Education in the United States (February 1982)
- Freedom of Technology Transfer (July 1982)
- Engineering Manpower Policy in the United States (November 1982)
- Spent Nuclear Fuel Reprocessing in the United States (August 1983)
- Conservation and Cogeneration (August 1983)

USAB Position Statements

- U.S. Civilian Space Program (February 1981)
- The Need for Tax Incentives to Promote a Healthy R&D Effort (June 1981)
- Service Contracts (August 1981)
- Age Discrimination by Employers of Engineers (November 1982)
- Technology Transfer in the United States (November 1982)
- Licensure and Registration (February 1983)
- Interpretation of Engineering Manpower Supply and Demand Surveys (June 1983)
- National Technology Foundation (June 1983)

- Integration of Social Security Benefits with Private Pensions (June 1983)
- Professional Practices for Engineers, Scientists and Their Employers (June 1983)
- Telecommunications Network Standards Under Deregulation (July 1983)
- Alien Engineers, Foreign Students and the U.S. National Engineering Resource (August 1983)
- Advanced Scientific Computing Capability Development (November 1983)
- Pre-Invention Assignment Agreements (February 1984)
- Intellectual Property Protection (February 1984)
- Retirement Income Benefits (February 1984)

Want to Know More About USAB?

Complimentary copies of the Annual Report of the United States Activities Board in 1983 are still available. Also available are copies of a commemorative booklet, *IEEE's United States Activities Board: The First Ten Years*, a history of professional activities in IEEE, marking USAB's tenth anniversary in 1983. For your copy, address the IEEE Washington Office.

National Academy of Engineering Announces Election Results

The National Academy of Engineering recently announced that Stephen D. Bechtel, Jr., chairman of the Bechtel Group, Inc., was re-elected to a four-year term as chairman by the Academy's members. They also announced the re-election of their vice president, Ralph Landau, consulting professor in economics and chemical engineering at Stanford University. Mildred S. Dresselhaus was re-elected as councilor. Other officers and councilors elected are: Alexander H. Flax, as home secretary; H. Guyford Stever, foreign secretary; and H. Norman Abramson, Gerald P. Dinneen and Paul E. Gray as councilors. Their terms begin on July 1, 1984.

Consumers Will Pay More for Electricity if "Consumer Bill" Passes Senate

The Edison Electric Institute announced that consumers will pay more for electricity, while the adequacy and reliability of electric power supplies could be seriously jeopardized, if Congress passes legislation that would effectively prohibit utilities from recovery of interest costs for new plants while they are being built. Testimony to the Senate Subcommittee on Energy Regulation read, in part, that such legislation "constitutes a real threat to the long-term viability of the electric utility industry." There are three such bills currently before the Subcommittee.

Acid Rain Legislation Premature

The Edison Electric Institute examined the problem of acid rain in three separate testimonies to Congress. The rush to enact legislation is largely based on assumptions, which cannot be justified by currently known facts, according to EEI. ♦

—M. Coble, G. Aukland

THE WHITE HOUSE

WASHINGTON

February 17, 1984

I am delighted to extend my greetings to the Institute of Electrical and Electronics Engineers on the occasion of its Centennial celebration.

From the earliest uses of electricity for lighting to today's communications and computer industries, the IEEE's history spans a remarkable century of progress in technology. Over the years its members, now nearly 200,000 strong in the United States, have made invaluable contributions to a virtual revolution in the way their fellow citizens live and work in the modern world.

As the IEEE enters its second century, we can begin to anticipate the impact of continuing innovations in electro-technology that will transform the future -- from the shrinking dimensions of the microchip to the expanding horizons of space.

You have shown us how to harness the delicate and powerful forces of nature and use them for the betterment of mankind. On behalf of all Americans I wish you continued success for another hundred years of progress.

Ronald Reagan

USAB OpCom MEETS IN KNOXVILLE

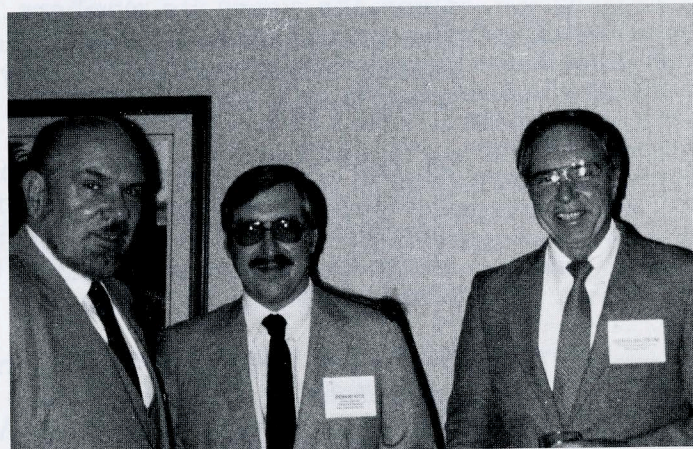
The Operating Committee of the United States Activities Board met in Knoxville, Tennessee, on March 31. During 1984, the OpCom is continuing its practice of scheduling its meetings in various cities around the country, in order to



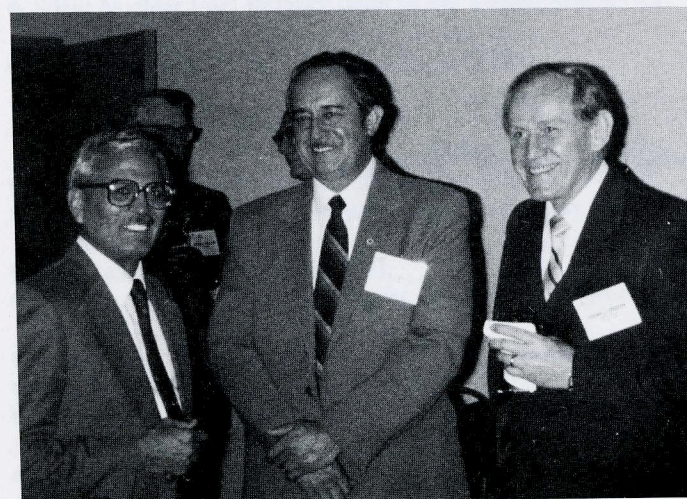
meet with local IEEE leaders. Twenty members of the East Tennessee, Oak Ridge, Tri-Cities, Chattanooga, Western North Carolina, and Middle Tennessee Sections, as well as Region 3 leaders, attended.

William A. Baldauf, Jr., (l.), Vice Chairman of the Oak Ridge Section, meets George R. Dean (c.), Chairman of USAB's Government Activities Council and Charles R. Alexander, Chairman of USAB's Member Activities Council.

Alex Gruenwald (l.), Director of Region 1 and USAB liaison to the Regional Activities Board, meets Richard Keck (c.), former PACE Chairman of the East Tennessee Section, and Charles Ballentine, PACE Chairman of the Chattanooga Section.



Dr. Saj Durrani (l.), Director of Division IX and USAB liaison to the Technical Activities Board, meets with John J. Miller (c.), Region 3 PACE Coordinator, and Frank J. Hanson, Vice Chairman of the Tri-Cities Section.



LETTERS

Needs vs. Goals

Editor:

This is to comment on the redraft of "IEEE Members' Professional Goals" as published in the February issue of *The Institute*. The content is very good, and it contains a wide range of well thought out material of importance to the profession. Let me add the following comments.

A more specific statement should be made regarding the role of job assignments to practicing engineers. The concept of engineering obsolescence and its avoidance are two of the most misunderstood concepts in the industry today. I believe that one of the strongest factors in obsolescence is job assignment. New technologies are often introduced or grow into companies where few experts exist and a learning cycle is required. Often, mature engineers are not assigned to new technology projects, and these "learning cycles" are given to the younger engineers who are said to be "more current." In fact, it is probable that the recent graduate is less capable. Leading-edge technology does not play an important role in undergraduate programs. Even if the recent graduate has had some specific undergraduate college course training, it is probably equivalent to only a few credit hours. Typically, that much material can be learned by a well motivated engineer in a few short weeks, when actual need and interest are present.

On the other hand, an experienced engineer can take many continuing education courses and still be considered obsolete if he never gets actual work assignments which permit him to practice in the newer technologies.

Thank you for considering my comments.

—Bill F. Rider
Region 4 Vice-Chairman

Editor:

It is the avowed purpose of USAB to serve the professional needs of IEEE members, and any USAB action that is counterproductive to these needs is counter to the USAB charter. The re-draft of this position paper is a case in point.

The authors of the re-draft have apparently done a diligent job, but the rewrite has one very detrimental feature. It changes members professional *needs* to professional *goals*. The substitution of the word *goals* for *needs* makes these something we approach asymptotically and never reach. Thus the realization of these goals is rendered impossible and put off into eternity. This gives USAB a few centuries of relaxation, but it is detrimental to the professional needs of the members, the overwhelming majority of whom are practicing engineers, working for a salary. As such, it is counter to the USAB charter.

I have two concrete suggestions with respect to this re-draft: (1) Change members' goals back to members' needs; and (2) Introduce a new member need. The latter is the member's need to have accurate and ethical representation by IEEE to the rest of the Institute, the media and the public. It can happen (on rare occasions) the the USAB VP and other high IEEE functionaries do not share the point of view of the practicing engineer. When such persons convey information to any third party, they are prone to reflect their own

point of view. This runs counter to members' needs. I therefore request that this additional member need be added to the position paper.

—Robert Bruce
PACE Member Service
Facilitator, 1984

Editor:

In the presentation in *IMPACT* and *The Institute* soliciting comments on the rewritten IEEE Position Paper, "IEEE Members' Professional Needs," little attention was drawn to the fact that the suggested new version substitutes the word goal(s) for need(s) throughout. If nothing else were changed, this one change alone would have the effect of removing the element of strong concern that is attached to "needs." Needs were enumerated originally, I believe, in the sense that Maslow and others referred to the needs that motivate people to performance and achievement. Higher level needs are items that have to be fulfilled by an individual, if he is to maintain a level of performance involving noteworthy contributions for any sustained period. The needs of engineers, as expressed in the IEEE Position Paper, relate to those satisfactions which must be obtained by individuals, if they are to function in that manner that we describe as professional. Our members are capable of performing as professionals, but many do not because employment circumstances are such that these needs as presented in the Position Paper are not being met. In using the term "needs" we can recognize that some members are having their professional needs met, for the most part, while others are not. We can, therefore, strive to create a professional environment for our members where the requisite needs compatible with professional performance are met for all members. "Goal" merely implies something that we would like to attain at some unspecified future time.

If we are to have a profession that can maintain technical leadership in world competition, then we must have members who can function at the level that Maslow describes as "self-actualization." If we are to attract talented young people to our profession, it must be apparent that it is a profession that is satisfying and provides rewards for the hard work that is required to enter it and to maintain competence in it. Goals are not a substitute for meeting needs. Meeting needs has more urgency and, when we are dealing with world competition, energy self-sufficiency, health care, defense, and standard of living, as engineers do, we are dealing with urgent matters in today's world.

Since the original needs were published, it has become apparent, sometimes painfully so, that the members, as a group that is predominantly practitioners, have a very strong need to be ethically represented to their legislatures, the public and the media. Any IEEE member who cannot act in such a manner should not accept a position in the Institute where he would be required to make public statements on behalf of the members. An appropriate statement of this need would encourage our spokesmen to be accurate and ethical.

—Frank E. Lord
VTS PACE Chairman

continued p. 18

Editor:

I was gratified that some of my comments on the revision of the IEEE Position Paper, IEEE Members' Professional Needs, found their way into the draft prior to publication. I would suggest that *Needs* be retained in the title, rather than *Goals*, to emphasize the importance of the six statements.

I would like to see the USAB Entity Position Statement, Professional Practices for Engineers, Scientists, and Their Employers, brought to the IEEE Board of Directors for acceptance as an IEEE Position Paper, independent of the "Needs" paper. The Professional Practices document is more focused and was carefully crafted with enough merit to stand alone.

—Harry M. Cronson, Chairman
USAB Career Maintenance and
Development Committee

Affirmative Action Quotas

Editor:

In a recent disclosure, the U.S. Civil Rights Commission decided that Affirmative Action quotas in hiring practices may not be used to offset discrimination in employment. What does this mean? What quotas?

How many readers are familiar with the language used in Uncle Sam's Requests for Bids, which follows: "... the bidder does not maintain ... facilities which are segregated on the basis of race, creed, color, or national origin ... the bidder shall offer a written plan acceptable to the Contracting Officer ... including particularly a plan for taking affirmative action ... bidders and subcontractors will be subject to full pre-award equal opportunity compliance reviews ... "

How is such compliance regulated?

Any company awarded a U.S. government contract, which is in the amount of \$1,000,000 or more must prepare and maintain a complete record (open for public inspection) of its employees, complete with the following data:

1. The number of employees in each Department, Section or group, categorized by pay grade.
2. A detailed list of employees in each of the above-listed categories, giving a breakdown by sex and race or origin, including American Indian or Alaskan native; Hispanic; Asian; black; white.

If you do not believe this, inquire of your company personnel department.

For those individuals who feel they have been forgotten, or otherwise "left out," there is good reason to believe that all sorts of other categories may be included in the near future to assure that there is "balanced" representation for all lost souls working on Government-funded programs.

Let us all live like one happy (?) family! *C'est la vie!*

—Antonio N. Paolantonio, P.E.
Senior Member, IEEE
Reseda, California

MIRACLES OF TOMORROW...



The miracles of tomorrow begin in today's classroom. The electrical and electronic miracles we take for granted didn't just happen over the past hundred years or so. They took active support for education in technology and science. That kind of support will enable our children to enjoy another "century of progress."

Here, K.P. Lau, a Duke Power engineer, works with youngsters in a Charlotte elementary school. Give youngsters the chance to build their future, starting today!

A public service message of IEEE scheduled to air during 1984 over 200 television stations nationwide.

SENATOR JAMES A. McCLURE RECEIVES USAB AWARD FOR DISTINGUISHED PUBLIC SERVICE



Senator James A. McClure (R-Idaho) was recently presented with the IEEE United States Activities Board Award for Distinguished Public Service by Dr. Russell C. Drew, IEEE Vice President for Professional Activities. Senator McClure was cited for "advocacy of IEEE goals of professionalism in engineering before the Congress of the United States," particularly for his work on energy issues. At the presentation were (l.-r.): Leo C. Fanning, Staff Director of the IEEE Washington Office; John A. Casazza, former chairman of the IEEE Energy Committee; Senator McClure; Dr. Drew; James F. Strother, Chairman of the Subcommittee on Energy Education of the IEEE Energy Committee; and William G. Herrold, Manager of Public Affairs for the IEEE Washington Office and staff secretary of the Energy Committee. ♦

ROBERT J. FRANK IS AWARDED USAB CITATION OF HONOR

Robert J. Frank was presented with an IEEE United States Activities Board Citation of Honor for his work in furthering the "IEEE goal of professionalism in engineering." The Citation was presented by Dr. Russell C. Drew, IEEE Vice President of Professional Activities, during the joint Washington-Northern Virginia Section Awards Banquet. Mr. Frank has been active in USAB's patent efforts for several years and is former chairman of the Patents Committee. ♦



PROGRAMS DESIGNED TO HELP SMALL BUSINESSES—continued

The current incentives and the current climate of Government support could change in the future, as the sense of crisis passes (assuming that the U.S. rebounds in high-tech areas), but the nature of such change is that it occurs slowly in response to a sense of gradually waning priority. In the near term, it seems clear that more Government involvement is likely rather than less. The nature of new measures will depend upon (1) the sense of deepening crisis, if such a sense develops, (2) the political philosophy of the administration then in power, and (3) the new ideas or approaches that are developed by the engineers and scientists, industry managers, economists, and other interested parties in our society. For the present, then, the climate in Washington is one that is receptive to those measures that will enhance the competitiveness of high-tech industry and promote more productive application of engineering and science to our national economy.

Postscript: Viking Instruments Case Study

Viking Instruments Corporation provides an example of the utilization of Federal policy initiatives and the importance of broad public concerns to the creation of a new prod-

uct. The product in question is a new family of analytical instruments based upon a unique, compact, patented mass spectrometer technology originally developed by NASA for space use.

Utilizing the current Government patent policy, Viking Instruments applied for, and was granted an exclusive license to commercialize the NASA technology. Simultaneously, in response to a stated need by DoE for an environmental test instrument capable of identification and quantification of complex organic pollutants, Viking submitted a proposal under the SBIR program for Phase I funding of a system based upon the licensed technology. A Phase I grant was awarded, and work is under way on this project.

Viking Instruments is a small business, with ideas and with the desire to pursue them toward the marketplace. Without the current level of Government involvement to supplement private capitalization however, it is not likely that we would have been able to realize our objective. While the final chapter on this development has not yet been written, the Viking experience clearly demonstrates the potential impact of Federal initiatives in a real-world situation in the instrumentation field. ♦

NEW PUBLICATIONS

**A
FIRST**

A Profile of U.S. IEEE Women Members: Salaries, Demographics, Attitudes and Professional Status

The status of U.S. IEEE working women members has become a critical issue in the male-dominated electrical, electronic and computer engineering profession.

Under the auspices of the IEEE United States Activities Board, a committee on Professional Opportunities for Women (COMPOW) critically examined:

- Characteristics of IEEE women members
- Demographic differences between male and female members
- Attitudes toward the workplace
- Professional status

plus... the impact of age related factors.

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"FUSION POWER" REVIEW AND UPDATE AVAILABLE TO MEMBERS AND PUBLIC FREE OF CHARGE

Fusion Power—Its Status and Prospects, a leaflet prepared by the IEEE Energy Committee, provides an update on the development of fusion power as an alternative energy source. It describes current research and experimentation and the advantages and disadvantages of nuclear fusion, and it tells how to learn more about this virtually inexhaustible fuel source. Readers are urged to support fusion energy development as a national goal. Copies may be obtained on request to the IEEE Washington office. ♦

IEEE WOMEN MEMBERS SURVEYED ON SALARIES AND ATTITUDES TOWARD CAREER

The results of a survey of more than 3,000 women IEEE members—the first of its kind—on salary, position level, and differences in treatment on the job, have been compiled. *Profile of IEEE U.S. Women Members: Their Salaries, Demographics, Attitudes Toward the Workplace, and Professional Status* is available from the IEEE Service Center as IEEE Catalog No. UHO160-2: Members, \$20; Nonmembers, \$45. Salary data is compared to data on male IEEE members contained in the 1983 IEEE Salary Survey. Details of some of the comparative data were reported in *The Institute*, March 1984. ♦

1983 MEMBER OPINION SURVEY REPORT PUBLISHED

The results of the *1983 IEEE U.S. Member Opinion Survey* have been published. IEEE leadership, including all PACE officers, will receive a complimentary copy to help in planning their activities. Officers of the IEEE major Boards, members of USAB Task Forces and Committees, Section Chairmen and Society Presidents will also receive complimentary copies. A limited number are also available for sale from the IEEE Service Center. IEEE Catalog No. UH0159-4. Members, \$3.50; Nonmembers, \$5.00. ♦

