### NATIONAL ENGINEERS WEEK

**IS**

**FEBRUARY 21-27, 1982**

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**Schedule for the February 1982 Board of Directors Series of Meetings**

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**M.C.**: Pres. Elect
Dr. George A. Keyworth
Presidential Science Adviser

**1 1/2 hr**
Energy Policy

**1 1/2 hr**
National Resources for Innovation

**1 1/2 hr**
Information Systems Technology Policy

**1 1/2 hr**
Educating Society About Technology

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**Foundation Board**

**Executive Committee**

**Board of Directors**

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**M.C.**: VP-PA
Sen. John Glenn

**M.C.**: VP-PA
Sen. Alan Cranston
EDITORIAL

This is the first issue of a new year. For the IMPACT reader the changes are minor. The editorial staff remains the same. Ron Fredricks continues as the National PAC Chairman. We have a new chairman for the Member Activities Council, the umbrella under which IMPACT reports to USAB. We also have a new Vice President for Professional Activities, Jack Doyle. Jack should have something in every issue as did his predecessor.

The topic of concern hasn't changed much. In the past two months the most debated issues still relate to entry into the profession. The main gate is through the Universities. A second gate, usually in a series with the first, is through recruitment of high school students into engineering. The third input to the registration examination, and standards for accreditation of colleges have all been on the table during November and December.

The opinions on an IEEE brochure for high school students reflect the concerns of our members for the profession and our own interest in selling. The increasing marketplace does not respect the engineer. As a consequence, engineering is not a professional group. This brings several schools to consider high school students from entering engineering schools. They believe that only by creating another engineering shortage can the engineer command the respect, pay, and job security that is deserved.

A second group believes that there is an engineering shortage today. The national economy requires far more people with engineering training. They further state that even if there were a surplus of engineers, the education received is good for all jobs in a modern society. There is, of course, everything in between these two extremes within the IEEE.

I believe we should encourage the students with the highest technical competence and motivation to enter engineering. We should set the accreditation standards for engineering schools high enough to ensure that most (we can never get all) graduates are well educated in fundamentals and trained in the use of modern equipment. All present many of our new graduates fall short of this goal.

In a guidance brochure we must tell students about engineering in general, and the careers that their interest will lead them. We must also make the prospective student aware that an engineering degree is not a guaranteed sinecure. With the rise in the number of schools offering technology degrees we must inform high school students as to the differences between engineering and technology. I believe that the approved brochure is a reasonable compromise of my views with those of others in the IEEE.

On the issue of registration we have opinions from those who think state licensing is inappropriate for engineers to those who feel that all practicing engineers should be forced to obtain a state license just as is done in law and medicine. Registration for engineers practicing in areas that affect public health and safety is required by law in every state. IEEE policy is to support such registration. The USAB and your editor believe that it is worth while to spend a comparatively small sum of money to make the professional examination more meaningful to the practicing engineers in the areas that affect public health and safety at the recent USAB meeting was heated, but the vote was to proceed.

On standards for accrediting engineering programs in Universities, the EAB is considering revision of the criteria for accreditation of Electrical Engineering and Computer Science and Engineering programs. I have recommended that use of modern, interactive computing in engineering design be part of the criteria. Others have said that schools cannot afford to upgrade their computer facilities. My opinion is that such schools cannot afford to teach engineers and should not be accredited.

For example, even in any of these issues we get the complete documentation from the Washington Office. EAB is responsible for both the Guidance Brochure and the Design Engineering Technology, USAB is charged with our interface with NCE.

—Ben Leon
Editor-in-Chief

FROM THE USAB CHAIRMAN

As 1982 Chairman of USAB there is no way to start our initial "message" to the readers of IMPACT with anything other than "Thank you". Dick has approached the needle-like path of professional activities in IEEE with uncomprehending dedication. Fortunately enough to be involved, and I was one, that Dick, above all, brought organization to what tends to be an anarchic state. I believe that the USAB and the four Council Chairmen have been chosen by an election process for the first time.

But I would be remiss if I merely credited Dick with running the organization well. He was also personally involved. Whdn Three Mile Island became an issue, in quick time, he got with the NRC and organized a conference on the subject. This conference, as we know, produced the report alleged to have been voted by Wilson from Vanderbilt University in Nashville. In this Council are the various technology committees: Energy, R&D, COMAR, through which we fulfill our responsibility to professional to present our positions to our government in matters of our expertise. Over the decade that IEEE has been active in Washington, both the government and industry have come to count on us for our expert opinion. Our views are presented to the government in many ways, in testimony at hearings, through meetings with members of Congress, government officials or members of their staffs, and through correspondence. In addition we are responsible for the presentation to the public through dissemination of position papers.

To operate in Washington, we need not only our expertise, but also connections to the power points in the government. That is the responsibility of the Government Activities Committee, which will be headed in 1982 by Russel Drew who lives and works in that climate. Russ is currently busy organizing the 1982 Technology Policy Conference being held during National Engineers Week. I know that he will bring together the various Board members of IEEE and many government officials in discussions on the socio-technical issues our Councils will address in the next decade, as it has always been my feeling that USAB, as best it can, should represent the thinking of the membership of IEEE. Obviously, it is, of course, impossible to have every issue in all these discussions. To keep myself on even keel, I am an avid reader of our membership opinion survey which USAB takes every couple of months. I do not have that much time and I am not sure what I should read. That is, until that day when some event grabs at their own personal career.

Incidentally, Ron and I have both agreed that IMPACT in 1981 under the editorial direction of Ben Leon has been great. We have asked Ben to stay on in 1982 and he has agreed. I am sure that with the "CAGD" as the "family" newsletter. I especially hope you will use it to convey your opinions to USAB on what it is, or is not, doing to your satisfaction.

Dave Lewis, last year's Pension Chairman and former IEEE Congressional Fellow, has probably the toughest

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IMPRESSIONS OF THE IEEE CAREERS CONFERENCE: WHAT'S WORKING TO ENRICH ENGINEERING CAREERS?

Harry Cronson
1981 National PAC Member Services Facilitator

This conference, organized by the IEEE Task Force on Career Maintenance and Development, was held in Denver on October 22-23, 1981. Its purpose was to present viewpoints on long- and satisfying careers for the million-plus engineers in U.S. who work as technical contributors. The attendance of about 115 people was fairly evenly divided among practicing engineers, industry managers, and human resource managers along with social and behavioral scientists. I thought the Conference was very helpful in providing good communications among these groups. The Conference Chairman, Wally Decker of Lawrence Livermore National Laboratory, deserves much praise for his organization and dedication.

Below are some ideas from the 6 sessions which I found particularly useful. They represent only a small part of the material covered. A Conference Record with the text of all the papers is available from the IEEE.*

SESSION 1: Engineering Careers: Dimensions of the Problem

- The most important factor in maintaining high job performance is a challenging job assignment. A person who was once a high (low) performer is most likely to remain a high (low) performer.
- Usually a first line supervisor is too job focussed to decide what's good for an engineer's career. Job assignment decisions should be made by a higher level manager.
- Comments on role of engineers in organizational decision-making: "Their is not reason to why, theirs is but to cut and try."

SESSION 2: Past and Future Patterns in Engineering Careers

- Some problems of career planning are: 1) an engineer is unsure where s/he wants to go, 2) management lacks useful ways of thinking about careers, 3) lack of clarity in responsibility between management and engineering, 4) lack of management support.
- There is a psychological work contract between a set of expectations brought to the job and the derived psychic income.
- Is engineering a lifetime career? No, if the individual is non-adapting; yes, if the individual and the organization change.

SESSION 3: Alternative Management Methods for Effective Improvement in Careers of Engineers

- Bell Labs has had a Sounding Board for 30 years. This is an organization of technical people who collectively presents the views of technical professionals to each other and to management. The Board publishes salary surveys, opinion surveys, job postings, and is concerned with many issues. It is not a union, but its right to organize is protected by NLRB rules.
- A company's main interest is money; only a union can legally look out for its members.
- Management should provide engineers with challenging job assignments and establish clear and measurable performance goals.

SESSION 4: Professionals and Their Societies

- One can make an analogy between an engineering shortage and an energy shortage. Two ways to reduce an energy shortage are more production and more conservation. Similarly with engineering, more graduates and improved utilization are needed. Engineers need more support people. An engineering utilization study is currently being done by the American Association of Engineering Societies.


There are various career cultures. Conflicts arise between organizations and individuals with different career concepts. Individuals should select an organization most compatible with their career concepts. Different career cultures are:

- Linear: promotion and steady upward movement are the main reward. Most organizations are run by linear people.
- Steady State: very little vertical movement occurs and pay scales are based on technical merit. This culture is very prevalent among engineers. Those with a linear career concept are frustrated in a steady state culture.
- Transitory: a series of brief engagements (1 to 4 years). This culture can reflect the cyclical nature of some engineering jobs.
- Spiral: 5 to 10 year engagements which could be totally different careers. An example is spin-offs from the main organizational product line.

- Only 8% of engineers become permanent line managers.

UNDER CONSTRUCTION

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OPINIONS AND ITEMS FOR DISCUSSION

I. THE FIRST POINT
The IEEE Guidance Brochure—A Case Study 12/15/81

Our story starts in 1975, when the IEEE Educational Activities Board (EAB) drafted a new guidelines brochure for high school students who might enter engineering. It was entitled "What Shall I Be?", and it started a revolution in the Internet. In the days that followed, when the Board of Directors wanted a guidance brochure, they requested that EAB write one. Then the B. of D. would review and allow the edited result to be published under the name of IEEE. No grass-roots IEEE members were brought into the "loop", so the brochure reflected the point of view of academics.

However, something unusual happened in 1975. Some sympathetic Board members circulated copies of "What Shall I Be?" to Professors (now PAC's); Long Island PAC (LIPAC) got a copy. We observed that the brochure glamorized the career of engineering and did a good marketing job for the (then) newly-emerged degree, the Bachelor of Technology. Other PAC's around the country made the same observations, and each of the PAC's independently wrote criticisms of the brochure and mailed them to whatever sympathetic Board members they could find.

The contact yielded by this brochure was unprecedented. It caused the Board of Directors to recall all copies of "What Shall I Be?" and shred them. (I still have a copy.) View it and allow the edited result to be published under the name of IEEE. No grass-roots IEEE members were brought into the "loop", so the brochure reflected the point of view of academics.

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Engineers need to acquire personal power so they can cope with life, in general, and cope with management, in particular. Management should stop behavior that robs employees of personal power by ending excessive domination, providing opportunities, and building on strength rather than weakness.

Surveys among engineers show their favored employer practices include: sophisticated job posting, promotion from within, communication with employees, mentoring opportunities, increased responsibility, and enthusiasm for products.

To build a good track team you need man to jump 7 feet. Having 7 men who each can jump 1 foot will not do.

The Conference ended with an optional Career Strengthening Workshop for those wishing to improve their effectiveness in a technical environment. These Career Strengthening Workshops were developed by the IEEE Task Force in Career Maintenance and Development and have been held in many sections of the country.
Continued from page 7

spending eliminates thousands of engineering jobs. Con- versaely, new projects create a demand for engineers. Un- fortunately, the demand is often in another part of the country. During the last thirty years, cyclical ups and downs have been the order for engineering employment, resulting in thousands of displaced engineers and long- term unemployment for thousands of others. Unemployed engineers have been forced to change careers in mid-life. This mobility may be desirable when you’re young, but it’s difficult for families when they are required to give up homes and friendships and juggle the children’s schools.

3. RETIREMENT/PENSIONS Mobility also affects plans for retirement. Intentionally or not, most engineers change jobs every few years, too often to realize pension vesting. You probably will not stay with an employer long enough to receive the de- scribed pension benefits. Your retirement plans may have to be based on living on Social Security plus personal sav- ings.

4. UNRECOGNIZED PROFESSION Engineers are seldom treated as professionals. Engineering includes long hours of tedious effort. Also, in spite of professionalism, your employer may require unnecessary overtime.

Other professions, union protected trades, and some business ventures offer the potential for an enjoyable, stable, and profitable lifetime career. With experience, you are often worth more. In engineering, there is a strong demand for your services for only approximately six years after graduation. This does not lead to a stable lifetime career. For the years of study and years of experience required to be really competent, it may not pay to be an engineer.

Advantages Of E/E Engineering

1. SALARY Starting engineers currently receive higher pay than most graduates entering other occupations, and there is presently a strong demand for new engineers.

2. PERSONAL SATISFACTION Engineering design problems provide the opportunity for creativity, and deep personal satisfaction during the course of solving design problems.

3. RECOGNITION Recognition for significant accomplishments generally comes within a company from one’s peers. Within the in- dustry, recognition arises from the publication and presen- tation of technical papers.

4. JOB BENEFITS Most employers provide the following employee benefits. Some of these may be better for the EE than for a non-professional.

(a) Financial support of continuing education

(b) Time off for personal business, emergencies, etc.

(c) Health, Dental and Hospitalization insurance

(d) Life insurance

(e) Sick leave

(f) Savings plan

(g) Retirement plan

(h) Paid vacations

(i) Some companies have flexible working hours

5. PAID TRAVEL A job may require some travel for company business. This can provide the opportunity to visit areas of the United States and foreign countries. Your company may send you to technical symposia and conferences. Generally, all travel expenses are paid by your employer.

6. BROAD TECHNICAL FOUNDATION The rapid engineering advances taking place today provide many opportunities for an individual with technical expertise. A few engineers will attain high levels of technical responsibility and recognition. Others may find that their training and experience prepare them to enter private practice. Still others may find engineering-related business opportunities. Engineering is often a stepping stone to business management.

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III. THE THIRD POINT

After College, What?

The program you select in electrical engineering or technology will prepare you for your first job after graduation. However, no college degree is an end in itself. Advancement in a technical field requires continuing education and professional growth. Since professional careers span approximately 40 years, you can expect technology to continue to change radically during your career and you should keep yourself technically prepared. Membership in technical societies (such as IEEE) with their various technical publications, continuing education, short courses and continued interaction with technical peers are helpful.

Unlike some professions, the engineering related person- nel are not regulated according to the number of people who can enter the field. Success is usually acquired through com- petence and hard work. Throughout your professional life you will encounter competition from peers and new en-

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treants. Your willingness to keep up with the technology is necessary for continuing professional development—or even em- ployment—in the profession. You should choose your career based on your own talents and what you enjoy do- ing rather than on the prospects for a certain monetary gain.

Engineering graduates have employment opportunities in a number of different environments. Most engineers work in private industry and in government contract pro- grams. Others work for government agencies. A small percentage work in educational institutions and eventual retirement. This usually requires advanced degree. A small percentage work as self-employed consultants, but these are rarer with years of experience. Almost all technologists work in private industry.

Traditionally, the job opportunities for engineers, technologists and technicians vary somewhat cyclically with changing economic conditions. Most of the time there appear to be reasonable opportunities. Sometimes changes may require moving to a new location or in- dustry, and the job market will be better in other places. In some fields, future retirement benefits may have to be provided by the engineer if frequent movement is required. But, overall, the number of available jobs is normally greater for engineers than for many workers in other fields. With continuing significant increases in the use of technological developments in our lives, job opportunities for engineers and technologists seem relatively favorable.

There are two major areas which engineers may pursue, that may lead to management of technical projects and organizations. A majority of engineers spend their entire careers in technical related pursuits. There is a larger need for technically oriented workers than for managers. Also, many engineers prefer the technically related job over management. Both venues may be rewarding for the pro- ductive person.

THE ROLE OF PROFESSIONAL SOCIETIES

Noel P. Lindsay and Dirk A. Rodgers

Students, University of Wisconsin/Madison

Picture this scenario: It’s your first year at your first job after graduating from the college of engineering. You have recently begun to feel like you understand exactly what your job is about and you are beginning to get tired of working on such a limited aspect of it. You feel as if you are now ready to take on more responsibil- ity than the current situation allows. Your supervisor is scheduled for next week and you are hoping for a promo- tion. Suddenly your supervisor tells you that he has to go out of town and asks you to take his place at the monthly board meeting. Among other things, he tells you that it is vital that more money be allocated to that project that is currently involved with. Realizing that your performance at this meeting would probably be the decisive factor in your promotion, you now must decide whether or not to gamble your possible advance- ment on your ability to perform effectively at this meeting.

This ability would be dependent not only on your tech- nical competence, but also on your level of professional development. Unfortunately, many engineering students ignore the second of these essential characteristics until it is enforced upon them by their first employer. Other stu- dents begin their professional growth before they even graduate.

Many people in industry feel that one of the best ways to accomplish this is to become an active member of a professional society as a student, rather than waiting until after graduation. For example, the student branch of the Institute of Electrical and Electronics Engineers (IEEE) has many programs oriented towards increasing the professional awareness of its members.

One consists of bringing industry professionals to speak at the meetings on relevant technical topics. In addition to the valuable technical in- formation, members also have an unprecedented oppor-

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Faculty Recruiting Experience—There May Not Be a Shortage

In recent issues of IEEE Spectrum we placed the following advertisement:

Faculty Positions in Electrical Engineering at the University of Kentucky are available at the Associate/Assistant Professor level. A Ph.D. or an equivalent qualification is required. Experience in research is a demonstrated necessity. It is expected that the candidate will have teaching experience. The process is moving forward and candidates are being encouraged to respond. Applicants should contact the Department of Electrical Engineering at the University of Kentucky, Lexington, KY 40506. The University is committed to an Equal Opportunity/Affirmative Action Employer.

During the few months we received 81 applications. Of these 81, 18 were from U.S. citizens, 9 were from individuals who were permanent residents of the United States, and 56 were from people who were either outside the U.S. at present or, if in the United States, they were on a visa other than a permanent visa. All except one of the applicants had a Ph.D. of residence. One of the applicants had a Ph.D. from a country outside the U.S.

Of the 81 applicants, 15 were from Canada and the rest included Western Europe, Israel, Japan, Australia, and India. When one looked back at where the people received their Bachelor’s Degree, it turned out that the largest number came from the Indian subcontinent (India, Pakistan, and Bangladesh). Twenty-nine had Bachelor’s Degrees from these countries. Nineteen had their Bachelor’s Degrees from United States institutions. Twelve were from the middle east, ten were from western Europe and Israel, eight from the Far East and two from other countries.

Since our tenure track positions would ultimately be filled by permanent residents of the United States, we felt it best to try to recruit from among the citizens or permanent residents and not to be too concerned with the credentials, anyone who did not have permanent status in the United States. Of this group, two had Canadian Ph.D.’s, one had an Indian Ph.D., and all of the rest had Ph.D.’d of living from outside the United States. We next examined how long it had been since each of this group received their Ph.D. We found one Ph.D. each in the years 1964, 66, 68, 69 and 70. In 1972, 73 and 74 there were 3, 2, and 3 Ph.D.’s. Then we had 3 whose degrees were received in 1971, 77, 79, respectively. Thus, as we expected, most people were recent Ph.D.’s. Just looking at years since the degree, there were certainly 10 and probably 13 people who would expect to be offered an Assistant Professorship. There was a fairly large pool (8 individuals) with Ph.D.’s in the early 70’s who would expect to be ready for Associate Professorships. There were a few individuals who had their Ph.D.’s from earlier years and these might not be as attractive to the Associate Professorship. The advertisement said at the Assistant or Associate Professor level, these individuals apparently were willing to accept an Associate Professorship.

Five individuals were invited in for interviews. Four offers were made and the two positions were filled, both at the Assistant Professor level. The other two offers were one as an Assistant Professor and the other as an untenured Associate Professor.

There were a few very well-qualified candidates who, by their resumes, were well qualified for tenure-track positions at a research-oriented University. We did not invite these for interviews since they had their basic areas were somewhat outside those of our primary needs. Had we not filled the two positions when we did, we would have invited more people. We did not have a strict area restriction. I think we could have filled the two positions at least twice with qualified individuals from this pool of applicants.

From our experience with faculty recruitment, I am personally convinced that there are indeed a number of people available for faculty positions who are qualified to do research, teach and obtain tenure, under the most stringent rules in American universities. These individuals are citizens, or have already gained permanent residency. There are a lot more than we could interview in areas that involve overseas travel, and there are so many more who do not have permanent status in the United States. It is reasonable that American universities are doing a good job of attracting younger faculty members, but there is also room for improvement.

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Bright Lights in Dark Places

Al Louis Ripsik: For nearly a decade, Ripsik has been central to the creation of the Department of Housing and Urban Development for teenagers. He should know; he works there.

Ripsik, now 38, has served as a HUD program analyst and devotes his spare time to an unremitting search for department boondoggles, scandals, and mismanagement. He has been known to call on Congressmen, the Justice Department, or the FBI, and has been known to, on occasion, accuse them of impecuniousness while they are, in fact, paying themselves huge salaries. He has been known to, in short, be a troublemaker.

His most recent expense charge that HUD had wasted $3 million in a contract management over the past six years.

One should let the new professor know what is expected for the continual progress that will lead to a double salary at the end of the year. One of the 20-year progressing professor will have become a recognized leader in his or her field of specialty. At the institution he or she should be involved in the development of a course program at both the undergraduate and graduate level in that specialty field. By the 20-year mark, at least one text book should have been written and placed at the forefront in the field. The outside recognition should have led to the individual being a Fellow member of the IEEE. The individual should have done some work in a professional society, most probably one of the IEEE societies. If he or she is administratively inclined, by the 20-year point, he or she should have been an editor of the society transactions or president of the society or some other such administrative office. If the person is strictly a scholarly type, then we would expect that he or she has been given some sort of scholarly awards by International organizations.

One should be conducting a research program that has been recognized to regularly draw external support. The nature and amount of the support depends on the area. The person should certainly be supporting a few graduate students and have sufficient additional funding to pay for the fraction of his or her time that is devoted to the supervision of those students and also pay for most of his or her travel. The Administration must recognize that the support is not a constant thing. There must be funding from the project who run both faculty member and graduate students in the area do not have a sharp change in their job in periods of funding valleys. The funding of the department should, by the end of the year, be regularly published in the archival journals in the field and presenting papers at most of the major meetings in the field.

A senior full professor is also expected to come about some share of responsibility for the University governance and administration by serving on various university, departmental committees or administration and curriculum planning.

—Ben Leon Chairman, Dept. EE University of Kentucky

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Former HUD Secretary Patricia Harris would rage at the reference to Ripsik’s name. HUD officials have tried to license for years to force him out. But Ripsik has survived as the ultimate whistleblower, mercilessly flaying HUD officials in his newsletter when they go astray.

—Washington Post Magazine

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• UH0148-7, IEEE Careers Conference. See p. 5.

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