



THE INSTITUTE OF
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ENGINEERS, INC.

THE UNITED STATES ACTIVITIES BOARD

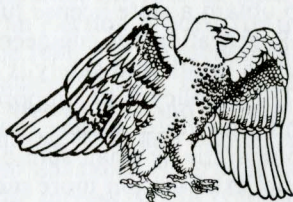
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NATIONAL ENGINEERS WEEK IS FEBRUARY 21-27, 1982

Schedule for the February 1982 Board of Directors Series of Meetings

TIME PERIODS	DAY 1 [Tuesday Feb. 23, '82]	DAY 2 [Wednesday Feb. 24, '82]	DAY 3 [Thursday Feb. 25, '82]	DAY 4 [Friday Feb. 26, '82]	DAY 5 [Saturday Feb. 27, '82]	DAY 6 [Sunday Feb. 28, '82]	DAY 7 [Monday Mar. 1, '82]
Breakfast Period			M.C. (C) Pres. Elect Dr. George A. Keyworth Presidential Science Adviser	M.C. (F) VP-TA Dr. Courtland D. Perkins President of the National Academy of Engineering	Foundation Board		
Morning Period		TAB OpCom	1 ½ hr Energy Policy 1 ½ hr National Resources for Innovation	TAB RAB EAB PUB			
Lunch Period	United States Activities Board	M.C. (A) VP-PA Rep. Don Fuqua	M.C. (D) Inst. Pres. Senior White House Spokesman	(G) Dr. John H. Gibbons Director, Office of Technology Assessment	Executive Committee	Board of Directors	Board of Directors
Afternoon Period		Long Range Planning Comm TAB OpCom Society Presidents Forum	1 ½ hr Information Systems Technology Policy 1 ½ hr Educating Society About Technology	TAB RAB EAB PUB			
Dinner Period	Audit Comm.	M.C. (B) VP-TA Sen. John Glenn	M.C. (E) VP-PA Sen. Alan Cranston	Executive Committee			

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 topics of concern haven'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 registration. Recruitment of high school students into engineering, IEEE 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 job security. Some feel that the market place does not respect the engineer. As a consequence, engineering is not a good profession. This group believes we should discourage high school students from entering engineering schools. They believe that only by creating an 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. At present many of our new graduates fall short of this goal.

In a guidance brochure we must tell students about engineering in terms that stir their interest. 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 worthwhile to spend a comparatively small sum of money to make the professional examination more meaningful to the practice of electrical engineering. The debate on this issue 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 many schools cannot afford to upgrade their computer facilities. My opinion is that such schools cannot afford to teach engineers and should not be accredited.

PACs who are interested in any of these issues can get the complete documentation from the Washington Office. EAB is responsible for both the Guidance Brochure and the Accreditation Guidelines. USAB is charged with our interface with NCEE.

—Ben Leon
Editor-in-Chief

IEEE IMPACT

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FROM THE USAB CHAIRMAN

As 1982 Chairman of USAB there is no way to start out my initial "message" to the readers of *IMPACT* without first paying tribute to Dick Gowen who has been Chairman for the past two years. Dick has threaded the needle-like path of professional activities in IEEE with uncommon expertise and finesse. Those fortunate enough to have been involved, and I was one, know that Dick, above all, brought organization to what tends to be an unorganized activity. During his term the USAB Council form of organization was instituted. It has worked very well to put USAB on a business-like basis. And for 1982 under our new Bylaws, 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. When Three Mile Island became an issue, in quick time, he got with the NRC and organized a conference on the application of advanced electro-technology to nuclear power plants. The success of this conference led to a second successful conference just this past fall on Probabilistic Risk Assessment. When the press became saturated in 1981 with stories about the engineering shortage, saying we should generate quadruple numbers of additional engineers, Dick said, "Hey, wait a minute. It's not that simple". He quickly organized an Engineering Manpower Conference in Washington to begin to look at all aspects of the "problem". Unearthing the facts on this issue will be an ongoing activity of USAB in 1982, and I am very happy to say that Dick has agreed to stay on and head it. I am sure it will move forward. Let me add that I, personally, cannot reconcile the "engineering shortage" with engineer layoffs and flat salary curves. If there is a real shortage, it must be of engineers with specific capabilities. This then raises the questions of engineering education and career maintenance. It is not a simple issue and I hope Dick Gowen and his task force will be able to lay out the parameters of the problem.

Let's look ahead to 1982. The organization is in place. It's our job to get something done with it. Ron Wojtasinski is our Member Council Chairman. Ron is in Florida at the Cape and comes out of the PAC's. Working with him as National PAC Chairman for the second year will be Ron Fredricks from Michigan. This Council has the job of establishing communications down to and up from our members as well as stimulating local professional activities. It's a tough job and there is a long way to go. So many of our members are so busy with their technical and job activities that they just don't have the time or interest. 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 look upon *IMPACT* 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

Council job in USAB, the Careers Council. That's where it's at. With Reagan, we now have an IRA for employed engineers for the first time. But also with Reaganomics, we are hearing about layoffs for the first time in a while. IEEE played a most positive part in Detroit in 1981 in finding opportunities for unemployed EE's. We will continue this activity in 1982 whenever and wherever it is needed. It is frustrating to me that we still have not found the answer to the Service Contract wagebusting problem, but we're not going to give up. The Service Contract Task Force is in the final stages of development of a bill to remedy this issue and still treat engineers as true professionals. All of these activities, as well as others I have not mentioned: Registration, ethics, pensions, patents, etc., all fall under Dave's mantle. He is in for a busy 1982.

The other side of the coin from our Careers Council, which concerns itself with our internal career needs, is the Technology Activities Council headed in 1982 by Larry Wilson from Vanderbilt University in Nashville. In this Council are the various technology committees: Energy, R&D, COMAR, through which we fulfill our responsibility as professionals 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 make our views known to industry and to the public through dissemination of position papers.

To operate in Washington, we need not only our expertise and opinions, but also connections into the power points in the government. That is the responsibility of the Government Activities Council, which will be headed again in 1982 by Russell Drew who lives and works in that climate. Russ is currently busy organizing the 1982 Technology Policy Conference being held during National Engineers Week February 21-27. This will bring together the various Board members of IEEE and many government officials in discussions on the socio-technical issues our United States society faces in the next decade or two.

It has always been my feeling that USAB, as best it can, should represent the thinking of the membership of IEEE. Obviously, it can't please everyone on every issue. To keep myself on an even keel, I am an avid reader of our membership opinion survey which USAB takes every couple of years. In this survey, as in the dues check-off, our members are about equally divided on spending our time on career activities (for ourselves) and socio-technological activities (for society). We have ample talent in USAB to do both. That's what I intend to do.

The four Council Chairmen and I are now actively working on the selection of task force leaders and on the development of plans for programs for the coming year. We are seeking leaders and are setting goals which will assure an active, challenging, and productive year for

Continued at bottom of next page

INFORMATION ITEMS

USAB MEETING DEC. 2, 1981

- I. Action Items:
 - A. Election of 1982 officers.
 1. Controller—Peter Rusche
 2. Member Activities Council Chair—Ron Wojtasinski
 3. Government Activities Council Chair—Russ Drew
 4. Career Activities Council Chair—Dave Lewis
 5. Technical Activities Council Chair—Larry Wilson
 6. National Pac Chair—Ron Fredricks
 - B. Approval of the following items.
 1. A recommendation to the Secretary of Labor that certification of foreign nationals for U.S. engineering positions be denied if the only evidence of unavailability of domestic engineers is advertising of the position at a salary below the 25th percentile from the 1981 (or subsequently most recent) IEEE salary survey.
 2. A motion to maintain PAC funds in a separate, segregated account.
 3. An extension of the PAR experiment for a second year. PAR is an employment service that matches resumes with available jobs. For the period the resume service is available to IEEE members without cost.
 4. A motion to provide financial support for the committee charged to work with the National Council of Engineering Examiners (NCEE) to prepare questions for the Professional Engineering Examination. This item prompted considerable discussion.
 5. The PreCollege guidance brochure in the compromise form worked out by a joint USAB, TAB, EAB committee. The item prompted little discussion at USAB because all the arguments, (as discussed elsewhere in this issue of *IMPACT*) had been dealt with previously.
 6. The COMAR position paper on "Human Exposure to Microwaves and other Radiofrequency Electromagnetic Fields."

- II. Information Items.

A number of information items were received; three deserve special mention.

 - A. The Treasurer reported that we are doing well with respect to our 1981 (revised) budget.
 - B. Plans for the Technology Policy Conference, which will take place Feb. 24-25, 1982, are proceeding.
 - C. A meeting on Engineering Manpower Requirements was held in Washington in November. Darrell Vines summed up the results of the meeting by observing that after all of the statistics about engineers currently employed, new graduates in the pipeline, job vacancies, and salaries were discussed the attendees came to different conclusions. Basically there were two opinions on the underlying truth of the statistics.

One group's "truth" was

- a. There is presently an excess of engineers.
- b. There will be more excess in the future.
- c. There is an excess number of electrical engineers.
- d. In 1967 dollars (discounting inflation) starting salaries are lower now.
- e. Salary compression is atrocious.
- f. Faculty salaries are too low.

The other group's "truths" seemed to be contradictory to the first group's.

- a. There is a current shortage of computer specialists and semiconductor engineers.
- b. There is a long term demand for increased numbers of engineers in all areas.
- c. In 1962 dollars, salaries for engineers are up.
- d. We always need good people.
- e. To meet high technology needs, we need new ideas and young ideas.
- f. Faculty salaries are too low. ■

keep them coming. Write to Ben. Write to the Council Chairmen. Write to me. Let us know what you think. We may not do just what you ask, but we will do something a little differently because you wrote.

—Jack Doyle

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USAB. I urge each of you who has an interest in working with us to accomplish our goals to let us know of your interest. We will try to put that interest to good use.

I look at *IMPACT* readers as those who are truly interested in professional activities. Many of you I know personally. One important part of *IMPACT*, maybe the most, is the letters back from the readers. I hope you will

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 achieving 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 focused to decide what's good for an engineer's career. Job assignment decisions should be made by higher level management.
- Comments on role of engineers in organizational decision making: "Theirs is not to reason 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.

- 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:

- A. *Linear*: promotion and steady upward movement are the main reward. Most organizations are run by linear people.
- B. *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.
- C. *Transitory*: a series of brief engagements (1 to 4 years). This climate can reflect the cyclical nature of some engineering jobs.
- D. *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.

SESSION 3: Alternative Management Methods for Effecting 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.

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*Publication No. UH0148-7, available from IEEE Service Center. Members, \$18.75; Nonmembers, \$25.00.

- Sometimes go to IEEE chapter meetings not in your discipline. You'll meet new people and learn the buzzwords.
- Volunteer for job rotation.
- Develop communication skills.

SESSION 5: How Companies are Handling Career Development for Engineers

- Honeywell started a triple ladder system. From a common base, there are three branches: staff, fellow, and management. They also run Career Exploration Workshops which take 3 days and consist of tests, group discussion, and counseling.
- Westinghouse undertook career development programs as an important part of an increased productivity effort.
- At HP every engineer spends 2 weeks a year in another HP division. Project teams go off on retreats together.

SESSION 6: The Mid-Career Crisis

- Lawrence Livermore National Laboratory has a Career/Life Planning Program to reduce career anxiety and let people decide what their goals are. Since 1973 over 900 employees have attended workshops with 34 contact hours over a 5 week period. Studies of the effects of the workshop have shown that participants reduced blaming others with the realization that they have choices, improved self-esteem, resulted in better communications, and improved moral.
- The utility of workshops is it gets people thinking about what do I enjoy doing, what am I good at, and what opportunities exist other than moving up.
- 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 1 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. ■

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) wrote a draft of a new guidance brochure for high school students who might enter engineering. It was entitled "What Shall I Be", and it started a minor revolution in the Institute. Back in those days, when the Board of Directors wanted a guidance brochure, they requested that EAB write one. Then the B. of D. would review 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.

However, something unusual happened in 1975. Some sympathetic Board members circulated copies of "What Shall I Be" to Professional Activities Committees (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 furor created by this draft 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.) Then B. of D. told EAB to heed some of the critiques and rewrite the brochure. A few months later a new booklet emerged, "Careers in Electrical/Electronics Engineering", IEEE publication EH01164. It contained almost all of the same press agency as the original booklet, but it set a precedent. A new group had been allowed to enter the IEEE activity of creating guidance brochures—the local PAC's. Publication EH01164 undoubtedly caused many high school guidance counselors to advise students to enter engineering college. Thus it must have earned considerable income for the colleges. But the story doesn't end here.

For some reason I don't fathom, EAB wrote a new draft of a guidance brochure in Feb. '81, entitled "Careers in the Electrical, Electronics, and Computer Engineering Fields". Because of the precedent set in '75, the U.S. Activities Board (USAB) was given advance copies of this draft to circulate to PAC's all over the country. Thus practicing engineers were voluntarily given the chance to evaluate this brochure before publication. LIPAC got a copy and found it contained the same flaws as its predecessor.

We of LIPAC wrote another critique and mailed it not only to USAB but also to other PAC's around the country. All the critiques were gathered by a USAB Task Force and summarized for USAB. Then they were forwarded to EAB. It seemed that EAB would have to pay attention to complaints about their brochure-writing capability. But how would they handle the matter equitably?

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THE PRECOLLEGE GUIDANCE BROCHURE

Three Points of View

- I. Bob Bruce, one of the USAB representatives on the USAB-EAB-TAB Committee, gives his thoughts on the *Guidance Brochure*.
- II. This document, which originated with the San Fernando PAC, has been reprinted in a number of section newsletters.
- III. The following statement on career paths and hazards is taken from the just approved *Guidance Brochure*. It represents the compromise that the Committee accepted.

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The IEEE Board of Directors appointed an ad hoc committee to meet in Chicago in November '81 to rewrite the brochure. The Vice President of Educational Activities (EAB Chairman) was on the committee. He's from the University of Illinois. Four other college professors were on the committee, including two of the three USAB representatives. (Yes, college professors are in USAB also.) I was the third USAB rep. Of the remaining committee members, two were from a sheltered industry (the phone company), and one was a Technical Activities Board (TAB) representative from Westinghouse. His point of view seemed to be that of corporate management. In my humble opinion, the committee was *stacked*, and its composition predetermined the end result, since it adopted a rather novel editing technique. If any committee member suggested changes to the brochure, the suggestion was offered to the other members to approve or disapprove. When I suggested that salary information be included in the brochure, the rest of the committee disagreed. In effect, most of my suggestions were *vetoed* by the rest of the committee. Predictably, the edited result is little better than the one before.

During the first week of December the major boards of IEEE met in Savannah. I learned from phone conversations that the edited version of the draft brochure was approved by both USAB and the Board of Directors. This is despite the fact the Long Island PAC wrote a protest, and despite the fact that I wrote a minority position that

Robert Bruce
L.I. Section/USAB Liaison

II. THE SECOND POINT

WHY BE AN ENGINEER?

Disadvantages Of E/E Engineering

1. SALARY COMPRESSION

An early 1978 survey reported on average salaries received by engineers. Entry level engineers received

*1978 Surveys conducted by Fox Morris Associates, Inc. and National Personnel Consultants, reported in Design News, 4/17/78.

went along with the edited brochure, which set forth the shortcomings of the brochure. Since the ad hoc committee contained representatives from the major boards of IEEE—USAB, EAB, TAB, etc. its output was construed as the work of the entire Institute. In point of fact academics dominated the proceedings. The present version of the guidance brochure (the approved version) contains most of the same propaganda as its predecessors. Several conclusions can be drawn from this series of events.

IEEE is in the business of recruiting high school students into engineering college, even though they don't belong in that business. Academics are fighting to maintain control of all guidance material issued by IEEE. They have a business interest in publishing glowing reports about engineering, since their prosperity depends on recruiting the maximum number of students. This maximizing process is counterproductive to the professional well being of the practicing engineers who comprise the overwhelming majority of IEEE membership. If you have any wish for IEEE to pursue your professional interest in a real and material way, write or phone your representative on the IEEE major boards. If you want to know what issues to act on or what to tell your representative or who he/she is, come to PAC meetings and find out. If you want a payoff, get a piece of the action.

\$15,300 per year. Engineers with 2 to 5 years experience received \$21,500. However, senior level engineers received only \$28,200*. This is referred to as salary compression. Senior engineers' salaries have not kept up with the increase in the cost of living.

2. JOB INSECURITY/MOBILITY

Job security is directly related to the general economy. This is especially true for engineers. Government cancellation of projects, such as the B-1 Bomber, or reduced

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spending eliminates thousands of engineering jobs. Conversely, new projects create a demand for engineers. Unfortunately, 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 change 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 described pension benefits. Your retirement plans may have to be based on living on Social Security plus personal savings.

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 uncompensated 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 industry, recognition arises from the publication and presentation 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

Your 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 prepares them to enter private practice. Still others may find engineering-related business opportunities. Engineering is often a stepping stone to business management.

The above article was published by the San Fernando Section of the IEEE and developed by their Professional Activities Committee. If you would like more information or have anything to add, please write to Herbert J. Barr, Chairman, PAC, 5314 Willis Ave., Van Nuys, CA 91411.

Reprinted from *The IEEE Newsletter*, North Jersey Section, November, 1981.

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 personnel are not regulated according to the number who can enter the field. Success is usually acquired through competence and hard work. Throughout your professional life you will encounter competition from peers and new en-

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trants. Your willingness to keep up with the technology is necessary for continuing monetary reward—or even employment—in the profession. You should choose your career based on your own talents and what you enjoy doing 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 programs. Others work for government agencies. A small percentage of engineers work in educational institutions, though this usually requires advanced degrees. A small percentage work as self-employed consultants, but these are persons 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 industrial area offering more or better jobs. 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 of technically related activities and eventually that of management of technical projects and organizations. A majority of engineers spend their entire careers in technically 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 avenues may be rewarding for the productive 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 department is doing 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 responsibility. Fortunately your annual performance review is scheduled for next week and you are hoping for a promotion. Suddenly your supervisor tells you that he has to go out of town unexpectedly 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 the project that you are presently 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 advancement on your ability to perform effectively at this meeting.

This ability would be dependent not only on your technical competence, but also on your level of professional development. Unfortunately, many engineering students ignore the second of these essential characteristics until it is forced upon them by their first employer. Other students 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 of these programs consists of bringing industry professionals to speak at the meetings on relevant technical topics. In addition to the valuable technical information, members also have an unprecedented oppor-

tunity to interact with practicing engineers in a relaxed atmosphere. This program also includes a series of plant tours allowing students direct exposure to a variety of industries.

IEEE's summer job placement service was started this year to provide its members with a better opportunity to gain invaluable summer engineering experience. There are now over a thousand electrical engineering positions available to IEEE members for next summer. The students participating in this program will receive a computer listing of the positions which correspond to their interests.

Another program consists of soliciting donations of equipment from industry for the student electronic shop and promoting its use. Students using the shop have the opportunity to go beyond theoretical design by actually building equipment and making it work.

To help the students gain a better perspective on their profession, IEEE sponsors a number of design contests. One of these contests is intended to highlight the same economic concerns that industry must consider. The entries will be judged on the basis of marketability, profitability and even the quality of the 'sales' presentation.

IEEE is only one of many professional engineering societies. Each of these societies have their own individual methods of accomplishing the same basic goal—to help their members begin their professional development.

While many engineers would have difficulty with the decision in the above scenario, a professional would not hesitate to take the opportunity to show what he can do. Maybe you should begin now to prepare yourself for this kind of situation. Become a professional. Become involved in a professional society. ■

This article originally appeared in the *IEEE Newsletter* of the Madison WI Section.

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 Assistant/Associate Professor level. A Ph.D. or an equivalent research and publication record is required as a demonstration of individual research initiative and ability. Faculty at the University of Kentucky divide their time about equally between teaching and research. Senior faculty are expected to help in finding support for their own research and that of their junior colleagues and graduate students. Applicants should send resumes to Professor B. J. Leon, Chairman, Department of Electrical Engineering, University of Kentucky, Lexington, KY 40506. The University of Kentucky is an Equal Opportunity/Affirmative Action Employer.

During the next 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. Forty-nine of the Ph.D.'s were from U.S. universities, 15 were from Canada and the rest included Western Europe, Israel, Japan, Australia, India and Turkey. 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 consider, in the initial screenings, 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.'s from United States universities. We next examined how long it had been since each of this group received the 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 1977, 4 in 1979, 1 in 1980 and 5 in 1981. Thus, as 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 have been ones who wanted full Professorships. Since 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 number of candidates who, by their resumes, were well qualified for tenure-track positions at a research oriented University. We did not invite these for interviews because 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 recruiting, 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 is no need to bring in non-resident aliens for these positions except in cases of very special need in certain specialized areas. The problem is that the universities must offer competitive salaries and must make the job situation, after one is hired, that of a good job. The candidate must be shown that not only is the initial salary adequate, but that there is room for salary growth. This must be obvious from the salaries of the other faculty. Furthermore, teaching loads must be reasonable and there must be reasonable administrative support toward developing research programs. If the institution does not have adequate internal funding, support for obtaining outside funding must be provided. A person of any age does not wish to be told—The University wants you but you must go out and earn a major portion of your own salary, all of the money required for your research equipment, travel and other such needs.

For salaries, I propose that a beginning Assistant Professor should make, for the academic year, at least as much money as our B.S. graduates are getting as a 12-month starting salary. For 1981-82 this must be at least \$22,000 and maybe as much as \$24,000. The person coming in must see that the existing faculty consists of individuals whose salary is progressing. After 20 years of service and 20 years of good progress, a full professor should be making double the salary of the *present* beginning assistant professor. The doubling in 20 years must be invariant as the beginning salaries go up.

Teaching loads must be reasonable. A person who is teaching and engaged in research should not have to teach more than two courses. If the classes are large, there must be adequate sub-professional (that is graduate student) support to help with the routine teaching work. Even in small undergraduate courses, the professor must be supplied with a grader so that the students can have sufficient drill problems.

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 20 years. I say that 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 for a course in the field at some level. 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.

The person 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 internal sources so that both faculty member and graduate students in the area do not have a sharp change in their job in periods of funding valleys. The professor's research group should, by the 20-year point, 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 take some share of responsibility for the University governance and administration by serving on various university departmental committees or administration and curriculum plan-

ning. He or she should take regular turns at chairing these committees.

This full professor with 20 years of continued progress since the Ph.D. would be earning between \$44,000 and \$48,000 for the academic year. Since most universities allow somewhere between 2/9's or 3/9's of the academic year salary to be obtained for doing research in the summer, such a full professor who brings in funding for his own summer support will make between \$54,000 and \$64,000 on a 12-month basis. This may not be quite competitive with what an individual with this kind of reputation and qualifications can make in industry. It is sufficient so that many would consider the job as full professor at a university to be a better job which pays an adequate salary for a reasonable standard of living.

With the salary scale just described, and the type faculty position described above, my recruiting experience convinces me there is a pool of individuals available who are already permanent residents, if not citizens of the United States. They have Ph.D.'s from good universities; and since obtaining the Ph.D. they have been engaged in research. The pool for Assistant Professor seems fairly large. There is tremendous demand. There is also a number of people (some of whom responded to our ad, but there are many more) who received their degrees in the early 70's when academic jobs were very hard to get. These people would like to go to a research university to work towards the position of full professor described above. They will go for the salary scale described above. This means an academic-year salary in the low 30's at an institution that has full professors now making in the mid 40's.

My opinion is that the faculty candidate shortage is not a shortage of people available—it is a shortage of money to pay the people adequately both in absolute salary and in the time-requirements of the job.

—Ben Leon
Chairman, Dept. EE
University of Kentucky

An IMPACT is an IMPACT is an Impact is an IMPACT

Bright Lights in Dark Places

Al Louis Ripskis: For nearly a decade, Ripskis has been excoriating the people who run the Department of Housing and Urban Development for misdeeds. He should know; he works there.

Ripskis works full time as a HUD program analyst and devotes his spare time to an untiring search for department boondoggles, scandals, and mismanagement. He publishes his findings in his newsletter, *Impact*, which he sells outside the department before work.

His most recent expose charged that HUD had wasted more than \$1 billion in contract mismanagement over the past six years.

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

—Washingtonian Magazine

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
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NEWSLETTER EDITORS: THIS IS FOR YOU

Editors of IEEE publications are invited to reprint any stories appearing in *IMPACT* in their own Section, Society, or other IEEE publication. Simply credit source.

While we no longer print a special editors' clip edition, the regular *IMPACT* printing has changed to black ink, which should prove helpful.

The *Washington IEEE Bulletin* has published a special February 1982 issue to document the meetings of the IEEE and the Technology Policy Conference. Extra copies are available and will be sent to those requesting same as long as the supply lasts. Send name and complete mailing address to Editor, IEEE Washington Bulletin, 608 H Street, S.W., Washington, DC 20024.

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Executive Summary of IEEE-NRC Conference (see above)

- Contains recommendations of the working groups and an overview of presentations made at the Conference. (TH0077-8) Members, \$24; Nonmembers, \$32.

Special Offer: Both the Conference Record and the Executive Summary (see above listings)

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Record of the Joint IEEE-Industry Professional Conference

- "Building a Professional Work Climate" concerns the professional utilization and development of EEs in industry. (UH0140-4) Members, \$12.75; Nonmembers, \$17.

Executive Summary of the 1980 Conference on U.S. Technological Policy

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- Two-color print suitable for framing (11" x 14") of the twelve portraits included in the Washington Office mural: Faraday, Morse, Babbage, Kelvin, Maxwell, Edison, Bell, Tesla, Steinmetz, DeForest, Marconi, von Neumann. Commemorating engineering discovery and invention, a tribute to the technical excellence of leading figures in the development of electrosience and technology. (UH0141-2) Members, \$2.50; Nonmembers, \$3.50.

1981 IEEE U.S. Member Salary and Fringe Benefit Survey

- Contains latest information on EE salaries related to numerous variables, such as job function, supervisory responsibility, type of employer, company size and geographic location, years of experience and level of education. Extensive tables showing income based on pairs of variables simultaneously, as well as survey statistics on a number of fringe benefit plans. (UH0145-3) Member, \$45.00; Non-member, \$60.00.
- UH0148-7, IEEE Careers Conference. See p. 5.