

AMERICAN ENGINEERTM

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AEA Testifies On Portable Pensions

The American Engineering Association presented written testimony to the Subcommittee on Select Revenue Measures of the House Ways and Means Committee in support of the combined legislation (2 bills) introduced by Representatives Dan Rostenkowski (D-IL) and Sam Gibbons (D-FL).

We are supporting the position of the IEEE which has been instrumental in getting this legislation introduced. Points of the IEEE plan include:

- Expanded pension coverage by requiring employers that do not have pension plans or retirement savings programs to establish voluntary salary reduction plans for their employees.

- Help preserve the value of earned retirement benefits by reducing vesting requirements; permitting employees to determine where employer contributions will be held after termination; using an assumed interest rate of 3 percent rather than prevailing market rates to determine employer contributions at termination; prohibit the employee from "cashing-out" employer contributions and increasing the penalty on employee contributions not rolled over to other qualified plans or IRA's.

- Expand personal savings by tax favored Individual Retirement Accounts.

While we agree with IEEE on their proposals, we feel they are of basic benefit to permanent employees but do not address many of the needs of the contract engineering community. We have therefore asked for these additional points to be included in any final legislation.

The American Engineering Association believes the following features are essential for a workable retirement plan for contract engineers:

- First dollar earned eligibility. Allow individual contributions from the first dollar the individual earns. Contract engineers are often not on a job long enough to meet eligibility requirements.

- Require immediate vesting for any contributions made by a contract engineering firm (should they contribute). Contract engineers are seldom on a job long enough to meet the current 5-year vesting requirements.

- Allow the individual tax deferred contributions to the maximum percentage and dollar limit minus any company contributions. The current law is about right overall in dollars and percent but should allow the individual to contribute everything the company does not (i.e. Keogh plan levels of contributions).

- Require the employer to contribute to the plan of the individual engineer's choice when they make contributions (i.e. not necessarily the company controlled plan).

- Allow the individual to make contributions at his/her convenience, but never in advance of the limit determined by his/her earnings. (Contract engineers are often "strapped" for cash after a period of unemployment but may end the year with excess cash due to overtime, etc..) This is a condition one can never predict or plan for.

- Require a monthly statement similar to a bank statement listing each transaction with a balance for that day which includes that transaction and earnings through that day.

- Allow the individual to combine or roll over all of his/her plans into one.

- Add one category to the emergency borrowing currently allowed (Education & Home purchase). That new category would be for extended unemployment of three months or more.

- Allow contract engineers to purchase health insurance with pretax dollars as most businesses do.

In essence what we are advocating is "self-employed" status for the contract engineer for the purposes of retirement and insurance only. It is our position we can live with "employer" withholding of taxes if we can get this relief.

Other items such as travel and living expenses when you are out of town are deductible regardless of your employment status.

As I write this, it appears that Congress will not reconvene in 1991. Thus, I'm not urging you to write your Congressmen to back some form of this legislation. In 1992, the legislation is likely to reappear. When it does, we will then urge our members to write Congress. We'll even offer a sample letter.

Billy R. Reed, AEA President

Did you introduce AEA to an associate this month?

The Invisible Engineer

Part III—Conclusion

A NEW INSTITUTION

Henry Robinson Palmer, a 23-year-old who was working for Thomas Telford on the construction of St. Katherine Dock near the Tower of London, called a meeting and put forth his argument for a new institution:

"(Although) the principles of systematic education for most of the learned and scientific professions have been and still are actively encouraged, not even an attempt seems to have been made towards the formation of any special source of information or instruction for persons following or intending to follow the important profession of a Civil Engineer."

The Institution of Civil Engineers, with a commitment to education through the dissemination of knowledge about civil engineering, was formed in 1818, bylaws were drawn up, and in 1820 Thomas Telford was invited to be the institution's first president. The invitation was accepted by the sexagenarian Telford, a talented orphan who had attended a church school and served an apprenticeship to a stonemason but who, as a successful engineer, was overshadowed in the Smeatonian Society by his rival John Rennie, the elder, who came from a well-established Scottish farming family and was educated at Edinburgh University.

During Telford's presidency, the Institution of Civil Engineers' membership grew steadily, gradually winning over many older engineers. In 1828 the membership petitioned for a royal charter, which gave the institution a corporate existence and empowered it to act in the public interest. The Institution of Civil Engineers was chartered to carry out purely educational objectives for the public good, and thus it was considered a charitable organization for tax purposes. On several occasions the institution had to defend its claim as a purely charitable organization by demonstrating that its objectives were not for professional advantage or for the material welfare of its members. Those were the objectives of a craft guild or trade union, and they were not sought by visionary engineers.

But the objectives of a professional organization are not always consistent with the practice of its members. By the 1840s the railways—some of which were being developed by clever mechanics, such as locomotive builder George Stephenson, who was not attracted to the members of the institution nor they to him—were creating stiff competition for the canals and turnpikes for which civil engineers served as consultants. But locomotive builders could not always survey a route for a railway, so civil engineers had to become involved. This led to some conflicts of personality and principle as railway engineers, who had not come up through the ranks of what came to be known as "the civils," had their membership in the institution blocked. In turn, their lack of membership could be used to argue against their qualifications for railway work.

Such conflicts set in motion a retrograde behavior among engineers that eventually fragmented what could have been a single profession of civil engineers into specialties ironically reminiscent of craft guilds, and were instrumental in leading to the formation of the Institution of Mechanical Engineers in 1847. George Stephenson became the organization's first president, and thus he asserted his contempt for those he had called the "London engineers."

According to a history of "the mechanicals," the objectives of the new institution were: "To enable Mechanics and Engineers engaged in the different Manufactories, Railways and other Establishments in the Kingdom to meet and correspond, and by a mutual exchange of ideas respecting improvements in the various branches of Mechanical Science, to increase their knowledge and give an impulse to Inventions likely to be useful to the World."

While the civils and mechanicals were both interested in things of use to the world, they effectively specialized in different useful things, the former tending to design static structures like canals, roads and bridges, and the latter tending to develop dynamic things like locomotives, steam engines and machines. The accelerated pace of technological development in the latter part of the 19th century soon led to ever finer distinctions among professional

groups. Before too long, European engineering societies formed after the British model.

NO SINGLE VOICE

A similar pattern developed in America, beginning with the founding of the Boston Society of Civil Engineers in 1848, which evolved into the American Society of Civil Engineers by 1852. By the end of the century there was a plethora of specialized societies and educational institutions in which "scientific engineering" was taught on both sides of the Atlantic. However, because of the diversity of engineering societies and specialized professorships, there was no single voice for the engineering profession as a whole.

Whether the engineering profession was organized or unified, there was a tremendous popular appreciation for its benefits and an insatiable desire to know more about the ideas behind its wonders. Even before the Great Exhibition of 1851 drew millions to London to view everything from a lump of plumbago to an electric clock, the Crystal Palace itself was an object of wonder. Its structural principles were the subject of lectures, attended by audiences "of the most distinguished and brilliant of both sexes, blended with the humbler, but potent classes, whose labours everywhere speaking for them, in the imposing spectacle around, proclaimed at once their industry, and their power, and that without them nothing great or beneficial could ever be achieved," according to a contemporary history of the exposition.

In America at midcentury there seemed to be no less interest in the products and science of engineering, *Scientific American* was founded, and its pages were as likely to report on the construction of a great bridge as on the discovery of a new physical or chemical principle. The interest in engineering continued throughout the latter part of the 19th century, as the "50 and 100 Years Ago" page of each new issue of *Scientific American* attests today. The cover illustration for a typical issue showed ship construction, a cable repair steamer or some other engineering achievement, and each 16-page, tabloid-size issue contained a full-page index of inventions for which letters of patent were granted during the week of record.

Engineering not only sold popular magazines in the latter part of the 19th century, it also sold books. *Lives of the Engineers*, by Samuel Smiles, had brisk sales and a broad readership from 1861, when it first appeared, into the new century. The last edition of *Lives* appeared in 1904, and it included biographies of John Rennie, Thomas Telford, the Stephensons, and others, and the multi-volume work held up engineers and their achievements as paragons of virtue. Prime Minister Gladstone, after reading *Lives of the Engineers*, wrote to Smiles, praising this aspect of the work: "It appears to me that you first have given practical expression to a weighty truth—namely, that the character of our engineers is a most signal and marked expression of British character."

By the turn of the century, engineers and their creations had a respectable foothold in the public's imagination, but the profession of engineering was still uncertain of itself. The proliferation of specialized branches of engineering, each with its own professional organization, eventually worked against the public image. The increasing distinctions between civil, mechanical and other engineers, especially in Britain, where references to "civils" and "mechanicals" came to be less and less affixed to the unifying term "engineer," meant more and more that there was no single voice for the new profession. Thus the positive image of engineers and engineering that the likes of Samuel Smiles and *Scientific American* cultivated throughout the latter part of the 19th century was jeopardized by engineers themselves, or, more correctly, by the growing number of societies of engineers with independent agendas.

Today, we live with the legacy of those developments and it is in part because of them that the lay public does not have as clear an image of an engineer as it does of a doctor or a lawyer. While those professions have their specialties too, of course, they also have their umbrella associations, which promote the professions themselves. But perhaps even more important, doctors and lawyers deal directly and personally with the public, whereas engineers seldom do. And because this is unlikely to change, if engineers are to achieve more visible roles in society and culture they must seize every opportunity.

This is certainly easier said than done, but by remembering how engineers are forgotten and left out of the very ceremonies that their work occasions, and by realizing how far from public adulation engineers fell after the late-19th-century enthusiasm for technology, then perhaps all of us—civils, electricals, mechanicals, and our various subsets and offshoots—will be more alert for opportunities. While we may not be able to write ourselves into bridge dedication speeches, we may be able to tell our own stories more publicly and thus not be forgotten on future occasions. And civil engineers, whose title once included us all, may have more opportunities than most for increasing their visibility, for structural and environmental achievements are among the most monumental and public products of all engineering.

By Henry Petroski

(AE has reprinted this article in several installments, because of its length. It is reprinted, with permission, from the Nov. 1990 edition of "Civil Engineering," the publication of the American Society of Civil Engineers (ASCE).

More Layoffs Expected

Those engineers who think that the worst of the layoffs are over are indulging in wishful thinking. A *Newsweek* magazine article on California ("Laid Off in La-La Land," Oct. 28, 1991, p. 50) reported, "The aerospace-defense industry, which accounts for more than 8 percent of the state's employment (AEA comment: and a far higher percentage of the state's engineering employment), has been devastated by military spending cuts. Having already shed 72,000 jobs in the last three years, it could lose as many as 100,000 more." The *Newsweek* article was corroborated by a *Daily News* article ("Extended hard times expected," Business section, p.1, Nov. 9, 1991), which stated, "(aerospace) companies will continue to down size or branch out into other businesses as defense spending falls 25 percent between 1990 and 1995." And the *Newsweek* article noted, "Even Silicon Valley, the symbol of California's entrepreneurial vigor, is reeling. The area has lost at least 17,500 jobs in three years. Stiff global competition makes a big turnaround unlikely even when the slump ends." Says Philip Kohlenberg of the state employment-development department: "We are faced with a long-term decline and we don't know where the bottom is."

Engineering employment has become like a game of musical chairs. (Or, to you bicycle track racing fans out there, that sport's version of the game is called "miss-and-out" or "devil-take-the-hindmost"): once you are out, you can't get back in, no matter how good a player you are.

Meanwhile, the old-line engineering societies, the U.S. Dept. of Labor, and Betty Vetter continue to make rosy engineering-employment forecasts or otherwise lure gullible young people into engineering.

Robert Bruce, AE Editor

Golden Opportunity

What happens to mature scientists and engineers? Do they drop out of engineering and the sciences? Do they get pushed out? Or do they retire comfortably at age 65 or older?

For years, the scuttlebutt has been that older engineers get shoved out one door while college grads come in the other. But we don't really know. No one has successfully tracked the same group of engineers throughout their entire careers.

Recently, in congressional testimony on how the nation measures the supply and demand of engineers, Richard Ellis revealed a startling fact. Back in 1961, the National Science Foundation, the American Association for the Advancement of Science, and others sponsored a major survey of the national college graduating class of 1961. "Carried out at the National Opinion Research Center (NORC) at the University of Chicago, this project created a massive database covering every aspect of the background and training of those graduates," said Ellis, the director of manpower studies at the Engineering Manpower Commission of the American Association of Engineering Societies (AAES).

"Now, 30 years later, the NORC respondents are at the peak of their careers. NORC staff advise us that this study can be reopened. Doing so will create an unprecedented opportunity to conduct research on the career histories of mature scientists and engineers, at bargain costs," said Ellis.

Ellis is the statistical guru at the AAES, the engineering umbrella organization that has recently found some new support with the impending entry of the National Society of Professional Engineers. It has revived hopes that the AAES can truly be an "engineering unity" organization. This sounds like a perfect unity project for the engineering-oriented AAES and scientific societies to take on. Ellis suggested that the government fund it. But in this budget climate, we doubt that will happen. And, let's face it, tracking engineers and scientists is probably not a high-priority concern of our lawyer-packed Congress. But it's essential to all of us in this business to get hard data on what's really happening.

It's a perfect project for the AAES, the American Association of the Advancement of Science, the National Science Foundation, the National Research Council, the National Academy of Engineering...and, if budget constraints allow, the government.

Has the Class of '61, as Ellis testified, "reached the peak of their careers?" Or have they disappeared into the woodwork? Let's reopen the NORC study.

Robert Bellinger, Section Editor, "The Profession"

(Editor: This editorial is reprinted, with permission, from the August 12, 1991 issue of "Electronic Engineering Times," a CMP Publication.

APPLICATION FORM

AMERICAN ENGINEERING ASSOCIATION

P.O. Box 820473, Fort Worth, TX 76182-0473

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Annual membership begins on receipt of Application. Dues in the American Engineering Association are tax deductible

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Reader's Voice

This column in the "American Engineer" provides readers the opportunity to voice an opinion relevant to any issues that affect the professional life of an engineer. Articles or letters should be in good taste and not slanderous. Each submission should include the name, address, home and business phone of the writer. Except for short excerpts, we will include the writer's name, city and state (unless the writer requests anonymity). We reserve the right to edit each submission, as long as we don't change the gist of it, and to publish or not publish it. We assume that authors who send us material have accepted these conditions, unless they instruct us otherwise in writing.

Editor: Here's a recent letter to Richard Tax, VP of AEA, from a friend and colleague.

Dear Dick:

I hope things are going well with you. I haven't worked much in the last two years, myself. This AEA organization seems to be a worthwhile endeavor—may be too late for us, but it might straighten things out for the future. My check's enclosed. If I go back to work, I'll have to make it more, if we're going to get anything done. Best regards, *RM, Massapequa Pk., N.Y.*

And a new idea from a California member. If any AEA members decide to clip articles for possible publication in "American Engineer", I would appreciate their including the name, address and date of the publication from which they clip an article. If they want to be even more helpful, they can obtain permission to reprint the article. They simply have to write the publication and request permission to reprint. Their request would include mention of the fact that "American Engineer" is the newsletter of AEA, a non-profit organization dedicated to enhancement of the engineering profession.

I have an idea for an opportunity to involve more AEA members: running an information service or clearinghouse. Functions could include:

- (1) Collecting magazine & newspaper articles, or letters and other printed information that would interest reader/members of AEA.
- (2) Cataloguing and filing the above items. I believe Bill Reed (AEA President) did this for many years.
- (3) Writing summaries and critiques of the above items for the newsletter.
- (4) Forwarding the above items to the appropriate persons in AEA.
- (5) Inviting prominent non-members of AEA to contribute articles or interviews to the AEA newsletter. *Name withheld by request.*

Please send AEA brochures for distribution. I would be glad to pass them on and spread the word. During these tough economic times, there should be plenty of interest and activity to help out some fellow engineers and improve the engineering profession. We younger engineers who didn't experience the Depression are starting to appreciate the real meaning of frugality. All we've seen is the abundance of the Eighties. We have never been faced with massive, white-collar layoffs before, along with the limited amount of available jobs. And, with the few jobs that are available, the competition is tremendous. There are plenty of qualified people on the streets right now. I feel very fortunate just to be employed at this time. We pray the future will be better, but in the meantime, hiding out in the weeds is about all we can do.

J. Bruni, Boca Raton, FL

The above is a letter to AEA VP, Richard Tax, from a Florida member. I appreciate his writing, but would like to comment on one notion in the letter. If engineers remain professionally passive until there's high unemployment, they're likely to remain professionally powerless. The lesson engineers should learn is that they need to participate in professional activities during good times and bad. And these professional activities should not be restricted to attending technical seminars. Engineers need to keep on top of issues like pension reform, bogus claims of manpower shortages, patent

rights, employment agreements that entrap them, salary compression, etc.

I notice, with disapproval, the absence of the REACH OUT section in the November issue of AE. Without addresses and phone numbers of AEA officers and committee members, the publication appears to lack the urgency, sincerity and camaraderie it is intended to convey. Maybe it was pushed out "this time only" by the need for space in which to print a Petition form. Otherwise I am grateful for your hard work in this thankless, time-consuming task. Keep up the good work.

Frank Smerke, Santa Monica, CA

Editor: First I thank Mr. Smerke for his kind words about the hard work of AEA committee members. We do indeed put in hundreds of unreimbursed hours, attending to AEA business. Regarding the REACH OUT column, I decided to discontinue it, because of a notion from information theory: An invariant signal contains no information. I was concerned that readers would begin to ignore this column since it appeared unchanged in every issue. Apparently I was wrong. Names, addresses and phone numbers of Publication Committee members appear in the Editor's Column on page 5.

Enclosed is my \$20 check. Please send a gift subscription to one of the Oklahoma criminals in Washington. (*Editor: I presume the writer refers to Oklahoma Congressmen.*) Does AEA have a representative in DC? If so, how about asking them to publish a report in the newsletter each month.

The Contract Employment Weekly will publish a directory of "Job Shoppers" in 1992. You need not be a shopper nor a subscriber to be included. (*Editor's note: There is a fee to be in the directory. For more information, send SASE to Roll Call c/o C.E. Weekly, Box 97000, Kirkland, WA 98083.*) Will again leave copies of the November newsletter in the lunch room and will send a copy to the lady engineer who owns this wonderful company. My very best regards to all for a Merry Christmas and a prosperous 1992.

Joan Campbell, Tulsa, OK

Robert Bruce, AE Editor

P.O. Box 4493, Great Neck, NY 11023

Non-Compete Agreements

The following item is based on an article titled, "You'll Never Eat Lunch in This Industry Again," which appeared in *Business Week* magazine (Nov. 11, 1991, p. 44):

A "non-compete" agreement is an agreement by an employee not to work for certain competitors for a certain time after leaving his current employment. Standards for non-compete agreements vary from state to state, but these agreements are usually held to be enforceable when they (1) specify a reasonable time, usually 6 months to three years; (2) define a geographical area, anywhere from an adjoining county to the continental U.S., depending on the nature of the business; (3) detail the types of work that are prohibited, and (4) protect a legitimate business interest of the employer.

Jack W. Schuler was squeezed out of his job as president and chief operating officer of Abbott Laboratories. He had, on joining Abbot, signed a very far-reaching noncompete agreement barring him from working for competitors anywhere in the world for six years. The agreement later resulted in a 10-month court battle, with Abbott finally deciding not to sue for enforcement of the agreement. Judge Edwin M. Berman interpreted Abbott's decision to not try to enforce the agreement after two years as an "admission that it was too far-reaching." But Schuler is likely to seek damages to compensate for job opportunities that were lost because of the agreement. Schuler claimed that he was pressured into signing the agreement by a threat of denial of severance benefits. Another Abbott executive remarked, "It's disturbing that the board could force one of the country's top health care executives out of his job and then fight to keep him from going back to work."

Noncompete agreements, like many agreements between employers and their employees, can be very one-sided, giving employers something for nothing. Unlike the employment contracts that are

often signed by teachers, athletes, and entertainers, non-compete agreements give employees no promise of future employment in exchange for a promise not to work for another employer. Conceivably, there may be times when non-compete agreements are reasonable. However, the chances of abuse are great, as the case of Mr. Schuler illustrates. The fight for reasonable standards on non-compete agreements is another reason why we need engineering societies that represent working engineers and not the corporations and the universities.

Editor: This article is based on information received from a California member.

Robert Bruce, AE Editor

Editor's Column

The proposed IEEE Constitutional amendment, which would have made the Vice President of Professional Activities a voting-member-elected position, has gone down in defeat in the 1991 IEEE election. Therefore, this vital IEEE position is still an appointed one instead of a member-elected one. The proposed amendment was written by Robert Rivers and publicized in the pages of this newsletter. I can't understand why IEEE voting members would not approve this measure, except that the Board of Directors recommended its defeat. Apparently IEEE members take the advice of the Board in voting matters. I think this is naive, but that's what happened. It remains for organizations like AEA to continue to press for reform of the old-line engineering societies, so they can better serve their members.

We advertised and backed another proposed IEEE constitutional amendment. This one, written by IEEE 1991 presidential candidate, Troy Nagle, would prevent members of the IEEE Assembly (a subset of the Board of Directors) from nominating themselves to the Board for the year following their membership in the Assembly. I expect the IEEE Board of Directors to oppose this one, assuming the petition gets the 900 signatures that puts it on the 1992 ballot. I hope AEA members circulate the petition (printed in the October and November issues) and collect signatures. I signed it. This amendment, like the last, takes power away from the Board of Directors. This is precisely what reformers of IEEE are hoping for and what most IEEE Boards oppose. Let's see what happens; first it has to get on the ballot.

We'd like to thank those AEA members who supported our activities by joining and paying dues, by backing the measures we suggested (in Congress and in the IEEE), and by providing us with material to publish in this newsletter. We hope that in the coming year, AEA will continue to expand, both in membership, and in scope of activities.

Here's a list of names and addresses of Publication Committee members. My address is under the Reader's Voice column.

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Robert Bruce, AE Editor

10 Myths About Searching For A Job

Looking for a job is never easy and it seems tougher when times are tough. But many people defeat themselves by accepting conventional wisdom about job hunting. Ten common myths need debunking:

Myth No. 1: Lower your salary demands. That makes you more attractive to employers in an uncertain economy.

Fact: People who ask for less are viewed by employers as "undesirable property." If you are considered undesirable—or anything less than first-class—you are not likely to be hired.

Myth No. 2: Try to get the highest paying job available because job security no longer exists.

Fact: Job security still exists but you create it with job performance. Opting strictly for money is a mistake if you take the wrong job.

Myth No. 3: If there's nothing available in your field, switch careers.

Fact: That's one of the worst things you can do. You compete against others with experience and will not approach your old salary level.

Myth No. 4: If you're over 50 and you've just lost your job, it will be very hard to find another.

Fact: Workers over the age of 50 are winning new jobs in about the same length of time as their younger counterparts. Today's employers place a premium on experience.

Myth No. 5: Raise the subject of salary as quickly as possible in the first interview.

Fact: That's one of the fastest ways to be removed from consideration for a job. It tells employers that you are more concerned with yourself than with your company or the job.

Myth No. 6: Entrepreneurship is a young person's game. Don't try it if you're over 40.

Fact: The opposite is true. About one in five discharged managers are starting their own businesses. More than 70 percent of them are over 40.

Myth No. 7: Look only at the big companies.

Fact: Most of today's job growth occurs in small to medium-sized companies. They are competing for talent by offering salary packages comparable to those of the large companies.

Myth No. 8: Avoid companies having layoffs.

Fact: Those can be among the best places to look. Many continue to hire even while they are laying off workers.

Myth No. 9: The November-December holiday season is the worst time to look for a job. Employers are unavailable or distracted.

Fact: The holidays are among the best times to look for a job. Employers (except for retailers) are available and job seekers have the advantage of not facing as many competitors as they would in other times of the year.

Myth No. 10: You can only get job interviews between the hours of 9 and 5 on weekdays.

Fact: Employers are often available before and after regular hours. If the employer indicates he or she is not available on a given day, ask for an earlier or later interview. If you get it, you've got an employer's undivided attention.

James E. Challenger

(Mr. Challenger is president of Challenger, Gray & Christmas, Chicago, an international outplacement consulting firm.)

(This article reprinted with permission, from the Nov. 10, 1991 issue of The New York Times.)

Engineers Oppose IEEE POSITION

In the October, 1991 issue of the "American Engineer" we published an article entitled "IEEE Exasperates Engineers." The article discussed IEEE-USA's efforts to reduce funding for the NASA Space Station program and was also published in the IEEE North Jersey Section's "Newsletter." Arvid G. Larson, a research professor at George Mason University's School of Engineering, chairman of IEEE-USA's Technology Policy Council and now IEEE's (1992) appointed vice president of Professional Activities wrote a three page rebuttal that was published in the IEEE North Jersey, December, "Newsletter." Although we did not print his letter in our AE, the following does address many of his points and was also published in the "Newsletter."

First, an apology is in order. The mail I received about the IEEE-USA efforts to reduce funding of the space station program included current magazine and newspaper articles, excerpts from the *Congressional Record* pertaining to the issue and a five-page copy of IEEE-USA's 1990 testimony on the FY 1991 budget for NASA and the NSF. It was my error to cite the 1990 IEEE-USA testimony on the FY 1991 budget as the 1991 testimony for the FY 1992 NASA budget and for this, I apologize. I do sincerely hope that this error caused no harm.

However, in review, I must also say that the greatest harm came in reporting this issue a year too late. The current 1991 furor was about the June 1991 IEEE-USA's press release, by Arvid Larson, under the title "Electrical Engineers Call For New NASA Program Priorities." Again in 1991 as in 1990, under the same IEEE-USA (250,000 U.S. member) banner, IEEE-USA publically asked for reduced funding for the NASA space station program. I could also apologize for not writing about this issue in 1990, but it was not brought to my attention at that time.

In the December issue of North Jersey's "Newsletter" they published Arvid Larson's letter responding to the article "IEEE Aggravates Engineers." Larson accurately pointed out my error of presenting IEEE-USA's 1990 testimony as 1991 testimony. He also insists that the IEEE-USA's testimonies (press statements in the latter case) are representative of the views of the membership and he supports this by citing IEEE policy, representative process and review procedures to guarantee this. Does it work? Does the engineering community want to reduce funding of the NASA space station program? Many IEEE members attending the 1991 PACE Conference in September were upset about this issue and disagreed with the "IEEE-USA" position.

The Galveston Bay IEEE Section members did come forth as representing an official IEEE entity that opposed the IEEE-USA position on cuts to the space station program. According to the July 17, 1991 *Congressional Record* - Senate, S10235, 15 other groups including the American Institute of Aeronautics and Astronautics (AIAA) and the Council of Engineers and Scientists Organizations (CESO) opposed IEEE-USA by supporting the space station program.

CESO's written testimony, quoted in part from the *Congressional Record*, included: "The current attack on the space station is another form of the continuing opposition to a manned program by some in the academic community. They are now trying to create a false dichotomy between theory and practice. We believe that enemies of the space station favor the funding of theoretical science over applied science. Theoretical science funds the research of professors whose focus is scientific theory, whereas applied science utilizes scientists, engineers, and production workers in the actual construction of technological systems."

The testimony also said: "What is most unfortunate, however, is that opponents of the space station are trying to divide the academic community from those scientists and engineers engaged in the practical application of the scientific process. Theory and practice go

hand-in-hand. We believe that there must be a balance between the two. Our goal is to put theory into practice. To do so, we must preserve our aerospace industrial base. We cannot continue to create theoretical models of space stations or national aerospace planes only to see them produced abroad."

In the July 15, 1991 issue of *Aviation Week & Space Technology*, CESO pointed a finger at IEEE citing a "grossly exaggerated opposition of a handful of IEEE board members." Is this enough to assure you that we do not have the support of the engineering community on this IEEE-USA position? Can you believe that IEEE's engineers feel any different?

There are conflicts. Some of the problems arise because IEEE Position Papers or IEEE Entity Position Statements are in conflict. Only last year, after a committee investigation, Michael Whitelaw, V.P. of USAB, ordered the destruction of a widely disseminated IEEE-USA publication that cited "engineer shortages" as a reason to study engineering. These were blatant recruiting brochures fabricated to satisfy the needs of college recruiters. They were developed by IEEE-USA's, academic dominated, Pre-College Education Committee under the same system Larson defends. Those brochures also served to discredit the IEEE. Are these mistakes, or are some using IEEE as a credible marketing reference at the expense of the membership?

Larson defends the admitted, unbalanced over representation of academics on IEEE-USA committees because of the "willingness of universities to fund volunteer activities" and stresses the academic members sense of business knowledge. I never questioned the business capabilities of the academic members, but I do believe their business interests conflict with the interests of the engineering community and the IEEE. Apparently, others also agree.

In support of increasing the NSF budget and disregarding their "shortage shouting" by blaming the "news-hungry media" for spreading the NSF false alarm, he credits Presidential Science Advisor, Allan Bromley, and Allan Fechter of the National Research Council, for repudiating their shortage claim as being unsupported. Both Bromley's and Fechter's statements came too late and were too restricted to be of any significant value to the U.S. tax payer and the engineering community. (See UPDATE.)

IEEE, the worlds largest technical professional society, whose nearly 250,000 U.S. members had the most to lose by the NSF deception, stood by and did nothing. Where were these same IEEE-USA volunteers, that Larson lauds in his letter, when NSF disseminated their shoddy fabrication about engineer shortages? Does university funding of its staff in IEEE-USA volunteer activities prevent IEEE-USA from challenging NSF when NSF harms the public and the engineering community? Could NSF's funding of university and academic programs influence the opinions of our academic volunteers? Should this jade IEEE-USA's vision? Who does NSF serve by their fabrication? If IEEE-USA and their members lose credibility in professional activities they will soon lose their credibility in the technical area.

UPDATE: Academics Still Shout Shortage

1992—NSF's phoney "Shortage Shouting" fabricated report is still used by academia to sell college credits to the naive public. A TV program, "The Science Gap", sponsored by Rutgers University shows Dr. Vaughn Vandergrift, of Montclair State College quoting the false NSF report projecting a shortfall of engineers and scientists. Vandergrift, surrounded by other academic shortage shouters, has gone to TV in another attempt to fill their classrooms. They continue to promise rewarding engineering careers to the viewers. Meanwhile, last year's engineering graduates are still unemployed and searching for engineering jobs.

Richard Tax, AEA VP

Bromley Scoffs At Warnings Of R&D Manpower Shortage

Warnings of impending shortages of scientists and engineers have been a standard theme for decades in the science establishment's appeals for increased federal support for research and training. Having been repeatedly proclaimed, the shortage thesis has come to be accepted as reality in public discourse.

Lately, however, as skeptics raise doubts about the reliability of alarmist manpower projections, the Bush Administration has been discreetly distancing itself from the shortage camp. The strongest sign of repositioning is evident in a talk on September 11 by D. Allan Bromley, the President's Science Advisor, at a conference on "Engineers in America's Future: Shortage or Surplus," held in Washington by the Engineering Manpower Commission and the American Association of Engineering Societies.

Citing declines in the college-age pool and a shift away from science and math studies, Bromley acknowledged that "these trends would seem to indicate that this country faces rather severe shortages of scientists and engineers in the near future.

"But," he continued, "I have learned to approach these projections with some caution. Labor markets in this country are remarkably flexible. Particularly in engineering, where many baccalaureate-level engineers can be trained in just a few years, fluctuations in supply or demand generate quick responses."

The position stated by Bromley represents a remarkable turn-about in a relatively short time. In July 1989, at his confirmation hearing before the Senate Committee on Commerce, Science, and Transportation, Bromley matter-of-factly repeated the warnings of shortages that have long emanated from the National Science Foundation.

"NSF surveys," he told the Committee, "have already identified major shortages amounting to more than 100,000 computer scientists per year in the early 1990s and to corresponding shortages in the 35,000-50,000 range in many fields of engineering." He added that "There are corresponding shortages in biomedical science, in biotechnology and in the number of physicians committed to careers in research."

In his recent address, Bromley linked his conversion to an examination of the prophetic powers of the alarm criers. Referring to a retrospective study of manpower modeling and forecasts conducted for the National Science Foundation by Ronald L. Oaxaca and Larry Leslie, economists at the University of Arizona, Bromley said: "None of the models of interest to policymakers had much validity beyond one year. By the end of two years, the model predictions were almost invariably worthless. In these cases, it is the demand numbers that turn out to be wrong; supply numbers are relatively easy to obtain from the educational pipeline and are relatively reliable."

Bromley then turned to history to support his skepticism. In 1962, he recalled, a panel of the President's Science Advisory Committee, "responding to a widespread perception of impending shortages of personnel for the nation's space and military programs, recommended a crash program of support for students and universities.

"Universities responded enthusiastically—in retrospect, much too enthusiastically—so that the 1970 manpower goals were achieved in 1967, and, not surprisingly, the crash program was terminated," Bromley said. He added, "The large number of students, particularly doctoral students, educated in the 1960s in the

crash program had difficulties finding employment in the 1970s. Media reports of these difficulties—frequently exaggerated—influenced a new generation of students to shy away from graduate training in science and engineering."

Bromley assured his audience that he wasn't pointing to a reduced federal role in science and engineering training. But, he continued, "the fundamental uncertainty surrounding manpower projections... emphasizes that in training scientists and engineers, we must focus on flexibility and versatility," so that engineers can shift employment as market needs change.

Bromley's reversal on the shortage issue did not affect his standing plea for efforts to encourage more American students to pursue science and engineering careers. He tied that goal to the possibility that many of the foreign students who now fill engineering classes and remain to work here may eventually be lured back to their homelands. And he reiterated the Administration's call for upgrading science in the schools.

This campaign, a centerpiece of Mr. Bush's anemic domestic program, has been aimed at the dual goals of raising scientific literacy in the workforce and putting more students into the educational pipeline that leads to PhDs. Bromley left the impression that the Administration's thinking on advanced training and US manpower needs is in an inchoate state.

Bromley told the meeting of engineers that he endorsed a proposal by Roland Schmitt, President of Rensselaer Polytechnic Institute, for "engineering-based liberal education." The aim would be, Bromley said, to prepare engineers to go on to "broader managerial roles," and to enrich the education of non-engineers.

In support of this proposal, Bromley cited an odd couple: "People trained as engineers are now making many important contributions to society—Boris Yeltsin and John Sununu are only the two examples that come most immediately to mind."

Meanwhile, the belief that the nation is short of scientists and engineers persists as a popular article of faith, though in many fields, jobs are scarce. An editorial in the *Washington Post* on September 21, "Math, Science, and Uncle Sam," argues for improving the quality and extent of science in the schools. Tests show American students perform poorly in math and science, the editorial states, adding, without explanation: "The evidence also lies in the debilitating shortage of American scientists."

On Capitol Hill, the manpower alarms have drawn the skeptical interest of the Subcommittee on Oversight and Investigations of the House Science, Space and Technology Committee (*SGR* September 15: "Scientist Shortage? House Committee Requests Data"). Heaps of data requested from NSF were delivered to the Subcommittee last week and are now being examined by the staff. No decision has been made at the Subcommittee on the next step, if any.

In political terms the skepticism works against calls for a major new federal fellowship program to counter warned-of shortages. The leading proponent of the fellowship drive is Richard Atkinson, Chancellor of UC San Diego. Two years ago, Atkinson calculated, in a widely publicized paper, that a major shortage of PhDs in science and engineering would peak in about 15 years, with demand at about 18,000 new degree holders and a supply of only 10,500. At present, foreign students account for 30 percent of the PhDs in the physical sciences, 50 percent in math and 60 percent in engineering.

By Atkinson's account, the future is bleak and no time should be lost in providing incentives for Americans to proceed through advanced training.

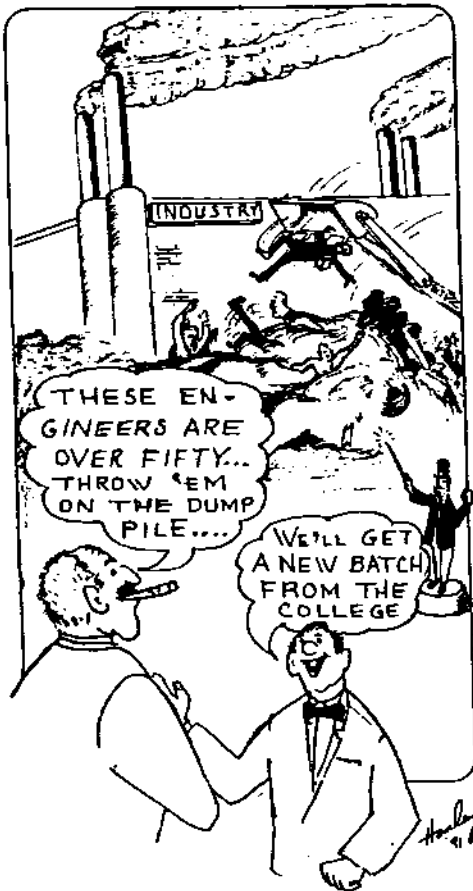
The evidence in these matters is murky, neither fully supportive of the shortage school, nor conclusive in behalf of the new skeptics. It should be noted the Bromley is merely arguing that the warnings of shortage have proven wrong in the past. He has not dismembered the latest round of warnings.—*DSG*

(This article reprinted from the Oct. 1, 1991 issue of "Science & Government Report", with permission of Daniel S. Greenberg, Editor & Publisher.)

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