IEEE CSIT NEWSLETTER

COMMITTEE on SOCIAL IMPLICATIONS of TECHNOLOGY

ISSUE NO. 9—MARCH 1975

INTERCON'75 HIGHLIGHT SESSION: SOCIAL IMPLICATIONS OF NUCLEAR POWER

The highlight session at the IEEE International Convention (April 7-10, 1975, New York City) has been organized by CSIT to focus attention on the social implications of nuclear power plants. As anyone who has followed the controversy about various aspects of this question might expect, the arrangements for this session were a bit touchy.

The session format will consist of:

1) 15 minute presentations by each of the four panelists;
2) 30 minutes (total) for rebuttals by panelists;
3) 90 minutes open discussion from the floor.

Topics that will be discussed include: Emergency Core Cooling Systems, Liquid Metal Fast Breeder Reactors, and Waste Disposal and Handling.

The (4) panelists and moderator are:

Carl J. Hocevar, Union of Concerned Scientists;
Andrew C. Kadak, Energy Research Group, Boston;
Chester R. Richmond, Oak Ridge National Laboratory;
Arthur Tamplin, Lawrence Livermore Laboratory;
Seville Chapman - Moderator, New York State Assembly Scientific Staff.

The highlight session is scheduled to be held Wednesday April 9, 1975 at 7 pm in the Georgian Ballroom B at the Americana Hotel in New York City. ■

CSIT OPEN FORUM INTERCON'75

April 7, 1975 - Hotel Americana - New York

The Committee on Social Implications of Technology of the Institute of Electrical and Electronic Engineers is sponsoring an open forum session to be held from 2 pm to 5 pm on Monday, April 7 during the upcoming international convention.

The format of the session will follow that initiated at INTERCON '74. IEEE members are encouraged to submit abstracts (approx. 300 words) for possible presentation. Authors will be asked to prepare 10 minute oral presentations with a subsequent 15 minute discussion period.

CSIT has, from its inception, proposed that the IEEE adopt a professional code of ethics and employment practices guidelines. One theme of this year's session will be the analysis, by case study presentations, of factors relating to the implementation of such policies and the manner in which this may affect the indi-

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New subscriptions: IEEE members wishing to receive this Newsletter should write to: IEEE, CSIT Newsletter, 345 East 47th Street, New York, New York 10017.

The editorial staff invites letters and articles from readers. We are interested in publicizing news of all upcoming meeting, study groups, discussions, lectures, or workshops that in any way relate to the interaction between technology and society. Correspondence may be sent to any of the above editors. Material for publication must be received at least by the 7th of each odd numbered month.

vidual engineer. In this regard a presentation will be made by Roy W. Anderson (former Chairman of the CSPE Transportation Safety Committee) on the BART case. This matter, which has recently received national notice in part as a result of CSIT interest and coverage in the CSIT Newsletter, involved the dismissal of three engineers allegedly as a consequence of their analysis and concern regarding potential BART hazards to the public.

It has recently been rediscovered that the AIEE (a predecessor of the IEEE) drafted and subsequently ratified a code of principles of professional conduct during the period 1906-1912. This document will be compared, in open debate, with alternate versions of the CSIT proposal and the codes adopted by other technical societies. Those interested in delivering somewhat more formal analyses are invited to submit abstracts.

Other topics with a bearing on the social implications of technology will be given consideration, subject to schedule constraints. Presentations on social aspects of energy/environment issues would, for example, be appropriate. Persons desiring to speak on such matters are requested to contact the session organizer at their earliest convenience.

Session Organizer: R. J. Bogumil; Dept. of Obs. & Gyn., KP2; Mt. Sinai Medical Center; N.Y., N.Y. 10029. (212) 864-5046

Other CSIT Information: P. D. Edmonds; IEEE Headquarters; 345 East 47th Street; N.Y., N.Y. 10017. (212) 752-6800 Ext. 333

EDITORIAL

SECRET!

The IEEE Board of Directors is due to consider a proposal to change IEEE Policy Statement 9.7 to permit IEEE entities to sponsor or cosponsor classified sessions anywhere in the world. The policy has been to prohibit such (co)sponsorship on the grounds that every dues-paying IEEE member has a fundamental right to attend any and all IEEE events. That right should not be abrogated.

This proposal has been made because the organizers of WINCON and EASCON are reportedly uncomfortable with the criticism they have encountered for their persistent flouting of existing IEEE policy -- their practice every year since 1963. Therefore, for their convenience, and because IEEE officers have been unable or unwilling to enforce their own policy, the existing policy may now be changed. As a result, the principle of open admission for all IEEE members is about to be buried as quietly as possible. When the proposed change was brought to the IEEE Technical Activities Board on January 31, 1975 by Robert Briskman (IEEE Divisional Director for Division I which includes the Aerospace and Electronic Systems Society, the cosponsors of WINCON and EASCON), only two questioning and dissenting voices were raised from an assembly of about 30 IEEE Group/Society Presidents, officers, and Divisional Directors.

The question of the necessity of holding classified meetings is irrelevant. There are always alternatives open to those so inclined. Indeed it is remarkable that such sessions are publicized at all. The real issue is that a professional organization is no place to permit or promote restricted sessions. This applies to the transnational IEEE Groups and Societies as well as to other IEEE subunits.

It has been argued that IEEE should offer conference facilities to its members on any technical subject that they have chosen to work upon for their livelihood. The argument loses its validity when based on the exclusion of other members. The concept of some members having more privileges than others is not only unprofessional, but legally questionable.

From its inception a new exclusionary policy will require qualification - company tours with competitors excluded, concurrent restricted sessions for belligerent states, restricted sessions for "illegal" or "unethical" purposes are but a few of the more obvious examples of exceptions to be made.

Indeed, the list of exceptions will proliferate and will require judgements which will be made by people who may not be in a position to act impartially. For example, can IEEE guarantee that everything to be discussed at its classified sessions will be in accordance with international law, or constitutional law? There are too many recent instances throughout the world where cosponsoring agencies have not always acted scrupulously within the law. How, for instance, would IEEE screen out as illegal, a paper considering strategies for breaching the Strategic Arms Limitation Treaties, when some Program Committee members may feel this work essential to a restricted session? Those who will make such decisions have already defined their position: The contempt for existing policy is to be legitimized, and forums where dissidence is represented are to be discouraged whenever possible.

How long will it take for some organizers of classified sessions to decide that its just too inconvenient to be prohibited by IEEE policy from having IEEE publish their classified proceedings? The proposed policy contains this prohibition. Will it too be disregarded? How long before there is an IEEE Journal of Classified Documents - the publication of the IEEE Secrecy Society (GS-007.5), available only to a select few? How long before IEEE cosponsored sessions are classified according to the nature of the conferee's clearance?

Before these thoughts are discounted as fantastic, it should be pointed out that IEEE's record of disciplining the organizers of WINCON while they "made mistakes" for 12 years in succession, was pitiful. Now these actions are to be dignified by policy change. Since the Board of Directors has control over the money that flows to any IEEE entity, it has always had the power to use "purse string suspension" to assure compliance. It chose not to do so. The proposed policy change, if adopted, would only add further tarnish to an already blemished record, and would set precedents for further member exclusion actions.

Readers, of all viewpoints, are urged to write to the Board and to this newsletter. As per our custom, we will print as many responses as space permits.

VICTOR KLIG

LETTERS

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Dear Editor: In the CSIT Newsletter of November, 1974, you quote "Lifestyle Index" to the effect that: "It takes one acre of strip-mined coal to burn six 100-watt bulbs continuously for one year." When one of my colleagues pointed this out to me, I was a bit surprised. However, one gets used to surprising numbers--such as the number of cows that could be laid end to end on the major power transmission lines in the United States. Nonetheless, I thought the statistic worth checking. And to my surprise "Lifestyle Index" is correct. It does take one acre of coal to run six 100-watt bulbs for one year--if the coal seam is one hundredth (0.01) of an inch thick.

Timothy J. Healy
Associate Professor, EE Dept.
University of Santa Clara

▶

Dear Editor: Please be more careful in your editing for on p. 9 of issue #8, you have a quote which is reproduced below...
...In West Texas we still regard an acre as a measure of area, consequently the calculations indicate that you can get 5.2 Megawatt hours per year for zero volume of coal. Now that is efficient!

You and your group need all the support you can get. Don't leave yourself open to such criticism as this.

Darrell L. Vines
Associate Professor, EE Dept.
Texas Tech University

▶

Dear Editor: In one of my courses I may occasionally ask students to calculate the power from the sun, given the power on a square meter at the earth. The calculation is not a difficult one, but sometimes I get a quite ridiculous answer, such as 4.372 milliwatts. What is particularly alarming about these bizarre answers is that the student seems quite unaware that it cannot be even approximately correct. The same goes for only slightly less unreasonable replies, such as 600 megawatts.

As engineers interfacing with the public we should be continually on the lookout that we do not mislead by quoting figures such as these that are "obviously" wrong.

In the November issue of CSIT, page 9, it is quoted "It takes one acre of strip-mined coal to burn six 100-watt bulbs continuously for one year." Really? The figures can't possibly be right! I don't know the circumstances in which the piece was selected, but surely someone should have spotted that the order of magnitude was way off.

Leonard Lewin
Professor of Electrical Engineering
University of Colorado, Boulder, Colorado

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Dear Editor: Ever since its beginning, I have been receiving a copy of the CSIT Newsletter and find it very interesting and informative. However, I must confess that my credibility was somewhat strained by the note on the lower right-hand corner of page 9 of the November 1974 issue. This refers to the statement that, "It takes one acre of strip-mine coal to burn six 100-watt bulbs continuously for one year." My calculations would indicate that this data is off by a factor of approximately 1000. If I make the following assumptions:

* The coal seam has an average thickness of two feet.
* In a modern generating station, one pound of coal will generate one kilowatt hour of electrical energy.
* One cubic foot of coal weighs at least 50 pounds.

One acre of strip-mine coal will generate approximately 5,000,000 kilowatt hours, which is 1000 times the annual kilowatt hour consumption of six 100-watt bulbs.

A. J. Hornfeck
Director, Division II

▶

Dear Editor: The statement made under news, notes, and comment section, page 9 of Issue No. 8 of the IEEE CSIT Newsletter that it takes one acre of strip mined coal to burn six 100-watt bulbs continuously for one year can be interpreted at least two ways--either coal is strip mined for less than 0.1 inch seams or it takes 50 to 150 tons a day to light six 100 watt bulbs.

The minimum social contribution of IEEE should be to replace fictions of technology with facts of technology, and in appropriate perspective.

H. William Welch
Assistant Dean
College of Eng. Sciences,
University of Arizona

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THE EDITOR REPLIES: Mea culpa. These readers have correctly pointed out an error contained in the Center For Science in the Public Interest (CSPI) Newsletter, from which the News, Notes, and Comment item was drawn. The correct number of 100-watt light bulbs should have been 6,000 - three orders of magnitude higher than originally stated. The CSPI Newsletter error should have been picked up by us but was not. On the matter of the basis for the statement, the director of CSPI has sent the explanation presented below. Readers not in agreement with CSPI's argument are invited to submit their own conclusions and computations.

It is unfortunate that reader response appears limited to the detection of errors in short items when there are larger issues of concern in the area of social implications of technology.

Dear Editor: The following is the reasoning behind the figure of 6000 light bulbs of 100 watts that can be burned continuously for one year on one acre of strip-mined coal.

1 100 watt bulb burns 880 Kwhr/year
4600 tons of coal are available from one optimal coal strip-mined acre
Coal energy equivalent = 765 E.U./tons

Calculations:

$(4.6 \times 10^3 \text{ tons})(7.65 \times 10^2 \text{ E.U./ton}) = 3.5 \times 10^6 \text{ E.U.} = 3.5 \times 10^7 \text{ Kwhr}$ (1 E.U. = 10 Kwhr)

Conversion factor for conversion of primary energy source to deliverable electricity (due to transmission and generation losses, as explained in Lifestyle Index) = 3.68

$\frac{(3.5 \times 10^7 \text{ Kwhr})}{(3.68)} = 9.5 \times 10^6$ Kwhr of deliverable electricity from every optimal coal strip-mined acre.

Mining Statistics:

The Complete Ecology Factbook, Philip Nobile & John Deedy
Anchor Books, 1972
153,000 acres/year are disturbed by surface mining (p.227)

U.S. Bureau of Mines, Jim Paone, Dir., Division of Environment
60,000 acres/year are strip-mined for coal

Technology Review, 76, #2, Dec. '73, Edmund A. Nephew,
Oak Ridge National Laboratory
"The lands already affected by contour and area strip mining in the U.S. are enormous in extent; at present coal stripping rates, more than 100 square miles of new land are being stripped annually."

There are obviously great disparities among the figures on strip-mined land. As a conservative estimate, allow one acre of land wasted in access roads, dumping, deforestation, storage of machinery, and exploratory stripping of the top-soil for every optimal strip-mined acre.

Using the most conservative strip-mining firure--that of the U.S. Bureau of Mines: 120,000 acres/year are lost to coal strip-mining industry, of which 60,000 acres are optimal coal strip-mined acres.

Therefore: The fraction of acreage stripped that is actually mined for coal = 1/2.

$(9.5 \times 10^6 \text{ Kwhr/acre mined}) \times 1/2 = 4.8 \times 10^6 \text{ Kwhr/acre mined}$

$\frac{4.8 \times 10^6 \text{ Kwhr/acre mined}}{8.8 \times 10^2 \text{ Kwhr/bulb/year}} = 5500$ bulbs/year, or
= approximately 6000 bulbs/year

I hope that the above calculations will explain the reasoning behind the figure used in the CSPI Newsletter to which your question pertained.

Albert J. Fritsch
Director, Center for Science in the Public Interest

NEWS, NOTES, AND COMMENT

▶

BIBLIOGRAPHIES RELATED TO SIT

An increasing number of bibliographies related to technology, science, and society are now available or are in preparation. Among these are: Daniel Gothie, "A Selected Bibliography of Applied Ethics In The Professions 1950-1970", University Press of Virginia (1973);

Carl Mitcham and Robert Mackey, "Bibliography of the Philosophy of Technology", University of Chicago Press (1973);

Roy Woodstrom, "Impact of Technology on Society - A Selective Bibliography", University of Minnesota Library (12/73);

Shawn Bryan, Ezra Heitowit, and Raymond Bowers, "Science, Technology, and Society - A Guide to the Field", Program on Science, Technology, and Society, Cornell University (in preparation).

Readers knowing of additional works in this field are asked to contact the editor. Information regarding institutions having repositories for SIT related material would also be appreciated.

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UPDATE ON BART

1. BART Management has reached an out-of-court settlement with the three engineers discharged after criticisms were made of the Automatic Train Control system (ATC).

2. BART Management has filed a 237 million dollar damage suit against three firms which provided the bulk of the electrical and electronic equipment; its engineering consultants; and a group of insurance companies.

3. A BART train collided with a maintenance car on January 19, killing one person and injuring two others. The maintenance car was undetected by the ATC system because it was fitted with rubber tires, thus inhibiting signal transmission through the rails.

▶

"The Fletcher School of Law and Diplomacy of Tufts University has appointed Dr. Ernest D. Klema as Adjunct Professor of International Politics. Prof. Klema, a senior member of IEEE and a former Dean of the College of Engineering at Tufts, is involved in courses and seminars on transfer of technology to developing nations, international energy problems, and Science, Technology, and American foreign policy."

Continued on page 7...

CRITIQUE OF THE 1974 IEEE–CSIT/ED KENTUCKY WORKSHOP

by Basil Myers

EDITOR'S NOTE: In previous issues the CSIT Newsletter has published reviews of sessions organized by other entities in IEEE, notably INTERCON. Many of these have been critical of the narrow perspectives of the organizers and authors. We now publish below a critique of an event organized by CSIT itself, which discusses the disadvantages of being too broad.

The workshop "Engineering in the Service of Society: New Education Programs", sponsored jointly by the IEEE Committee on Social Implications of Technology and the IEEE Education Group was held on August 26-27, 1974, at the Carnahan House Conference Center of the Host Institution, the University of Kentucky at Lexington. It attracted approximately forty participants who came from sixteen states and Canada, their number including representatives from industry, government and academe, mostly the latter. This diverse representation reassuringly reflects the widespread interest and activity with which the broad subject area of the workshop is being addressed. It also speaks well for the organizers of the workshop. This was not the workshop's only success, yet, it also perhaps fell short in many respects, as we shall elaborate in this critique.

The opening general assembly got the meeting off to a good start with Dr. John G. Truxal's keynote address, directed largely towards the problem of delivering technical awareness-education courses to non-engineering students. His was a valuable ecology of views and experiences in depth. We might mention, for instance, his advice to the uninitiated not to use mathematical equations, no matter how simple their form. To do so simply turns the non-engineering student off. At best he will forever curse having been sold into purgatory, at worst he will simply drop the course. The trick is to write equations out long-hand, in sentences - which, of course, takes time and effort, drastically reducing the amount of material that might otherwise be covered.

In any event, in the discussion following Truxal's address there seemed to be agreement that it is up to us, the engineers and scientists, to take and retain the initiative in bridging the socio-technical gap. Effective initiative is not likely to be forthcoming from elsewhere.

The rest of the first day was given to twenty-four individual presentations, some co-authored, in two parallel sessions. Their several titles and authors were as follows:

The DaVinci program at the University of Santa Clara (R. J. Parden).

A coherent program in social sciences for engineering students (K. S. P. Kumar).

The E^3 program at the Illinois Institute of Technology (R. K. Scharf, K. G. Pandey).

Technical orientation for humanities students, with emphasis on journalism students and nuclear engineering (R. L. Carter).

Education in social aspects of engineering: survey of such programs in Canadian universities (H. J. McQueen).

Technology for liberal arts students (R. C. Walker).

The ODU experience with split campus graduate engineering education in a metropolitan area (A. S. Roberts, Jr.).

An industry-university cooperative continuing education and training Master's degree program (B. R. Myers).

Professional development through continuing education (D. K. Blythe).

Independent study options in electrical engineering (L. Zelby).

Programs for high-ability secondary school students (M. E. White).

Bridging the "two cultures" in the engineering college (D. J. Brady).

A comprehensive visual-mental image of the social process (W. L. Bingham).

System approach to the social implications of engineering (G. Sinclair).

The impact of teaching the impact of technology (G. Hankins).

Expanded awareness in engineering education through the implication of the principles of general system theory (K. W. Prest, Jr.).

Engineering and food - and the implications for engineering education (J. T. Clayton).

Education for a highly technological society (M. Luckens).

How we teach a series of courses emphasizing the future interaction of technology and society (J. S. Mendell, W. L. Tanner).

The Columbia program in engineering education for public service (R. J. Schwarz).

Carrot and stick P.S.I. at Tennessee Tech. (O. E. Estes).

Electro-mechanical technology (W. G. Bakonyi).

New educational opportunities through accessibility enhancement (P. B. Terry).

Social implications of technology: footnotes to a histroy (J. S. Jackson).

This commentator would categorize these papers as follows:

Socio-technical philosophy	6
Social sciences for engineers	6
Technical courses for non-engineers	3
Industry-university cooperative programs	2
Novel in-house engineering programs	3
Special-audience and continuing education	4
	24

This wide distribution of topics identifies what this participant found to be a shortcoming of the first day's presentations, regarded as an entity: the mandate of the workshop was altogether too broad. We learned a lot but yet we really learned nothing, because there was neither the time nor the intent to focus on any one topic in sufficient depth. To be sure, there were a few superb presentations. But, as this observer saw it, the open license afforded authors by the broad mandate resulted largely in two classifications of papers: (i) those which were altogether too philosophical, too sweeping, too ecumenical, too mantic almost, and (ii) those which really only served the interests of the particular author or his institution (some, but not all, of those listed in the program with titles of the form "The ABC Program in RST at XYZ Institution"). Given the broad mandate of the workshop, there is no surprise in this; neither would it be fair to cast aspersions - for how could it possibly have come out otherwise? So be it, this observer could not help feeling that the first day of the workshop betrayed a preoccupation with participation rather than with new ideas. It was too self-serving, too patronizing - too much just a new priesthood. We couldn't escape the feeling. A narrower mandate might well have precluded it.

Time and space do not allow for a detailed commentary on each of those presentations which this observer attended. One contribution, however, perhaps deserves special mention because, to those who choose to listen (and most of those present at the time frankly did not), its thesis exposes what well might be at the root of most of the difficulties we seem to encounter in our so-often-futile attempts to come to grips with the socio-technical problem. We refer to Dr. George Sinclair's "System Approach to the Social Implications of Engineering". In it, as we understood it, he (i) charges that we engineers and scientists, specifically, are guilty of "intellectual game-playing", which offers little promise for grasping (i.e. defining or understanding) the socio-technical problems we have, let alone solving them, and (ii) there does not exist a proper philosophy of engineering to provide the engineer with the guidelines he needs to relate his activities to social problems. These are but two of his charges. As this commentator sees it, and as one who shares his views (at least, in principle), we lack our own definition, and we have failed to define what it is that we really are, what we really do, what we really should be, and what we really should be doing. 'Tis surely worth more than just a passing thought.

The second day was given to working discussion groups, covering the following topics:

Gaining acceptance of technology and science courses in an engineering curriculum.

How to interact with public policy decision makers.

Technology and society courses for non-engineers.

Alternative techniques and approaches to learning.

Engineering education for societal interaction.

The several groups duly presented their reports in the afternoon plenary session.

As might be expected, this was probably the more exciting of the two days by virtue, if nothing else, of the free license it afforded an individual to expound on his pet theme, whether anyone else was listening or not. Ideas came forth in torrents, to the point perhaps of exhaustion. Most of them we had heard of before, perhaps even had practiced. A lot were altruistic ideals rather than particularly tangible entities (e.g., "bring in the necessity of liberal education for the entire fulfillment of an engineering profession", "the ability to perceive, conceive, and communicate", "encourage and set an example in devoting study time to journals, etc., within and outside one's discipline", and so on). Unfortunately, with one notable exception, there were no priorities, weights or qualifications given by the several groups to the deluge of "should" and "should not" recommendations. The exception was the group on "Alternative Techniques and Approaches to Learning", which sagely noted, among other things: "---schools cannot prepare a student for all possible alternatives. Funding priority should go to those needs that include long-term evolution."

In summary, the workshop had too broad a mandate. This observer was left with a disturbing feeling that there was a preoccupation with participation rather than with new or particularly tractable ideas. There was perhaps too much blowing of golden trumpets, heralding in the new priesthood. But few sound new ideas and valuable experience reports came out of it (though let us not deny the few that did).

Perhaps, therefore, Dr. Sinclair's voice, though presently lost in the wilderness, is the one that we should tune to first: define who and what we are, and what and why the problem is.

FORUM

An all day forum on "Societal Obligations of the Professional Engineer in Education" will be held on April 25, 1975 at the Nebraska Center for Continuing Education, (33rd and Holdrege Streets, Lincoln, Nebraska). Panelists will discuss this topic from the vantage point of the practicing engineer, the recent graduate, the educator, and the engineering organization. Afternoon workshops will attempt to expand on these themes. For further information contact Dr. J. Lagerstrom, Director of Engineering Extension, c/o Office of the Dean, W181 Nebraska Hall, Lincoln, Nebraska 68508.

FORUM ON HUMAN EXPERIMENTATION

The ethical and legal issues involved in biomedical experiments on human beings--with special emphasis on children, the poor, prisoners, and military personnel, as well as fetal research--were publicly debated in Washington on February 18 and 19 at an Academy Forum sponsored by the National Academy of Sciences.

Four areas were examined in discussions among invited experts and members of the audience:

1. Perspectives of biomedical research;
2. Individual risks versus societal benefits;
3. Regulatory, judicial, and legislative processes; and
4. Future policy options.

The intention of the Forum was to explore thoroughly the triumphs and failures of human research; the conflict between individual rights and benefits to society; the ethical and legal aspects of free and informed consent; the equitable distribution of risk among different segments of the population; and the implications of proposed legislation and its impact on the future of research.

General inquiries about the two-day event should be addressed to M. Virginia Davis, Academy Forum, 2101 Constitution Avenue, N.W., Washington, D.C. 20418.

Continued on p. 9

CSIT OPEN MEETING

Monday, April 7, 1975, 7pm - Americana Hotel, 52nd Street and 7th Avenue - Malmaison Room - 3rd Floor

Any IEEE member is welcome to attend this meeting.

Officers of CSIT and Chairmen of Working Groups will report on their activities & will be available to answer questions and receive offers of help.

ENGINEERING "ASSOCIATION" A BETTER BET

by Marvin Moss

(The following is reprinted from the 1/1/75 issue of ELECTRONIC ENGINEERING TIMES - Readers' responses are invited - Ed.)

I (Believe) that a single, strong engineering association is essential for the well-being of engineers. Furthermore, I'll run the risk of stating that what's good for engineers might very well be good for the country...and even good for all mankind. Since this kind of organization has different objectives than those of the professional societies (but not conflicting objectives) the new association would have to be founded and organized independently, although it should function in cooperation with the professional societies.

Such an association cannot be patterned along the lines of the AMA (American Medical Assoc.), nor can it operate in the manner of a labor union. The AMA is structured to serve a body of self-employed professionals who traditionally set their own fees and deal with their clients individually. Engineers, for the most part, are employees. On the other hand, I don't believe that engineers would support collective bargaining and other traditional practices of organized labor that give union members little voice in arranging their destinies. Furthermore, most engineers would regard membership in a labor union as detrimental to their professional aspirations.

I would like to suggest a third alternative... an engineering association based on the following eight-point program:

Members of the association agree to accept employment only from corporations or other organizations (including government agencies) that have agreed, in writing, to deal with members on the basis of the ground rules established by the association.

The terms of engineer employment are specified in an individually written contract binding the employer and the engineer. The member may contract to serve as a consultant, or to engage in a full-time association for a fixed or indeterminate period.

An employer may approach a member directly with an offer of possible employment, whether or not the engineer is currently employed, or may elect to use the association as an employment agency. In the latter case, the employer benefits because he is tapping the largest possible pool of available talent, with candidates better screened for his particular needs. (It would be up to the association to make this claim a reality...a true test of professionalism for the association.)

By the terms of the contract, those so-called fringe benefits, the value of which is dependent on continuity of coverage regardless of the member's employment situation (e.g., health, accident, and life insurances, pension plans) are to be paid to and administered by the assoication on the member's behalf. The terms of these benefits, including cost to the employer, are to be set by the association and to be standard for all employers.

The contract provides for standardized, substantial compensation upon cancellation by the employer of a fixed-time-span contract before the specified termination date, or upon any cancellation of an indeterminate-period contract. (This clause would ultimately have the effect of influencing the employer's planning so that abrupt terminations of engineers' jobs would be minimized.)

The contract provides specific compensation for job requirements beyond the duties normally required of the member (e.g., overtime).

Apart from the aforementioned terms, the member is free to make any agreement with an employer, particularly with regard to such arbitrary matters as salary level. However, the association provides its members with information as to what salary and other compensation they can reasonably ask for.

The association will establish codes of professional ethics applicable to engineering activities in various kinds of industries. These codes will serve as guidelines for defining the engineer's responsibilities in those efforts that concern the public good as in matters of safety, health, and the environment. In those instances in which an engineer feels that his employer is requiring him to violate an applicable portion of the code, the engineer can request that the situation be reviewed by an impartial board of association members. If the board finds that a breach of the code has occurred, the association will negotiate with the employer to bring about the necessary corrective action. In extreme cases, the association may find it necessary to reinforce its negotiating effort by withdrawing its members from employment by the offending organization until acceptable action is taken. In any case, the association will act to protect an engineer initiating a review of an alleged ethics violation against retaliatory action by the employer.■

LEGISLATIVE ACTION REQUEST

At its January, 1975 Winter Meeting, the National Society of Professional Engineers, Board of Directors adopted a Resolution expressing grave concern over the consequences of the action of the 93d Congress in approving legislation to increase allowable truck weights on the Interstate Highway System, and calling upon Congress to forthwith reconsider its action.

The Resolution noted that previously Congress had rejected such proposals on the basis of safety and cost considerations detailed in testimony presented to appropriate Congressional committees over the years by NSPE and others. NSPE's position has historically been that bigger trucks on the Nation's highways would be detrimental as resulting in: an aggravation of safety arising out of the big truck versus smaller automobile mixture; an earlier obsolescence of the highway system with increased ultimate cost to the consuming public; an impossible financial burden on state and local governments arising out of the need to construct new and more frequently repair old off-Interstate streets, bridges, and highways; an increase in danger incident to utilization of state and county roads and bridges presently incapable of sustaining larger loads; and the lack of regulation imposing safety standards dealing with items such as weight to horsepower ratios, braking capacities, coupling systems, acceleration capabilities, jackknife controls, overturn stability, splash and spray generation, etc.

A copy of the Resolution is being sent to each member of the United States Senate and House of Representatives. It concludes by stating: "Now Therefore Be It Resolved, That the Board of Directors of the National Society of Professional Engineers, assembled at Tucson, Arizona for its January 1975 Winter Meeting expresses grave concern over the consequences of the action of the 93d Congress in approving legislation which permits states to increase allowable truck weights on the Interstate Highway System. We recommend that the Congress reconsider its action forthwith."

On January 23, 1975, action began with introduction of HR 1867 sponsored by Representatives Koch (New York), Gude (Maryland), and Hechler (West Virginia) and cosponsored by 30 other Congressmen.

This particular bill would repeal the increase in the truck weight limitation--it would, simply stated, put everything back where it was before enactment of the Federal Aid Highway Act of 1974 with respect to truck weights. The bill would also re-establish the 10,000 pound weight limitation on steering axles which was included in the Senate bill as a safety precaution, which provision was removed in conference. HR 1867 has been referred to the Public Works Committee. It is the preference of its sponsors that the Committee hold early hearings in order that all safety factors and cost considerations can be publicly explored.

It is imperative that engineers write to Congressmen from their districts urging passage of law to overturn the action taken by the last Congress in its final days which permits bigger trucks on the country's highways, streets, roads, and bridges. It is especially important for engineers from states represented by members of Congress serving on the Public Works Committee to advise these Congressmen of engineering's concern. They are:

Democrats

Robert E. Jones, Ala., Chairman
John C. Kluczynski, Ill.
Jim Wright, Texas
Harold T. Johnson, Calif.
David N. Henderson, N.C.
Ray Roberts, Texas
James J. Howard, N.J.
Glenn M. Anderson, Calif.
Robert A. Roe, N.J.
Teno Roncalio, Wyo.
Mike McCormack, Wash.
James V. Stanton, Ohio
Bella S. Abzug, N.Y.
John B. Breaux, La.
Gerry E. Studds, Mass.
Bo Ginn, Ga.
Dale Milford, Texas
Norman Y. Mineta, Calif.
Kenneth L. Holland, S.C.
Allan T. Howe, Utah
Elliott H. Levitas, Ga.
James L. Oberstar, Minn.
Jerome Ambro, Jr., N.Y.
Henry J. Nowak, N.Y.
Robert W. Edgar, Pa.
Mrs. Marilyn Lloyd, Tenn.

Republicans

William H. Harsha, Ohio
Janes C. Cleveland, N.H.
Don Clausen, Calif.
Gene Snyder, Ky.
John Paul Hammerschmidt, Ark.
E. G. Bud Shuster, Pa.
William F. Walsh, N.Y.
Thad Cochran, Miss.
James D. Abdnor, S.D.
Gene Taylor, Mo.
Barry M. Goldwater, Jr., Calif.
Tom Hagedorn, Minn.
Gary A. Myers, Pa.

CALL FOR PAPERS AND EXHIBITS

The Third Joint Conference on Sensing of Environmental Pollutants: A Focus on Applications of Science and Technology to the Effective Assessment of Pressing Environmental Problems, September 14 - 19, 1975, Las Vegas, Nevada.

Technical sessions will feature information exchange on the close interrelation of sensing methodology and assessment of environmental problems.

Papers are solicited in the areas of pollutant measurement and assessment of problems associated with personal exposure monitoring; pollutants of current interest; energy extraction, processing, transport and use; general transportation and other urban activities; agricultural activities; industrial processes; waste disposal methods; interactions between climate and pollution; long-range global environmental trends; and relationship of data bases and processing to user needs.

Those wishing to present papers (20-25 minutes) should submit (a) a short (50-100 word) abstract to be incorporated in the Conference Program, and (b) an extended abstract (400-500 word) to be used by the Program Committee in selection of papers to be presented at the Conference. Abstracts must be received by April 30, 1975 by the Program Chairman, Dr. Henry Freiser, Dept. of Chemistry, University of Arizona, Tucson, Arizona 85721. A Conference Record containing the complete papers will be published.

Exhibits of commercial equipment and scientific and informational displays are desired. Exhibitors should contact Mr. Howard C. Thacke, P.O. Box 447, Las Vegas, Nevada 89101, (702) 385-5336.

The Conference is cosponsored by IEEE, ACS, AIAA, AMS, EPA, ISA, NASA, NOAA, DoT, UNLV, and WHO. For information, please contact IEEE, TAB, 345 East 47th Street, N.Y., N.Y. 10017. (212) 752-6800 Ext. 333.

THE INTERSOCIETY CONFERENCE ON ENGINEERING ETHICS

The Conference will be held within the framework of the concurrent sessions of the General Engineering Department (ASME) on "Changing Society - An Engineering Challenge". The latter meetings will be held from May 19 to May 21 or 22, while the Conference on Engineering Ethics will be held on Sunday/Monday, May 18 and 19, 1975. The Ethics Conference is co-sponsored by the following societies: ASME, IEEE, AIChE, NSPE, ASCE, AIME, and Am. Chem. Society.

All sessions will be in the Baltimore Hilton Hotel in Baltimore, Maryland. There will be five sessions.

Session I: "Case Histories" of engineers who experienced a conflict of loyalties to employer and the public in carrying out their assigned tasks.

Speakers: Roy W. Anderson, "Railroading the Ethical"; Kermit Vandivier, "Engineering, Ethics and Economics"; Carl W. Houston, "Experiences of a Responsible Engineer".

Session II: "Analysis of the Present Condition from a Legal and Practical Viewpoint"

Panel: Larry P. Ellsworth, Esq. (from Nader's group); Professor Richard K. Scharf (Sociologist, IIT, Chicago); The three speakers of Session I.

Session III: "Engineering Ethics in Education"
Part A - Education in College
Panel: William Lea (ASEE, Ethics Committee); George Rawlins (ECPD Ethics Committee); Florence Torda, Sociologist.

Part B - Education of the Engineer in Practice
Panel: Michael Ascher, "Societal Responsibilities"; A demonstration of role playing by Charles Colgan.

Session IV: "Enforcement of a Code"
Panel: Charles C. Space (Chairman, ASME Professional Practices Committee); F. J. Kuchma - Engineering Union; Victor Paschkis - Engineering Ethics (paper); Dan H. Pletta.

Session V: "Desirable Changes in Codes"
Panel: Carl Barus (IEEE): H. B. Koning (ASME); J. C. Bennett (Am. Chem. Soc.); Mario G. Salvadori (ASCE).

Registration Fees: Members of co-sponsoring society $30. (two days), $15. (one day)
Non-members co-sponsoring society $45. (two days), $25. (one day)
Students and Spouses no fee.

For further information, please contact either: ASME (Paul Drummond) IEEE (Peter Edmonds). 345 East 47th Street, N.Y., N.Y. 10017 (212) 752-6800 ASME Ext. 452, IEEE Ext. 333.

Hotel Rates: Single $28.00. Double or Twin $35.00.

TROUBLE IN MASS TRANSIT

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EDITOR'S NOTE: The following article is condensed from the March 1975 issue of Comsumer Reports (by permission of Consumers Union). Readers are invited to respond. For an update on the BART saga see NEWS, NOTES and COMMENT.

Why have the space-age features of BART had so much appeal? The answer, of course, includes the hope that technologically innovative systems will perform better than familiar methods of mass transportation, perhaps saving labor costs, permitting closer spacing between trains, and allowing greater speed. And there is the natural desire of planners of completely new operations, such as BART, to attempt great leaps forward, so that a transportation system that may have to last half a century or more isn't outmoded in a few years.

But another important factor has been the attempt of aerospace and other companies to diversify into mass transit. To break into the business, they've been pushing their own new technologies and lobbying intensely with both public officials and transit systems.

As part of the promotion campaign, two companies attempted some big-money gambling in Las Vegas last summer. Rohr Industries, the California aerospace company that built BART's cars, and Pullman Inc., Chicago, each offered to "give" Las Vegas a "free" monorail system from the airport through the "Strip" to downtown. The companies both claimed they would arrange the $130 million financing and cover any operating deficits. They said they needed the experience to sell monorails to other cities.

The talk of a free monorail didn't persuade the county commissioners, who were skeptical of the guarantee provisions and feared a big drain on public funds. They also saw the proposal as a system that would help tourists get around but would be of little use to Las Vegas residents. The commissioners voted against taking either offer.

Another factor working for the creation of space-age systems is the glamour of it all. It costs little to reserve a lane for buses on an existing freeway, but the idea makes a terrible four-color brochure and a rather undramatic boast of political accomplishment. And, until recently, such modest proposals opened few Federal purse strings. More likely to attract Federal funds were projects that embodied the Disneyland dream of the American city of the future, complete with monorail.

In reality, there's nothing new or technologically challenging at all about a monorail; a fully functioning monorail system was built in Wuppertal, Germany, in 1901. And the monorail does have a serious problem. It requires an expensive elevated structure along its entire route, even in places where trains could just as easily run on the ground.

Despite this drawback, BART tried to co-opt a little of the glamour of the monorail during its early promotional phase. Its publication, "Rapid Transit", in June 1961 reported: "For the Bay region, BART engineers have tentatively selected a modern 'supported duorail' system."

"Supported duorail" means resting on two rails-in other words, a train track.

BART also tried to make its trains look extra-sleek by designing a sloped front and rear car for each train (between them are strung conventional-looking straight-ended cars). Sleek appearance has resulted in a unique problem. In nonrush hours, when travel is light, ordinary rail transit systems shorten trains to conserve electricity. Normally, railroaders shorten a train by putting it on a siding, uncoupling it in the middle, and running the first few cars out. But because BART needs a slanted "A" car on each end of the train, a train must be taken to one of three storage yards for a complex, clumsy recoupling operation that takes out some middle cars and reattaches the end cars. (BART's former General Manager, B. R. Stokes, told reporters that a commuter might drive to work if all BART could offer was a ride in a train with a conventional-looking, blunt nose.)

The insides of BART cars are as sleek as the outside. There are no rods or straps along the ceiling for standing passengers to grab onto when the train lurches; BART officials didn't want to spoil what one of its engineers calls "the clear, wide spacious view when you get into the car." As a result, standees are sometimes flung against each other when trains are crowded. After a public outcry, BART last fall instituted a crash program for installing ceiling rods-a program that will take two years to complete.

The reasons why things have gone wrong with BART will be debated for years, BART is suing Westinghouse for $55-million, and Westinghouse has filed a $15.8-million claim with BART for compensation in addition to the $40-million already committed for the controls (the original bid price was $26-million). Some BART engineers think the controls will eventually work perfectly; some BART critics advocate tearing them out and starting from scratch.

All this doesn't mean that new transit systems must revert to the red, yellow, and green signals of 30 years ago. The Lindenwold line, going from southern New Jersey to Philadelphia, has been running successfully with automatic controls since 1969. Lindenwold's controls were installed by Union Switch and Signal Co., a company long in the business. The BART controls, on the other hand, were designed from scratch and ignored technical developments within the rail industry in favor of what has turned out to be impractical aerospace technology.

Although the automation that comes with high levels of technology may reduce the number of train operators, it also results in the need for more engineers and maintenance personnel. For example, the Toronto subway system has about the same number of cars as BART. It has half again as many stations and three times the passenger load, although only one-third the track mileage. Toronto's manually operated trains have two attendants and the system functions well with 600 operations personnel and 700 in maintenance. The highly automated BART has 630 in operations and 1073 in maintenance.

The technical problems are only a part of the controversy surrounding BART. BART's impact on the San Francisco Bay Area is also a matter of controversy. To understand that impact, it's necessary to understand how BART came about .

The Bay Area Rapid Transit District was created by the California Legislature in September 1957. It's not widely known outside of San Francisco that at the time of BART's creation there already was an electric rail transit system, called the Key System, serving the East Bay and running across the lower deck of the Bay Bridge to downtown San Francisco. It had five rail lines and 55.9 miles of track.

The Key System's patronage declined all through the 1950's. Service was cut. Fares were raised. Finally, the Key System won approval from the state's Public Utilities Commission for a plan to abandon its train service, claiming it was losing $350,000 annually and didn't have the $4.5-million needed to renovate its tracks. (BART cost $1.6-billion and is losing more than $20-million a year.) In April 1958, seven months after creation of the BART district, the Key trains stopped running.

BART now operates in San Francisco County and in two counties in the East Bay. But it was originally planned as a five-county system-going south from San Francisco through San Mateo County and north across the Golden Gate Bridge through Marin County. Supervisors in San Mateo and Marin, however, voted to secede from the system.

Without the branches into Marin and San Mateo counties, BART is little more than a commuter railroad for East Bay suburbanites. Almost 60 per cent of the workers in San Francisco's central business district live in San Francisco, while only 17 per cent live in the East Bay. Yet 25 of BART's 34 stations are in the East Bay. There are four stations in downtown San Francisco and only four in San Francisco's residential neighborhoods. (The 34th station is in suburban Daly City, just south of San Francisco.)

BART's original financing came from a $792-million bond issue passed by voters in the three counties in November 1962. The group that campaigned for the bonds was called "Citizens Committee for Proposition A," which described itself an "an association of interested citizens." Depositions taken by a lawyer for a group of taxpayers show that financing for the campaign came from some very special citizens indeed-corporations, including contractors and others, that hoped to benefit from the building of the BART system. Westinghouse Electric, which is in broadcasting as well as in aerospace and transportation, gave the group television time on its San Francisco station and ran full-page ads in newspapers. The Downtown Property Owners and Building Association solicited its members. The chief fund raiser, Carl F. Wente, retired president of Bank of America, testified that he visited "the property owners, the banks and the insurance companies....I could almost tell you every contractor in this area by heart."

Accompanying the contractor-financed promotion of BART was a successful lobbying effort in the state legislature, which had specified in creating BART that a bond issue would need approval of two-thirds of the voters. "BART representatives said two-thirds is damned hard to get," acting general manager Lawrence Dahms recalls. The legislature agreed to lower the needed majority to 60 per cent. The bond issue won 61.2 per cent of the vote.

Thirteen years after the bond issue, San Francisco is more choked than ever with cars, while most of its residents still depend on a heavily criticized bus system for public transportation. But all San Franciscans, along with residents of the two East Bay counties, pay an extra half-cent sales tax to support BART, since the system has failed to support itself out of the fare box, as originally planned.

Martin Wohl, a professor at Carnegie-Mellon University in Pittsburgh and one of the nation's leading transportation experts, thinks BART was put in precisely the wrong place. "The market for transit has always been the central-city dweller and still is," he says. "He's the guy who deserted transit. And there's even more of a market today, because the people in the central city are poorer. But increasingly with newer systems, we're concentrating our stations in the suburbs. BART is damned expensive for the few people who use it."

BART, of course, is taking some people out of cars. But BART has also spurred the building of many new high-rise office towers in downtown San Francisco. These new office buildings are part of another BART goal: To concentrate business and industry, to increase property values, and to attract greater economic growth. The issues here are controversial and complex-and rarely discussed or understood when a subway system is being proposed. Will the explosive growth of the downtown centers combined with easy access to the suburbs mean that a city becomes increasingly poor and rundown while commuters flee home at 5 pm? Do the additional tax revenues provided to the city by the high-rises counterbalance this danger, and do they offset the new services the city will have to provide?

There are no easy answers to the questions, but one thing is clear: The choices should be made by the voters and not the land developers. And they should be implemented with the zoning regulations before the subway systems gets built. Critics of BART charge the development around stations has been unplanned and haphazard.

There's another question connected with this: Should land developers be permitted to make huge profits because their property is improved at public expense through a nearby transit facility?

Frank C. Herringer, head of the Urban Mass Transit Administration, which dispenses Federal funds for transit systems, tell CU he thinks developers should help pay for transit facilities that increase their profits.

Congress recently enacted a $11.8-billion mass transit bill that will provide $7.9-billion in Federal money over the next six years to help finance new systems. Although it's unlikely that another city would duplicate all BART's mistakes, any city could repeat enough of them, and make enough new mistakes, to keep consumers trapped in their automobiles even as we belatedly invest billions in what should be much more efficient modes of transportation.

BART's experience does not argue against fixed-guideway transit, nor does it say that new transit technology is doomed to failure. But there are some hard lessons to be learned.

The first is that a transit system design must be based on real needs. That is harder than it sounds, because those needs might not necessarily fit the interests of politicians or of a city's business establishment. Rail transit is essential for high-density areas, such as New York and Chicago. And trains can be economical, especially when right-of-way already exists, as with abandoned railroad lines running to a city's downtown. But sometimes a metropolitan area's needs are best met through expanded bus service and exclusive bus lanes on freeways.

As for new technology, the lesson from BART is simple: Try out new, unproved ideas on a test track, not on a city that will have to live with the idea's failure. And develop technology to make a system run better and more efficiently, not merely to eliminate personnel or to make it more glamorous and "modern".

Then there's the question of public control. Until last December, BART directors were appointed by the cities and counties in the system. Many of the appointments rested in the hands of politicians who supported BART at any price. (Voters finally rebelled last year and passed a measure requiring an elected board.)

Around the country, much of mass transit is controlled by special agencies created by state legislatures and given broad powers. The potential for abuse is enormous, since the agencies and their contractors can push their own pet projects and keep the relevant facts hidden from public view. Ideally, a way should be found to give close public review to the operations of these agencies. The solution might lie in a rigorous public auditing procedure, perhaps by special teams from both the state legislature and the Federal Government. Such a review could uncover abuses without undermining the independence public agencies need to obtain good ratings on the bond market. Publicly elected directors would help, too.

Finally, the existence of BART itself might prove a deterrent to future BART-type mistakes. Similar proposals in other cities are already coming in for more public questioning than BART ever did. With increased public interest, sensible planning could replace Buck Rogers in the driver's seat. ■

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