IEEE Student Newsletter

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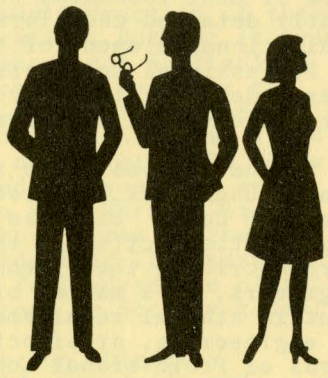

Ethics in Engineering

Perhaps strangely alien to a student throughout his college career is the subject of ethics, or in different words, "the ethical practice of a profession." In the past several years, however, the importance of a uniformly-enforced standard of conduct for each professional group has appeared to grow in importance as we once again face the fact that there is always a minority who find themselves unable to conform to the moral values of their peers or even adhere to the laws of the land. Under the scrutiny of wide media coverage, doctors, lawyers, and congressmen have all been forced to re-evaluate their professional values. Legislation establishing ethical principles has even been considered in connection with congressmen. The engineering profession has not escaped this re-evaluation process. As stated by the National Society of Professional Engineers (NSPE) in their publication Opinions of the Board of Ethical Review: "Every professional engineer worthy of that title is aware of his obligation to conduct himself (herself) and practice his (her) profession in accordance with ethical standards." (1)

The questions for students to carefully consider as they approach their futures in engineering are: What are the ethical standards for engineers? Where are they? How did they come about? It is an interesting story, and its evolution has been a process of some length.

In the first decades of the 1800's, the early days of engineering in the United States, organizations among various disciplines of technology were founded. They were led by men of great dedication, high principles, and substantial personal influence. By force of their personal leadership, adherence to informal principles of high character, integrity and dedication prevailed. It was not until about 1910 that any movement developed to formalize a code of conduct. It was in this era that engineers began to become prominent in and be employed in great numbers by industry rather than in the previous principal field of endeavor, consulting. At about this time, evidence began to surface that some of the engineering consultants were growing greedy by what appeared to be less than desirable affiliations in their dealings with government agencies. Thus was born the motivation for formalizing ethical codes to create a salutory effect on the profession itself and to counteract the unfavorable impressions which had been gained by the public.

Later, in the early and mid-1900's a wave of concern swept the engineering profession regarding the status of and public recognition for engineers. While some may argue the connection of this concern to the concept of ethics, it remains that there is a very real coupling. To this day, the concern has continued and codes of ethics now serve as cornerstones for arguments directed toward demonstrating that engineering is a learned profession--in the eyes of both the practioner and the public.

E. T. Layton, in his book, The Revolt of the Engineer, Social Responsibility and the American Engineering Profession (2) treats much of the background on the evolution of Codes of Ethics. Other excellent papers, rich with historical background of the movement, can be read in the transactions of various societies, notably those from the American Society of Civil Engineers (ASCE), the American Institute of Mining Engineers (AIME), the American Society of Mechanical Engineers (ASME), and the American Institute of Electrical Engineers (AIEE), predecessor to IEEE.

It was the AIEE, spurred on by Schuyler S. Wheeler, that in 1912 adopted the first formalized engineering ethical code, the "Code of Principles of Professional Conduct of the American Institute of Electrical Engineers". In December, 1974, the IEEE Board of Directors approved a new Code of Ethics which bears a considerable resemblance to the original Code, reflecting, however, a broader application of ethical practices to engineers employed in the industrial environment. A future article in the IEEE Student Newsletter will review Codes of Ethics in a more specific fashion. In particular, some of the major aspects of the IEEE Code will be discussed.

(continued on p. 2)

Codes of Ethics are now a part of the lore of most technical societies. A significantly detailed code forms a substantial organizational element of the National Society of Professional Engineers--while a much simpler code is utilized by the Engineers' Council for Professional Development (ECPD).

The various state societies of Professional Engineers affiliated with NSPE utilize the NSPE Code. Likewise, the Engineering Registration Act(s) of the various states, circumscribing the licensing of Professional Engineers, as a matter of law quite frequently contain ethical requirements for the practice of engineering, or effectively mandate "Standards of Professional Conduct" which have the effect of law. Such legal requirements differ from the Codes of Ethics of the societies as they are enforceable through action by the Registration Boards of the various states through the Court systems. They can sanction an engineer by reprimanding him, censuring him, or even withdrawing his license to practice. Such actions may reflect on or be stimulated by other criminal prosecutions for acts inimical to the accepted practices of the profession. In contrast, the ethical codes of the Societies are enforceable to the extent that adjudicated violations reflect on the member status or relationship in the organization. This may, however, incite a reaction by his peers based on the punitive action meted out or by the public if such information is released for public consumption.

Student conduct during the academic years provides a small but important insight into the larger world of practice, be it in industry, private practice, government, or education. Ethics in our learning processes are but a capsule form of our future productive processes. Professional and technical societies are not unmindful of this and discussion continues on the many ramifications of this most interesting subject. (See next issue for further discussion.)

-- W. W. Middleton, P. E.
Past Director, IEEE
Chairman, Ethical Practices
Committee, NSPE

References:
(1) Opinions of the Board of Ethical Review. Vols. I-IV, National Society of Professional Engineers, Washington, D.C.

(2) Transactions of the American Institute of Electrical Engineers, Vol. 31 and others, June-December, 1912, IEEE, New York.

(Editor's Note - The IEEE Code of Ethics is printed in the 1976 edition of the IEEE Student Branch Operations Guide. Read it, study it, learn it. It will soon be a part of your life.)

Employment Prospects Brighten

After two straight years of decline, job prospects for this year's college graduates appear significantly better, according to an early-season survey of employers by the College Placement Council (CPC). More than 600 employers, responding to an annual servey by CPC, indicated that overall they expect to hire 12% more new college graduates than in 1975-76. At the same time last year, a 5% decrease was forecast. However, conditions improved during the recruiting season, and the Council's year-end survey in June 1976 showed a decrease of just 2%. Continuing last year's late recruiting surge, private sector employers remain the most optimistic. They estimate they'll have 16% more jobs available this year. In contrast, federal government agencies foresee an increase of less than 1%.

Approximately 90% of the employer respondents who provided comments said that opportunities will continue to be very good for minorities and women candidates, especially in technical areas. They noted, however, that in the future, minorities and women could find the job-search becoming more competitive as the supply increases.

While many employers commented that 1976-77 possibly could be the best recruiting year in the last four or five, they cautioned that hiring will remain selective. Top-quality candidates may have a number of offers from which to choose while less-qualified candidates will still have difficulty finding jobs.

Respondents noted a continuing strong demand for engineers at all degree levels. Just 5% of the nation's college students receiving their baccalaureates are expected to get degrees in an engineering discipline, yet 26% of the jobs reported for bachelor's candidates are for engineering graduates. In the science areas, the most sought disciplines will be metallurgy and the geological sciences, particularly at the graduate level. Openings should also be available for those seeking work in computer fields.

-- College Placement Council, Inc.

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Professional Affiliation

An Education in Itself

"I have been assigned the topic _____ for a term paper. Please send me the information I will need." Truth or fiction? Truth! Such requests do come in to IEEE Headquarters. Unless the request comes from an isolated place with meager library facilities my usual reply is: "Learning to use the existing literature is part of the eudcational process and I would not knowingly rob you of the experience, if not the joy, of a personal encounter with a library." I then cite several IEEE publications--Proceedings, Transactions, Journals, Conference Records--that would be likely sources of the information needed.

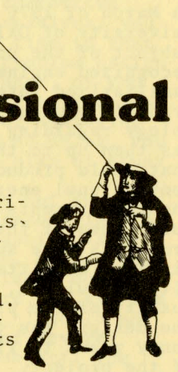
So far as I am able to recall, however, I have never had this type of request from an IEEE Student Member. To lend credibility to this assertion, I'd like to share with you the results of a study made by a prestigious university department that once undertook to determine how scientists and engineers acquired the specific technical information needed for the next step in a job assignment. In researching this question, the university staff interviewed employees of firms that designed radio and television receivers, computers, household appliances, instruments and controls, motors and transformers, etc. They used as "control populations", randomly selected members from the relevant IEEE Groups and Societies. The survey revealed an unanticipated finding (which was confirmed by a second survey): IEEE members were not typical of all industrially-employed scientists and engineers! Most non-members tended to get information by asking around until someone was found who could provide the desired information. Not so for the typical IEEE member--if one or two inquiries did not produce results, the IEEE member would go to the library!

It is impossible to learn in college all the facts you will later need on the job. Consider this also--the forefront of technology is, on the average, at least three to five years ahead of textbooks. To be at the forefront of your field, you must become fami liar with current periodical literature. IEEE publishes a significant fraction of the total world output in the broad field of electrotechnology. You, as an IEEE Student Member, have a unique opportunity to enhance the learning environment of the college regime through direct, personal involvement with IEEE activities--special student programs and the regular activities of the local Section and technical Chapters. You'll have a chance to listen to visiting lecturers, participate in symposia and conferences, and take advantage of the vast periodical literature sponsored by the IEEE Groups and Societies. Basic IEEE Student Member dues of $10.00 are a very small fraction of the cost of a college education. But for it, you gain access to experiences not available through any academic course. Remember too that IEEE's 30 Groups and Societies offer Student Memberships for an additional $3.00 each. Joining a Group or Society will allow you to receive selected Transactions or Journals and help you keep abreast of developments in one or more areas of the electrotechnology fields that IEEE serves. If you are not taking full advantage of this opportunity, join a Group or Society today!

--Richard M. Emberson, Director
Education, Field, Standards and
Technical Services

(Editor's Note: "Membership Sale Days" are here! IEEE Student dues are only $5.00 from now until August 31, and Group/Society fees are a mere $1.50 each. Take advantage of this bargain and after you do, tell a friend about it.)

Your Professional "Roots"



The history of the electrical engineering professional is rich in genius and revolutionary contributions. A new IEEE Press Book, Turning Points in American Electrical History (Ed. James E. Brittain, Georgia Institute of Technology), recounts the fascinating story of your profession's roots through selected papers written over the past 200 years. Each paper is preceded by editorial comments on the significance of the development it describes. They are all here: Bell, Edison, Steinmetz, DeForest, and numerous other greats in a book that ties together the present with the past in electrical/electronics engineering. In an age when more and more people are seeking their genealogical roots, here is a book to make you proud of your professional roots, to make you a better engineer for the reading. For your copy send $12.95 check or money order payable to IEEE to IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. Make sure you indicate product number PP-00836 and your return address.

An ERA Comes to An End

The 1976-77 Energy Resource Alternatives II (ERA II) competition, sponsored by SCORE (Student Competitions on Relevant Engineering), is rapidly approaching its grand finale. The final test event, scheduled for June 9-15 in Richland, Washington, will be hosted by the Energy Research and Development Administration (ERDA) and its local affiliated contractors. Fifty-one teams representing 42 colleges and universities submitted entries for systems that will produce electricity from nonconventional energy sources such as the sun, wind, waves, and even waste material. At the final test event in Richland, competitors will undergo rigorous evaluation of a final written report, an oral marketing presentation, and a working demonstration of their project. Innovation, marketability, efficiency, and output are some considerations of the judges who, significantly, represent a wide cross-section of the engineering community. The final test event is the culmination of many months of work for the participating teams.

The competition officially got underway in March of 1976 with a symposium held at the University of Oklahoma. At that time the subject of the competition was presented and recognized engineers from across the country familiarized interested graduate and undergraduate students with state-of-the-art technology regarding alternate energy sources. It was then up to the team to design a system that would produce electricity from a nonconventional energy source, as well as meet the requirements established by the rules and guidelines of the competition. The design proposals were submitted to the ERA II Coordinating Committee at Washington State University in Pullman, Washington. Depending on the quality of the proposal and the feasibility of the design, the team was awarded a SCORE seed money grant to finance the actual construction of the project. The students were then required to turn their design into full-scale energy systems while working under strict budgetary controls. The students claim that it is an educational experience within itself to deal with actual hardware as opposed to ideas on paper.

The second ERA II symposium, held in Houston in February, gave students a chance to ask engineering experts how to cope with the problems they were encountering in construction. At this point in time, students are putting the finishing touches on their projects and preparing for the trip to Richland in June.

Each year, SCORE sponsors a new competition to challenge engineering students across the country. The past three competitions have been: the Urban Vehicle Design Competition (1971-72), Students Against Fires (1973-74), and Energy Resource Alternatives I (1975-76). The new topic for the 1978-79 program will be announced soon. If the "SCORE experience" sounds like something you would like to be involved in, let us know and we will keep you informed as the next competition develops.

Contact for more information:
SCORE
Room 9-220
The Massachusetts Institute of Technology
Cambridge, MA 02139

-- Richard Aseltine, President, SCORE

Career and Life Planning

The IEEE Student Newsletter has, in three previous issues, presented some basic principles of "Career and Life Planning", a program designed to assist you in assessing your needs and abilities, and in articulating your life goals. "Planning for your career--and your life--involves more than writing competent resumes and making positive impressions at interviews," our author claims. "Rather," he continues, "it involves developing insight into yourself, knowing what you need in life and what you can contribute both in a job and in your society. It is also important to concretely state these needs and planned contributions in an organized plan." The article that follows discusses this plan and its implementation. The editor advises: "Read on ... for your future's sake."

(Editor's Note: If you missed any of the previous Career and Life Planning articles, don't worry. A special pamphlet incorporating all four articles in this series is scheduled to be printed soon. Look for the announcement to be sent to all Student Branch Counselors and Chairmen and a further notification in the next issue of the IEEE Student Newsletter.)

Career Planning for Students

IV. IMPLEMENTING YOUR PLAN

AND STAYING IN CONTROL

Think for a moment. How many times have you "planned" to do something but never quite got around to it? You may have intended to research an interesting technical project, but never made that slightly inconvenient trip to the library. You may have meant to write to someone who had data you needed for a class paper but you procrastinated until it was too late to make a difference. Or, as many students have done, you might have hoped for a special firm to hire you but you never did the background work necessary to understanding that organization's problems, needs, and goals, and then evaluate how your skills could be applied to assist the company in meeting its objectives. There can be no results without effective action, no matter how good a plan you may have developed. If you have summoned up enough self-discipline to generate commitment to a set of goals by creating a viable plan, then you must continue to follow through and execute that plan before you can realize the benefits of your planning.

Evaluating Performance and Effectiveness

Things don't always work out as planned. Although it is virtually certain that you won't get what you are after without a plan, the plan itself brings with it no guarantees that you will achieve what you desire. What you need to help make the unpredictable more predictable, is a system for measuring and evaluating your efforts. The system of measurement and evaluation that you develop should be an integral part of your overall plan. It should have clearly-defined criteria and standards to be used for judging your performance in reaching toward your goals, as well as for evaluating the results you achieve. Periodic checkpoints or milestones should be set up to see if things are developing as planned. All this may require that information and data be regularly collected and analyzed. There's no harm in being scientific with your life!

Let's consider, as an example of a measurement and evaluation system, a company which has as its main objective, the increase in its sales of a certain product. The plan that the company develops to achieve its objectives includes the creation of a larger sales force and the introduction of the product into a new territory. In order to measure the success of its efforts in that direction, the company would undoubtedly carefully chart activity in that new territory by recording the monthly volume of sales and comparing it to the sales quotas they require to progress at a certain level. The company would also make periodic evaluation checks of each sales person to determine the effectiveness of his efforts. If everything were "on target" according to pre-arranged standards, the managers of the company would be satisfied. However, if trouble were detected through their management and evaluation techniques, changes would have to be made in the operations or in the objectives themselves. In other words, the plan would have to be revised.

Taking Corrective Action
Revising Your Plan

The process of making the changes needed in order to achieve the results you want involves making corrections and revisions in your plans. To do this correctly, you should first identify areas where performance problems exist. For instance, you may find out after "mid-terms" that your grade in a particular course is lower than you had hoped and expected it would be. In this case, the professor's midterm evaluation revealed a problem to you. If your plans called for the achievement of an "A" average, corrective action is needed. You have alternatives: you may decide to devote more study time to that course, you may complete extra problem assignments, you may write an extra paper, or you could do all three. By taking corrective action, you increase the chances of achieving the grade that you want, but in so doing, you may have to alter your previous plan of study.

Taking corrective action is not an easy task. In fact, I would rank it second in difficulty among all the career planning issues we have discussed in this series, second only to the task of establishing a clear "objective" for life's plans. Therefore, to aid you in this step of remedial action, I would advise that you skim through any of several good reference sources on the subject. The best, in my opinion, is the one by Kepner and Tregoe entitled The Rational Manager (McGraw-Hill, 1965). Kepner and Tregoe have advanced the thesis that taking corrective action really involved two separate processes. The first they call *PROBLEM ANALYSIS:* this process involves determining the causes of difficulty. The second is *DECISION-MAKING:* a process in which avenues of corrective action are explored. Kepner and Tregoe go on to enumerate seven basic concepts for each of these two processes. Within these concepts, they outline what is required in order to pinpoint a problem and advise how to implement the best possible solution. Go through these points,

understand them and you will be well on your way to taking complete charge of your life.

THE KEPNER-TREGOE METHOD OF PROBLEM ANALYSIS

1. The problem analyzer has an expected standard of performance against which to compare actual performance.
2. A problem is a deviation from a standard of performance.
3. A deviation from standard must be precisely identified, located, and described.
4. There is always something distinguishing that which has been affected by the cause from that which has not.
5. The cause of a problem is always a change which has taken place through some distinctive feature, mechanism, or condition to produce a new, unwanted effect.
6. The possible causes of a deviation are reduced from the relevant changes found in analyzing the problem.
7. The most likely cause of a deviation is one which exactly explains all the facts in the specification of the problem.

THE KEPNER-TREGOE METHOD OF DECISION MAKING

1. The objectives of a decision must be established first.
2. The objectives are classified as to importance.
3. Alternative actions are developed.
4. The alternatives are evaluated against the established objectives.
5. The choice of the alternative best able to achieve all the objectives represents the tentative decision.
6. The tentative decision is explored for future possible adverse consequences.
7. The efforts of the final decision are controlled by taking other actions to prevent possible adverse consequences from becoming problems, and by making sure the action decided on are carried out.

The principal point to remember when attempting to take corrective action is: "Do not try to solve a problem before you know what the problem is all about." Kepner and Tregoe emphasize problem analysis before decision-making and the whole process assumes that a clear objective and plan has been created in the first place. As the wise philosopher Seneca once said, "If a man does not know to what port he is steering, no wind is favorable to him."

What the Future May Demand

In the world of the future, your opportunities should continue to expand. Simultaneously, however, so will the demands made on you. I have broken down into categories and discussed those three demands that I believe to be the greatest. To live up to your potential in the future, understand these demands, be prepared to deal with them, and take them into account when implementing your plan.

First, the future will demand that fundamental resource--knowledge--and the ability to acquire it on a regular and continuing basis. Each of us must become a *life-long learner* capable of analyzing and interpreting changes and integrating new information into his knowledge base. There is already abundant evidence that the old "model" of life's customary pattern of Education--Work--Retirement is a false one. The need is, and will be, for "continuing learning" and the ability to teach one's self. Engineers have a unique pressure to be aware of in this area, and that is the pressure resulting from rapid technological change and the necessity of staying as current as possible on the state-of-the-art of his field.

The demands of the future also will include the ability to stay in touch with yourself, to know who you are and what you need. View each experience, good or bad, as an opportunity for *growth in self-knowledge*, for as the old adage admonishes, "Good judgment comes from experience. And experience, well, that comes from poor judgment." After you assilimate that experience-generated new knowledge, factor it into your planning.

Third, the future will continue to demand

your increasing ability to interact with and *grow in organizations*, particularly in the organization known as "the work place". Often organizations and their managers are obliged to put the needs of the company above those of individuals working inside of it. If you are aware of it, you will be better prepared to deal with such a situation. I believe human-resource development inside an organization is optimized when a *mutualizing of goals* has been achieved, so that the needs of the organization as well as those of the individual can be realized.

Although organizations spend millions of dollars each year training their managers to develop and better utilize their people, not much progress has been made in this respect yet. I feel that this is because the individuals themselves have not taken the initiative and expended the time and trouble to begin to plan their lives, set individual goals, and seek avenues of opportunity to achieve them. Organizations can respond to individuals but the individual himself must do his share. When musing about how modern organizations can make knowledge more productive and the knowledge-worker a higher achiever, Peter Drucker said:

> One thing is clear: making knowledge productive will bring out changes in job structure, careers, and organizations as drastic as those which resulted in the factory from the application of scientific management to manual work. The entrance job--that is, the job that first introduces the man or woman with high formal education to the adult world of work and experience--will have to be changed drastically to enable the knowledge worker to become productive. For it is abundantly clear that knowledge cannot be productive unless the knowledge worker finds out who he is himself, what kind of work he is fitted for, and how he works best. There can be no divorce of planning from doing in knowledge work...the knowledge worker must be able to plan himself.

A Few Closing Thoughts

This article has dealt with implementing your plan and staying in control of it. We have discussed this on two levels, one dealing with your immediate planning activities, and the other with your longer-term needs for career management and growth planning. The basic reason that we are able to consider this subject on two levels is that Career and Life Planning principles comprise a "process" which can and should be renewed and applied whenever necessary throughout one's life. These principles encourage a thorough review of who you are today in terms of your skills, interests, talents, and values. They stress development of a clear sense of where you want to go with your life, and they incorporate the development of the steps and strategies which make up your plan. As you work out some or all of the suggested exercises, do some of the suggested reading, and otherwise strive to examine these ideas in relation to your own personal life, it is important for you to remember a few basic ideas:

1. *You* must act. No one can do it for you. Get to know your unique self. Set goals for yourself. Develop a sense of mission in your life and work.
2. Go out of your way to meet people who share your visions, ideals and concerns. Develop a sense of community with them.
3. Learn how to *communicate* your ideas and express your viewpoint through both speaking and writing.
4. Continue to seek opportunities to grow and learn. When you cease learning or being challenged, know it is time to make a change.
5. Get in *control* and stay in control of your time and of your life.
6. Learn how to manage people and tasks. The task includes planning, organizing, leading, and controlling resources (manpower, money, materials, and machines).
7. *Read.* Read in different fields. Read about what your associates and peers are doing. Read what your critics are saying and thinking.
8. Evaluate developments against performance standards.
9. Maintain a balanced set of values with respect to work, family, self, and others. Enjoy the road to accomplishing your goals.
10. The grandfather of one of my students once told us, "A lot of things have gone wrong in my life and most of them never happened". Control your attitude. Build strength and confidence through positive thoughts

and action-plans.

11. Remember, you are never without power to make things better. You have the power to choose. Use it.

12. Learn to work with and through other people. Don't try things alone. Allow them to grow and develop as individuals as well.

13. Make sure the people you're following or working for are going somewhere with themselves, that is, they are trying to accomplish something worthwhile.

14. Remember, engineers are trained to design and build systems to meet certain standards and objectives. Don't forget to apply this training to the greatest design project of all, your own life!

Suggested Exercises

1. Choose a problem that is currently important in your life. For example, you might choose a Student Branch project, a summer employment search, a project for a college design course, etc. Perform the steps of problem analysis as outlined by Kepner and Tregoe (The Rational Manager, McGraw-Hill, 1965) and summarized in the text of this article. Make sure that you clearly understand what the problem is in reference to objectives and performance standards. Once you identify the causes of the problem, decide on a solution which eliminates the causes and which included your criteria for an acceptable answer. To do this, follow the Kepner-Tregoe steps of decision-making which are also outlined in the article.

2. Refer to your work under Exercise #4 of our second article on "Goal-Setting" (IEEE Student Newsletter, December 1976). This exercise instructed you to determine what you would like to see changed or accomplished in your lifetime in our society. Prepare a brief paper describing the positive and negative effects that this change could have on your life, the lives of others, and, if applicable, on one of our institutions (government, family, business, etc.)

Suggested Further Reading

1. William Abbott, "Work In The Year 2001", in the Futurist Magazine, February, 1977.

2. Warren Bennis, ab al., Editors, The Planning of Change, Holt, Rinehart, and Winston, New York, 1961.

3. Fred Best, Editor, The Future of Work, Prentice-Hall, Spectrum, New Jersey, 1973.

4. Wilbur Bradburg, The Adult Years, Time-Life Series on Human Behavior, Time-Life Books, New York, 1975.

5. James S. Coleman, et al., Youth: Transition to Adulthood, The University of Chicago Press, Chicago, 1974.

6. Samuel A. Culbert, The Organization Trap, Basic Books, New York, 1974.

7. Gene Dalton, et al., "An EE for All Seasons" in Spectrum Magazine, December, 1976.

8. Raymond F. Gale, Who Are You? - The Psychology of Being Yourself, Prentice-Hall, Spectrum, New Jersey, 1974.

9. Bernard Haldane, et al., Job Power Now, Acropolis Books, Washington, D.C., 1976.

10. Harold G. Kaufman, Editor, Career Management: A Guide to Combatting Obsolescence, IEEE Press, New York, 1975.

11. Richard Kopelman, "Career Hurdles and How to Clear Them", in Spectrum Magazine, February, 1977.

12. John S. Morgan, Managing Change, McGraw-Hill, New York, 1972.

13. Gail Sheehey, Passages - Predictable Crises of Adult Life, Dutton, New York, 1976.

-- John G. Picarelli

About the Author

Dr. John G. Picarelli is the Dean of the Washington International College and a consultant to industry, education and government specializing in management and human resources development. He is a member of IEEE's Student Activities Committee and Chairman of its Subcommittee on Career-Life Planning.

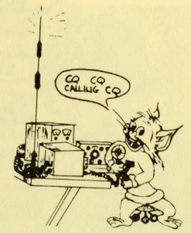
In the future...Dr. Picarelli hopes to hear from *you*. He'll be provide you with more details and answer your questions in upcoming issues of the Student Newsletter. The initiative is yours. Write to him today at: Washington International College, Career-Life Planning Project, 1239 G Street, NW, Washington, C.C. 20005.

Program Ideas

Has your Branch ever held an *issues forum?* Try it for a meaningful meeting that will actively involve most, if not all, of your members. Bring in experts in fields of concern to all of you as future engineers. Such topics as "ethics in engineering" and "career and life planning" are ideal for stimulating absorbing discussions.

Discuss the *energy controversy*. A listing of energy publications, reports, books, films, and multimedia kits are available from the Edison Electric Institute free of charge. Write to Carolyn Stern, EEI, 90 Park Avenue, New York, NY 10016.

Set up a "Day with an Engineer." Design your program so that Branch members can observe first-hand the operation of an engineering organization and become familiar with various electrical/electronics engineering positions available on graduation. A letter describing one Branch's experience organizing such a program is available from Judy Rundle, IEEE, 345 East 47th Street, New York, NY 10017.



Calling All Hams

A new edition of the Directory of IEEE Student Hams will be published in June. Names, addresses, and call letters of individual Student hams and Branch stations are sought. Contact Judy Rundle, Manager, Student Services, IEEE, 345 East 47th Street, New York, NY 10017. The IEEE Student Ham Directory has laid the groundwork for lasting on-the-air-friendships. Let's help this tradition continue. TNX

Changing Your Plans?

When you filled out your Student membership application, you gave us your "expected" date of graduation. If you said you were graduating in May, June, or July of 1977, then you will soon receive a change of address form from us. As sometimes happens, maybe you are not graduating now. If that's the case, then return the form to us advising us of the new date on which you will graduate and the school you will be attending. This information is vital if you are to retain your Student Member status. If you're planning on moving soon, let us know. We would like you to continue receiving your IEEE publications. In short... keep in touch as you change your plans.

Spectrum Highlights

Throughout the summer months, you will continue to receive IEEE Spectrum. Reading it will help keep you abreast of developments in your own field of interest as well as in related fields.

The April issue will feature instrumentation, including articles on instrument safety, trends in automatic test equipment, and the unexpected benefits of microprocessors in making analog measurements. In April you will also see a special report on Electro '77 and a related article on trends in trade shows.

In the May issue there's a potpourri of fascinating articles. Delve into the technology of electronic banking (and its social problems) in an article entitled, "Electronic Fund Transfers". In "Hobby Computers: Microelectronics' Mail-Order Bride", you can acquaint yourself with this new enthusiasm among amateurs. Machines that can recognize and interpret commands by a human voice through an automatic speech recognition system is a commercial reality described in "Voice-Controlled Systems--A Technology in the Offing". Read about all this and more in the up-beat, up-to-date journal of your profession ... Spectrum.

Let's Go!

Those far-away places with the strange-sounding names, far away over the sea ... Dreaming of seeing the world? For budget-minded students and faculty who have the travel bug, there's lots of help this summer. Low-cost air fares, study-abroad packages, economical lodgings, and car rentals are all described in the 1977 Student Travel Catalog--the "how to travel" handbook for the academic community, available free of charge from the Council on International Educational Exchange in New York.

For Western Hemisphere students with the wanderlust, many charter flights have been arranged to London, Paris, Amsterdam, Frankfurt and Zurich. Originating in New York, Chicago, San Francisco, or Los Angeles, fares to London begin at $289 (from New York) and go no higher than $489 (from Los Angeles and San Francisco). While you're goggling, remember the conditions: you must arrange your booking no later than 50 days before departure and pay a deposit of $125 per person. The fare you pay, however, entitles you to stay two to 13 weeks, depending on the charter you choose. Entire semester or academic year charters are also available.

While in Europe, you can enjoy an innumerable number of money-saving travel services simply by presenting an "International Student Identity Card." The Card is your key to inexpensive student hotels, restaurants, low-cost international tours, and student charter flights all over Europe and Asia, and to points in Africa--at savings of 50% or more. The 1977 Card costs $2.50 and is valid until December 31. To get a Card, contact the Council, but only if you are a full-time student and can demonstrate proof.

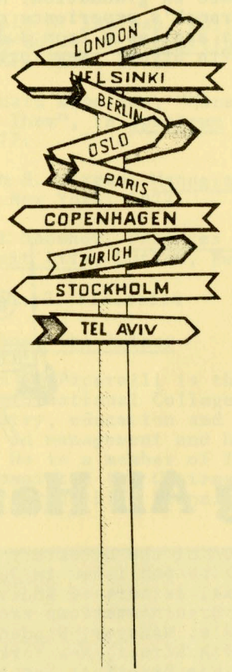
Full-time students (over age 18) and faculty members can also see Europe conveniently--by car. Car leasing plans are ideal for those in need of low-cost transportation in Europe for four or more weeks. This plan is also agreeable to those who may wish to share their travel expenses; most cars seat at least four. A flat fee is paid for the car rental (no tax and/or mileage charge!) but you must pay for gas and oil. If you want to camp, rent car and tent--and keep the tent. Pick up your car in Paris and go!

For students visiting the U.S., a special hotel has opened in New York appropriately named the "New York Student Center." The Center provides economy accomodations in mid-Manhattan convenient to train, subway, and bus transportation. No reservations are accepted, but you can call 212-695-0291 at any time, day or night, for room availability. Room charges range from $8.50, for four to five in a room, to $20.00 for a single room with bath.

These facts and figures should get you started planning. For more information, write for a free Student Travel Catalog. Contact:

The Council on International Educational Exchange
77 United Nations Plaza
New York, NY 10017
(212) 661-0310

They will help you get your identity card, make your reservations, answer your questions, and make suggestions on study programs. They will also send you a publications list so that you can read about Vienna, Rome, the French Riveria, Bangkok, Morocco, New York ... Let's go!



Graphic

Reprinted from the 1977 Student Travel Catalog
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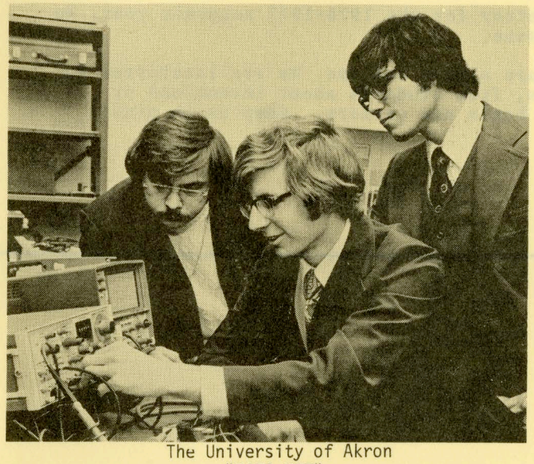
Great Lofty Ideas Happened!

In December, 1976, eight IEEE Student Branch engineering teams received word of their success in the latest Vincent Bendix Award Competition. Twenty-two teams submitted proposals describing plans for projects which would strengthen the professional development of its creators while contributing to the development of the Branch program as a whole. The most outstanding were awarded cash sums of up to $500 to carry out their projects.

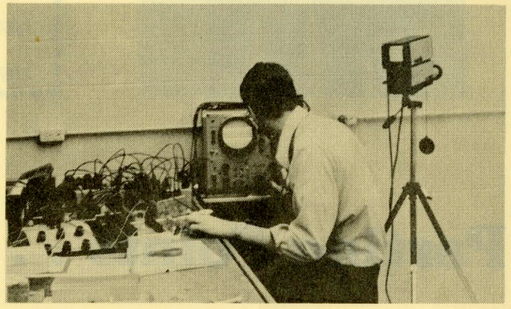
IEEE Bendix Award winners show an unusual amount of creativity and initiative. They are also often very practical. For example:

The University of Akron team was awarded $300 to complete a project entitled DATA-NET. DATA-NET is designed to provide data communications facilities for an interactive computer network at the University of Akron. The network will link remote terminals, primitive microprocessor systems, and a T.I.-960 A minicomputer. Team leaders Michael Wascher and David Kisak are proud of their project's practicality, claiming that the DATA-NET system will maximize the use of the machine by giving different divisions at the University access to the machine without leaving their respective departments.



The University of Akron
"DATA-NET"

The communications field also proved to be an area of interest to Bendix team members at the University of Wyoming. Their winning system, team member Tom Scheidt states, will be capable of sending and receiving a live picture and voice, similar to a two-way television, over two strands of glass fiber. As Tom describes it, "The audio and video signals will both be carried by infra-red light through the glass cable from one terminal to the other. The image and sound will be sent by encoding them into electrical signals that drive a light emitting diode. The modulated light is directed down the optical fiber. The signals are then detected by a photo-sensitive transistor and demodulated to reproduce the picture and sound that were sent from the other terminal."



Youngstown State University
"Microprocessor - Based Pattern Recognition
as Applied to Track Event Timing"

A fascination with sports and a concern for health care motivated two other team projects. Youngstown State University Branch members wanted to create an inexpensive and reliable electronic system for track-event timing, and received $300 to experiment. They will use a microprocessor in conjunction with a video camera to "see" runners approaching the finish line, and time and place these runners to a precision of 0.01 seconds. Meanwhile, University of Detroit students Michael Michel and David Witkowski will also be utilizing a microprocessor. They will be developing an ECG arrhythmic monitoring system for coronary care units.

While 1976 winners complete their projects, future 1977 participants should be planning theirs. Now is not too soon. Competition rules, posters, and a "how-to" tutorial on proposal-writing for the Bendix competition are available from your editor. Write to Judy Rundle, IEEE, 345 East 47th Street, New York, 10017. Next year we may be featuring your team.

Here Comes Summer!

Professional models? Beach bums? No, these are the two hardworkers who make up the IEEE Personnel Department. Karen Wagner and Gene Logan are proud of their professional affiliation and are showing it off this summer with new IEEE T-Shirts. You can order yours--and one for a friend--by filling out the order form below:

IEEE T-SHIRT ORDER FORM

Return with payment to: IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854
Specify Quantities Each Size: 1-9 Quantities: $3.75 each; 10 or more: $3.25 each.

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April/May SN/L

Parting Points . . .

This is the last issue of the Student Newsletter for the 1976-1977 academic year. We start up again with the September/October 1977 issue.

Articles or comments about the Newsletter are always welcome. We are interested in hearing from Branches about projects and programs, from students about inventions or special interests, and from recent graduates who begin new careers. Keep us in mind!

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