

# IEEE Student 3 Newsletter

Volume 3, No. 3  
February, 1975

## Women in Engineering

by Martha E. Sloan, Michigan Technological University  
Guest Editor, February 1975 IEEE Transactions on Education

Women have been studying and practicing engineering for more than 90 years, but until recently only about one percent of engineering students and working professionals were women. The women's rights movement, however, has resulted in increasing numbers of women entering the traditionally masculine fields of engineering, medicine, law, and business. Some engineering schools that have made special efforts to attract women students have increased their numbers by an order of magnitude. Freshmen engineering enrollment for the 1974-1975 academic year is 9.4 percent female at Michigan Tech, 13 percent female at Cornell, and 17.5 percent female at Stanford. But even these percentages fall short to matching the 30 percent or more of female engineers in some European countries.

Opportunities that engineering offer women, and some of the programs sponsored by engineering schools, industry, and professional societies to acquaint young women with job alternatives are discussed in the February 1975 issue of the IEEE Transactions on Education, a special issue devoted to women in engineering. Complementing the February 1974 special issue on minorities in engineering, this issue focuses on engineering schools and their contributions in preparing women for engineering careers. Featured papers include a review of the fields that may be particularly attractive to women, programs to attract women to engineering schools, the characteristics and problems of women in a male-dominated field, experiences of women at several engineering schools, career paths of women engineers, and minority women in engineering.

Improving the persistence rate of women in engineering schools is still a major challenge. Dr. Sandra O. Davis of the Institute of Technology of the University of Minnesota studied the persistence rate of all women who entered the Institute in a ten-year period and an equal number of men with similar high school ranks and majors. In an article included in this issue, she compares women and men students on standard interest, personality, and achievement tests and also on the basis of results from a special questionnaire. Personalities and interests of the women engineering students were much like those of other college women. The women had a much broader range of interests than the men in literature, art, music, history, and politics. Despite common stereotypes of women in engineering or science as disinterested in marriage and family life, a full 80 percent of the women planned to combine marriage and family responsibilities with their careers. Half of them were married at the time of the survey. The women reported that many of their male classmates acted resentful or cold-shouldered toward them. A majority of the male students held negative views regarding women students, however, one-third of the men liked the women students around and wished to have more of them in their classes.



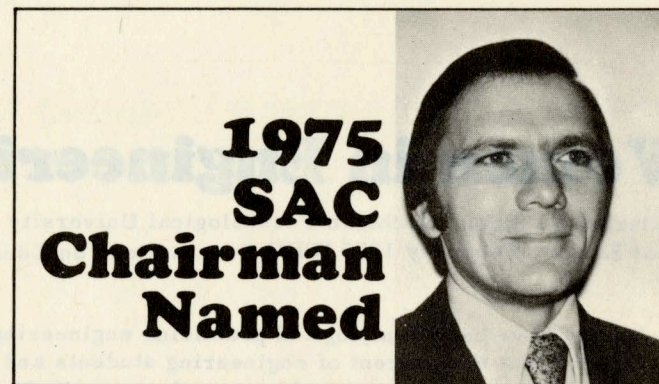
The persistence study found that about 20 percent of both men and women dropped out because of low grades. However, the men showed much higher persistence; half the men but only one third of the women graduated from the Institute. Dr. Davis found that the women who left considered the Institute as too rigid, demanding and restrictive. She believes that technical schools must provide more outlets for women's diverse interests if they wish to retain more women. Despite the belief that women drop out to marry, only one woman (and one man) left school with matrimony in mind.

Dr. Mildred S. Dresselhaus of M.I.T. reflects on the similarities and differences in the educational requirements of men and women in engineering. One problem women encounter is their high visibility, particularly when a class or group has only one woman. Dr. Dresselhaus recommends that faculty should treat men and women students in the classroom as equally as possible, neither ignoring the women nor concentrating attention to them. Women students, she finds, tend to have less self-confidence and lower expectations than men, a difference probably culturally developed. Informal discussions between women engineering students and women professionals have been found helpful in improving the student's self-perceptions and raising their aspirations. Often women feel that they are "left out of the action" while the men go out for beer or study together. Coed dorms have increased opportunities for women to interact with their male classmates and have partly helped this problem. Still, it seems, women engineers tend to remain somewhat isolated throughout their career. Women are often not taken seriously by their classmates and by faculty and receive less-than-subtle remarks from professors who believe that engineering is not appropriate for women. Fortunately the larger number of women entering engineering and the success of the women's movement have caused both men and women to take women more seriously. Entering women students usually have had less experience working with tools than men have had. In response, an increasing number of schools are providing special courses for laboratory and shop work for them. Dr. Dresselhaus also points out the importance of role models -- women faculty -- for encouraging women in the engineering field.

Professor Yvonne Y. Clark of Tennessee State University and Dr. Lilia A. Abron-Robinson of Howard University comment on the experiences of Black women in engineering schools. Some Black women students have had problems in dealing with foreign male instructors, apparently because of a conflict of life styles. The position of Black women engineering students on campus is improving; they enjoy a good social life and their classmates and frequently are elected officers of the undergraduate professional societies. Graduate school and faculty life present further problems, both in being accepted by peers and in combining a career with marriage and

family life. Black women faculty are generally well received by campus peers outside the engineering school, and they more often hold positions of leadership on university committees than other women faculty do.

Several important themes emerge from the 1975 Transactions on Education but one overshadows all the rest. The engineering profession has much to offer women; women have much to offer the engineering profession. Many barriers have been lifted and the future looks promising. This is truly an exciting time for women who wish to be engineers.



Byron E. Thinger, Associate Professor of Electrical Engineering at San Francisco State University, has been named Chairman of the Student Activities Committee (SAC) for 1975.

Professor Thinger holds a bachelor's degree in Engineering Physics (1958), a master's in Physics (1960), and a Master of Engineering degree in Nuclear Engineering (1971) from the University of California, Berkeley. He has carried out advanced work in Plasmas and Energy Conversion. A recipient of several NSF Research Grants and NASA Faculty Fellowships, he has authored a number of publications in the area of nuclear thermionics and direct energy conversion. Active in University and community affairs, Byron is Chairman of the Academic Senate's Student Affairs Committee and Faculty Counselor of the IEEE Student Branch at San Francisco State University.

The Student Activities Committee is responsible for all policy and programs relating to the over 22,000 Student members and 430 Student Branches of IEEE. It is composed of 10 Regional SAC Chairmen, seven Student appointees, and several representatives from industry. The next meeting of the Student Activities Committee is scheduled for April 1975. Byron can be contacted at the San Francisco State University, 1600 Holloway Avenue, San Francisco, California 94132, or through the Staff Secretary of the Student Activities Committee, Bob Asdal, at IEEE Headquarters in New York.

## Graduating Soon?

If your membership application indicated that you are planning to graduate in the coming months, you will be soon hearing from us about possible address changes. Please complete and return the "graduate address form" soon after you receive it. If you will be continuing studies you can also let us know at this time. This way you will continue receiving IEEE publications without interruption.

Upon graduation, you are automatically upgraded to the next higher grade of membership to which you are entitled, either Member or Associate grade. You will find IEEE's scientific, educational, and professional programs and services of lasting value to your personal and professional development.

## Student Branch Reminder

Student Branch Annual Report and Financial Statements were due February 1 at IEEE Headquarters. Region SAC Chairmen (names included in this issue) and Section SAC Chairmen should also be sent a copy of the Reports. Student Branch rebates for 1974 are issued as Reports are received. Miss the deadline? Submit your Report as soon as possible - it's not too late yet!

## On Participation

by Norm Blesman  
North Jersey Section Executive Committee

As a Student at Drexel University in 1946, I became aware of IEEE (AIEE at that time) and simultaneously of the fact that one gets only as much out of an activity as one puts into it. As a Student I realized there was a need for a wider exchange of Student ideas and views than a single engineering school could offer. When I became involved enough to be elected Chairman of the Student Branch, we reactivated the group meetings of all the area colleges to achieve this goal.

When I arrived in the New York area after graduation I was pressed to decide whether to transfer to Associate grade or not renew my membership. Again my decision was to transfer and to become a member of the Power & Industrial Division's Education Committee. With the exception of one year, I have been involved in a technical group and in Section activities ever since.

In order for any engineer to get the optimum output from his or her technical society, he or she must get involved. Usually that involvement is in the specific technical group most closely allied to their technical needs, say computers, communications, power, reliability, management, etc. If the technical group is not serving his or her needs, then that member must prove the need so the group can react positively.

I did this in the P&I division when I realized all of our many programs, educational courses and related activities did not allow a free exchange of ideas by young and older members on current or everyday problems. I presented the problem and a plan of solution which resulted in technical discussion groups which now cover the entire metropolitan area.

As a young engineer I learned that much of the technical advancement was generated within the technical committee whose membership was international in makeup and usually by invitation. I found a working group of the Substation Committee studying the problem which was the subject of my recently completed thesis for my graduate degree. I made the committee and my employer aware of this, and was accepted for working group membership. The scope of my involvement on the Substation Committee has grown to now include administration of Standards, which places me in active contact with the IEEE Standards Board.

The latest addition to the IEEE scope of socio-economic concern creates even more reasons for non-affiliated Students and working engineers to join IEEE.

Locally, it will permit us to encourage economic growth to benefit the engineer and it will allow the engineer to become involved in State, County and local legislation and action affecting engineers. An example of this is a current bill in New Jersey pro-



posing a State Building Code which apparently had no EE output, though many of our members will be governed by the code. There are probably many other pieces of legislation at all levels of government to which we could and should contribute for greater social growth.

As a Member-at-Large of the Executive Committee of the North Jersey Section, I am learning the workings of our Section as compared to that of the New York Section, in which I was active for almost 20 years. I am convinced that there are too

many unaffiliated EEs who could learn of the many advantages of membership beyond the much-improved monthly SPECTRUM, if only they would become involved in IEEE.

Editor's note: Interested in the full scope of IEEE membership benefits? Write to IEEE Headquarters for the brochure, "IEEE Membership Information". Want to get more involved in Branch, Section, or Chapter activities? - ask your IEEE Counselor or write to Bob Asdal at IEEE Headquarters giving your school and home address for names of who to contact.

## ieee intercon75

The annual IEEE International Convention and Exposition will be held April 8 - 10 in New York City. Breaking with tradition, the Show has moved to a new month and becomes a compact three-day event with new program features and visitor services.

A diverse technical program has been organized into 37 half-day sessions to be held at the Hotel Americana. The highlight session on Wednesday evening will be devoted to social implications of nuclear power plants. The Product Exposition will cover two floors of the New York Coliseum and a special area has been designated as an Applications Forum.

For more information on INTERCON'75, write to IEEE INTERCON at IEEE Headquarters for an Advance Program.

## SPECTRUM Highlights

IEEE SPECTRUM, in February, presents an assortment of interesting articles to whet any future engineers appetite. "Instrument Displays: What will the future hold?" discusses LED's, gas-discharge devices, and liquid crystals and explores the pros and cons of each of the major display technologies. "The \$100 Idea", an inspiring article by Edward Gintzton of Varian Associates, traces the invention of the klystron from the desire to detect aircraft in overcast weather to the whole new industry it launched: microwave electronics. IEEE President Arthur P. Stern, in another article, presents and discusses the "IEEE Code of Ethics" and explains its rationale, keeping you posted on Institute professional activities.

"The French (train) Connection", by Gordon Friedlander starts the March SPECTRUM off on the right track. A consensus of railway experts contends that the French National Railways, today, are the finest in Europe. This article reviews that system. Automobiles take prominence in two articles, one reviews energy consumption and system effi-

ciency and the other provides a sampling of innovative applications of computerized instrumentation in the automotive field. And observing how engineers tend to reduce all problems to essentials the article "Equations for Managers" views, somewhat tongue in cheek, what happens when technologists don their management hats.

Each month you can use SPECTRUM. Discover the topics and articles published each month in IEEE Transactions, identify new IEEE educational offerings, standards, IEEE Press books and special publications, review upcoming meetings, and check out news from your own Region. To locate any article published during 1974, see the December issue - it includes an annual index of articles printed during the year. SPECTRUM is diverse, readable and the best publication in its field. Make friends and make SPECTRUM work for you.

## Career Opportunities

A condensed version of the 1974 IEEE Manpower Report for the U.S. Regions 1 - 6, "Your Job in E/E Engineering - A Student Review", is available for a nominal cost from IEEE. The Student Review covers a broad range of topics such as career planning, engineering supply and demand, views of government, and industry, employment practices, and educational challenges that are of importance and recommended reading to anyone entering the profession. The Student Review is available for \$1.85 for single copies and \$1.00 per copy in quantities of ten or more.

If you are seeking more information, the complete 280-page Manpower Report, available at \$10.00 for Members and \$15.00 for non-Members, provides the most current and comprehensive survey information available. Send your order to IEEE Service Center, 445 Hoes Lane, Piscataway, New Jersey 08854



Six Student Branch groups, winners of the 1974 Vincent Bendix Awards, are off to an early start in working on their projects. Of eighteen Branches from the United States, Canada, South America, and Asia which submitted proposals, the following were chosen to receive funding:

University of Alberta	"Infrared Heat Sensor"
Brigham Young University	"A Ground Base Weather Satellite Receiving System"
Cooper Union	"Audio-Manual Tracking"
Georgia Institute of Technology	"The Study, Design and Construction of a Digital Computer Guided Mobile Unit"
Lehigh University	"An Investigation of Atmospheric Electric Fields and Their Interaction with the Biosphere"
New Mexico State University	"IEEE Education in Electrical Engineering"

Awards, funded by the Bendix Corporation, allow groups of Students to work together on imaginative projects contributing to their professional development and sense of identity.

The most consistently successful Branches, like the University of Alberta (which has won eight years in a row!) begin work on a proposal months in advance. Branch members in frequent idea sessions, agree on several projects to investigate. Feasibility studies including time and cost factors - are done to arrive at the final project to be pursued and submitted. Lots of Students get involved at Alberta - and they keep winning.

Now it's the time to start on 1975 Vincent Bendix Award proposals. Awards are based on six-page proposals submitted before November 15 - but its time to begin today. Contest rules and entry information are available from your IEEE Counselor or from Bob Asdal at IEEE Headquarters.

## Two Free Offerings

A 20-minute slide-tape presentation, "The Role of Electric Power and Power Engineers in Meeting Energy Needs", is available on a free-loan basis to IEEE Student Branches. A timely and authoritative review of the U.S. energy picture, it is based on a talk given by Dr. Thomas H. Lee, President of the IEEE Power Engineering Society. The presentation was developed to assist Student Branches and Power Engineering Society Chapters become more directly involved in the dialogue between informed and responsible engineers and all others that energy related problems effect.

Another offering is a must for any student or engineer preparing an audio-visual presentation for a technical audience. A 16mm film entitled, "The Slide Talk", covers in 20-humorous minutes the classical blunders to which many well-intending speakers subject their audiences and some simply tried and proven remedies to make such technical presentations more effective. Students preparing to enter a Student Paper Contest will find some of "The Slide Talk" tips helpful.

Both presentations were produced by the Chapters Department of the Power Engineering Society. When ordering, give at least one month's prior notice before date of intended use and two alternate dates. To order, contact: Mr. John C. Lang, Chairman, Chapter Relations and Continuing Education Working Group, Room 1220, Baltimore Gas and Electric Company, Lexington and Liberty Streets, Baltimore, Maryland 21203. Tel. (301) 234-5717.

## POWER PAPERS: \$1,000

Bachelor and Master Student technical papers which advance the art of power system engineering are sought for the 1975 Hickernell Scholarship Award. In addition to the \$1000 Award, the winning Student will also receive an expense-paid trip to the Winter Power meeting in New York City.

Latimer Farrington Hickernell was Vice President and Chief Engineer of Anaconda Wire and Cable Company. He served the Institute in various capacities including the Presidency. Because of "Hick's" outstanding contribution to power engineering and the Institute, this Award is presented in his honor. The Award is sponsored and administered by the Power Engineering Education Committee of IEEE.

Papers will be accepted until June 15. Complete details are available from your IEEE Counselor, the Hickernell Award Committee of the Power Engineering Society at IEEE Headquarters, or from Professor William F. Kersting, Electric Utility Management Program, Box 3-0, Las Cruces, New Mexico 88003.



# NPSS Student Awards

Each year the Nuclear and Plasma Sciences Society of the IEEE provides awards to four undergraduate students and one non-U. S. scholar studying in the United States in recognition of outstanding achievements in, and contributions to the field of nuclear and plasma science and technology. Awards are \$200 for each U. S. student and \$500 for a non-U. S. scholar along with recognition by the NPSS.

Letters of nomination are solicited from Engineering Deans. A letter of nomination should contain a concise narrative basis for the award, including a description of the nominee's contributions to the field of nuclear and plasma science and technology, an indication of scholastic achievements, and evidence for future promise in the field. Membership in the IEEE or NPSS is not a requirement. Nomination deadline is April 1, 1975. Awards will be made the end of May 1975. Send nominations to: A. J. Stripeika, Lawrence Livermore Laboratory, P.O. Box 808, Livermore, California 94550

## Students Qualified Too!

One of the outstanding benefits of membership in IEEE is the Group Insurance Program approved by the Institute to help meet your special needs. The coverage includes low-cost life, accident, disability, hospital and excess major medical insurance.

The rates are lower than those of comparable coverage purchased on an individual basis. And they may be further reduced if any credits are earned. (Such credits benefit insured members only; the Institute neither profits nor incurs expense in the operation of the Program.) Interested? Return the coupon to get more details and eligibility information. There is no obligation.

S/NL75

**Administrator, IEEE Group Insurance Program**  
1707 L Street, N.W.—Suite 700, Washington, D.C. 20036

Send me complete information on the IEEE Group Life Insurance Plan.

Name \_\_\_\_\_ Age \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

I am also interested in the:

<input type="checkbox"/> Disability Income Protection Plan	<input type="checkbox"/> Major Hospital-Nurse-Surgical Plan
<input type="checkbox"/> High-Limit Accidental Death and Dismemberment Plan	<input type="checkbox"/> In-Hospital Plan
	<input type="checkbox"/> Excess Major Medical Plan



New Officers - continuity from one year's Student Branch Executive to the next has been a problem IEEE Student Branches have faced for years. Some Branches have solved the problem by electing officers on a calendar year basis providing a 4 or 5 month on-the-job training for incoming officers. Others elect a junior as Vice Chairman who succeeds to Chairman in his senior year. Whatever method you choose - consider continuity as a standard good management practice - elect new officers early and send their names to the Manager of Student Services within 20 days of election.

Holding an IEEE office is a rewarding benefit of membership - giving over 2000 Students each year an opportunity to develop leadership and management skills. Branch Chairman, Vice Chairman, Secretary, Treasurer, program or membership chairman are all possibilities. How about throwing your hat in the IEEE leadership ring for 1975?

## WANTED: Instrumentation Papers

Undergraduate student-authored papers concerning instrumentation are sought for the 1975 W. D. George Memorial Award. A \$250 cash award and a certificate will be presented at an IEEE meeting of the successful author's choice. W. D. George, a distinguished radio scientist, played a major role in advancing the standard time and frequency programs of the U. S. National Bureau of Standards. The award in his name, is administered by the IEEE Group on Instrumentation and Measurement.

Nomination must be made by letter from a professor in the student's major field of study. The letter must provide the expected degree date, verify the subject matter the nomination is based upon, and be accompanied by six copies of an unpublished report giving a definite conclusion, written during the 1974-1975 academic year; or seven reprint or preprint copies of a paper accepted for publication in an IEEE journal between March 1, 1974 and March 1, 1975. Each student project nominated must report either construction and operation of an instrument or be a theoretical discussion of an instrument's principles and capabilities. In case of multiple authors, only

one will be accepted as a candidate and the nominating letter must specify the degree of the student's participation. A student project may be used to support a nomination for only one year.

Deadline for receipt of nominations is June 15. Send nominations to Dr. James A. Barnes, Chief of Time and Frequency Division, National Bureau of Standards, Boulder, Colorado 80302.

## Getting The Most Out Of Your Latest Paper

Sometime during your undergraduate studies you will be required to write a survey, design a project report, or thesis (if you haven't done so already) for academic credit. Not easy work, you'll agree, so why not take the second step and get the most out of your efforts.

Since 1930 the Institute has encouraged IEEE Student members to develop effective communication skills by writing and presenting papers in the IEEE Student Paper Contest. Professional recognition by 'hiring influences' of prospective employers is one reason to get involved. But consider, throughout a career you will be called upon to communicate and sell your ideas to others - either in writing or verbally. Participation in the IEEE Student Paper Contest is an ideal way to get experience and exposure before entering the working world.

The IEEE Student Paper Contest is organized geographically, with local Branch, Section, and Area contests providing the feeder system to the 10 Regional contests held throughout the world. Prizes for local contests vary but Regional Awards provided by the IEEE Life Member Fund are \$200, \$100, and \$50 for first, second and third place.

To find out more about contest deadlines, rules for entering, and judging criteria - check with your IEEE Counselor or Regional Chairman.

## New Education Programs

Social influences and responsibilities of engineers has been a matter of increased discussion over the past several years. The IEEE Committee on Social Implications of Technology held a workshop in August 1974 at the University of Kentucky to discuss life and social science courses for engineering students, technical courses for non-engineering majors, "novel" engineering programs, and socio-technological philosophy. The papers presented at that workshop and the recommendations from it have been published in the record, "Engineering in Service of Society: New Educational Programs", now available from IEEE. Price is \$7.50 to IEEE Members in North America, \$5.00 to IEEE outside North America, and \$10.00 to non-members. Send your order to IEEE Service Center, S. P. S. U., 445 Hoes Lane, Piscataway, New Jersey 08854.

## Membership Sale Days

Stalwart non-joiners rejoice! Now there is no excuse for not joining IEEE, the world's largest professional engineering society and taking full advantage of the most natural adjunct to your career.

Students whose applications are received at Headquarters between March 1 and August 31 need only pay HALF PRICE of regular membership fees. Membership dues are only \$4.00 and Group and Society fees only \$1.00 each during this 6 month period. But tell your friends not to delay, the sooner an application arrives at Headquarters the more publications and services new members will receive.

If, by chance, two stalwart friends pass you by... give them a tip, a subtle clue by wink of an eye... Show them the error of their stubborn ways... and full details on how IEEE membership Professional pays.



Here's your money  
— now leave me alone.

Membership brochures are available from your IEEE Counselor, Student Branch Chairman, or Bob Asdal at IEEE Headquarters





THE INSTITUTE OF  
ELECTRICAL AND  
ELECTRONICS  
ENGINEERS, INC.

345 EAST 47TH STREET, NEW YORK, N.Y. 10017

Non Profit Org.  
U.S. Postage  
PAID  
IEEE

IEEE STUDENT NEWSLETTER is published quarterly during the academic year by the Institute of Electrical and Electronics Engineers, 345 East 47th Street, New York, New York 10017. Material may be reproduced without permission, although credit to the source is appreciated. Annual subscription: IEEE Student Members, included in membership dues; other IEEE members \$3.00 (single copy \$1.00); all others \$6.00 (single copy \$2.00). Change of address requires thirty day notice to IEEE.

The Editor welcomes contributions from Student Branches, Student Members, IEEE Organizational units, and other sources. Editor: Robert K. Asdal.

## Regional SAC Chairman

### Student Activities Committee Chairman

Professor Byron Thinger  
San Francisco State University  
Engineering Division  
1600 Holloway Avenue  
San Francisco, California 94132  
415-469-1228  
415-469-1386

### Regional SAC Chairmen

#### Region 1

Professor Jugdish Gajjar  
Union College  
Department of Electrical Eng  
Schenectady, New York 12308  
518-370-6273

#### Region 8

Professor O. Memelink  
Technische Hogeschool Twente  
Postbus 217  
Enschede, The Netherlands

#### Region 2

Professor Donald Talhelm  
Lehigh University  
Department of Electrical Eng  
Bethlehem, Pennsylvania 18015  
215-691-7000 ext. 396

#### Region 3

Professor Lyle Back  
University of Kentucky  
Department of Electrical Eng  
Lexington, Kentucky 40506  
606-258-4684

#### Region 4

Dr. Gerald Nelson  
South Dakota State University  
Department of Electrical Eng  
Brookings, South Dakota 57006  
605-688-5217  
605-688-4526

#### Region 9

Mr. Eduardo Bonzi C.  
Casilla 9807  
Santiago, Chile  
Tel: 21-5646

#### Region 5

Professor Gustav Vahl  
University of Colorado  
ESOT 2-32  
Boulder, Colorado 80302  
303-492-7713

#### Region 6

Dr. Carl H. Durney  
University of Utah  
Department of Electrical Eng.  
Salt Lake City, Utah 84112  
801-581-6696

#### Region 7

Professor Eric Robinson  
Northern Alberta Institute  
of Technology  
11762 - 106th Street  
Edmonton, Alberta, Canada  
403-477-4259

#### Region 10

Dr. S. Y. King  
University of Hong Kong  
Department of Electrical Eng  
Hong Kong, Hong Kong  
Tel: 5-46816