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The IEEE

Newsletter

PUBLICATION OF THE NORTH JERSEY SECTION OF THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS

PACE Meetings:

The next two North Jersey Section PACE meetings are set for Thursday May 11, and June 8, 1989. The Section does not publish the Newsletter for the month of June. Therefore this will also serve for our June Meeting Notice.

LEGISLATION:

The Committee will review legislation that affects engineering jobs. We shall support, oppose or revise legislation and present our findings to the responsible legislative body. We shall also draft letters to our representatives. The letters will be sent with the endorsement of our Section's Executive Committee. Specific attention will be given to organizations supplying false information to Congress about engineering manpower.

Jobs for Engineers: We are presently looking into alternate careers for engineers.

Speaker Agenda: We are preparing a list of speakers and subjects for forthcoming meetings.

Career Conference: Review of the April 29th Careers Conference.

All IEEE members and guests are encouraged to attend. Refreshments will be served

Time: 7:30 PM, Thursday, May 11, 1989.
Place: ITT Auditorium, (use rear door),
500 Washington Ave., Nutley, N.J.
Further Information: Richard Tax (201) 664-0803.

Newark Airport Facilities Tour

On Wednesday, June 21, 1989 at 12 Noon, the Joint Chapters of the Computers and Communications Society will hold a buffet luncheon followed by a tour of Newark Airport Air Traffic Control and/or Communications Facilities. The luncheon will begin at 12 Noon at the Newark Airport Marriott Hotel at the Toucan Terrace. The luncheon will be attended by FAA personnel who will be the guides for the tour.

After the luncheon the attendees will begin the tour departing from the Marriott about 1 PM. The tour will run not later than 4 PM.

All IEEE members and guests are invited. Reservations must be made in

advance by mail for the tour and buffet. The cut off date for reservations will be June 10, 1989 and the number of reservations taken will be limited to 30. This has always been a popular tour and reservations are usually sold out quickly.

To make reservations, send your check to North Jersey Section IEEE, c/o David Perry, Treasurer, 57 Forest Hill Road, West Orange, NJ 07052. Cost of the reservation is \$17.00 for IEEE members and \$20 for non members.

For further information call: David Perry (201) 325-8415.

IAS Seminar On Co- Generation And Resource Recovery

On May 20, 1989 the North Jersey Section Industry Application Society will present a Panel Symposium consisting of six presentations covering the primary areas of concern to the electrical engineer. The Chairman and Moderator will be R.V. Rebbapragada, Chairman IAS/North Jersey Chapter.

The presentation topics and speakers are as follows:

1. Licensing and Utility Rate/Tariff, Considerations Associated with Planning Co-Gen Plants - *J. Tana, Jr., EBASCO Services* (201) 241-5565.
2. Utility Requirements for Co-Gen Plants - *E. Griffith, Jersey Central Power & Light* (201) 455-8313.
3. Plant and Generator Protection Requirements for Co-Gen Units - *R.V. Rebbapragada, Burns and Roe Company* (201) 265-2000.
4. Electrical Control Panel, Metering,

Alarms and Monitoring for Co-Gen Plants - *L.H. Cordero, Foster Wheeler USA Corp* (201) 730-4293.

5. Design Considerations of 30kw-1000kw Co-Gen Plants Using Reciprocity Gas Engines - *L. Cadigan, Tecogen, Inc.* (201) 671-2200.

6. Startup of Co-Gen Units - *A. Bagocius, Consolidated Power Co.* (203) 847-2747.

These in-depth talks will be presented on Saturday, May 20, 1989 starting at 9 AM and ending by 3 PM. The location is the Park Ridge Marriott, 300 Brae Blvd., Park Ridge, N.J. (201) 307-0800.

Cost for this complete technical discussion, including the luncheon is as follows: \$90 Non-Members, \$60 Members, \$35 Students.

In order to provide the presentation at this price, reservations with a \$30 per person deposit should be made by May 10, 1989. The remainder will be accepted at the door. Check or money order for the deposit should be made payable to IEEE North Jersey Section and sent to Mr. Vittal Rebbapragada, Manager, Electrical Engineering, Burns and Roe Co., 800 Kinderkamack Road, Oradell, NJ 07649.

Coffee and danish will be served before the talks commence and coffee will be available throughout the morning. A buffet luncheon will be served during seminar break to offer an opportunity for people to get together to discuss various side issues at length.

Time: 9:00 AM-3:00 PM, Saturday, May 20, 1989.
Place: Park Ridge Marriott, 300 Brae Blvd., Park Ridge, NJ. (201) 307-0800.
Further Information: Vittal Rebbapragada (201) 265-2000, ext. 3449.

May Exec Comm Meeting Rescheduled

Because of a conflict with the date of the Annual Section Banquet, the May Executive Committee meeting will be held on May 10th.

The meeting will be held at the usual time of 7 PM at ITT, 500 Washington Ave., Nutley, N.J. Information on the meeting agenda is available from Richard Snyder, Section Secretary, who may be reached at (201) 492-1207.

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MAY 1989

MAY 1989
Volume 35, Number 11

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NEWSLETTER STAFF
Editor.....M.M. Perugini
Business Manager.....A.M. Beattie

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REPORT ADDRESS CHANGES TO:
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It is not necessary to inform the North Jersey Section when you change your mailing address. The NEWSLETTER and other section mailings use a list provided by IEEE's national headquarters in New York. This means the Section has no need to maintain a mailing list or addressing plates. Section membership records are changed when Headquarters notifies us.

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The North Jersey Section Executive Committee meets the first Wednesday (except holidays and December) of each month at 7 PM. These meetings (held at ITT, 500 Washington Ave., Nutley, N.J.) are open to all members. Information on each meeting agenda is available from Richard Snyder, Section Secretary at (201) 492-1207.
Elected Section Officers are listed above.

A Guide For PC
Users And New
Owners

The IEEE North Jersey Section Young Engineers Committee will meet on May 25, 1989 to hear a talk on "A PC By Any Other Name." The speaker will be Frank Relotto, Past Section Chairman and long-time computer hobbyist.

About The Talk
The presentation should be of interest to all who either own or expect to purchase in the near future, an IBM PC or PC clone.

Topics will include a discussion on future trends, compatibility, processor types, speed, operating systems, and upgrading. If time permits, a short tutorial will be included on how to access and get the most out of a remote BBS (Bulletin Board System).

CHAIRMAN'S
CORNER

Attended the first two days of the ELECTRO Show at the Javits Center, NYC. Despite a small drop in the number of exhibitor booths and attendance, it was a great show, from the keynote speech, to the crowded room session on superconductivity, to the 1200 plus exhibitor booths, and finally to the last day blitz by groups of students to pick up whatever was not nailed down.

Dr. John Stoessinger, Professor of International Affairs, Trinity University, San Antonio, Texas, the keynote speaker, talked about the tremendous changes that were taking place internationally and how the Communist Bloc was looking to the West for help with their economies. He suggested that, where prudent, we help them move toward more open elections and capitalism.

He further suggested that there were new opportunities opening up for the electronic industry to sell to Russia, Eastern Bloc countries, and China and that this potential trade could alleviate the U.S. trade deficit. He further indicated that Russia and China, once our WWII allies, would rather do business with the U.S. but that if we were unable or unwilling, the Japanese would be waiting to take the business.

Dr. Stoessinger, finished his speech with a very moving description of how he eventually immigrated to this country. After Hitler marched into Austria, he and his mother immigrated first to China through Russia and then with the help of a U.S. Army officer, he immigrated to the U.S. on a student scholarship. The keynote speech ended with a standing ovation.

ELECTRO was a big success and we as a Section, which derive a major portion of our financial support from the surplus, owe many thanks to the ELECTRO directors and other IEEE volunteers that made it all happen. We particularly want to thank our own Frank Relotto, Director of Special Activities, who arranged for the keynote speaker and many other events, and George Graul, Chairman of Transportation, for their outstanding contributions. And we express our gratitude to all of the other members of the North Jersey Section that volunteered their time at ELECTRO.

To those of you who think that the IEEE is not doing enough in professional activities to obtain portable pensions and alleviate salary compression and age discrimination, I urge your support of Merrill Buckley's petition candidacy for President-Elect of the IEEE. He strongly supports action on these issues and needs about 2400 member signatures by mid May. If you would like to sign the petition or take one around to your member associates, please contact me at (201) 540-1283 (H), or Dick Tax at (201) 664-6954 (H).

Finally, if you know of a friend or associate that may be interested in joining the IEEE, now is the time to suggest that they join. As of March 1st, the price of membership dropped to half price, \$36.50, for the rest of the year. It's the perfect time for you to suggest to your associates that they sign up now. For application forms contact Don Weinstein, Membership Development Chairman, at (W) (201) 461-0900 or (H) (201) 797-4366.

HOWARD LEACH, Chairman

About The Speaker
Mr. Relotto has been involved with microprocessors since 1976. He delivered the first series of seminars on micros for the North Jersey Section in 1978. He owns five computers with his latest being an 80386 class machine. He is also the sysop of The Dean's Office BBS; which has been in operation now for more than three years.

All Welcome
Members and guests are invited. A free buffet will be provided an hour prior to the scheduled talk.

Time: 7:30 PM, Thursday, May 25, 1989. (Buffet starts at 6:30 PM.)
Place: ITT Auditorium, 500 Washington Avenue, Nutley, N.J.
Further Information/Reservation: Sam Benzacar (201) 881-1200; Tom DeNigris (201) 575-1300; Maitland McLarin (201) 335-6847.

New York Chapter IEEE Computer Society
Sixteenth Semiannual Seminar
CURRENT TRENDS
IN
COMPUTER SECURITY

Wednesday, May 24, 1989 — 9:00 AM - 4:30 PM
United Engineering Center Auditorium
345 East 47th Street, New York, N.Y.

The importance of computer security has been put in the forefront by recent breaches of a national computer network. This seminar will acquaint you with several important aspects of computer security: Physical (computer room and desk top); Network; PC access; software (virus); and financial fund transfer.

PROGRAM

A Prospective On Computer & Network Security	Steve Lipner Group Engrg. Manager Digital Equipment Corp.
Security Of A Financial Network	Herb Whiteman VP-Security Advisor Fed. Res. Bank of New York
Physical/Anti-Theft Devices For Computers	Guy Capolupo Director/Special Projects Business Machine Security
Who, Where, When & What Of Network Management	Mel Schwartz Chairman/CEO Digital Pathways, Inc.
PC And LAN Access Security	Dick McClung President Harcom Security Sys. Corp.
Virus Protection	Arnold A. Singer President Integrity Technology Inc.
Computer Viruses: Theory & Experiments	Fred Cohen
Computer Security In The Federal Government	John B. Ippolito Sr. Vice President, COMSIS

Fee: \$125 for IEEE Members; \$150 for non-Members, with \$25 discount for early registration with payment before May 7, 1989. Fee includes seminar proceedings, lunch, and coffee. For special student and group rates, and for further information, call Jim Barbera (212) 395-8765 or Bert Lindberg (212) 825-1527.
Note: above program is subject to change.

Registration for "Current Trends in Computer Security '89" - May 24, 1989

To: Andrew Weigel, c/o Eclipse Software, 30 West 15th Street, Suite 5-N, New York, N.Y. 10011. Make checks payable to "IEEE Computer Society."

Name:_____ IEEE No._____

Affiliation: _____ Phone:_____

Address:_____

NY/LI/MTT Annual
Microwave
Symposium

On May 17, 1989 the New York/Long Island Chapter of the Microwave Theory and Technique Society will hold its Annual Symposium at the Crest Hollow Country Club, 8325 Jericho Turnpike, Woodbury, New York. As in the past, the Symposium will consist of a Technical Session and a Microwave Show. Henry Bachman, Vice President of Engineering at Hazeltine Corporation will present the keynote address.

The subject of the 1989 Symposium is "Emerging Microwave Technologies." The Technical Session will begin at 9:00 AM and end at 5:00 PM. Seven distinguished speakers will present papers on:

Lightwave Technology; Microwave Superconductivity; Microwave Monolithics; Acousto-Electronics (ACTs); Miniature Vacuum Electronics; and Microwaves and Medicine. These topics should stimulate, excite, and pique the interests of attendees.

The Microwave Show will be held from 12:00 noon to 6:30 PM, and will be open to the general public **free of charge** starting at 2:00 PM. Over 50 exhibitors will be present to demonstrate the latest in microwave instrumentation, CAE tools, components, and devices. The Committee urges you to mark your calendar and attend what is expected to be an outstanding symposium.

Pre-Registration Information
Pre-Registration fees are: \$40 IEEE Members; \$50 Non-Members and \$30 for Students or Retired Members. Pre-Registration with check payable to "IEEE, Long Island Section" **must be received by May 8, 1989.** Send registration request to: Pari Boloori, Narda Microwave Corp., 435 Moreland Rd., Hauppauge, N.Y. 11788, (516) 231-1700, ext. 437. After May 8, add \$5 to the fee schedule and register at the door. The registration fee includes symposium digest, refreshments, buffet lunch and access to the microwave show.

Attendees are urged to arrive at 8:00 AM for Check-In/Registration. Complimentary coffee, tea and danish will be available.

Time: 8:00 AM - 6:30 PM, Wednesday, May 17, 1989.
Place: Crest Hollow Country Club, 8325 Jericho Turnpike (Rte. 25), Woodbury, N.Y.
Further Information:
Pari Boloori (516) 231-1700, ext. 437; Matt Jacobs (516) 226-8900, ext. 304; or John Pierro (516) 595-4834.

North Jersey IEEE MTT/AP Scholarship Application
For Scholastic Year September 1989 to May 1990
(MICROWAVE ENGINEERING)

Name: _____ Home Phone: _____

Address: _____

School: _____ School Phone: _____

School Address: _____

Current Class Year: _____ (Must be Senior or Graduate student in September 1989)

Member of Student Branch: _____ Number of Years: _____

Office/Position Held: _____

Current Microwave Engineering Course (Number/Title): _____

Projected Microwave Engineering Course(s) Next 2 Semesters: _____

Latest Cumulative Grade Point Average: _____

I am a full-time student in good standing in my college and in the community in which I reside. I will retain my IEEE membership for at least three years after receipt of this MTT/AP Scholarship.

Applicant's Signature

Date

As a member of the faculty of _____ and having specific knowledge of the applicant, the above statements are true to the best of my knowledge.

Signature

Position

Date

Thesis:

500 words (One 8 1/2" x 11" page) handwritten, single spaced. (Attach thesis to back of application.) Choose one topic from (1) and (2), and also (3).

1. "My Concept of Microwave Engineering"
2. "Relationship of Microwave Engineering to the Digital World"
3. "My Microwave Engineering Project for the Next Academic Year"

(One essay and one project description required.)

Respond To:

Dr. Richard V. Snyder
c/o RS Microwave Co. Inc.,
22 Park Place, P.O. Box 273
Butler, NJ 07405-0273

IEEE North Jersey Section Calendar

May 10--"Technology Management: Results Of Project Management Experience"--NY/NJ Chapter of the Engineering Management Society, 7:00 PM, Stevens Institute of Technology, 4th Floor, Stevens Center, Hoboken, NJ. Jay Gilbert (201) 420-5369.

May 10--"First Annual Bioengineering Conference"--IEEE Metropolitan Chapter Engineering in Medicine and Biology, Rockefeller University, Tower Bldg., Room 305, NYC. **Admission Free. Registration Required.** Ben Caref (718) 270-1712.

May 11--"PACE Meeting: Review Of Legislation Affecting Engineering Jobs"--North Jersey Section PACE, 7:30 PM, ITT Auditorium, 500 Washington Ave., Nutley, N.J. Richard Tax (201) 664-0803.

May 15--"Officer Elections And Review Of Advertising Campaign"--NY Consultant's Network, 6:30 PM, Con Edison Building, 4 Irving Place, Room 1405, NYC. Theodore Fishman (914) 937-0658.

May 16--"An Overview Of Low-Bit-Rate Coding For Motion Video"--North Jersey IEEE Acoustics, Speech, and Signal Processing Chapter, 7:30 PM, JCP&L Co., Madison Ave. and Punch Bowl Rd., Morristown, NJ. John Burgess. (201) 386-2736.

May 16--"Quality and Reliability Programs For Medical Devices"--North Jersey Chapter Reliability Society, 7:00 PM, ITT Auditorium, 500 Washington Ave., Nutley, NJ. Hank Moss (201) 785-6458.

May 17--"Symposium: Emerging Microwave Technologies"--LI Chapter MTT Society. For details call Pari Boloori (516) 231-1700, ext. 437.

May 18--"GaAsFET And HEMT Modeling Circuit And System Simulation; Optimization Of Non-Linear Circuits"--North Jersey IEEE MTT-AP Chapter, 5:00 PM, ITT Clubhouse, 417 River Rd., Nutley, NJ. **Reservations required for complimentary pre-meeting buffet dinner.** Dick Snyder (201) 492-1207.

May 20--"Symposium On Co-Generation And Resource Recovery"--North Jersey Section Industry Application Society, 9:00 AM-3:00 PM, Park Ridge Marriott, 300 Brae Blvd., Park Ridge, N.J. V. Rebbapragada (201) 265-2000, ext. 3449.

May 22--"Symposium: Neural Networks (NN) And Applications To Intelligent Robots"--Long Island IEEE Artificial Intelligence and Intelligent Robot Technical Committees, 6:00 PM, Harry J. Schure Hall, NY Institute of Technology, Old Westbury, LI. Robert Hong (516) 575-3634.

May 24--"Today's Premises Communications Wiring - An Update"--North Jersey Section IEEE Computer/Communications Chapter, 8:00 PM, AT&T Bell Labs Auditorium, 600 Mountain Ave., Murray Hill, NJ. Jim Morgan (201) 766-0969.

May 25--"A PC By Any Other Name"--IEEE North Jersey Section Young Engineers Committee, 7:30 PM, ITT Auditorium, 500 Washington Ave., Nutley, N.J. Sam Benzacar (201) 881-1200.

June 8--"PACE Meeting"--North Jersey Section, 7:30 PM, ITT Auditorium, 500 Washington Avenue, Nutley, N.J. Richard Tax (201) 664-0803.

June 13--"Networking—Plans For Future Meetings"--IEEE NY Section Consultants' Network, 6:30 PM, Consolidated Edison Building, Room 1405, 4 Irving Place, NYC. Jim Wetterau (212) 321-1999.

June 14--"Technology Policy Issues Relating To IEEE/PES Members"--IEEE New York Section Power Engineering Society, Education Committee, 5:00 PM, Consolidated Edison Building, 4 Irving Place & 14th Street, Room 1405, NYC. Leon Katz (212) 492-8400.

June 20--"Testability Impact On Reliability"--North Jersey Chapter of the Reliability Society, 7:00 PM, ITT Avionics Auditorium, 500 Washington Avenue, Nutley, N.J. Hank Moss (201) 785-6458.

June 21--"Newark Airport Facilities Tour"--Joint Computers & Communications Society, 12 Noon, Newark Airport Marriott. **Reservations Required for Tour and Buffet.** David Perry (201) 325-8415.

PLEASE POST
Members and Non-Members Welcome

Controversy
Conflict Or
Compatibility

The May 18, 1989 meeting of the North Jersey IEEE MTT-AP Chapter will have two topics. The first, "GaAsFET And HEMT Modeling Circuit And System Simulation" will feature speakers Charles H. Holmes and Octavius Pitzalis, Jr. The second topic "Optimization Of Non-Linear Circuits" will be discussed by U. Rhode of Compact Software Inc., Paterson, N.J. There will be an EEs of and Compact display 5:00 - 7:00 PM

About The Talks

Charles H. Holmes and Octavius Pitzalis, Jr., will discuss a number of significant simulation tools that have emerged in the past several years that permit the microwave engineer to realistically simulate an important part of microwave circuit design: device modeling and circuit simulation. Although linear (small signal) frequency-domain circuit simulation has been widely available since the mid 70's, many other tools are required: nonlinear device models and circuit simulation, thermal analysis, reliability analysis and system-level simulation.

The continued progress in MMIC manufacturing has created a need for an integrated suite of tools--including circuit layout and yield/cost analysis--operating in a heterogeneous, networked computer environment.

Recent developments in GaAs FET and HEMT modeling have resulted in a single device model that can be used in non-linear time-domain and linear/nonlinear frequency-domain circuit simulators. The model also supports a statistical description reflecting the manufacturing process. Future extensions should include temperature as a parameter, and as a dynamic variable in conjunction with device/circuit thermal analysis. Extensive measurement data will be presented to demonstrate model validity.

Recent advances in nonlinear time domain and hybrid (e.g., harmonic balance) circuit simulation will be presented. Special attention will be paid to circuit performance as a function of power and quiescent bias.

Field-based simulation--both spectral and spatial techniques will be discussed as a tool to analyze complex geometries and coupling between components that arise in MMIC development. A critical comparison of MMIC simulation requirements and present capabilities will be made.

System Simulation can be viewed as the top of a hierarchical design suite, with device modeling feeding circuit simulation, which in turn feeds system simulation.

Finally, design automation will be discussed both from the point of view of integrating discrete products, and from the perspective of radically different approaches: physical device modeling as a basis for process modeling and a circuit yield estimation/optimization, circuit topology generation, and layout-driven simulation.

U. Rhode's talk will cover the harmonic-balance method as an attractive means for the analysis of microwave circuits operating in steady-state. Microwave Harmonica is a commercial harmonic-balance based simulator that has the capability to analyze and optimize non-linear microwave circuits. In addition to optimizing the performance of microwave components such as amplifiers and mixers, the program's optimizer can also be used to tune circuit elements, enabling the design of oscillators at specific frequencies. This talk will focus on practical design examples illustrating the use of the optimizer in nonlinear amplifier and oscillator circuits.

About The Speakers

Charles H. Holmes received his bachelor's and master's degrees in Electrical Engineering from Auburn University, New York, and the PhD degree from Stanford University where he conducted research in the Ginzton Laboratory. In addition, he has an MS in Operation Research from Stanford University.

Holmes is currently Vice President, Advanced Development and Chief Scientist of EEs of, Inc. He first joined EEs of in 1984. Prior to that, he was at Compact Software Inc., (and predecessors Comsat General Integrated Systems and Compact Engineering), Farion Electric, Hewlett-Packard Co., and Auburn University where he held teaching and administrative positions in the School of Engineering. He is a Senior Member of the IEEE and currently serves as Chairman of the Santa Clara Valley Chapter of the MTT Society.

He has contributed to the development of computer aids for microwave circuit design since 1972 when he first joined the Hewlett-Packard Company. There, he helped organize an intensive design seminar which was available on a world-wide time-sharing service to the microwave community.

At Compact, he was chief architect and principal author of SUPER-COMPACT™. At EEs of, he collaborated with Dr. William H. Childs in the development of the engineering and scientific portions of the first release of Touchstone™, primarily responsible for models, optimization, noise analysis and statistical analysis. More recently, he has shared responsibility for development of EEs of's harmonic balance simulator, Libra and has also been involved with electromagnetic simulation.

Octavious Pitzalis, Jr., received a BSEE from the University of Missouri in 1959. From 1963 to 1966, he did graduate study towards the MSEE degree at New York University. From 1959 to 1978, Mr. Pitzalis was a civilian electronics engineer at the U.S. Army Research and Development Laboratories (presently called LABCOM) at Ft. Monmouth, N.J. Until 1966, he was involved in advanced analog and digital circuit design for the newly emerging silicon integrated circuit technology. During this time, he was a principal contributor in the first design studies for micropower digital and analog circuits.

In 1967 Mr. Pitzalis pioneered an engineering methodology for broad bandwidth, high efficiency, RF and microwave transistor power amplifiers using transmission line and ferrite impedance transformers and power combining hybrids. In 1970, Pitzalis and Russell Gilson pioneered the now widely accepted approach of using gain-compensating, losses, reactive input matching networks to produce level transistor gain over octave bandwidths. In 1971, they collaborated in developing a design methodology for the synthesis and design of broad bandwidth output matching networks for transistor power amplifier stages. In recognition of this work, Pitzalis and Gilson were presented the 1974 Outstanding R&D Achievement Award by the Department of the Army.

In 1978, Mr. Pitzalis joined Hughes Research Labs, Malibu, California. 1978 to 1981, he led the development of power-combining circuits for microwave diodes in transistors. 1981 to 1987, he held principal responsibility for the design of MMICs (microwave and millimeter-wave) and transistor modeling characteristics at Hughes Research Labs.

Since 1987, Mr. Pitzalis has been Senior Staff Scientist at EEs of, Inc., where his responsibilities include microwave circuit design, and advanced product development. He also serves as a technical spokesman and as a technical advisor to the MIMIC program.

He is a member of the IEEE, is the author of over 35 technical publications and has five patents.

Free Buffet Dinner

There will be a free buffet dinner for attendees in the lobby at 6 PM. Reservations for the complimentary dinner are requested.

Time: 7:15 PM, Thursday, May 18, 1989. EEs of & Compact Display 5-7 PM. (Pre-meeting dinner at 6:00 PM. Reservations required.)

Place: ITT Auditorium (at the tower), 500 Washington Ave., Nutley, N.J.

Information/Reservations: Dick Snyder (201) 492-1207; Willie Schmidt (201) 284-2255.

IEEE Engineering in Medicine and Biology Chapter
of the New York/Long Island/North Jersey Sections
First Annual Bioengineering Conference

Wednesday, May 10, 1989 - 6:00 PM-9:00 PM
Rockefeller University
Tower Building, Room 305
York Avenue and 67th Street, NYC

There will be 9 abstracts presented. Each speaker will lecture for 10 minutes, and a 5 minute question and answer session will follow each talk. There will be a 45 minute intermission, from 7:00 to 7:45 PM when refreshments and a light buffet will be served.

Admission is free. To register by individual or group please call the Program Chairman (see below).

Free parking in the Rockefeller University parking lot on York Avenue and 67th Street is available.

PROGRAM

- 6:00 PM Reconstruction of the 3-D Shape of Arterial Lumen - M. Suardiaz, J. Barba - City College of NY, Electrical Engineering Department.
- 6:15 Edge Detection in Cytology - L. Yuan, J. Barba, J. Gil - College of NY, Electrical Engineering Dept. and Mount Sinai Medical Center.
- 6:30 A 3-D Segmentation Algorithm for Surface Reconstruction - A. Kalvin - NY University Robotics Laboratory.
- 6:45 Cell and Nucleus Shape Analysis Using Elliptical Measurements - R. Wali, J. Barba, M. Colef, P. Young - City College of NY, Electrical Engineering Dept., and NY Institute of Technology.
- 7:00 Break for Refreshments
- 7:45 Non-Linear and Stochastic Models of the Estrogen-Progesterone Blood Concentrations in the Human Female - H.M. Hubey - Montclair State College, Dept. of Mathematics and Computer Science.
- 8:00 Microcomputer-Aided Electrocardiography - J. Fung, A. Marsillo, K.Y. Leung - Cooper Union School of Engineering.
- 8:15 Simulation and Quantification of Human Biodynamic Response to Transitory Acceleration Profiles - P.H. Frisch - Applied Physics, Inc.
- 8:30 Evaluation of the Efficiency of a Newly Developed Permanent Implantable Mechanical Cardiac Assist Device - L. DeLuca, W. Welkowitz, S. Petrucelli, S. Orbine - Rutgers University, Dept. of Biomedical Engineering.
- 8:45 Automatic Charting of Dental Radiographs - T. Liang, S.M. Dunn, P.J. Desjardins, M. Milles - Rutgers University, Dept. of Biomedical Engineering.
- 9:00- 9:05 Closing Remarks by Chairperson

For Registration or Information please contact the following persons:

- Raphael Henkin, Chairman, Program Comm., Brooklyn VA Medical Center, Dept. Cardiology, 800 Poly Place, Brooklyn, N.Y. 11209 (718) 630-3734;
- Benjamin Caref, Chairman, SUNY Health Science Center, Box 1199, 450 Clarkson Avenue, Brooklyn, N.Y. 11203 (718) 270-1712;
- V.J. Kowtha, Vice Chairman, Rutgers University, Dept. Bioengineering, Box 909, Piscataway, N.J. 08855 (201) 878-1889.
- Edna Feher, Member-At-Large (212) 757-0610.

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(PACE Column continued)

Better Teaching Is Needed

As I see it the real problem is the quality and competence of science, math and other teachers have declined and need to be restored. Tests given a few years ago in Houston, Texas, have demonstrated that colleges that typically train teachers have steadily lowered standards and are graduating teachers without having properly prepared them in the subjects they will teach. These new teachers may be well trained in how to teach, but they're ill-prepared in what to teach. An embarrassingly high percent of high school teachers recently failed tests given to seniors to qualify for graduation. If this problem isn't addressed and remedied, what hope is there of ever achieving the educational excellence we all desire and so desperately need?

More Money Is Not The Solution

According to former U.S. Secretary of Education William Bennett, who spoke at the National Press Club in September 1987, U.S. citizens are currently spending more than \$300 billion per year to educate our youth. This is more than any other nation spends--both in total and in terms of per capita amounts. In addition, the per-pupil expenditure (in constant dollars) has increased almost fourfold since the early 1950s, while the results in terms of test scores have steadily declined.

Mr. Bennett pointed out that "if we are to improve our schools, we must have ways of identifying and rewarding schools that work, methods that work, and principals and teachers who work. We want to encourage people who do a good job." A financial incentive that will increase salaries of competent teachers will keep them from switching careers to industrial jobs for higher salaries. But money is not the only answer to the problem.

Accountability Is Mandatory For Reform

To achieve positive educational reform we must promote and support accountability--giving and taking responsibility for results. "Accountability is the single most important and needed improvement we can make in our educational system today," Mr. Bennett said. "Put accountability in, and other needed reforms will follow."

A successful reform process must begin in teachers' training colleges and must continue through the school system. Achievement tests and competency tests that measure results must be implemented by state and local boards of education, so that added funds can be applied to reward positive achievements and successes.

What we have now is a system that offers no incentive for excellence. Principals and teachers aren't rewarded for doing good things with and for their students. Likewise, if a teacher does something bad for a group of students, nothing happens. "There are greater, more certain, and more immediate penalties in this country for serving up a single rotten hamburger than for furnishing a thousand school children with a rotten education," according to former Secretary Bennett. Expectations must be defined and results must be measured.

Accountability and incentive awards have been instituted in many U.S. school districts:

- In Dalton, Georgia, public school teachers who perform to expectations get merit awards of up to \$3,000 a year.
- In Ladue, Missouri, teachers can earn up to \$4,500 in yearly bonuses.
- In Lake Forest, Illinois, incentive increases raised teacher morale along with student scores.
- The Ohio state budget allows for the public to compare school districts on the basis of student test scores, with tests administered in grades 4, 6, 8, 10, and 12. Much of the education establishment opposed the plan, but a member of the legislature explained, "Educators can't expect the public to keep sending them more money and have them continue to oppose any form of accountability for what they do."

These are just a few examples of what accountability can accomplish, and as IEEE members and engineers we must use our influence to support enforcement in all public school systems.

We need to show toughness, persistence and courage in our determination to provide school children with the quality education they need. If we allow the failed methods to continue, not only will our children lose, but our profession and our nation will suffer greatly. Let's do more to support the basic programs and methods that have already proved successful and not settle for limited "Band-Aid cures."

PACE Committee Meets Monthly

The PACE Committee meets on the second Thursday of every month at the ITT Auditorium, 500 Washington Avenue, Nutley, N.J. (near the the ITT Tower) at 7:30 PM. Our Section Executive Committee meets there on the first Wednesday of every month (except in December) at 7:00 PM. Any questions or comments will be well received. Contact Richard Tax at (201) 664-0803 (after 7:00 PM) or write to R. Tax, 630 Montview Place, River Vale, N.J. 07675.

Neural Networks And Robotics-II

On May 22, 1989, the Long Island IEEE Artificial Intelligence and Intelligent Robot Technical Committees have organized the second of a series of symposiums on one of the most popular and important topics in recent months, "Neural Networks (NN) And Applications To Intelligent Robots."

This second symposium will consist of four speakers from the State University of Stony Brook. The speakers will present their research work for advancing the state-of-the-art in the applications of neural networks to computer vision, mobile robot with manipulators for obtaining samples from Mars to be returned to earth. These are challenging problems important to Jet Propulsion Laboratory and NASA. Specifically, the papers are as follows:

- (1) Imaging of below-the-surface properties to determine load-bearing strength and frictional coefficients of terrains - K.H. Ramachandran and N. Prasad.
- (2) Intelligent control of manipulators for picking up samples - Carlos Alayo.
- (3) Recognition of shapes and geological features - Ravi C. Sundararajan.
- (4) Classification of scene into regions based on textural features - Jyi-Shane Liu.

There is no charge for attending the symposium.

Time: 6:00 PM, Monday, May 22, 1989.
Place: Harry J. Schure Hall, NY Institute of Technology, Old Westbury, LI.
Information: Robert Hong (516) 575-3634, or Dr. Leon Wang (516) 686-7970.

High Technology Cabling Systems

On May 24, 1989 the North Jersey Joint Computers and Communications Society will meet to hear a talk on "Today's Premises Communications Wiring - An Update." Speakers at this meeting will be James H. Morgan; Marc S. Liciardello; and John T. Bolcar, P.E. In addition there will also be a cabling contractor.

About The Talk

This will be a follow-on to last year's well-attended April introductory talk with the same title. This year's session will use a panel consisting of a user, supplier, and consultant, with heavy audience question and answer participation.

Wiring/cabling continues to grow rapidly as a high-interest subject. Building owners and users are realizing the importance of well-planned cabling systems. Cabling is no longer incidental; it has become high-technology. The concept of "bandwidth to the workstation" is now being implemented with unshielded twisted pair up to 10 Mbps and fiber above for FDDI and B-ISDN, -- both media to each workstation. Proper engineering can provide a Universal Cabling System carrying a wide variety of signals.

This session will start with a synopsis of last year's talk; an update on this past year's cabling advances; and audience questions and answers. The popular AT&T PDS wiring system will be featured. Some equipment will be shown. The talk is expected to interest users, suppliers, engineers, and consultants.

About The Speaker

James Morgan heads J.H. Morgan Consultants, Morristown, N.J., specializing in advanced telecom. Several clients are planning leading-edge cabling. Mr. Morgan has a BSEE (1956) and MS in Management (1965), from NCE/NJIT.

Marc Liciardello is Airport Electronics Superintendent responsible for all planning and operations for electronic systems. The new international airport terminal will be wired as an intelligent building, with both copper and fiber to all 1,250 stations. He is pursuing a BSEE at Drexel University.

John Bolcar is a Senior Systems Consultant with the Network Systems Group of AT&T. He has many years of experience in the design and engineering of building cabling systems utilizing fiber optics and twisted pair. Mr. Bolcar has a BSME (1981) and MSME (1985) from Catholic University and NJIT, and is a P.E. in N.J.

All Welcome

IEEE membership is not required for attendance. No need to register. Just walk in. Plenty of room. Handouts and some hardware demonstrated.

Time: 8:00 PM, Wednesday, May 24, 1989.

Place: AT&T Bell Labs Auditorium, 600 Mountain Ave., Murray Hill, N.J.

Further Information: Jim Morgan (201) 766-0969; John Bolcar (201) 631-5177.

Quality And Reliability In Diagnostic Systems

The North Jersey Chapter of the Reliability Society will meet on May 16, 1989 to hear a talk on "Quality And Reliability Programs For Medical Devices." The speaker will be Mr. Vincent Campo of the Kearfott Corporation, Wayne, N.J.

About The Talk

The talk will cover the role of Quality and Reliability in a multi-discipline medical device setting. It compares the requirements for medical and military equipment, noting the similarities and differences. The quality and reliability procedures developed for managing the development and production of diagnostic systems are analyzed. drawing on actual experience with "In Vitro," diagnostic products. The applicability of these procedures to ensuring the production of reliable medical products and to satisfying the latest FDA regulations is also discussed.

About The Speaker

Vincent Campo is currently Product Assurance Manager for the Kearfott Corporation and is responsible for military guidance and navigation systems and for automatic depot test equipment. Prior to joining Kearfott, he was the Director of Quality Assurance and Regulatory Affairs at the Technicon Instrument Corporation in Tarrytown, New York, a leading developer and producer of medical diagnostic systems.

Mr. Campo has a Bachelors and a Masters degree in Mechanical Engineering from City College of New York, and has done additional graduate work at New York University and Brooklyn Polytechnic Institute. He is a licensed New York State Professional Engineer, and is called on to consult on medical devices and regulatory matters.

Free Buffet

A free buffet will be provided starting at 6:00 PM, on a first-come-first-served basis.

Time: 7:00 PM, Tuesday, May 16, 1989. (Buffet starting at 6:00 PM.)
Place: ITT Auditorium, 500 Washington Avenue, Nutley, N.J.
Further Information: Hank Moss (201) 785-6458.

Technology Management

The New York/North Jersey Chapter of the Engineering Management Society will hold a May 10, 1989 meeting on "Technology Management: Results Of Project Management Experience." The speaker will be Professor William G. Wells, Jr., of the George Washington University.

About The Talk

Dr. Wells will discuss the results of a recent survey of 60 project managers in the Washington-Baltimore area. He will review their opinions about the advantages and drawbacks of various project management techniques, the characteristics of good project reports and of good review meetings, and of how to effectively define project milestones.

About The Speaker

Prof. Wells combines over thirty years of work experience related to national science and technology policy and R&D management with more than twenty years of part-time and full-time teaching. He has served in a number of technical, management and policy positions in the U.S. Air Force, National Aeronautics and Space Administration, the U.S. House of Representatives, and the American Association for the Advancement of Science. Dr. Wells has served as a consultant to public and private organizations on a number of issues of major national concern. His teaching and research specialties include project management and international science and technology issues related to economic growth and multinational corporate strategy.

Buffet Reservations

A buffet priced at \$7.00 will precede the meeting starting at 6 PM. **Reservations for the buffet are requested by Friday, May 5, 1989.**

All Welcome

All Engineering Management Society members and non-members are welcome.

Time: 7:00 PM, Wednesday, May 10, 1989. (Buffet starts at 6:00 PM.)
Place: Stevens Institute of Technology, 4th Floor, Stevens Center, Hoboken, N.J.
Information/Reservations: Jay Gilbert (201) 420-5369.

Engineering Management Society Meetings

The NY/NJ Chapter of the Engineering Management Society announces the following schedule of meetings for 1989:

- September 18 - Dr. Jerry Siegel - "Motivating The Engineer."
 - November 15 - Dr. Michael Frisch - "Leadership in Management."
- For information call: Jay Gilbert (201) 420-5369.

An Overview Of Low-Bit-Rate For Video Coding

The May 16, 1989 meeting of the North Jersey IEEE Acoustics, Speech and Signal Processing Chapter will feature a talk on "Low-Bit-Rate Video Coding." The speaker will be Dr. Barry Haskell, AT&T Bell Laboratories.

About The Talk

Color motion video signals are typically coded with PCM at rates in excess of 100 Mbits/second. The coding and transmission of motion video at the very low rate of 64kbs for ISDN teleconferencing applications has been accomplished only by reducing the quality of the reproduced image substantially below what most people are used to in viewing entertainment television. The coding techniques used at this time basically attempt to exploit both the "statistical redundancy" amongst the pels of the picture and the "subjective redundancy" inherent in the spatial and temporal resolution limitations of human vision.

The p x 64 kbs algorithm currently being pursued by the CCITT SGXV Experts Group on Video Telephony utilizes a Discrete Cosine Transform of motion compensated frame differences in a Conditional Replenishment Codec. Background, principles and interworkings of this and related algorithms will be discussed and pictures will be shown.

At the somewhat higher bit-rate of 1.5Mbs the same basic techniques can be used with some embellishments. The ISO Motion Picture Experts Group is about to look at suitable algorithms in this range for applications such as CD-ROM. Recent work at Bell Labs will be described and pictures will be shown.

About The Speaker

Barry G. Haskell received the BS, MS and PhD degrees in Electrical Engineering from the University of California, Berkeley in 1964, 1965 and 1968, respectively.

From 1964 to 1968 he was a Research Assistant in the University of California Electronics Research Laboratory, with one summer being spent at the Lawrence Livermore Laboratory. Since 1968 he has been at AT&T Bell Laboratories, Holmdel, N.J. and is presently Head of the Visual Communications Research Department. He has also taught graduate courses at Rutgers University, City College of New York and Columbia University.

His research interests include digital transmission and coding of images, videotelephone, satellite television transmission, medical imaging as well as most other applications of digital image processing. He has published over 30 papers on these subjects and has 15 patents either granted or pending. He is also the co-author of the book "Digital

Pictures - Representation and Compression."

Dr. Haskell is a member of Phi Beta Kappa and Sigma Xi, and is a Fellow of the IEEE. He is also an editor of the *IEEE Transactions on Communications* on the subject of Image Communications.

Free Buffet

A free buffet will be provided on a first-come-first-served basis an hour prior to the scheduled talk.

Time: 7:30 PM, Tuesday, May 16, 1989. (Free buffet at 6:30 PM.)

Place: JCP&L Co., Madison Ave. and Punch Bowl Rd., Morristown, N.J.

Further Information: John Burgess (201) 386-2736; Steve Laico (201) 386-2031; Sunil Patel (201) 582-4923; Joe Rothweiler (201) 284-2722.

Calling All Associate Members!

It's time to advance to member or Senior Member grade. The dues are the same for all three grades so apply for the highest grade for which you are qualified.

For information and a Member and/or Senior Member application, contact Don Weinstein, Kulite Semiconductor, One Willow Tree Road, Leonia, N.J. 07605 (201) 461-0900, ext. 238.

Officer Election And Review Of Advertising

On May 15, 1989 the IEEE NY Section Consultants' Network will meet to elect officers for 1989-1990, and review the results of the past year's advertising efforts.

The meeting will take place at the Consolidated Edison Building, 4 Irving Place, Room 1405, NYC. (Please note the new and more convenient location and that the Con Ed cafeteria opens at 5:00 PM.)

The June meeting will take place on Tuesday, June 13th at the same location. The new officers will discuss their plans for next year, and Mr. Bob Noberini, the new chairman of PACE will talk about the future functions of PACE.

Time: 6:30 PM, Monday, May 15, 1989.

Place: Consolidated Edison Building, Room 1405, 4 Irving Place, NYC.

Further Information: Jim Wetterau (212) 321-1999; Ted Fishman (914) 937-0658.

Testability Impact On Reliability

The North Jersey Chapter of the Reliability Society will meet on June 20, 1989 to hear a talk on "Testability Impact On Reliability." The speaker will be Jon L. Torino of Logical Solutions Technology.

About The Talk

Testability is a design characteristic which allows the status (operable, inoperable, or degraded) of an item to be determined, and it addresses the extent to which a system or unit supports fault detection and fault isolation in a confident, timely and cost-effective manner. The incorporation of adequate testability, including build-in test (BIT), requires early and systematic management attention to testability requirements, design and measurement.

Testability has long been part of the reliability and maintainability disciplines. On more than several occasions, however, testability has actually been reduced in order to improve calculated reliability. This apparent conflict between testability and reliability needs to be understood and resolved. This talk will address the issues and try to offer solutions that resolve the apparent conflicts.

About The Speaker

Jon L. Torino, President of Logical Solutions Technology, Inc., has twenty years experience in all aspects of testing. His technical background extends from electrical parametric testing of processed silicon wafers through field service testing of complex electronic systems and from system and circuit design through programming and applications support.

Educated in management and electronics engineering at El Camino College and West Coast University, Mr. Torino is the author of three books and numerous articles and papers. He has lectured on testing and test equipment throughout the United States and Europe. He is a frequent participant at conferences including ATE Seminars, NEPCON, ASEE and European ATE conferences. Mr. Torino is a member of IEEE, Co-Chairman of the IEEE Testability Bus Standards Committee, Past President of the American Society of Test Engineers, Fellow in the Institute for Quality Assurance (U.K.) and a Fellow in the Society of Test Engineering.

Free Buffet

A free buffet will be provided starting at 6:00 PM, on a first-come-first-served basis.

Time: 7:00 PM, Tuesday, June 20, 1989. (Buffet starting at 6:00 PM.)

Place: ITT Avionics Auditorium, 500 Washington Avenue, Nutley, N.J.

Further Information: Hank Moss (201) 785-6458.

PACE NEWS

By R. Tax

PROFESSIONAL ACTIVITIES

The purpose of this column is to increase your level of awareness about professional activities. We also hold a PACE meeting each month to give you the opportunity to get involved, present your views and hopefully to get you into a position to make things happen. See PACE meeting notice in this issue.

This month I have selected two articles from *IMPACT*, our National PACE newsletter. One article is about "Engineering Layoffs" by Robert Bruce and the other addresses Pre-college Education by the Division IV PACE Coordinator, Helmut E. Schrank.

I thank both Bob and Helmut for their contributions.

SECTION PACE STUDIES AREA'S ENGINEERING LAYOFFS

by Robert Bruce, Long Island Section

The Long Island (New York) Section's PACE network undertakes a wide variety of projects each year. One project of special interest currently is a study of engineering unemployment on Long Island.

Between March and June 1988 the PACE subcommittee working on this study published announcements, articles and interviews in various periodicals, including the *Long Island Pulse* (IEEE Section newsletter), *Newsday*, and *EE Times*. The publications asked for replies from Long Island engineers who have been laid off. The Subcommittee had already estimated that approximately 400 engineers on Long Island were unemployed. This estimate was based on newspapers reports of the previous 18 months and listings under the "engineer" category at the New York State Job Service. In addition, *Newsday* reported that approximately 8800 high-tech jobs left Long Island during the previous two years. Even if only 10 percent of these jobs were engineering positions, that would represent 880 layoffs. The Section's estimate of 400 was conservative.

As of August, the Subcommittee received only 42 responses, a disappointing number. In fact, very few had been received until *Newsday* carried its inquiry. The PACE Subcommittee attributed the poor response to several factors:

- Laid-off engineers fear winding up on a "black list";
- Unemployed engineers are preoccupied with their job search and aren't reading other news items;
- The unemployed engineers have left Long Island;
- Engineers are reluctant to be identified with an unemployed group; or
- The unemployed engineers are apathetic or reluctant to admit the reality of the situation.

The Subcommittee found the statistical breakdown of the responses revealing. By age group, more than a quarter of the respondents are under 30, seven percent are between 30 and 40 years old; 19 percent are in the 40-50 range; 24 percent are between 50 and 60 years old; and a tenth of respondents are 60 or older. Fourteen percent didn't specify age. The Subcommittee interprets this spread as an indication that the companies that laid off employees wanted to keep those who gave them the "most bang for the buck." In other words, these companies laid off either the least-experienced engineers or the most senior people.

Almost 40 percent of the respondents reported having more than 20 years of experience. Almost another third said they had less than 10 years' experience. Nineteen percent reported having between 10 and 20 years of job experience. Again, this shows that the employers were more likely to lay off engineers with either very few or very many years of experience.

By affiliation the breakdown is 35 percent from the military, 30

percent from industry, and 21 percent new graduates without jobs. Some new graduates had spent as long as two years looking for a job, with no success. No respondents reported being from the academic sector.

Companies in other locations, as well as "headhunters," sent inquiries to the Subcommittee. They were looking for applicants willing to relocate. Headhunters and job shops reported that business on Long Island was very slow. Currently, some Long Island companies that employ engineers are planning new layoffs, so the engineering job situation here can be expected to get worse before it gets better.

The book *What Color Is Your Parachute* describes how the job hunting-job filling system in the United States works against job search progress, rather than facilitating it. I don't know whether IEEE can contribute to restoring order in the professional chaos that follows engineering layoffs. However, I think this problem merits attention--more than mere job-search assistance--from the IEEE United States Activities committees that are concerned with such professional problems. The unemployment subcommittee of Long Island PACE should be commended for their efforts to date.

PRECOLLEGE EDUCATION NEEDS MORE THAN "BAND-AID CURES"

by Helmut E. Schrank, Division IV PACE Coordinator

Lately it seems that concern for precollege education is diminishing, which is unfortunate. I am convinced that no other issue--including pensions, age discrimination, or career maintenance--is more important to the future of our profession, of IEEE, and of our nation than the need to improve our public education system, which has had a shameful record for the past two or more more decades.

I benefited from a superior American education system that existed during the pre-progressive education era. I immigrated to this great country in 1929 at the age of 7, knowing no other word of English than "hello." Ten years later I graduated from high school as class president and valedictorian, to the credit of the fine dedicated teachers and the disciplined, traditional education system that existed then.

When I compare my education experience with what kids are getting now, I get disturbed and wonder how these tragic regressive changes were allowed to be made. We need to restore our education system to the excellence it once enjoyed. It needs to be the world's best; seventh or eighth best won't do.

Good Starts Made, But More Is Needed

We in PACE have heard of many excellent efforts to help improve science and math education in secondary schools. I commend those who are engaged in such fine programs as JETS, MathCounts, Young Astronauts, and the Triangle coalition, among others. I'm also glad IEEE produced "Education: The Key to America's Future," a slide show that effectively calls attention to the seriousness of the problem and pleads for help in finding solutions. All of these positive activities should be supported more widely and more vigorously. Unfortunately, these are not solutions to the basic problems, but are like the proverbial "Band-Aid cures."

Most of the precollege programs I've mentioned concentrate on science and math, which of course are vital to engineers. However, today's high school graduates are also lacking in basic reading skills, a problem that goes back to the incorporation of so-called "progressive" teaching methods in primary schools. (See "Are We Operating Scientifically on Pre-College Education?" *IMPACT*, December 1986). Also, if you've ever played "Trivial Pursuit" with the younger generation, you've probably realized how little geography and history they know. Today's international competition in high-tech business requires engineers to know more than just science and math. Even the arts and humanities need to be reemphasized, so that our students will be well educated for their future roles in the world market.

(Continued next page)