

RELIABILITY SOCIETY NEWSLETTER (USPS 460-200)

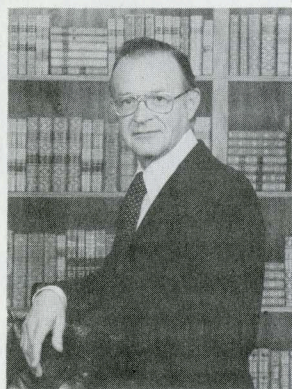
Editor: John Peter Rooney

Vol. 26, No. 3, July 1980



Mr. Val Monshaw

## Message from the President



The Reliability Society endorses Mr. Val Monshaw, the nominee for the office of IEEE Director of Division VI.

Mr. Monshaw's candidacy is most timely because currently there exist numerous problems centered about two Institute bodies: the Technical Operations Board (TAB) on the one hand, and the Societies/Groups/Councils on the other. Salient among the problems

are the expectations of TAB and the expectations of the Societies/Groups/Councils, which more often than not are in quadrature with each other, and the size-commonality of interest grouping of Societies/Groups/Councils within the Division.

By virtue of the length and breadth of experience at various levels of the Institute, Mr. Monshaw is considered the most knowledgeable and qualified of the candidates. Having previously served as the president of the Reliability Society and as a member of TAB, he has a perceptive understanding of the conflicting problem of expectations posed by the Society/Group/Council presidents' needs to articulate their concerns and problems before TAB, and the TAB expectations of having the Society/Group/Council presidents address the Institute-wide problems inherently imbedded in TAB.

As chairman of the Reliability Society Ad Hoc Committee on Division Structure, Mr. Monshaw has studied extensively

the 1968 vintage ground rules governing the Division makeup. He is well familiar with the commonality of interest grouping of the Societies/Groups/Councils as then established, and as presently evolved manifesting substantially modified or vastly changed interests.

The in-depth understanding of such problems at the TAB-Society/Group/Council level recommends well the election of Mr. Monshaw. But he would also bring to the office of the Director the perceptivity and the insights gained from being sharply attuned to the concerns and problems unique to the Chapter's membership and the Sections of the Institute having served as the Chairman of the Philadelphia Chapter of the Reliability Society.

Through his long and distinguished tenure with the Annual Reliability and Maintainability Symposium as Chairman of the Finance Committee, the Program Committee, the Long Range Plans Committee, and as the General Chairman, and the Chairman of the Board of Directors, Mr. Monshaw would bring the necessary know-how, the understanding of and appreciation for the Society/Group/Council sponsored IEEE extramural activities. Through his service with the International Electrotechnical Commission as U.S. Delegate, Mr. Monshaw would bring the necessary experience to deal with problems at the International level.

We urge all members of the Reliability Society, as well as all members of Division VI Societies on Systems, Man and Cybernetics, Engineering in Medicine and Biology, Professional Communication, Education, and Engineering Management, to rally behind the candidacy of Mr. Val Monshaw.

DR. THADDEUS L. REGULINSKI  
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Editor: John Peter Rooney, Old Colony Estates, 16 Sansome Street, Plymouth, MA 02360.

## Membership—B. Retterer, Vice President

The Membership growth of the Reliability Society has been targeted at 6% for 1980. Society membership as of January 31, 1980 was 3,065.

Membership development is under the chairmanship of H. Wuerffel. Our primary approach for developing new membership will be to get our message concerning the advantages of society affiliation to potential members through several media.

Our efforts in Chapter activities are focused on maintaining the health of existing chapters and to establish at least

two new chapters during 1980. Chapter activities development continue under the chairmanship of H. Malec.

Professional development is under the chairmanship of O. D. Trapp. The professional development goals for 1980 include: (1) initiating efforts to formulate a home study course on reliability and (2) identify other activities which will generally promote the reliability profession.

Dave Troxel is continuing in the capacity of Membership Analysis. This function is geared toward providing a means to direct our actions toward best serving our membership while providing feedback necessary to assist in achieving membership goals.

## Officers' Reports

### Vice President, Meetings

The primary objective of the Meetings organization in your Society is to provide you, the members, with conferences and meetings which fulfill your needs for exchange of technical information. We, your officers, strive to define these needs but often find we do so based upon our own experience rather than your desires. We do this only because we do not hear from you what technical exchanges are needed to make you more effective in your job.

I am particularly interested in the needs of the members in the area of Software Reliability. Do you feel this subject is adequately covered in currently available Symposia and workshops, or do you have needs beyond the available meetings?

I would be delighted to hear from any members who would like to make their desires known on this subject. Please write me at:

IBM Corporation  
102A353  
Owego, NY 13827

Carl M. Bird  
Vice President, Meetings

Item	1978	1979
ARMS Profits	1,600	1,300
IRPS Profits	3,100	2,600
Interest on Savings	4,100	5,500
Other	700	2,900
	TOTAL	TOTAL
	\$94,600	\$112,300
Expenses		
Transactions	\$61,500	\$71,100
Newsletters	6,500	5,800
ARMS Proceedings to Members	9,000	7,700
IRPS Proceedings to Members	6,400	6,400
IEEE Technical Charges	2,600	7,000
Administration	3,100	5,000
Awards	700	1,800
Other	1,000	1,300
	TOTAL	TOTAL
	\$90,800	\$106,100

### Treasurer's Report

The IEEE 1979 Final Financial Status Report indicates that the Reliability Society had a final surplus of \$6200. This brought our reserves to \$52,900 as of the end of the year. This is higher than the 1978 surplus of \$3800 and is considerably better than the deficit of \$16,700 which was reflected in the official 1979 budget. The following are condensed figures showing the income and expense items for 1978 and 1979.

Item	1978	1979
Income		
Membership Fees	\$16,800	\$18,100
Transactions Sales	63,600	79,400
Conference Pubs. Sales	4,700	2,500

These figures show that our chief sources of income, in addition to the dues income of \$18,100, are sales of publications, profits from the conferences we sponsor, and interest on the savings account maintained with our reserves. The largest of these, Transactions sales, provides revenues from nonmembers such as libraries, other institutions, and nonmember individuals. Our primary expenses relate to the cost of our publications and the distribution of conference proceedings to our members.

Our official budget for 1980 shows a projected surplus of \$1100. While expenses are expected to increase due to inflation and some increase in Transactions pages, this will be offset by higher expected income from nonmember subscriptions and membership and a new IEEE organization change which eliminates Headquarters Technical Charges. Therefore, no change in present Society fees or extra services provided is expected.

Irwin A. Feigenbaum  
Treasurer

## Vice-President of Technical Operations

Mr. Alan O. Plait, V.P. Tech. Operations, requests each Reliability Society member to examine the charters for each of the nine Technical Operating Committees. These Committees are off and running, but wherever a member would like to contribute, the member is asked to contact the appropriate chairman.

### Technical Operations Committees

#### Advanced Reliability Techniques

Mr. Anthony Coppola, Chairman  
RADC/RBET  
Rome Air Development Center  
Griffiss AFB, NY 13441  
(315) 330-4726

The field of interest of the Committee shall include all techniques for the Prediction, Demonstration, Management, and Improvement of reliability which are applicable to electronic or electrical engineering.

#### Human Performance Reliability

Dr. Arthur Siegel, Chairman  
Applied Psychological Services  
Wayne, PA 19087  
(215) 688-4874

The field of interest of the Committee shall include:

(1) Development and analysis of methods and concepts for measuring and implementing human performance reliability considerations in all phases of the system development cycle.

(2) Dissemination of information relative to human performance reliability and integration of this information among industrial, governmental, academic, and consumer organizations.

(3) Encouragement of the consideration of all aspects of human performance during the preliminary design, development, test, and evaluation of man-machine systems.

(4) Maintenance of liaison with other groups having similar and related interests such as the Human Factors Society, the Society of Engineering Psychologists, and the American Society of Mechanical Engineers.

#### International Reliability

Mr. Marion P. Smith, Chairman  
Honeywell Aerospace Division  
St. Petersburg, FL 33733  
(813) 531-4611 X107

The field of interest of the Committee will include support of and participation in the preparation of international standards, involving reliability technology and practice. Committee function will include:

(1) Participation in the work of the International Electrotechnical Commission (IEC) and the International Standards Organization (ISO) in the work of those bodies on international standards.

(2) Recommendation of material or subject matter in the field of reliability which should be considered by the IEC and/or the ISO as candidate material for international standards development.

(3) Providing review and comments on international standards which are in the process of development so as to assure publication of standards which represent appropriate reliability, technology, and practice.

(4) Provide input and reports to IEEE Reliability Society Administrative Committee on work in the field of international reliability standards in order to keep the Reliability Society abreast of this work and encourage input from all members and officers wherever possible.

(5) Inform the IEEE Reliability Society of planned future work in the field of international reliability standards in order to provide guidance to this work where necessary and appropriate. Encourage the inclusion of appropriate reliability terminology and practices in international equipment standards in order to foster effective use of reliability technology.

#### Maintainability

Mr. Richard Kowalski, Chairman  
ARINC Research Corporation  
2551 Riva Road  
Annapolis, MD 21401  
(301) 858-4841

The field of interest of the Committee will include the theory and practice associated with the design, specification, measurement and control of the maintainability characteristics of electronic and electromechanical systems. The management practices are of concern attendant to the formation and pursuit of a maintainability program applied to system concept, development, production, and operation phases. Test equipment and other support items used as part of system maintenance are also topics of interest.

#### Mechanical Reliability

Mr. Henry Hegner, Chairman  
ManTech International Corp.  
Century Suite 930  
2341 Jefferson Davis Highway  
Arlington, VA 22202  
(703) 979-0733

The field of interest of the Committee will include reliability theory and practice associated with design, specification, test and demonstration of nonelectronic equipment. Management practices are of concern as part of a reliability program applied to system concept, development, production, and operation phases. The reliability program is directed towards the control of reliability through an analysis of the factors that affect mechanical reliability and provide a system of actions to improve low reliability levels. The detection of failures as well as failure prevention methods for nonelectronic equipment are also topics of interest.

#### Nuclear Systems Reliability and Safety

Dr. J. B. Fussel, Chairman  
Nuclear Engineering Building  
University of Tennessee  
Knoxville, TN 37916  
(615) 974-2525

The field of interest of the Committee shall include:

(1) Reliability and availability of nuclear systems.

(2) Radiological safety of nuclear systems as related to industrial personnel or the public.

The area of major concern is the probabilistic analyses associated with (1) and (2). These nuclear systems are any systems that are associated with (1) nuclear powered electrical generating stations, (2) the nuclear fuel cycle, (3) usage of radioisotopes, and (4) other nuclear industry elements that potentially could benefit from the application of techniques for evaluating and improving reliability or radiological safety.

The basic functions of this committee, as related to the above scope, are to:

(1) Develop basic criteria for the applicability of reliability and safety methodologies.

(2) Promulgate, develop, or coordinate standards, guides, and recommended practices for the implementation of reliability and safety calculations.

(3) Foster the investigation of new methods and techniques for modeling, measuring, and verifying nuclear system reliability and safety.

(4) Define criteria or requirements for the acquisition of information and the standardized presentation of reliability and safety data.

(5) Provide information to regulatory agencies for review and consideration.

(6) Encourage the consideration of reliability and safety disciplines as elements of the nuclear system design process.

(7) Investigate the application of reliability and safety technology to appropriate new areas of interest.

(8) Coordinate reliability and safety matters with other domestic and international committees, groups, societies, and agencies for consistency of interpretation and standardization of terminology.

(9) Sponsor technical meetings, sessions, or conferences to promote better understanding of the reliability and safety disciplines and their role in the engineering process.

(10) Prepare, review, and coordinate technical papers on reliability and safety subjects.

(11) Disseminate reliability and safety information to the nuclear industry.

(12) Enhance public understanding of issues related to nuclear systems reliability and safety.

(13) Advance the development of reliability and safety disciplines through participation with student groups and educational institutions.

(14) Enhance the productive relationships among the various organizations that make up the nuclear industry including educational institutions and regulatory agencies.

(15) Serve where qualified as a general source of expertise

to the IEEE and other bodies in the review of matters related to reliability and safety.

#### Software Reliability

Mr. Irv Doshay, Chairman  
380 Surf View Drive  
Pacific Palisades, CA 90278  
(213) 536-2003

The field of interest of the Committee shall include all technical and management considerations relative to computer software reliability, maintainability, quality, and effectiveness. These may include, but are not limited to, techniques pertinent to Quantification, Modeling, Analysis, Design, Hardware/Software Interface, Implementation, Assessment, Evaluation, Testing, Verification, Data Gathering/Compilation, Validation, Cost Determination, Certification, Improvement, and Management.

#### Solar Energy Device Reliability

Dr. John Meakin, Chairman  
Solar Cell Development  
Institute of Energy Conversion  
One Pike Creek Center  
University of Delaware  
Wilmington, DE 19808  
(302) 995-7155

The field of interest of the committee shall include:

(1) Reliability and durability of solar energy conversion devices.

(2) Reliability of electronic and electromechanical monitoring and control subsystems associated with solar energy conversion systems.

The areas of major concern will be the impact on reliability of:

(1) The design, production, and utilization of direct solar energy conversion systems including photovoltaic, photogalvanic, and photochemical cells.

(2) The design, production, and operation of monitoring and control systems for solar energy conversion systems.

(3) The integration of solar conversion devices and systems into other generation, conversion, and distribution systems.

The basic functions of this committee will be to:

(1) Encourage the development of a sound technical basis to the understanding and improvement of the reliability of solar energy devices.

(2) Promulgate, develop, or coordinate standards for reliability testing and the presentation of reliability data in cooperation with industry, government agencies, education, and professional institutions.

(3) Sponsor technical meetings, sessions, or conferences to promote the exchange of information and the development of improved reliability testing and analysis.

(4) Prepare, review, and coordinate technical papers on reliability.

(5) Advance the development of those disciplines which bear on reliability through interaction with educational and professional institutions.

## Standards and Definitions

Mr. Augustus Constantinides, Chairman  
Columbia Research Corporation  
2531 Jefferson Davis Highway  
Arlington, VA 22202  
(703) 841-1445

The field of interest of the Committee shall include review and critique of proposed reliability and/or maintainability standards, specifications, handbooks, etc. upon request.

This activity will be accomplished as follows:

- (1) Establish a committee as defined herein.
- (2) Develop procedures for implementing the formal

review of specifications, standards, etc.

(3) Acquaint Society members, and other potential sources of specifications for review, of the committee's charter and availability to perform this function.

(4) Upon receipt of a proposed specification for review establish a review panel comprised of appropriate members to accomplish this independent review and critique.

(5) Summarize and coordinate review comments and disseminate to Vice President Technical Operations, President of AdCom, the source requesting review (DoD agency or other), all members of the review panel, and Standards and Definitions Committee."

## EDITORIAL

More than most engineers, Reliability Engineers are aware of government regulations, specifications, rules, and agencies. In many of the coffee-break discussions, the topic will be government interference in business. To some of the critics of the EPA, OSHA, FTC, and other agencies, I've often replied that government interference is getting so bad that "...you don't hardly see children in the coal mines anymore!"

A recent EPA news release gives more factual details in their defense; it is reprinted here for your information. Space, for opposite views, will be provided; just write:

Editor, *Newsletter*  
Old Colony Estates  
16 Sansome Street  
Plymouth, MA 02360

I look forward to your inputs, your comments and your ideas.

JOHN PETER

## Environmental Rules Produce Savings That Far Outweigh Costs

Paul G. Keough

Director, Office of Public Awareness  
U.S. Environmental Protection Agency

BOSTON...Environmental regulations have been increasingly under attack by business and other critics as being unduly costly to society in comparison to the benefits from such rules and restrictions.

A new report by the President's Council on Environmental Quality (CEQ) shows however, that federal controls on air and water pollution have given the country billions of dollars worth of benefits and saved thousands of lives.

The study's "best estimate" of annual benefits of air pollution control was \$21.4 billion for 1978. This savings comes

from improvements to human health, reduced soiling and therefore reduced cleaning costs, reduced damage to vegetation and crops, and reduced damages to a wide variety of materials.

The report also estimates that air pollution regulations probably saved about 14,000 lives in 1978.

By way of comparison, CEQ estimates the cost of compliance with federal air pollution regulations at \$16.6 billion in 1978. Judging by these numbers, the benefits of air pollution regulations have far exceeded their costs.

Estimated benefits of water pollution control for the year 1978 could not be determined because of a lack of adequate data. However, the report projected benefits for the year 1985, which the Clean Water Act has set as the deadline for installation of "best available technology" to reduce pollution such as phosphorous and fecal bacteria, at \$12.3 billion.

These benefits would come from increased recreation and aesthetic uses of lakes and streams, higher fishery yields, reduction of certain water-borne diseases, and reduced water treatment costs.

The CEQ report was prepared by A. Myrick Freeman III, an economist at Bowdoin College in Brunswick, Maine. The report was not based on new research but rather on a review of previous studies of the economic benefits of environmental controls.

The estimates in the report are admittedly rough. For example, the CEQ report states that the range of benefits from air pollution control in the wide variety of studies reviewed was between \$5 billion and \$51 billion in 1978. The rough estimate for water pollution benefits in 1985 was taken from a range of \$6.5 billion to \$26 billion.

Regardless of what figures are used, however, this report and others like it clearly show that investment in pollution control is a wise one—the benefits derived truly outweigh the costs.

Copies of the report: "Benefits of Air and Water Pollution Control: A Review and Synthesis of Recent Estimates," can be obtained from CEQ, 722 Jackson Place, NW, Washington, DC. A self-addressed mailing label should be enclosed.

## Reliability Society Chapter Chairman

December 1, 1979

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## CHAPTERS NEWS

### Henry A. Malec Chapter Activities Chairman IEEE Reliability Society AdCom

#### I. Colorado Chapter Founding

An inaugural meeting was held in early March led by Sam Keen. Subsequently, a letter and a petition with more than the required twelve signatures was sent to the Chairman of the Denver Section requesting that a Denver Chapter of the IEEE Reliability Society be established.

In conversations with Mr. Keene, a recommended first year program of three or four meetings would start the chapter. The first meeting could feature a member of AdCom or an AdCom-sponsored speaker. Another meeting could have a tour of a local quality facility or lab with a lecture such as "Highlights of the 1981 RAMS". In addition, a half-day spring tutoring on basic reliability could further expand the chapter membership.

#### II. Chapter Activities—1980 Goals

- 1) Continue efforts to establish a chapter in Colorado.
- 2) Establish a chapter in Denmark.
- 3) Issue Chapter Activities Newsletter #3 through #5.
- 4) Modify the new chapter awards form to reflect the first use.

- 5) Issue a status report on chapter health and recommend desolation or increased support for specific chapters found not functioning at an acceptable level.
- 6) Coordinate with Action Item 16 of AdCom 113 the possible areas for new chapter locations.

### Clark Hackley Washington North Virginia Chapter

#### First Place

The award for the first place will consist of providing the Chapter with a planned program for one of their regular meetings. An outstanding speaker(s) will be selected to present a topic to the Chapter on a subject that is of general interest to the Chapter. A maximum of \$500.00 for expenses for this speaker will be paid by the AdCom. A suitable award will be given to the Chapter Chairman.

The Washington/Northern Virginia Chapter is made up of both industry and government employees with about 134 members. This chapter generally has 8 meetings per year. This year the chapter has had 5 meetings, generally an average of over 30 attendees.

Last May the Chapter sponsored a very successful "Tutorial on Accelerated Testing of Semi-Conductor Devices". This chapter is consistently presenting many meetings on various subjects in a timely fashion.

**Clark L. Hackley**, immediate past chairman of the Reliability Society Chapter serving both the Washington, D.C. and Northern Virginia sections of IEEE, has been working in the Reliability engineering field over 16 years, since the early days of the Apollo Program. This started at the Manned Spacecraft Center in Texas as Manager of Reliability Design Engineering with General Electric's Apollo Support Department. Since then he's had a varied career as a manager or project engineer at General Electric plants in Binghamton, New York (Avionic Control Equipment), in Erie, Pennsylvania (electric rapid-transit rail cars), and currently in Crystal City, Virginia (R & M engineering support contracts, primarily for the Navy).

Clark graduated from Rensselaer Polytechnic Institute (B.E.E.) and started his career with Central New York Power Corporation in Utica, New York. Then he served in the Navy as a radar officer during World War II in the Pacific. After the war, he started his career with General Electric in Schenectady, New York (earning a M.S. degree at Union College) and has been with the same Company ever since, over 34 years!

During his Navy days in Boston he was married and took enough time out of his busy career to help his wife raise five children, who are now out on their own. But only one came anywhere near the engineering field: the youngest son became a geologist.

### **Joe Drvostep** **New York-Long Island Chapter**

#### **Second Place**

The award for second place will be \$150.00, plus a suitable award for the Chapter Chairman.

The Metropolitan New York Reliability Chapter serves New York City, Long Island, and Westchester residents. The Chapter currently has 130 members, most of whom live on Long Island.

The 1978-1979 program included meetings on Automated In-Circuit Testing, an overview of Reliability Improvement Warranties, the impact of Reliability and Maintainability on the Cost of a Program, an introduction to the USAF Modular Automatic Test Equipment Program, and a Logistics Symposium in conjunction with the Society of Logistics Engineers. Attendance averaged 40.

**Joseph Drvostep** (SM'54) received a B.S. degree in electrical engineering in 1943 from New York University. In 1949 he received the Masters degree in Administrative Engineering from New York University.

From 1969 to date, he has been a group leader and senior reliability engineer with the Grumman Aerospace Corporation, Bethpage, NY. He has been responsible for the reliability of advanced electronic systems in the A-6E, EA-6B, and E-2C aircraft.

### **Vince Lalli** **Cleveland Chapter**

#### **Third Place**

The award for third place will be \$100.00, plus a suitable award for the Chapter Chairman.

**Vincent R. Lalli** was born in Garfield Heights, OH on October 16, 1931. He received the B.S. and M.S. degree in Electrical Engineering from C.W.R.U. in 1953 and 1959, respectively. He is now responsible for Reliability Engineering at NASA Lewis Research Center.

Vince founded the Cleveland Reliability Society Chapter and has been its chairman for over 10 years. This chapter tries to have 4 good meetings per year, participate in CECON each year and is working on a reliability training program with Case Institute of Technology.

Vince has recently accepted the Chairmanship of the Reliability home study IEEE course.

### **Boston Chapter**

The February Chapter meeting was held at the Hanscom Air Force Base NCO Club in Bedford, MA. The guest speaker was Mr. Frank VanHorn of the USAF Electronic Systems Division, Hanscom AFB. His talk, entitled "R/M/A Military Specifications," discussed the Government viewpoint on a number of R/M/A specifications, both current and proposed.

In March, Mr. Aaron DerMarderosian of Raytheon Company was the guest speaker at the Chapter meeting, also held at the Hanscom AFB NOC Club. Mr. DerMarderosian made a presentation on "Metal Migration Failure Modes in Electronic Equipment." He imparted much of the experience gained on metal migration through both test and experimentation.

The Boston Chapter wishes to thank all those people in the Boston area whose participation contributed to the highly successful year of professional activities.

### **Spring Reliability Seminar**

Another successful seminar was held by the Reliability Chapter, Boston Section of the IEEE. On Thursday, April 24, 1980, eighty people congregated at the Hillcrest Nims in Waltham, MA for the 18th Annual Spring Reliability Seminar. Sixteen companies (Assurance Technology Corporation, AVCO, Data General Corporation, DEC, ESD, GTE Sylvania Inc., Honeywell, IDR of Long Island in New York, Itek Corporation, Mitre, Raytheon, Raytheon Service Company, RCA Corporation, Sanders Associates Inc., Sanford Process Corporation, and Systems and Informatics Inc.) sent representatives to participate in the day's events.

Colonel Curt Haley, Director of Logistics, USAF, Electronic Systems Division, Hanscom Air Force Base in Bedford, MA gave the keynote address on "The Growing Dependence on the Assurance Sciences".

There were eight presentations dealing with timely commercial and military reliability topics. Mr. Gordon Cawood of Raytheon gave a presentation on the Pave Paws Radar System. There are two of these large phased-array search/track radars currently in operation. One is located at Otis AFB in Cape Cod, MA. This installation maintains surveillance over a large portion of the North Atlantic and Gulf of Mexico tracking and characterizing submarine launched ballistic missiles. The second installation is located at Beale AFB in California. It covers the North Pacific extending as far as the Aleutian Islands and the Hawaiian Islands.

Mr. Cawood described the requirements that the Air Force stressed on this program and how Raytheon met these requirements: by designing in high system reliability; by designing margin in array performance to optimize reliability, availability, and cost; by designing in redundancy with automatic switchover and repair in the signal processor; by providing a redundant data processor; and by providing top-down structured software.

Dr. Moisey Lerner (Sanford Process Corporation) presented his paper "TL-Indexes as a Tool for Insuring Reliable Operation of Electrical Capacitors." Dr. Lerner defined the TL-Index and demonstrated how it could be used to quantitatively estimate the potential danger of overheating the capacitor circuit element when it is subjected to a nonsinusoidal signal of any waveform.

Mr. Al Spann of Digital Equipment Corporation shared with the seminar participants "A Practical Method For Printer Reliability Evaluation." Mr. Spann showed the failure rates for the printer components had to be broken into three categories for the reliability model. These failure rate categories are: (1) failures attributable to all on-time, including "idle time", (2) those attributable to the active print mode, without regard to the print rate, and (3) the per character failure rate of the print head, including wearout. The graphical techniques that Mr. Spann used during his presentation gave the audience a good feeling of the interaction of the parameters involved in the model.

The paper "Captive Line Controls Produce Hi-Rel ICs" was presented by the two authors, Mr. John Gaffney and Mr. Avery Hevesh. These gentlemen described how Raytheon achieves high reliability goals through the imposition of "Captive Line" controls on IC suppliers. Raytheon's program was discussed in detail. Topics included were the Captive Line Concept—Theory and Practice, Captive Line Management Techniques, Product Acceptance Requirements, Reliability Assessment of Digital Devices, Sources of Data, and Data Reduction and Analysis. Both Mr. Gaffney and Mr. Hevesh feel that a Captive Line Program is a good investment when major defense systems must depend upon complex ICs of high reliability.

Dr. Leonid Lipchin of Systems and Informatics Inc. ("Development of Standard Procedures for the Reliability of Capacitors and Capacitive Circuit Elements") was unable to attend the seminar. However, Dr. Lerner was kind enough to speak for a few minutes on the work in which Dr. Lipchin is involved.

## **Members' Contributions**

### **Status of the Reliability Technology**

#### **Report of A. Coppola, 1979**

Advances in Solid State Technology continue to influence the direction of reliability research and development. The most significant developments in 1979, however, were in Maintainability Technology, reliability's sometimes neglected companion discipline. The developments in maintainability amount to the creation of a new engineering

"Switching Transistor Current Gain Design Criteria Optimization" was authored by Mr. H. Larue Renfroe, President of Assurance Technology Corporation. For his presentation, Mr. Renfroe discussed a method of determining the available worst case switching transistor current gain. This method represents a significant improvement over alternative methods evaluated because it reflects both the inherent transistor gain characteristics and the specific transistor application. This method yields a resultant worst case current gain value which enables a more accurate assessment of available gain margin. This results in a more optimum overall system design.

Mr. Joseph A. Dzekevich discussed how Digital Equipment Corporation blended various product assurance program elements into an innovative program that was implemented in the development of the MINC (Modular Instrument Computer). Mr. Dzekevich described the goals of the MINC program. He showed how these goals were attained through Design Maturity Testing, Process Maturity Testing, Environmental Testing, EMC (ElectroMagnetic Compatibility), Product Safety, and Software Quality Programs.

In the paper "Military Vehicle Maintenance," Mr. Fred W. Hohn and Mr. Michael L. Johnson of RCA Corporation discussed the vehicle fleet maintenance problem, of growing proportions, that the modern U.S. military services must face. Diagnostic equipment, such as the VTM (Vehicle Test Meter) developed by RCA for the U.S. Army Tank Automotive Research and Development Command, will assume a major role in coping with this problem. Mr. Johnson had a VTM on display at the seminar. During his presentation, he demonstrated the self-testing capabilities of the unit. It is an interesting note that RCA completed the STE/ICE (Special Test Equipment for the Internal Combustion Engine) program ahead of schedule and surpassed both the design to cost and reliability goals.

The Annual End of the Year Banquet was held at the conclusion of the day's events. Everyone enjoyed a roast beef dinner which was followed by an awards ceremony and the announcement of next year's officers:

Chairman—*Mike Johnson* (RCA Corporation)  
Vice Chairman—*Wilfred Aubert* (Sanders Associates)  
Treasurer—*Susan Eames* (Data General Corporation)  
Secretary—*Edward Naas* (GTE Sylvania)

discipline labeled "Testability" concerned with creation of cost-effective fault detection and isolation capabilities in electronic systems.

The trends to greater use of solid state technology have paid dividends in reliability. The severe operating environment of military avionics has been characterized by system Mean-Time-Between-Failures (MTBF) measured in the low hundreds of hours and in complex equipment in the tens of hours. Today the AN/ARC-164 UHF Command Radio and

the AN/ARN-118 TACAN are achieving MTBFs measured in thousands of hours. These units, however, do not provide significantly better functional performance than their predecessors. On the aircraft level, the increasing performance requirements, coupled with the increased capability possible with new devices has resulted in a steady growth in avionics complexity. As a result, the MTBF of a modern aircraft is virtually the same as that of earlier vintages. The MTBF of the F-15, for example, is not significantly different than that of the F-4E, despite ten years difference in technology, or even that of the F-102, 20 years older. Hence, military emphasis on reliability continues and the military efforts are the chief source of the reliability techniques used by the industry just as industry developments are the chief source of new devices for military applications.

On the device level, the microprocessor and its supporting devices have received great attention from reliability specialists. The wide application of these devices has spurred an effort to achieve some control of their quality and performance by creating military specifications standardizing their characteristics and the quality assurance screens applied.

In November 1978, MIL-M-38510/440-01 was published providing a military standard for the 2901A Central Processor. In May 1979, MIL-M-38510/460-01 standardized the 9900A, and a draft specification for the Z-80A is due in February 1980. These join as standardized devices the 8080A and 6800, which were standardized in 1978 and can be obtained from vendors qualified as meeting the specifications. Specifications also exist or are in preparation for hundreds of microprocessor support devices and memories. To keep potential users current, the Rome Air Development Center (RADC), preparing activity for MIL-M-38510, publishes a periodic status report listing specifications available and in progress. The report is available free to users of military integrated circuits from RADC/RBR, Griffiss AFB, NY 13441.

Continued standardization of microprocessors and other large scale integrated circuits can be expected for the foreseeable future. Ultimately, specifications will exist for Very High Speed Integrated (VHSI) circuitry and for bubble memories.

Besides their obvious blessings, large scale integration is accompanied by its own problems. One serious problem is the testing of the circuit. Exhaustive testing of present circuits, even at computer rates, is a practical impossibility. As a result, one may only test a small subset of possible failure states, based on prevalent failure mechanisms. Assisting in the determination of test vectors are automated test program generators such LASAR (Logic Automated Stimulus and Response), originally developed under Navy sponsorship by Digitest Corporation. In 1979, Digitest was acquired by Teradyne and a new version of LASAR released by Teradyne. Another version was released in 1979 by Scientific Corporation called SI LASAR. Continued development of automated test program generators is expected in the future.

Another testing problem of large scale integrated circuits is the analysis of failures. In 1979, RADC applied Liquid

Crystal Technology to LSI failure analysis. Experiments with 2708 EPROM, 4116 dynamic RAM, and the 1802 microprocessor proved the feasibility of mapping circuit activity using a nondestructive liquid crystal technique. Essentially, electric fields in the device change the orientation of portions of a liquid crystal coating. These changes are observed under polarized light, revealing the circuit operation.

Reliability developments on a system and equipment level were pursued in 1979 by all three Services under coordination by the Joint Technical Coordinating Group—Reliability and Maintainability (JTCG-RAM) established by the Joint Logistics Commanders (i.e., Commanders of the Army Materiel Command, the Naval Materiel Command and the Air Force Systems and Logistics Commands).

Dr. Larry Crow, U.S. Army Materiel System and Analysis Activity, Aberdeen Proving Ground, MD, is preparing a Tri-Service handbook for predicting and measuring reliability growth.

The Naval Sea Systems Command has developed and distributed a Human Reliability Prediction Systems User's Manual, describing various analytic and simulation techniques for both predicting human performance reliability and integrating calculations of human performance with calculations of equipment reliability to provide metrics to describe overall system reliability.

The Air Force Center of Activity for Equipment and System Reliability is Rome Air Development Center. In 1979, RADC published MIL-HDBK-217C, "Reliability Prediction of Electronic Equipment", the fourth revision of the handbook since RADC became responsible for it in 1974. The handbook is the DoD standard for reliability prediction models and RADC has established a policy of frequent revisions to keep pace with changes in the technology. A draft of Revision 1 to MIL-HDBK-217C\* is currently in coordination and RADC has on contract studies to provide models for passive parts (i.e., resistors, capacitors, etc.) were extensively revised and the LSI models updated. In 1980, environmental factors, which modify the models for different conditions of use, will be revised, as well as failure models for traveling wave tubes and lasers.

Another 1979 RADC product was criteria for application of warranties to Command, Control and Communications (C<sup>3</sup>) systems. Reliability Improvement Warranties (RIWs) have been apparently successful in improving the reliability of avionic equipment. The AN/ARN-118 mentioned above was produced under RIW contract. However, present guidelines for use of RIW apply to acquisitions of self-contained equipments in high volume production. The RADC study provided RIW ground rules applicable to the large, low volume C<sup>3</sup> contracts.

Burn-in is a widely used method for improving the reliability of equipment before deployment. However, as verified in a 1979 workshop on Electronic Equipment Stress Screening

\*Editor's note: Version 1 of MIL-HDBK-217C was issued on May 1, 1980.

sponsored by the Institute of Environmental Sciences and a subsequent DoD Industry Planning Conference, there is no standardization of burn-in at assembly levels higher than the individual part. In 1979, RADC produced a report, "Electronic Equipment Screening and Debugging Techniques, RADC-TR-76-55", which provided some equations of relative test strengths and a computer program to optimize burn-in costs. The report was produced on contract by Hughes Aircraft Company drawing on the Hughes CREDIT (Cost Reduction Early Decision Information Techniques) and inputs from 34 other sources. The report has been used by Hughes to structure burn-in tests with their military customers and is under study by the General Electric Company Aerospace Electronics Division, Utica NY for possible application. It has also evoked considerable interest for nonmilitary applications ranging from commercial computers to heart pump controls.

In 1979, RADC completed many years of studies in Bayesian Statistics to provide a practical and simple approach to reliability testing using Bayesian Statistics. Two reports, RADC claims, provide sufficient information for a statistical layman to apply the techniques. These are "Design of Reliability Test Plans Based Upon Prior Distribution, RADC-TR-78-241" and "Application of Bayesian Techniques to Reliability Demonstration, Estimation and Updating of the Prior Distribution, RADC-TR-79-121". The former provides computer generated tabulations of test plans given the parameters of the prior distribution, which the latter shows how to calculate. To these may be added the paper presented in the 1979 Reliability and Maintainability Symposium, under the same title as RADC-TR-78-241, which discussed the greater variety of statistical risks which can be established using Bayesian Test Plans. RADC is currently combining these documents into a single standard which can be understood and applied by nonstatisticians and which is intended to be invoked on selected Air Force contracts starting in 1980.

Future plans of RADC in reliability techniques include the initiation of a mechanical reliability program to cover the prediction, demonstration, and improvement of those nonelectronic devices used in electronic systems.

RADC is also pursuing an extensive program in software reliability, in recognition of the increasing dependence of Air Force systems on computer programs. Despite significant development by Dr. Martin Schooman and associates at the Polytechnic Institute of New York and Dr. Amrit Goel, et al., of Syracuse University, software reliability is still more art than science. As one specialist put it: "If you asked five software experts for a definition of software reliability, you would get seven answers." The next few years should see the standardization and institutionalization of software reliability techniques, including the development of models combining hardware and software reliability metrics into a system reliability figure of merit.

Outside the military sphere, the reliability of nuclear systems commands the interest of a wide range of agencies including the general public. Under the auspices of the IEEE Reliability Society, a Nuclear System Reliability and Safety Committee is developing probabilistic reliability and safety

methodologies and the standards and guides to implement these procedures. In 1979, this committee prepared a draft guide for the analysis of common cause failures, events which could result in multiple component failures. Besides the release of the guide, future activities of the committee may include nuclear waste management, data acquisition and human error analysis.

A new engineering discipline labeled "Testability" was launched in 1979 at a Testability Program Review held at RADC on Aug. 14-15, 1979. Testability refers to the engineering methodology used to create cost-effective fault detection and isolation capabilities in electronic systems including Built-in-Test (BIT) and Automatic Test Equipment (ATE). Testability is a concern of all three Services and so documented by the Joint Logistics Commanders' ATE Working Group. The Naval Electronics Laboratory Center produced a Built-in-Test Design Guide in 1976, the Naval Avionics Facility sponsored a study of a Standard BIT Circuit in 1977 and both the Navy and RADC produced BIT Design Guides in 1979, the RADC publication acknowledging a liberal use of the two earlier Navy documents. In 1979, the Air Force Aeronautical Systems Division (ASD) of the Systems Command and the Air Force Acquisition Logistics Division (AFALD) of the Logistics Command completed a joint study of the effectiveness of BIT in avionics systems. The Air Force Avionics Laboratory completed the study phase of a five year effort to develop guidelines for the Ease of Maintenance of Avionic Equipment. Results are presented in AFAL-TR-79-1130, "Design of Repair Concept Definition". The Air Force Modular Automatic Test Equipment Office at ASD, charged with the responsibility for developing an Air Force approach to cost-effective Automatic Test Equipment, awarded survey and study contracts to the Westinghouse Electric Corporation and Sperry Rand Corporation which included development of testability concepts. All of these agencies converged in August on RADC for the RADC Testability Review.

RADC started a testability program in 1978. It found that it could not perform its charter to produce techniques for the prediction, demonstration and improvement of maintainability without consideration of testability. Moreover, RADC concluded that there was not a testability discipline. Specifications for fault detection and isolation (FD&I) capabilities were created ad hoc, resulting in 35 different figures of merit in use by the military departments. No method for demonstrating FD&I capability existed. Trade-off methodology for design was lacking, and cost models nonexistent. Hence, RADC created a program with the avowed purpose of creating an engineering discipline. Seven contracts were awarded with Grumman, Lockheed, and Hughes sharing the \$800,000 total value. Each contract attacked a different facet of the problem with the aggregate establishing, in RADC's opinion, the foundation for the testability discipline. The August meeting presented the findings to the other agencies whose follow-up actions will determine the extent of their implementation.

A head start on implementing testability concepts was achieved by the Air Force Electronic Systems Division, RADC's parent organization, who obtained from RADC in-

terim testability guidelines in September 1978. These included the BIT Design Guide mentioned above, a method of evaluating FD&I capability, a mathematical model for optimizing FD&I design, a recommended revision to MIL-STD-470, "Maintainability Program Plan", to include testability considerations and a guide for program managers. The latter was also adopted by AFALD who published a condensed version as guidance to the deputy program managers for logistics provided by AFALD to the Systems Command Program Offices.

RADC is continuing its studies of testability with award of a contract to determine the cause of maintenance actions resulting in no trouble found. Failures which cannot be duplicated account for about 30% of maintenance actions in the Air Force and about the same in the Navy Air Fleet, the commercial airlines, and the Canadian Air Force. The RADC contract will attempt to determine the underlying causes of this phenomena to recommend appropriate corrective action to reduce this maintenance load. Another RADC contract will study the causes of BIT false alarms. Other refinements of testability are planned for the future by RADC which hopes to maintain a close liaison with the JLC-ATE Committee, the MATE Office, and AFAL to speed transition of the findings to the field. Testability will likely continue to be the main focus of maintainability technology efforts for the foreseeable future as the cost-effectiveness of BIT and ATE continue to receive high level attention in all three Services.

## An Interim Report from IEEE's Congressional Science & Engineering Fellow

Thomas L. Fagan  
Reliability Society

Since January 2, 1980 I have been serving as a Special Assistant to Senator Strom Thurmond (R-SC) assigned to the Senate Armed Services Committee. Subcommittees which I support throughout 1980 include General Procurement, Arms Control, and Military Construction and Stockpiling. This has been an outstanding, wonderful experience for me. I am learning more every day on how Congress operates, the legislative process, congressional hearings, and the budget process. The days are long (an average workday is nine to seven) but the work is fast paced and very stimulating.

My first assignment was to do some research in the Library of Congress on Soviet expansion activities since World War II, Soviet violations of the SALT I treaty, the impact of SALT II negotiation agreements which affect the ability to verify treaty terms, and Soviet violations of treaties other than SALT I. This resulted in my preparation of a speech for Senator Thurmond which he read on the floor of the Senate on the opening day of the Second Session of the 96th Congress. This article appeared in the January 22, 1980 issue of the Congressional Record on page S-36.

I attend Congressional Fellows Evening Seminars every two weeks and am responsible for my own seminar on April

28th. In addition, we have a monthly luncheon at the IEEE Washington Office with the IEEE officers to discuss Congressional activities, where IEEE might help and how they can help.

There is quite a bit of writing associated with this job. Some typical examples are a letter to the State Department outlining recommendations for the US on the UN Moon Treaty; a press release for Senator Thurmond on his position on the Soviet invasion of Afghanistan; a letter to Secretary of Defense Harold Brown endorsing and supporting the military pay raise bill; and a magazine article for the American Legion Magazine on "Why The US Needs A Strong Civil Defense Program".

The Military Pay Raise Bill was quite interesting. By unanimous consent, I was allowed on the Senate floor during the debate between the Armstrong Bill and the Werner-Nunn Bill, plus amendments. My function was to advise the Senator on the pro and con issues of each bill and amendment and make a recommendation on how to vote. The Werner-Nunn Military Pay Bill was approved by the Senate and sent to the House of Representatives.

People are always dropping by to brief the Senator on some issue. The most recent have been General Hecker on the MX Program, a Vice Present of LTV on their interests in the Rapid Deployment Force Program, and a Vice President of Kaman Aerospace on the LAMPS I Program.

One aspect of the job which is great fun is the generation of questions for the Senator to ask the witnesses during the Hearings. I prepare 6 to 10 questions for each witness and during the Hearing sit up on the stage behind the Senator as an advisor. I have the ability, in real time, to follow up the questions and steer the testimony along any avenue of interest. Hearings in which I have participated include Sale of High Technology to the Soviets and the Army, Navy, and Air Force budget hearings. Typical witnesses for whom I have prepared questions are:

Secretary of Defense Harold Brown  
Secretary of the Air Force Hans Mark  
Deputy Under Secretary of Defense, International Programs & Technology (V. Geibse)  
Deputy Director, Office of Export Administration, Dept. of Commerce (L. Brach)  
General Wickham, Commander In Chief UN, Korea  
Lt. General Ginn, Commander US Forces, Japan  
Under Secretary of Defense, W. Perry  
General Ellis, Commander Strategic Air Command  
Admiral Griffiths, Deputy Chief of Naval Operations, Submarine Warfare  
Major General Kelly, Commander Rapid Deployment Force  
Admiral Stansfield Turner, Director CIA  
General Lew Allen, USAF Chief of Staff

Some quick reaction research I have prepared for the Senator included: Russian method of payment for US High Technology, production rates on fighter aircraft, NATO versus Warsaw Pact Forces, Soviet Spare Parts Embargo, Senate Bill S737 Embargo Act for Technology Transfer, Strategic Technology Sales to Soviets, and the role of tactical automation in C<sup>3</sup>I.

One of my most significant current activities involves writing an amendment to the Defense Authorization Bill to increase the Navy budget in order to reactivate the Battleship *New Jersey*. I am responsible for all legislative research, preparation of the amendment, convincing other Senators to vote for the amendment, personally briefing the Armed Services Committee, as well as liaison with the Navy Department and the House of Representatives.

I attend the Senators frequent Staff Meetings on a regular basis, attended a birthday party for his youngest son Paul, age 4, and have been the Senator's representative to several congressional receptions.

It's a completely new world in Washington, D.C.!

*Editor's Note:* The above article represents activities during the first two months of Tom Fagan's Fellowship. Tom hopes to provide an update of his activities in a fall issue of the Reliability Newsletter.

## Report on Meetings

The 5th Annual Control of Power Systems Conference and Exposition was held at the Lincoln Plaza Forum, Oklahoma City, OK March 17-18, 1980. Energy Management—The Challenge of the 80's was the theme of the two day meeting sponsored by the Oklahoma City Section of the Institute of Electrical and Electronics Engineers and the University of Oklahoma. This conference, one of the few focusing on the new and growing field of load management and control has attracted national and international interest. Eighteen sessions covered Alternate Sources of Energy, Planning and Modeling Network Control, Load Control and Load Management Equipment and Systems. Dr. T. L. Hurst, Vice President Environmental Affairs, Kerr McGee, Mr. J. G. Harlow, President, Oklahoma Gas and Electric Company, and Dr. Ron Hull, Vice President EBASCO discussed the impact of the "Public Utilities Regulatory Policies Act," at a special Power Society meeting held the first evening.

## Welcome to New Members

The names and addresses of new members, from January 1980 until May 1980 are listed below. For USA members, they are listed by state according to IEEE regions. For members outside the USA, they are listed by alphabetical order of their country's English name.

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**PETITION TO FORM AN IEEE SOCIETY ON SOCIAL IMPLICATIONS OF TECHNOLOGY**

The undersigned IEEE members hereby petition the Executive Committee of the IEEE to authorize the formation of a Society on Social Implications of Technology. The purposes of the Society are to develop and promote understanding of the interaction between technology and society, to enhance our knowledge of the benefits and detriments of technological options, to support the engineer in the exercise of ethical responsibilities, and to discover and promote means to make technology better serve society. These purposes will be pursued by publishing a transactions, by publishing a newsletter, by holding meetings and conferences, and/or by any other activities appropriate for encouraging analysis, communication, discussion, and action relating to social implications of technology. The interests and activities of the present IEEE Committee on Social Implications of Technology, including publication of Technology and Society, will be assumed by the new Society.

Signature.....

Name  
(please print).....

IEEE Member Number  
(above student grade).....

Please return Stephen H. Unger  
signed petitions to: 229 Cambridge Ave.  
Englewood, N. J. 07631

The Committee on Social Implications of Technology was established by the IEEE in 1972. During the eight years of its existence, CSIT has published 29 issues of its quarterly sixteen-page newsletter, *Technology and Society*, which features articles, book reviews, and commentary on such topics as ethics, energy, environmental quality, arms control, information technology, societal systems engineering, consumer product safety, and technology in less-developed countries. (*Technology and Society* has a paid circulation of 2500.) CSIT has organized sessions on "Social Implications of Nuclear Power" (Electro '75) and "Solar Energy: A Status Report" (Electro '77). CSIT has given four engineers the Award for Outstanding Service in the Public Interest, consisting of a certificate and \$750. CSIT provided the impetus for the IEEE to adopt a Code of Ethics and to set up a Member Conduct Committee that enforces the Code and supports engineers who adhere to the Code.

Nevertheless, CSIT finds that its effectiveness is severely limited by the constraints that are imposed on IEEE Technical Activities Board committees. CSIT believes that to do the quality work that is needed in this area, it must have access

to the full range of activities and communication channels that are available to IEEE groups and societies; most importantly, it must be able to publish a refereed Transactions.

Maximizing the benefits and minimizing the harmful effects of technology are important for the well-being of all people, but CSIT feels that these pursuits have a special importance for members of the engineering profession by reason of technical knowledge, ethical responsibility, and economic self-interest. CSIT asks all IEEE members who care about these issues to sign its petition. (Your IEEE member number appears on the mailing label on the outside page of this Newsletter.)

**VITA: Appropriate Technology for the Developing World**

- An isolated village in Papua New Guinea needs a small, low-cost electric power plant: if it works, neighboring villages might also get inexpensive electricity.
- The Tanzanian Water Ministry needs someone to design an inexpensive windmill pumping and generating system for irrigation.
- Liberia needs a micro-hydro project.

Requests like the samples above are received everyday by Volunteers in Technical Assistance (VITA), an organization that provides technical assistance to Third World people. Begun in Schenectady, New York, by a handful of scientists and engineers, VITA was formally incorporated as a non-profit volunteer organization in 1960. Its headquarters now are in Mt. Rainier, Maryland, right outside of Washington, DC.

Today, VITA's volunteer engineers, businessmen, educators, and others number almost 4000. They lend their time and expertise to the solution of important problems for individuals and organizations in developing countries who otherwise might not have access to technical information.

Requests come by mail—over 100 a month. As an "agent" of the requestor, VITA coordinates the flow of information by tapping a variety of resources. A documentation center contains over 50,000 items on small-scale technology. VITA publications include over 100 manuals, handbooks, and technical bulletins, many of which have been compiled by the volunteers. A best seller, *The Village Technology Handbook*, has helped lay the foundation for many rural projects. The volunteer roster itself represents the backbone of the organization, a resource both of spirit and technical expertise.

The "brainchild" of those early engineers, VITA became known as a source of information on small-scale, village level technologies—"appropriate technology," before it was called by that name. Appropriate technology meets the financial, economic, and technical needs of a population without adversely affecting the environment or the culture. It is labor intensive, easy to maintain, simple to operate, flexible and decentralized. It is technology that takes into account the low capital assets, limited technological infrastructures, and unskilled labor force in developing countries.

**CALL FOR PAPERS****Boston Section, IEEE Reliability Society**

The Nineteenth Annual Spring Reliability Seminar has been scheduled for April 30, 1981. The Seminar will be hosted by the IEEE Boston Section Reliability Chapter. The theme of this year's Seminar will be "Assurance Sciences, Meeting the Challenge of the 80's."

A call for papers is issued in the following broad topic areas: Reliability, Maintainability, Availability, System Safety, Integrated Logistics Support, Life Cycle Cost Design-to-Cost, Reliability Improvement Warranties, Software Reliability, Human Factors Engineering, and Reliability Growth.

Interested authors should prepare and submit an abstract of 300 to 500 words, accompanied with a biographical sketch, by November 28, 1980. Selected authors will be notified by December 26, 1980. Completed papers, suitable for reproduction in the Seminar Proceedings, will be re-

quired by March 9, 1981.

Abstracts and biographical sketches should be sent to: Mr. John S. Chipchak, Technical Program Chairman Honeywell, Defense Electronics Division Electro-Optics Center 2 Forbes Road Lexington, Massachusetts 02173 MS/35

Questions concerning the Seminar may be directed to Mr. Gary J. Kushner, Seminar Chairman, Digital Equipment Corporation, One Iron Way, Malboro, MA 01752, MR2-1, or by telephone at (617) 467-5713.

**To Make Technology Better Serve Society**

The IEEE Committee on Social Implications of Technology (CSIT) has launched a petition drive to convert CSIT to an IEEE Society (see box).

In a current wind energy project in Mexico, VITA is collaborating with General Electric to develop windmills tailored to Mexican conditions. Meteorological data collected by a VITA volunteer on-site in Cuernavaca will be included in the design criteria. The windmills will be low-cost hybrid types designed to be cost effective and durable.

Another activity involves analyzing the possibility of using photovoltaic cells for cottage industries in developing nations.

VITA recently contracted with the Agency for International Development to promote the use of alternate sources of energy in ways that will benefit the rural poor. This project will support the development, transfer, and diffusion of technologies using solar, wind, water, methane, wood, etc. The energy project greatly expands VITA's potential to provide meaningful development assistance. Many more volunteers with expertise in energy fields are needed as consultants here and abroad to answer the growing number of

energy related requests.

VITA's objective now, as it was 20 years ago, is to help improve the living conditions of people in Third World countries without affecting the delicate balance between basic human needs and the availability of resources and trained manpower. To make this information available, and to encourage the flow of expertise, requires continued help. Won't you join VITA in this important work? Become a VITA Volunteer today.

Contact:

Dr. James D. Palmer  
Mech. Tech. Inc.  
R&D  
986 Albany-Shaker Road  
Latham, NY 12110  
(518) 785-2474

## NEWS

### IEEE Dues Increase Likely for 1981

An increase in the basic \$35 annual dues of between four and eight dollars is being considered for 1981 by The Institute of Electrical and Electronics Engineers (IEEE). The Board of Directors is acting on the recommendations of a task force which prepared a dues management plan that included a broad range of fiscal policies of the organization.

A specific recommendation on 1981 dues will be made at the August meeting of the Board.

The most recent dues increase was in 1976 when a five dollar increase was implemented in both the basic dues and United States member assessment. In addition to the basic dues increase, the concept of an assessment for Region 8, Europe and Africa, of between five and seven dollars was also approved by the Board.

Donald S. Brereton, IEEE Treasurer and task force chairman, explained that the committee recommended a broad financial management plan. The recommendation is designed to assure a sound fiscal operation based on a balanced budget, investment income from reserves to offset inflationary effects, and product pricing policies which reflect true costs and added values.

While the 1980 operating budget was approved with a projected \$1.2 million deficit, further assessment now targets that deficit at \$750,000. This deficit is to be funded from general reserves. Without a dues adjustment, the deficit could be substantially higher in 1981.

Mr. Brereton emphasized that the considerations affect only The Institute's operating budget and that individual technical society membership fees were not evaluated by the task force.

He pointed out that since the last general dues increase, The Institute's finances have benefited from expanded membership, increased sales of goods and services, extraordinary interest income from reserves and other sources, and from improved efficiencies in staff operations.

"Over the past three years we have added \$1.5 million to our general reserves which were \$5 million at year end, about one-third of one year's operating funds. With the expected deficits, this reserve will be reduced," Mr. Brereton explained. He said that dues income accounts for less than one-third of the total operating funds of approximately \$17 million.

Mr. Brereton said that "Our cost per member in 1981 will be about \$45, and when one considers students, retired, and unemployed members, the average basic dues being paid is about \$26. This gap must be filled by income from other sources such as sales of publications, conferences, courses, investment income and reserves."

In addition to the dues recommendation, the task force also recommended that costs for goods and services offered for sale by The Institute include both direct and indirect costs for determining income performance, that prices to members avoid losses and that nonmember prices be established which reflect the value of member contributions.

"We believe we have developed a workable plan to manage dues and other membership costs more effectively," Mr. Brereton said, "and a plan that can be realistically applied to our annual financial planning process."

### IEEE Board Selects Candidates for 1981 President, Executive Vice President

Dr. Richard W. Damon and Dr. Robert W. Lucky have been declared candidates for the offices of 1981 President and Executive Vice President, respectively, by the Board of Directors of The Institute of Electrical and Electronics Engineers (IEEE).

Dr. Damon is Director of the Applied Physics Laboratory, Sperry Corporation's Sperry Research Center, Sudbury Massachusetts. Dr. Lucky is Director of the Electronics and

Computer Systems Research Laboratory of Bell Laboratories, Holmdel, New Jersey.

In accordance with The IEEE bylaws, qualified members who solicit signatures from one percent of the eligible voting membership (approximately 1600) may so declare their candidacy by petition by noon, May 30, 1980. IEEE elections, including the offices of regional and technical divisional directors, will take place by mail ballot in September. Complete information on candidacy eligibility and campaign practices are available from IEEE headquarters.

Richard W. Damon—Candidate for 1981 President

Dr. Damon has been with Sperry Research Center since 1962 and prior to that was with General Electric Research Laboratories, the Raytheon Company, and Microwave Associates. Holding undergraduate, masters, and doctoral degrees in physics from Harvard University, Dr. Damon is currently supervising projects in such areas as fiber optics, ring laser gyroscopes, magnetic disk recording materials, and surface acoustic wave devices. In addition to his work with Sperry, Dr. Damon has served on advisory committees with NASA, the National Bureau of Standards, and the Department of Defense.

Active in IEEE affairs since 1944 and named a Fellow in 1968, he has served in both technical and professional activities. Included among these have been: member of the Board of Directors as a technical division director, 1978-79, and Chairman of the Ad Hoc Committee on Registration, and of the Audit Committee, 1978-79. Dr. Damon has also served on the Educational Activities and the United States Activities Boards and on a number of technical and publishing committees.

He is also a Fellow of the American Physical Society.

Robert W. Lucky—Candidate for 1981 Executive Vice President

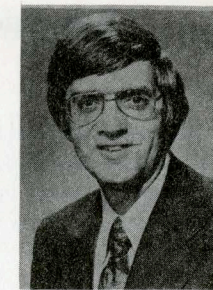
Dr. Lucky joined Bell Laboratories in 1961 as a member of the technical staff and was named to his present directorship in January 1979. An expert in digital communication techniques, Dr. Lucky holds a number of patents, has published papers and a textbook, and has lectured extensively on the subject. He earned his bachelors, masters, and doctoral degrees from Purdue University.

An IEEE member since 1955 and named a Fellow in 1972, Dr. Lucky's principal activities with The Institute have been in technical and publishing activities. In 1978-79, he served on the Board of Directors as Vice President for Publications and was also president of the Communications Society. He has served as past editor of the *Proceedings* and as assistant editor of *Transactions of Information Theory* and on *Communications*.

He was elected to the National Academy of Engineering in 1978.



Richard W. Damon



Robert W. Lucky

### IEEE Urges Commission Support for LERA

The Institute of Electrical and Electronics Engineers commends the President's Commission on Pension Policy for recognizing the need for tax credits to encourage retirement savings and employee contributions to pension plans.

However, the Interim Report issued today by the Presidential Commission recommended that more study be done before a specific proposal is made in this area. In doing so, the Commission has failed to recognize that a significant amount of study has already been done by the U.S. Congress.

Since 1971, every session of Congress has considered the concept of a Limited Employee Retirement Account (LERA). "The LERA concept has been studied, restudied, and studied again," stated Robert Barden, Leader of the IEEE Task Force on Pensions. "It is time to act on this legislation, and it distresses me to hear one more call for study by the Administration."

The enactment of legislation to establish LERAs would allow individuals in highly mobile professions such as engineering to contribute to individual retirement accounts. Existing laws do not provide an equitable means of ensuring the individual an economically sufficient retirement fund. This is due mainly to the disqualification provisions of the Individual Retirement Account structure as it exists today. IEEE has actively supported legislation to enact a LERA concept since its inception, through testimony and consultation with the Congress.

LERA provides the tax incentives which would encourage the American people to individually plan for retirement years without being totally dependent upon a government or employer pension system. It provides a much needed mechanism to spur capital formation.

IEEE also supports the Commission's intention to examine the topics of portability and vesting. This interim report treats the topic of vesting in a cursory manner. Only 37% of the American work force at the age of 55 is vested in a pension program. This fact is disturbing in itself, but what needs to be more closely examined by the Commission is the benefit level at which these Americans are vested. "Suppose you are vested in \$100 a year. You are technically vested, but it is of little value," stated Mr. Barden.

# An Invitation To Membership in the Reliability Society

There is no better time than now to join the IEEE Reliability Society. Membership gives you ready access to meetings and conferences in your areas of interest, and to the prime movers in engineering, science, and business.

The Reliability Transactions and Newsletter - both included in your Reliability Society Fee - keep you abreast of the latest developments in the reliability field. You also receive automatically a free copy each of the Proceedings of the:

- Annual Reliability and Maintainability Symposium,
- International Reliability Physics Symposium.

As an IEEE member, you can choose from a wide offering of Standards, products, and services (books, conference records, employment surveys, short courses, and other helpful aids) - all at reduced member rates.

Active local Reliability Society chapters in many locations throughout the United States offer opportunities for your personal professional participation and growth. Association with other Reliability Society members helps you to exchange information and experiences on current technical problems and to learn how others are solving them.

Your membership entitles you to reduced registration fees for activities sponsored or cosponsored by the IEEE or Reliability Society. This could save you more than the cost of annual membership.

Don't wait. Fill out the membership application below and mail it today. If you are already a member of the Reliability Society, show this application form to a colleague - sign up another member. The cost/benefit ratio is terrific.

\* The age and sex information requested on the application form is for demographic purposes ONLY. The information (or lack thereof) does NOT affect the application at all.

## IEEE RELIABILITY SOCIETY FEE: \$7.00 PER YEAR

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If you are a student, see your IEEE counselor or write for Student Membership brochure.
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