

# Reliability Society

NEWSLETTER

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Editor:  
Bruce Bream

## President's Report

**T**he IEEE Standards Board has formed an ad hoc committee to make recommendations to the Board of Directors concerning an IEEE-wide metric policy. The committee will examine relative needs and desires of users of IEEE standards and other publications and the societies, trade associations, and governmental bodies with which IEEE conducts its professional business.

The U.S. Congress, in the Omnibus Trade Act of 1988, declared that it is the policy of the United States

- to designate the metric system as the preferred system of weights and measures for United States Trade and Commerce,
- to require that each Federal agency, by a date certain and to the extent economically feasible by the end of the fiscal year 1992, use the metric system of measurement in its procurement, grants and other business related activities.

In July 1991 President Bush signed an executive order implementing this as law.

Some portions of U.S. industry (e.g., the automotive sector) have already converted to the metric system. In other areas, conversion is proceeding slowly or not at all.

The chief anti-metric force in the U.S. is inertia caused by tradition, custom and the large portion of the U.S. manufacturing still based on the inch. The cost concomitant with the change is another major factor.

Although the overall trend toward the metric system is clear, the task of the IEEE committee will be to identify the methodology and schedule for various activities of IEEE to "go metric" and to facilitate and coordinate this conversion.

The Committee on Metric Policy, chaired by Bruce B. Barron, has requested "grass roots" comments on this topic. To this end, they have established a special mail-drop at Piscataway. If you have any opinion, either for or against metrication, drop a line to:

C. Goldsmith  
IEEE  
445 Hoes Lane  
P. O. Box 1331  
Piscataway, NJ 08855-1331

W. Tom Weir  
President, IEEE Reliability Society

# Editor's Column

The Reliability Society Administrative Committee (AdCom) held elections at the '93 RAMS. You'll find the new slate of officers listed in the newsletter.

The issue of finding a forum for Quality in the IEEE societies was brought up again at the Reliability AdCom this year. There have been concerns that adding Quality would dilute the Reliability aspects of our society, while others say that adding Quality aspects is a natural extension. A number of papers at RAMS and the Transactions already deal with Quality issues. Concern has also been expressed that Reliability by itself is on a downturn and that we should get involved in the Quality arena. Both Reliability and Quality are significant contributors to the need for good products and services in

today's marketplace. Our society is unique since it is one of the few forums focused on Reliability. I think we should expand our view to include Quality issues but we should not lose our emphasis on Reliability. There are other organizations, although not in IEEE, that have a Quality focus. They address both Reliability and Quality. We should also address both Reliability and Quality aspects while maintaining a focus on the aspects associated with Reliability. Let us hear what you think about this possible change in scope (and name). At this point, it is still out to our AdCom committee for review. You can write an editorial to me or contact the society officers.

Bruce Bream  
Editor,

IEEE Reliability Society Newsletter

## RELIABILITY SOCIETY OFFICERS

### PRESIDENT

W. Thomas Weir, PhD, PE  
Public Service Electric & Gas Company  
Nuclear Department M/C N32  
P.O. Box 236  
Hancocks Bridge, NJ 08038  
(609)339-5328 FAX (609)339-5076

### JR PAST PRESIDENT

Samuel J. Keene, PhD  
3081 Fifteenth Street  
Boulder, CO 80304  
(303)924-7711 FAX (303)924-4752  
Email: sam\_keene@vnet.ibm.com

### SR PAST PRESIDENT

Bernhard A. Bang  
4208 Wickford Road  
Baltimore, MD 21210  
(301)765-7340

### VP MEETINGS

Robert A. Jaquess  
Martin Marietta  
P.O. Box 179, M/S L5461  
Denver, CO 80201  
(303)971-4221

### VP MEMBERSHIP

Henry H. Hartt  
Vitro Corporation  
400 Virginia Avenue SW  
Suite 825  
Washington, DC 20024-2730  
(202)646-6339 FAX (202)646-6398

### VP PUBLICATIONS

Joseph A. Guessing  
Westinghouse Electric  
P.O. Box 746, M/S 1675  
Baltimore, MD 21203  
(410)765-7070 FAX (410)993-8126

### VP TECHNICAL OPERATIONS

Richard L. Doyle  
Doyle and Associates  
5677 Soledad Road  
La Jolla, CA 92037  
(619)459-6504

### SECRETARY

Loretta Arellano  
Hughes Aircraft  
P.O. Box 92426, M/S RE-R7-P514  
Los Angeles, CA 90009  
(310)334-4248 FAX (310)334-2828

### TREASURER

Richard Kowalski, PhD  
ARINC Research  
2551 Riva Road  
Annapolis, MD 21401  
(401)266-4841 FAX (401)266-4049

# Chapter Activities

## Cleveland

The Cleveland Chapter has had three meetings during the reporting period.

Our 4th meeting was on getting rid of interference. This meeting was from the IEEE Learning Channel Video Conference Seminars. Three experts: Hugh W. Denny, David Millard and R. Kenneth Deenan talked about:

- How interference arises
  - How to apply component selection
  - PC board design for minimum interference
  - Techniques for keeping interference from crossing boundaries
- This meeting was well received.

The annual mid-year social was held at NASA Lewis Research Center. Old friends and new members get together for an evening of relaxation. No speaker was used. Pool, ping pong and dancing were enjoyed by many.

Our 6th meeting was a Multicultural Forum: Gain The Competitive Edge. NASA Lewis has developed a strategic plan to implement total quality. A panel of experts led by John Fernandez explained our vision, mission, guiding principles and beliefs, strategic focus, strategic goals, challenge of the future, organizational excellence and community outreach.

RAMS '93 just about broke even; attendance was down somewhat this year for a variety of reasons. Hope we can do better next year. Our chapter will help RAMS '94 on the arrangements committee.

Our community outreach project has made some progress. Four volunteers were obtained to staff the most recommended technical sessions.

- Electrical Power - Prof. E. Villaseca
- Industrial Control - Prof. N. Sreenath
- Total Quality - John Hairston

Professional Activities - Mike Patena  
These topics should put together 12 papers for a nice one day workshop something we have not done for awhile in Cleveland.

All-in-all here in Cleveland we are having fun staying active as volunteers.

**Vince Lalli, Chairman**  
Cleveland Chapter

## Dallas

The Dallas IEEE Reliability Society continued its technical programs in 1Q93. In January the topic was software reliability. The world-class reliability of IBM's space shuttle avionics software was described by Mr. Ted Keller. This was one of our large attendance meetings; the topic of software reliability is most popular. The TQM philosophy that has led the development of virtually "error-free" software for NASA was explained. The relationship between customer and supplier was also a key factor in their success. IBM's approach is certainly a role model for those improving their SEI level ratings. Mr. Keller also detailed the reliability analysis and modelling techniques used by the IBM team. Mr. Keller stated that his organization is available for consulting with other companies on the software development process.

In February we heard from Mr. Michael Strung from Loral Vought Systems, Inc. on the Army Tactical Missile Systems (TACMS) ESS process. The failure rates of components was contrasted to subsystems. The evolution of the ESS process was also detailed, including se-

quence changes, temperature extremes and dwell times. This meeting was held in Los Colinas in order to be more centrally located to our mid-cities and Fort Worth participants.

In March the technical program topic switches to storage reliability by a speaker from Texas Instruments, Charles Watson. Mr. Watson has a vast experience on missile system with long term storage requirements. He will describe the storage environment, storage failure mechanisms, analysis methods and tools, prediction and verification tools. His current project is the Navy's Joint Stand Off Weapons Program (JSOW).

**Julie England**

## Los Angeles

Myles Losch spoke on "Privacy in Voice Mail" at our October meeting. This was a joint meeting with the LA Chapter of SSIT. Our November technical meeting was held in Anaheim on the last day of WESCON. Ed Ansell of JPL spoke on "Enhancing Worldwide Competitiveness through Technology Transfer." We held a mini-course on Software/Hardware Reliability and Safety Tools in December.

## Reliability Society Newsletter Inputs

All RS newsletter inputs should be sent to:	The schedule for submittals is:
Mr. Bruce Bream	<b>Newsletter Due Date</b>
NASA Lewis Research Center, M.S. 501-4	January November 19
21000 Brookpark Road	April February 26
Cleveland, OH 44135	July May 28
Tel: (216) 433-6532 Fax: (216) 433-5270	October August 27
Email: scbream@lims02.lerc.nasa.gov	

### ADVERTISING RATES

All copy that contains graphics or special fonts must be camera-ready or delivered on computer disk and be received by the due dates indicated.

Ad Size	One Time	2-3	4+
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Third Page (vertical)	\$240	225	210
Quarter Page	\$205	190	180
Eighth Page	\$120	110	100

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## New IEEE Fellows

Congratulations to the following members of the IEEE Reliability Society who have been elected to fellow grade, as of 1 January 1993:

Prof. Rafael Portaencasa-Baeza  
Universidad Politecnica de Madrid  
Madrid, SPAIN

For institutional developments and leadership in computer science and engineering education, and for management of technological organizations

Mr. Harry Schafft  
Silver Spring, MD USA

For contributions to the reliability of semiconductor devices and for the development of test methods for improving quality control

Dr. Thomas Weir  
Ocean City, NJ USA

For leadership in reliability engineering through publications and educational activities



Los Angeles Chapter Engineering Week Students (Loretta and Winnfort in back)

Presenters were Myron Lipow, Irv Doshay, Peter Goddard, and Mike Friedman, all of Hughes Aircraft. It was well attended. In February, Nancy Leveson,

UCI, spoke on Software Safety. This was a joint meeting with Association for Computing Machine (ACM) and the Society of Women Engineers (SWE).

Upcoming meetings include:

March - "Estimating Task Response Time for Real-time Distributed Systems"

April - "Software Reliability" by Dennis Wood

Other meeting topics in development: Direct TV, Parallel Processing, System Safety on the Space Station, and Congressional Debriefing by Larry Stern.

During National Engineering Week, chapter officer Winnfort Myles coordinated a visit to a local middle school. A videotape of Hughes' engineering technologies and an IEEE video titled "Who are Engineers? You?" was shown to a group of 65 sixth graders. The students had prepared questions for the panel of engineers

which included Winnfort, Irv Doshay and Loretta Arellano relating to engineering, science and Hughes.

There are over 100 videotapes in our Videotape Exchange program. Descriptions of the latest can be viewed and downloaded through our bulletin board at (818)768-7644 300-2400 baud.

**Loretta Arellano**  
Los Angeles Chapter Chair

### Philadelphia

The meetings that were held last year include:

- Electronic Interconnection Materials for the Year 2000 — Daniel I. Amey
  - TQM-FAD or Foundation for the Future — S. Levy
  - A Brief Introduction into the Techniques and Characteristics of the New Family of Permanent Magnetic Materials — Dr. Jacob G. Bogatin
- Fulvio E. Oliveto, Chairperson**  
Philadelphia Section

### Reliability Society AdCom Meeting

The IEEE Reliability Society Administrative Committee (AdCom) meeting was held on Monday January 25, 1993 at the annual RAMS in Atlanta, Georgia. The following topics were discussed at the AdCom meeting:

1. The issue of changing the Reliability Society name and charter to include quality was addressed. As there is no Quality Society within the IEEE, Sam Keene, last year's president, was asked by the IEEE to consider including quality in its charter or possibly form a Quality Council made up of presidents of many different societies. Sam attempted to form this council last year with little support from other societies. Supporters expressed the need to revitalize the Reliability discipline by the addition of Quality. Their idea was to incorporate more of TQM principles and tools into the up front design. Those opposing recalled the struggle to overcome the association with

quality inspectors with their QA stamp or with statisticians. Everyone agreed that the definition of quality used in our charter would not refer to inspectors but rather to team members who have early influence on the design. After much discussion, we agreed to form a subcommittee to consider all ramifications and propose a solution at the next AdCom meeting.

2. The Reliability Society is now sponsoring the annual Software Reliability Symposium. The next will be held in November 1993 in Denver, Colorado. This is a joint sponsorship with the IEEE Computer Society.

3. A draft of MIL-STD-338 revision B is out for review. Comments must be submitted by March 7.

4. The Army has contracted Michael Pecht of the University of Maryland to investigate alternative approaches to MIL-HDBK-217.

5. A committee comprised of members of the ten sponsoring societies of RAMS (the Reliability Society being one) have proposed a project to be funded by proceeds from RAMS. The first of many (hopefully) will be on interactive software tools for early design using design rules. The intent is to work with Tri-services as well as Computer Aided Design (CAD) vendors. This project is expected to cover 24 months.

6. The annual Leesburg R&M Computer Aided Engineering (CAE) workshop, which has been sponsored by the Reliability Society, was canceled last year due to lack of attendance. Although it had been quite successful in past years, the feeling is that this type of workshop has run its course. It was recommended that one not be held this year but that in a few years, this workshop be held again.

### JPL/NASA RADIATION EFFECTS DATA BANK PROGRAM

This program provides user access to the JPL/NASA radiation effects ground test data bank. The data bank consists of total dose and single event effects (SEE) ground test data, predominantly gathered by JPL. This data is for general information only, and should not be used as a substitute for a comprehensive testing program of the devices actually specified in a given system. Inclusion of data in this data bank does not imply endorsement by JPL for the use of any vendors's product. Comments and remarks regarding the devices and test results are intended to apply to JPL internal usage only. Due to the massive amounts of data recorded for very complex devices, only a summary is presented herein. The data may be retrieved by downloading the data to your computer. (See BBS section for phone numbers)

### System Reliability and Its Impact on National Issues

by  
**Hank Wolf, Reliability Society Representative to the IEEE Committee on Communications and Information Policy**

As required by Congress under the High Performance Computing Act of 1991 (P.L. 102-194), the Office of Science and Technology Policy, a branch of the Executive Office of the President, submitted its report on the National Research and Education Network in December 1992. The report "...represents a consensus assessment of its status and a collective vision for this important federal initiative." It represents our country's collective investment policy in the initiation of a National Information Infrastructure.

Why should this activity concern the Reliability Society membership?

In my opinion, it stimulates thinking about our way of life, our life-long learning processes and our future standard of living. It pushes technology's 'bleeding edge' today and forces us to consider our vision of tomorrow's technology. Our nation's policy for government investments in technology must result from our collective thoughts. Unless we articulate those thoughts and inject them into the policy making process, we deserve what results.

The point of this short article is to request your help identifying what you consider the five most important technology issues from the Reliability Society's view. This data is needed to help temper the IEEE-USA position papers being prepared by the Committee on Communications and Information Policy. The ideas in those position papers find their way into Congressional offices, into testimony before congressional committees and into legislation.

Let me raise one issue as an example. Commercial off the shelf equipment will become a more vital part of future defense systems, especially as budget resources decrease. Viewpoints and attitudes must change to reject a new system development approach and accept what the market has to offer. What policies should the federal government pursue as a result of that perceived reality and why?

Please direct your comments, other examples, and opinions to Hank Wolf at:

hwolf@gmuvax.gmu.edu  
or  
211 Kings Garden Way  
Falls Church, VA 22043-2568

### FREE PROCEEDINGS

Your Reliability Society has the following surplus proceedings on hand:

1991 RAMS, 40 copies

1992 RAMS, 100 copies

1992 IRPS, 560 copies

Reliability Society members who did not get a copy of any of these and want one, may request a copy by writing the following address. Request should identify the proceedings desired and confirm that the requester is a member of the Reliability Society. Requests will be filled only so long as supplies last.

Send to:

**Anthony Coppola**  
18 Melrose Ave.  
Utica, NY 13502

Multiple copies of proceedings may be requested for educational purposes by Academic Institutions. Such requests will be honored so long as supplies last, and after individual Reliability Society member requests are filled.

# IEEE Reliability Society Emerging Technology Initiatives and Directions

by Joseph Gruessing

## High Reliability/Long Life (HRLL) Systems

Recently Jet Propulsion Laboratory (JPL) has initiated the high reliability/long life system initiative to devise design and manufacturing strategies that will permit spacecraft and their subsystems to fly successful space missions of the order of 20 years. The United States has had several spacecraft and satellites which have exceeded their design life requirements by up to 20 times. Why? What factors distinguish these long life vehicles from others? Why do specific Magellan, Defense Meteorological Satellites, Pioneer, Voyager spacecraft, etc. survive beyond their planned lives by more than 10 to 20 times and beyond? This paper/analysis suggest the beginning of a cooperative effort across the industrial, governmental, and academic communities to identify these factors for future systems.

Key issues to the HRLL problem and its solution are (1) to perform a study to identify the class of long life/high reliability systems (which must operate without maintenance; (2) identify design process factors/features which contributed to HRLL; (3) identify specific design process factors/feature which lessen life and reduce reliability but which can be mitigated/avoided by specific design/manufacturing improvement actions; (4) develop specific process/procedures and guidelines which when implemented will enhance HRLL system life and reliability.

## Software Reliability

In the last decade, the IEEE, ASQC, AIAA, and a number of other professional societies have conducted studies on software reliability. The interim and final reports of these initiatives still fail to agree on definitions, models, methods, and techniques. Even two separate units of RADC have published conflicting di-

rection for DOD programs. The IEEE Reliability Society and IEEE Software Division are not in absolute agreement with respect to this important technology. However, the IEEE appears to have the leadership potential to bring together this diversity of opinion and has the capability to begin the formation of a consensus view of software reliability.

The key to this effort would be to bring together IEEE (Reliability and Software), ASQC (Reliability and Software), AIAA, ACM, SRE, SAE, and such other professional societies as have an interest in the subject. This group of societies and personnel with expertise would develop a consensus of definitions, models, and techniques to formulate a position in the U.S. That would promote joint activity in all the interested professions. This could be accomplished via the American Association of Engineering Societies (AAES).

## Software Failure Prevention, Analysis, and Modeling

Software failure studies are being published in the literature to an increasing degree in recent years. These studies have isolated some 30 plus failure mode causality and coined a number of definitions. However, these is no consensus on definition, modeling, and techniques among investigators. As time constants decrease, information content and word bit size increase, computer architecture complexity increases, and characterization proliferates, these failure modes could become increasingly difficult to analyze and avoid or mitigate. The IEEE Reliability Society can bring to the problem a discipline standard which is currently not evident in any professional organization. This would involve bringing the Reliability, Electronic Device, and Software elements of the IEEE.

Major gains have been made in selected soft failure modes and their causality. These are error correction/detection

and metastability with some progress being made in jitter and a selected set of timing failure modes.

## Fault Tolerance-Detection-Correction and Avoidance (FTDCA)

New methodologies in fault tolerance, fault detection, fault correction, and fault avoidance are being described in the professional journals/seminar proceedings and trade publications almost on a monthly basis. These methodologies include advanced error correction and detection schemes, partial redundancy schemes, marginal checking, software recovery block schemes, and many other advanced mechanisms for improving FTDCA capabilities in hardware and software. The IEEE Reliability Society should actively respond to these proposals and claims as they become known so that they can be studied and utilized throughout the profession and contribute to individual member capabilities.

## System Reliability of an all Optical Computer and Communication System

Systems Reliability requirements in the future National Information Infrastructure are an unknown. Failure impacts can range from the tolerable at times on a research and development network to intolerable in the commercial world. Can current Reliability data and techniques adequately predict and assess the issues of such complex, integrated system soft e.g. high performance supercomputers, visualization workstations, global network access and realtime, integrated computation.

The need to provide voice, video and data connectivity, to enable high performance workstations with visualization and animation capabilities linked to supercomputers, to have mainframes interconnect with each other and to data storage peripherals in one data center and to su-

percomputers in different centers or to link supercomputers in realtime for resolution of 'grand challenge' problems is a recognized vision of the future. The High Performance Computing Act of 1991 is the focal point for these activities. Over, high speed, high throughput systems demand communication systems and bandwidths that can accommodate the traffic without data loss, delayed message routing or administrative failures, e.g. node or processor element mis-addressing. While failure of these systems may not be life threatening, in general, the cost impacts quickly become very large and intolerable. Telephone system and power grid failures in the past were memorable. System reliability techniques need to be reviewed, refined and/or developed that apply not only to electronic hardware, but pure optical and hybrid optoelectronic systems and the associated network hardware, software, applications and network management operations.

Internet, a network of networks, already exists as an initial amalgam of Federal agency networks, private systems, state and regional networks and local research center and university networks. This pattern of network tiers: high tech, R&D and commercial network systems, will continue to expand as the demand for more connectivity and system capacity by users grows. Now is the time to learn while the system is relatively simple.

An all optical system is evolving in terms of hardware, operating systems, applications, switching capability and administrative operations. Optical means will be used between processing elements within a host computer, between computers at a geographic site and between sites using equipment elements that range from POTS (plan old telephone systems) to SONET connectivity as the systems is transitioned to the all optical mode.

System Reliability practitioners involvement in the early stages will minimize any downstream re-design grief.

## Human Reliability

Human reliability continues to be a fertile field for research as it has been

## IEEE RS President in IEEE Videocon

The 1993 IEEE Video Conference Program will include a special presentation by Dr. Samuel Keene on ISO 9000 and Logistics Issues for World Wide Software Support. This presentation will be part of the IEEE topic on Delivering Software Products to the Global Marketplace, which will be broadcast live via satellite to subscribing businesses, universities and some IEEE sections. This will be on May 20, 1993 from 10am to 1pm MST. Individuals interested in establishing a downlink to the broadcast may contact IEEE representative Bob Kahrman at (908)562-5491.

for the last three decades. There are numerous predictive models and improving sources of data but there is no consensus on the choice of models or the selection of data. Recent studies have shown that comparative applications of predictive models to the same test cases have yielded significant differences in the resultant predictions.

Despite the trend toward increasing automation, the human remains an invaluable part of many systems and processes. Therefore, it is essential that research be continued to evolve a consensus on the choice of predictive models. There also needs to be research in to the development of prediction models that are easy to use, not resource intensive, and readily understandable by both reliability and human factors engineers. Additional research needs to be conducted into the formation of a data bank that would be usable by a wide range of users; i.e. widely applicable data bank that would support one or more prediction techniques. Finally, there is a need to train reliability and human factors engineers to understand and evaluate human reliability explicitly.

## IEEE HOTLINE

For member address changes, application information, membership assistance, IEEE publication orders:

1-800-678-IEEE

## IEEE Division VI Director's Report

by Bruce A. Eisenstein

One item which is kicking around the Board now is the question of whether or not each member of IEEE should be a member of at least one technical society. The proponents of this point of view argue that, in a revenue neutral way, each member could be allowed one free society membership for a modest dues increase. Thus, the 60% who are presently members of at least one society would have a *decrease* in their total IEEE costs, while the 40% who are not society members would see a modest increase in their total costs, but they would have the opportunity to join one technical society. It is thought that many of these additional members might join the societies represented by Division VI, and so we have a vested interest in the decision, no matter which way it goes.

The arguments in favor of universal society membership center on the premise that the technical aspects of the IEEE are the *raison d'être* of the Institute: without the technical content, what is the purpose of IEEE? Furthermore it is argued that there is a society for every need. Putting aside for a moment the "technical specific" societies like Automatic Control, Signal Processing, Microwave Theory, etc. which appeal to the specialists, *everyone* needs Professional Communications, Reliability, Social Implications of Technology, Engineering Management, and Education. Many societies issue a general interest magazine that can keep the non-specialist informed about new developments. Also, with the increased number of potential society members, there might be some interest in offering new, multi-society "area-interest" magazines focused on a single area such as Systems, or Devices, or Human Potential, or Statistics, or Education, etc.

The arguments against universal membership are that it is fundamen-

tally unfair to coerce people into something that they don't want to do. If someone wanted to join a society, it is argued, there is nothing preventing them from doing so except their own desire. Finances are irrelevant, the opponents argue, because the plan calls for a dues increase anyway for those who have chosen not to participate. A further argument against is that certain societies would garner up all of the extra members, thus causing unintended shifts in membership and funding patterns.

To help me focus my thinking, I developed the following analog:

I. E. Easie University (IEEE U.)

Named after its benefactor, I. E. Easie, the university has the following unique attributes:

- students are allowed to pay a fee of X dollars for which they get: id card; right to live on campus in dorm or fraternity; use of school store; right to subscribe to student life and/or health insurance; use of gym, tennis courts, and pool; student prices for football games; No courses!!
  - each course the students want to take costs Y dollars extra (but you can maintain your student status without taking a course, not even one!)
- 40% of the students elect the base X dollar option  
60% take at least one course

A proposal is made to change the fee structure so that each student is required to take at least one course in order to retain their student status. The new fee will be  $(X+2/3Y)$  dollars which entitles the student to one free course plus Y dollars for each additional course. Thus, in order to be a student at IEEE U., you must be registered for a course.

Arguments in favor of this new fee structure are: *raison d'être* of IEEE U. is to educate the students by offering courses; those students already taking courses will save money ( $2/3 Y$  instead of Y for the first course); wide range of subjects assure that every student can find a course of interest; since faculty and courses are in place, marginal cost to handle the extra 40%, who will likely divide themselves among many different courses, is small; "extra" students reduce cost/student in courses enabling some extra services and, perhaps, more courses in new areas.

Arguments against this new fee structure are: everyone must pay more; removal of element of choice about whether or not to take courses; some people will leave the university, particularly if Y is a substantial number of dollars.

Posed this way, I see that the function, the main function, of IEEE (the professional society, not the "university") is the promulgation of technical information which is the realm of the societies. It seems philosophically sound to me that everyone who joins IEEE should do so for the information, the "courses," which they would get.

As a director, I may be called upon to vote on this issue. I am requesting your input so that I can get a sense of what the membership wants. I understand that the readers of this newsletter are a biased group in that you are already a member of a society, but nevertheless your thoughts on this issue would be appreciated, and I hope to hear from you.

Dr. Bruce A. Eisenstein  
ECE Department  
Drexel University  
Philadelphia, PA 19104 USA  
Tel:(215)895-2359  
Email: eisenstein@cbis.ece.  
drexel.edu

## Electronic Bulletin Boards

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(400+ members)

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Statistics, Reliability

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(703)321-8020  
300-9600 baud 8N1

The CALS BBS is reached through this number to the National Technical Information Service (NTIS) BBS. Membership is free.

**Defense Electronics Supply Center (DESC) Engineering Standardization Bulletin Board System**

Latest information on many standard military electronic part drawings under the control of DESC  
DESC-RBBS: (513)296-6046, 300-2400 baud, 8N1  
(513)296-8875, 9600 baud, 8N1, V.32/V.42  
Sysop: Cindy Prich, (513)296-6347

**JPL/NASA Radiation Effects Data Bank**

Test data on Single Event Effects and total-dose for electronic parts  
BBS: (818)393-4156, 1200 baud, 8N1  
(818)306-6920, 1200 baud, 8N1  
Sysop: Keith Martin, (818)354-0319

After logon hit return and type RADATA in response username, no password required.

## ROME LABS ELECTROMAGNETIC (EM) PERFORMANCE MONITOR (EMPM)

**Rolfe E. Ferrara**  
Rome Laboratory/ERPT

The EM Performance Monitor (EMPM) is a sensitive, wide bandwidth electromagnetic (EM) energy sensor system that will detect, record and time correlate the occurrences of high EM fields on military platforms with a minimum of measured field perturbation.

Command, Control, Communications, and Intelligence (C3I) electronics can be upset or damaged when subjected to high intensity electromagnetic (EM) fields. Sources of high EM fields can include both natural and man-made phenomena. Natural sources include lightning and electro-static discharges. Man-made phenomena include nuclear electromagnetic pulse, emissions from communications, radar and electronic warfare transmitters, and possible emissions from high-power microwave weapons. Upset or damage can occur in sensitive C3I electronics because of signal coupling on interconnect cables, signal leakage through shield apertures and seams, and direct signal coupling on system antennas. In many instances the interference source may be part of the C3I system, with upset or damage occurring due to degradation of cable and equipment shields, failure of transient limiting devices, etc. In many cases, the source of system upset or damage is unknown since no record is kept of the electromagnetic fields encountered or of voltage and current levels coupled to critical wiring harnesses.

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Rome Laboratory has completed the EMPM feasibility study and is now pursuing a 26-month effort to design and fabricate a development model of a miniature EMPM system for both laboratory and field evaluation.

This effort is being closely coordinated with the development of the highly advanced Time Stress Measurement Device (TSMD). The EMPM will be designed to be utilized as both a stand alone system or as a "smart" sensor for the TSMD system, depending upon monitoring requirements.

The EMPM system will provide a powerful troubleshooting tool for Air Force maintenance organizations, especially when tracking down "retest OK" and/or intermittent equipment failure problems related to EM effects. These failures will become more critical as the newer, fly-by-wire platforms are introduced to the Air Force inventory.

Long range plans are to validate the EMPM concepts in the field and transition this technology to Air Force and DoD logistics and maintenance organizations to increase reliability and lower costs.

For more information on this program, contact R. Ferrara at Rome Laboratory, RL/ERPT 525 Brooks Road Griffiss Air Force Base NY 13441-4505; phone (315)330-2841.

from:  
(315)330-2047  
Chuck Messenger

# Conference Calendar

## DATE & PLACE CONFERENCE

### CALL FOR PAPERS 1993

13-15 Oct. **Second IASTED International Conference Reliability, Quality Control and Risk Assessment**  
Cambridge Massachusetts USA

See the advertisement for this conference on page 13.

### 1994

20-24 March **PSAM-II International Conference Devoted to the Advancement of System-based Methods for the Design and Operation of Technical Systems and Processes**  
San Diego California

The purpose of PSAM is to provide a forum for the presentation of scientific papers covering both methodology and applications of system-based approaches to the design and effective, safe operation of technological systems and processes. These include nuclear plants, chemical and petroleum facilities, defense systems, aerospace systems, and the treatment and disposal of hazardous wastes. The objective is to share experience to the benefit of all industries.

The following is a list of topics within the scope of the meeting:

- Risk management and decision making
- Risk-based regulation
- Reliability-base design
- Probabilistic and deterministic models for process safety management
- Uncertainty and sensitivity analysis
- Uncertainties in physical and chemical phenomenology
- Exper judgement in assessment studies
- Cognitive models of human behavior
- Design and evaluation of man-machine systems
- Human factors and human reliability
- Risk-based methods for improving operator performance
- Computerized control systems and operator aids
- Organizational factors and safety culture
- Automatic fault detection and diagnosis
- Redundancy Management
- Artificial intelligence in support of process safety management
- Software dependability
- Earthquakes, fires, tornadoes, and other natural phenomena
- Survivability and vulnerability
- Safeguards analysis
- Aging of systems, structures, and components
- Communicating the results of risk assessment and management to peers, decision makers, and the public

**Instructions for Summary Submission:** Four copies of a summary (800-1,200 words, typed, single-spaced) should be submitted to the Technical Program Chairman no later than May 13, 1993. Summaries must contain a title and include all author's names, affiliations, and telephone and fax numbers. Authors should indicate the primary and one alternate category with which their papers are most closely identified. Full papers will be due 10 October 1993. Papers will be published and issued at the Conference.

**Technical Program Chairman:** Professor George Apostolakis, Mechanical, Aerospace and Nuclear Engineering Department, 38-137 Engineering IV, University of California, Los Angeles, CA 90024-1597 USA, Tel: (310)825-1300, Fax: (310)206-2302

11-14 April **International Reliability Physics Symposium**  
San Jose, CA Fairmont Hotel

See the advertisement for this conference on page 12.

### CONFERENCES 1993

14-17 June **COMPASS '93 Computer Assurance Conference**  
Gaithersburg Maryland  
National Institute of Standards and Technology (NIST)  
See the advertisement for this conference on page 13.

5-7 July **23rd Reliability & Maintainability Symposium**  
Tokyo, Japan

Sponsored by the Union of Japan Scientists and Engineers

The symposium welcomes the papers focusing on: 1) component, device and systems reliability, 2) mechanical and structural reliability, 3) reliability and maintainability management, 4) reliability design theory and technique, 5) data collection and analysis, 6) reliability test, 7) failure analysis, 8) maintainability and availability, 9) reliability and safety, 10) software reliability and computer aided reliability engineering, and 11) TQC and reliability.

Contact: Prof. Yoshihisa Suzuki, Dept. of Management Engineering, Tokyo Metropolitan Institute of Technology, 6-6 Asahigaoka, Hino, Tokyo 191 JAPAN, Tel: +425-83-5111, Fax: -81-3-3463-5214

1-3 Sept. **EOBT'93, 4th European Conference on Electron and Optical Beam Testing of Electronic Devices**  
Zurich Switzerland  
Swiss Federal Institute of Technology (ETH)

The aim of EOBT is to provide an international biennial forum for the presentation and the discussion of the advances in internal and contactless testing by Electron Beam (EBT), by Optical Beam (OBT), and newly by Scanning Tunneling and other local probe microscopy methods (STM, AFM, etc.). The Conference covers applications on all types of semiconductors, electronic and microelectronic integrated circuits (including test structures), and systems.

Address for information: Swiss Federal Institute of Technology (ETH), Reliability Laboratory, EOBT'93, ETH-Zentrum, CH-8092 Zurich, Switzerland, Phone +41 1 256-2743, Fax +41 1 251-2172, e-mail: eobt93@nimbus.ethz.ch

17-21 Oct. **1993 International Joint Power Generation Conference**  
Kansas City Missouri

The Reliability and Availability (R&A) Committee of the American Society of Mechanical Engineers (ASME) Power Division is sponsoring the 1993 International Joint Power Generation Conference (IJPGC). Topics for the conference are:

- Availability of repowered older power plant units
- Operating availability of cogeneration and waste-to-energy plants
- Plant betterment program impacts
- Practical applications of RCM
- Economic benefits of improved availability
- On-line equipment performance monitoring
- Data for RAM modeling analysis
- Availability of overseas and emerging technologies
- Availability impacts of the Clean Air Act
- Predicting, tracking, optimizing availability at unit or component level
- Practical application of statistical methods for decision making

For information, contact: Mr. Jim Lofe (Bin B412), Paper Review Coordinator, ASME Reliability and Availability Committee, Southern Company Services, Inc., P.O. Box 2625, Birmingham, AL 35202, Tel: (205)877 7929

1-5 Nov. **4th International Symposium on the Physical & Failure Analysis of Integrated Circuits**  
Singapore

Organised by the IEEE Singapore Section in co-operation with the Centre for Integrated Circuit Failure Analysis & Reliability, National University of Singapore.

The Technical Committee is now inviting the submission of papers for presentation at IPFA 93. Papers should deal with work on:

Failure Mechanisms, Failure Analysis Techniques, EOS/ESD Studies, Reliability Testing, Design and Process Control for Reliability in LSI/VLSI, Semiconductor-insulator interfaces, contacts and metallisation, Packaging, bonding, die attach and encapsulation, Opto-electronic devices, Power devices

Authors are requested to submit two copies of a 500 word summary and a 50 word abstract to:

Technical Committee Chairman, c/o IPFA 93 Secretariat, IEEE Singapore Section, PO Box 1066, Kent Ridge Post Office, Singapore 9111. Tel: (65) 291-9690 Fax: (65) 292-8596

Final date for submission of summary and abstracts: 1 March 1993.

A four day exhibition of FA & Reliability related equipment and services will be held concurrently with the Symposium.

Contact: SWEE Yong Khim, IEEE Singapore Section, 200 Jalan Sultan, #11-03, Textile Centre, Singapore 0719, Tel: (65)291-9690, Fax: (65)292-8596

or: IPFA, 93, Daniel Chan, National University of Singapore, Electrical Engineering Department, 10 Kent Ridge Crescent, Singapore 0511, Email: ELECSDH@NUSVM.BITNET

3-6 Nov. **ISSRE '93 The Fourth International Symposium on Software Reliability Engineering "The Experimental Paradigm in Software Reliability Engineering"**  
Denver Colorado

The conference will have presentations of papers, panel discussions, and tutorials. Topics of interest will be: Reliability modeling, estimation and prediction, software metrics, tools, measurement, data collection and analysis, testing and verification, test effectiveness, applications, process control and management, resource scheduling, software accreditation, safety and security, fault-tolerance, reliability/testing in object oriented/distributed/concurrent/realtime environments, ect. The conference is sponsored by the IEEE Computer Society Technical Committee on Software Engineering and the IEEE Reliability Society Denver Chapter.

For more information contact: Michael R. Lyu, Bellcore, 445 South Street, Morristown, NJ 07962-1910 USA, Tel: (201) 829-3999, Fax: (201) 829-5981, Email: llyu@bellcore.com

1994 **Annual Reliability and Maintainability Symposium**  
24-27 Jan. Anaheim California  
Anaheim Marriott Hotel

The theme for next year is "How You Can Make It Happen" Share your knowledge and expertise with your colleagues at the world's premier forum for the assurance technologies. Plan to attend.

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- Quality Assurance
- Simulation
- Testing
- Quality Costs
- Optimization
- Design & Manufacturing
- Human Factors and Reliability
- Applications in all fields
- Survey papers and case studies on any of the above subjects are also welcome
- Software and Algorithms
- Methodologies for Quality Control
- Risk Assessment and Analysis
- Safety-Critical Systems
- Identifying and Controlling Risks
- Probabilistic Models for Safety Assessment
- Maintainability & Availability

**SUBMISSION OF PAPERS**

Four copies of the papers (maximum 15 double spaced pages) should be submitted to program chairman by May 1, 1993. Mark the envelope "IASTED 1993 Submission". All submitted papers will be reviewed for merit and content, and papers will be accepted as regular papers or short papers. Notification of acceptance/rejection will be mailed by July 1, 1993. Camera-ready papers for inclusion in the proceedings will be due on August 15, 1993. Mail to:

Dr. Hoang Pham  
 Idaho National Engineering Lab  
 P.O. Box 1625  
 M/S 2408  
 Idaho Falls, ID 83415 USA  
 Tel: (208)526-9274  
 Fax: (208)526-2930  
 Email: hgp@inel.gov

**INTERNATIONAL PROGRAM COMMITTEE**

Kishor S. Trivedi, General Chairman  
 Hoang Pham, Program Chairman  
 Nasser S. Fard, Local Arrangements Chairman

**COMPASS '93**

**8th Annual Conference on**  
**Computer Assurance**

National Institute  
 of Standards And Technology  
 Gaithersburg, MD USA  
 14-17 June 1993

COMPASS is dedicated to finding ways to assure that computer systems perform correctly under all circumstances within the context of the systems they control. The purpose of COMPASS is to advance the theory and practice of critical systems, especially those using digital computers or other new technologies. The goal of COMPASS is to find and publicize ways to prevent unacceptable failures of critical systems. COMPASS '93 has adopted the slogan "Practical Paths for Assurance". This expresses the need for the theories behind critical systems to be put into practical reality to establish and meet real requirements, and to build these critical systems in a way that results in high integrity operation. COMPASS '93 will have sessions and panels in the following areas:

- Reliability Measurement
- Verification Technology
- Management and Developmental Issues
- Developing Standards and Issues
- The Results of Workshops and Studies
- Systems Safety
- Special Topics

**Debate**

Resolved: Productivity and Techniques For Assurance Can Co-Exist

**Full Day Tutorials** (Monday, 14 June)

"Formal Methods With Automated Support Using PVS"

John Rushby, SRI International

"Federal Criteria (New Orange Book)"

Janet Cugini, NIST

**Conference Registration**

Advanced registration ends 28 May 1993. To register contact:

Karen Ferraiolo  
 Compass '93 Registrar  
 ARCA Systems, Inc.  
 8229 Boone Blvd., Suite 610  
 Vienna, VA 22182 USA

**Hotel Reservations**

A block of rooms is reserved at the Gaithersburg Marriott Hotel for attendees. Make reservations directly with the hotel and refer to COMPASS '93. Reservations must be made by May 30 to take advantage of the \$70 per night, single or double rate. Contact: Gaithersburg Marriott, 620 Perry Parkway, Gaithersburg, MD 20877 USA, Tel: (301)977-8900

**For Further Information Contact**

COMPASS '93 General Chairman  
 Judy Bramlage  
 (202)512-6210



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**1994 INTERNATIONAL RELIABILITY PHYSICS SYMPOSIUM**

April 11-14, 1994 ■ Fairmont Hotel ■ San Jose, California

**CALL FOR PAPERS**

Building-in Reliability continues to be the cornerstone of the Symposium's Program. Papers are solicited that illustrate the incorporation of reliability physics, reliability engineering, design for maximum performance margin, fabrication, assembly, and manufacturing process control to improve system reliability. The identification of new microelectronic failure mechanisms, improved insights into existing failure mechanisms, and new or innovative analytical techniques continue to be the mainstay of the 1994 Symposium. Papers dealing with the reliability of advanced packaging techniques for multichip modules are also requested.

**YOUR PAPERS ARE SOLICITED ON:**

- **BUILDING-IN RELIABILITY FOR Si, GaAs, AND OPTOELECTRONIC DEVICES, especially:**
  - Integration of reliability engineering with all elements of design
  - Establishing effects of input parameters on product reliability & control
  - Physical basis for design rules & concepts for minimizing jeopardy with experimental validation
  - Particulate control and its effects on reliability
  - Improved manufacturing techniques for wafer fabrication through assembly
- **TESTING METHODOLOGIES FOR RELIABILITY, including:**
  - In-process wafer fabrication control and assembly, monitors, and sensors
  - Novel test structures and materials
  - Evaluation at wafer level or after partial processing
  - Reliability modeling & field failure rate prediction
- **ANALYZING FOR RELIABILITY:**
  - VLSI failure mechanisms and models applied to:
    - dielectric integrity
    - low power/low voltage issues
    - LED/laser degradation
    - passive element degradation
  - Assembly related failure mechanisms and models applied to:
    - bonding
    - package integrity
  - SYSTEM related failure mechanisms, including:
    - automotive
    - consumer
  - Failure analysis techniques: new, advanced, & simplified
  - Analytical instruments & techniques
  - Computer-Aided Reliability (CAR) applications & simulation with experimental validation

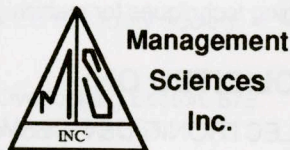
**SUBMISSION DEADLINE: Received no later than October 1, 1993**

Please submit fifteen copies of both a one page 50-word abstract, and a two-page summary that states clearly and concisely the specific results of your previously unpublished work, why the results are important, and how the results relate to prior work. The fifteen copies of the abstract and summary must either be on 8-1/2 by 11-inch or A4 paper and include the title of the paper, and the name, affiliation, complete return address, telephone and telefax numbers, and **e-mail address, if available**, for each author. Line drawings, key references, and coarse halftones may be included, but please no continuous-tone photographs. **Submissions should be by post or express mail** rather than by telefax, because telefax is not necessarily legible for review after subsequent duplication.

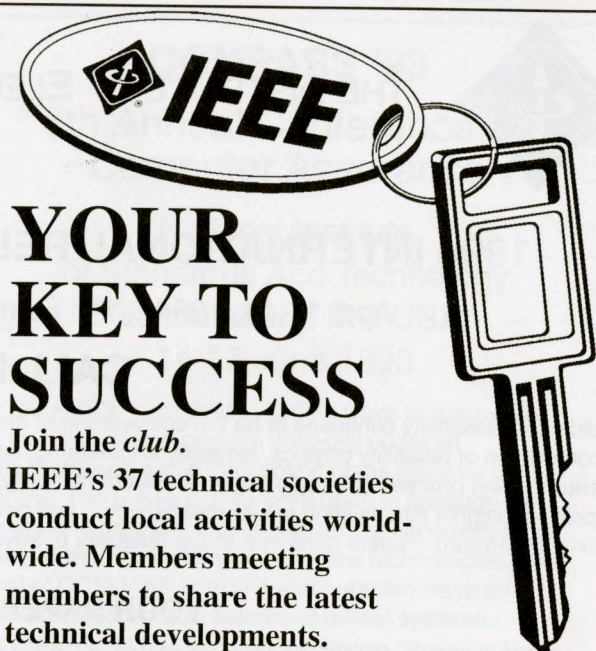
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