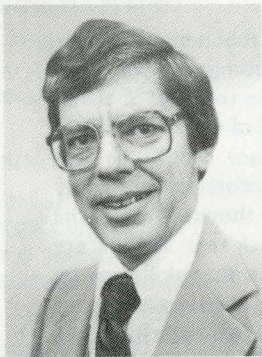


Reliability Society Newsletter

Editor: Anthony Coppola
Vol. 27, No. 3, July 1981 (USPS 460-200)



President's Report

C. M. Bird
President

IN APRIL'S NEWSLETTER, I briefly outlined my objectives for the coming year and began an effort to better communicate the activities of the Society to you—the general membership. As part of this commitment we will continue to publish committee reports. In so doing, I hope to receive feedback and participation from the membership.

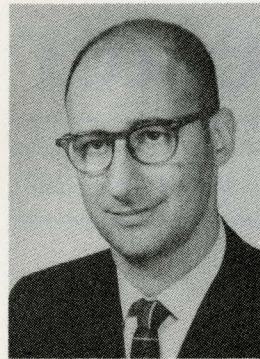
Your Society officers feel that better coverage of Reliability is needed at some existing technical conferences. As a first step in achieving this, we have agreed to endorse and provide technical contributions to the AUTOTESTCON. We must now show that we can make these contributions by providing technical papers and/or organizing sessions for the conference. Deadlines have passed for the 1981 Conference; however, any contribution you can offer for 1982 will be appreciated (contact our Meetings Vice President, Alan Plait). We have also endorsed, and hope to more actively support, the Annual Symposium on Reliability of Electric Power.

Membership growth is essential to the continued success of our Society. In order to adequately represent the Reliability discipline, we must have a high percentage of practitioners in our membership. Last year we exceeded 3,000 members for the first time. Sadly, due to non-renewals, we have again dropped below 3,000. I would hope that by year end we can recover this loss and grow to at least 3,200. Your efforts to make the application in this Newsletter available to a potential member will help.

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The Editor's Corner



Anthony Coppola

number of the recipient. It would eliminate the need for any length zip code. If we are going to use automation, let it make life easier rather than more complex.

Ideally, we should find a way of automating the mail so the letter writer does not have to format or stylize his input. This may not be possible. However, the article has an ominous ring to it when considered in the light of the following quotation from Hubert L. Dreyfus' book *What Computers Can't Do* (Harper & Row 1972):

"Man's nature is indeed so malleable that it may be on the point of changing again. If the computer paradigm becomes so strong that people begin to think of themselves as digital devices on the model of work in artificial intelligence, then, since . . . machines cannot be like human beings, human beings may become progressively like machines. During the past two thousand years the importance of objectivity; the belief that actions are governed by fixed values; the notion that skills can be formalized; and in general that one can have a theory of practical activity, have gradually exerted their influence in psychology and in social science. People have begun to think of themselves as objects able to fit into the inflexible calculations of disembodied machines: machines for which the human form-of-life must be analyzed as a meaningless list of facts, rather than the flexible pre-rational basis of rationality. Our risk is not the advent of superintelligent computers, but of subintelligent human beings."

IN THE MARCH 1981 ISSUE of *Spectrum*, Jacob Rabinow presented an article on postal automation. A point of the article is that postal automation requires the use of formatted and stylized information on the envelope. Mr. Rabinow suggests the information to be formatted be a persons telephone number rather than the proposed nine digit zip code. In either case, a computer would convert the digits to a small area for delivery. I believe he missed an idea. If we are to be forced to format and stylize a zip code or surrogate, why not format and stylize the street address and eliminate the zip code or any other surrogate entirely? The street address, city and state certainly provide all the information a phone number does to localize the recipient of the letter, with the added advantages of being human, sortable, and not requiring the sender to know the phone

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Reliability Society Newsletter is published quarterly by the Reliability Society of the Institute of Electrical and Electronics Engineers, Inc. Headquarters: 345 East 47th Street, New York, NY 10017. Sent automatically and without additional cost to each member of the Reliability Society. Printed in U.S.A. Second-class postage paid at New York, NY and at additional mailing offices.

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Reliability Society Album



Dr. T. L. Regulinski (left) 1980 Reliability Society President, congratulates R. Owen Holbrook, 1980 Chairman of the Washington/Northern Virginia Chapter on its selection as 1980 Chapter of the Year. (Photo courtesy of Bud Stiehl)



Dr. Regulinski receives a memento of his office from his successor, 1981 Reliability Society Chairman, Mr. Carl Bird. (Photo by Bud Stiehl).



P. H. Eisenberg (left) and A. L. Tamburrino display Reliability Society Certificates for their service as Guest Editors of the IEEE Transactions on Reliability Special Issue on Failure Analysis, August 1980.



Your hard working Editor in action.

Our thanks to Bud Stiehl. Reader's contributions welcome. Chapter Chairmen—please send some pictures of your activities.

Announcements

Reliability Conference to be Held in Copenhagen

In the summer of 1982, the Technical University of Denmark in Lyngby, near Copenhagen, will be the setting for a European Conference dealing with reliability in electrical and electronic components and systems.

The conference, EUROCON '82, arranged by the IEEE (The Institute of Electrical and Electronics Engineers) and EUREL (The Convention of National Societies of Electrical Engineers of Western Europe), has already attracted a great deal of interest world-wide, and reliability experts from countries such as the USA and Japan intend to submit a paper.

The conference committee, under the management of chairman Erik Lauger and technical program chairman Peter W. Becker, are confident that the 1982 conference will be more successful than past EUROCON conferences, technically as well as socially. The committee expects to welcome some 800 participants from all over the world to the conference, which is scheduled for June 14-18, 1982. The opening ceremony will be performed by His Royal Highness, Prince Henrik of Denmark. A scientific and technical exhibition will take place while the conference lasts, with exhibits highlighting the reliability theme of the conference. Also, of course, the participants will be given ample

opportunity to enjoy "wonderful Copenhagen," which is at its best in the month of June!

The technical program has been structured to be of interest to electrical and electronics engineers, marketing experts, and anyone concerned with the research, development, manufacturing, and application of electrical and electronic systems. The committee has sent out a *Call for Papers* from which the insert below is extracted. Potential contributors should submit a preliminary title of their paper as early as possible. The deadline for *abstracts is September 1st 1981, and papers January 1st 1982*. These deadlines are not far off, so get in touch with the conference office now if you plan to contribute in 1982! They will send you the *Call for Papers* information sheet and further details of the conference. Write to Conference Office, DIEU, Danish Engineers' Post Graduate Institute, The Technical University of Denmark, Bldg. 208, DK-2800 Lyngby, Denmark, telephone Mrs. Aase Sonne at (45) 02-882300.

Call for Papers

A. General aspects

1. Reliability Theory
 - Failure rate models and prediction methods

- Failure mode effects and criticality analysis
- Fault tree analysis
- Testing procedures and reliability indicators
- Models for reliability growth
- Operation research techniques
- Software reliability

2. Management and Economic Issues

- Decision making
- Reliability planning and management
- Life cycle costs, trade-offs between reliability, maintainability and availability
- Quality circles
- Reliability as a marketing factor

3. Human and Legal Aspects

- Human factors
- Standards
- Legal issues
- Product liability

B. Applied reliability

1. Energy Processing

- Power components
- Power generation
- Power distribution
- Energy flow control
- Transportation systems (road, rail, sea, air)
- Traffic control and regulation
- Household appliances

2. Communication Data and Signal Processing

- Passive components
- Microelectronic components
- Tubes (camera, display, microwave etc.)
- Microprocessors and related components
- Radio and TV sets
- Communication equipment and systems
- Submerged transmission systems
- Satellites
- Navigation equipment
- Data processing systems
- Software reliability
- Instrumentation and measuring equipment
- Medical electronics

Contributions outside the listed topics are welcomed as well.

RS Solicits Participation in Autotestcon

The annual Automatic Testing Conference sponsored by IEEE Societies, Aerospace and Electronic Systems and Instrumentation and Measurement, provides a forum for

designers, acquisition managers, manufacturers, and software developers in that area that deals in automatic testing systems and equipment so vital to the support of our military weapon systems. The Conference, called AUTOTESTCON, is held in the fall of the year, and usually consists of 80 to 100 technical and management oriented papers.

During April, the Vice President of Meetings for RS, Alan Plait, made a presentation to the AUTOTESTCON Board of Directors soliciting approval for our participation in the Conference. Pending acceptance of a Plan of Participation, the proposal was accepted and we begin our activities with AUTOTESTCON '82, to be held in Dayton, Ohio. Of course, our support of the '81 conference in Orlando, Florida, during 17 to 19 October 1980, is welcomed.

In order to demonstrate that the Society is prepared to provide support to AUTOTESTCON, our members are being asked to express their interest in some aspect of the conference: preparing a paper (for next year), assisting on the management committee, or acting as a local area focal point for publicity (notify Mr. Plait in writing).

In general, automatic testing deals with computer controlled detection, diagnosis, and isolation of system malfunctions. The complexity and reaction rate for modern systems readiness evaluation normally precludes the use of human testing. The computer probes the system through its test points, observing and controlling the stimulus and response of circuit/function elements, and displaying the readiness status. The depth of the problem can be readily understood when one considers that literally hundreds of functions can be performed by a small circuit board and its components. Speed in testing is required, if for no other reason than that it takes considerable time for a human to test the many possible functional interactions of the elements.

Not only does Automatic Testing (AT) require the usual hardware design techniques, with its inherent need for reliability and maintainability considerations, but designers are now faced with the need for considering testability and built-in-test and their trade-offs. Testability, a relatively new discipline, is rapidly approaching the state of a technology. A testability standard is being prepared. Testability figures of merit are being defined and quantified, and courses are being offered to management and technical personnel in the intricacies of this field.

A session at the 1981 RAMS presented some basic considerations of automatic testing and testability, as part of the Joint Logistics Commanders Panel on Automatic Testing papers. Members of the Society may be aware that our VP of Publications, Tony Coppola, supervises a group at RADC that is concerned with R&M, and now with T.

EASCON Incorporates Exhibits Moves to Downtown Washington, D.C.

EASCON announces its annual Electronics and Aerospace Systems Conference to be held November 16-19, 1981. EASCON '81 has moved downtown to the Washington Hilton, a large centrally located facility in downtown

Washington, D.C. This change will facilitate ease of operations for the conference and allow attendees to take advantage of all the cultural and social opportunities that Washington has to offer.

The 1980's will be a decade where the mutual interchange and understanding between government and industry will be of paramount importance. Therefore, EASCON is featuring the GOVERNMENT - INDUSTRY INTERCHANGE theme.

Industry hardware and software will be exhibited this year to complement the technical, classified and tutorial programs. The exhibits will feature the latest technological developments in the electronics and aerospace industries.

EASCON '81 will be Washington's major technological event of the fall. For more information contact: Dr. Delbert D. Smith, EASCON General Chairman, Senior Vice President Corporate Affairs, COMSAT, 950 L'Enfant Plaza, S.W., Washington, D.C. 20024, (202)554-6111.

National Conference on Quality and Reliability Indian Institute of Technology, Bombay

December 27-30, 1981

A National Conference on Quality and Reliability will be held at IIT Bombay, December 27 to 30, 1981, sponsored by:

- Bhabha Atomic Research Centre (BARC)
- Defense Research and Development Organization
- Institute of Electrical and Electronics Engineers (IEEE)
- Indian Standards Institution (ISI)
- Indian Institution of Industrial Engineering (IIIE)
- Indian Association for Productivity, Quality, and Reliability (IAPQR)
- Indian Society for Theory of Probability and its Applications (ISTPA)
- Indian Institute of Technology, Bombay (IITB)
- The Institute of Standards Engineers, Bombay Section
- Regional Testing Centre, Western Region, Government of India, Bombay

The purpose of the Conference is to bring together persons working in the area of quality and reliability to discuss problems of common interest. The Conference will begin on 27 December with two tutorial sessions—one on quality control and the other on reliability. The technical sessions will commence on 28 December with presentation of contributed papers. There will also be talks by persons of eminence in the field and, on the last day of the Conference, there will be a panel discussion.

For details contact: Prof. M. N. Gopalan, Organizing Secretary, National Conference on Quality and Reliability—1981, Department of Mathematics, Indian Institute of Technology, Powai, Bombay 400076.

Component Screening Seminar Abstracts Available

Copies of the abstracts/data compendium of the Electronic Components Reliability Screening Seminar are available at \$13 per copy. The 200-page document contains information presented at the seminar held 25 April 1981 in Redondo Beach, California, sponsored by the Reliability Society and the Components, Hybrids and Manufacturing Technology Society Chapters of the IEEE Los Angeles Council.

For copies contact: TRW, I. Doshay, 90/2983, 1 Space Park, Redondo Beach, CA 90278. Make checks payable to LA IEEE Reliability Society.

International Conference on Systems Theory and Applications

December 17-19, 1981

Punjab Agricultural University

Ludhiana 141004, India

The aim of the conference is to discuss original research papers on recent advances in systems theory and its applications. Special emphasis on applications relevant to present-day needs of developing nations, particularly the rural sector, is desired.

Topics will include: simulation and modelling; automatic control; optimal control; instrumentation systems; computer-related systems; identification and estimation; digital signal processing; system reliability; applications in power systems, water resources systems, farming systems, biosystems, environmental and ecosystems and policy modelling (energy, including unconventional sources, transportation, rural development, etc.); and other related topics.

The conference will be composed of invited as well as contributed papers. The official language of the Conference is English.

Registration fee is Rs. 150/—(or US \$20.00) per delegate.

One copy of the Proceedings will be made available to registrants attending the Conference. Those unable to attend can receive a copy of the Proceedings on payment of postal and handling charges.

Send intention of submitting a paper with tentative title as soon as possible. Submit two copies of full paper before July 31, 1981. Notification of acceptance by Sept. 15, '81. Submit paper in final form by Oct. 15, 1981.

The Program Committee is composed of experts from India and abroad. Members are requested to contact researchers in their locations to make additional calls for papers.

The Conference is being sponsored by the UNESCO/ICAR Centre of Advanced Studies in Agricultural Engineering. It will be co-sponsored by several other national agencies and organizations.

Address correspondence to:
Professor R. K. Varshney, Organizing Secretary, International Conf. on Systems Th. & App., Electrical Engineering Department, PAU, Ludhiana 141004, India.

OCEANS '81

September 16-18, 1981
Boston, Massachusetts

The conference committee is inviting papers to be presented at OCEANS '81, September 16-18, 1981, at the Sheraton Boston, Boston, MA. Original papers are sought on research, development, practice and policy pertaining to the following subjects: Oceanographic instrumentation, communications and telemetry, remote sensing, navigation, computer graphics, seismic exploration, acoustics in the ocean, microprocessor applications, buoy technology, cables and connectors, coastal zone management, diving, education, geology and geophysics, marine biology, marine power systems, marine fisheries, marine geodesy, technology exchange, marine law and policy, marine materials, marine mineral resources, ocean economic potential, ocean energy, oceanographic ships, offshore structures, financing and capital formation, salvage and towing, seafloor engineering, undersea physics, undersea vehicles, underwater photography and sensing, water quality, intl. marine food and drug, resources.

AUTOTESTCON '81

Orlando Hyatt House, Orlando, FL
October 19-21, 1981

The 1981 IEEE National Automatic Testing Conference, AUTOTESTCON '81, will highlight progress and problems in technology, acquisition support, and management for

automatic testing. Both formal technical sessions and workshops will be presented, including:

- Automatic Test Generation
- Design for Testability
- Machinery/Vehicle Testing
- Test Analysis and Preparation Techniques
- Test Program Sets
- ATE/UUT Interfaces
- Field Calibration of ATE Systems
- Education and Training
- ATE Language Standardization
- System Software
- ATE Systems Engineering
- Maintenance Planning and Concepts
- Software Verification & Validation
- ATE Benefits Analysis
- Acquisition Support
- Unique ATE Applications
- Report on JLC
- Management of ATE Resources
- Case Studies: Factory to Field Vertical Commonality
- In-Circuit Component Testing

Workshops are planned for the following topics:

- Problems in ATE Development Today
- Control of Test Program Set Development
- The Challenges Ahead

For more information contact: general chairman, George F. McClure, Martin Marietta Aerospace (305)352-3782; vice chairman, Frank A. Hanusek, Honeywell Avionics Division (813)532-4611, Ext. 2492; registration, Charles R. Curley, Martin Marietta Aerospace (305)352-2020; facilities, Alvin J. Levy, Martin Marietta Aerospace (305)352-3970; program committee, Dr. Fred Simons, Jr., University of Central FL, (305)275-2786, Arnold Greenspan, AMG Associates, Inc. (703)892-5600, Paul Winterhalter, Honeywell Avionics Division (813)531-4611, Ext. 2233.

Adcom Vice-President Reports

Treasurer's Report

April 1, 1981

1980 Final Status—The pre-audit year-end financial statement received from IEEE Headquarters indicates a 1980 surplus of \$16,400. This brought our reserves to \$69,200 as of the end of 1980. This is much higher than the 1979 surplus of \$6100 and considerably better than the \$600 surplus reflected in the official 1980 budget. As usual, differences between budgeted and actual figures are difficult to analyze due to changes that were made in IEEE budgeting and accounting procedures. Comparison of 1979 and 1980 figures shows the following significant changes:

	Item	1979 (\$K)	1980 (\$K)
<i>Income:</i>	Membership Fees	18.1	19.0
	Non-Member Subscriptions	65.9	73.5
	Conference Publ. Sales	2.5	—
	Meeting Receipts	4.0	10.8
<i>Expenses:</i>	Transactions	67.1	72.6
	Newsletters	5.8	6.4
	Conference Publications	14.1	18.9
	AdCom Administration	5.0	6.5
	Awards	1.8	2.3

1981 Budget—The sixth and presumably final official version of the 1981 Budget now shows an expected surplus of \$1300 instead of the deficit in the fifth version. This is due to an additional \$6400 budgeted for non-member subscription income. Major income and expense items reflect the following expected changes:

	Item	1980 Actual (\$K)	1981 Budget (\$K)
<i>Income:</i>	Membership Fees	19.0	19.8
	Non-Member Subscription	73.5	80.9
<i>Expenses:</i>	Transactions	72.6	86.7
	Conference Publications	18.9	20.0

1982 Budget—IEEE Headquarters has requested initial inputs for the 1982 budget by April 13, 1981. I have prepared a proposed reply, and projected a complete preliminary first-cut budget based on this proposed reply. Principal changes from our 1981 budget input are as follows:

- a. Increases in Transactions printing costs and Society Editorial expenses proposed by Ralph Evans. He proposes changing total pages from 500 to 532 and Society Editorial expenses from \$12,000 to \$15,000.
- b. Minor changes in expected income and expense estimates based on prior history, increased postage, and expected inflation.

Miscellaneous—The 1981 Awards Luncheon resulted in a

net expense of \$575. The cost for mailing and distributing 1981 ARMS proceedings to society members was \$10,550 compared to \$9,465 in 1980.

Irwin A. Feigenbaum
Treasurer

Technical Operations

All committees and chairmen have been established and are actively working. They are:

- Human performance, A. Siegel
- Maintainability, R. Kowalski
- Nuclear systems safety and reliability, J. B. Fussell
- Oceanic engineering, F. Envent/E. Early
- Software reliability, I. Doshay
- Standards and definitions, A. Constantinides
- Advanced devices and techniques, A. Coppola
- IEEE energy committee, D. Sturges/H. Wolf
- International, M. P. Smith
- Solar energy, J. D. Meakin
- Screening, O. D. Trapp
- Representative to professional activities comm., I. Doshay
- Health care, V. Gardner
- Mechanical reliability, H. R. Hegner

The objectives for 1981 are:

- Establish a set of objectives and schedule for achieving for each committee.
- Assure that new committees get started on their activities, obtain members, and establish operating procedures and goals.
- Continue activity to complete all committee charters.
- Establish a new committee.
- Increase membership knowledge about Technical Operations by submitting articles to the Newsletter. These articles would discuss committee activities, calls for assistance, etc.

Summary of Activities

Advanced Reliability Techniques—Anthony Coppola

1. Objectives for 1981
 - a. Obtain a new chairman.
 - b. Have status for the Reliability Technology Report ready for the January 1982 ADCOM meeting as required by charter.
 - c. Obtain a wide variety of inputs through solicitation of all ADCOM Vice Chairmen and Technical Operation Committee Chairman.

2. Progress

- a. Have requested Technical Operations Vice-President to provide my replacement.
- b. Solicitation of inputs will commence 1 May 1981.

Human Performance Reliability—A. Siegel

During 1981–1982 the Human Performance Reliability subgroup will present a tutorial on human performance reliability methods, concepts, considerations, and applications. The tutorial will be presented in conjunction with the District of Columbia chapter and preliminary arrangements for currently being completed. The tutorial is scheduled for April 1982.

We will also continue to monitor the actively evolving human performance reliability evaluation, design, and methodological progress in the nuclear power field and to maintain a working relationship with other IEEE groups who possess human performance interest relative to nuclear power.

International—M. P. Smith

IEC Technical Committee 56 on Reliability and Maintainability met the week of March 23 in Tel Aviv. Meeting results not yet available. Agenda included the following:

Terminology	Failure Mode and Effect Analysis
Reliability Testing	Software Reliability
Maintainability	Prediction Procedure
Reliability Management	Design Review

US delegation returning this week. Meeting report will be distributed.

Oceanic Engineering Report—F. Envent and E. Early

The 1981 conferences organized by the council are as follows:

1. The 13th Offshore Technology Conference is scheduled for May 4–7, 1981 in Houston, Texas (Astrodome). The 1980 OTC participation: 2200 exhibiting companies, 87,000 registrations and 483,000 net square feet of space used. The preliminary technical program for the 1981 OTC has been established.
2. The Oceans'81 Conference is scheduled for September 16–18, 1981 in Boston, Massachusetts.

Software Reliability—I. Doshay

SRTC has been active in two areas since the January report. These are:

1. Preparing and presenting tutorials and mini-courses.
2. Interfacing with IEEE Computer Society, EIA, ACM and AIAA on Software Standards and Definitions.

A mini-course on software reliability will be presented on Saturday 23 May at TRW. The software course will follow a hardware reliability course on the preceding Friday. This will serve to introduce the relationship in a system context and prepare the students in understanding the similarities and differences in methodology.

We have been in communication with F. J. Buckley of RCA on preparation of a standard for software quality assurance plans. We are also coordinating with Shirley Gloss-Soler of RADC on software terminology. In addition, we are working with Gene Carruba of the EIA on inclusion of the software reliability requirements in an update of reliability program plan specifications.

Plans this year are to follow these commitments and to prepare plans for a Software Reliability Seminar in Los Angeles in 1982.

Solar Energy Device Reliability—J. D. Meakin

Attention during 1981 will be focused on attempts to arrange special sessions on durability of solar conversion devices at suitable meetings, such as the IEEE Photovoltaic Specialist Meeting. Consideration will also be given to arranging a special issue of an appropriate IEEE journal to the field covered by this committee.

Naomi J. McAfee

April 3, 1981

Meetings

The two immediate goals of the meetings vice president are:

- Pursue continuing cognizance of the Annual Reliability Conference for the Electric Power Industry, determine (actively) the possibility of having a more intimate role in the management of the Conference, and seek full sponsor status for the Reliability Society.
- Maintain liaison with the Board of Automatic Testing Conference (AUTOTESTCON), which is currently sponsored by two IEEE societies, assesses what benefit RS can provide the Conference, and pursue possible full sponsorship status.

RS has already approved our endorsing the "Power" Conference at our last AdCom meeting. I have initiated liaison with the AUTOTESTCON people, through the Chairman, Bernie Gollomp.

In addition to these ventures, we will continue to monitor our sponsorship of RAMS and IRPS and play an active role in the management of those two symposia.

Report on Meetings

RAM Symposium—The 1981 Symposium was an outstanding success! About 830 attendees included 52 international guests and 30 students. From an attendance standpoint, these figures have not been seen since 1969. Plans for the 1982 Symposium are well in hand.

It should be noted that although a total surplus of \$8,000 is probable, this kind of figure will not be expected in future years, since IEEE Headquarters policy of purchasing many Symposium Proceedings will cease. Consideration is being given to an increase in fees, and other possible reductions in expenses, to take up the difference. However, it may happen (for the first time?) that a deficit will be sustained.

IRP Symposium—Representatives from AdCom RS on IRPS will make a verbal report on status at the April AdCom meeting.

Annual Symposium on Reliability of Electric Power—Liaison with representatives of ASREP has been maintained. They have been given our logo for use on their Proceedings (as an endorsing organization). Forms for advertising ASREP have been forwarded from IEEE headquarters.

AUTOTESTCON—We have been invited to make a presentation on 14 April to the Board of Directors of

AUTOTESTCON '81, to describe our interest in endorsing the Conference and to discuss what we can bring to the party. The Conference has about 600 to 700 attendees in the fields of automatic testing hardware and software, logistics, R&M, etc.

A. O. Plait

10 March 1981

Publications

Objectives for the 1981 newsletter include: vigorously pursuing all sources of news, publishing four scheduled issues on time, including a photo page in each issue, providing special features (e.g., status of Reliability Report), and obtaining an Editor.

Transactions Editor, Dr. Ralph Evans, needs your support. (Otherwise, do not interfere with his activity.) We must

find a Special Papers Chairman for soliciting practical papers.

Progress is good. Manuscripts for April's Newsletter were mailed to IEEE Headquarters on time. We have enough photos to fill a photo page for next three issues, and continue to solicit more for wider scope and more timely topics. Dr. Kowalski has promised inputs for a Maintainability Corner.

The April issue will feature a Status of Reliability 1980 report. July will feature a listing of RADC R&M Technical Reports. Advertisements for Editor and Special Papers Chairman will be run in the April Newsletter. I am acting in these capacities for now. Letters to Committee Chairmen and Chapter Chairman will be mailed 1 April 1981 to solicit inputs for the July issue.

One item of interest—The postage rate increase will raise mailing costs and increasing both Newsletter and Transactions expenses.

Anthony Coppola

13 March 1981

AdCom Committee Reports

Chapter Activities

Awards

The awards program is complete for the 1979–1980 awards year. The forms will be revised and presented at the fall AdCom Meeting.

New Chapters

Denmark. No further progress. I have scheduled a start on this chapter in May 1981.

Dallas, Texas. A second letter was sent on February 18, 1981 to Ray Wilson who answered the Reliability Newsletter ad for new chapters. Attached to this letter was a new list for the Dallas–Fort Worth area that was received from Dave Troxel. In April, a followup phone call will be placed to Ray Wilson.

San Diego, California. No responses to our ads. In April, we suggest obtaining a list of the members and sending them a letter to see if we can get a response.

Phoenix, Arizona. Possibility!

Membership Program Incentives—Chapters

No requests for additional brochures "Your Invitation to Join" were received.

Reliability Newsletter

A Chapter Chairman's report was given to the editor for the April 1981 issue.

Miscellaneous

A letter was sent to Art Siegel with information on Chapter Sponsored Seminars, another was sent to Albert Angevine of the IEEE Components, Hybrids Group on the establishment of IEEE Society or group awards.

Henry A. Malec

April 1, 1981

Maintainability Committee

The 1981 objectives for the Maintainability Committee (MC) are:

(a) To provide an interface between the IEEE Reliability Society and other technical organizations on matters of interest to the MC.

(b) To contribute to the Newsletter articles and other information related to maintainability.

(c) To develop a core group to conduct MC activities.

Plans and progress to date:

(a) Four organizations will be identified for contacts during the year, including the EIA, SAE, and AMC (Airlines Maintenance Conference). Appropriate persons within these organizations will be contacted in the second quarter, and exchanges of information will begin in the second half of the year.

(b) Tony Coppola has agreed to set aside Newsletter space for a "Maintainability" column if I can provide him with appropriate material in a timely manner. Initial inputs are planned for April (for the July issue). I plan to encourage several contributions to each issue's inputs.

(c) The contributors from (b) and those appointed to the organizations identified in (a) will form the basis of a core group for the MC. My goal is to have this group number 6–8 persons by the end of the year.

R. Kowalski

RAMS Committee

At the March 19, 1981 meeting of the Board of Directors of the RAMS, the following points were made:

- The attendance for 1981 was 830 total, of which 197 were gratis.
- A net surplus of approximately \$8,000 is expected which will be divided equally among all the sponsors.
- The Symposium attendance statistics were distributed by Kurt Green, the 1981 General Chairman, including the distribution of attendees by society affiliation. As usual, the IEEE led by a wide margin. Also included was a listing of people requesting information on certain societies. Among these, a number inquired about IEEE Reliability Society.
- We desperately need IEEE candidates in the management committee queue. I recommend either a newsletter article on this, seeking out qualified candidates or, as a minimum, recommendations by members of AdCom.

- A first cut for the 1982 break-even point (assuming 1981 fee structure) was made and indicates 702 paid would be required. Howard Kennedy was asked to recalculate necessary fees to achieve a break-even from 500 to 550. Significant differences for 1982 income and expenses will be: IEEE proceedings income, changes in mailing rates, increased banquet costs, and a number of other items.
- The usual sponsor self-evaluation is required for the June Board of Directors meeting. I plan to put this together and will furnish a draft copy for review and comment sometime prior to that date.

Val Monshaw
March 30, 1981

Chapter Reports

Mohawk Valley Chapter

The May meeting of the Mohawk Valley Chapter will be held on May 6, 1981 at Grimaldi's Restaurant in Utica, New York. The topic will be "An Advanced Look at the Electronic Reliability Design Handbook," presented by J. J. Naresky, IITRI. The speaker will preview completed portions of the handbook now in preparation. When complete it will supersede the 1975 Reliability Design Handbook. The work is sponsored by the Rome Air Development Center who also sponsored preparation of the 1975 document.

(Received 27 April 1981)

Cleveland Chapter

Meetings

- Oct. 1980—Photovoltaic Power Systems
- Nov. 1980—Computer Metrology
- Apr. 1981—GIDEP Productivity
- May 1981—CSU Research Topic
- June 1981—Computer Medical Diagnosis
- Completed CECON '80 Conference Record Project.
- Submitted Draft Copy of Reliability Society Home Study Course.

V. R. Lalli
Chairman

Los Angeles Chapter

One hundred thirty engineers attended a Saturday seminar on Electronic Components Reliability Screening that took place at the TRW Forum in Redondo Beach, CA on April 25, 1981. It was sponsored jointly by the IEEE S7 Reliability and S21 Components, Hybrids and Manufacturing Techniques Society Chapters of the IEEE Los Angeles Council.

This seminar featured data from burn-in and screening tests collected by the Parts Screening Committee on over 30 million parts (mostly ICs) and some data on module

screening. Emphasis was on the efficiency of different screening methods to permit selection of appropriate methods to meet program constraints.

The following is a list of the talks given and data presented on April 25, 1981.

Morning

- Evaluation of part screening effectiveness—Paul H. Greer, Motorola Semiconductor.
- Effectiveness of alternative parts screening techniques for commercial equipment—F. Dagonese, TRW.
- Parameter drift screening and minuteman data—Arthur Hetherington, TRW.
- Results of screening "MIL-SPEC" built parts to mil specifications parameters—Dyle W. Seldon, MCAIR Space Division.
- Non-destructive screening on a microscopic scale—Rolf D. Weglein, Hughes Aircraft Company.
- Non-destructive thermal wave microscopy payoff—Allen Rosencwaig, THERMO-SCAN, Inc.

Luncheon

Address: Component Screening—An Economical Overview—J. R. Isken, Director Reliability and Quality Control, TRW Electronic Components Division.

Afternoon

- Conformity/improvement dilemma in component screening—Dr. Herman D. Rue, Hughes Aircraft Company.
- The Effect of endless burn-in on reliability growth projections—an update—A. Bezat, Honeywell.
- Long-term testing of 16K RAMS to establish failure mode screening requirements—I. Doshay, RTW.
- Compendium of burn-in and screening data—ECRSC Members Panel.
- Optimum screening—Benefits vs. Cost—ECRSE Members Panel.

A copy of the seminar abstracts and data compendium may be obtained thru Irv Doshay at TRW 90/2983, One Space Park, Redondo Beach, CA 90278. The cost is \$13, and checks should be made out to LA IEEE Reliability Society.

This book includes a foreword by Kam Wong on the use of screening to surface flaws in devices and an introduction by Irv Doshay on considerations for optimizing burn-in and screening, together with a "break even" chart.

The IEEE Reliability Society, Los Angeles Council, presented a reliability training course on May 22 and 23, 1981. It was held at TRW, Building 110 in El Segundo. Hardware and software reliability and their interrelationships were covered. Emphasis was on applications of quantitative methods, particularly concentrating on the "how-to," at an intermediate-to-advanced level.

The first topic covered on May 22, was the basis and use of the proposed new revision of MIL-HDBK-217 for reliability prediction for both military and commercial equipment. The lecturer, Mr. Sam Lehr of TRW, also discussed and compared the important changes of the new revision, such as environmental factors and the addition of nonoperating failure rate models for all parts.

The second topic was intermediate-to-advanced techniques in modeling, found essential for reliability predictions involving equipment in complex configurations. This lecture, by Mr. Eugene Barnett of TRW, covered such techniques as truth tables, stress-strength models, Markov models and Monte Carlo simulation.

On May 23, the subjects encompassed the fundamentals of computer software reliability including terminology, error sources and prediction models. Management techniques and tools for producing reliable computer programs were also presented. A thorough discussion was held on the relationships between those hardware and software reliability con-

cepts that must be understood in order to conduct overall reliability and maintainability models of systems controlled by computer processing. Mr. Irving Doshay and Mr. Myron Lipow of TRW presented the topics on software reliability. Mr. Frank Ingrassia, also of TRW, covered software quality.

Throughout the series of lectures, a set of interesting examples was presented for class participation. A complete set of lecture notes and a text on reliability was supplied to each of the participants. The fee of \$85 for two days or \$50 for one day included catered luncheons. Class participation was limited to 40 each day. For information on a repeat of this mini-course contact Mr. Irving Doshay, TRW/STNC/-1514, One Space Park, Redondo Beach, CA 90278. (213-536-2006 or 213-535-1020).

A joint meeting of the CHMT and Reliability Chapters took place in Los Angeles, at the Hacienda Hotel, on March 19, 1981 on Reliability of Thin Gold Plated Electrical Contacts in an Office Environment. The speaker at that meeting was Will Reyes of the Xerox Corporation at El Segundo, CA. Gold plating only 15 microinches thick can be adequate for the contact fingers of printed wiring boards used in an office environment. This startling conclusion was reached as a result of studies and field measurements of over 20,000 contacts. Will Reyes, materials and process manager of Xerox Corporation, described the nature and rate of wear of the gold plating during successive cycles of mating with the connector as well as connector design considerations. The effect of usage environment on the reliability of the contact system was also covered.

Volunteers Needed

The Annual Reliability and Maintainability Symposium (RAMS) is managed by a committee of volunteers nominated by the sponsoring societies. The IEEE Reliability Society will need a supply of workers for future symposiums, and would like to hear from those interested.

The 1982 Symposium Committee has been at work since January 1981. Volunteers will be needed for the 1983 and future symposiums. The 1983 Committee will start work in January 1982. Committee members will be expected to attend planning meetings held at the Symposium site as well as the Symposium itself. Planning meetings are held in March, June, September, and November of the year before the symposium. The 1983 Symposium will be held in Orlando and the 1984 gathering on the West Coast. Those interested in participating as IEEE representatives, please contact: Carl M. Bird, IBM Corporation, 102 A 353, Owego, NY 13827, (607) 751-3729.

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The names and addresses of new members, from January 1981 through March 1981, are listed below. For USA members, they are listed by alphabetical order of their state. For members outside the USA, they are listed by alphabetical order of their country's English name.

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Congressional Record Cites IEEE Fellow

Senator Strom Thurmond (R-S.C.), Chairman of the Senate Armed Service Committee, in December cited the importance of the Science and Engineering Fellows program which has allowed over 140 scientists and engineers to participate in the Congressional process since 1973. As published in the Congressional Record of December 3, 1980, he issued an extensive citation of IEEE Congressional Fellow Thomas L. Fagan who, as the Senator noted, worked for the Subcommittee on General Procurement, and also assisted the Senator in such areas as technology transfer, the U.N. Moon Treaty, civil defense and other defense related matters.

He stated that "Mr. Fagan has performed a very valuable service for the U.S. Senate and for our country. I extend to him my appreciation for the service to his country and urge other members to make use of this worthwhile Congressional Science and Engineering Fellows Program."

Reader's Contributions

Tutorial Reliability Course

A three hour tutorial reliability course on industrial and commercial power systems was conducted on October 1,

1980, in Cincinnati, Ohio, at the IEEE Industry Applications Society Annual Conference. Attendance was 54. The newly issued IEEE Standard No. 493-1980 was used as text material.

Four previous reliability tutorials during 1976-1978 had attendances of 130, 42, 160, and 54. These were given respectively at: 1) IEEE Industrial & Commercial Power Systems Technical Conference; 2) The Pentagon for the Department of Defense; 3) ASQC Reliability Engineering Conference for the Electric Power Industry; and 4) NASA Goddard Space Flight Center.

IEEE Standard No. 493-1980—"IEEE Recommended Practice for the Design of Reliable Industrial and Commercial Power Systems"

This standard is a 224 page reliability handbook and was issued in October 1980. Included are summaries of the data from the extensive IEEE-IAS equipment reliability surveys and cost of power outage surveys published as committee reports during 1973-1979.

Also included are the basic concepts of reliability analysis by probability methods; fundamentals of power system reliability evaluation; economic evaluation of reliability; reliability analysis examples; evaluating and improving the reliability of existing plant power systems; emergency and standby power; and electrical preventive maintenance.

IEEE members can purchase this standard from the IEEE Standards Office, 345 East 47th Street, New York, N.Y.

10017. The price is \$17.95 per copy plus a \$2.00 handling charge.

Reliability Survey of Power Transformers (1980)

The results from this IEEE-IAS reliability survey of industrial plants and commercial buildings were published at the I & CPS Conference in May 1980 (80CHI543-8-1A). They will also be published in the IEEE-IAS Transactions.

Reliability Survey of Local Generation Equipment and Emergency and Standby Power Systems (1980)

The results from these two IEEE-IAS surveys were published at the I & CPS Conference in May 1980 (80CHI543-8-1A).

Motor Reliability Survey (1982)

A new IEEE-IAS reliability survey on motors is now in process.

Cable Reliability Survey (1983)

A new IEEE-IAS reliability survey on cable, terminations and joints is now starting up.

Other Future Equipment Reliability Surveys (1983 and after)

Additional IEEE-IAS equipment reliability surveys will be undertaken for one, two or three equipment categories at a time. The procedures for how to conduct IEEE-IAS equipment reliability surveys have been written up. These procedures reflect twenty years of AIEE and IEEE-IAS experience on this subject.

Effect of Preventive Maintenance and Diagnostic Testing on Failure Rate

A paper "Calculation of Optimum Preventive Maintenance Intervals for Electrical Equipment" by D. J. Sheliga was presented at the IEEE-IAS Conference, October 1, 1980. This paper was based upon 10,000 failures collected at the author's company over a period of seven years for twenty-three categories of electrical equipment. Included was a definition of what failures could be prevented by maintenance. Actual data were used to determine how this failure rate varied with maintenance interval. The optimum maintenance interval was then determined based upon maintenance cost and the cost of failures/power outages. Failures that could be prevented by diagnostic testing were then studied in a similar manner to those that could be prevented by maintenance. The optimum diagnostic test interval was then calculated for fifteen equipment categories based upon the cost of diagnostic testing and the cost of

failures/power outages. Mr. Sheliga reported that 25 percent of the failures could have been prevented by maintenance and additional failures could have been prevented by diagnostic testing.

It is hoped that the methods used in this paper can be incorporated into future IEEE surveys of the reliability of electrical equipment in industrial plants and commercial buildings. This approach fills an important missing link that needs to be considered when making studies on the economics of improved reliability. The IEEE-IAS surveys during 1973-80 have found that inadequate maintenance is a significant cause of failures of electrical equipment in industrial plants and commercial buildings.

Inputs to Other IEEE Standards

An updated reliability section will be included in the following IEEE Standards when they are revised in the future:

- No. 141 "Recommended Practice for Electric Power Distribution for Industrial Plants" (the largest selling standard in the entire IEEE).
- No. 241 "Recommended Practice for Electric Power Systems in Commercial Buildings."
- No. 399 "Recommended Practice for Industrial and Commercial Power Systems Analysis."

Charles R. Heising
February 11, 1981

Reader's Contributions Wanted

We hope you find this newsletter useful as a source of information. You can also use it as a forum for communicating with the Reliability Society AdCom or with the Reliability Community in general. If you would like to announce a meeting, compliment or criticize the Newsletter Editor or the Reliability Society ADCOM, suggest an idea, make an observation, or just share a joke, please let us hear from you.

All contributions for the October 1981 issue must be received by 1 August 1981. Otherwise they will appear in the January 1982 issue.

Also needed are contributions to the Status of the Reliability Technology 1981. The April 1981 issue of this Newsletter contained a report on the Status of the Reliability Technology 1980. We hope you found it useful. Your contributions are sought for the 1981 report. They could include any new developments in Reliability or Maintainability, trends you perceive, noteworthy accomplishments or failures, and unresolved problems. All inputs welcome, but must be received by 1 November 1981.

Send all contributions to ANTHONY COPPOLA, Editor, RADC/RBET, Griffiss AFB, NY 13441.

Maintainability Matters

Like the Marine Corps, the Maintainability Committee (MC) is looking for a few good men and women to interface with selected technical organizations on matters of interest to the MC, and to contribute articles and other information related to maintainability to this Newsletter.

Newsletter information can include reviews of maintainability related reports; status reports for on-going research; discussions of subjects needing additional research; description of new specifications or standards relating to maintainability or revisions of such documents.

If you are interested, contact Dr. Richard Kowalski, Maintainability Committee Chairman, ARINC Research Corporation, 2552 Riva Road, Annapolis, MD 21401, (301) 266-4841.

The IEEE Transactions on Reliability has scheduled a special issue on maintainability for August 1981.

The special issue will include approximately a dozen papers which focus on three topics related to the maintainability of modern electronic systems: fault detection/fault isolation (FD/FI) characteristics; the interaction of system hardware and software elements; and the cost (or other resources required) for maintenance.

Each of these topics is addressed and analyzed from a variety of viewpoints. The results are a snapshot of current achievements and the identification of several areas for future analysis and research. The information in the Special Issue will be useful both to the newcomer to the maintainability discipline and to the experienced analyst or researcher.

Dr. Richard Kowalski, of ARINC Research Corporation, is the guest editor for this special issue.

AFSC and AFLC publish a "Product Performance Agreement Guide"—At a series of meetings in 1979, senior Air Force and industry representatives met to discuss the application of commercial type warranties to military hardware. A set of principles were adopted during these meetings and it was decided that these principles should be expanded and incorporated into a guide for use by Air Force and industry in their mutual efforts to determine, better define, and communicate the requirements for building a quality product.

These efforts resulted in a "Product Performance Agreement Guide," dated 22 July 1980 and jointly published by the Air Force Logistics Command (AFLC) and the Air Force Systems Command (AFSC). A cover letter, signed by Generals Bryce Poe (AFLC) and Alton D. Slay (AFSC), states that the Guide is an informational document and that the principles in the Guide should be implemented to the maximum possible extent.

The Guide is divided into two parts. Part A provides an overview and summary of twenty-three product performance agreements that may be appropriate for use in Air Force contracts and describes the planning efforts that should accompany the use of such agreements and the relationships between these activities and other program efforts. Several of the product performance agreements are related to

maintainability characteristics of an equipment, for example, the warranty of repaired/overhauled equipment; availability guarantee; maximum parts cost guarantee; and a mean time to repair guarantee.

Part B of the Guide is a series of appendixes which summarize each product performance agreement and provide more details of the potential applications of the agreement.

Copies of the "Product Performance Agreement Guide" may be obtained from HQ AFSC/PMP, Andrews AFB, MD 20334.

Dr. Richard Kowalski

Training Courses

Reliability and Life Testing

This course is designed for engineers, scientists and others concerned with the reliability, design, product assurance, quality and safety aspects of components, equipment and systems. The course is also of interest to those concerned with improving the reliability of components, equipment and systems; following their reliability growth; identifying the distributions of their times to failure; determining their mean life, reliability and confidence limits; selecting small sample size and short duration tests to determine their mean life, reliability and confidence limits; identifying nonparametric testing techniques when the underlying times-to-failure or life distribution is not known; and the planning and execution of sequential, accelerated and Bayesian tests for all types of components, equipment and systems. Numerous applications will be presented. Course participants' problems will be solicited and solutions suggested or given.

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Course No. Engineering 885.80 3.0 CEU

FEE: \$775, includes extensive lecture notes of over 700 pages.

For TECHNICAL information regarding the courses, contact the coordinator Dimitri Kececioglu, at (602)626-2495, 626-3901, or 297-2679.

For REGISTRATION information, call the Short Course Program Office at (213)825-1295 or 825-3344.

George Washington University Announces Three Short Courses to be Presented in Chicago

Courses to be held at the Center for Continuing Education, the University of Chicago, 1307 East 60th Street, Chicago, IL 60637. The fee is \$760 for each course. Group discounts are available. For information call: Continuing Engineering Education Program, George Washington University, Washington DC 20052 (202)676-6106, (800)424-9773, TELEX 64374 (International). Refer to course no. 757C1 *Quality Circles*—July 6-10, 1981; course no. 765C1 *Reliability Engineering*—July 13-17, 1981; or course no. 679C1 *Reliability Testing*—July 20-24, 1981.

Machines Don't Fail—People Do

Edwin F. Shelley

On the evening of April 24, 1980, the United States launched a dramatic military operation to rescue the 50 American hostages held in Teheran. In the early hours of the following morning the rescue mission was aborted because of the mechanical failure of three out of eight helicopters assigned to the mission. Eight American servicemen died during the withdrawal operation.

More recently, on June 3rd and then again on June 6th a computer failure in our air defense system triggered an erroneous warning that Russian missiles were launched and speeding toward targets in the United States. Nuclear countermeasures were initiated, and retaliatory strikes were finally called off after several minutes of frantic checking to determine the validity of the computer signals.

The avalanche of political comment on the tragic failure of the rescue mission and on the close brush with nuclear Armageddon has obscured a crucial lesson for all Americans: if we wish to preserve our independence as a nation and our freedom as a people we must overhaul our attitude toward personal responsibility in our work.

Machines do not fail—the people who design, build, operate or maintain them fail. There was a time when trains rarely derailed, when cranes rarely buckled, when roofs rarely collapsed and when standard military gear functioned even in a storm. A failure rate of three out of eight (almost 40%!) would have destroyed the U.S. space program long before we landed on the moon. It would have paralyzed the invasion forces on D day and lost World War II for the Allies. An airline failure rate of three planes out of eight would stop all air travel. An unresolved failure in the air defense computer system could launch World War III.

Yet a high failure rate, routinely blamed on machines, is becoming typical of much American society today. When your department store keeps dunning you for a bill that you have already paid, the so-called "computer error" was caused by an ordinary clerk pressing a wrong key or an ordinary programmer who didn't allow for contingencies. When you buy a new automobile and spend the next six months in and out of the shop getting it to run properly, it is not machine failure, it is a failure by a careless designer, assembler, inspector or manager responsible for the car's production or delivery. When you get your wedding invitations back from the printer and the middle initial is wrong, it was not the automatic press which substituted initials. Of course, the printer does the job over at no charge, but obviously the cost of such errors must be built into the price of the wedding announcements—and the price of the automobile, and the department store merchandise.

Thus, in the commercial sphere, our growing carelessness and lack of personal responsibility is reflected in lower productivity and higher costs for goods and services. We compete less effectively with other countries, and our national standard of living declines. "Nobody's perfect" and "I'm only human" and "Work isn't everything, you know" translates into "I can't make ends meet," "I can't afford a vacation this year" and "I need a raise."

Increasingly frequent examples of "machine failure" simply represent the failure of people to take reasonable care in performing their jobs. They are not the failures of some inanimate devil called a machine—machines do precisely what their designers, builders, operators and maintainers tell them to do. Although some machines are more complicated than others, they all obey the same laws. Assuming that the basic knowledge exists for designing, building, operating and maintaining a particular machine, its reliability is determined by the care taken by the people engaged in each of these tasks. The railroad locomotive built in the last century under an earlier standard of care, and now retired to a museum after 50 years of operation, could roar out of the museum tomorrow to resume the task for which it was designed.

The military effects of this alarming syndrome of personal irresponsibility and carelessness can be catastrophic. The failure of a dramatic rescue mission with the loss of eight lives, the resulting scorn of our enemies and the shaken confidence of our friends—these are just curtain raisers. The crucial drama comes when we must defend our allies, and ultimately ourselves, against the escalating advances of practitioners of realpolitik. Our military power—real or perceived—is an important stabilizer in today's world. Any advantage which we may possess in sophisticated weaponry becomes a terrible disadvantage if the weapons fail to work. And they will fail to work if the people—from top to bottom—responsible for their design, construction, maintenance and operation are not imbued with a strong and continuing sense of responsibility for their respective jobs. Competent leadership is obviously important, but in the end it may be the degree to which we practice individual responsibility that determines whether we survive as a free nation. ■

Reprinted from IEEE TECHNOLOGY AND SOCIETY, September 1980. To get a free copy of the latest issue of TECHNOLOGY AND SOCIETY, write or phone Frank Kotasek, Jr., 73 Hedges Ave., E. Patchogue, NY 11772, (516)475-1330. Edwin F. Shelley (Senior Member, IEEE) is Director of the Center for Energy Policy and Research at New York Institute of Technology. He was a flight test engineer during World War II.

Safety Engineering and the Value of Life

T. W. Lockhart

It has been argued that any realistic approach to safety engineering must countenance setting a monetary value on human life. This is because most practical engineering designs involve tradeoffs between safety considerations and costs. Usually either it is impossible to produce a design that carries no risk to human life or the costs of implementing such a design would be prohibitive. The engineer often must decide what risks are acceptable.

If a monetary value can be assigned to human life, then the task of deciding how safe the design should be is greatly simplified. Since human life has a monetary value, the preserving of a human life is an economic benefit, just as the costs of safety are economic costs. The optimum design will be that which is expected to maximize the margin by which benefits exceed costs. It is therefore of practical importance to determine what monetary value should be assigned to human life. However, views differ greatly on how one even approaches such a task.

If we agree that when a person dies something of value is lost that is not merely its utility for society, then we have reason to believe that there is an *intrinsic value of human life* that generally makes it worth preserving. According to this view, associated primarily with Immanuel Kant, human beings have a worth that is not commensurable with that of mere objects. This Incommensurability Principle is clearly incompatible with any attempt to place a monetary value on human life or to justify actions on the basis of such a valuation.

Is it possible to reconcile the Incommensurability Principle with the commonsense view that considerations of safety must be weighed against economic costs? If we accept the Incommensurability Principle, how can we ever say that

further risk reductions are "too expensive"? I believe that part of the answer lies in the fact that we increase the *quality of life* by accepting certain risks—for example, the risks inherent in air transportation, in driving our cars, or in walking across the street. We would consider it "too expensive" to eliminate those risks by foregoing those activities. The intrinsic value of human life, while perhaps not expressible in dollars and cents, may be commensurable with the *quality of life*.

To say that some safety improvements may be rejected as "too expensive" of course does not explain how to distinguish them from those that should be implemented. Perhaps, however, our analysis does support the principle that we should forego available safety improvements only when they would require substantial sacrifices in the quality of our lives. ■

(Excerpted from IEEE *Technology and Society*, March 1981. To get a free copy of the March issue, write or phone Frank Kotasek, Jr., 73 Hedges Avenue, East Patchogue, NY 11772, (516)475-1330.)

TECHNOLOGY AND SOCIETY

Can engineers afford to remain silent in the ongoing public debate over the effects of technology on society? Should the engineering profession play a more active role in technology policy decisions? Is the IEEE Code of Ethics relevant to situations encountered by engineers in real life? Can the value of a human life be expressed in dollars and cents? These are some of the questions that are explored in the following articles, which appear in the March 1981 issue of IEEE TECHNOLOGY AND SOCIETY:

The Social Implications of Technology—the Engineer's Trilemma; Ethical Dilemmas in Modern Engineering; The Value of Human Lifetime and its Application to Environmental and Energy Policy; Safety Engineering and the Value of Life.

To get a free copy of the March issue, write or phone Frank Kotasek, Jr., 73 Hedges Ave., E. Patchogue, NY 11772, (516) 475-1330.

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Call for AdCom Nominations

The Reliability Society Bylaw 4.1 directs the Chairman of the Nominating Committee to issue a Call for Nominations directed at Society Membership. It further directs the Chairman to advise the Society Membership that a Nominating Petition carrying a minimum of twenty-five names of Society members, excluding students, will automatically place the nominee's name on the slate to be voted on by the AdCom.

Nominations and/or nominating petitions should be sent by 1 August to Dr. T. L. Regulinski, Chairman, Nominating Committee, P.O.Box 295, Goodyear, AZ 85338.

Potpourri

The following is a collection of short contributions, each hopefully worth a brief meditation or maybe a smile.

Overheard at a technical conference was the comment by an anonymous Air Force Master Sergeant: "We find Maintenance Technical Orders quite useful—as something to stand on so we can reach the equipment."

Observation by Pat O'Connor during a discussion of Reliability Prediction: "Statistics are fine for modeling acts of God. For modeling acts of man they very often aren't worth a damn."

Related comment in March 1981 IEEE Components, Hybrids and Manufacturing Technology Society Newsletter: "Statistics can be used to support anything—mostly statisticians."

In response to the editor's request for technical humor, Naomi McAfee resurrected the following limerick:

There once was a lady named Bright
Who could travel much faster than light;

She departed one day
In a relative way
And returned on the previous night.

Etymology Dept: Some disillusioned program manager provided the following analysis of the origin of the title "Reliability Engineer": An engineer creates things, "ability" is the capability of doing something successfully, "Lie" is a falsehood, and "re" is a prefix designating repetition. Hence, a reliability engineer is a person who can be counted on to create a series of falsehoods.

Incidentally, the title of this article, "Potpourri", designating a mixed bag, derives from the French *Pot Pourri* meaning "rotten pot." (Note: This is supplied for academic interest only, expressions of agreement would be quite inappropriate. However, your editor will be delighted to serve as the pot if you will provide the ingredients for future verbal stews. See *Readers Contributions Wanted* in this issue).

Call for Papers

The IEEE Transactions on Reliability has a continuing need for practical papers.

Examples are:

- Case histories.
- Reliability techniques which were actually found to be useful on a job, and those which were not useful or were too expensive.
- How you set realistic R&M requirements for a system or equipment.
- What kinds of reliability testing were actually cost-effective.
- Use of reliability data from the field instead of from special reliability tests. Comparison of field data with reliability tests.

- Comments on the worth of standards such as the many international or US military standards on reliability.
- Ideas, from experience, on the major obstacles to setting and achieving worthwhile reliability requirements in commercial, military, or other fields.
- Where to find information. For example, a list of trade and professional journals of value to electronics reliability and quality control practitioners.
- Information summaries. For example, annotated lists of computer programs for analyzing electronic circuits or for generating fault trees—tell what the programs do, how big a computer they need, and where they are available.

Send submissions or ideas to Ralph A. Evans, Editor, IEEE Transactions on Reliability, 804 Vickers Ave., Durham, NC 27701.

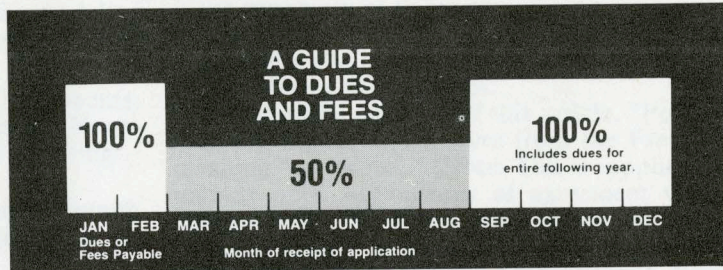
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