



Reliability Society Newsletter

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PAUL GOTTFRIED
9251 THREE OAKS DR
SILVER SPRING MD 20901

Editors: Gary Kushner and Mark Snyder
Vol. 34, No. 1, January 1988 (USPS 460-200)

Chapter Awards 1986-1987

The IEEE Reliability Society AdCom held its Annual Chapter Awards Dinner at the Radisson Mark Plaza Hotel, Alexandria, Virginia, on Thursday evening, October 22, 1987. Bob Jaquess, Chairman of the Chapter Awards Committee, reported that six of our 17 active chapters had completed awards questionnaires:

- Central New England
- Cleveland
- Northern New Jersey
- Ottawa/Ontario
- Philadelphia
- Washington/Northern Virginia.

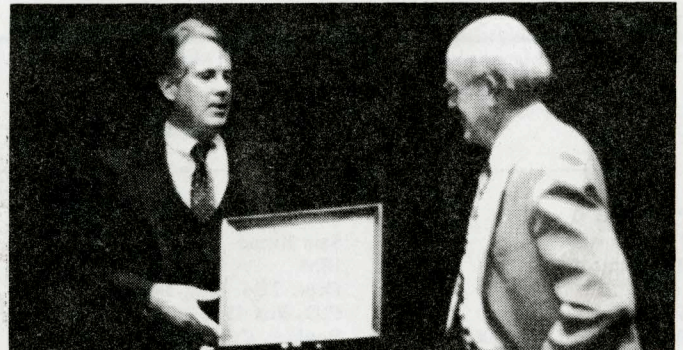
Their responses included information on chapter activities, technical publications, and membership growth. Bob applauded the efforts of each participating chapter and the thoroughness and completeness of their responses.

The winning chapters and their chairmen are shown below. The AdCom congratulates you and your officers for outstanding efforts on behalf of our members.

First Place **Philadelphia**
Certificate and \$500 for Chapter expenses
Chairman: Fulvio E. Oliveto
Dave Troxel accepted for Fulvio

Second Place **New England Council**
Certificate and \$150 for Chapter expenses
Chairman: Gene Bridgers

Third Place **Ottawa**
Certificate and \$100 for Chapter expenses
Chairman: R. Arseneau



Bob Jaquess (L) presenting the first place plaque to Philadelphia's Dave Troxel (R).



Gene Bridgers (L) of the New England Council receiving plaque from Bob Jaquess (R).



Shown are the three chapter chairmen, who attended the AdCom Meeting on October 22. (From left to right) Hank Moss — North Jersey, Ray Schaffer — Washington/North Virginia, and Gene Bridgers — Central New England Council.

RS Newsletter Inputs

All RS Newsletter inputs should be sent to one of the associate editors, **Gary Kushner**, 499 Brigham St., Marlboro, MA 01752, or **Mark Snyder**, Digital Equipment Corporation, 24 Porter Road (LJ01/C2), Littleton, MA 01460, per the following schedule:

For October Newsletter: by July 15
 For January Newsletter: by Oct. 15
 For April Newsletter: by Jan. 15
 For July Newsletter: by Apr. 15

Associate Editors: Gary Kushner
 499 Brigham St.
 Marlboro, MA 01752

Mark Snyder
 Digital Equipment Corporation
 24 Porter Rd. (LJ01/C2)
 Littleton, MA 01460

Reliability Society Officers

PRESIDENT T. L. Fagan Research Cottrell 1625 K St. Suite #210 Washington, DC 20006	VP MEMBERSHIP Sam Keene IBM Dept. TR4, Bldg. 002 P.O. Box 1900 Boulder, CO 80302	VP TECH. OPERATIONS Bernard Bang Westinghouse Electric Corp. P.O. Box 1521 MS-3856 Baltimore, MD 21203	SECRETARY Al Tamburino RADC/RBRP Griffiss AFB, NY 13441-5700
JR. PAST PRESIDENT Alan O. Plait ManTech Advanced Systems, Inc. 5402 Yorkshire St. Springfield, VA 22151	VP MEETINGS A. Constantinides AC Sciences Ltd. 11525 Chapel Road Clifton, VA 22024	VP PUBLICATIONS A. Coppola Rome Air Dev. Ctr. RADC/RBET Griffiss AFB, NY 13441-5700	TREASURER W. T. Weir Evaluation Associates, Inc. GSB Building 1 Belmont Avenue Bala Cynwyd, PA 19004

Reliability Society AdCom Elections

The election for the class of 1990, Reliability Society Ad-Com has been completed. The following persons have been elected and will be inducted at the AdCom meeting at RAMS on 25 January 1988:

Bernhard Bang
 Phil Eisenberg
 Kurt Greene
 Bob Jaquess
 Howard Kennedy
 Al Tamburino

Congratulations!

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Reliability Society Newsletter

Reliability Society Chapter Chairmen

CHAIRMAN, CHAPTER ACTIVITIES
 Bernhard A. Bang
 Westinghouse Electric Corp.
 P.O. Box 1521
 MS 3856
 Baltimore, MD 21203

CLEVELAND
 V. R. Lalli
 21000 Brookpark Rd.
 MS 500 211
 Cleveland, OH 44135

MOHAWK VALLEY
 Jack Bart
 RADC/Att. RB
 Griffiss AFB, NY 13441-5700

NORTHERN NEW JERSEY
 Raymond W. Sears Jr.
 13 Garabrandt St.
 Mendham, NJ 07945

TRI CITIES
 Alan O. Backus
 1141 Oakleaf Dr.
 Kingsport, TN 37663

BALTIMORE
 Neil Hall
 113 Newburg Ave.
 Catonsville, MD 21228

DENVER
 Samuel Keene
 IBM
 Dept. 515, Bldg. 025-1
 P.O. Box 1900
 Boulder, CO 80320

MONTREAL
 Mr. Francis Dupuis
 Hydro Quebec
 75 West Dorchester, #801-S
 Montreal, QC, Canada H2Z 1A4

PHILADELPHIA
 Fulvio E. Oliveto
 920 Snyder Ave.
 Philadelphia, PA 19148

WASHINGTON/NORTHERN VIRGINIA
 W. Raymond Schaffer
 Andrulis Research Corporation
 2231 Crystal Drive #711
 Arlington, VA 22202

CENTRAL NEW ENGLAND COUNCIL
 A. G. Bajakian
 Raytheon Sudbury
 Box 210
 528 Boston Post Road
 Sudbury, MA 01776

FLORIDA WEST COAST
 James N. Rutledge
 E-Systems
 ECI Division
 P.O. Box 12248, MS19
 1501 72nd St. North
 St. Petersburg, FL 33733-2248

ONTARIO
 Rejean Arseneau
 Nat'l Res. Council of Canada
 Division of Electrical Engineering
 Montreal Rd., Bldg. M-50
 Ottawa, Ont. Canada K1A 0R8

SANTA CLARA VALLEY/SAN FRANCISCO/OAKLAND/EAST BAY
 David Burgess
 Hewlett-Packard Co.
 1681 Page Mill Rd.
 Bldg. 28B
 Palo Alto, CA 94304

CHICAGO
 Paul Evans
 Northrop Defense Systems Div.
 500 Hicks Road
 Rolling Meadows, IL 60008

LOS ANGELES COUNCIL
 Donald Segal
 650 Jacob Way
 Pacific Palisades, CA 90272

NEW YORK/LONG ISLAND
 Esam Khadr
 Public Service Electric & Gas
 MS T14 A
 80 Park Plaza
 P.O. Box 570
 Newark, NJ 07101

TOKYO
 Prof. Mas. Sasaki
 Dept. of Electrical Engineering
 The National Defense Academy
 Yokosuka 239, Japan

Chapter Activities

Central New England Council

The last three months have been busy for the Central New England Reliability Chapter. We concluded our successful Fall Lecture Series entitled "Product Assurance Principles," conducted by Gene Carrubba of Codex Corporation.

In December we had a stimulating dinner meeting at the Holiday Inn Crowne Plaze in Natick, Massachusetts. The topic was "Reliability Training - What's Available?" Over 50 members attended the meeting.

Arsene (Jake) Bajakian
 Chairman, CNEC

Denver Chapter

The Denver Chapter under the direction of Chairman Dale Butler and Meetings Chairman Jack Reisdorf conducted a roundtable meeting on R&M 2000 and has schedul-

January 1988

ed a joint meeting on safety and reliability. The R&M 2000 meeting featured Bob Jaquess as the speaker and was held on November 11, 1987. The safety and reliability meeting is scheduled for January 14, 1988. Both meetings are in Denver. Additional details on these meetings can be obtained from Jack Reisdorf at (303) 977-4951.

The Denver Chapter of the IEEE Reliability Society has planned the following meetings and seminars for the coming year.

- February 11, 1988—Joint meeting with ASQC (date is tentative)
- March 10, 1988—Roundtable meeting on reliability tools and innovative solutions to reliability problems/tasks.
- April 15, 1988—Full day training seminar. Tentative topic will be an in depth study of the Weibull distribution and it's applications.
- May 13, 1988—Annual software reliability symposium hosted by Ford Aerospace in Colorado Springs.

New Reliability Society Members

Edward J. Abeska 608 Ardmore Drive Detroit, MI 48220	Walter Carrasquillo 5734 Carmack Rd. Hixson, TN 37343	Donald K. Higgins 2708 Blue Quail Ridge Edmond, OK 73034	Glenn A. Lott 6525 Delmonico Dr. Apt. 13 Colorado Springs, CO 80919
Phil E. Alexander Phelps Dodge Magnet Wire Co. P.O. Box 600 Fort Wayne, IN 46801	Joseph E. Chirco 8 Cordwood Path Shoreham, NY 11786	Robert E. Hill 4836 157th Ave. SE Bellevue, WA 98006	F. P. Whitsitt Lynch 654 North Broadway Providence, RI 02914
Michel Allaire 8845 Blvd. St-Laurent Montreal, Que. Canada H2N 1M3	Arthur J. Curry, Jr. 4002 Lexington Dr., NE Cedar Rapids, IA 52402	Nayem-ul Hoq 1275 W. 29th St. #308 Los Angeles, CA 90007	Manuel C. Macedo, Jr. 70 Talcott Forest Road Farmington, CT 06032
Carmelo S. Amarena 3775 Bay Rd. Menlo Park, CA 94025	Bryce A. Curtis 944 NW 11th Street Boynton Beach, FL 33426	Shze J. Hu School of Physics Univ. Sains Malaysia Penang 11800 Malaysia	Judith A. Malsbury Box 476 RD3 Ringoos, NJ 08551
James C. Arnett 1711 Bonita Vista Dr. La Canada, CA 91011	Joseph J. Danzilio 124 Sudbury St. Marlborough, MA 01752	Michael F. Hunt 35 Commons Dr. #23 Shrewsbury, MA 01545	Frank Margherita 42 Avon St. Wakefield, MA 01880
Gary E. Ashford V T OEM Inc. 900 Lafayette St. Suite 407 Santa Clara, CA 95050	Jimmy L. Davidson 2057 Hummingbird Lane Auburn, AL 36830	Morlin E. Marks 1322 Addiewell Pl. San Jose, CA 95120	Robert G. McBrien 27 Bear St. Selden, NY 11784
John Baird 5 Hale Road Ext. Hubbardston, MA 01452	Alicia D. Ellis Qualified Equip. & Ser. 1616 S Edward Dr. Tempe, AZ 85281	Kevin G. Jew P.O. Box 745 Santa Clara, CA 95052	Nihal J. Mehta 3600 Chestnut St. Box 1064 Philadelphia, PA 19104
Jim W. Becker 7627 E 37th St. N#606 Wichita, KS 67226	Peter C. Enright P.O. Box 353 Ronkonkoma, NY 11779	Everett H. Johnson 9450 Ridge Blvd. Brooklyn, NY 11209	James Miner 17 Hinckley Rd. Tewksbury, MA 01876
Barry I. Bell 1807 Lamonte Lane Houston, TX 77018	Amelia Saenz Fava Conde De Nieva 252 Urb La Vi-Rreyna Lima 33 Peru	David F. Jones 175 Presidential Circle Marshfield, MA 02050	H. W. Mitchell, III 1041 Lynnwood Ave., NE Renton, WA 98056
Lisa S. Berger Van Nostrand Reinhold Publ. 115 Fifth Ave. New York, NY 10003	F. Carl Joyner, Jr. 504 Winston Rd. Columbia, SC 29209	Gabi Katz Intel Israel Ltd. P.O. Box 1659 31015 Haifa Israel	Hamid Mokariha No. 46 Mossavian Alley 87 Sq 46 Meters of West Narmak, Tehran 16457 Iran
James R. Blacquier 26 Woodman St. Lynn, MA 01905	Doreen E. Figueroa 14 Wallis Rd. Portsmouth, NH 03801	Hideki Kitagawa 2350 Kihara Mihomura Inashikigun Ibaraki-Ken/T300-04 Japan	Vide Morkunas 3047 Cherrier Ile Bizard, Que. Canada H9C 1C8
Francis M. Blake 55 Shaw Silver Spring, MD 20904	Ralph B. Fink 11 Peckham Ave. Newport, RI 02840	Andrew A. Konigsberg 41 Valencai Ave. Wembley Downs Perth 6019 Australia	Tim M. Muotka 25037 B 109th Place SE Kent, WA 98031
John B. Bowles 110 Mill Stream Rd. Lexington, SC 29072	Glen T. Fujimori 3816 Oriental Dr. Olympia, WA 98506	Richard K. Kunze, Jr. 7330 Bobolink Ct. Columbia, MD 21045	Ross P. Murosako 67 Aldrich Rd. Wilmington, MA 01887
Lennart J. Brattgard Ericsson Radio Systems AB Stockholm S-16380 Sweden	Arnold J. Fuoco 4621 S 2nd St. Arlington, VA 22204	Lawrence L. Laine 908 Marlborough Cir. Virginia Beach, VA 23464	Harry Niewood 369 Jones Rd. Englewood, NJ 07631
Thomas A. Breigenzer 900 6th Ave. NE Milaca, MN 56353	Peter Grosewald Mill St. Putnam Valley, NY 10579	Mark A. Lavecchia 408 Union Ave. Belleville, NJ 07109	S. Azubike Obiagwu 5781 Cabot St. Detroit, MI 48210
Orvar B. Burman 6401 Cranbrook NE Albuquerque, NM 87111	Jeffery P. Hansen Carnegie Mellon Univ. Dept. of EE & Comp. Eng. Pittsburgh, PA 15213	Robert F. Leepa 3518 Belfont Drive Ellicott City, MD 21043	Jose M. Ochoa 37-55 93 St. Jackson Heights, NY 11372
Thomas L. Cain 309 N. Roundtree Dr. Cocoa, FL 32926	Donald E. Harris 1295 Whirl-a-Way Court Gambrills, MD 21054		

Richard E. Ryals
7969 Quarterfield Rd.
Severn, MD 21144

Daniel J. Udovic
Processor Innovations Corp.
621 Randall Way
Aberdeen, NJ 07747

David P. Wengert
493 Barling Terrace
Goleta, CA 93117

Cary S. Zaborowski
6122 Cedar Lane
Rowlett, TX 75088

Steven J. Sampson
3800 Camino De La Sierra NE
Albuquerque, NM 87111

James F. Vencl
7308 Chicora Ct.
Raleigh, NC 27615

Gregory P. Williams
11 Woodbury Hill
Woodbury, CT 06798

Patricia L. Zajicek
Aerojet Electro Systems
P.O. Box 296
Bldg. T Q/Dept. 4345
Azusa, CA 91702

Bill C. Spradlin
7219 Cambridge Way
Clearwater, FL 34624

Esther Berger Vidal
Calle 11 Nro 159
Urb Los Precursores Surco
Lima 33
Peru

Jeffery W. Wilson
9236 Monte Vista
Alta Loma, CA 91701

David J. Zaterka
13 Riverbirch Rd.
Durham, NC 27705

Janet M. Teshima
1100 W. Hollyvale St.
P.O. Box 296
Azusa, CA 91702

David A. Wallace
Clarkson Univ. Reynolds House
Box R223
Potsdam, NY 13676

Homer Wimberley, Jr.
10405 Angora Dr.
Cheltenham, MD 20623

Tamotsu Yuki
Device Design Yasu Plant IBM
800 Ichimiyake Yasu-Cho
Yasu-Gun Shiga-Ken 520-23
Japan

Angelo V. Zerella
Via Lello 61
IBM Italia QRA Dept. 489
Vimerlate Mi
Italy 20059

Fellow Criteria

Because the Societies established within the Institute are considered to be in an excellent position to identify candidates qualified for the grade of IEEE Fellow, the IEEE Fellow Committee invites their active participation not only in the evaluation of candidates but in the submission of nominations. To aid in that regard, enclosed find:

- (1) An outline of the Fellow Committee's scope of activities and mode of operation to fulfill its responsibilities;
- (2) A list with the names and addresses (and telephone numbers, where available) of Fellow grade members within the respective Societies.

IEEE Fellow Committee Activities

The IEEE Bylaws define the Fellow grade as one of unusual distinction in the profession, to be conferred only by invitation of the Board of Directors upon a person of outstanding and extraordinary qualifications and experience in IEEE designated fields (including electrical engineering, electronics, computer engineering and computer sciences, and the allied branches of engineering and related arts and sciences), who has made important individual contributions to one or more of these fields. The candidate shall hold Senior Member grade at the time the nomination is submitted. Normally the candidate shall have been a member in any grade for a period of five years or more preceding January 1 of the year of election; however, the five-year membership requirement may be waived for a Fellow candidate who has been engaged in professional practice (as needed to qualify for Senior Member grade) in a geographical area where, in the judgment of the Board of Directors, it was difficult to become a member previously, as evidenced by the absence of a Section previously and the recent formation of a new Section to cover that geographical area. In such case, membership of five years or more in a

recognized local electrical, electronics or computer engineering society may substitute for the five-year IEEE membership requirement, when the nomination is submitted within two years after the formation of the new Section.

The Fellow Committee, appointed by the Board of Directors, has the responsibility of making recommendations to the Board of Directors for nominees to be conferred the grade of Fellow.

The Fellow Committee acts as a guardian of IEEE Fellow grade standards and works carefully and faithfully to maintain these standards uniformly throughout the IEEE. In the performance of its duties, the Committee is concerned with determining whether the applicants meet the requirements of the IEE Bylaws and it seeks assistance from many sources in adjudicating the nominations.

The Fellow Committee depends upon the *nominator* of a candidate to furnish all of the basic necessary information requested on the nomination form, and to point out the unique contributions of the candidate in a concise and succinct statement.

The Fellow Committee depends upon the *Society evaluations* of the technical contributions of the candidates, and their ranking of the candidates.

The Fellow Committee depends upon the *Fellow grade references* to comment on the candidate's specific achievements which they are qualified to judge.

The Fellow Committee will consider brief *letters of endorsement* from IEEE Sections, Chapters and Committees.

In the processing by the Fellow Committee, the candidates' dossiers are evaluated on a basis of eight criteria:

- (1) Individual contributions as engineer, scientist, originator, technical leader, or educator.
- (2) Evaluation by an IEEE Society. Note that only *one* IEEE Society evaluation is to be submitted for each candidate. The nominator is responsible for selecting the IEEE Society that best reflects the candidate's

field of technical accomplishments.

The Society is responsible for identifying potential problems in Society selection and for notifying the IEEE Fellow Committee and the nominator of recommendations for a more appropriate Society for evaluation.

- (3) Tangible and verifiable evidence of technical accomplishment, such as technical publications, patents, reports, or published descriptions of products, facilities, and/or service;
- (4) Opinions of confidential Fellow references who are qualified to judge the work of the candidate;
- (5) Service to IEEE and its predecessors, the AIEE and IRE;
- (6) Professional engineering service other than the IEEE;
- (7) Opinions of endorsers;
- (8) Total years in the profession.

Having considered all of the valuable information supplied from these many sources, a consensus of Committee judgments is reached on the nominees to be recommended to the Board of Directors for elevation to the IEEE Fellow grade, taking into account the maximum number of recommendations permitted by the IEEE Bylaws which can be submitted annually.

During the next few years, greater attention will be given to recognizing the contributions of practitioners, and the attached one-page summary is intended to encourage the nominations of practitioners in 1988.

Recognition of Practitioner Contributions

Election to the grade of Fellow is an important element in pursuit of the IEEE objective of recognizing excellence among its members in the advancement of the theory and practice of electrical and electronics engineering.

The IEEE Board of Directors and the Fellow Committee are seeking to enhance the recognition accorded to the electrical engineering practitioner for outstanding technical contributions. The practitioner is to be distinguished from the academic who teaches the content of the electrical engineering profession and from the theoretician who deals with the basic science underlying electrical engineering practice. The

work of the practitioner can be described as product design and applications, and the construction, operation and evolution into practical use or manufacturing of items or systems. Part of the difficulty in providing recognition to the outstanding practitioner is that proprietary considerations of the corporation in which he practices his profession sometimes prevents full documentation of his contribution in the open literature. Recognition of the practitioner must be based on the product (which is publicly visible), by assurances from those within his company regarding his individual role in creating and developing the product (Fellow references that are suitably specific) and by documentation from within the company which confirms, to some small group in the IEEE, that the individual's relation to the product is as cited. Some level of disclosure of the nature of the product and the individual's specific technical contribution embodied in it is necessary to assure the integrity of the selection process, but with the passage of time such disclosure is ultimately palatable for most companies.

It is not the intention of this pursuit of enhanced Fellow recognition for practitioners to reduce the standards for recognition of technical contributions. The goal is to accord to those whose contribution is of a proprietary nature and not immediately publishable and to those whose contribution is the product and its application the same recognition now available to those who can publish and/or patent their results and the products that stem from them. The standards for associating the product with the individual and his individual technical contribution must be, if anything, more stringent since the information is not generally available in public documents and errors in attribution and faulty perspective regarding the importance of the contribution must be guarded against.

This note is intended to encourage those who are seeking to nominate outstanding practitioners. Such nominations will be given special attention by the Society Evaluation Committees and by the Fellow Committee. It is strongly urged that those who were discouraged by the previous emphasis on publicly documented individual contributions should proceed to submit practitioner nominations with the assurance that such nominations will be regarded with a positive attitude by the evaluators.

IEEE Fellow Nominations

Nominations for IEEE Fellow candidates are now being solicited. The Reliability Society Fellow Committee stands ready to assist in the nomination process. Contact the Society Awards Committee, Alan Plait, Chair, at the following:

5402 Yorkshire Street
Kings Park
Springfield, VA 22151
Work: (703) 347-6710 or 6711

A list of Reliability Society Fellows follows. Fellow grade references will be required for each nominee.

Willis A. Adcock
3414 Mt. Bonnell Dr.
Austin, TX 78731

Dharma P. Agrawal
North Carolina State Univ.
Dept. of Elec. & Comp. Eng.
Box 7911
Raleigh, NC 27695

A. Avizienis
Univ. of California
Comp. Sci. Dept.
Boelter Hall 3732
Los Angeles, CA 90024

Murty P. Bhavaraju
1061 Vail Road
Parsippany, NJ 07054

J. R. Biard
Honeywell Opto
830 East Araphaho Rd.
Richardson, TX 75081

R. Billinton
Univ. Saskatchewan
Dept. of Engr.
Saskatoon, Sask.
Canada S7N 0W0

James T. Brothers
54 Sylvian Way
Los Altos, CA 94022

Harold Chestnut
1226 Waverly Pl
Schenectady, NY 12308

D. Christiansen
434 West Main St.
Huntington, NY 11743

Anthony Coppola
18 Melrose Ave.
Utica, NY 13502

Earle A. Crellin
424 Peninsula Ave.
San Mateo, CA 94401

J. T. Day
Westinghouse Elec.
777 Penn Center Blvd.
Pittsburgh, PA 15235

Wellesley Dodds
5 Ashlea Vlg.
New Holland, PA 17557

W. J. Dowis
1603 Judson Ave.
Richland, WA 99352

G. W. A. Dummer
27 King Edwards Rd.
Malvern, Worcester, England

J. Endrenyi
500 Duplex Ave. Apt. 3205
Toronto, Ont.,
Canada M4R 1V6

Ralph Evans
804 Vickers Ave
Durham, NC 27701

L. H. Fink
11304 Full Cry Ct.
Oakton, VA 22124

R. C. Fletcher
Ceramics Process Syscorp
840 Memorial Dr.
Cambridge, MA 02139

F. E. Gentry
6109 Tidewater Ct.
Prospect, KY 40059

E. J. Glenner
GTE Network Systems
2500 W. Utopia Rd.
Phoenix, AZ 85027

Harold Goldberg
311 S. Hollybrook Dr.
Apt. 303
Pembroke Pines, FL 33025

Koosuke Harada
Dept. of Elec.
Kyushu Univ.
Fukuoka City 812, Japan

George G. Harman
National Bureau of Standards
Bldg. 225, Rm. A 331
Gaithersburg, MD 20899

Eric Herz
14 Magnolia Dr.
Rye Town, NY 10573

Hiroshi Hirayama
Sch. of Sci. & Eng-Waseda Univ.
Elec. & Communications Dept.
170 Nishiohkubo
4, Chome Shinjuku-Ku
Tokyo, Japan

Masaru Ibuka
Sony Corp.
7-35 Kitashinagawa
6 Chome Shinagawa-Ku
Tokyo, Japan

Koji Imai
2-3-18 Momijigaoka Fuchu
Tokyo 183, Japan

Irwin M. Jacobs
2710 Inverness Court
La Jolla, CA 92037

G. Jancke
Swedish State Power Board
S-162 87 Vallingby, Sweden

Harry Kimel
8825 Patton Rd.
Philadelphia, PA 19118

Hisao Kimura
2-1-1 Hodokubo
Hino Shi
Tokyo 191, Japan

C. R. Knight
362 Overlook Trail
Epping Forest Rt. 1
Annapolis, MD 21401

F. C. Kohli
Tata Consultancy Services
Air India Bldg.
Nariman Point
Bombay, India

R. E. Kuehn
803 S. Lindell Rd.
Greensboro, NC 27403

Jay W. Lathrop
Clemson Univ.
Elec. Eng. Dept.
Clemson, SC 29634

L. K. Lee
4479 Deerberry Ct.
Concord, CA 94521

Kunio Mano
503 Co-Op Koyo-En
52 Koyo-En Yatomi-Cho
Mizuho Nagoya 467, Japan

Edward J. Mc Cluskey
Stanford Univ.
Computer Sys. Lab Erl 460
Stanford, CA 94305

J. F. Meyer
1946 Ridge Rd
Ann Arbor, MI 48104

Fumio Minozuma
3-10-705 Shibuya 3-Chome
Shibuyaku
Tokyo 150
Japan

Shota Miyairi
c/o Denki Gakkai
1-12-1 Yurakucho
Chioda-Ku
Tokyo, Japan

V. R. Monshaw
1768 Lark Ln.
Cherry Hill, NJ 08001

J. D. Musa
39 Hamilton Rd.
Morristown, NJ 07960

H. T. Nagle, Jr.
ECE Dept.
NCSU
Raleigh, NC 27695

Osamu Nishino
Kogakuin Univ.
1-24-2 Nishi-Shinjuku
Tokyo, Japan

Elidio J. Nucci
9400 Stateside Ct.
Silver Spring, MD 20903

Kanichi Ohashi
Iwatsu Electric Co. Ltd.
7-41 1-Chome Kugayama
Suginam-Ku
Tokyo 168, Japan

A. D. Patton
1722 Broadmoor
Suite 110
Bryan, TX 77801

D. S. Peck
3646 Highland St.
Allentown, PA 18104

W. J. Poppelbaum
University of Illinois
Dept. of Computer Science
Urbana, IL 61801

William M. Portnoy
Texas Tech. Univ.
EE Dept.
Lubbock, TX 79409

Keats A. Pullen
2807 Jerusalem Rd.
Kingsville, MD 21087

C. V. Ramamoorthy
1117 Sierra Vista Way
Lafayette, CA 94549

H. E. Reese, Jr.
511 Portsmouth Ct.
Doylestown, PA 18901

T. L. Regulinski
Reliability Training Inst.
P.O. Box 275
Avondale, AZ 85323

B. Reich
45 Gimbel Place
Ocean, NJ 07712

A. S. Robinson
11125 Glade Dr.
Reston, VA 22091

Gustave Shapiro
3704 Munsey St.
Silver Spring, MD 20906

M. L. Shooman
Polytechnic Inst. of NY
Long Island Ctr.-Rt. 110
Farmingdale, NY 11735

M. P. Smith
Honeywell/Avionics Div.
M/S 350-1
13350 U.S. Highway 19 South
Clearwater, FL 33546

James M. Snodgrass
849 Coast Blvd.
La Jolla, CA 92037

Ned A. Spencer
10410 Crossing Creek Dr.
Potomac, MD 20854

Jerome R. Steen
472 Sidney St.
Madison, WI 53703

Masao Sugi
Sumitomo Electric Ind. Ltd.
Taya Cho 1 Tozukka Ku
Yokohama Kanagawa Ken
Japan

W. T. Sumerlin
P.O. Box 3098
Littleton, CO 80161

Noboru Takagi
3-6-20 Kitashinagawa
Shinagawa
Tokyo 140, Japan

Michio Takaoka
The Fujijura Cable Works Ltd.
5-1 Kiba 1-Chome Koto-Ku
Tokyo 135
Japan

Ikuo Tanaka
4-20-5 Fujishiro-Dai
Suita
Osaka 565, Japan

R. J. Van Overstraeten
Professor K. U. Leuven
President Imec VZW
Kapeldreef 75/B 3030 Leuven
Belgium

James O. Weldon
5205 Park Ln.
Dallas, TX 75220

James P. Welsh
504 Brantwood
Snyder, NY 14226

Stephen S. Yau
Northwestern Univ.
Dept. of Elec. Eng. & Comp. Sci.
Evanston, IL 60201

S. W. Zimmerman
102 Valley Rd
Ithaca, NY 14850

Field Awards Solicitations

Field Award nominations are solicited from Society members. For additional information, contact Al Plait. The following field awards are current.

Name of Award	Distinctive Features	Presentation
IEEE Service Award*		
Haraden Pratt Award	For outstanding service to the Institute	One annually, to an IEEE Senior Member or Fellow. Bronze Medal, Illuminated Certificate, \$1,000. Date established: 1971
*To be awarded at major IEEE meetings. Nominations are due at IEEE Headquarters not later than July 1.		
IEEE Field Awards†		
Cledo Brunetti Award	For outstanding contributions in the field of miniaturization in the electronic arts	One annually. Certificate and \$1,000. Bequest of the late Cledo Brunetti. Date established: 1975
Control Systems Science and Engineering Award	For meritorious achievement in the field of control systems science and engineering, to an individual	One annually. Certificate and \$1,000. Sponsored by IEEE Control Systems Society. Date established: 1980
Harry Diamond Memorial Award	For outstanding technical contributions in the field of government service in any country, as evidenced by publication in professional society journals	One annually. Certificate and \$2,000. Date established: 1949
Herman Halperin Electric Transmission and Distribution Award	For outstanding contributions to the field of electric transmission and distribution.	One annually. Certificate and \$2,000. Sponsored by the Halperin Family. Date established: 1986
IEEE Award in International Communication in honor of <i>Hernand and Sosthenes Behn</i>	For outstanding contribution in the field of international communication. Preference given to achievement by a single individual. May be conferred on a team of not more than three individuals	One annually. Plaque, Certificate, and \$2,000. Sponsored by ITT Corporation. Date established: 1966
Morris E. Leeds Award	For outstanding contribution in the field of electrical measurement, to an individual or group. Special consideration given to value of contribution made before candidate reached 36th birthday	One annually. Illuminated Certificate and \$1,000. Sponsored by Leeds & Northrup Foundation. Date established: 1958
Morris N. Liebmann Memorial Award	For important contribution to emerging technologies recognized within recent years	One annually. Certificate and \$2,000. Date established: 1919
Jack A. Morton Award	For outstanding contributions in the field of solid-state devices to an individual or group	One annually. Bronze Medal, Certificate, and \$2,000. Sponsored by 20 semiconductor organizations of the United States, Europe and Japan. Date established: 1974
Frederik Philips Award	For outstanding accomplishments in the management of research and development resulting in effective innovation in the electrical and electronics industry. Preference given for achievement by a single individual. May be conferred on a team of not more than three individuals	One annually. Gold Medal, Certificate, and \$2,000. Sponsored by N. V. Philips' Gloeilampenfabrieken. Date established: 1971

†To be awarded at an IEEE meeting of wide scope and interest upon the recommendation of the Awards Board. Nominations are due at IEEE Headquarters not later than April 1.

Name of Award	Distinctive Features	Presentation
Emanuel R. Piore Award	For outstanding achievement in the field of information processing, in relation to computer science deemed to have contributed significantly to the advancement of science and to the betterment of society. Preference given for achievement by a single individual. May be conferred on a team of two individuals	One annually. Gold plated Bronze Medal, Certificate, \$2,000 and \$2,500 international travel grant. Sponsored by IBM Corporation. Date established: 1976
David Sarnoff Award	For outstanding contribution in the field of electronics. Preference given to a single individual for achievement recognized during five years preceding year in which award is made. May be conferred on a team of not more than three individuals	One annually. Gold Medal, Bronze Replica, Certificate, and \$1,000. Sponsored by RCA Corporation. Date established: 1959
Charles Proteus Steinmetz Award	For major contributions to the development of standards in the field of electrical and electronics engineering, to an individual	One annually. Certificate and \$1,000. Sponsored by IEEE Standards Board. Date established: 1979
Nikola Tesla Award	For outstanding contributions in the field of generation and utilization of electric power to an individual or group	One annually. Plaque and \$1,000. Sponsored by IEEE Power Engineering Society. Date established: 1975. To date, the Yugoslav Society for the Promotion of Scientific Knowledge-Nikola Tesla and the Union of Yugoslav Electric Power Industry have provided additional recognition to the recipient.

SUMMARY OF NEW MEDALS AND AWARDS — JANUARY 1987*

Major Annual Medals

IEEE Medal for Engineering Excellence	For the achievement of exceptional application engineering in the technical disciplines of the IEEE, for the benefit of the public and the engineering profession, to an individual or team of not more than three.	One annually to a member of IEEE. Gold medal, bronze replica, certificate, and \$10,000.
Richard W. Hamming Medal	For exceptional contributions to information sciences and systems. Preference given to an individual, but may be conferred on a team of not more than three.	One annually. Gold medal, bronze replica, certificate, and \$10,000. Sponsored by AT&T Bell Laboratories.
Field Awards		
Richard H. Kaufmann Award	For outstanding achievement in the field of industrial systems engineering. Preference given to an individual, but may be conferred on a team of not more than three.	One annually. Bronze medal, illuminated certificate, \$2000. Sponsored by the IEEE Industry Applications Society.
Koji Kobayashi Computers and Communications Award	For outstanding technical contributions in the field of computers and communications, i.e., integration of computers and communications recognized within 10 years of the award. Preference given to an achievement by a single individual, but may be conferred on a team of not more than three.	One annually. Bronze medal, certificate, \$2000. Sponsored by NEC Corp.
Judith A. Resnik Award	To recognize an electrical engineer for contributions to space engineering. Preference shall be given to an individual who has not yet reached his/her 37th birthday and who holds membership in IEEE.	One annually. Plaque, \$2000, travel expenses for recipient and companion to attend award ceremony.
Service Award		
Richard M. Emberson Award	For distinguished service to the development, viability, advancement and pursuit of the technical objectives of the IEEE.	One annually to an IEEE member. Bronze medal, illuminated certificate, \$1000, and travel expenses for recipient and companion to attend award ceremony.

*Open for receipt of nominations in 1987; first presentation 1988. Due dates follow schedule of other IEEE Awards. April 1 for Field Awards; July 1 for Major Annual Medals for Service Award.

SEA Continues to Address the Needs of Reliability Engineering Professionals

Making Reliability Analysis an Integral Part of the Design Process . . .



Shown running on the Workview System/PCB Design System, SEA's integrated package predicts the reliability of a printed circuit board design.

First, SEA delivered a reliability package integrated with maintainability and cost analysis.

Then, SEA introduced RAMCAD, the first general-purpose link to CAD/CAE systems.

Now, SEA presents true integration of reliability analysis and the design environment.

Finally, industry recognizes the importance of reliability as a design parameter. With SEA's approach, reliability engineers become an integral part of the design process.

MS-DOS is a trademark of Microsoft Corporation.
VAX and VMS are trademarks of Digital Equipment Corporation.
Viewlogic and Workview are registered trademarks of Viewlogic Systems, Inc.
SEA and RAMCAD are trademarks of Systems Effectiveness Associates, Inc.

Announcing Thermal Analysis That Is Both Easy to Use and Worth Using . . .

THERMAL ANALYSIS			
Major Assembly :	COMPUTER SYSTEM	Date :	31-DEC-1987
Next Higher :	CENTRAL PROCESSOR	Assembly # :	3
Assembly :	DISK CONTROLLER	File Name :	SYS3.THE
Part Number	Part Type	Reference Symbol	Case Temp (C)
7448	IC	U1	39.0
74LS181	IC	U2	21.7
506	IC	U3	38.6
74LS04	IC	U4	44.8
74LS04	IC	U5	42.3
74LS181	IC	U6	20.4
74154	IC	U7	22.7
74154	IC	U8	22.9
74LS42	IC	U9	27.8
74LS42	IC	U10	29.1
74LS08	IC	U11	37.9
74LS04	IC	U12	42.1
74LS04	IC	U13	41.9
74LS04	IC	U14	41.7

SEA's new Thermal package generates summary reports showing component temperatures and passes calculated data directly to SEA's Reliability software.

SEA's new Thermal package is an easy-to-learn program that does not require an extensive background in thermal design.

SEA's new Thermal package calculates component temperatures to upgrade the accuracy of reliability predictions.

SEA's Thermal package:

- Offers basic thermal analysis capability for support engineers.

- Analyzes forced and natural convection airflow.
- Accommodates localized cooling devices on individual components.
- Supports complete integration with SEA's Reliability analysis software.
- Offers versions compatible with either MS-DOS or VAX/VMS operating systems.

Visit SEA in booths 37 and 38 at the 1988 RAM Symposium, January 26-28, Los Angeles.

SEA SYSTEMS EFFECTIVENESS ASSOCIATES, INC.
20 Vernon Street • Norwood, MA 02062 • 617-762-9252

Volunteers Needed for RAMS' Management Committee

As most of you are aware, the IEEE Reliability Society is one of 10 co-sponsoring societies of the Annual Reliability and Maintainability Symposium. Each year we have the opportunity to nominate members to the RAM Management Committee. This particular Symposium is one of the best organized of any professional society and attendance is now running about 1250 per year. Serving on the Management Committee is an excellent way to interact with your peers, get more deeply immersed in your chosen field, and further hone your overall management and administrative skills. The personal and professional benefits of participating are ex-

tremely rewarding. If you are interested in serving on the Management Committee, and have a desire to ultimately be General Chairman of RAM Symposium, please write or call the following for an application form. You'll never regret taking this first step.

Mr. Val Monshaw
RCA Astro-Space Division
P.O. Box 800 MS 74
Princeton, NJ 08543-01800
Phone: (609) 426-2182

1988 International Reliability Physics Symposium

April 12-14, 1988—Hyatt Regency—Monterey, Calif.

The 26th Annual Symposium, co-sponsored by the IEEE Reliability and Electron Devices Societies, emphasizes device reliability as the dominating influence in the development of new VLSI technologies and circuit designs. With the awareness that today high reliability is the norm for VLSI, the 1988 Symposium will emphasize the role of design, processing, packaging and testing for building-in high reliability. Papers are especially solicited in this area; however, work in all areas of reliability physics will be included in the program.

Papers will deal with work on:

- Relationship between reliability of systems and devices
- Physics of Failure Mechanisms - Quantitative models and mechanisms of component failure
- Electrostatic Discharge Contact Degradation/Corrosion
- Hot Electrons Surface Mount
- Electromigration Packaging
- Oxide Breakdown Mechanical & Thermal Stress
- Failure Analysis Techniques - Advanced or simplified, as they are applied to specific problems.
- Accelerated Testing/Screening and Field Reliability/Failures—Emphasizing the physical mechanisms which validate testing and screening techniques and "User's point of view".
- Burn-in
Test combinations: User and Abuse
Correlation with Observed Reliability in the Field
Water Level Testing
- Design and Process Control for Reliability - Relating specific design concepts, process controls, and reliability.
- Latent Defects Multichip subsystems
- Statistical Process Designed-in Reliability
- Control Computer Integrated

Particle Control Manufacturing
Oxide and Metal Process Monitor and Reliability Testing
Starting Material & Processing Controls
In the following or related areas:

- VLSI (Microprocessors, Memory, PLA, Redundancy, etc.) - MOS, Bipolar, CMOS, I²L, SOS, SOI
- Semiconductor/Insulator Interfaces, Contacts and Metallization
- Packaging Bonding, Die Attach, Coatings and Encapsulation
- Large Die Shear Stress
- Hermetic Packaging (Noncorrosive Metallization)
- Tape Automated Bonding
- Hybrids (Materials, Processes, and Components)
- Displays, Sensors, and Solar Cells
- Microwave, Optoelectronic, and SAW Devices
- GaAs Devices and Interface Effects on III-V Devices
- New Devices and Technologies, including Superconducting Materials and Circuits
- Passive Components
- Attachment of Leadless Ceramic Chip Carriers

A panel discussion is planned for defining and understanding the perceived gap between the top-down reliability of systems and the bottom-up reliability of devices. Based on the long-range outlook and the interaction, actions should be recommended to design-in the reliability of the system.

For general conference information contact:

Robert W. Thomas
General Chairman
RADC/RBRE
Griffiss AFB, NY 13441-5700
(315) 330-3737

CALL FOR PAPERS

IEEE TRANSACTIONS ON RELIABILITY

SPECIAL ISSUE DEVOTED TO RELIABILITY OF PARALLEL AND DISTRIBUTED COMPUTING NETWORKS

The editorial board of the IEEE Transactions on Reliability is planning a special issue of papers devoted to reliability of parallel and distributed computing networks. The basic objective is to provide a literary forum for the exchange of information among computer network planners and design engineers, computer systems analysts, computer reliability and maintainability specialists, and other computer engineering professionals.

Invitation is extended to authors of previously unpublished papers dealing with specifics of the following suggested topical areas:

1. Reliable design of LANs with bus and ring topologies.
2. Multistage interconnection network design.
3. Synthesis of reliable network for parallel and distributed computing.
4. File allocation and network configurations for optimum reliability.
5. Fault-tolerant design techniques of parallel and distributed architecture.
6. Network reliability and redundancy trade-offs.
7. Performance evaluation of reliable networks.
8. Protocol modeling and validation for distributed systems.
9. Distributed system network reliability.

PAPERS ARE SOLICITED DEALING WITH PARTICULARS RATHER THAN GENERALITIES OF SUGGESTED TOPICAL AREAS. PREFERENCE WILL BE GIVEN TO DESIGN FOCUSED PAPERS OVER THEORETICAL PAPERS.

In order to assist the board in planning the special issue, cooperation of prospective authors is solicited with the following target dates:

- Author's letter of commitment — 4 January 1988
- Submission of manuscripts (4 copies) — 7 March 1988
- Submission of revised manuscript — 27 June 1988

Letters of commitment containing brief description of paper essence or letters of inquiry should be sent to guest editors:

Dr. Dharma P. Agrawal or Dr. Suresh Rai
Department of Electrical and Computer Engineering
Box 7911
North Carolina State University
Raleigh, North Carolina 27695-7911
Phone (919)737-2336

Technical Operations

Standards and Specifications

Dave Troxel

In the highly technological societies of today's world, the fundamental foundation blocks for design, development and manufacturing are standards and specifications. They pertain to all the diverse technical disciplines. The Reliability Society Standards and Definitions Committee, organized under the Vice President for Technical Operations, is the focal point for work on reliability specification and standardization within the IEEE. This effort concerns documents dealing expressly with reliability and also systems, equipment, parts, materials and process documents that include reliability considerations. The work of the Standards and Definitions Committee relates to the development of new specifications and standards as well as revisions of existing documents and review of proposed drafts. The same applies for related handbooks, guidelines, and manuals.

There are several primary sources for developing and promulgating standards and specifications pertaining to the electronics industry including the following: IEEE, U.S. Department of Defense, American National Standards Institute, North Atlantic Treaty Organization, and international organizations. Subsequent portions of this Newsletter article cover IEEE and DoD activity. Information on other source organizations will appear in future Newsletter articles.

IEEE Standards

Functioning at the national level, the IEEE Standards Board is involved with standards and specifications across the total scope of IEEE societies. A few of the documents are totally concerned with reliability while others include the discipline as a portion of their content. The most notable among the IEEE documents that relate to reliability are listed in the following table along with status information.

Responsible Society/Committee	Std. #	Standard Title	Last Update
Computer	982.1	A Standard for Measures to Produce Reliable Software	3/87
Computer	982.2	Guide for the Use of Standard Measures to Produce Reliable Software	3/87
Computer	1844	Software Errors/Faults/Failure; Classification	6/87
Computer	1496	Rugged Bus: Standard for a Very High Reliability Bus Structure	6/87
Power Eng.	352	Reliability Analysis Principles	3/86
Power Eng.	379	Appl. Single Failure Criteria/Class 1E Systems	3/87
Power Eng.	500	Reliability Data Manual	3/86
Power Eng.	933	Reliability Program Plans	7/86
Power Eng.	1082	Human Action Reliability Analysis	10/86
Power Eng.	762	Electric Generating Unit Reliability; Availability	6/87
Power Eng.	C57 117	Transformer Failure Reporting and Liability Analysis	7/86
Stds. Coord. Com.	1054	Fault Tolerant Design Arrays/Photovoltaics	3/86

DoD Standardization Documents

(DOD data provided by Kurt Greene, Deputy Director, Industrial Productivity Support Office and Rome Air Development Center.)

The Department of Defense has generated standardization documents for many years over an extremely broad range of subjects. In many areas, it has been the leading source exemplified by reliability. The top DoD documents for reliability and its allied discipline, maintainability, are shown in Fig. 1. For the prime reliability standard, MIL-STD-785, the individual requirement topics are listed in the following tabulation. For each requirement topic, the applicable standardization document is shown along with its latest revision date. Quite a few of these documents reference additional specifications and standards to complete the documentation tree.

MIL-STD-785 Reliability Program Requirements Document	Requirement	Date
Task Section 100—Program Control		
MIL-HDBK-189	Reliability Growth Management	2/13/8
MIL-STD-2155	Failure Reporting Analysis and Corrective Action System	7/24/85
MIL-STD-790D	Reliability Assurance Program for Electronic Parts Specifications	7/24/85
MIL-STD-965A	Parts Control	12/13/85
Task Section 200—Design and Evaluation		
MIL-STD-756B	Reliability Modeling and Prediction	8/31/82
MIL-HDBBK217E	Reliability Prediction of Electronic Equipment	10/27/86
MIL-MDBK-251	Reliability Design- Thermal Applications	6/19/78 (Val. 4/84)
MIL-STD-1629A	Failure Mode, Effects, and Criticality Analysis	11/28/84
MIL-HDBK-33B	Electronic Reliability Design Handbook	
MIL-STD-1686	Electrostatic Discharge Control	5/2/80
MIL-HDBK-263		
Task Section 300—Testing		
MIL-STD-781D	Reliability Testing; Engineering Development Qualification and Production	4/18/87
MIL-HDBK-781	Reliability Test Methods	7/14/87
MIL-STD-1635	Reliability Growth Testing	2/3/78
MIL-STD-2164	Environmental Stress Screening	4/5/85
MIL-HDBK-344	Environmental Stress Screening- Electronic Equipment	10/20/86

A Source for basic information on DoD standardization is the sixteen page DOD publication SD-8, "An Overview of the Defense Standardization and Specification Program" (DSSP). The purpose of the publication is "to provide government and industry managers with an understanding

DOD DIRECTIVE 5000.40 - RELIABILITY AND MAINTAINABILITY

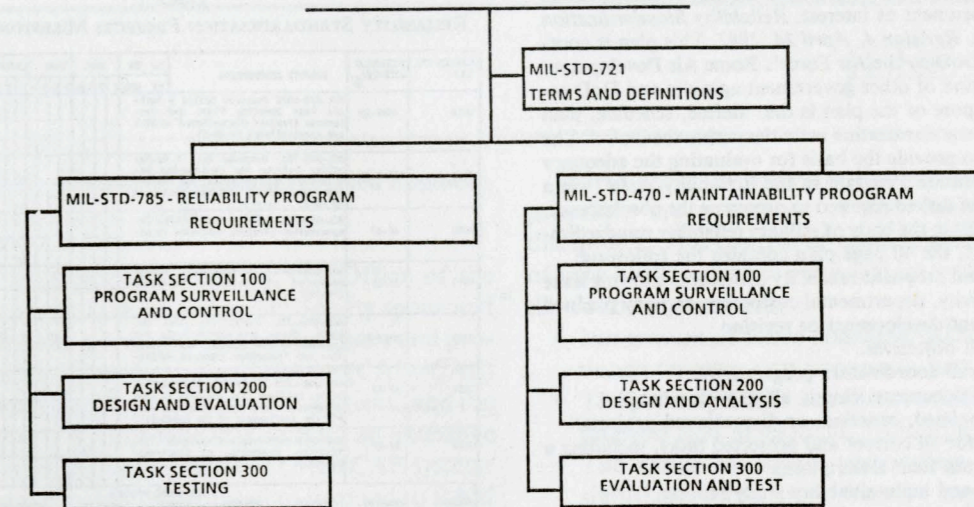


Fig. 1—DoD Top Level Reliability and Maintainability Standards.

of the standardization process and insight into the DoD program to manage military standardization initiatives." The following excerpt from Section VI provides information on how to obtain documents and lists a few additional documents of basic interest.

Where to Obtain Standardization Documents

The single stock point within DoD for the distribution of documents listed in the DoDISS is:

Naval Publications and Forms Center
5801 Tabor Avenue
Philadelphia, PA 19120

The Naval Publications and Forms Center (NPFC) serves all DoD, other government, industry, and private requesters except as indicated below. Orders may be submitted on a Specifications and Standards Requisition, DD Form 1425, by letter, telex (834295), Western Union (710/670-1685) or telephone (215/697-3321; autovon 442-3321).

a. All unclassified and uncontrolled Federal and Military Specifications, Standards, Handbooks, QPLs, DIDs, and CIDs are available to all requesters except certain foreign sources.

b. Adopted nongovernment standards, such as those adopted from the American Society for Testing and Materials (ASTM), are available only to DoD requesters. Others must obtain these documents from the issuing organization, technical libraries or commercial information services.

c. Classified or controlled distribution documents are issued based on need to know. Requests for such documents will be forwarded to appropriate authorities for clearance prior to issue.

d. Some NATO documents are controlled and requests for them will be handled as in paragraph c. above. Others are available to all requesters.

Copies of standardization documents required in connection with specific procurement actions may be obtained from NPFC or as directed by contracting officers. Documents not listed in the DoDISS, such as drawings, technical manuals, departmental regulations, etc., are not available from NPFC and must be obtained from, or as directed by, contracting officers.

A subscription service is available from NPFC for a nominal fee per Federal Supply Class or standardization area. With this service, a subscriber automatically receives all new or revised documents issued during the year in the FSCs to which he subscribes. Additionally, notification of newly adopted nongovernment documents is provided. All subscribers receive the DoDISS Notice, which is printed weekly and lists selected new, revised or adopted documents in all FSCs and areas.

Several other documents of interest to the standardization community are listed below.

Standardization Documents of Interest

Document Title	DoD Organizations Obtain From	All other Organizations (non DoD and nongovernment/Private Concerns) Obtain From
"DoD Index of Specifications and Standards," Parts I, II, & III Printed Edition	NPFC	GPO
Microfiche Edition	NPFC	Naval Publications & Printing Service Office, 700 Robbins Avenue, Philadelphia, PA 19111
"Department of Defense Single Stock Point for Specifications and Standards: A Guide for Private Industry"	NPFC	NPFC
"Standardization Directory, SD-1	NPFC	GPO
"Status of Standardization Projects," SD-4	NPFC	Not Available
"Provisions Governing Qualification," SD-6	NPFC	GPO
"The Defense Standardization and Specification Program Summary," SD-8	NPFC	NPFC
"Selling to the Military"	GPO	GPO
"Guide to Specifications and Standards of the Federal Government"	GPO	GPO
U.S. GOVERNMENT PRINTING OFFICE: 1985/605-021/1214		

Relative to management of the overall DoD reliability standardization effort there is another document of interest: *Reliability Standardization Document Program Plan, Revision 4, April 24, 1987*. This plan is coordinated on behalf of the DoD by the Air Force's Rome Air Development Center with the participation of other government agencies and DoD activities. The essential purpose of the plan is the "define, schedule, plan and control the reliability standardization activities within the DoD." The underlying objective is "to provide the basis for evaluating the adequacy of the Defense Standardization Program in the Reliability Area" via a "time-phased delineation of tasks required to overcome the obsolescence, overlap, conflicts, and voids in the body of military reliability standardization documents." In brief, the 40 page plan contains the following:

1. A table of current and proposed reliability documents showing issue date, preparing activity, departmental custodians and any planned activity for document development or revision.
2. A list of ten explicit objectives.
3. A summary of overall coordination program.
4. A list of secondary documents closely allied with reliability.
5. A summary of completed, canceled, or discontinued projects.
6. Project statements for all current and projected tasks, including a list of applicable Data Item Descriptions.
7. A list of reliability and maintainability study reports.

The following table shows the current projects and their milestone schedules.

TABLE I
RELIABILITY STANDARDIZATION PROJECTS MILESTONE SCHEDULE

PROJECT NO.	PREPARING ACTIVITY	PROJECT DESCRIPTION	FY YR	FY YR											
				1983	1984	1985	1986	1987	1988						
0018	ARMY-ER	MIL-STD-883C Proposed Revision 3 Failure Rate Sampling Plans and Procedures (Project discontinued in 83-1 and reestablished in 86-2)													
0025	NAVY-EC	MIL-STD-781C Proposed Rev. B Reliability Testing for Engineering Development, Qualification, and Production (New Title) (Project initiated in 79-1)													
0026	AF-17	MIL-STD-217B Bayesian Reliability Demonstration (Project initiated in 81-3)													
0031	AF-17	DOD-HDBK-344 Environmental Stress Screening of Electronic Equipment (Project initiated in 82-1)													
0032	NAVY-EC	MIL-HDBK-781 Reliability Test Methods, Plans, and Environments for Engineering Development, Qualification, and Production (Project initiated in 81-7)													
0034	AF-17	MIL-HDBK-328 Microelectronic Reliability Handbook (The schedule in part encompasses the contractual effort for the development of the handbook.)													
0039	AF-17	MIL-HDBK-217D Proposed Revision E Reliability Prediction of Electronic Equipment													

SYMBOL: HEARING Initiate Project (Δ), HEARING Approved Doc. (□), REPRESENTATIVE USES Time Span Action (○)

3/ Fiscal Year (FY) is October 1 to September 30
5/ See Page 4 for explanation of Preparing Activities Codes

PROJECT NO.	PREPARING ACTIVITY	PROJECT DESCRIPTION	FY YR	FY YR											
				1983	1984	1985	1986	1987	1988						
F041	AF-19	MIL-STD-1543A(USAF) Proposed Revision B Reliability Program Requirements for Space and Missile Systems													
0042	AF-17	MIL-HDBK-333 System Hardware/Software Reliability (The schedule in part encompasses the contractual effort for the development of the handbook)													
N042	NAVY-AS	MIL-STD-217A(AS) Proposed Derating and Application Requirements for Electronic and Electrical Parts													
N047	NAVY-ES	MIL-STD-2058(AS) Proposed Reliability Development Test Program													
0045	NAVY-54	MIL-STD-1686 Pro Rev A Electrostatic Discharge Control Prog for Protec of Electrical & Electronic Parts, Assemblies & Equipment (Excl Electrically Initiated Explosive Devices) (Metric)													
F051	AF-17	DOD-HDBK-344(USAF) Environmental Stress Screening (ESS) of Electronic Equipment													

Reliability Society Standards and Definitions Committee

The role of the Standards and Definitions Committee is to contribute to the development of new standards and specifications regarding reliability and to participate in their review and revision. Any member of the Reliability Society who has an active interest in the development and upgrading of standardization documents is welcome and invited to join in the work of the committee. If you are interested, contact the committee chairman:

David Troxel
5242 Garfield Ave.
Pennsauken, NJ 08109
Phone: (609) 662-9408

Technical Operations Committee

Irv Doshay
Chairman, Software Reliability
380 Surf View Drive
Pacific Palisades, CA 90272
(213) 297-4591

Phil Eisenberg
Chairman, Advanced Reliability
Techniques Committee
Northrop Corporation
Organization 8100, Zone N5
2301 West 120th Street
Hawthorne, CA 90250

Thomas L. Fagan
Vice President, Tech Ops
Gould Inc.
1755 Jefferson Davis Highway
Suite 900
Arlington, VA 22202
(703) 521-5900

Dr. Jerry Fussell
Chairman, Nuclear System Safety
& Reliability Committee
University of Tennessee
Nuclear Engineering Building
Knoxville, TN 37916
(615) 966-5232

Vernon Gardner
Chairman, Health Care Engineering
Committee
6624 Kirby Court
Falls Church, VA 22043
(703) 533-0999

Hank Malec
Chairman, Quality Assurance
Management Committee
Digital Equipment Corporation
146 Main Street
ML 01-4/B21
Maynard, MA 01754
(617) 493-3011

Alan Plait
President, Reliability Society
ManTech
2320 Mill Road
Alexandria, VA 22314
(703) 838-5781

Harry Reese
Chairman, Research & Development
Committee
American Electronics Labs., Inc.
P.O. Box 552
Lansdale, PA 19446
(215) 822-2929 X2400

Bernie Retterer
Chairman, Maintainability
Committee
ARINC
2552 Riva Road
Annapolis, MD 21401

Charlie Rudasil
Acting Chairman, Energy Technology
Assessment Committee
Virginia Power
P.O. Box 26666
Richmond, VA 23261
(804) 771-3595

Henry Hegner
Acting Chairman, Mechanical
Reliability Committee
ManTech
2230 Mill Road
Alexandria, VA 22314
(703) 838-5651

Ken LaSala
Chairman, Human Performance
Reliability Committee
Code AMCQA-E
HQ U.S. AMC
5001 Eisenhower Avenue
Alexandria, VA 22333-0001
(703) 274-8912

Bill Wallace
Chairman, Systems Screening
Committee
Litton Industries
College Park, MD
(301) 864-5600 X2190

Hank Wolf
Chairman, Computers & Informa-
tion Committee
Grumman Aerospace Corporation
MS A02-39
Bethpage, NY 11714
(516) 575-8044

Marion Smith
Chairman, International Reliability
Committee
Honeywell, Inc.
MS 229.1
13350 U.S. Highway 19
Clearwater, FL 33546-7290

David I. Troxel
Chairman, Standards & Definitions
Committee
5242 Garfield Avenue
Pennsauken, NJ 08109
(609) 662-9408

IEEE Workshop

Reliability and Maintainability in Computer Aided Engineering, Leesburg, VA—Aug. 25-26, 1987

In response to recommendations of The Office of the Secretary of Defense, the IEEE Reliability Society sponsored a workshop to initiate a dialogue among designers and producers of computer aided design/engineering (CAD/CAE) systems, developers and users of electronic systems, and the R&M community. The objective was to start an exchange of information on current capabilities of CAD/CAE systems and the additional capabilities required to respond to R&M requirements.

The workshop was structured to address and focus on four critical questions:

- What design/engineering automation is needed for R&M?
- What R&M capabilities currently exist in CAD/CAE?
- What design descriptions and interchange formats exist or are being pursued?
- What research on R&M automation is being conducted?

Workshop attendance was limited and represented an appropriate cross section of the R&M and CAD/CAE disciplines. This control of attendance resulted in two days of very lively audience - panelist interactions which yielded the following consensus.

- Integration of R&M characteristics into the automated design/engineering process is just beginning.
- The primary R&M activities to date are automation of analysis and assessment techniques.
- The range of design parameters and rules requires significant expansion. Current capability is primarily in the thermal area.
- The dialogue started at the workshop should be continued. There was strong agreement that continuation will promote and foster improved integration and expansion of capability.

Proceedings capturing the essence of the discussions, conclusions and recommendations are in preparation and will be distributed free of charge to all Reliability Society Members. Target date for publication is November 1987.

Conference Calendar

DATE	CONFERENCE	PLACE	CONTACT
1988			
Jan. 26-28	Annual Reliability and Maintainability Symposium	Los Angeles, CA	Al Plait Mantech Advanced Systems, Inc. 5402 Yorkshire St. Springfield, VA 22151
Mar. 7-9	National Conference and Workshop on Reliability Growth	Cambridge, MA	Dr. Larry Crow Technical Program Chairman AT&T Bell Laboratories Whippany Road Whippany, NJ 07981 (201) 386-4682
Apr. 12-14	1988 International Reliability Physics Symposium	Monterey, CA	H. C. Jones Westinghouse Corp. Baltimore, MD (301) 765-7387
Jun. 14-17	INTER-RAM	Portland, OR	John Sporysz-EMQ-2 Quality Assurance/Reliability Bonneville Power Admin. P.O. Box 3621 Portland, OR. 97208



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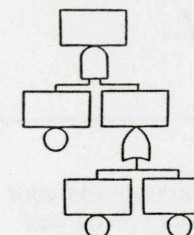
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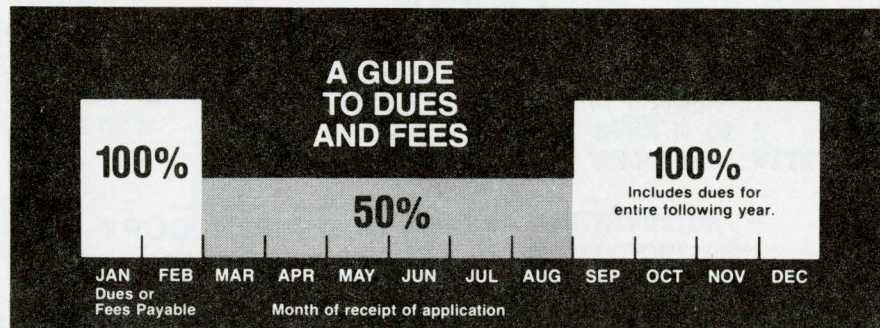
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