

20901 MD  
HT 123  
\*\*\*\*  
070

PAUL GOTTFRIED  
9251 THREE OAKS DR  
SILVER SPRING  
E03 159 SM

# Reliability Society Newsletter



**Editors: Gary Kushner and Mark Snyder**

**Vol. 36, No. 2, April 1990 (USPS 460-200)**

## President's Message

Dear Members,

Many things have transpired since my last message. Here are a few highlights.

The University of Maryland has a fully accredited masters program and doctors program in Reliability under the leadership of Dr. Marvin Roush. An advisory council has been selected from government and industry. I was privileged to be asked to join the council as a representative of our Reliability Society. In December 1989 the council met and was introduced to the faculty, some of the students, and examples of the work they are doing. We can all be proud of the strong program U. of Md. has established. At the conclusion of the program, the council made suggestions on how the program should best continue. The course work was found to be exemplary. The main suggestion was to introduce Reliability examples into the undergraduate course work. More on this later.

The 1990 Reliability and Maintainability Symposium (RAMS) was held at the Biltmore Hotel in Los Angeles on January 22nd to 25th, attendance was down slightly, but the conference had many good papers. You will find your copy of the proceedings in the mail shortly. Tutorials were excellent, organized by our 2nd past President, Alan Plait. The General Chairman was our VP of meetings, Anthony Coppola. Our Reliability Society was well represented. If you wish to get active in the operation let me know and I will put you in touch with the correct person.

At RAMS there was some discussion about Total Quality Control (TQM) of which Reliability management is a part. The most meaningful discussion was on the subject of concurrent engineering in which the Reliability and Maintainability Engineers will be working together in real time with the

design engineers, both electrical and mechanical. This is believed to be one of the main changes for the R&M Engineer of the 90's. Tomorrow's products must be produced faster and with more R&M in order to meet the foreign (and our own) competition.

RAMS has always been heavily slanted towards the military market, perhaps too much so for today's decreasing military budget and increasing emphasis on the commercial competition. The RAMS management recognizes this and will be making a concerted effort to bring more aspects and techniques of the commercial field into the 1991 agenda. If you have any suggestions how this can be accomplished, let me know.

One important seminar was held on the preceding Sunday in which approximately 15 professors from colleges and universities from across the U.S. discussed how to introduce R&M into the curriculum of the undergraduate courses. They recognize that it must be done to meet tomorrow's challenge, most teachers are not willing to give up limited class time to accomplish it, and that most of them do not know how to do it! Ideas were developed to allow these contradictions to merge. It is a difficult task but they are working hard.

Our ADCOM met on Monday, January 22, with many important subjects discussed. Some of the results were:

1) Election of Joe Gruessing of Westinghouse Electric to the ADCOM to replace the position vacated by Bob Jacquess. Joe brings to us considerable background in maintainability and is now working in the CAD field.

2) A special subscription rate to the Wiley Publication "Quality and Reliability Engineering International" journal has been negotiated. There are now 5 issues a year with normal subscription rate of \$270/year. Our subscription rate

Continued on following page.

\$108/year, a 60% reduction! Details will be released with the next issue of this newsletter.

3) The annual dues have been increased from \$8 to \$10. The ADCOM felt that this was desirable because of the slight deficit anticipated this year and the increased services and awards that are planned. Even with this increase, our society is one of the cheapest within IEEE. Our dues have not increased since 1984.

In parallel with the ADCOM meeting, several of our associate editors of the Transactions met with our editor, Dr. Michael Pecht, to help smooth the flow of our transactions.

They are doing a fine job with a lot of hard work.

One of the highlights of the evening was the Reliability award to Dr. Roush for his leadership in forming the center for Reliability Engineering at Univ. of Md.

I have not heard from any of you on my call for a discussion of what R&M will be like during the 90's. Give me a call at (301) 765-7340 or fax at (301) 765-5070. Thanks!

It has been fun and I look forward to hearing from you.

Bernhard Bang

## RS Newsletter Inputs

All RS Newsletter inputs should be sent to one of the associate editors, **Gary Kushner** or **Mark Snyder**, per the following schedule:

|                         |            |
|-------------------------|------------|
| For October Newsletter: | by July 25 |
| For January Newsletter: | by Oct. 25 |
| For April Newsletter:   | by Jan. 25 |
| For July Newsletter:    | by Apr. 25 |

**Associate Editors: Gary Kushner\***

499 Brigham St.  
Marlboro, MA 01752  
(508) 486-6034

**Mark Snyder**

Digital Equipment Corporation  
6 Tech Drive (AET1-1/7)  
Andover, MA 01810  
(508) 474-2165

\* Material may be FAXed to Gary Kushner at (508) 467-6796 [please be sure to say Attn: Gary Kushner at x6765.]

## Reliability Society Officers

### PRESIDENT

Bernhard A. Bang  
Westinghouse Electric Corp.  
P.O. Box 1521  
MS-3G07  
Baltimore, MD 21203

### VP MEMBERSHIP

Al Tamburrino  
RADC  
RADC/RBRP  
Griffiss AFB, NY 13441-5700

### VP TECH. OPERATIONS

Sam Keene  
IBM  
P.O. Box 9023  
Dept. TR4, Bldg. 003C  
Boulder, CO 80302

### SECRETARY

Richard Kowalski  
ARINC Research  
2551 Riva Rd.  
Annapolis, MD 21401

### JR. PAST PRESIDENT

T. L. Fagan  
ManTech Int. Corp.  
2121 Eisenhower Dr.  
Alexandria, VA 22314

### VP MEETINGS

Anthony Coppola  
Rome Air Dev. Ctr.  
RADC/RBET  
Griffiss AFB, NY 13441-5700

### VP PUBLICATIONS

Paul Gottfried  
9251 Three Oaks Dr.  
Silver Springs, MD 20901

### TREASURER

W. T. Weir  
Evaluation Associates, Inc.  
GSB Building  
1 Belmont Ave.  
Bala Cynwyd, PA 19004

Reliability Society Newsletter is published by the Reliability Society of the Institute of Electrical and Electronics Engineers, Inc. Headquarters: 345 East 47th Street, New York, NY 10017. Sent at a cost of \$1.00 per year 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. Postmaster: Send changes to Reliability Society Newsletter, IEEE, 445 Hoes Lane, Piscataway, NJ 08854.

## Reliability Society Chapter Chairmen

### BALTIMORE

Neville Jacobs  
10 Calypso Court  
Pikesville, MD 21209

### BINGHAMTON

Thomas D. Gaska  
1010 Elmwood Drive  
Endwell, NY 13760

### BOSTON

Donald Simpson  
M/S 60  
GTE Government Systems  
1 Research Drive  
Westboro, MA 01581

### CHICAGO

Michael I. O. Ero  
AT&T Bell Laboratories  
1200 E. Warrenville Rd.  
Naperville, IL 60566

### CLEVELAND

Vince R. Lalli  
NASA LRC  
21000 Brookpark Road  
MS-501-4  
Cleveland, OH 44135

### DALLAS

Lou Boudreaux  
516 Vernet Street  
Richardson, TX 75080

### DENVER

Juan Hernandez  
National Systems & Research  
3075 Squaw Valley  
Colorado Springs, CO 80918

### FLORIDA WEST COAST

J. N. Rutlege  
E Systems, Inc.  
ECI Division  
P.O. Box 12248 MS-19  
1501 72nd St. North  
St. Petersburg, FL 33710

John Thornberry

13350 U.S. South  
Clearwater, FL 33516

### LOS ANGELES COUNCIL

Loretta Arellano  
10940 Olinda St.  
Sun Valley, CA 91352

### MOHAWK VALLEY

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

### MONTREAL

Mr. Francis Dupuis  
Hydro Quebec  
75 West Dorchester #801-5  
Montreal, QC, Canada H2Z 1A4

### NEW YORK/LONG ISLAND

Vic Bonardi  
Grumman Aerospace Co.  
B85-01  
Bethpage, NY 11714

### NORTHERN NEW JERSEY

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

### OTTAWA/ONTARIO

Rejean Arseneau  
Nat'l Res. Council of Canada  
Division of Electrical Engineering  
Montreal, Rd., Bldg. M-50  
Ottawa, Ontario, Canada  
K1A OR8

### PHILADELPHIA

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

### SANTA CLARA VALLEY/ SAN FRANCISCO/ OAKLAND/EAST BAY

Art Rawers  
International Microelectronics Products  
2830 N. First Street  
San Jose, CA 95134

### TOKYO

Prof. Masayoshi Furuya  
Dept. of Systems Engineering  
Tokyo Denki University  
Hatoyama, Saitama 350-03  
Japan

### TRI-CITIES

Pete Montague  
105 Travelers Way  
Bristol, TN 37620

### WASHINGTON/NORTHERN VIRGINIA

William E. Breslyn  
3203-11 University Blvd. W.  
Kensington, MD 20895

## UCLA Extension Short Course

"Wafer-Level Reliability Testing," May 30-June 1, introduces methods for evaluating quality during and after fabrication of wafers. The instructor is Vance Tyree, MS, of the USC/Information Sciences Institute. Fee: \$995.

For further details, call (213) 825-1047 or write: Engineering Short Courses, 10995 LeConte Ave., Ste. 530, Los Angeles, CA 90024.

## Annual Awards Dinner

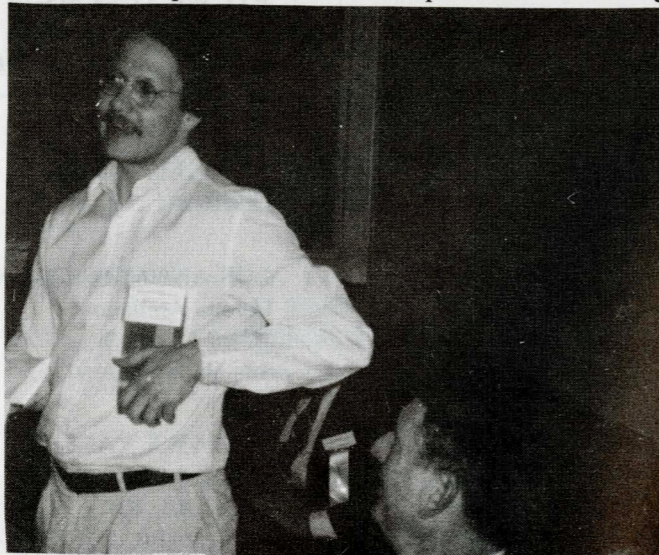
Each year, a special dinner is held in conjunction with the January meeting of the Reliability Society AdCom and the RAM Symposium. The featured event is the presentation of the Annual IEEE Reliability Society Award. The 1989 recipient was Dr. Marvin L. Roush of the University of

Maryland. (Refer to article in January issue of RS Newsletter.)

In addition to the award presentation, Dr. Michael Pecht, editor of the *IEEE Transactions of Reliability*, introduced and had recognized by the AdCom many of the associate editors of the publication, who were present at the meeting.



Tom Fagan, Jr. Past President (left), presents an award to Dr. Roush.



Dr. Michael Pecht introduces associate editors.

FROM CONCEPT TO DEPLOYMENT . . .

### The Computer-Aided Engineering TOOL-KIT

A Single Source for all the CAE Tools

- Electronic Mail • Computer-Aided Design • Reliability
- Maintainability • Project Records • Testability
- Safety/Risk Assessment • Availability • Logistics
- Report Generation • Configuration Management
- Failure Mode and Effects Analysis



Management Sciences, Inc.

Phone (505) 255-8611  
Telex 9109975519 MSI  
FAX: (505) 268-6696

6022 Constitution Ave. N.E.  
Albuquerque, N.M. 87110 USA

## Chapter News

### Boston Chapter

The Boston Reliability Chapter has continued their busy schedule with two monthly dinner meetings during December and January and a meeting of the Reliability Technology Workshop during January. The December monthly meeting was held at the Hanscom Air Force Base Officers Club and featured a full course dinner followed by an excellent talk, "Computer-Aided Design Tools for Reliability & Maintainability." The guest speaker was Mr. William Thompson of GTE Government Systems, Needham, MA. Bill shared his experiences as the principal architect of the Design Assurance functions of a division-wide Computer-Aided Engineering System. Bill also described what he saw as the changing roles of R/M professionals in a concurrent design environment. There were 51 people in attendance at the meeting.

The January monthly meeting was held at the NCO Club at Hanscom. Following the dinner, Mr. Michael Johnson, of RELEX Engineering, spoke on the subject, "Desk Top Computer Database Technique for Integrated R&M Analysis." This talk focused on a simple desk top approach that uses the design's indentured Bill of Materials as the relational database structure. Examples of various R/M analyses done with this approach were presented and discussed. There were 40 people in attendance.

As a new service to the members of the New England Reliability Council, the Boston Reliability Chapter continued with the Technology Development (TD) Workshops. The 6th meeting of the TD Workshop was held during January, 1990 and focused on the MIL-HDBK-217E survey results to date. The workshop has been collecting opinions and data relating to 217E reliability predictions of items containing commercial IC's with subsequent field experience. To date the survey indicates wide spread dissatisfaction with the failure rates obtained from the Handbook for this classification of parts.

### Denver Chapter

The monthly activities this past Fall have been as follows:

October—"Software Reliability Initiatives in Design"  
Sam Keene, speaker

November—"Total Quality Management"  
Dale Butler, speaker

December—Dinner Playhouse Social

The chapter also continues to sponsor a monthly symposium series on Software Reliability and Quality Topics. This has run continuously for the past 19 months. The success of this initiative is owed to Mr. Richard Karcich, who has spearheaded this series of special meetings.

### Los Angeles Chapter

Currently there are approximately 300 members in the LA Chapter of the Reliability Society. We jointly hold our technical meetings with the LA Chapter of the Computer Society which has approximately 5600 members. We plan to incorporate the Components, Hybrids, and Manufacturing Technology to have unified coverage.

Nine technical presentations were presented this year including:

- Surviving in Tomorrow's Software Environment
- Superconductivity/Long Term Reliability
- Making a C.A.S.E. of Database
- Neural Networks: Algorithms, Applications, Etc.
- Parallel Processing Supercomputers
- Trends/Opportunities in Optical Networking
- What's All This About SPARC
- Clearing the Air about HDTV
- Application of Error Code

One mini-course was held in August on Fiber Optics. We offer a Video Tape Exchange of previous technical presentations. A current list of 80 available video tapes is attached.

Our chapter owns two personal computers, one of which operates a 24-hour Bulletin Board. Over 325 subscribed members can obtain meeting information, up-to-date video tape lists, use E-mail among other members, review the JOBLINE where members offer available jobs or lists want ads, or use the OPEN FORUM which members can ask technical questions or voice an opinion. Also available and expanding is an exchange of shareware programs.

### Philadelphia Chapter

Meetings held:

September 19, 1989

- Recent Navy R. M. and Q. A. Policy Initiatives  
Mr. Louis Gills
- A Practical U.S. Strategy for High Definition Television  
Mr. Gordon W. Bricker

October 17, 1989

- Ship Machinery Analysis and Reporting Technique (SMART)  
Dr. Mark Elfont
- Fiber Optic Interconnection Networks for Parallel Processing  
Mr. Carl Hein and Mr. Richard Zieger

Continued on following page.

November 21, 1989

- Exploring the Future  
Dr. Ann Mintz
- Trends in Space-Based Radar (SBR)  
Dr. Moh'd Hasan

### Twin Cities Chapter

The Reliability and Fault Tolerant Society met in November, 1989.

Andy Kostic, Manager of Quality and Reliability Verification at UNISYS presented information that indicated Japanese and American semiconductor quality and reliability were comparable for comparable devices. Much of the confusion exists because often the Japanese and American devices are very different products which have inherently different quality and reliability. It appears that American companies have made a significant improvement over the last several years and continue to improve at a rapid rate while the Japanese progress has been less rapid.

Alex Mikonowicz, Quality Consultant at Control Data, concurred with Mr. Kostic's observation and pointed out the differences in approach between the two countries. Japan attempts to reduce process variation as much as possible and has a central processing group that provides manufacturing operations with specific instructions on how a line is to be operated. American companies tend to "build to print" and have much more local autonomy. As a result of these differences, the Japanese companies tend to be more consistent but do not improve as rapidly as the American companies.

Mark Kamin, Principal Reliability Engineer, Space Process Systems Directorate at Control Data, shared information about a paper that had just been presented at ISTFA comparing Japanese, Korean, and American 64K and 256K DRAM quality. The investigator used a transmission electron microscope to examine cross sections of critical structures. His conclusion was that Japanese products of this kind were superior to American or Korean. The date codes of the product examined were not available, and several listeners suggested that the specimen preparation procedure could account for much of the differences noted.

When  
Your Product  
Reliability is at Stake,  
Don't Settle for  
Anything less than  
Excellence.  
Reliability Excellence!

## Technical Operations—Human Performance Reliability Committee

IEEE RELIABILITY SOCIETY  
COMMITTEE PROJECT REPORT

### Survey of Industry Human Performance Reliability Practices

by  
*Kenneth P. LaSala,*  
Chairman, Human Performance  
Reliability Committee

In order to help determine the direction for future Human Performance Reliability Committee activities, a survey was conducted with the objective of identifying industry practices in the human performance reliability area. The following areas were addressed:

- Prediction
- Design Approach
- Design Validation Approach
- Allocation Approach
- Needed Tools

A questionnaire was sent to 37 aerospace companies to obtain data. For each area, e.g., prediction, it asked the respondent to identify which type of tool, e.g., probabilistic models, he used and to name the particular tool he or she used. In the "Needed Tools" category, respondents were asked to identify the areas in which they believed additional tools needed to be developed. The companies to which the questionnaire was sent represented a spectrum of aerospace companies: "systems houses," "equipment houses," aircraft manufacturers, and electronics manufacturers. Of the 37 solicited responses, eight were received. This response was somewhat disappointing because it was hoped to obtain a sufficient number to begin developing some statistics on industrial practices.

Although the data sample is extremely limited, it does provide some useful information on industrial practices. Quantitative data is presented in the tables below.

In the tables, commonly appearing responses are identified in the "Common Tool" column. From a qualitative perspective, there was little commonality in the techniques employed by the respondents. This applied to type of tool used in a particular area as well as particular tool used. Several companies used several types of tools in a given area. It is noted that companies that were equipment manufacturers, as compared with systems designers, tended to use human performance reliability tools or, if they did, used the approach specified by their prime contractor.

TABLE II  
DESIGN APPROACH RESPONSES

| Tool Type              | No. Users | Common Tool        |
|------------------------|-----------|--------------------|
| Computer-Aided Design  | 3         | Crew Chief SAMMIE* |
| Task Analysis          | 5         | —                  |
| Human Factors Physical | 7         | —                  |
| Layout                 | 0         | —                  |

\* SAMMIE = System for Aiding Man-Machine Integration Evaluation

TABLE I  
PREDICTION RESPONSES

| Tool Type              | No. Users | Common Tool |
|------------------------|-----------|-------------|
| Analytical Models      | 1         | —           |
| Stochastic Models      | 2         | —           |
| Task Analytical Models | 2         | —           |
| Digital Simulation     | 1         | —           |
| Other                  | 1         | —           |

TABLE III  
DESIGN VALIDATION APPROACH RESPONSES

| Tool Type                              | No. Users | Common Tool |
|--|-----------|-------------|
| Computer Simulation                    | 2         | —           |
| Full-Scale Mock-up                     | 5         | —           |
| Prototype Test with Customer Personnel | 6         | —           |
| Other                                  | 4         | —           |

TABLE IV  
ALLOCATION APPROACH RESPONSES

| Tool Type         | No. Users | Common Tool |
|-------------------|-----------|-------------|
| Analytical Models | 3         | —           |
| Optimization      | 1         | —           |
| Other             | —         | —           |

TABLE V  
NEEDED TOOLS

| Tool Area         | No. Respondents |
|-------------------|-----------------|
| Prediction        | 4               |
| Design            | 2               |
| Design Validation | 1               |
| Allocation        | 3               |

With respect to needed tools, the strongest interest was in front-end tools, as shown in Table 5.

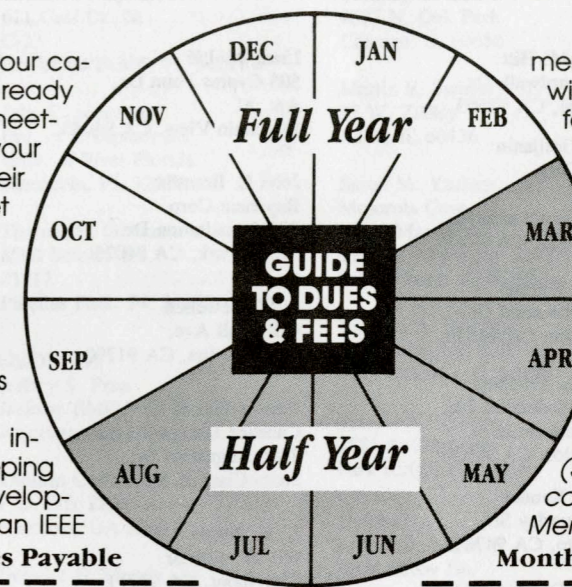
The emphases on prediction tools is somewhat surprising because the best publicized aspect of human performance reliability has been the prediction. The lower degree of interest on design tools appears to reflect a satisfaction with the computer design tools that are available and the traditional human factors methodologies. Several respondents noted needs in more than one area.

In summary, this limited survey showed that, despite publicity about prediction and computer design tools, there is a considerable amount of diversity in the treatment of human performance reliability by the aerospace industry. The survey suggests the need to develop and widely publicize readily understandable techniques for allocating and predicting human performance reliability.

## Join your society today...

It's always time to upgrade your career. Membership gives you ready access to state-of-the-art meetings and conferences in your areas of interest, and to their published proceedings. You get to meet experts from other organizations and to participate in technical activities with the prime movers in engineering, science and business. Our membership is world-wide.

At least one periodical is included in your Society fee, keeping you abreast of the latest developments in your field. And, as an IEEE



member, you may choose from a wide range of books, Standards, conference records, employment surveys, short courses and other career-building aids—all at discounted member prices. Please take this opportunity, now, to broaden your outlook, open your mind to new concepts, new techniques, new fields of interest. There will be no better time. Return the Membership Application form included below.

(Students should contact their IEEE counselor or write for a Student Membership brochure.)

MEMBERSHIP

APPLICATION



IEEE

## Reliability Society

Please check appropriate box(es) below:

All dues and fees below are annual rates. Indicate here whether you are remitting either 100% or 50% of these rates. (See chart above.)

100%  50%

Society fee: \$8.00  \$ \_\_\_\_\_  
Includes the following (please check one):

*Trans. on Reliability*

*Trans. on Semiconductor Manufacturing*

IEEE membership annual dues and Regional assessment payments.

U.S. \$77.00  \$ \_\_\_\_\_

Canada \$69.00  \$ \_\_\_\_\_

Europe, Africa & Mid. East \$68.00  \$ \_\_\_\_\_

Latin America \$61.00  \$ \_\_\_\_\_

Asia & Pacific \$59.00  \$ \_\_\_\_\_

TOTAL AMOUNT ENCLOSED  \$ \_\_\_\_\_

I am applying for the following as indicated:

I am an IEEE member. Please enroll me in the above society.

IEEE member No.

IEEE membership plus society membership.

IEEE membership only.

Check enclosed. Remit in U.S. dollars drawn on a U.S. bank. Make check payable to IEEE.

Note: Payments made in local currency must include an additional 2% currency exchange fee and a \$15.00 U.S. bank fee.

Charge to my credit card. (Minimum \$10.00 charges only.)

VISA  MasterCard  American Express  Diners Club

Full signature \_\_\_\_\_ Date \_\_\_\_\_

First name (print) \_\_\_\_\_ Middle initial(s) \_\_\_\_\_ Last name \_\_\_\_\_

Street address \_\_\_\_\_

City \_\_\_\_\_ State/Country \_\_\_\_\_ Postal Code \_\_\_\_\_

APPLICANTS FOR IEEE MEMBERSHIP

PLEASE COMPLETE THE FOLLOWING INFORMATION:

Were you ever a member of IEEE  Yes  No If Yes, please furnish (if known):

Grade \_\_\_\_\_ Membership No. \_\_\_\_\_  
Years in professional practice \_\_\_\_\_ Date of Birth \_\_\_\_\_  Male  Female

Education (Highest level completed) \_\_\_\_\_

Name of educational institution \_\_\_\_\_ City/State \_\_\_\_\_

Course \_\_\_\_\_ Degree received \_\_\_\_\_ Date \_\_\_\_\_

ENDORSEMENT (Signature of one IEEE member who knows you professionally) \_\_\_\_\_ IEEE Member Number \_\_\_\_\_

IEEE SERVICE CENTER  
445 Hoes Lane/P.O. Box 1331  
Piscataway, NJ 08855-1331 U.S.A.  
1 (800) 678-IEEE

| EVENT CODE |      | EVENT DATE |    | BROCHURE CODE |     | BROCH DATE |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|------------|------|------------|----|---------------|-----|------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| P          | 0790 |            |    | B             | 999 |            |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| 56         | 57   | 58         | 59 | 60            | 61  | 62         | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 |

Please mail to:



# Relex Means Reliability Excellence!

Analyze and improve your product reliability using Relex, an unprecedented set of reliability analysis software tools. Quality, ease of use, power, and flexibility are just a few of Relex's unique trademarks.

Relex's impressive features include unparalleled data input and output abilities, graphical functions, part data libraries, system modeling, CAD interfaces, support for electrical and mechanical devices, and more.

The Relex product line, our service, and our support attest to a continuing commitment to quality. And our products are backed with a full 30 day money-back guarantee. Now is the time to take a step towards excellence!

Call Today and Ask for Your **FREE** Demo Disk!



Innovative Software Designs, Inc.

One Kimball Ridge Court · Baltimore, MD 21228  
(301) 747-8543 · Fax (301) 747-8599





Kenneth P. Lasala  
703 Cannon Rd.  
Silver Spring, MD 20904

Leonard E. Miller  
4310 Puller Dr.  
Kensington, MD 20895

**MICHIGAN**  
Mike W. Huxford  
16378 Marr Rd.  
Almont, MI 48003

Allan D. Olson  
1211 Wilmot Apt. 5  
Ann Arbor, MI 48104

David A. Delorm  
2500 Mapleview Ct.  
Kentwood, MI 49508

Glenn S. Peffers  
1001 Augusta St.  
Sault St. Marie, MI 49783

Judith A. B. Kessler  
1514 Montclair Pl.  
Ann Arbor, MI 48104

**MINNESOTA**  
Michael Sershon  
7821 Hearthside Ct. #2  
Cottage Grove, MN 55016

Bret E. Mumm  
19239 Rhinestone NW  
Anoka, MN 55303

Paul R. Pukite  
4960 Fillmore St. NE  
Minneapolis, MN 55421

A. Eugene Hoffman  
2229 Fairmount Ave.  
Saint Paul, MN 55105

**MISSOURI**  
Terrial C. Cutsinger  
Central Microwave Co.  
12180 Prichard Farm Rd.  
P.O. Box 1095  
Maryland Hts, MO 63043

Yihong A. Cheng  
500 South Ewing #A  
St. Louis, MO 63103

**NORTH CAROLINA**  
Jeff B. Johnson  
260 Beachtree Dr.  
Cary, NC 27513

**NORTH DAKOTA**  
Marshall L. Kjelvik  
3002 10th St. N. Apt. 1  
Fargo, ND 58102

**NEBRASKA**  
John C. Estes Jr.  
Union Pacific Railroad  
1416 Dodge St.  
Omaha, NE 68179

**NEW HAMPSHIRE**  
Sheila M. Shea  
7 Jill Rd.  
Salem, NH 03079

D. F. Blodgett  
112 Searles Rd.  
Nashua, NH 03062

Thomas E. Noll  
4 Pittsburgh Ave.  
Teradyne Circuits  
Nashua, NH 03062

**NEW JERSEY**  
J. F. Prorok  
511 N. Riverside Dr.  
Shark River Hills  
Neptune, NJ 07753

Andrew L. Reibman  
AT&T Bell Labs Ho 2L-518  
6000 Crawfords Corner Rd.  
Holmdel, NJ 07733

Steven T. Moore  
203 Alpine Trail  
Neptune, NJ 07753

Fred L. Swern  
53 Village Rd.  
Florham Park, NJ 07932

Gary J. Rittman  
Oak Tree Dr.  
Apt. 0-4  
No. Brunswick, NJ 08902

Anthony J. Aukstikalnis  
9 Montclair Dr.  
Delran, NJ 08075

**NEW MEXICO**  
R. H. Williams  
1716 California NE  
Albuquerque, NM 87110

Mark A. Rodrigues  
4114 Tara Ct. NE  
Albuquerque, NM 87111

Douglas H. Loescher  
8500 Prestina NE  
Albuquerque NM 87111

Ralph W. Kewish, Jr.  
2379 Camino Pintores  
Santa Fe, NM 87505

James R. Spehar  
1907-203 Buena Vista St.  
Albuquerque, NM 87106

**NEW YORK**  
Larry D. Munson  
RFD #5 Box 82  
Upper Stella Ireland Rd.  
Binghamton, NY 13905

Laurence Beck  
32 Cambria Rd.  
Syosset, NY 11791

John D. Litke  
645 Park Ave.  
Huntington, NY 11743

Edward Fischbein  
80-32 193rd St.  
Jamaica, NY 11423

William E. Haberkorn  
93 A. Farimont Ave.  
Kingston, NY 12401

Shen Zhang  
827 Euclid Ave. Apt #4  
Syracuse, NY 13210

Ann C. Merenda  
22 Titus Rd.  
Poughkeepsie, NY 12603

Craig J. Beers  
8801 Delta Ave.  
Rome, NY 13440

Jerome C. Bobrowski  
218 Dorothy St.  
Endicott, NY 13760

Scott J. Bauer  
17 Mayapple Ln.  
West Henrietta, NY 14586

**NEVADA**  
F. R. Oblad  
6800 Selkirk Cir.  
Las Vegas, NV 89108

**OHIO**  
John L. Becker  
1643 Heatherwood Trail  
Beavercreek, OH 45385

Chien In H. Chen  
Dept. of Elec. Eng.  
Wright State Univ.  
Dayton, OH 45435

Steve G. Belovich  
18872 Meadow Ln.  
Strongsville, OH 44136

Chris J. Abel  
9208 Malvern Dr.  
Cleveland, OH 44129

Wayne R. Recla  
619 Pinewood Pl.  
Dayton, OH 45430

Jeffrey A. Fleeman  
4689 Olentangy Blvd.  
Columbus, OH 43214

Robert B. Strother  
P.O. Box 21145  
Cleveland, OH 44121

Ann M. Konopinski  
8098 Patterson Rd.  
Dayton, OH 45419

**OREGON**  
Anne V. Isbell  
Intel Corp  
5200 NE Elam Young Pkwy.  
MS HF1-36  
Hillsboro, OR 97124

Kenneth T. Zetlmaier  
19971 Williams Hwy.  
Williams, OR 97544

George P. Young  
20012 Williams Hwy.  
Williams, OR 97544

**PENNSYLVANIA**  
Lawrence A. Walter  
1007 Hill Dr.  
Allentown, PA 18103

Jin Fa Lee  
1577 Bevan Rd. #9  
Baldwin, PA 15227

W.A. Baker  
Bell Laboratories  
555 Union Blvd.  
Allentown, PA 18103

Kevin J. Torek  
1215 Old Boalsburg Rd.  
State College, PA 16801

Henry J. Lory  
3221 Stoudts Ferry Bridge Rd.  
Reading, PA 19605

Ronald L. Remke  
2 Fawn Dr.  
Reading, PA 19607

Kent D. Wilken  
6637 Aylesboro  
Pittsburgh, PA 15217

Joseph M. Stroz  
1005 Glass Run Rd.  
Apt. 7  
Pittsburgh, PA 15236

**TENNESSEE**  
Laurie J. Hussong  
Rt 8 Box 8947  
Apt. #18  
Manchester, TN 37355

Carla D. Pratcher  
580 East McKellar Ave.  
Memphis, TN 38106

Bharat L. Bhuva  
P.O. Box 5-8  
Vanderbilt Univ.  
Elec. Eng. Dept.  
Nashville, TN 37235

Wallace F. Carden Jr.  
208 Battle Front Trail  
Knoxville, TN 37922

**TEXAS**  
Michael A. Schoenfelder  
311 E. 31st St. #205  
Austin, TX 78705

Keith L. Jones  
11239 Signal Ridge  
El Paso, TX 79936

Joseph G. Durand  
3901 Oak Meadow Dr.  
Round Rock, TX 78681

Peter L. Janes  
409 N. Park  
Uvalde, TX 78801

James L. Allen  
C/O Rel Inc.  
P.O. Box 218370  
Houston, TX 77218

John F. Hunt  
700 Thicket Ln.  
#608  
Houston, TX 77079

Raul Rodriguez  
5521 Greenville Ave.  
Apt. #104-259  
Dallas, TX 75206

David E. Carr  
12111 Avdelia Rd.  
#107 W.  
Dallas, TX 75243

Jeffrey B. Stamets  
6835 John Marshall Blvd.  
San Antonio, TX 78240

Seuk Kyung Sung  
U2L Hensel  
College Station, TX 77840

Ben L. Tillison, Jr.  
15995 North Barkers Landing  
#120  
Houston, TX 77079

Ram Lal  
903A Appleton  
Arlington, TX 76010

Lawrence C. Wagner  
P.O. Box 655012 M/S 74  
Texas Instruments  
Dallas, TX 75265

Richard J. Dell  
237 Elen Ct.  
Wylie, TX 75098

James J. Ewell III  
1301 Harvey Rd. #225  
College Station, TX 77840

Mark Jackson  
10610 Morado Cir #1021  
Austin, TX 78759

T. Chow  
7220 Mc Callum Blvd. #1809  
Dallas, TX 75252

John D. Stewart  
P.O. Box 814245  
Dallas, TX 75381

Matthew G. Beyers  
14222 Wunderlich  
Apt. 102  
Houston, TX 77069

Scott A. Artman  
1915 Wells Branch Parkway  
Apt. 302  
Austin, TX 78728

Rolando Garza  
2420 Ridgepoint Dr. MS/A105  
Austin, TX 78729

Robert J. Czepiel  
11114 Orsini Pl.  
Austin, TX 78750

Richard A. Fry  
3809 Quivera Cir.  
Carrollton, TX 75007

Calvin Adkins  
7628 Precinct Line  
Fort Worth, TX 76180

Jerry A. Gerner  
14000 Renaissance Ct.  
Apt. 1074  
Austin, TX 78728

Tat Kwan E. Yu  
2207 Wickersham Ln.  
Apt. #408  
Austin, TX 78741

**UTAH**  
Pratap S. Khanwilkar  
Ahril  
803 N. 300 W  
Salt Lake City, UT 84103

**VIRGINIA**  
Gordhan R. Barevadia  
1026 Bolling Ave. #291  
Norfolk, VA 23508

Robert W. Whinnery  
1303 N. Quincy  
Arlington, VA 22201

Joseph R. Tauchen  
421 Bethune Dr.  
Virginia Beach, VA 23452

Herbert F. Butler III  
9305 Saint Marks Place  
Fairfax, VA 22031

Seldon O. Morgan  
7416 Scarborough St.  
Springfield, VA 22153

Robert H. French  
P.O. Box 16728  
Arlington, VA 22215

Murray R. Berkowitz  
7411 Houndsbury Ct.  
Alexandria, VA 22310

Gregory E. Menk  
ITT Gallium Arsenide  
Tech Ctr. 7625 Plantation Rd.  
Roanoke, VA 24019

John A. Allen, Jr.  
10412 Darby St.  
Fairfax, VA 22030

Byron K. Dunn  
1041 Knight Ln.  
Herndon, VA 22070

James M. Brase  
518 Fourmile Rd.  
#201  
Alexandria, VA 22305

**VERMONT**  
Frits T. Verdonk  
4 South Cove Rd.  
Burlington, VT 05401

Paul R. Szczerbak  
35 Pheasant Way  
Burlington, VT 05403

**WASHINGTON**  
Ross E. Youngs  
7316 Vashon Place SW  
Seattle, WA 98136

Paul D. Berndt  
2612 S. Meridian  
#1134  
Puyallup, WA 98373

Robert D. Stuart  
1604 X St.  
Apt. 2  
Vancouver, WA 98661

Thomas E. Ryan  
21609 NE 109th St.  
Vancouver, WA 98682

Jay S. Dickinson  
Hewlett Packard  
18110 SE 34th St.  
Camas, WA 98607

Marshall W. Davis  
1111 39th Ave. SE  
MS 2A024  
Puyallup, WA 98373

Arnold W. Nordsieck  
2714 162nd Ave. NE  
Bellevue, WA 98008

**WISCONSIN**  
Raphael G. Strosin  
213 Rose Ln.  
Belgium, WI 53004

Robert R. Buttner  
5746 Gladstone Ln.  
Greendale, WI 53129

Meera Balakrishnan  
10 High Point Oak Lane #104  
Madison, WI 53719

E. F. John  
Miller Electric Mfg. Co.  
P.O. Box 1079  
Appleton, WI 54912

#### INTERNATIONAL

**ARGENTINA**  
Ismael J. Allami  
Casilla De Correo 20  
1603 Villa Martelli  
Argentina

**AUSTRALIA**  
Clive A. Goldsmith  
18 Barnes Ave.  
Northfield SA 5085  
Australia

Timothy J. Withers  
817 Ipswich Rd.  
Yeerongpilly Qld 4105  
Australia

John W. Holm  
90 Kent St.  
Sydney NSW 2000  
Australia

**WESTERN AUSTRALIA**  
Say T. Lai  
Currie Hall Crawley  
Perth 6009  
Western Australia

**AUSTRIA**  
Johann T. Lafferl  
Mandlinggasse 36  
Grillenbergr  
2560 Berndorf  
Austria

Andreas Sethy  
Liechtensteinstrasse 32/6  
A-1090 Vienna  
Austria

**BAHAMAS**  
Benjamin R. Beneby  
P.O. Box N1179  
Nassau, Bahamas

**BELGIUM**  
John M. Nolf  
Bierbeekstraat 89  
3040 Korbeek-Lo  
Belgium

Jan Van Dooren  
Yzerenmolenstraat 63  
Heverlee B-3030  
Belgium

Herman E. Maes  
IMEC V2W  
Kapeldreef 75  
B-3030 Leuven  
Belgium

**BRAZIL**  
Wellington S. Mota  
Rua Maria De Lourdes  
Lima 297 Bairro Universitario  
58100 Capgna Grande PB  
Brazil

Antonio S. Conti  
Rua Antonio Iervolino N 202  
Vila Augusta Guarulhos SP  
Guarulhos, Sao Paulo Cep 07020  
Brazil

S. Granato De Araujo  
Rua Estelita Lins 20/202  
Laranjeiras  
Rio De Janeiro RJ, 22251  
Brazil

**CANADA**

Timo A. Venalainen  
122 Rosemount Ave.  
Weston Ont. Canada  
M9N 3B7

Amin Foroughian  
2527 Hamilton Rd  
Brights Grove Ont Canada  
N0N 1C0

Paul P. Dasiewicz  
34 Academy Crs  
Waterloo Ont Canada  
N2L 5H7

Pok Y. Lee  
30 Mallon Ave.  
Toronto Ont Canada  
M4M 1P8

Fred J. Oberbuchner  
43 Westmount Bay  
Winnipeg Man Canada  
R2J 1Y7

Robert M. Berger  
40 Gerrard Gast Apt. 1410  
Toronto Ont. Canada  
M5B 2E8

John O. Harris  
51 Dunsmoor Rd.  
London Ont. Canada  
N6K 1T6

J. G. Gaudette  
75 O. R. Levesque CD 15/FL  
Montreal, Que. Canada  
H2Z 1A4

Fatma N. Ozmizrak  
Dept of Computer Science  
Univ. of Ottawa  
Ottawa, Ont. Canada  
K1N 6N5

Raul E. San Martin  
1502-475 Elgin St.  
Ottawa, Ont, Canada  
K2P 2E6

A. Liebelt  
1629 E. 59th Ave  
Vancouver, BC, Canada  
V5P 2G8

Moe El-Gamal  
MLSP-Aviation-Transport Canada  
110 O'Connor St. 7th Fl.  
Ottawa, Ont. Canada  
K1A 0N8

Christian Tessier  
3428 Paul-Prevost  
St-Hubert, Que. Canada  
J3Y 9Z6

Douglas B. Hay  
400 Parkside Dr.  
#604  
Waterloo, Ont. Canada  
N2H 5E6

Sivarama P. Dandamudi  
School of Computer Science  
Carleton University  
Ottawa, Ont. Canada  
K1S 5B6

Alain R. Comeau  
Mitel SCC  
18 Blvd. De L'Aeroport  
Bromont, Que. Canada  
J0E 1L0

Stan C. Gordeyko  
1028-78 Ave. NW  
Calgary, Alberta, Canada  
T2K 0S7

Eldon D. Wig  
Sub P.O. 24  
Saskatoon, Sask. Canada  
S7M 0V0

Robert Y. Yuen  
#18 Lansdowne Dr.  
Brampton, Ont. Canada  
L6S 5V4

Kenneth W. K. Chum  
518-291 Windermere Rd.  
London, Ont. Canada  
N6G 2J9

**DENMARK**

Nikolai Bisgaard  
GN Danavox AS  
Haydnsvej 2  
DK-2450 Copenhagen SV,  
Denmark

**EGYPT**

El Sayed A. Rashed  
03 Nakeep El Ghish St.  
Abasia Cairo,  
Egypt

**ENGLAND**

Simon J. Barnett  
10 Moira Rd.  
Ashby-De-La-Zouch  
Leicestershire LE6 5GA  
England

David Salt  
HY-Q International (UK) Ltd.  
Station Rd.  
Whittlesford Cambridge CB2 4NL  
England

Meirion E. Roberts  
Texas Instruments Ltd.  
Manton Lang Bedford MK41 7PA  
England

**FINLAND**

Josu A. Takala  
University of Vaasa  
P.O. Box 297 SF-65101 Vaasa  
Finland

**FRANCE**

Yves Veret  
Cap Sesa Defense Doc  
30 Quai De Dion Bouton  
Puteaux Cedex 92806  
France

Frederic Leconte  
4 Square Leon Guillot  
75016 Paris,  
France

**GREECE**

Alkiviades Hatzopoulos  
Univ. of Thessaloniki  
P.O. Box 430  
54006 Thessaloniki  
Greece

Chris Bezirtzoglou  
2 Fleming St.  
Ilioupolis  
16345 Athens,  
Greece

**HONG KONG**

Yeung Tak Hung A  
Flat H. 18/F Nelly Heights  
Belair Garden  
Shatin New Territories  
Hong Kong

Tat Ming Wong  
RCL Semiconductors Ltd.  
3 Tai Fu St. Tai Po  
Industry Estates NT  
Hong Kong

Yu-Kwan Law  
Motorola Semiconductor Hk Ltd  
Profit Ind. Bldg/7 FL Phase II  
Kwai Fung Crescent/Kwai Chung  
NT Hong Kong

On-Wah Kong  
No. 7 19 Floor Block D  
Tak Bo Garden  
Kowloon  
Hong Kong

Xiaoyu Zhou  
China Hewlett-Packard Co  
25/F Bond Centre West Wing  
89 Queens Way Xiao Yu Zhou  
Hong Kong

**INDIA**

G. R. Patel  
3 Ganpati Society  
Sindhvai Mata Rd.  
Pratap Nagar/Baroda 390 004  
India

Jitendra J. Puniwala  
8/1945 Near Govindjee Mandir  
Gopipura  
Surat Gujarat 395001  
India

**IRELAND**

Eamon S. Hynes  
Lisatunny Nenagh  
Co. Tipperary  
Ireland

**ISRAEL**

Shlomo Barak  
Optrotech Ltd  
P.O. Box 69  
70450 Ness Ziona  
Israel

Naftali Chayat  
Ministry of Defence  
P.O.B. 25034 Tel Aviv 61250  
Israel

**JAPAN**

Kisaburo Nakazawa  
6-29-10 Sagamidai  
Sagamihara Kanagawa 228  
Japan

Todomo Osakama  
1-18 Kifune Kamiyagari  
Sendai-Shi  
Miyagi 981-31  
Japan

Akihiko Masuda  
Microwave & Sat Comm Div.  
Nec Corp 4035 Ikebe-Cho  
Midori-Ku Yokohama City 226  
Japan

Trien N. Pham  
2007-1 Hayashi  
Komaki City  
Aichi Pref. 485  
Japan

Tamotsu Ninomiya  
Kyushu Univ. Dept. of Elect.  
6-10-1 Hakozaiki Higashi-Ku  
Fukuoka 812  
Japan

Nobuki Kudo  
Toshiba Corp. Med. Eng. Lab.  
1385 Shimoishigami  
Otawara-Shi Tochigi-Ken 329-26  
Japan

Yasutaka Kainuma  
Garden Home #306  
1-10-1 Renkoji Tama  
Tokyo 206  
Japan

Shoshiro Hatekeyama  
Tokyo Denki Univ.  
Isizaka Hatoyama Hiki-Gun  
Saitama 350-03  
Japan

Tsuneo Sasamoto  
Fuji Phot. Film Co Ltd  
Micro Elect RS 798 Miyanodai  
Kaisei-Machi Ashigarakami-Gun  
Kanagawa 258 Japan

Kizashi Shimada  
Toshiba Tamagawa 1-Komukai  
Toshiba-Cho Saiwai-Ku  
Kawasaki-Shi 210  
Japan

**KOREA**

Kwang S. Moon  
Library of Yonam Jr.  
College of Eng.  
P.O. Box 39 Chinju  
Kyungnam, Seoul, 660-300  
Korea

Sangyoung Park  
Department of Elec. Eng.  
Seoul National Univ.  
Seoul, 151-742  
Korea

Cho B. Jin  
Dept. of Elec. Eng. Kaist.  
P.O. Box 150 Cheongryang,  
Seoul, Korea

**KUWAIT**

Hosam M. F. Aboel-Fotoh  
Kuwait University  
Dept. of Mathematics  
P.O. Box 5969  
Kuwait, 13060

**MALAYSIA**

Cheng Sin Chew  
42 Jalan SS2/97  
47300 Petaling Jaya Selangor  
Malaysia

Jaya R. Ganasan  
B-2062 JLN HJ Ahmad  
Kuantan  
Pahang 25300  
Malaysia

Koay K. Huah  
15 Lebuhrambai Lima  
Payaterubong  
11060 Penang  
Malaysia

**MEXICO**

Rafael Cristerna  
Apartado Postal 5-042  
Col Cuauhtemoc CP 06500  
Mexico DF  
Mexico

**NETHERLANDS**

Giuliano Gatti  
Writsaert 154  
2202 PV Noordwijk  
The Netherlands

Nicolaas P. Van Rossum  
Bomas 2  
Venendaal 3GOSWG  
Netherlands

Cees G. M. Van Kessel  
Nederlandse Philips Bedrijven  
B. V. Ctr for Mfg Tech Bldg. SAQP  
Postbus 218 5600 MD Eindhoven  
Netherlands

Hendrikus Van Gestel  
Van Bleyswijkstraat 32  
2613 Rt Delft  
Netherlands

**NORWAY**

Helge Kildal  
Ankerneien 74  
0765 Oslo 7  
Norway

**PAKISTAN**

Mohammad A. Beg  
Prof. of Statistics  
Punjab Univ. Lahore 54590  
Pakistan

**PUERTO RICO**

Carlos E. Morales  
Jose R. Caballero AA-1  
Hormigueros, PR 00660

Marian De Jesus  
Calle 412 MJ-1 Country Club  
Rio Piedras, PR 00924

**SAUDI ARABIA**

Khalid A. Binali  
P.O. Box 30910  
Jeddah 21487  
Saudi Arabia

**SCOTLAND**

Alan Miles  
Doire Teile Station Rd.  
Carrbridge  
Inversness Hire PH233 AL  
Scotland

**SINGAPORE**

Ah Bok Soo  
Block 6 Farrer Rd.  
#04-60  
Singapore 1026  
Singapore

Chua K. Seng  
Apt Blk 223/Simei St. 4  
#05-152  
Singapore 1852  
Singapore

Ngoh Huang Tan  
Block 411 Eunos Rd. 5 #08-124  
Singapore 1440  
Singapore

**SOUTH AFRICA**

John E. Robinson  
45 Eksteen St.  
Loevenstein 7535  
South Africa

Frederick J. Bruwer  
Bouardialaan 9  
0081 Pretoria  
South Africa

Michael F. Romancia  
903 Milnerton  
30 De Beer Str  
Braamfontein 2001  
South Africa

**SPAIN**

Juan J. Benito-Martin  
Villa De Muro 10-5  
Valencia 46020  
Spain

Anibal O. Baturone  
Escuela Univ. Politecnica Dpto.  
Ing. De Sist. Info Biblioteca  
Plaza El Ejido D/N Malaga  
Spain

Ignacio Alejandro-F  
Avda Jose Antonio No 10 4 IZQ  
24002 Leon  
Spain

Juan J. Serrano Martin  
Univ. Politecn De Valencia  
Dpto D I S C A  
Apdo 22012 Valencia 46071  
Spain

**SWEDEN**

Sture R. Torseng  
ABB Power Systems AB Dept. H  
S-72169 Vasteras  
Sweden

Bertil Linder  
Saab Space AB  
S-40515 Goteborg  
Sweden

**SWITZERLAND**

Ernst Bachmann  
Pilgerstrasse 4  
CH-5405 Baden-Daettwil  
Switzerland

Jacob H. De Vries  
C/O Landis & Gyr Zug AG  
6301 Zug  
Switzerland

**TAIWAN**

Tzyy-Jang Tseng  
No 3 Industrial East Rd III  
Science-Based Ind Park  
Hsin-Chu City  
Taiwan

Chad Hung Chen  
188 Lin Sen 13th Rd.  
Kaohsiung 80605  
Taiwan

Chia Jen Lin  
242 Roosevelt Rd.  
Section 3  
Taipei 107  
Taiwan

Chin Shan Hou  
#19 LN 93 Sec 1 Hsing Nan Rd.  
Chung Ho  
Taipei 23561  
Taiwan

T. M. A. Chen  
11 Alley 63 Lane 14 Sec 7  
Chung-Shan N. Rd.  
Taipei 11137 Taiwan  
ROC

Tzonelih Hwang  
Inst. of Info Eng.  
National Cheng Kung Univ  
Tainan  
Taiwan

Bin-Kwie Chen  
Tatung Inst. of Tech/EE Dept.  
40 Chungshan N Rd 3rd Sec.  
Taipei  
Taiwan

**TURKEY**

Cahit Buckun  
Yaylagol Sok 3/18  
Cagatay Apt. A Ayranci  
Ankara  
Turkey

**UNITED ARAB EMIRATES**

Mohammed M. Al-Bornic  
Abu Dhabi Co for Onshore Oil  
ADCO P.O. Box 270  
Abu Dhabi  
United Arab Emirates

**VENEZUELA**

Candido C. Perez  
Apartado Postal 6309  
Carmelitas  
1010 Caracas  
Venezuela



## CALL FOR PAPERS

# 1991 Annual RELIABILITY AND MAINTAINABILITY Symposium

1991 January 29-31

Orlando Marriott

Orlando, Florida USA

## Product Assurance—Return On Investment

Share your knowledge and expertise with your colleagues at the world's premiere forum for the assurance technologies.

### Deadline for Abstract Submittal—1990 April 15

Commercial-product management addresses the concern of development and production costs with an eye on the net profit to the company. Decisions on funding of all tasks, including Product Assurance, must consider return on investment—both short term and long term.

Similarly, defense-product management has the same cost concerns. Tailoring of Product Assurance tasks is viewed from a cost-effectiveness standpoint. Our discipline's ability to quantify our contributions in terms of return on investment—again, both short and long term—is mandatory.

Your paper should enhance our ability to understand these factors.

Papers in the following types of subjects are solicited:

#### TECHNOLOGY

CAD/CAM/CAT/CALS  
Design to Life-Cycle Cost  
Modeling & Simulation Methods  
Software: R&M and Safety  
R&M Test & Demonstration  
Reliability Growth  
Screening  
Failure Analysis  
Built-In-Test & Testability  
Hazard Analysis  
Fault Trees  
Repair/Maintenance  
R&M Analyses  
Software Tools  
Environmental Testing

#### MANAGEMENT

CAD/CAM/CAT/CALS  
Design to Life-Cycle Cost  
System Effectiveness  
R&M Contracting & Management  
R&M Requirements  
Risk Management  
Database Management  
R&M Cost-Benefit Tradeoffs  
Testing Effectiveness  
Warranties/Guarantees  
Logistics Support  
International Programs  
Reliability-Growth Management  
Product-Assurance Management  
Safety Management  
Logistics & Support

#### INDUSTRY APPLICATIONS AND LESSONS LEARNED

Aerospace & Defense  
Electric Power & Other Utilities  
Oil & Other Resource Industries  
Mechanical/Structures Equipment  
Transportation  
Microelectronics  
Computer Hardware & Peripherals  
Software  
Robotics  
Consumer Products  
Medical Systems  
Communication Systems  
Office Automation  
Electrical & Electronic Systems

For Submittal Procedure, See Reverse Side

### The P.K. McElroy Award

The P.K. McElroy Award recognizes the best combination of the technical paper and its presentation. All submitted papers are graded by the Program Committee. The top contenders are selected and their presentations at the Symposium are monitored by a group of past General Chairmen. The author(s) of the winning paper is recognized at the next Symposium and receives a plaque, a \$1000 honorarium, and gratis registration.

RAMS is a nonprofit symposium sponsored by the following Societies:



ASME



ASQC



IIE



IEE



SOLE



IES



AIAA



SSS



SRE

# Call For Papers

## 1991 Annual RELIABILITY AND MAINTAINABILITY Symposium

1991 January 29-31

Orlando Marriott

Orlando, Florida USA

### Procedure for Abstract Submittal

If you wish to present a paper, now is the time to contact us. All papers must be new, i.e., neither published nor presented at a national meeting prior to the Symposium. Papers presented at local meetings are acceptable.

We will need 10 copies of the set of the following items as soon as possible—and remember—**The Deadline is 1990 April 15.**

- Abstract (as informative as feasible, not more than 1000 words)  
Structure the Abstract in three sections:
  - Problems or Questions Addressed
  - Work Performed
  - Results and/or Conclusions Reached.
- For each author:
  - Name
  - Work—mail address, phone number, and FAX number
  - Home—mail address and phone number
  - Brief professional biography.
- For the paper:
  - The Correspondence Author (the author to whom correspondence should be addressed)
  - The Presenting Author (the author who will present the paper at the Symposium)
  - The status of any previous or planned presentation and/or publication of the material to be covered.

Send your 10 copies of the set (by the 1990 April 15 Deadline) to:

Dr. R.J. Loomis (phone: 407-867-5921)  
AR&MS Program Chairman  
Lockheed Space Operations Company  
LSO-291  
1100 Lockheed Way  
Titusville, Florida 32780 USA

The initial screening for candidate papers is based solely on these Abstracts. If an Abstract does not clearly indicate the paper's value, then it will generally receive no further consideration. Therefore, it is essential that your initial submission be carefully prepared.

All submittals become the property of the Symposium and will not be returned.

The Correspondence Author will be notified of the Program Committee decision early in 1990 June.

- If the Abstract is accepted then—
- The complete drafts of both the paper and slides must be received by the end of 1990 July for review.
  - Comments from this review will be mailed to the Correspondence Author early in 1990 September.

If the Paper is accepted then the following 3 items must be received by Monday, 1990 October 15:

- The final, camera-ready paper.
- The set of finished slides
- The completed Copyright Form for the Symposium Proceedings.

These dates do not have slack. Each author must accept the responsibility of meeting this schedule.

### DEADLINE FOR ABSTRACT SUBMITTAL—1990 APRIL 15

**FROM:** Dr. R.J. Loomis  
AR&MS Program Chairman  
Lockheed Space Operations Company  
LSO-291  
1100 Lockheed Way  
Titusville, FL 32780 USA

Annual Reliability & Maintainability Symposium

Sponsored by:

ASQC/ED/RD—IEEE/RS—IES—AIAA—  
ASME—IIE—SOLE—SSS—SRE

# CALL FOR PAPERS

## Fourth Annual R&M CAE Workshop

Xerox Training Center; Leesburg, Virginia; October 9-11, 1990

R&M CAE—An Enabling Technology for Concurrent Engineering  
INITIAL ABSTRACT SUBMITTAL SUSPENSE: APRIL 2, 1990  
SUBMITTAL PROCEDURES: SEE REVERSE

Because of the outstanding success of the past three R&M in CAE Workshops, the IEEE Reliability Society will sponsor a fourth Workshop aimed at assuring that R&M concerns are addressed when the capabilities of engineering workstations are being defined. Past workshops have discussed the reliability, maintainability, and producibility tools that have been developed and are in development. Workshop groups have also explored how the tools should be integrated and the need for accurate reference data. We now need to ask:

- How can the developments made under R&M CAE be extended from a base for CAE system supporting concurrent engineering?
- How should the design process be changed to take advantage of a concurrent engineering CAE environment?
- What are the remaining critical technical issues (and proposed solutions thereto) affecting the successful implementation of R&M CAE in the functional engineer's working environment (from a Government, CAE industry, academia, and using community perspective)?
- How can the Government, CAE industry, academia, and the using community work together to continue our progress?
- Given the many design characteristics and design specialists, how can an R&M CAE system resolve potential conflicts?
- How must design and analysis data be managed during the design process to assure optimal designs?
- What new integration tools will be needed?

Attendance will be limited. If you wish to participate in this important workshop contact your local IEEE Reliability Society Chapter or the address below to receive information as it becomes available: Henry Hartt, VITRO Corp., 600 Maryland Ave. Suite 300W, Washington, DC 20024. Phone: (202) 646-6339. Fax: 202-646-6398.

Papers addressing the R&M CAE—AN ENABLING TECHNOLOGY FOR CONCURRENT ENGINEERING theme are requested for the 1990 Annual R&M CAE Workshop. Because this Workshop is the major forum for addressing the issues facing development of R&M CAE, your presentation of a meaningful, informative paper will benefit your colleagues, your profession, and you. Representative subject matter includes:

|                                    |                    |
|------------------------------------|--------------------|
| Fault Tree Analysis                | Reliability        |
| Design to Life Cycle Cost          | Maintainability    |
| Design Synthesis                   | Producibility      |
| CAE & CAE Tool Development         | Optimization       |
| Design Data Management             | Trade Studies      |
| RM&S Prediction Methods & Tools    | Prediction Tools   |
| Modeling and Simulation Methods    | Test Development   |
| Failure Modes and Effects Analysis | Test Effectiveness |
| Reference Data Management          | Test Data          |

R&M CAE—An Enabling Technology for Concurrent Engineering

## ABSTRACT & PAPER SUBMITTAL PROCEDURES

If you wish to present a paper, now is the time to contact us. All papers must be new; i.e., neither published nor presented at a National meeting prior to the Workshop. Papers presented at local meetings are acceptable. We will need 5 copies of the set of the following items as soon as possible—and remember—the **DEADLINE for ABSTRACT SUBMITTAL is APRIL 2, 1990.**

- 1) **Abstract:** (informative and concise—not more than 1000 words). Structure the Abstract in three sections: a) Problems or Questions Addressed, b) Solutions or Work Performed, and c) Results and/or Conclusions Reached.
- 2) **For each Author:** a) Name, b) Work—Mail Address, Phone Number, and FAX Number, c) Home—Mail Address and Phone Number, and d) Brief Professional Biography.
- 3) **Paper:** a) Correspondence Author (the author to whom correspondence should be addressed), b) the Presenting Author (the author who will present the paper at the Workshop), and c) the status of any previous or planned presentation and/or publication of the material to be covered.
- 4) **Mail Abstracts by April 2, 1990 to:**

**AFHRL/LRL**  
**Attention: Captain Mike Hanuschik**  
**WPAFB OH 45433-6503**

The initial screening for candidate papers is based solely on these Abstracts. If an Abstract does not clearly indicate the paper's value, then it will generally receive no further consideration. It is, therefore, essential that your initial submission be carefully prepared. All submittals become the property of the Workshop and will not be returned. The Correspondence Author will be notified of the Program Committee decision early in **May 1990.** The following dates apply. These dates do not have slack. Each author must accept the responsibility of meeting this schedule.

*If the Abstract is Accepted, then:*

- 1) **July 2, 1990:** The complete drafts of both the paper and slides must be received from the Correspondence Author.
- 2) **August 3, 1990:** Comments from this review will be mailed to the Correspondence Author.

*If the Paper is Accepted, then:*

- 3) **September 4, 1990:** The following items must be received from the Correspondence Author: a) Final, Camera-Ready Paper, b) Set of Finished Slides, and c) Completed Copyright Form for the Workshop Proceedings.

**FOR MORE INFORMATION PLEASE CALL MR HENRY HARTT, VITRO CORP, AT 202-646-6339**

# Call for Papers Probabilistic Safety Assessment and Management (PSAM)

*An International Conference Devoted to the Advancement  
of System-based Methods for the Design and Operation  
of Technological Systems and Processes*

**Sponsored by the Society for Risk Analysis**

**February 4-7, 1991 • The Beverly Hilton • Beverly Hills, California, USA**

## SCOPE

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

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

1. Safety management and decision making.
2. Risk-based regulation.
3. Qualitative and quantitative design objectives.
4. Evaluation of alternate technologies and processes.
5. Probabilistic and non-probabilistic models for safety assessment.
6. Uncertainty analysis.
7. Uncertainties in physical and chemical phenomenology.
8. Expert judgment in safety studies.
9. Human reliability.
10. Risk-based methods for improving operator training.
11. Computerized control systems and operator aids.
12. Artificial intelligence in support of safety management.
13. Software system safety.
14. Implications of advances in computer power.
15. Earthquakes, fires, tornadoes, and natural phenomena.
16. Multi-hazard analysis, e.g., fires following earthquakes.
17. Vulnerability and safeguards analysis.
18. Aging of systems, structures, and components.
19. Reliability-based design.
20. Accident management.
21. Communicating the results of risk assessment and management to peers, decision makers, and the public.

## INSTRUCTIONS FOR SUMMARY SUBMISSION

Four copies of a summary (800 - 1,200 words; typed, single-spaced) should be submitted to the General Chairman not later than Friday, April 6, 1990. Summaries should contain a title and include all authors' names, affiliations, and telephone, Telex, and FAX numbers. Authors should indicate the primary and one alternate category with which their papers are most closely identified using the numbering scheme in the Scope section of this announcement. Full papers will be due August 15, 1990.

## GENERAL CHAIRMAN

Professor George Apostolakis  
Mechanical, Aerospace, and Nuclear Engineering Dept.  
University of California  
405 Hilgard Avenue  
Los Angeles, CA 90024-1597 USA  
Telephone: (213) 825-1300  
FAX: (213) 825-0761  
TELEX: 3716012 UCLA LSA

## Conference Calendar

| DATE        | CONFERENCE   | PLACE          | CONTACT   |
|-------------|--|----------------|---|
| <b>1990</b> |  |                |   |
| Apr. 19     | 28th Annual Spring Reliability Seminar                     | Framingham, MA | Ruth Evans<br>Data General Corp.<br>4400 Computer Dr.<br>Westboro, MA 01580<br>M/S F017                                   |
| June 5-8    | International Symposium on Reliability and Maintainability | Tokyo, Japan   | ISR&M 1990 Tokyo<br>Union of Japanese<br>Scientists and Engineers<br>5-10-11 Sendagaya,<br>Shibuya-Ku, Tokyo 151<br>Japan |

## CALL FOR PAPERS

|            |                |             |   |
|------------|----------------|-------------|---|
| June 12-15 | 17th Inter-RAM | Hershey, PA | Roy R. Fray<br>Technical Program Chrmn.<br>SAIC, Suite 1250<br>160 Spear St.<br>San Francisco, CA 94105<br>(415) 855-2441 |
|------------|----------------|-------------|---|

## 1991

## CALL FOR PAPERS

|            |  |               |  |
|------------|--|---------------|--|
| Jan. 29-31 | Annual Reliability and Maintainability Symposium | Orlando, FL   | Program Chairman<br>Dr. R. J. Lumas<br>Lockheed Space<br>Operations Operations<br>MS LSO 291<br>1100 Lockheed Way<br>Titusville, FL 32780<br>(407) 867-5921<br>Fax (407) 867-2131<br><br>Publicity<br>L. M. Rabon, Jr.<br>(703) 664-1003<br>(703) 664-2502<br><br>General Information<br>Ed Anderson<br>1411 Jefferson Davis Highway<br>JP-1<br>Suite 920<br>Arlington, VA 22202<br>(703) 920-6083<br>(703) 920-6084 |
| Apr. 8-11  | 1991 International Reliability Physics Symposium | Las Vegas, NV | Registration<br>IEEE-IRPS<br>P.O. Box 308<br>Westmoreland, NY 13490<br>(315) 339-3971<br>Fax (315) 336-9134  |

|            |   |                    |   |
|------------|---|--------------------|---|
| Apr. 18-20 | 11th Advances in Reliability Technology Symposium               | Liverpool, England | Mrs. Ruth Cambell<br>11th Advances in Reliability Technology Symposium<br>National Centre of System Reliability<br>Ukaca, Wigshaw Ln.<br>Culteth, Warrington<br>WA3 4NE<br>UK Tel. (0925) 31 244 X424<br>Fax (0925) 766 681 |
| Apr. 19    | 28th Annual Spring Reliability Seminar                          | Framingham, MA     | Information:<br>Sid Gorman<br>Raytheon Company<br>(508) 440-4149  |
| Apr. 24-25 | Tri-Service RAMCAD Group 6th Technical Interchange Meeting      | Arlington, VA      | Contact:<br>6th RAMCAD TIM Committee<br>C/O Washington, DC<br>Chapter of Sole<br>P.O. Box 2645<br>Arlington, VA 22202<br>(703) 664-5771   |
| Jun. 5-8   | International Symposium on Reliability and Maintainability      | Tokyo, Japan       | ISR&M 1990 Tokyo<br>Union of Japanese Scientists and Engineers<br>5-10-11 Sendagaya,<br>Shibuya-Ku, Tokyo 151<br>Japan<br>03-352-2231<br>Fax 03-225-1813  |
| Jun. 18-22 | 7th International Conference on Reliability and Maintainability | Brest, France      | Secretariat for the 7th Conference<br>CNET<br>Division Lab/IFE<br>BP 40<br>22301 Lannion Cedex<br>France<br>96 052430<br>Fax 96 052372  |
| Sep. 24-26 | 1991 IEEE Autotestcon   | Anaheim, CA        | Robert C. Rassa<br>Mantech Advance Systems International<br>150 S. Los Robles Ave.<br>Suite 350<br>Pasadena, CA 91101   |

★ ★ ★ Offer extended until June 30, 1990 for Reliability Society members. ★ ★ ★

**SPECIAL** ★ ★ ★ ★ ★

# CALS

## Preparedness Package

RELIABILITY, MAINTAINABILITY, AND LIFE-CYCLE COST ANALYSIS COMPLETE WITH CAE/CAD/CAM SYSTEM INTERFACE

Now available for your PC – yours for only

# \$10,000\*


Team up with SEA™ to get ready for CALS and enjoy significant savings!

We want to make it easy for you to address the challenges that the CALS initiative will bring. That's why SEA has integrated three powerful analysis programs – *Reliability, Maintainability, and Life-Cycle Cost* – and packaged them with our user-programmable RAMCAD™ CAE/CAD/CAM interface software. The result: SEA's new CALS Preparedness Package.

Need to integrate SEA's predictive analysis solutions with your concurrent engineering system? The CALS Preparedness Package is the answer. Our user-programmable RAMCAD interface lets you quickly and easily link SEA software with **existing computer-aided engineering or word processing systems** to protect and leverage your investment.

SEA has the software, systems, and support you need to get ready for CALS. And, for a limited† time, you can license the CALS Preparedness Package on your PC for only \$10,000\*. This special introductory offer will save you money in more ways than one!

To find out more, call SEA today, or clip and mail the handy coupon.



**SYSTEMS EFFECTIVENESS ASSOCIATES, INC.**

20 Vernon Street  
Norwood, MA 02062

Tel: 617-762-9252  
FAX: 617-769-9422

\*Special \$10,000 license fee for Reliability Society members only. Non-members' fee is \$12,000.

†This special offer is valid for purchase orders received by June 30, 1990. SEA CALS Preparedness Package includes software compatible with MS-DOS® and PC-DOS operating systems.

MS-DOS is a registered trademark of Microsoft Corporation. RAMCAD and SEA are trademarks of Systems Effectiveness Associates, Inc.

**YES! I need to get ready for CALS.**

Have an SEA representative call me.

Arrange a demonstration for me.

Send me more specific information.

Name: \_\_\_\_\_

Title: \_\_\_\_\_

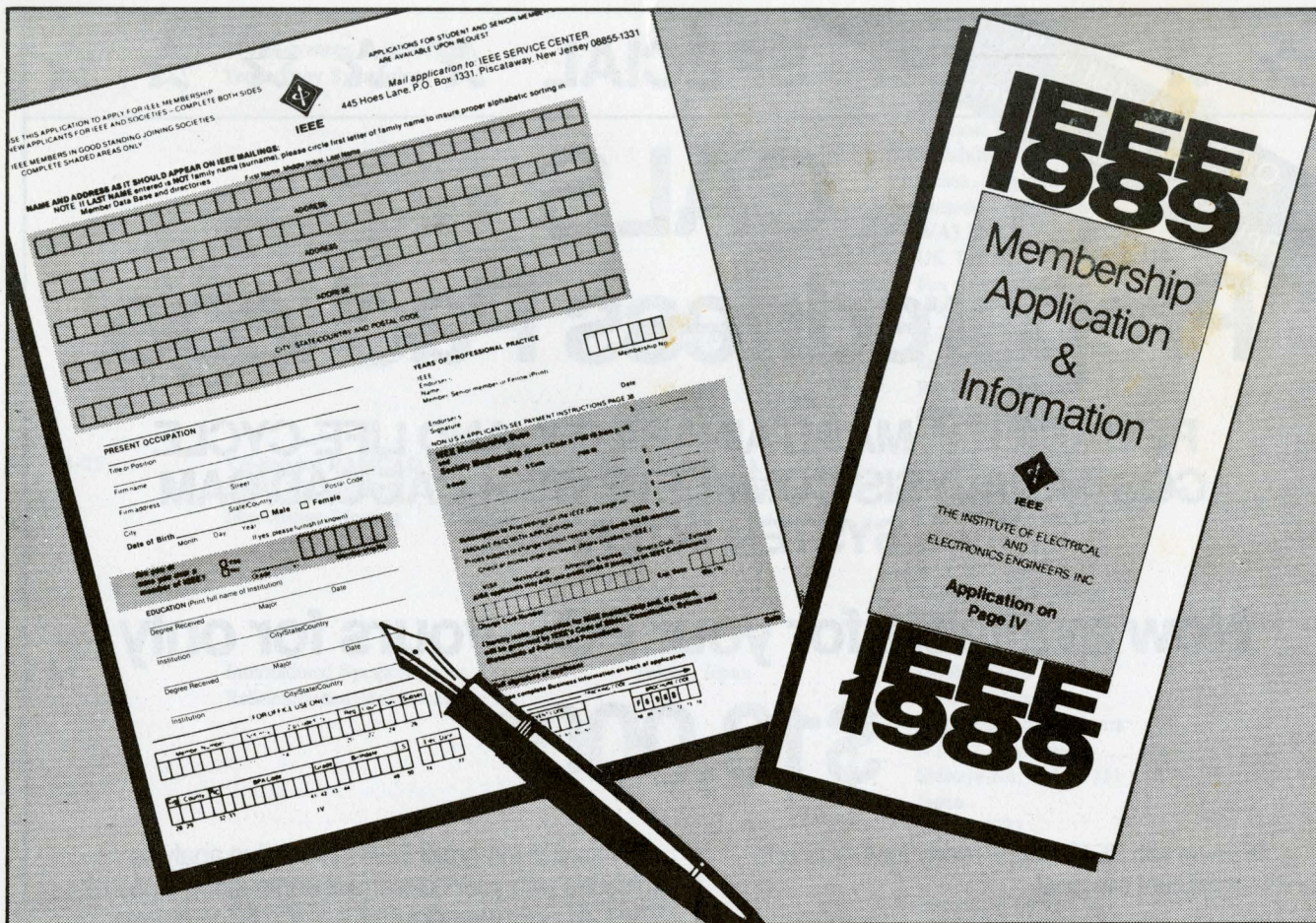
Company: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ ZIP: \_\_\_\_\_

Phone: (\_\_\_\_) \_\_\_\_\_ Ext: \_\_\_\_\_

Membership #: \_\_\_\_\_ Exp. Date: \_\_\_\_\_



# How would you like to write your own success story?

Discover IEEE... the professional society that will not only serve your intellectual and business needs, it will be the *single* most vital source of technical information and professional support to you throughout your entire working career.

Located in over 20,000 establishments throughout the world—including 50,000 members in 412 of the Fortune 500—The Institute of Electrical and Electronics Engineers, Inc. represents the largest *single* concentration of scientific/engineering professionals in the high technology field—over 300,000 members worldwide.

IEEE operates worldwide through 36 technical societies organized in hundreds of local chapters. We can put you in touch with a chapter near you.

Simply fill in the coupon below.

FOR A **FREE** IEEE MEMBERSHIP INFORMATION KIT USE THIS COUPON.

Name \_\_\_\_\_  
 Title \_\_\_\_\_ ( ) Phone \_\_\_\_\_  
 Firm \_\_\_\_\_  
 Address \_\_\_\_\_  
 City \_\_\_\_\_ State/Country \_\_\_\_\_ Postal Code \_\_\_\_\_

MAIL TO: IEEE MEMBERSHIP DEVELOPMENT  
 The Institute of Electrical and  
 Electronics Engineers, Inc.  
 445 Hoes Lane, P.O. Box 1331  
 Piscataway, N.J. 08855-1331, USA  
 (201) 562-5524

