



# RELIABILITY GROUP NEWSLETTER

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Editor: Paul Gottfried

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## EDITOR'S NOTES

The editorial (Let's Give It a Name<sup>1</sup>) in the August issue of the G-R Transactions called for naming of the Cumulative Distribution Function for the Gaussian distribution. Reader Carl J. Garbe noted that the suggested acronym, "gaf", is the name of a well-known film manufacturer and hence might cause problems. He suggested an informal contest to come up with a name.

Notice is hereby given that the Newsletter is establishing such a contest, but those wishing the background will have to look up the August Transactions. Closing date for entries: April 30, 1974. Prize: Whatever fame derives from publication of the winner's name in the Newsletter. Judges: ye Editor, aided by any volunteers who come forward.

"Material for the April issue must be in the Editor's hands by February 22. Chapter material should be sent directly to the Associate Editor."

## Free Offer Inside

# Chapter chairmen

Baltimore	Mr. Thomas T. Jackson 601 Bay Hills Drive Arnold, Md. 21012	Montreal	Mr. Duco W. Weytze CAE Electronics, Ltd. P. O. Box 1800 St. Laurent Montreal 379 Quebec, Canada
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# Chapter news

## Baltimore

The first meeting of the year was held September 17. Mr. Karl Dill spoke on "New Horizons in Quality". The second meeting was held November 19. Mr. Dana E. Lindon, Logistic Service, FAA, spoke on "The New FAA Quality System Certification Program". Future meeting dates and topics are: January 21, 1974, "Maintainability Demonstration Panel"; March 18, "Reliability Demonstration Panel"; and May 20, "What's New in Reliability Predictions". All meetings are held at the Beltway Motel in Baltimore with dinner at 7 p. m. and program at 8:15 p. m.

Officers for the 1973-74 season are:

Chairman: Thomas T. Jackson, Litton  
Vice Chairman: Frank P. Lee, FAA  
Secretary/Treasurer: Thomas A. Kurzmiller, Westinghouse

## Boston

The first chapter meeting of the 1973-74 season was held on October 10, at RCA in Burlington, Massachusetts. The proceedings began with a cocktail hour, followed by a roast beef dinner. After dinner, the 32 attendees heard Don Fradette, a Raytheon Division Reliability Manager, speak on Raytheon's Parts Management System (PAMS). Mr. Fradette described the way in which PAMS leads to improved reliability at reduced cost through standardization and user access to the data base by remote computer terminal.

The second chapter meeting of the 1973-74 season was a Ladies Night held at Busch Gardens (Budweiser Brewery), Merrimack, New Hampshire, on November 14. The evening's festivities included a plant tour, courtesy beer, buffet supper, and an interesting movie.

## Canaveral/Daytona

A schedule of seven meetings are planned for the year. The first chapter meeting was held September 11, at Romons Restaurant, Cocoa Beach. The meeting featured a product assurance panel discussion of important U.S. Government Programs in Brevard County. Featured panelists were: Lou Besalldo (Kennedy Space Center - Space Shuttle); Dick Farrand (Radiation - B-1 Bomber); Tom Novak (Radiation - Washington-Moscow "Hotline"); and Chuck Symeon (Harris Semiconductor - Poseidon). The panel moderator was Lee Webster, who is the current Vice-Chairman for the R&M Symposium. The discussion centered around the various techniques used on these programs to aid the customer and the contractor to arrive at the optimum desired level of product assurance.

The second chapter meeting of the year was held October 18, at Cocoa Beach. Mr. D. Flutie discussed the "Electron Scanning Microscope".

Chicago

The Chicago Chapter, reactivated under the chairmanship of Dr. John E. Condon (VP, Corporate Quality Assurance at Abbott Laboratories and former head of Reliability & Quality for NASA), got off to a great start with a November 8 meeting in cooperation with G-PHP. Over 100 members and nonmembers, from as far away as Missouri, Iowa, and Indiana, attended a panel discussion followed by a Q&A period lasting over three hours. The subject was the status of reliability of plastic discrete devices and IC's and the panelists included Hugh Edfors (also moderator), Victor Comptometer; Larry Gallace, RCA Solid State Division; Samuel Carrell, Texas Instruments; Dr. M. H. Valek, Texas Instruments; Alfred Tamburino, RADC; and Henry Buschke, Zenith Radio Corporation.

Meetings are scheduled for February 7 and April 11, both to be held at Nielsen's Restaurant, 6475 Mannheim Road. At the February meeting, Lee Mirth of the RADC Reliability Analysis Center will discuss the Center's data bank as related to industrial applications. The April meeting will feature Robert Peach of Sears, Roebuck on "Use of Field Service Experience to Improve Product Reliability". For information and reservations, contact the IEEE Office (Judy) at (312) 263-5954 or Hugh Edfors at 297-1770.

Washington

The second meeting of the season was a joint meeting, with the IEEE Electron Device/Parts, Hybrids and Packaging Chapter. It was held November 15, at Mitre Corporation, McLean, Virginia. Mr. Ethan Goldberg, Sperry Gyroscope Company, spoke on "Failure Analysis - A Balanced Approach".

On December 11, 1973, Mr. A. S. Pollack, Headquarters, U.S. Army, discussed "Reliability and Choosing the Number of Prototypes". The meeting was held at the Naval Ship Engineering Center (NAVSEC), Hyattsville, Maryland.

# In Memorium

An Appreciation - P. K. McElroy

When we lose a person of prominence, his passing usually is marked by great fanfare because of the public nature or the visibility of his accomplishments. In rarer instances we note with quiet sadness the loss of a figure whose work has been so free of self-serving motives that his great contributions have brought neither fame nor fortune in the usual sense.

Paul Kinney (P.K.) McElroy probably had more true friends, and was more widely known and respected in the electrical engineering community, than any other engineer I've known. But his record was one of quiet leadership, contribution, and service which got results without attracting much attention. Only upon stepping back to view the composite picture, is it obvious how his work permeated and improved every aspect of his profession and his community associations.

Although P.K. was not a "joiner", the list of his offices, committee work, active association memberships, directorships and awards, which spans at least four close-typed pages, leaves the reader incredulous. The mind really boggles when it becomes evident that P.K. never entered any activity without making a significant contribution. In 1965 Marion Smith, then Chairman of the IEEE Reliability Group, was presenting to P.K. the Group's highest award. Halfway through, Marion suspended his recitation of P.K.'s accomplishments, with the observation that the point already was proven. As a recipient of this award, P.K. joined such greats as Dr. Robert Seamans, present President of The National Academy of Engineering; Paul Darnell; and the late Dr. Jack Morton.

P.K.'s productive life was a long one -- from 1899 to October of this year. Showing early evidence of his now proven excellence, he graduated Phi Beta Kappa from Harvard University, A.B. in 1920 and A.M. in 1921. At Harvard, as in all of his endeavors, P.K. maintained a life-long interest and rose to a position of leadership, serving for many years on the Board of Overseers.

Perhaps indicative of his character, and probably unique in today's society, P.K. spent his entire forty-three year working career with General Radio. GR has been one of the pioneers in electronics, in standardization, in reliability, and in measurement technology. There is little doubt that P.K. had a major hand in some of that pioneering, as he did in the complex world of professional associations. He became General Radio's principal emissary to professional societies, industry associations, and national/international standards projects. Thanks to General Radio's support and his own self-denied genius, he became a leader and an initiator of many of the standards we now take for granted.

In this process P.K. was, to understate it, an active member of the Precision Measurement Association, American Society for Quality Control, a Fellow and Charter Member of the Standards Engineers Society, and a leader of innumerable committees for EIA, ASA and RETMA.

P.K. was a Fellow Member of both IRE and AIEE, and a moving force in their highly successful merger into IEEE, thus helping to create the world's largest engineering society. Without enumerating the countless lesser offices through which he progressed, a partial look at chairmanships alone gives some feeling for the depth and breadth of his influence on the emergence of the present Institute. In the pre-merger AIEE, he was Chairman of the Instrumentation Division, Technical Vice President, and Chairman of the Professional Technical Groups Committee. The latter office, which he held from its creation 'till the merger, successfully integrated the AIEE Professional Technical Groups into the IEEE Group structure. Following Boston Section activities for IRE, he was General Chairman of NEREM.

In IEEE he was Vice Chairman of the Groups Committee for the two organizing years; member of TAB OpCom; Chairman of the Fellow Committee; and Chairman of the Group Awards Subcommittee. He chaired an ad hoc committee that formed G-AES from four predecessor groups. He led the merger of G-CP and G-PEP into G-PMP and was the first Chairman of G-PMP, continuing on the AdCom for over ten years. He was Chairman of G-R, and an AdCom member or officer for most of the last fifteen years, including 1973. Similarly he helped to form G-MT and served on its AdCom from formation until this year. The extent of his influence on today's IEEE technical structure is almost beyond measurement.

Quite a few major technical conferences have been enriched by P.K.'s special mix of humor and good management sense. P.K. was Proceedings Chairman for the Electronic Components Conference in 1964, the first year the Proceedings went gratis to Group members. For two years he chaired the Joint Electronics Conference Executive Committee. From the birth of the Annual Symposium on Reliability in 1954 through its twentieth anniversary this year, P.K. served on the Management Committee and managed the publication of all twenty issues of the Proceedings, spanning over ten thousand pages of technical material. (Many of you met him unknowingly - the spare, white-haired man who handed you your Proceedings in exchange for the ticket. -Ed.)

Going back to the 1940's, P.K. chaired the EIA committee which wrote the first standards on relay racks. He continued through standards committees on other components, eventually representing IEEE to ASA (USASI) and IEC. At Nice in about 1963 he helped to form IEC Technical Committee 56 which has worked successfully for ten years toward international reliability standards.

I must repeat, because it may not be apparent, that these are only selected highlights from P.K.'s professional career. To quote a former IEEE Director "...he (P.K.) ranks at or near the top of the list of individuals who dedicate themselves to IEEE." That statement was made five years ago and has been underscored by P.K.'s continued involvement.

While I have emphasized the professional side of P.K.'s career, the list of local charities, business organizations, and community citations is even longer. Not least, he maintained an exemplary family life and found time to relax with friends wherever he went in the world. All of us looked forward to seeing him at meetings. His humor was legendary, pervading everything he did and said. P.K. had such a superb command of the language that we formed the habit of listening closely to avoid missing the gems of purposeful but subtle malapropism he would insert to keep us alert. For those who are "limerick lovers", P.K.'s memory was the ultimate reference. There were none in existence that he couldn't recall.

Above all else, P.K. brought out the best in his associates. This writer is only one of many whose endeavors have been immeasurably enhanced by P.K.'s influence. Speaking for the Reliability Group, I say "thank you, P.K. McElroy."

Harry Reese

# Letters

Dear Paul:

I note with interest that the Technology Tree published in the Newsletter is derived from a chart that was prepared for the Newsletter by V. E. Gardner and there was a request for comments.

We have been seeking some help in this area and I wonder if the Newsletter couldn't be the stimulus in this direction. The Technology Tree contains a listing of the various items in Reliability and Maintainability that are normally associated with programs on Military contracts and which, to some extent, are also being considered for commercial efforts. We are seeking such a family tree with the current MIL Specs associated with each of the items in the branch of the tree. Many of them are known to us by their MIL Standard designation; however, there are many that have NASA, MIL Service peculiar, and commercial standards identified for them which are not always known to all of us.

To the best of my knowledge in checking with the Navy in Washington and RADC, there has been no update to the family tree that was published by Martin-Marietta many years ago. The Technology Tree is the first step and I have taken action to reproduce it within our organization so that our R&M people will have it as a ready source of information.

Sincerely,  
Julian Edelman

Dear Paul:

From time to time I read in other Newsletters about the dissatisfaction of Group members with the Transactions. The complaints usually fall into two groups: 1) Referees are an evil lot, with uncertain parentage; so they should be made to account for their opinions.

2) Let's have more papers of an applied nature. Why is the editor so biased in favor of theoretical papers?

Editors virtually all point out the same things to the complainers, and I will be no exception.

1) The referees only advise the editor; their advice often conflicts violently. They do provide a valuable service to authors who, because of the advice they receive, are able to eliminate errors, make the presentation clearer, and generally have a much better paper. In our Transactions, the fact that referees are anonymous to the authors does not harm the author in any way. I am the one who makes the final decisions and communicates them to the author; I am not anonymous to the authors. (Actually, most of our authors appreciate the help they get from the referees and from the editor.)

2) In the early 40's when I was an undergraduate, I heard these same complaints. They referred to an unfortunate situation which existed then, exists now, and will undoubtedly plague our children. Academia get paid for writing papers; it is their most important product. Working engineers get paid for creating hardware; authoring articles is the least of their concerns. We have set up a Special Papers Board (see the article elsewhere in this Newsletter) whose sole purpose is to find applications/hardware type papers and papers in newer areas such as biomedical and oceanographic endeavors.

Probably less than 3% of papers submitted to our Transactions are outright rejected. Usually they have either been published elsewhere or have a topic not at all related to reliability (in its general sense). Virtually always, the author is told what he must do to make his paper acceptable for publication. Since it annoys me to be told only that something must be changed, with no hint as to how (except "better"), I usually make very explicit suggestions to the author on how he can improve his paper.

If there's a budding cartoonist in the crowd out there, who'd like an outlet for some of his work (on a complimentary basis of course) get in touch with me. We've lots of little places to fill -- and if we made it interesting enough, maybe our "readers" would look through the pages to find 1 or 2 of your cartoons.

Best regards,  
Ralph A. Evans

Ed. Note: The Editor will be pleased to transmit and/or publish any responses.

Since our Transactions is virtually the only publication in its field, we do try to act also as a high-class trade magazine -- publish tutorial and how-to-do-it papers.

## AdCom Elections

The following were elected to 3-year terms commencing January 1:

Dr. Ralph A. Evans  
Mr. Harry E. Reese  
Mr. Marion P. Smith  
Mr. J. W. Thomas  
Dr. W. Thomas Weir  
Mr. Jack M. Wiesen

Dr. Weir was nominated by membership petition -- the first time the membership has responded to the annual call for nominations to the AdCom.

In addition, Mr. Max M. Tall was appointed to serve for the remainder of the term (through December, 1975) vacated as the result of the death of P. K. McElroy.

## Call for Fellow nominations

The IEEE Fellow Committee annually reviews nominations submitted by April 30. Preparation and processing of nominations is a demanding and time-consuming procedure.

G-R members wishing to initiate nominations may identify candidates at any time by contacting Val Monshaw, RCA Astro Division, MS 76, Box 800, Princeton, New Jersey 08540. Those wishing to prepare nominations outside G-R channels may obtain kits from Miss Emily Sirjane, IEEE, 345 East 47th Street, New York, New York 10017.

## Paper Awards

Beginning this year, G-R will undertake continual review of papers in its Transactions in order to select nominees for two IEEE prize papers awards:

The W. R. G. Baker Prize Award, for the most outstanding paper in any of the IEEE Transactions, Journals, or the Proceedings

The Browder J. Thompson Award, for the best paper in any IEEE publication by authors under 30 years of age at the time of paper submittal for publication

Both awards are annual, covering the period July 1 - June 30. Each award consists of a certificate and one thousand dollars.

## IEEE REFERENDUM RESULTS

The IEEE membership has voted, by a margin of five to one, against the proposal to set up a separate corporation to administer technical activities. There were over 45,000 valid ballots, over 37,000 of which were cast against the proposal.

## Speaker's Opportunity

### IEEE REGIONAL OUTSTANDING LECTURE TOURS

In 1972 a score of U.S. members gave lectures at IEEE section meetings in Europe and Japan when they were visiting these areas on business or vacation. The opportunity is still available for competent, audible and interesting speakers visiting any part of the world, who can advise IEEE Headquarters approximately three months in advance of their travel plans, even if these are tentative. Do not delay until everything is definite; by then it may be too late to assemble the audience.

The expenses of deviating from your itinerary to fulfil an IEEE speaking engagement are reimbursable from IEEE funds for this program. Intercontinental travel costs are not reimbursable.

If you are interested in serving in this speaking role, please contact Dr. Peter D. Edmonds, IEEE Headquarters, 345 East 47th Street, New York, New York 10017 - Phone: 212/752-6800 - Ext. 333, and advise him of your topic, probable itinerary and dates, and the name of a technical colleague who has heard you speak and could function as a peer reference. Your group/society officers would be glad to receive an information copy of your initial letter.

# Free Offer!

## PROCEEDINGS AVAILABLE

Copies of the proceedings of the 1973 Product Liability Prevention Conference (PLP-73: August) are available FREE to G-R members as long as the supply (200 copies) lasts. Only one copy per member, please. Address your request to:

Prof. R. M. Jacobs  
Newark College of Engineering  
323 High Street  
Newark, New Jersey 07102

During the first month after announcement of a similar offer for proceedings of the IEEE Symposium on Computer Software Reliability, half of the available copies were distributed. Some should still remain when this Newsletter is published -- requests for these should go to:

D. I. Troxel  
RCA  
Bldg. 13-5-2  
Camden, New Jersey 08102

# 1974 IEEE Symposium on Computer Software Reliability

## Chapters and the AdCom

If we group the useful products of IEEE into those delivered remotely, or impersonally, and those delivered face-to-face, the relative roles of the technical specialty organization and the geographical organization are apparent. A fairly large, tightly organized (but non-geographical) entity is necessary to collect, screen, edit, and publish authoritative technical information which can then be sent directly to each interested member to keep him abreast of his chosen discipline. This is the principal function of the Group. Similar material, with more flexibility and a limited degree of personal interaction, is delivered by the Group through the media of large national or international meetings. Here again, the financing, long-range planning, and management complexity dictate sponsorship by a large broadly-supported organization such as a Group. Conversely, the very magnitude of these operations limits the ability of the individual member to directly exchange his views with his peers. Some degree of personalia is provided through the Group in its Newsletter, but the contact is still somewhat remote for most members.

Even though the Group is managed by an Administrative Committee (AdCom) elected from the regular membership, and thus consisting of ordinary engineers like all other members, the chances are that most Group members feel little relationship with Group management. The Group Administrative Committee members are volunteers and the business of earning a living makes it difficult for them to do more than manage the publications, pump life into the annual meetings, and promote Reliability/Maintainability as a professional discipline. Frequent direct contact with a significant number of individual members is just not economically practical. Neither would it be practical for the individual members to attend frequent meetings of the entire group.

The IEEE organization fills the need for frequent and direct personal contact among members through its geographical organization, the Sections. If within the area covered by a Section there are sufficient members interested in Reliability, a Chapter is formed, representing a technical specialization within the Section in the same manner that the Group represents a technical specialization within the Institute. Thus the Chapter has technical ties to the Group and administrative ties to the Section.

The Chapter, as the real heart of individual member activity, can hold frequent meetings on a relatively informal basis, with minimal administrative effort, small expense, and no travel problems or work interruptions. The size and informality of the meetings enhances discussion and encourages the participation of the entire audience. Chapter offices and committees provide an excellent channel to increasing involvement in professional technical affairs, with a rich return in personal ability to handle meetings and improve communication ability. Chapter meetings provide opportunities to try out new technical ideas before airing them to broader audiences, as well as to present proven material to those unable to attend national meetings. By these processes the Chapters provide sources and outlets for technical information, means of maintaining member interest, and a supply of talent to hold Section, Group, and Institute offices. Certainly the Chapters have the most intimate contact with Group members and can be most responsive to member interests. Chapter Chairmen are always invited to Group AdCom meetings; they can contribute to Group success by using AdCom meetings and correspondence to keep the AdCom informed of membership desires.

For physical convenience, the Section administers Chapter funds and coordinates Chapter meetings, keeps local membership rosters and usually maintains a paid Section office. Non-technical operating problems of Chapter officers are best taken to Section officers for guidance. Usually the Section can assist with the mechanics of publicity for Chapter activities.

Reliability Group members active in the Chapters have occasionally wondered aloud what the AdCom does for Chapters (or why the AdCom doesn't give the Chapters more support). Although it may not be apparent, the AdCom wants to help Chapters and is constantly searching for practical ways to do so. A brief review of the complex relationship among Groups, Sections, and Chapter may help to elicit constructive suggestions from Chapter leaders.

The IEEE is a complex organization because for practical reasons it deals with individuals on a geographical basis but is concerned with technical subjects which cross geographical boundaries, and because it is basically a volunteer organization. To see why this complexity works better than a simple vertical structure we must look at the reasons why a person joins IEEE. To this writer the answer is simple: the person sees in IEEE a significant opportunity for his own personal development, a chance to contribute to the enhancement of his profession, and to receive professional recognition. IEEE provides the opportunity; the value actually received by the individual is directly proportional to his personal commitment and involvement.

The IEEE delivers its part of the bargain by providing essential information and by creating a great variety of opportunities for activities and associations conducive to personal development. It is up to the member to maximize his return by using the information, participating in the activities, and contributing of himself in both areas.

The IEEE is organized to provide a continuous flow of up-to-date, reliable technical information keyed to the special interests of the member, and to encourage direct personal contacts among interested professionals at all levels. IEEE is a partnership of geographical organizations (Sections) and technical organizations (Groups or Societies) working together in a matrix where each offers its own values to the individual member. This can be viewed as a matrix in which the intersections are the Chapters.

Direct support of the Chapters by the Group (AdCom) includes awards for individual contribution and for chapter excellence; assistance in obtaining good speakers (including maintenance of the "Speaker's List"); guidance on educational programs; use of special segments of the Group mailing list for local chapter programs of more-than-local interest; and availability of internationally prominent technical expertise via the many Group committees. A standing Chapters Committee is maintained by the AdCom to strengthen Chapter-Group relationships.

In a less direct manner, the Group aids Chapters by serving all members' interests through the Transactions, the Newsletter, and distribution of Symposium Proceedings. In 1973 the Group was a principal sponsor for the Annual Reliability and Maintainability Symposium, the Reliability Physics Symposium, the Product Liability Prevention Conference, and the new Software Reliability Symposium. The Group also works steadily in Standards and Definitions, and is beginning to speak for the R/M engineer in professional matters.

The structure provides innumerable opportunities for personal growth through education, contact, and participation. Working together, Chapters, Groups, and Sections make the IEEE worthwhile to the individual member.

Harry E. Reese

# 1974 International Reliability PHYSICS SYMPOSIUM

Features MOS Device Drift Mechanisms and  
Metallurgical Failure Mode Workshops

Failure Mechanisms and Analysis Technology will receive major emphasis at the 12th Annual International Reliability Physics Symposium to be held at the MGM Grand Hotel, Las Vegas, Nevada, April 2-4, 1974. The symposium traditionally serves as a forum for exchanging ideas and latest information on isolation, identification and control of failure mechanisms in electronic semiconductor components. In keeping with this tradition, the 1974 Symposium Program Committee, chaired by Mr. I. A. Lesk of Motorola, Inc., Semiconductor Products Division, has put together what is described as a very precise and up-to-date state-of-the-art Technical Program.

Highlighting the program are tutorial workshops dealing with the Mechanisms of Drift phenomena in MOS devices, co-organized by Mr. Ed Labuda of Bell Telephone Labs and Mr. Neil Berglund of Bell-Northern, and with Metallurgical Failure Modes of Semiconductor Devices, organized by Mr. E. M. Philofsky of Motorola, Inc. The workshops are designed to benefit both experienced failure analysts and the relative newcomer wishing to broaden his knowledge of MOS Drift phenomena and Metallurgical Failure modes. The Workshops will cover the fundamentals of Drift characteristics and the mechanisms that produce drift in MOS devices, and will detail the established methods and procedures used in the study of Metallurgical Failure modes.

The very latest in Failure Mechanisms and Analysis Techniques will be treated in one of the sessions being organized by Mr. Al Tamburrino of the RADC Reliability Physics Laboratories. Papers will discuss such topics as SEM Analysis, LASER and Infrared Scanning Techniques, to mention a few.

Other technical sessions will report current work in areas of vital interest including: Reliability Improvements through Process Control and Component Design; Metalization, Metallurgical Effects and Bonding; Packaging and Encapsulation; Hybrid and Passive Components; Compound Semiconductor Devices and Amorphous Devices; and Silicon Components.

Represented on the program from previous Symposiums are authors from Canada, Japan, France, Germany, England and the Soviet Union, thus giving the Symposium a truly international flavor. The word "International" has been added to the Symposium title to indicate the growing number of attendees from outside the United States and to reflect this worldwide participation.

The Symposium is co-sponsored by the IEEE Professional Groups on Electron Devices and Reliability. Mrs. Jayne Partridge of the MIT Draper Labs is serving as General Chairwoman of the 1974 meeting. Researchers, engineering specialists and managers involved with design, test, failure analysis, reliability engineering, procurement, specifying and production of electronic components and systems can benefit by attending the sessions.

More information and an advance program can be obtained by writing R. E. "Bob" Davies, Publicity Chairman, Burr-Brown Research Corporation, P. O. Box 11400, Tucson, Arizona 85734. Reservations at the MGM Grand Hotel (the newest and most modern of Las Vegas hotels) should be made no later than February 25, 1974, to assure adequate accommodations.

# conferences

- January 29-31 1974 Annual Reliability and Maintainability Symposium (G-R, ASQC, ASME, AIEE, ASM, AIAA, IES), Biltmore Hotel, Los Angeles, California
- February 13-15 1974 IEEE International Solid-State Circuits Conference (Solid-State Circuits Council, Philadelphia Section, University of Pennsylvania), Philadelphia Marriott Motor Hotel
- April 1-5 1974 IEEE Power Engineering Society Underground Transmission and Distribution Conference, Convention Center, Dallas, Texas
- April 2-4 1974 International Reliability Physics Symposium (G-R, G-ED), MGM Grand Hotel, Las Vegas, Nevada
- April 3-4 1974 ASME/IEEE Joint Railroad Conference, Pittsburgh, Pennsylvania
- April 22-24 1974 IEEE International Symposium on Circuits and Systems (S-CS), Sir Francis Drake Hotel, San Francisco, California
- April 22-26 EUROCON 74 (European Conference on Electronics) (Region 8 et al.), R.A.I. Congress Centre, Amsterdam, The Netherlands
- May 7-8 1974 IEEE Appliance Technical Conference (S-IA), Columbus, Ohio
- May 11 First Canadian Reliability Symposium (Ottawa Chapter of the Society of Reliability Engineers), Carleton University, Ottawa, Canada
- May 14-17 International Magnetism Conference (INTERMAG) (S-M), Four Seasons Sheraton, Toronto, Ontario
- June 25-27 1974 Government Microcircuit Applications Conference (GOMAC 74) (D.O.D. and other agencies), University of Colorado, Boulder, Colorado
- July 1-5 1974 Conference on Precision Electromagnetic Measurements (The Royal Society and IEE with URSI, IERE, et al.), London, England
- August 21-23 IEEE International Conference on Engineering in the Ocean Environment, (Canadian Atlantic Section, Oceanography Coordinating Committee), Hotel Nova Scotian, Halifax, Nova Scotia
- August 21-23 1974 Product Liability Prevention Conference (PLP-74) (G-R, Newark College of Engineering, et al.), Newark College of Engineering, Newark, New Jersey
- September 10-13 1974 IEEE COMPCON Fall (S-C), Mayflower Hotel, Washington, D.C.

# Employment Notices

The Newsletter accepts both "Help Wanted" and "Position Wanted" Notices on a no-charge basis, subject to the following rules:

- Notices will appear in two successive issues unless cancellation notice is received before editorial deadlines.
- Text for each notice will be limited to ten lines plus identification, with a maximum of 45 characters and spaces per line.
- Notices may be open or blind, but blind "Help Wanted" notices should identify the type of business and the general geographic location of the vacancy.
- Submittals of "Position Wanted" notices should include IEEE membership number.
- "Help Wanted" notices must fall in the "Equal Opportunity - M&F" category. Agreement to this requirement will be considered to be implied by the submittal of the notice and need not appear in the text.

## HELP WANTED

Electronics reliability design assurance engineer, at least 3 years experience in reliability or maintainability on Navy electronic systems, capable of interfacing with Navy Project Engineers. BSEE required. Send resume to:

Columbia Research Corporation  
P. O. Box 485  
Gaithersburg, Maryland 20760  
Attention: Mr. E. McMahon

Engineers - Many openings in the following areas: Reliability; Electronic Design and Design Analysis; Avionics; Aircraft Armament Systems; Digital Multiplexing; System Safety; Quality Assurance Review of Engineering Documentation; ILS. BS Degree or equivalent required. Send resume to:

Systems Consultants Incorporated  
543 Graaf Street  
Ridgecrest, California 93555



# publications

From the National Bureau of Standards, available through the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402

Methods of Measurement for Semiconductor Materials, Process Control, and Devices (Quarterly Report January 1 - March 31, 1973), NBS Tech Note 788, SD Catalog No. C13.46:788, 79 pages, \$0.95.

Newsletter policy with respect to short-course announcements, as established by the AdCom, is to provide publication for information only. No endorsement is implied, and no check on course content or instructor qualifications has been accomplished.

## University of California at Los Angeles

Software Reliability: January 21-25. Five days, \$325. Contact: P.O. Box 24902, Continuing Education in Engineering and Mathematics, University Extension, UCLA, Los Angeles, California 90024

Evaluation Technology and Risk Analysis: January 24-February 1. Five days, \$335.

Human Errors and Accidents: Facts and Countermeasures: February 11-15. Five days, \$325.

Configuration Change Management Workshop: March 13-15. Three days, \$275.

Theory and Design of Fault-Tolerant (Ultra-Reliable) Digital Computers: March 18-23. Six days, \$375.

## The George Washington University

System Safety: February 4-8. Five days, \$425. Contact: Director, Continuing Engineering Education Program, The George Washington University, Washington, D.C. 20006

Working Statistics for Engineers, Scientists, and Managers: February 6-8. Three days, \$225.

Operations Research for Engineers, Scientists, and Managers: February 11-13. Three days, \$225.

Configuration Management of Engineering Changes, Waivers and Deviations: March 5-7. Three days, \$255.

Forecasting Techniques for Engineers, Scientists, and Managers: March 11-15. Five days, \$350.

## University of Wisconsin

Product Liability: Products and Materials: March 4-8. Five days, \$300. Contact: University of Wisconsin--Extension, Department of Engineering, 432 North Lake Street, Madison, Wisconsin 53706.

How to Apply Statistical Methods for Quality Control: April 22-26. Five days, \$300.