Editor’s Notes

"Material for the July issue must be in the editor's hands by May 29."

A reader -- W.O. Solberg -- responded to Ralph Evans' letter in the January Newsletter just in time. Four chapters mustered enough energy (in two cases, a lot of energy) to contribute to Chapter News at mid-season; some others didn't muster enough to bother with meetings. The rest of this Newsletter's contents come from G-R's national-level participants and from outside sources.

There is a temptation to believe that the Group membership seeks only the Group's larger-scale functions -- the Transactions, symposia, and perhaps the professional services performed by the few (members of formal committees) on behalf of the many (members of the Group). If this belief were valid, active chapters such as Boston and Philadelphia would not exist and new chapters such as Montreal would have remained unborn. It also seems unlikely that the membership of other chapters differs in kind from these.

The best guess is that the weaker chapters suffer from lack of support or push from the membership for the leaders. If you want a more active chapter, let your chapter officers know. (Sure, there's a "risk" that you'll be drafted into service -- but it only hurts for a little while.)
1969 Reliability Award

Harry Reese, G-R Chairman, presents the 1969 Reliability Award to "Deke" Slayton at the 1970 Symposium Banquet.

Each year the Reliability Group recognizes an exceptional contribution to the field of reliability. In 1969, we have witnessed an almost incredible display of reliability teamwork in the Apollo lunar landings. These have so captured the public admiration that our award would seem only a tiny gesture amongst the honors already bestowed by kings and presidents. There is, however, a behind-the-scene achievement which we believe is most relevant to the massive problems facing the world. I hope that our award will serve to increase public awareness of this spin-off from the space effort.

There are today many intelligent people who fear that man may have reached the point where he is unequal to the task of controlling the forces he himself has set in motion. There is considerable evidence that man is often the weakest link in the systems he has created.

NASA has pioneered in designing total systems, considering man as an integral subsystem, and selecting and training man to effectively carry out his subsystem role. The same emphasis has been given to human reliability as to hardware reliability.

The resultant performance of the Apollo astronauts serves to renew our confidence that man's judgement can still be superior to his machines; that with liberal doses of patience, dedication, intelligence, and faith, man can still be made the most reliable subsystem of all. We might even be encouraged to think that this could be true in our social and environmental systems as well as our lunar landing systems.

The man responsible for astronaut performance has picked a lot of experience into a few years. He has logged 4,400 hours flying time as an Air Force pilot and a test pilot, and has held maintenance, inspection, and training responsibilities. He has his degree in Aeronautical Engineering, has engineering experience in the aircraft industry, and has been awarded two Master's Degrees in both science and engineering. In 1969, he was named a Mercury astronaut, but when he developed a heart condition, his Mercury Atlas 7 mission was reassigned to Scott Carpenter. He became Coordinator of Astronaut Activities in 1962, and Director of Flight Crew Operations in 1963. In this position, he is responsible for the Astronaut Office, the Aircraft Operations Office and the Flight Crew Support Division.

For demonstrating that with proper preparation the human subsystem can be reliable in the most difficult of circumstances; for giving such inspiration at a time when it is sorely needed, our award goes to Mr. Donald K. "Deke" Slayton and his Flight Crew Operations organization.

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(Philadelphia Continued)

The Chapter has scheduled another meeting for April 16 at the Presidential Apartments, City Line Avenue and Schuylkill Expressway, subject and speaker identification were unavailable at press time. Elections will also take place at this meeting, with nominations remaining open until then. The Chapter also will hold its Third Annual Failure Analysis Seminar on May 21 (see announcement elsewhere in this Newsletter).

The talk on "Microwave Integrated Circuit Reliability" presented at the November 20 meeting was subsequently videotaped by RCA -- possibly the first time that a Chapter meeting program has been recorded on video tape by an industrial organization. The tape is now being presented at various RCA locations. Anyone desiring more information may contact Mr. H. H. Schack at RCA Corporation, Building 2-5-1, Camden, New Jersey 08102, or call him at (609) 963-8000, Ext. PC-6121.

Twin Cities

The November 17 meeting featured Jan Pakit of Honeywell as the speaker on "Systems Effectiveness Modeling." Dan Lovery of Control Data Corporation, Chapter Chairman, re-presented his 1970 Annual Symposium paper on "Maintainability Demonstration Performed on a Computer System" at a luncheon meeting on January 28. On March 28, Bill Fitch of Motorola's Advance Products Division addressed another luncheon meeting on "Advances to be Made in MSI/LSI Reliability." Chapter elections are scheduled for the April 22 meeting.

Washington

Dr. Norman Singewalds, George Washington University, discussed "Accelerated Life Testing" at the Chapter's January 21 meeting. The February 9 Washington Section meeting was sponsored by the Chapter and featured Dr. W. W. Hopp of NASA's Electronics Research Center as a lecturer on "Challenge Remaining for Flow Graph Techniques." On March 18, Henry Collins, Assistant to the President of Underwriters Laboratories, discussed "Product Safety, and Associated Warranty and Certification Problems" at a joint meeting with C-PMP.

CONFERENCES

May 4-6
1970 IEEE Transducer Conference, National Bureau of Standards, Gaithersburg, Maryland

May 4-7

May 4-8
5th International Research Symposium on Electric Contact Phenomena (Verband Deutscher Elektrotechniker), Munich, Germany

May 5-6

May 5-7
1970 Spring Joint Computer Conference (AFIPS), Convention Hall, Atlantic City, New Jersey

May 7-8
Midwest Symposium on Circuit Theory (CSCT-70), University of Minnesota, Minneapolis, Minnesota

May 13-15
1970 Electronic Components Conference (ECC), Hilton-Hilton Hotel, Washington, D.C.

June 2-3
Silicon Device Processing Symposium, National Bureau of Standards, Gaithersburg, Maryland

June 15-19
1970 IEEE International Symposium on Information Theory (ISIT), Union Radio Scientifique Internationale, Hotel Ruister Duin, Noordwijk, The Netherlands

June 16-18

July 14-15
1970 IEEE International Symposium on Electromagnetic Compatibility, Convention Center, Anaheim, California

July 20-24
1970 Conference on Dielectric Materials, Measurements and Applications (IEEE, IERE), London England

July 21-23
1970 IEEE Annual Conference on Nuclear and Space Radiation Effects, University of California, San Diego, California

August 18-21
International Conference on Microwaves, Circuits and System Theory (IEEE, The University of New South Wales, IERE Australia, IEE), Sydney, Australia

August 24-27
1970 Mexican Electrical Insulation Conference & Exhibition (IMEI Mexico Section, Mexican Society of Electrical and Mechanical Engineers), Mexico City

September 21-24
1970 IEEE International Conference on Engineering in the Ocean Environment (IEEE Oceanography Coordinating Committee and Panama City Section, with assistance by U.S. Naval Ship Research and Development Laboratory, Florida State University, Louisiana State University, Panama City, Florida

September 21-25
1970 Interassociation Energy Conversion Engineering Conference (IG-ED; G-ABB; et al.), Las Vegas, Nevada

October 6-8
GOMAC '70 -- 1970 Government Microcircuit Applications Conference, Fort McPherson, New Jersey

October 26-28
Short Courses

University of Michigan
Design and Analysis of Engineering Experiments: July 6-17, Two weeks, $350. Contact: Professor Charles Lippincott, The University of Michigan, Ann Arbor, Michigan 48104.

University of Wisconsin
Electrical Encapsulation Seminar: May 21-22. Two days, $70. Contact: Donald E. Bass, Institute Director, 123 Expansion Building, 432 North Lake Street, Madison, Wisconsin 53706.

Solid State Parameters and Models: May 12-13. Two days, $100. Contact: David P. Barmann (address as above).

Third Annual Failure Analysis Seminar

The Philadelphia Chapter, in conjunction with the Philadelphia Section of IEEE, will conduct its Third Annual Failure Analysis Seminar on May 31 at the University of Pennsylvania's Alumni Hall, Towne School, 33rd and Walnut Streets. The program includes:

- Morning Session: Recent Developments in Failure Analysis
  - Moderator: Dr. D. Outlaw, G. E.
  - D. M. Catlow, Martin-Marista Corp. “Effect of Non-Steady Avionic Cooling Requirements on Electronic Product Reliability”
  - William J. Maloney, GE/ESD. “GE/ESD Failure Analysis System”
  - Dr. Henry E. Frankel and A. Babichek, Goddard Space Flight Center. “Metalurgical Implications in Failed Electrical and Electronic Devices”

- Technical Session: Recent Research in Failure Analysis
  - Milton A. Levy, JPL, papers on Failure Analysis

- Luncheon: Dr. John Condon, NASA Headquarters: “Reliability Management for the ‘70s”

- Afternoon Session: Failure Analysis in Microelectronics
  - Thomas J. Bossaier, RADC: “Ambient Effects on Gold Aluminum Bonds”

- David B. Christini, XERCO: “Current Concepts in Failure Analysis”


Philadelphia Chapter

To Present Gift

The Philadelphia Chapter, in appreciation for the free use of University of Pennsylvania Towne Building facilities for three successive years for the Annual Failure Analysis Seminar, will, on behalf of the IEEE Philadelphia Section, make a gift presentation to the University.

The presentation will be made by Chapter Chairman Jim Goodman to Dr. Carl C. Chambers, Vice President of Engineering Affairs, who will be accepting it on behalf of the University, and Dr. Gaylord P. Herrell, President.

Publications


Special Issue: IEEE Proceedings

A special issue of the Proceedings of the IEEE is planned for mid-1971 on the subject of engineering education. The issue will include both invited and submitted papers.

Prospective authors are invited to submit contributions on any of the following aspects of engineering education: general or specific curricular questions; technological aids to education; experiments in relating engineering education to the problems of society; relations between universities and government; optimum use of the computer in typical engineering courses; unique laboratory experiences; motivation and counseling toward majors in engineering; other related matters. Authors are urged to give specific experiences rather than broad philosophical treatments, and to choose topics of long-term concern appropriate to an archival publication.

Because only a limited number of contributed papers can be accepted, prospective authors are asked to submit a summary of from 500 to 750 words before undertaking the work of preparing the whole manuscript. Summaries should be sent to the guest editor, Professor J. R. Whinnery, Department of Electrical Engineering and Computer Sciences, University of California, Berkeley, California 94720 by July 15, 1970. Completed manuscripts will be due no later than October 1, 1970.

Letter To The

Editor

Ralph Evans' definition of a wear-out process is rather general to avoid confusion in the use of the term wear-out.

In a sense all failure proceeds from wear-out at small sites within the structure. If each of these sites undergoes wear-out or decomposition proceeds in its own way toward failure, without influence from the state of wear of adjacent sites the failure distribution is extremal in nature. As such it may have a Weibull shape factor above, below, or equal to one. If, however, the degradation at one site influences the rate of degradation of adjacent sites as by releasing reactive decomposition products, by producing heat, by changing the stress distribution, or by other means too numerous to mention, then failure is by wear-out as used by many people. The latter process will always, to the best of my knowledge, be described by a distribution whose hazard rate increases with time.

This definition has the practical advantage of providing for physical as well as statistical measurements confirming the existence of a wear-out process. For example, a wear-out effect so defined will give evidence of its approaching failure by gradual degradation of appropriate characteristics. Also unfolded remnants of the failed piece will show pronounced degradation. Neither of these symtoms are usually found in failures of isolated site type.

W. C. Selberg
General Electric Company
Capacitor Department
Sudan Falls, New York 12830
**IEEE Reorganization**

The "cluster" concept for reorganization of the IEEE was approved unanimously at the December meeting of T&AB. The effect will be to increase technical representation on the Board of Directors from one in nine over a three-year period, with Directors at Large being phased out. However, the cluster to which G-8 has been assigned is not among those electing directors in 1970. The cluster arrangement is as follows:

| Division 1 | G-1 Audio & Electrocoustics | 4,300 |
| G-4 Circuit Theory | 8,000 |
| G-12 Information Theory | 4,500 |
| G-25 Automatic Control | 6,200 |
| Division 2 | G-10 Computer | 13,700 |
| Division 3 | G-3 Broadcasting & TV Receivers | 2,100 |
| G-9 Aerospace & Electronic Systems | 8,000 |
| G-10 Communication Technology | 8,300 |
| G-27 Electromagnetic Compatibility | 1,600 |
| Division 4 | G-3 Autonomous & Propagation | 4,500 |
| G-15 Electron Devices | 8,200 |
| G-17 Microwave Theory & Techniques | 9,900 |
| G-29 Sonics & Ultrasonics | 1,300 |
| G-21 Parts Materials & Packaging | 1,900 |
| G-30 Magnetics | 1,800 |
| Division 5 | G-5 Nuclear Science | 2,300 |
| G-8 Vehicular Technology | 2,000 |
| G-9 Instrumentation & Measurement | 4,000 |
| G-13 Industrial Elec. & ControlInstr. | 2,300 |
| G-31 Power | 12,100 |
| G-33 Electrical Inspection | 1,100 |
| G-34 Industry & General Applications | 1,800 |
| Division 6 | G-1 Reliability | 2,200 |
| G-14 Engineering Management | 5,700 |
| G-25 Power Systems | 4,300 |
| G-29 Computer Systems | 1,200 |
| G-21 Geoscience | 1,400 |
| G-33 Systems Science & Cybernetics | 23,200 |

**Lost, Strayed Or...?**

As of this issue of the Newsletter, it is no longer possible to report on the activities of chapters not in communication with the Editor. Until this year, chapter meeting reports wound their way through channels to IEEE Headquarters and from there back to the Newsletter -- a slow route, but better than nothing. Under a new policy, Headquarters will get only annual reports from IEEE Sections and the Newsletter will have to rely on direct inputs from chapter officers.

As a parting gesture, IEEE Headquarters has furnished a tabulation of chapter meetings reported to IEEE for 1968 through November 1969. The New Jersey Coast, Huntsville, and San Diego chapters reported no meetings during the first eleven months of 1968; the Chicago Chapter has reported no meetings in the four-year period!

**AdCom Organization**

Current officers of the AdCom are:

- **Chairman**
  - H. E. Reese
- **Vice Chairmen/Editor, Development and Standards**
  - R. M. Manley
- **Vice-Chairman/Technical Operations**
  - W. T. Sweeney
- **Vice-Chairman/Publications**
  - P. K. McElroy
- **Vice-Chairman/National Meetings, Chapters, and Membership**
  - L. J. Ballentine

Newly elected AdCom members for three-year terms expiring December 31, 1972 are:

- Dr. John E. Condon
- Mr. R. D. Stoll, Marks
- Mr. J. R. Wexley
- Mr. Richard M. Jacobs
- Mr. A. R. Park

**Call For Papers:**

**1971 Annual Symposium On**

**Reliability**

May 1 is the deadline for submission of the paper title and an abstract of 250 to 500 words for papers to be considered for the 1971 Symposium, to be held in Washington, D.C., January 12-14. Send ten copies of title, abstract, and biographies -- or your request for further information -- to:

- J. W. Thomas
  - Program Chairman
  - Annual Symposium on Reliability
  - Vistex Laboratories
  - 1800 Georgia Avenue
  - Silver Spring, Maryland 20910

**Speakers**

**Who’s Who In Reliability**

**Product Liability Prevention Conference**

A conference on the systems approach to product liability prevention will be held at the Newark College of Engineering, Newark, New Jersey, August 24-28. The conference is sponsored by the New Jersey sections of IEEE, ASQC, and the American Society of Safety Engineers, and supported by Associated Testing Laboratories. Papers and attendees are welcome; for information, contact Dick Jacobs at the Newark College of Engineering (201) 845-5540.
Computer-Aided Reliability Analysis & Design

As many of you (including the G-R members who receive it) know, the CARAD (Computer-Aided Reliability Analysis and Design) team publishes a newsletter available for the asking (via Richard Emerson, IEEE Headquarters). Within CARAD, CARAD focuses on the aspects of computer-aided design that must closely relate to Reliability. Clint Purdy functions as chairman of both CARAD and CADAR (Comprehensive Automatic Design of Reliability).

The kind of information represented by the three program descriptions that follow appears regularly in the CADAR Newsletter. If the G-R membership expresses interest, it can become a regular feature in the Reliability Newsletter.

One measure of interest will be your response to the questionnaire provided elsewhere in this issue. Please send your comments to Clint at the address indicated.

G-R Membership Interest Profiles

Program: ECAP (Electronic Circuit Analysis Program)
Developed By: IBM
Computers: IBM 1620, 7090, System 360, 1130 System
Memory: 32K
Language: FORTRAN
Description: ECAP is a general purpose computer program which can be used to calculate the DC steady state, AC steady state and transient characteristics of linear circuits. No knowledge of computer programming is required. The circuit to be analyzed must be converted to an equivalent circuit in which the elements can be assigned branch labels, nodes numbered, etc. The input data is in a listing of the elements, nodes and values of the circuit. No stored device models are available to the user. Initial DC conditions must be specified for a transient analysis.

The output data must be specified in a listing of the calculated node voltages and branch currents.

Documentation: IBM Application Program 1965 Electronic Circuit Analysis Program (ECAP) 1969-KE-032E Users Manual Order through local IBM office Consultant: Contact local IBM office Status: Available through local IBM office

NOTE: A version of ECAP is operational in the GE Mark II Time Share System in Los Angeles. Contact nearest GE Time Share Service Office for details.

Program: SCEPTRE (System for Circuit Evaluation and Prediction of Transient Radiation Effects)
Developed By: IBM under contract to AFWL
Computer: IBM 7090, 7094, CDC 6600
Memory: 32K, 66K required if IBM/VS overlay features are not available.
Language: FORTRAN IV
Description: The SCEPTRE general purpose computer program can be used to calculate the DC steady state and transient behavior characteristics of electrical circuits. No knowledge of computer programming is required. The input data is in a listing of the circuit elements, the connection points (nodes) and element values.

The capability exists for using a variety of device models; however, the user must implement this facility, which requires considerable skill on the part of the user.

The output data must be specified, however, all of the circuit performance characteristics are available.

Consultants: Barry W. Mathies, Stephen R. Sedore and John R. Sensi - IBM
Status: Available from Consultant after approval. Requires 1 reel of 1/2" magnetic tape.

Ray Knight, Chairman of the Advanced Techniques Committee, has submitted his committee’s proposed interest profile for the “750’s.” The profile’s purpose is to provide the IEEE Headquarters staff information enabling them to reduce overlaps and gaps between Groups and in aid of matters of organization.

The proposed profile is reproduced below for your members may comment on possible additional areas of interest, deletions, or other modifications. All comments should be addressed to Mr. Stanley T. Karalus, Manager, Reliability, Perkin Elmer Corporation, Optical Technology Division T7, Danbury Road, Wilton, Connecticut 06897.

IEEE RELIABILITY GROUP 1975 MEMBERSHIP INTEREST PROFILE

1.0 FUNDAMENTAL RELIABILITY THEORY AND TECHNIQUES
1.1 Basic principles
1.2 Assurance program structure and management
1.3 Mathematics
1.4 Prediction and assessment
1.5 Analysis, review and audit
1.6 Reliability and Physics
1.7 Testing and measurement

2.0 RELIABILITY PROGRAM MANAGEMENT
2.1 Requirements analysis and definition
2.2 Program planning and direction
2.3 Program evaluation and risk assessment
2.4 Resource utilization tradeoffs
2.5 Interrelation of assurance disciplines
2.6 Education and training
2.7 Configuration management

3.0 RELIABILITY AND PROCUREMENT
3.1 Contracting and negotiation factors
3.2 Incentive structures
3.3 Guarantees and warranties
3.4 Vendor and subcontractor control

4.0 RELIABILITY AND COST
4.1 Total cost-of-ownership concepts
4.2 Life cycle costing principles and techniques
4.3 Value tradeoffs in program planning
4.4 Product service analysis

5.0 SYSTEM DISCIPLINES
5.1 Systems effectiveness - analysis and assessment
5.2 Failure modes and effects and criticality analysis
5.3 Availability analysis
5.4 Software reliability
5.5 Human factors - human reliability
5.6 Computer techniques
5.7 Modelling
5.8 Optimization techniques
5.9 Logistics and spares provisioning

(Continued)
6.0 MAINTAINABILITY
6.1 Design considerations
6.2 Detection and diagnostic techniques
6.3 Recovery rates - prediction and assessment
6.4 Human factors and training

7.0 PARTS, MATERIALS AND INTEGRATED CIRCUIT RELIABILITY
7.1 Failure rates and device models
7.2 Failure mechanisms and degradation analysis
7.3 Screening techniques
7.4 Environmental effects
7.5 Selection and application control techniques
7.6 Packaging and connections

8.0 PRODUCT DESIGN FOR RELIABILITY
8.1 Engineering analysis and evaluation
8.2 Review techniques
8.3 Design margins control
8.4 Design features for contamination control
8.5 Evaluation and qualification test techniques

9.0 PRODUCT DESIGN FOR SAFETY
9.1 Specifications and requirements
9.2 Engineering analysis and evaluation
9.3 Review techniques
9.4 Design margins (safety factors)
9.5 Design features for hazard control
9.6 Evaluation and test techniques

10.0 RELIABILITY IN MANUFACTURING
10.1 Specifications and producibility
10.2 Process evaluation and control
10.3 Statistical control techniques
10.4 Defect reporting and analysis
10.5 Contamination control
10.6 Screening and conditioning
10.7 Acceptance testing techniques

11.0 RELIABILITY TESTING AND DEMONSTRATION
11.1 Statistical test design techniques
11.2 Reliability test planning
11.3 Test data analysis
11.4 Reporting, analysis, and corrective action systems
11.5 Measurement capability and techniques
11.6 Environmental and mission simulation techniques
11.7 Accelerated testing

12.0 PRODUCT RELIABILITY TECHNIQUES AND EXPERIENCE
12.1 Aircraft
12.2 Bio-medical instrumentation
12.3 Defense products
12.4 Electrical Power
12.5 Ground Transportation
12.6 Home appliances
12.7 Home entertainment equipment
12.8 Industrial control
12.9 Information systems
12.10 Marine products
12.11 Nuclear systems
12.12 Space systems

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CARAD QUESTIONNAIRE

Name ____________________________

Company __________________________

Address ____________________________

Phone No. ____________________________

☐ Office ☐ Home

1. DO YOU USE A COMPUTER TO SOLVE RELIABILITY PROBLEMS ☐ Yes ☐ No

If "yes", what kind of program or programs do you use?

On what computer?

2. DO YOU USE CIRCUIT ANALYSIS PROGRAMS ☐ Yes ☐ No

If "yes," please check the appropriate box or boxes:

☐ ECAP ☐ CIRCUS ☐ NET-1 ☐ SCEPTRÉ ☐ Other (Specify)

Please send the completed questionnaire to:

C. H. Purdue, 2442
Sandia Laboratories
P. O. Box 8800
Albuquerque, New Mexico 87115