

# EDITOR'S PROFILE of this issue

*from a historical perspective ...*

with Paul Wesling, SF Bay Area Council GRID editor (2004-2014)

April 1, 1962:

Cover: Organizers of the Bay Area Reliability Seminar discuss a microwave-based system that can detect movement of a person, and thus provide security throughout a building or a large outdoor area. It will be held at the Naval Postgraduate School in Monterey; registration is \$12, and this includes the Proceedings. The inset shows the Carmel mission.



Archive of available SF Bay Area GRID Magazines is at this location:

[https://ethw.org/IEEE\\_San\\_Francisco\\_Bay\\_Area\\_Council\\_History](https://ethw.org/IEEE_San_Francisco_Bay_Area_Council_History)

At time of scanning, the bound volumes are held by Paul Wesling.

January, 2021

Contact [p.wesling@ieee.org](mailto:p.wesling@ieee.org)



SAN FRANCISCO SECTION

*Grid*  
APRIL 1, 1962



**THIRD  
BAY AREA  
RELIABILITY  
SEMINAR**

**SPECIAL ISSUE**



## IREminder

- April 4 (Wednesday) PGA
- April 11 (Wednesday) PGAP, PGI
- April 17 (Tuesday) PGBME, PGSET
- April 18 (Wednesday) PGRQC
- April 18, 19 (Wednesday, Thursday) PGMIL
- April 24 (Tuesday) PGEC
- April 25 (Wednesday) PGI
- April 26 (Thursday) SFS (Consolidation Forum)
- May 11 (Friday) PGRQC/SFS/USNPGS Student Branch
- May 11-12 (Friday-Saturday) PGRQC
- May 23 (Wednesday) PGI
- May 29 (Wednesday) SFS (Annual Meeting)



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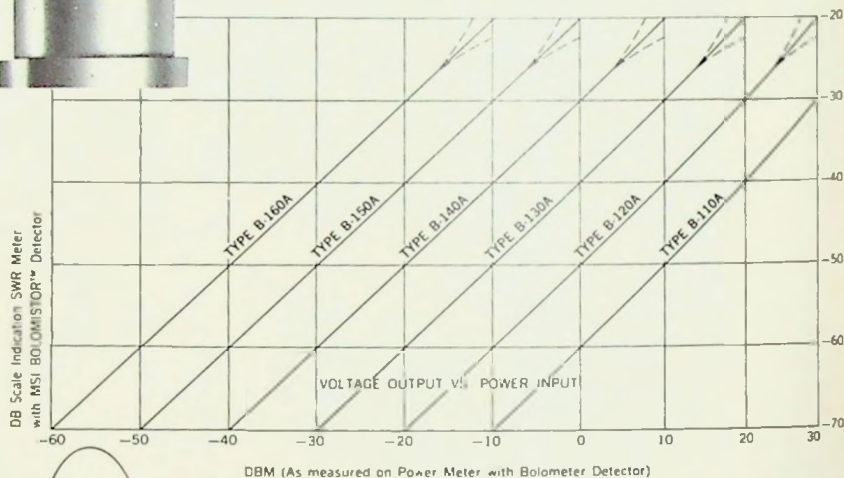
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# Grid

April 1, 1962

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### cover

Reliability is the keynote of this special issue for the Third Bay Area Reliability Seminar. Three members of the TBARS organizing group are shown discussing a motion-sensitive electronic security system with senior engineering specialist George Byrne (second from left) of the security systems department in Sylvania's reconnaissance systems laboratories.

Inset shows Carmel Mission—nearby point of historic architectural interest.

Seminar personnel are Paul S. Read, department head of reliability assurance; Rudy S. Cazanjan, reliability and quality assurance manager of the Minuteman missile program; and Roger H. McDonald, department head of relia-

bility engineering, all of Sylvania RSL.

Security equipment, using microwave frequencies, produces an electromagnetic field capable of covering an area ranging in size from that of a desk to that of an entire warehouse, and can reliably detect a moving object weighing 50 pounds or more and having a specific gravity similar to that of a human. Byrne developed the concept and equipment. Photo is by Arvin Skyrud.

A similar advanced version is being developed and produced at RSL under a \$1.2 million contract to provide security reliability at Minuteman ICBM sites. Contract was awarded by the Air Force Ballistic Systems Division, Inglewood, Calif.

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## MEETING CALENDAR

**SAN FRANCISCO SECTION** 8:00 P.M. • Thursday, Apr. 26  
Forum: "Proposed AIEE/IRE Consolidation"  
Place: Physics Lecture Hall, Stanford University

**SAN FRANCISCO SECTION** 8:00 P.M. • Friday, May 11  
(Joint with PGRQC, USNPGS Student Branch, see below)

**SAN FRANCISCO SECTION** • Wednesday, June 13  
Annual meeting—details to be announced

### PROFESSIONAL GROUPS

**Audio** 8:00 P.M. • Wednesday, Apr. 4  
"Noise Considerations in Tape Reproduce Amplifiers"  
Speaker: Erling T. Skove, senior engineer, audio division, Ampex Corp.  
Place: Conference Room B, Stanford Research Institute  
Dinner: 6:30 P.M. (Cocktails 6:00 P.M.), Ramor Oaks, 3435 El Camino Real, Atherton  
Reservations: Herb Ragle, EM 9-7111, Ext. 596

**Antennas & Propagation** 8:00 P.M. • Wednesday, Apr. 11  
"H-F Communications Frequency-Management Techniques and Frequency-Independent Antenna Applications"  
Speaker: R. W. Berg, Granger Associates  
Place: Room 320, Electronics Research Laboratory, Stanford University  
Dinner: 6:30 P.M. (Social Hour 6:00 P.M.), Dinah's Shack, 4269 El Camino Real, Palo Alto  
Reservations: Miss S. Torrey, DA 1-3300, Ext. 392

**Bio-Medical Electronics** 8:00 P.M. • Tuesday, Apr. 17  
"Experimental Biology in Space"  
Speaker: Dr. Richard S. Young, Ames Research Center, Mountain View  
Place: Room M-112, Medical School Building, Palo Alto-Stanford University Medical Center  
Dinner: 6:00 P.M., Red Cottage Restaurant, 1706 El Camino, Menlo Park  
Reservations: Ken Gardiner, DA 6-6200, Ext. 2659, by April 16

**Electronic Computers** 8:00 P.M. • Tuesday, Apr. 24  
"List Processing and Practical Problems"  
Speaker: J. Weizenbaum, manager, computer organization unit, G.E. Computer Laboratory  
Place: Lockheed Auditorium, 3251 Hanover Street, Palo Alto  
Dinner: 6:00 P.M., the Red Shack Hofbrau, 4085 El Camino Way, Palo Alto  
Reservations: None required

**Instrumentation** 8:00 P.M. • Wednesday, Apr. 11  
(First in a series of four lectures)  
"Automatic Instrumentation Systems. Introduction: The Problem, the Equipment"  
Speakers: James R. Cunningham, systems manager, Systron-Donner Corp., and Joseph L. Hussey, consultant  
Place: Hewlett-Packard Co., 1501 Page Mill Road, Palo Alto (main lobby)  
Meet-the-Speaker Dinner: 6:00 P.M., L'Omelette Restaurant, 4170 El Camino Real, Palo Alto  
Reservations: None required  
*\*Note change of date*

**Instrumentation** 8:00 P.M. • Wednesday, Apr. 25  
Lecture No. 2  
"Analog-Digital System Elements"  
Speakers: William Gross, Dymec, and Terry Thayer, Lockheed  
Place: Hewlett-Packard Co., 1501 Page Mill Road, Palo Alto (main lobby)  
Meet-the-Speaker Dinner: 6:00 P.M., L'Omelette Restaurant, 4170 El Camino Real, Palo Alto  
Reservations: None required

## MEETING CALENDAR

### Instrumentation

8:00 P.M. • Wednesday, May 23

Lecture No. 3

"Storage: Processing and Printout"

Speakers: Robert N. Flanders, Dymec, and Douglas Wilcox, Precision Instruments

Place: Hewlett-Packard Co., 1501 Page Mill Road, Palo Alto (main lobby)

Meet-the-Speaker Dinner: 6:00 P.M., L'Omelette Restaurant, 4170 El Camino Real, Palo Alto

Reservations: None required

### Military Electronics

7:30 P.M. • Wed., Thurs., Apr. 18, 19

(Joint meeting with all professional societies)

"Research for the Space Age"

Speaker: Lt. Col. Paul L. Marer, Washington office, Air Force Systems Command Headquarters

Place: Foothill College Auditorium, El Monte Avenue, Los Altos

Registration: 7:00 P.M.

Reservations: Secret clearance must be established with Major Herman H. Teifeld, director, Scientific & Technical Liaison Office, Air Force Systems Command, 1176 Los Altos Ave., Los Altos, WH 8-1434. Forms for establishment of six-month clearance are available at the Section office.

Dinner meeting has been cancelled

### Reliability & Quality Control

8:00 P.M. • Wednesday, Apr. 18

"Should Reliability Be a Part of the Engineering Curricula?"

Moderator: J. Hall, IBM

Panelists: Dr. B. Epstein, consultant; P. W. O'Green, director of space programs, Lockheed; and Cmdr. R. Smiley, USN

Place: Room 101, Physics Lecture Hall, Stanford University

Dinner: 6:30 P.M., Chez Yvonne, 1854 El Camino Real, Mountain View

### Reliability & Quality Control

• Fri., Sat., May 11, 12

Third Annual Bay Area Reliability Seminar

Seminar: "Today's Reliability Challenge"

Program: See page 7

Place: U. S. Naval Postgraduate School, Monterey

### Reliability & Quality Control

8:00 P.M. • Friday, May 11

(Joint with San Francisco Section and Student Branch U. S. Naval Postgraduate School)

Dinner Meeting

Speaker: Dr. Royal Weller, director of engineering, space-systems division, Lockheed Missiles and Space Co., Sunnyvale, Calif.

Place: Officers' Club, U. S. Naval Postgraduate School, Monterey, Calif.

Cocktails: 6:30 P.M. Dinner 8:00 P.M. prime ribs or lobster, \$3.50 in adv.

Reservations: J. M. Alderman, Arinc Research, 467 Hamilton Ave., Palo Alto, DA 1-0390

### Space Electronics & Telemetry

8:00 P.M. • Tuesday, Apr. 17

"Traveling-Wave-Tube Developments and Their Role in Space Communications"

Speaker: To be announced

Place: Lockheed Auditorium, 3251 Hanover Street, Palo Alto

Dinner: 6:30 P.M., Camino Bowl, 2025 El Camino Real, Mountain View

Reservations: Cynthia Chaney, DA 6-4350

### third seminar

#### THE RELIABLE PENINSULA

In the contemplative quiet of Monterey and environs, the Third Bay Area Reliability Seminar will take place Friday and Saturday, May 11 and 12. The theme is to be: Today's Reliability Challenge. This issue of the **Grid** is devoted primarily to the presentation of information on this event which has in previous years been a popular feature of the season's technical activities.

Chairman of the Seminar committee is F. B. Durand, Fairchild Semiconductor. Other members are J. M. Alderman, Arinc Research Corp.; Paul S. Read, Sylvania; and J. D. Rowley, Pulse Engineering. Officers of the PGRQC Chapter are John W. Hall, IBM, chairman; R. S. Cazanjan, Sylvania, vice chairman; R. O. Holbrook, Arinc Research Corp., secretary-treasurer; and R. H. McDonald, Sylvania, program chairman.

As before, the event will be held at the U. S. Naval Postgraduate School in Monterey. Technical sessions are abstracted beginning on page 7.

Advance registration is being requested by the committee and implemented by a \$3.00 saving as a special incentive.

Registrants should address J. M. Alderman, Arinc Research Corp., 467 Hamilton Avenue, Palo Alto, Calif., with a \$12.00 per person check to cover the seminar, the dinner, and a copy of the Proceedings. Indication of a choice between prime ribs of beef and lobster should be provided and, if a spouse is to be included for the dinner, an extra \$3.50 will cover this situation. Registration at the door, as sharp arithmeticians will have observed, will be \$15.00.

A free Monterey scenic tour will be provided for the ladies on Friday, and reservations for this should be indicated as well.

Printed Proceedings, which are to be available at registration, will include, besides the papers presented during the program, three additional papers listed at the end of the abstracts.



*Leading figures in the coming Spring Joint Computer Conference: Richard I. Tanaka, Lockheed, technical program chairman; George A. Barnard, Philco WDL, general chairman; and Hewitt D. Crane, SRI, vice chairman*

## *sjcc news*

### **LEARNING TO LOVE COMPUTERS**

A special education program delving into broad applications of computer technology is planned in connection with the 1962 Spring Joint Computer Conference in San Francisco next May 1-3. Headed by R. J. Andrews of International Business Machines Corp., San Jose, Calif., the special education offerings are a departure from past conference programming.

On the opening morning of the conference (May 1), J. H. Herrett, president of Business Electronics, Inc., of San Francisco and an instructor in the Sloan Fellowship Program at Stanford University, will conduct an hour's session on "Computer Orientation." Following will be an "IBM Computercade," featuring a demonstration of "The World's Slowest Computer"—illustrating storage, data transfers and programming via a special display system linked to an IBM 604-521. Completing the first morning's events will be a review of systems design, programming aids and electronic data processing terms by Dr. Ned Chapin of San Francisco State College.

An afternoon session opening day has been designed to appeal to auditors and accountants and is being coordinated by Bryce Ells of IBM, San Jose. John Scott, partner in Peat, Marwick,

Mitchell & Co., San Francisco, will make the initial presentation comparing a computer audit with standard auditing procedures. He will emphasize the correlation between classic auditing techniques and those required for EDP systems. "A Case Study of a Computer Audit" will be given by William R. Margerm, manager of Management Advisory Services of Price Waterhouse Co., San Francisco. C. E. Hemphill, partner in Arthur Anderson & Co., San Francisco, will discuss two types of controls of a computer operation—those built into the machine as a part of the hardware and those established as operating company controls.

Special education features for the second afternoon (May 2) will deal with applications of computers to systems and will be led by William Gerkin and Earl Means of Remington Rand, San Francisco. Dr. George Evans, manager of the mathematical sciences department of Stanford Research Institute, will discuss simulation of accounting management as performed by computing machines. A second presentation will be made on data communications from remote terminal to control computer. Concluding this afternoon program will be a panel discussion on "Rental versus Buying," "Centralized versus Decentralized Data Processing Installations"

## *broadcasting*

### **NOMINATION OF OFFICERS**

At the end of February, a nominating committee in the PGB Chapter presented the following slate: Paul Gregg, Bauer Electronics, chairman; James Gabbert, KPEN, vice chairman; and Ben Wolfe, KPIX, secretary.

Elections will be held during the meeting scheduled for May 1. The nominating committee comprised J. L. Berryhill, KRON; Fritz Bauer, Bauer Electronics; and R. A. Isberg, University of California, Berkeley.

## *geoscience note*

### **NEW GROUP G-29**

Geoscientists who may attend the 1962 SWIRECO convention in Houston (April 11-13) are invited to attend a second organizational meeting of the new Professional Group on Geoscience Electronics.

Nine members of the projected 15-member administrative committee were elected at a first organizational meeting held in Dallas in February, and it is planned that the remaining six positions will be filled from other areas.

and questions raised from the audience.

Appearing on the panel will be William Mitchell, manager of data processing at McClellan Air Force Base, Sacramento; Don Jackson, manager of scientific engineering for Aerojet at Sacramento; Charles Clayton, data processing manager for Chrysler Motor Parts, San Francisco, and Vincent LaCoste, data processing manager at Hewlett-Packard Co., Palo Alto.

The concluding session of the special education program will take place Thursday afternoon, May 3, with Adolph Bodine of IBM, San Jose, as coordinator for a series of talks on information retrieval. Dr. I. A. Warheit of IBM, San Jose, will be session chairman. Robert S. Meyer of Lawrence Radiation Laboratory, Livermore, Calif., will give an introduction to indexing and retrieval. F. C. Stockton of Shell Development Co., San Jose, will speak on "Search for Legal and Patent Data." Additional presentations on information retrieval systems for management reports and a library cataloguing system to be developed into an information retrieval system are being planned.



*Monterey Fisherman's Wharf, once famous as a whaling and sardine port, now features many attractive shops and restaurants*

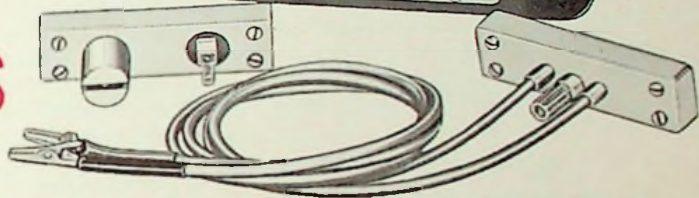
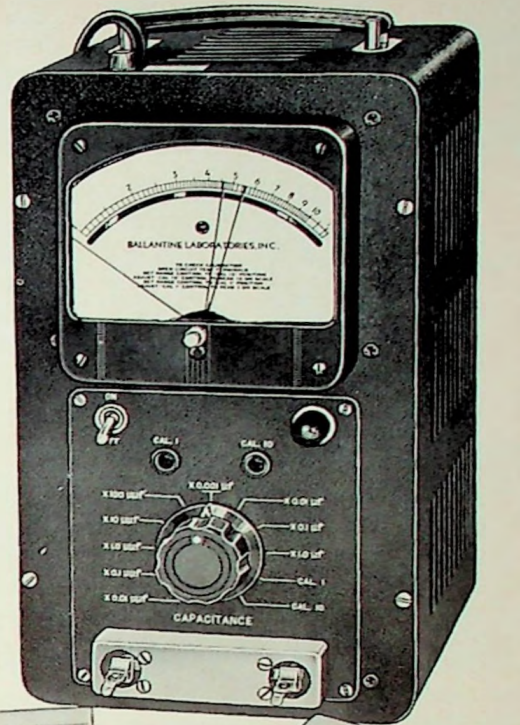
## *wescon news*

### **FILM AVAILABLE**

Wescon is offering the use of a new film on the Future Engineers Show to groups within the 7th Region. The 8½-minute 8-mm color movie with sound track tells a brief story about this traditional Wescon event, and shows the winners together with their projects.

Requests for scheduling should be submitted to Don Larson, Wescon manager, 1435 So. La Cienega Blvd., Los Angeles 35, Calif.

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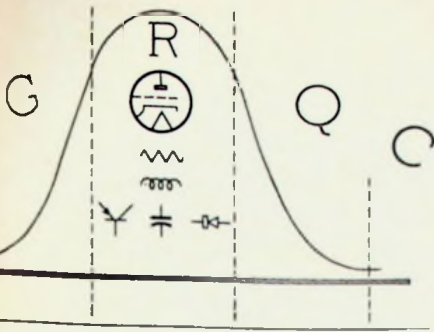


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## reliability seminar

### PROGRAM

Friday, May 11, 1962

8:00-9:00 A.M.

Registration

9:00 A.M.

Call To Order

J. W. Hall, IBM, chairman, PGROC Chapter  
9:15 A.M.

Welcome

Marshall E. Derrin, rear admiral,  
U. S. Navy Superintendent

9:30 A.M.

Keynote Address

Dr. Landis S. Gephart, director,  
office reliability and system evaluation, NASA

10:00-10:45 A.M.

### RELIABILITY AND COSTS IN FUTURE SATELLITE SYSTEMS

R. O. Halbrook, Arinc Research Corp, Palo Alto

Future satellite systems will be predominately electronic in nature. Therefore, a look into the future of electronics will certainly give an insight as to what the future holds for satellite systems. And, of course, the future of electronics is dependent upon the national growth picture.

By 1970 the gross national product is estimated to be increased by 50 per cent. If international tension and the overall defense effort stay about the same, the defense expenditures are expected to keep pace with the GNP. Expenditures for electronic equipment will increase even more than the GNP. This expansion will be primarily for missile and space applications.

The picture of electronics in ten years will be quite different from the normal electronics as we know it today. This is described in terms of quantity, density, and environment.

10:45 A.M.

Coffee

11:15 A.M.-12:00 Noon

### AN APPLICATION OF THE MONTE CARLO METHOD TO LOGIC DESIGN CIRCUIT

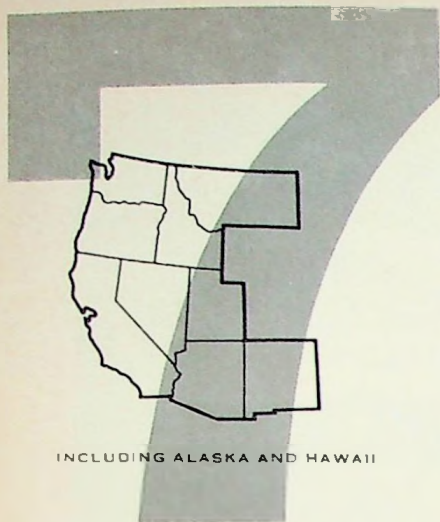
H. Ginsberg and A. Albert, Philca Corp., Palo Alto, Calif.

The use of "worst-case" techniques in the design of circuits penalizes the circuit designer relative to the efficiency at which a circuit and its component parts can operate, and over-designing is a common result. Fuller information concerning electronic-parts behavior with reference to stress and aging is becoming available (e.g., through IDEP exchange information). Probabilities can be established that a part will behave in a certain manner, and these probabilities can be used to determine the performance of a particular circuit design.

Polynomial fitted curves through the values between the "min" and "max" values can be interpreted as probability distribution functions.

(Continued on page 8)





INCLUDING ALASKA AND HAWAII

## 7th region news

### NEXT CENTURY

Taking its theme from the Seattle World's Fair, Century 21, the 1962 IRE Seventh Region Conference will cover a broad range of advanced studies in electronics during its three-day session May 24 to 26.

According to Leroy Perkins of the Boeing Company, chairman of the 1962 event, "this meeting will bring together one of the finest technical programs ever presented in the west."

He cited, as an example, the session headed by Dr. Walter L. Brown of Bell Telephone Laboratories, which includes papers on, Radiation Environment for Space Electronics, by Professor S. F. Singer of the University of Maryland; Status of Work in Radiation Effects on Solar Cells, by Dr. J. M. Denney of STL; The Implication of Nuclear-Powered Space Systems to the Radiation-Effects Problem, by Dr. J. C. Lee of Lockheed Missiles & Space Co.; and, Prediction of Transient Radiation Effects on Electronic Equipment, by Dr. G. L. Keister of the Boeing Co.

Another provocative session, titled, Electronics in 2012 A.D., will be chaired by Dr. Lester M. Field, director of the microwave tube division of Hughes Aircraft Co.

Other sessions at the 1962 IRE 7th Region Conference will deal with Satellite Communications, Radio Astronomy, Space Experiments, Electronics in Education, and Advanced Circuit-Packaging Techniques.

A full session, headed by Walter C. Scott of NASA, will cover the subject of Primary Power.

Because of the concurrent Century 21 event in Seattle, early hotel reservations are suggested. Seventh Region IRE members are currently receiving full particulars and hotel reservation forms.

### MORE PROGRAM (Friday)

Random numbers can be generated to select values from the probability distributions. This is known as the Monte Carlo technique. These randomly selected values for the parts parameters are substituted in the transfer function (the mathematical model) for the circuit. The resulting value of the transfer function is the performance of the circuit for the randomly selected values of the parts parameters. This procedure is repeated as many times as desired and a distribution of the performance of the circuit is obtained. If the output of this circuit is the input to another circuit, the performance distribution can be interpreted as a probability distribution function. The circuit designer can examine the performance distribution and determine the adequacy of the selection of the parts and of the design. This allows prediction of future performance more accurately than is possible with the worst-case approach.

This sampling procedure, or circuit simulation, is very suitable for development by electronic computer. A flow diagram is presented. A simple logic circuit developed at Philco's WDL was selected as an example and the results are presented.

12:00 Noon

Luncheon

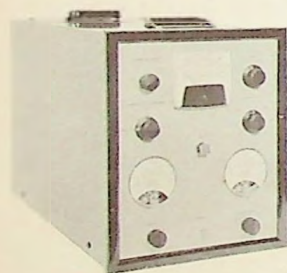
1:45-2:30 P.M.

### DISCRIMINATE ANALYSIS—A METHOD OF SCREENING POTENTIAL FAILURES FOR PNP SILICON MESA TRANSISTORS

H. Ginsberg and J. Ehlers, Fairchild Semiconductor, Mountain View, Calif.

Using least squares techniques, a statistical method of screening is developed using initial parameter drift and initial absolute value as input data. Various combinations of parameters are tested to determine which is the most effective in discriminating between known failures after 4700 hours of life testing and known good devices at this time point. The effectiveness of this

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The Royco Model 210 Airborne-Particle Monitor gives an analog readout of particles by size, at rates up to 30,000 per min with five ranges from a minimum concentration of zero to a maximum concentration of 150 million. Particle-size ranges reach from 0.5 micron to 16 microns or from the low end of any range to the largest sizes present.

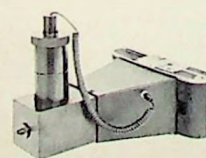
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## MORE PROGRAM (Friday)

technique is checked on data from over 42,000 transistors placed on test for the Autonetics Minuteman reliability improvement program. Approximately 65 per cent of the potentially "bad" units can be screened at a cost of also screening out 5 per cent of the potentially "good" units. The combination of Icao and early life Icao drift proves to be the best indicator. It is also demonstrated that the 350-hour burn-in period used for this analysis could be reduced to 100 hours without significant loss of effectiveness.

2:30-3:15 P.M.

### SOLID TANTALUM CAPACITORS—INCREASING THE STATE OF THE ART

R. J. Allen, Sylvania Electronic Systems, Mountain View, Calif.

Manufacturers of solid tantalum capacitors, when transferring the development operations from the laboratory to production, are faced with many problems.

In this paper, manufacturing techniques are presented which have resulted in 92 per cent yields in production. Quality control stations are established and the required parameters are specified. Test records, production failure points, and result analysis are also presented.

3:15 P.M.

Coffee

3:30-4:15 P.M.

### RELIABILITY FLOW GRAPHS OF REPAIRABLE SYSTEMS

W. W. Happ and J. L. Burroughs, microsystems electronics department, Lockheed Missiles & Space Co., Sunnyvale, Calif.

Oriented graphs provide an effective technique to evaluate the reliability of systems operating in two or more states, such as "in-force" and "stand-by" or "in-use" and "in-repair." Thus, a wide range of reliability problems can be formulated in terms of graphs referred to as "reliability flow graphs." The steady-state behavior and the transient response of several ergodic systems are computed to illustrate the effectiveness and versatility of reliability flow graphs.

4:15-5:00 P.M.

### PREDICTING SYSTEM RELIABILITY WHEN SYSTEM FAILURE DEPENDS UPON A PARAMETER THAT CHANGES WITH TIME

F. R. VanWagner, IBM, San Jose, Calif.

This paper will concentrate upon the development of a completely general mathematical model for estimating the failure rate and other reliability measures of a system whose performance depends essentially on a parameter having a probability distribution that changes with time. Special cases for two different parameter distributions associated with two different "laws" of parameter distribution "aging" and one hypothetical system, an electronic circuit, will be worked out as examples.

Methods of solving the model equations on computers will be indicated. Finally, the mathematical model will be extended to the case of a system whose performance depends critically upon two or more independently changing parameters. Applications will be suggested.

6:30-8:00 P.M.

Happy Hour

8:00 P.M.

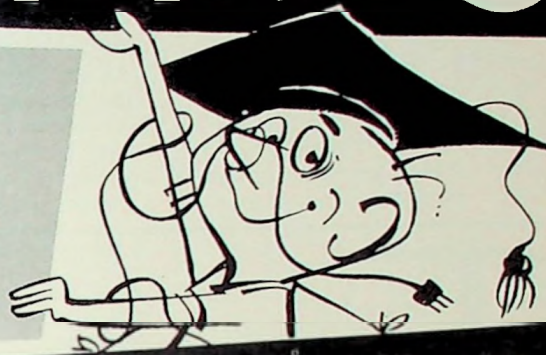
Dinner

Speaker: Dr. Royal Weller, director of engineering, space systems division, Lockheed Missiles & Space Co., Sunnyvale, Calif.

(Continued on page 10)

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## wema program

### MANAGEMENT DEVELOPMENT

Training directors, personnel managers, top executives, and other management people in a number of electronic companies in the West have been making many worthwhile recommendations for the recently announced WEMA Management Development Program.

During February, Albert C. Beeson, program director, traveled through California, Arizona, Washington, and Oregon to meet with management representatives in WEMA member companies and hear first-hand their suggestions

for the workshop seminars planned this spring.

In addition to attending the monthly meetings in all five WEMA councils, Beeson visited more than a dozen firms and also conferred by phone with many industry leaders. He continues to solicit opinions and suggestions from anyone in the industry, and invites anyone to call or mail their recommendations to him at the WEMA office in Palo Alto. Beeson has emphasized that the type of seminars to be offered and the agendas for the meetings would be patterned after recommendations from companies planning to participate.

### MORE PROGRAM

Saturday, May 12, 1962  
9:00-9:45 A.M.

#### RELIABILITY ACHIEVEMENT IN COMPLEX ELECTRONIC SYSTEMS

J. J. Seidman and N. D. Buckman, Space Technology Laboratories

Experience gained in the systems engineering and technical direction of large-weapon systems and in current space-systems efforts indicate that fundamental decisions must be made early in the programs in order to obtain reliability objectives, goals, or requirements. Decisions of this type can best be made, and in many cases can only be made, by the overall systems contractor. This follows from the fact that he is in a unique position to evaluate the relative effectiveness and trade-off of the individual subsystem areas.

Several major decisions must be made early in any program of this type. Among these are the decisions with regard to the methods of vertical control, as well as the usual horizontal control, of the different members of the system, as well as the suppliers. The problems of integrating the overall vendor-user relationships indicate further the need for effective system control. In turn, these imply the continual evaluation and effectiveness of these decisions in terms of the overall system requirements.

9:45-10:30 A.M.

#### DIODE BURN-IN FOR RELIABILITY

F. M. Schriever, J. Fabbri, and R. Ullman, Ford Instrument Co., Division of Sperry Rand Corp., Long Island City, N. Y.

"Burn-in" of electronic components and/or systems is one method that can be used to increase the reliability of components and/or systems. If the term "unit" is used to define both

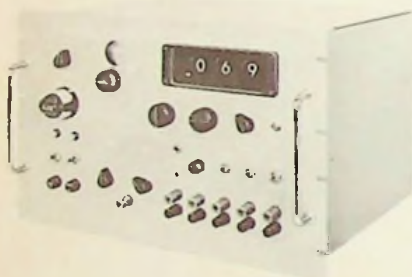


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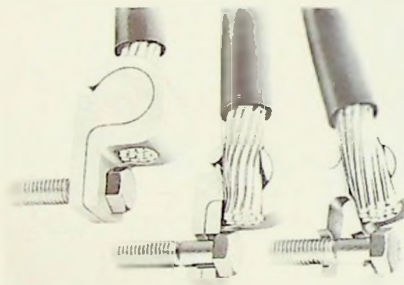
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Gamma Research, 8949 Reseda Blvd., Northridge, Calif.



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Ultrasonic Laboratories, Inc., Vacuum Tweezer Division, 1780 St. Georges Avenue, Rahway, N. J.

## MORE PROGRAM (Saturday)

components and/or systems, then burn-in is the operational testing of a unit for a specific, pre-determined length of time, prior to the start of the unit's desired operational life. The purpose behind the burn-in is to rid the unit of infant mortality failures and thereby increase overall unit reliability. In effect, burn-in safeguards the unit against the penalty of early failures. This paper will show the increase in Mean Time to Failure (MTTF) which was obtained on a particular piece of equipment as a result of a burn-in of one of its component parts.

10:30-11:15 A.M.

### BASIC RELIABILITY MODELS—CONSIDERING NON-ZERO HAZARD RATES FOR INACTIVE DEVICES

S. L. Boyle, Philco Corp., Palo Alto, Calif.

It is generally specified in reliability models that a unit will not fail during an "off" period. This paper extends common models (under the assumption of an exponential failure distribution) to include the possibility of a device failing while idle.

### Adjourn

(Following papers, not presented, are included in Proceedings.)

### MAXIMIZING SYSTEM AVAILABILITY THROUGH OPTIMAL MONITORING PROCEDURES

Kenneth M. Hall, development engineer, and Bill J. Blakeley, Senior Engineer, Sylvania RSL

This paper is concerned with optimizing the availability of a system that is designed to operate continuously. It is assumed that the system can be partitioned into two independent subsystems,  $S_1$  and  $S_2$ , such that when failures in  $S_1$  occur they are immediately known and when failures in  $S_2$  occur, they are only known after a check of  $S_1$  has been performed.

If  $S_1$  is monitored too often, the expected down time of the system is then increased due to the time expended in checks. On the other hand, if  $S_1$  is monitored too frequently, then failures in  $S_2$  will cause the system to be down too long prior to their discovery. This paper presents the derivation of an analytical expression from which K, optimal time between checks, is determined.

### ON A MEASURE OF LOSS ASSOCIATED WITH SYSTEM MALFUNCTION

Robert Riffenburg, Laboratory for Electronics, Inc.

Loss associated with a malfunction within a system includes quantities such as the reduction of probability of mission success, fiscal cost of repair, and/or loss of operation time, etc.

It is necessary to consider not only the chance that an outage will occur, but also the probable length of time the system is out and the cost to the operator. A mathematical method of estimating this loss function is derived.

### AN ALGEBRA FOR FOUR-STATE SAFETY DEVICES

Alvin D. Wiggins, Hanford Laboratories operation, General Electric Company, Richland, Washington

In the design of, for example, safety systems associated with nuclear reactors, the instrumentation can report that the nuclear process is in control, when in reality the process is out of control—a "catastrophic" failure. The instrumentation can report that the nuclear process is out of control, when in reality the process is in control—an "operating-continuity" failure. The two remaining states, namely, "process in control, and instrumentation so reporting," and "process out of control, and instrumentation so reporting," represent reliable states of operation.

In the present paper any system or component that can be described in these terms will be referred to as a four-state device.

Using a Boolean matrix representation, a reliability algebra of four-state devices is constructed. The algebra contains, as elements, the class of all  $2 \times 2$  Boolean matrices representing four-state devices.



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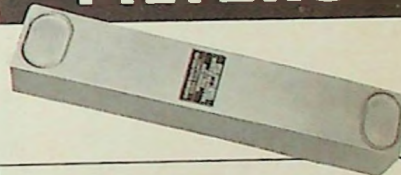
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Good All Capacitors	Straube Associates	Tel-Instrument Electronics	O'Halloran Associates
Guide Manufacturing Co.	Western Electronic Associates	Telonic Industries and Engineering	T. Louis Snitzer Co.
Hammarlund Manufacturing Co.	R. W. Thompson Assoc.	Tensor Electric Development Co.	W. K. Geist Co.
Hamner Electronics	McCarthy Associates	Trim Inc.	R. W. Thompson Associates
Harrison Labs., Div., H-P	Neely Enterprises	Valor Instruments, Inc.	Belsco
Hathaway Instruments, Inc.	J. T. Hill Co.	Varian Associates, Recorder Division	McCarthy Associates
Heli-Coil Corp.	Premmco, Inc.	Varian Associates	Neely Enterprises
Hewlett-Packard Company	Neely Enterprises	Western Gear Corp. (Electro Products Div.)	Straube Assoc.
Holt Instruments Laboratories	W. K. Geist Co.	Western Sky Industries	Premmco, Inc.
Huggins Labs., Inc.	O'Halloran Associates	Western Ultrasonics, Inc.	J. T. Hill Co.
Hughes Aircraft Co., Instruments	Walter Associates	Westrex Div. Litton Industries	American Wireless
Hughes Aircraft (Videersonic Division)	McCarthy Assoc.	Wiltron Co.	O'Halloran Associates
Hughes Vacuum Tube Products Division	Belsco	Wincharger Corp. (Zenith Radio Corp.)	Premmco, Inc.
IMC Magnetics Corp.	Richard A. Strassner Co.		

For addresses and telephone numbers of reps listed, see opposite page

**IRE MEETINGS SUMMARY**

April 11-13—**Southwest IRE Conference and Electronics Show (SWIRECO)**. Rice Hotel, Houston, Texas. Exhibits: J. C. Robinson, PO Box 1505, Houston, Texas. Program: Prof. Martin Graham, Rice University, Houston 1, Texas.

April 24-26—**Symposium on Mathematical Theory of Automata**. Engineering Society Building auditorium, UN Plaza, New York, N. Y. No exhibits. Program: symposium committee, Polytechnic Institute of Brooklyn, 55 Johnson St., Brooklyn 1, N. Y. Proceedings: Microwave Research Inst., 55 Johnson St., Brooklyn 1, N. Y.

May 1-3 — **Spring Joint Computer Conference**. Fairmont Hotel, San Francisco. Exhibits: John Ball, Pacific Telephone Co., 3240 Arden Way, Sacramento. Program: Richard I. Tanaka, Lockheed, Dept. 58-51, Palo Alto.

May 24-26—**Seventh Region Conference**. Olympic Hotel, Seattle, Washington. Exhibits: Century 21 Fairgrounds. Program: T. G. Dalby, 3220 99th N.E., Bellevue, Washington.

**NON-IRE LOCAL EVENTS**

April 4—Northern California Section, **American Ceramic Society**. "Lasers and Laser Detection" by Burton McMurtry, Sylvania. Dinner meeting (cocktail hour, 6:30 p-m), Ming's Restaurant, 4100 El Camino Real, Palo Alto.

April 11—Santa Clara Valley Sub-section, **AIEE**, general meeting. "Electrical Propulsion for Heavy Vehicles" by J. A. Kirtland, FMC Corp. Villa LaFayette Restaurant, 1140 Castro St., Mountain View. Dinner: 7 p-m (social hour 6:30 p-m). Reservations: Mrs. George, RE 9-5840.

April 25-29—**Western Space Age Industries and Engineering Exposition/Conference**. Cow Palace, San Francisco.

**PAPERS CALLS**

April 15—100- to 200-word abstracts, 500- to 1000-word summaries, and indication of technical field of the paper, along with title of paper and name and address of author for Wescon (Los Angeles; Aug. 21-24). Send to: Wescon business office, 1435 La Cienega Blvd., Los Angeles 35, Calif.

April 20—1000-word summaries, author and title for National Symposium on Space Electronics and Telemetry (Miami Beach; Oct. 2-4). Send to: Dr. Joachim Muehlner, Lockheed Missiles & Space Co., Bldg. 204, Plant 2, P.O. Box 504, Sunnyvale, Calif.

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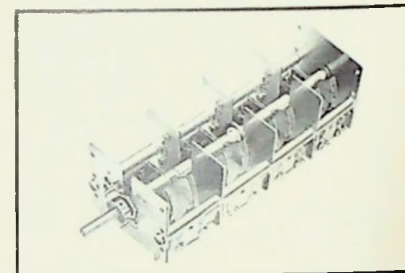


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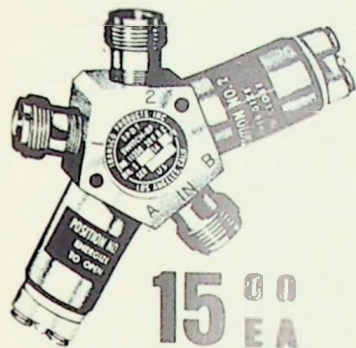
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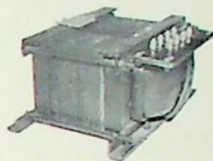
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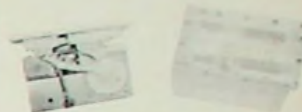
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2 ft. 10 in.	2.52	2.27	2.04
3 ft.	2.56	2.30	2.07
4 ft.	2.76	2.48	2.23
6 ft. 6 in.	3.26	2.93	2.64
7 ft. 6 in.	3.46	3.11	2.80
8 ft. 6 in.	3.66	3.30	2.97
18 ft.	5.56	5.00	4.50
26 ft.	7.16	6.44	5.80

UG 1185/U One End UG 573 A/U One End

1 ft. 3 in.	\$ 2.96	\$ 2.66	\$ 2.40
1 ft. 10 in.	3.09	2.79	2.50
2 ft. 6 in.	3.21	2.89	2.60

UG 1155/U One End UG 571/U One End

3 ft.	\$ 2.86	\$ 2.57	\$ 2.30
4 ft. 8 in.	3.20	2.88	2.60

PL 259 One End

25 ft.	\$ 5.49	\$ 4.94	\$ 4.44
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RG 8 A/U with UG 1185/U One End UG 573 A/U One End

6 ft.	\$ 3.43	\$ 3.10	\$ 2.79
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RG 59 A/U 73Ω CoAx Cable UG 260 B/U Each End

3 ft. 6 in.	\$ 1.12	\$ 1.00	\$ .90
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36 ft. 6 in.	2.77	2.50	2.25

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2 ft.	1.37	1.23	1.10
4 ft.	1.47	1.32	1.20
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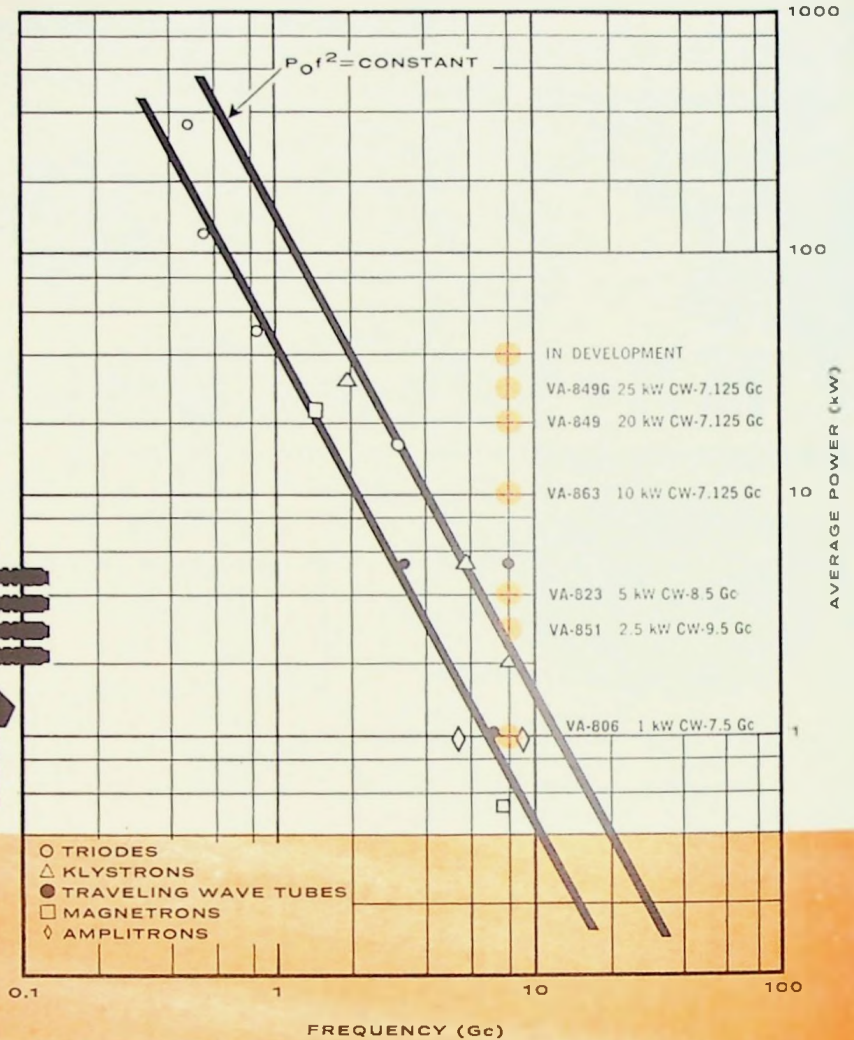
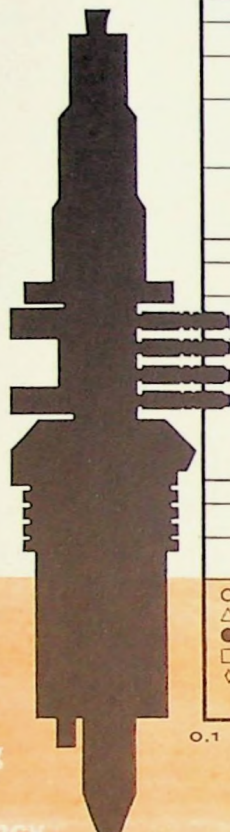


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