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LUNCHEON

To allow time for an informal get-together, no formal luncheon arrangements have been made. There are a number of good restaurants available for lunch.

TRAVEL DIRECTIONS

The following instructions indicate the available transportation routes serving the United Engineering Center, which is located in the U.N. Plaza (First Avenue at 47th St.)

Public Transportation

The 50th Street bus stops in front of the UEC Building and can be used by those people traveling on the following subways:

BMT Sea Beach, West End (transfer at 42nd Street), Brighton and Fourth Avenue local trains to 49th Street Station.

Independent 6th Avenue "D" and "F" trains to Rockefeller Center 47th-50th Street Station.

Independent 8th Avenue "E" train to 50th Street Station.

IRT Lexington Avenue local and 7th Avenue local trains to 51st Street and 50th Street respectively.

Pennsylvania Station and Grand Central Station are served by the subways listed above.

Automobile

From Long Island: Take Long Island Expressway to Queens Midtown Tunnel and exit to 34th Street. Turn from 34th Street to First Avenue and then proceed to 47th Street and the United Engineering Center.

From New Jersey and Points West: Take Lincoln Tunnel to New York and proceed down 34th Street to First Avenue. Turn on First Avenue and drive to 47th Street and the United Engineering Center.

DOOR REGISTRATION 8:00 A.M., 18 October, 1963.

Those who register in advance may claim their identification cards at the registration desk. Copies of the "Proceedings" will be available for distribution to delegates at this time.

FOURTH N.Y. CONFERENCE ON ELECTRONIC RELIABILITY

REGISTRATION AND ORDER FORM

To:
Mr. E. Murphy
Sperry Gyroscope Co.
155 Glen Cove Road
Carle Place, New York

I will attend _____

I will not attend _____

The Reliability Engineering Conference on October 18, 1963, remittance, payable to the New York Conference on Electronic Reliability, is enclosed as follows:

Registration for _____ person(s) at $5.00 each for IEEE members and $7.50 each for non-members which includes one copy of the "Proceedings" $_____

_____ copies 1963 Proceedings $5.00 non-members $_____

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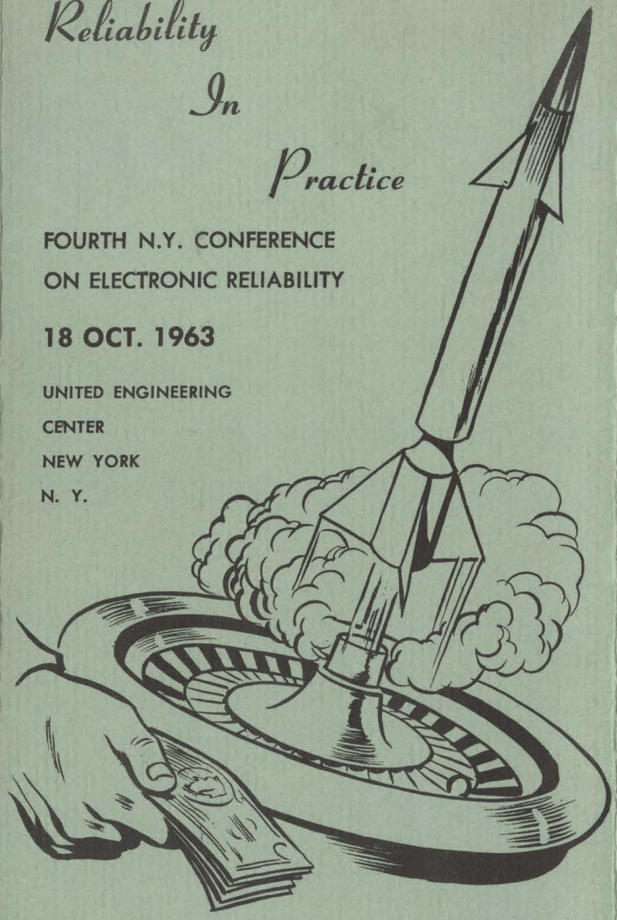
Reliability In Practice

FOURTH N.Y. CONFERENCE ON ELECTRONIC RELIABILITY

18 OCT. 1963

UNITED ENGINEERING
CENTER
NEW YORK
N. Y.



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FOURTH NEW YORK CONFERENCE ON ELECTRONIC RELIABILITY — TIME TABLE AND PROGRAM

RELIABILITY IN PRACTICE

The Fourth New York Conference on Electronic Reliability will stress reliability during the design, development and production programs. Co-sponsored by the New York, Northern New Jersey and Long Island sections of the Institute of Electrical and Electronic Engineers through the Metropolitan New York Chapters of the Professional Technical Groups on Reliability, Component Parts, and Product Engineering and Production.

Papers will be presented at this conference whose subjects scan the entire scope of reliability. The first portion of the program discusses reliability during the design and engineering phase and its economic effect on the program. In addition the parts reliability aspect is considered, and papers on integrated circuitry and parts testing are presented.

Reliability mathematics papers discuss the results of reliability computations on redundant systems and indicates a technique of relating the Markov Process to system mathematical models. The production aspect of reliability considers the problems faced in many programs and presents some techniques to aid in their solution.

The Conference this year will be held in the United Engineering Center on First Avenue at 47th Street, situated in midtown New York. The Center is readily accessible via local transportation, major highways and Pennsylvania and Grand Central Stations.

MORNING SESSION IA — Reliability Engineering 8:30 a.m.

Moderated by Paul Darnell

Economic Balance in Reliability Objectives

GREGORY L. HETZEL,
Bell Telephone Laboratories, Inc.

For reliability objectives to be really meaningful in the development of a system which will efficiently achieve its intended function, consideration of these objectives is necessary. The relationships between system characteristics; such as performance, reliability, maintainability, etc.; have to be estimated utilizing past experience and existing preliminary system information. Trade-offs between these characteristics are then evaluated to arrive at a system developmental and operational plan which realizes the system's intended function at minimal total cost. Total cost includes all costs from inception of the system concept to its operation and maintenance by the user throughout its service life. Thus, an integrated analysis as part of the system feasibility study weighs the various problems associated with development and operation, and distributes the total funds accordingly, resulting in an economically-balanced program.

Economics of Implementing Reliability Objectives

GEORGE H. EBEL,
Fairchild Camera & Instrument Corp.

An effective reliability program must be economically justifiable. That is, the total system cost should be reduced as a result of the reliability program. A discussion of various tools and techniques to achieve a more efficient program will be presented. These include the use of digital computers for rapid, accurate calculations, the use of design engineers on a rotational basis for circuit reliability evaluation, and the need for a balanced failure reporting and analysis system. Case histories showing over-all cost savings of a reliability program will be discussed. The information will be presented from both a military and commercial viewpoint.

Demonstrated Consequences of an Economically Balanced Reliability Program

WILLIAM H. VON ALVEN,
Arinc Research Corp.

In recognition of the need for improvements in systems effectiveness and operational readings, the Department of Defense has established by Instruction 3200.6 (7 June 1962) the Technical Development Plan (TDP). The TDP, applied to new systems, requires that considerations be given to orderly planning for reliability and maintainability as well as to performance requirements, initial and operating costs, delivery schedule, and personnel requirements. This plan also requires the establishment of appropriate test and evaluation procedures for the new system, which will include consideration of adequacy of the system design, reliability and maintainability. Although the TDP specifically serves as a decision-making document at the management levels, the discussion will primarily concern the anticipated impact on industry, where contractors will be encouraged to optimize the distribution of over-all expenditure of effort among the various elements of a development program.

SESSION IA — Panel Discussion:
G. Hetzel, G. Ebel, W. Von Alven

MORNING SESSION IIA — Parts Reliability 8:30 a.m.

Moderated by Terry Utz

Application Reliability of Integrated Semiconductor Circuits

PAUL BUCKLER,
Texas Instruments Inc.

Over three years ago a reliability program for Integrated Semiconductor Networks was initiated with a resultant flow of data and information to the industry. Specific benefits have resulted from this program. These will be presented with electrical data, reliability indicators, radiation effects, designs, and package innovations useful to the application of Integrated Semiconductor Networks.

Accelerated test programs were designed to identify failure modes most likely to occur if and when a failure would occur. Using this as well as field data, the feed back loop has been closed, and continuous improvement is vividly illustrated in the process stability and the noted increased reliability of the devices in application work.

Current reliability information is presented with consideration given to future applications of Integrated Semiconductor Networks.

Establishment of a Reliability Testing Program

EARL P. REED,
Sylvania Electronic Systems

This paper describes the thin film microelectronic program of the Sylvania Electronic Systems Microelectronics Laboratory. A brief description will be presented of manufacturing techniques process controls and inspection procedures. Applications of thin film microcircuits and their advantages and limitations will also be discussed.

This paper will emphasize the establishment and aims of our reliability testing and evaluation program, the use of mathematical models in establishment and evaluation of tests and results of these tests as of 1 October, 1963.

Application Reliability of Micromodule

DONALD T. LEVY,
Radio Corporation of America

Since the start of the Micromodule Program, six years ago, the primary objective has been to achieve an exceptionally high level of performance and reliability. The establishment of Micromodule Reliability has required an integrated four-fold program, whose accomplishments are described in this paper.

The Micromodule Program has developed a complete set of rigid specifications on each of the microelements and micromodules. Each of the more than thirty sub-contracting microelement vendors developed products which have been qualified to meet these demanding specifications. A full set of reliability procedures for the Micromodule program has been developed, tested, and enforced. Examples from these specifications and procedures are listed.

A mechanized, production facility for micromodules has been built. This facility is now capable of producing a minimum of 25,000 reliable micromodules per month. A family of specially-designed processing equipments have been incorporated into the production facility to minimize the chance of human error during manufacture. Illustrations are included which show how these facilities were improved by a Reliability Feedback Loop. The Micromodule and its component microelements have undergone over 110 million element-hours of high stress life tests.

SESSION IIA — Panel Discussion:
P. Buckler, E. Reed and D. Levy

AFTERNOON SESSION IP — Reliability Mathematics 2:00 p.m.

Moderated by Victor Selman

Markov Processes Applied to Aerospace Systems Reliability Models

N. S. JAGODINSKI,
Sylvania Electronic Products Corp.

A mathematical technique was developed for application to operational equipment to provide a dynamic reliability program capable of instantaneously forecasting the probabilities of mission success at any time during the mission. The technique is based on the application of the Markov process and matrix theory to operational equipment.

The Markov process is described and the conditional probabilities of system failure for various equipment configurations are assessed through the application of Markov chains. A hypothetical transmitter is then examined and its transitron matrix evaluated for a specific mission.

Calculation of Circuit Reliability by Use of Von Neumann Redundant Logic Analysis

DR. N. T. GRISAMORE,
George Washington University

In determining the reliability of circuits with redundant paths, it often becomes necessary to utilize complex mathematics which include Boolean algebra, conditional probabilities, etc. This is especially true when the same component is used for more than one routing; the difficulties are increased when mode of failure is considered such as shorts, opens, and the permutations associated with flip-flops. The flip-flop permutation problem of closing when normally closed, closing when normally open, is especially difficult to conveniently be handled by the usual mathematics. The works of Von Neumann include methods of handling these problems by use of algorithms which can greatly reduce the amount of computation necessary to determine the reliability of a multi-channel redundant circuit design. Examples are given.

The MTBF and Availability of Compound Redundant Systems

RONALD DICK,
International Electric Corporation

This paper deals with A subsystems with similar failure and repair rates for each subsystem where no more than N out of A may fail and the system be considered operative. The MTBF starting in any state is found for any A and N. The relationship between MTBF and steady state solutions is given. The theory is illustrated for the case N-1 and A-2, which is the well-known Epstein-Hosford case of two machines in parallel.

SESSION IP — Panel Discussion:
N. S. Jagodzinski, Dr. N. T. Grisamore, R. S. Dick

AFTERNOON SESSION IIP — Product Reliability 2:00 p.m.

Moderated by Robert Gauger

Reliability: The Design-Production Interface

E. F. DERTINGER,
Raytheon Corp.

We know more about how to design and produce reliable products than we are able to put into practice. Constraints on time and money and mismatch between Design and Production result in our not applying all the reliability and quality control techniques we know about during the design phase in order to optimize the achievement of reliability during production.

Suggestions are made as to how to apply reliability and quality control techniques in parallel with design effort, in such a way that reliability objectives are achieved without impediment to the design schedule.

Product Reliability Through Management of Men and Machines

CHARLES C. TYLER,
Western Electric Company

The past decade has seen much effort expended in the application of technical methods and procedures for obtaining product reliability. Emphasis has also been placed on the application of the management function in securing product reliability. It is recognized that technical competence will not in itself produce product reliability. Neither will management competence in itself produce reliability. The two are interdependent and the total mutual output from them determines the overall effectiveness of the manufacturing program for product reliability.

The paper will discuss objectively the importance of this mutual effect. Examples of accepted technical methods used for producing reliable products will be related to the specific management functions which must be performed in order to obtain an over-all effective program. The purpose of the paper is to trace, in outline, the conventional history of the product in sufficient detail to show this interdependence.

Can Reliability Survive the Hazards of Cost Reduction?

MARVIN KAPLIN,
Loral Electronics Corp.

This paper deals with reliability oriented techniques which must be considered when implementing value engineering in a product or design. In the same manner that cost reduction can be accomplished without degrading quality, so can value engineering be utilized without affecting specified reliability parameters. Examples are included to illustrate how reliability can be degraded or maintained by proper value engineering applications.

SESSION IIP — Panel Discussion:
E. F. Dertinger, C. Tyler, M. Kaplin, A. Finocchi