



Department OF DEFENSE

TEST & EVALUATION of SYSTEM RELIABILITY AVAILABILITY and MAINTAINABILITY

A Primer

DIRECTOR TEST AND EVALUATION

Office of the Under Secretary of Defense
for **Research and** Engineering

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TEST AND EVALUATION
OF
SYSTEM
RELIABILITY AVAILABILITY MAINTAINABILITY

- A PRIMER -

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FOREWORD

This handbook is issued under the authority of DoD Instruction 3235.1, "Test and Evaluation of System Reliability, Availability, and Maintainability," February 1, 1982. Its purpose is to provide instruction in the analytical assessment of System Reliability, Availability, and Maintainability (RAM) performance.

The provisions of this handbook apply to the Office of the Secretary of Defense, the Military Departments, the Organization of the Joint Chiefs of Staff, and the Defense Agencies (hereafter referred to as "DoD Components").

This handbook is effective immediately and may be used on an optional basis by DoD Components engaged in system RAM.

Send recommended changes to the handbook to:

Office of the Director
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DoD Components may obtain copies of this handbook through their own publication channels- Other federal agencies and the public may obtain copies from the Naval Publication and Form Center, 5801 Tabor Avenue, **Philadelphia, Pa.** 19120.

A handwritten signature in cursive script, appearing to read "Isham Linder".

ISHAM LINDER
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OFFICE OF THE UNDER SECRETARY OF DEFENSE

WASHINGTON, D.C. 20301

RESEARCH AND
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MEMORANDUM FOR TEXT USERS

SUBJECT : The Application of Statistical Concepts to Test and Evaluation

Test and Evaluation of military systems and equipment is conducted by DoD to support the assessment of system performance characteristics. These assessments are an integral part of the decision process inherent in the acquisition cycle.

In many hardware and software development programs, testing has become a controversial issue. Questions which often arise are: How much testing is enough? Is the hardware/software ready for testing? Are hardware requirements, assessment parameters and critical issues adequately defined? Does the test effort represent the minimum time and resource program consistent with meaningful results? Have the development and operational testing cycles been integrated so as to form an efficient evaluation program? And so on.

This text presents concepts and techniques for designing test plans which can verify that previously established system suitability requirements have been achieved. We realize, of course, that test resource availability may be adversely affected by cost, schedule and operational urgency constraints. In such cases, alternate test plans which represent the most meaningful, timely and cost effective approach, consistent with these constraints, must be developed. In any event, it is essential that all participants understand the critical issues being addressed and the acquisition risks inherent in conducting a limited test program.

The design and execution of sound test programs is NO accident. It requires numerous hours of research and planning and a thorough understanding of testing techniques, the test system and its operating scenario. Further, the test results must support the development of realistic performance estimates for the entire production run, after having tested relatively few systems. Herein lies the usefulness of the statistical concepts contained in this text.

The topics addressed in this text will familiarize the reader with the statistical concepts relevant to test design and performance assessment. In short, these topics, when combined with common sense and technical expertise formulate the basis of all sound test programs.

A handwritten signature in black ink, appearing to read "Isham Linder".

Isham Linder
Director Defense
Test and Evaluation

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