**Title:** Statistical Aspects of Reliability, Maintainability and Availability

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**Abstract:**

Under this grant, the main thrust of the research was in the development of methods and concepts in reliability, availability, and maintainability, presently applicable and potentially applicable to the programs of the Air Force in particular and the Department of Defense in general. In addition, because of the general nature of the mathematical and statistical research performed, the results obtained are of value in a variety of other applied areas, and in mathematical and statistical theory.
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Statistical Aspects of Reliability, Maintainability and Availability.

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Tallahassee, Florida 32306

Myles Hollander and Frank Proschan
Co-Principal Investigators

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Under Grant AFOSR-81-0038, a total of 14 research reports were issued, 27 papers were published in scientific journals or are in press or accepted for publication, and 3 books are in preparation.

The main thrust of the research performed under the grant is the development of methods and concepts in reliability, availability, and maintainability, presently applicable and potentially applicable to the programs of the U.S. Air Force in particular and the Department of Defense in general. In addition, because of the general nature of the mathematical and statistical research performed, the results obtained are of value in a variety of other applied areas, and in mathematical and statistical theory.

A partial list of topics treated may give some idea of the scope of the research performed under the Grant:

1. Accelerated life testing.
2. Reliability growth models.
3. A variety of maintenance models under the more realistic assumption that repair is imperfect.
4. Inference for the exponential life distribution.
5. Analysis of mean remaining life, both probabilistic and inferential.
6. Testing whether more failures occur later.
7. Testing whether a new item has stochastically greater life length than a used item of age $t_0$.
8. Bayesian inference for coherent structures.
9. Further work on the extension of coherent structure theory to the multistate case.

11. Deriving optimal methods of inspection to determine the failed component(s) causing system failure.

12. Developing a new concept of negative dependence, deriving its properties, and obtaining applications in reliability.

13. Developing a theory of stochastic rearrangement inequalities and applying it to optimum construction of systems, testing for trend, and other areas of reliability.

14. Testing whether the mean residual life function displays a change in trend (i.e., is monotone increasing and then monotone decreasing).

15. Probabilistic and inferential treatment of the percentile residual life function (the analogue of the mean residual life function).

16. Testing whether one device possesses more of the "new better than used" property than does a second device.

17. Further work on shock models.

18. Analysis of censored data.

19. Types of qualitative dependence among random variables.


21. Inference under the log rank test.

22. Renewal processes.

23. Approximation of DFR distributions.

24. First passage time distributions.


Additional topics were treated but are not listed.
Papers Published During the Grant Period, In Press, or Accepted for Publication.


Reports Issued During Grant Period.


Books in Progress.


Finally, a number of distinguished and developing reliability theorists visited the Reliability Center for various lengths of time. These included Richard E. Barlow, Philip Boland (Ireland), Emad El-Neweihi, Peter Franken (East Germany), Kumar Jogdeo, Naftali Langberg (Israel), Moshe Shaked, and Nozer Singpurwalla.