

Bendat J S & Piersol A G. *Random data: analysis and measurement procedures*.
New York: Wiley, 1971. 407 p.
[Measurement Analysis Corp., Digitek Corp., and Dept. Engineering, Univ.
Southern California, Los Angeles, CA]

This book presents an integrated discussion and development of the requirements and problems associated with random data acquisition and analysis. The emphasis is strongly practical with special attention given to detailed data processing procedures and inherent statistical errors by analog and digital techniques. [The *Science Citation Index*® (SCI®) and the *Social Sciences Citation Index*® (SSCI®) indicate that this book has been cited over 750 times since 1971.]

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"This 1971 Wiley book, *Random Data: Analysis and Measurement Procedures*, is the second edition of our earlier book, *Measurement and Analysis of Random Data*, published by Wiley in 1966.¹ That first book originated from an extensive research effort which we performed in 1960-1961 for the US Air Force Flight Dynamics Laboratory at Wright-Patterson AFB, Ohio, to study 'the application of statistics to the flight vehicle vibration problem.' It became clear during that program and in subsequent work for NASA, the US Navy, and others that most of the available books dealing with applications of random process theory and time series analysis were written from the viewpoint of electrical engineers and mathematicians. This was because communication problems such as radar represented the most direct application areas to analyze properties of signals and noise passing through electrical systems. However, with the introduction of jet and rocket powered flight vehicles after World War II, the need arose for special, accurate, practical methods to describe aerospace structural loads, random vibrations, and dynamic responses. This led to increased interest and funding for the applications of random processes to

mechanical type problems in many fields and motivated us to write the 1966 book. It was one of the earliest books to be published with other than an electrical engineering orientation.

"In 1971, we revised the 1966 book to include new developments, particularly the widespread usage of fast Fourier series procedures (due to Cooley and Tukey in 1965²) which made it possible to process large amounts of data rapidly at low cost. Otherwise, the 1971 book still retained the comprehensive treatment of our 1966 book on how to collect and analyze random data to solve mechanical type problems.

"I believe our book was so well received because we explained complicated ideas both in clear mathematical terms and also in nonmathematical physical terms so that the reader could easily understand the discussion. This is why our 1971 *Random Data* book has been translated into Russian, Polish, Japanese, and Chinese and has served to standardize notation, definitions, and acceptance of desired results throughout the world.

"Since 1971, computer technology has expanded greatly and we have been able to improve ways to model and analyze multiple input/multiple path/multiple output problems when stationary random data goes through linear systems. We have also derived new practical statistical error analysis criteria to help design test programs and to evaluate measured results. This motivated us to write our most recent book, *Engineering Applications of Correlation and Spectral Analysis*,³ as an applications companion to the 1971 *Random Data* book.

"We are currently preparing a third edition of the 1971 book which will extend the theoretical background and digital data processing procedures. Included will be new material on nonlinear system analysis techniques and on nonstationary data analysis techniques. This future revision plus the 1980 *Engineering Applications* book will be a two-volume textbook and reference for students and practicing engineers."

1. Bendat J S & Piersol A G. *Measurement and analysis of random data*. New York: Wiley, 1966. 390 p.
[The *SCI* and *SSCI* indicate that this book has been cited over 635 times since 1966.]
2. Cooley J W & Tukey J W. An algorithm for the machine calculation of complex Fourier series.
Math. Comput. 19:297-301, 1965.
3. Bendat J S & Piersol A G. *Engineering applications of correlation and spectral analysis*.
New York: Wiley, 1980. 302 p.