

# Biography of Dr. Robert B. Abernethy

*By Paul Barringer*



Dr. Bob does Weibull analysis with a slide rule

Dr. Robert B. Abernethy is known worldwide for his expertise in jet engine performance, measurement uncertainty analysis and Weibull analysis. "Dr. Bob", as he is affectionately known, has presented his Weibull Workshop in Australia, Canada, China, Japan, Germany, Spain, Sweden, Israel, The Netherlands, and the United States of America. More than 9,000 students have attended his seminars. More than 18,000 copies of his text [The New Weibull Handbook](#) have been distributed. (Dr. Bob provides free copies to university libraries around the world to encourage the teaching of Weibull analysis.) The handbook is now in the 5th edition and Dr. Bob's research continues. A similar number of the original US Air Force Weibull Analysis Handbooks, AD A143100, 1983, were distributed worldwide by the US Government. The New Weibull Handbook was favorably reviewed by the Royal Statistical Society.

Dr. Bob graduated from Rensselaer Polytechnic Institute as a Navy scholar with a B.Sc.ME and in 1958 received his M Sc in Industrial Management. He served on destroyers during the Korean War<sup>[1]</sup> and joined Pratt & Whitney Aircraft in 1955. The picture to the left was taken at Pratt &

Whitney in 1963 just before he left for England, doing Weibull analysis with a slide rule. He was the Fulbright Scholar for science and math to Great Britain where he obtained his DIC and PhD degrees in statistics from the Imperial College of Science in 1965. He retired from Pratt & Whitney Aircraft in 1987 after 32 years as Manager of Reliability, Safety, Maintainability, and Statistical analysis to teach Weibull analysis.

He has awards from [AIAA](#), [ASME](#), [ASQ](#), [ISA](#), and [SAE](#) for his work in Weibull analysis and measurement uncertainty. He is a fellow of [ASME \(2003\)](#), SAE, ASQ, [The Royal Statistical Society](#), and an Associate Fellow of AIAA for his development of Weibull technology, Weibayes methodology, failure forecasting, and the Weibull substantiation test designs. He founded and chaired both the [SAE G11 Reliability Division](#) and the SAE **E33 Committee on Aircraft Performance Measurement**. He was Chief American delegate to ISO TC30 SC9, sponsored by ASME and ANSI. He chaired two ASME committees on measurement uncertainty.

[Dr. Bob](#) holds the patent on a feature of the J58 Pratt & Whitney engine that powers the world's fastest aircraft. His invention converts the afterburning turbojet into a partial ram jet at high Mach number. The J58 engine powers the supersonic [SR-71 "Blackbird"](#) that still holds all 17 world speed records even though his patent was submitted in October 1958. An [SR-71](#) is located at the [Smithsonian Institute Aircraft Museum](#). On the final [USAF SR-71 flight](#), it cleared the measurement gate in 1990 at Oxnard, CA (west coast of



Dr. Bob receives the 2001 SAE McFarland Award from SAE's president for his contributions to Education

the USA) and crossed the completion gate at Salisbury, MD (east coast of the USA) in just under 68 minutes to set a new USA coast-to-coast speed record of 2,124.05 miles per hour (not bad considering the afterburners were at part power!). NASA recently retired several Blackbirds used for supersonic research. Dr. Bob also holds patents on the [F100](#) afterburner control system engine used in both the [F15 Eagle](#) and [F16 Falcon](#) fighters.



Dr. Robert B. Abernethy on his 73rd birthday  
July 12, 2003

The Weibull distribution was invented by [Waloddi Weibull](#) (1887-1979) for which he received [ASME's 1972 Gold Medal](#). (By coincidence, Dr. Bob received [ASME's 1988 Dedicated Service Award](#) for his contributions to statistics and his name is shown third from the top of the [Dedicated Service Award Recipients](#)). Both Abernethy and Weibull were midshipman and officers in their respective navies, and both received support from Wright Patterson Air Force Base for Weibull research. Both were widowed and remarried. Dr. Bob had his 77rd birthday on July 12, 2007 and hopes he may follow Waloddi Weibull who lived to be 89. Dr. Bob may be contacted by [email](#), and he is available for Weibull consulting or problem solving by use of his [EagleEye<sup>SM</sup> Service](#).

Dr. Abernethy's successful development of improved methods for life data analysis has inspired others to do significant research as well, particularly Wes Fulton, Paul Barringer, and Carl Tarum. The New Weibull Handbook has contributions from many others. The Handbook is supplemented by the SuperSMITH software written by [Wes Fulton](#) of [Fulton Findings](#). Every method described in The Handbook is available in the software. The Fulton Findings software is [WinSMITH Weibull](#) for making Weibull probability plots and [WinSMITH Visual](#) for making Crow-AMSA reliability growth plots.

Dr. Bob winters in North Palm Beach, Florida and summers on Lake Tellico, Tennessee, with his wife Sally. His hobbies are orchids, staghorn ferns, fishing and traveling. Sally and Dr. Bob have four children and eight grandchildren.

**[1]** In three years his two destroyers (USS Hank and USS English) collided with the world's largest ship, sank the ammunition dock and train at Yorktown, lost both anchors in the North Sea, squashed a tugboat in Naples, put a torpedo in the engine room of a sister destroyer, almost destroyed a shore fire control party in Maryland and collided at 33 knots with a sister destroyer, losing 20 feet of the bow. He decided engineering might be a better, if not safer, career.

#### **Some of R. B. Abernethy's Publications and Papers:**

1. "An Improved Method for Measuring Rocket Engine Reliability," American Statistics Association, Florida Chapter, May 1967.
2. Film, "A Picture is Worth a Thousand Printouts", IEEE, West Palm Beach, Florida, 1968, produced and distributed by IBM.
3. "ICRPG Handbook for Estimating the Uncertainty in Measurements Made with Liquid Propellant Rocket Engine Systems," CPIA180, April 1969, co-authors B. Powell and David Colbert.
4. "The ICRPG Measurement Uncertainty Model," AIAA 69-734, Propulsion Conference 1969 and the "Journal of Spacecraft and Rockets," Vol.7 No.1 1970.

5. "Uncertainty In Gas Turbine Measurements", AIAA, Las Vegas, Nevada, November 5-7, 1973, co-authored with J. W. Thompson, Jr.  
[\[929KB PDF, 9 pages\]](#)
  
6. "Handbook Uncertainty in Gas Turbine Measurements," USAF AEDC-TR-73-5, 1973, AD 755356, co-authors, J.W. Thompson et al. This text was adopted by the Instrument Society of America as their "Measurement Uncertainty Handbook."  
[\[0.7MB PDF\]](#) Cover through Table of Contents  
[\[1.0MB PDF\]](#) Section I Introduction, pages 1-16  
[\[0.5MB PDF\]](#) Section II, Uncertainty Model, pages 17-27, page 28 is blank  
[\[1.3MB PDF\]](#) Section III, Force Measurement, pages 27-56  
[\[1.1MB PDF\]](#) Section IV, Fuel Flow Measurement, pages 57-76  
[\[1.1MB PDF\]](#) Section V, Pressure And Temperature Measurements, pages 77-98  
[\[1.1MB PDF\]](#) Section VI, Airflow, pages 99-120  
[\[0.4MB PDF\]](#) Section VII, Net Thrust And Net Thrust Specific Fuel Consumption, pg121-128  
[\[0.6MB PDF\]](#) Section VIII, Special Methods, pages 129-138  
[\[0.3MB PDF\]](#) Section IX, Glossary, pages 139-143, page 144 is blank  
[\[1.2MB PDF\]](#) Appendices A-E, pages 145-172  
     A=Precision Index For Uniform Distribution of Error  
     B=Propagation Of Errors By Taylor's Series  
     C=Estimates Of The Precision Index From Multiple Measurements  
     D=Outlier Detection  
     E=Tables Section, Fuel Flow Measurement, pages 57-76
  
7. "Three Applications of Monte Carlo Simulation to the Development of the F100 Turbofan Engine," AIAA/SAE 12th Propulsion Conference, 1976, co-author Jack Sammons.  
[\[384KB PDF, 4 pages\]](#)
  
8. "SAE In-Flight Propulsion Measurement Committee E-33, Its Life and Work," SAE Aerospace Journal, 1981.
  
9. "ASME Measurement Uncertainty," ASME paper 83-WA/FM-3, coauthors R. Benedict and R. Dowell.  
[\[435KB PDF, 5 pages\]](#)
  
10. "**Weibull Analysis Handbook**," U.S. Air Force AFWAL-TR-83-2079, November 1983, AD #A143100, co-authors J.E. Breneman, C.H. Medlin, & G.L. Reinman.
  
11. "Analysis of Turbopump Failures Using Advanced Weibull Techniques," RAMS Proceedings available from IEEE, #83RM367, January 1983, co-authors C.H. Medlin, B.G. Ringhiser.  
[\[376KB PDF, 4 pages\]](#)
  
12. USAF Video "An Introduction to Weibull Analysis,' 1982. Available from [Dr. Bob](#).
  
13. "The History and Statistical Development of the New ASME-SAE-AIAA-ISO Measurement Uncertainty Methodology," AIAA/SAE/ASME/ASME Propulsion Conference, 1985.  
[\[1,051KB PDF, 9 pages\]](#)
  
14. "Fluid Flow Measurement Uncertainty," ISO/DIS 5168, approved by unanimous Committee vote 1987, and world vote 1988, (17 for, France and Italy against), and yet never published because the French delegation controls the ISO TC30 Secretariat. Dr. Abernethy believes the earlier 10th draft of this proposal was better than this 12th draft and is published in four sections for ease of download.  
[\[1.01MB PDF, 16 pages\]](#) Sections 1 through 5  
[\[825KB PDF, 12 pages\]](#) Sections 6 through 9

[\[699KB PDF, 12 pages\]](#)

Annex A

[\[849KB PDF, 14 pages\]](#)

Annex B though F

15. "WeibullNEWS," published twice a year with Wes Fulton and Paul Barringer. You can download no-cost copies of WeibullNewsas PDF files.
16. "The New Weibull Handbook," Fifth Edition. Published and distributed by [Dr. Bob](#). Other distributors include Paul Barringer, Wes Fulton, SAE, RIAC, ASME, Amazon.com, and Barnes & Noble.
17. "New Methods for Weibull & Log Normal Analysis," ASME Winter Annual 1992, 92-WA/DE-14, co-authored with Wes Fulton.
18. "New Weibull Analysis Methods for Electric Utilities," 1992 INTER-RAMQ Conference.  
[\[883KB PDF, 10 pages\]](#)
19. "A Simple Method for Comparing Designs...Are Two Data Sets Significantly Different?," SAE 960544, February 1996, co-authored with Wes Fulton.
20. "Likelihood Adjustment: A Simple Method for Better Forecasting from Small Samples," presented at the 2000 RAMS Conference. co-authored with Wes Fulton.
21. "New Methods for Life Data Analysis-A Management Overview" Seven case studies showing the latest methods and applications in a PowerPoint presentation emphasizing the benefits of this analysis, designed for group presentations to managers and engineers, plus how-to-do-the-case-studies, step-by-step, in a "Word" document. This material compliments the video above (Item 13) so they are packaged together on one CD.

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For comments or additions to Dr. Bob's biography, [contact Paul Barringer](#).