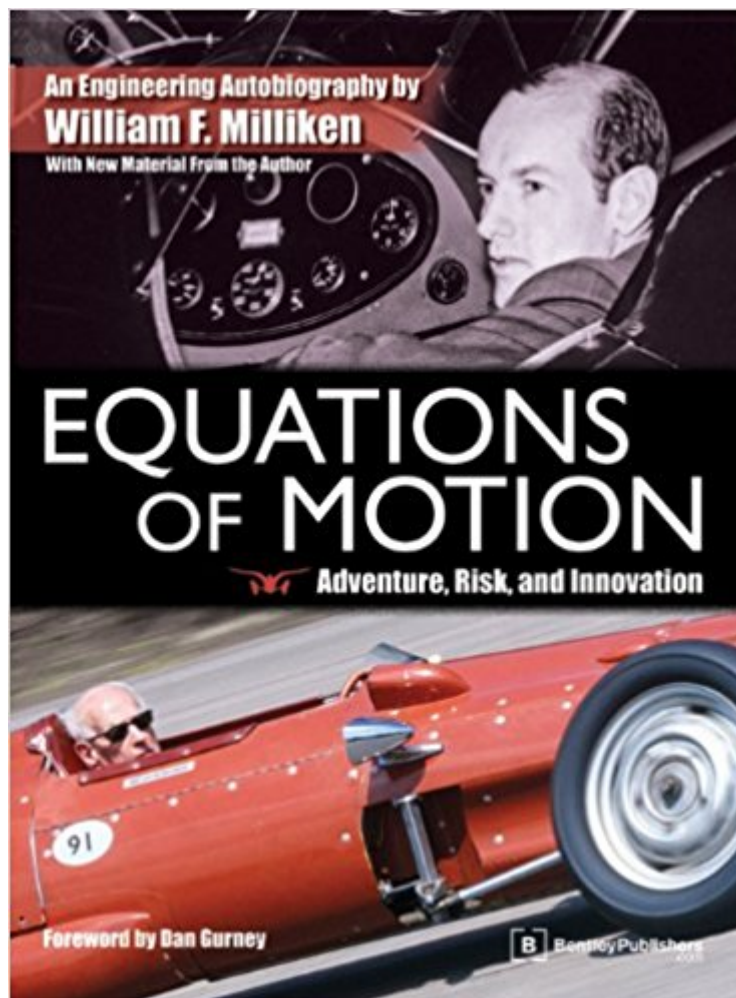




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# Equations Of Motion: Adventure, Risk And Innovation - An Engineering Autobiography



## Synopsis

William F. Milliken's handling research is fundamental to modern automobile design, and his definitive books on vehicle dynamics provide engineers and racers with practical understanding of chassis design for maximum performance. *Equations of Motion* is the story of Milliken's lifetime of experimentation and innovation in vehicle stability and control. In *Equations of Motion: Adventure, Risk and Innovation*, Milliken vividly recounts his experiences pushing airplanes and race cars beyond their limits. His exciting life provides singular, real-world insight into the challenge and joy of engineering and the history of vehicle dynamics as he created it in the air and on the track. Bill Milliken's acclaimed engineering autobiography is now available as a lower-priced paperback containing new material written exclusively for this edition.

## Book Information

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## Customer Reviews

"&#x85; as riveting as it informative &#x85; someone who was willing to challenge convention and make some needed changes." -- SCCA Sports Car Magazine, September 2006  
A wonderfully entertaining book . . . he recounts challenges and joys in the air and on the ground. -- General Aviation News  
Book of the month . . . A must for all car and aircraft enthusiasts. -- Classic & Sports Car  
Equations of Motion is both a revealing personal memoir and a repository of insightful and expert musings on the essence and findings of research into the dynamics of ground and air vehicles. -- Winding Road  
Whatever your leanings, Bill's story is a delight. -- Road & Track  
--This text refers to an out of print or unavailable edition of this title.

"Sometimes in life you meet a person and for unknown reasons you feel an immediate connection  
&#x85; That happened to me when I first met Bill Milliken almost 50 years ago &#x85; " "&#x85;  
wonderfully entertaining book &#x85; will enlighten generations of young inventors and trailblazers  
to come." Dan Gurney, from his Foreword --This text refers to an out of print or unavailable edition  
of this title.

To comment on this book requires some effort to understand what it actually is. The phrase  
engineering autobiography could have many meanings but in this case it should be understood  
mostly as an autobiography of an engineer. The engineering work is constantly in play because for  
a person like Bill Milliken, that is what he was. However, don't expect a version of his analytical  
texts. Rather this work recounts what it felt like to participate in the engineering life he led. Milliken is  
quite frank and open about the fact that an engineering career rarely progresses in a straight line  
and there are ups and downs often beyond the control of the individual but sometimes as a result of  
decisions and actions taken with the best of intents. The book is divided into six sections. The first is  
the requisite early life up to the time of his college education, which illustrates his relentless drive to  
make things work and his reckless approach to his personal safety. The second section, quite  
interesting to me, covers his education at the University of Maine and MIT and his first industry  
jobs. It does a good job of indicating at what level of physical and mathematical sophistication  
aeronautical engineering was being taught at the elite university level. The third section covers the  
wartime engineering effort, primarily at Boeing. This section ends with the XB29 tragedy and  
Milliken's difficult role in the events leading up to it. The fourth section covers the transition in his  
career from general development engineering to focus on the analytical basis of stability and control  
which is clearly explained without significant mathematical exposition. In many ways this section  
shows the setting of the trajectory of the rest of Milliken's professional life covering questions of  
stability and control on aircraft and automobiles. In the fifth section there is a long description of his  
involvement in amateur auto racing from 1947 to 1956 which could for some be the high point of this  
book and for others a tiresome and overly lengthy indulgence. The last section covers the  
application of stability and control theory originally developed for aircraft into the automotive realm,  
all based on the fundamental solution of Newtons' equations of motion on all six axes. Again, the  
description is as clear as it can be without introduction of the mathematics used in his texts. In this  
section is described his long time fascination with the possibilities of high negative camber  
suspensions. There follows a set of appendices that are really addendums to the text. All in all, if you

want to know what kind of life a deeply committed and hard working engineer might have with a bit of luck and a love of people, which shines through all the pages, this can give you a clue. Bill Milliken had an exceptionally long and productive life which was to the benefit of society and, it would seem, to the pleasure of those in his company. What a good thing to read.

What an amazing life, his recollection of obscure details from more than seventy years previous is incredible. Sometimes a bit too much detail but it is all great reading. That one man could have been at the center of so many technological breakthroughs is mind boggling. Real boys own adventure stuff!

From the authors of the best racing car bible there is, this book provide smroe technical insights and interesting historical anecdotes. This book is a must have for techno-historical racing junkies.

The book is a wealth of information about Bill's life. The photos are good, and probably a number of ones never published. I was on a pit crew for him in 1958. He was truly remarkable then, and, as the book, says, still is remarkable. A must for the aviation and sports car buff.

This book is maybe twice as long as it need be. There is too much material on the authors early life which has little or nothing to do with the main idea. A bit full of himself here and there. I am sorry that I purchsed this book and while I will read it though it is about half of it a waste of time.

A disappointment. I expected a lot of engineering. Instead, it's a too-long account of a lot of childhood pranks. Etc.

Equations of Motion, Adventure, Risk and Innovation, An Engineering Autobiography by William F Milliken When the first edition of Equations of Motion was released in 2006, I wrote in a published review that it was unequivocally "the most interesting and well-written of the 50-some-odd books that I'd read during all of that year." Now, with the publication of the 2nd edition, this time in softcover, you get more for less. This is a true second edition, not merely a reprint of the first, with 12 additional pages and five more photos. That's the more. The "for less" part is, while the first edition was hardbound and cost \$59.95, this second edition (remember, more pages, more photos, plus a few extras and some corrections too) retails for \$44.95. Those additional pages bring Milliken's life story up to date as they relate his accepting Lord March's invitation to bring his MX-1 camber car

across the pond and run it at Goodwood in 2007. (The camber car is shown on the cover of the book. Look closely at that tire. The wheel set-up is that radical--it, all four wheels, are indeed running on their inside edges.) And run it he did, twice each day for three days--each day exceeding 100 mph over the course (for those unfamiliar with the it, Goodwood is a hillclimb event) and pulling in excess of 1g. Mind you, Bill Milliken was born in April 1911 (you do the math). Those who knew Bill Milliken during his childhood wouldn't be surprised at all that he would achieve. Consider he helped build and was driving his first car before he entered his teens--a non-powered (soap-box derby-type) Miller look-alike. Barely a teen, at 13 he built and flew his first two flyers, gliders both--but, assuredly there's not much better way to really internalize the basic principles of flight. And the next year, he got into motorcycles buying no less than a 1914 Excelsior. And so it went until 1928, at the ripe old age of 17 Bill designed and began to build his first powered airplane. That entire adventure is recounted in the chapter titled "Designed, Built, Flew and Crashed." By the time the crashed part took place Bill was already well on with his higher education that would eventually net him his engineering degree from the Massachusetts Institute of Technology. Nineteen thirty-six found Bill working at Chance Vought responsible for stability and control. He worked on the Vindicator dive bomber, the Kingfisher, and then a series of events led to Bill going to work for Boeing. At Boeing he became involved in developing cabin pressurization systems which included test flights at altitude on a specially outfitted B-17 Flying Fortress. Not for the faint of heart or physique as is related in the chapter titled "Higher than Everest". We'll leave you to discover Milliken's other aviation pursuits and tease you with mention of just a few of those oriented around the automobile. Whether you've visited SpeedReaders.info before or are looking and reading for the first time, slide your cursor to the right and just below the calendar block you'll find Search the Reviews. Key in Olley and click search. There you'll discover one aspect of Milliken's automotive research and development involvement. Others include Pikes Peak, a Dynaflo equipped Bugatti, a car called Butterball, the four-wheel drive Miller, and that unlikely appearing camber car that goes like stink and sticks like glue. If you've ever been to Watkins Glen and driven on the streets that were part of the old, original circuit, you may have noticed a New York state-placed historic sign that identifies that corner as "Milliken's Corner"--yep, the corner has been named after Bill Milliken. You'll have to read the book to discover how that came to be. While a quick synopsis of Bill's life, adventures and achievements is all we can do here, the book tells the story in full. And tells it well. Bill's manuscript was entrusted to the incomparable, now-late, Beverly Rae Kimes. Her deft hand turned an already fascinating story into a compelling read. Bev's Editor's Note at the conclusion of the book is revealing: "I'm a Method editor...trying to 'inhabit' the person I'm working with makes for

a better edit. (Referring to My Two Lives which she co-authored)...As Renée Dreyfuss I drove Bugatti, Alfa and Delahaye racecars...(Yet, she says) I have never enjoyed being anyone more than Bill Milliken, (but) there was a lot to learn editing the estimable Mr Milliken. I'm better at math now, can fashion a bit of physics, and understand vehicle dynamics. Nowadays I find camber really sexy."What more need be said? Want the best read of your year? Get hold of a copy of Equations of Motion.Copyright 2009 Helen V Hutchings (speedreaders.info)

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