"EGGHEADS" IN DEFENSE AGAINST COMMUNISM

The quality of this space age military power and the rapidity with which we can achieve it depends fundamentally upon the kind of mind power we possess. Today, more than ever before, we need for national survival the disciplined and resourceful mind which makes possible intellectual performance of the highest order.

In my view it is a national disgrace that the term "egghead" as a synonym for intellectual excellence has become a derogatory expression. Let me tell you that it is the "eggheads" who are saving us — just as it was the "eggheads" who wrote the Constitution of the United States. It is the "eggheads" in the realm of science and technology, in industry, in statecraft, as well as in other fields, who form the first line of freedom's defense against communism.

General Bernard A. Schriever (1959, 37)

weightlessness? Where would the propellant exactly be in the propellant tank at that time? How to ensure that a gas bubble would not cover the propellant outlet thus preventing the second stage from proper ignition? Sloshing and vortexing of propellants in the tanks further complicated problems of attitude control and produced undesired loads on rocket structure.

One-and-One-Half-Stage Design

The uncertainty of the ignition of the second rocket stage under conditions of a free-fall environment (weightlessness) led to the selection of a conservative "one-and-one-half-stage" design for the Atlas. All Atlas's three engines started simultaneously at liftoff. Two side booster engines were jettisoned after two minutes of powered flight, while the third sustainer engine continued acceleration of the vehicle with the entire propellant tanks until the engine cut off. Interestingly, the concept of the first Soviet ICBM R-7 (SS-6) would be somewhat similar, with four side boosters.

Rocketdyne's Engines

As with any complex technological system, the performance characteristics of the Atlas power plant improved as the development progressed. The first development test vehicles, Atlas A, B, and C, used the MA-1 engine system consisting of the two XLR43-NA-3 booster engines and XLR43-NA-5 sustainer engine. The Atlas D, the first deployed ICBM, had the MA-2 engine system (LR-89-NA-3 boosters and LR105-NA-5 sustainer). The MA-3 system for the Atlas E and F ICBMs followed. The MA-5 system was a version of the MA-2 used for space launches. Thrust and specific impulse of the Atlas engines steadily progressed as shown in the following table:

Engine system	Sustainer (S) Booster (B)	Thrust, lbf (total)	Specific impulse, s
MA-1 (Atlas A,B,C)	S	54,000	210
MA-2 (Atlas D)	S	57,000	213
MA-3 (Atlas F,E)	S	57,000	214
MA-5 (launchers)	S	60,000	220
MA-1 (Atlas A,B,C)	B	300,000	245
MA-2 (Atlas D)	B	309,000	248
MA-3 (Atlas F,E)	B	330,000	250
MA-5 (launchers)	B	377,000	259

M. Gruntman, *Blazing the Trail. The Early History of Spacecraft and Rocketry*, AIAA, Reston, Va., 2004. Page 236

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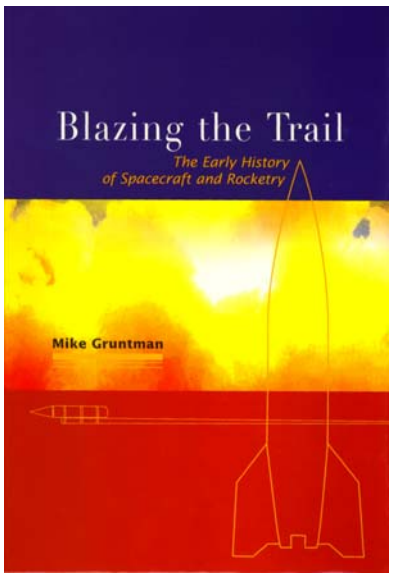
Blazing the Trail

The Early History of Spacecraft and Rocketry

Mike Gruntman

AIAA, Reston, Va., 2004
ISBN 156347705X; 978-1563477058

505 pages with 340 figures
Index: 2750+ entries, including 650 individuals



This book presents the fascinating story of the events that paved the way to space. It introduces the reader to the history of early rocketry and the subsequent developments which led into the space age. People of various nations and from various lands contributed to the breakthrough to space, and the book takes the reader to far away places on five continents.

This world-encompassing view of the realization of the space age reflects the author's truly unique personal experience, a life journey from a child growing on the Tyuratam launch base in the 1950s and early 1960s, to an accomplished space physicist and engineer to the founding director of a major U.S. nationally recognized program in space engineering in the heart of the American space industry.

Most publications on the topic either target narrow aspects of rocket and spacecraft history or are popular books that scratch the surface, with minimal and sometimes inaccurate technical details.

This book bridges the gap. It is a one-stop source of numerous technical details usually unavailable in popular publications. The details are not overbearing and anyone interested in rocketry and space exploration will navigate through the book without difficulty. The book also includes many quotes to give readers a flavor of how the participants viewed the developments. There are 340 figures and photographs, many appearing for the first time.

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Book details (including **index** and **reviews**) at: **http://astronauticsnow.com/blazingthetrail/**

About the author. Dr. Mike Gruntman is professor of astronautics at the University of Southern California. Accomplished physicist, Mike is actively involved in research and development programs in space science and space technology. He has authored and co-authored nearly 300 publications, including 4 books.

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