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M-1 Injector Development

Springer

Long before the NASA was the throes of planning for the Apollo voyages to the Moon, many people had seen the need for a vehicle that could access space routinely. The idea of a reusable space shuttle dates

at least to the theoretical rocketplane studies of the 1930s, but by the 1950s it had become an integral part of a master plan for space exploration. The goal of efficient access to space in a heavy-lift booster prompted NASA's commitment to the space shuttle as the vehicle to continue human space flight. By the mid-1960s, NASA engineers concluded that the necessary technology was within reach to enable the creation of a reusable winged space vehicle that could haul scientific and applications satellites of all types into orbit for all users. President Richard M. Nixon approved the effort to build the shuttle in 1972 and the first orbital flight took place in 1981. Although the development program was risky, a talented group of scientists and engineers worked to create this unique space vehicle and their efforts were largely successful. Since 1981, the various orbiters -Atlantis, Columbia, Discovery, Endeavour, and Challenger (lost in 1986 during the only Space Shuttle accident)- have made early 100 flights into space. Through 1998, the space shuttle has carried more than 800 major scientific and technological payloads into orbit and its astronaut crews have conducted more than 50 extravehicular activities, including repairing satellites and the initial building of the International Space Station. The shuttle remains the only vehicle in the world with the dual ability to deliver and return large payloads to and from orbit, and is also the world's most reliable launch system. The design, now almost three decades old, is

still state-of-the-art in many areas, including computerized flight control, airframe design, electrical power systems, thermal protection system, and main engines. This significant new study of the decision to build the space shuttle explains the shuttle's origin and early development. In addition to internal NASA discussions, this work details the debates in the late 1960s and early 1970s among policymakers in Congress, the Air Force, and the Office of Management and Budget over the roles and technical designs of the shuttle. Examining the interplay of these organizations with sometimes conflicting goals, the author not only explains how the world's premier space launch vehicle came into being, but also how politics can interact with science, technology, national security, and economics in national government.

Saturn CRC Press

The incredible story of spaceflight before the establishment of NASA. NASA's history is a familiar story, one that typically peaks with Neil Armstrong taking his small step on the Moon in 1969. But America's space agency wasn't created in a vacuum. It was assembled from pre-existing parts, drawing together some of the best minds the non-Soviet world had to offer. In the 1930s, rockets were all the rage in Germany, the focus both of scientists hoping to fly into space and of the German armed forces, looking to circumvent the restrictions of the Treaty of Versailles. One of the key figures in this period was Wernher von Braun, an engineer who designed the rockets that became the devastating V-2. As the war came to its chaotic conclusion,

von Braun escaped from the ruins of Nazi Germany, and was taken to America where he began developing missiles for the US Army. Meanwhile, the US Air Force was looking ahead to a time when men would fly in space, and test pilots like Neil Armstrong were flying cutting-edge, rocket-powered aircraft in the thin upper atmosphere. Breaking the Chains of Gravity tells the story of America's nascent space program, its scientific advances, its personalities and the rivalries it caused between the various arms of the US military. At this point getting a man in space became a national imperative, leading to the creation of the National Aeronautics and Space Administration, otherwise known as NASA.

The Smell of Kerosene www.Militarybookshop.CompanyUK

Stung by the pioneering space successes of the Soviet Union - in particular, Gagarin being the first man in space, the United States gathered the best of its engineers and set itself the goal of reaching the Moon within a decade. In an expanding 2nd edition of How Apollo Flew to the Moon, David Woods tells the exciting story of how the resulting Apollo flights were conducted by following a virtual flight to the Moon and its exploration of the surface. From launch to splashdown, he hitches a ride in

the incredible spaceships that took men to another world, exploring each step of the journey and detailing the enormous range of disciplines, techniques, and procedures the Apollo crews had to master. While describing the tremendous technological accomplishment involved, he adds the human dimension by calling on the testimony of the people who were there at the time. He provides a wealth of fascinating and accessible material: the role of the powerful Saturn V, the reasoning behind trajectories, the day-to-day concerns of human and spacecraft health between two worlds, the exploration of the lunar surface and the sheer daring involved in traveling to the Moon and the mid-twentieth century. Given the tremendous success of the original edition of How Apollo Flew to the Moon, the second edition will have a new chapter on surface activities, inspired by reader's comment on Amazon.com. There will also be

additional detail in the existing chapters to incorporate all the feedback from the original edition, and will include larger illustrations.

How Apollo Flew to the Moon Hachette UK

Orbital Mechanics for Engineering Students, Second Edition, provides an introduction to the basic concepts of space mechanics. These include vector kinematics in three dimensions; Newton ' s laws of motion and gravitation; relative motion; the vector-based solution of the classical two-body problem; derivation of Kepler ' s equations; orbits in three dimensions; preliminary orbit determination; and orbital maneuvers. The book also covers relative motion and the two-impulse rendezvous problem; interplanetary mission design using patched conics; rigid-body dynamics used to characterize the attitude of a space vehicle; satellite attitude dynamics; and the characteristics and design of multi-stage launch vehicles. Each chapter begins with an outline of key concepts and concludes with problems that are based on the material covered. This text is written for undergraduates who are studying orbital

mechanics for the first time and have completed courses in physics, dynamics, and mathematics, including differential equations and applied linear algebra. Graduate students, researchers, and experienced practitioners will also find useful review materials in the book. NEW: Reorganized and improved discusions of coordinate systems, new discussion on perturbations and quarternions NEW: Increased coverage of attitude dynamics, including new Matlab algorithms and examples in chapter 10 New examples and homework problems

Taming Liquid Hydrogen

JHU Press

Thousands of workers labored at Kennedy Space Center around the clock, seven days a week, for half a year to prepare a mission for the liftoff of Apollo 11. This is the story of what went on during those hectic six months. Countdown to a Moon Launch provides an in-depth look at the carefully choreographed workflow for an Apollo mission at KSC. Using the Apollo 11 mission as an example, readers will learn what went on day by day to transform partially completed stages and crates of parts into a ready-to-fly Saturn V. Firsthand accounts of launch pad accidents, near misses, suspected sabotage, and last-minute changes to hardware are told by more than 70

NASA employees and its contractors. A companion to Rocket Ranch, it includes many diagrams and photographs, some never before published, to illustrate all aspects of the process. NASA's groundbreaking use of computers for testing and advanced management techniques are also covered in detail. This book will demystify the question of how NASA could build and launch Apollo missions using 1960s technology. You'll discover that there was no magic involved – just an abundance of discipline, willpower, and creativity.

Rocket and Spacecraft Propulsion Springer Science & Business Media

This National Association of Rocketry handbook covers designing and building your first model rocket to launching and recovery techniques, and setting up a launch area for competition.

Unsteady Combustion Allen & Unwin

Developed and expanded from the work presented at the New Energetic Materials and Propulsion Techniques for Space Exploration workshop in June 2014, this book contains new scientific results, up-to-date reviews, and inspiring perspectives in a number of areas related to the energetic aspects of chemical rocket propulsion. This collection covers the entire life of energetic materials from their conceptual formulation to practical manufacturing; it includes coverage of theoretical and experimental ballistics, performance properties, as

well as laboratory-scale and full system-scale, handling, hazards, environment, ageing, and disposal. Chemical Rocket Propulsion is a unique work, where a selection of accomplished experts from the pioneering era of space propulsion and current technologists from the most advanced international laboratories discuss the future of chemical rocket propulsion for access to, and exploration of, space. It will be of interest to both postgraduate and final-year undergraduate students in aerospace engineering, and practicing aeronautical engineers and designers, especially those with an interest in propulsion, as well as researchers in energetic materials.

Voyage DIANE Publishing

The launch of Sputnik in 1957 not only began the space age, it also showed that Soviet rockets were more powerful than American ones. Within months, the US Air Force hired Rocketdyne for a feasibility study of an engine capable of delivering at least 1 million pounds of thrust. Later, NASA ran the development of this F-1 engine in order to use it to power the first stage of the Saturn V rocket that would send Apollo missions to the Moon. It is no exaggeration to say that without the F-1 engine NASA would not have been able to achieve President Kennedy's 1961 challenge to his nation to land a man on the Moon before the decade was out.

Liquid Rocket Valve Components AIAA

(American Institute of Aeronautics & Astronautics)
On April 25, 2006, NASA's John C. Stennis Space Center hosted a series of lectures on Apollo Propulsion development. This monograph is a transcript of the event, held as part of the celebration to mark the 40th anniversary of the first rocket engine test conducted at the site then known as the Mississippi Test Facility. On April 23, 1966, engineers tested a cluster of five J-2 engines that powered the second stage of the Saturn V moon rocket.

Chemical Rocket Propulsion Apogee Books
This is the first major publication on liquid-rocket combustion devices since 1960, and includes 20 chapters prepared by world-renowned experts. Each chapter focuses on a specific aspect of liquid-propellant combustion and thrust chamber dynamics, and is incorporated into the volume in a well-organized, cohesive manner. There are contributions from nine different countriesChina, France, Germany, Italy, Japan, the Netherlands, Russia, Sweden, and the United States.

Modern Engineering for Design of Liquid-Propellant Rocket Engines Smithsonian Institution
Most lifting bodies, or "flying bathtubs" as they were called, were so ugly only an engineer could love them, and yet, what an elegant way to keep wings from burning off in supersonic

flight between earth and orbit. Working in their spare time (because they couldn't initially get official permission), Dale Reed and his team of engineers demonstrated the potential of the design that led to the Space Shuttle. Wingless Flight takes us behind the scenes with just the right blend of technical information and fascinating detail (the crash of M2-F2 found new life as the opening credit for TV's "The Six Million Dollar Man"). The flying bathtub, itself, is finding new life as the proposed escape-pod for the Space Station.

Fundamentals of Aircraft and Rocket Propulsion CreateSpace

This book puts the reader in the pilot's seat for a "day at the office" unlike any other. The Smell of Kerosene tells the dramatic story of a NASA research pilot who logged over 11,000 flight hours in more than 125 types of aircraft. Donald Mallick gives the reader fascinating first-hand description of his early naval flight training, carrier operations, and his research flying career with NASA. After transferring to the NASA Flight Research Center, Mallick became involved with projects that further pushed the boundaries of aerospace technology. These included the giant delta-winged XB-70 supersonic airplane, the wingless M2-F1 lifting body vehicle, and triple-sonic YF-12 Blackbird. Mallick also test flew the Lunar Landing Research Vehicle and helped develop techniques used in training astronauts to land on the Moon.

Shuttle, Houston Springer

Science fiction roman.

Space Stations Prentice

Hall
Exploring these early years of aviation, Joseph Corn describes the fascinating, and often bizarre, plans for the future of manned flight and brings back to life the famous and lesser-known aviators who became American heroes.
Countdown to a Moon Launch University Press of Kentucky
The original "final edition" of the Apollo 11 flight plan, restored and reprinted for the 50th Anniversary of the moon landing that took place in 1969.
Fundamentals of Rocket Propulsion Penguin
For the early history of rocketry up through the work of Dr. Robert Goddard in the early 1940s, the author referenced the history books of T.A. Heppenheimer and Frank Winter. The rest of the book is a chronicle of both the author's own memories and experiences as a member of the Rocketdyne team, as well as those of other keys members of this elite group.
Apollo 11 Flight Plan Springer Science & Business Media
Roland Miller's color photographs document the NASA, Air Force, and Army facilities across the nation that once played a crucial role in the space race.
Handbook of Model Rocketry Springer Science & Business Media
The revised edition of this practical, hands-on book discusses the launch vehicles in use today throughout the world, and includes the latest details on advanced systems being

developed, such as electric and nuclear propulsion. The author covers the fundamentals, from the basic principles of rocket propulsion and vehicle dynamics through the theory and practice of liquid and solid propellant motors, to new and future developments. He provides a serious exposition of the principles and practice of rocket propulsion, from the point of view of the user who is not an engineering specialist.

Orbital Mechanics for Engineering Students

AIAA

Book & DVD. Saturn V was the largest, most powerful rocket ever produced. Developed in the 1960s, in response to President Kennedy's call for a moon landing by the end of the decade, it rose from the drawing board to flight vehicle in record time. The rocket was masterminded by Wernher Von Braun and did not fail in any of its flights. The story of the moon missions is well known with many books and films on the subject. Little has been written on the Saturn V rocket and next to nothing on the development, manufacturing and testing of the rocket stages. In this book, for the first time ever, the detailed story of the history of each Saturn V stage is presented. This includes the 45 flight stages built and all of the various test stages. Most of the stages ended up being launched. Some are in museums, some were destroyed on the ground and some are so obscure they are detailed for the

first time in this book. The book traces each stage from the start of manufacturing, through assembly, testing, static firing and transport to the Kennedy Space Center. Facilities across the US were used to manufacture and test the hardware at a pace demanded by the Kennedy pronouncement. Engines were built by Rocketdyne and the rocket stages by Boeing, North American Aviation and the Douglas Company. Testing took place in Santa Susana, Sacramento, Mississippi and other facilities around the country. There were many problems along the way and all are covered in a detail never published before. Stages blew up, materials disintegrated, engines exploded. The development of the F1 and J2 rocket engines is covered as well as details of all the major manufacturing and testing facilities. Throughout, unprecedented details of dates, times, events and parameters are presented. Other unique aspects include: Details of the history of each and every engine on each stage including a log of engine allocation; Details of the transportation of each stage and engine by various means such as truck, barge, boat, super Guppy aircraft including a unique log of these trips; Details of every firing including timelines, test stands, problems, performance details plus logs of each firing on each stage. To supplement the book many photographs

that have never been published before have been obtained and appear for the first time. The location of the remaining hardware is identified with photographs of the museum pieces. Research for the book has taken over two years and included unique access to all the major facilities and NASA history offices and libraries. Information has been obtained from Saturn veterans and also through the Freedom of Information Act. In summary this book has the first ever comprehensive presentation of the complete Saturn stage and engines activities from the early 1960s to the conclusion of the program in the mid 1970s. The bonus DVD includes rare Saturn V construction film footage.

The Saturn V F-1 Engine

AIAA

Taking advantage of the Soviet archives, which were opened in the 1990s, Siddiqi has written a groundbreaking work that examines why the Soviet Union fell behind in the space race of the 1960s after changing the course of human history with the first artificial satellite launch, Sputnik, in 1957.