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KEY=A - SUTTON CARLSON

How Apollo Flew to the Moon *Springer Science & Business Media* **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. The First Men on the Moon The Story of Apollo 11**

Springer Science & Business Media **This book tells the story of Apollo 11 and dispels the myth that NASA faked the moon landings. The story is brought to life by exploiting the flight plan, mission report, in-flight transcripts (including conversations among the crew in the spacecraft that were not transmitted) and post-flight debriefing. It features scans recently produced by NASA of the original Hasselblad film. The final chapters discuss what was learned of the moon rocks, and reviews the follow-on missions. The author's impressive expertise and knowledge of the Moon landings shines through and seamlessly unites the myriad details of the mission. China in Space The Great Leap Forward** *Springer Nature* **In 2019, China astonished the world by landing a spacecraft and rover on the far side of the Moon, something never achieved by any country before. China had already become the world's leading spacefaring nation by rockets launched, sending more into orbit than any other. China is now a great space superpower alongside the United States and Russia, sending men and women into orbit, building a space laboratory (Tiangong) and sending probes to the Moon and asteroids. Roadmap 2050 promises that China will set up bases on the Moon and Mars and lead the world in science and technology by mid-century. China's space programme is one of the least well-known, but this book will bring the reader up to date with its mysteries, achievements and exciting plans. China has built a fleet of new, powerful Long March rockets, four launch bases, tracking stations at home and abroad, with gleaming new design and production facilities. China is poised to build a large, permanent space station, bring back lunar rocks, assemble constellations of communications satellites and send spaceships to Mars, the moons of Jupiter and beyond. A self-sustaining lunar base, Yuegong, has already been simulated. In space, China is the country to watch. US Spacesuits** *Springer Science & Business Media* *** the most accurate and comprehensive work on U.S. spacesuits ever published. *A unique insight into the development of US spacesuits through to the present day. * Presents in context the authors' unique collection of 172 black and white photographs. * Explains why spacesuits are a last refuge for astronauts for survival. * Details many technically and historically interesting developments, but which never achieved fruition. Gemini 4 An Astronaut Steps into the Void** *Springer* **The flight of Gemini 4 in June 1965 was conducted barely four years after the first Americans flew in space. It was a bold step by NASA to accomplish the first American spacewalk and to extend the U.S. flight duration record to four days. This would be double the experience gained from the six Mercury missions combined. This daring mission was the first to be directed from the new Mission Control at the Manned Spacecraft Center near Houston, Texas. It also revealed that: Working outside the spacecraft would require further study. Developing the techniques to rendezvous with another object in space would not be as straightforward as NASA had hoped. Living in a small spacecraft for several days was a challenging but necessary step in the quest for even longer flights. Despite the risks, the gamble that astronauts Jim McDivitt and Ed**

White undertook paid off. Gemini 4 gave NASA the confidence to attempt an even longer flight the next time. That next mission would simulate the planned eight-day duration of an Apollo lunar voyage. Its story is recounted in the next title in this series: Gemini 5: Eight Days in Space or Bust. Emerging Space Powers The New Space Programs of Asia, the Middle East and South-America *Springer Science & Business Media* **This work introduces the important emerging space powers of the world. Brian Harvey describes the origins of the Japanese space program, from rocket designs based on WW II German U-boats to tiny solid fuel 'pencil' rockets, which led to the launch of the first Japanese satellite in 1970. The next two chapters relate how Japan expanded its space program, developing small satellites into astronomical observatories and sending missions to the Moon, Mars, comet Halley, and asteroids. Chapter 4 describes how India's Vikram Sarabhai developed a sounding rocket program in the 1960s. The following chapter describes the expansion of the Indian space program. Chapter 6 relates how the Indian space program is looking ahead to the success of the moon probe Chandrayan, due to launch in 2008, and its first manned launching in 2014. Chapters 7, 8, and 9 demonstrate how, in Iran, communications and remote sensing drive space technology. Chapter 10 outlines Brazil's road to space, begun in the mid-1960's with the launch of the Sonda sounding rockets. The following two chapters describe Brazil's satellites and space launch systems and plans for the future. Chapters 13 and 14 study Israel's space industry. The next chapters look at the burgeoning space programs of North and South Korea. The book ends by contrasting and comparing all the space programs and speculating how they may evolve in the future. An appendix lists all launches and launch attempts to date of the emerging space powers. How Apollo Flew to the Moon** *Springer* **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. The Artemis Lunar Program Returning People to the Moon *Springer Nature* **This book describes the future of the Artemis Lunar Program from the years 2017 to about 2030. Despite the uncertainty of the times and the present state of space exploration, it is likely that what is presented in this book will actually happen, to one degree or another. As history has taught us, predictions are often difficult, but one can see enough into the future to be somewhat accurate. As the Bible says, "Wesee thru the glass, but darkly." All of the elements of the proposed program are described from several perspectives: NASA's, the commercial space industry and our International partners. Also included are descriptions of the many vehicles, habitats, landers, payloads and experiments. The book tells the story of the buildup of a very small space station in a strange new lunar orbit and the descent of payloads and humans, including the first women and next man, to the lunar surface with the intent to evolve a sustained presence over time. The Apollo Guidance Computer Architecture and Operation** *Springer Science & Business Media* **The technological marvel that facilitated the Apollo missions to the Moon was the on-board computer. In the 1960s most computers filled an entire room, but the spacecraft's computer was required to be compact and low power. Although people today find it difficult to accept that it was possible to control a spacecraft using such a 'primitive' computer, it nevertheless had capabilities that are advanced even by today's standards. This is the first book to fully describe the Apollo guidance computer's architecture, instruction format and programs used by the astronauts. As a comprehensive account, it will span the disciplines of computer science, electrical and aerospace engineering. However, it will also be accessible to the 'space enthusiast'. In short, the intention is for this to be the definitive account of the Apollo guidance computer. Frank O'Brien's interest in the Apollo program began as a serious amateur historian. About 12 years ago, he began performing research and writing essays for the Apollo Lunar Surface Journal, and the Apollo Flight Journal. Much of this work centered on his primary interests, the Apollo Guidance Computer (AGC) and the Lunar Module. These Journals are generally considered the canonical online reference on the flights to the Moon. He was then asked to assist the curatorial staff in the creation of the Cradle of Aviation Museum, on Long Island, New York, where he helped prepare the Lunar Module simulator, a LM procedure trainer and an Apollo space suit for display. He regularly lectures on the Apollo computer and related topics to diverse groups, from NASA's computer engineering conferences, the IEEE/ACM, computer festivals and university student groups. The Saturn V F-1 Engine Powering Apollo into History** *Springer* **When the mighty Rocketdyne F-1 engine was conceived in the late 1950s for the U.S. Air Force, it had no defined mission and there was no launch vehicle it could power. It was a bold concept to push the technological envelope of rocket**

propulsion in order to put massive payloads into Earth orbit. Few realized at the time that the F-1 would one day propel American astronauts to the Moon. In The Saturn V F-1 Engine, Anthony Young tells the amazing story of unbridled vision, bold engineering, explosive failures during testing, unrelenting persistence to find solutions, and ultimate success in launching the Saturn V with a 100 percent success rate. The book contains personal interviews with many Rocketdyne and NASA personnel involved in the engine's design, development, testing and production; is lavishly illustrated with black-and-white and color photographs, many never previously published is the first complete history of the most powerful rocket engine ever built. The F-1 engine remains the high point in U.S. liquid rocket propulsion – it represents a period in American history when nothing was impossible. Gemini Flies! Unmanned Flights and the First Manned Mission *Springer* **In May 1961, President John F. Kennedy committed the United States to landing a man on the moon before the end of the decade. With just a handful of years to pull it off, NASA authorized the Project Gemini space program, which gathered vital knowledge needed to achieve the nation's goal. This book introduces the crucial three-step test program employed by the Gemini system, covering: The short unmanned orbital flight of Gemini 1 that tested the compatibility of launch vehicle, spacecraft and ground systems. The unmanned suborbital flight of Gemini 2 to establish the integrity of the reentry system and protective heat shield. The three-orbit manned evaluation flight of Gemini 3, christened 'Molly Brown' by her crew. A mission recalled orbit by orbit, using mission transcripts, post-flight reports and the astronauts' own account of their historic journey. The missions of Project Gemini was the pivotal steppingstone between Project Mercury and the Apollo Program. Following the success of its first two unmanned missions and the exploits of Gus Grissom and John Young on Gemini 3, NASA gained the confidence to plan an even bolder step on its next mission, as described in the next book in this series on Gemini 4. Countdown to a Moon Launch Preparing Apollo for Its Historic Journey** *Springer* **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. Spies in the Sky Surveillance Satellites in War and Peace *Springer Science & Business Media* **Reviews the history of the military's use of satellites since the flight of Sputnik 1, discusses lesser-known nuclear powers such as the United Kingdom and France, and argues for nuclear non-proliferation. Selecting the Mercury Seven The Search for America's First Astronauts** *Springer Science & Business Media* **The names of the seven Mercury astronauts were announced in April 1959 amid a flurry of publicity and patriotism. This work provides biographical details of all thirty-two finalists for the seven coveted places as America's pioneering astronauts. All of the candidates were among the nation's elite pilots involved in testing new supersonic aircraft capabilities. Most had served as wartime fighter and bomber pilots; some were test pilots on top secret and sophisticated aviation projects, while others were fleet admirals, prisoners of war, and proposed pilots for spaceflight programs such as the Dyna-Soar (X-20). The names of all 32 finalists have been kept secret until very recently. "Selecting the Mercury Seven" also relates the history and difficulties behind the initial choice of candidates. The lives, motivations, military careers, and achievements of the unsuccessful twenty-five finalists are explored first in fully authorized biographies. Test pilots for the U.S. Navy, Air Force, and Marine Corps, each man has a fascinating and very different story to tell. All thirty-two men had to endure meticulous, demeaning, and brutal week-long medical examinations at the Lovelace Clinic in New Mexico. This was followed by another torturous week at the Wright Aeromedical Laboratory in Ohio, where they were subjected to extreme fitness and physiological testing, the sole purpose of which was to sort out the Supermen from the near-supermen. The final part of the book examines the accomplishments and spaceflights of the seven successful candidates, bringing their amazing stories right up to date. Rocket Ranch The Nuts and Bolts of the Apollo Moon Program at Kennedy Space Center** *Springer* **Jonathan Ward takes the reader deep into the facilities at Kennedy Space Center to describe NASA's first computer systems used for spacecraft and rocket checkout and explain how tests and launches proceeded. Descriptions of early operations include a harrowing account of the heroic efforts of pad workers during the Apollo 1 fire. A companion to the author's book Countdown to a Moon Launch: Preparing Apollo for Its Historic Journey, this explores every facet of the facilities that served as the base for the Apollo/Saturn missions. Hundreds of illustrations complement the firsthand accounts of more than 70 Apollo program managers and engineers. The era of the Apollo/Saturn missions was perhaps the most exciting period in American space exploration history. Cape Canaveral and Kennedy Space Center were buzzing with activity. Thousands of workers came to town to build the facilities and launch the missions needed to put an American on the Moon before the end of the decade. Work at KSC involved much more than just launching rockets. It was a place like none other on Earth. Technicians**

performed intricate operations, and hazards abounded everywhere, including lightning, fire, highly-toxic fuels, snakes, heat, explosives, LOX spills, and even plutonium. The reward for months of 7-day workweeks under intense pressure was witnessing a Saturn V at liftoff. For anyone who ever wished they had worked at Kennedy Space Center during the Apollo era, this book is the next best thing. The only thing missing is the smell of rocket fuel in the morning. The Moon Resources, Future Development and Settlement *Springer Science & Business Media* **This extraordinary book details how the Moon could be used as a springboard for Solar System exploration. It presents a realistic plan for placing and servicing telescopes on the Moon, and highlights the use of the Moon as a base for an early warning system from which to combat threats of near-Earth objects. A realistic vision of human development and settlement of the Moon over the next one hundred years is presented, and the author explains how global living standards for the Earth can be enhanced through the use of lunar-based generated solar power. From that beginning, the people of the Earth would evolve into a spacefaring civilisation. The International Space Station Building for the Future** *Springer Science & Business Media* **A comprehensive, highly readable account of complex, technical, political and human endeavor and a worthy successor to Creating the International Space Station (Springer Praxis, January 2002) by David Harland and John Catchpole. This volume details for the first time the construction and occupation of the International Space Station from 2002 through to 2008, when it should reach American “Core Complete”. Rocket Ranch The Nuts and Bolts of the Apollo Moon Program at Kennedy Space Center** *Springer* **Jonathan Ward takes the reader deep into the facilities at Kennedy Space Center to describe NASA’s first computer systems used for spacecraft and rocket checkout and explain how tests and launches proceeded. Descriptions of early operations include a harrowing account of the heroic efforts of pad workers during the Apollo 1 fire. A companion to the author’s book Countdown to a Moon Launch: Preparing Apollo for Its Historic Journey, this explores every facet of the facilities that served as the base for the Apollo/Saturn missions. Hundreds of illustrations complement the firsthand accounts of more than 70 Apollo program managers and engineers. The era of the Apollo/Saturn missions was perhaps the most exciting period in American space exploration history. Cape Canaveral and Kennedy Space Center were buzzing with activity. Thousands of workers came to town to build the facilities and launch the missions needed to put an American on the Moon before the end of the decade. Work at KSC involved much more than just launching rockets. It was a place like none other on Earth. Technicians performed intricate operations, and hazards abounded everywhere, including lightning, fire, highly-toxic fuels, snakes, heat, explosives, LOX spills, and even plutonium. The reward for months of 7-day workweeks under intense pressure was witnessing a Saturn V at liftoff. For anyone who ever wished they had worked at Kennedy Space Center during the Apollo era, this book**

is the next best thing. The only thing missing is the smell of rocket fuel in the morning. Prepare for Launch The Astronaut Training Process *Springer Science & Business Media* **Today's astronauts require many different abilities. They must not only be expert in performing flight simulations but must also be proficient in such dissimilar subjects as photography, thermodynamics, electrical repairs, flight procedures, oceanography, public affairs, and geology. In Prepare for Launch, the author introduces the technologies and myriad activities that constitute or affect astronaut training, such as the part-task trainers, emergency procedures, the fixed-based and motion-based simulators, virtual environment training, and the demands of training in the Weightless Environment Training Facility. With plans to return to the Moon and future missions to Mars, the current selection criteria and training are very different from those used for short duration mission Space Shuttle crews. Dr. Erik Seedhouse in this book focuses on how astronaut candidates are taught to cope with different needs and environments (for example, hibernation, artificial gravity, and bioethics issues) and also includes brief discussions of the astronaut application and selection process. Apollo 12 - On the Ocean of Storms** *Springer Science & Business Media* **In July 1969 the 'amiable strangers' that made up the crew of the historic Apollo 11 flight successfully achieved the first manned lunar landing. Several months later, three close friends set off on an even more challenging mission. Free of the burden of making history, the Apollo 12 astronauts were determined to really enjoy their experience while taking care of business. This is the story of their mission, told largely in their own words. Their exploits and accomplishments showed how conservative the inaugural mission had been. With its two moonwalks, deployment of the first geophysical station on the Moon, and geological sampling, Apollo 12 did what many had hoped would be achieved by the first men to land on the Moon. The Apollo 12 mission also spectacularly demonstrated the precision landing capability required for success in future lunar surface explorations. In addition to official documents, published prior to and after the mission, APOLLO 12 – ON THE OCEAN OF STORMS draws on the flight transcript and post-mission debriefing to recreate the drama. Gemini - Steps to the Moon** *Springer Science & Business Media* **In Gemini - Steps to the Moon, David Shayler, the author, tells the story of the origin and development of the programme and the spacecraft from the perspective of the engineers, flight controllers and astronauts involved. It includes chapters on flight tests, Extra Vehicular Activity (EVA), rendezvous and docking, as well as information from NASA archives and personal interviews. Apollo Mission Control The Making of a National Historic Landmark** *Springer* **This book describes the history of this now iconic room which represents America's space program during the Gemini, Apollo, Skylab, Apollo-Soyuz and early Space Shuttle eras. It is now a National Historic Landmark and is being restored to a level which represents the day the flight control teams walked out after the last lunar landing missions. The book is dedicated to the estimated 3,000 men and**

women who supported the flights and tells the story from their perspective. It describes the rooms of people supporting this control center; those rooms of engineers, analysts and scientists most people never knew about. Some called it a “shrine” and some called it a “cathedral.” Now it will be restored to its former glory and soon thousands will be able to view the place where America flew to the moon. Soviet Robots in the Solar System Mission Technologies and Discoveries *Springer Science & Business Media* **Soviet Robots in the Solar System provides a history of the Soviet robotic lunar and planetary exploration program from its inception, with the attempted launch of a lunar impactor on September 23, 1958, to the last launch in the Russian national scientific space program in the 20th Century, Mars 96, on November 16, 1996. This title makes a unique contribution to understanding the scientific and engineering accomplishments of the Soviet Union’s robotic space exploration enterprise from its infancy to its demise with the collapse of the Soviet Union. The authors provide a comprehensive account of Soviet robotic exploration of the Solar System for both popular space enthusiasts and professionals in the field. Technical details and science results are provided and put into an historical and political perspective in a single volume for the first time. The book is divided into two parts. Part I describes the key players and the key institutions that build and operate the hardware, the rockets that provide access to space, and the spacecraft that carry out the enterprise. Part II is about putting these pieces together to enable space flight and mission campaigns. Part II is written in chronological order beginning with the first launches to the Moon. Each chapter covers a particular period when specific mission campaigns were undertaken during celestially-determined launch windows. Each chapter begins with a short overview of the flight missions that occurred during the time period and the political and historical context for the flight mission campaigns, including what the Americans were doing at the time. The bulk of each chapter is devoted to the scientific and engineering details of that flight campaign. The spacecraft and payloads are examined with as much technical detail as is available today, the progress is described, and a synopsis of the scientific result is given. Russian Planetary Exploration History, Development, Legacy and Prospects** *Springer Science & Business Media* **Illustrated with photographs from Soviet Venus and Mars probes, images of spacecraft, diagrams of flight paths and maps of landing sites, this book draws on published scientific papers, archives, memoirs and other material. The text reviews Soviet engineering techniques and science packages, as well the difficulties which ruined several missions. The program’s scientific and engineering legacy is also addressed, within the Soviet space effort as a whole. Soyuz A Universal Spacecraft** *Springer Science & Business Media* **Rex Hall and Dave Shayler provide a unique history of the Soyuz spacecraft programme from conception, through development to its use, detailed in the only English language book available on this topic. Planned for publication in 2003, it will celebrate 40 years since the original**

concept of the Soyuz craft. Moon Bound Choosing and Preparing NASA's Lunar Astronauts *Springer* **Often lost in the shadow of the first group of astronauts for the Mercury missions, the second and third groups included the leading figures for NASA's activities for the following two decades. “Moon Bound” complements the author’s recently published work, “Selecting the Mercury Seven” (2011), extending the story of the men who helped to launch human spaceflight and broaden the American space program. Although the initial 1959 group became known as the legendary pioneering Mercury astronauts, the astronauts of Groups 2 and 3 gave us many household names. Sixteen astronauts from both groups traveled to the Moon in Project Apollo, with several actually walking on the Moon, one of them being Neil Armstrong. This book draws on interviews to tell the astronauts' personal stories and recreate the drama of that time. It describes the process by which they were selected as astronauts and explains how the criteria had changed since the first group. “Moon Bound” is divided into two parts, recounting the biographies relating to the nine astronauts from NASA’s Group 2 in the first part, and the fourteen finalists in Group 3 in the second part. The stories of both selection groups are narrated through the experiences of four finalists with interesting backgrounds. One of these men is Al Rupp of the USAF who, as a West Point cadet, cheekily helped to steal the Navy mascot goat prior to the annual Army versus Navy game in 1953, thus achieving legendary status in the game’s history. Rupp was killed in a plane crash just two years after being named as a finalist for Group 3. The service career of naval aviator John Yamnicky was also very much the equal of other finalists, but he was killed on September 11, 2001, as he was a passenger on hijacked Flight 77, which was flown into the Pentagon. At the end of the work there are several chapters on how these candidates were prepped for their missions. Rocket and Spacecraft Propulsion Principles, Practice and New Developments** *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. The Soyuz Launch Vehicle The Two Lives of an Engineering Triumph** *Springer Science & Business Media* **“The Soyuz Launch Vehicle” tells the story, for the first time in a single English-language book, of the extremely successful Soyuz launch vehicle. Built as the world’s first intercontinental ballistic missile (ICBM), Soyuz was adapted to launch not only Sputnik but also the first man to orbit Earth, and has been in service for over fifty years in a variety of forms. It has launched all Soviet manned spacecraft and is now the only means of reaching the International Space Station. It was also the**

workhorse for launching satellites and space probes and has recently been given a second life in French Guiana, fulfilling a commercial role in a joint venture with France. No other launch vehicle has had such a long and illustrious history. This remarkable book gives a complete and accurate description of the two lives of Soyuz, chronicling the recent cooperative space endeavors of Europe and Russia. The book is presented in two parts: Christian Lardier chronicles the “first life” in Russia while Stefan Barensky explores its “second life,” covering Starsem, the Franco-Russian company and implementation of technology for the French Guiana Space Agency by ESA. Part One has been developed from Russian sources, providing a descriptive approach to very technical issues. The second part of the book tells the contemporary story of the second life of Soyuz, gathered from Western sources and interviews with key protagonists. “The Soyuz Launch Vehicle” is a detailed description of a formidable human adventure, with its political, technical, and commercial ramifications. At a time when a new order was taking shape in the space sector, the players being the United States, Russia, Europe and Asia, and when economic difficulties sometimes made it tempting to give up, this book reminds us that in the global sector, nothing is impossible. Russian Space Probes Scientific Discoveries and Future Missions *Springer Science & Business Media* **Brian Harvey recounts for the first time the definitive history of scientific Russian space probes and the knowledge they acquired of the Earth, its environment, the Moon, Mars and Venus. He examines what Russian Space Science has actually achieved in furthering our knowledge of the Solar System, focusing on the instrumentation and scientific objectives and outcomes, the information gained and lessons learnt. Boxes and charts are used extensively in order to convey in an easily understandable manner for the non-scientific reader the problems and issues addressed and solved by Soviet space science. The book opens with the story of early space science in Russia, which started when the first Russian rockets were fired into the high atmosphere from Kapustin Yar in the late 1940s. Instruments were carried to measure and map the atmosphere and later rockets carried dogs to test their reactions to weightlessness. In order to beat America into Earth orbit, two simpler satellites than originally planned were launched, Sputnik and Sputnik 2, which provided some initial information on atmospheric density, while the following Sputnik 3 carried twelve instruments to measure radiation belts, solar radiation, the density of the atmosphere and the Earth’s magnetic field. The author recounts how, by the 1960s, the Soviet Union had developed a program of investigation of near-Earth space using satellites within the Cosmos program, in particular the DS (Dnepropetrovsky Sputnik), small satellites developed to investigate meteoroids, radiation, the magnetic fields, the upper atmosphere, solar activity, ionosphere, charged particles, cosmic rays and geophysics. Brian Harvey then gives the scientific results from Russian lunar exploration, starting with the discovery of the solar wind by the First Cosmic Ship and the initial mapping of the lunar far side by the Automatic Interplanetary**

Station. He describes Luna 10, which made the first full study of the lunar environment, Luna 16 which brought soil back to Earth and the two Moon rovers which travelled 50 kms across the lunar surface taking thousands of measurements, soil analyses and photographs, as well as profiles of discrete areas. Chapters 4 and 5 describe in detail the scientific outcomes of the missions to Venus and Mars, before considering the orbiting space stations in Chapter 6. Space science formed an important part of the early manned space program, the prime focus being the human reaction to weightlessness, how long people could stay in orbit and the effects on the body, as well as radiation exposure. Chapter 7 looks at the later stage of Soviet and Russian space science, including Astron and Granat, the two observatories of the 1980s, and Bion, the space biology program which flew monkeys and other animals into orbit. The final chapter looks forward to a new period of Russian space science with the Spektr series of observatories and a range smaller science satellites under the Federal Space Plan 2006-2015. Creating the International Space Station *Springer Science & Business Media* **As the most obvious man-made object in the night sky, clearly visible to the naked eye, the International Space Station is of interest to almost everyone. This book describes the technical aspects of its design and construction and details of its day-to-day operation. Space 2.0 Revolutionary Advances in the Space Industry** *Springer* **A true revolution has rocked the space industry, as Silicon Valley and new startup companies around the world have shaken up the status quo. This has in turn triggered a hefty response among traditional aerospace companies, launching the sector into the new Space 2.0. This book explains how and why this remarkable change has happened, starting from the industry's origins during the Space Age and working its way to the present day. No other industry in the world has experienced the dramatic shift in technology and services as rapidly as the field of satellite services and rocket launch systems has. This book analyzes the dynamic shift over the past decade in how satellites are designed, manufactured, launched, and operated. It also turns an eye to the future, discussing the amazing feats and potential issues we can expect from this shifting arena by 2030. With its beginner-friendly writing style and plethora of illustrations, this book serves as a perfect introductory text to students and professionals alike wishing to learn more about the key trends in the field of space applications and launch systems. To Orbit and Back Again How the Space Shuttle Flew in Space** *Springer Science & Business Media* **The Space Shuttle has been the dominant machine in the U.S. space program for thirty years and has generated a great deal of interest among space enthusiasts and engineers. This book enables readers to understand its technical systems in greater depth than they have been able to do so before. The author describes the structures and systems of the Space Shuttle, and then follows a typical mission, explaining how the structures and systems were used in the launch, orbital operations and the return to Earth. Details of how anomalous events were dealt with on individual missions are also provided,**

as are the recollections of those who built and flew the Shuttle. Many photographs and technical drawings illustrate how the Space Shuttle functions, avoiding the use of complicated technical jargon. The book is divided into two sections: Part 1 describes each subsystem in a technical style, supported by diagrams, technical drawings, and photographs to enable a better understanding of the concepts. Part 2 examines different flight phases, from liftoff to landing. Technical material has been obtained from NASA as well as from other forums and specialists. Author Davide Sivolella is an aerospace engineer with a life-long interest in space and is ideally qualified to interpret technical manuals for a wider audience. This book provides comprehensive coverage of the topic including the evolution of given subsystems, reviewing the different configurations, and focusing on the solutions implemented. Building Habitats on the Moon Engineering Approaches to Lunar Settlements *Springer* **Designing a habitat for the lunar surface? You will need to know more than structural engineering. There are the effects of meteoroids, radiation, and low gravity. Then there are the psychological and psychosocial aspects of living in close quarters, in a dangerous environment, far away from home. All these must be considered when the habitat is sized, materials specified, and structure designed. This book provides an overview of various concepts for lunar habitats and structural designs and characterizes the lunar environment - the technical and the nontechnical. The designs take into consideration psychological comfort, structural strength against seismic and thermal activity, as well as internal pressurization and 1/6 g. Also discussed are micrometeoroid modeling, risk and redundancy as well as probability and reliability, with an introduction to analytical tools that can be useful in modeling uncertainties. Soviet and Russian Lunar Exploration** *Springer Science & Business Media* **This book tells the story of the Soviet and Russian lunar programme, from its origins to the present-day federal Russian space programme. Brian Harvey describes the techniques devised by the USSR for lunar landing, from the LK lunar module to the LOK lunar orbiter and versions tested in Earth’s orbit. He asks whether these systems would have worked and examines how well they were tested. He concludes that political mismanagement rather than technology prevented the Soviet Union from landing cosmonauts on the moon. The book is well timed for the return to the moon by the United States and the first missions there by China and India. The Value of the Moon How to Explore, Live, and Prosper in Space Using the Moon's Resources** *Smithsonian Institution* **While the Moon was once thought to hold the key to space exploration, in recent decades, the U.S. has largely turned its sights toward Mars and other celestial bodies instead. In The Value of the Moon, lunar scientist Paul Spudis argues that the U.S. can and should return to the moon in order to remain a world leader in space utilization and development and a participant in and beneficiary of a new lunar economy. Spudis explores three reasons for returning to the Moon: it is close, it is interesting, and it is useful. The proximity of the Moon not only allows for frequent launches, but also**

control of any machinery we place there. It is interesting because recorded deep on its surface and in its craters is the preserved history of the moon, the sun, and indeed the entire galaxy. And finally, the moon is useful because it is rich with materials and energy. The moon, Spudis argues, is a logical base for further space exploration and even a possible future home for us all. Throughout his work, Spudis incorporates details about man's fascination with the moon and its place in our shared history. He also explores its religious, cultural, and scientific resonance and assesses its role in the future of spaceflight and our national security and prosperity. Space Mining and Manufacturing Off-World Resources and Revolutionary Engineering Techniques *Springer Nature* **This book produces convincing evidence that exploiting the potential of space could help solve many environmental and social issues affecting our planet, such as pollution, overcrowding, resource depletion and conflicts, economic inequality, social unrest, economic instability and unemployment. It also touches on the legal problems that will be encountered with the implementation of the new technologies and new laws that will need to be enacted and new organizations that will need to be formed to deal with these changes. This proposition for a space economy is not science fiction, but well within the remit of current or under development technologies. Numerous technologies are described and put together to form a coherent and feasible road map that, if implemented, could lead humankind towards a brighter future. Doing the Impossible George E. Mueller and the Management of NASA's Human Spaceflight Program** *Springer Science & Business Media* **Apollo was known for its engineering triumphs, but its success also came from a disciplined management style. This excellent account of one of the most important personalities in early American human spaceflight history describes for the first time how George E. Mueller, the system manager of the human spaceflight program of the 1960s, applied the SPO methodology and other special considerations such as "all-up"testing, resulting in the success of the Apollo Program. Wernher von Braun and others did not readily accept such testing or Mueller's approach to system management, but later acknowledged that without them NASA would not have landed astronauts on the Moon by 1969. While Apollo remained Mueller's priority, from his earliest days at the agency, he promoted a robust post-Apollo Program which resulted in Skylab, the Space Shuttle and the International Space Station. As a result of these efforts, Mueller earned the sobriquet: "the father of the space shuttle." Following his success at NASA, Mueller returned to industry. Although he did not play a leading role in human spaceflight again, in 2011 the National Air and Space Museum awarded him their lifetime achievement trophy for his contributions. Following the contributions of George E. Mueller, in this unique book Arthur L. Slotkin answers such questions as: exactly how did the methods developed for use in the Air Force ballistic missile programs get modified and used in the Apollo Program? How did George E. Mueller, with the help of others, manage the Apollo Program? How did NASA**

centers, coming from federal agencies with cultures of their own, adapt to the new structured approach imposed from Washington? George E. Mueller is the ideal central character for this book. He was instrumental in the creation of Apollo extension systems leading to Apollo, the Shuttle, and today's ISS and thus was a pivotal figure in early American human spaceflight history. China's Space Programme *Springer Nature* **Apocalypse When? Calculating How Long the Human Race Will Survive** *Springer Science & Business Media* **This book will be a key trailblazer in a new and upcoming field. The author's predictive approach relies on simple and intuitive probability formulations that will appeal to readers with a modest knowledge of astronomy, mathematics, and statistics. Wells' carefully erected theory stands on a sure footing and thus should serve as the basis of many rational predictions of survival in the face of not only natural disasters such as hits by asteroids or comets, but perhaps more surprisingly from man-made hazards arising from genetic engineering or robotics. Any formula for predicting human survival will invite controversy. Dr Wells counters anticipated criticism with a thorough approach in which four lines of reasoning are used to arrive at the same survival formula. One uses empirical survival statistics for business firms and stage shows. Another is based on uncertainty of risk rates. The third, more abstract, invokes Laplace's principle of insufficient reason and involves an observer's random arrival in the lifetime of the entity (the human race) in question. The fourth uses Bayesian theory. The author carefully explains and gives examples of the conditions under which his principle is valid and provides evidence that can counteract the arguments of critics who would reject it entirely. His deflection of possible criticisms results from two major premises: selecting the proper random variable and "reference class" to make predictions, and the recognition that if one does not know the law that governs a process, then the best prediction that can be made is his own formula. Interkosmos The Eastern Bloc's Early Space Program** *Springer* **This book focuses on the Interkosmos program, which was formed in 1967, marking a fundamentally new era of cooperation by socialist countries, led by the Soviet Union, in the study and exploration of space. The chapters shed light on the space program that was at that time a prime outlet for the Soviet Union's aims at becoming a world power. Interkosmos was a highly publicized Russian space program that rapidly became a significant propaganda tool for the Soviet Union in the waning years of communism. Billed as an international "research-cosmonaut" imperative, it was also a high-profile means of displaying solidarity with the nine participating Eastern bloc countries. Those countries contributed pilots who were trained in Moscow for week-long "guest" missions on orbiting Salyut stations. They did a little subsidiary science and were permitted only the most basic mechanical maneuvers. In this enthralling new book, and following extensive international research, the authors fully explore the background, accomplishments and political legacy of the Interkosmos program. Through personal and often highly revealing**

interviews with many of the participants they relate the very human story behind this extraordinary but controversial space venture..