
Get Free How We Developed The Apollo Lunar Module

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KEY=THE - MICHAELA CULLEN

MOON LANDER

HOW WE DEVELOPED THE APOLLO LUNAR MODULE

Smithsonian Institution Chief engineer Thomas J. Kelly gives a firsthand account of designing, building, testing, and flying the Apollo lunar module. It was, he writes, "an aerospace engineer's dream job of the century." Kelly's account begins with the imaginative process of sketching solutions to a host of technical challenges with an emphasis on safety, reliability, and maintainability. He catalogs numerous test failures, including propulsion-system leaks, ascent-engine instability, stress corrosion of the aluminum alloy parts, and battery problems, as well as their fixes under the ever-present constraints of budget and schedule. He also recaptures the exhilaration of hearing Apollo 11's Neil Armstrong report that "The Eagle has landed," and the pride of having inadvertently provided a vital "lifeboat" for the crew of the disabled Apollo 13.

BUILDING MOONSHIPS

THE GRUMMAN LUNAR MODULE

Arcadia Publishing Chronicling the visual history of the design, construction and launch of the lunar module - one of the most historic machines in human history. In 1961, President John F. Kennedy announced his plans for landing a man on the moon by 1970 - despite the fact that the United States had a total of just 15 minutes of spaceflight experience up to that point. With that announcement, the space race had officially begun. In 1962, after a strenuous competition, the National Aeronautics and Space Administration (NASA) announced that the Grumman Aircraft Engineering Corporation of Bethpage, Long Island, had won the contract to build the lunar module - the spacecraft that would take Americans to the moon. This was the first and only vehicle designed to take humans from one world to another. Although much

has been written about the first men to set foot on the moon, those first hesitant steps would not have been possible without the efforts of the designers and technicians assigned to Project Apollo. [Building Moonships: The Grumman Lunar Module](#) tells the story of the people who built and tested the lunar modules that were deployed on missions as well as the modules that never saw the light of day.

CHARIOTS FOR APOLLO

THE NASA HISTORY OF MANNED LUNAR SPACECRAFT TO 1969

[Courier Corporation](#) *Written by a trio of experts, this is the definitive reference on the Apollo spacecraft and lunar modules. It traces the design of the vehicles, their development, and their operation in space. More than 100 photographs and illustrations highlight the text, which begins with NASA's origins and concludes with the triumphant Apollo 11 moon mission.*

LEM LUNAR EXCURSION MODULE FAMILIARIZATION MANUAL

[Periscope Film LLC](#) *Designed by Grumman's brilliant Tom Kelly, the Apollo Lunar Excursion Module (or "LEM" for short) was a triumph of purpose-built engineering. In the six years 1962-1968 between drawing board and first flight, a myriad of challenges were overcome related to weight, reliability and safety. The final design, designated the Lunar Module or "LM," boasted tiny windows instead of large portholes, four legs instead of five and most famously had no seats instead relying on the astronauts' legs to cushion a lunar landing. Ten LMs made it into space including three flown in development and test missions, and six which landed on the Moon. A seventh famously saved the crew of Apollo 13 when that mission's Command Module suffered a catastrophic malfunction. Originally created for NASA by Grumman in 1964, this LEM Familiarization Manual provides an operational description of all subsystems and major components of the lunar lander. It includes sections about the LEM mission, spacecraft structure, operational subsystems, prelaunch operations, and ground support equipment."*

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.

DIGITAL APOLLO

HUMAN AND MACHINE IN SPACEFLIGHT

MIT Press How human pilots and automated systems worked together to achieve the ultimate in flight—the lunar landings of NASA's Apollo program. As Apollo 11's Lunar Module descended toward the moon under automatic control, a program alarm in the guidance computer's software nearly caused a mission abort. Neil Armstrong responded by switching off the automatic mode and taking direct control. He stopped monitoring the computer and began flying the spacecraft, relying on skill to land it and earning praise for a triumph of human over machine. In Digital Apollo, engineer-historian David Mindell takes this famous moment as a starting point for an exploration of the relationship between humans and computers in the Apollo program. In each of the six Apollo landings, the astronaut in command seized control from the computer and landed with his hand on the stick. Mindell recounts the story of astronauts' desire to control their spacecraft in parallel with the history of the Apollo Guidance Computer. From the early days of aviation through the birth of spaceflight, test pilots and astronauts sought to be more than “spam in a can” despite the automatic controls, digital computers, and software developed by engineers. Digital Apollo examines the design and execution of each of the six Apollo moon landings, drawing on transcripts and data telemetry from the flights, astronaut interviews, and NASA's extensive archives. Mindell's exploration of how human pilots and automated systems worked together to achieve the ultimate in flight—a lunar landing—traces and reframes the debate over the future of humans and automation in space. The results have implications for any venture in which human roles seem threatened by automated systems, whether it is the work at our desktops or the future of exploration.

LUNAR MODULE LM 10 THRU LM 14

Periscope Film LLC Originally created for NASA in 1969 by prime contractor Grumman, this Lunar Module Vehicle Familiarization Manual was mandatory reading for Apollo astronauts, contractors and NASA support staff. This version of the manual describes the so-called ELM, or Extended Lunar Modules designed for the "J" class missions Apollo 15-17 and the never-flown Apollo 18 and 19. The ELM came about as part of NASA's efforts to enhance the scientific study of the Moon and its geology. To do that, longer surface stays would be needed. To make it possible, LM 10 to LM 14 received various modifications intended to increase their payloads, and allow them to return larger samples to Earth. Over forty major changes were planned, including

enlarging the fuel and oxidizer tanks on both the ascent and descent stages, extension of the descent engine nozzle to improve its efficiency and allow it to deliver more power, and added capacity of oxygen and water. Some changes, such as adding solar cells and affiliated batteries to allow surface stays of up to 72 hours, proved too difficult given the program's schedule. In the end, the maximum duration of stays on the Moon would be limited to 54 hours. The extended LM weighed up to 36,500 pounds compared to 32,000 for earlier versions. The ELM's larger payload capacity enabled it to carry the 463 pound (mass) Lunar Roving Vehicle and other scientific equipment. The LRV greatly enhanced the astronauts' range and ability to retrieve samples. It's never been easy to find a copy of this text because copies were never made available to the general public -- until now. This reprint features all the original text and diagrams. It's a wonderful reference for the space flight fan, docent or engineering buff or for anyone else who ever wondered, ""How'd they do that!""

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.

AFTER LM

NASA LUNAR LANDER CONCEPTS BEYOND APOLLO /

HOW WE GOT TO THE MOON

THE PEOPLE, TECHNOLOGY, AND DARING FEATS OF SCIENCE BEHIND HUMANITY'S GREATEST ADVENTURE

Crown Books for Young Readers *LONGLISTED FOR THE NATIONAL BOOK AWARD • YALSA EXCELLENCE IN NONFICTION FINALIST • A ROBERT F. SIBERT HONOR BOOK*
This beautifully illustrated, oversized guide to the people and technology of the moon landing by award-winning author/illustrator John Rocco (illustrator of the Percy Jackson series) is a must-have for space fans, classrooms, and tech geeks. Everyone knows of Neil Armstrong's famous first steps on the moon. But what did it really take to get us there? The Moon landing is one of the most ambitious, thrilling, and dangerous ventures in human history. This exquisitely researched and illustrated book tells the stories of the 400,000 unsung heroes--the engineers, mathematicians, seamstresses, welders, and factory workers--and their innovations and life-changing technological leaps forward that allowed NASA to achieve this unparalleled accomplishment. From the shocking launch of the Russian satellite Sputnik to the triumphant splashdown of Apollo 11, Caldecott Honor winner John Rocco answers every possible question about this world-altering mission. Each challenging step in the space race is revealed, examined, and displayed through stunning diagrams, experiments, moments of crisis, and unforgettable human stories. Explorers of all ages will want to pore over every page in this comprehensive chronicle detailing the grandest human adventure of all time!

APOLLO BY THE NUMBERS

A STATISTICAL REFERENCE

GATEWAY TO THE MOON

BUILDING THE KENNEDY SPACE CENTER LAUNCH COMPLEX

A comprehensive history of the Kennedy Space Center uses archival illustrations, aerial views, and extensive interviews with NASA personnel to tell the story. Reprint.

SUNBURST AND LUMINARY

AN APOLLO MEMOIR

In 1966 the author, newly graduated from college, went to work for the MIT laboratory where the Apollo guidance system was designed. His assignment was to program the complex lunar landing phase in the Lunar Module's onboard computer. As Apollo 11 approaches, the author flies lunar landings in simulators and meets the astronauts who will fly the LM for real. He explains the computer alarms that almost prevented Neil Armstrong from landing and describes a narrow escape from another dangerous problem. On Apollo 14 he devises a workaround when a faulty pushbutton threatens Alan Shepard's mission, earning a NASA award, a story in Rolling Stone, and a few lines in the history books. This memoir is a new kind of book about Apollo. It tells a story never told before by an insider -- the development of the onboard software for the Apollo spacecraft. It makes a vertical connection between technical

details and historic events, but by broadening the story using his own experiences as he grows into adulthood in the 1960s the author draws a parallel between that era of successful space exploration, and the exploration, inner and outer, that was taking place in the culture.

APOLLO 11

THE INSIDE STORY

Icon Books 'Terrific and enthralling' New Scientist Fifty years ago, in July 1969, Apollo 11 became the first manned mission to land on the Moon, and Neil Armstrong the first man to step on to its surface. He and his crewmates, Buzz Aldrin and Michael Collins, were the latest men to risk their lives in this extraordinary scientific, engineering and human venture that would come to define the era. In Apollo 11: The Inside Story, David Whitehouse reveals the true drama behind the mission, putting it in the context of the wider space race and telling the story in the words of those who took part – based around exclusive interviews with the key players. This enthralling book takes us from the early rocket pioneers to the shock America received from the Soviets' launch of the first satellite, Sputnik; from the race to put the first person into space to the iconic Apollo 11 landing and beyond, to the agonising drama of the Apollo 13 disaster and the eventual winding-up of the Apollo program. Here is the story as told by the crew of Apollo 11 and the many others who shared in their monumental endeavour. Astronauts, engineers, politicians, NASA officials, Soviet rivals – all tell their own story of a great moment of human achievement.

MISSION MOON 3-D

RELIVING THE GREAT SPACE RACE

APOLLO MOON MISSIONS

THE UNSUNG HEROES

U of Nebraska Press In 1961 President John F. Kennedy challenged the United States to land a man on the moon and return him safely to Earth before the end of the decade. It seemed like an impossible mission and one that the Russians?who had launched the first satellite and put the first man into Earth orbit?would surely achieve before the Americans. However, the ingenuity, passion, and sacrifice of thousands of ordinary people from all walks of life enabled the space program to meet this extraordinary goal. This is the story of fourteen of those men and women who worked behind the scenes, without fanfare or recognition, to make the Apollo missions successful.

ACROSS THE AIRLESS WILDS

THE LUNAR ROVER AND THE TRIUMPH OF THE FINAL MOON LANDINGS

HarperCollins "THRILLING. ... Up-end[s] the Apollo narrative entirely." —The Times

(London) A "brilliantly observed" (Newsweek) and "endlessly fascinating" (WSJ) rediscovery of the final Apollo moon landings, revealing why these extraordinary yet overshadowed missions—distinguished by the use of the revolutionary lunar roving vehicle—deserve to be celebrated as the pinnacle of human adventure and exploration. One of The Wall Street Journal's 10 Best Books of the Month 8:36 P.M. EST, December 12, 1972: Apollo 17 astronauts Gene Cernan and Jack Schmitt braked to a stop alongside Nansen Crater, keenly aware that they were far, far from home. They had flown nearly a quarter-million miles to the man in the moon's left eye, landed at its edge, and then driven five miles in to this desolate, boulder-strewn landscape. As they gathered samples, they strode at the outermost edge of mankind's travels. This place, this moment, marked the extreme of exploration for a species born to wander. A few feet away sat the machine that made the achievement possible: an electric go-cart that folded like a business letter, weighed less than eighty pounds in the moon's reduced gravity, and muscled its way up mountains, around craters, and over undulating plains on America's last three ventures to the lunar surface. In the decades since, the exploits of the astronauts on those final expeditions have dimmed in the shadow cast by the first moon landing. But Apollo 11 was but a prelude to what came later: while Neil Armstrong and Buzz Aldrin trod a sliver of flat lunar desert smaller than a football field, Apollos 15, 16, and 17 each commanded a mountainous area the size of Manhattan. All told, their crews traveled fifty-six miles, and brought deep science and a far more swashbuckling style of exploration to the moon. And they triumphed for one very American reason: they drove. In this fast-moving history of the rover and the adventures it ignited, Earl Swift puts the reader alongside the men who dreamed of driving on the moon and designed and built the vehicle, troubleshooted its flaws, and drove it on the moon's surface. Finally shining a deserved spotlight on these overlooked characters and the missions they created, *Across the Airless Wilds* is a celebration of human genius, perseverance, and daring.

NASA'S MOON PROGRAM

PAVING THE WAY FOR APOLLO 11

[Springer Science & Business Media](#) In 'Paving the Way for Apollo 11' David Harland explains the lure of the Moon to classical philosophers, astronomers, and geologists, and how NASA set out to investigate the Moon in preparation for a manned lunar landing mission. It focuses particularly on the Lunar Orbiter and Surveyor missions.

CHARIOTS FOR APOLLO

THE UNTOLD STORY BEHIND THE RACE TO THE MOON

[Harper Perennial](#) Describes the design and construction of the lunar module, behind-the-scenes conflicts at NASA, and the drama of the Apollo Moon missions

JOHN HOUBOLT

THE UNSUNG HERO OF THE APOLLO MOON LANDINGS

Purdue University Press *In May 1961, President Kennedy announced that the United States would attempt to land a man on the moon and return him safely to the earth before the end of that decade. Yet NASA did not have a specific plan for how to accomplish that goal. Over the next fourteen months, NASA vigorously debated several options. At first the consensus was to send one big rocket with several astronauts to the moon, land and explore, and then take off and return the astronauts to earth in the same vehicle. Another idea involved launching several smaller Saturn V rockets into the earth orbit, where a lander would be assembled and fueled before sending the crew to the moon. But it was a small group of engineers led by John C. Houbolt who came up with the plan that propelled human beings to the moon and back—not only safely, but faster, cheaper, and more reliably. Houbolt and his colleagues called it “lunar orbit rendezvous,” or “LOR.” At first the LOR idea was ignored, then it was criticized, and then finally dismissed by many senior NASA officials. Nevertheless, the group, under Houbolt’s leadership, continued to press the LOR idea, arguing that it was the only way to get men to the moon and back by President Kennedy’s deadline. Houbolt persisted, risking his career in the face of overwhelming opposition. This is the story of how John Houbolt convinced NASA to adopt the plan that made history.*

PROJECT APOLLO: THE TOUGH DECISIONS

THE TOUGH DECISIONS

Government Printing Office *NASA SP-2005-4537. Monographs in Aerospace History Series No. 37. Presents the history of the manned space program from September 1, 1960 to January 5, 1968. Outlines chronologically and in detail the steps taken from the early Mercury days through the operation tests conducted with Gemini, to the qualification of Apollo. Describes the key technical, operational, and management milestones and how key issues in each phase of the space program were resolved*

LUNAR SOURCEBOOK

A USER'S GUIDE TO THE MOON

CUP Archive *The only work to date to collect data gathered during the American and Soviet missions in an accessible and complete reference of current scientific and technical information about the Moon.*

HERITAGE AUCTIONS SPACE EXPLORATION AUCTION CATALOG #6007

Heritage Capital Corporation

EXPLORING THE MOON

THE APOLLO EXPEDITIONS

Springer Science & Business Media *In this comprehensive overview of Man’s relationship with his planet’s nearest neighbor, David Harland opens with a review of*

the robotic probes, namely the Rangers which returned television before crashing into the Moon, the Surveyors which 'soft landed' in order to investigate the nature of the surface, and the Lunar Orbiters which mapped prospective Apollo landing sites. He then outlines the historic landing by Apollo 11 and the final three missions of comprehensive geological investigations. He concludes with a review of the robotic spacecraft that made remote-sensing observations of the Moon. This Commemorative Edition includes a foreword by one of the original astronauts as well as an extra section reviewing the prospect of renewed exploration there. New graphics and images are also included.

MARKETING THE MOON

THE SELLING OF THE APOLLO LUNAR PROGRAM

MIT Press One of the most successful public relations campaigns in history, featuring heroic astronauts, press-savvy rocket scientists, enthusiastic reporters, deep-pocketed defense contractors, and Tang. In July 1969, ninety-four percent of American televisions were tuned to coverage of Apollo 11's mission to the moon. How did space exploration, once the purview of rocket scientists, reach a larger audience than My Three Sons? Why did a government program whose standard operating procedure had been secrecy turn its greatest achievement into a communal experience? In Marketing the Moon, David Meerman Scott and Richard Jurek tell the story of one of the most successful marketing and public relations campaigns in history: the selling of the Apollo program. Primed by science fiction, magazine articles, and appearances by Wernher von Braun on the "Tomorrowland" segments of the Disneyland prime time television show, Americans were a receptive audience for NASA's pioneering "brand journalism." Scott and Jurek describe sophisticated efforts by NASA and its many contractors to market the facts about space travel—through press releases, bylined articles, lavishly detailed background materials, and fully produced radio and television features—rather than push an agenda. American astronauts, who signed exclusive agreements with Life magazine, became the heroic and patriotic faces of the program. And there was some judicious product placement: Hasselblad was the "first camera on the moon"; Sony cassette recorders and supplies of Tang were on board the capsule; and astronauts were equipped with the Exer-Genie personal exerciser. Everyone wanted a place on the bandwagon. Generously illustrated with vintage photographs, artwork, and advertisements, many never published before, Marketing the Moon shows that when Neil Armstrong took that giant leap for mankind, it was a triumph not just for American engineering and rocketry but for American marketing and public relations.

EARTHRISE

MY ADVENTURES AS AN APOLLO 14 ASTRONAUT

Chicago Review Press The inspiring and fascinating biography of the sixth man to ever walk on the Moon Of the nearly seven billion people who live on Earth, only 12 have walked on the Moon and Dr. Edgar Mitchell was one of them. Earthrise is a vibrant memoir for young adults featuring the life story of this internationally known

Apollo 14 astronaut. The book focuses on Edgar's amazing journey to the Moon in 1971 and highlights the many steps he took to get there, including growing up as a farm boy on a ranch; living in Roswell, New Mexico, during the alleged UFO crash; graduating from Carnegie Mellon and MIT; being a navy combat pilot; and becoming a NASA astronaut. In engaging and suspenseful prose he details his historic flight to the Moon, describing everything from the very practical—eating, sleeping, and going to the bathroom in space—to the metaphysical, such as the life-changing sensation of connectedness to the universe that he felt and that has been described, in varying degrees, by many astronauts. Extensive resources include annotated lists of websites about space, museums and organizations, films and videos, and books for further reading.

MOONPORT

A HISTORY OF APOLLO LAUNCH FACILITIES AND OPERATIONS

HSA SPACE EXPLORATION AND AVIATION AUCTION CATALOG #6000

[Heritage Capital Corporation](#)

WE ARE THE BEATLES

Wide Eyed Editions This inspiring picture book tells the story of the friendship between Ringo, Paul, George, and John, and how their unique talents came together to make something brilliant. In 1957, a boy named Paul met a boy named John. John was funny and confident, while Paul was quiet and steady, but one thing they had in common was a love and talent for songwriting. When they were joined by George and Ringo, they formed the band whose name would soon be known across the world: The Beatles. Together, the Fab Four became the world's best-loved band, drawing huge crowds to packed-out stadiums. But even they got nervous sometimes, and in those times they knew they could rely on each other. Through the power of friendship, The Beatles made their biggest dreams come true and still bring joy to the lives of millions. Friends Change the World is a series of picture books that celebrates the power of friendship. From musical greats to sports champions, scientists and explorers to artists and activists, these are the true stories of real friends who achieved amazing things. Whether best friends since school or thrown together by a chance encounter, they supported and inspired each other to make their shared dreams come true. This charming series shows 4- to 7-year-olds how togetherness, respect, and friendship can make the world a better place.

NASA APOLLO SPACECRAFT LUNAR E

Periscope Film LLC Originally created in 1971 by NASA contractor Grumman, the Apollo Spacecraft News Reference (LEM) was intended to educate members of the media, government, and private sector contractors about one of history's most ambitious undertakings. Within its pages you'll find general information about the Apollo Program, and a detailed examination of the Lunar Excursion Module and crew extra-vehicular activity procedures and equipment. (A companion book that focuses on the CM is also available.) Scores of photos and diagrams accompany the easy-to-

understand text. Chapters include: Introduction, Mission Description, Apollo Spacecraft, Lunar Module, Crew Personal Equipment, Environmental Control, Control and Displays, Guidance, Navigation, and Control, Main Propulsion, Reaction Control, Electrical Power, Communications, Instrumentation, Lighting, Portable Life Support System, Biographies, Grumman Aircraft Corp., Brief History of the LM, LM Manufacturing, Glossary, Contractors, The Moon (chapter written by Richard C. Hoagland), Index, and the LM Anatomy Booklet (reprinted in black and white). It also includes a fascinating chapter about "LM Derivatives," showing how variations of the LM could have been built and flown in support of a wide variety of missions. Although it may be one of the most complete studies of the systems and technology that made landing on the Moon possible, it's never been easy to find copies of this text because copies were never widely released -- until now. This reprint is of an edition featuring a mission similar to Apollo 15, 16 or 17, with astronauts performing three 7-hour EVAs using the Lunar Roving Vehicle. It features all the original text, diagrams and photos. It's a wonderful reference for the space flight fan, docent or engineering buff or for anyone else who ever wondered, "How'd they do that!"

APOLLO REMASTERED

THE SUNDAY TIMES BESTSELLER

Penguin UK *AN INSTANT SUNDAY TIMES BESTSELLER* Discover space as you've never seen it before, with these awe-inspiring, breathtakingly restored images of our first missions to the Moon 'The next best thing to being there' Charlie Duke, Apollo 16 astronaut In a frozen vault in Houston sits the original NASA photographic film of the Apollo missions. For half a century, almost every image of the Moon landings publicly available was produced from a lower-quality copy of these originals. Now we can view them as never before. Expert image restorer Andy Saunders has taken newly available digital scans and, applying painstaking care and cutting-edge enhancement techniques, he has created the highest quality Apollo photographs ever produced. Never-before-seen spacewalks and crystal-clear portraits of astronauts in their spacecraft, along with startling new visions of the Earth and the Moon, offer astounding new insight into one of our greatest endeavours. This is the definitive record of the Apollo missions and a mesmerizing, high definition journey into the unknown.

TEAM MOON

HOW 400,000 PEOPLE LANDED APOLLO 11 ON THE MOON

Houghton Mifflin Harcourt "This behind-the-scenes look at the first Apollo moon landing has the feel of a public television documentary in its breadth and detail" (Publishers Weekly, starred review). Here is a rare perspective on a story we only thought we knew. For Apollo 11, the first moon landing, is a story that belongs to many, not just the few and famous. It belongs to the seamstress who put together twenty-two layers of fabric for each space suit. To the engineers who created a special heat shield to protect the capsule during its fiery reentry. It belongs to the flight directors, camera designers, software experts, suit testers, telescope crew,

aerospace technicians, photo developers, engineers, and navigators. Gathering direct quotes from some of these folks who worked behind the scenes, Catherine Thimmesh reveals their very human worries and concerns. Culling NASA transcripts, national archives, and stunning NASA photos from Apollo 11, she captures not only the sheer magnitude of this feat but also the dedication, ingenuity, and perseverance of the greatest team ever—the team that worked to first put man on that great gray rock in the sky. Winner of the Robert F. Sibert Informational Book Award “An edge-of-your-seat adventure . . . Lavishly illustrated . . . This exhilarating book . . . will captivate.” —Chicago Sun-Times “Thimmesh gives names and voices to the army that got Neil Armstrong and company to the moon and back. The result is a spectacular and highly original addition to the literature of space exploration.” —The Horn Book “This beautiful and well-documented tribute will introduce a new generation to that triumphant time.” —Kirkus Reviews (starred review)

LANDING EAGLE: INSIDE THE COCKPIT DURING THE FIRST MOON LANDING

Fifty years ago, in a small, fragile spacecraft designed for only one purpose—landing on the Moon—two American astronauts prepared to fly that spacecraft from its 10 mile high orbit above the Moon down to a landing on the Sea of Tranquility. It was a sea in name only. It was actually a bone dry, ancient dusty basin pockmarked with craters and littered with rocks and boulders. Somewhere in that 500 mile diameter basin, the astronauts would attempt to make Mankind's first landing on the Moon. Neil Armstrong would pilot the Lunar Module "Eagle" during its twelve minute descent from orbit down to a landing. Col. Edwin "Buzz" Aldrin would assist him. On the way down they would encounter a host of problems, any one of which could have potentially caused them to have to call off the landing, or, even worse, die making the attempt. The problems were all technical—communications problems, computer problems, guidance problems, sensor problems. Armstrong and Aldrin faced the very real risk of dying by the very same technical sword that they had to live by in order to accomplish the enormous task of landing on the Moon for the first time. Yet the human skills Armstrong and Aldrin employed would be more than equal to the task. Armstrong's formidable skills as an aviator, honed from the time he was a young boy, would serve him well as he piloted Eagle down amidst a continuing series of systems problems that might have fatally distracted a lesser aviator. Armstrong's brilliant piloting was complemented by Aldrin's equally remarkable discipline and calmness as he stoically provided a running commentary on altitude and descent rate while handling systems problems that threatened the landing. Finally, after a harrowing twelve and a half minutes, Armstrong gently landed Eagle at "Tranquility Base", a name he had personally chosen to denote the location of the first Moon landing.

THE APOLLO CHRONICLES

ENGINEERING AMERICA'S FIRST MOON MISSIONS

Oxford University Press, USA *The moon landing of 1969 stands as an iconic moment*

for both the United States and humankind. The familiar story focuses on the journey of the brave astronauts, who brought home Moon rocks and startling photographs. But Apollo's full account includes the earthbound engineers, mounds of their crumpled paper, and smoldering metal shards of exploded engines. How exactly did the nation, step by difficult step, take men to the Moon and back? In *The Apollo Chronicles*, fifty years after the moon landing, author Brandon R. Brown, himself the son of an Apollo engineer, revisits the men and women who toiled behind the lights. He relays the defining twentieth-century project from its roots, bringing the engineers' work and personalities to bright life on the page. Set against the backdrop of a turbulent American decade, the narrative whisks audiences through tense deadlines and technical miracles, from President John F. Kennedy's 1961 challenge to NASA's 1969 lunar triumph, as engineers confronted wave after wave of previously unthinkable challenges. Brown immerses readers in key physical hurdles--from building the world's most powerful rockets to keeping humans alive in the hostile void of space--using language free of acronyms and technical jargon. The book also pulls back from the detailed tasks and asks larger questions. What did we learn about the Moon? And what can this uniquely innovative project teach us today?

MAGNIFICENT DESOLATION

THE LONG JOURNEY HOME FROM THE MOON

A&C Black Forty years ago, Buzz Aldrin became the second human - minutes after Neil Armstrong - to set foot on a celestial body other than the Earth. The event remains one of mankind's greatest achievements and was witnessed by the largest worldwide television audience in history. In the years since, millions more have had their earth-centric perspective changed forever by gazing at the iconic photograph of Aldrin standing on the surface of the Moon with the blackness of space behind him. He described what he saw as 'magnificent desolation'. The flight of Apollo 11 made Aldrin one of the most famous people on the planet, yet few people know the rest of the story. In *Magnificent Desolation*, Aldrin not only gives us a harrowing first-person account of the lunar landing that came within seconds of failure, as well as the ultimate insider's view of life as one of the superstars of America's space program, he also opens up with remarkable candor about his more personal trials - and eventual triumphs - back on Earth. From the glory of being part of the mission that fulfilled President Kennedy's challenge to reach the Moon before the decade was out, Aldrin returned home to an Air Force career stripped of purpose or direction, other than as a public relations tool that NASA put to relentless use in a seemingly nonstop world tour. The twin demons of depression and alcoholism emerged - the first of which Aldrin confronted early and publicly and the second of which he met with denial until it nearly killed him. As an adventure story, a searing memoir of self-destruction and self-renewal, and as a visionary rallying cry to once again set our course for Mars and beyond, *Magnificent Desolation* is the thoroughly human story of a genuine hero.

APOLLO

THE EPIC JOURNEY TO THE MOON, 1963-1972

Zenith Imprint Provides historical context to the beginning of the United States space program and how it ultimately achieved its goal of landing a man on the moon.

ONE GIANT LEAP

THE IMPOSSIBLE MISSION THAT FLEW US TO THE MOON

Simon & Schuster The New York Times bestselling, “meticulously researched and absorbingly written” (The Washington Post) story of the trailblazers and the ordinary Americans on the front lines of the epic Apollo 11 moon mission. President John F. Kennedy astonished the world on May 25, 1961, when he announced to Congress that the United States should land a man on the Moon by 1970. No group was more surprised than the scientists and engineers at NASA, who suddenly had less than a decade to invent space travel. When Kennedy announced that goal, no one knew how to navigate to the Moon. No one knew how to build a rocket big enough to reach the Moon, or how to build a computer small enough (and powerful enough) to fly a spaceship there. No one knew what the surface of the Moon was like, or what astronauts could eat as they flew there. On the day of Kennedy’s historic speech, America had a total of fifteen minutes of spaceflight experience—with just five of those minutes outside the atmosphere. Russian dogs had more time in space than US astronauts. Over the next decade, more than 400,000 scientists, engineers, and factory workers would send twenty-four astronauts to the Moon. Each hour of space flight would require one million hours of work back on Earth to get America to the Moon on July 20, 1969. “A veteran space reporter with a vibrant touch—nearly every sentence has a fact, an insight, a colorful quote or part of a piquant anecdote” (The Wall Street Journal) and in One Giant Leap, Fishman has written the sweeping, definitive behind-the-scenes account of the furious race to complete one of mankind’s greatest achievements. It’s a story filled with surprises—from the item the astronauts almost forgot to take with them (the American flag), to the extraordinary impact Apollo would have back on Earth, and on the way we live today. From the research labs of MIT, where the eccentric and legendary pioneer Charles Draper created the tools to fly the Apollo spaceships, to the factories where dozens of women sewed spacesuits, parachutes, and even computer hardware by hand, Fishman captures the exceptional feats of these ordinary Americans. “It’s been 50 years since Neil Armstrong took that one small step. Fishman explains in dazzling form just how unbelievable it actually was” (Newsweek).

DISTINGUISHED AFRICAN AMERICANS IN AVIATION AND SPACE SCIENCE

Greenwood Publishing Group A look at the lives and careers of 80 men and 20 women who defied poverty and prejudice to excel in the fields of aviation and space exploration.

APOLLO 16

THE NASA MISSION REPORTS

Burlington, Ont. : Apogee Books The landing site selected for the crew of Apollo 16 was in the lunar highland area of Descartes. NASA chose to send John Young to command the fifth lunar landing mission. Young had as much or more flight experience than any other member of the astronaut corps. He had circumnavigated the moon on Apollo 10 and he had flown two Gemini missions. Young would later go on to be the first commander of the Space Shuttle. The Descartes landing site was chosen because it appeared to be of volcanic origin. If it was, it might reveal secrets about the origins of the Earth. For three days Young and Duke embarked on their rover, away from the Lunar Module 'Orion', through rugged landscapes, in search of the origins of our world. Meanwhile Ken Mattingly shot hundreds of photographs and probed the moon's magnetic field from the Command Module 'Casper'. Back on Earth the political climate was beginning to turn against NASA and the remarkable risks and exploits undertaken by the crew of Apollo 16 went almost unnoticed. The three intrepid explorers and their spacecraft harvested a wealth of new data about the Earth-Moon system in an almost flawless performance of skills and bravado. Compiled here are many important documents about the mission including the complete debriefing in the crew's own words. The CD-ROM features an exclusive interview with Commander John Young and the complete footage shot at Descartes, over 2500 still pictures and 18 interactive panoramas. Running time: over 10 hours.

THE APOLLO MISSIONS

THE INCREDIBLE STORY OF THE RACE TO THE MOON

Arcturus Publishing Few events have matched the landing of the first man on the Moon for drama and excitement. Watched live on television by 600 million people, Neil Armstrong floated down from the final step of the Eagle's ladder onto the powdery surface of the Moon, uttering the famous line, "That's one small step for man, one giant leap for mankind." The Apollo Missions relives the experience and all the drama as it unfolded, from the birth of the Apollo space programme and the very first attempts to put an American astronaut into space to Apollo 11's successful Moon landing and its celebrated final splashdown in the Pacific Ocean. Packed with awe-inspiring photographs of the space missions, astronauts, and iconic views of the Earth and the Moon, as well as technical diagrams, flight plans, and tables of statistics, The Apollo Missions tells the thrilling story of the race to the Moon.