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Solar System Missions: The Apollo Program

Humanity on the Moon

Aira Astralis

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Introduction

The Apollo program, also known as Project Apollo, was the United States human spaceflight program led by NASA, which landed the first humans on the Moon in 1969. Apollo was conceived in 1960 in the Dwight D. Eisenhower presidency during Project Mercury and executed after Project Gemini. Apollo was later dedicated to the national goal President John F. Kennedy set before Congress and the country in May 1961: to place Americans on the Moon before the decade closed and bring them home alive.

Congress on May 25, 1961. Kennedy's goal was accomplished on the Apollo 11 mission, when astronauts Neil Armstrong and Buzz Aldrin landed their Apollo

Lunar Module (LM) on July 20, 1969, and walked on the lunar surface, while Michael Collins remained in lunar orbit in the command and service module (CSM), and all three landed safely on Earth in the Pacific Ocean on July 24. Approximately 650 million people worldwide watched this first landing on television.

Five subsequent Apollo missions also landed astronauts on the Moon, the last, Apollo 17, in December 1972. In these six spaceflights, twelve people walked on the Moon. Apollo ran from 1961 to 1972, with the first crewed flight in 1968. It encountered a major setback in 1967 when the Apollo 1 cabin fire killed the entire crew during a ground test. After the first Moon landing, sufficient flight hardware remained for nine follow-on landings with a plan for extended lunar geological and astrophysical exploration.

Budget cuts forced the cancellation of three of these. Five of the remaining six missions achieved landings; but the Apollo 13 landing had to be aborted after an oxygen tank exploded en route to the Moon, crippling the CSM. The crew barely managed a safe return to Earth by using the Lunar Module as a "lifeboat" on the return journey.

Chapter 1: Before the Decision: Apollo's Origins and Kennedy's Challenge

Apollo 8 was the first crewed mission to leave low Earth orbit and to orbit another celestial body, and Apollo 11 was the first crewed mission to land humans on one. Overall, the Apollo program returned 842 pounds (382 kg) of lunar rocks to Earth, greatly contributing to the understanding of the Moon's composition and geological history. The program laid the foundation for NASA's subsequent human spaceflight capability and funded construction of its Johnson Space Center and Kennedy Space Center.

Apollo also spurred advances in many areas of technology incidental to rocketry and human spaceflight, including avionics, telecommunications, and computers. The only other time humans have left low Earth orbit has been the

Artemis II flyby of the Moon in 2026, as part of the Artemis program, established as a successor to Apollo in 2017. Artemis intends to return humans to the Moon's surface no earlier than 2028.

The program was named after the Greek god Apollo by NASA manager Abe Silverstein, who later said, "I was naming the spacecraft like I'd name my baby." Silverstein chose the name at home one evening, early in 1960, because he felt "Apollo riding his chariot across the Sun was appropriate to the grand scale of the proposed program".

The context of this was that the program focused at its beginning mainly on developing an advanced crewed spacecraft, the Apollo command and service module, succeeding the Mercury program. A lunar landing became the focus of the program only in 1961. Thereafter Project Gemini instead followed the Mercury program to test and study advanced crewed spaceflight technology. The Apollo program was conceived during the Eisenhower administration in early 1960, as a follow-up to Project Mercury.

While the Mercury capsule could support only one astronaut on a limited Earth orbital mission, Apollo would carry three. Possible missions included ferrying crews to a space station, circumlunar flights, and eventual crewed lunar landings. In July 1960, NASA Deputy Administrator Hugh L. Dryden announced the Apollo program to industry representatives at a series of Space Task Group conferences.

Preliminary specifications were laid out for a spacecraft with a mission module cabin separate from the command module (piloting and reentry cabin), and a propulsion and equipment module. On August 30, a feasibility study competition was announced, and on October 25, three study contracts were

awarded to General Dynamics/Convair, General Electric, and the Glenn L. Martin Company. Meanwhile, NASA performed its own in-house spacecraft design studies led by Maxime Faget, to serve as a gauge to judge and monitor the three industry designs.

In November 1960, John F. Kennedy was elected president after a campaign that promised American superiority over the Soviet Union in the fields of space exploration and missile defense. Up to the election of 1960, Kennedy had been speaking out against the "missile gap" that he and many other senators said the Eisenhower administration had allowed to open through inaction.

Beyond military power, Kennedy used aerospace technology as a symbol of national prestige, pledging to make the US not "first but, first and, first if, but first period". Despite Kennedy's rhetoric, he did not immediately come to a decision on the status of the Apollo program once he became president. He knew little about the technical details of the space program, and was put off by the massive financial commitment required by a crewed Moon landing. When Kennedy's newly appointed NASA Administrator James E.

Webb requested a 30 percent budget increase for his agency, Kennedy supported an acceleration of NASA's large booster program but deferred a decision on the broader issue. On April 12, 1961, Soviet cosmonaut Yuri Gagarin became the first person to fly in space, reinforcing American fears about being left behind in a technological competition with the Soviet Union.

At a meeting of the US House Committee on Science and Astronautics one day after Gagarin's flight, many congressmen pledged their support for a crash program aimed at ensuring that America would catch up. Kennedy was circumspect in his response to the news, refusing to make a commitment on America's response to the Soviets. On April 20, Kennedy sent a memo to Vice President Lyndon B.

Johnson, asking Johnson to look into the status of America's space program, and into programs that could offer NASA the opportunity to catch up. Johnson responded approximately one week later, concluding that "we are neither making maximum effort nor achieving results necessary if this country is to reach a position of leadership." His memo concluded that a crewed Moon landing was far enough in the future that it was likely the United States would achieve it first.

On May 25, 1961, twenty days after the first American crewed spaceflight Freedom 7, Kennedy proposed the crewed Moon landing in a Special Message to the Congress on Urgent National Needs: Now it is time to take longer strides —time for a great new American enterprise—time for this nation to take a

clearly leading role in space achievement, which in many ways may hold the key to our future on Earth....

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ABOUT THE AUTHOR

Aira Astralis is a science writer specializing in astronomy and space exploration. Her work spans the full breadth of humanity's relationship with the cosmos -- from the earliest naked-eye observations to the engineering marvels of modern space missions.

Her books are built on a foundation of primary sources: peer-reviewed research, mission archives, and direct engagement with the scientific community. She writes for readers who want to understand not just what we know about the universe, but how we came to know it.

She believes that the most important frontier is not out there but in the gap between what scientists discover and what the public understands. Her books exist to close that gap.