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National Air and Space Museum's *Destination Moon*



# DESTINATION MOON

## The Smithsonian Exhibit and the Apollo Collection

By Michael J. Neufeld

**F**ifty years ago this fall, the United States began its campaign to send astronauts to the Moon. On October 11, 1968, the Apollo 7 crew—Wally Schirra, Donn Eisele, and Walter Cunningham—became the first to fly the command and service modules, nearly two years after the original crew had been killed in a devastating launch-pad fire. Two months later, Frank Borman, James Lovell, and William Anders of Apollo 8 became the first humans to approach the Moon, circling it 10 times on Christmas Eve. Then on July 20, 1969, the Apollo 11 astronauts carried out the landing that was the central objective of the program President John F. Kennedy had set in 1961. Neil Armstrong and Buzz Aldrin walked on the surface while Michael Collins orbited above in the mothership, *Columbia*. The direct exploration of the Moon by humans ended with Apollo 17 in December 1972, concluding a program that not only met Kennedy's Cold War objective of beating the Soviet Union, but also yielded an enormous trove of scientific information and samples.

Photo by Sarah Reck.

*Destination Moon: The Apollo 11 Mission*, the Smithsonian's traveling exhibition that opened at the Senator John Heinz History Center on September 29, celebrates the 50th anniversary of that first landing, and by extension, the whole Apollo program—one of the greatest achievements in human history. The exhibition's central artifact is the Command Module *Columbia*, the only part of the gigantic, 363-foot-tall Saturn V/Apollo 11 stack to return to Earth. It carried to a Pacific Ocean splashdown the precious cargo of the crew, their films, and the rock boxes containing the first samples ever returned from another celestial body. One of those boxes is also in the exhibition, along with other historic items carried on the flight.

Many of these artifacts, including *Columbia*, toured the United States once before, in 1970-71. A National Aeronautics and Space Administration (NASA) truck-based exhibit celebrating Apollo 11 visited every state capital except Alaska's (it went to Anchorage instead). At the conclusion of this long trip, the spacecraft and all tour objects arrived at the Smithsonian Institution in Washington, D.C., in May 1971, and the National Air and Space Museum (NASM) accessioned them. The spacecraft went on display in the Arts and Industries Building, as the museum would not have its own building until July 1976. *Columbia* joined two other historic American spacecraft at "A&I": John Glenn's Mercury capsule *Friendship 7*, in which he became the first American to orbit the Earth, and Gemini IV, from which Edward White had made the first American spacewalk. Another addition to the hall was Lunar Module LM-2, mocked-up to appear much like LM-5 *Eagle*, Apollo 11's lander. Its ascent stage had previously been used in another lunar module display for the 1970 Osaka World's Fair in Japan.<sup>1</sup>

The transfer of the Apollo 11 artifacts to the museum had long been planned. In 1967, NASA and the Smithsonian had concluded an agreement that effectively made the National



The permanent *Destination Moon* gallery, which opens at the National Air and Space Museum in 2022, covers the full history of lunar exploration, from ancient dreams to current missions. The exhibition's highlights will include the Apollo 11 Command Module *Columbia*, Neil Armstrong's Apollo 11 spacesuit, and a Saturn V engine.

Smithsonian Institution, National Air and Space Museum.

Air and Space Museum the space agency's primary museum. NASA had previously made arrangements for the exhibition of its most historic objects almost since its origin in 1958, notably in touring exhibits for both domestic and international audiences. The Cold War space race with the Soviet Union made demonstrating U.S. scientific and technical achievements crucial for foreign policy and international public opinion. Convincing the American public that the billions spent on the agency was worth it, and thanking the taxpayers for their support, were further motivation for domestic displays.

At first, the Smithsonian was given just those artifacts deemed most historic, like John

Glenn's *Friendship 7*—but only after NASA and the State Department sent that spacecraft on a tour around the world. Yet by the mid-1960s, NASA Administrator James Webb concluded that the agency was not well suited for the tasks of historic preservation and public display. He instructed his aides to respond favorably to the Smithsonian leadership's appeals for a deeper relationship. The NASA-NASM Agreement, as it came to be called, began a process in which almost all agency artifacts deemed historically important and no longer needed for the program, including spacecraft, rockets, and spacesuits, were transferred to Smithsonian control in the late 1960s and 1970s. Many of them never left their display locations at NASA



# THE MOON



## HUMANS REACH THE MOON

On July 20, 1969, Neil Armstrong and Buzz Aldrin became the first humans to walk on the Moon. That historic achievement followed years of planning and preparation. The United States sent robotic explorers to find landing sites, recovered from a tragic accident, tested the Apollo spacecraft, simulated preliminary missions, and developed the experiments and equipment for the lunar landing. By the time Apollo 11 reached the Moon, the whole world was watching.

SURVEYOR

FLIGHT ENGINE

Sighting the Moon

Finding a Landing Site

Why the Sea of Tranquility?

**MANY OF THESE ARTIFACTS, INCLUDING COLUMBIA, TOURED THE UNITED STATES ONCE BEFORE, IN 1970-71.**

The Apollo 11 Command Module toured 50 states in a 40 x 14-foot trailer in 1970-71. The Heavy Specialized Carriers Conference, an American Trucking Association, Inc. affiliate, provided the big rig without cost to the government.

NASA.



Apollo 11 astronaut's Buzz Aldrin, Michael Collins, and Neil Armstrong, show a two-pound Moon rock to Frank Taylor (right), director of the National Museum of History and Technology at the Smithsonian Institute in September 1969.

NASA 6903159.

The "rock box" was one of two used to bring back the very first samples of the moon to Earth—47.7 pounds (21.8 kilograms) of lunar material from the Sea of Tranquility.

Smithsonian Institution, National Air and Space Museum. Photo by Eric Long.

visitors' centers and independent museums. Only the titles changed hands.<sup>2</sup>

When the new National Air and Space Museum building was nearing completion in 1975-76, *Friendship 7*, Gemini IV, and *Columbia* moved to places of honor in the new central entrance hall, *Milestones of Flight*, and LM-2 was put on prominent display in the east end. One of the 23 new galleries was *Apollo to*

*the Moon*, where the rich collection of NASA artifacts from the Mercury, Gemini, Apollo, and Skylab programs could be displayed. Among them were the actual spacesuits Neil Armstrong and Buzz Aldrin wore on the Moon (years later, museum staff concluded that to better preserve them against deterioration, only one could be displayed at a time and with the helmet and gloves off). In an adjacent

diorama was a test version of the lunar roving vehicle (Moon buggy) that Eugene Cernan and Harrison Schmitt had driven on Apollo 17 in December 1972, alongside the suit worn by Cernan when he became the last man to walk on the Moon.

Partly because of the rush to complete so many galleries in time for the nation's Bicentennial in July 1976, and partly because these events were so fresh in the minds of the public, *Apollo to the Moon* had spectacular artifacts but little that explained the history of the Moon race and why it happened. The average visitor had lived through those events and experienced them through personal participation or by watching the news. As the museum aged into the 21st century, it became clear that a new Apollo exhibition was needed, notably because an increasing proportion of visitors were born after the Moon landings.

For some years, however, old galleries were replaced rather slowly because of the museum's focus on funding, opening, and filling a second museum, the Stephen F. Udvar-Hazy Center next to Washington Dulles International Airport in northern Virginia. Finally, in 2010-11, the Space History Department formally began a project to replace *Apollo to the Moon*. I, as curator for Mercury and Gemini spacecraft, along with Allan Needell (Apollo spacecraft curator), Cathleen Lewis (international space programs and spacesuits curator), and Priscilla Strain (program specialist for lunar samples and exhibitions in our Center for Earth and Planetary Studies) were the core of the content team. We planned to do an exhibit with much the same scope as the old one—Mercury, Gemini, and Apollo—in the same gallery space. But gradually we decided that we needed to include robotic exploration of the Moon and to broaden the historical coverage of the exhibit, from ancient dreams of lunar flights through to the revival of lunar missions in the 1990s and later. The Moon had once



*Columbia* (right) in the Smithsonian's Arts and Industries Building, 1973. On the left is Gemini IV, in the right background is Lunar Module LM-2, and hanging above (front to back) are the Wright 1903 flyer, the Wright 1909 military flyer, and Charles Lindbergh's *Spirit of St. Louis*.

Smithsonian Institution, National Air and Space Museum.

again become a place of scientific and political interest, and we could no longer justify stopping in 1972. After several title changes, we settled on *Destination Moon*, the name of a classic 1950 Hollywood science-fiction movie.

Events in the museum then produced a significant change in plans. With the National Air and Space Museum building approaching its 40th year, the museum leadership under then-director General John R. Dailey had been discussing the need for a complete overhaul of the building systems. Then engineering evaluations after a surprising 5.8 magnitude Virginia earthquake in 2011 revealed the unrelated fact that the external stone cladding would have to be replaced too, owing to the warping of many panels caused by water intrusion. In 2014-15 it became clear that this would require a total renovation of the building, which entailed removing almost all

of the artifacts, tearing down all the existing galleries, and refilling them with new or revamped exhibits. The result is two very ambitious projects we call Revitalization and Transformation: the former being the taxpayer-funded museum reconstruction project for \$650 million and the latter the replacement of all exhibits for the donor-funded sum of \$250 million, a challenging fundraising goal that we are still actively pursuing.<sup>3</sup>

One of the implications was that *Destination Moon's* projected opening date of July 2019—the 50th anniversary of Apollo 11—would no longer be possible. By then the exhibit team had decided to put *Columbia* into the center of *Destination Moon* and recommended that LM-2 replace it in the *Boeing Milestones of Flight Hall*, as it was renamed after a generous donation from that corporation. One of the associate directors,

Roger Launius, suggested that we investigate sending Apollo 11's command module on a national tour during the anniversary period, as the exhibit would not be open in time.

The museum began discussions with the Smithsonian Institution Traveling Exhibit Service (SITES), with whom we had often cooperated, regarding whether the very ambitious project of touring *Columbia* was feasible. The first question was simply whether we could move the spacecraft safely—notably because its scorched, fiberglass-and-resin heat shield, which had protected Armstrong, Aldrin, and Collins during their 24,500-mph plunge into the Earth's atmosphere, is fragile and subject to further erosion. The conservators, collections care specialists, and curators decided that if we mounted it on a refurbished, wheeled NASA-handling device for the entire tour, and lifted and moved it

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Prepping *Columbia* for a national tour



*Columbia* as it was exhibited in the *Milestones of Flight* gallery from 1976 to 2015.

Smithsonian Institution, National Air and Space Museum.

APOLLO 11  
COMMAND MODULE  
COLUMBIA

MISSION PLACARD



**John Glenn's Friendship 7, upon arriving at the airport in Ceylon (Sri Lanka), on July 1, 1962, is saluted by an elephant. NASA and the State Department organized a world tour to promote the United States and its space program in nearly 30 cities across the globe.**

Smithsonian Institution, National Air and Space Museum.



**In 2016, Smithsonian and Autodesk, Inc., staff scanned the interior and exterior of the Apollo 11 Command Module. Conservator Lisa Young is at left.**

Smithsonian Institution, National Air and Space Museum. Photo by Eric Long.



**Engen Conservation Fellows Meghann Kozak, Arianna Carini, and Lauren Gottschlich clean Columbia at the National Air and Space Museum's Udvar-Hazy Center in 2016.**

Smithsonian Institution, National Air and Space Museum.

only by that “ring,” as it was called, it could be done.

Both SITES and the museum began talking to potential venues and quickly decided to focus on Smithsonian Affiliates: museums and other nonprofit organizations affiliated with the Institution through a national program. It was important to the project team that hosting museums be located across the United States. The list was further winnowed by the challenges of lifting and moving an object that was nearly 13 feet across and weighed over 13,500 pounds on its ring. The size and accessibility of loading docks, pathways to the exhibit gallery, floor-load capacity, and availability of a gallery space large enough to hold an exhibit of several thousand square feet were further decision factors. Evaluation of these factors led to the announcement in February 2017 that the exhibition tour would begin at Space Center Houston in Texas in October 2017, then go to the Saint Louis Science Center in Missouri, the Senator John Heinz History Center in Pittsburgh, and The Museum of Flight in Seattle. The exhibition would spend about five months at each location, with several weeks of disassembly, moving, and reassembly between each venue. The tour will end in Seattle in early September 2019, whereupon the spacecraft and the associated artifacts will return to the National Air and Space Museum in preparation for the opening of the permanent version of *Destination Moon*.

Meanwhile, in preparation for the renovation of *Boeing Milestones of Flight*, in 2015 the museum's Collections Department had lowered *Columbia* from the stand on which it had been sitting since 1976, placed it on the ring, and moved it into another large hall, *Space Race*. There museum conservators began the initial assessment and light cleaning of the command module, followed by a complete 3-D scanning. The Smithsonian's Digitization Program Office had already begun a program of building digital 3-D models



of iconic Smithsonian objects, including the Wright 1903 flyer (see the models at 3d.si.edu). The move provided the perfect opportunity to make a scan of the entire spacecraft. From that, the Digitization Program Office, with the extensive in-kind service supplied by Autodesk, Inc., constructed digital models of the exterior and interior of *Columbia*. Lower-resolution versions eventually appeared on the Smithsonian's 3-D website,<sup>4</sup> but also provided

the basis for a higher-resolution interactive that we could include in both the traveling and permanent versions of *Destination Moon*. The interior model provides a view and an access simply unavailable otherwise, allowing one to move around inside the cockpit and zoom in on interesting details. Allan Needell, working with digital imaging specialist and

historian Rebecca Perry, constructed detailed annotations and specialized tours for the model, so that visitors to the exhibits or the website can explore the *Columbia* in greater detail. Among the features to see are astronaut graffiti found inside the cockpit during inspection and scanning, such as a "jailhouse calendar" in which Mike Collins crossed off the days of the mission, July 16-24, 1969.<sup>5</sup>

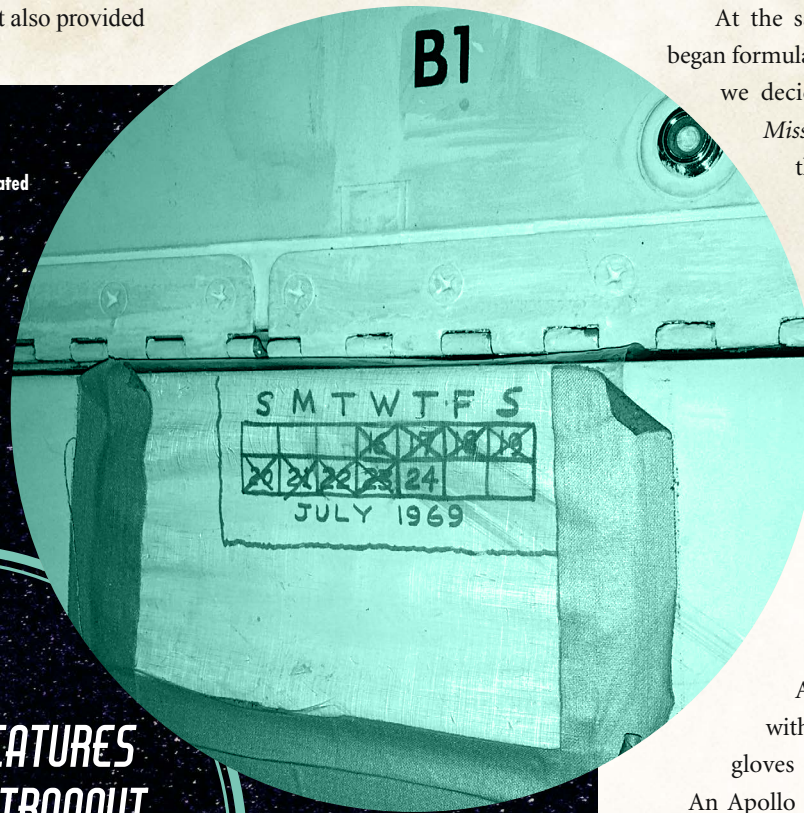
At the same time, the curatorial team began formulating the traveling exhibit, which we decided to subtitle *The Apollo 11 Mission*, as it would focus closely on the historic first landing that used *Columbia* as its mothership.

With the conservation and collections care specialists, led by Lisa Young and Jennifer Stringfellow, we chose important objects from the mission that could travel well and tell human stories. Owing to concerns about fragility, a whole spacesuit could not be sent on the road. Instead, we decided to move Buzz Aldrin's extravehicular helmet, with the iconic gold visor, plus the gloves he used on the lunar surface.

An Apollo 11 survival kit shows the kinds of emergencies that astronauts might have to go through if they made an Earth landing far from recovery forces: it includes water for survival at sea, a machete for cutting through jungles, sun protection for surviving in either place, and a radio for contacting rescuers. A medical kit that includes various medications and bandages tells the tale of what kinds of emergencies or illnesses astronauts might have to respond to, and by implication, what they would have had trouble dealing with. We were also able to include an injector plate from one of the Apollo 11 launch vehicle's gigantic first-stage F-1 engines: an expedition funded

Command Module Pilot Michael Collins created a small calendar on a wall below one of the lockers. Each day of Apollo 11 is crossed out except for the landing day. For preservation, the calendar was later covered with plastic sheet held by tape.

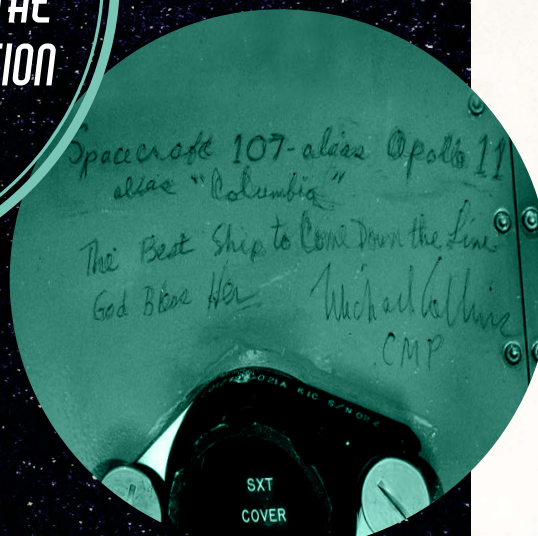
Smithsonian Institution,  
National Air and Space Museum.

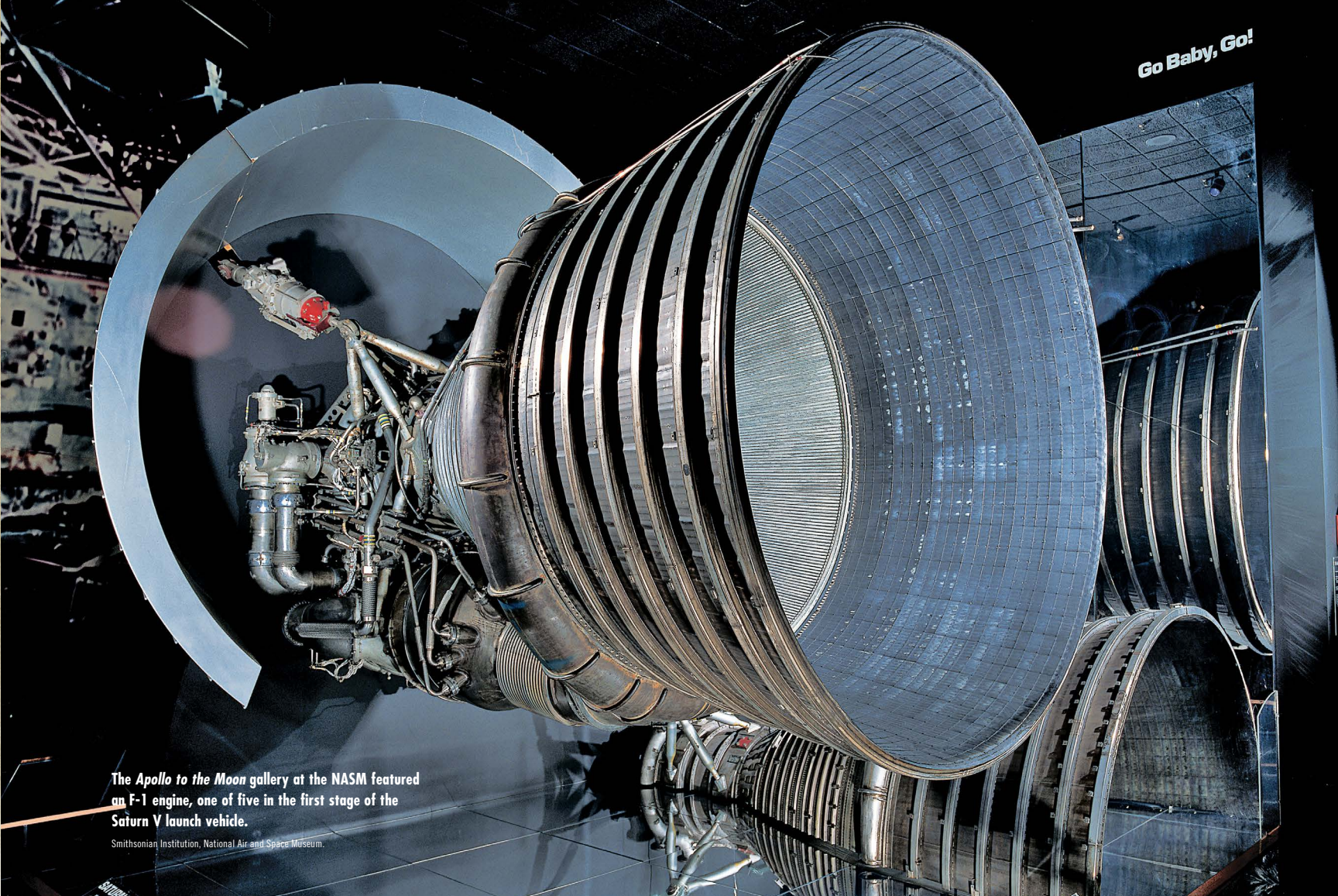


AMONG THE FEATURES  
TO SEE ARE ASTRONAUT  
GRAFFITI FOUND INSIDE THE  
COCKPIT DURING INSPECTION  
AND SCANNING.

While sailing to Hawaii on the *USS Hornet*, Collins crawled back into *Columbia's* cockpit (it was connected to the Mobile Quarantine Facility by an air-tight tunnel) and wrote a short note on one of the equipment bay panels: "Spacecraft 107—alias Apollo 11 alias 'Columbia' The Best Ship to Come Down the Line. God Bless Her."

Smithsonian Institution, National Air and Space Museum.





Go Baby, Go!

The *Apollo to the Moon* gallery at the NASM featured an F-1 engine, one of five in the first stage of the Saturn V launch vehicle.

Smithsonian Institution, National Air and Space Museum.



"That's one small step for man,  
one giant leap for mankind"  
NEIL ARMSTRONG

Buzz Aldrin's Apollo 11 extravehicular helmet and gloves as exhibited at the Saint Louis Science Center, 2018.

Smithsonian Institution Traveling Exhibition Service.



One of two Apollo command module survival kit rucksacks is filled with equipment to help the crew survive for up to 48 hours in the event of an emergency landing on Earth.

Smithsonian Institution, National Air and Space Museum. Photo by Eric Long.

by Amazon founder Jeff Bezos had recovered it and other Saturn engine parts from the bottom of the Atlantic Ocean in 2013. NASA transferred the Apollo 11 F-1 components to the Smithsonian soon thereafter.

Prior to sending the *Columbia* on the road, it was first moved to the Udvar-Hazy Center's restoration hangar for a thorough, six-month cleaning, assessment, and treatment. While the conservators under Lisa Young did their work, the SITES specialists, led by Project Director Kathrin Halpern, Registrar Viki Possoff, Assistant Director of Public Affairs Jennifer Schommer, and Director of Scheduling and Exhibitor Relations Michelle Torres-Carmona, worked with specialized museum contractors, designers, and the four receiving institutions

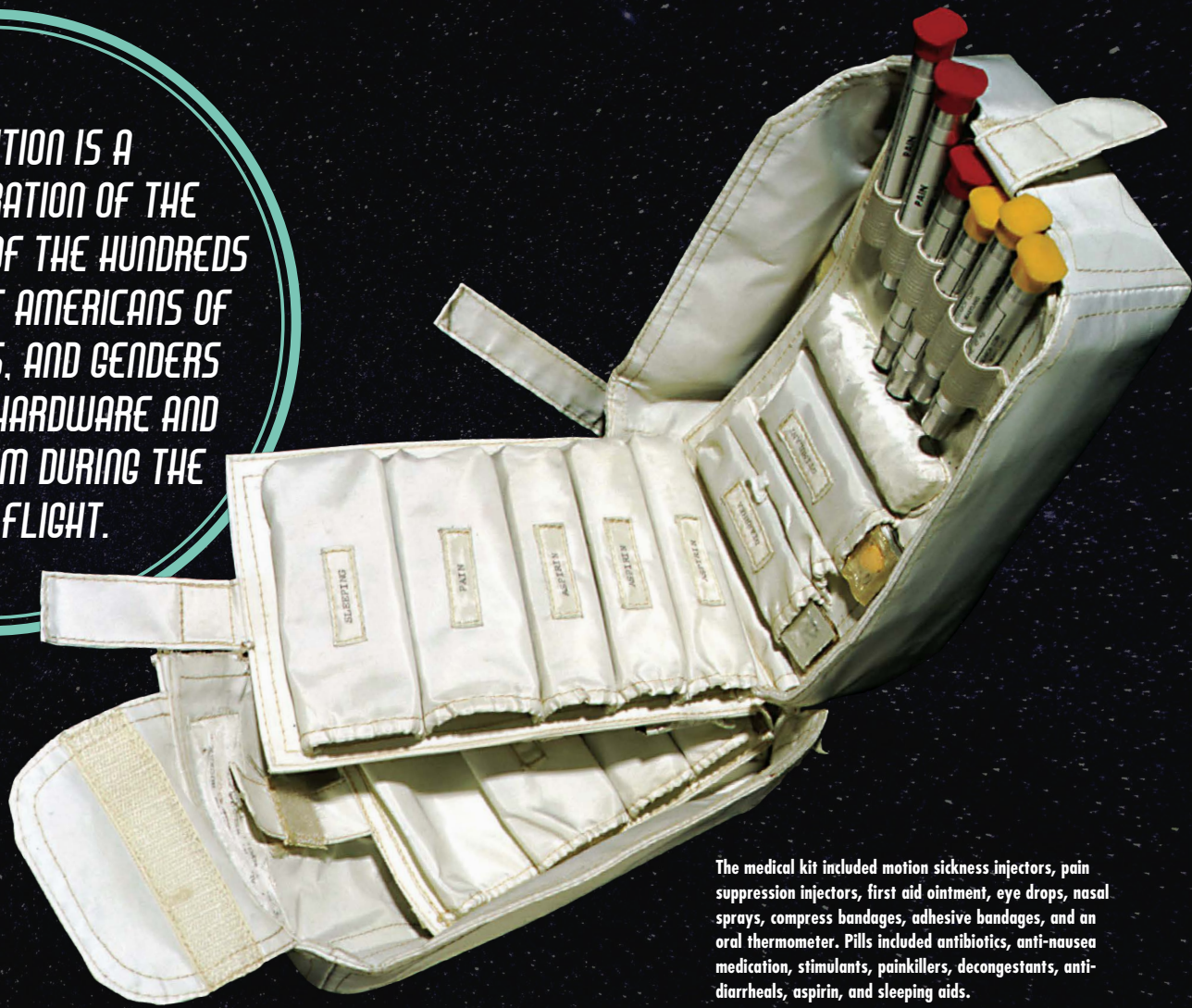
to plan the exhibition tour. *Columbia* and the other historic and often fragile artifacts were fitted for specialized crates, designed to minimize the impact of travel. FedEx, thanks to a generous in-kind donation of services, took on the task of transporting the exhibition between hosting museums.

In September 2017, *Destination Moon: The Apollo 11 Mission* left for Houston, where it began its cross-country odyssey. Visitors to the exhibit will find that it provides an overview of the space race with the Soviet Union, the reasons why President Kennedy set the goal of travel to the Moon, and the history of American human space flight up to Apollo 11. Detailed units then tell the story of the mission, introduce its artifacts, and provide

an in-depth description of *Columbia* and all its features. The exhibition is a fitting celebration of the astronauts and of the hundreds of thousands of Americans of all ages, races, and genders who built the hardware and supported them during the historic flight. We hope it will not only inform, but also inspire future explorers, scientists, and engineers to pursue new world-changing endeavors.

Once *Columbia* returns to Washington, D.C., it will be the centerpiece of the more comprehensive *Destination Moon* gallery, scheduled to open in 2022, when the first section of the new National Air and Space Museum is unveiled. As we celebrate the 50th anniversary of Apollo, we hope that you can visit both the Heinz History Center and the

THE EXHIBITION IS A FITTING CELEBRATION OF THE ASTRONAUTS AND OF THE HUNDREDS OF THOUSANDS OF AMERICANS OF ALL AGES, RACES, AND GENDERS WHO BUILT THE HARDWARE AND SUPPORTED THEM DURING THE HISTORIC FLIGHT.



The medical kit included motion sickness injectors, pain suppression injectors, first aid ointment, eye drops, nasal sprays, compress bandages, adhesive bandages, and an oral thermometer. Pills included antibiotics, anti-nausea medication, stimulants, painkillers, decongestants, anti-diarrheals, aspirin, and sleeping aids.

Smithsonian Institution, National Air and Space Museum.

new gallery at the museum and marvel again at one of the greatest human accomplishments of all time.<sup>6</sup>

**Michael J. Neufeld** is a senior curator at the National Air and Space Museum, Smithsonian Institution, where he is responsible for rockets and missiles to 1945 and Mercury and Gemini spacecraft and components. He is the lead curator of *Destination Moon* and is the author or editor of nine books, notably *Von Braun: Dreamer of Space, Engineer of War* (2007) and *Spaceflight: A Concise History* (2018).

<sup>1</sup> Allan A. Needell, "National and International Expositions and the Origins of the National Apollo 11 Artifacts Collection," in Elena Canadelli, Marco

Beretta, and Laura Ronzon, eds., *Behind the Exhibit: Displaying Science and Technology at World's Fairs and Museums in the 20th Century* (Washington, D.C.: Smithsonian Institution Scholarly Press, forthcoming).

<sup>2</sup> Teasel Muir-Harmony, "Selling Space Capsules, Moon Rocks, and America: Spaceflight in U.S. Public Diplomacy, 1961-1979," in *Reasserting America in the 1970s*, edited by Hallvard Notiker, Giles Scott-Smith and David J. Snyder (Manchester, U.K.: Manchester University Press, 2016), 127-42; Michael J. Neufeld and Alex M. Spencer, *Smithsonian National Air and Space Museum: An Autobiography* (Washington, D.C.: National Geographic, 2010), 228-229, 252-259.

<sup>3</sup> To donate to the museum, go to: <https://airandspace.si.edu/support>. The *Destination Moon* touring exhibit is made possible by the support of Jeff and MacKenzie Bezos, Joe Clark, Bruce R. McCaw Family Foundation, the Charles and Lisa Simonyi Fund for Arts and Sciences, John and Susann Norton,

and Gregory D. and Jennifer Walston Johnson. Transportation services for *Destination Moon* are provided by FedEx.

<sup>4</sup> *Columbia* exterior model: <https://3d.si.edu/model/fullscreen/p2b-1504357158170-1505831025623-0>; interior: <https://3d.si.edu/model/fullscreen/p2b-1504357158170-1505589102232-0>, accessed June 7, 2018.

<sup>5</sup> Allan A. Needell, "Apollo 11: The Writings on the Wall," NASM website story, February 11, 2016, <https://airandspace.si.edu/stories/editorial/apollo-11-writings-wall>, and "Investigating the Writing on Columbia's Walls," NASM website story, March 3, 2016, <https://airandspace.si.edu/stories/editorial/investigating-writing-columbia%E2%80%99s-walls>, accessed June 7, 2018.

<sup>6</sup> For further information on the Smithsonian's Apollo collection, see Teasel Muir-Harmony, *Apollo to the Moon: A History in Fifty Objects* (Washington, D.C.: National Geographic, 2018).