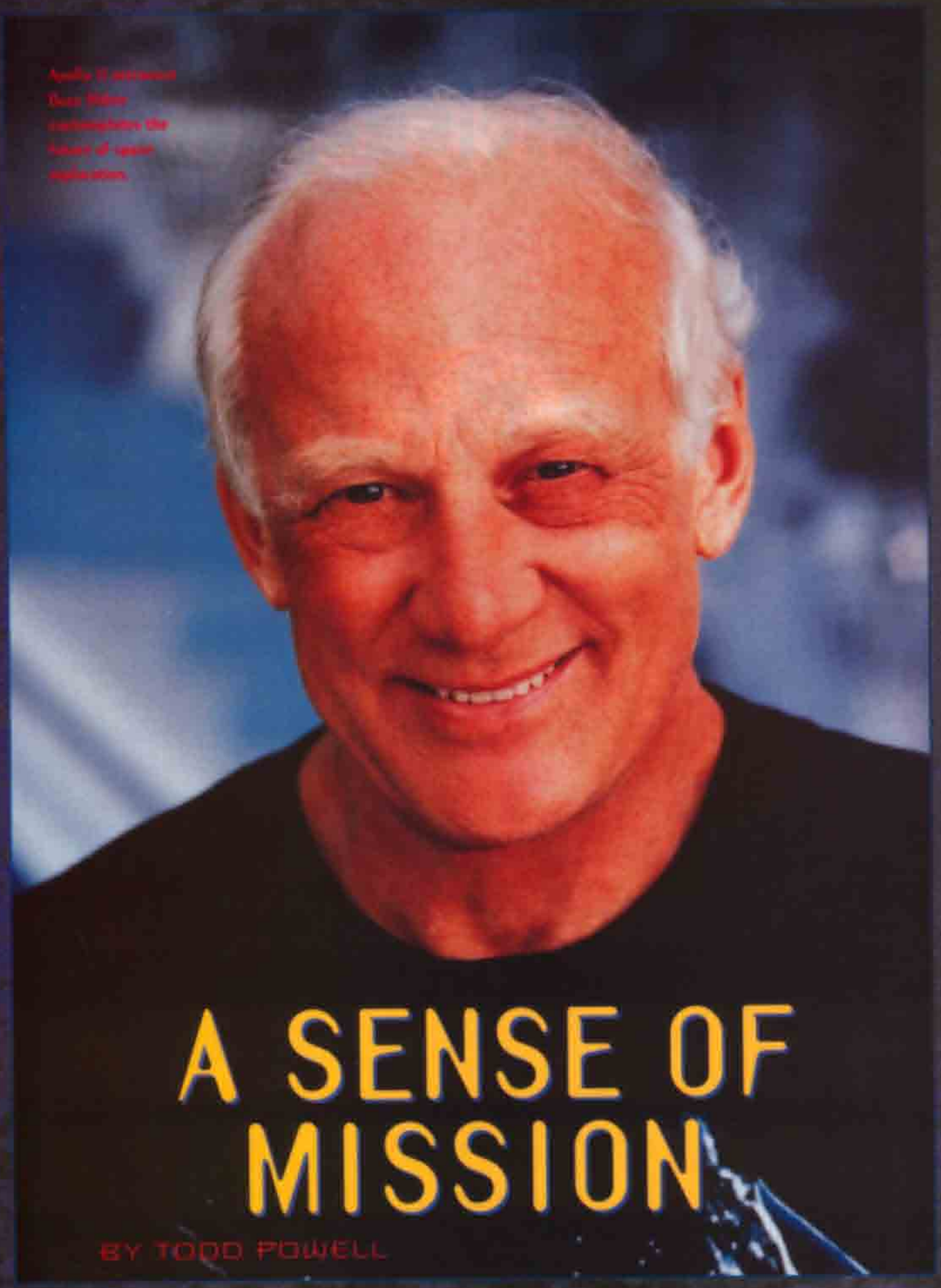


Apollo 13 astronaut Dave Scott contemplates the future of space exploration.

A SENSE OF MISSION

BY TODD POWELL

LOOKING BACK

Twenty-five years ago this month, astronauts Neil Armstrong and Buzz Aldrin took the first steps on the moon. Apollo 11 came to symbolize the culmination of an era of Cold War skirmishes and technological advancements. In the following pages, we look back, through the eyes of Buzz Aldrin and others involved in the mission, at the events that led to this historic moment.

PLUCKING A GLASS PAPERWEIGHT OF THE EARTH FROM HIS BOOKSHELF, BUZZ ALDRIN CRADLES IT IN HIS PALM LIKE A FRESHLY PICKED APPLE. HE SHIFTS IT FROM HAND TO HAND, PLACES IT ON HIS DESK, USES IT TO DEMONSTRATE A SHUTTLE-AND-SPACE-STATION SYSTEM

he calls the "Cycler," which could eventually take people to Mars and back.

Brimming with ideas for the future, Aldrin remains inextricably tethered to the past. On July 20, 1969, along with Neil Armstrong, he left the first human footsteps on the powdery lunar surface. Apollo 11 was witnessed by 600 million people around the world; its crew became instant heroes and celebrities.

Earth's largest satellite is woven into Aldrin's life. Outside his Laguna Beach, California, home lies a moon welcome mat. Inside by the door hangs an Andy Warhol silkscreen of him on the moon next to the American flag. The gold ring on his right hand forms the shape of a star inside a crescent moon. A moon and Earth painting given by the Taiwanese government hangs above the hearth.

Aldrin was born for the moon. His father was an aviation pioneer and student of Robert Goddard, renowned rocket developer. His mother's maiden name was Marion Moon. In the soft morning daylight, his eyes take on the blue-gray tinge of lunar seas.

Even so, Aldrin avoids sentiment as he discusses Apollo 11. A former Air Force pilot with a doctorate in space rendezvous from MIT, he seems more comfortable in the realms of strategy and application than emotion and philosophy.

Kicking a leg up on his bookshelf, he leans back in his chair, explaining the technological achievements of Apollo 11. His voice resonates like the matinee idols of his generation—settling somewhere between Charlton Heston and Kirk Douglas.

"Apollo really was an engineering feat of the greatest magnitude—based upon advanced levels of understanding of science, of mathematics, of computer processing, of information for navigation and autopilot control," he says, spinning the paperweight globe on his desk. "Putting 'em all together was really an enormous engineering task."

Apollo 11 was also the climax of the Cold War race to the moon, a race that started dramatically on October 4, 1957 when the 184-pound Soviet satellite *Sputnik* shot into orbit. America was caught off guard. Under the guidance of German-born rocket scientist Wernher von Braun, the United States had been developing rockets capable of putting a satellite into orbit, but the Eisenhower administration didn't provide von Braun the support he needed until after *Sputnik* beeped its way across the sky.

The race escalated in April 1961 when Russian cosmonaut Yuri Gagarin became the first man in space. Less than a month later, Alan Shepard was the first American in space, taking a brief 15-minute ride in *Freedom 7*. Shepard's trip was long enough to signal the Soviets that America was ready to compete. President Kennedy laid down the gauntlet in a speech to Congress on May 25: "I believe this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the moon and returning him safely to the earth. No single space project in this period will be more impressive to mankind or more important for the long-range exploration of space."

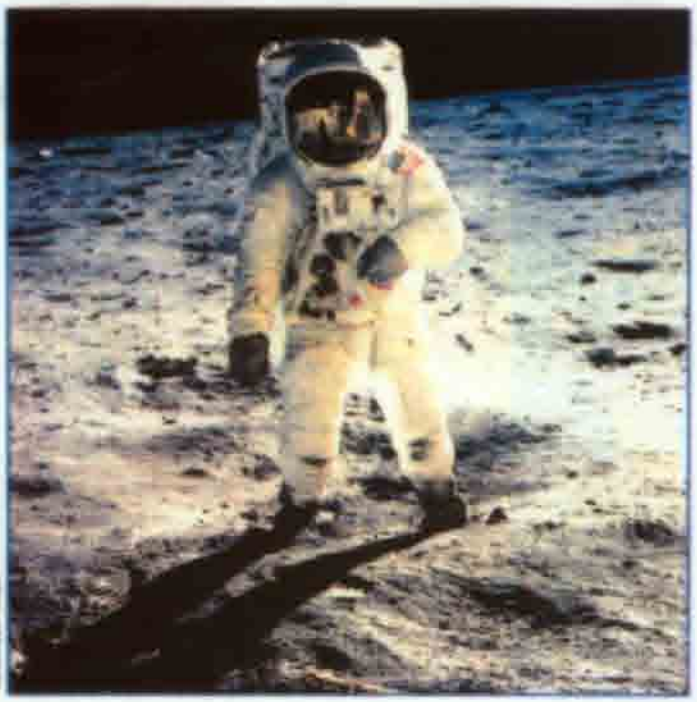
Kennedy's speech heightened the sense of urgency and political competition that the space program represented. Now there was firm backing, a mission and a deadline. Into this fervor stepped Aldrin, Armstrong and Michael Collins, who piloted the command module *Columbia* while Aldrin and Armstrong landed on the moon. The first group of astronauts, the Mercury Seven, had all been test pilots—stick-and-rudder men such as John Glenn and Gus Grissom who were skilled in handling new aircraft and risky flight missions. Armstrong and Collins, who entered the program in 1962 and 1963, were also test pilots. Aldrin wasn't—though he had flown 66 combat missions in Korea and shot down two Soviet MiGs.

Joining NASA in 1963, Aldrin was a different kind of astronaut. "The area that attracted me was mission planning, the overall purpose of the mission, and specifically how do we achieve portions of that which have to do with the multispacecraft maneuvering," he says. These interests and his academic degree earned him the nickname Dr. Rendezvous. They also made him a prime candidate for Gemini missions—two-man flights that developed the methods of orbital rendezvous and docking necessary for a flight to the moon.

Until the summer of 1965, the Soviets seemed to have the upper hand. Despite John Glenn's triumphant orbit of Earth in 1962, the Soviets kept chalking up one extraterrestrial record after another: June 1963—first woman in space; October 1964—first three-man spaceflight; March 1965—first spacewalk. America appeared to be stumbling down the backstretch.

But the Gemini project shift-

Lunar trio. (From left) Neil Armstrong, Michael Collins and Buzz Aldrin.



COURTESY NASA

On the surface: Neil Armstrong's famous photo of Buzz Aldrin.

ed momentum back to the United States. During the June 1965 flight of *Gemini 4*, Edward White became the first American to walk in space. In December, *Gemini 6* and *7* rendezvoused in space. The following year, *Apollo 11*'s crew made their inaugural space flights—Armstrong in *Gemini 8*; Collins in *Gemini 10*; Aldrin in *Gemini 12*. In the latter mission, Aldrin set an EVA (extravehicular activity) record by spacewalking a total of 5½ hours while he performed a series of manual tasks outside his capsule.

NASA appeared ready for the final project that would lead to the moon, when tragedy struck. On January 27, 1967, Gus Grissom, Ed White and Roger Chaffee—the crew of *Apollo 1*—were killed in a launch-pad training accident, setting the program back a year. Finally, after a major investigation, the Apollo project resumed with the liftoff of *Apollo 7* in October 1968. And with *Apollo 8*, which flew at Christmas in 1968, making 10 orbits of the moon, a lunar landing at last seemed inevitable. Kennedy's goal of landing on the moon before the end of the decade was in reach.

But Aldrin and his crew, three-quarters of the way up to the white room on the towering gantry, while technicians and support crew prepared Armstrong and Collins in the command module. The morning of July 16, 1969 had arrived; Aldrin was the last to enter *Columbia*. He surveyed the scene at Cape Kennedy's Launch Pad 39A.

"I was carrying my little cooling ventilator, standing there at 7 in the morning. The sun was just coming up, the waves were coming in and there was a haze out there," he recalls, motioning with his hands. "There are all the cars and the people parked, and nobody else. You may look down to the bottom and see some people walking, but not very many because we're getting late in the countdown. And the frost and the mist is coming off the rocket and you're looking at this thing . . .

"You say to yourself, 'Well, this is one memory I'm going to try to store away.' But I'm not really sure that there were philosophical thoughts that went along with it."

Down below, 3,000 members of the media gathered, waiting for liftoff. At 9:32 A.M., the Saturn V rocket's five engines ignited, burning more than 85,000 pounds of fuel in the first 8.9 seconds. It had 1.5 million pounds of thrust—the most powerful rocket ever created. Among the journalists present was Walter Cronkite, who recalls the scene's overwhelming bugle call. "No adventure of man was launched with such a physical tumult," he notes. "It came across with a tremendous roar. . . . It seemed to be announcing the importance of what we were all up to. This is us going, and this is what it takes to go. It was really a terribly exciting moment."

Apollo 11 lifted into space with ease, eventually reaching a speed of 24,545 mph after nearly two Earth orbits. Two days and 240,000 miles later, *Columbia* reached lunar orbit. On the morning of July 20, Aldrin entered the lunar module *Eagle* through the tip of the command module; Armstrong followed, and a few hours later, *Eagle* detached from *Columbia*. "The *Eagle* has wings," Armstrong remarked as they began their descent to the lunar surface.

To this point, each of the stages had been performed by previous missions. *Apollo 9* proved the ability of the lunar module to dock with the command module, and *Apollo 10* flew in low over the Sea of Tranquility—*Apollo 11*'s targeted landing site. Now, however, Aldrin and Armstrong were on the verge of a novel voyage—with the help of countless hours of training and the advice of Mission Control in Houston.

Both were necessary. Just two minutes into its descent burn, *Eagle*'s onboard computer alarm started blaring. Almost immediately, Aldrin announced, "Program alarm. It's a 12-0-2." The system was overloaded.

As the alarm continued, Houston's computer expert and command chief considered the implications. Armstrong asked for a reading.

JUST TWO MINUTES INTO ITS DESCENT BURN, EAGLE'S ONBOARD COMPUTER ALARM STARTED BLARING. ALMOST IMMEDIATELY, ALDRIN ANNOUNCED, "PROGRAM ALARM. IT'S A 12-0-2." THE SYSTEM WAS OVERLOADED.

Finally, word came. "We're go, *Eagle*. Hang tight, we're go."

Eagle eased down toward the surface as Aldrin read off the descent numbers. In retrospect, he wishes he had spent more time looking out the window. "We were going forward with the landing gear this way, facing down, with the rocket in front," he explains, using his fist to demonstrate the flight path of the lunar module, his fingers sticking out to form its buglike legs. "At a certain point we yawed around, and shortly thereafter we pitched forward. . . . The earth was in view for just a moment, and then it went high in the window and behind us."

But Aldrin had a job to per-

form. "We didn't have advances like a heads-up display where Neil could look out a window, and in front it would display the computer readouts so he could assimilate all of that," he says. "We had to do that by teamwork."

Soon it became clear that they were overshooting their target. Fuel was a concern as well. "It was as low or lower than it had been in any of the simulations or training," Aldrin notes. Other obstacles also became evident. Huge boulders and craters were strewn about the moonscape, and *Eagle* needed a smooth surface on which to land.

All Apollo missions after 11 used an updated autopilot system that could handle such predicaments. "If you put that into a video game for some kid to play with, it'd be a piece of cake—I could guarantee you," Aldrin says with a laugh. "Landing on the moon with the new control system would be a rudimentary, simple task—unless something went wrong. That's why you've got test pilots out there."

And that's where Armstrong's experience paid off. Once before, in *Gemini 8*, he had masterfully righted the capsule out of a wild spin caused by a stuck thruster. Now he needed to bring *Eagle* down safely, with the constant reminder from Mission Control that fuel was getting low. Armstrong took manual control of the spacecraft at 500 feet altitude.

"Sixty seconds."

Aldrin read the altitude and descent numbers: "Down 2½... 19 forward... forward... 2½... kicking up some dust ...faint shadows... drifting to the right a little."

"Thirty seconds," Mission Control interjected.

Eagle's 68-inch-long probes grazed the surface.

"Contact light!" Aldrin exclaimed.

"Shutdown," replied Armstrong.

"OK, engine stop," Aldrin said as the lunar module settled into the moon's surface.

Armstrong then delivered the famous sentence: "Houston, Tranquility Base here. The *Eagle* has landed."

"Roger, Tranquility, we copy you on the ground," responded Charles Duke at Mission Control. "You've got a bunch of guys about to turn blue. We're breathing again. Thanks a lot."

After a rest and a check of the lunar module's internal systems, Aldrin and

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Armstrong prepared for their historic walk, donning their bulky white suits and portable life-support system backpacks. As commander of the mission, Armstrong drew the privilege of being first to step off the nine-rung ladder and onto the moon.

Backing down the ladder, he pulled a lanyard that activated a black-and-white TV camera. Millions watched as he described the surface before taking the final step and making perhaps the most memorable statement of the modern era: "That's one small step for man. One giant leap for mankind."

Aldrin followed 20 minutes later. Stepping down, he scanned the horizon. Two words came to mind: "Magnificent desolation"—an oxymoron.

THE PHONE RINGS CONSTANTLY in Buzz Aldrin's home these days. He's up at 6 in the morning making and fielding calls. Some are from journalists seeking interviews; others from compatriots seeking to exchange ideas about the future. One person calls to see if Aldrin caught a show on cold fusion. Another talks with him about RD 180 engines.

Taking his foot off the bookshelf, he leans forward in his chair, describing the brevity of his lunar walk 25 years ago: "It was just *too* short. And it was a very focused time with history-making events like getting on the surface and putting the flag up, talking to the president—things that were somewhat interrupting the normal explorer's prudent tasks. And it was *prudent* to get outside and look at the spacecraft you just landed in."

He gives a chuckle. "Really the challenge was to land safely, do a few things and get back in and leave."

Not everything about the space program has been prudent, in Aldrin's eyes. Indeed, he's become an outspoken critic of NASA's and the government's inertia when it comes to moving forward in space. After Apollo 11, only five more lunar landings were made—none since Apollo 17 capped off the moon program in December 1972. Apollo 18 and Soyuz 19 offered a brief moment of detente in July 1975, when Americans and Soviets shook hands in space. But then six years lapsed before another American launched into space—something Aldrin finds appalling.

As chairman of the National Space Society, he's lobbied hard for the Space Station, which comes up for vote in Congress this summer. But he knows the political climate has changed considerably since 1969. The Cold War is over, for one thing, and the recession hasn't helped much. Furthermore, the public has lost its enthusiasm, spurred by such mishaps as the Hubble telescope's focus problems.

"As the environment of what's going on in the space program goes through its evolution, different things are appropriate," he concedes. "It's not quite as appropriate to talk with great enthusiasm about going to Mars because that's not one of the things that's under consideration now."

But Aldrin isn't about to give in. Since about 1983—when serious thought was being given to using the moon's surface as a gigantic solar energy collector—the driving force in his life has been to find ways to return people to the moon in reusable systems, instead of Apollo's throwaway system. (Half a billion dollars worth of equipment has been left on the lunar surface.) He also hopes to take advantage of Russian know-how—both the Energia rocket and the already existing Mir space station—and is a strong advocate of a cooperative international effort in space. Once these systems and alliances are developed, Aldrin hopes his Mars Cycler will be the next logical step.

Meanwhile, he'll bide his time. "Nobody's gonna flock around trying to help Buzz and his efforts," he says. "So it's been beholden upon me to try to grow this system for going to Mars while the climate isn't that conducive to having people work on new and different ways."

If Buzz Aldrin is an explorer at heart—Huck Finn looking for the next raft of possibility, whether it's pondering how to get to Mars or scuba diving off the Great Barrier Reef—he's also a pragmatist, knowing he'll forever be identified with the moon landing. It changed his life, after all. And if he doesn't gush memories in a glory-days kind of reverie, it's not because he's trying to shelve the past. On the contrary, Aldrin is trying to make the past part of our future. That may be a more challenging task than landing on the moon. ▲

Todd Powell is associate editor.