

MOONWALK SPECIAL REPORT

History's 'giant leap for mankind'

On July 20, 1969, humans made their mark in the lunar dust

BY JOHN NOBLE WILFORD

In memory, after all this time, Apollo resists relegation to the past tense:

It is close to midnight, and the summer air is warm and still, no heavier than usual for Florida. We are driving toward a light in the distance. Its preternatural glow suffuses the sky ahead but, strangely, leaves the land where we are in natural darkness.

After the first checkpoint, miles back, where guards inspected our badges and car pass, the source of the light comes into view. The sight is magnetic, drawing us on. Strong xenon beams converge on Pad 39A, highlighting the mighty Saturn 5 rocket as it is being fueled. Our car radio tells us the countdown is proceeding on schedule.

These are the wee hours of July 16, 1969 — the day the country has waited for since 1961. The rocket fueling continues, the radio informs us. The countdown proceeds without interruption.

A few more miles, another checkpoint, and Doug Dederer, a freelance writer for The New York Times, and I approach the Vehicle Assembly Building, a mammoth presence rising above the flat terrain of sand, palmetto and lagoons stretching to the Atlantic. We have beaten the heavy traffic that will clog the roads in the next hours. Several thousand journalists will be coming out in cars and buses, and 5,000 V.I.P.s — diplomats, members of Congress, industrialists, movie stars and former President Lyndon B. Johnson, who had championed the National Aeronautics and Space Administration and its Apollo program.

The roads outside the Kennedy Space Center gates are already filling with the cars and campers of more than a million tourists arriving for the launching. Even the rivers are crowded with an armada of pleasure boats.

We turn off the highway and pull into the press site, three miles, or five kilometers, this side of the shining light on Pad 39A. This is judged to be a safe distance away in case of an explosion. We

park next to a rusting old house trailer. Here we will wait for dawn and the liftoff, now some eight hours away.

THE SPACE RACE

The first time I came to Cape Kennedy (as Cape Canaveral had been renamed) was in December 1965. Momentum was then building in the space race between the Cold War superpowers, the Soviet Union and the United States. It all started with the Sputnik alarm in 1957 and then President John F. Kennedy's challenge to the nation in 1961 to put astronauts on the Moon by the end of the decade.

The first Americans flew in the Mercury capsules, with room for only one pilot and limited maneuverability. The Gemini was a two-seater built for longer flights and outfitted with navigation systems for practicing rendezvous maneuvers essential for lunar missions. I was at the Cape for the tandem mission of Geminis 6 and 7. After some delay and improvisation, astronauts successfully steered the two craft to a rendezvous in Earth orbit.

Gemini 8, a few months later, was a disaster narrowly averted. Neil A. Armstrong was at the controls of the spacecraft, with David Scott as co-pilot. There had been no hitches at liftoff, and the astronauts docked with an orbiting Agena target vehicle, the mission's principal objective. Then trouble struck. The Gemini began bucking and spinning because of a misfiring thruster rocket. Armstrong feared that he and Scott might lose consciousness from the high spin rate. They disengaged from the Agena, but still could not bring their spacecraft under full control. Armstrong managed to steer the Gemini to an emergency splashdown before the end of its only day in space.

Four more Gemini missions followed, mainly trouble-free, concluding the project in November 1966. The way was cleared for the first flights of the three-person Apollo craft, the first of which was already at the Cape.

On the afternoon of Jan. 27, 1967, the three astronauts — Virgil I. Grissom, known as Gus; Edward H. White II; and Roger B. Chaffee Jr. — were going through a dress rehearsal on the launching pad. The rocket was not fueled, but in every other respect, the crew and the launching teams went through the complete countdown procedures.

At 6:31 p.m., one of the astronauts yelled through the communications static, something like "Hey!" or "Fire!" A second later, monitors indicated movement in the cockpit and a rise in cabin temperatures. An astronaut cried out, "We've got a fire in the cockpit!" It took approximately five minutes for pad workers to open the hatch and fight their way through acrid smoke — too late. It was the darkest hour in the Apollo program.

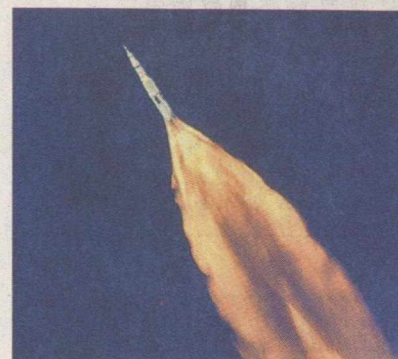
A NATION IN TUMULT

More than a year and a half of re-design and re-testing of the Apollo spacecraft passed before astronauts were finally cleared to fly one. The second of these



Hundreds of spectators, many of whom had camped overnight, gathered on the beach in Titusville, Florida, to watch as Americans reached for the Moon with the launching of Apollo 11.

In this report on Apollo 11, a New York Times reporter who covered the launching describes the unnerving buildup to the mission and its spectacular success.



missions, Apollo 8, restored confidence that the goal was in sight and attainable. It is still spoken of as the Genesis flight.

The flight came in the Christmas season at the end of one of the most tumultuous years in American history. The country in 1968 was divided and demoralized. Opposition to the Vietnam War had forced Johnson to withdraw from a run for another term. The Rev. Dr. Martin Luther King Jr. fell dead in Memphis from an assassin's bullet, a tragedy that incited a riot of arson and looting in scores of cities. The mourning and fury had hardly subsided when Robert F. Kennedy was cut down by another assassin's bullet, in Los Angeles.

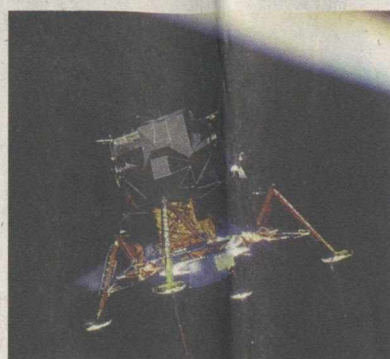
Protests raged on university campuses and provoked violent clashes between the police and demonstrators at the Democratic convention in Chicago.

The Cold War that engendered the Apollo drive to the Moon was now, on another front, threatening to be Apollo's undoing. No one in power, as I recall, seriously advocated canceling or deferring the enterprise. Yet amid a shooting war abroad and bitter unrest at home, going to the Moon slipped lower in the public's order of priorities.

THEN, EARTHRISE

Apollo 8 proved to be a tonic at this crucial time. The astronauts — Frank Borman, James A. Lovell Jr., and William A. Anders — flew to the Moon and circled it 10 times in orbits within 60 miles of the lifeless surface. Apollo's television camera recorded the gray plains and wide craters, one scene after another of everlasting desolation. On the fourth orbit, as Apollo emerged from behind the Moon, Borman, the commander, exclaimed: "Oh, my God! Look at that picture over there! Here's the Earth coming up. Wow, that is pretty!"

The astronauts gasped at the sight of Earth, a blue and white orb sparkling in the blackness of space, in contrast to the dead lunar surface in the foreground. People at home saw the full Earth only in black-and-white television images. Even so, the sight moved the poet Archibald MacLeish to write in The Times on Christmas Day: "To see the Earth as it truly is, small and blue and beautiful in that eternal silence where it floats, is to see ourselves as riders on the Earth together, brothers on that



bright loveliness in the eternal cold — brothers who know now they are truly brothers." After the mission, NASA released the color pictures the astronauts had taken of "Earthrise."

Looking back, three of the nine Apollo lunar missions stand out from the others as especially emotional experiences. Apollo 11 made history. A bold commitment was fulfilled, and those

Armstrong tests the footing.

"The surface is fine and powdery," he radios. "It does adhere in fine layers."

alive then have never forgotten where they were and their feelings when humans first walked on the Moon. Apollo 13, unlucky 13, was a suspense epic unfolding in real time to a global audience. Three astronauts went forth, met disaster, faced death and barely limped back to the safety of home. And Apollo 8, as the first flight of humans beyond Earth's low orbital confines, restored momentum and magnitude to the adventure of reaching for the Moon.

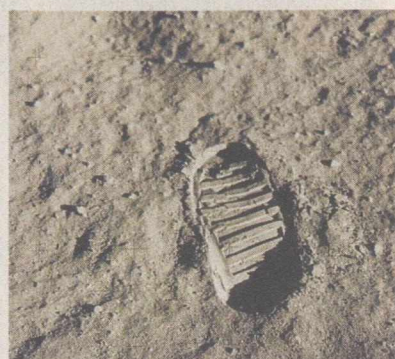
Michael Collins, who was the capsule communicator (capcom) in Mission Control for the flight, said that the essence of Apollo 8 was about leaving, and that Apollo 11's was about arriving.

"As you look back 100 years from now, which is more important, the idea that people left their home planet or the idea that people arrived at their nearby satellite?" Collins asked himself. "I'm not sure, but I think probably you would say Apollo 8 was of more significance than Apollo 11, even though today we regard Apollo 11 as being the showpiece and zenith of the Apollo program, rightly so. But, as I say, 100 years from now, historians may say Apollo 8 is more significant; it's more significant to leave than it is to arrive."

THE LAUNCHING

In the early light of dawn, the three Apollo 11 astronauts take the drive from their quarters to the launching pad. Everything is on schedule for a liftoff at 9:32 a.m.

Apollo 8 had departed on time. So had Apollo 9, a flight test with the lunar landing module in Earth orbit, and Apollo 10,



which orbited the Moon and practiced deploying and recovering a lunar module — the final readiness test for a landing attempt. We have become accustomed to reliability, but it cannot be taken for granted.

Precisely on schedule, Jack King, the "voice of Apollo," intones the final countdown. 5-4-3. Ignition.

Orange flame and dark smoke erupt from huge nozzles at the base of the Saturn 5. The rocket hesitates, held down by heavy steel arms. 2-1, King continues. "We have liftoff."

Once at full thrust, and unbound, the 3,817-ton spaceship strains to overcome gravity, and for a heart-stopping second or two, appears to be losing the fight. Then, ever so slowly, it rises and clears the tower.

Only now the staccato thunderclaps from the engines reach the press site, confirming once again that sound travels more slowly than light. The blasts beat on your chest and shake the ground you stand on. The experience is visceral, the Saturn moving earth and smacking us with good-byes. The spacefarers are off over the ocean, fire and vapor trailing behind, on their way to the Moon.

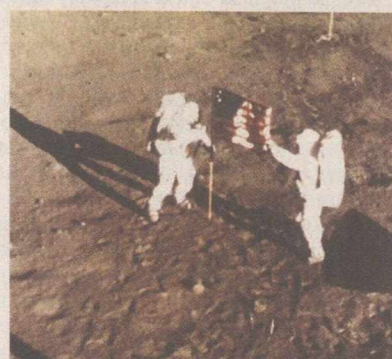
In less than 12 minutes, as Saturn 5's three stages fire one after the other, the Apollo command module and its linked lunar module settle into a low orbit of Earth. The astronauts have two and a half hours to make sure they have a Moon-worthy vehicle. Then, another firing of the Saturn's third-stage rocket powers Apollo 11 onto its lunar trajectory. I begin to write.

MOONFALL EVE

In the night before the day of the Moon walk, I lie wide awake in bed at a hotel down the road from the Houston space center. I have returned from the late change-of-shift briefing by a flight director: nothing new, the crew and their spacecraft are fine. On the fourth day of its journey, Apollo 11 had rocketed into orbit around the Moon. The astronauts so far are following a course almost identical to the one traveled by Apollo 10, only two months before.

I am exhausted but too excited for sleep. The landing is scheduled in less than 14 hours.

I think of what I will write. I have never made a practice of composing a draft



story in anticipation of a success, or alternative drafts for failure. I trust myself to draw inspiration from what happens, thinking spontaneity will serve me better and endow the story with the energy of immediacy. But now, phrases and disconnected sentences spill out of my wakefulness.

I get up and read the articles I have written about the mission up to now. Reporters may feel impelled to write of the next day's events as the culmination of the space race, the achievement of an ambitious national goal, a historic triumph. I swear to myself that I will not use "historic" in my top paragraph.

I reach for my notebook and try several opening sentences. They must be put on a strict diet. I cross out adjectives. I eliminate clauses that are superfluous and sound too much like heavy music for a movie soundtrack. I begin again: "American astronauts landed."

If Columbus were alive, he might be less astonished by two men landing on the Moon than by the millions of people watching every step.

No, too restrictive and chauvinistic; it will be clear soon enough that the astronauts are American and the goal of a decade has been achieved.

I finally get to the irreducible essence in one short sentence: "Men have landed and walked on the Moon."

THE LANDING

After three or four hours' rest, I drive to the space center to start the longest day in my career. It is no more than 6 o'clock. Nothing has changed overnight. The astronauts of Apollo 11 are up and getting ready for the landing attempt. At the newsroom, only steps from Mission Control, foreign reporters are filing copy for next editions in distant time zones. Others mill around, their eyes baggy.

On Apollo's 13th orbit of the Moon, Armstrong and Edwin E. Aldrin Jr. crawl into the lunar module Eagle, leaving Michael Collins to fly the command module while they are away. The two modules separate. With the firing of the Eagle's descent engine, Armstrong and Aldrin,

known as Buzz, ride toward the Moon.

Armstrong keeps an eye ahead, as they draw nearer to the surface, and checks lights and gauges on the cockpit computer display. Aldrin, on the radio to Mission Control, reads off altitude, fuel reserves and other data every few seconds.

The descent steepens, the engine firing continuously. The Eagle closes in on its target in the Sea of Tranquility, a broad basin that is a smudge on the right face of the Moon, as seen from Earth on clear nights. Hovering 300 feet above the designated landing site, Armstrong makes a startling discovery: the land there is littered with dangerous boulders.

Armstrong grabs manual controls for the rest of the way down. For about 90 seconds, he searches the surface for a clear spot, flying over a crater and ignoring warning lights from an overloaded computer.

If not for a final simulation before the mission, the flight director Gene Kranz will say later, controllers probably would have aborted the landing at this moment. The same alarms in the practice run had led them to the wrong conclusion, an abort command, but now they recognize that those signals can be safely disregarded.

Thirty feet, the engine exhaust kicking up lunar dust, Armstrong has only seconds left to make a landing or to abort and return, by firing the ascent engine, to the command module. Fuel is running low, near empty. Armstrong remains cool and finally sees a smooth spot he likes.

A blue light on the cockpit controls signals that the 5-foot-long probes, like curb feelers, have touched the surface. He cuts off the engine, and the Eagle settles to the surface, a few miles down-range from the intended site. Over the radio, the Apollo 11 commander announces: "Houston, Tranquility Base here. The Eagle has landed."

Charlie Duke, the capcom, responds: "Roger, Tranquility. We copy you on the ground. You got a bunch of guys about to turn blue. We're breathing again."

The same can be said for reporters at the Mission Control newsroom. The touchdown came at 3:17 p.m., Houston time. After a post-landing news conference, I begin writing the top of my story, which will soon appear under the banner "Men Land On Moon."

LIVE, FROM THE MOON

On July 20, 1969, at 9:56:20 p.m., Central Daylight Time in Houston, Armstrong steps from the Eagle's ladder to the surface of the Moon. His first words: "That's one small step for man, one giant leap for mankind." He presumably means "one small step for a man," but the article is lost in the static, or he simply forgets it in his understandable excitement.

Armstrong tests the footing. "The surface is fine and powdery," he radios. "It does adhere in fine layers, like powdered charcoal, to the soles and sides of my boots. I only go in a fraction of an inch, maybe an eighth of an inch. But I can see the footprints of my boots and the treads in the fine, sandy particles."

The astronaut determines that he can move about easily in his bulky white spacesuit and heavy backpack while under the influence of lunar gravity, which makes everything weigh one-sixth of what it weighs on Earth. After 19 minutes, he is joined outside by Aldrin, who had been preparing and handing down equipment for their walk. The two immediately set up a TV camera away from the craft to give people back home a broader view of the lunar landscape and their operations.

It then occurs to me that if Columbus and Capt. James Cook were alive, they might be less astonished by two men landing on the Moon than by the millions of people, worldwide, watching every step of the walk as it happens. Exploring is old, but instantaneous telecommunications is new and marvelous.

In just 1.3 seconds, the time it takes for radio waves to travel the 238,000 miles from Moon to Earth, each step by Armstrong and Aldrin is seen, and their voices heard, throughout the world they have for the time being left behind. In contrast to exploration's previous landfalls, the whole world shares in this moment.

Now Aldrin is describing the bounding kangaroo hops of their movements in the low lunar gravity. "Sometimes it takes about two or three paces to make sure that your feet are underneath you," he explains. "And about two or three, maybe four, easy paces can bring you to a fairly smooth stop."

The astronauts plant an American flag, deploy three scientific instruments for collecting data in the months after their departure, and pick up samples of rock and soil. At one point, they pause for a telephone call from the White House. "Because of what you have done," President Richard M. Nixon tells them, "the heavens have become a part of man's world."

The Moon walk lasts 2 hours and 21 minutes. After I file my wrap-up story and wait for any questions from the national desk, it is going on 3 a.m. I know I have just written the biggest single story of the century. **MOON, PAGE II**

MOONWALK SPECIAL REPORT

The 1960s didn't die quietly. In the final summer of a world-shaking decade, there were anti-war demonstrations, a new women's rights movement and the Woodstock Music and Art Fair. But on July 20, 1969, the clamor stilled as people around the world gathered to see two astronauts walk on the moon. Here are 13 recollections of the Apollo 11 landing.



STEWART BRAND
Author of "Whole Earth Discipline" and creator of the Whole Earth Catalog

I was an undergraduate at the University of Chicago. Though I didn't know about Stonewall or Woodstock or the other things happening that summer, the world was opening up for me. The idea that there was an intellectual universe and where new knowledge was coming out, it was exciting. I was less impressed that someone was walking on the moon than the fact that it was being broadcast in real time. The moon shot was a revelation of the power of electromagnetism to make extraordinary connections. I was learning about that stuff in school and comprehending it. It had seemed very abstract. Yet, there it was: these guys walking on the moon! It inspired me.



FRANK A. WILCZEK
Professor of physics at M.I.T., Nobel laureate for Physics in 2004

APOLLO'S LEGACY

Spaceflight is now embedded in our culture, so much so that it is usually taken for granted — a far cry from the old days when the world held its breath for Alan B. Shepard Jr. and John Glenn and watched, transfixed, the scene at Tranquility Base. That was then; no astronauts today are household names. Yet space traffic is thick and integral to the infrastructure of modern life.

Seldom does it cross our minds that our voices and text messages are carried across continents and oceans via satellites. Our weather and the effects of global warming are tracked from space. Our news, including reports of astronaut missions now relegated to back pages, is disseminated through space.

We view the spectacular images from the planet Saturn and the far cosmos with less thought to how they were obtained than of the beauty and abiding mystery they call to our attention.

For a brief time, when spaceflight was fresh and exciting, we embraced astronauts as heroes who took risks to reach grand goals. We believed then more readily in heroes, people who reflect what it is that we feel is admirable in humanity, who inspire us at least to strive to live up to some ideal image.

Only four years before Sputnik, Edmund Hillary and Tenzing Norgay were hailed as heroes for making the last "giant leap for mankind" of the pre-space-age generations. Their ascent to the top of Mount Everest, as high as anyone can aspire and still be rooted on terra firma, culminated an era of crossing oceans, penetrating continental interiors and reaching the ends of the earth. They created a divide in exploration between the more individual exploits of yore and the greater team efforts mobilized to challenge newer frontiers of achievement.

On this side of the divide, potential heroes get lost in the crowd of collaborators and overshadowed by their enabling technology. Even the amazing technology itself, so swiftly domesticated for the workplace and home, soon seems too ordinary to be remarkable. Our laptops have a greater capacity than any of the computers in the Apollo Project.

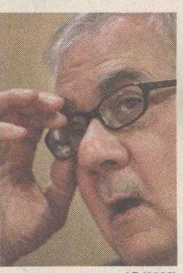
Neil Armstrong has earned the last word. "I think we'll always be in space," he said in a 2001 interview for NASA's oral-history program. "But it will take us longer to do the new things than the advocates would like, and in some cases it will take external factors or forces which we can't control and can't anticipate that will cause things to happen or not happen."

Armstrong then struck a note that resonates with his contemporaries, and that includes me. He and his Apollo 11 crew were born in the same year, 1930, three years before I was; we were the right age at the right time and places to participate in a singular adventure in history, whatever its legacy as seen through the eyes of later generations. "We were really very privileged," Armstrong said, "to live in that thin slice of history where we changed how man looks at himself and what he might become and where he might go."



URSULA K. LE GUIN
Author

The day Apollo left Earth for the Moon, my husband and I and our three kids left England for America. We just had time to see lift-off on our rented TV and rush around the corner to return the TV before we caught a cab to the train to Tilbury to board our ship — a small Russian liner, the Alexander Pushkin. The ocean crossing took about a week. News on board was limited to a daily print-out, mostly about events in the U.S.S.R. But one afternoon the captain came on the ship's audio system and gravely, politely, and a little ruefully congratulated the United States on the successful landing of the Apollo crew members on the Moon. We five Americans put up a little cheer, and our Russian fellow passengers cheered too, out there in midocean.



REP. BARNEY FRANK
Democrat of Massachusetts, chairman of the House Banking Committee

Man on the Moon:



ADAM MICHNIK
Activist in the 1980s Solidarity movement, editor of Gazeta Wyborcza

In July 1969, I was in jail in the Polish town of Sztum, a serving three years for my role in the 1968 Polish student movement. I was 23. About the Apollo landing: I learned about it immediately from Trybuna Ludu, the Communist Party's official organ. The news was accompanied by acid, somehow envious, pieces of commentary. The Americans landing on the moon had humiliated the Communist propaganda. I thought then that the United States — which I wasn't a fan of because of the Vietnam War and the assassinations of Martin Luther King and Robert Kennedy the year before — was winning the technological race against the Soviet Union. It was a thought that made all political prisoners in the Soviet bloc immensely happy. I myself had never thought I would ever want to go to the moon. But the Apollo landing made me realize that the impossible was becoming possible, a very consoling thought for a Pole in a Communist prison.

On the hot July day of the moon shot, I was holed up in my apartment, trying to meet a deadline for New York Magazine. CBS News kept calling, looking for someone to say on-camera the criticism I felt: huge sums being justified by Cold War arguments about militarizing space, and there was no way to vote for using that money to solve big problems on earth. CBS finally sent a car. I found myself sitting next to a student leader named Ira Magaziner who had his leg in a cast; the only other person they could find who would say what was "unpatriotic," according to mountains of later hate mail. I'm proud to see that Ira Magaziner became an expert advocate for health care. And the lasting legacy of the moon shot is not beating the Soviets, but seeing and sharing this fragile Space Ship Earth.



GLORIA STEINEM
Writer and feminist organizer

A day to remember

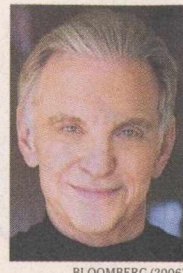


ANN DRUYAN
Co-writer, with Carl Sagan, of the "Cosmos" television series; widow of Carl Sagan; C.E.O. of Cosmos Studios.

I was on Cape Cod and had just gotten back from Vietnam — where I was not in combat, thank God, though I came home disaffected. In Vietnam, I'd seen an army occupying a country and that is pretty ugly. At the moment of the moon shot, I had really started to identify myself with the anti-war part of my generation. When I heard we had gone and landed on the moon, I thought this was yet another deprecation. This seemed like part of the technology of war, which it wasn't. I remember being in the backseat of a very nice young woman's VW bug and hearing on the car radio that we had landed on the Moon. I said, "Why don't those bastards leave the Moon alone!" She said, "I think it's great. What's the matter with you?" I've been trying to answer that question ever since.

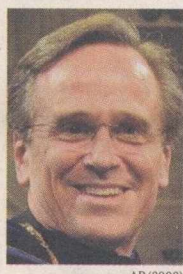


TRACY KIDDER
Author of "Strength in What Remains"



MARTIN DUEVERMAN
Historian and playwright

I was underwhelmed by the whole thing. I couldn't understand why people were so excited about Armstrong's "one small step" comment. To me, it wasn't immortal prose. By the summer of 1969, I had become very political. I suppose that's why the moon shot didn't mean that much. I was preoccupied with the black struggle, the war on poverty and feminism. Three weeks before the moon landing, the bar that I regularly frequented in Greenwich Village, the Stonewall Inn, was the scene of a pitched battle between New York's Police Department and the bar's gay patrons. That seemed momentous. Gays had been the lessons of the civil rights and women's movements to heart. The effects of that moment are still with us, 40 years later.



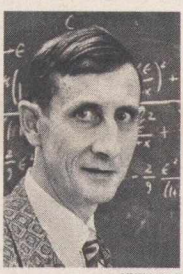
THE REV. JOHN I. JENKINS
President of Notre Dame

That was the big surprise, that NASA planned the Apollo operation as an international sporting event with the whole world watching. This strategy was brilliantly successful, but it had an unfortunate consequence. When the Russians walked out of the game, we walked out too.



PETER CUNNINGHAM (1968)
JANIS IAN
Singer-songwriter

I was 17 or 18 and had moved Philadelphia to be with my then boyfriend, Peter Cunningham, the photographer. I needed to get away from the music industry. Everything felt so apocalyptic. The Sixties were winding down, and I was winding down right with them. Then came the Moon-landing, which, as science fiction fans, we watched on a black and white TV. Who would have thought you could see that — some guy standing on the Moon. So much better than drugs! That wonderful quote, "One small step for man — one giant leap for mankind," was really moving. It could have been a horrible divisive nationalistic exclusionary moment. Instead, you had this humanistic embracing statement. Ahead of us was Watergate. But this was healing and unifying.



FREEMAN DYSON
Theoretical physicist and mathematician



MARTIN REES
Professor of cosmology and astrophysics, University of Cambridge

Neil Armstrong's "one small step" on the Moon gave us an image that is imprinted on the memories of all of us who are now middle-aged. I can never look at the moon without recalling that moment. Manned space flight has never recovered the same glamour — understandably so, because it hardly seems exciting 40 years after Apollo, for astronauts merely to circle the Earth in the hugely expensive space station. I see little practical or scientific purpose in sending people into space. But as a human being, I'm nonetheless an enthusiast for space exploration as a long-range adventure. The next humans to walk on the Moon may be Chinese. If Americans or Europeans venture to the Moon — if a child now in school will one day walk on Mars — a very different style of program is needed.

Humans leave mark in lunar dust

MOON, FROM PAGE 1

of my career, unless I should still be reporting it and when life is discovered elsewhere in the universe. I walk out into the hot, muggy night in a daze of elation and exhaustion, trying to recall where I had parked my car so long ago. I stop to gaze at the full Moon and the dark spot that is the Sea of Tranquility, where Armstrong and Aldrin are settling down after their day in history. What can they be thinking? What joy they must know, what relief! Next day, the astronauts leave Tranquility Base and rejoin Collins, in the command module. They return to a splashdown in the Pacific Ocean on Thursday, July 24. At the postmission news conference, William Hines, a reporter given to puncturing balloons, interrupts the self-congratulatory rhetoric with a question for Chris Kraft, chief of flight operations: "Chris, how do you know this was not just a random success?"

Someday, space travelers may return to Tranquility Base. The site should be just as Armstrong and Aldrin left it.

Long afterward, Collins would recall the world tour he and Armstrong and Aldrin took to foreign capitals. Collins was warmed by their reception, not so much by the adulation as the expressions of shared accomplishment. People they met felt they had participated in the landing, too. In the 2007 documentary "In the Shadow of the Moon," he said: "People, instead of saying, 'Well, you Americans did it,' everywhere they said: 'We did it!' We, humankind, we, the human race, we, people did it!" The inclusiveness of the experience was remarkable, given the space race's origins in an atmosphere of fear and belligerence.

FAREWELL TO THE MOON

Apollo 11 effectively ended the space race. The Russians conceded as much by their subsequent space endeavors. Handicapped by failures in testing their own heavy-lift rocket, they never attempted a human flight to the Moon and turned instead to long-duration flights in low orbit. American astronauts made six more journeys to the Moon, all successes, excepting the ill-starred Apollo 13. But public interest was flagging. A battle in the Cold War was won, people seemed to feel, so bring the boys home. By the end of 1972, the last of the 12 men to walk on the Moon packed up and returned home. The uncertain future for human spaceflight muted the celebrations at Houston.

At the conclusion of that flight, Apollo 17, I solicited historians' assessment of the significance of these early years in space. Arthur M. Schlesinger Jr. predicted that in 500 years, the 20th century would probably be remembered mainly for humanity's ventures beyond its native planet. At the close of the century, he had not changed his mind. How brief the space race was, the 12 years from the wake-up call by Sputnik to the first Moon walk, but thrilling, mind-boggling, even magnificent at times. No one has been back to the Moon since 1972. The United States has now embarked on a program to return astronauts to the Moon by 2020 to establish a more permanent research presence there and prepare for eventual human flight to Mars. But in the absence of the Cold War motivation, the effort lacks the money and the political mandate that favored

"WE CHOOSE TO GO TO THE MOON."

- John F. Kennedy

OMEGA
Speedmaster
PROFESSIONAL

40TH ANNIVERSARY MOON LANDING

The first and only watch worn on the moon
20 JULY 1969

Learn more by visiting the John F. Kennedy Presidential Library & Museum at www.jfklib.org

OMEGA BOUTIQUES New York • London • Paris • Zurich • Beverly Hills • Berlin • Moscow • Shanghai • Hong Kong • Tokyo

Grander missions to Moon in view

But uncertainty hangs over NASA's ambitious lunar astronaut plans

BY KENNETH CHANG

NASA's program to send astronauts back to the Moon by 2020 is often called "Apollo on steroids." To detractors, this is a description of disparagement — treading the same path as 40 years ago, only with bigger, costlier rockets. But the officials at the National Aeronautics and Space Administration say the new missions will be much grander — astronauts living on the Moon for months at a time, driving hundreds of miles across the lunar surface and, for the first time, building an outpost on ground that is not Earth.

"It's not just flags and footprints," said John Olson, director of the office within NASA's exploration systems mission directorate that integrates the disparate parts of a lunar program. "It's substantially important work." The technologies and skills, the NASA officials say, are essential before pushing on to Mars, the next major destination. Scientists see several exciting research possibilities on the Moon, like building a radio telescope on the far side, shielded from the noise from Earth, and looking for layers of frost in shadowed craters near the poles, which may preserve hints his two companions went to the surface in the lander. For the next Moon missions, all four astronauts are to head to the surface, while the Orion capsule, empty, takes care of itself.

That means the Altair lander must be much larger than the Apollo-era lander, both to carry the additional astronauts and supplies and to be able to reach more parts of the Moon. The advances in technology could also enable cargo versions of the Altair — without astronauts to bring modular components of an outpost as well as rovers. The rover concept calls for a fully pressurized cabin in which the astronauts can work in short sleeves. For sorties lasting a week or so, the astronauts would be essentially living out of their car. The spacesuits would be stored outside the rover, and the astronauts would be able to jump into them via openings in the back, enabling them to go from inside to outside in 10 minutes. "It's a total game changer," Dr. Olson said.

But the federal budget proposed by President Barack Obama would not pay for that, certainly not before 2020. After increases in the current year and for fiscal year 2010, Mr. Obama's proposed spending on human exploration in years 2011 through 2013 was several billion dollars less than what President George W. Bush proposed last year. That essentially cut the money to turn the Altair and the Ares V from paper concepts to detailed designs and real spacecraft. "No bucks, no Buck Rogers," Dr. Olson said.

But the hope of many inside and outside NASA is that the Obama administration's budget levels are just placeholders pending the recommendations of the panel reviewing the agency's human space program. Its report is expected by the end of August. Two additional pieces are needed for the trip to the Moon: the Ares V, a be-

hemoth "heavy lifter" rocket, and the Altair lunar lander, for getting the astronauts down to the Moon's surface.

At first glance, the Ares V looks more or less like the Saturn V from the Apollo era, and the Altair looks like a fashion update — with a rounder, more modern aesthetic — of the lander that carried Neil Armstrong and Buzz Aldrin to the Sea of Tranquility.

"Physics and engineering drive a lot of the designs," Dr. Olson said, explaining the similarities.

Then there are the differences. The Ares V is to be just a tad taller than the Saturn V — 381 feet, or 116 meters, versus 363 feet. But the Ares V will be able to send about 140,000 pounds, or 63,500 kilograms, on a journey to the Moon, or 40 percent more than the Saturn V.

The Ares V, unlike the Saturn V, will not carry astronauts as it lifts off. Following the recommendations of panel that investigated the loss of the space shuttle Columbia, the Constellation program puts crew and cargo on separate rockets to improve astronaut safety. While most of the spacecraft hardware — the Altair lander and the Earth departure stage — goes up on the Ares V, a crew of four astronauts will launch in an Orion capsule on top of an Ares I.

In Earth orbit, the Orion capsule will dock with the components sent up by the Ares V, and the combined spacecraft will then head to the Moon.

On Apollo 11, Michael Collins had to sit by himself circling the Moon while the other two astronauts landed. The Orion capsule, empty, takes care of itself. That means the Altair lander must be much larger than the Apollo-era lander, both to carry the additional astronauts

NASA could be told to find cheaper alternatives for getting to the Moon or to shift its target to something else, like an asteroid.

TODAY'S WEATHER--PARIS: Warm and partly cloudy. Temp. 32-62 (24-17). Tomorrow: Partly cloudy. Yesterday's temp. 29-61 (24-16). LONDON: Cloudy early, sunny later. Temp. 71-81 (23-18). Tomorrow: variable cloudiness. Yesterday's temp. 70-82 (24-17). CHANDEL: Partly cloudy. Temp. 70-81 (23-16). NEW YORK: Partly cloudy. Temp. 68-85 (21-19). Yesterday's temp. 77-83 (25-18). ADDITIONAL WEATHER--PAGE 12

INTERNATIONAL
Herald Tribune
Published with The New York Times and The Washington Post

Austria 6 S. Libya 9 Fiat,
Belgium 10 S.F. Luxembourg 10 L.Fr.
Denmark 125 D.Kr. Morocco 120 Dh.
Egypt 12 P.L. Netherlands 6.25 Flor.
France 100 F. Nigeria 20
Germany 0.75 D.M. Norway 1.25 N.Kr.
Great Britain 8 Drs. Portugal 6 Esc.
Greece 8 Drs. Spain 16 Ptas.
Iran 20 Rials. Sweden 1.20 S.Kr.
Ireland 1.00 S. Switzerland 1.00 S.Fr.
Italy 120 Lire. Turkey 2.50 T.L.
Israel 1.00 N.I.S. U.S. Military \$5.15
Lebanon 75 P. Yugoslavia 100 D.

No. 26,909

PARIS, TUESDAY, JULY 22, 1969

Established 1887

That's One Small Step for Man, One Giant Leap for Mankind
—Neil A. Armstrong as his foot touched the moon's surface.

Spacemen Fly From Moon After Fulfilling All Tasks



Standing on the moon before the lunar module and beside the American flag are Neil Armstrong and Edwin Aldrin (far right).

Luna-15 Dives to Moon; Objective Still Unknown

JODRELL BANK, England, July 21 (UPI).—Russia's Luna-15 lunar satellite apparently plunged to the surface of the moon today about 500 miles from the U.S. Apollo astronauts, but may have been severely damaged in a high-speed dive, Jodrell Bank tracking station said.

There was no explanation from Soviet sources.

Jodrell Bank's giant tracking antenna detected signal changes and then an abrupt cessation of transmissions that indicated Luna-15 had dropped out of orbit onto the lunar surface, an observatory spokesman said.

But Sir Bernard Lovell, Director of the tracking facility, said the craft was traveling about 300 miles an hour when the signals stopped.

If Luna-15 hit the surface at that speed, Sir Bernard said, "nothing is likely to survive such a landing. But this does not mean a complete crash landing."

But Sir Bernard added: "I expect to hear the thing lifting off at any moment—but I may be wrong about that. It seems to be an attempt to land and recover rock."

"If we don't get any more

Other News

U.S. Will Ease China Trade-Travel Limits

The State Department announced yesterday that American restrictions on trade with and travel to and from China would be eased. The restrictions will be lifted as of tomorrow. The department announced the change one day before President Nixon and Secretary of State William P. Rogers set out on their tour of Asian capitals. Page 13.

Kenyan Charged With Mbdya Murder

Nairobi police announced the arrest of a man who was charged with the murder of Tom Mboya, Kenyan Minister for Economic Development and Planning, who was shot on a Nairobi street July 5. Page 13.

Saigon Says Cabinet Quits, Then Denies It

The South Vietnamese government announced today the resignation of the entire cabinet, but two hours later a spokesman for Premier Tran Van Huong denied the story, saying that the spokesman had been ill informed. Page 13.

Transcript of Conversations Moon Talk--What They Said

HOUSTON, July 21 (NYT).—Excerpts from conversations between the crew of Apollo-11 and mission control in Houston during the astronauts' walk on the moon's surface:

Apollo Control (0247 GMT): Neil Armstrong on the porch at 109 hours 19 minutes 16 seconds. 25 minutes of PLSS (portable life support system) time expended now.

Eagle (both the astronauts talking): OK. Everything's nice and straight in here.

OK, can you pull the door open a little more?

Right.

OK.

Did you get the MESA out?

I'm going to pull it now.

Yes sir. The MESA came down all right.

Houston: Houston, Roger. We copy and we're standing by for your TV.

Armstrong: Houston, this is Neil. Radio check.

Houston: Neil, this is Houston. Loud and clear, break break. Buzz, this is Houston, radio check and verify TV circuit-breaker in.

Aldrin: Roger. TV circuit-breaker's in. That...

Houston: Roger. We're getting a picture on the TV.

Aldrin: You've got a good picture, huh?

Houston: There's a great deal of contrast in it and currently it's upside down on monitor. But we can make out a fair amount of detail.

Eagle: OK, will you verify the position, the opening I ought to have on the camera.

Houston: The what?

Houston: OK Neil. We can see you coming down the ladder now.

Armstrong: OK. I just checked getting back up to that first step. It didn't collapse too far. But it's adequate to get back up.

Houston: Roger. We copy.

Armstrong: It's a pretty good little jump.

Houston: Buzz, this is Houston: P-2, 1/100th of a second for shadow photography on the sequence camera.

Armstrong: I'm at the foot of the ladder. The LM foot beds are only depressed in the surface about one or two inches. Although the surface appears to be very, very fine grained as you get close to it. It's almost like a powder. It's very fine.

I'm going to step off the LM now.

That's one small step for man, one giant leap for mankind.

The surface is fine and powdery.

After 19 minutes of Mr. Armstrong's testing, Col. Aldrin joined him outside the craft.

The two men got busy setting up another television camera from the lunar module, planting an American flag into the ground, scooping up soil and rock samples, deploying scientific experiments and hopping and loping about in a demonstration of their lunar agility.

Easier Than Expected

They found walking and working on the moon less taxing than had been forecast. Mr. Armstrong once reported he was "very comfortable."

And people back on earth found the black and white television pictures of the bug-shaped lunar module and the men tramping about it so sharp and clear as to seem unreal, more like a toy and toy-like figures than human beings on the most daring and far-reaching expedition thus far undertaken.

When Mr. Armstrong and Col. Aldrin ventured outside the landing craft, they had no links with the ship. Each was breathing oxygen from his 125-pound set of back packs, which also contained radio equipment and units to absorb the carbon dioxide they expired into their suits.

During one break in the astronauts' work, President Nixon congratulated them from the White House in what, he said, "certainly has to be the most historic telephone call ever made."

"Because of what you have done," the president told the (Continued on Page 2, Col. 1)

Armstrong, Aldrin in LM, Near Orbiting Columbia

135 Minutes on Surface

By John Noble Wilford
HOUSTON, July 21 (NYT).—Men have landed and walked on the moon.

Two Americans, astronauts of Apollo-11, steered their fragile, four-legged lunar module safely and smoothly to the historic landing at 2017.40 GMT yesterday.

Neil A. Armstrong, the 38-year-old civilian commander, radioed to earth and the mission control room here:

"Houston, Tranquillity Base here. The Eagle has landed."

The first men to reach the moon—Mr. Armstrong and his co-pilot, Col. Edwin E. Aldrin Jr. of the air force—brought their ship to rest on a level, rock-strewn plain near the southwestern shore of the arid Sea of Tranquillity.

About six and one-half hours later, Mr. Armstrong opened the landing craft's hatch, stepped slowly down the ladder and declared as he planted the first human footprint on the lunar crust:

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

First Step

His first step on the moon came at 0256:20 GMT, as a television camera outside the craft transmitted his every move to an awed and excited audience of hundreds of millions of people on earth.

Mr. Armstrong's initial steps were tentative tests of the lunar soil's firmness and of his ability to move about easily in his bulky white spacesuit and backpacks and under the influence of lunar gravity, which is one-sixth that of the earth.

"The surface is fine and powdery," the astronaut reported. "I can pick it up loosely with my toe. It does adhere in fine layers like powdered charcoal to the sole and sides of my boots. I only go in a small fraction of an inch, maybe an eighth of an inch. But I can see the footprints of my boots in the treads in the fine sandy particles."

After 19 minutes of Mr. Armstrong's testing, Col. Aldrin joined him outside the craft.

The two men got busy setting up another television camera from the lunar module, planting an American flag into the ground, scooping up soil and rock samples, deploying scientific experiments and hopping and loping about in a demonstration of their lunar agility.

Easier Than Expected

They found walking and working on the moon less taxing than had been forecast. Mr. Armstrong once reported he was "very comfortable."

And people back on earth found the black and white television pictures of the bug-shaped lunar module and the men tramping about it so sharp and clear as to seem unreal, more like a toy and toy-like figures than human beings on the most daring and far-reaching expedition thus far undertaken.

When Mr. Armstrong and Col. Aldrin ventured outside the landing craft, they had no links with the ship. Each was breathing oxygen from his 125-pound set of back packs, which also contained radio equipment and units to absorb the carbon dioxide they expired into their suits.

Link-Up Last Crucial Step

By Al Rossiter Jr.

HOUSTON, July 21 (UPI).—America's two lunar pioneers blasted off from the moon today on their first step toward home.

Neil A. Armstrong and Edwin E. Aldrin pushed the firing button on the ascent stage of their lunar lander Eagle and streaked homeward at 1754 GMT.

They spent 21 hours 36 minutes on the surface of the moon. Thus man left his second world in the same manner he arrived—riding a column of flame.

"Beautiful," Col. Aldrin called. "Very smooth. Beautiful."

Ahead lay a dangerous and intricate set of maneuvers which will re-unite Eagle and command ship Columbia, piloted by Michael Collins, in orbit 69 miles above the moon. Then Eagle will be discarded as space junk, and Columbia will set course for home.

Olive Branch Behind

These men, who came to the moon "in peace for all mankind," revealed as they sped away from the moon's surface they had left an ancient peace symbol behind—an olive branch.

Mr. Armstrong revealed this surprise only after he was able to say "Eagle is safe in orbit" on its flight home.

Behind was man's greatest adventure, a flaming touchdown in a swirl of dust on the moon's Sea of Tranquillity and more than two hours of footfalls into the grainy lunar soil by the first men ever to step onto a world other than their own.

The take-off from the moon was another of Apollo's "firsts"—it had never been done before.

Mr. Armstrong and Col. Aldrin disconnected their tiny ascent stage from the lower half of the ship after a flawless seven-minute burn, which landed them safely after a frightening descent yesterday, and for the first time in the flight fired Eagle's essential ascent engine.

It fired perfectly, and pushed the spacemen up toward the circling Columbia.

80 Pounds of Rocks

The two American astronauts spent more than two hours walking, exploring and collecting some 80 pounds of priceless lunar rocks.

"Beautiful... beautiful," Col. Aldrin said, watching the spacecraft skim at more than 1,000 miles an hour over the craters and boulders around the flat landing field on the Sea of Tranquillity.

Ahead was the perilous 3 1/2-hour rendezvous maneuver to rejoin Col. Collins in the Apollo-11 command ship, then the blast out of lunar orbit at 04:53 GMT tomorrow, and homeward bound.

Behind they left the moon, the earth and history forever changed.

At 1754 GMT today Eagle's ascent engine roared to life and, for the first time without benefit of thousands of ground technicians, men launched themselves toward an orbit.

At 1802 GMT came the word they had made it. One of the most frightening aspects of their mission was a success.

"Very smooth," Col. Aldrin reported. Both pilots reportedly said: "Beautiful."

The astronauts coolly read off (Continued on Page 2, Col. 1)



Neil A. Armstrong



Edwin Aldrin



Michael Collins