

HERE MEN FROM THE PLANET EARTH...

Youngsters visiting the National Air and Space Museum will see the Apollo 11 command module that took Mission Commander Neil Armstrong, Command Module Pilot Michael Collins, and Lunar Module Pilot Edwin Aldrin, Jr., to the moon 40 years ago. Launched on July 16, 1969, the three astronauts landed on the moon four days later on July 20.

Buzz Aldrin spoke the first words from the lunar module (LM) on the moon's surface, navigational data that he was calling out to Neil Armstrong who was piloting the LM. The descent of the lunar module took longer than anticipated, creating some anxiety at Mission Control in Houston. As the *Eagle* landed and Aldrin completed the technical jargon-speak, Armstrong then informed Mission Control in the memorably heart-racing moment: "Houston, Tranquility Base here. The *Eagle* has landed."

Armstrong's unexpected change of call sign from *Eagle* to *Tranquility Base* momentarily threw Mission Control for a loop. Charles Duke, in his role as CAPCOM during Apollo's landing phase, acknowledged the landing, expressing Mission Control's relief.

Buzz Aldrin, an elder at Webster Presbyterian Church in Webster, Texas, then broadcast:

"This is the LM pilot. I'd like to take this opportunity to ask every person listening in, whoever and wherever they may be, to pause for a moment and contemplate the events of the past few hours and to give thanks in his or her own way."

He then took communion. Atheist Madalyn Murray O'Hair had sued NASA over the Apollo 8 crew reading from the Book of Genesis, demanding that astronauts not conduct religious activities while in space. The litigation was still being fought when Apollo 11 took flight, so Aldrin chose to refrain from directly mentioning this, and kept his plan quiet. The Rev. Dean Woodruff, pastor of the church Aldrin attended, prepared the communion kit Aldrin took to the moon.

Aldrin and Armstrong then prepared for the descent onto the moon's surface. Originally scheduled for two hours, preparation took longer than planned as the two astronauts mapped out their work from the 60-degree view from their twin triangular windows. Exiting the module presented a bit of a problem. The lunar module had been redesigned to have a smaller hatch but the life support system backpack the astronauts wore had not been reconfigured to conform to that smaller opening. Squeezing through the hatch with his Portable Life Support System (PLSS), Armstrong had such difficulty that his heart rate increased enough to cause concern down at Mission Control.

Armstrong made his descent to the surface, climbing down the nine-rung ladder. The Remote Control Unit controls on his chest prevented him. He pulled the D-ring to deploy the TV camera tucked against the side of the *Eagle*. The slow-scan television was incompatible with

commercial TV so the display on the special monitor with conventional camera on the monitor resulted in a tremendous loss in quality. Feed from the more sensitive Parkes radio telescope in Australia was finally used, and the first lunar images were broadcast to more than 600 million people on Earth. Sadly, it has been reported that these original recordings are now missing.

The two astronauts described the moon's surface dust as "fine and almost like a powder". Exactly six and a half hours after the *Eagle* landed, Armstrong stepped off the footpad and became the first human to set foot on another world, saying:

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

The slipperiness of the moon dust made it necessary for the astronauts to test ways to move around and plan their movements six or seven steps ahead. Loping was the best way to get around. The life support backpack created a tendency to tip backwards, but the astronauts had no problems keeping their balance. They took photos and scientific samples and measurements. Armstrong's metabolic rates became high as he moved quickly to complete tasks and Mission Control warned him to slow down. Thirty-four minutes were allotted for surface activities, but the two had to stop documented sample collection halfway through since the work took longer than expected.

After Armstrong and Aldrin planted a U.S. flag on the lunar surface, they spoke with President Richard Nixon in what Nixon called "the most historic phone call ever made from the White House." Their time allotment over, Aldrin entered the *Eagle* first. The two astronauts lifted film and two boxes containing more than 48 pounds of lunar surface material into the lunar module. Aldrin tossed down a bag of memorial items he had in his sleeve after Armstrong reminded him of it. Armstrong then climbed into the *Eagle*. After transferring to the lunar module's life support, the two lightened the module for return to orbit by tossing out their life support backpacks, lunar overshoes, one camera, and other equipment. Aldrin accidentally broke the circuit breaker that armed the main engine for lift-off from the moon, causing initial concern that this would prevent the engine from firing and strand them there on the moon. Luckily, a felt-tip pen activated the switch.

Armstrong and Aldrin repressurized the lunar module and settled down to sleep. Houston woke the rested astronauts to prepare for the ascent and return flight. Two and a half hours later, the *Eagle* lifted off to rejoin CMP Michael Collins aboard *Columbia* in lunar orbit. The astronauts left behind scientific instruments including a seismic apparatus to measure moonquakes and a retroreflector for a laser ranging experiment, an Apollo 1 mission patch, and a memorial bag carrying a gold replica of the olive branch as a traditional symbol of peace. They also left a silicon message disc with goodwill statements by Presidents Eisenhower, Kennedy, Johnson, and Nixon; messages from leaders of 73 countries around the world; a list of the leadership of Congress and NASA responsible for the successful mission; and Soviet medals commemorating Cosmonauts Vladimir Komarov and Yuri Gagarin.

The now famous American flag and a plaque mounted on the lunar module descent stage ladder bearing drawings of the western and eastern hemispheres, an inscription, and signatures of the astronauts and President Nixon also memorialized the historic event. The inscription read:

*Here Men From The Planet Earth First Set Foot Upon the Moon,
July 1969 A.D. We Came in Peace For All Mankind.*

The magic of President John F. Kennedy's Administration was the hope it gave Americans for great accomplishments. In a joint session of Congress on May 25, 1961, the new president articulated his goal: "I believe that 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." As the fifth human spaceflight of the United States' Project Apollo and the third human voyage to the Moon, Apollo 11 fulfilled that dream in a heart-racing, breathtaking, spectacular experience shared around the world.

Fast forward 40 years to now. Virgin Atlantic's Sir Richard Branson has built Virgin Galactic and his company is testing its space plane, as are other entrepreneurs who are thrilled at the chance to provide "weekend astronaut" excitement to interested passengers around the globe. The flight will reach altitudes where passengers can unfasten their seatbelts and enjoy six minutes of weightlessness. Riders will have to be medically fit for the trip and get two days of pre-flight briefing for the zero gravity experience to optimize the adventure into space.

Space tourism is expected to be a multi-billion dollar global industry, and I believe Hawaii should be in the position to be a pioneer in it. Our country's Federal Aviation Administration (FAA) in preparation for the emerging industry will issue a limited number of licenses. The Legislature this year passed a bill I introduced to conduct feasibility studies for a spaceport and to pay for consultation and other expenses relating to an application with the FAA for a commercial space transportation license. We anticipate flights between the Big Island and Oahu which will help add visitors to the tourist industry on both islands.

Aerospace holds tremendous economic potential for Hawaii while preserving our precious environment. Space planes would use the same airports that regular aircraft use, yet cater to the upper echelon of tourists. The highly sophisticated systems that make weightless flights possible would make available to Hawaii residents high-skill, high-paying jobs locally so that they don't have to leave home for the mainland.

Hawaii is a natural for aerospace businesses. Since the 1950s, our state has supported our national space efforts with astronaut training programs. In the 1960s Hawaii developed our world-renown observatories which bring in researchers (and their research funding) from all over the world. Over the last 30 years, the U.S. military, the University of Hawaii, and many companies statewide have worked together in pioneering programs in planetary geosciences, satellite communications, remote sensing, environmental monitoring, and meteorology. We

are at the forefront of “watching the stars” with the best, most modern telescopes on the Big Island and Maui.

Our diverse natural resources, unique topography, and locally grown scientific and engineering expertise make Hawaii for filling this niche. In 2007, I sponsored a bill which the Legislature funded to create the Office of Aerospace Development. Fostering, educating, and sustaining innovative commercial enterprise statewide and educating our K-12 and university students is the task of the OAD.

The Legislation also extended the efforts of the OAD to develop the Pacific International Space Center for Exploration Systems (PISCES) on the Big Island. Sited at the University of Hawaii at Hilo, PISCES began sparking interest among young people by hosting a national student design competition for a lunar space habitat which a team from Honolulu Community College won. PISCES assisted in initiating a new curriculum for aerospace studies there. It also participated in forming collaborative research efforts among the UH, NASA, and mainland universities. A crowning achievement was receiving an innovative, competitive NASA partnership to operate field tests for developing technologies that support robotic and human missions to the Moon. The “lunar landscape” of the Big Island was ideal for testing scientific prototype lunar vehicles that were showcased at an international conference hosted by PISCES last year.

The Legislature continues to support this high tech industry for the tremendous potential it holds. Fostering the aerospace efforts on the Big Island strengthens the island’s economy by diversifying revenue sources and employment opportunities as well as supplementing existing sectors. Providing career opportunities for highly skilled workers and our brightest students curtails the “brain drain” by making these jobs available at home rather than them having to move to the mainland to fulfill their professional ambitions. By hosting annual international conferences and student design competitions, PISCES brings in visitors to support the hospitality sector of the Orchid Isle’s economy.

Research is underway for site selection of an analog lunar base where astronauts can receive part of their training, making it a center for federal funding and job creation in supporting businesses. Expanding aerospace education opportunities at both K-12 and university levels with community outreach programs as well, bolsters our reputation nationwide and creates a magnet for students to come to Hawaii to study and scientists to do research. All of these strengthen Hawaii through diversification.

A small satellite program at UH-Manoa has students building and working on satellites that could be launched from the Pacific Missile Range in Kauai within a few years. Starting from a military application, commercial small satellite launches may be a growth industry for Hawaii in the future.

I am excited at the growth of the aerospace industry in Hawaii, and look forward to all of the career and economic opportunities it brings to our state.