APOLLO 15

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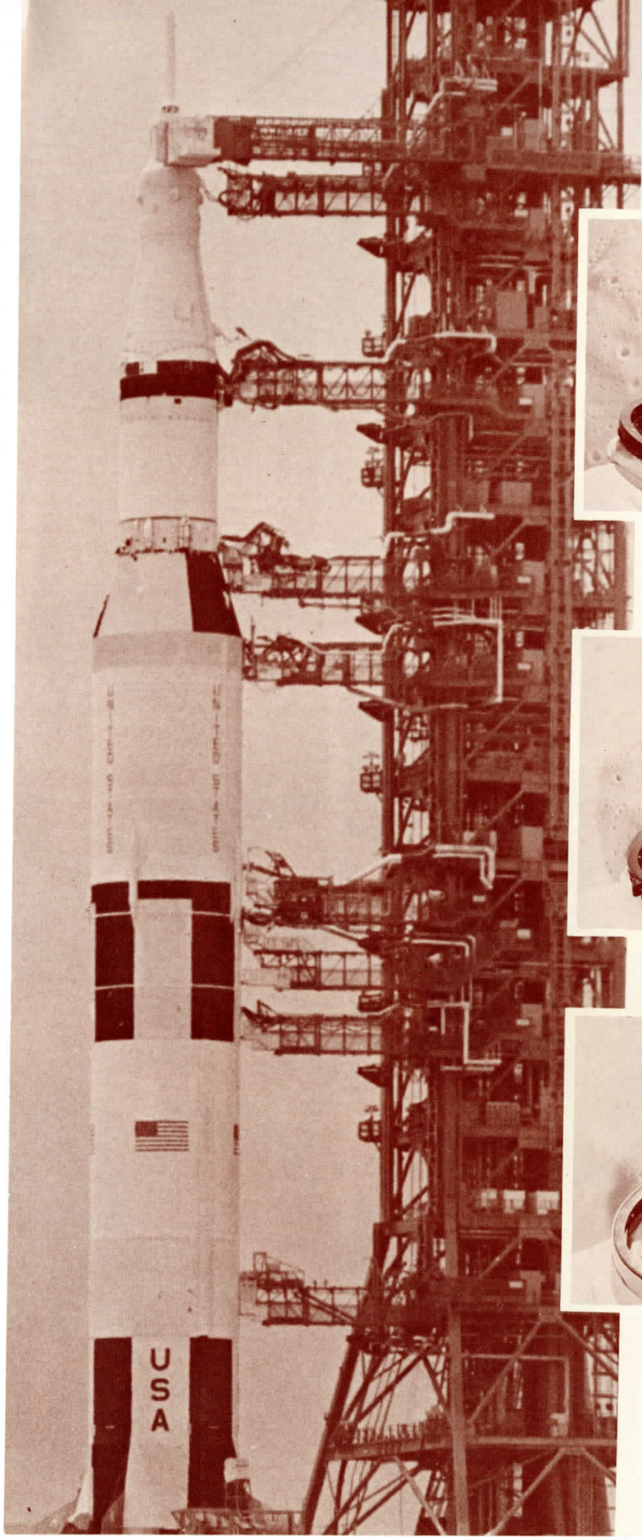

APOLLO 15 CREW

SPACECRAFT COMMANDER

DAVID R. SCOTT, 39, a colonel in the U.S. Air Force and a native of San Antonio, Texas, resides with his family in Nassau Bay, Tx. He served with Neil Armstrong on the Gemini 8 mission, the two of them performing the first successful docking of two vehicles in space. In 1969, he was assigned to the Apollo 9 flight as command module pilot, later serving as backup spacecraft commander for the Apollo 12 flight.

Colonel Scott was graduated fifth in a class of 633 at West Point. Settling on an Air Force career, following in the footsteps of his father, a retired brigadier general. He completed pilot training at Webb Air Force Base and gunnery training at Laughlin Air Force Base, both in Texas, and also at Luke Air Force Base, Ariz. After a tour of duty with the 32nd Tactical Fighter Squadron in the Netherlands, he completed work on his Master's degree in Aeronautics and Astronautics at M.I.T., next attending the Air Force Experimental Test Pilot School and the Aerospace Research Pilot School. In 1963, he was included among the third group of astronauts named by NASA.

He is married to the former Ann Lurton Ott of San Antonio; they are the parents of two children.

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LUNAR MODULE PILOT

JAMES BENSON IRWIN, 41, a native of Pittsburgh, Pa., is a lieutenant colonel in the Air Force and resides with his family in Nassau Bay, Tx. He was one of 19 astronauts chosen by NASA in April 1966 and was crew commander of lunar module (LTA-8), the vehicle that finished the first series of thermal vacuum tests on June 1, 1968. He later served as a member of the astronaut support crew for Apollo 10 and as backup lunar module pilot for Apollo 12.

After graduation from the U.S. Naval Academy in 1951 with a Bachelor of Science degree in Naval Sciences, he obtained a Master's degree in Aeronautical Engineering and Instrumentation Engineering from the University of Michigan. His flight training in the Air Force was received at Hondo Air Base and Reese Air Force Base in Texas. He served with the F-12 Test Force at Edwards Air Force Base, Calif., and with the AIM 47 Project Office at Wright-Patterson Air Force Base, Ohio. He was graduated from the Air Force Experimental Test Pilot School in 1961 and from the Air Force Aerospace Research Pilot School in 1963. Before becoming an astronaut, he was Chief of the Advanced Requirements Branch at Headquarters Air Defense Command.

Married to the former Mary Ellen Monroe of Corvallis, Oregon; they are the parents of four children.

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COMMAND MODULE PILOT

ALFRED MERRILL WORDEN, major in the Air Force, was born in Jackson, Mich., in 1932. He was one of 19 astronauts selected by NASA in April 1966, serving as a member of the astronaut support crew for the Apollo 9 flight and as backup command module pilot for the Apollo 12 flight.

Commissioned in the Air Force after his graduation from the U.S. Military Academy in 1955, he received flight training at Moore Air Base and Laredo Air Force Base, both in Texas, and at Tyndall Air Force Base in Florida. He served as a pilot and armament officer with the 95th Fighter Interceptor Squadron at Andrews Air Force Base, Md., from 1957 to 1961, after which he attended the Randolph Air Force Base Instrument Pilots Instructor School and the Empire Test Pilots School in England, completing his training at the latter in 1965. Before going to the Manned Spacecraft Center, he served as instructor at the Aerospace Research Pilots School.

The father of two children, he holds a Master's degree in Astronautical/Aeronautical Engineering and Instrumentation from the University of Michigan, receiving it in 1963.

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FLIGHT PROFILE—APOLLO 15 MISSION

Apollo 15, this nation's seventh and most complex mission to the Moon, will lift off from Kennedy Space Center, Florida, at 9:34 a.m. EDT July 26 and, if all goes well, will wind up in the Pacific Ocean 12 days later, on the afternoon of August 7, at 4:46 p.m. EDT.

It is projected as one of the most exciting scientific expeditions ever undertaken by man. Much of its scheduled program is based on knowledge gained from previous flights. Five periods of extravehicular activity (EVA), three more than on any other Apollo lunar mission and totaling more than 20 hours, are planned, with the stay on the Moon set for 67.3 hours, more than double that of any previous flight.

The first EVA will occur at 7:44 p.m. July 30; the second, at 9:24 a.m. July 31; third, at 6:46 a.m. August 1; fourth, at 3:24 a.m. August 2; and fifth, at 11:34 a.m. August 5. The last will take place while en route home, at which time Astronaut Worden will take a "walk" in space to retrieve film magazines.

The lunar liftoff will take place at 1:09 p.m August 2. Two days later, at 5:18 p.m., the return flight will begin.

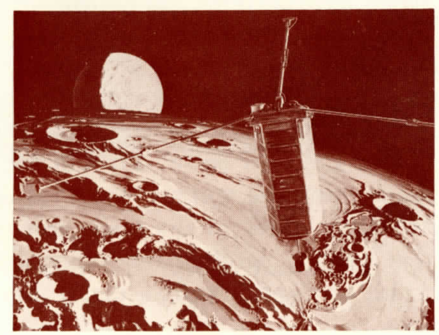
To increase the exploratory range of the astronauts, an electrically-powered vehicle called a lunar roving vehicle (LRV) will for the first time be used on the lunar surface. A television camera, controlled from Earth, will provide coverage of activity while the car is not in motion and later will permit the televising for the first time of a lunar module liftoff.

Meanwhile, as the command module, called Endeavour, continues in orbit, the most comprehensive photographs ever made of the Moon will be taken from it. If spread out when returned to Earth, they would cover an area 50 feet wide and 100 miles long.

In addition to a much more comprehensive photographing program, 11 more experiments than ever scheduled on any mission will be attempted. One of these will be made possible by a special electric drill capable of boring 10 feet into the lunar surface.

The two-man landing crew, wearing for the first time spacesuits that will permit them to bend over and sit down, will explore up to five miles away from the lunar module (LM), named Falcon.

Another unique feature of the mission will be a scientific instrument module (SIM). This will be operated while Endeavour is orbiting the Moon solo and during two days of post-rendezvous scientific studies and experiments. The SIM will hold 1,050 pounds of equipment, including cameras, as against 250 in the command module on past missions. A part of it will be a subsatellite, containing three experiments, to be put in orbit around the Moon and designed to operate about a year.



Scientific equipment to be landed on the lunar surface will be increased from 510 pounds to about 1,200 pounds. The crew will be expected to evaluate modifications made in the LM to enable it to carry a heavier payload, and also to check the performance of the LRV, the revised spacesuits, and the improved portable life support systems.

The landing site, called Hadley-Apennine, will be the most attractive to date from the standpoint of lunar science. It will provide the first opportunity for astronauts to collect rocks from lunar mountains and study at first hand a feature called Hadley Rille that resembles in many ways the channels cut on Earth by meandering streams.

LIFTOFF AND OUTWARD FLIGHT

Except for the change from Eastern Standard to Daylight Saving Time, the hour of liftoff is identical with that of Freedom 7, the first American space flight by Alan B. Shepard in 1961. As in the past, a large number of viewers and a worldwide television audience are expected to witness the launch. Twelve minutes after takeoff, the first stage will be jettisoned and the second will be ignited. Later, the launch escape tower and finally the second stage will be jettisoned.

The flight profile will be essentially the same as that during earlier missions. After circling the Earth one and a half times in a 90-nautical-mile parking orbit, the space vehicle will be prepared for the rocket engine firing (translunar injection burn) that will put it on a path to the Moon—scheduled for 12:30 p.m.

CIRCLING MOON

At 4:07 p.m. July 29, Apollo 15 will fire its rockets to go into lunar orbit, traveling a 58-by-170 nautical mile orbit around the Moon. During this period, Astronauts Scott and Worden will check thoroughly the LM systems and communications. The crew also will take pictures and perform orbital science experiments. An attempt also will be made to impact the spent IVB stage against the Moon to stimulate the passive seismometers (devices for detecting Moon tremors and impacts on the lunar surface) left on earlier missions. It will be aimed at a target area about 185 miles from the Apollo 14 landing site. The energy source at impact will be equal to about 11 tons of TNT.

About three and a half hours after the beginning of the orbit, i.e., 8:14 p.m., the orbit will be changed to one that dips to within eight nautical miles of the surface. And at 1:48 p.m. July 30, the LM will separate from the CSM.

TOUCHDOWN

The lunar landing is scheduled for 6:15 p.m. July 30. Even though the LM, with its additional equipment, will weigh more than any of its predecessors, the final vertical descent phase preceding the touchdown will be about the same, starting at an altitude of about 100 feet. Special probes which extend downward about five feet below three LM footpads will cause lights to flash when they touch the surface, and the engine will be turned off.

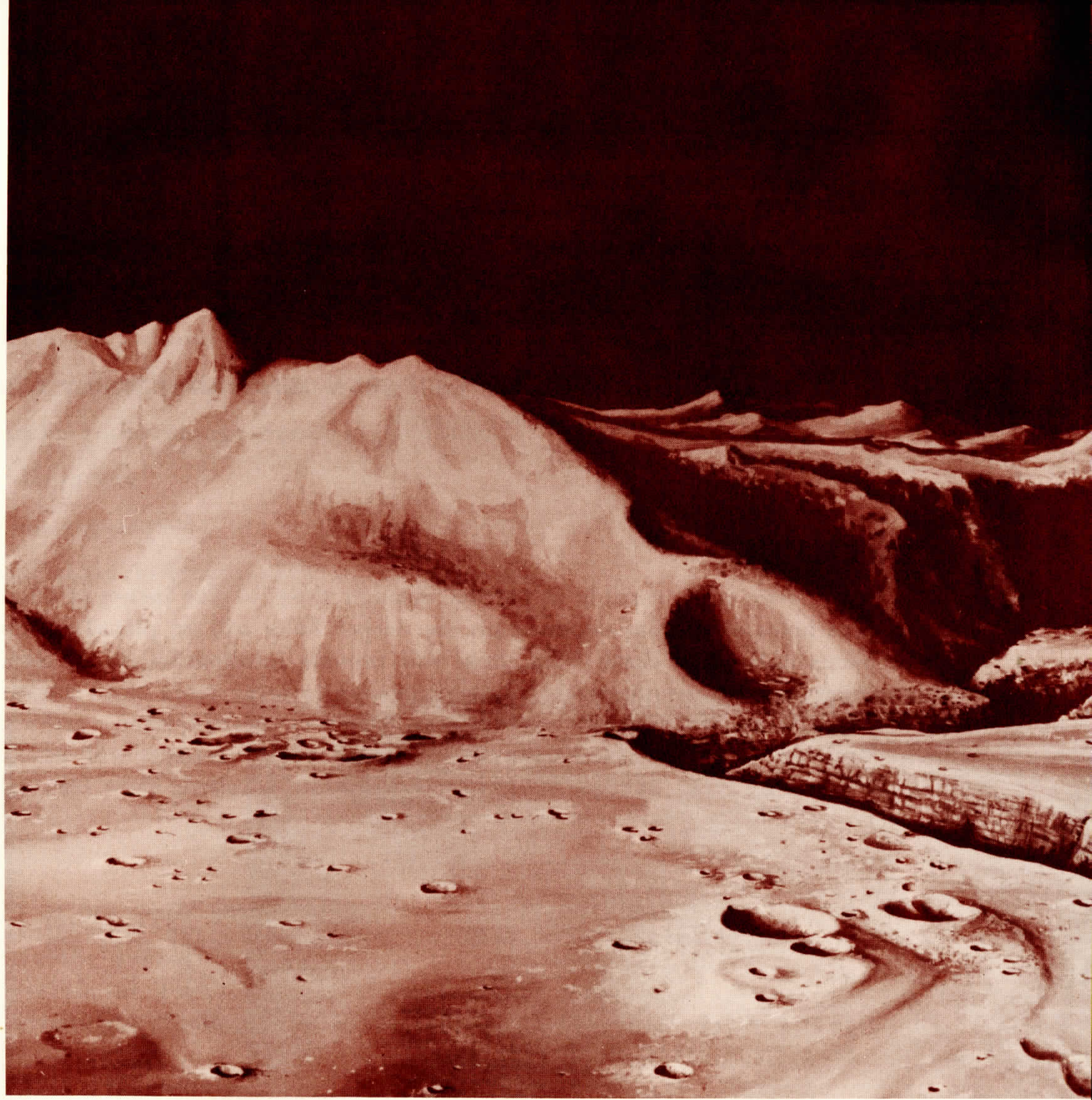
LANDING SITE

The LM will be set down at the foot of the Apennine Mountains, some of the Moon's highest. They rise 12,000 to 15,000 feet above the landing site and are described as higher than the eastern face of the Sierra Nevadas in the western United States. The site is about 465 miles north of the lunar equator, whereas the previous landing sites are within 70 miles of it. Nearby is Hadley Rille, a gorge that roughly parallels the mountains along the eastern boundary of Mare Imbrium (Sea of Rains). This depression has an average width of about a mile, a depth that varies from 600 to 1,200 feet, and is 60 miles long. The area is pockmarked by craters of various sizes.

LUNAR SURFACE ACTIVITY

FIRST EVA

The first EVA will be a simple standup affair, lasting half an hour. Scott will stand on the LM engine cover, put his head and shoulders out of the top hatch, or docking tunnel, and will photograph and describe the landing site.



SECOND EVA

Next comes a sleep session, for which they will remove their suits, something not done on previous missions. Then the astronauts will lower the LRV, or Rover, out of its folded stowage position in the LM's descent stage and will make their first geological traverse, lasting about two hours. The Rover, with a speed of up to eight miles an hour, is a little over 10 feet long, six feet wide, and 45 inches high. Each wheel is individually powered by an electric motor. It can be steered by both the front and rear wheels and can carry 1,000 pounds.

A radio will enable the astronauts to talk to Earth and send back television pictures during Moon walks or drives independently of the communications system on the LM. On earlier flights, since voice and telemetry had to be relayed through the spacecraft's systems, crews were limited in their treks to line-of-sight distances from the LM.

Following the two-hour geology traverse, the astronauts will deploy the seven experiments included in the Apollo Lunar Surface Experiment Package (ALSEP), the third to be placed on the Moon. Always in the past, the ALSEP was deployed before the astronauts engaged in any other activity. Total time for the second EVA will be about seven hours.

THIRD EVA

Another seven-hour stay outside is scheduled for the third EVA. The LRV will be taken on a traverse to the Apennine front for geology investigations. Photographs will be taken and samples collected.

FOURTH EVA

This EVA will last six hours. The LRV will be driven along Hadley Rille, to the north of the landing site in an area with fresh-looking mare and volcanic-like surface features.

EXPERIMENTS

The electric drill, capable of cutting through three to five inches of basaltic rock per minute, will be used during the second EVA to drill holes of varying depths. Into the deeper holes will be placed extremely sensitive electronic thermometers. Temperature measurements radioed to Earth from them will provide information on the outward flow of heat from the Moon's interior and the thermal conductivity of lunar material, helping scientists to make more exact models of that planet. Similar measurements on Earth have contributed basic information concerning volcanoes, earthquakes, and mountain-building processes. From the shallower hole astronauts will be able to obtain cores of lunar material from a depth of about eight feet, deeper than any previous core tube samples.

Other experiments will include the following:

A passive seismometer, to measure seismic activity on the Moon and to relay information relating to physical properties of the lunar crust and interior.

A tri-axis magnetometer similar to that left on the Apollo 12 flight to measure the magnetic field.

A solar wind spectrometer, to measure the strength, velocity and directions of the electrons and protons which emanate from the Sun and reach the lunar surface.

A composition spectrometer, to collect the gases of the solar wind for return to Earth for analysis.

A suprathermal ion detector, to provide information on the energy mass of positive ions—electrically-charged molecules—close to the lunar surface.

A cold cathode ionization gauge, to measure the density of neutral particles in the lunar atmosphere.

A lunar heat flow experiment, to measure the steady-state heat flow from the lunar interior.

A lunar dust detector, to measure the amount of dust accumulation on the surface of the Moon.

A laser ranging retro-reflector, larger than those left previously, to measure the distance between the Moon and Earth.

A gamma-ray spectrometer, to determine the concentration of radioactive elements in the lunar surface.

An x-ray spectrometer, to determine the concentration of major rock-forming elements in the surface.

An Alpha-particle spectrometer, to locate radon sources in the surface.

A mass spectrometer, to obtain data on constituents of the lunar atmosphere.

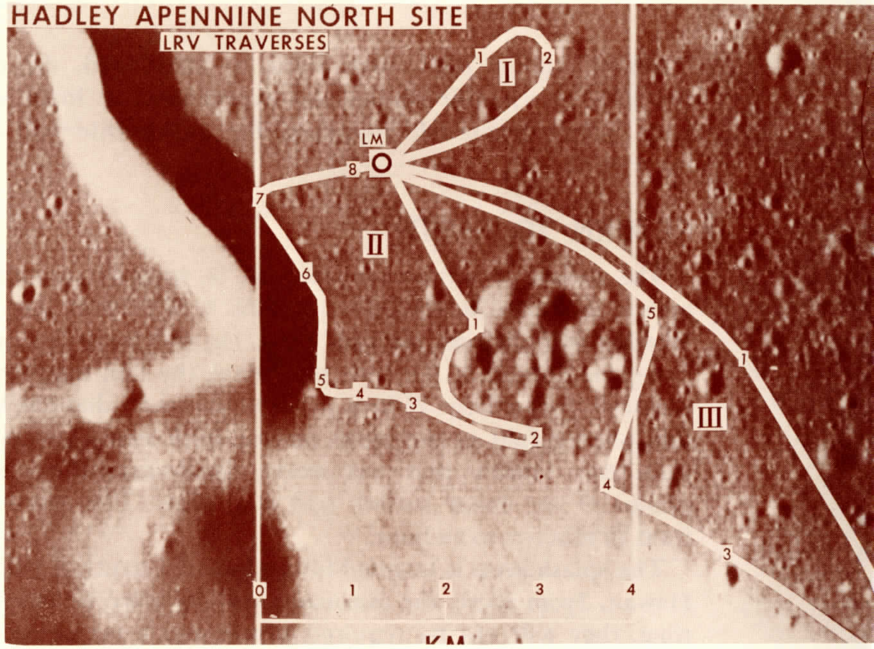
A laser altimeter, to measure precisely the spacecraft's altitude above the lunar surface.

RETURN FLIGHT

LIFTOFF

At 1:09 p.m. August 2, the ascent stage of the LM will rise from the lunar surface for the return flight to the command/service module, leaving behind the descent stage and the LRV, from the latter of which the TV camera will relay to Earth the first pictures of a spacecraft leaving the Moon.

The docking with the mother craft will take place at 3:04 p.m., not quite two hours later. Astronauts Scott and Irwin will transfer back to the command module, taking with them selected items of equipment, as well as the samples, which this time may total up to 150 pounds, compared with less than 100 pounds on Apollo 14. The ascent stage will next be separated and jettisoned to impact on the lunar surface about 25 nautical miles west of the Hadley-Apennine landing site. As on previous flights, this will create another seismic event.



Before starting the return flight, as mentioned, the crew will devote two days to scientific studies and experiments in lunar orbit. About one hour before transearth injection, the subsatellite will be ejected into lunar orbit.

RETURN TO EARTH

The command/service module will be injected into the flight path for return to Earth at 5:18 p.m. August 4. The next day, while en route, Worden will perform the fifth EVA. He will leave the cabin and proceed along the outside of the craft to retrieve the film magazines. They will be removed from a large 24-inch panoramic camera that has taken high-resolution photographs of the lunar surface, both stereo and monoscopic, and a three-inch camera that has made simultaneously-exposed, high-quality photos of the lunar surface and star fields. The space "walk" will last from 20 minutes to an hour.

The splashdown is targeted for an area 285 nautical miles north of Oahu, Hawaii. From there, the astronauts will be taken to Houston. For the first time, they will not be required to undergo a period of quarantine.

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