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Apollo 16 begins journey to Descartes.

science news OF THE WEEK

Apollo 16: On to the highlands

"You make the superb commonplace. I never fail to marvel at the way you bring these things off." These were the words of Vice President Agnew as he addressed a group of NASA employees after this week's successful launch of Apollo 16 toward the lunar highlands (SN: 4/8/72, p. 235). It was the second-to-last moonlanding mission in the Apollo series. Apollo 17 will bring the program to its conclusion in December.

If all went well, Apollo 16 Astronauts John W. Young and Charles M. Duke Jr. were to spend a record 73 hours on the moon, including three excursions of seven hours each outside the lunar lander, Orion, while Thomas K. Mattingly operated remote-sensing instruments from the orbiting command module, Casper.

Several incidents marred the early phase of the flight to the moon, but none proved serious. Paint flaking off the landing craft caused some early concern, but was soon determined not to have any expected effect on the mission. And on Tuesday Apollo 16's main guidance system was knocked out briefly by electrical interference, but the problem was rapidly overcome with the help of instructions radioed from Houston.

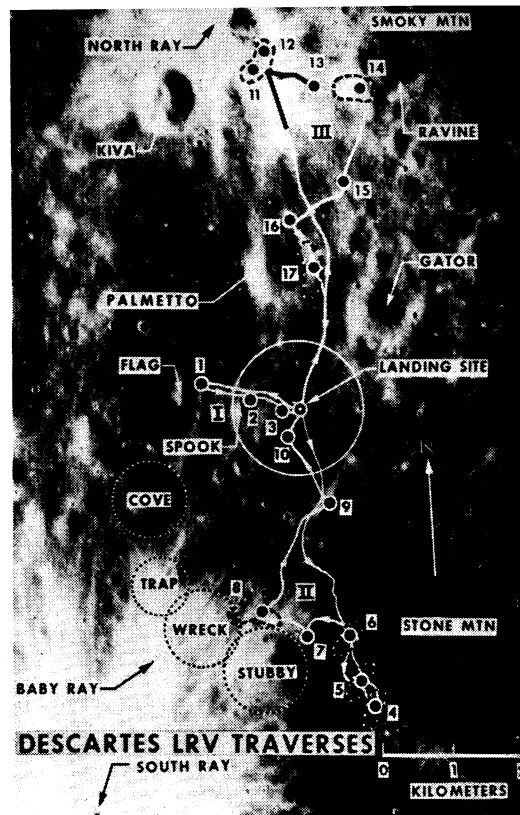
Like the Apollo 15 astronauts, Young and Duke had the benefit of a four-wheeled lunar Rover to carry them over the undulating region of the Descartes formation in the Central Highlands. Plans called for them to use it on field trips to sample two distinct geological units—the Cayley and Descartes formations. These two units are

thought to have been formed by volcanism in the lunar highlands occurring sometime between 3.7 billion and 4.6 billion years ago. The mission could eventually help resolve a major dispute about the thermal history of the moon. (Many scientists do not believe that the moon was ever thermally active enough to support considerable volcanism.)

The Descartes unit appears to have been the more viscous flow. It forms the mountains in the region. The Cayley, a more fluid flow, forms the plains at the site. The astronauts were to travel to the region of two bright impact craters—one to the north and one to the south. Plans called for them to set up the fifth scientific station placed on the moon. The instrument array, called ALSEP, will supply data for determining the seismic activity, the heat flow to the surface, the magnetic field and the subsurface structure at the site. Young and Duke also carried with them the first astronomical observatory to be used on the moon—an ultraviolet camera (SN: 4/15/72, p. 247).

Mattingly's array of instruments for use from the orbiting command module included mapping and metric cameras and gamma-ray, X-ray and alpha particle spectrometers.

If all went as planned, Orion was to lift off the lunar surface on Sunday for redocking with Casper. The astronauts were then to spend two more days in lunar orbit before beginning the flight back to earth on April 25. Splash-down in the Pacific was scheduled for 3:30 p.m. EST April 28. □



NASA

Three 7-hour excursions on the moon.

Kennedy, Vandenberg: Sites for space shuttle

To no one's great surprise, NASA announced last week that the Kennedy Space Center (KSC) in Florida and Vandenberg Air Force Base in California would be the sites for the space shuttle launches and operations (SN: 4/1/72, p. 220).

Kennedy will be the initial launch and landing site, used for the research and development flights beginning in 1978 and for all operational flights launched into equatorial orbits. NASA's preliminary estimates for establishing the facilities required at KSC are about \$150 million. This is part of the \$300 million total that it previously estimated would be required for shuttle facilities.

The Air Force will pick up the tab for the Vandenberg facilities, expected to cost about \$500 million. That site will be constructed toward the end of the decade. It will be used for flights requiring high inclination orbits. NASA says the \$500 million estimate is compatible with estimates of future investment costs for shuttle operations included in both NASA and Department of Defense studies.

Since the Air Force has its own secret requirements for the shuttle, DoD is expected to purchase its own fleet and fly the missions with Air Force pilots. Although Vandenberg and Kennedy will be the two major ports, theoretically the shuttle could land at any airport with a 10,000-foot runway. □