I. General news release, Apollo press kit

Apollo 8, a six-day lunar orbit mission in the step-by-step buildup to a manned US lunar landing, will be launched no earlier than December 21 from Cape Kennedy, Fla. The mission will fly the identical profile that will be flown on lunar landing missions with the exception of actual descent and landing on the lunar surface. No lunar module will be carried on Apollo 8.

The prime objective of the Apollo 8 mission is to prove the capability of the Apollo command and service modules in the type of mission for which they were designed---operations in deep space at lunar distance. Earlier developmental Apollo earth-orbital manned and unmanned flights have qualified all the spacecraft systems---including the command module heatshield at lunar return speeds---and the Apollo 7 ten-day failure-free mission in October demonstrated that the spacecraft can operate for the lunar-mission duration.

Apollo 8 will gather data to be used in early development of training, ground simulation and crew inflight procedures for later lunar orbit and lunar landing missions.

Crewmen for Apollo 8 are commander Frank Borman, command module pilot James A Lovell, Jr., and lunar module pilot William A. Anders. (A LM will not be flown on Apollo 8, but a ballasted dummy---Lunar Test Article B---will be carried in the spacecraft/LM adapter.)

The mission will be launched from NASA Kennedy Space Center Launch Complex 39A on an azimuth varying from 72 to 108 degrees, depending upon launch date and time of day. Launch windows hinge upon the moon's position and lunar surface lighting conditions at the time the spacecraft arrives at the moon, and upon launch and recovery area daylight conditions.

The mission will be the first manned launch using the Saturn V launch vehicle. Saturn V has been successfully flown in two unmanned Apollo developmental missions.

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The first opportunity launch window calls for liftoff at 7:51 am EST December 21 on an azimuth of 72 degrees. Insertion into a 103 nm (191.3 Km) circular earth parking orbit will take place at 11 min 21 sec after liftoff.

Following two revolutions in earth orbit, the S-IVB third-stage engine will restart for the translunar injection burn. The command and service modules will separate from the S-IVB and begin the translunar coast period of about 67 hours. A lunar orbit insertion burn with the service propulsion engine will place the spacecraft into a 60 X 170 nm (111 X 314.8 km) elliptical lunar orbit which later will be circularized at 60 nm.

The translunar injection burn will place the spacecraft on a free-return trajectory, so that if for some reason no further maneuvers are made, Apollo 8 would sweep around the moon and make a direct entry into the earth's atmosphere at about 136 hours after liftoff and land in the Atlantic off the west coast of Africa.

Ten revolutions will be spent in lunar orbit while the crew conducts navigation and photography investigations. A transearth injection burn with the service propulsion engine will bring the spacecraft back to earth with a direct atmospheric entry in the mid-Pacific about 147 hours after launch.

Several alternate mission plans are available if for some reason the basic lunar orbit cannot be flown because of an early shutdown at translunar injection or at some other point in the mission profile. The alternate range from 10 days in low earth orbit, a high-ellipse orbit, to a circumlunar flyby with direct earth entry.

The mission will be run on a step-by-step "commit point" timeline. That is, a go-no go decision will be made before each major maneuver based upon the status of spacecraft systems and the crew. Commit points for Apollo 8 are during prelaunch checkout, during earth parking orbit prior to translunar injection, and during translunar coast prior to lunar orbit insertion.

As Apollo 8 leaves earth orbit and starts translunar coast, the Manned Space Flight network for the first time will be called upon to track spacecraft position and to relay two-way communications, television and telemetry in a manned spaceflight to lunar distance. Except for about 45 minutes of every two-hour lunar orbit, Apollo 8 will be "in view" of at least one of three 85-foot deep-space tracking antennas at Canberra, Australia, Madrid, Spain, and Goldstone, California.

Speculation arising from Lunar Orbiter missions was that mass concentrations below the lunar surface caused "wobbles" in the spacecraft orbit. In Apollo 8, the ground network, coupled with onboard navigational techniques, will sharpen the accuracy of lunar orbit determination for future lunar missions.

Another facet of communicating with a manned spacecraft at lunar distance will be the use, for the first time of the Apollo high-gain antenna---a four-dish unified S-Band antenna that swings out from the service module after separation from the third stage S-IVB. The high-gain antenna relays onboard television and high bit-rate telemetry data, but should it become inoperative, the command module S-Band omni antennas can relay voice communications, low bit-rate telemetry and spacecraft commands from the ground.

Apollo 8 will gather data on techniques for stabilizing spacecraft temperatures in deep-space operations by investigating the effects of rolling the spacecraft at a slow, fixed rate about its three axes to achieve thermal balance. The Apollo 8 mission will be the first opportunity for in-depth testing of these techniques in long periods of sunlight away from the reflective influence of the earth.

Any solar flares occuring during the mission will be monitored by Solar Particle Alert Network (SPAN) stations around the world. Solar radiation and radiation in the Van Allen belt around the earth present small hazard to the crew of Apollo 8 in the thick-skinned command module; the anticipated dosages are one or two rads per man, well below that of a thorough chest X-ray series.

Although Apollo 8's entry will be the first from a lunar flight, it will not be the first command module entry at lunar-return velocity. The unmanned Apollo 4 mission in November 1967 provided a strenuous test of the spacecraft heatshield when the command module was driven back into the atmosphere from a 9769 nautical mile apogee at 36,545 feet per second. By comparison, Apollo 8 entry velocity is expected to be 36,219 feet per second.

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Heatshield maximum char depth on Apollo 4 was three-quarters of an inch, and heat loads were measured at 620 BTUs per square foot as compared to the 480 BTUs anitcipated in a lunar-return entry.

Apollo 8 entry will be flown with a nominal entry range of 1350 nautical miles in either the primary or backup control modes. Adverse weather in the primary recovery area can be avoided by a service propulsion system burn prior to one day before entry to shift the landing point. Less than one day out, the landing point can be shifted to avoid bad weather by using the spacecraft's 2500 mile entry ranging capability.

The crew will wear the inflight coveralls during entry---pressure suits having been doffed and stowed since one hour after translunar injection. Experience in Apollo 7, when the crew flew the entry phase without pressure suit helmet or gloves, prompted the decision to not wear suits once the spacecraft's pressure integrity was determined.

The decision to fly Apollo as a lunar orbit mission was made after thorough evaluation of spacecraft performance in the 10-day earth-orbital Apollo 7 mission in October and an assessment of risk factors involved in a lunar orbit mission. These risks are the total dependency upon the service propulsion engine for leaving lunar orbit and an earth-return time as long as three days compared to one-half to three hours in earth orbit.

Evaluated along with the risks of a lunar orbit mission was the value of the flight in furthering the Apollo program toward a manned lunar landing before the end of 1969. Principal gains from Apollo 8 will be experience in deep space navigation, communications and tracking, greater knowledge of spacecraft thermal response to deep space, and crew operational experience---all directly applicable to lunar landing missions.

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