

# Astronauts Ready to Start 2d Voyage to Moon Today

By JOHN NOBLE WILFORD

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CAPE KENNEDY, Fla., Nov. 13—Three American astronauts were ready tonight to embark tomorrow on man's second voyage to land on the moon, a trip aimed at a more

thorough scientific investigation into the origin and nature of the earth's only natural satellite.

The 10-day Apollo 12 mission is scheduled for launching at 11:22 A.M. tomorrow. President and Mrs. Nixon will be here to view the lift-off.

Technicians at Launching Pad 39-A successfully replaced overnight a leaky fuel tank that had threatened a month's delay in the mission. Then they resumed countdown preparations leading to the loading of rocket fuel.

"All is proceeding satisfactorily, and we foresee no problems" in meeting the scheduled lift-off time, the National Aeronautics and Space Administration announced.

"We're ready to go when they are," Comdr. Alan L. Bean, one of the astronauts, said as technicians began their final countdown tasks on the 363-foot-high rocket and spacecraft at the launching pad.

The astronauts — Comdr. Charles Conrad Jr., who heads the mission, Comdr. Richard F. Gordon Jr. and Commander

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## NIXON TO OBSERVE LIFT-OFF AT CAPE

Leaky Fuel Tank Replaced  
but Spacecraft Remains  
on a Tight Schedule

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Bean—were reported to be in good physical condition. The three Navy test pilots spent their final day of preflight training flying T-38 jet trainers and polishing their space flight skills in computerized spacecraft simulators.

They flew loops and rolls in the jet trainers because, as Commander Bean said, "it helps get your inner ear acclimated to zero gravity," which is the condition of weightlessness they will face in space.

Apollo 12's primary purposes are for the astronauts to practice pinpoint navigation and landings on the moon, deploy an array of nuclear-powered scientific instruments and walk on the lunar surface for some seven hours. Their lunar walk is to include collecting rocks and, if their landing has been accurate enough, retrieving a piece of an unmanned spacecraft, Surveyor 3, resting in a crater near their planned touchdown point.

The first lunar landing, by Apollo 11, was made last July on the Sea of Tranquility. The Apollo 11 crew spent only two and a half hours outside their craft on the lunar surface and conducted only a small amount of scientific investigation.

Commanders Conrad and Bean will be aiming for a landing in the Ocean of Storms early on the morning of Nov. 19. The Ocean of Storms site is about 950 miles west of the Apollo 11 landing area and is near the lunar equator.

### Gordon to Stay Aloft

The two astronauts will ride the spindly-legged lunar module, code-named Intrepid, to a 32-hour stay on the moon while Commander Gordon pilots the command ship, called Yankee Clipper, in a lunar orbit 69 miles above the surface.

The weather for launching day is expected to be satisfactory, with moderate winds and partly cloudy skies.

The chief concern of launching officials was their tight countdown schedule.

Because of having to replace the leaky fuel tank in the spacecraft's electricity-generating system, launching workers used up most of their reserve time for rest and handling any other mechanical problems.

Another serious malfunction would probably force a postponement of the flight until Dec. 14. At that time the lighting conditions will again be satisfactory at the primary landing site.

A full lunar day and night lasts 28 earth days. The astronauts want to touch down on the rolling plain called the Ocean of Storms when the sun is low on the horizon and behind their backs. This makes it easier for them to distinguish landmarks during their final approach for landing.

### Ground Rules Changed

If minor malfunctions or weather conditions create any delay, launching teams have more than four hours to get Apollo 12 off the ground. Otherwise, they will have to postpone the mission for a month.

Apollo project officials changed the ground rules and extended the period in which Apollo 12 can be launched by an hour 23 minutes—until 3:50 P.M.

Chester M. Lee, the mission director, said, however, that "conditions are all go."

The equipment — or "hardware" as the space engineers call it—for Apollo 12 is essentially the same as for Apollo 11.

The Saturn 5 rocket to start the astronauts on their journey is a mammoth three-stage power plant. The first, or booster, stage generates 7.6-million pounds of thrust over two and a half minutes of firing for the initial step in overcoming the gravity that holds man on earth.

After the 138-foot-tall first stage drops away, the five engines of the 84-foot-high second stage are to ignite to a thrust of 1.1-million pounds for six and a half minutes.

The 58-foot-tall third stage rocket is supposed to ignite and fire for more than two minutes to give the astronauts their final boost into an orbit 118 miles above earth.

The first stage of the Saturn

5 is built by the Boeing Company, the second by North American Rockwell Corporation, the third by the McDonnell Douglas Corporation. The rocket's instrument unit is made by the International Business Machines Corporation.

After the astronauts circle earth nearly two full turns, the rocket's third stage is to ignite again to push them out of a low earth orbit and toward the moon, some 230,000 miles away. The third stage is then discarded.

For most of the journey the astronauts will ride in the cone-shaped command module, the uppermost part of the 82-foot-tall spacecraft that sits atop the Saturn 5 at launching.

Attached behind the command module is the service module, the cylindrical compartment housing the crew's oxygen supply, the electricity-generating units and the main rocket used to power them into and out of lunar orbit.

### Helps Generate Power

The leaky fuel tank that caused so much concern earlier in the countdown is near the base of the service module. It is one of two tanks holding the super-cold liquid hydrogen used, in chemical reaction with liquid oxygen, to produce the spacecraft's electricity and water supply.

The faulty tank was replaced with an identical one from the Apollo 13 spacecraft. The exact location of the pinpoint leak has not been identified, but tests of the new tank showed no recurrence of the problem.

The third part of the spacecraft is the lunar landing vehicle, the lunar module. It stands 23 feet high and is 31 feet wide when its four landing gear are extended.

The lunar module has two rockets, one of the descent to the moon and one for the lift-off and return to the orbiting command module. Commanders Conrad and Bean are to ride to and from the lunar surface in the module's upper half.

The command and service modules were built by North American Rockwell. The lunar module's builder was the Grumman Aerospace Corporation.

If all goes well, the three astronauts are scheduled to swing into an orbit of the moon at 10:57 P.M. next Monday. Late the next day, Commanders Conrad and Bean will

leave Commander Gordon in the command ship and crawl into the lunar module for their descent to the moon.

Changes in the lunar module's guidance computer are designed to provide the astronauts with navigation data so up-to-date that they should be able to land on a smooth spot within yards of where the Surveyor 3 has been standing for nearly three years.

Altogether, Commanders Conrad and Bean plan two moon walks lasting three and a half hours each in a 32-hour stay on the moon's surface. The Apollo 11 crew took only one walk of two and a half hours in their 21-hour stay on the moon.

"Apollo 11 demonstrated that we can land and return safely from the moon," Rocco A. Petrone, the Apollo program director, said. "with Apollo 12, we start the exploitation of this system we developed in the name of science and knowledge."

Mr. Petrone, who was promoted from launching director to the program director's post after Apollo 11, cautioned that, although it is a second trip, flying to the moon "is still risky business."

The primary objectives of Apollo 12 are the following:

¶To bring back to earth carefully selected lunar rocks.

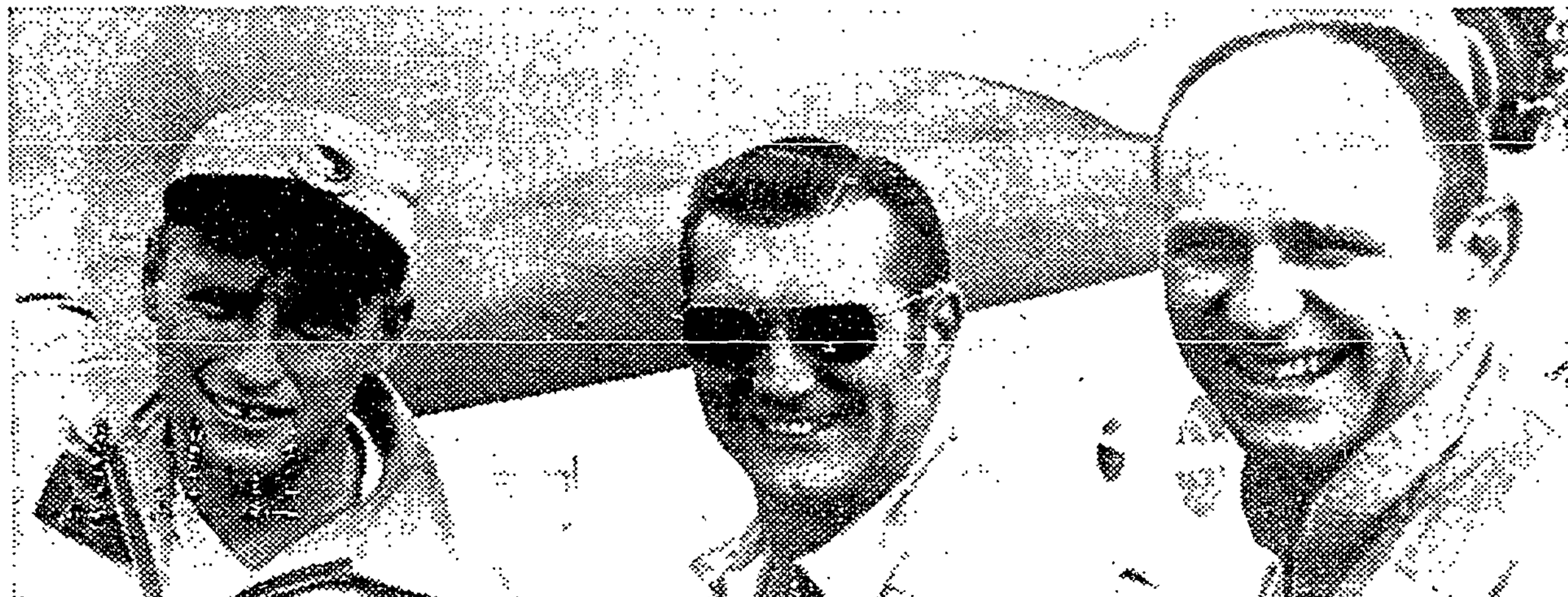
¶To deploy six scientific experiments on the moon's surface, including a seismometer for registering possible moonquakes, volcanic action or meteorite impacts, and several instruments for measuring atomic particles in the lunar environment.

¶To practice techniques for a pinpoint landings. This should clear the way for future astronauts to aim for more rugged mountainous regions that are of particular interest to scientists.

¶To take close-up pictures of future landing sites.

The two moon-walking astronauts will also transmit color television pictures of their activities and attempt to walk over and inspect the Surveyor 3, possibly even snipping off a piece for scientists to examine.

Apollo 12 is scheduled to begin its return trip to earth with a lift-off from the moon at 9:23 A.M. on the seventh day—Nov. 20. Splashdown is set for Nov. 24 in the Pacific Ocean.



Associated Press  
**THEIR MISSION BEGINS TODAY:** The Apollo 12 astronauts after flying in T-38 jet trainers at Patrick Air Force Base, Fla. From the left: Comdr. Charles Conrad Jr., Comdr. Richard F. Gordon Jr. and Comdr. Alan L. Bean. The lift-off is scheduled for 11:22 A.M., E.S.T.