

# TIME

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## THE U.S.

### INTO THE DEPTHS OF SPACE

**T**O the nation and the world, space shots have become routine affairs. There is still a special sort of drama in the trembling instant of decision when the rocket ignites and begins to rise, and in the knowledge of the men strapped down inside the huge projectile—but the drama has become familiar from so many past launchings. The voyage of Apollo 8 was an event of another magnitude altogether, and it transfixed a blasé world. Three U.S. astronauts were about to soar 230,000 miles to the moon, circle it ten times and return to earth. In the eleventh

KEYSTONE

year of the space age, man stood on the very threshold of exploration of the solar system.

Apollo 8's historic flight had a thundering and auspicious beginning. The mighty, 36-story Saturn 5 rocket lifted from its pad a negligible 65 milliseconds after its scheduled 7:51 a.m. launch time. Propelled by an awesome 7,500,000 lbs. of thrust, it soared into the clear Florida sky over Cape Kennedy. Two hours and 20 minutes later, as Apollo whirled in orbit around the earth, came the anxiously awaited word to make the translunar insertion—the maneuver that would send the vehicle toward the moon.

The tone was laconic and the meaning obscured by space-age jargon, but the message from the Houston ground controller was unmistakably clear to the astronauts: "You are go for TLI." All of the systems aboard their spacecraft and the attached S-4B rocket were operating perfectly, and nothing stood in the way of making the final thrust. As Apollo passed over Hawaii on its second orbit of the earth, the astronauts fired the S-4B engine. It was a perfect burn. The spacecraft increased its velocity from 17,400 to 24,200 m.p.h. The speed was enough to enable the spacecraft to escape from the earth's gravitation pull. At long last, man was on his way to the moon.

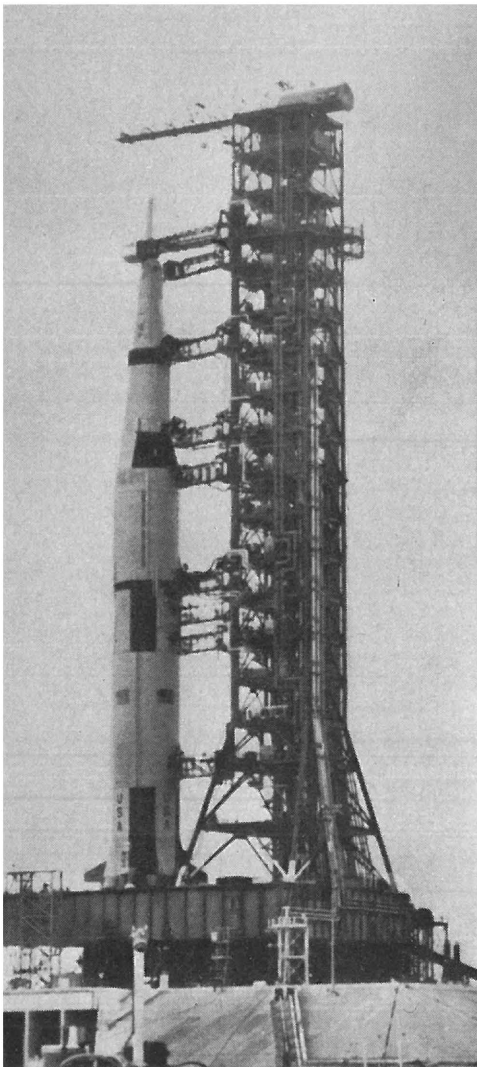
**Uncharted Perils.** The drama visibly affected normally imperturbable space officials. "If we hadn't had other manned flights before," said Kennedy Space Center Director Kurt Debus, "the excitement, the stress would be unendurable. To go to the moon is symbolic of man's leaving earth, of opening vast new frontiers." The impending flight inspired Robert Gilruth, director of the Manned Spacecraft Center, to deliver a rhapsodic Christmas message to the center's 4,500 employees: "Perhaps the ancient mariners had the same feeling of anticipation as they set sail through the Straits of Gibraltar past the limits of the known world."

There was good reason for both exhilaration and apprehension. As they began their pioneering journey, Astronauts Frank Borman, James Lovell and William Anders were pushed into space by a rocket that had never before been used in manned flight. Only minutes after they were propelled out of earth orbit toward the moon, they were far-

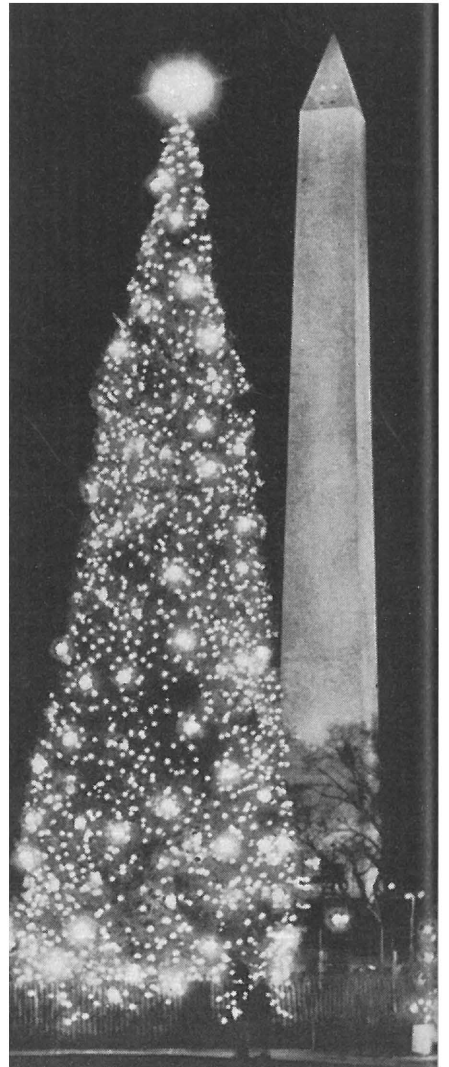
ther than man has ever been from his home planet (the previous record of 850 miles was set by the U.S. Gemini 11 mission in 1966).

Ahead lay clearly defined perils, and perhaps some uncharted ones as well. Power- or oxygen-supply failures so far from earth might well doom the astronauts. Failure of the key Service Propulsion System (SPS) at crucial junctures could send them crashing into the moon or leave them stranded in lunar orbit. "We have got elements of danger all along the way," said Borman. Yet the potential rewards were great. From their

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APOLLO 8 ON LAUNCHING PAD  
"Symbolic of man's leaving earth."



NATIONAL TREE & WASHINGTON MONUMENT  
Historic Christmas for the country.

spacecraft, if all went well, the Apollo astronauts would be the first men to look down at the lunar surface, only 69 miles below, and up into the black sky to see the blue-green ball of earth, mantled by a filmy layer of cloud.

**Down in Darkness.** The week before Apollo 8's lift-off was filled with feverish activity. At Greenbelt, Md., technicians at the Goddard Space Flight Center simulated a mission by exchanging data with the 14 ground stations, four ships and six Boeing 707 jets that make up Apollo's worldwide communications network. Some 3,000 men were involved in this final check of telemetry and communications capabilities.

In the Pacific, Atlantic and Indian oceans, the ships, planes and 10,000 men of the recovery forces endlessly rehearsed their assigned roles, planning for Apollo's Friday morning splash-down, the first to be made in predawn darkness. In Houston, the 1,600-man mission control team put the giant computers at the Manned Spacecraft Center through their paces one last time, thoroughly rechecking important trajectory calculations and burn times for spacecraft engines. At four observatories around the world, astronomers kept a careful watch on the sun for major eruptions of deadly particles, which might call for postponement or abortion of the flight.

But most of the world's attention was centered on Cape Kennedy, where technicians on the steel tower at launch pad 39A were testing computer and electrical circuits on the 363-ft.-tall Saturn. Three miles away, in the firing control room, other technicians and engineers of the 5,500-man launch crew monitored the lights on their consoles and data from their computers as the 103-hour final countdown ticked away. There were a number of minor holds in the count when the launch crews discovered a sticky valve in a liquid hydrogen ground storage tank and a leak in a pipe carrying liquid oxygen to the rocket. Less than a day before the scheduled lift-off, an analysis of the liquid oxygen in the spacecraft's fuel cells showed the presence of liquid nitrogen. Had it been permitted to remain, the contaminating nitrogen would have made it necessary for the astronauts to purge the cells every hour instead of every seven hours during the mission. Fortunately, the countdown schedule had been padded with enough precautionary hold time to enable technicians to replace the oxygen without delaying the launch.

**Busman's Holiday.** While Apollo was receiving its final checkup, Astronauts Borman, Lovell and Anders were successfully passing theirs. "We don't see anything that will cause us any concern," reported NASA's Dr. Charles Berry. "We seem to be escaping illnesses this time."

To ensure that the astronauts would not come down with colds like those that plagued the Apollo 7 crew, NASA doctors asked Cape Kennedy personnel with colds to keep their distance. The as-

tronauts and everyone who might come in contact with them were also given inoculations of Hong Kong flu vaccine. And as a final precaution, Apollo's medical kit was stocked with 60 decongestant pills, three nasal sprays, 21 sleeping pills and some aspirin.

Until Friday, when they spent the day relaxing in their isolated quarters, the astronauts were kept busy rehearsing crucial maneuvers in an Apollo flight simulator, holding briefings with space officials and jogging to keep in condition. On a busman's holiday, they watched the midweek launch of the synchronous communications satellite Intelsat 3 by a three-stage Delta rocket.

As Saturday began, the astronauts switched to an inflexibly precise schedule. They were awakened at exactly 2:36 a.m., began a final medical check at 2:51, breakfasted at 3:21 and began climbing into their space suits at 3:56. They left the suit room on schedule at 4:42, arrived at pad 39A at 5:03 and entered the Apollo spacecraft at 5:11.

**Christmas Present.** For weeks before launch time, NASA headquarters in Washington was flooded with protests from Fundamentalists objecting to the Christmas timing of the flight. The Apollo crew, all of whom attended church on the last Sunday before blast-off, had no such qualms. "I can't think of a better religious aspect of the flight than to further explore the heavens," said As-

tronaut Lovell. "I think it would be a very good Christmas present for the country."

Actually, the timing of the shot is a matter of sheer coincidence. In October, some space officials, apprehensive about Russian moon-shot plans, were hoping that Apollo 8 could be launched as early as Dec. 6. When it was decided that preparation of Saturn 5 and trajectory calculations could not be completed in time, the flight was scheduled for the next moon-shot "window," the period between Dec. 21 and 27.

On any one of those days, scientists calculated, Apollo 8 could be launched in daylight, reach and orbit the moon when the sun was at the correct elevation for photography of lunar landing sites, and arrive back at earth in an appropriate recovery area. Because time is fast running out on the U.S. goal of landing men on the moon before the end of 1969, U.S. officials were reluctant to delay the launch until the next lunar window opens in January.

**Earthbound Cosmonauts.** Some of the same considerations affected the plans of Russian space scientists, who had an opportunity to launch a moon-shot early in December. Despite hints in the Soviet press, widespread rumors in Moscow, and the conviction of some Western experts that the Russians would attempt to upstage Apollo 8, the cosmonauts remained earthbound. Why no

## A Six-Day Timetable

**A** HALF-HOUR after thrusting out from earth orbit toward the moon, the astronauts faced a test that was crucial to the first actual lunar landings. They successfully separated their spacecraft from the third-stage S-4B rocket, moved 50 feet ahead of it, then turned to inspect it. After sending the S-4B off into orbit around the sun, Apollo was to continue coasting toward the moon, firing its engine briefly only if a mid-course correction was needed to put the craft precisely on its path.

On Sunday, after another opportunity for correcting their trajectory, the astronauts were to make their first live telecast from space. They were also to conduct navigational tests. Other major events this week:

**MONDAY:** Provided all went well up to this time, more navigation tests, spacecraft attitude changes and a second live telecast were to occupy the astronauts' time. Late in the evening, the pull of earth's gravity would have slowed Apollo to its minimum translunar speed of 2,170 m.p.h. At that point, 30,000 miles from the moon, lunar gravity takes over. Apollo would thus begin accelerating again as it sped closer to the moon.

**TUESDAY:** Early in the morning, Apollo was due to curve around the western edge of the moon at a speed of 5,720 m.p.h. Around 5 a.m., behind the moon and cut off from radio

contact with earth, the astronauts were to fire Apollo's rocket to cut their speed and drop into orbit around the moon. Some 20 minutes later, they would emerge from behind the eastern edge of the moon and resume radio contact. At 7:30 a.m. and again at 9:31 p.m., they were scheduled to transmit live TV pictures of the lunar surface and of the earth, hanging like a Christmas-tree ornament far distant in the sky.

**WEDNESDAY:** Shortly after midnight on Christmas Day, the astronauts planned to burn Apollo's engine again, in order to boost their speed to 6,060 m.p.h., and head back toward earth. This maneuver would also occur behind the moon, so that long minutes would pass before earth stations knew whether it had been successful. The Apollo crew's itinerary called for spending the remainder of the day and all day Thursday in housekeeping chores and navigation tests while coasting back toward earth. There were also to be two more live telecasts to earth from the spacecraft in the course of its journey homeward.

**FRIDAY:** After jettisoning of the service module, the Apollo command module was due to re-enter the earth's atmosphere about 10:40 a.m. and splash down in the Pacific recovery zone near Christmas Island about eleven minutes later.

shot was made, only the Russians know. But U.S. specialists note that the Soviet tracking ships that were strung out early in December in apparent preparation for a manned shot are now returning to port. Even the tracking ship *Komarov*, usually in the Caribbean, is sailing all the way back to Russia.

Having missed the December window, the Russians may well have to delay their own manned circumlunar shot for at least a few months. Launch and recovery areas inside the Soviet Union are usually snowbound during winter months. Western experts suspect, moreover, that the Russians were not fully satisfied with the results of the landing of the unmanned moonship, *Zond 5*, in the waters of the Indian Ocean, where warm weather makes year-round recovery possible. These factors, and possible problems with the Soviet manned spacecraft, have led one U.S. expert to chalk up the following prediction on his office blackboard: "Next Russian unmanned attempt—March 2; next Russian manned attempt—March 30."

Even if the Russians should unexpectedly launch a moonshot this week, a successful Apollo 8 mission would put the U.S. a giant step ahead, for the first time, in the race to land men on the moon. Limited by the size and thrust of their operational rockets and still too unpracticed at assembling larger spacecraft in earth orbit, the Soviets at best can do no more than shoot a manned spacecraft around the moon and back again in a single loop.

U.S. spacemen have far greater capabilities. With the proven Saturn 5 and the Apollo spacecraft, they need only complete manned tests of the bug-

like lunar module (LM) before they will be able to place two men on the moon. Apollo 9 will test the LM in earth orbit in February. If no serious problems show up, Apollo 10 will orbit the moon in April while two astronauts aboard the LM descend to within 50,000 ft. of the lunar surface—less than ten miles. A few NASA "hawks" want the LM to go all the way down on that mission, but a more cautious majority is holding out for a landing during the flight of Apollo 11, in June or July.

**Toy for Millionaires.** If all goes well, when the last bits of data are analyzed, the spacecraft recovered from the ocean and the astronauts debriefed, the Christmastime flight of Apollo 8 will have cost the U.S. some \$310 million. The lives of three able men and the prestige of the nation will have been again put



THE ANDERSES  
And 11 for all the way.

dent Johnson agrees. "Space is not a gambit," he said. "It is not a gimmick. Where the moon is a major goal today, it will be tomorrow a mere whistle-stop for the space traveler."

Why go to the moon? Congressman Olin Teague, a member of the House space committee, answers with a question: Why did Lindbergh go to Paris? "He didn't give a damn about Paris," says Teague, "but he gave a damn about how he got there. The same applies to the moon." During a debate about a small appropriation for aircraft research 60 years ago, Teague notes, some Congressmen predicted that the airplane would never contribute anything to the economy and would remain only "a toy for millionaires."

**Undaunted by Danger.** Before the launch, Nuclear Physicist Ralph Lapp gave voice to the nagging fears that many Americans have about this week's mission. "We are pushing our luck," he said, "gambling that everything will work perfectly. NASA experts will assure you that they have thought through the risks and have planned for them. Well, they didn't in Apollo 204."\*

But like the men who first set out to cross continents on foot and oceans in frail ships, the astronauts seemed undaunted by the danger and challenged by the unknown. "We've studied the mission," said Spacecraft Commander Borman, "and we've studied the vehicle. We have faith in the guys who are helping us on the ground, and we have faith in the guys who built the machines. We wouldn't go if we didn't think the mission was worth the risks."

\* The craft in which Astronauts Gus Grissom, Ed White and Roger Chafee burned to death in early 1967.



THE BORMANS  
10 to descend to 10.

on the line. As on earlier missions, voices were raised to question the value of flying to the moon when the U.S. is heavily involved in Viet Nam and beset with domestic crises.

Even in better times, critics of the Apollo program have been articulate and vociferous. Wrote Walter Lippmann in 1963: "There were two big mistakes. One was the commitment to put man, a living person rather than instruments, on the moon. The other mistake was to set a deadline—1970." Nobel Laureate Linus Pauling complained that "something is wrong with our system of values when we plan to spend billions of dollars for national prestige."

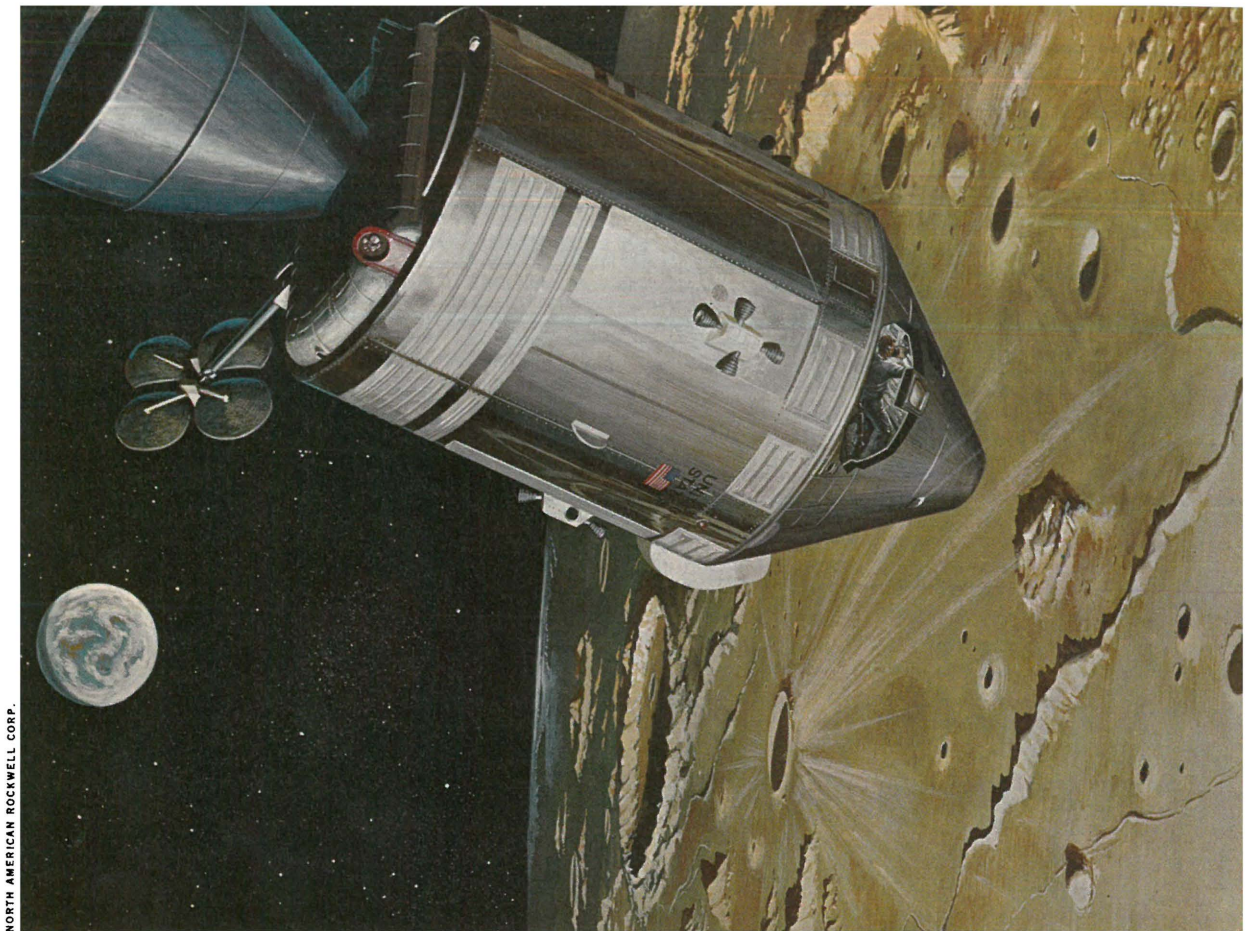
There is equal certainty on the part of Apollo's supporters. "While we cannot guarantee that we shall one day be first," said President John Kennedy in committing the U.S. to the moonrace, "we can guarantee that any failure to make this effort will make us last." Presi-



THE LOVELLS  
9 to orbit the LM.



Suited up at Cape Kennedy for the historic mission, Rookie William Anders (left) poses with Veteran Astronauts James Lovell Jr. and Frank Borman, the spaceship's commander.



In illustration of moon orbit, Apollo keeps its cloverleaf communications antenna aimed at the remote earth as astronaut peers at the moonscape from a height of about 69 miles.

Ten orbits later, if all goes well, astronauts will fire Apollo's rockets to begin their return to earth and an ocean splashdown.

