

Newsweek

APOLLO TRIUMPH

JANUARY 6, 1969

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Astronauts Anders, Lovell and Borman



First men to the moon: Borman, Lovell and Anders were glad to be back on 'the good earth'

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Associated Press

The end of the odyssey: Frogmen steady the spaceship as Yorktown stands by

INTO THE UNIVERSE

"Thousands of people made this possible," said Col. Frank Borman as he stood on the Yorktown flight deck last week, less than two hours after he and Navy Capt. James A. Lovell Jr. and Air Force Maj. William A. Anders had returned to earth from their triumphant journey to the moon.

It was the typically modest disclaimer. But in a very real sense, it was true. All around the world, thousands of men had sustained the astronauts during their six-day flight to the moon and back. Beyond that, there were the hundreds of thousands of engineers and workers who built the Apollo spaceship and the mammoth Saturn rocket. And stretching back in time and space were mathematicians, astronomers, physicists, chemists, biologists and physicians—the centuries of study and research from Newton and Kepler on—that culminated in Apollo 8. Even the texts of religion buoyed their flight. Apollo 8, in short, was borne to the moon on the sum of all of man's knowledge.

Daring: And if all mankind made it possible for Borman, Lovell and Anders to reach the moon, men the world over genuinely shared in their adventure. It was the farthest, fastest and most daring journey ever made—"one of the great pioneering efforts of mankind," said Dr. Thomas O. Paine, acting administrator of NASA. And of all the accomplishments, four stood out:

First, never before had man seen what Borman, Lovell and Anders saw as they circled 70 miles above the moon. Their feat gave the world a new and humbling perspective: looking back at the clouded earth from the moon, it was impossible to discern if life exists on this planet.

Second, their close-in inspection revealed a lonely, bleak and oppressive moonscape. "The color of the moon looks like a very whitish gray," reported Anders. While there were no scientific surprises, they nevertheless confirmed visually what selenologists had suspected about the barren moon. By pointed contrast, the astronauts referred several times to "the good earth."

Third, the flight was a pathfinder for the Apollo mission this summer that is intended to land Americans on the moon. The astronauts took hundreds of black-and-white and color photographs and thousands of feet of movies of the moon, the earth, and themselves—an unparalleled record of the spaceflight.

Fourth, Apollo 8 was a triumph of

U.S. technology. The 363-foot-tall rocket and ship, with no fewer than 3½ million working parts, performed flawlessly. In particular, Apollo 8 was clear proof of the hard work that the North American Rockwell Corp. had done to correct problems in design after the spaceship fire that killed the first Apollo crew. Launching was only six-tenths of a second late; lunar orbit was just one-half mile off; splashdown came within 7,100 yards of the carrier.

Fogged: There was one annoying problem. Three windows in Apollo 8's command module—the 9-foot-tall, 13-foot-diameter, cone-shaped crew cabin—fogged badly early in the flight. (Apparently the rubbery calking material between the three-paned windows decomposed when exposed to direct sunlight and gave off a gas that coated the inner surfaces of the windows.) The 9-inch-diameter, circular window in the hatch directly over Lovell's center seat and the 13-inch-square windows off Borman's left shoulder and Anders's right shoulder fogged. The two small 8- by 11-inch triangular windows directly in front of Borman's and Anders's faces used different calking material and didn't fog; most of the pictures taken by the crew during their flight were shot through these two windows.

The astronauts left earth orbit on their six-day journey at 24,200 mph, just 429 mph slower than the speed at which they returned. It was a smooth TLI (Trans Lunar Injection) but it soon developed that the crew of Apollo 8—if not the ship—had developed a bug. Some 28 hours after launch, Lovell told the Mission Control Center in Houston that Borman had been suffering the past ten



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Jeffrey Lovell: Astronaut-to-be?

U.S. AFFAIRS

hours from nausea, headaches and fever. He had one loose bowel movement and vomited twice. (In space, the astronauts defecated into small bags that were sealed and sterilized by a small germicidal tablet; the bags were stowed in a special compartment for post-flight medical analysis.) Lovell added that neither he nor Anders was feeling particularly chipper. But when Dr. Charles A. Berry, the astronauts' physician, rang them up one hour later, he got an optimistic health report. "I don't have a fever now," Borman told Berry. "I slept for a couple of hours and the nausea is gone and I'm controlling the loose b.m. I think everything is in good shape now." He diagnosed his symptoms as an attack of the "24-hour" flu, rather than the debilitating Asiatic strain, and Berry concurred.

There was little else the physician could do. Later, Berry said that if Lovell and Anders had become as ill as Borman, or if Borman's illness had persisted,

stick. "This transmission," the ship commander said to viewers around the world, "is coming to you approximately halfway between the moon and the earth." Lovell was mixing a bag of water and dehydrated chocolate pudding, but he popped up and his bearded face almost filled the screen. "Happy birthday, Mother," he said. Back down on earth, in Edgewater, Fla., Mrs. Blanche Lovell, was marking her 73rd birthday.

Unfortunately, the transmission failed to show the earth as anything more than a blurred ball of light that day; the camera's long telephoto lens was inoperative. The smaller lens caught streaks of light flashing by the windows. Prosaically, they proved to be only bits of ice formed by excess water dumped from the ship's evaporator; the water turned instantly into ice crystals in the cold vacuum of space. The lens was working the next afternoon, Dec. 23, when the crew—from a distance of 212,000 miles in space—

hung suspended in the sky as a brilliant, beautiful but mysterious ball. "What I keep imagining," Lovell reflected, "is if I am some lonely traveler from another planet, what I would think about the earth at this altitude, whether I think it would be inhabited or not."

Although the shrinking size of the earth was a constant reminder of the great distances they had flown, there were no visual or physical cues by which the astronauts could judge their speed. Lovell, Apollo 8's navigator, plotted the ship's position in space through a highly complex guidance and navigation station on one wall of the craft. Using an optical subsystem consisting of a sextant and a telescope, Lovell manipulated the two until a target star and a known earth or lunar landmark were superimposed in the sight. The system's computer—which the crew praised at the end of the flight—then calculated the angle between the two and, coupling this with references from the ship's inertial platform, determined Apollo's track in space.

Crest: Monday, Dec. 23, Apollo 8 slowed to 2,217 mph and was crossing the "equigravisphere"—the Great Divide of space between earth and moon, 202,700 miles from earth and 38,900 miles from the moon. After going over this crest, the ship entered the lunar gravity field and in effect began rolling downhill. So accurate was the initial trajectory given Apollo 8 by its Saturn 5 rocket, and so precise were two small mid-course corrections calculated by banks of computers back at the Houston control center and radioed up to the crew en route to the moon, that Apollo 8 swept to within 69.5 miles in back of the moon—only one-half mile more than planned. So sensitive was Apollo 8's trajectory that even the seemingly routine matter of dumping urine overboard through a special vent had to be curtailed temporarily. The act of venting, Houston calculated, added a small fraction of speed to the ship and nudged Apollo 8 from the planned flight path.

Told by the ground that they were "go" for lunar orbit, Borman replied flatly: "Okay. Apollo 8 is go." The crew accepted this momentous decision with the same equanimity they had treated all earlier steps in the flight. Borman, in fact, noted almost as an afterthought: "As a matter of interest, we have yet to see the moon." The moon, between earth and sun throughout Apollo 8's translunar crossing, was dimly illuminated, and with that and the problem of cloudy window glass, Borman said he felt he was traveling "in a submarine."

Just one minute before Apollo 8 whipped around the leading edge of the moon, Houston radioed: "Safe journey, guys." Anders replied: "Thanks a lot, troops. We'll see you on the other side."

Radio contact was suddenly lost as the ship passed behind the moon out of sight of earth. Alone more than 231,000 miles from home, Borman then pushed a but-

(Continued on Page 14)



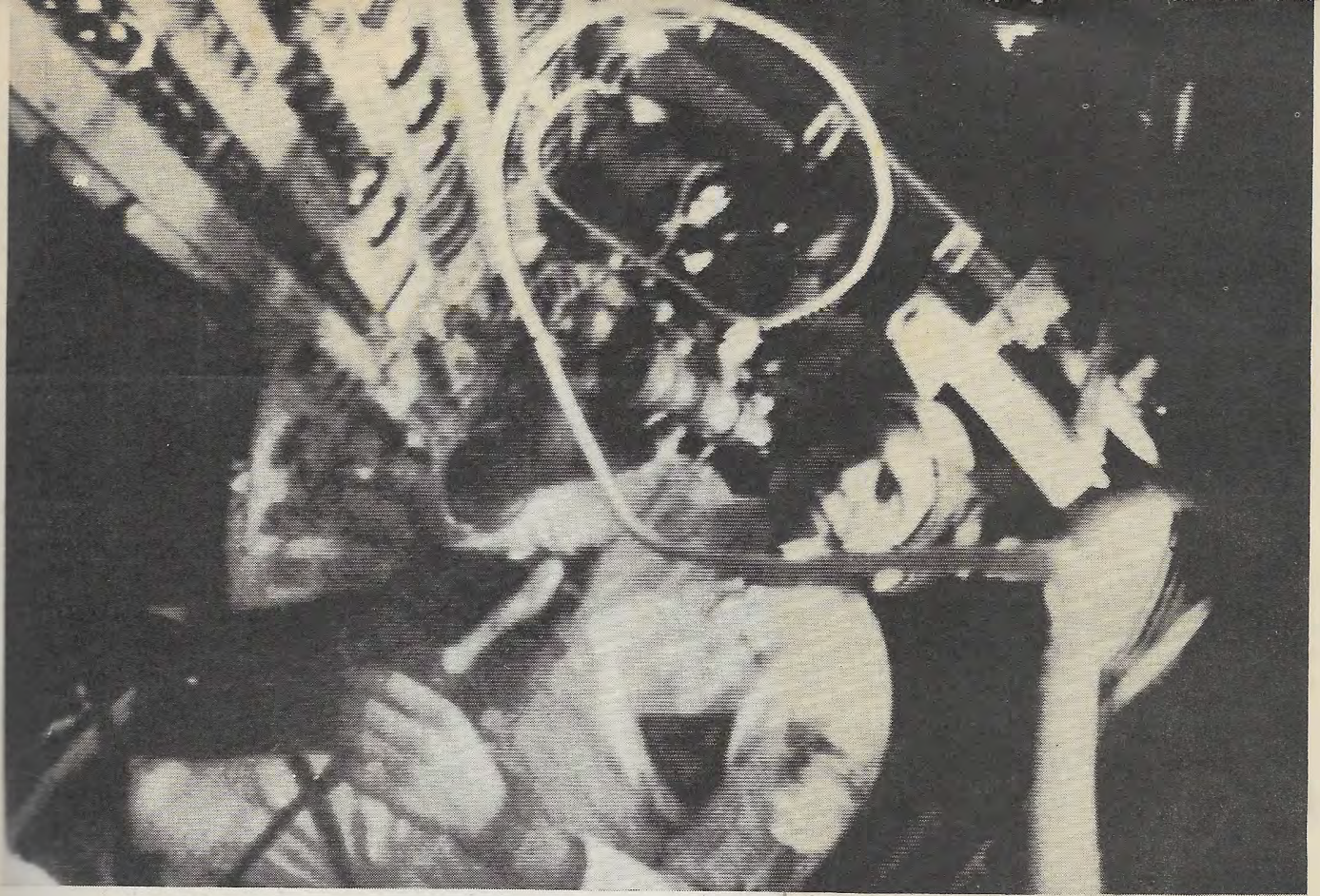
Apollo 8 wives: Sue Borman, Valerie Anders, Marilyn Lovell

it was doubtful that Apollo 8 would have received permission from the ground to enter lunar orbit. (They would have had to whip around the moon and come back one-half day early.) The crewmen took Lomotil, a drug to curb diarrhea, and Marezine, an anti-seasickness pill, and reported themselves a day later as feeling fine. But the episode provided a revealing insight into the crew. It seems that they delayed notifying the Houston center of their malaise, perhaps because they were afraid that they would be recalled to earth.

Health: Whatever reservations controllers had about the health of the Apollo 8 crew were dispelled not long after the men first reported their troubles. Sunday afternoon, when they were 138,700 miles from earth, the astronauts sent the first of their six live black-and-white telecasts back to earth. CBS broke into the NFL playoffs to show the first men leaving earth's shores—and was promptly chastised by about 2,000 callers. Anders served as chief cameraman, showing first Borman sitting in his left-side couch with his right hand on the spaceship's control

beamed their second transmission from space. The pictures were received by a large, 85-foot, dish-shaped antenna at Goldstone, Calif. Along with Madrid and Canberra, these Deep Space Network tracking stations kept the Mission Control Center in Houston and the spaceship in touch with each other, sometimes through the intermediary of communications satellites 22,300 miles above earth. While it was difficult to identify landmarks beneath the cloud patterns that seemed to cover most of the earth, the TV picture was much better than the previous day's.

Lovell said that he could see South America all the way down to Cape Horn, Baja California and the southwestern United States. "For colors," he added, "waters are all sort of a royal blue. Clouds, of course, are bright white. The land areas are generally a brownish, sort of dark brownish to light brown in texture." All of man's works—cities, roads and bridges—were obliterated by distance; the earth, now seen by the crew as a celestial body about four times bigger than the moon appears on earth,



Inside Apollo: Anders exhibits telephoto lens as weightless power cord snakes into foreground

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Signing off: Borman waves good-by after first TV broadcast

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Happy Birthday: Lovell greeting his mother

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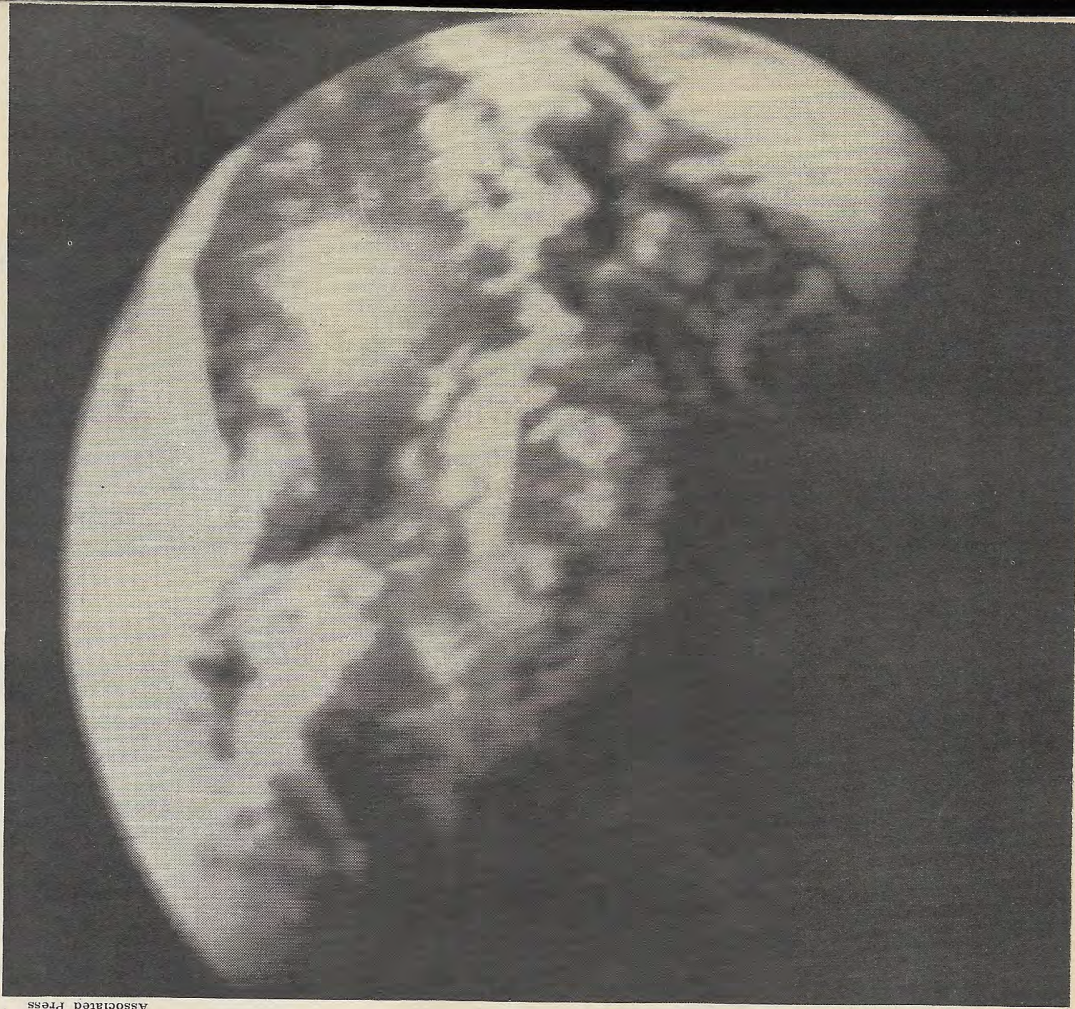


EARTH, 200,000 MILES OUT: Apollo 8's TV camera photographed planet earth as ship neared the moon. Outline diagram shows how North American continent is almost entirely blanketed by clouds. The North Pole is at 9 o'clock. Most of North Atlantic is in darkness beyond the terminator marking night-day line. It is 3 p.m., EST, Dec. 23. This was the farthest telecast of earth transmitted from Apollo.

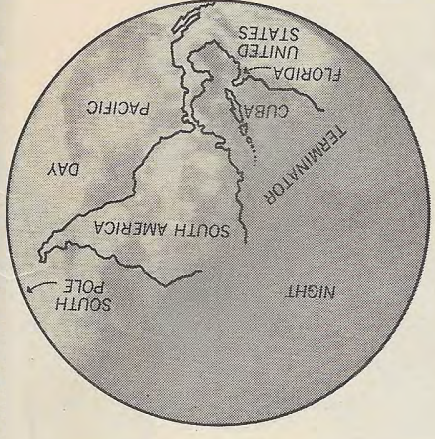


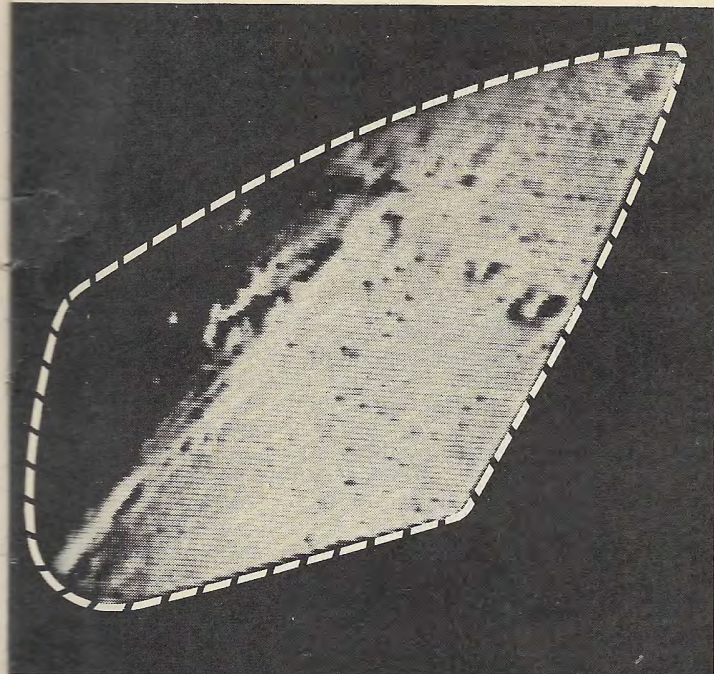
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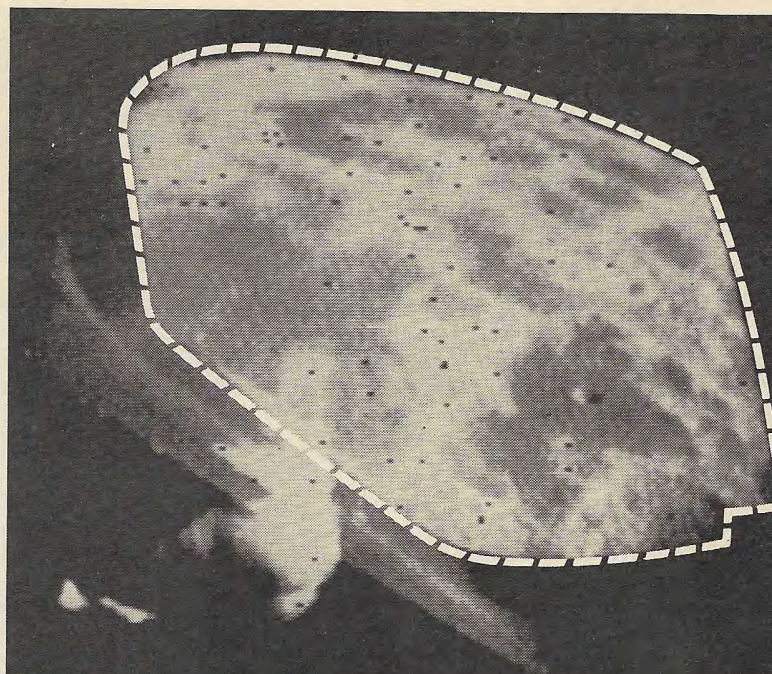


EARTH FROM 111,000 MILES: Returning from moon, astronauts photographed earth from about half-way home. This time South Pole is at 2 o'clock and terminator just touches edge of South America. Time is 3:51 p.m., EST, on Dec. 26. Western Hemisphere shows up in pictures because transmissions are made in LOS (line of sight) with the antenna of Goldstone, Calif., receiving station.





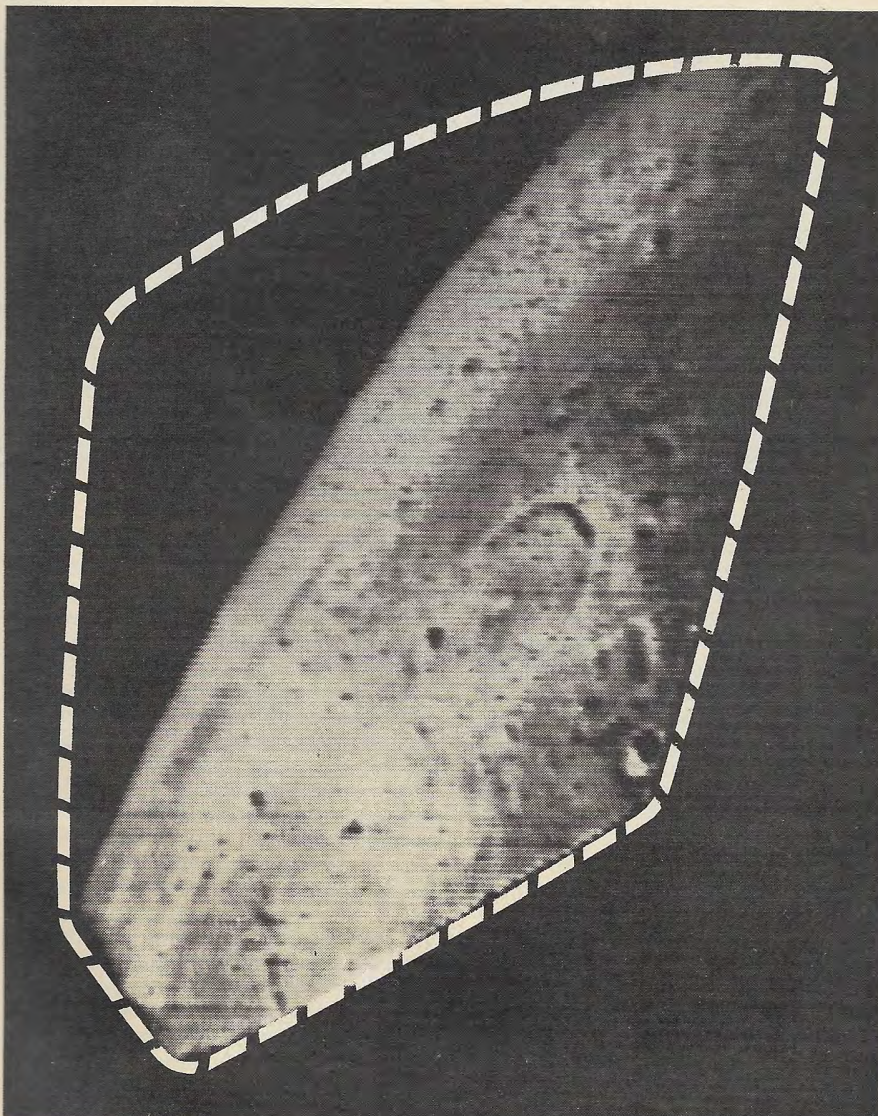
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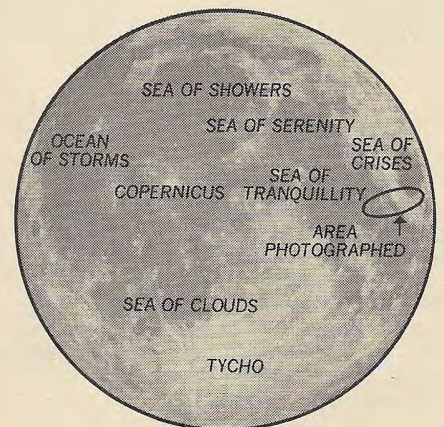
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LUNAR TERMINATOR: "And in the beginning God created the Heaven and the Earth," Anders began reading on Christmas Eve, as Apollo 8 passed from lunar day into lunar night (above, left). With the sun low on horizon, astronauts caught their sharpest view of a crater near Sea of Crises which lies on the eastern edge of the moon's face.

HIGH LUNA: The picture above was taken from right-side window (shape indicated by dotted line) during middle of blazing-hot lunar day. Sun bounces off window sill and illuminates a desert-like lunarscape seemingly free of craters and mountain ranges.



Associated Press



SEA OF CRISES: During their Christmas Eve telecast Borman, Lovell and Anders sent this view of a large flat area known as Sea of Crises. The Apollo 8 altitude is 70 miles. Astronauts estimated the crater seen through window to be 30 or 40 miles in diameter. Lunar horizon curves in distance.

(Continued from Page 10)

ton on their computer marked PROCEED. The computer took control of the ship's systems, counting down the final few seconds of "LOI-1"—Lunar Orbit Insertion—and then turning on the ship's powerful 20,500-pound-thrust rocket engine. Borman's heart rate jumped to 130 beats a minute. The engine burned for a little more than four minutes, cutting the spaceship's speed from 5,700 mph to 3,600 mph. This braking maneuver slowed Apollo 8 down to the calculated speed at which the moon's weak (only one-sixth of earth's) gravity field would take it out of earth's predominant pull: Apollo then became a manned satellite of earth's only natural satellite.

Cheer: Some 36 minutes after disappearing behind the moon, Apollo 8 sailed up and around the far lunar horizon; a jubilant voice of mission control shouted: "We've got it! We've got it! Apollo 8 now in lunar orbit. There is a cheer in this room." From the moon came a matter-of-fact message from Lovell: "Good to hear your voice."

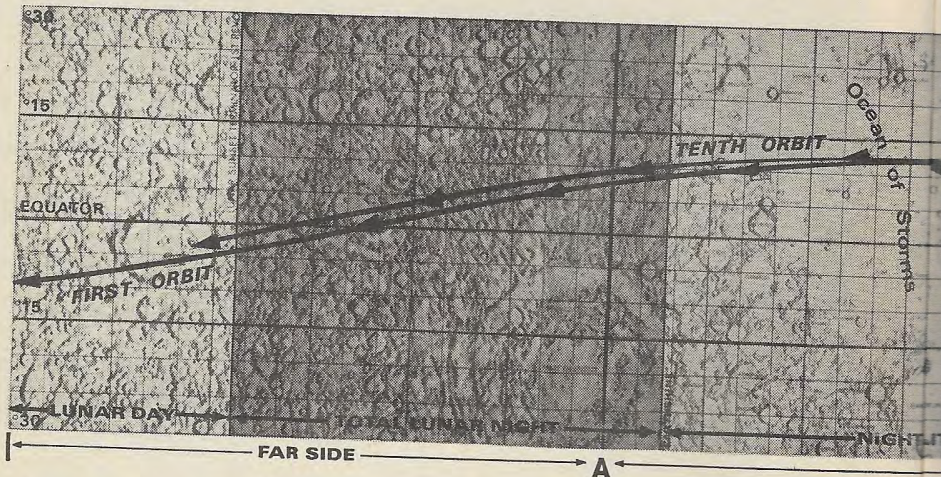
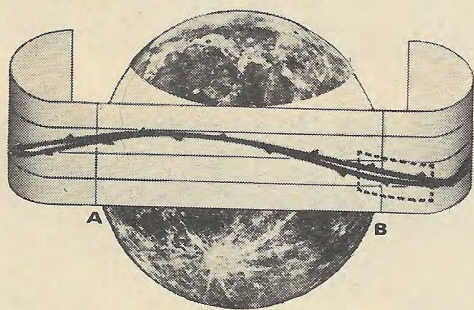
The first words that came down from the moon were not the poetic expressions of elated men; rather, they were an

accountant's audit of the ship's performance, including status reports on the ship's instrument panel, evaporators and orientation angles. Then Lovell gave an eyeball report on the moon as seen looking down and rearward from the ship (page 13). "The moon," Lovell said in an almost bored tone of voice, "is essentially gray. No color. Looks like plaster of Paris or sort of a grayish deep sand." Although the crew could see sharp details on the lunar surface, Lovell continued, the Sea of Fertility oddly was not as prominent to them as it is to astronomers back on earth. "The craters are all rounded off," he said. "Langrenus is quite a huge crater. It's got a central cone to it. The walls of the crater are terraced, about six or seven different terraces on the way down its sloping sides."

Lovell said that the 9-inch diameter, circular hatch window, located directly over his center couch, was so badly iced over from the waste water dumped by the spaceship that he had to lean over Anders's right-hand seat and look through the triangular 8- by 11-inch window there. Later, however, Lovell reported that Apollo 8 had acquired a window defroster—the sun reflected off

the moon's surface had melted the ice. "The view appears to be good," Lovell said as the spaceship orbited above one of the potential Apollo landing sites in the Sea of Tranquillity. "It appears that visibility at this particular site is excellent." Lovell said that he could see clearly two craters—Pickering and Messier—and a triangular mountain—landmarks that a future Apollo crew will use as they glide down toward a landing at the prime site. Anders then broke in, saying that "the backside (of the moon) looks like a sand pile my kids have been playing in for some time. It's all beat up, no definition, just a lot of bumps and holes."

Haze: Anders also saw an area that appeared to have undergone volcanic action at one time in its past. Selenologists have speculated that some lunar craters have been caused by volcanoes on the moon, and not by meteoroids slamming into the lunar surface. Lovell described a strange phenomenon. When the sun came up abruptly over the lunar horizon, he said, a fine white haze, glowing slightly, would appear behind the moon's limb, or edge. "It takes a fan shape," he explained. "This is just sort of a complete haze all over the local area. It's concen-



MOON NAMES: A NEW LUNAR WHO'S WHO?

Explorers traditionally name the landmarks they discover, and the Apollo 8 crew has been no exception. As their ship hurtled from the lunar day through lunar twilight to total night on the dark side, the astronauts bestowed several dozen names on the peaks and craters of the pale surface below.

Some of the names honored dead astronauts like Virgil I. Grissom, Edward H. White 2nd and Roger B. Chaffee. Some names seemed somewhat whimsically chosen: there is, for instance, a Crater Dennis, named after Dennis L. Bentley, who helped the astronauts with their preflight checklists. Lovell named a lunar mountain after his wife, Marilyn. There is also a Crater Borman, a Crater Lovell and a Crater Anders. Yet neither John F.

Kennedy who put the space program on its lunar trajectory nor Col. John Glenn, the first American to orbit the earth, was honored.

The christenings were done innocently and almost lightheartedly—in order, said NASA, to enable the crew to give its position to Houston quickly and accurately. But this effort to honor friends and colleagues while making navigation easier involved the astronauts in one of astronomy's most ancient and tradition-bound preserves.

The ritual of naming lunar features is almost as old as scientific astronomy itself. Johannes Hevelius, a German astronomer, first began naming lunar features in the middle of the seventeenth century. Hevelius named the moon's mountains for those on earth. Hence the lunar Caucasus. As Latin was the language of scholars and scientists in those days, he used it automatically. Other scholars followed Hevelius's example,

and even today lunar topographical names are officially given in Latin. Hevelius's colleague, Giovanni Battista Riccioli, introduced another tradition—that of naming lunar features after great scientific and historical figures.

As more astronomers began training telescopes on the moon, names for craters and other features proliferated and so did the confusion. To bring some order to the profusion of names, the International Astronomical Union's lunar nomenclature commission began standardizing the designations in 1935. Today, for the name of a lunar feature to be official it must be approved by the commission and the IAU's general assembly. In selecting new names suggested by astronomers and scientific academies, the nomenclature commission, chaired by Donald H. Menzel of Harvard, follows three general guidelines: big features like the seas are named for states of mind and places; smaller features like craters

trated at the exact time the sun comes up and then goes away. Very interesting."

Borman, naturally, had another concern. "While these other guys are looking at the moon," he radioed, "I want to make sure we have a good SPS [Service Propulsion System, the rocket to take the crew out of lunar orbit]. How about giving me that report when you can?" He wanted the ground, reading telemetry measurements on the ship's vital systems, to verify that Apollo 8 was functioning perfectly every time it appeared on the side of the moon visible to earth. Otherwise, he added, Apollo 8 would start up its engine and head home.

Apollo got a "go" for each of its ten orbits. From 4:59 a.m., EST, on the day before Christmas until 1:10 a.m., EST, on Christmas morning, the three men circled the moon. The first two orbits were egg-shaped, ranging from a pericyynthion of 69.5 miles to an apolune of 194.4 miles above the moon, before the crew once more fired the ship's big engine (again, behind the moon and out of sight of earth tracking stations) to circularize the orbit at 70 miles.

Ground controllers also noted a slight wiggle in Apollo 8's lunar orbits. Scientists

believe that the slight variations in orbit are caused by "mascons"—concentrations of large masses beneath the surface of five lunar seas, perhaps the remains of huge meteors that struck the moon with such great force that they melted and then sank deep beneath the soil. Other scientists believe the mascons are large iron deposits.

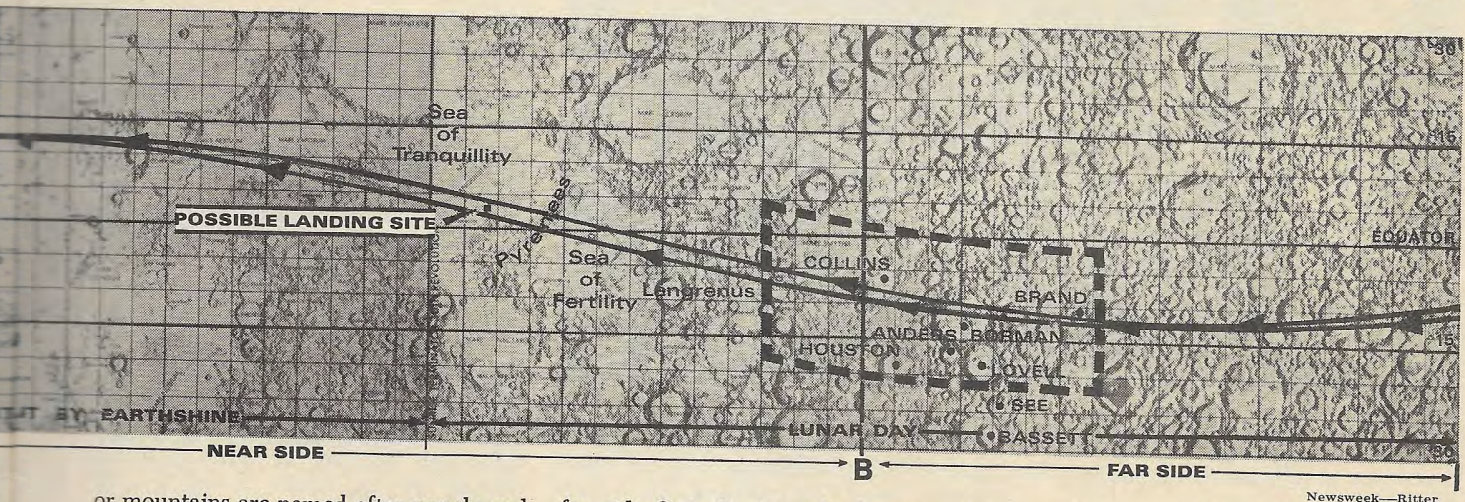
During Apollo 8's second lunar orbit, the crew pointed the small, 4½-pound television camera out the window to take live shots of the lunar surface as they moved at 3,643 mph.

'Too Tired': By the seventh orbit, the heavy work load and irregular sleep periods had begun to sap the men's energy. While Borman flew the spaceship so that it was pointing down at the moon, Lovell and Anders were busy shooting 70-mm. still photographs, taking 16-mm. movies and making observations on the geological features they could see, as well as performing their regular duties of navigation and systems checking. The men had not slept well on the way to the moon because of their early illness, a crowded work schedule and the adjustment from gravity to weightlessness. Borman suddenly told earth: "We're scrub-

bing everything. I'll stay up and keep the spacecraft vertical but I want Jim and Bill to get some rest. We're getting too tired." Lovell was soon snoring and the Houston center told Borman: "We can hear him down here."

The gray, unrelieved wasteland that is the moon was made clear during the second lunar telecast in the ninth orbit, on Christmas Eve. The crew panned their TV camera across vast naked plains, barren mountains and huge craters 70 miles beneath them. "The moon is a different thing to each one of us," Borman said. "Each one carries his own impression of what he's seen today. I know my own impression is that it's a vast, lonely, forbidding type . . . expanse of nothing. It looks rather like clouds and clouds of pumice stone. And it certainly would not appear to be a very inviting place to live or work."

Lovell said he was struck by the empty loneliness of the moon. "It's awe-inspiring," he stated, "and it makes you realize just what you have back there on earth. The earth from here is a grand oasis in the big vastness of space." Anders said he had been most impressed by the lunar sunrises and sunsets. "These bring out



or mountains are named after people and places (with the size of the crater corresponding roughly to the namesake's importance) and only the names of the dead are used. "We cannot select living people intelligently," Menzel explains, "because we cannot judge them against the background of history."

The Apollo 8 designations, Menzel fears, may offend Russian astronomers. And if the Russians are uncooperative, the IAU progress toward choosing names for features on the far side could be slowed. Indeed, national rivalries were exported to the moon in 1967 when the nomenclature committee met in Prague.

At that meeting, the Russians proposed a list of 150 names, weighted with their own luminaries and heroes. U.S. representatives objected on the ground that the mapping of the far side by unmanned probes was not yet good enough to support accurate naming. In truth, of course, the Russians had gotten to the

far side first. So instead of names, the U.S. proposed a system of numbers.

At a later meeting in 1968, the committee members evolved a compromise procedure: first, the group would decide on a list of 500 names; next, they agreed to pick some arbitrary method for assigning names to specific features, perhaps by alphabetical distribution. That way no one could feel slighted if his candidates did not get the biggest seas or craters. Among the 500 names that the committee tentatively agreed on were those of H.G. Wells, Ernst Mach and A.A. Michelson. Menzel also proposed that one large area be called the Sea of Astronauts (for both dead U.S. and Soviet spacemen) and that the small craters in it be named after individual men. These proposals were to be discussed at a future meeting of the committee, perhaps in April 1969. Now Menzel fears the Russians may retaliate for what they could judge to be pre-

emptory naming by the U.S. with some arbitrary naming of their own.

NASA officials reply that neither the Russians nor Menzel have to worry. The names, they insist, are temporary and chosen only for Apollo 8. The numerical designations of Menzel's committee could have been used, of course, but NASA points out that this could be confusing because of the endless series of numbers that crew and CapCom fire at each other. NASA says it even cleared the scheme with Gerard Kuiper of the University of Arizona, a member of the IAU lunar commission. And the agency says that if it ever does put any of the names before the IAU for approval they will be those of dead persons.

Perhaps so. But it seems possible that the designations made by Borman and his crew may stick—after all, they got there first—unless the IAU acts soon. After that, the matter is in the hands of the cartographers.

the stark nature of the terrain . . . The sky up here is also a rather forbidding, foreboding expanse of blackness . . ."

There was a brief pause, as the bleak and desolate lunar scene continued to pass slowly beneath Apollo 8's windows, before Anders's soft voice was heard again: "We are now approaching the lunar sunrise and for all the people back on earth, the crew of Apollo 8 has a message that we would like to send to you: 'In the beginning, God created the heaven and the earth. And the earth was without form and void and darkness was upon the face of the deep.'" Anders read another two verses and then Lovell read the following four verses. Borman, a lay reader of an Episcopal church not far from the Houston space center, read the final two verses and added: "And from the crew of Apollo 8, we close with good night, good luck, a Merry Christmas and

pend on this engine, it was designed to have only about 100 moving parts.

The spaceship sped across the crescent face of the moon for the last time and, just minutes after Christmas Day had dawned on earth, slid behind the moon. There, in accordance with the strict laws of celestial mechanics, the crew had to restart the ship's engine and increase their speed to the point where the moon's gravity field could no longer hold them as it had for twenty hours. But the engine proved as reliable as the astronauts; it came on with a resounding thump and quickly accelerated Apollo 8's speed.

'Santa': It was 1:20 a.m., EST, on Christmas when Apollo 8 rose suddenly above the moon's eastern horizon and came again into view of the earth. "Please be informed there is a Santa Claus," said Lovell. Back at mission control, the large lunar strip that the flight

ried it with him inside Apollo 8. The astronauts' Christmas presents waited beneath the trees (though Jeffrey Lovell, 2, broke out his toy astrohelmet).

Four hours after firing the spaceship's engine to boost themselves out of lunar orbit, the Apollo 8 crew again passed through the equigravisphere and into the stronger pull of the earth's gravity field. In two final telecasts, Borman, Lovell and Anders gave earth viewers a guided tour of their cabin and another spectacular look at earth from deep space. Borman pointed out details on the ship's instrument panel and Lovell was seen exercising with two stretchable cords attached to the wall. Anders then demonstrated the steps an astronaut must go through to prepare a zero-gravity meal.

Chores: The flight home was uneventful. The crew tried to catch up on the sleep they missed during the first four days of the mission. The Apollo 8 crew spent the last few hours of their 147-hour, half-million-mile flight on mundane housekeeping chores—stowing away film packs, cameras, used food bags, and any other loose equipment that might have hampered them during re-entry. Then, just minutes before they struck the wispy-thin upper levels of the atmosphere 80 miles above the earth's surface, at a point over China, the astronauts fired small explosive charges to separate their 9-foot conical cabin section from the aft service module with the SPS rocket.

Re-entry was the final critical maneuver for Apollo 8. The ship had to thread itself through a narrow re-entry corridor, 38 miles from top to bottom, in the upper atmosphere to hit the planned landing zone in the Pacific Ocean.

But Apollo 8 flew an unerring path home to the good earth. The cone-shaped section successfully withstood the 5,000-degree Fahrenheit temperatures that engulfed it during re-entry. The crew described re-entry as a "real fireball." With a small amount of lift provided by the angle at which it knifed through the air, Apollo 8 flew a slight "roller-coaster" trajectory to splashdown, dropping to 180,000 feet altitude before rising back up to 210,000 feet and then finally falling to the ocean below. A Pan Am pilot, en route to Sydney, described their blazing re-entry, with Apollo trailing an incandescent white streamer some 100 miles long.

Shave: Landing just before dawn, Hawaiian time, Dec. 27, some 1,043 miles southwest of Hawaii, the astronauts bobbed in the water until there was enough light for frogmen to jump into the water alongside them. The moon, Borman told the helicopter above, "isn't made of green cheese; it's made of American cheese." The helicopter then flew them back to the deck of the carrier 90 minutes after splashdown. Inside the helicopter, West Pointer Borman used an electric razor (which he had requested before he left) to shave off a six-day growth of beard. Lovell and Anders waited until later to shave.



NASA from Associated Press

Mission control at splashdown: A time for flags and cigars

God bless all of you—all of you on the good earth."

It was the most moving moment of the flight and perhaps of the space age, heard by millions gathered around Christmas trees. A rabbi, listening to the astronauts reading Genesis, told a friend he thought that was how God sounded when He created the earth.

Critical: Apollo 8's final lunar orbit was a painstaking preparation for the start of the homeward journey. Numbers for guidance equations were exchanged like mathematical Christmas presents between the crew and mission control. There was no banter between crew and controllers on earth, for Apollo 8 was facing its most critical moment: the restart of the big service-module engine. If the engine failed to respond to the computer's command to turn on, or if it quit before the planned 246½-second burn, Borman, Lovell and Anders would have eventually died, their lifeless ship circling a lifeless moon, their wreath a decaying lunar orbit. Because so much de-

controllers had watched for the past twenty hours was replaced with a map of earth, and a Christmas tree was set up behind the control consoles. Later, at splashdown, the controllers broke out cigars and a huge American flag.

Probably the happiest people to learn of the successful TEI (Trans Earth Injection) burn were the families of the three astronauts. The Borman, Lovell and Anders households in Houston kept track of the flight through color TV sets and special "squawk boxes" plugged in to mission control by the space agency. On Christmas morning, the families all attended church services—the Bormans and Lovells at Episcopal churches, the Anderses at a Roman Catholic church. Marilyn Lovell wore a new mink coat, a Christmas gift that her husband arranged to have delivered from Neiman-Marcus on Christmas morning. "It came," she said happily, "from the man in the moon." Valerie Anders had to wait for one of her gifts—a gold pin in the shape of an 8, with a moonstone crest; her husband car-

The crew spent the remainder of Dec. 27 aboard the Yorktown, undergoing medical examinations. They were flown to Hawaii Saturday and from there to Houston, arriving early Sunday morning for a brief reunion with their families. For at least the next week, the astronauts will be debriefed—telling all of the details of their flight.

'Fabulous': Men reached for the right words to express their soaring thoughts. Pope Paul VI told a pre-Christmas meeting of cardinals: "How can we forget that while we sit here quietly, studying the horoscopes of the past and future, a feat that surpasses every ordinary limit of fantasy and human activity is being carried out in the cosmic space with the fabulous trip of three astronauts flying toward the moon?" Ten Russian cosmonauts, including Georgy Beregovoi, Alexei Leonov and Gherman Titov, sent the Apollo 8 crew a congratulatory telegram, praising the astronauts for "the precision of your joint work and your courage."

The progress of Apollo 8 was also followed by President Lyndon B. Johnson, recovering from the Hong Kong flu, and President-elect Richard M. Nixon. Mr. Johnson telephoned the families of the three astronauts shortly after Apollo 8 had plunged into the Pacific Ocean; later, he sent a message to the astronauts themselves on the Yorktown.

But it was Nixon's reaction to the flight—and his Administration's attitude toward the manned space program—that was of more meaningful concern. Will Nixon re-uscitate the program with a new set of priorities for the 1970s and with the billions needed? Before last week's flight, NASA's hopes seemed dim.

Funding: During his campaign, Nixon said that he considered "the space program both indispensable and of major importance to our country." Since winning the election, he has said little about the program, other than that the Apollo project should be seen through the goal of landing men on the moon. Nixon and his recently appointed science adviser, Lee DuBridge, the retiring president of Caltech, have said that space should receive a consistent level of funding over the years, but neither has said just what that level should be. Currently, NASA is operating on a slightly less than \$4 billion a year and the agency has been unable to start any new major manned programs.

DuBridge told NEWSWEEK's Henry Simmons last week that NASA should be allowed to proceed with those missions for which the spaceships and rockets have been bought. Significantly, he said nothing about ordering more hardware for manned flights in the 1970s.

After the Apollo astronauts have made as many as three landings on the moon, the U.S. lunar exploration program will end. The handful of rockets and spaceships left over from Apollo will be used in an early 1970s project called Apollo Applications Program. Basically, this will be a small earth-orbital space station.

DuBridge has been a diffident booster

WHERE DO WE GO NOW?

By Edwin Diamond



The astronauts are back from their moon trip—and now it is time to hear from the politicians. The question before the earth is: where does man go now?

The timid would have us turn our backs on space exploration and stay home; the belligerent would have us militarize the cosmos with H-bomb carriers and spy platforms. My advice to President-elect Nixon is to fly a straight course with his eye steadily on the grander goals of space. We certainly can't sit on our launching pads: national prestige—as much as curiosity—propels us into space. But neither should we pollute space with the parochial rivalries that have blighted the home planet.

Nixon and his advisers take over the controls of the U.S. space program as it circles aimlessly in a faltering orbit, out of touch with mission control. The lunar landing by two Americans now appears well within the grasp of the U.S. sometime early next summer—some \$24 billion and eight years after John F. Kennedy made it a national goal. But there are no viable U.S. space plans beyond the lunar landing; it seems that the post-Apollo space program has become a victim of the war in Vietnam—like so much else in U.S. life.

Record: The Kennedy and Johnson Administrations had the virtue of single-mindedness in space; even if they lacked a good follow-through. Whether the Republicans under Nixon will do better at the controls is a question still very much up in the air. The track record of the Eisenhower Administration in which Nixon served is not encouraging. After Sputnik I, the first, instinctive response of the conservative members of the Eisenhower team was to dismiss the entire notion of space exploration as a "stunt." Both the Republican Administration of the 1950s and Democratic Administrations of the 1960s have allowed the national space program to be deflected from its high

aims. Under Ike, the astronauts sold their "personal stories" and became part of the magazine and encyclopedia business. Under LBJ, space became part of the political pork barrel, like rivers-and-harbors legislation (there is no sound technical reason why mission control is in Houston rather than Cape Kennedy).

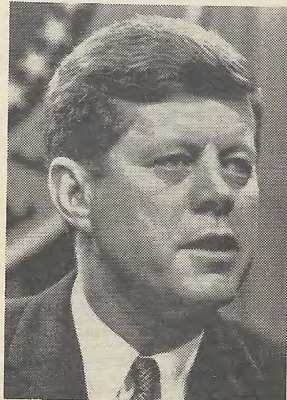
Perhaps Nixon can avoid these excesses. He has shown himself to be a pragmatist and this week he may very well be scanning the skies for signs and portents. The message seems to me clear: Nixon must set some firm space goals for the U.S. in the 1970s—and set them soon.

On to Mars: The first goal should be the establishment of a moon-research station manned the lunar year around—just like one of the U.S. bases in the Antarctic. The cost would be perhaps more than the Apollo program, but still less than the current Defense Department budget for one year.

Second, the parallel of Antarctica should be extended; not only should the moon base be civilian in cast but scientists of other nations should be invited to come along and man the base alongside Americans. Third, an invitation to participate in building and running this station should be extended in particular to the Soviet Union, since it now appears some time before the Russian lunar program will get into orbit again.

These proposals are not starry-eyed. Indeed, NASA technicians have already put the lunar-base studies on paper. Because of the enormous lead times involved, the U.S. has announced plans for an unmanned Mars trip in 1973 when Earth and Mars are in favorable positions relative to each other.

Presidents are used to making political plans over eight-year periods at most. The demands of space require Presidents to think beyond their terms in office. Now, as he begins his term, Nixon has a chance to show this high statesmanship.



Kennedy, Johnson, Nixon: New hand at the controls

U.S. AFFAIRS

of manned space projects. He has in the past aired his doubts about the manned projects' domination of the space program and he has not indicated that he feels any differently today. Advocates of manned space have not been particularly encouraged by Nixon's creation of a task force on space policy under Nobel physicist Dr. Charles Townes.

Obituaries for the space program are, of course, premature. There is, first of all, the lunar landing and there are reports that the space agency might name Borman, Lovell and Anders as the crew for Apollo 11—the mission most likely to attempt a landing on the moon.

Future: Now, NASA is preparing to trundle out Apollo 9 and its Saturn 5 rocket to pad 39. Apollo 9, with the crew of James A. McDivitt, David R. Scott and Russell L. Schweickart aboard, will be an earth-orbit test of the Apollo lunar module, the only part of the spaceship that actually lands on the moon. If the flight, set for Feb. 28, is successful, Apollo 10 will fly to the moon either in May or June with the crew of Thomas P. Stafford, John W. Young and Eugene Cernan. Stafford and Cernan will crawl into the landing module and swoop down to within 50,000 feet of the moon before climbing back into lunar orbit

to rejoin Young and the mother ship.

The lunar flight could come in July. And next to the crew, the men most excited about it are the selenologists.

"It is my expectation," says Nobel chemist Harold Urey of the University of California, "that those rocks will be about four and one-half billion years old." Urey believes that the moon was formed independently of the earth and was captured by the earth's gravity field. If this should prove true, then Urey believes that it might provide clues to the origin of the solar system.

Urey regards the flight of Apollo 8 as still one more humbling experience for mankind. "The idea of man as a special creation is out," he said last week. "Man's attitude toward himself is changing radically. Man is now capable of seeing himself as a small organism in the universe. The farther out he goes, the smaller and frailer he seems to become."

True in one sense but wide of the mark in another. If the flight of Apollo 8 demonstrated one triumphant truth above all other revelations, it is the discovery of how great and powerful the image of man becomes the farther out he goes. The pre-eminent figures, of course, are Borman, Anders, Lovell—and their families. But all of us rode with them.

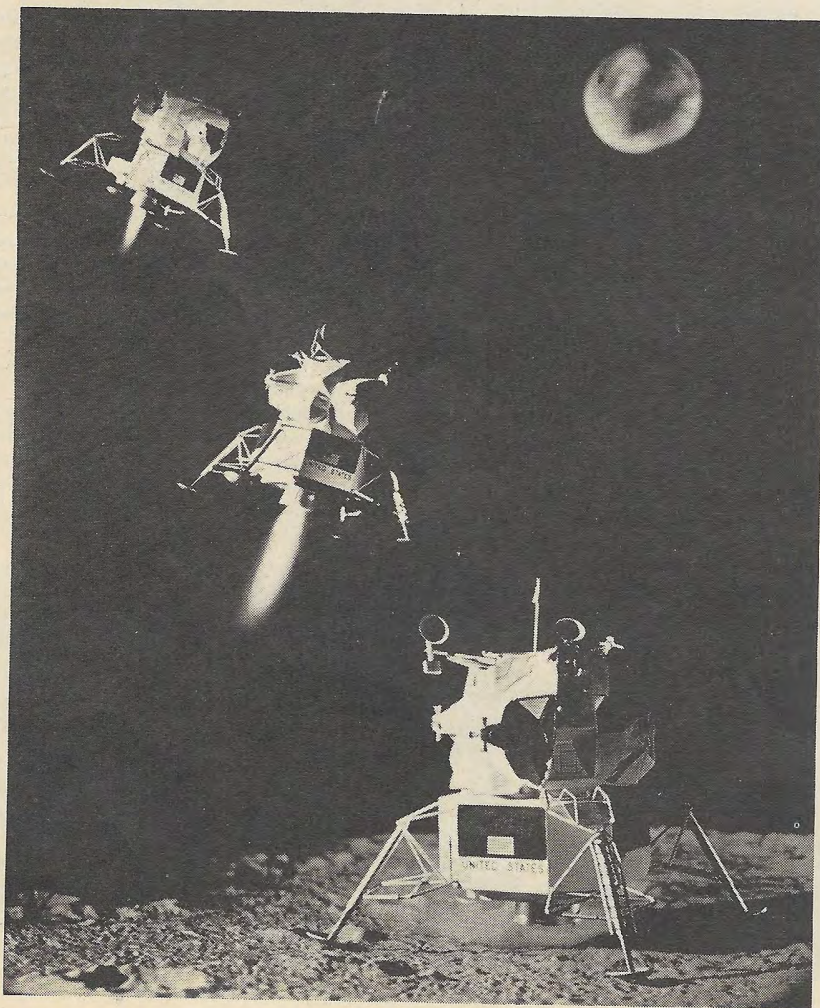
STORYBOOK WEDDING

They were only grade-schoolers when they met at Dwight Eisenhower's 1957 Inaugural and barely college freshmen when Ike, so the story goes, played Cupid. "I hear Julie Nixon is at Smith," the old soldier told Dwight David Eisenhower II, Amherst '70, and soon young David was on the phone for a date. For their first evening out, they sat up watching the 1966 Congressional election returns, in which Julie's dad led the Republican Party to a famous comeback victory. And then last week, the only grandson of the 34th President and the younger daughter of the soon-to-be 37th stood at the poinsettia-banked altar of New York City's Marble Collegiate Church, looking terribly young and radiantly happy as they took the vows in the storybook wedding of the year.

Their marriage was an utterly fitting first social splash for the Nixon Era. Like everything the Nixon people do, it went a little bit better than clockwork, starting with brisk dispatch a minute early and running precisely on schedule thereafter. "It was an Eisenhower-Nixon crowd," reported Claire Boothe Luce afterward, which was to say that the crowd was all mink and misty eyes and expectably lacking in surprises. Apart from Mrs. Luce, the Spiro Agnews were there; so were Mrs. Billy Graham (whose husband was in Vietnam) and Thomas E. Dewey. The Rev. Dr. Norman Vincent Peale officiated, and the champagne at the reception was all-American—half New York, half California. The ever-catty Women's Wear Daily found it ever so predictably bland—"450 safe guests wearing safe fashions dancing to safe music and eating safe food."

Grins: Square it may have been by some standards, but newlyweds Julie and David, each 20 years old, infused the day with an unaffected sweetness that no amount of chic or show could have purchased. David was all thumbs, grins, blushes, cowlicks and knocking knees, Julie a picture of demure serenity in a swirl of white silk peau d'ange and Belgian lace. And the bride's father was reduced, for a day, to being the father of the bride. "Julie wasn't nearly as nervous as I was," Nixon said later. "If she handles all the great events of her life as she managed her wedding, we won't have to worry a bit."

Sure enough, the wedding was full of Julie's personal touches. She asked for Dr. Peale, whose positive thinking had sustained the Nixons through the days when everything looked most negative. At Julie's request, Peale substituted the Quaker "thee" and "thou" for the "you's" in the Dutch Reformed service. She didn't kiss David at all during the serv-



Moon touchdown: Borman, Lovell and Anders might try this year Grumman