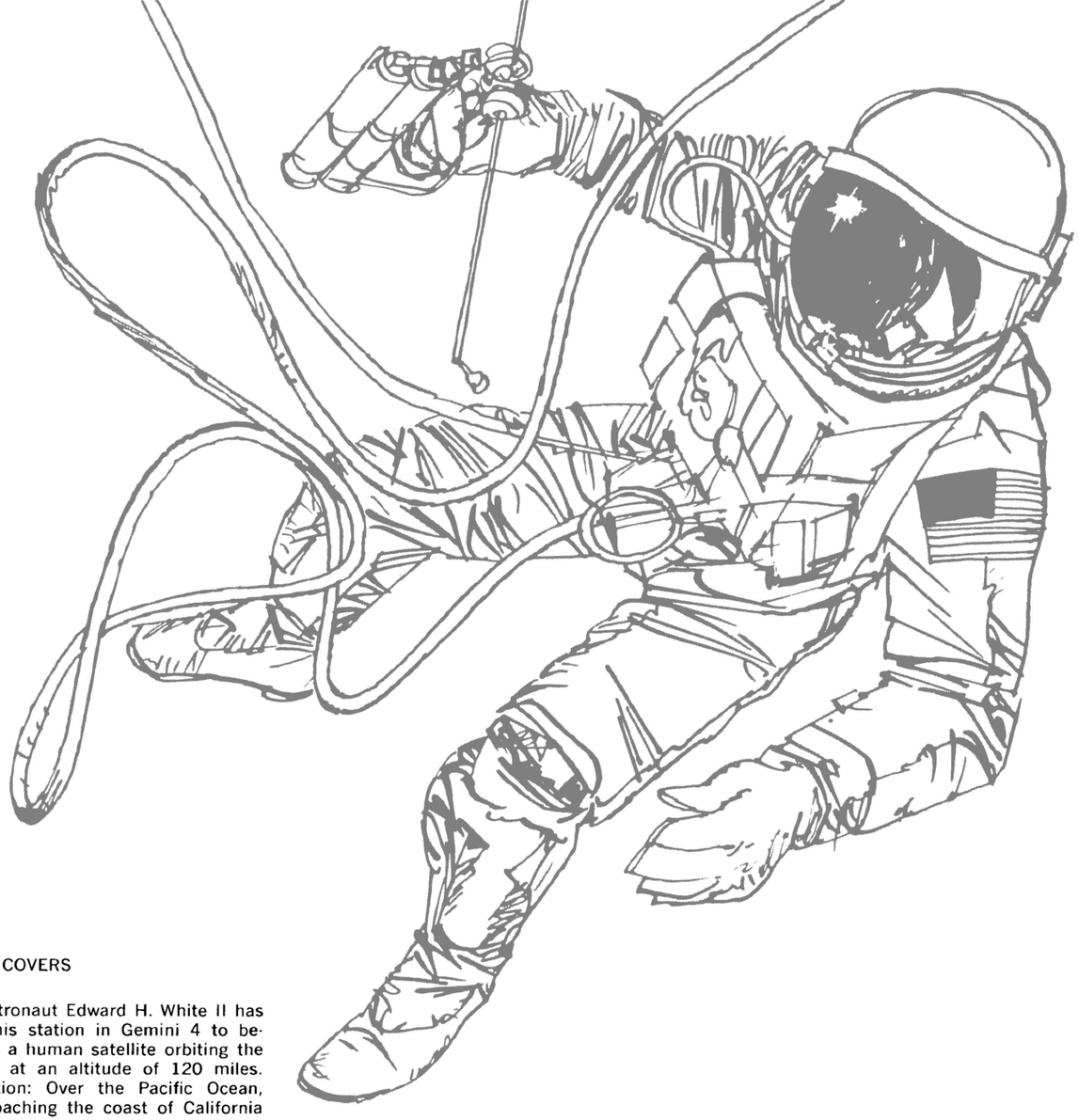
GEMINI 4 • EXTRAVEHICULAR ACTIVITY

A WALK IN SPACE



THE COVERS

Astronaut Edward H. White II has left his station in Gemini 4 to become a human satellite orbiting the earth at an altitude of 120 miles. Location: Over the Pacific Ocean, approaching the coast of California at a speed of 17,500 miles per hour relative to the earth. The picture was taken by James A. McDivitt with a hand-held camera pointing through the window over his Command Pilot position in the spacecraft.

On the back cover are additional photos of Astronaut White "walking" in space. Most of these, also, are from McDivitt's hand-held camera. One in which an open hatch door is seen at right is a frame from a motion picture taken by a camera which White mounted on the outside of the spacecraft before maneuvering free of the spacecraft.

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A WALK IN SPACE

On June 3, 1965, during the third revolution of an extended earth orbital mission in space by NASA's Gemini 4, Astronauts James A. McDivitt and Edward H. White II carried out the first Extravehicular Activity in the United States manned space flight program. Extravehicular Activity (EVA) is the operational term for "walking in space," or more properly, maneuvering in space by an astronaut outside the spacecraft. It is not a stunt. It is a basic technique required for the development of manned space flight capability.

Future spacemen will leave their vehicles and maneuver in space to accomplish specific tasks vital to their missions. This could include transferring from one vehicle to another, monitoring of the joining of one spacecraft to another (docking), making adjustments to the outside of the spacecraft, assembling a space station, making repairs or adjustments to an unmanned instrumented earth satellite.

In the Gemini 4 EVA, Astronaut White left the spacecraft to walk in space; Command Pilot McDivitt remained at the controls. White was outside Gemini for 21 minutes. He was photographed by a motion picture camera fastened to the outside of Gemini 4, and by McDivitt. White also took pictures, including the first photograph ever taken of a spacecraft in space from a vantage point outside the spacecraft.

In the early hours of the flight, prior to EVA, an effort was made to rendezvous Gemini 4 with the orbiting second stage of the Titan II launch vehicle, which had placed the spacecraft in orbit. The necessary control maneuvers were accomplished readily in Gemini, but the booster was in an orbit differing so much from that of the spacecraft that a great deal of fuel was consumed controlling attitude to keep Titan's Stage 2 in sight and changing altitude in an attempt to match the booster's orbit. Also, the booster was tumbling (turning end over end) which made it difficult to judge range and would have posed a hazard in a close approach. For these reasons, the rendezvous maneuver was discontinued. This insured having a sufficient amount of maneuvering gas for the long duration orbital flight.

Gemini 4 was the second manned flight in Project Gemini, Flights 1 and 2 having been tests without astronauts aboard. In Gemini 3, Astronauts Virgil I. Grissom and John W. Young made three orbits of the earth in 4 hours and 53 minutes, demonstrating manned orbital flight in the Gemini spacecraft and qualifying it for long duration missions. Gemini 4, flown by Astronauts James A. McDivitt as command pilot, and Astronaut White as pilot, began at 11:16 a.m. EDT on June 3 from Cape Kennedy, Florida, proceeded through 62 plus revolutions and ended with touchdown in the Atlantic Ocean 97 hours and 56 minutes after the launch. These, and flights still to come, are parts of a three-phase program for placing men on the moon and returning them safely to earth before the end of this decade. Project Mercury was the first phase, in which techniques of manned orbital flight were developed. Project Gemini is the second phase, and the third is Project Apollo, with the objective of lunar landings.

Project Gemini has the mission of accomplishing orbital flights of long duration, of developing the techniques of maneuvering, including changes of orbit, and the joining of one spacecraft to another (docking). It continues the studies of equipment for space flight, and the effect on men of space flight—including the effects of weightlessness. It is a continuation of astronaut training. And it includes the Extravehicular Activities mission, the stated purpose of which is "to experiment with astronauts leaving the Gemini spacecraft while in orbit and determining their ability to perform extravehicular activities such as mechanical or other type tasks." This mission was begun with Astronaut White's walk in space and further EVA missions are scheduled. Project Gemini has the additional mission of carrying into space a series of experiments in space medicine, engineering and space sciences.

The Manned Space Flight program is managed by NASA's Manned Spacecraft Center at Houston, Texas, under the direction of the Office of Manned Space Flight, NASA Headquarters, Washington, D. C.

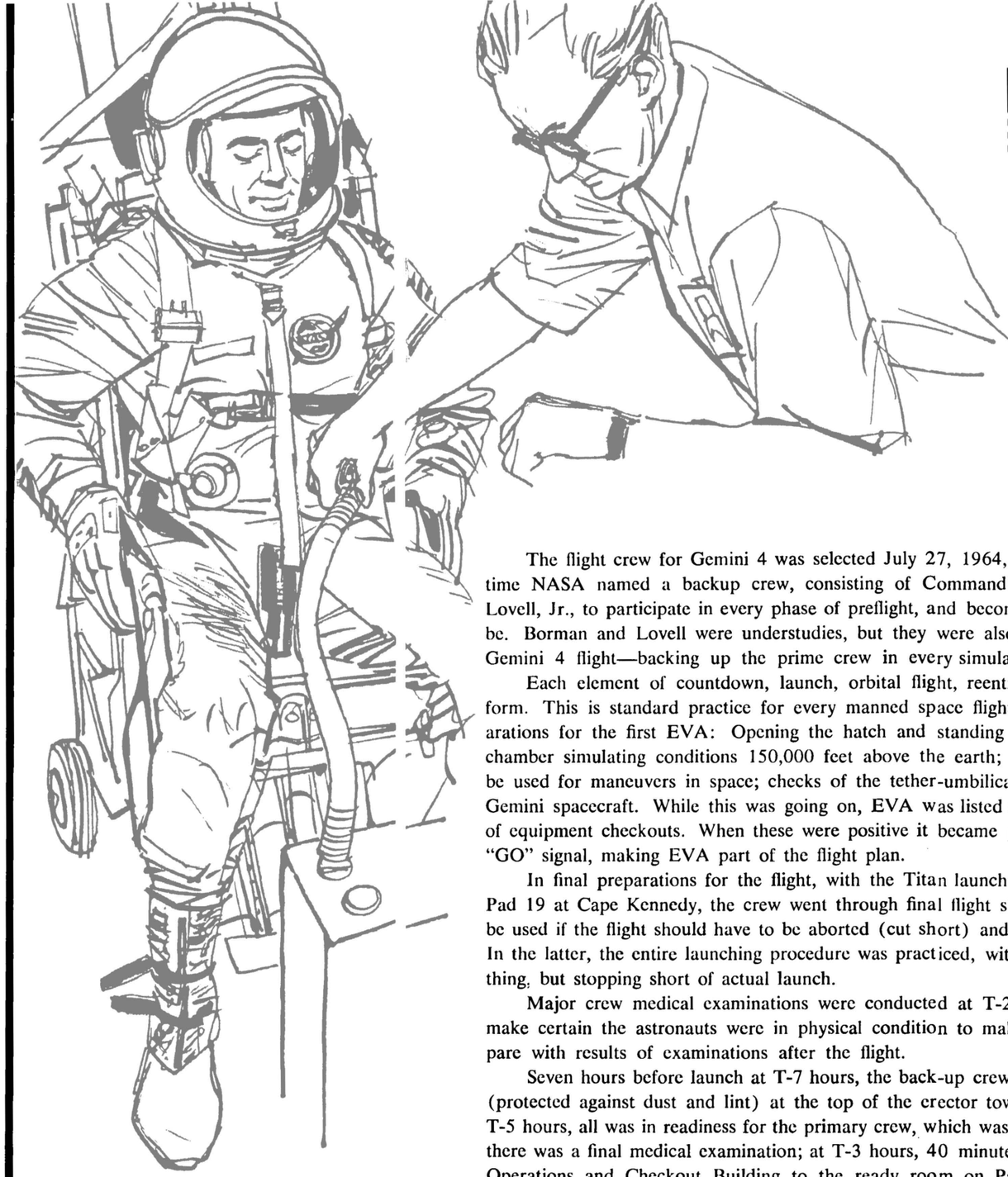
THE ASTRONAUTS•GEMINI-TITAN 4

James A. McDivitt was the Command Pilot. During the walk in space it was his difficult task to keep the Gemini spacecraft in a stable attitude so that Astronaut White would have a constant and dependable point of reference against which to gauge his movements outside the spacecraft.

Edward H. White II was pilot for GT-4. For the total mission it was his function to help operate the spacecraft, and to take over during periods when McDivitt was sleeping. His special assignment was to leave the spacecraft for Extravehicular Activity, or in short form, EVA.

Astronauts McDivitt (left) and White examine a celestial globe, prior to their flight, identifying locations of constellations and other celestial bodies which they will see during 62 orbits. They had been prepared for this element of the mission by a study of celestial pattern recognition in the Moorehead Planetarium at Chapel Hill, N. C.

Astronauts McDivitt (right) and White as they appeared suited and helmeted for their journey into space. This picture was taken on May 29 as they completed flight simulation exercises.



PREFLIGHT

The flight crew for Gemini 4 was selected July 27, 1964, nearly a year prior to launch. At the same time NASA named a backup crew, consisting of Command Pilot Frank Borman and Pilot James A. Lovell, Jr., to participate in every phase of preflight, and become qualified to make the flight itself, if need be. Borman and Lovell were understudies, but they were also essential members of a team preparing the Gemini 4 flight—backing up the prime crew in every simulation and checkout, contributing to evaluations.

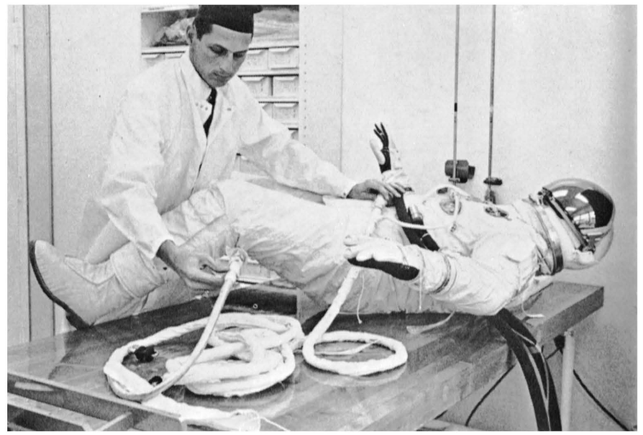
Each element of countdown, launch, orbital flight, reentry and recovery was carried out in simulated form. This is standard practice for every manned space flight; for Gemini 4 it included the special preparations for the first EVA: Opening the hatch and standing up, with head out the door, in a pressure chamber simulating conditions 150,000 feet above the earth; practice with the pressure gun which was to be used for maneuvers in space; checks of the tether-umbilical line which would connect White with the Gemini spacecraft. While this was going on, EVA was listed as a possibility for Gemini 4, subject to results of equipment checkouts. When these were positive it became possible for the Mission Director to give the "GO" signal, making EVA part of the flight plan.

In final preparations for the flight, with the Titan launch vehicle and the Gemini spacecraft in place on Pad 19 at Cape Kennedy, the crew went through final flight simulations, practiced procedures which would be used if the flight should have to be aborted (cut short) and carried out a "wet mock simulated launch." In the latter, the entire launching procedure was practiced, with conditions as close as possible to the real thing, but stopping short of actual launch.

Major crew medical examinations were conducted at T-2 days, two days before scheduled launch, to make certain the astronauts were in physical condition to make the flight, also to provide records to compare with results of examinations after the flight.

Seven hours before launch at T-7 hours, the back-up crew took stations at Gemini in the White Room (protected against dust and lint) at the top of the erector tower, to monitor preparations at this stage. At T-5 hours, all was in readiness for the primary crew, which was awakened at T-4 hours, 30 minutes. At T-4, there was a final medical examination; at T-3 hours, 40 minutes, breakfast; at T-3 hours the trip from the Operations and Checkout Building to the ready room on Pad 16 for placement of the medical sensors, and for donning spacesuits and having them adjusted and checked. The crew entered the spacecraft at T minus 1 hour and 40 minutes.

A technician examines and checks the umbilical line which will carry oxygen to White while he walks in space. The umbilical is a 25-foot-long gold-plated tube running from the spacecraft which conveys oxygen to the astronaut and contains electric wires and a 24½-foot nylon tether. The wires relay voice messages between the astronauts inside and outside of Gemini. The tether, tested for as much as a thousand pounds of pull, is shorter than the other lines and the tube to prevent strain on them.



Astronauts McDivitt and White prepare to enter the Gemini 4 spacecraft for the wet mock simulation test.

Astronaut White's spacesuit helmet is put into place by Technician Joe Schmitt during the wet mock simulation (dress rehearsal).

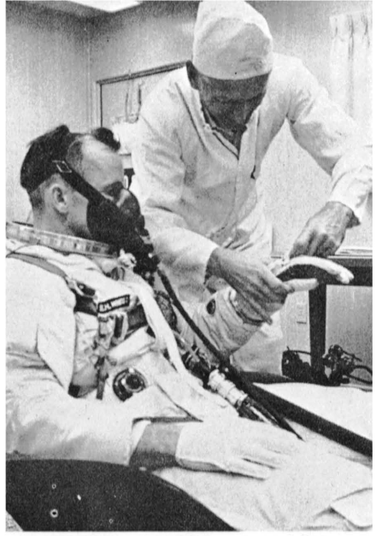
Spacesuits to be worn in flight are tested during wet mock simulation. (McDivitt is in foreground.) White wore the extravehicular suit, which differs from the previous Gemini suit in these ways: (1) There is an extra layer of material consisting of high temperature nylon and layers of aluminized mylar and left, for protection against heat and micrometeoroids (dust particles traveling at high speed in space). (2) The helmet has two external visors. The inner visor is of Lexan, 30 times stronger than the plastic for aircraft canopies, and coated with a solution preventing heat leak from inside the suit. The outer visor is tinted and provides glare protection.

The astronauts have taken their stations; technicians have closed the hatches. During the next two hours the elements of launch are rehearsed with conditions as close as possible to the real thing.

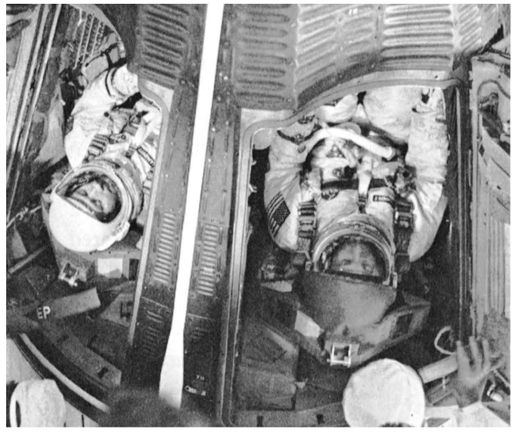
At the Goddard Space Flight Center, Greenbelt, Md. (near Washington, D. C.) communications network personnel prepare for their supporting role in Gemini 4's flight. Goddard is the center for communications from the tracking stations around the world. Communication with the Mission Control Center at Houston is instantaneous.

Specialists in the blockhouse at Pad 19 stand by at their stations to carry out, during the wet mock, the same functions that they will have during the launch.

The day is June 3, 1965. Gemini 4's countdown has proceeded to T minus four hours and 40 minutes. Astronauts McDivitt and White are at breakfast with two doctors and two Catholic priests. Clockwise, starting front center, are Dr. D. O. Coons, Houston Manned Spacecraft Center; McDivitt; Dr. Eugene F. Tubbs, Kennedy Space Center; Rt. Rev. James Heiliky; Msgr. Irvine J. Nugent; and White.

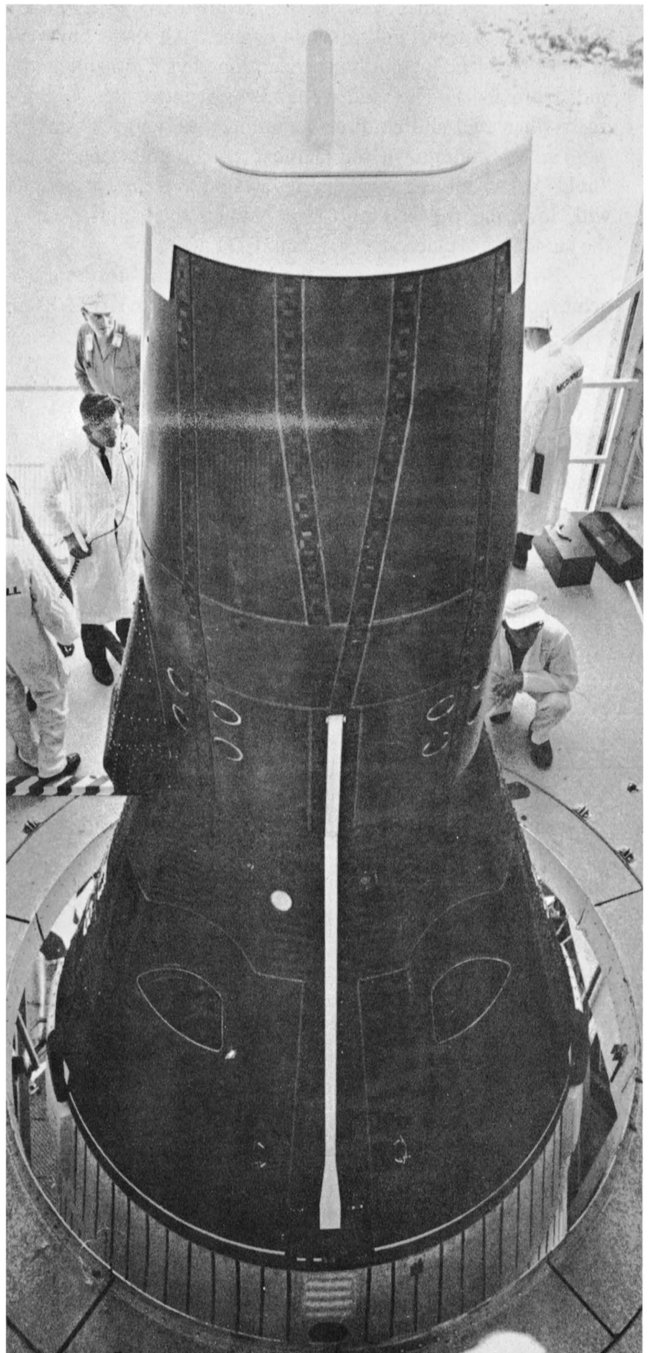


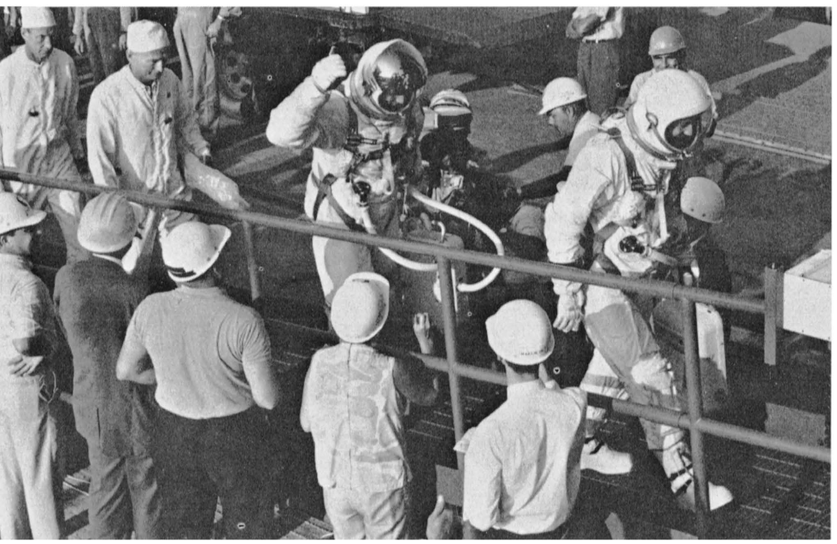
Suit technician Joe Schmitt adjusts a glove as Astronaut White breathes pure oxygen through a face mask. The process is called pre-oxygenization, and it purges the astronaut's body of nitrogen. This is necessary because the Gemini spacecraft is to be depressurized for extravehicular activity; a residual of nitrogen in the body might cause the astronaut to suffer the "bends."



The astronauts have entered Gemini 4; McDivitt occupies the Command Pilot's position at left. They recline, in position for launch. At the bottom of the picture are heads and hands of technicians securing equipment.

Both hatches are secured. It is 8:35 a.m. EDT, the countdown is proceeding on schedule, condition is "GO."





Astronauts McDivitt and White, followed by suit technicians Joe Schmitt and Clyde Teague, walk up the ramp to the elevator which will carry them to the White Room at the top of Gemini-Titan's erector. White gives a "GO" signal with his upraised thumb.

McDivitt's hatch is closed from the outside. (If this picture is rotated so that the right becomes the bottom, an idea can be had of the astronaut's forward vision.)

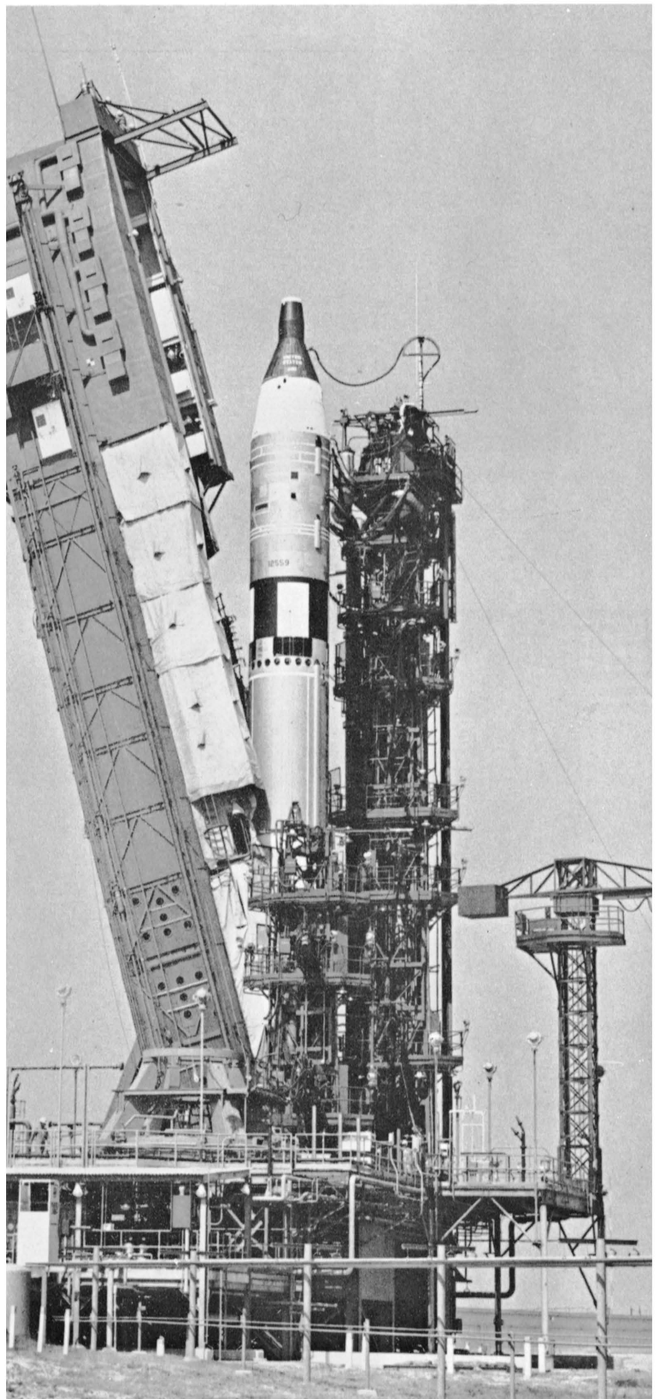
LAUNCH INTO ORBIT

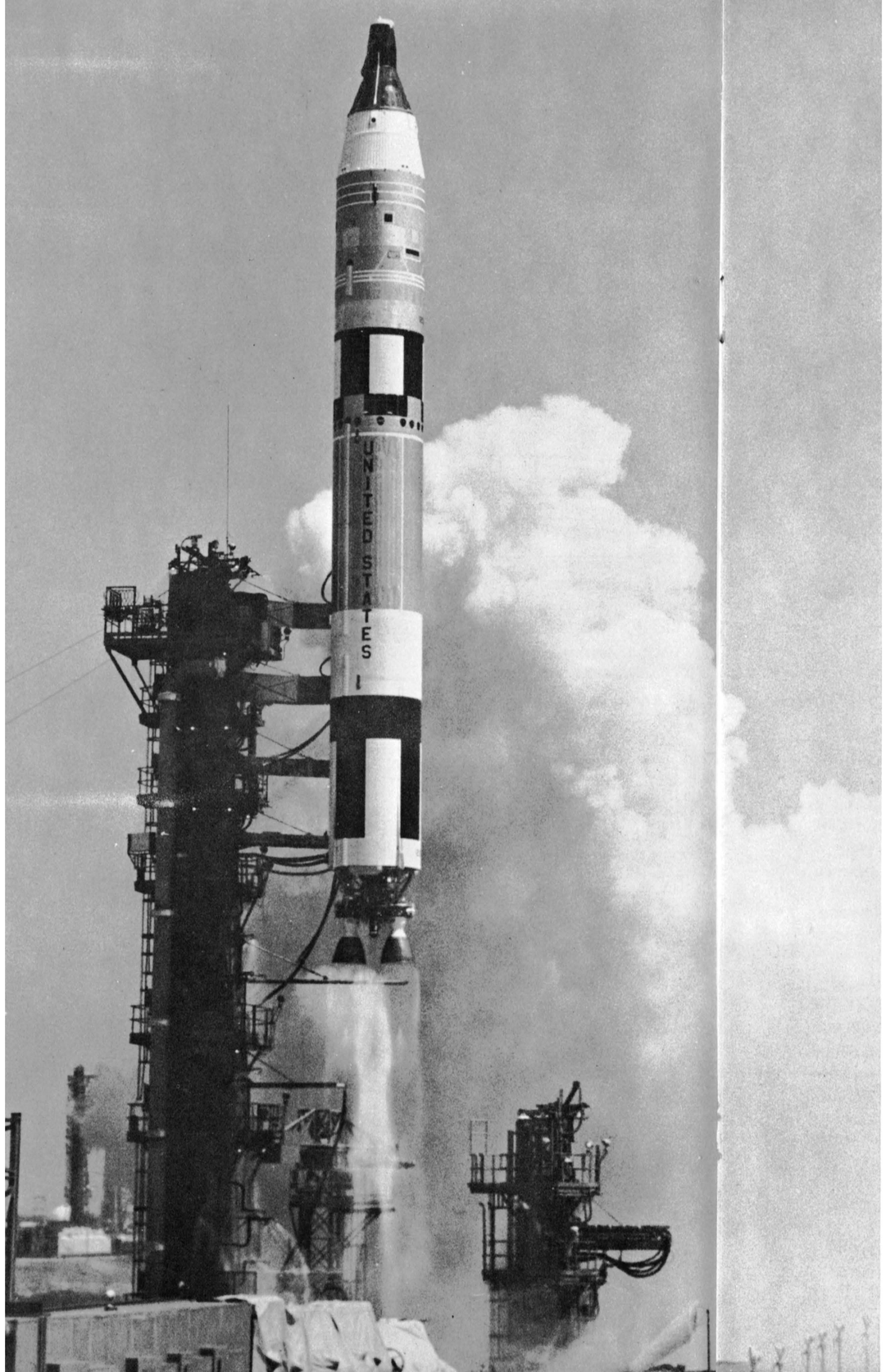
Gemini's Launch Vehicle is a modified U.S. Air Force Titan II. It has two stages, the first with two rocket engines, the second with a single engine. All three burn the same fuel, Aerozine 50. (This fuel is described as a 50-50 blend of unsymmetrical-dimethyl hydrazine and monomethyl hydrazine, or it may be called UDMH and hydrazine.) The oxidizer is nitrogen tetroxide. The fuel is hypergolic, meaning that it ignites spontaneously when fuel and oxidizer come together, and it is storable.

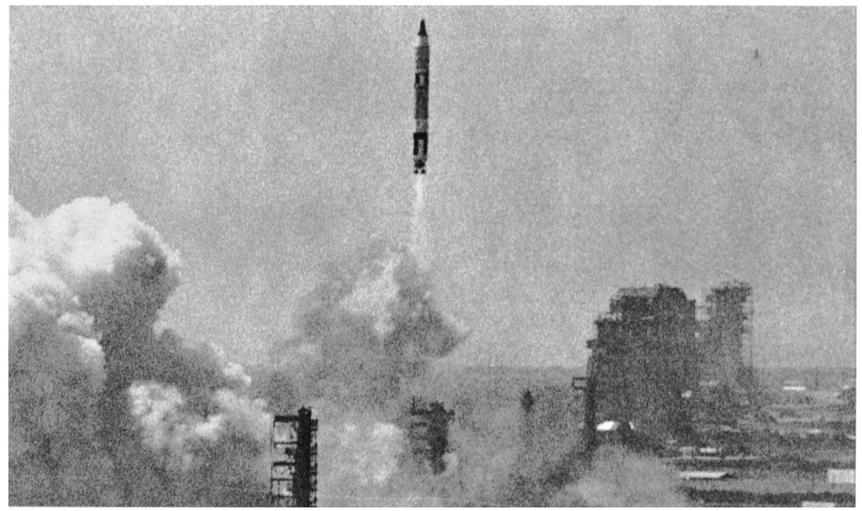
In the countdown for Gemini, launch was scheduled for 10 a.m. Eastern Daylight Time. There was a "hold" of an hour and 16 minutes while the technical people located and corrected a difficulty which interfered with lowering the erector tower. When this adjustment had been made, the countdown proceeded, and the launch took place at 11:16 a.m. EDT.

From that point onward the launch was a "textbook" maneuver. It went exactly according to schedule, achieved an orbit with perigee (closest to earth) of 100 miles and apogee (farthest out) of 175 miles.

The launch vehicle erector tower is lowered, exposing Gemini spacecraft and the Titan launch vehicle. Liftoff was at 11:16 a.m. EDT on June 3.



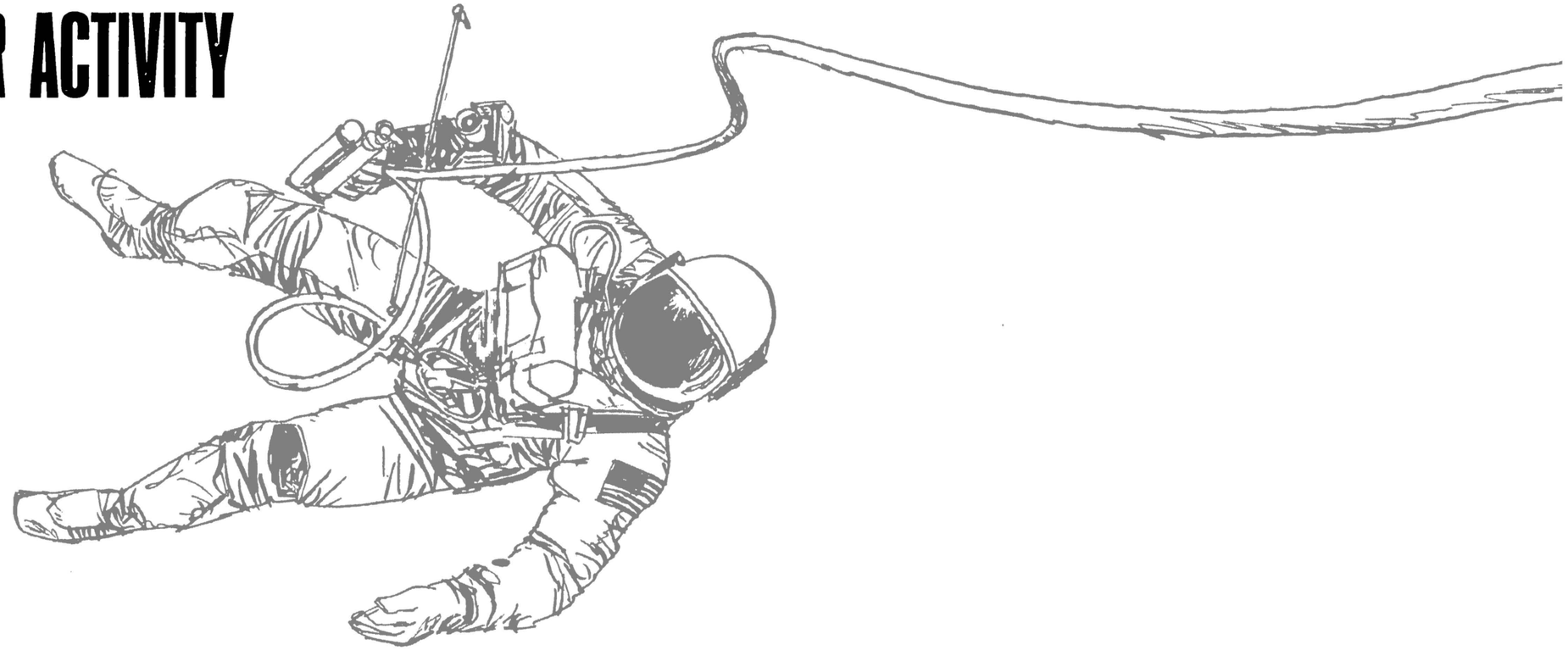




The "clock is running" and Gemini is enroute to a flight of 62+ revolutions and concluding on schedule to touchdown after 97 hours and 56 minutes.

In the blockhouse at Pad 19, three fellow astronauts monitor the launch. Left to right, Clifton C. Williams Jr., Frank Borman (Command Pilot of the backup crew for GT-4) and Alan B. Shepard Jr. (first U. S. astronaut to go into space, in a suborbital Project Mercury flight on May 5, 1961). Following insertion into orbit, control passed to the Mission Control Center at NASA's Manned Spacecraft Center, Houston.

EXTRAVEHICULAR ACTIVITY



Quotations are from the transcript of the "Mission Commentary," a running verbal account of Gemini 4 events in which the participants included the astronauts, Flight Director Christopher Kraft, Flight Surgeon Dr. Charles Berry, Capsule Communicator Virgil I. Grissom at the Mission Control Center, Houston, other Capsule Communicators, and Paul Haney of Public Affairs, Manned Spacecraft Center, Houston, and others. (A Capsule Communicator at each tracking station had the prime assignment for talking to Gemini 4 when the spacecraft was in his area.) Much of this mission commentary went out in "real time" (the instant it occurred) to TV and radio audiences around the world.

Quotations in the captions are from the transcript of a press conference at Houston, and from the Mission Commentary.

GEMINI CONTROL: *"This is Gemini Control. Four hours and 24 minutes into the mission. The Hawaii station has just established contact and the pilot, Jim McDivitt, advises the cabin has been depressurized. It is reading zero. We are standing by for a GO from Hawaii to open the hatch . . . White has opened the door. He has stood up, and it's a most relaxed period. McDivitt reports that White is standing in the seat. . ."*

Millions of TV watchers and radio listeners, the world over, were listening to these words from the Mission Control Center at Houston.

Gemini 4 was completing the third revolution. Location was over the Pacific Ocean, communications were with Kauai, Hawaii, altitude was 120 miles and speed relative to the surface of the earth was 5 miles per second.

The walk in space, postponed from Revolution Two to permit more time to prepare for it, was about to take place.

CAPSULE COMMUNICATOR, HAWAII: *"All systems on the ground look good . . ."*

FLIGHT DIRECTOR, Houston: *"You're having him get out?"*

CC: *"Roger, Flight, we're GO . . ."*

FLIGHT DIRECTOR: *"Tell him we're ready to have him get out when he is."*

CC TO GEMINI: *"We just had word from Houston we're ready to have you get out whenever you're ready. Give us a mark when you egress the spacecraft . . ."*

GEMINI: *"He's ready to egress right now."*

At this point communication with Gemini was lost for a few moments, as the spacecraft passed out of range of Hawaii. Following resumption of communications by Guaymas, Mexico, Houston picked up the report again:

GEMINI CONTROL: *"This is Gemini Control, Houston. Gus Grissom has just established contact with the spacecraft. McDivitt confirmed that White did leave the spacecraft. He said he looks great. He's outside working his maneuvering unit and Jim is quite exuberant about the performance that he's witnessing at this time. Let's cut in live now and listen to what White says . . ."*

WHITE: *"The maneuvering unit is good. The only problem I have is that I haven't got enough fuel. I've exhausted the fuel now and I was able to maneuver myself down to the bottom of the spacecraft and I was right up on top of the adapter . . . I'm looking right down, and it looks like we're coming up on the coast of California, and I'm going in slow rotation to the right. There is absolutely no disorientation association."*

McDIVITT: *"One thing about it, when Ed gets out there and starts whipping around it sure makes the spacecraft tough to control . . ."*

WHITE: *"I'm going to work on getting some pictures, Jim."*

McDIVITT: *"OK. Get out in front where I can see you again . . . Where are you?"*

WHITE: *"Right out in front now. I don't have the control I had any more . . . There's no difficulty in recontacting the spacecraft . . . particularly in trying to move back . . . I'm very thankful in having the experience to be first . . ."*

McDIVITT: *"Ed, will you please roll around? Right now we're pointing just about straight down to the ground."*

WHITE: *"OK, now I'm taking a look back at the adapter. I'm looking back there. The thrusters are clean. The sun in space is not blinding but it's quite nice. I'm coming back down on the spacecraft. I can sit out here and see the whole California coast."*

FLIGHT SURGEON: *"Flight, this is Surgeon. The data looks great here."*

FLIGHT DIRECTOR: *"How's his EKG? (Electrocardiagram.)*

FLIGHT SURGEON: *"It looks great, Flight. He's just ripping along here at great rate."*

McDIVITT: *"You smeared up my windshield, you dirty dog! You see how it's all smeared up there?"*

WHITE: *"Yep!"*

McDIVITT: *"Looks like there's a coating on the outside and you've rubbed it off. That's apparently what you've done."*

Astronaut White was outside of the Gemini spacecraft for 21 minutes. He reported afterward that he had perfect control of his movements using the

Hand-held Self Maneuvering Unit, which he called "the gun." He found, after the gun's gas supply was exhausted, that he could still maneuver using the tether as a guide, but that there were limitations in this method. At some angles to the spacecraft he could not move as he desired. Also, his use of the tether added to problems of control of the spacecraft by Command Pilot McDivitt.

But the answers to the basic questions posed were emphatically positive. Can man maneuver at will in space, on his own, outside of the spacecraft? Yes. Can he do this without physical harm or strain? Emphatically, yes.

These answers were substantiated by the record that McDivitt and White built up as the Extravehicular Activity continued: the record incorporated in their still and motion pictures, their conversations with each other and with their colleagues on the ground, and impressions retained in their minds and reported afterward.

As White reentered the spacecraft, this conversation took place:

WHITE: *"OK, I'm on top of it right now."*

McDIVITT: *"OK, You're right on top. Come on in, then . . ."*

WHITE: *"All right."*

McDIVITT: *"I'll put the gun up."*

WHITE: *"I'll open the door and come through there."*

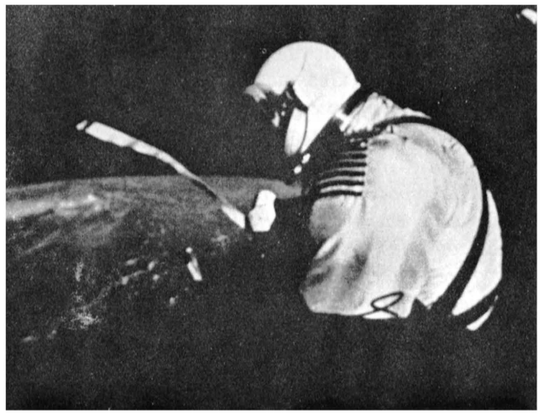
McDIVITT: *"OK. Let's not lose this camera now. I don't quite have it. A little bit more. OK, I've got it . . . Come on. Let's get back in here before it gets dark."*

Thus ended the first U.S. astronaut's EVA.

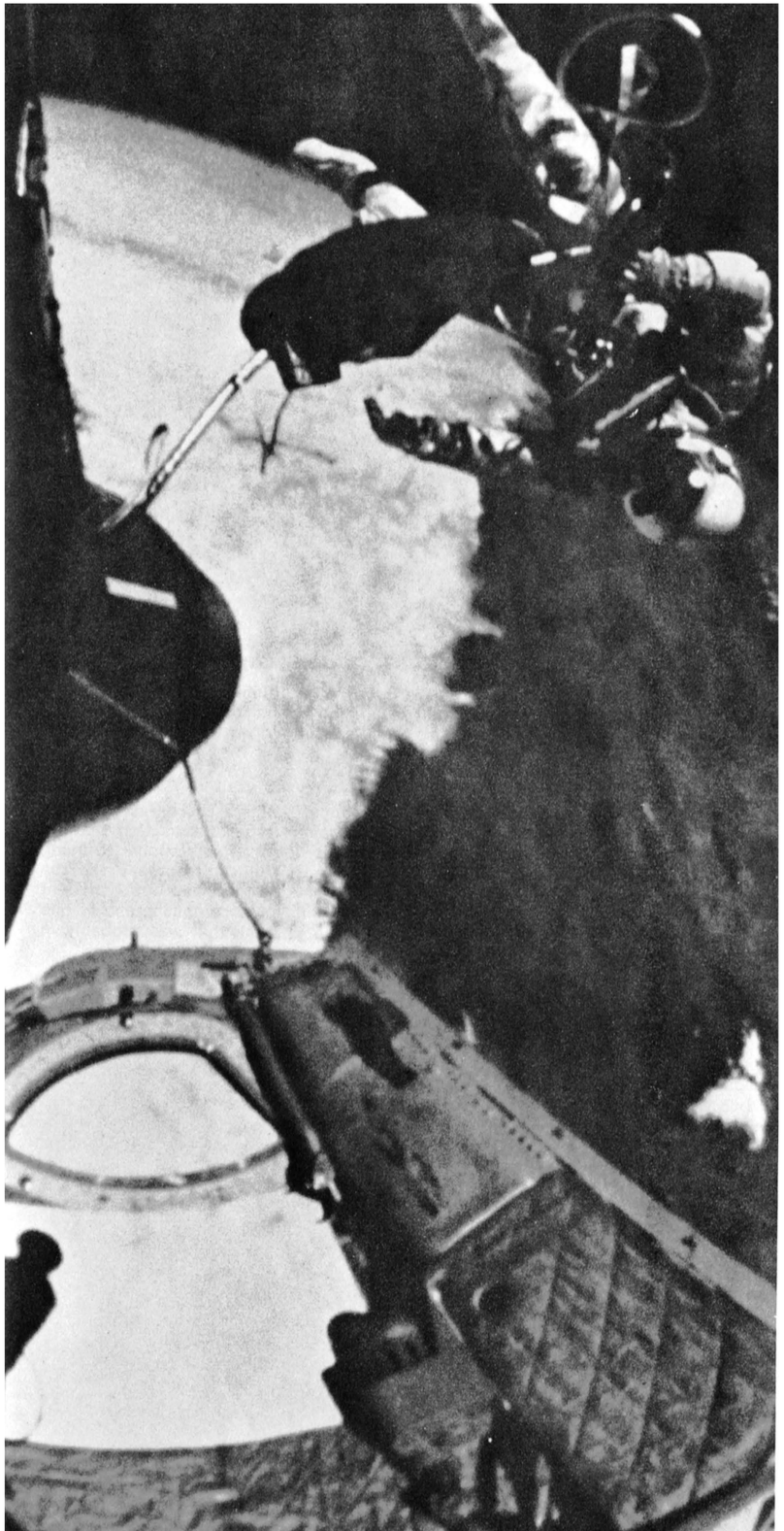
It was not without a final complication. The hatch door failed to close and lock normally; the fastenings had to be maneuvered into place and secured. As a consequence, the spacecraft was never depressurized afterward as had been planned, for disposal of materials no longer needed, and these had to be carried throughout the remainder of the 62 revolutions.

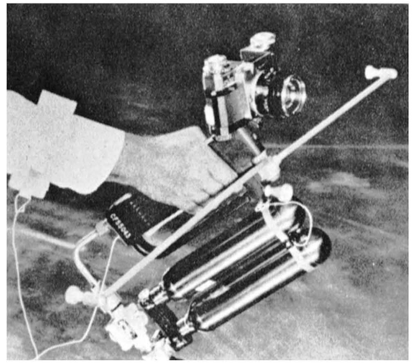
But the first walk in space had been successfully accomplished. Astronauts McDivitt and White had demonstrated that the technique was feasible, and available for future use in the expanding mission of peaceful exploration of space.

The flight is monitored and directed from Mission Control at the Manned Spacecraft Center, Houston. In this photo, left to right, are Astronauts John W. Young, Virgil I. Grissom, Walter M. Schirra Jr., and Donald K. Slayton. Seated, in shirt sleeves, at upper console: Flight Director Christopher Kraft.



"This is actually when I am coming out. What I tried to do was actually fly with the gun or maneuver with the gun right out of the spacecraft, and when I departed the spacecraft this time there was no pushoff whatsoever from the spacecraft. The gun actually provided the impulse for me to leave the spacecraft. At this time, I knew we had something with the gun, because it was actually providing me an opportunity to control myself where I wanted to go out there."

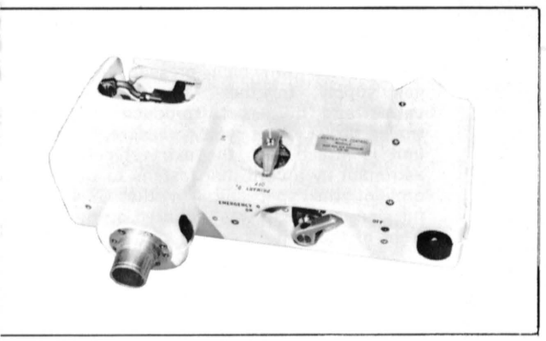




The Hand-Held Self Maneuvering Unit (the austronauts call it "the gun") contains its own high pressure cold gas supply, together with metering valves and nozzles to produce controlled thrust. As a safety measure, the unit is attached to the extravehicular astronaut by a cord that fastens to the arm of the spacesuit. In the GT-4 mission, a camera was mounted on the front of the unit.

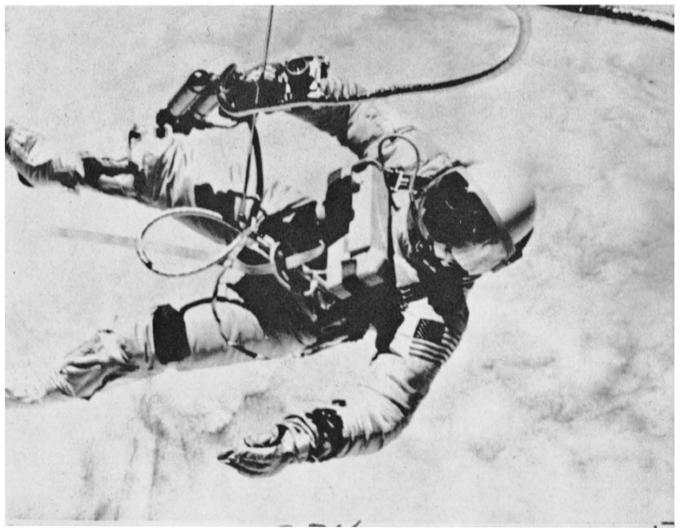
"The control was actually what we were trying to demonstrate on our EVA operation. We wanted to find out how well a man outside a spacecraft would, with a maneuvering unit, control himself and we wanted to find out just how well could the man control himself with a tether, also."

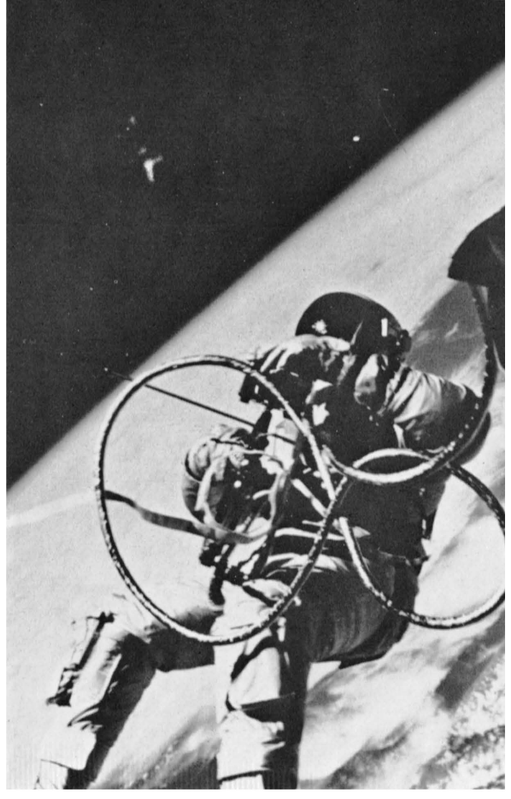
"I found that the control with the gun to the right and to the left, was, I felt, quite adequate. I only had six feet per second in the gun, which is a very limited amount of air. So I tried to use it very sparingly. I used it enough to satisfy myself and to make maneuvers so that I saw in my own mind I could control myself in both pitch, yaw and translation."



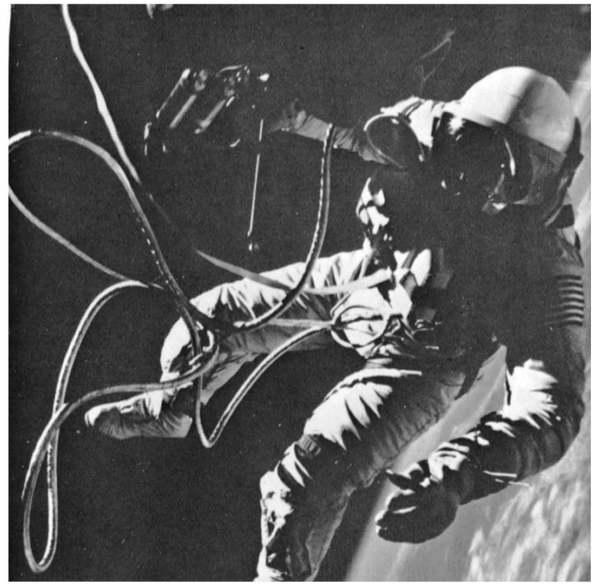
The chest pack regulates the flow of oxygen to the astronaut for breathing and suit pressurization. It also carries an emergency supply of oxygen, sufficient for 9 to 12 minutes, in case flow from the supply within Gemini, via the umbilical, should falter. The pack is white, 13.2 inches long, 6 inches wide, 2 inches deep and weighs 8.3 pounds.

"There was absolutely no sensation of falling. There was very little sensation of speed, other than the same type of sensation that we had in the capsule, and I would say it would be very similar to flying over the earth from about 20,000 feet. You can't actually see the earth moving underneath you . . . I think as I stepped out, I thought probably the biggest thing was a feeling of accomplishment of one of the goals of the Gemini 4 mission. I think that was probably in my mind. I think that is as close as I can give it to you."

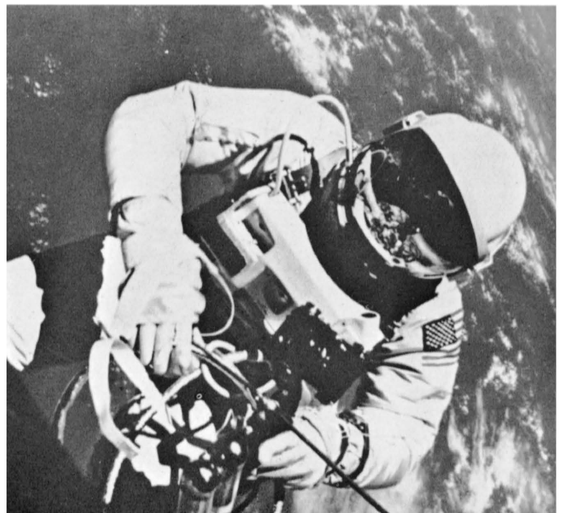




"The tether was quite useful. I was able to go right back where I started every time, but I wasn't able to maneuver to specific points with it. Another use of the tether that Jim mentioned to me was that I also used it to pull myself down to the spacecraft, and at one time I called down and said, 'I am actually walking across the top of the spacecraft,' and that is exactly what I was doing. I took the tether to give myself a little friction on the top of the spacecraft and walked about three or four steps until the angle of the tether to the spacecraft got so much that my feet went out from under me."

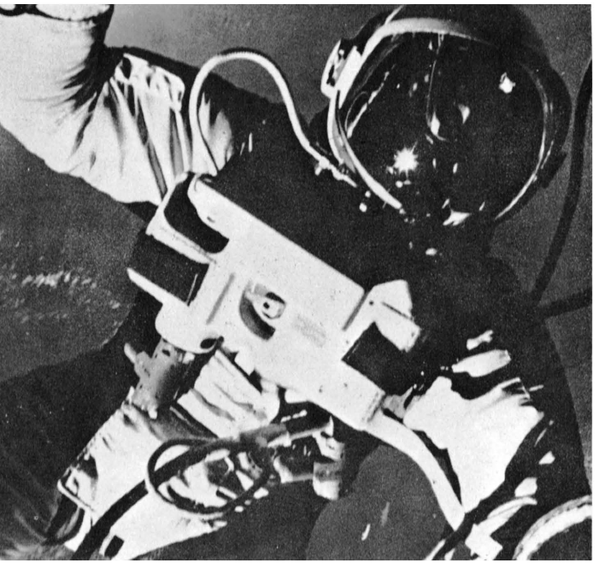


"We were looking to find out, could man control himself in space, and the answer is yes, man can control himself in space. He needs a little more fuel than was provided to me. We also were trying to find out what were the dynamics of a tether. We found out a great deal, I believe, about the dynamics of the tether. I also realized right away that our tether was mounted so that it put me exactly where I was told to stay out of. He (McDivitt) told me to stay away from the adapter end and also the thruster firings."



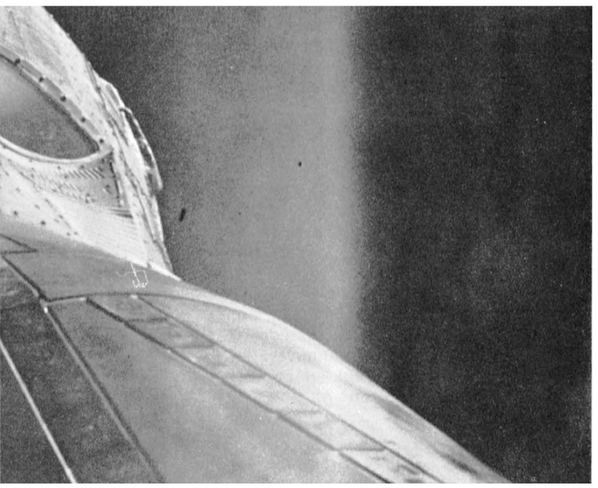
WHITE: "The maneuvering unit is good. The only problem I have is that I haven't got enough fuel. I've exhausted the fuel now and I was able to maneuver myself down to the bottom of the spacecraft and I was up on top of the adapter . . ."

McDIVITT: "One thing about it, when Ed gets out there and starts whipping around—it sure makes the craft tough to control . . ."



McDIVITT: "Get out in front where I can see you again. Where are you?"

WHITE: "Right out in front now!!! There's no difficulty in recontacting the spacecraft . . . I'm very thankful in having the experience to be first. . ."

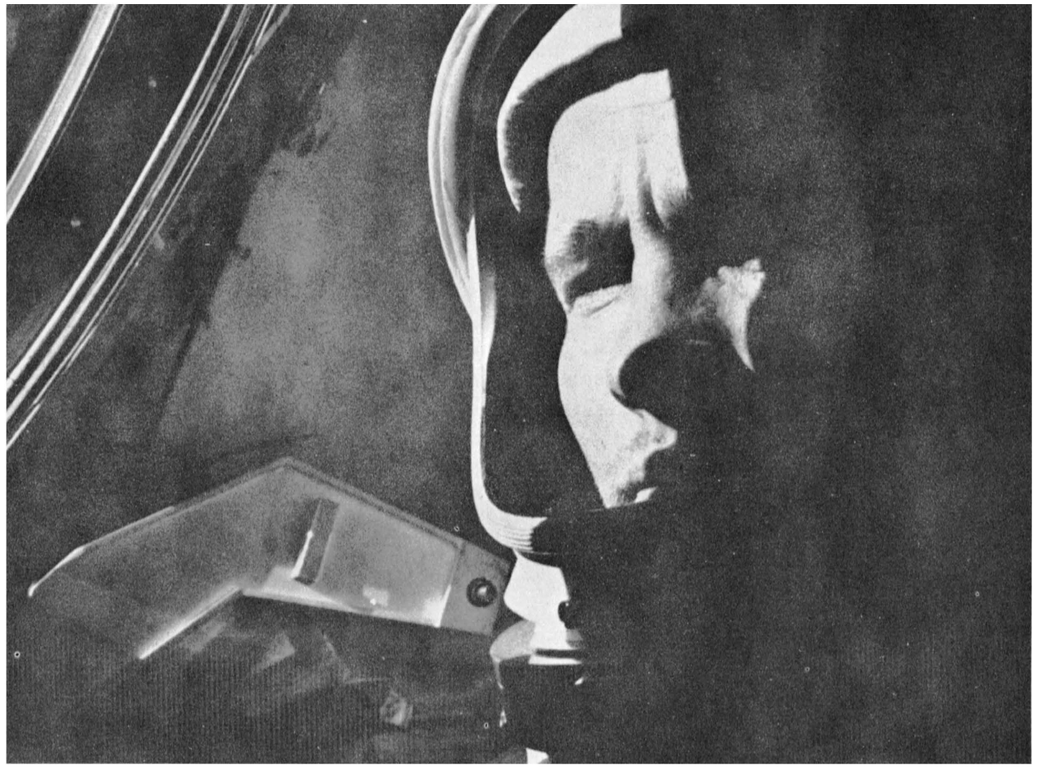


WHITE: "I'm going to work on getting some pictures, Jim."

White made space history by getting this first picture of a spacecraft in orbit taken from outside the spacecraft. The picture was shot with a 35mm. Zeiss Contarex camera attached to the top of the front end of the maneuvering unit.

This photograph taken by McDivitt during a pass over Florida shows the coast line of Florida and the Cape Kennedy area.

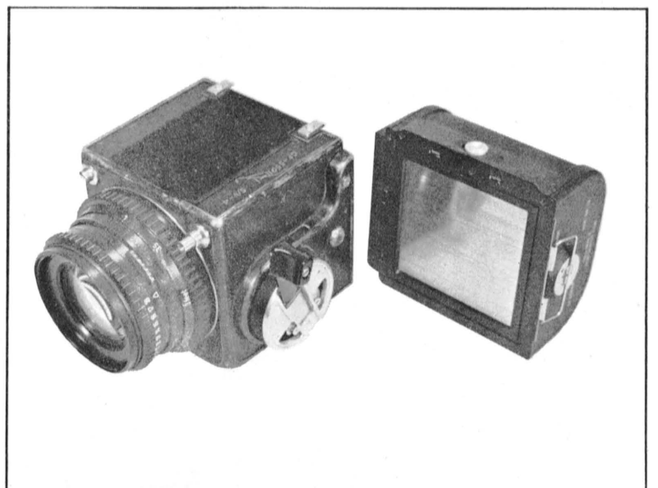
In the enlargement of the Cape Kennedy area, from the photo above, the Saturn V launch complex can be seen in the upper portion of the Cape area.



After the Gemini 4 mission had settled into something of a routine, Jim McDivitt picked up his camera, pointed it toward Ed White, and snapped this picture. The violently sharp contrast between light and dark that is typical of space may be seen here, but reflection within the capsule may be observed, too, in the area at left, below and to the right of White's window.

GRISSOM: "Gemini 4, this is CAPCOM."

This is the hand-held 70 mm Hasselblad camera with which James McDivitt took pictures during Gemini 4. Most of the pictures of White in space are McDivitt's. Others are from the remarkable motion picture taken by the camera which White mounted on the outside of the spacecraft before he moved out into space. This was a camera especially designed for this purpose.



SIXTY TWO + REVOLUTIONS TO TOUCHDOWN

Compared with the chase of Titan's second stage during the early stages of the flight and the exciting walk in space which took place during the third time around the earth, Revolutions 4 to 62 were relatively routine.

But this was only by comparison. Astronauts McDivitt and White had duties to perform in connection with eleven medical, engineering and scientific experiments assigned to Gemini 4. They had to assure a continuous flow of data to the Medical Director, Dr. Charles Berry; a primary objective of the mission was to determine effects on the body of prolonged space flight in a weightless condition. They had to sleep, and they had to eat.

Rest was in four-hour periods. At first the astronauts tried to sleep with their radio headsets connected—later in the flight the astronaut resting disconnected his earphones, leaving his companion on watch. Later, on the ground, the astronauts recommended that longer continuous periods be assigned for sleep.

Food was provided for four meals a day—stored in 18 packages, 14 two-man meals and four one-man meals. The food consisted of freeze-dried items, dehydrated items in powder form and compressed bite-sized items. Water was added to the dehydrated food and some of the freeze-dried, with a special water gun. An appetizing variety was included: orange juice, bacon and egg bites, toasted bread cubes for breakfast; soup, beef, chicken salad, ham and applesauce, fruit, puddings, to mention a few, for other meals. Beverages included cocoa and tea.

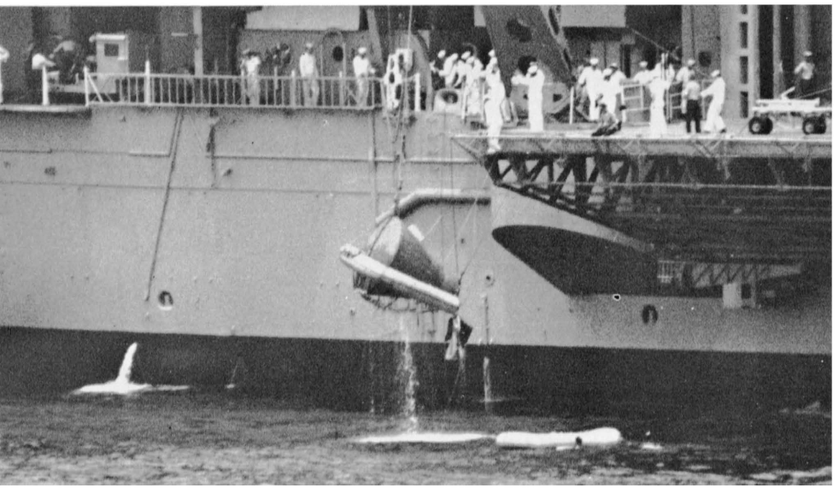
In the press conference at Houston, answering a question about the prospects for flights of 12 to 14 days, McDivitt had this to say about rest and food: "We have got to rearrange our work-rest cycles a little differently than when we planned . . . We have got to provide sufficient food and water and rest period for people in space, the same way that we do on the ground. I don't think there should be any problem. And White added: "Up there when I got hungry my energy level went down considerably. And each time I had a meal, it was like a shot in the arm."

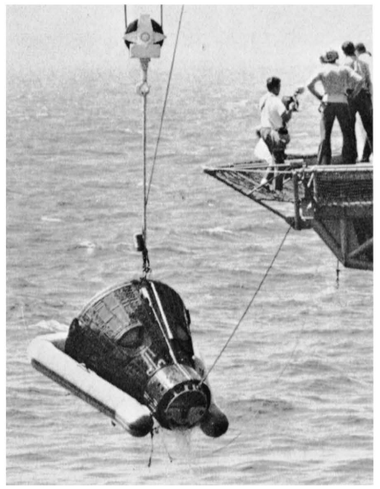
During the 48th revolution, the astronauts found they would not have the use of the Gemini 4 computer, which would have enabled the astronauts to control the reentry and letdown of the spacecraft with great precision. The consequence of this was that Gemini had to make a ballistic reentry. Computers on the ground selected the instant for starting the retrorockets to slow Gemini 4 for reentry. Using this method of leaving their orbit, the astronauts still touched down just 56 miles short of target, the U.S. Navy carrier Wasp.

Gemini's elapsed time in space was 97 hours, 56 minutes and 22 seconds; touchdown was at 1:12 p.m. EDT on June 7, about 400 miles east of Cape Kennedy.

McDivitt and White have transferred from the spacecraft to a life raft, with Navy frogmen standing by in the water. A Navy helicopter hovers overhead and begins to lift one of the astronauts on board. The spacecraft, with flotation collar, floats high out of the relatively smooth sea. Marker dye discolors the water.

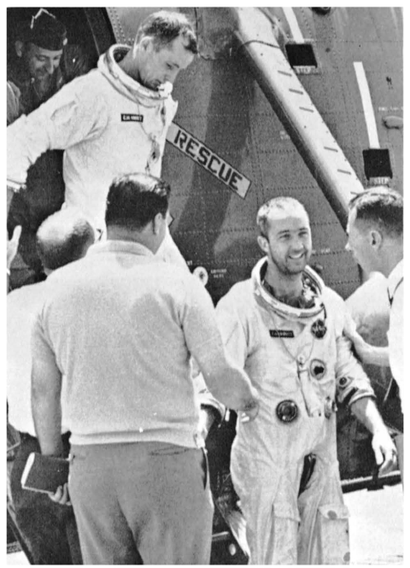
Two weary astronauts try to relax in the recovery helicopter, on the way to the flight deck of the aircraft carrier, **USS Wasp.**





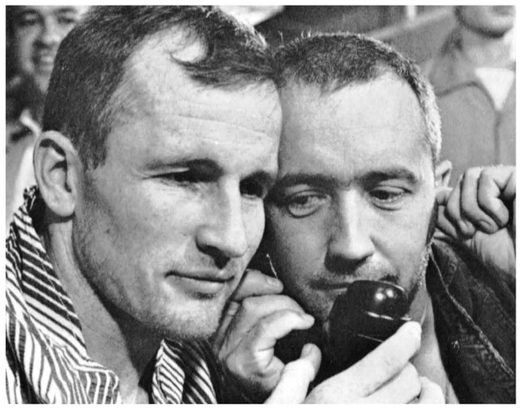
Gemini 4 is hoisted from the Atlantic by crew members of the **Wasp.**

The **Wasp** puts out the red carpet for the Gemini astronauts as they are welcomed by crew members of the carrier and representatives of NASA.



The astronauts step from the helicopter onto the deck of the **Wasp;** they are greeted by colleagues from the Manned Spacecraft Center at Houston, John Stonesifer, Landing and Recovery Division and Ben James, Public Affairs.

McDivitt and White are welcomed aboard by Capt. J. W. Conger (left) the ship's commander, and Rear Adm. W. M. McCormick, Commander, Carrier Division 14, Atlantic.



Astronauts White (left) and McDivitt talk to the President of the United States from the **Wasp.** Mr. Johnson invited them to come and see him, said he was keeping "a little something" for them.

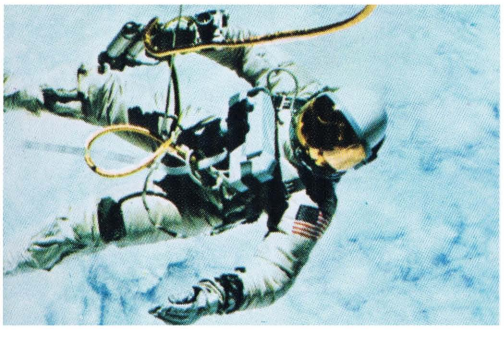
In excellent shape after its 1,600,000-mile journey in space, Gemini 4 is examined by technicians. The blunt end shows the results of the fiery reentry into the atmosphere, when heat was carried away by ablating material on the broad surface in the left of the picture.

The astronauts stand in the spacecraft that was their home in space for 97 hours and 56 minutes.

At the Manned Spacecraft Center, Houston, Texas, the Gemini 4 astronauts present to President Johnson a picture of White's walk in space, and a photo book of the space flight. Left to right: James E. Webb, NASA Administrator; Astronaut McDivitt; Dr. Robert C. Seamans, Jr., Associate Administrator of NASA; President Johnson; Astronaut White.

In Washington, at the White House, McDivitt and White present to President Johnson a flag which traveled with them during the flight of Gemini 4. Left to right: McDivitt, White, President Johnson and Vice President Humphrey. At far right, Charles W. Mathews, Manager of the Gemini Program Office. Next day the astronauts flew to Paris with the Vice President to visit the air show in progress there.

Information concerning other educational publications of the National Aeronautics and Space Administration may be obtained from the Office of Educational Programs and Services, NASA, Washington, D. C., 20546.



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