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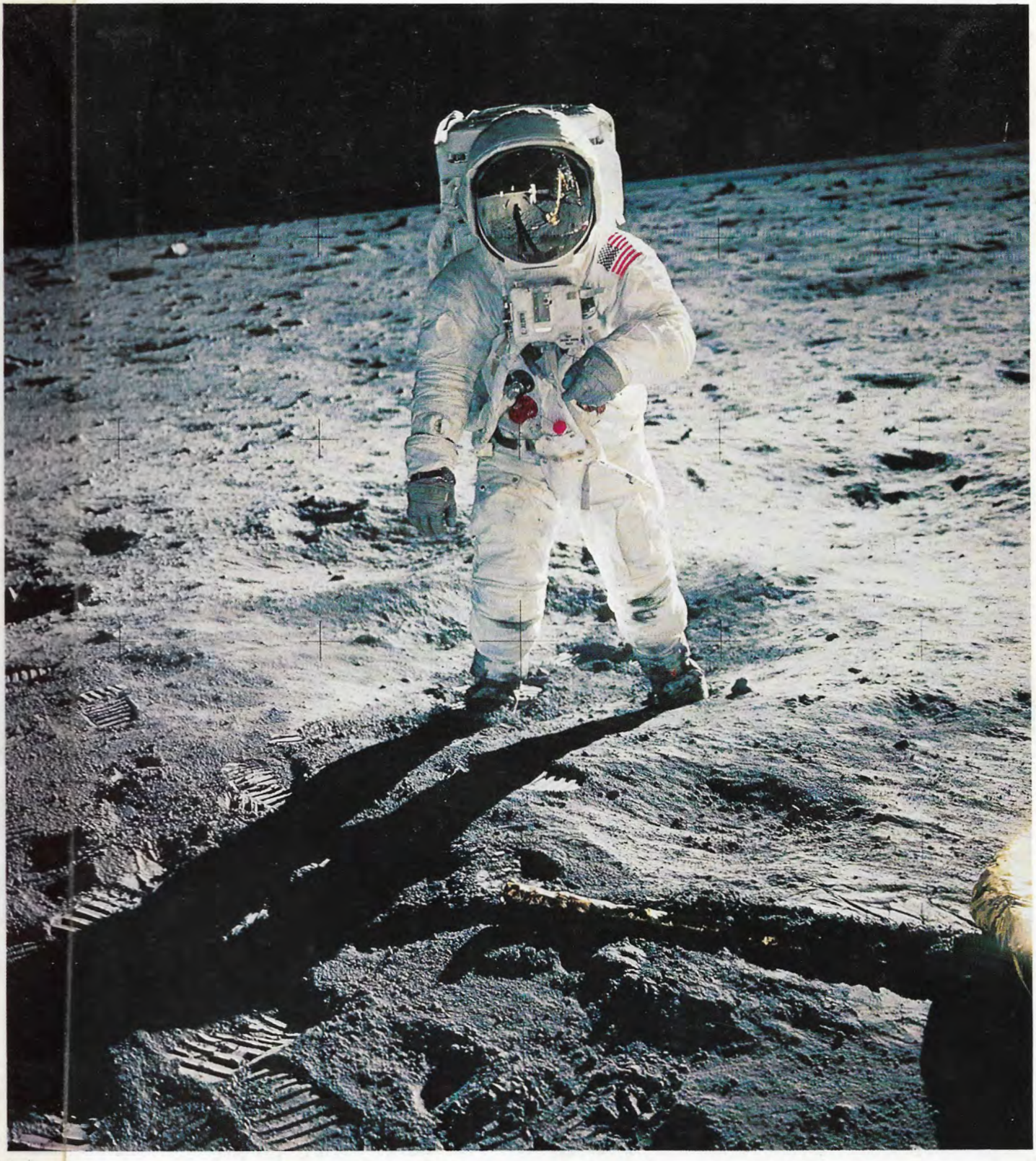

First Man on the Moon July 20 1969

hasselblad

Featuring: Apollo IX, X and XI

"That's one small step for a man, one giant leap for mankind."

– Neil Armstrong

Cover: A photo by Neil Armstrong of Edwin Aldrin, two of the three astronauts of the Apollo XI flight; taken on the moon, July 20, 1969. Hasselblad 500EL Data Camera with Biogon f. 5.6/60 mm lens.

Photo, right: Apollo X at the blast-off, Cape Kennedy, May 1969. Taken by Klaus J. Wilckens.

Photos courtesy of the National Aeronautics and Space Administration.

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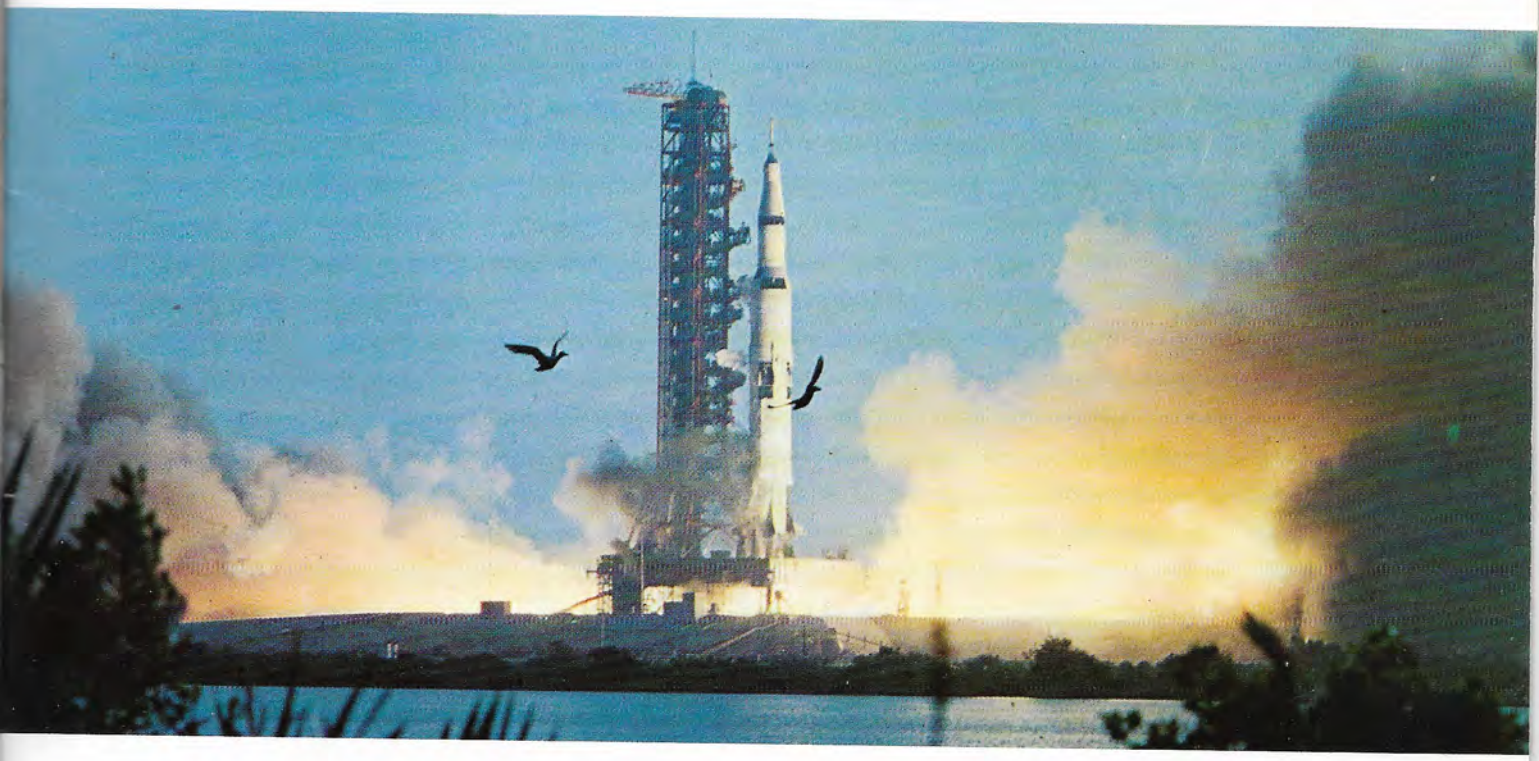
INTRODUCTION *Victor Hasselblad, D. E.*

For the first time in history man has reached the moon, our nearest neighbour in space, and left footprints on the lunar surface. We would like to salute these 20th Century pioneers.

For several years we at the Hasselblad camera plant have been working on cameras to document this achievement. Hasselblad cameras have also recorded previous NASA space flights in their Mercury, Gemini and Apollo programs; research and test flights leading to the landing on the moon.

Like everyone else, we are thankful for the safe return of the astronauts from their space flight and moon exploration. For our history book at the camera plant, we take pride in recording the use of Hasselblad cameras for the first time by men on the moon. We do not regret the two Hasselblad cameras which astronauts Armstrong and Aldrin left on the moon. Who knows? Perhaps some day they will be brought back to earth and be regarded as collector's items! The photographic results which have been printed in newspapers and magazines, and admired all over the world, should be of inestimable value to others who will continue to explore different areas of the moon.

After these historical space flights culminating with the first moon landing, we would like to express our gratitude and esteem to the astronauts and their colleagues in the research and engineering departments at NASA for their richly-deserved success in using the space vehicle with its instruments to increase our knowledge of the moon.



APOLLO XI, *July 16—24, 1969*

Astronauts Neil Armstrong, Edwin Aldrin and Michael Collins

"That's one small step for a man, one giant leap for mankind."

— Neil Armstrong

At left: Astronaut Edwin Aldrin climbs down from the lunar module, Eagle, to become the second man in the world to set foot on the moon. This photo was taken by Neil Armstrong (above) with his Hasselblad 500EL Data Camera fastened to his spacesuit at chest height.

How many were there who sat fascinated in front of their TV sets on that historical day and saw the astronauts land on the moon? Some estimate 500,000,000 people did; almost fifth of the world's population. They saw Armstrong put his left foot down firmly, then raise it quickly up while he uttered those inspired words, "That's one small step for a man, one giant leap for mankind." An incident in the most momentous journey in man's history; many alive now will probably witness no greater achievement.

Some people still cannot get over the fact that although it has taken thousands and thousands of years for man to advance to his present state of civilization, he has been able to break his earthly shackles and set foot on another celestial body in what seems to be the twinkling of an eye. No matter that the celestial body is the moon: earth's nearest neighbour and our constant satellite. The deed is awesome and difficult to comprehend.

The journey to the moon started on July 16, 1969, at 9.32 in the morning (local time). Hundreds of thousands of tourists from around the world had gathered for the event. They, and more than 7,000 official guests and 2,000 journalists saw the mighty Saturn rocket rise from its launch-pad in a cloud of orange-coloured smoke and start on its argosy across the skies. At the very top of the rocket, in the nose cone, were the three astronauts Neil Armstrong, Edwin Aldrin and Michael Collins. Armstrong was in command, Aldrin the pilot of the lunar module (this time called "Eagle") and Collins the pilot of the command module, "Columbia". They were all experienced astronauts. Collins is of particular interest to us Hasselblad camera-owners, as he was the astronaut who "lost" a Has-


NASA
ARMSTRONG
NASA
COLLINS
NASA
ALDRIN

selblad SWC in space almost three years ago to the day while taking part in the Agena-Gemini docking maneuver on the Gemini 10 flight, July 21, 1966. The camera went into orbit around the earth and for all we know it is still orbiting! The incident was played up in the world's press.

The camera equipment carried on the Apollo XI flight was comprehensive. In addition to the usual TV and small-film cameras on board, there was a special camera for near-distance stereoscopic shots of the moon. And, of course, there were also the cameras which, in our eyes, are the most important, viz., three Hasselblad 500ELs. Two of them were identical to the ones carried on the Apollo VIII, IX and X flights; that is, each camera had its own Zeiss Planar f. 2.8/80 mm lens, and a Zeiss Sonnar f. 5.6/250 mm telephoto lens was also carried. One of the 500ELs, the telephoto lens, and two extra magazines were in Apollo XI's command module throughout the flight. The other 500EL, and two extra magazines as well, were placed in the lunar module. Also in the lunar module, and making its first journey in space, was the Hasselblad 500EL Data Camera.

The Data Camera, like the two others carried, is a modified standard 500EL camera but it differs from the other two by the addition of a so-called Reseau plate (see special article at the end of this issue). The Reseau plate is engraved with grid markings, and it is inserted immediately in front of the film between magazine and camera-body. The grid is useful for making topographical calculations. The Hasselblad 500EL Data Camera was also fitted with a new Zeiss lens, a Biogon f. 5.6/60 mm, specially designed for NASA. The lens was calibrated in the camera body together with the Reseau plate in order to get pictures completely without distortion. Furthermore, the lens of the camera was fitted with a polarizing filter which could easily be detached. This camera, which was the one used on the moon's surface, was given a silver finish so that it could better resist the great changes in the moon's temperature and thus maintain a more uniform internal temperature. The two extra magazines concerned were also silver colored. The violent extremes of heat and cold, highly unlike the conditions on earth, were factors that had to be overcome as best as possible. The film used was the type carried on the other flights-Kodak special thin-based and thin emulsion double-perforated 70 mm film, which permits 160 pictures in color or 200 on black/white in each loading.

Maneuvers after the launching went according to plan: the parking orbits around the earth; the separation of the command module from the rocket's 3rd stage; the docking with the lunar module and its extraction from the rocket; and the long moonbound flight (from launch to lunar touchdown, 102 hours and 47 minutes). With Columbia—and the Eagle in the van—hurtling through space, the astronauts then prepared for the moon landing.

After slowing down their spacecraft to go into, first an elliptical orbit and then circular ones by the third revolution, Armstrong and Aldrin transferred to the lunar module. Undocking was effected on the 13th revolution. Collins stayed behind to pilot Columbia and keep watch like some lonely sentinel, while the eyes and ears of the world were directed, hour after hour, minute by minute, upon reports of the momentous event taking place on the moon.

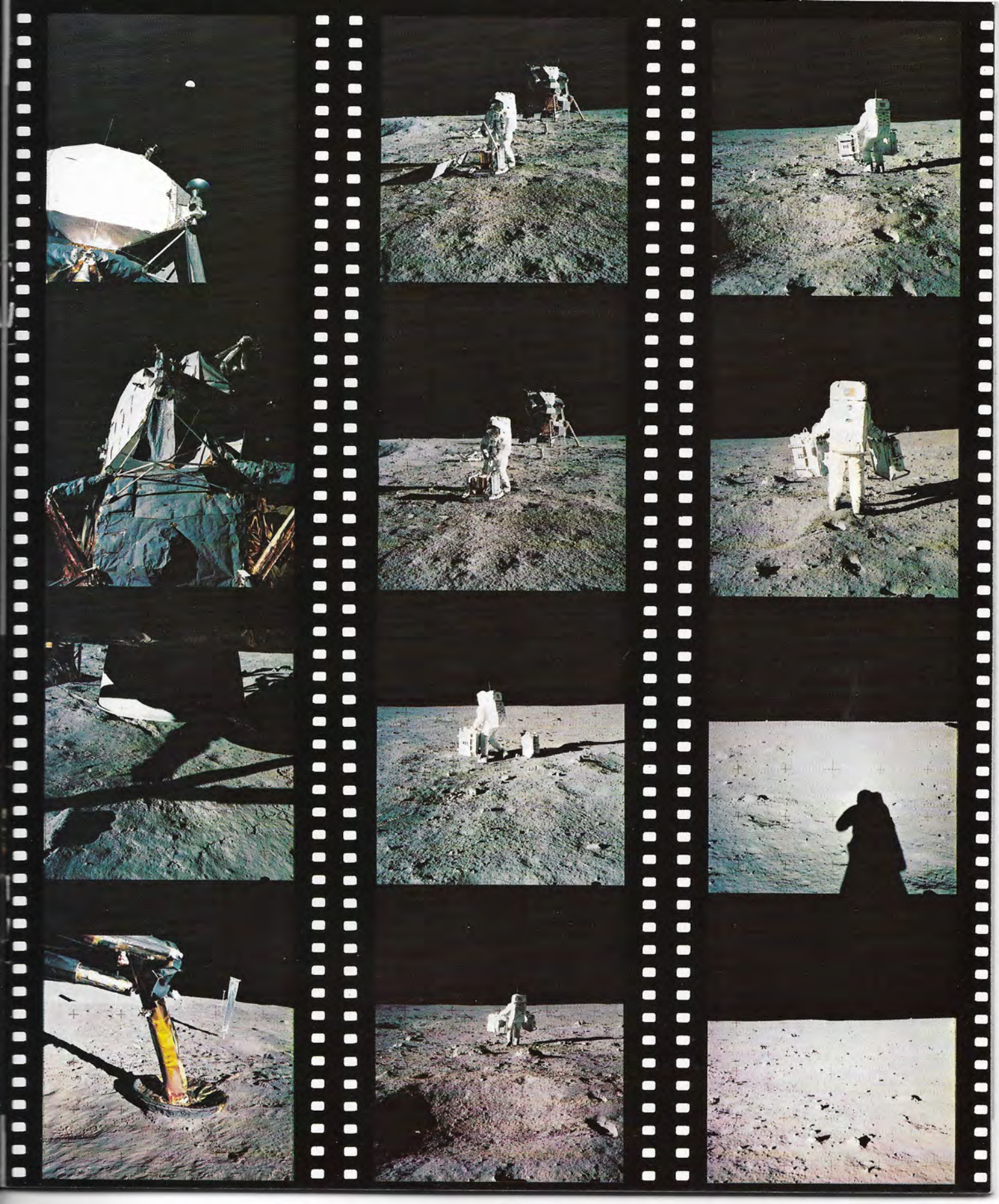
As Eagle approached the moon, Aldrin took over from the automatic controls to pilot the craft manually for the last few hundred feet of descent. A larger crater and boulders had to be avoided before the actual touchdown was made on July 20, 1969 in the Sea of Tranquility.

The next two and a half hours were a hectic time for Armstrong and Aldrin. Guided by a check list with several hundred points, they had a number of actions

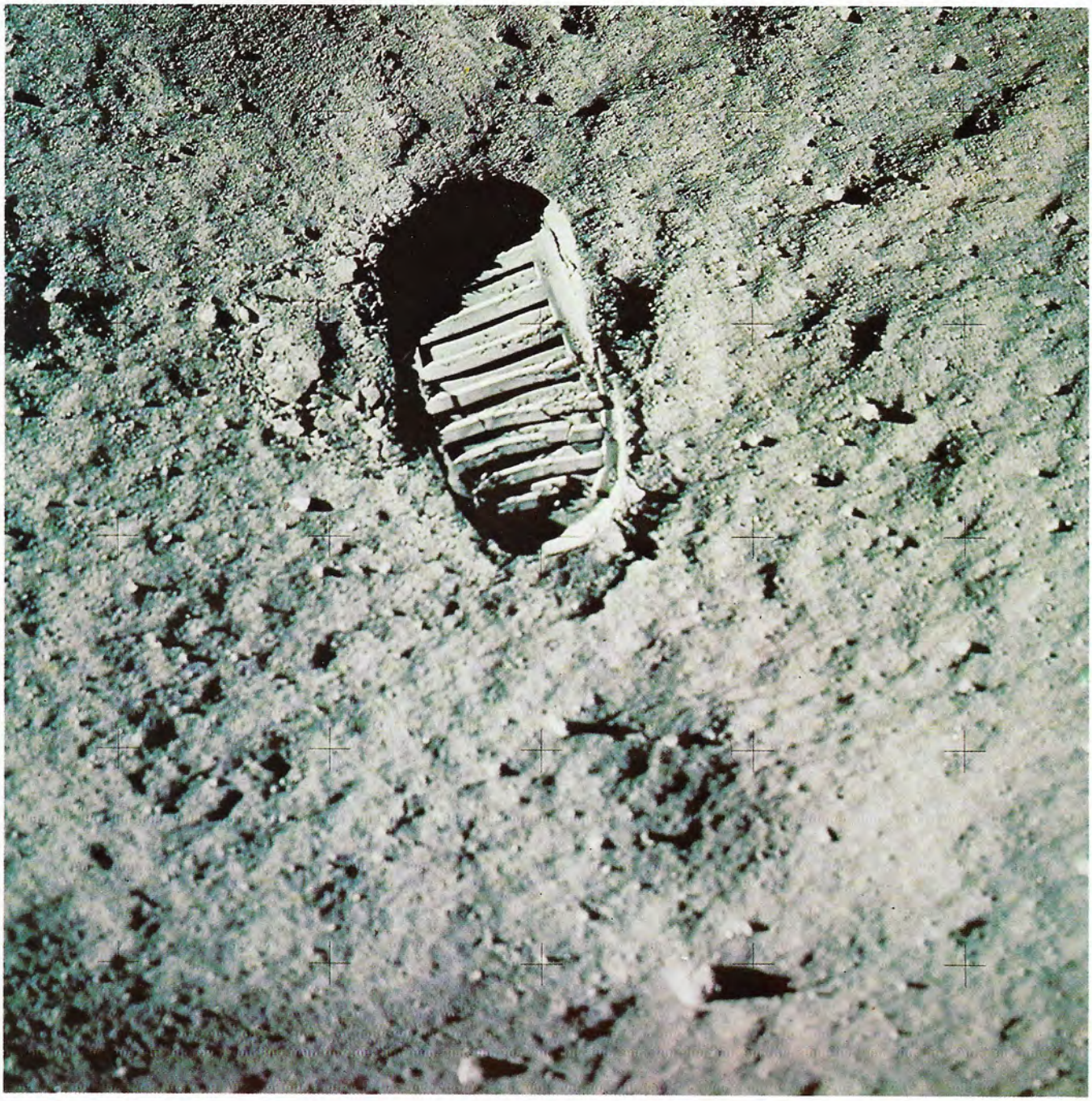
Continued on page 14

At left: The three astronauts who carried out the first landing on the moon. From left, Neil Armstrong, Michael Collins and Edwin Aldrin. Armstrong was in command of the lunar expedition; Aldrin piloted the lunar module Eagle; and Collins piloted the command module, Columbia.

In the following double-page spread are shown a few strips of the 70 mm film which Neil Armstrong exposed on the moon with the Hasselblad Data Camera attached to the chest of his spacesuit. All these shots are of Buzz Aldrin. Armstrong could expose without the slightest difficulty an entire 70 mm magazine loaded with color film (almost 150 color shots).

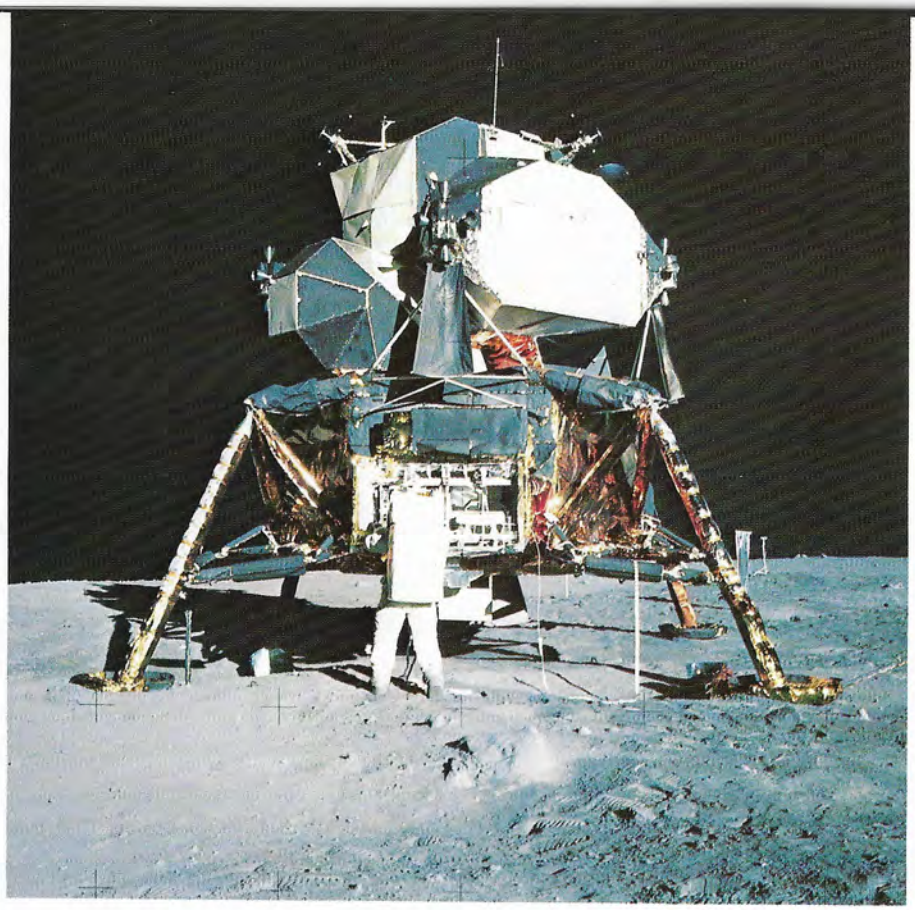


The first human footprint in the lunar soil. An impression that will remain as long as the moon exists; there being no atmosphere, therefore no wind, on the moon to efface it!



Edwin Aldrin salutes the American flag which has been wired to "wave" on the windless moon. The lunar module can be glimpsed at left.

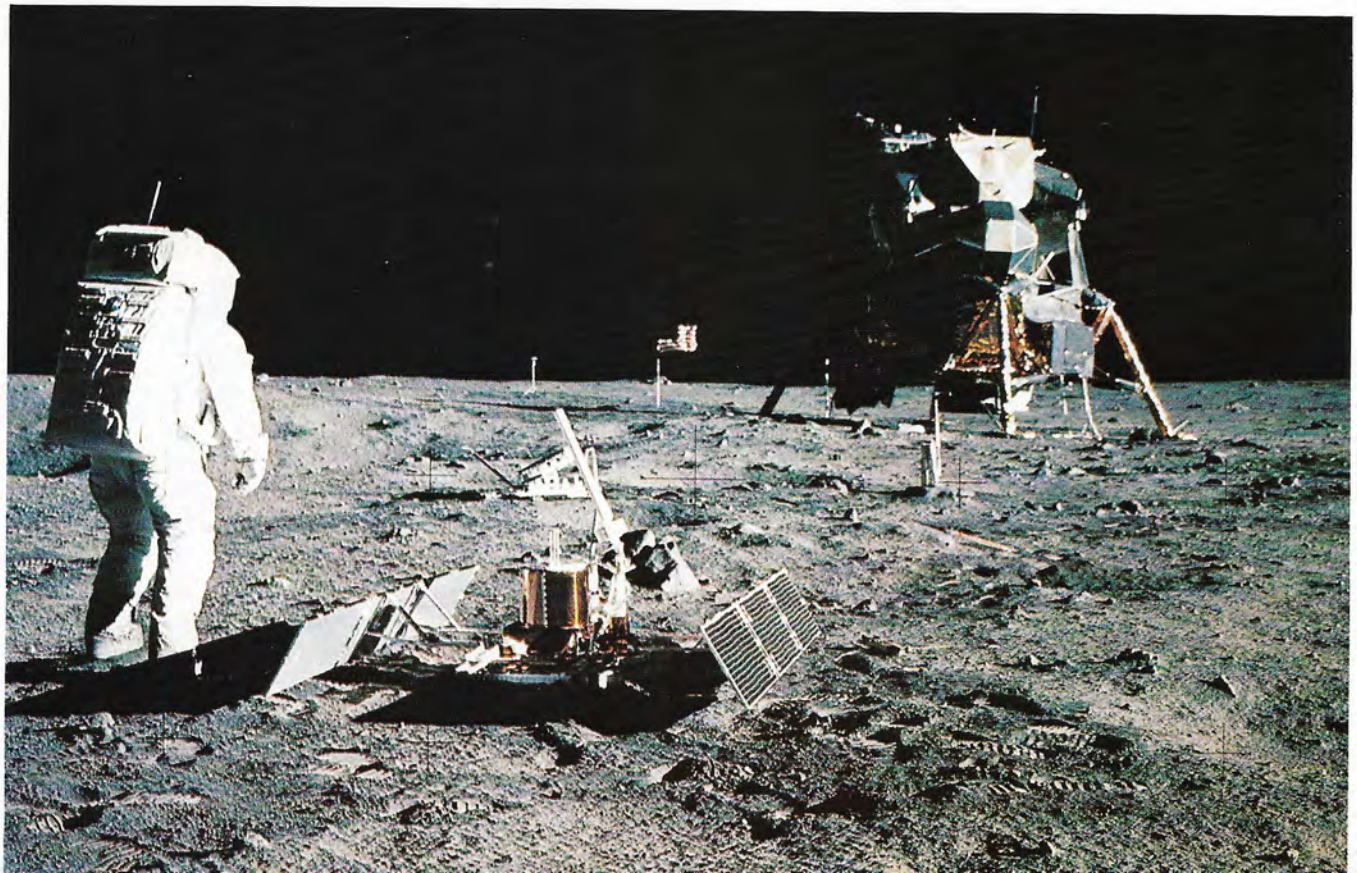
Aldrin can be seen inspecting one of the legs of the lunar module in the following double-page spread. The photo gives an excellent idea of the difference in size between man and machine.



At left: Astronaut Aldrin, pilot of the Eagle, working in front of his ship shortly after they landed on the moon.

At right: The Eagle could lift off from the moon without difficulty, and after a few complicated maneuvers on co-elliptical orbits with the mother ship, Columbia, they were ready to dock. This magnificent shot of the returning Eagle (foreground), with the moon in the middle distance and the earth shimmering in the black background of the firmament was taken by Michael Collins.

Below: Astronaut Edwin Aldrin setting out the seismometer, worked by solar energy, which was left behind to record possible moon quakes.



Continued from page 5

to perform. At the same moment that Armstrong was ready for his descent, the most unusual telecast ever devised was put into operation. People all over the world could distinctly follow the first and the following steps taken by the astronauts. "That's one small step for a man, one giant leap for mankind." The only person who was unable to witness this event was Collins in the command module!

Armstrong reported that the lunar soil was firm, and covered by only an inch or so of dust. The Eagle had sunk only a few inches into the soil, and this was less than expected. Aldrin came out of the Eagle 20 minutes later. After his first step on the moon, he jumped nimbly up to the bottom rung of Eagle's ladder a couple of times. He weighed only one-sixth of his terrestrial weight as the moon's gravitational force is only one-sixth of the earth's.

Armstrong and Aldrin then set out various instruments on the moon, planted an American flag, spoke with President Nixon in the White House, gathered rock samples, and-they photographed!

Armstrong took a typical "tourist" snapshot with his Hasselblad 500EL Data Camera of Aldrin by the American flag. Aldrin jumped up and down experimentally, with the Eagle in the background, in front of the TV camera. The scene looked odd, but Aldrin did this to find out how soon it would take him to get tired. He found out that it didn't take long!

Armstrong photographed industriously with his Hasselblad which he had attached to a device on his chest. He took shots of the lunar landscape and the Eagle from different angles. He set out a gray-tone scale and a color test chart so that they could be included in the photos taken. These devices would help to establish the color of the lunar surface and also simplify the work of the laboratory staff in the developing and printing work. Armstrong had no difficulty in taking his shots. All he had to do was to press the square release key. The electric motor in the Hasselblad camera did the rest: exposing, film winding and shutter tensioning. After they carried out their work, the astronauts left their two Hasselblad cameras and some other equipment behind, but they carried the exposed Hasselblad film magazines back with them to the lunar module.

All the above could be seen on TV screens around the world, and millions closely followed every movement the astronauts made during the over 2-hour-long direct telecast from the moon.

Armstrong and Aldrin then took a rest upon entering the Eagle; Aldrin slept on the floor and Armstrong curled up on the instrument counter. Although the astronauts took sleeping pills, sleep, understandably, was not easy. However, they were awakened at the correct time and made preparations for the lunar lift-off. The maneuvers for the lift-off, ascent, rendezvous and docking with Columbia were accomplished perfectly, although they had never been carried out before. Docking was complicated and required two revolutions on co-elliptical orbits before it could be carried out. The entire procedure was guided by data machines, and manual piloting was used only when the three astronauts in the two ships sighted one another. The actual docking procedure was carried out by Aldrin, who had previously worked out a method for docking two spacecraft in flight and written a thesis on the subject. Before Armstrong and Aldrin crawled through the tunnel back into the mother ship,

they vacuum-cleaned their clothing to remove the lunar dust. They also left their outer spacesuits and their shoes behind.

After having collected from the Eagle everything that should be brought back to earth, including the precious boxes of lunar rock and dust specimens which weighed almost 70 pounds, the astronauts jettisoned the lunar module into a solar orbit. Then after a further two revolutions around the moon, the astronauts fired their rocket motor onto an earthbound course. On the return journey, Armstrong, Aldrin and Collins made a special telecast for children and they carried out a number of amusing demonstrations, like weightlessness, and so on.

Upon approaching the earth's atmosphere the astronauts put Columbia into an earthbound trajectory and splashed down in the Pacific southwest of Hawaii at early dawn on July 24. The three astronauts were picked up by the waiting carrier, *Hornet,* where a special quarantine bus was set up for the astronauts to live in until they returned to the NASA base in Houston. But before that, the astronauts were liberally doused with disinfectant to reduce lunar contamination. The chance of contamination was small but no unnecessary risks were run, and therefore the astronauts did not get the same enthusiastic homecoming that the other astronauts always got before. But President Nixon and many other prominent people, including astronaut Frank Borman from the Apollo VIII flight, were there to witness the return, and President Nixon spoke to them through a window.

The astronauts were flown from Hawaii to Houston. There they were confined to a special lunar receiving laboratory-a luxury prison of sorts-for the 3-week quarantine period. During that time they were probed, examined and investigated by experts, but were ultimately discharged with a clean bill of health and reported to be in perfect condition. Nor were the lunar specimens of rock and dust permitted to be released for scientific examination until a similar 3-week period had ensued. Only the photographs which the astronauts had taken were permitted to be released for immediate processing after the films had been disinfected. The world waited with excitement to see these Hasselblad pictures. And when some of them were released by NASA, they were immediately reproduced on the front pages of the world's press. The astronauts were hailed as heroes by people all over the world after emerging from the long period of quarantine.

Once again Hasselblad had been given the opportunity to be of service to mankind by spreading knowledge about space. The gravity of the task humbles us while at the same time we take pride in the confidence shown by NASA in our efforts. We trust that the success of the Apollo XI flight will inspire NASA to new goals and new achievements in space exploration. Someone at NASA has said that they started to use the Hasselblad as a documentary camera to show people what the astronauts saw in space. Today the Hasselblad is being used as a tool in the hands of science. We think that's just fine! The names of President Nixon, and astronauts Armstrong, Aldrin and Collins ("We came in peace for all mankind") have been perpetuated on the moon. It would be less than human if we did not confess that we at the Hasselblad plant are happy that the name of Dr. Victor Hasselblad is there too, as perpetuated by the two Hasselblad cameras left behind on the moon.

APOLLO X,

May 18—26, 1969

Astronauts Thomas P. Stafford, John W. Young and Eugene A. Cernan

Elation, terror and ultimately triumph marked the space adventure of the Apollo X to the moon and back in May 1969. Never before had man made such a close approach to our nearest celestial body. At one point, Stafford and Cernan in the lunar module swooped to within 47,000 ft. of the heavily-cratered moon surface and gave an anxiously waiting world their first-hand impressions. "We're right here," cried Cernan, "we're right over it!" One of the proposed landing sites of the Apollo XI was sighted. "I wish I could stay" said Stafford.

This was the only time, since Hasselblad cameras were first used on space flights in October 1962, that a Hasselblad camera failed to work perfectly. The astronauts said so by radio. Newspapers printed the story. At one point it seemed to be the most interesting topic of the journey because such an incident had never happened before on all the 15 earlier flights!

At left: From left, Astronauts Eugene A. Cernan, John W. Young and Thomas P. Stafford (in command) in front of the Apollo X.

At right: An "earthrise" above the lunar horizon. Hasselblad 500EL with Zeiss Sonnar 250.

The camera in question, a Hasselblad 500EL/70, failed to respond when the lunar module swooped over the lunar surface for a close look. But actually only the last 20 inches or so of film (eight frames) in the last magazine remained unexposed. If it had been possible to change magazines, the camera would most likely have worked perfectly.

Apollo X started its historical flight from Cape Kennedy on May 18, 1969 at 12.49 (local time). On board were USA's most experienced astronauts at that time. Thomas P. Stafford, in command, had participated in two of the earlier Gemini flights and helped to carry out the first rendezvous in space. John W. Young, veteran of the Gemini 3 and Gemini 10 flights, was the first astronaut to alter the altitude of a spacecraft while orbiting the earth. Eugene Cernan, on the Gemini 9 flight, had walked six times longer in space than any other human being.

As in the Apollo VIII flight in December 1968, photography played the most important role, and the purpose of the Apollo X flight was to ascertain and chart the planned landing-sites for the Apollo XI. On board the Apollo X were two Hasselblad 500EL cameras, each fitted with the standard Zeiss Planar f. 2.8/80 mm lens, a Zeiss Sonnar f. 5.6/250 mm telephoto lens, plus six magazines loaded with 70 mm double-perforated reversal color film (transparencies) and four magazines loaded with black-white film.

Twelve minutes after the start, the spacecraft went into a parking orbit around the earth at an altitude between 115 and 135 miles. Two and a half hours later, while Apollo X was directly over Australia, the astronauts separated the third stage of the S-4B rocket from their command-and-service module (Charlie Brown), moved back to dock with the lunar module (Snoopy) still nestling in the rocket's nose, plucked Snoopy out,

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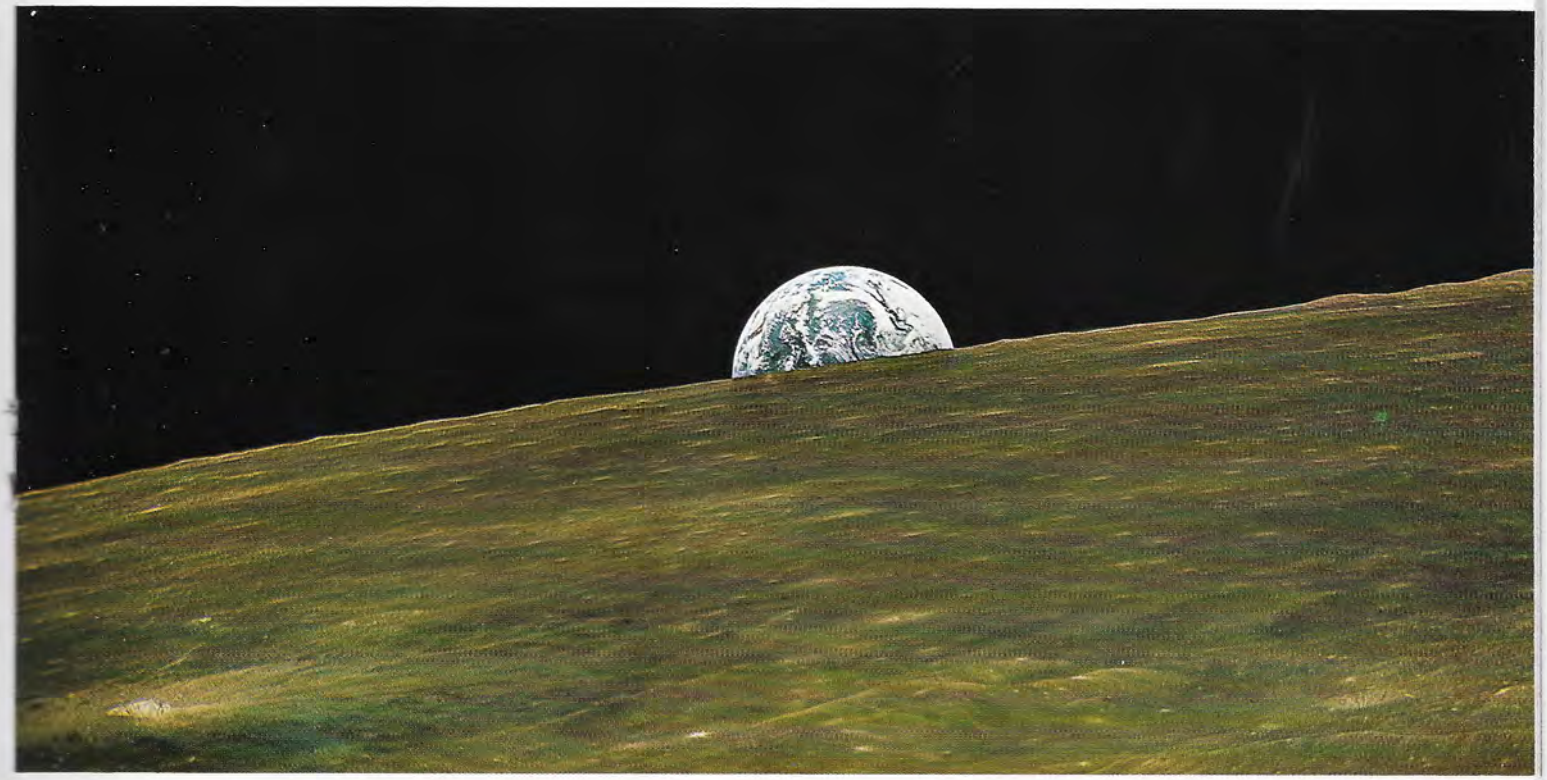
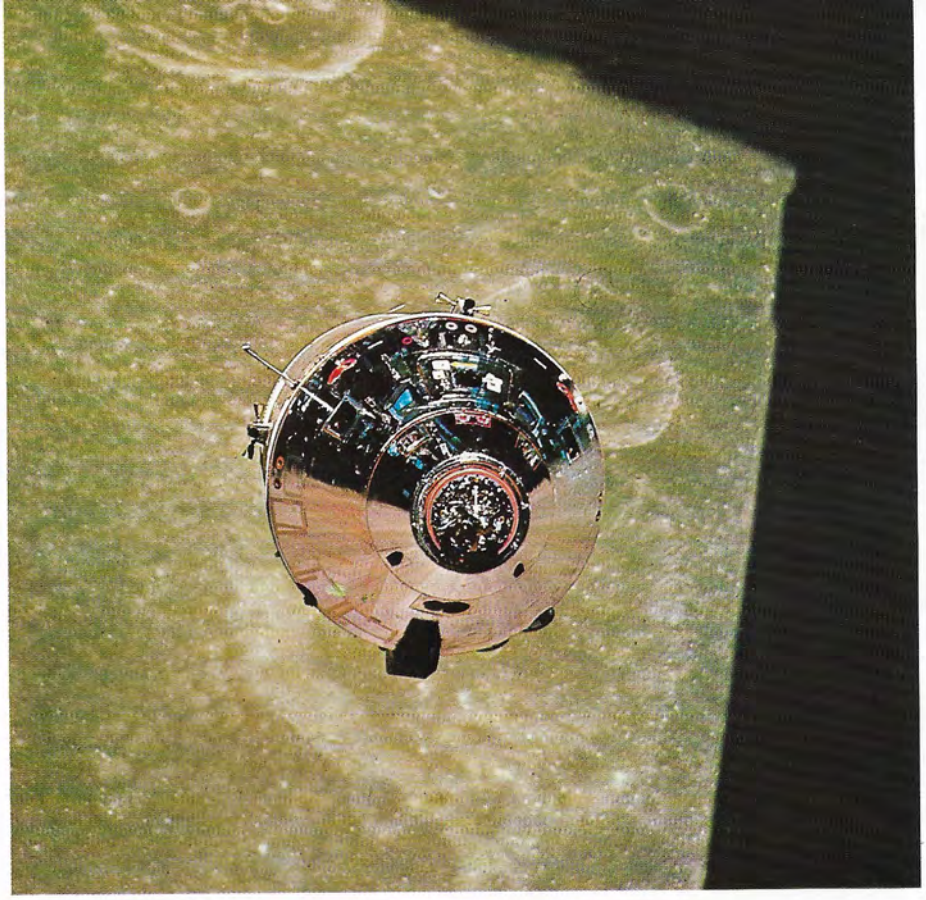
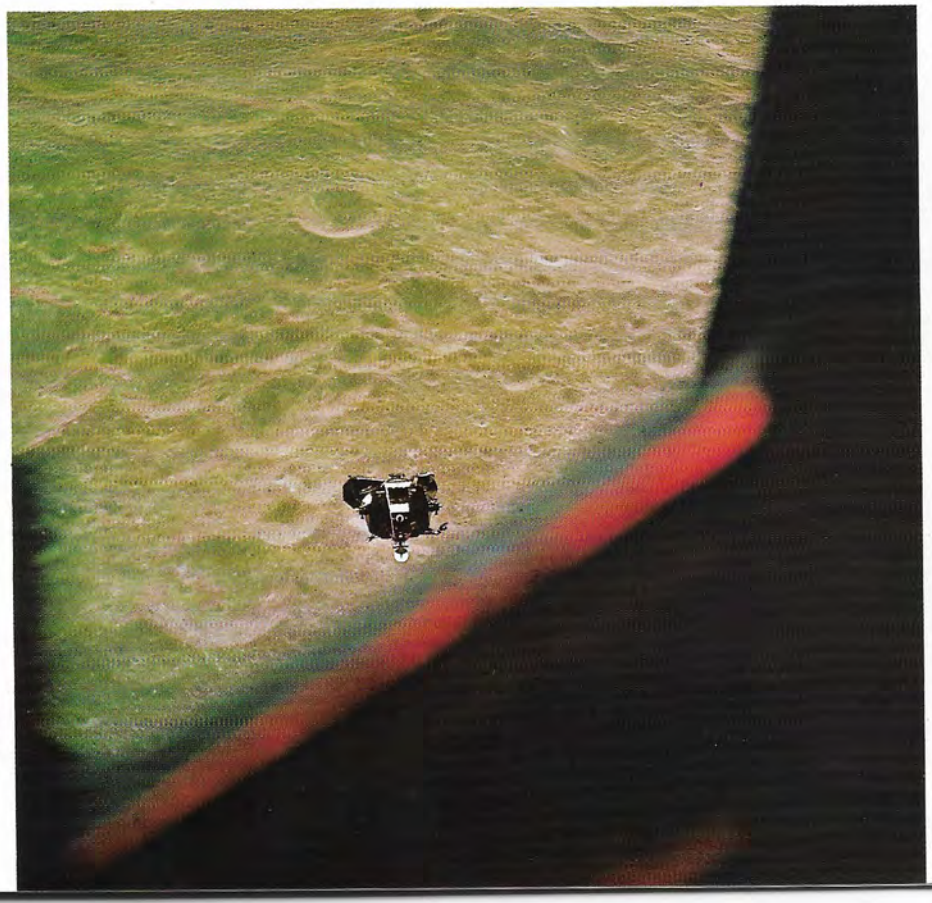


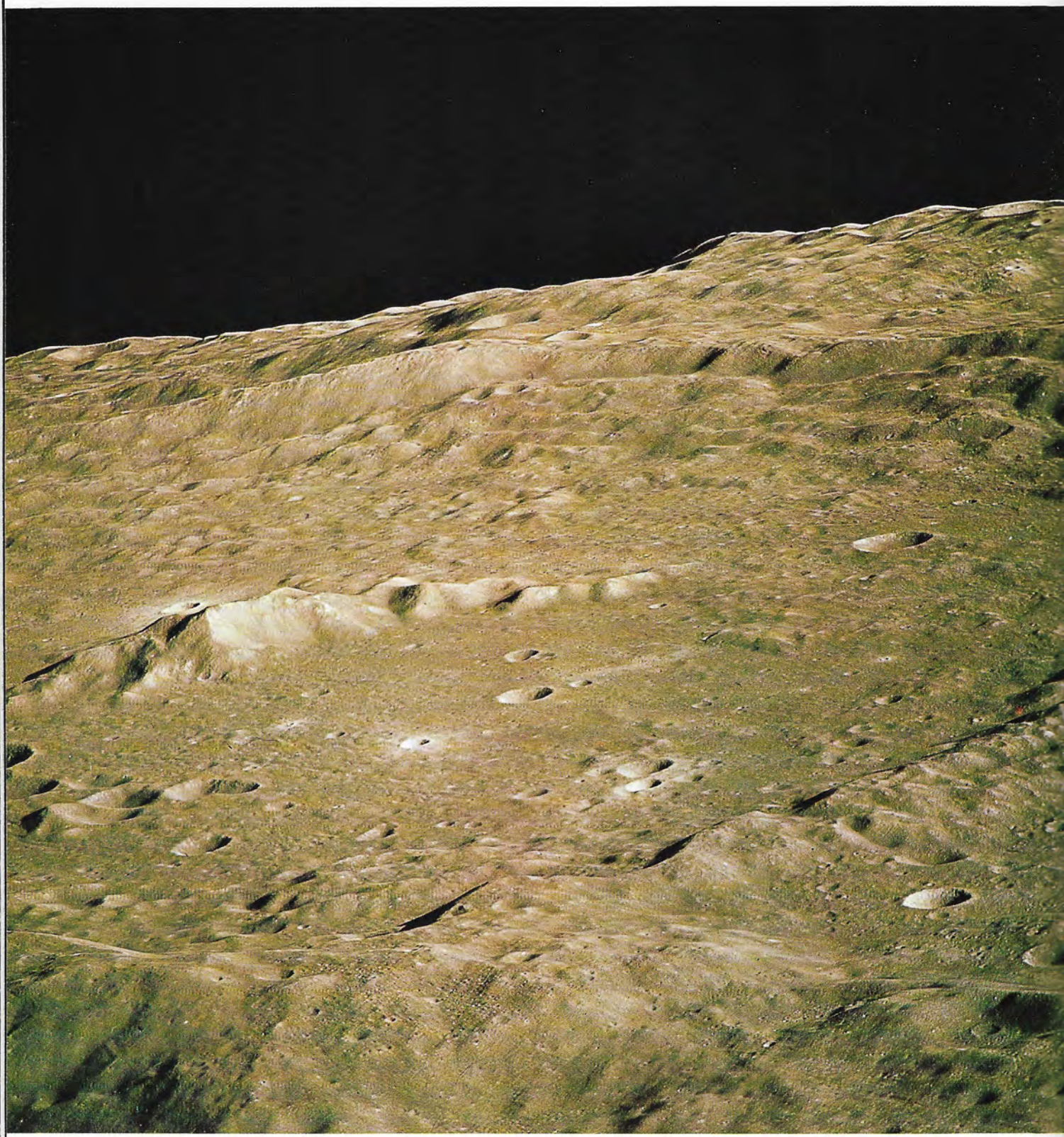
At right: The Apollo command module 75 miles over the lunar surface; taken from the moon module. The entire lunar surface is reflected in the shiny underside of the command module.



At left: Between the earth and the moon the astronauts took this shot with the Hasselblad 500C and Zeiss Planar 80. Practically the whole of North America can be clearly seen, especially the west coast region around the Gulf of California and Lower California.



The lunar module 75 miles over the lunar surface; taken from the command module immediately before docking.



At left: The lunar landscape. A shot from the lunar module at the start of its descent to the moon. Mountainous formations of rock can be seen in the background.

The rays of the low-lying sun bring out the edge of the crater Godin in sharp relief. The crater is near the landing site of the Apollo XI. Photo taken from Snoopy, the lunar module of the Apollo X, when it took a close "sniff" at the moon.

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and then began their long journey of more than 250,000 miles at a starting speed of about 2,500 m.p.h. to break away from the earth's gravitational pull.

After the three-day journey to the moon, which required only minor mid-course corrections, the astronauts reduced the spacecraft's speed to go into an elliptical orbit around the moon. Apollo X then went into circular orbit on the third revolution and, after Cernan and Stafford had transferred to the lunar module, it was time to undock Snoopy and start another series of maneuvers. Young remained in the command module, alone for about 7½ hours, while Snoopy was tested. Young took a number of exceptionally fine shots with his Hasselblad 500EL; among them, photos of the lunar module over the moon's surface.

During the next 25 minutes Charlie Brown and Snoopy went around the moon in formation at a height of about 75 miles. Snoopy playfully turned over and around so that Young could check that there was no damage anywhere.

Snoopy's moon probe started when the astronauts altered the circular orbit to a steeply elliptical one; and at the Sea of Tranquility Snoopy's altitude was 50,000 ft. The closer the astronauts came to the moon's surface, the more difficult it was to keep in radio communication because of interference and communications blackout. At one point, just before a break in the direct communications with Houston, ground controllers heard Stafford report that there were lots of boulders in the crater Maskelyne, a spot extremely close to the flat space where it was planned to land Apollo XI.

During Snoopy's solo flight, many shots were taken with the Hasselblad 500EL and Planar f. 2.8/80 mm lens; several 70-magazines were used in succession. The resulting pictures, of scientific interest and which also helped to determine Apollo XI's landing site, were superior in smartness and brilliancy to those taken previously.

Schmidt is another crater near the landing site of the Apollo XI in the Mare Tranquillitatis. The lunar module of Apollo X, in its moon probe, went as close as 50,000 feet to the lunar surface.

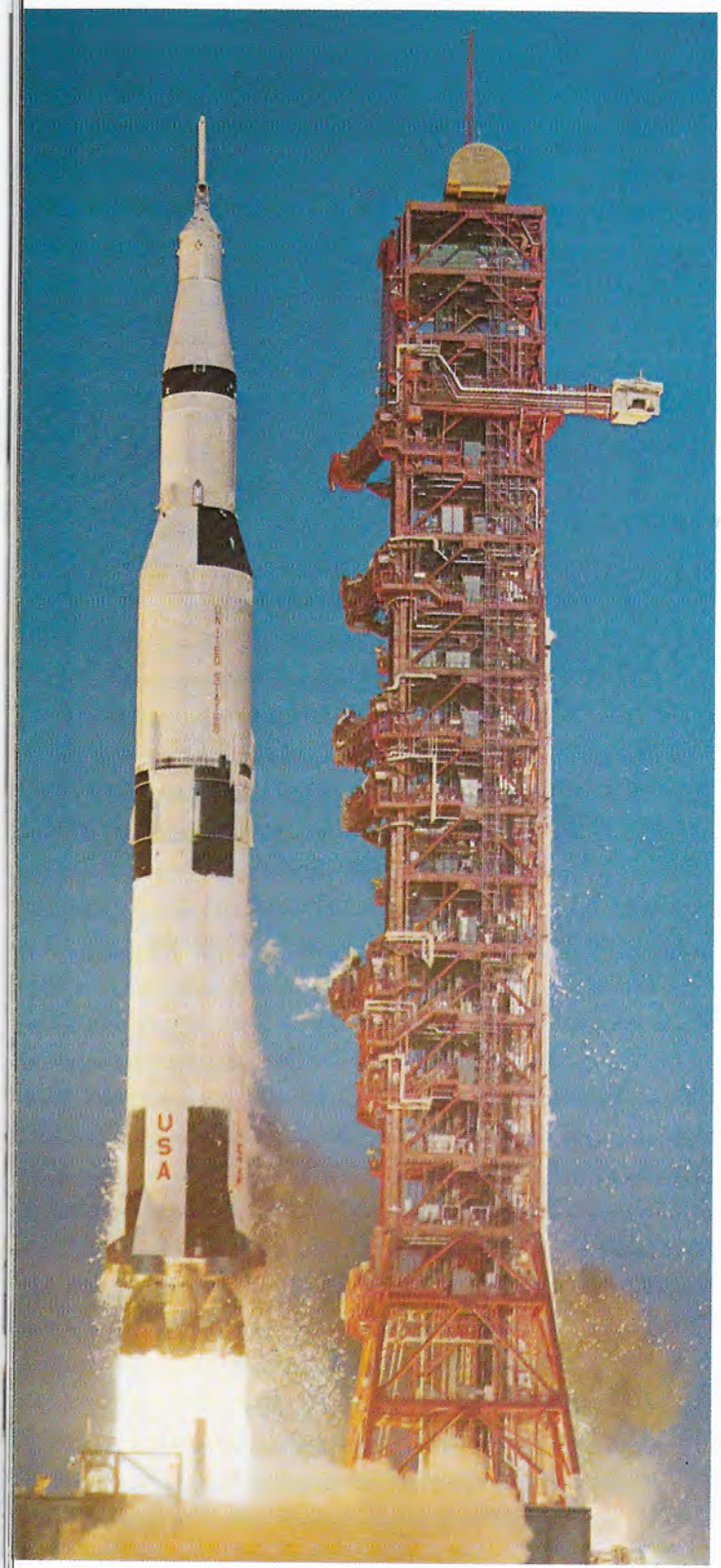
Stafford reported that the areas between the massive boulders were flat, and looked like wet sand or clay. A shot taken by the astronauts showed that Apollo XI's proposed landing site was a rather flat area surrounded by small craters. He also said that the possible landing sites around the Sea of Tranquility should be carefully studied. It would seem that from 25—30 % of the flat surface could be used for landing. In other words, the lunar module should be given sufficient time to check the right spot.

During Snoopy's 14th revolution around the moon, an incident occurred which could have ended in disaster. The lunar module failed to jettison its descent stage at its first attempt. The second attempt was successful but Snoopy began to gyrate violently. With two lives at stake, the ground controllers in Houston worked frantically to find out the cause of the terrifying gyrations. Inside the lunar module the astronauts did everything possible to subdue the pitching and gyrating which could play havoc with the LM's precision instruments. They succeeded after about a minute. The reason for the near-disaster was that while Stafford was guiding the lunar module in one direction, automated equipment was guiding it in another.

But after both ships went into co-elleptical orbit, rendezvoused and docked, Stafford happily reported, "Charlie Brown and Snoopy are hugging each other —we're almost home!" The world drew a sigh of relief!

After the astronauts' 192-hour journey around the moon, their 12,000-pound craft—all that remained of the original 6,000,000-pound behemoth which started eight days earlier from Cape Kennedy—splashed down in the Pacific. The carrier *Princeton* was waiting about 400 nautical miles east of Pago Pago, of the Samoa group. As the astronauts had executed a precision splashdown, the recovery operations were the fastest carried out up to that time. The astronauts were hauled aboard the recovery helicopter after being only 10 minutes in the water.

This journey to the moon and back with Snoopy showed that the little lunar module could navigate and communicate independently while way out in space, and that its landing radar worked efficiently—all favorable indications that the moon landing in July 1969 would be a success!



APOLLO IX

March 3—13, 1969

Astronauts James A. McDivitt, David R. Scott and Russell L. Schweickart.

On Monday March 3, 1969, Apollo IX started its 10-day space flight, the main purpose of which was to test the lunar module under realistic conditions.

There was a cloudy sky over Cape Kennedy when the gigantic 363-foot-tall Saturn rocket was blasted off and projected the spacecraft into a circular orbit around the earth. The flight schedule originally called for a start on Friday, February 28, but it was postponed as the astronauts had a touch of influenza. However, by Monday they had made a full recovery, although Schweickart was given a motion-sickness pill.

The crew was composed of the space veterans, James McDivitt, who had commanded the Gemini 4 flight, David Scott from the Gemini 8 flight, and Russell Schweickart the rookie on that flight.

As mentioned, the most important job of the flight was to test that part of the Apollo flight system to be used in the first moon landing; i.e., the odd-looking craft which looked like an insect, and which the astronauts promptly called the Spider. This was the first time in the history of flight that aerodynamic principles were not observed when designing a craft that would be flying at high speed. It was unnecessary to observe these principles as the Spider would be flying in vacuum and there would be no wind resistance.

The Spider had never been in space before, so the Apollo IX flight was the first time that all the units comprising the rocket-spacecraft system-Saturn 5 rocket, Apollo service module, command module (the Gumdrop) and lunar module, (the Spider)-were up in space together.

The mighty Saturn rocket, 363-foot-tall, with Apollo IX at the peak, clears the launch-pad in a cloud of orange-colored smoke.

From left, Astronauts James A. McDivitt, David R. Scott and Russell L. Schweickart in front of the gigantic Saturn Rocket.

Two hours after the blast-off, the lunar module, which had been housed in the third stage of the Saturn, was plucked from the rocket by the command module after a nose-to-nose docking. When this was effected, the first important phase of the flight was accomplished. During the next two days the astronauts tested every part of the spacecraft to check that all was in order. Between the complicated docking maneuvers Schweickart had time to take a space walk. The walk was planned to last over two hours but because Schweickart was affected by some unexpected space ailment, his walk was cut down to 40 minutes.

The main purpose of his walk was to test the lunar space suit and portable life-support system (PLSS) which the astronauts would be wearing on their first moon landing. The PLSS was fitted with automatic cooling and heating valves, an oxygen tank, radio-communications system, etc.

During this period of the flight, the three astronauts photographed one another and everything else within sight. On one occasion all three were using their respective Hasselblad cameras at the same time! That was the time when NASA's Houston base heard Schweickart commenting, "Now we're all taking pictures of everybody taking pictures". The result were good and once more the world was pleasantly surprised by the sharpness, brilliancy and colors of the photos taken by the astronauts.

The photographic equipment on the Apollo IX flight consisted of: two Hasselblad 500C cameras, each fitted with the standard Planar f. 2.8/80 mm lens; one Hasselblad SWC, the extreme wide-angle camera with the Biogon f. 4.5/36 mm lens; and four Hasselblad 500EL cameras (connected together for simultaneous exposure in a cluster; see special article at the end of this magazine) fitted with Magazine 70 and the standard Planar f. 2.8/80 mm lens. One of the two above-mentioned 500Cs was in the lunar module.

On the fifth day of the flight, the command and lunar modules were undocked, and the lunar module flew by itself for the first time in space, at the maximum distance of about a hundred miles from the command module. After test-firing the LM's descent engine, McDivitt and Schweickart tested the ascent engine in

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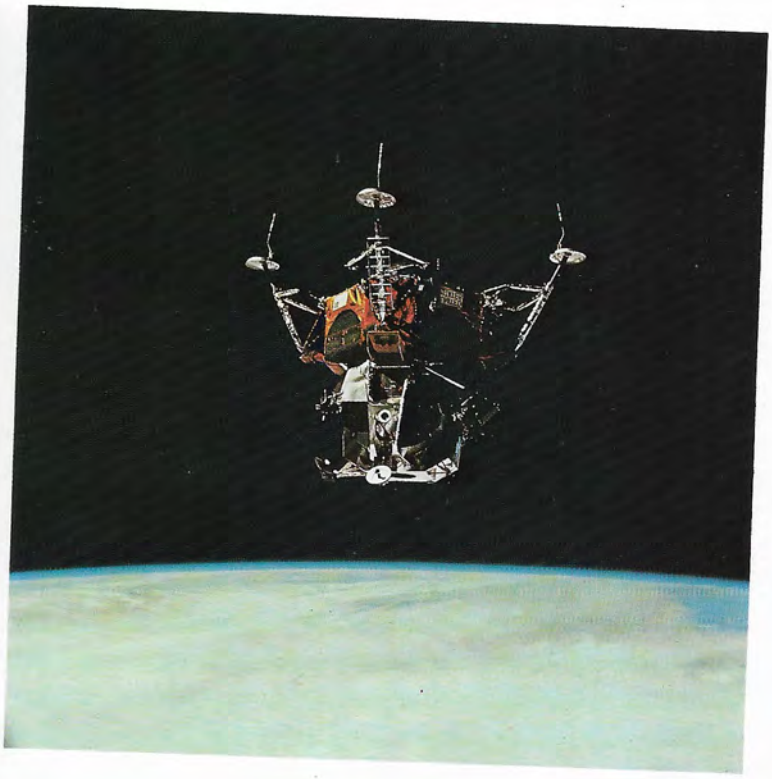
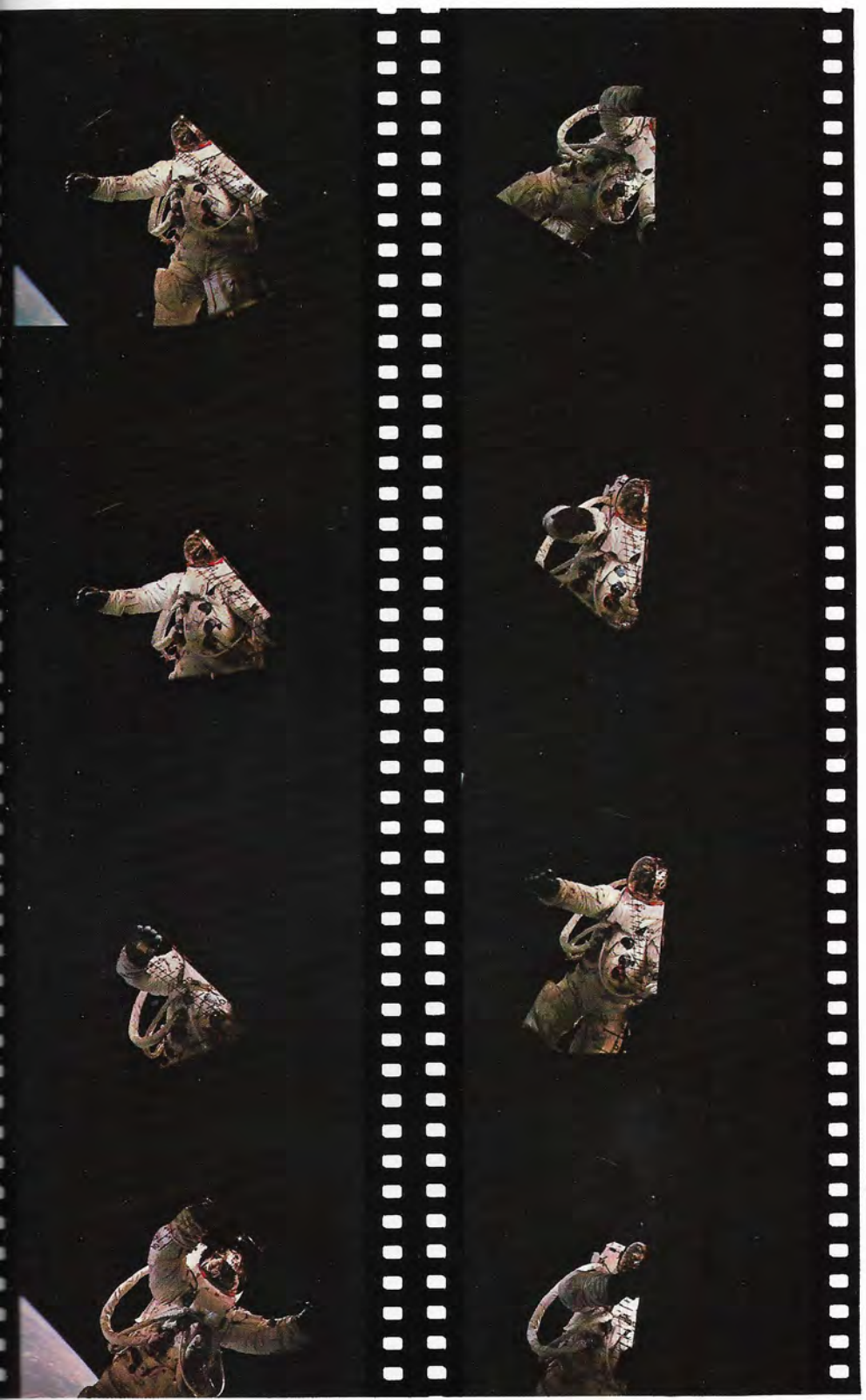


Extreme left: Scott is seen taking shots with a Hasselblad SWC from the hatch of the command module. In the foreground, the lunar module.

At left: McDivitt was the first astronaut to pilot the lunar module in space. The earth is seen in the background.

Below, left: The Apollo command module from the lunar module. Below right: the lunar module nestling in the third stage of the Saturn rocket during the flight. The third stage had been separated from the command module which then returned, and is about to make a nose-to-nose docking with the lunar module before literally plucking it out from the rocket.



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a simulated lunar lift-off before docking with the command module. This series of maneuvers kept the world in suspense while it was being carried out.

When the Spider was approaching the Gumdrop, Scott radioed McDivitt: "You're upside down." McDivitt replied coolly, "One of us isn't right side up," but nevertheless he chose to flip his craft to carry out the docking.

Apollo IX had completed 151 orbits around the earth when it splashed down in the Atlantic after a perfect 10-day flight. On March 13, 1969, the heat-charred spacecraft with its three red-and-white parachutes floated down through the cloud cover and splashed into the water east of the Coral Is. of the Bahamas. The Gumdrop landed so near the helicopter carrier *Guadalcanal* that TV cameras could record the event. Five helicopters circled above the bobbing spaceship at the climax of the mission. Three frogmen were routinely lowered to attach a flotation collar to the Gumdrop and open its hatch. Before the recovery helicopter was successful in this maneuver, both Schweickart and McDivitt received a regular soaking, and 45 minutes elapsed before they could be landed on the carrier's deck.

The astronauts brought back all their Hasselblad equipment and almost 3,000 fantastic pictures.

During the Apollo IX flight, the astronauts took several space walks and photographed one another outside the command and lunar modules.

HASSELBLADS IN CLUSTER

The most Hasselblad equipment ever carried in space was on the Apollo IX flight. In addition to two Hasselblad 500C cameras and one SWC camera for the actual documentary work, four 500EL cameras fitted with magazines for 70 mm double-perforated film were carried for scientific purposes.

On the sixth day of the flight, the astronauts mounted these four cameras into a cluster at one of the spacecraft's windows. The cameras were inter-synchronized with one another for simultaneous exposing. Exposures were effected automatically by a timer.

The purpose of the Hasselblad cluster was to take pictures of different parts of the earth while the Apollo IX was in its parking orbit prior to re-entry.

The magazines were loaded with four different types of film and, from the individual characteristics of the film employed, valuable scientific information could be deduced from the geographical areas photographed. Details of the film and filters used with the cluster:

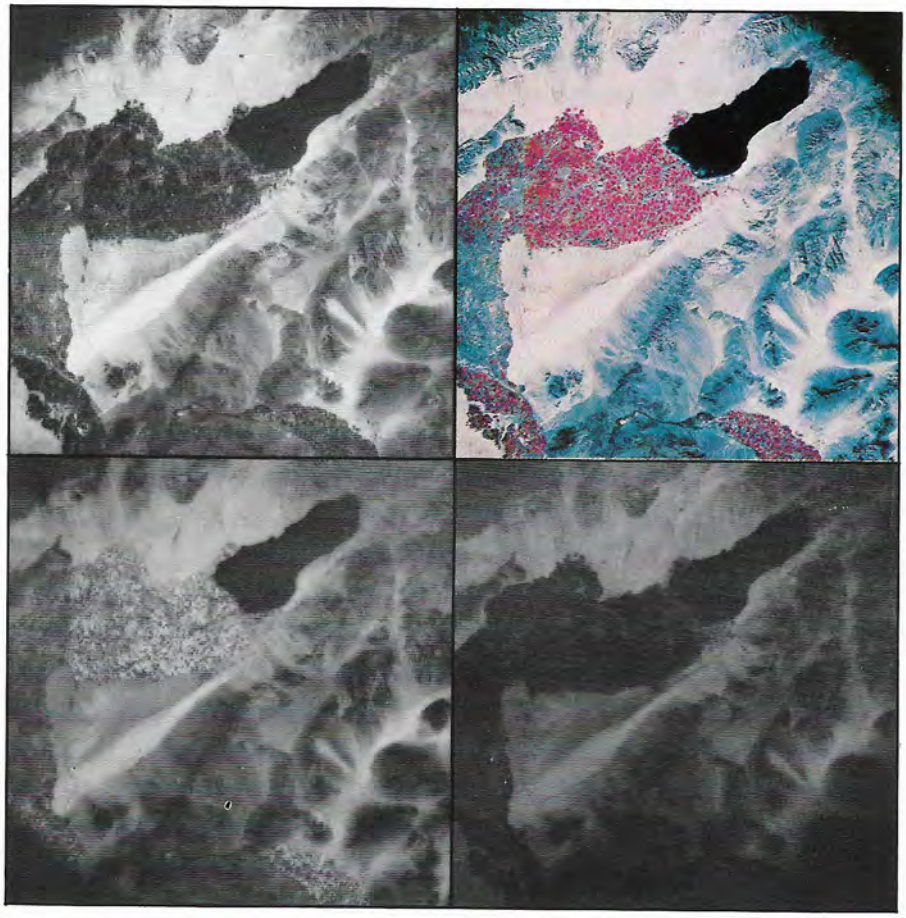
First camera: Infra-red Ektachrome color film; orange filter 15.

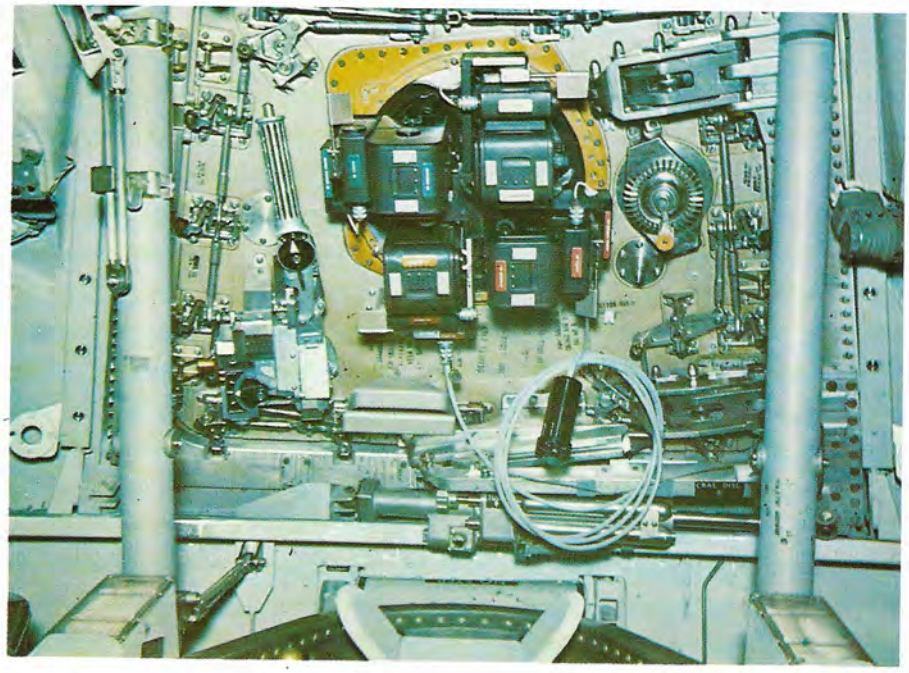
Second camera: Black-white Panatomic X aerial film; green filter 58B.

Third camera: Infra-red, black-white film; dark red filter 89B.

Fourth camera: Same black-white film as in second camera, but with red filter 25A.

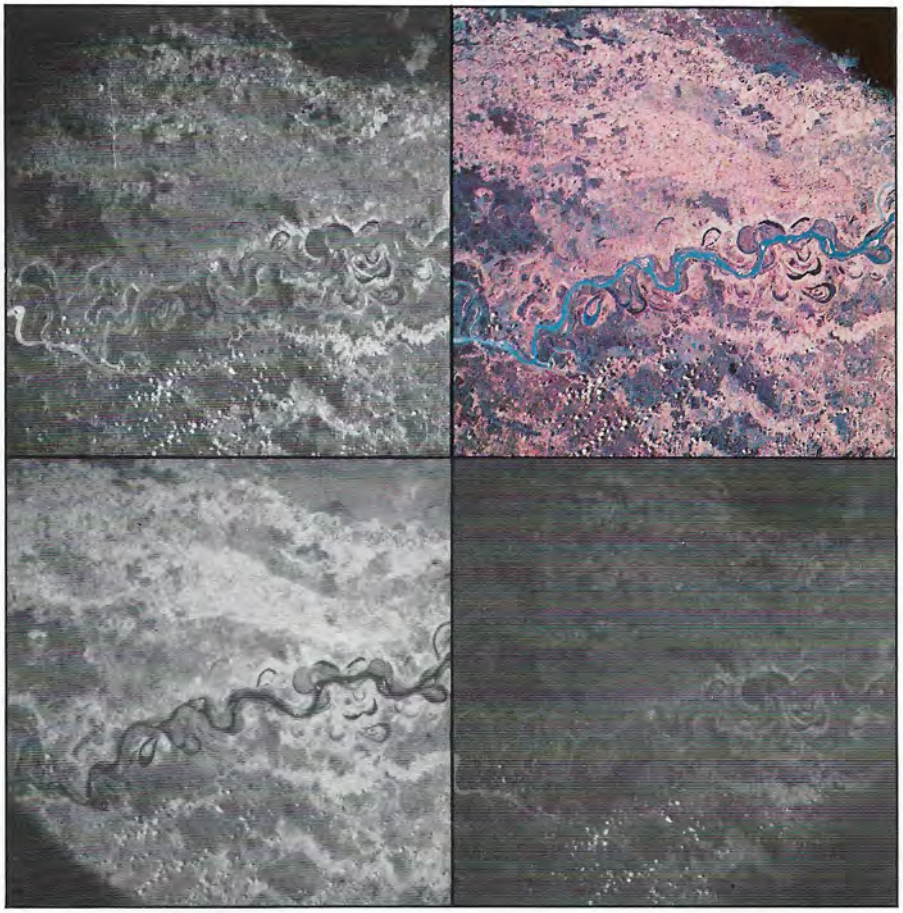
The scientists concerned were mostly interested in the topography of the United States, and by using the timer the astronauts photographed certain areas to allow for a 60 % overlap in





Photo, above: Four shots, taken simultaneously by the Hasselblads in cluster, of the Salton Sea, Lower California. As mentioned in the accompanying article, a lot can be read from these photos. For example, the boundary between USA and Mexico can be seen because of the huge, cultivated area on the USA side; that area is shown in red on the infra-red color film.

Photo, below: The four Hasselblad 500EL cameras mounted in a cluster at the spacecraft window and ready for simultaneous exposing.



the photographs. The pictures were highly satisfactory and photo-readers could extract a lot of interesting facts; such as the affected areas in healthy forests, different forms of water pollution, marine conditions at and below the water level, and so on.

It is believed that interest in this field of photography will grow strongly, not only for the kind of investigations mentioned above, but also for subjects like geology, mineralogy, agriculture, forestry research, meteorology and studies connected with water-and-air pollution.

These pictures taken by the Hasselblads in cluster show the Mississippi meandering through the richly productive land of the American South Middle-west.

HASSELBLAD 500EL DATA CAMERA

—with the Reseau plate

As mentioned in another article in this issue, the camera equipment of the Apollo XI consisted of three Hasselblad 500EL cameras of which one was the specially equipped Hasselblad 500EL Data Camera. The latter was used for the first time in space on the Apollo XI flight, and it was left behind on the moon with one other Hasselblad 500EL camera.

The Hasselblad 500EL Data Camera has

The Hasselblad equipment carried on the Apollo XI flight. At left and center, respectively, the Hasselblad 500EL Data Camera and Hasselblad 500EL. These two cameras were carried on the lunar module, Eagle, and then left behind on the moon. At right, the Hasselblad 500EL camera and the Sonnar 250 lens which were on the command module.

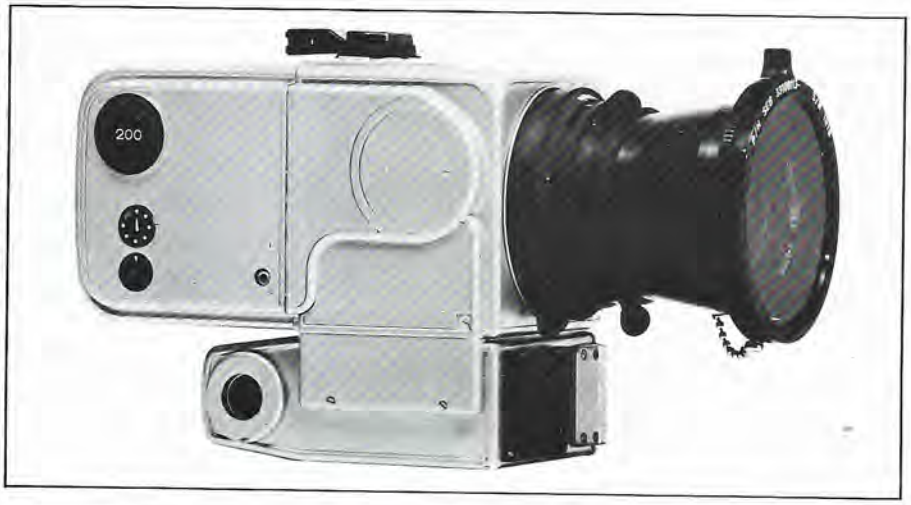
the same basic framework as the other 500EL space cameras; but in addition to the modifications made on the usual 500EL standard cameras, when used for space purposes, the Data Camera had been fitted with a Reseau plate and a new Zeiss lens, the Biogon f. 5.6/60 mm. So as to produce absolutely undistorted results, the lens was specially fitted into the camera, and measurements were very carefully calibrated. The lens was designed by Zeiss for use on space flights, but will also be sold commercially as it can be highly useful in other fields of photography. On the Apollo XI flight, the lens was fitted with a polarizing filter which could be easily detached.

The Data Camera was colored silver for the flight to keep its internal temperature more constant against the violent extremes of heat and cold encountered on the moon. The magazine of the camera was fitted with a tether ring, to which a cord was attached when the camera was lowered by one astronaut from the lunar module to his companion standing on the lunar surface. The exposed magazines were hoisted the same way. The Reseau plate is made of glass. It is attached to the back of the camera body extremely close to the film plane. The plate is engraved with a number of crosses to form a grid, and the intersections are accurately calibrated to a tolerance of 0.002 mm. The crosses are recorded on every exposed frame. From these markings, it is possible to determine distance and heights in shots taken either from the ground or in the air. When film is wound in a camera, static electricity is generated on the film surface. Normally, this electricity is dispersed by the metal rims and rollers that guide the film, and by the humidity of the air. In the camera fitted with the Reseau plate, however, the film is guided by the raised edges of the Reseau plate. As glass is a non-conductor, the electric charge built up at the glass surface can become so heavy that sparks occur between plate and film, especially if the camera is used where the air is without moisture, or in vacuum.

Sparks cause unpleasant patterns to appear on the film, and they can also be a hazard if the camera is used in an atmosphere of pure oxygen. To conduct the static electricity from the Reseau plate, the side of the plate facing the film is coated with an extremely thin conductive layer which is led to the metallic parts of the camera body by two contact springs. Contact is effected by two projecting silver deposits on the conductive layer.

The Reseau plate, or register glass, as such, is not a new development in photography. What is most remarkable, however, is that the group of the Hasselblad staff working on NASA camera projects in collaboration with Carl Zeiss has been successful in applying the idea to a small camera, like the Hasselblad 500EL Data Camera. This camera, naturally, is not only useful in space photography; it is particularly suitable for all kinds of aerial photography.

The special cameras produced in the past for aerial photography were large and intended for a large negative-format. This frequently meant high prices. The Hasselblad 500EL Data Camera with Reseau plate is a small and comparatively low-cost camera which gives satisfactory results in aerial photographic work.



The Hasselblad 500EL Data Camera, fitted with the new Zeiss Biogon f. 5.6/60 mm lens to which is attached the polarizing filter. The appearance and positioning of the Reseau plate at the back of the camera body of the Hasselblad 500EL Data Camera. When the magazine is attached, the film is in immediate proximity to the Reseau plate.

The Hasselblad magazine for 70 mm double-perforated film, modified to take 160 color shots or 200 black-white photographs on the thin base, thin emulsion film produced by Kodak specially for NASA. Note the tether ring at the back of the magazine; a cord is attached to it to lower the magazine from and raise it into the lunar module when the astronauts photograph on the moon.

At right: While Russell Schweickart was being photographed by David Scott, Schweickart himself took a shot of Scott with his Hasselblad SWC and standing on "front porch" of the Spider during the Apollo IX flight in March 1969.

Back cover: The Hasselblad 500EL Data Camera which was left behind on the moon after the Apollo XI flight, July 1969.

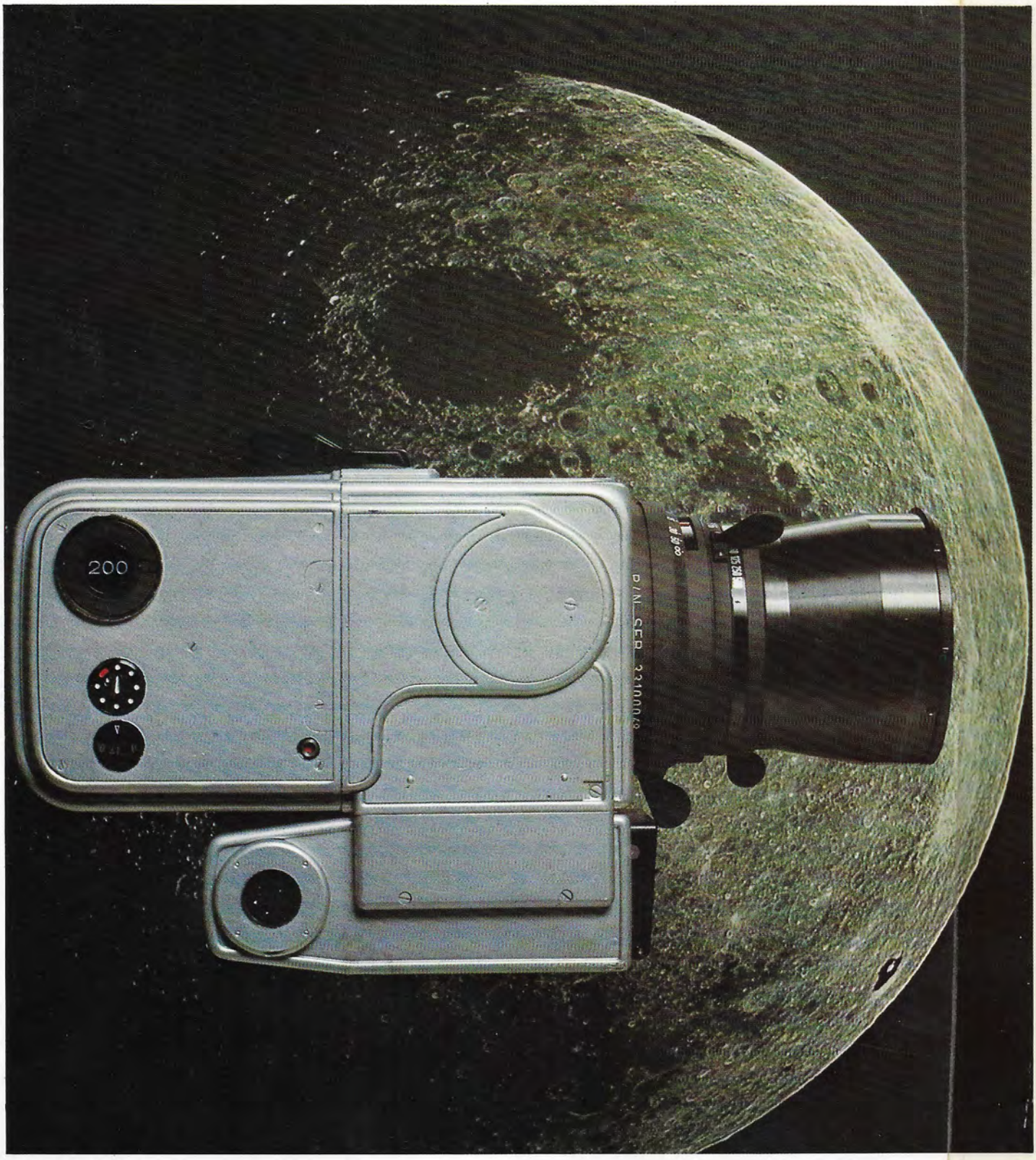


Photo: Bo Timback

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