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# PHOTOGRAPHY

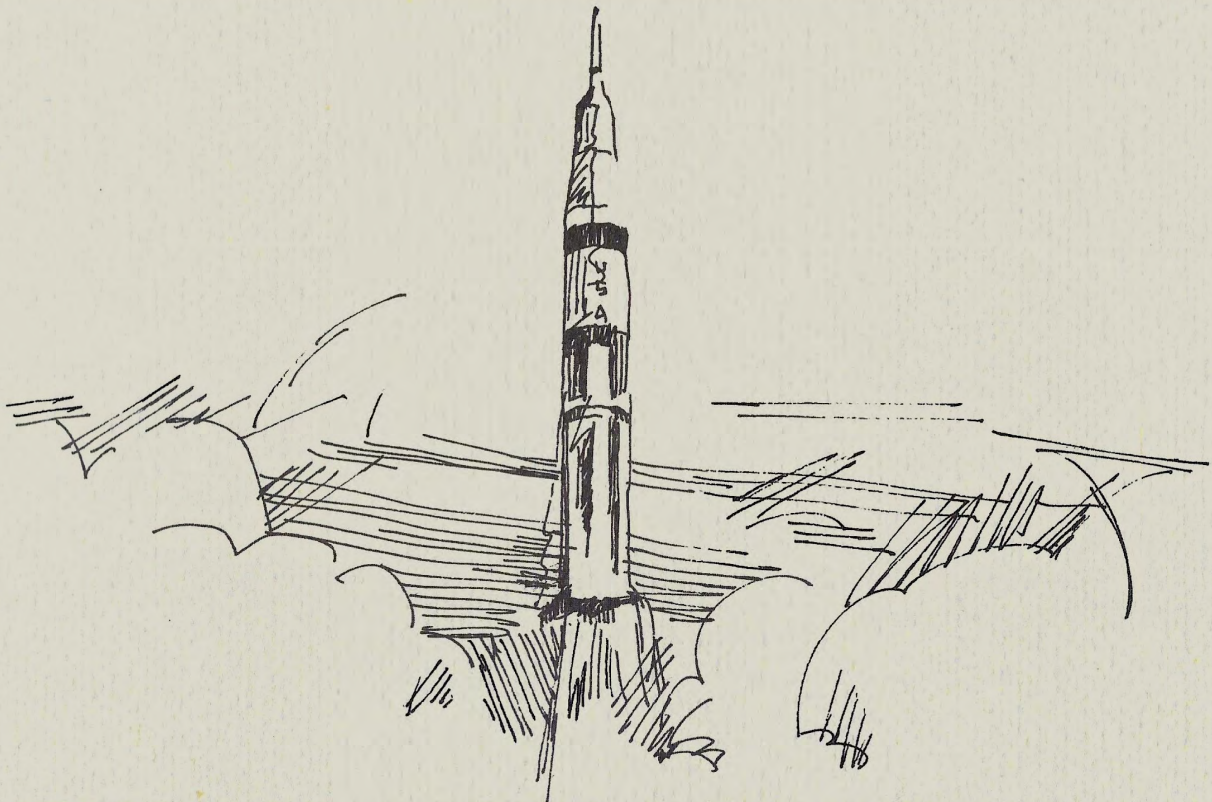
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## VITAL TOOL IN REACHING THE MOON

Unlike the discovery of the New World or the early exploration of some of the most remote corners of the earth, every step of man's dramatic trek to the moon has been recorded for all to see. Millions of photographs—including thousands taken from beyond the reaches of earth's atmosphere—helped pave the way for the historic flight of Apollo 11. And when, on 20 July 1969, astronauts Neil Armstrong and Edwin Aldrin stepped on the lunar surface, the event was captured forever by the memory cell of photography. This series of 12 pictures portrays a few of the photographic highlights along the United States' path to the moon.

As man continues his unending conquest of space and knowledge, of one thing we can be sure: the camera will not only go with him; it will precede him.

A Kodak exhibit (all photographs courtesy of U.S. National Aeronautics and Space Administration)



This exhibit is designed to illustrate some of the photographic highlights along the United States' path to the moon. The vital role of photography in this momentous undertaking is told through a dozen breathtaking pictures.

In terms of the overall story of photography's role, however, this exhibit illustrates only a few of the most spectacular uses. Many of the greatest contributions of photography have been far more mundane—like reproducing millions of engineering drawings . . . micro-filming tons of records for easy and rapid access . . . radiographing thousands of parts of the rockets and spacecraft to make sure they were sturdily and properly made . . . recording the results of tests of every kind . . . and teaching thousands of workers jobs they had never done before.

Each of the Apollo launches was photographed simultaneously by more than 200 official cameras, not counting those of the press and spectators. The vast majority of these cameras contained color film. How else but through photography could the blinding blast of the rocket engines, for example, be analyzed close up and in slow motion?

Equally important, many miles of special photographic paper were used in oscillographs to give telemetry data promptly to engineers—so they could watch, moment by moment, the temperature, pressure, velocity, acceleration, and vibration of the spacecraft during launch and flight.

Today, upon the moon, rests a coin-size silicon disc containing messages from the leaders of 74 countries on earth. The disc, left on the moon by the Apollo 11 astronauts, is also a product of photography. Each message, whether handwritten or typed, was reduced 200 times to a size much smaller than the head of a pin onto Kodak high resolution plates. The messages were then etched on the disc by a process employing a Kodak photosensitive resist.

To complete the cycle, this entire exhibit is a result of photography. The printing plates—like all lithographic plates—were produced photographically. And the text was done by phototypesetting.

We hope this exhibit will suggest the indispensable contributions of photography—not only in reaching the moon—but in virtually every great undertaking of man.



24 March 1965 Television recording on 35mm Eastman television recording film.

## Ranger...A "Smashing" Success

The United States' first photographs from the moon came on 31 July 1964, when Ranger 7 sent spectacular pictures back to earth before plunging into the lunar surface. The flights of Ranger 8 and 9 followed early in 1965. In all, 17,000 Ranger pictures were radioed back to earth and projected on a cathode-ray tube, which was photographed for the world to see and study. The photos were vastly more detailed than any previously seen of the moon. Some showed features as small as 10 inches.

Ridges and rills in the crater Alphonsus stand out in this Ranger 9 photo, taken from an altitude of about 265 miles some three minutes before impact. The area viewed is roughly 110 miles square. At left is Mare Nubrium.





15 December 1965 Photo on 70mm Kodak Ektachrome MS film.

## Gemini . . . Rendezvous in Space

Less than a month after Yuri Gagarin's trail-blazing orbit of the earth in Russia's Vostok I on 12 April 1961, Alan Shepard made the United States' first manned space flight—a suborbital one—to begin the Mercury series. During the next two years there were five more Mercury flights, including four that orbited the earth. Then between March, 1965, and November, 1966, came ten Gemini flights.

Valuable photographs were taken on each of these Mercury and Gemini flights—including unforgettable motion pictures of the space walk of Edward White on 3 June 1965. Another historic moment was captured in the above photograph of Gemini 6 and 7, immortalizing the first rendezvous in space.



Kodak Exhibit 2

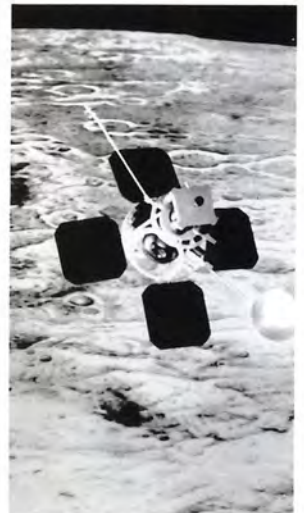


2 June 1967 Photo taken above moon on 70mm Kodak high definition aerial film and reconstructed on earth on strips of 35mm Eastman television recording film.

## Lunar Orbiter . . . Cartographer Par Excellence

It is said that the 1,600 photographs returned from the five Lunar Orbiters between August, 1966, and September, 1967, will stand as the definitive source of lunar surface information for many years. The Lunar Orbiters examined a variety of potential sites for manned landings and mapped 96 percent of the lunar surface, including much of the far side. The spacecraft contained a completely automatic photographic laboratory made by Kodak.

Shown above is an area on the very edge of the near side of the moon. The dark, flat basin at lower left is Mare Orientale. The irregular basin at top and right, at the foot of the Rook Mountains, is Mare Veris. This basin was apparently made by a large meteorite, then partly filled later by dark, volcanic material.



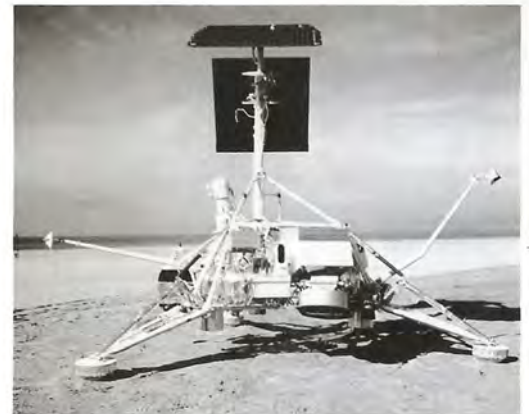


January, 1968 Television recording on 35mm Recordak Dacomatic film.

## Surveyor . . . Robot on the Moon

Between June, 1966, and January, 1968, five Surveyor spacecraft made soft landings on the moon. While they carried out experiments like digging and analyzing lunar soil, their television cameras transmitted over 86,000 pictures, providing important information for future manned landings.

This mosaic of Surveyor 7 photos shows highlands about 18 miles north of the crater Tycho. The large rock in the foreground is two feet across. The rocky crater behind it is five feet wide and some 18 feet from the Surveyor camera. It was formed by the impact of lunar material ejected during a still greater impact elsewhere. About 2,100 feet from Surveyor at upper left is a 200-foot crater. The middle of the horizon is about eight miles away.





19 October 1968 Photo on 70mm Kodak aerial color film.

## Apollo . . . Prospecting from Space

Much new knowledge about the earth has come from the thousands of color photographs taken with Hasselblad cameras by the Gemini and Apollo astronauts. The above Apollo 7 photo, for example, shows—as could never have been seen before—the Great Barrier Reef (right) and Queensland, Australia, including Cape Melville (above) and Cape Flattery (below). The white area at left is not cloud cover but smoke from forest fires. This photograph has been of particular interest to those involved in oil exploration.

Soon, through photography, man will routinely “prospect from space”—mapping the earth and its resources precisely and continuously.



Kodak Exhibit 5



21 December 1968 Photo on 70mm Kodak Ektachrome MS film.

## Apollo . . . Beholding the Globe

The first human beings ever to see, with their own eyes, the earth as a sphere—much as a child views a globe in his classroom—were the astronauts of Apollo 8 as they sped toward the moon. Through photography, they have shared that breathtaking experience with the world.

The photo above shows nearly the entire Western Hemisphere—from the mouth of the St. Lawrence River, including nearby Newfoundland . . . through Central America . . . across cloud-covered South America to the Andes Mountains and the southwest coast . . . leading to Tierra del Fuego at the southern tip of the continent. Across the Atlantic Ocean, at upper right, is the bulge of west Africa.





22 May 1969 Photo on 70mm Kodak Ektachrome MS film.

## Apollo . . . Dawning of a New Age

Without doubt, few sights in the history of man have been as exhilarating as the first earthrise witnessed by the astronauts of Apollo 8 as they orbited the moon in December, 1968. Fortunately, they were able to capture the sight on color film and share its thrill with the rest of mankind.

The above photo, taken five months later from Apollo 10, shows the earth peering from above the highlands of the lunar far side.

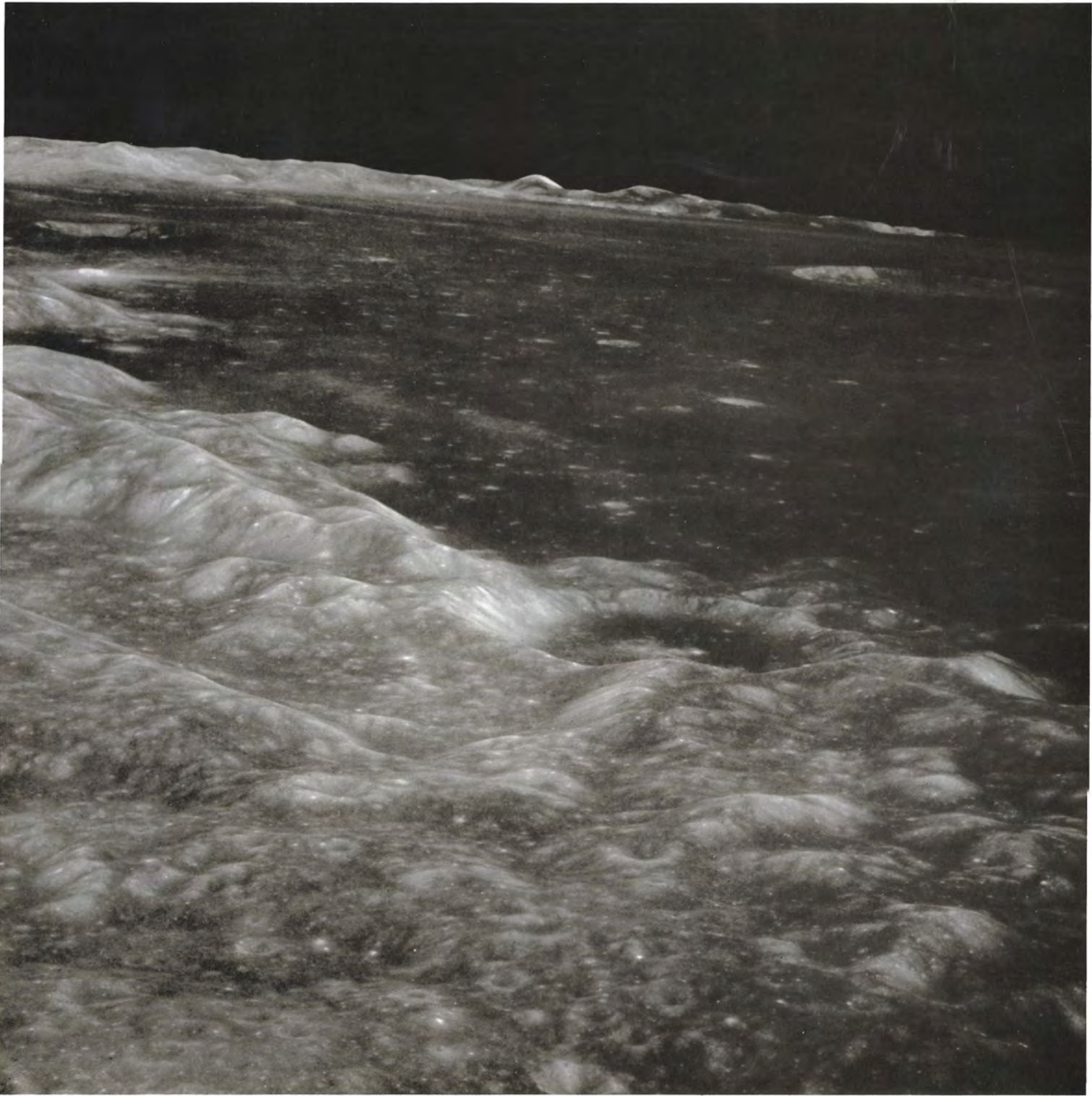


25 December 1968 Photo on 70mm Kodak Ektachrome MS film.

## Apollo . . . Portraying Both Sides

To the astronauts of Apollo 8, “near side” and “far side” of the moon became phrases of significance only to mortals on earth. To the astronauts’ eyes (and to the film in the camera), this is how the moon appeared. Most of the right half of the picture portrays the far side—including two conspicuously bright-rayed craters and, at lower right, the large, dark crater Tsiolkovsky.

At upper center, the circular, dark area is Mare Crisium, which from earth is seen near the eastern edge of the moon. Below and to the left is Mare Fecunditatis, distinguished by the crater Langrenus on its southeastern edge. And at upper left, crossed by the sunlight terminator, is Mare Tranquillitatis, where the Apollo 11 astronauts made their historic landing.



22 May 1969 Photo on 70mm Kodak Panatomic-X aerial film 3400

## Apollo . . . Mapping More of the Moon

Besides giving the Lunar Module its final trial before the lunar-landing flight, Apollo 10 brought back some 1,500 still photographs—including many of the moon's surface that can be viewed in stereo.

Above is one of the more spectacular photographs—depicting Mare Crisium, the large “flat” area near the eastern edge of the moon as seen from earth. In the foreground is the mountainous terrain that forms part of the southern rim of Mare Crisium. Visible near the horizon, 285 miles across the mare, is its northern rim. Prominent at above right in the mare is the 24-mile-wide crater Picard.



6 March 1969 Photo on 70mm Kodak Ektachrome MS film.

## Apollo . . . Taking Photos in Space

While Apollo 9 was orbiting the earth, astronaut Russell Schweickart opened the hatch of the Lunar Module, stepped out on its “porch” wearing a portable life support system on his back, and began taking photographs with a Hasselblad camera. His photographic activity (above) was recorded with another Hasselblad camera, snapped by one of the astronauts in the Command Module.

The flight of Apollo 9 marked the first test of the Lunar Module in space—an eminently successful test, well-documented through photography.



20 July 1969 Photo on 70mm Kodak Ektachrome EF film.

## Apollo . . . Walking on the Moon

As the world, via television, watched astronaut Neil Armstrong step from the ladder of the Lunar Module onto the moon, one of the first things they saw him do was to reach for his camera and immortalize the moment by taking color photos like this.

With historic footprints in the foreground and the window of the Lunar Module showing up as bright blue in the background, this picture shows astronaut Edwin Aldrin at work. He is setting up a device which for over an hour recorded the bombardment of subatomic particles that constitute the "solar wind."



20 July 1969 Photo on 35mm Kodak Ektachrome MS film.

## Apollo . . . Scrutinizing Lunar Soil

Invaluable samples of lunar rocks and soil were brought back by the Apollo 11 astronauts. But, for further clues about the evolution of the moon, scientists wanted—and received—more: close-up photos that showed what the lunar surface was like before it was disturbed. A stereo camera developed by Kodak especially for the Apollo flights made this possible.

The above photograph—half of a stereo pair—shows a portion of the lunar surface approximately three inches square. This clump of powder, with many small, shiny spherical particles, may well have looked much like this for thousands of years.

