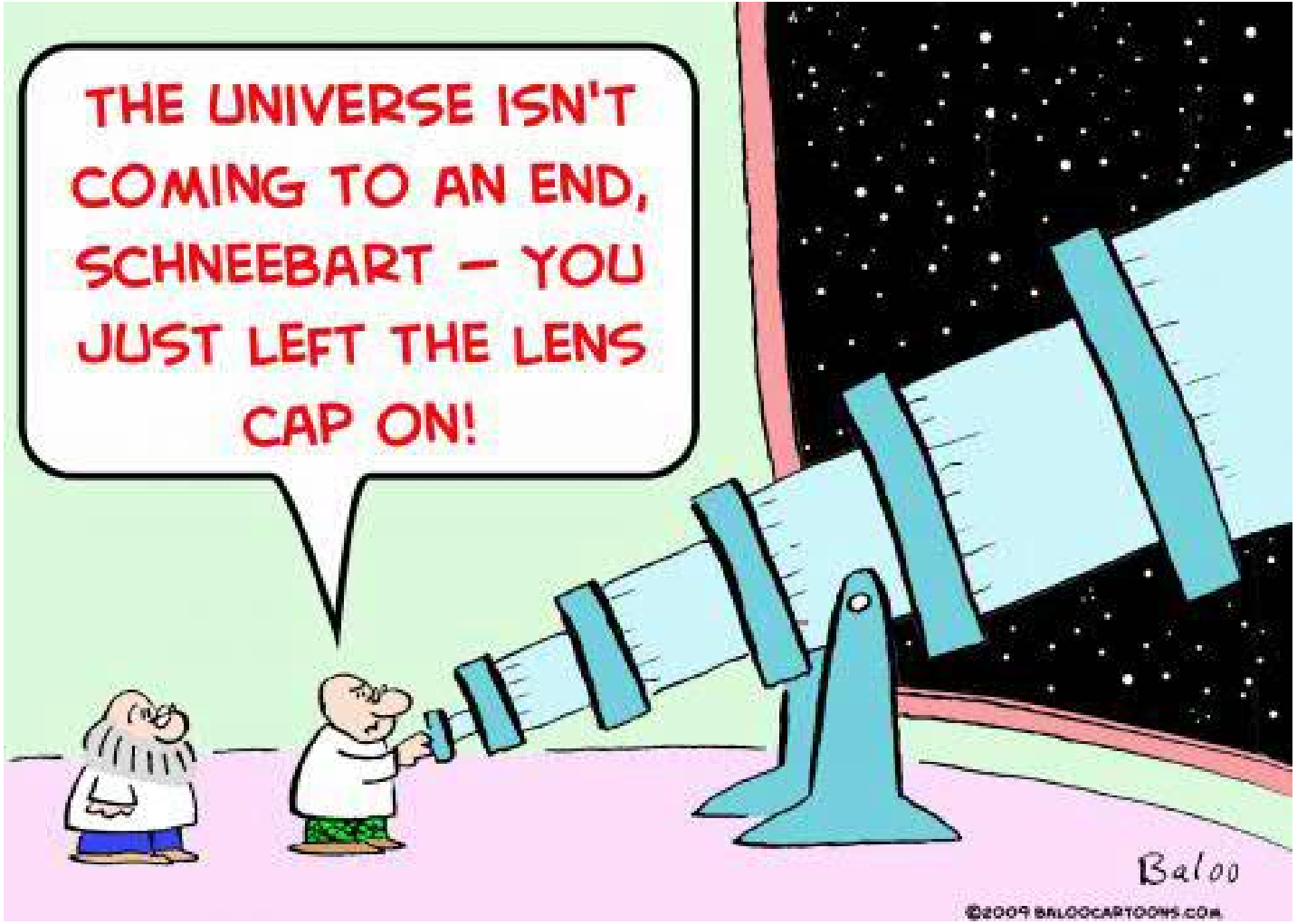
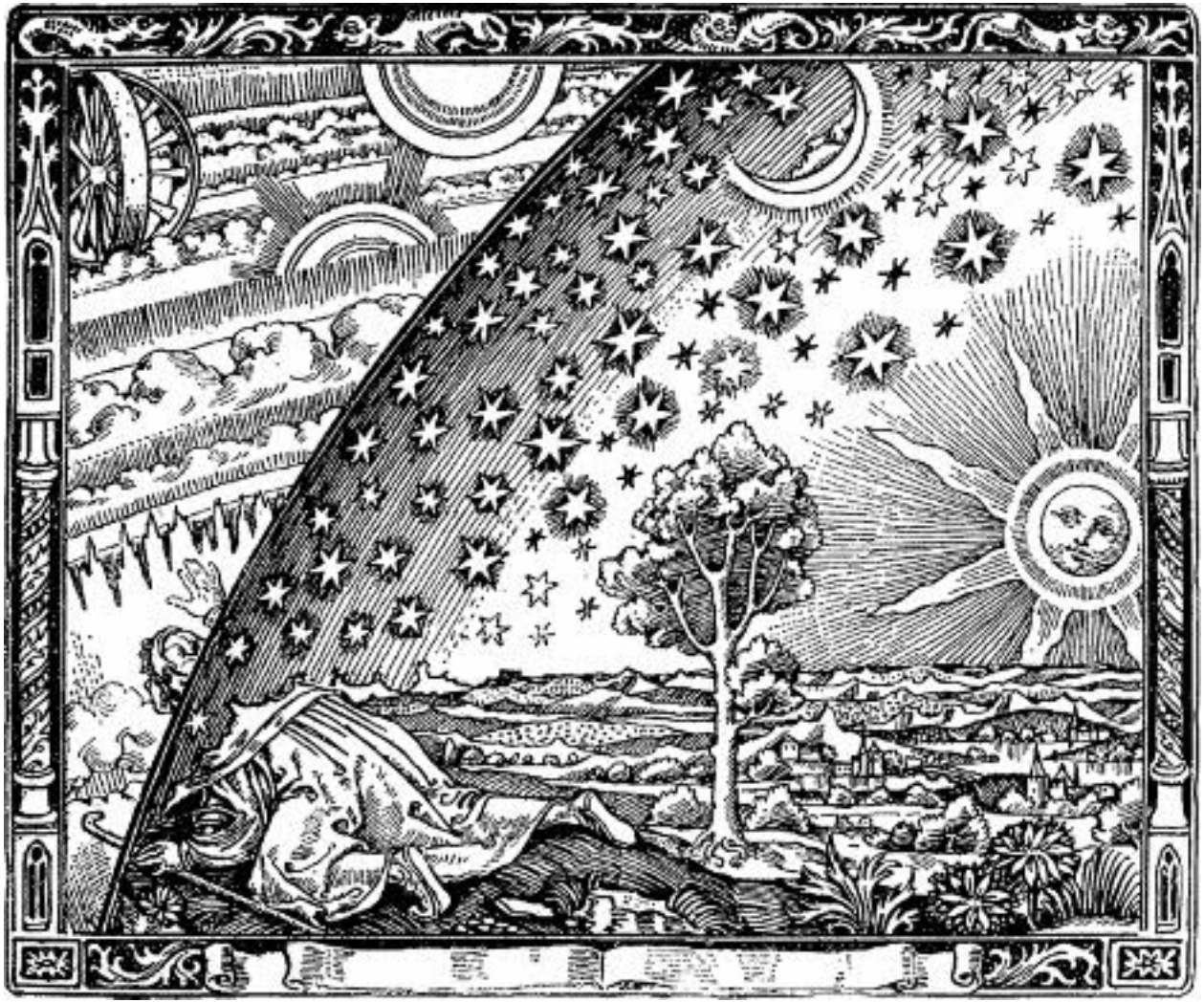

THE UNIVERSE ISN'T COMING TO AN END, SCHNEEBART – YOU JUST LEFT THE LENS CAP ON!
Baloo
©2009 BALOOCARTOONS.COM


Havaintokurssi

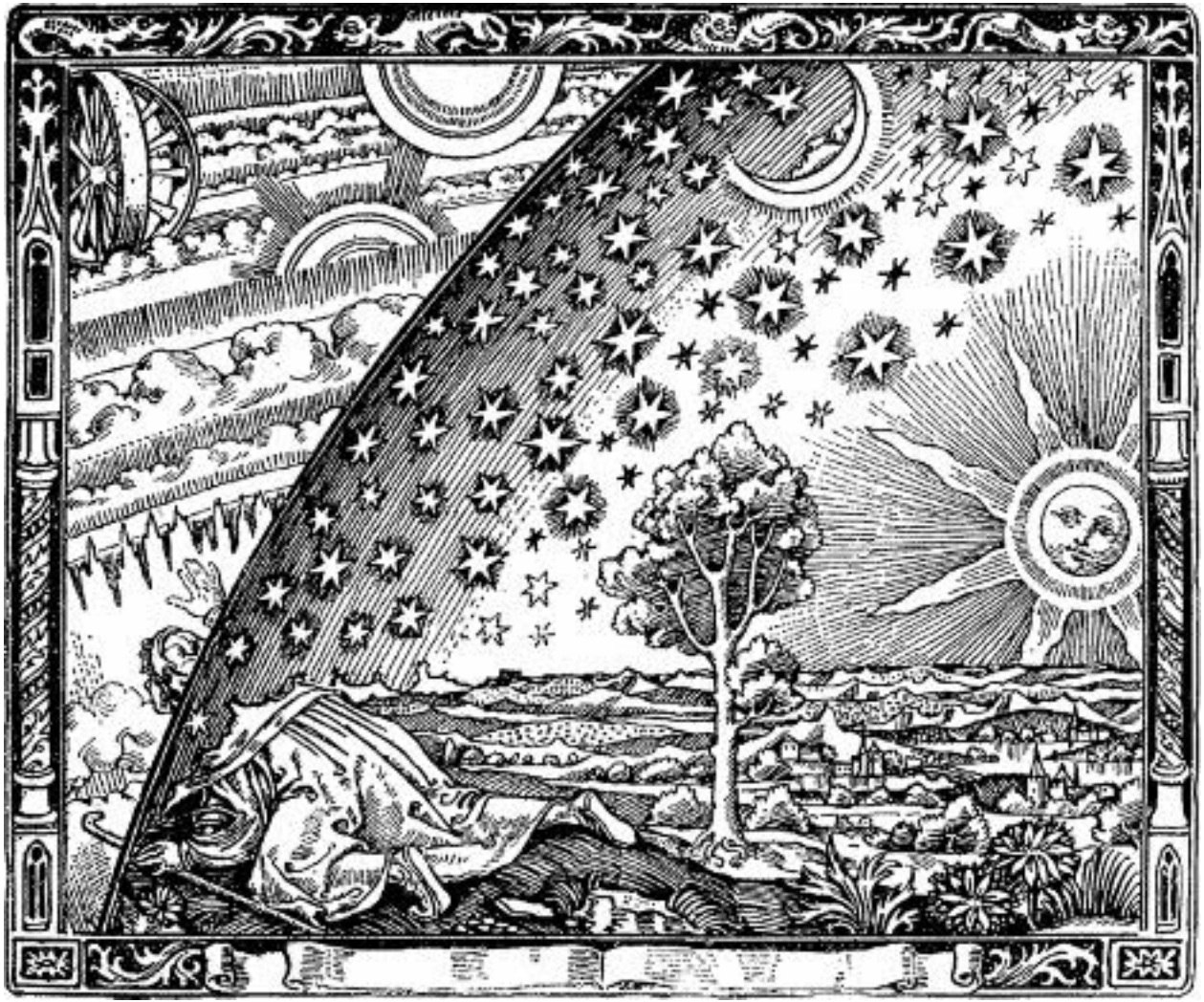


Kamerat Kuussa

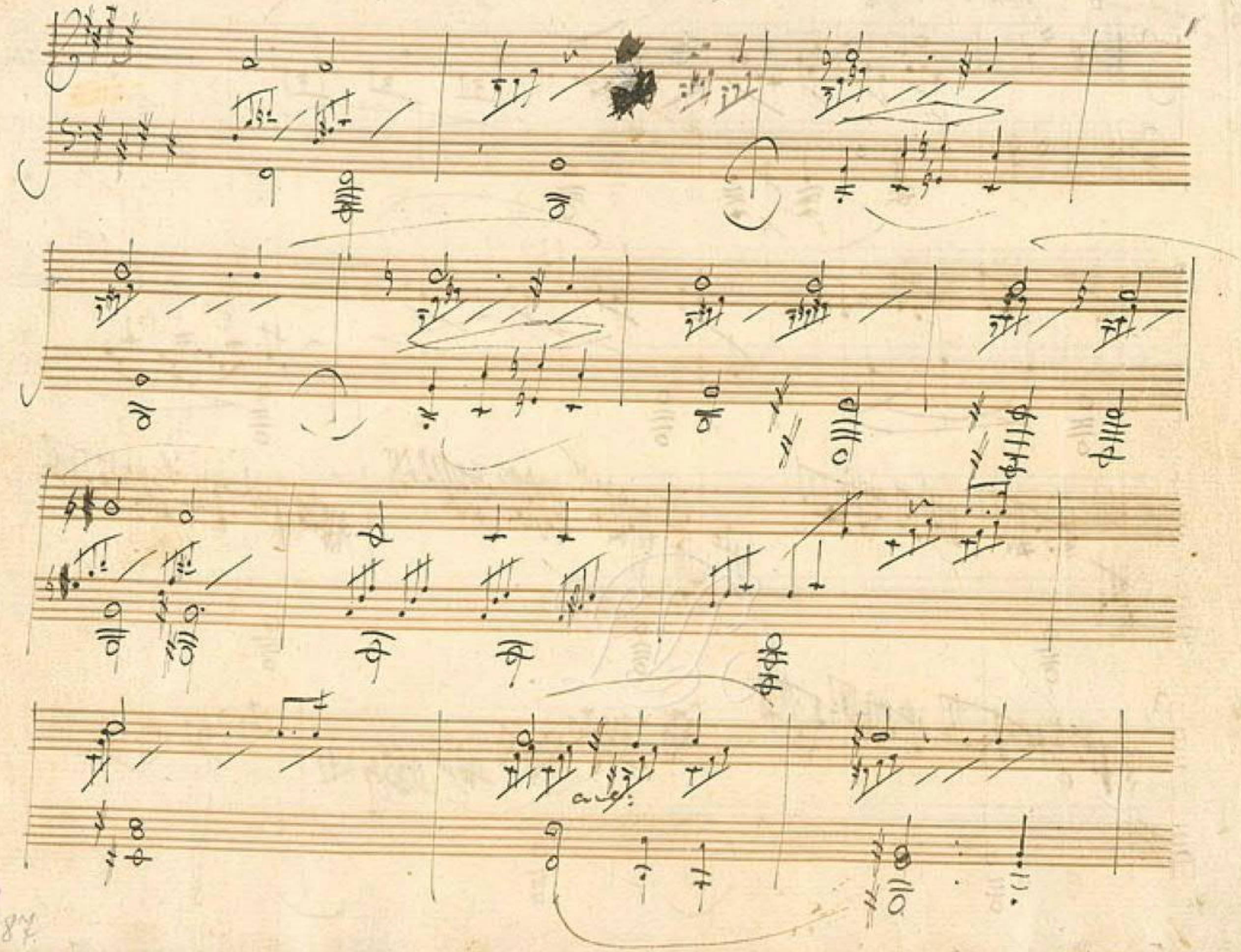
Ursan etäjäsenilta

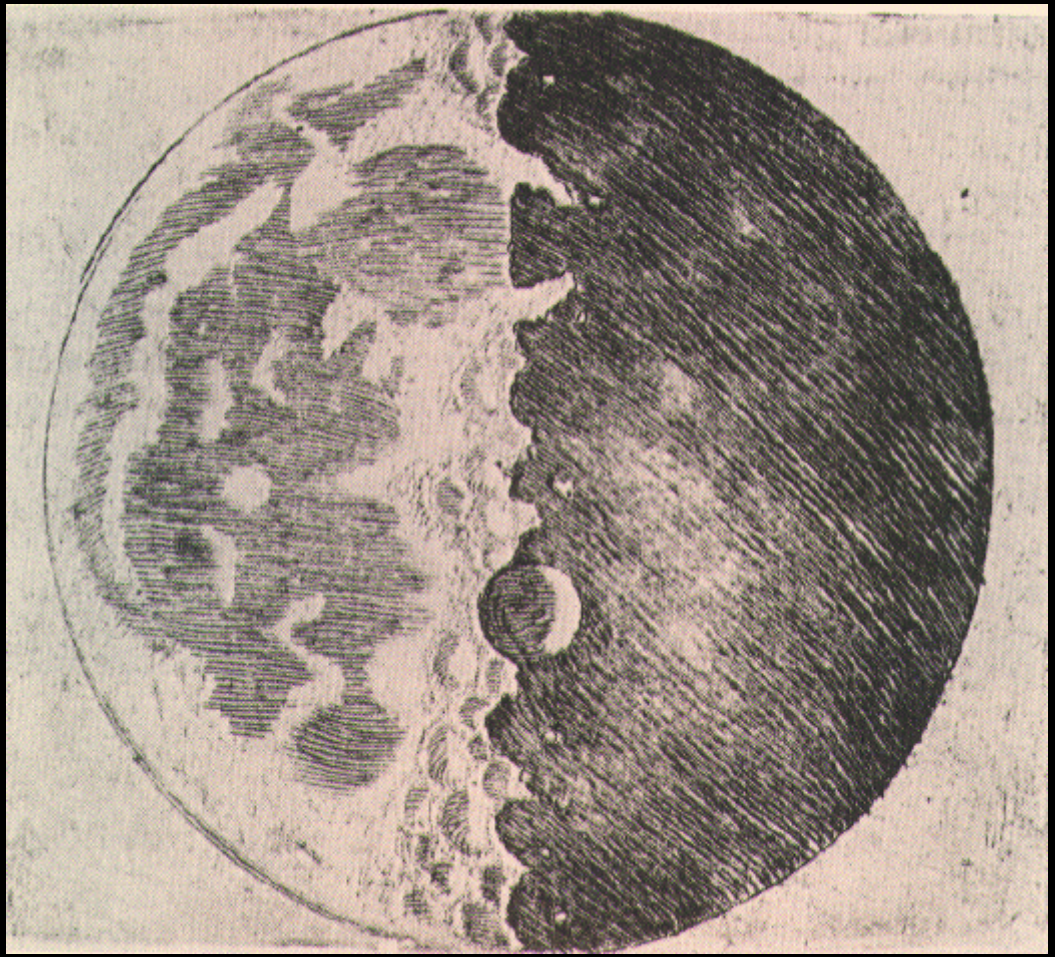
14.4.2021

Hannu Määttänen




James Arthur O'Connor





Galileo Galilei 1609

1647, Selenographia sive lunae descriptio, Johann Hevelius

23. maaliskuuta, 1840, 20 minuutin daguerreotypia Kuusta 5 tuuman peileteleskoopilla

Dr. J. W. Draper, New York


Georges Méliès 1902

1962

We choose to go to the moon. We choose to go to the moon in this decade and do the other things, not because they are easy, but because they are hard, because that goal will serve to organize and measure the best of our energies and skills, because that challenge is one that we are willing to accept, one we are unwilling to postpone, and one which we intend to win, and the others, too.

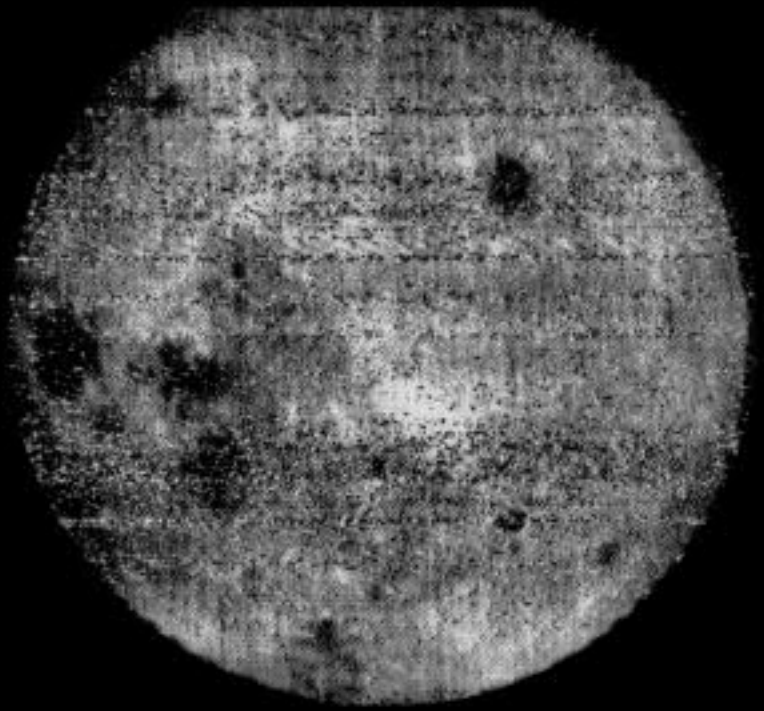
12.9.1962

1959

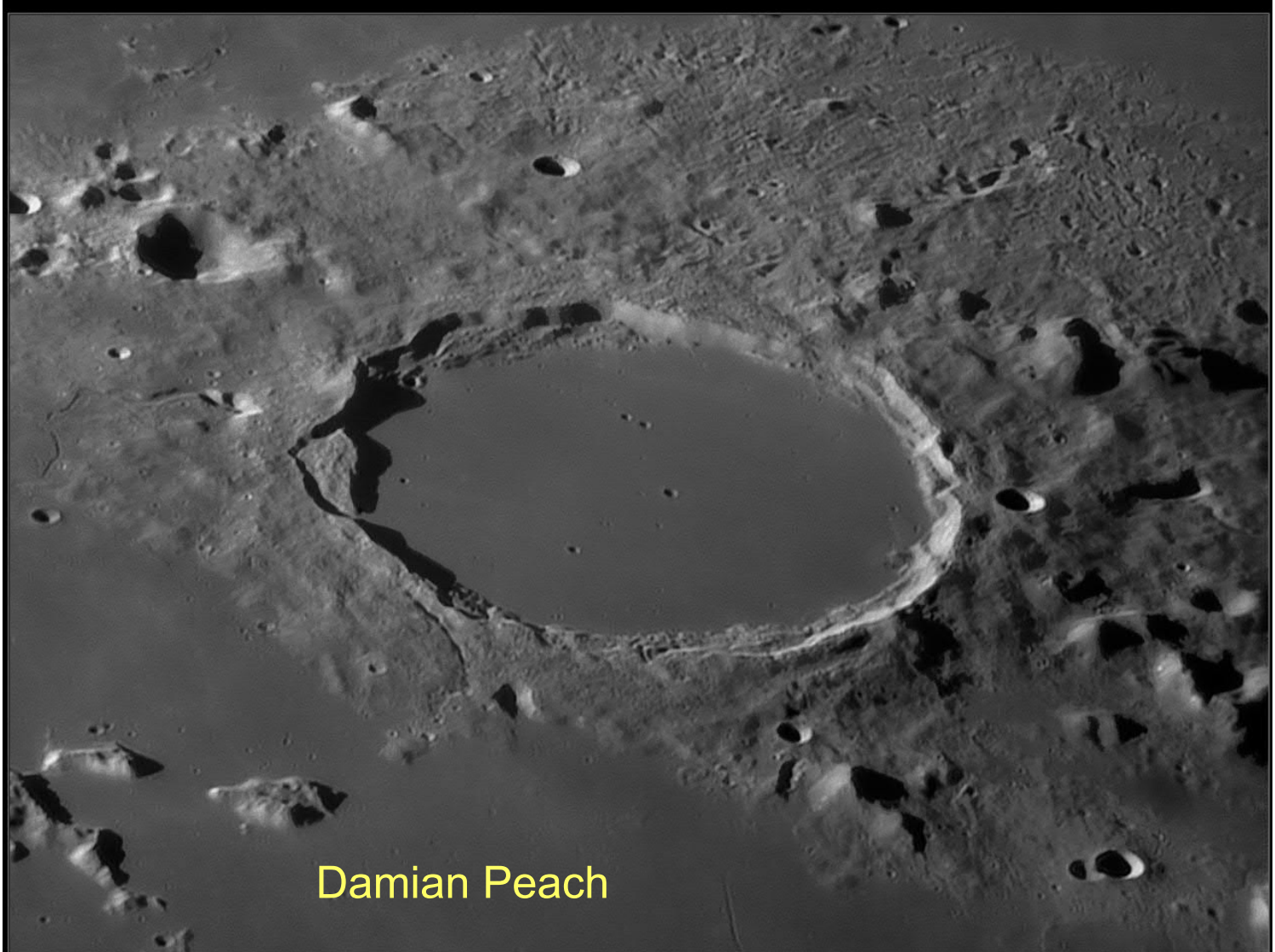
Ensimmäinen kuva Kuun kääntöpuolesta

7.10.1959

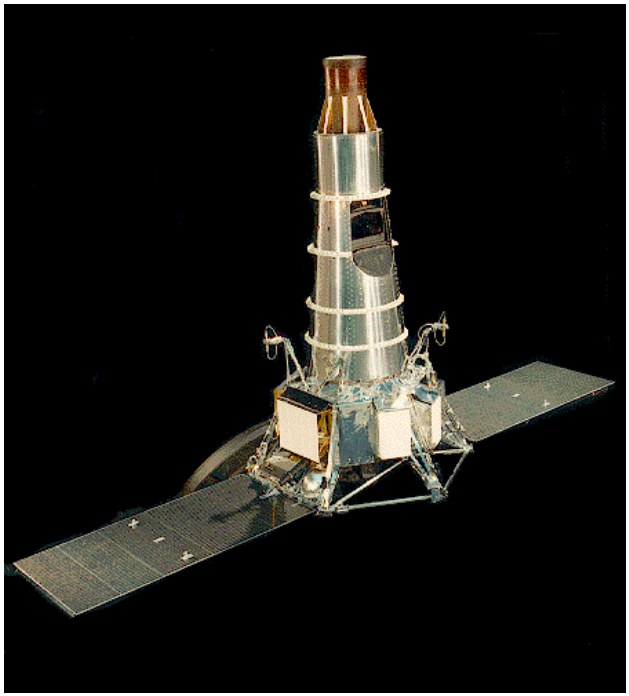
Luna 3



Voiko Kuuhun mennä?


Damian Peach

1962



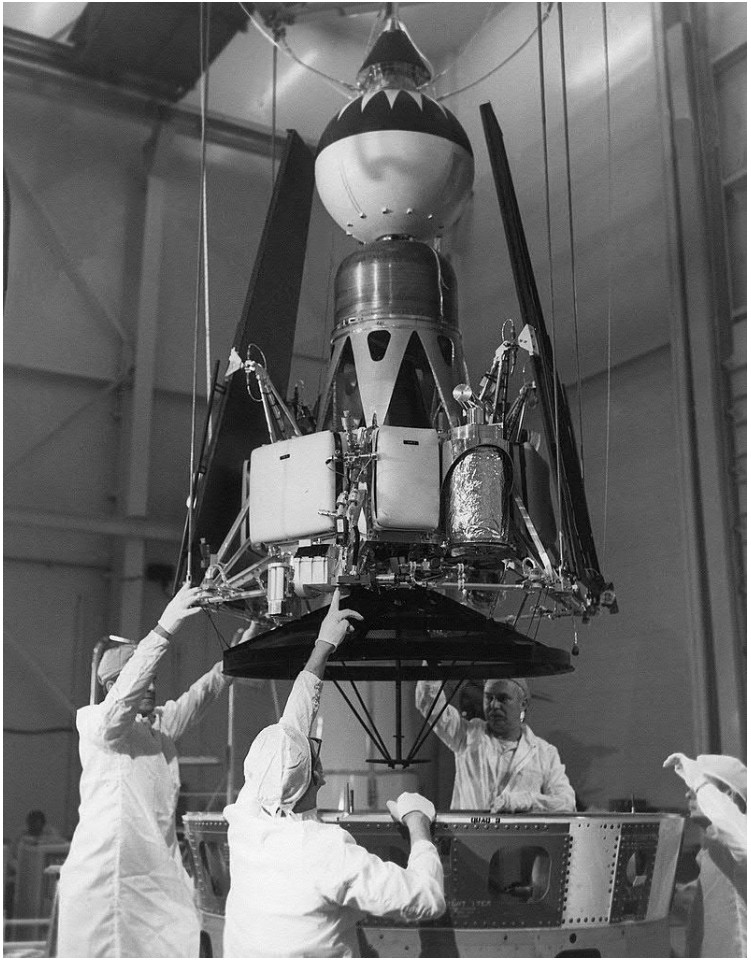
Ranger 3, ohi Kuun

Ranger 4, törmäsi Kuuhun, ei kuvia

Ranger 5, ohi Kuun. Tavoite törmätä Kuuhun 130-150 km/h ja lähettää sieltä dataa

1962

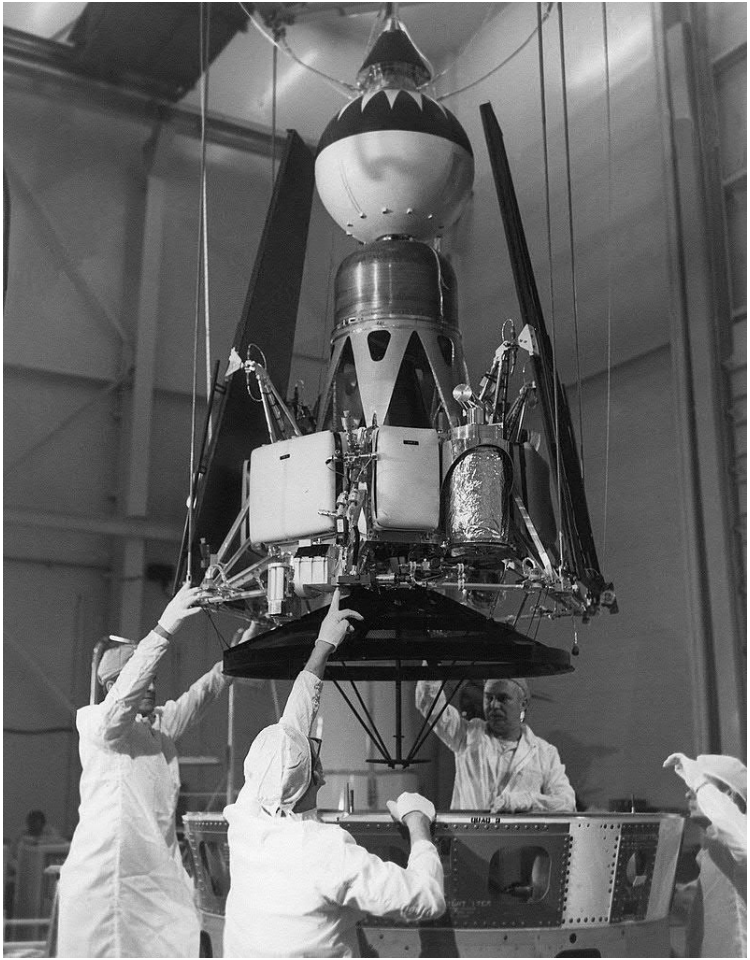
Ranger 4 törmäsi Kuun takapuolelle (229.3 astetta E, 15.5 astetta S) nopeudella 9600 km/h 12.49.53 UT, 26. huhti-kuuta 1962, 64 tunnin lennon jälkeen.



1962

Ranger 4 törmäsi Kuun takapuolelle (229.3 astetta E, 15.5 astetta S) nopeudella 9600 km/h 12.49.53 UT, 26. huhti-kuuta 1962, 64 tunnin lennon jälkeen.

Ensimmäinen kamera Kuussa



1964

Ranger 7

Ensimmäinen kuva
31.7.1964
13.08.45 UT

Ranger VII

Kaikkiaan kuusi kameraa

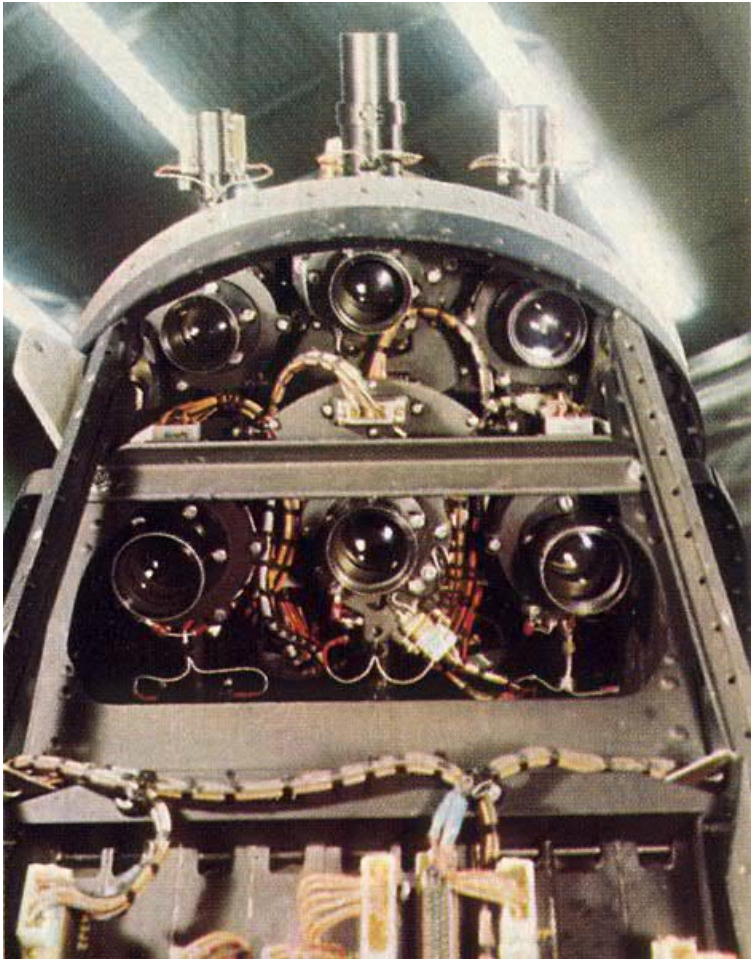
Kolme kameraa f/1, polttoväli 25 mm.

Kolme kameraa f/2, polttoväli 76 mm

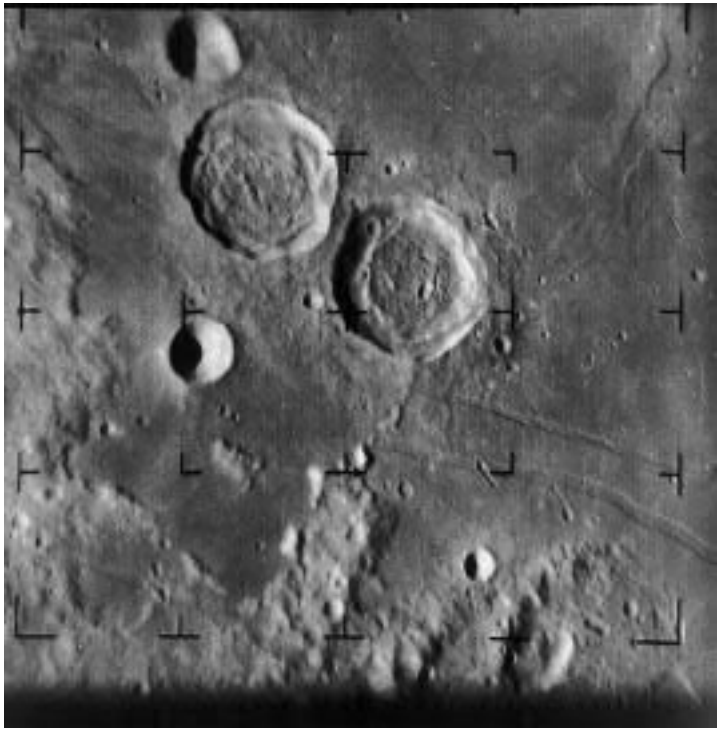
Kaksi kameraa kuvasi koko kennon alaa, jolloin

Kuva-ala 25x25º ja 8,4x8,4º

Neljä kameraa käytti vain osaa kennosta. Kamerat suunnattu hieman eri suuntiin.

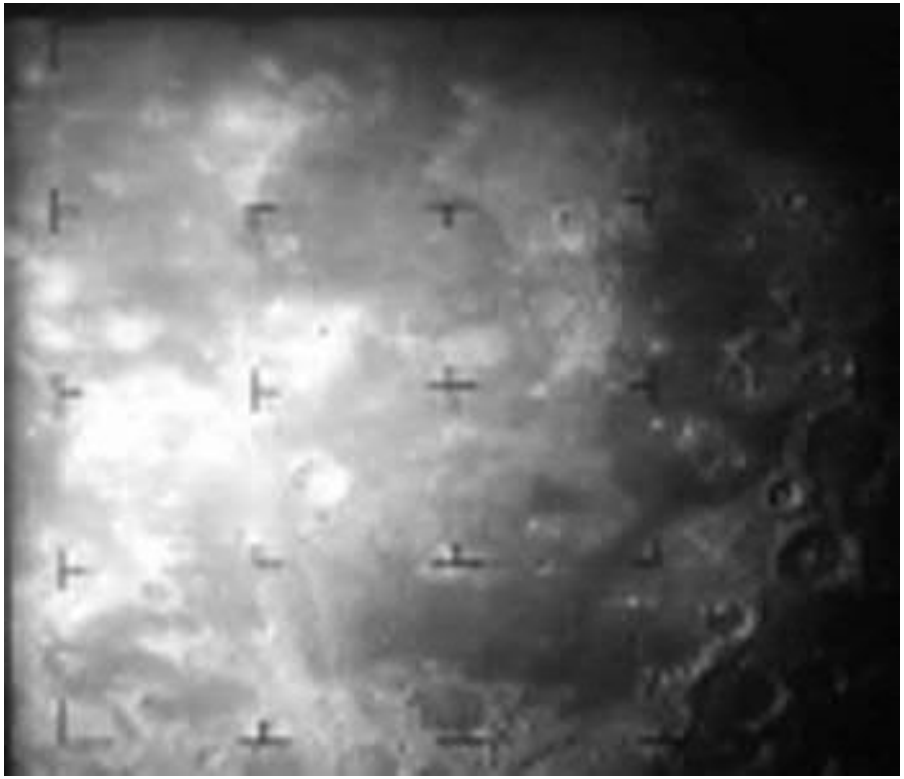


1965



Ranger 8 image of the Moon from 302 km. The image was taken on 20 February 1965 and 9:55 UT, two and a half minutes before the spacecraft impacted on the lunar surface. The two large craters at upper center are Ritter (above left) and Sabine, each about 30 km in diameter. The Apollo 11 landing site is just off the right edge of the image at about 4:00. The image is about 130 km across and north is up. (Ranger 8, A030)

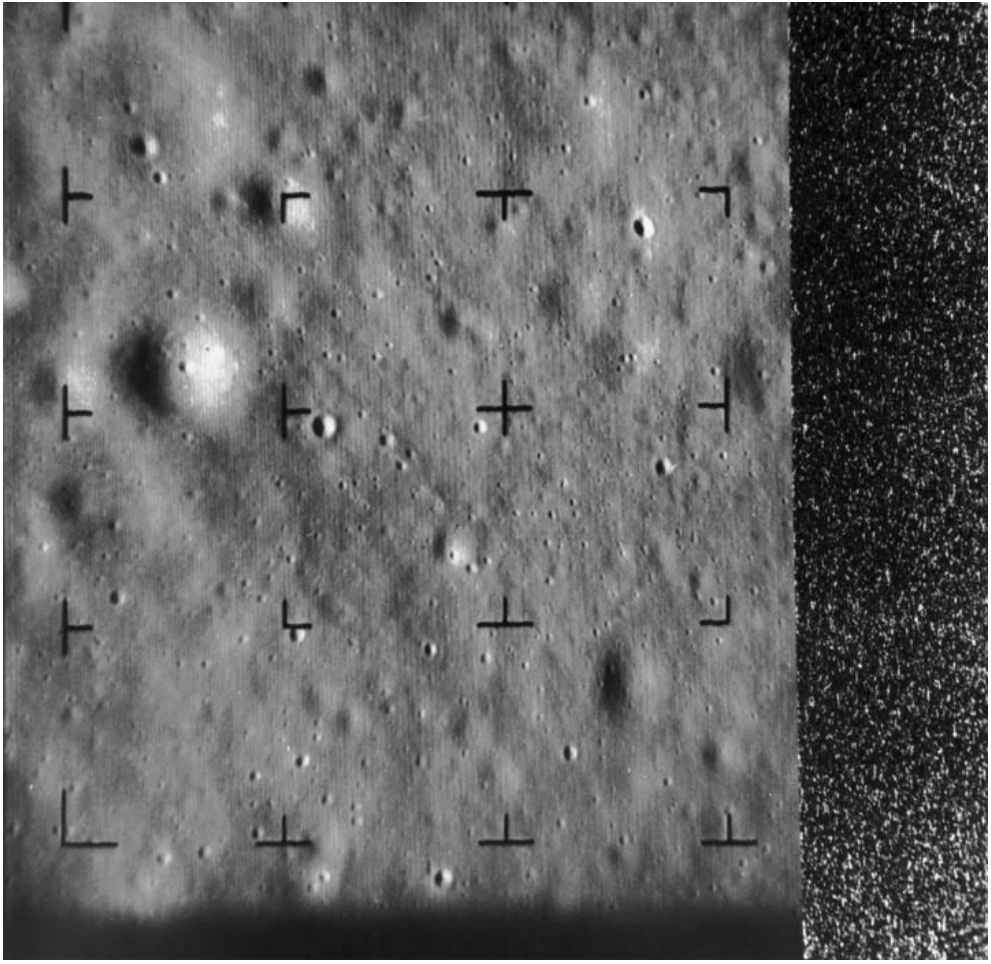
1965



Ranger 9

24.3.1965

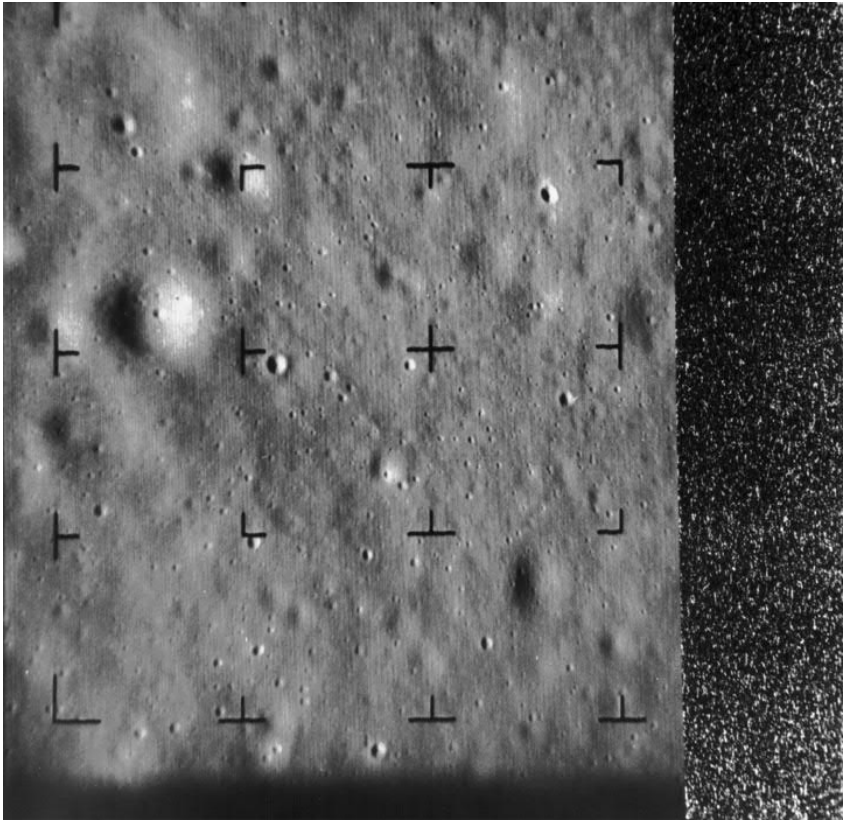
1965



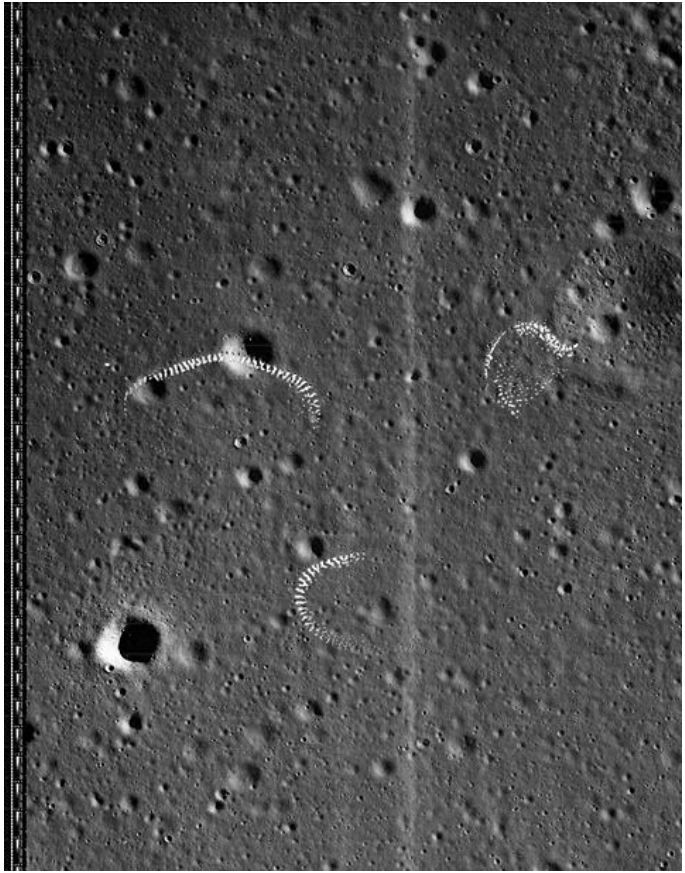
Last image taken by Ranger 8 camera-A from a distance of 4.2 km, 2 seconds before impact on 20 February 1965. The area shown is at 2.7 N, 24.55 E and the image is about 1.4 km across. The right side of the image is missing because Ranger 8 crashed before completing transmission. This area is about 60 km from the Apollo 11 landing site in the Sea of Tranquillity. These Ranger close-ups showed for the first time that even areas on the Moon which looked smooth from Earth were peppered with small impact craters. North is up. (Ranger 8, A060)

1965

The first third of the photographs taken with the 76-mm focal length cameras appear to match closely the resolution of the best photographs of the Moon previously obtained with Earth-based telescopes. The first two-thirds of the pictures taken with the three 25-mm focal length cameras have a resolution somewhat inferior to the best Earth-based photography.



Orbiter 1966 - 1967



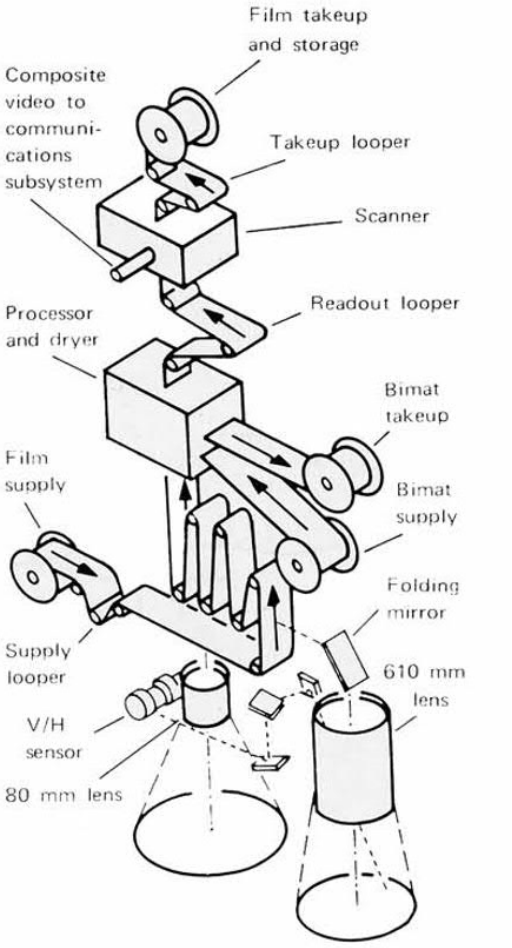
Viisi luotainta, kaikki onnistuivat.

99 % Kuusta kuvattiin 60 m:n tarkkuudella, mahdolliset laskeutumisalueet 20 ja 2 m:n tarkkuudella.

70 mm filmi, polttovälit 610 ja 80 mm.

Orbiter 4 ja 5 polaariradoilla, ensimmäiset pienillä inklinaatioilla.

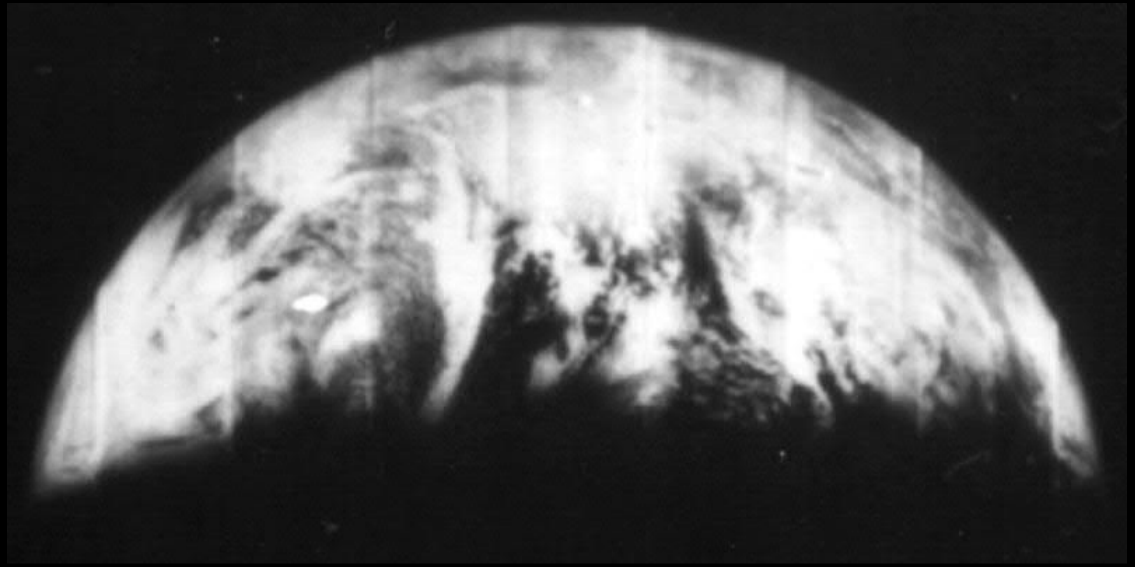
Orbiter 1966 - 1967



Yhteensä 2180 suuren resoluution kuvaan ja 882 pienen.

Filminä Kodak SO-243

Orbiter 1, 2 ja 3 Kuun kääntöpuolella



Surveyor 1966 - 1968

7 lentoa, joista 5 onnistui

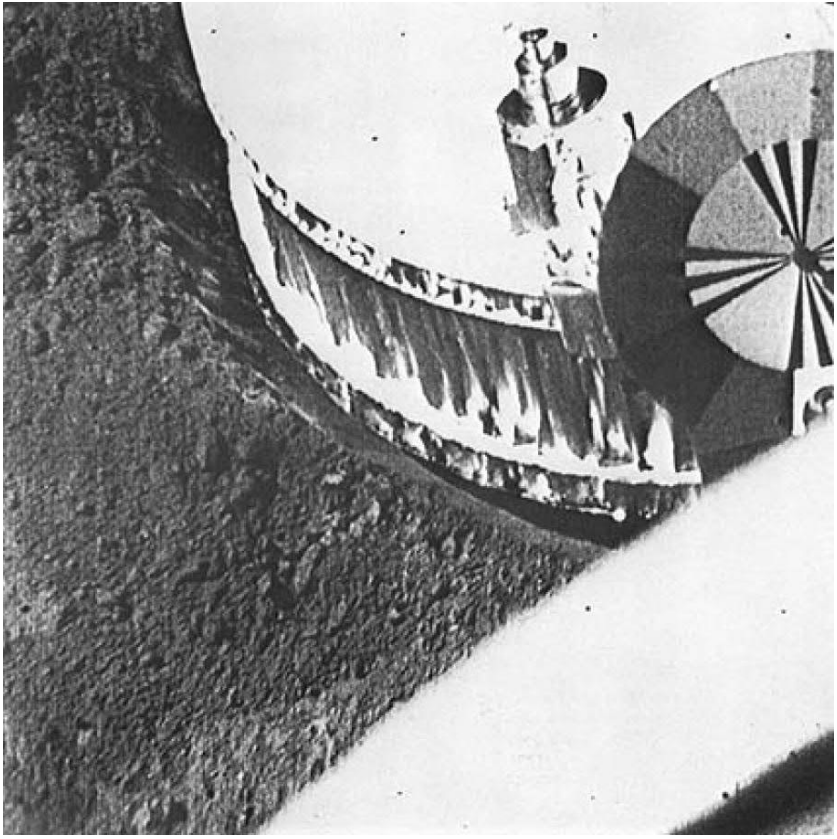
Suora lento, n. 65 tuntia

Ensimmäinen 30. huhtikuu 1966

Viimeinen 7. tammikuu 1968

n. 300 kg

Surveyor 1966 - 1968

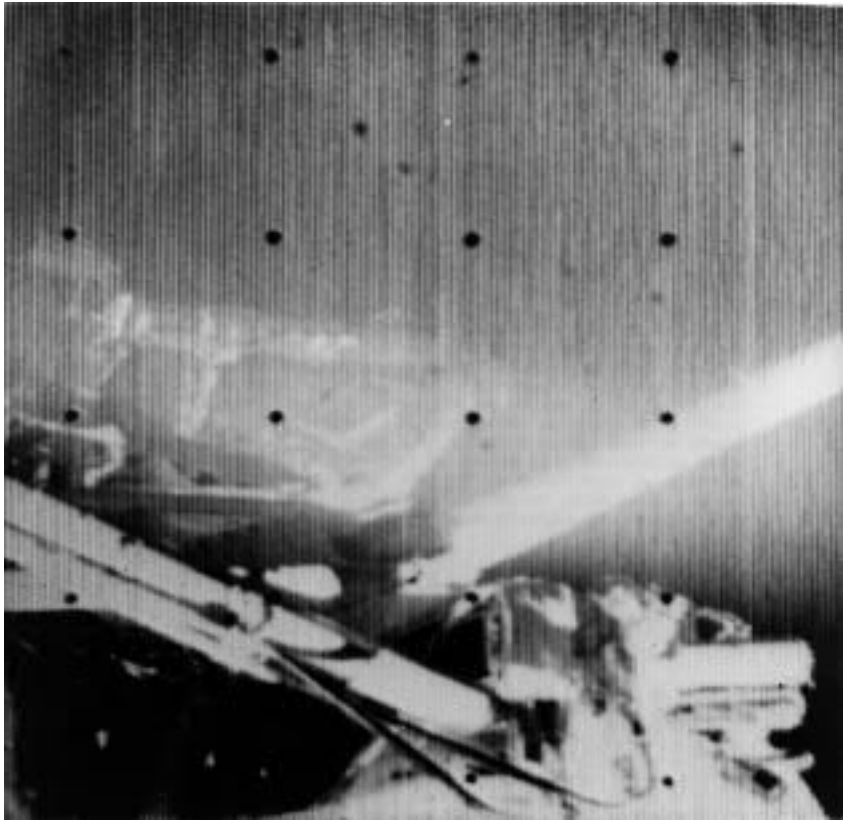


Kameraa ohjattiin maasta.

Luotain kuvasi ensin oman jalkansa.

Normaaliresoluutio 600-linjainen. Lähetykseen käytettiin suunta-antennia 220 kHz:n kaistalla, jolloin kuvia saatiin 3,6 sekunnin välein.

Surveyor 1966 - 1968



Vidiconkameran kuva-ala 11x11 mm.

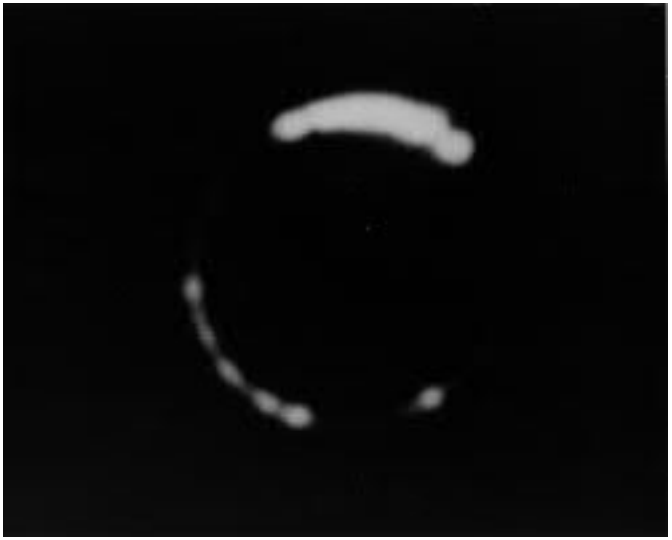
Käytössä polttovälit 25 ja 100 mm.

Vieressä 200-linjan resoluutiolla lähetetty kuva.

200-linjaisen kuvan lähetys kesti 20 sekuntia 1.2 kHz:n kaistalla.

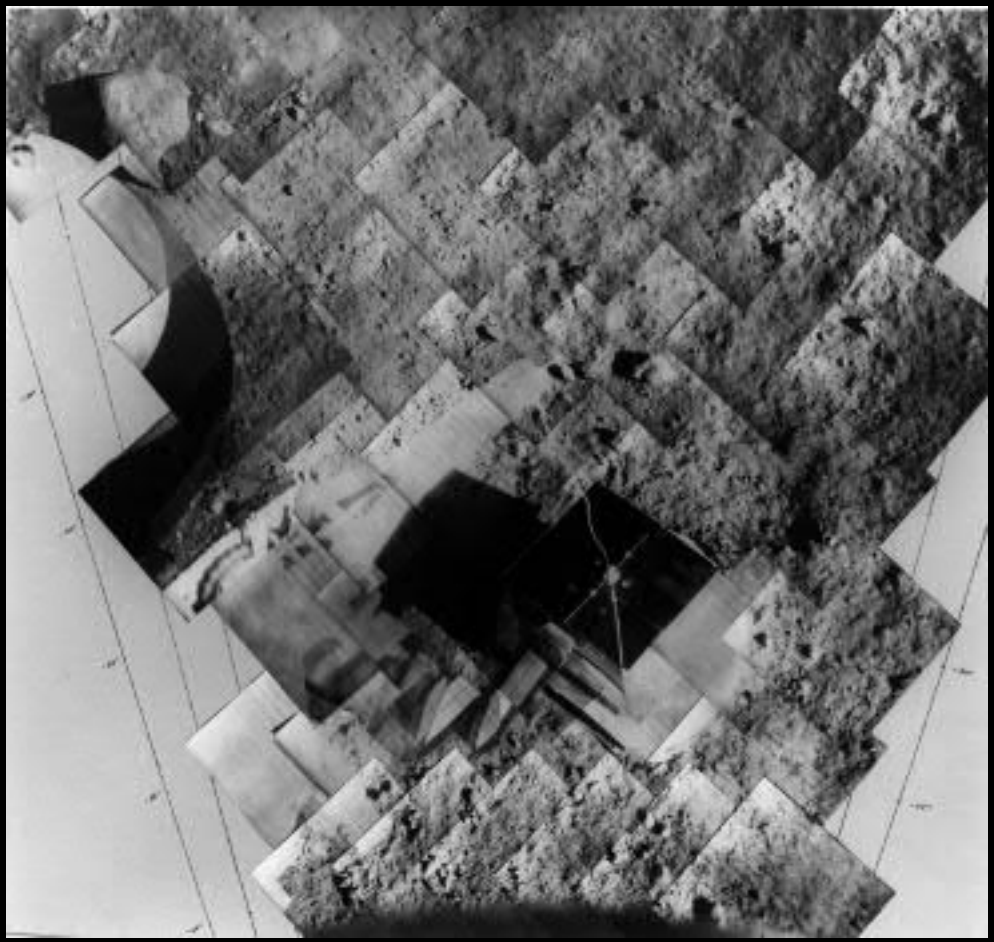
Surveyor 1966 - 1968

Surveyor 1 kuvasi varjonsa



24.4.1967 Surveyor 3 kuvasi kuunpimennyksen aikana maan

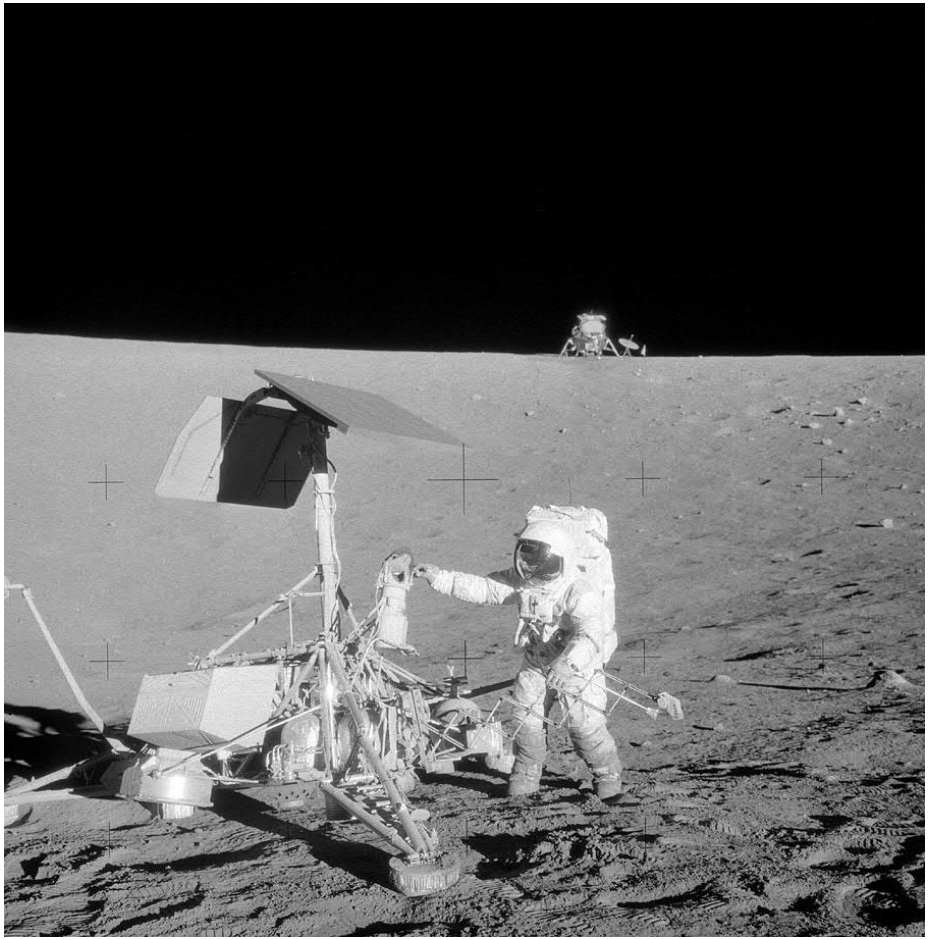
Surveyor V 1967



Surveyor 1966 - 1968

Ottivat yhteensä 87 674 kuvaa.

TV-kameran resoluutio 600 linjaa.

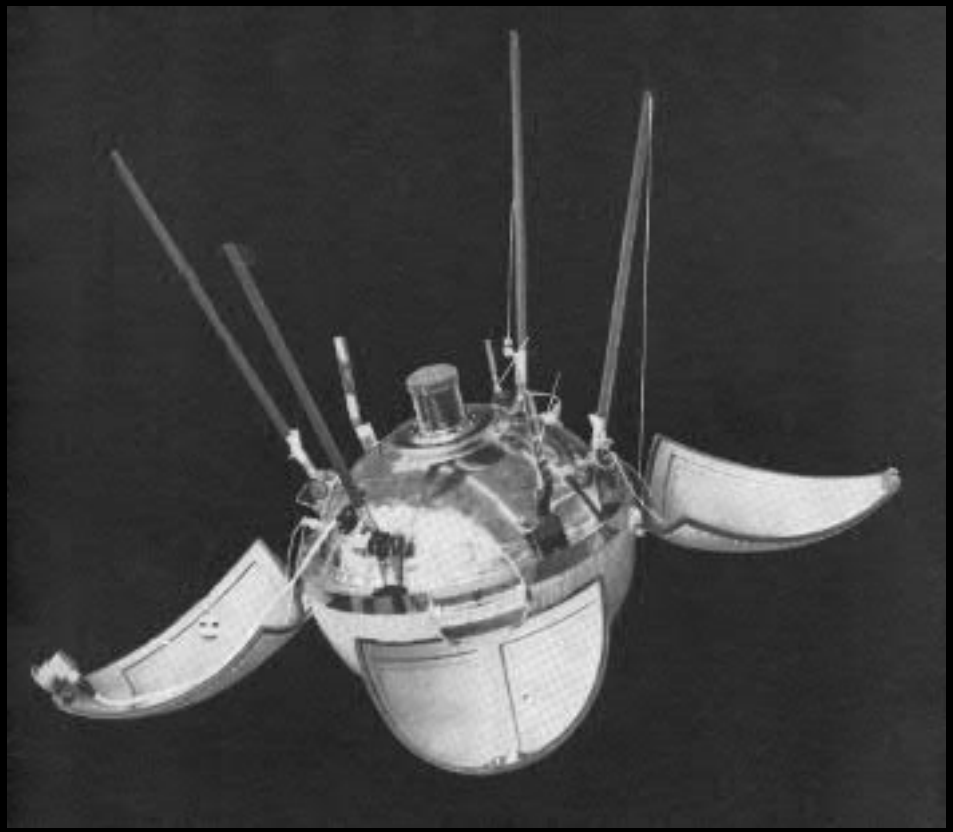


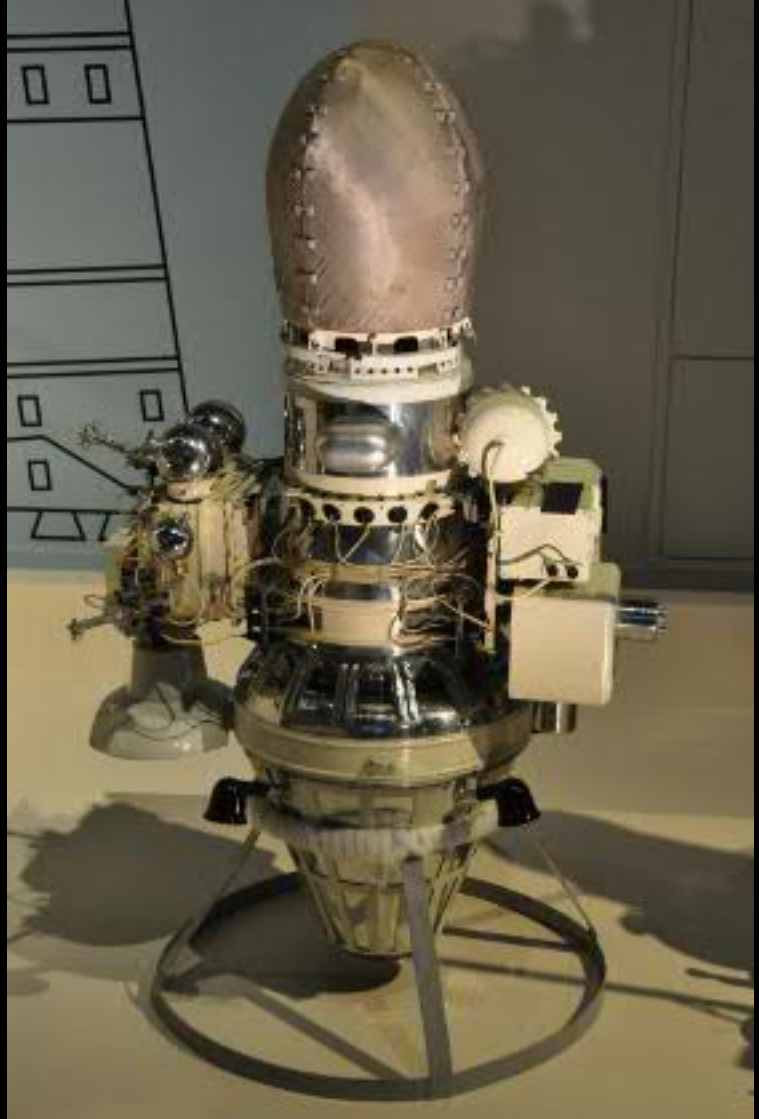
Surveyor III 1969

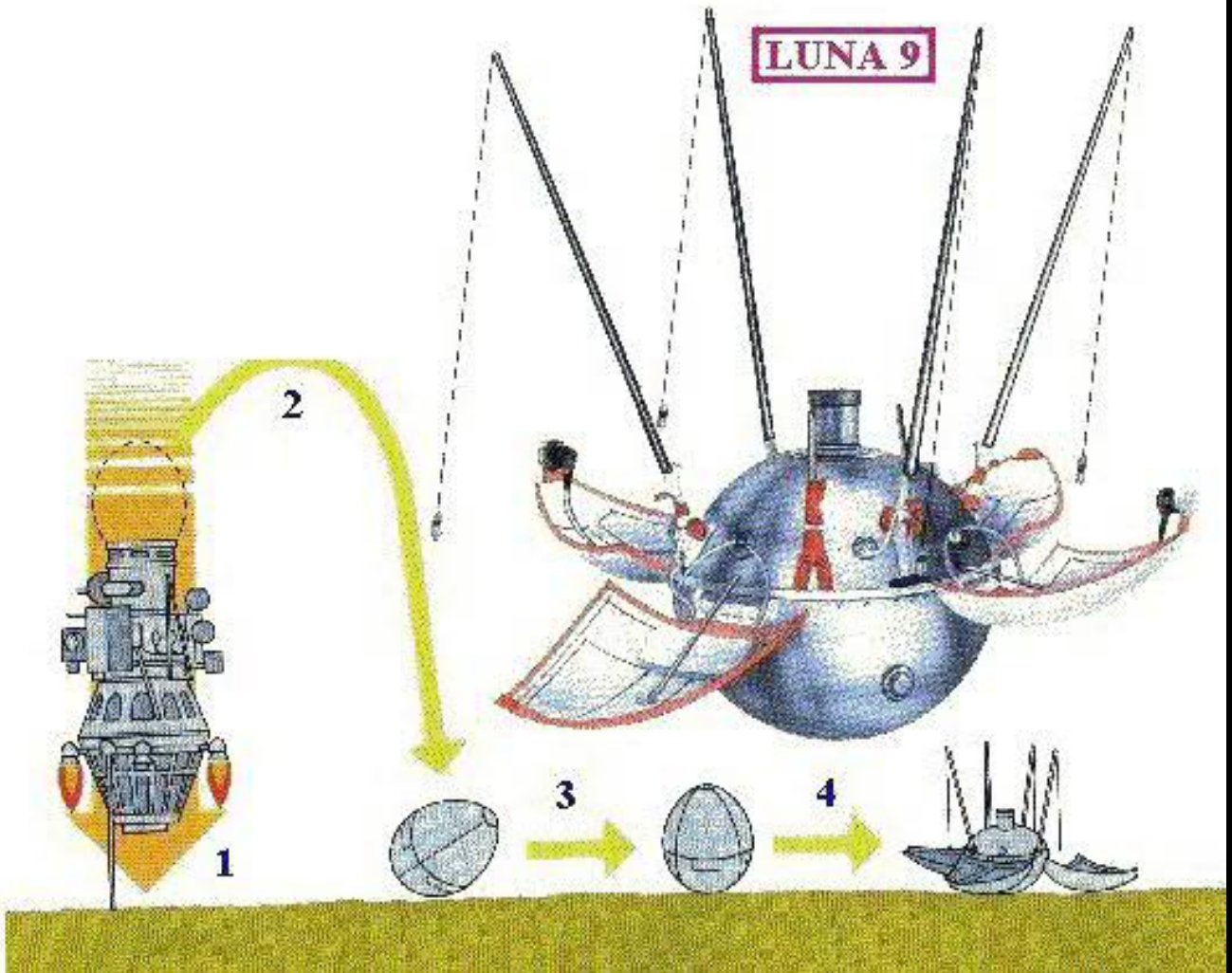
Ottivat yhteensä 87 674 kuvaa

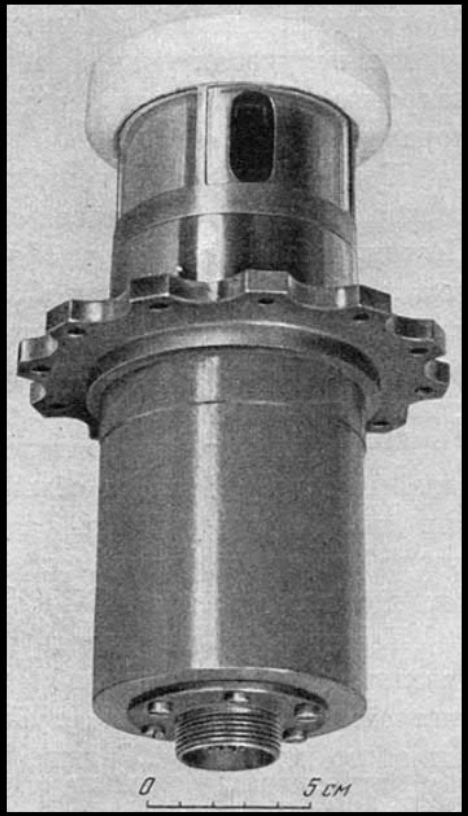
Luna 9

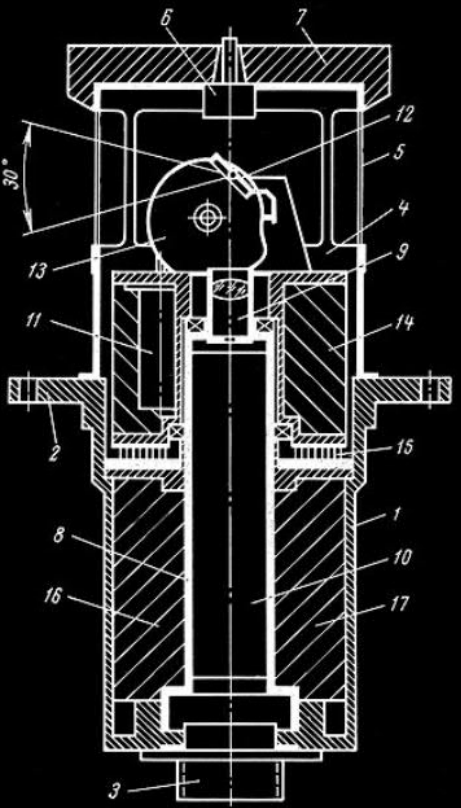
Pehmeä laskeutuminen 3.2.1966





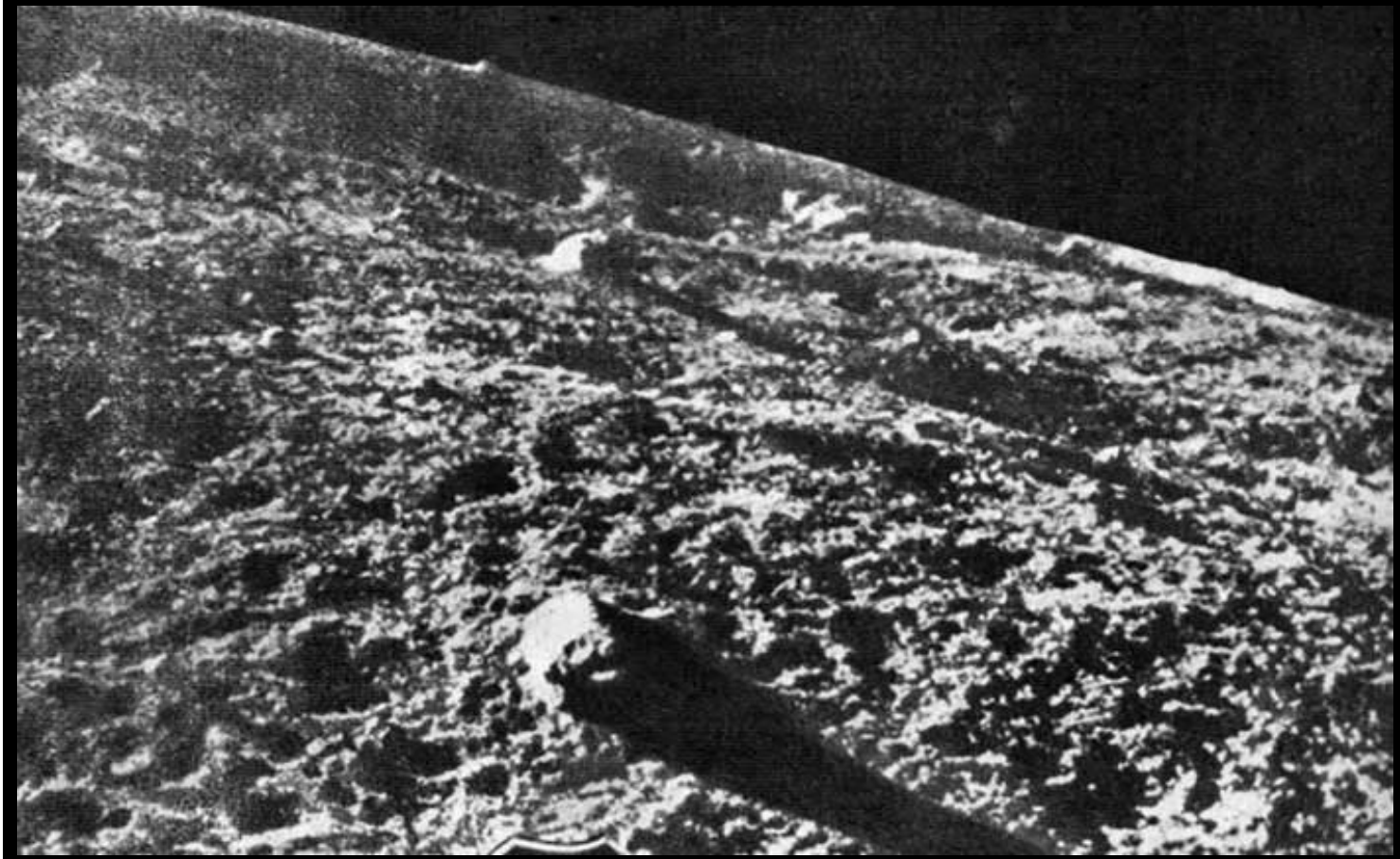

LUNA 9
1
2
3
4





1. 80 × 205 mm housing
2. Mounting flange
3. Electrical connector
4. Cap
5. Thin dacron window
6. Pressure equalization valve
7. Thermal insulation cover
8. Support pipe
9. Objective lens & diaphram
10. FEU-54 photomultiplier tube
11. Scanner motor
12. Scanning mirror
13. Shaped pushing-mirror cam
14. Motor control electronics
15. Electrical connection brushes
16. Photomultiplier power supply
17. Logarithmic pentode amplifier

Luna 9



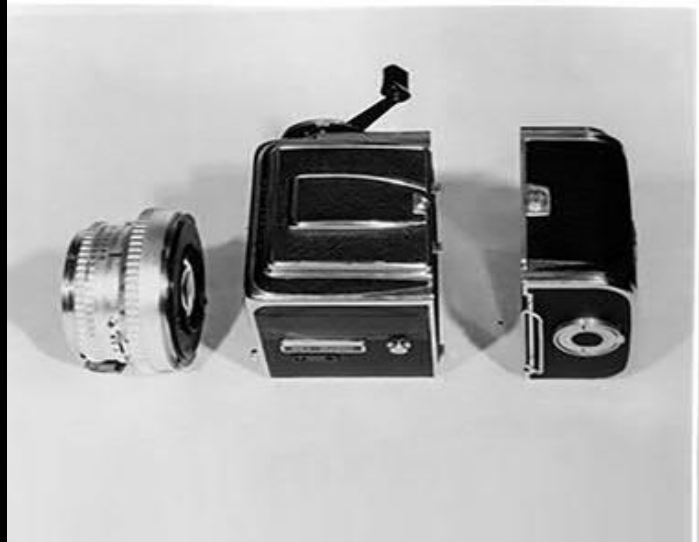
NASAn kameravalinta

Hasselblad

>

BEFORE

AFTER



Ed White made the United States' first spacewalk on 03 June 1965 during the Gemini 4 mission.

White opened his hatch and used the hand-held manuevering oxygen-jet gun to push himself out of the capsule.

The photographs were taken by commander James McDivitt.

On Apollo 8, Hasselblad EL electric cameras were used for the first time. The electric motor in these Hasselblads largely automated the picture taking process. The astronauts needed only to set the distance, lens aperture, and shutter speed, but once the release button was pressed, the camera exposed and wound the film and tensioned the shutter. Two Hasselblad EL cameras, each with a Planar f 2.8/80mm [normal] plus a single Sonnar f5.6/250mm [telephoto] lens and seven magazines of 70mm film, were carried. The cameras, film magazines, and lenses used on Apollo 8 had black anodized surfaces to eliminate reflections. Modifications to the cameras included special large locks for the film magazines and levers on the f-stop and distance settings on the lenses. These modifications facilitated the camera's use by the crew operating with pressurized suits and gloves. Additionally, the cameras had no reflex mirror viewfinder and instead a simple sighting ring assisted the astronaut in pointing the camera.


1976
CLASS III
NOT FOR FLIGHT
1976

Each film magazine would typically yield 160 color and 200 black and white pictures on special film. Kodak was asked by NASA to develop thin new films with special emulsions. On Apollo 8, three magazines were loaded with 70 mm wide, perforated Kodak Panatomic-X fine-grained, 80 ASA, b/w film, two with Kodak Ektachrome SO-168, one with Kodak Ektachrome SO-121, and one with super light-sensitive Kodak 2485, 16,000 ASA film. There were 1100 color, black and white, and filtered photographs returned from the Apollo 8 mission.

Apollo 11

Apollo 11:n miehistö: Neil Armstrong, Michael Collins ja Buzz Aldrin

Kamerat Kuun pinnalla

Zeiss Biogon 5.6/60 ‘Moon lens’


MADE IN SWEDEN
CAUTION
DO NOT TOUCH
GLASS SURFACE
S/N 1003


REMOVE DARKSLIDE
BEFORE INSTALLING MAGAZINE
HBW
1/250
12
11
8
8
9
3
5.6
FILT.
5.6/125

CEN


CDR

Hasselbladin isoon kuluttajakasettiin mahtuu 5,5 m filmiä = 70 ruutua.

Kuukasetteihin ohutta mv-filmiä 200 ruutua ja värifilmiä 170 ruutua.

Apollo 11 kuvasi yhdeksän kasettia.

Apollo 11

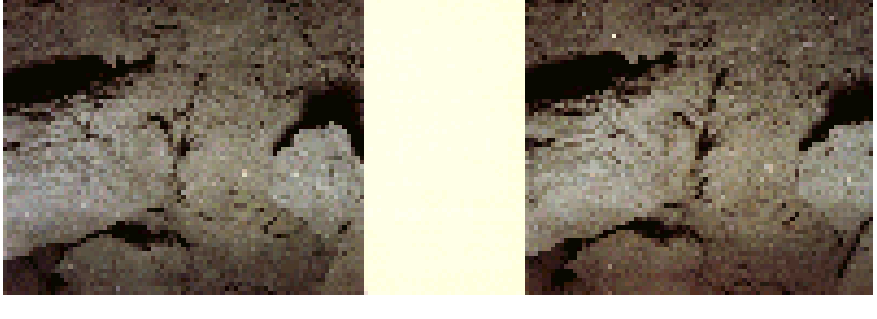
Vasemmalla värikamera, oikealla kamera, jolla kuvattiin ensimmäiset askeleet Kuussa.

Apollo 11

Apollo Lunar Surface Close-up Camera

Apollos 11, 12, & 14 carried a stereo camera for taking close-up images of the lunar soil, small rocks, & other small items of interest.

The Apollo 11 mission carried a close-up stereo camera with which the astronauts took 17 pictures, each of an area 3 by 3 inches and a resolution of approximately 80 μm.



Apollo 11

Seven months prior to the Apollo 11 mission, a new camera was commissioned by NASA. The camera would be used by the crew to take close-up stereo views of the lunar soil and rocks. The camera had a shutter speed of 1/100th of a second, an aperture of f/22.6, film was held approximately 10 inches from the lunar surface, and lighting was provided by an integral electronic flash.

The camera was designed for ease of use by the astronaut in his bulky pressure suit. The camera was rested on the soil and the astronaut would simply press down on a trigger on a long handle to expose the frames. Each exposure resulted in two side-by-side photographs of the same area of the surface. The surface photographed measured three inches by three inches. The size of the exposed film was one inch square.

Apollo 11

During the mission, nine magazines of 70-millimeter film and 13 magazines of 16-millimeter film were exposed. The 16-millimeter film taken during lunar module descent provided the first accurate knowledge of the exact landing point of the lunar surface. The 70-millimeter photographs taken on the lunar surface provided panoramic views of the surface near the landed LM and allowed detailed topographic mapping of the lunar surface near the landing point.

Apollo 16

It used a 3-inch telescope to obtain images and spectra at wavelengths between 500 and 1600 Angstroms. Emission at these wavelengths comes primarily from very hot stars of spectral classes O, B, and A, with surface temperatures of 10,000° to 50,000° K. Stars as faint as magnitude 11, or 100 times fainter than can be seen with the human eye, were recorded. Results were recorded on a film cartridge and returned to Earth for analysis. A total of 178 frames of film were obtained. The telescope was periodically reoriented by the astronauts in order to study various parts of the sky. Among the objects studied were the Earth's upper atmosphere and aurora, various nebulae and sclusters, and the Large Magellanic Cloud.

Apollo 16

Apollo 16 also left a gold-plated extreme ultraviolet telescope that performed the first astronomical observations from another heavenly body.

Apollo 16

Apollo 16 Komentomodulin kamerat

Nikon F

55 mm, f 1,2 objektiivi

9 kasettia filmiä

Hasselblad

80 mm objektiivi

250 mm objektiivi

105 mm UV objektiivi

70 mm filmikasetteja 7 kpl

70 mm UV filmikasetti

Apollo 16 Kuumodulin kamerat

16 mm DAC, 2 kpl

10 mm objektiivi, 2 kpl

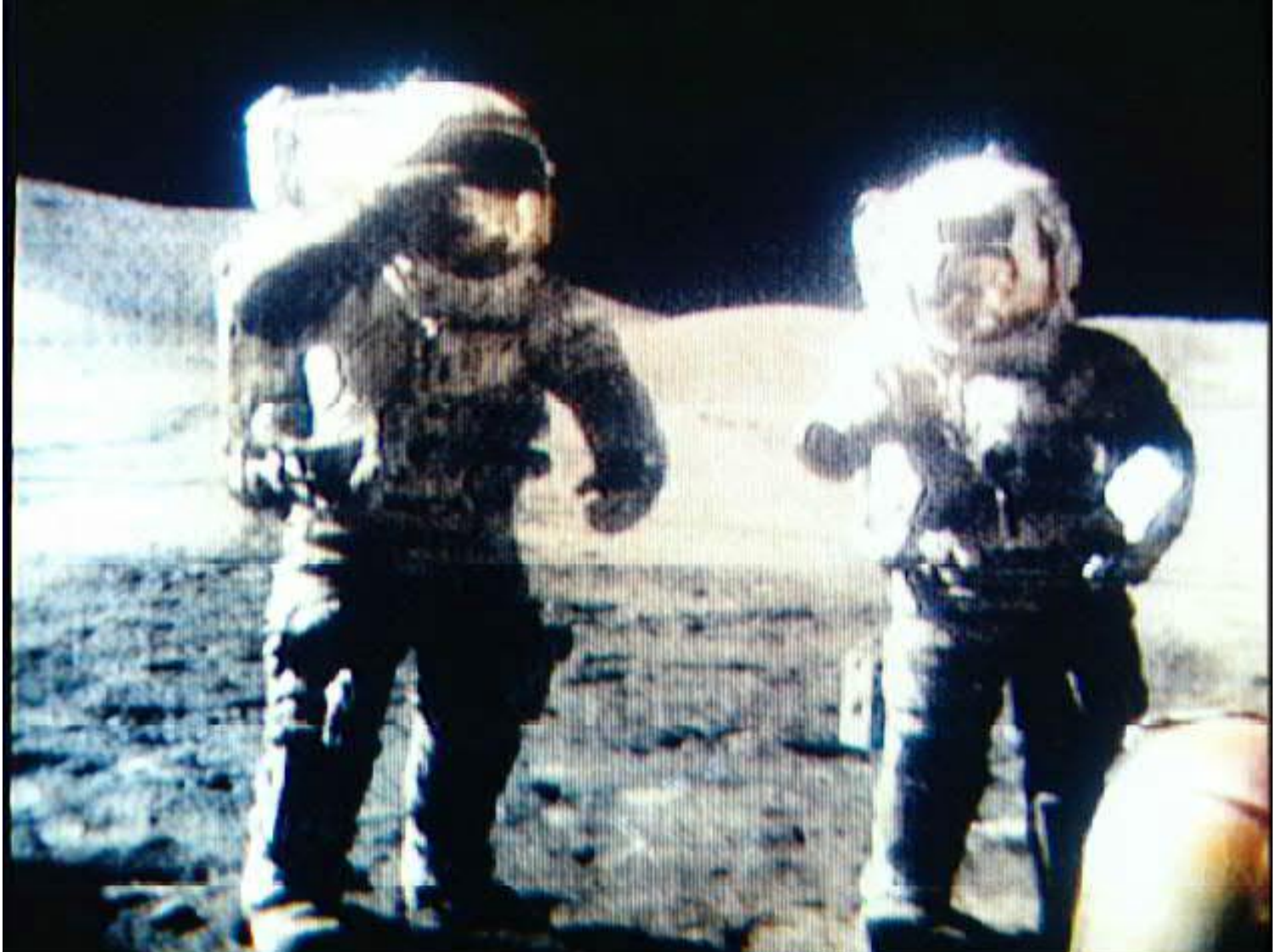
Kuu-Hasselblad, 2 kpl

60 mm objektiivi, 2 kpl

500 mm objektiivi

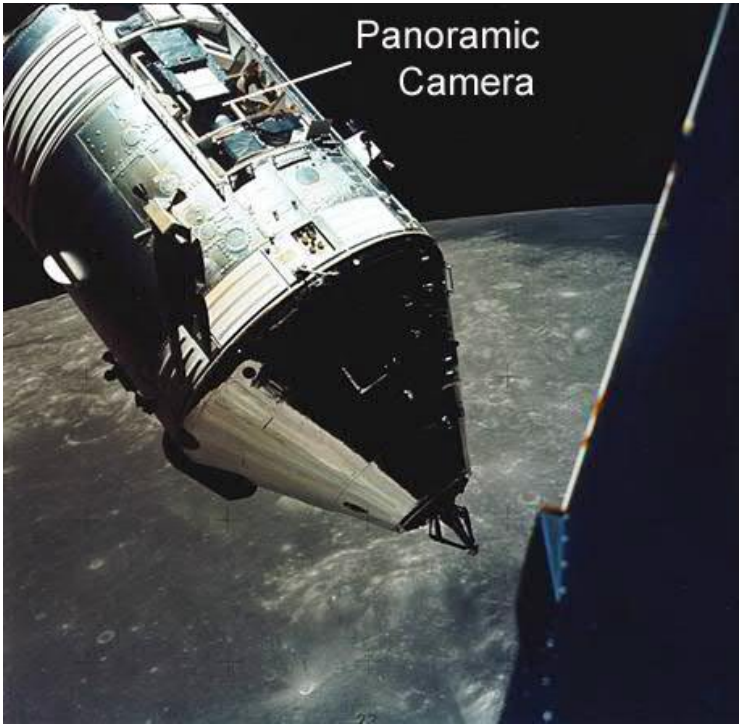
Polarisaatiosuodatin

70 mm filmikasetti, 13 kpl

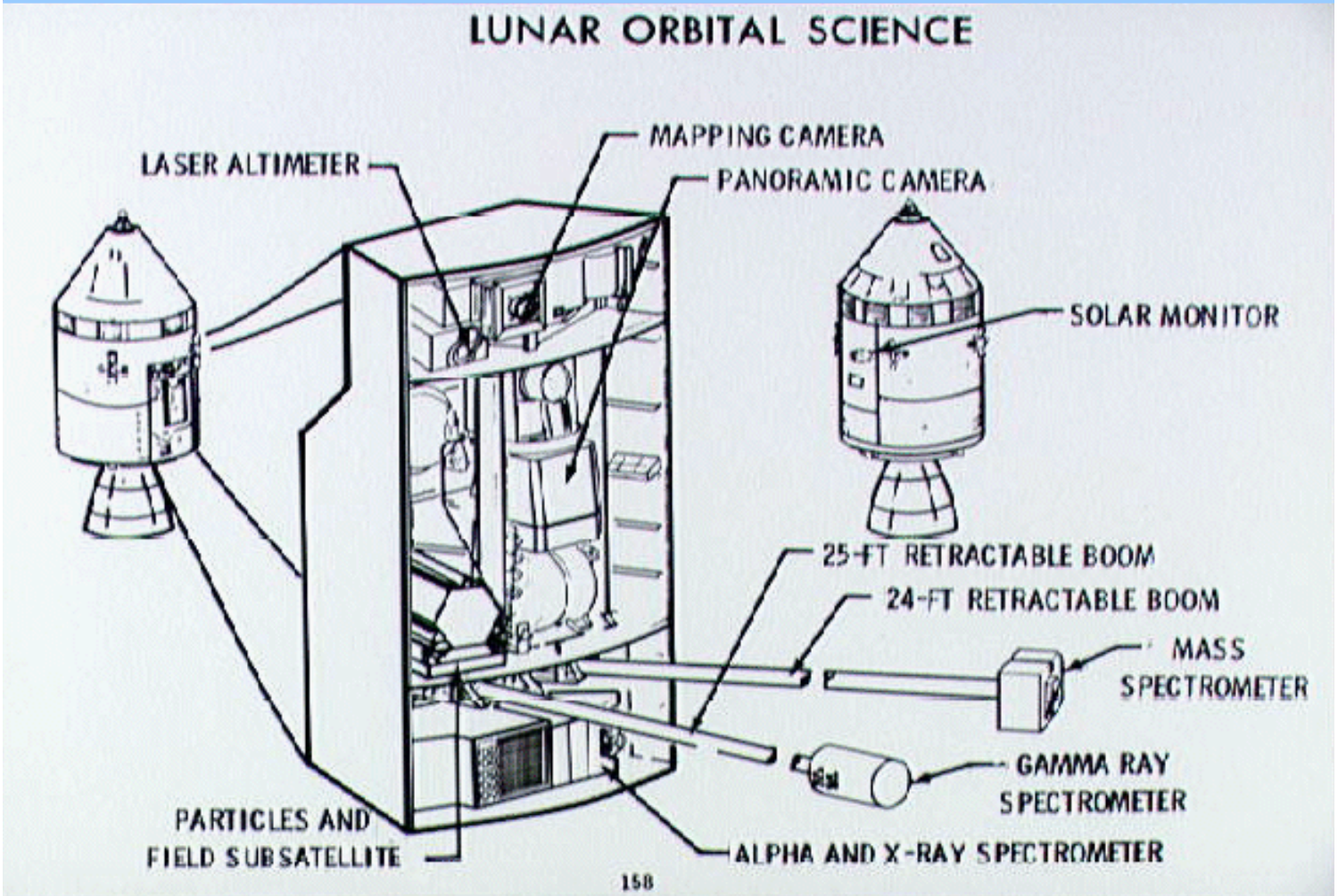


Kamerat Kuun kiertoradalla

Apollo 15, 16, and 17 carried a set of cameras in the Scientific Instrument Module of the Service Module.



Apollo 15


LUNAR ORBITAL SCIENCE
LASER ALTIMETER
MAPPING CAMERA
PANORAMIC CAMERA
SOLAR MONITOR
25-FT RETRACTABLE BOOM
24-FT RETRACTABLE BOOM
MASS SPECTROMETER
GAMMA RAY SPECTROMETER
PARTICLES AND FIELD SUBSATELLITE
ALPHA AND X-RAY SPECTROMETER
158

Metric and Panoramic Cameras

Metric and Panoramic Cameras

Apollo 15, 16, and 17 carried a set of cameras in the Scientific Instrument Module of the Service Module.

Metric and Panoramic Cameras

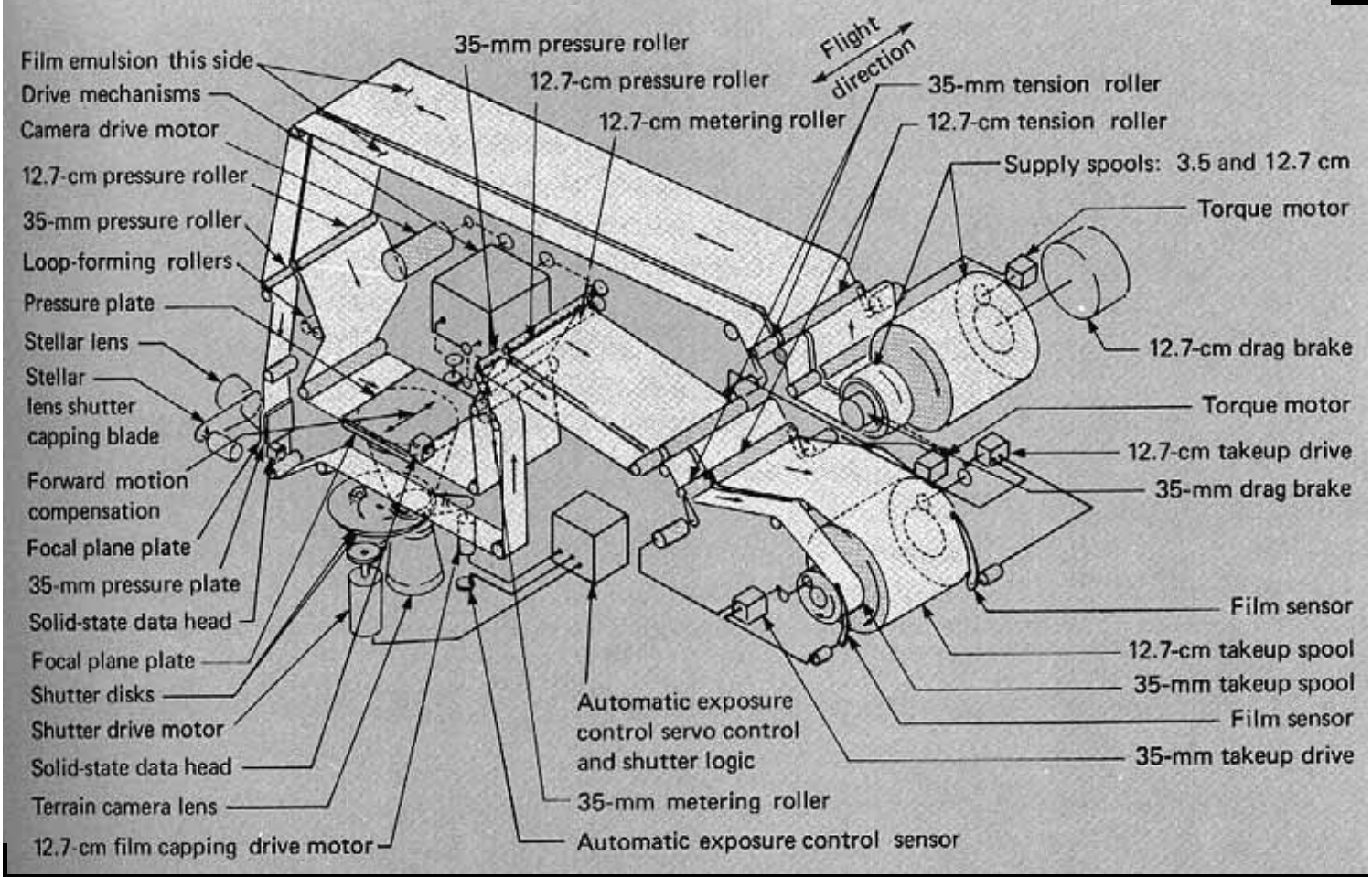
This oblique photograph looks south across the Aristarchus plateau. There are two prominent impact craters in the photograph. On the left is Aristarchus, 40 kilometers in diameter, and on the right is Herodotus, 35 kilometers in diameter. The sinuous valley that snakes its way to the right is Schroter's Valley. Schroter's Valley, which is typically 8 to 10 kilometers wide and more than 150 kilometers long.

Metric and Panoramic Cameras

This camera system consisted of a 76-millimeter Fairchild mapping camera (SIM3) using 5-inch film, a 3-inch stellar camera using 35-millimeter film, and a laser altimeter.

The Metric Camera obtained pictures of the surface covering 165 kilometers on a side, with a horizontal resolution of 20 meters, based on a nominal spacecraft altitude of 110 kilometers.

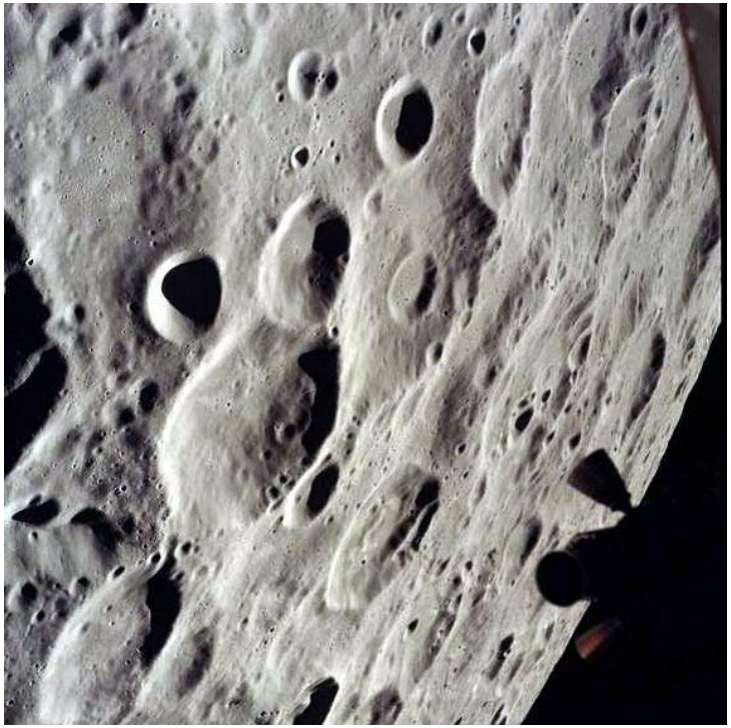
Metric and Panoramic Cameras



Metric and Panoramic Cameras

The Panoramic Camera

610-millimeter (24-inch) focal length f/3.5 and field of view (FOV) of 10.77° (20 kilometers of surface and 100 kilometers altitude). The lens was rotated about an axis parallel to the SM, and a capping shutter opened during the time the lens passed through a 108° arc (320 kilometers of lunar surface at 100 kilometers altitude) below the vehicle.




MADE IN SWEDEN
CAUTION
DO NOT TOUCH
GLASS SURFACE
S/N 1003

Maurer 16-mm-DAC

Kern Aarau NASA Switar Lenses and Maurer 16-mm-DAC

with Switar lenses from Kern Aarau (Kern & Co. AG, Aarau). Kern manufactured the well-known 50 mm (macro) Switars for the 35 mm ALPA and the equally famous Switar cinema lenses for the Paillard Bolex.

Kuvanopeudet 1 fps, 6 fps, 12 fps, and 24 fps. Filmiä 40 m. Filmikasetin paino 0,4 kg. Kasetin kesto kun 1 fps 87 minuuttia ja 3,6 minuuttia kun 24 fps.

Maurer 16-mm-DAC

Apollo 11

The NASA Switar 18 mm corresponded approximately to a slightly longer "normal focal length" and was very fast with a maximum aperture of 0.9 (T 1.0). Besides, there was a 75 mm with an aperture of 2.2 (T 2.3). The comparable focal length on 35 mm would equal a telephoto of a remarkable 250 mm.

Filmiä valotettiin 13 kasettia

Luna-17 & Lunokhod 1

Luna-17 landed on the Moon on November 15, 1970. The robotic rover, Lunokhod-1 rolled off the landing platform to explore the surface of the Moon for about a month. Two cycloramic cameras on either side of the rover were oriented for 180° horizontal panoramas (500 × 3000 pixels). These panoramas are sometimes geometrically warped to correct for the 15° tilt of the camera.

Two other cameras were oriented for 360° vertical panoramas of 500 × 6000 pixels, including images of the sky for star locations.

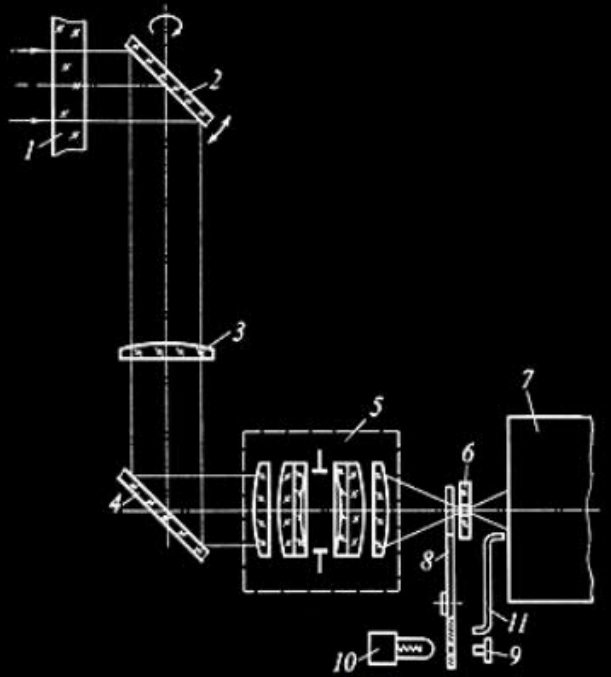
Luna 20

Luna-20 landed on the Moon on February 21, 1972. Like Luna-16, it was a robotic mission that returned lunar soil to the Earth. It carried a stereo pair of optical-mechanical cycloramic cameras, working at 4 lines per second and 300 pixels per line. Angled at 50° from the vertical, these cameras returned 360° panoramas, including the lunar surface and portions of the spacecraft and sky. It also scanned the drilling site before and after sampling. Published fragments of panoramas show the soil drilling apparatus in the foreground and views of the lunar horizon to either side.

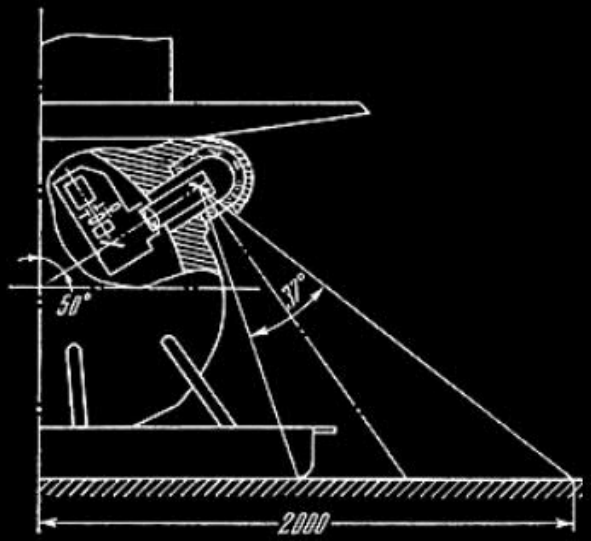
Like Luna-16, a stereo pair of cameras were included, spaced 0.5 meters apart.

Luna-21 & Lunokhod 2

Luna-21 entered Lunar orbit on January 12, 1973, and landed on January 15. The robotic rover, Lunokhod-2 rolled off the landing platform to explore the surface of the Moon for about 4 months. Like Lunokhod-1, it had two vidicon television cameras for navigational control, and four optical-mechanical cycloramic cameras. It returned 86 panoramas and over 80,000 navigational video pictures.



Camera Schematic

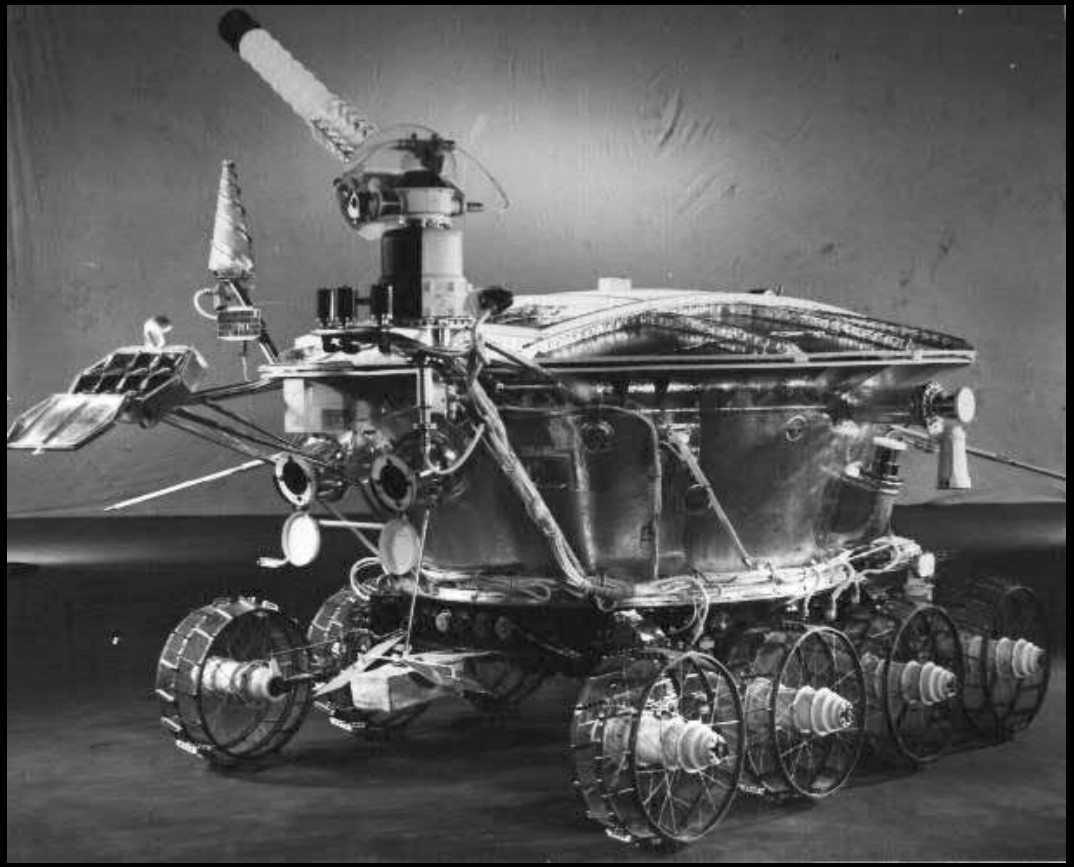


Placement of Camera

1. 10 mm quartz window
2. Scanning Mirror
3. Compensating Lens
4. Fixed Mirror
5. 28 mm Objective Lens
6. Image-Plane Aperture
7. Photomultiplier Tube (FEU-114)
8. Shutter
9. Photosensitive Diode
10. Stablized Lamp
11. Light Guide

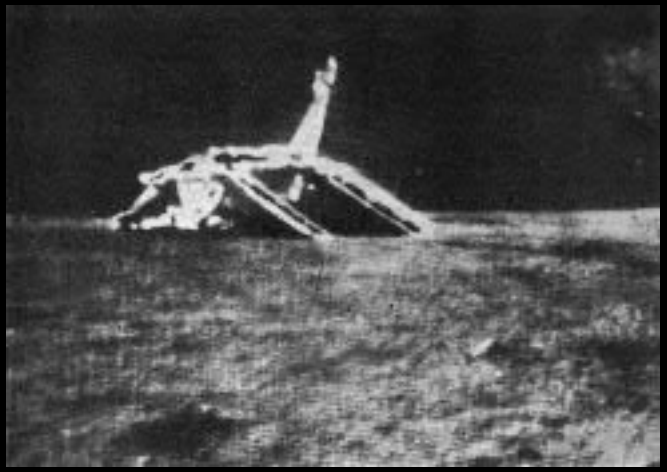
Luna 17 & Lunokhod 1

17.10.1970



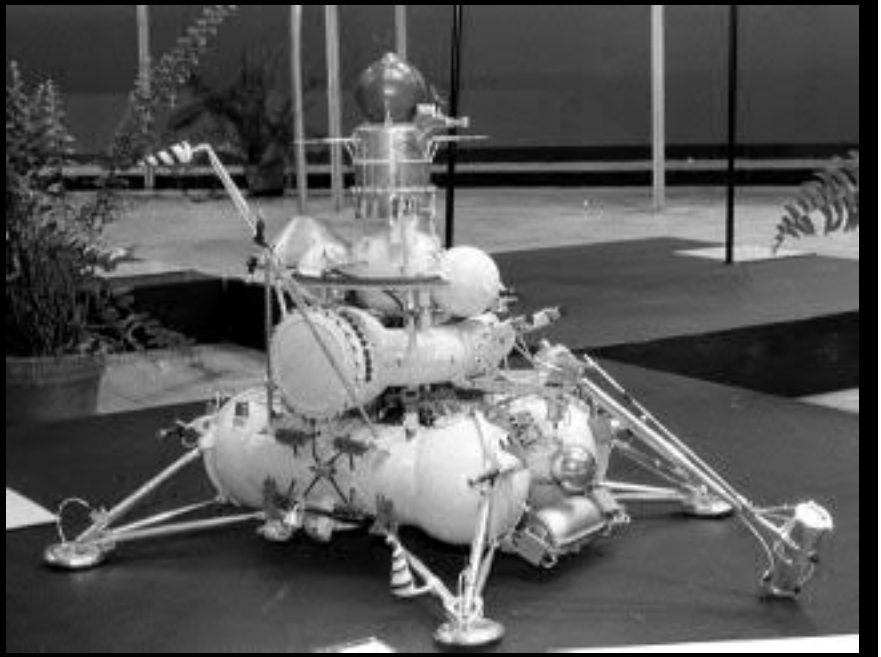
Lunokhod 1

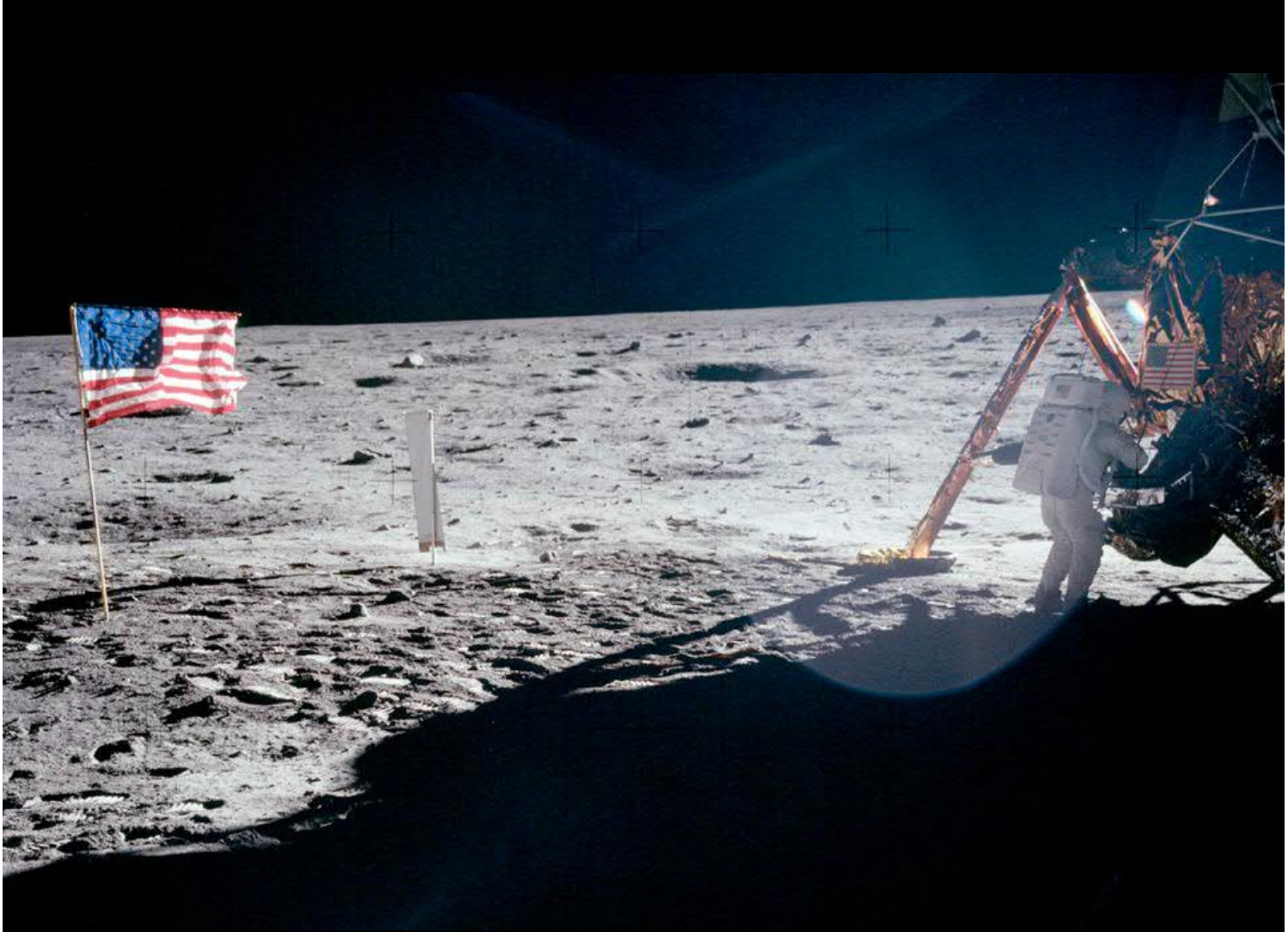
Over 20,000 low-resolution video pictures were transmitted, primarily for use by the drivers to navigate the rover. Note the usual horizontal scanlines of a TV camera, as opposed to the vertical scanlines of the cycloramic cameras.Pictures were transmitted, primarily for use by the drivers to navigate the rover.



Luna-24

Luna-24 was the last spacecraft to land on the Moon (Soviet or American), on August 18, 1976. Boring 2.25 meters into the Moon, it obtained a 170.1 gram core sample 1.6 meters in length. The drilling apparatus packed the sample into a 8mm diameter plastic tube, which was wound into a helical container.





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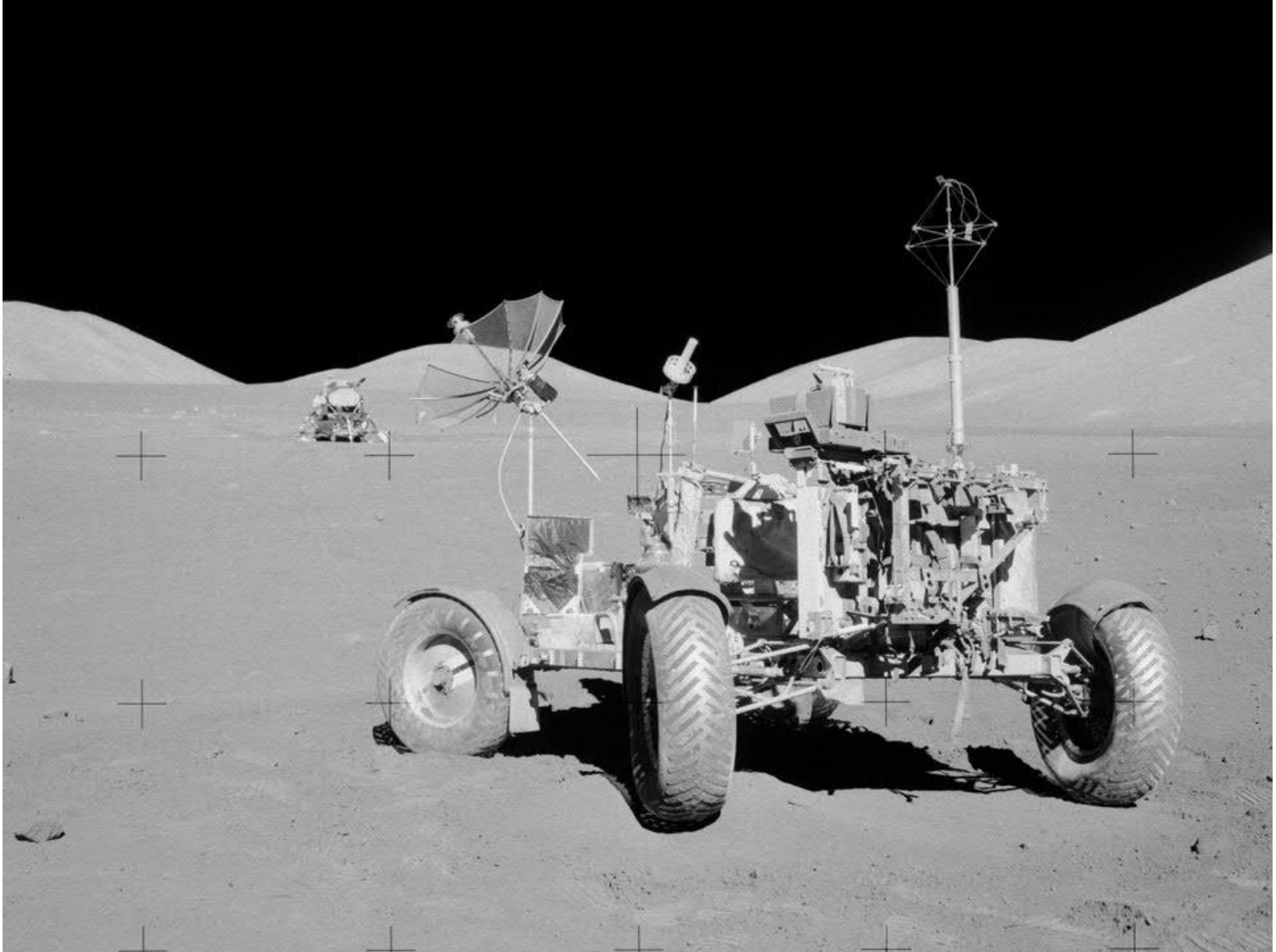

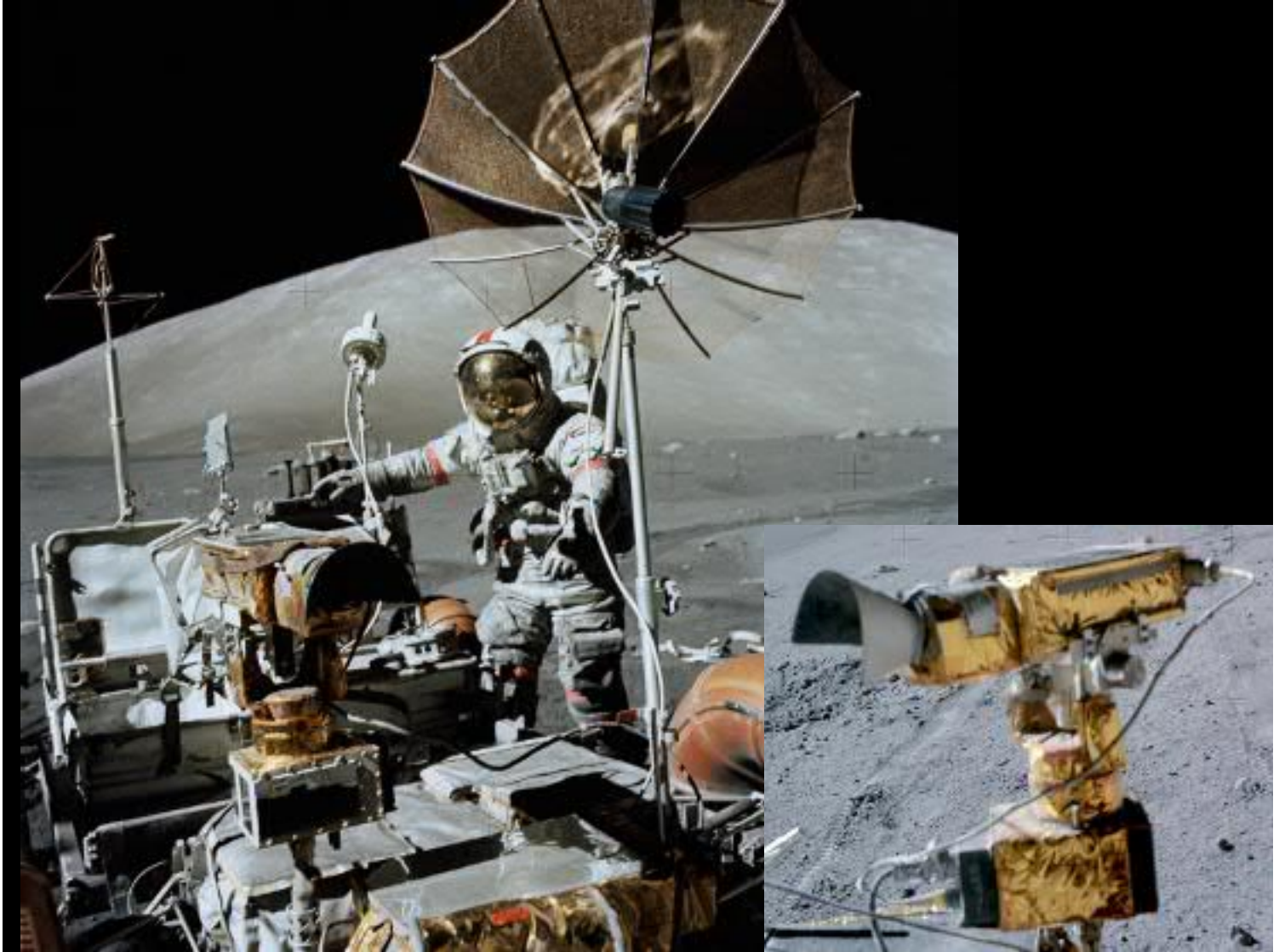

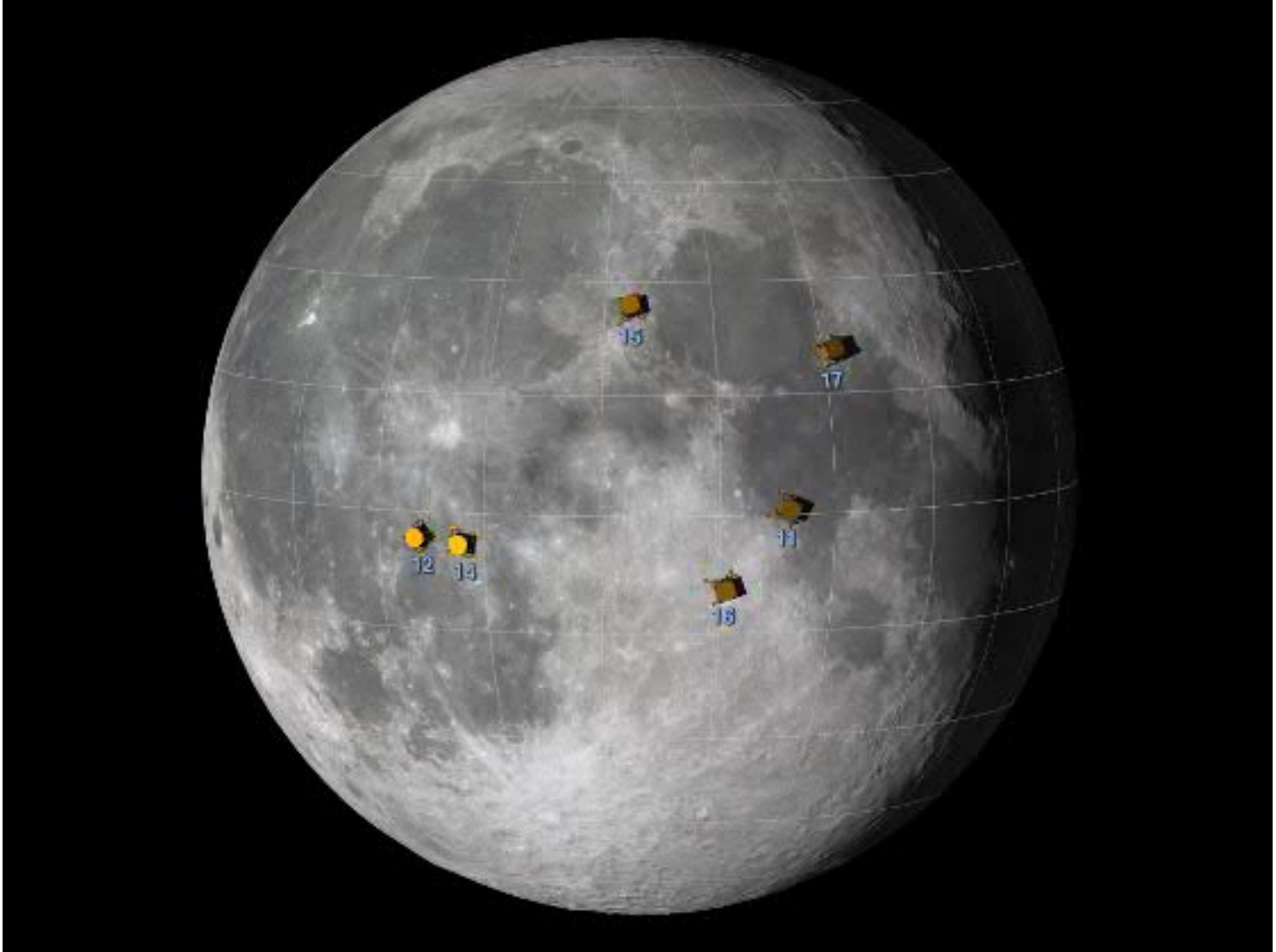
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