SPACE EXPLORATION

NEW YORK 20 JULY 2017

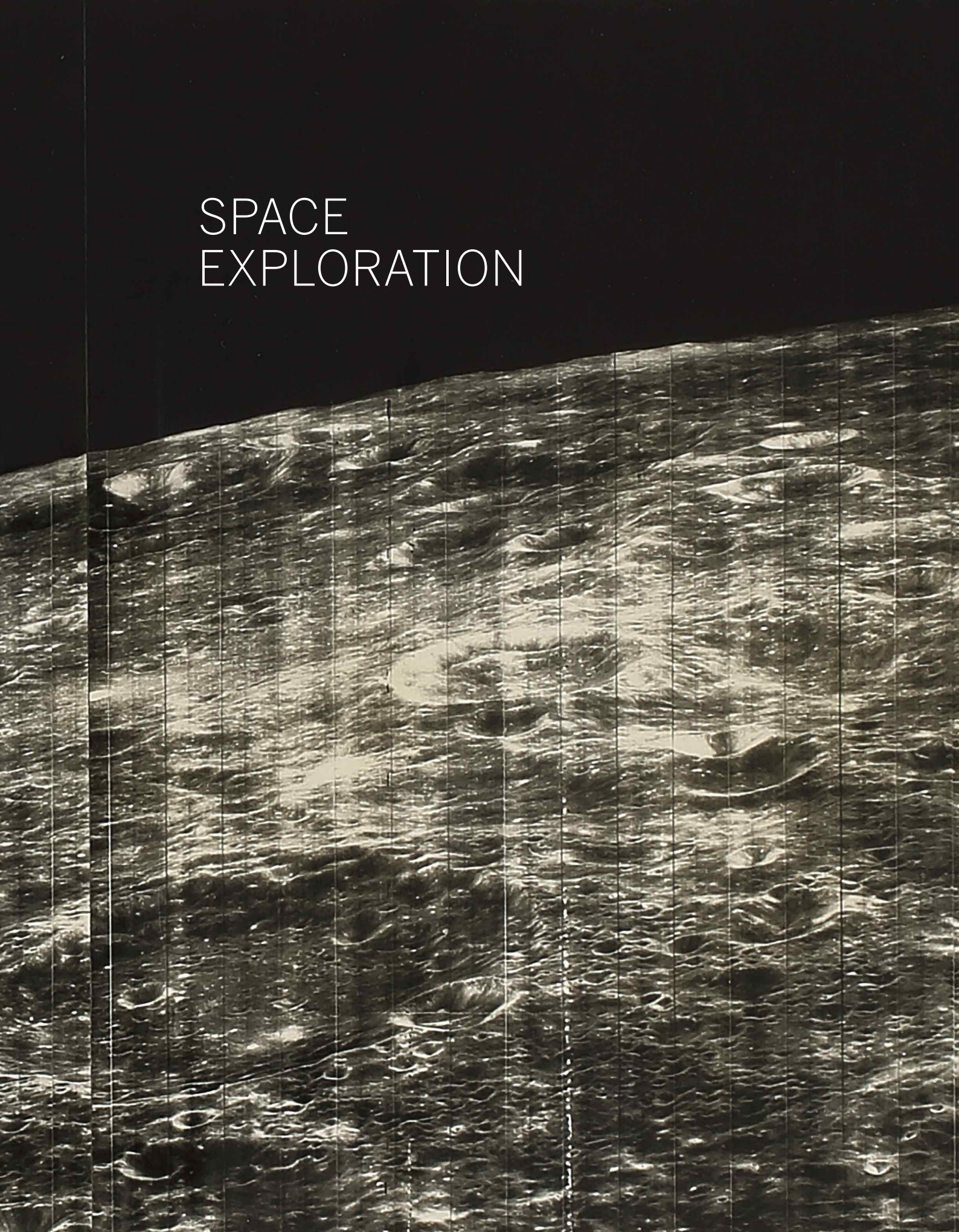
Sotheby's EST. 1744

FRONT COVER
LOT 116

BACK COVER
LOT 171

THIS PAGE
LOT 6

SPACE EXPLORATION



FLIGHT PLAN

MCC-H

1030 EDT

169:00
:10
:20
:30
:40
:50
170:00
:10
:20
:30
:40
:50
171:00

MSFN

FLOWN TO THE MOON

TJ Suzy Aldrin

REST PERIOD
(10 HOURS)

~171:35

CO_2 FILTER CHANGE NO. 13
(15 INTO A, STORE 13 IN A4)

REPORT CM RCS EJECTOR VLV TEMP

EAT PERIOD - ALL

O_2 FUEL CELL PURGE

V66 - TRANSFER CSM STATE VECTOR TO LM SLOT

POST SLEEP CHECKLIST

CREW STATUS REPORT (SLEEP)
CYCLE O_2 & H_2 FANS
GDC ALIGN TO IMU
CONSUMABLES UPDATE
SELECT NORMAL LUNAR CONFIGURATION EXCEPT:
S-BD AUX TAPE - OFF
TAPE RCDR FWD - OFF
POT H_2O HTR - ON
AUTO RCS JET SELECT (16) - ON

171:40
45%

PTC

UPLINK CMC
CSM STATE VECTOR
MCC6 TGT LOAD

NOTES

P23-NO COMM (5 SETS)
TEI + 35:00 (170:30)
DIPHDA (02), EFH (00120)
DIPHDA (02), EFH
NAVI (03), ENH (00110)
MIRFAK (10), ENH
ALDEBARAN (11), ENH

V67 R_1 +30000
R_2 +00004
R_3 +00003
CDR - 8.5
CMP - 7
LMP - 8

CONSUMABLE UPDATE
(Δ FROM NOMINAL)

GET:	170:00
RCS TOT	-3.5%
A	-14.5
B	+7
C	-4.5
D	-3
H_2 TOT	-1*
O_2 TOT	+24

MISSION	EDITION	DATE	TIME	DAY/REV	PAGE
APOLLO 11	FINAL	JULY 1, 1969	169:00 - 171:00	8/TEC	3-119

MSC Form 29 (May 69)

FLIGHT PLANNING BRANCH

SPACE EXPLORATION

AUCTION IN NEW YORK
20 JULY 2017
SALE N09759

SESSION ONE: 11:00 AM
SESSION TWO: 2:00 PM

EXHIBITION

Thursday 13 July
10 am-5 pm

Friday 14 July
10 am-5 pm

Saturday 15 July
10 am-5 pm

Sunday 16 July
1 pm-5 pm

Monday 17 July
10 am-5 pm

Tuesday 18 July
10 am-5 pm

Wednesday 19 July
10 am-5 pm

Thursday 20 July
10 am-2 pm

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LOT 27

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SALE NUMBER

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1- IT ISN'T DIRTY BEACH SAND!

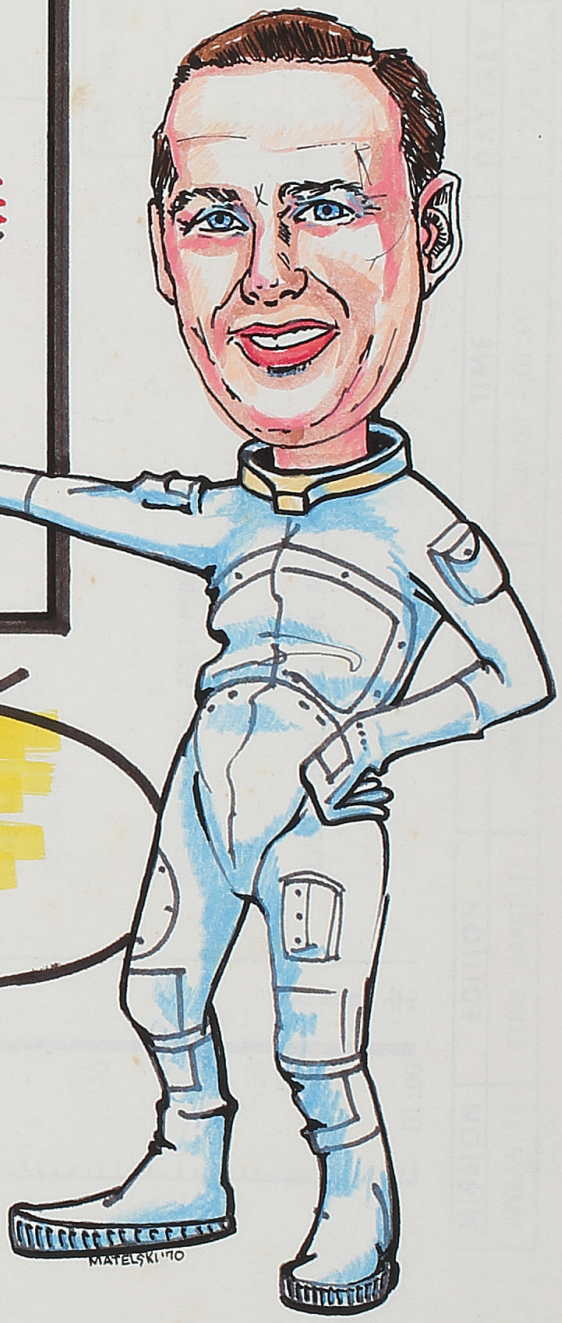
2- LET'S GET RID OF ALL THE OLD ATTITUDES!

3- ANY IMPROVEMENTS ARE TO BE FOR THE BETTER!

4- IF WE HAVE PLENTY OF FUEL... IT DOESN'T HURT TO MANEUVER

5- IN THE BEGINNING!

REPEAT AFTER ME...



CONTENTS

KEY DATES IN THE HISTORY OF SPACE EXPLORATION

BEGINNING OF THE SPACE RACE

Sputnik-1 (Oct. 1957): Launch of the first artificial satellite

FIRST HUMAN IN SPACE

Vostok-1 (April 1961): Yuri Gagarin†

FIRST SPACEWALK

Voshkod-2 (March 1965): Alexei Leonov

FIRST MOONLANDING & MOONWALK

Apollo 11 (July, 1969): Neil Armstrong† & Edwin "Buzz" Aldrin, Jr.

END OF THE SPACE RACE

Apollo-Soyuz Test Project-ASTP (July, 1975):
Apollo Crew: *CDR*: Thomas Stafford; *CMP*: Vance D. Brand; *DMP*: Donald "Deke" Slayton†
Soyuz Crew: *CDR*: Alexei Leonov; *FE*: Valeri Kubasov†

UNITED STATES MANNED MISSIONS & CREWS

PROJECT MERCURY (The "Mercury Seven")

Mercury Redstone-3 (May, 1961): *Pilot:* Alan Bartlett Shepard Jr. †
Mercury Redstone-4: (July, 1961): *Pilot:* Virgil "Gus" Grissom†
Mercury Atlas-6 (Feb. 1962): *Pilot:* John Herschel Glenn Jr. †
Mercury Atlas-7 (May, 1962): *Orig. Pilot:* Deke Slayton†; *Replacement Pilot*: Malcolm "Scott" Carpenter†
Mercury Atlas-8: (Oct. 1962): *Pilot:* Walter "Wally" Schirra, Jr. †
Mercury Atlas-9 (May, 1963): *Pilot:* Leroy Gordon "Gordo" Cooper, Jr. †

PROJECT GEMINI

Gemini 3 (April 1964): *CP:* Virgil "Gus" Grissom†; *Pilot:* **John Young**
Gemini IV (June 1965): *CP:* James McDivitt; *Pilot:* Ed White†
Gemini V (August 1965): *CP:* Leroy Gordon "Gordo" Cooper, Jr.†; *Pilot***: Charles "Pete" Conrad**†
Gemini VII (Dec. 1965): *CP:* Frank Borman; *Pilot:* James Lovell
Gemini VI-A (Dec. 1965): *CP:* Walter "Wally" Schirra†; *Pilot*: Thomas Stafford
Gemini VIII (March 1966): *CP:* **Neil Armstrong**†; *Pilot:* **David Scott**
Gemini IX-A (June 1966): *CP:* Thomas Stafford; *Pilot:* **Eugene "Gene" Cernan**†
Gemini X (July 1966): *CP:* **John Young**; *Pilot:* Michael Collins
Gemini XI (Sept. 1966): *CP:* **Charles "Pete" Conrad**†; *Pilot:* Richard F. Gordon
Gemini XII (Nov. 1966): *CP:* James Lovell; *Pilot:* **Edwin "Buzz" Aldrin, Jr.**

APOLLO PROGRAM

Apollo 1 (Jan. 1967): *CDR*: Virgil "Gus" Grissom†; *Sr. Pilot:* Edward White†; *Pilot*: Roger Chaffee†
Apollo 7 (Oct. 1968): *CDR*: "Wally" Schirra†; *LMP*: "Walt" Cunningham; *CMP*: Donn Eisele†
Apollo 8 (Dec. 1968): *CDR*: Frank Borman; *LMP*: James Lovell; *CMP*: William Anders
Apollo 9 (March 1969): *CDR*: James McDivitt; *LMP*: "Rusty" Schweickart; *CMP*: **David Scott**
Apollo 10 (May 1969): *CDR*: Thomas Stafford; *LMP*: **Eugene "Gene" Cernan**†; *CMP*: **John Young**
Apollo 11 (July 1969): *CDR*: **Neil Armstrong**†; *LMP*: **Edwin "Buzz" Aldrin, Jr**.; *CMP*: Michael Collins
Apollo 12 (Nov. 1969): *CDR*: **Charles "Pete" Conrad**†; *LMP*: **Alan Bean**; *CMP:* Richard F. Gordon
Apollo 13 (April 1970): *CDR*: James Lovell; *LMP*: Fred Haise; *CMP*: John "Jack" Sigert†
Apollo 14 (Feb. 1971): *CDR*: **Alan Shepard**†; *LMP*: **Edgar Mitchell**†; *CMP:* Stuart Roosa†
Apollo 15 (July 1971): *CDR*: **David Scott**; *LMP*: **James B. Irwin**†; *CMP*: Al Worden
Apollo 16 (April 1972): *CDR*: **John Young**; *LMP*: **Charles M Duke**; *CMP:* Thomas "Ken" Mattingly
Apollo 17 (Dec. 1972): *CDR:* **Eugene "Gene" Cernan**†; *LMP***: Harrison Schmitt**; *CMP*: Ronald Evans†

Moonwalkers in bold; †: Deceased; *CP:* Command Pilot; CDR: Mission Commander; *LMP:* Lunar Module Pilot; *CMP*: Command Module Pilot; *DMP:* Docking Module Pilot; *FE:* Flight Engineer

INTRODUCTION

We are thrilled to be holding Sotheby's first Space Exploration-themed auction in over two decades, timed to coincide with the 48th anniversary of the first moon landing, accomplished during the Apollo 11 mission on July 20th, 1969 by astronauts Neil Armstrong & "Buzz" Aldrin.

When Sotheby's held its two groundbreaking Russian Space History sales in 1993 and 1996, the material in the sale had never before been offered at auction – Alexei Leonov's flown space suit from *ASTP*, the *Soyuz TM-10* space capsule, the *Lunokhod-1* lunar rover (which is still on the moon), and even lunar rocks collected by the *Luna-16* unmanned probe (the only legal sale of moon rock to date) were just some of the incredible items that captured the imaginations of bidders and the general public. The excitement in the room was palpable, and the general consensus amongst buyers was disbelief that they could actually have a chance to own items of such significance.

A few of the items in this years' sale were originally purchased in those first Sotheby's sales, including the English-language Records File for the very first human journey into outer space, by Cosmonaut Yuri Gagarin (lot 44), and a very fine model of the *Soyuz TM-*6 spacecraft (lot 50), presented to Cosmonaut Lyakhov in commemoration of his masterful handling of the most challenging Soviet mission to have ever occurred.

Much has changed in the intervening decades, and the collecting interest in Space Exploration has grown tremendously. Until just five years ago, there was no clear legislation pertaining to ownership rights of artifacts received by US astronauts. This changed dramatically in October of 2012, when President Obama signed into law an act [H.R. 4158], clarifying this, and granting US astronauts who participated in the Mercury, Gemini, or Apollo programs through the Apollo-Soyuz Test Project "full ownership of and clear title to" artifacts that they received during participation in the space missions. It further "prohibit[ed] the federal government from having any claim or right to ownership, control, or use of (1) any artifact in the possession of such an astronaut; or (2) any such artifact that was subsequently transferred, sold, or assigned to a third party by such an astronaut." Partly because of this legislation, the collecting field has been transformed, and buyers can experience the thrill of being able to purchase items of this type, knowing that their ownership is fully protected by law. In this vein, we have several items that come either directly from a US astronaut, such as lot 95, Apollo 11 Command Module Pilot Michael Collins Crew signed Beta-cloth emblem, that flew with them to the moon; or items that were given as a gift to someone by an Apollo astronaut, such as lot 140, the Flown Flight plan from Apollo 13.

The star lot in the sale however, does not come to us directly from an astronaut. The Flown Apollo 11 Contingency Lunar Sample Return bag (lot 102) was used by Neil Armstrong on Apollo 11 to bring back the very first sample of the moon ever collected. Still containing remnants of lunar dust, this seemingly modest bag has undergone an incredible journey from the Earth to the moon and back, and to us here 48 years later. Due to an error very early on, the bag was misidentified and nearly thrown in the trash, and its true identity remained hidden up until just two years ago when it found its way into a seized assets auction held on behalf of the US Marshall's Service. The current owner purchased the bag along with a box full of other space-related odds and ends, and on a hunch, decided to send the bag to NASA for testing. It was determined that not only did the bag contain lunar dust, but it was in fact the very bag used by Neil Armstrong to bring back the contingency lunar sample. A legal battle to determine the rightful ownership of the bag ensued, with the current owner being awarded full ownership and clear title by a Federal judge — making this the only such artifact available for private ownership. It is quite simply one of the most remarkable items we have ever had the pleasure of handling, and we are very pleased to be able to say that it will be on view to the public *for the very first time* during out exhibition in July. We look forward to having you here for the exhibit in our New York galleries, and are happy to answer any questions or provide condition reports for any lots in the sale.

Cassandra Hatton
Books & Manuscripts

SESSION ONE

NEW YORK
THURSDAY
20 JULY 2017
11AM

LOTS 1-77

THIS PAGE
LOT 13

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3

EARLY LUNAR & SPACE PHOTOGRAPHY

LOTS 1–5

1

WARREN DE LA RUE

Lunar photograph, executed ca. 1855

Albumen print, 5½ by 4¼ inches, mounted on paper within an ink-ruled border.

An early lunar photograph depicting the moon at 20 days. Warren De La Rue was a pioneering British astronomer and chemist who made great contributions to the field of astrophotography. La Rue began his photographic experiments in 1853, continuing his investigations into celestial photography throughout the 1860s, while simultaneously publishing and lecturing on the subject.

PROVENANCE

Ex Ewen Whitaker, lunar scientist and astronomer

$ 4,000-5,000

2

ROBERT LEWIS JOHN ELLERY

Lunar photograph executed at the Melbourne Observatory, 1 September 1873

Albumen print, 10¼ by 8 inches, mounted on card stock, inscribed in contemporary hand on verso: "*Photograph made with the Melbourne Telescope 1875",* 1875 has been crossed out, and 1873 Sept 1 has been written in pencil.

An image of the moon at 9 days executed by astronomer and scientist Robert Lewis John Ellery. Ellery was the director of the earliest permanent observatory in Australia — the Melbourne Observatory, established in 1863 — and oversaw the installation and operation of the Great Melbourne Telescope.

PROVENANCE

Ex Ewen Whitaker, lunar scientist and astronomer

$ 2,000-2,500

3

CORONEL TEODORO QUINTANA

Lunar photograph taken at the Observatorio Astronómico Nacional, Mexico, 2 February 1887

Albumen print, 6 by 5¼ inches, mounted on printed card stock within ink ruled border. Inscribed in contemporary hand on verso: *"Royal Observatory Greenwich, Folio 17."*

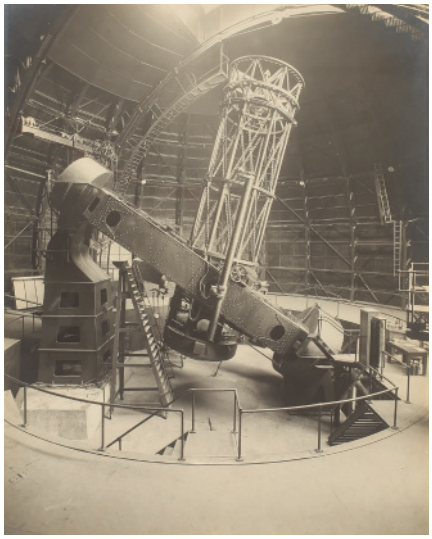
A photograph of the moon at 10.5 days. Mounted on board with the printed caption: "*Ensayos de Fotographía Lunar. Fotographía sacada con el refractos de 15 pulgadas (con aberracion cromática) el dia 2 de Febrero de 1887 en el 10° dia de Lunacion por el Teniente Coronel Teodoro Quintana."*

Established in 1877-78 in conjunction with the National Meteorological Observatory and National Central Observatory, the National Astronomical Observatory was located in Chapultepec Castle in Mexico City. Lieutenant Colonel Teodoro Quintana, the photographer of the Presidential Guard, became involved with the observatory in 1885 at the invitation of director Ángel Anguiano. During his tenure there, Quintana undertook the study of astrophotography, and began producing lunar photographs such as the one at hand.

PROVENANCE

Ex Ewen Whitaker, lunar scientist and astronomer

$ 2,000-2,500



4

4

4

FRANCIS GLADHEIM PEASE

Southern portion of the Moon, 15 September 1919

Two silver gelatin prints, 9¾ by 8 inches.

A photograph of the southern portion of the last quarter of the Moon, accompanied by a photograph of the 100-inch Hooker Telescope — the telescope with which the former was taken.

Dr. Francis Pease was an American mechanical engineer, optician, and astronomer, who made great contributions to the field of instrument design and astrophotography in the early twentieth century. He spent the bulk of his career at the Mount Wilson Observatory near Pasadena, where he designed and constructed a series of instruments, and explored the practical operation of large telescopes.

With the completion of the Hooker 100-inch reflector, Pease commenced a series of direct photographic observations of nebulae and star fields from 1917-1919, and would later expand his subject matter to encompass lunar photography. The Hooker telescope remained the largest aperture telescope in the world from 1917 to 1949. Pease's interest in lunar and planetary photography remained with him throughout his life, and for his contributions to the field, had a lunar impact crater named after him (Pease crater).

PROVENANCE

Ex Ewen Whitaker, lunar scientist and astronomer

$ 1,500-2,000

5

5

FRANCIS GLADHEIM PEASE

3 Photographs of Nebulae taken from the Mt. Wilson Observatory in Pasadena, ca. 1917-1919

Three silver gelatin prints, 15 by 18¾ inch, mounted on board.

PROVENANCE

Ex Frederick C. Durant, III collection

$ 1,500-2,500

LUNAR ORBITER PHOTOGRAPHY

LOTS 6-16

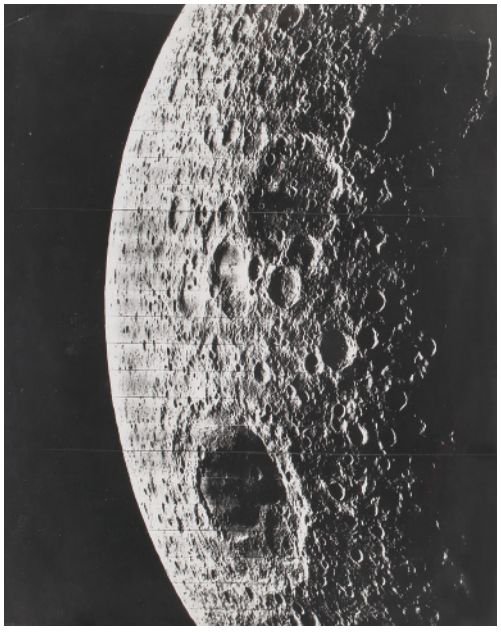
The Lunar Orbiters were a series of five unmanned spacecraft sent by NASA from 1966-67 to orbit the moon and take detailed images of it with the primary objective of mapping the surface and identifying potential manned landing sites. All five missions were successful, and 99% of the Moon was photographed with a resolution of 60 m or better. Orbiters I-III were sent with the objective of imaging 20 potential lunar landing sites, and were flown at low inclination orbits. Orbiters IV-V had broader scientific objectives, and were flown in high altitude polar orbits. The entire nearside and 95% of the farside were photographed by Orbiter IV, with the farside imagery being completed by Orbiter V.

The Orbiters' camera systems were an ingenious technological feat, and the entire process of transmitting the images back to Earth almost defies belief. Each Orbiter was equipped with a dual-lens Kodak camera (one medium resolution wide angle 80 mm lens, and one 610 mm high resolution telephoto lens), a film processing unit, a readout scanner, and a film handling apparatus. Each lens then placed its exposures on a single roll of 70 mm film. The film was moved during exposure to compensate for the spacecraft velocity, which was estimated by an electric-optical sensor. The film was then processed on board the Orbiter by a method Kodak invented called Bimat (akin to the Polaroid process). The film was then passed through an analog scanner, which in turn transmitted the data back to Earth by radio, using technology largely derived from television broadcasting and developed by the Research & Development wing of CBS. This data was then gathered by three NASA Deep Space Network receiving stations (in California, Spain, and Australia), and from there, the data was sent to the Army Map Service, and the NASA Langley Research Center (LRC). The video signal was then converted into variations of light on a cathode ray tube, producing an image that was then captured on positive film by a 35 mm camera. These film positives, or framelets, are then placed side-by-side to recreate the original Orbiter photograph. These framelets are considered zero-generation, and from them negatives were produced, and from those contact prints.

6

7

8



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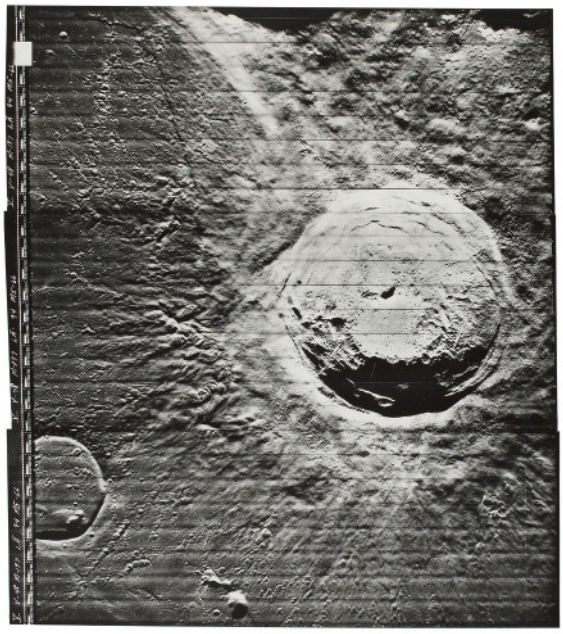


10

6

LUNAR ORBITER I

MAN'S FIRST LOOK AT THE EARTH FROM THE MOON, 23 AUGUST 1966

Silver gelatin print, 16 by 20 inches, of Lunar Orbiter images I-102H-1 & 2. WITH: Original Aeronautical Chart and Information Center mailing tube, stamped Apr 4, 1967.

Perhaps the most famous of the Lunar Orbiter images, this photo, taken by Lunar Orbiter I after responding to commands sent to it from Earth from a quarter million miles away, was taken from a vantage point of 730 miles above the far side of the Moon, on August 23, 1966.

REFERENCES

See Bowker & Hughes, *Lunar Orbiter Photographic Atlas of the Moon*; Illustrated in: Cortright, *Exploring Space with a Camera,* pp 84-85.

$ 4,000-6,000

7

LUNAR ORBITER II

"THE PICTURE OF THE CENTURY" - OBLIQUE VIEW INTO THE HEART OF CRATER COPERNICUS, 24 NOVEMBER 1966

Silver gelatin print, 16 by 20 inches, of Lunar Orbiter image II-162-H3.

Hailed by *Life* magazine as "The Picture of the Century," this image was taken from approximately 28.4 miles above the lunar surface, from a vantage point of 150 miles south of the crater. Until this photo was taken, the few images that had been taken of the lunar surface were from a perpendicular angle - this was the first to be taken from an oblique angle, and thus the first ever view of the rugged surface, with its mountains and valleys.

REFERENCES

See Bowker & Hughes, *Lunar Orbiter Photographic Atlas of the Moon*; Illustrated in: Cortright, *Exploring Space with a Camera,* p 89.

$ 3,000-5,000

8

LUNAR ORBITER V

EARTH FROM SPACE, 17 AUGUST 1967

Silver gelatin photograph, 19½ by 23½ inches. Lunar Orbiter image V-027M.

A striking photo of Earth taken from a distance, showing just how small our planet is when compared to the vast expanse of space.

REFERENCES

See Bowker & Hughes, *Lunar Orbiter Photographic Atlas of the Moon.*

$ 2,500-3,500

9

LUNAR ORBITER V

FARSIDE OF THE MOON WITH MARE MOSCOVIENSE, 13 AUGUST 1967

Silver gelatin print, 16 by 20 inches, of Lunar Orbiter image V-103M.

A spectacular image of the farside of the moon, showing the Mare Moscoviense (Sea of Moscow) and the craters Campbell and D'Alembert.

REFERENCES

See Bowker & Hughes, *Lunar Orbiter Photographic Atlas of the Moon.*

$ 1,500-2,500

10

LUNAR ORBITER V

CRATER ARISTARCHUS, 18 AUGUST 1967

Silver gelatin print, 18 by 20 inches, of Lunar Orbiter image V-197M.

A highly detailed image of crater Aristarchus, with the smaller Aristarchus F to the lower left.

REFERENCES

See Bowker & Hughes, *Lunar Orbiter Photographic Atlas of the Moon.* Washington, D.C.: National Aeronautics and Space Administration, 1971; Illustrated in: Cortright, *Exploring Space with a Camera,* pp 122-23.

$ 1,000-1,500

11

LUNAR ORBITER V

HARBINGER MOUNTAINS, 15 AUGUST 1967

Two telephoto panoramas, 62½ by 19 and 58 by 19 inches, each comprising 9 silver gelatin prints joined, of Lunar Orbiter images V-186-187H. Printed on vintage Kodak watermarked paper, versos stamped October 16 & October 17 1967 respectively.

The Harbinger Mountains, so-named because they serve as the harbingers of dawn on the crater Aristarchus, are an isolated cluster of mountains at the *Mare Ibruim* basin's western edge. They consist of four primary mountain ridges, as well as several hills.

REFERENCES

See Bowker & Hughes, *Lunar Orbiter Photographic Atlas of the Moon.*

$ 2,000-3,000

12

LUNAR ORBITER V - LANDING SITE III

LANDING SITE III, PART II, 17 AUGUST 1967

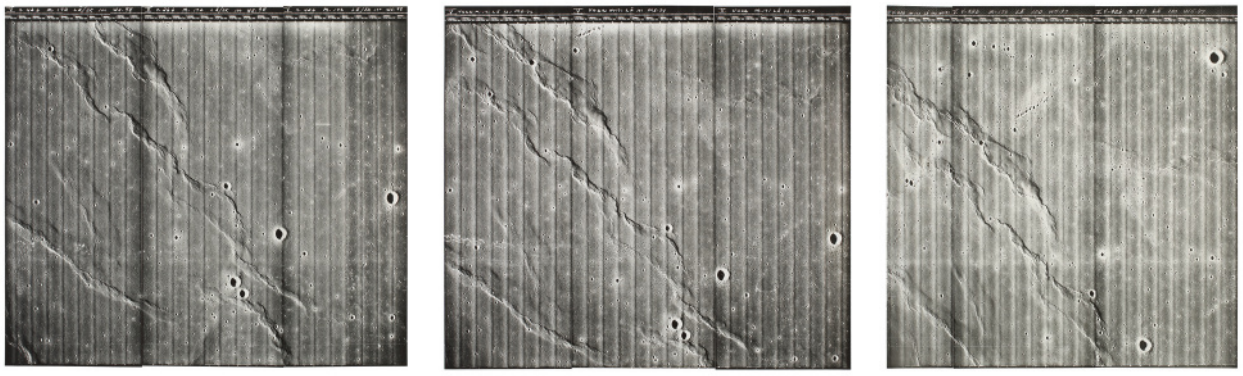
Two telephoto panoramas, 65 by 19 and 68 by 19 inches, each comprising 10 silver gelatin prints joined, of Lunar Orbiter images V-174-175H plus V-171-173M. Printed on vintage Kodak watermarked paper.

A sweeping view of the second portion of the landing site for Surveyor 3, located in the *Oceanus Procellarum,* which would later become the landing site for Apollo 12.

REFERENCES

See Bowker & Hughes, *Lunar Orbiter Photographis Atlas of the Moon.*

$ 4,000-6,000



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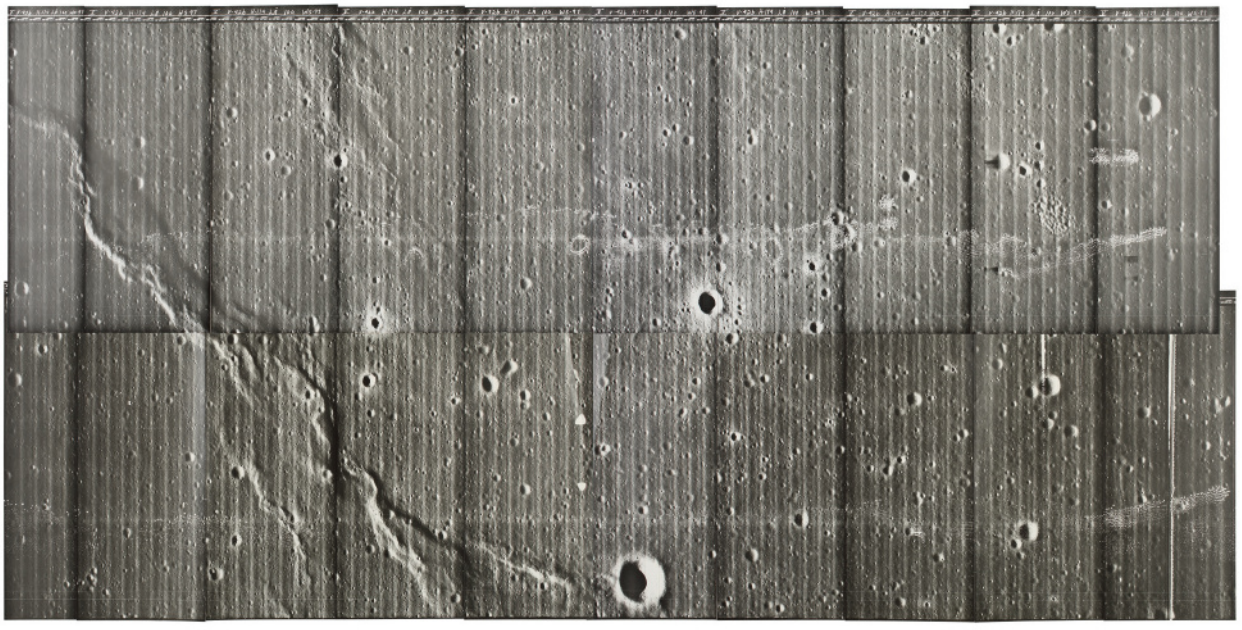

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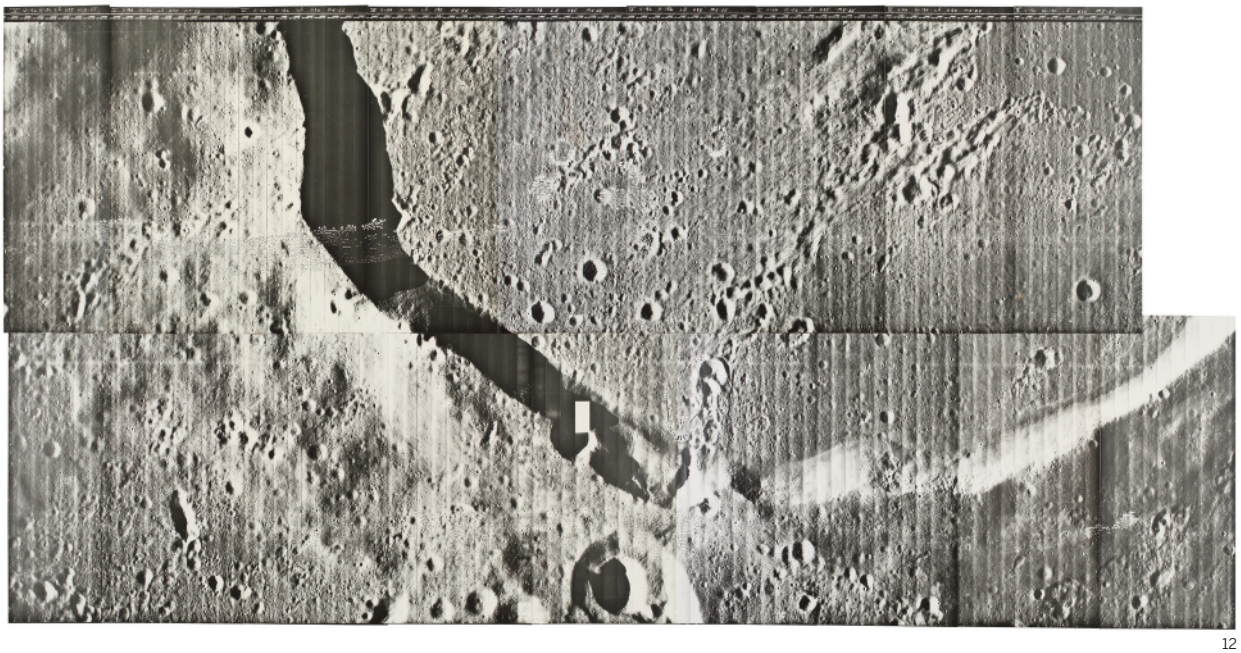
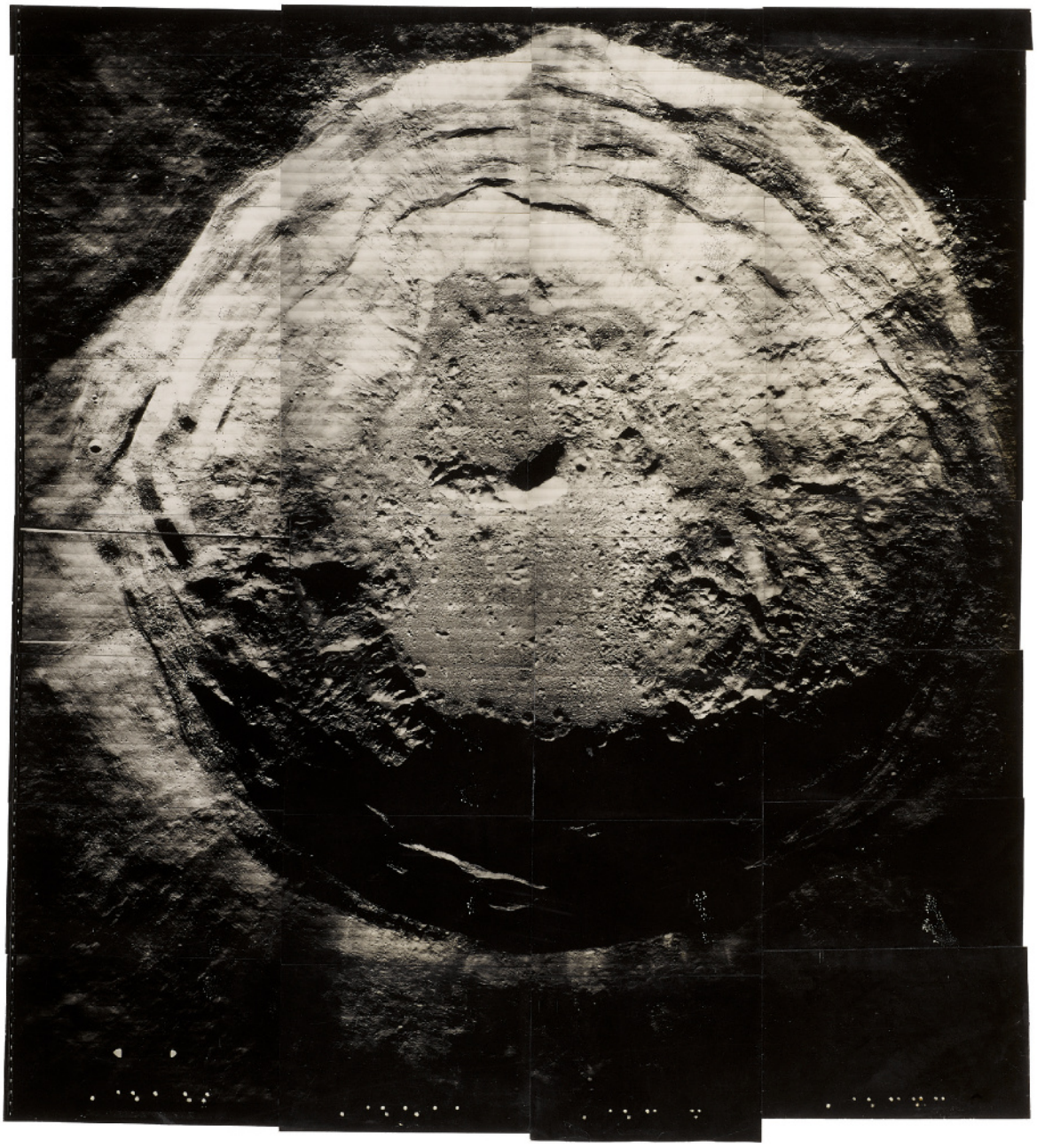


12



13

13

LUNAR ORBITER V

Oversize view of the crater Aristarchus, 18 August 1967

4 telephoto panoramas, each comprising 8 silver gelatin prints mounted, of Lunar Orbiter images 197-200H, 51½ by 57¾ inches overall, framed.

ONE OF ONLY TWO KNOWN COPIES of this impressive image of the complex impact crater Aristarchus, taken using a 24-inch focal length lens from an altitude of 80 miles. Aristarchus is considered the brightest of the large formations on the lunar surface, and is visible to the naked eye, being 23 miles in diameter, and 10,000 feet deep. Probably formed about 175 million years ago, it is one of the most geologically interesting regions of the moon, and there have even been periodic sightings of reddish gas emissions from the crater rim.

The only other known copy of this image is in the collection of the George Eastman House in Rochester, New York.

EXHIBITED: Lunar Landscapes, Menil Collection, Houston, TX, March 10-June 4, 2000.

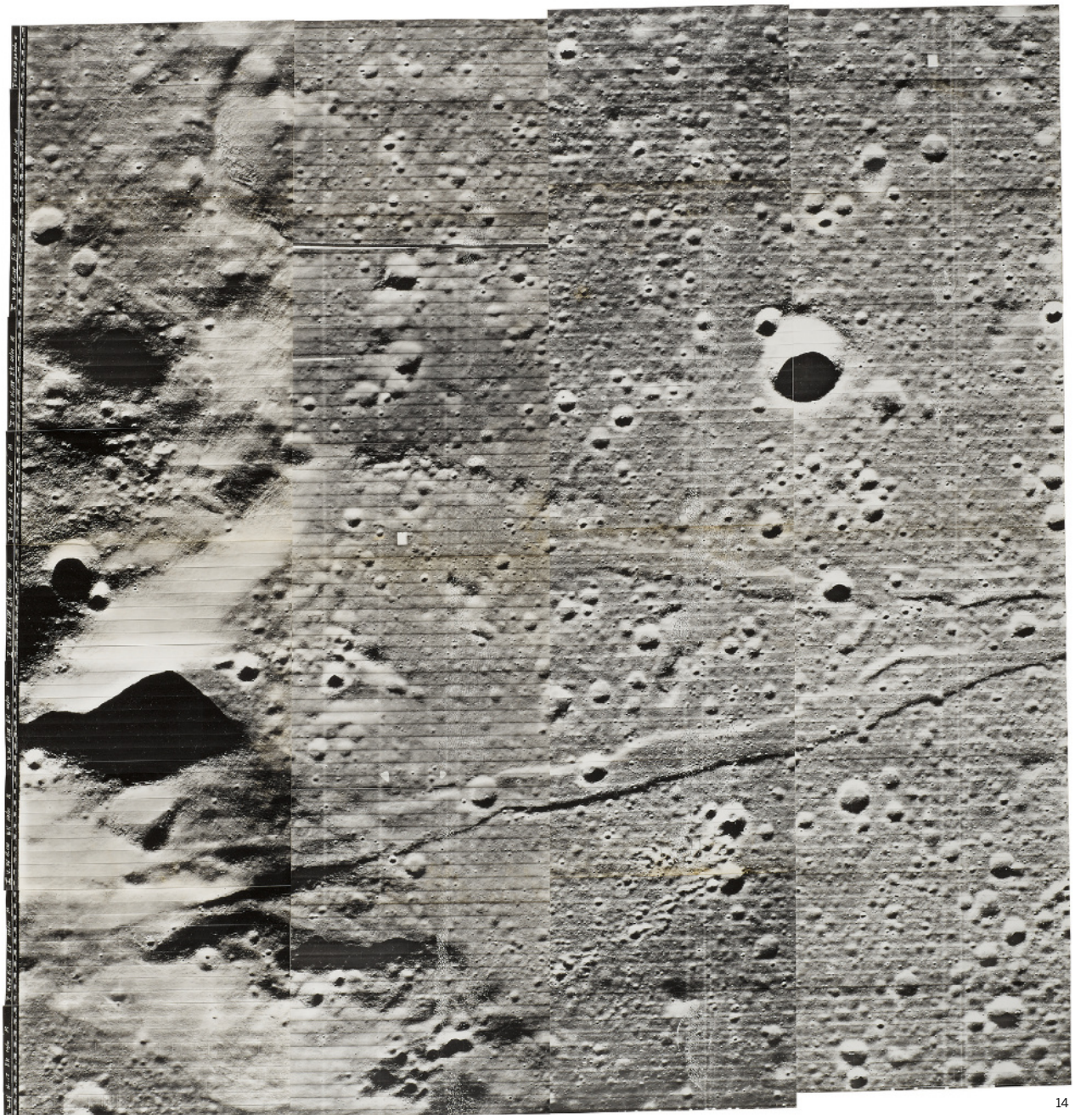
REFERENCES

See Bowker & Hughes, *Lunar Orbiter Photographic Atlas of the Moon*; Illustrated in: Cortright, *Exploring Space with a Camera,* pp 122-23.

PROVENANCE

Ex George T. Keene, Head of Kodak's Photo Science Group

$ 100,000-125,000



14

14

LUNAR ORBITER V

Oversize view of the Rimae Parry leading into Fra Mauro crater, 15 August 1967

4 telephoto panoramas, each comprising 10 silver gelatin prints joined, of Lunar Orbiter images V-138-141H, 59½ by 61½ inches overall, framed.

A SWEEPING VIEW OF A PORTION OF THE LUNAR SURFACE, SHOWING THE RILLES, RIDGES AND CRATERS IN EXCEPTIONAL DETAIL. The Rimae Parry are two sinuous rilles that lead into and cross over the Fra Mauro crater.

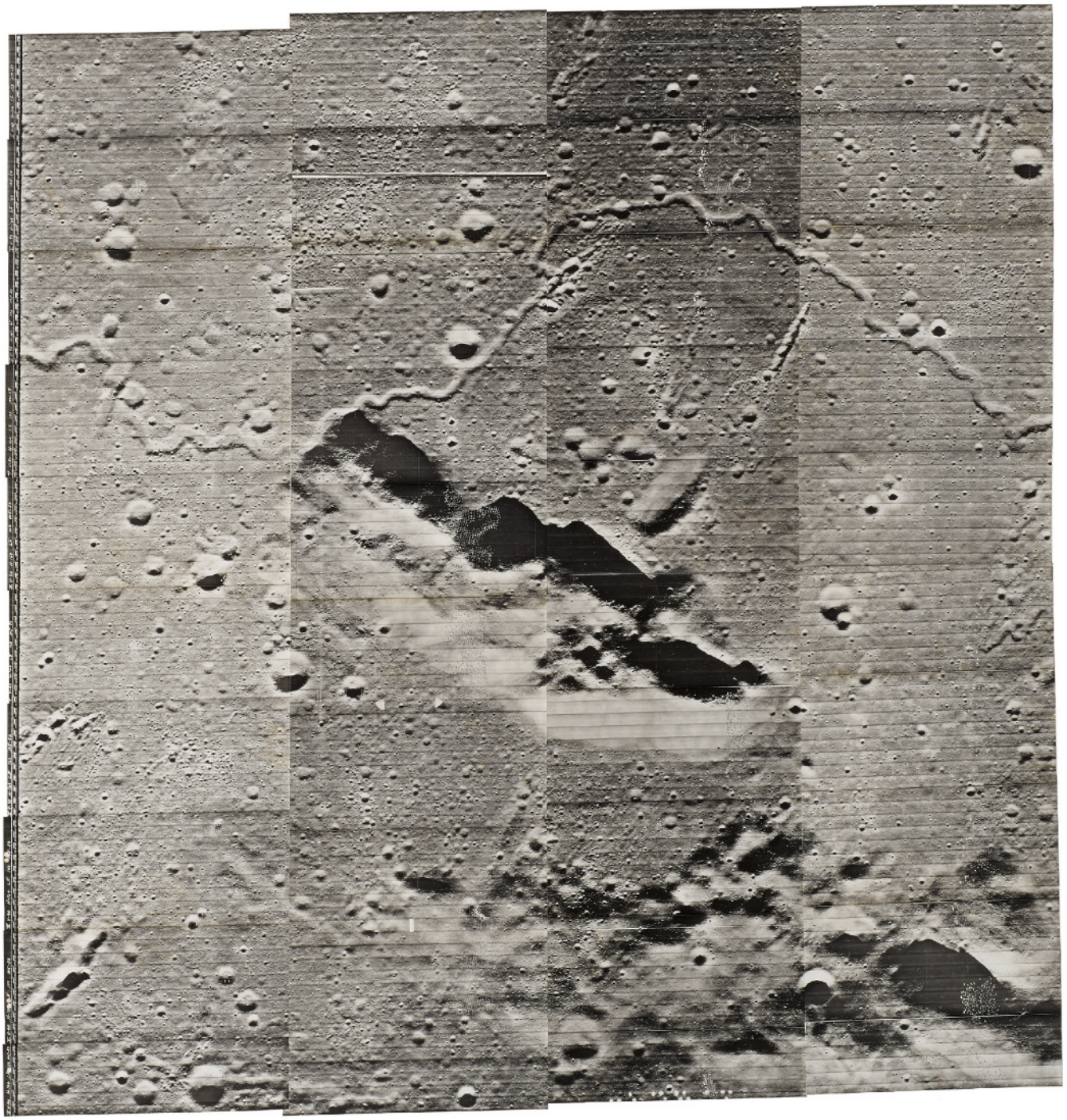
REFERENCES

See Bowker & Hughes, *Lunar Orbiter Photographic Atlas of the Moon.*

PROVENANCE

Ex Robert H. "Steiny" Steinbacher, JPL scientist

$ 15,000-20,000



15

15

LUNAR ORBITER V

Oversize view of the Rima Tobias Mayer, and a low dome, 17 August 1967

4 telephoto panoramas, each comprising 10 silver gelatin prints joined, of Lunar orbiter images V-164-167H, 58½ by 61¾ inches overall, framed.

The lunar rimae are usually named after nearby craters, and such is the case with Rima Tobias Mayer, which was itself named after the 18th-century German astronomer known for his careful investigations of the moon, and his excellent lunar tables.

REFERENCES

See, Bowker & Hughes, *Lunar Orbiter Atlas of the Moon.*

PROVENANCE

Ex Robert H. "Steiny" Steinbacher, JPL scientist

$ 15,000-20,000

16

16

LUNAR ORBITER V

Oversize view of Schröter's Valley, 18 August 1967

4 telephoto panoramas, each comprising 10 silver gelatin prints joined, of Lunar Orbiter image V-202-205H, 59 by 61 inches overall, framed.

Taken from an altitude of 87 miles from the lunar surface, this large mosaic image of Schröter's Valley, located near the crater Aristarchus, brings into evidence one of the most unusual features of the lunar surface: its sinuous rilles. Basically long, meandering channels, scientists believe that they may be collapsed lava tubes, as they usually begin at an extinct volcano, and meander and split across the lunar surface in the way that a river would flow.

REFERENCES

See Bowker & Hughes, *Lunar Orbiter Photographic Atlas of the Moon;* Illustrated in: Cortright, *Exploring Space with a Camera,* p. 124 (detail).

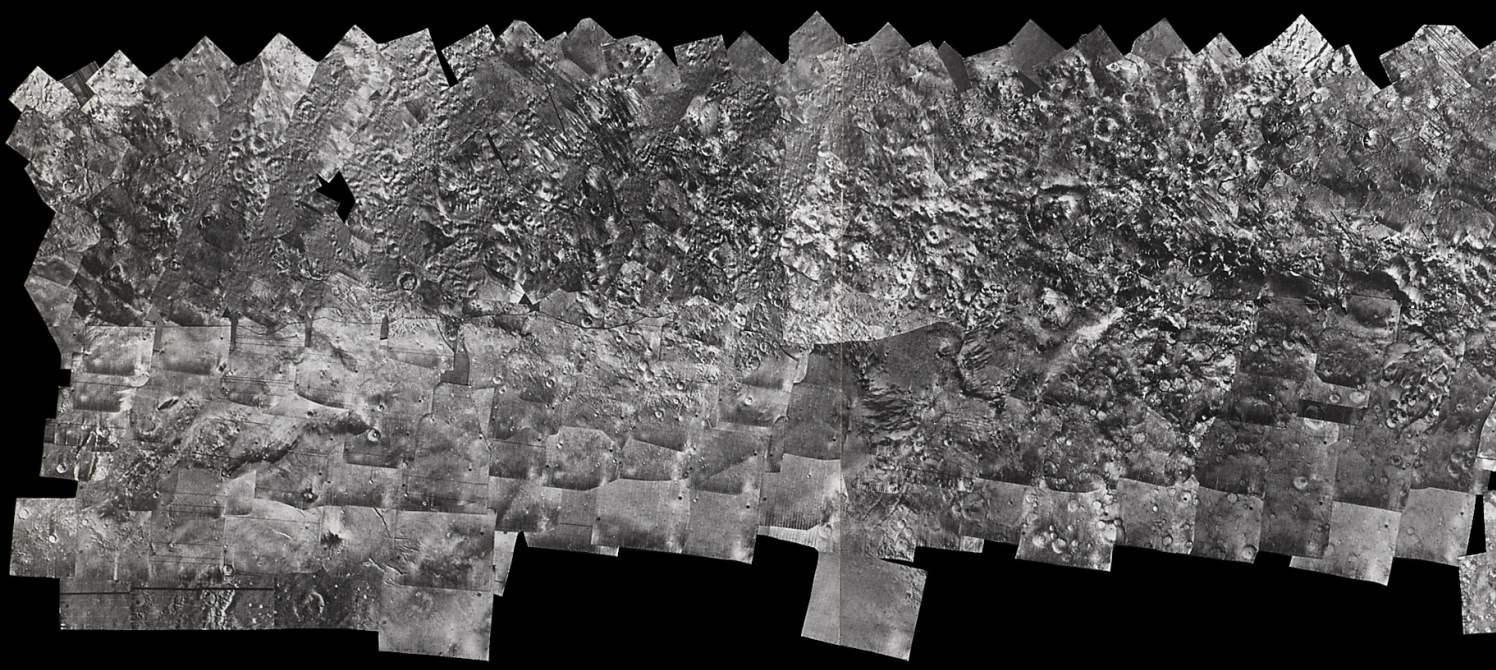
PROVENANCE

Ex Robert H. "Steiny" Steinbacher, JPL scientist

$ 15,000-20,000

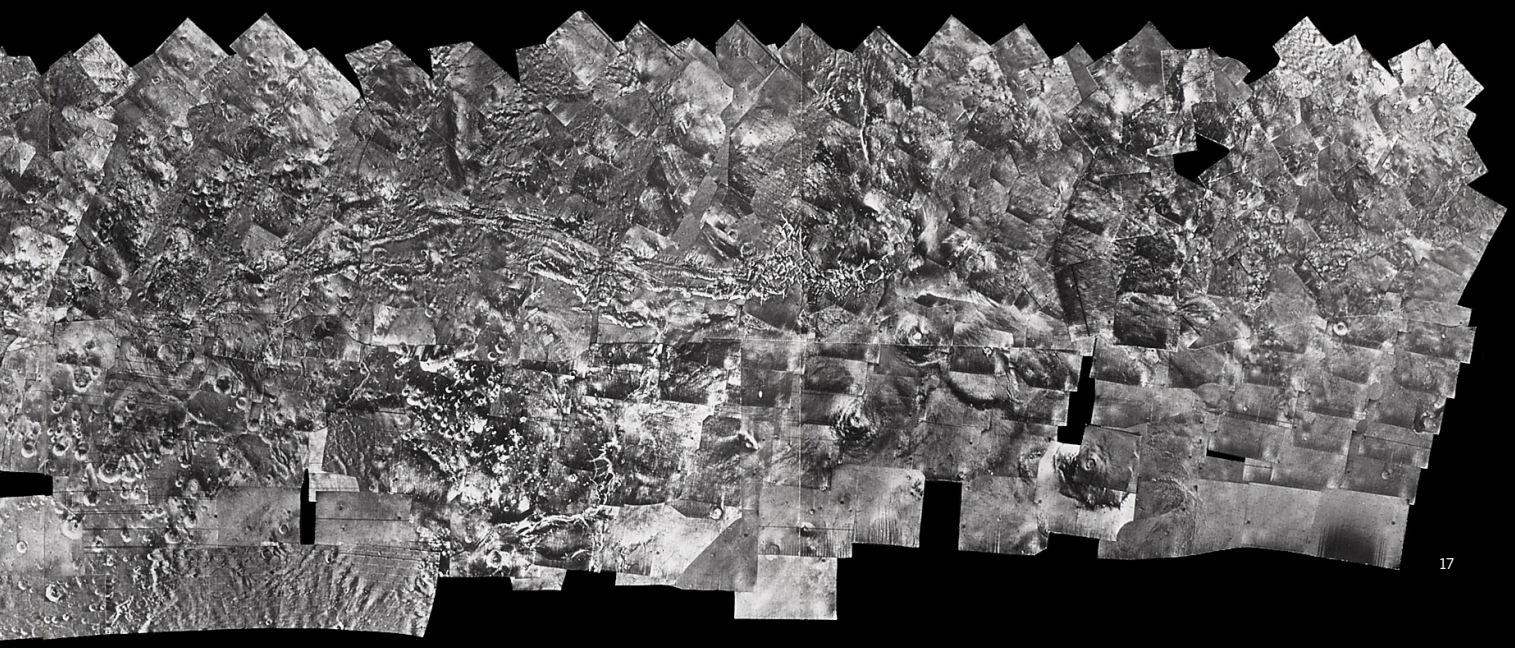
MARINER IX & VIKING ORBITER PHOTOGRAPHY OF MARS

LOTS 17–23



The Mariner IX spacecraft launched on May 30th 1971, becoming the first artificial satellite of Mars. After completing its final transmission on October 27, 1972 it had photo-mapped 100% of the planet's surface, including providing close-up pictures of Mars' two small moons. The images taken by Mariner IX were then printed on photo paper, and hand trimmed. Using a detailed diagram of the spacecraft's photographic coverage of the planet, the images were then assembled into a mosaic image by hand onto a large board. These mosaics were then photographed and printed out, and then corrected, enhanced, and reassembled before the final mosaics were printed.

Viking Orbiters 1 & 2 launched in August and September 1975 and arrived approximately 10 months later. Both Orbiters were first used exclusively to search for and certify a safe landing site for their landers. After doing so, they set about systematically imaging the planet's surface using a remarkable twin camera system. The cameras were similar to television cameras, and each was fitted with a 475 mm Cassegranian telescopic lens assembly. These cameras operated alternately, with one shuttering at the end of the readout scan of the other. Each image was the product of a single readout of the slow scan video sensor, with the 1.25 million pixels in each image arranged in a matrix of 1056 lines x 1182 samples. Images used in the production of the mosaics were cut from this format, with each image identified by a unique alphanumeric designator picture number known as a PICNO.



17

17

MARINER IX

The Equatorial belt of Mars with Olympus Mons visible, November 14, 1971-October 27, 1972

4 silver gelatin prints of a hand mosaic, joined and mounted together, 17¾ by 80 inches. Framed.

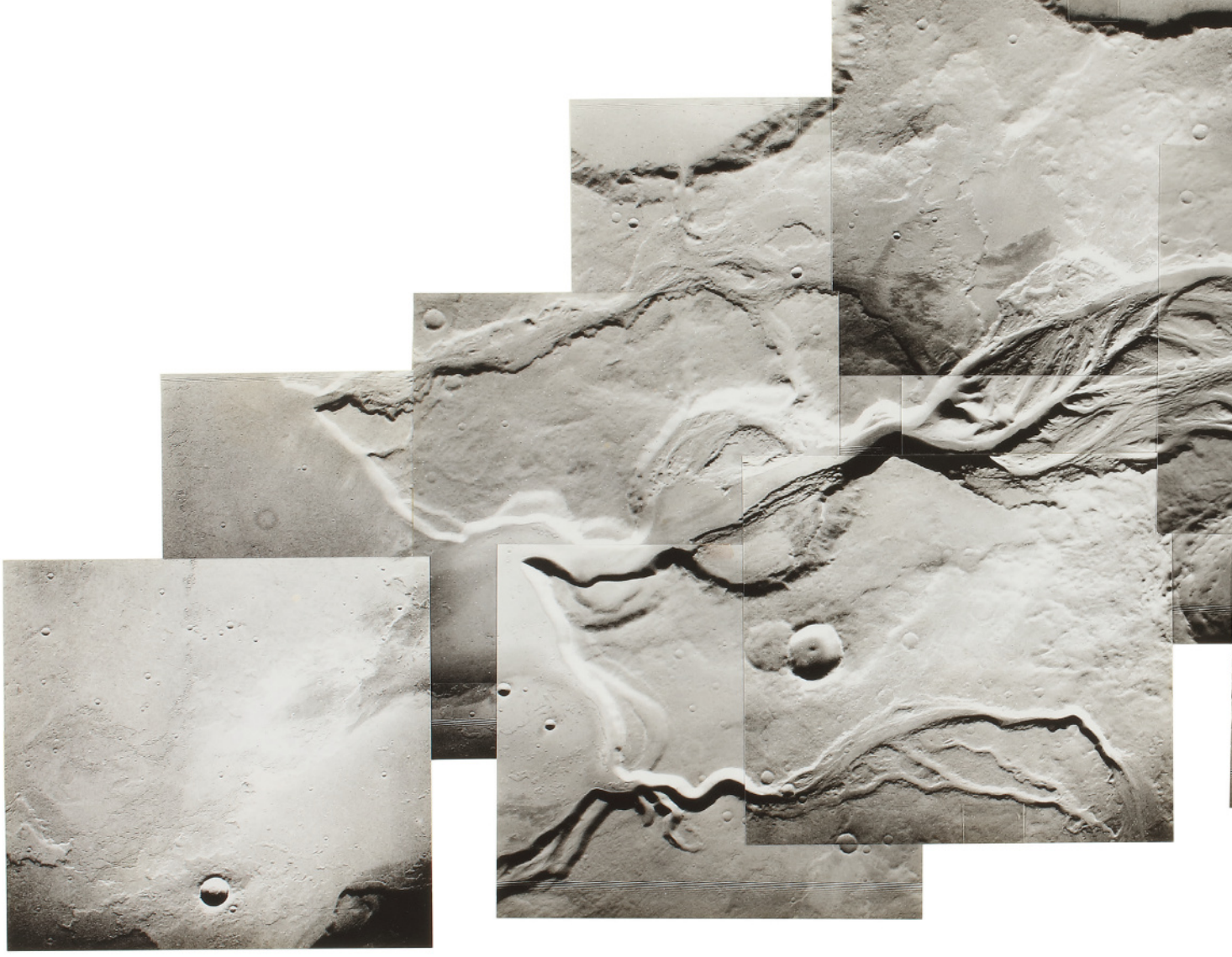
AN INCREDIBLE IMAGE OF THE RED PLANET'S SURFACE, INCLUDING THE AREA EXPLORED BY THE MARS ROVER - TAKEN BY THE FIRST SPACECRAFT TO ORBIT ANOTHER PLANET. A mosaic image, consisting of a belt completely encircling Mars, covering about half of the planet's surface. Major features shown include Olympus Mons, as well as Gale Crater, which was the landing site for the Curiosity Rover.

Mariner IX was an unmanned spacecraft launched on May 30, 1971 with the purpose of exploring Mars. It reached the red planet on November 14th 1971, just ahead of the Soviet *Mars 2* and *3* unmanned spacecrafts. After months of dust storms, it was finally able to send back clear images of the planet's surface, revealing an incredible rocky landscape reminiscent of the surface of the moon, complete with impact craters, canyons, valleys, volcanoes, and dry lake beds.

PROVENANCE

Ex Robert H. "Steiny" Steinbacher, JPL scientist

$ 15,000-25,000



20 (DETAIL)

18

VIKING ORBITER

Hand Mosaic of Mars, ca. 1979

9 silver gelatin prints mounted, PICNOs 174S 32-48 (even only), 3½ by 27¼ inches overall.

$ 1,500-2,500

19

VIKING ORBITER

Hand Mosaic of Mars, ca. 1979

10 silver gelatin prints mounted, PICNOs 768 A61-70, 6 by 18 inches overall.

$ 2,500-3,500

20

VIKING ORBITER

Hand Mosaic of Mars, ca. 1979

15 silver gelatin prints mounted, PICNOs 457 S 3-10, 458 S 11-14, & 459 S 16-18, 13 by 21¾ inches overall.

$ 3,000-5,000

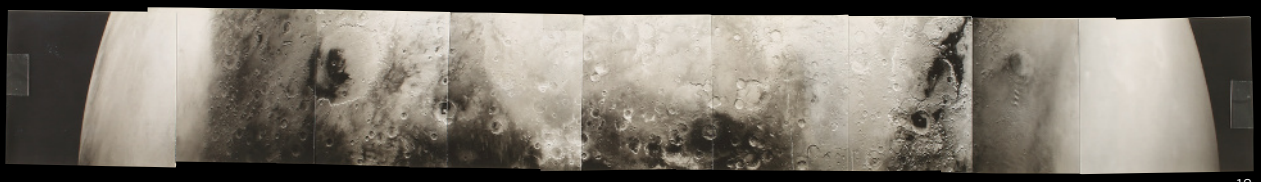
21

VIKING ORBITER

Hand Mosaic of Mars, ca. 1979

16 silver gelatin prints mounted, PICNOs 627 A 41-56, 8½ by 30½ inches overall.

$ 3,000-5,000



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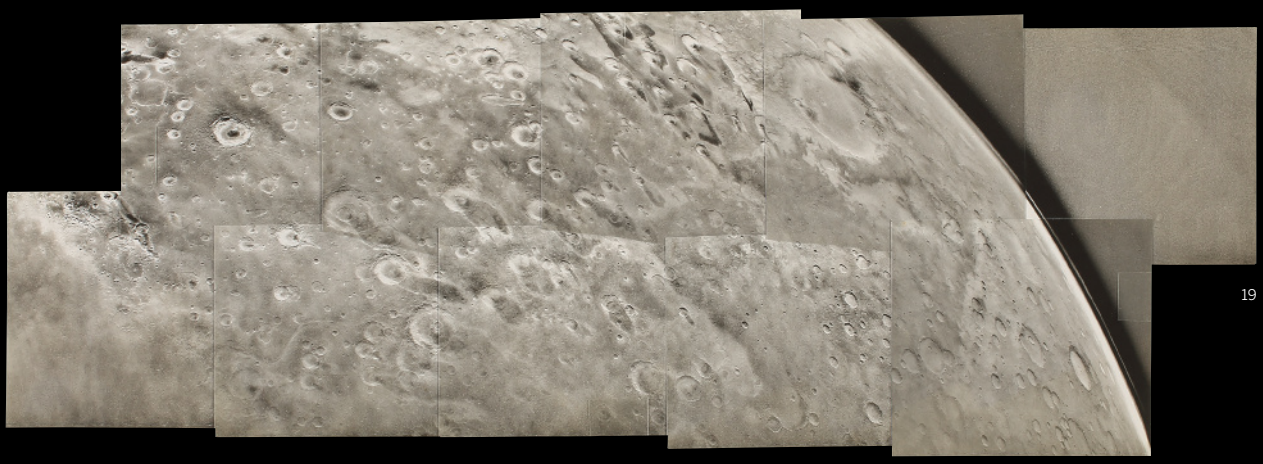

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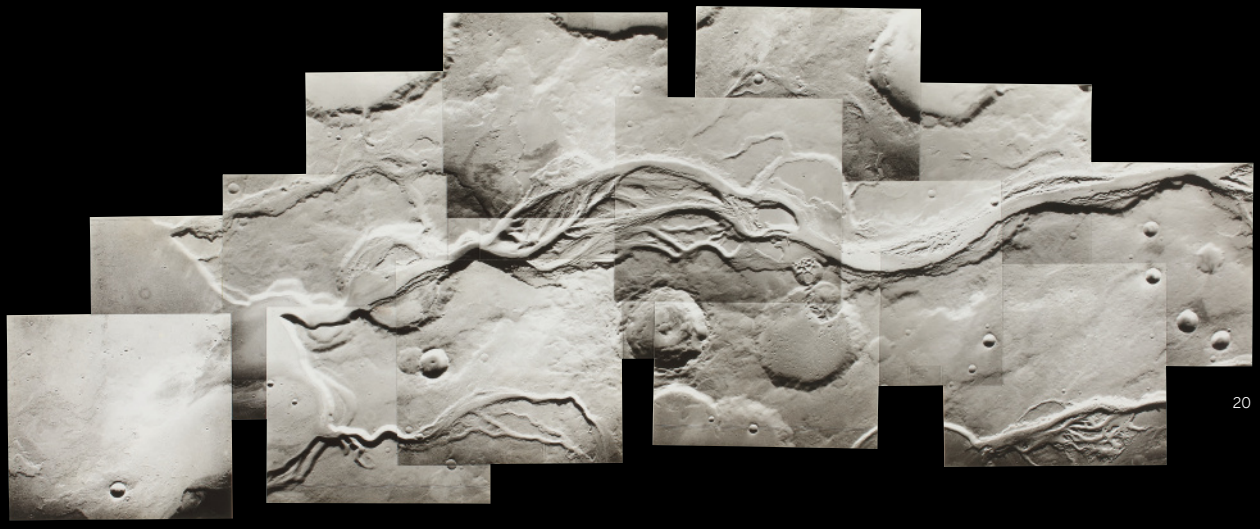

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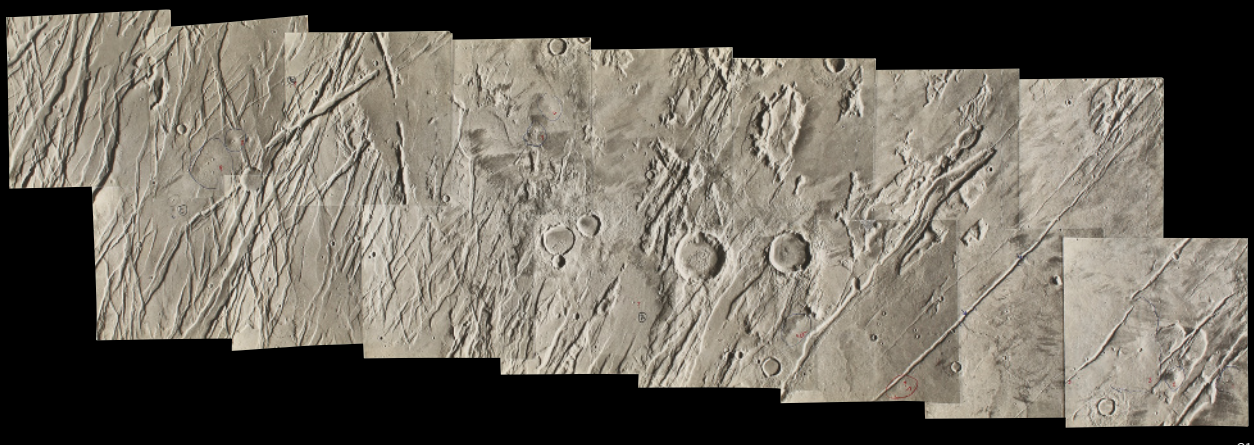

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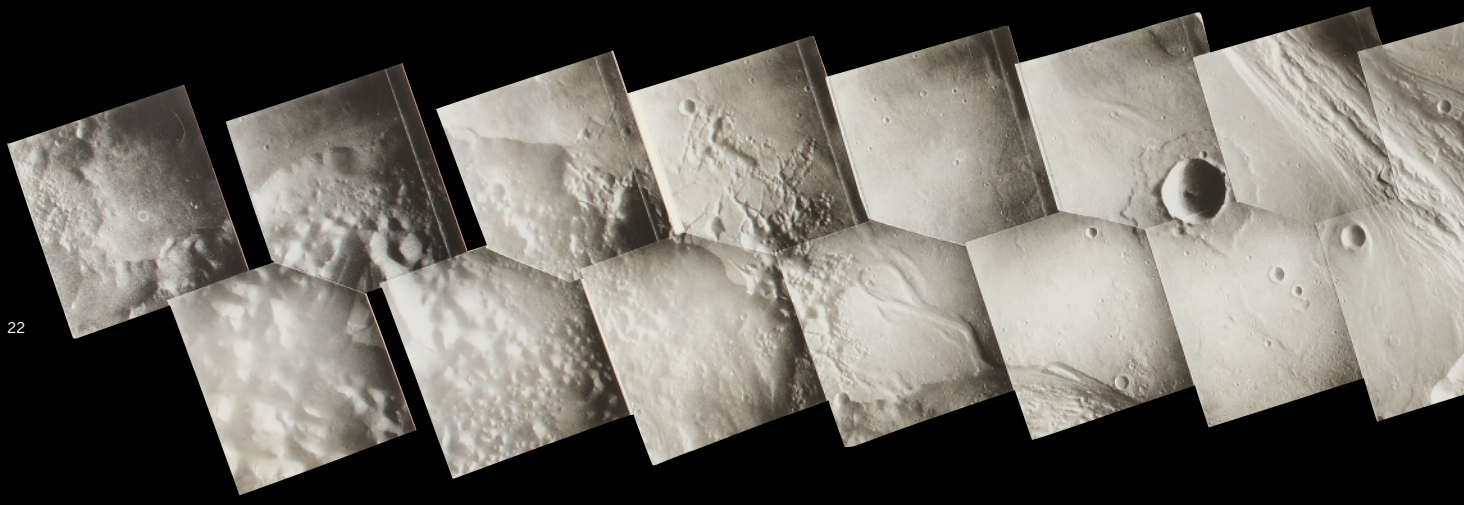

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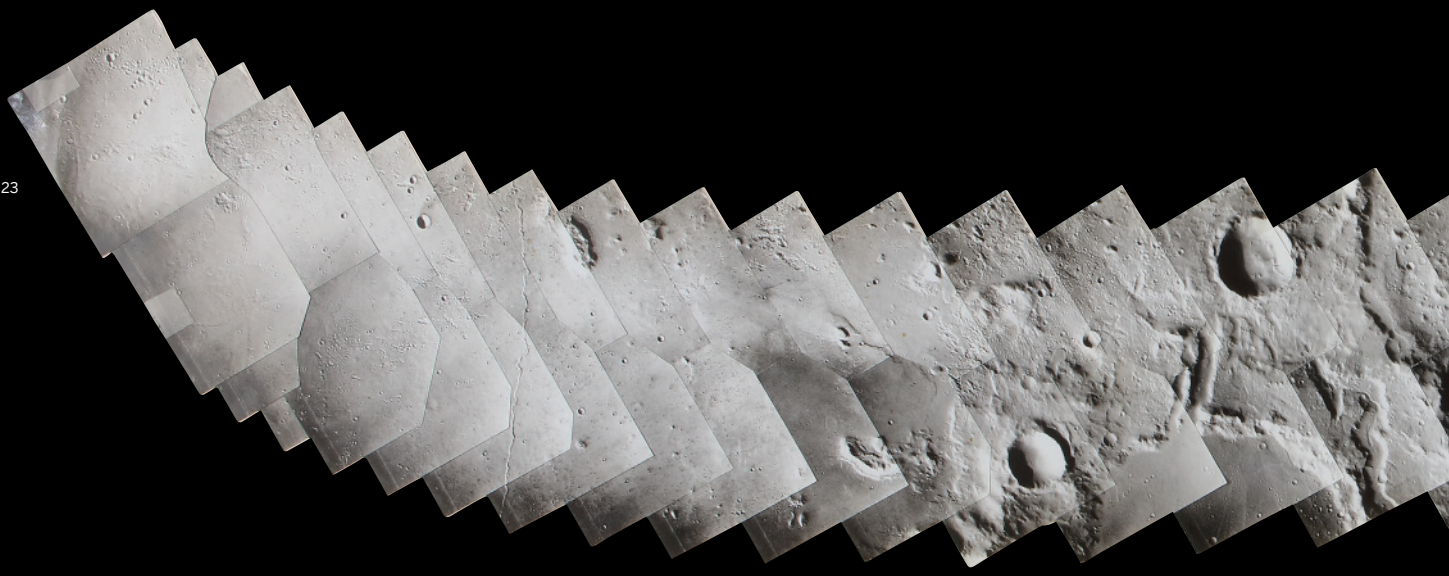
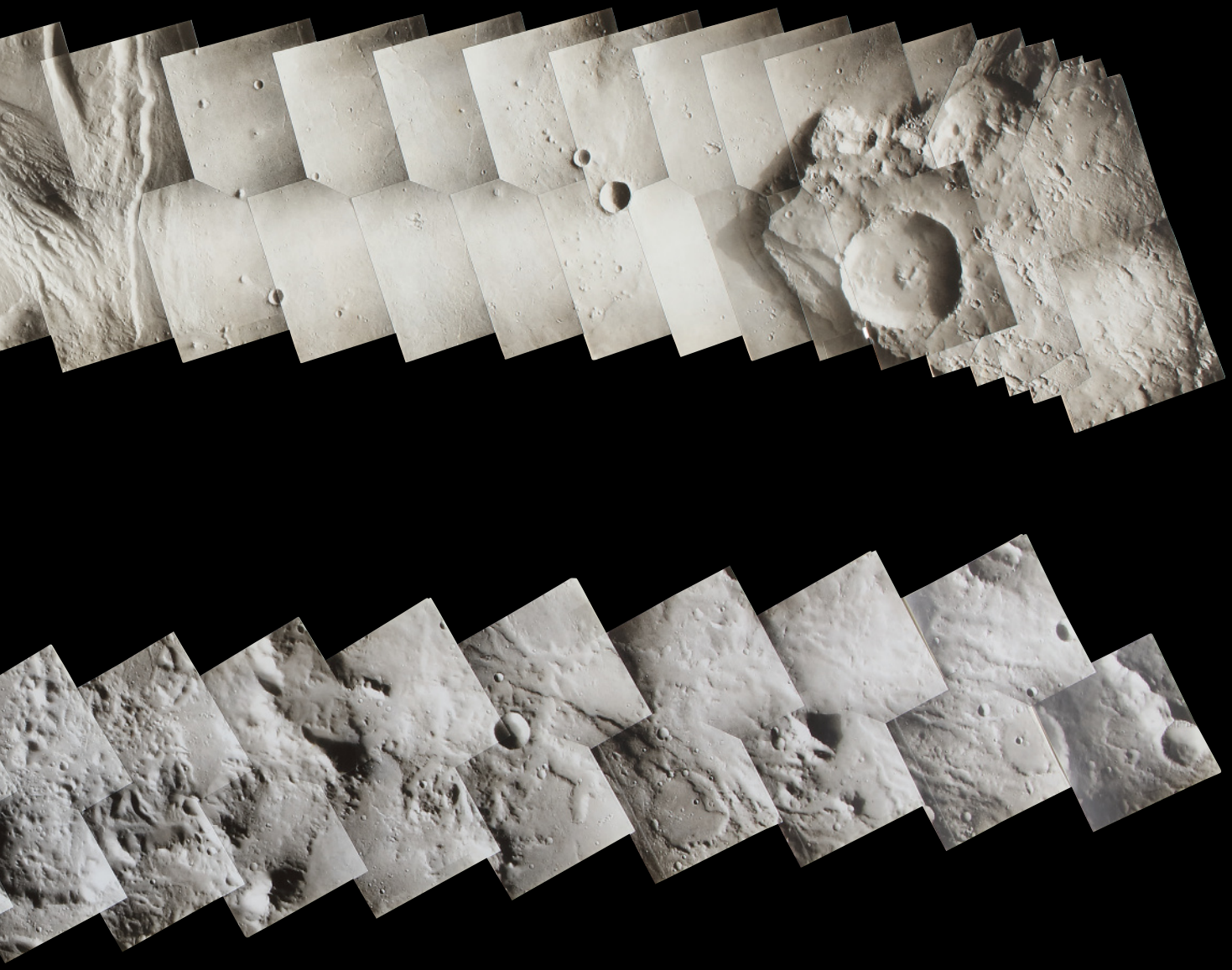




22

VIKING ORBITER

Hand Mosaic of Mars, ca. 1979

45 silver gelatin prints mounted, PICNOs 705 A01-48, 7½ by 50¼ inches overall.

$ 6,000-9,000

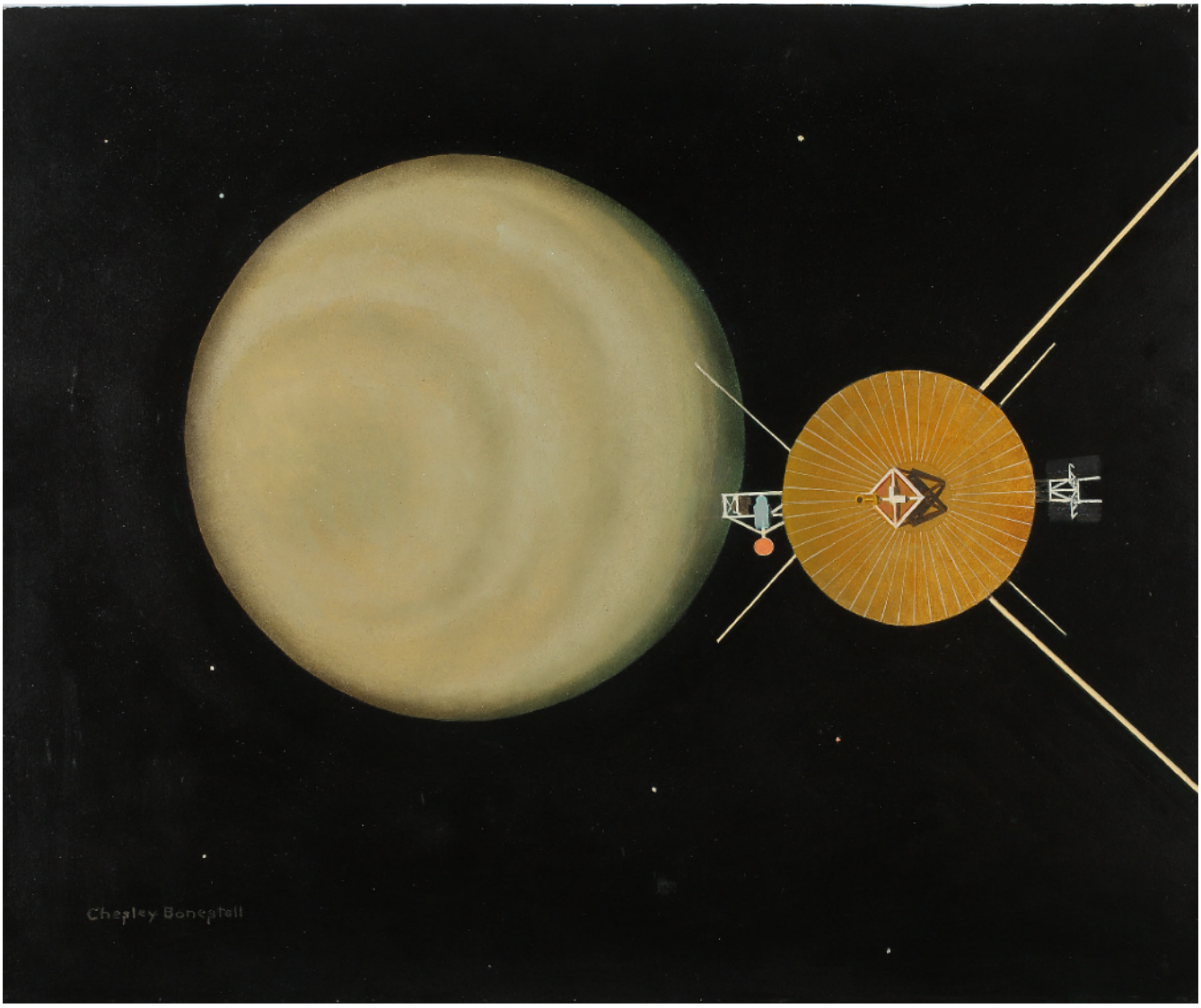
23

VIKING ORBITER

Hand Mosaic of Mars, ca. 1979

48 silver gelatin prints mounted, PICNOs 718 A01-48, 9¾ by 56¼ inches overall.

$ 6,000-9,000



24

ARTISTIC INTERPRETATIONS OF SPACE

LOTS 24–30

24

BONESTELL, CHESLEY

"Uranus two hours before encounter on February 1, 1984 (launch from Earth January 29, 1979)...."

Oil on artist's board, 18 by 15 inches, signed "Chesley Bonestell" lower left, captioned in ink by Bonestell to verso "Uranus two hours before encounter on 1984 February 1 (launch from Earth 1979 Jan 29th). The spacecraft is 90,000 miles from the planet; because the axis of Uranus lies almost in the plane of its orbit, the spacecraft comes in over the pole." With additional notations to verso in pencil and black marker.

An original illustration done for *Beyond Jupiter: The Worlds of Tomorrow,* a joint work by Bonestell and Arthur C. Clarke. In the tradition of the 1949 work *The Conquest of Space* by Willy Ley, *Beyond Jupiter* features the artwork of Bonestell alongside the text by Clarke to describe the historic voyages of Pioneers 10 and 11, *before* the two spacecrafts made their trips to the outer planets.

REFERENCES

Published in: Arthur C Clarke & Chesley Bonestell, *Beyond Jupiter: The Worlds of Tomorrow.* Boston: Little, Brown, and Company, 1972, p 80 as figure 26; see McAleer, *Sir Arthur C. Clarke: Odyssey of a Visionary: A Biography,* chapter 22.

PROVENANCE

Ex Collection of Frederick C. Durant, III

Please see illustration on following page

$ 6,000-9,000

25

25

BONESTELL, CHESLEY

"Stone Architecture on Mars, Demonstrating Mars' two-thirds less gravity than Earth's."

10½ by 11 inch oil on artist's board, signed "Chesley Bonestell" lower right. Verso stamped "Chesley Bonestell", titled on verso in pen in Bonestell's hand, with additional pencil notation reading "In 1985 I realized that the columns should be 1¾ times thicker (measure closest col. at base) than they are in the ptg."

A striking image by the "Father of Space Art". "Bonestell's work represented a quantum leap in the quality of space art. By combining his experience as an architectural renderer (for the knowledge of perspective and light and shadow) with his experience as a Hollywood special effects matte painter (for realistic painting techniques), Bonestell was able to bring a sense of reality to space art that set a standard that is still admired today." (Hartmann, Bradbury, Sokolov, Miller et al, *In the Stream of Stars,* p 31).

REFERENCES

Published in: Ley & Von Braun's *The Exploration of Mars*, 1956, p. 66, as plate x.

PROVENANCE

Ex Collection of Frederick C. Durant, III

Please see illustration on following page

$ 8,000-10,000

26

26

BONESTELL, CHESLEY

"The Moon as it Should Have Been". Study for "Lunar Landscape", ca 1957, a 40 by 10 foot mural commissioned for the Boston Science Museum's Hayden Planetarium, which was unveiled on March 28, 1957

Oil on photograph over board, 41 by 10 inches (to sight), matted, glazed and framed to 52 by 21 inches.

The "Lunar Landscape" was a dramatic depiction of the lunar surface as imagined by Bonestell. In his usual fashion, he planned the mural in exacting detail, calculating the position of the stars and planets behind an imaginary crater on the moon's surface replete with dramatic peaks, caverns and crater walls. A little more than six months after Bonestell's "Lunar Landscape" was unveiled to great fanfare, the Soviet *Sputnik-1* satellite was launched, bringing back the first photographs of the lunar surface. Reality was far less dramatic than what Bonestell had imagined. Boston Museum officials quietly had the mural taken down in 1970, once they realized that it would no longer be seen as an accurate depiction, and six years later, presented it to the Air and Space Museum, where it remains. This interim study is typical of Bonestell's meticulous work, using his frequent technique of painting over photographs that he shuttered himself - his use of this technique is well documented starting from the 1940s.

PROVENANCE

Ex Collection of Frederick C. Durant, III

$ 6,000-9,000

27

BONESTELL, CHESLEY

Alternate version of Bonestell's popular "Exploring Copernicus", ca. 1967, with Cosmonauts in red spacesuits rather than green & blue

Oil on board, painted over a print of the Lunar Orbiter frame II-162H, 9 by 13 inches, matted, glazed and framed to 18 x 23 inches.

Based on the "Picture of the Century," an oblique photograph taken by Lunar Orbiter II this popular scene was first published as the inside front cover illustration for the October 1969 issue of *Magazine of Fantasy and Science Fiction,* with the caption "Russian astronauts have arrived on the rim of Copernicus only to discover the Americans have already been there..." It subsequently appeared in the April 1978 issue of *Future Life* magazine, Ron Miller's *Space Art* in 1978, the July 1979 issue of *Sky and Telescope* magazine, and Fred Durant and Ron Miller's 1983 work, *Worlds Beyond.* If one looks very closely at the lower right hand portion of the work, one can see one of the Russian Cosmonauts pointing to the area just below Bonestell's signature, where one can see some trash, presumably left there by the American astronauts who got there first.

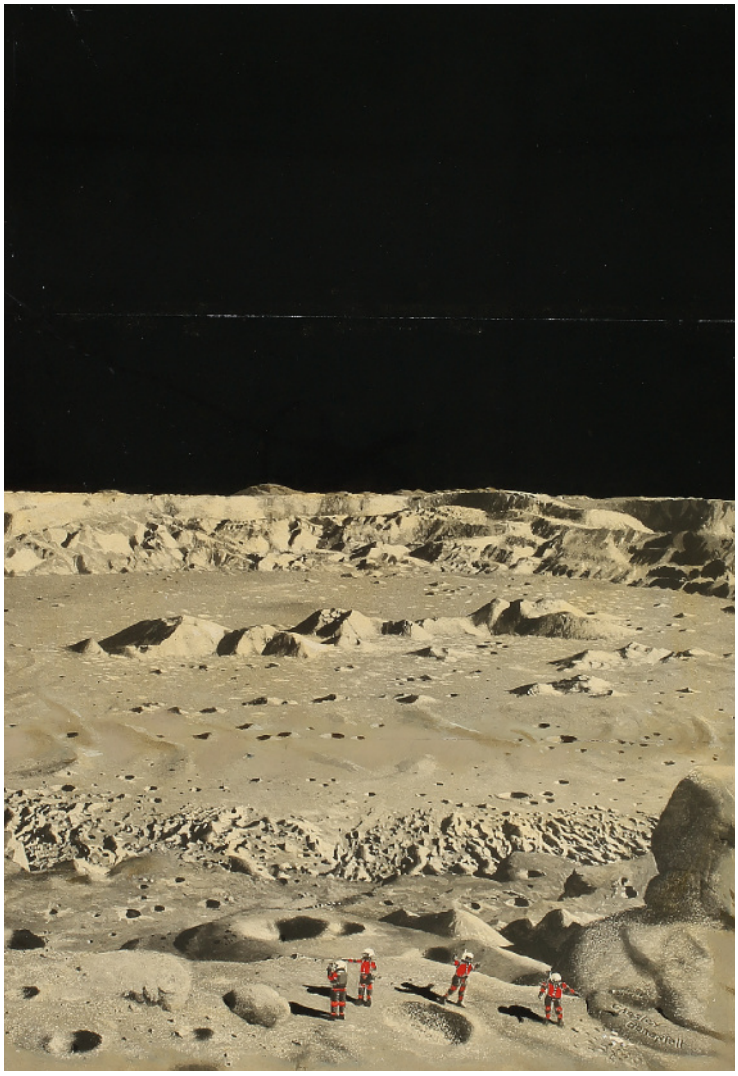
REFERENCES

Illustrated in: Durant, Fred and Ron Miller, *Worlds Beyond. The Art of Chesley Bonestell,* p. 21; Miller, *Space Art,* Starlog Press, p. 27; Frank, Jane & Howard, *Great Themes from the Frank Collection,* pp. 44-45.

PROVENANCE

Ex Collection of Frederick C. Durant, III

$ 8,000-12,000



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28

RÖSCHEL, KURT, [AFTER FRED FREEMAN]

Untitled, but after Fred Freeman's illustration published in *Collier's Magazine* in 1952. Published in: Dolezal, *Unternehmen Mars.* Vienna: Budesverlag, 1955

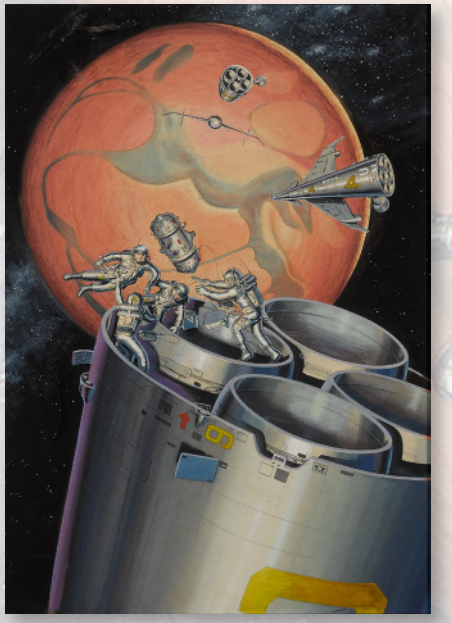
Acrylic on artist's board 12 by 17 inches (to sight), matted, glazed and framed to 22 by 27 inches.

Original illustration executed for Erich Dolezal's 1955 German science-fiction work *Unternehmen Mars* [Company Mars], depicting astronauts preparing a space rescue boat outside of a Lunar Spacecraft nacelle. Röschel was an Austrian graphic artist and painter who was best known for illustrating Dolezal's popular science fiction works.

REFERENCES

See Williamson, *Spacecraft Technology: The Early Years*. London: Institutions of Engineering & Technology, 2008.

$ 1,000-1,500



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29

[NASA MISSION TO MARS]

Untitled early depiction by an unidentified artist of a NASA mission to Mars, ca. 1960

Watercolor, gouache, and pencil on paper, 20 by 28 inches, matted framed and glazed to 34 by 42 inches.

Depiction of four NASA astronauts conducting a spacewalk, the red planet looming in the background and three other spacecraft heading for the planet's surface.

$ 2,000-3,000

30

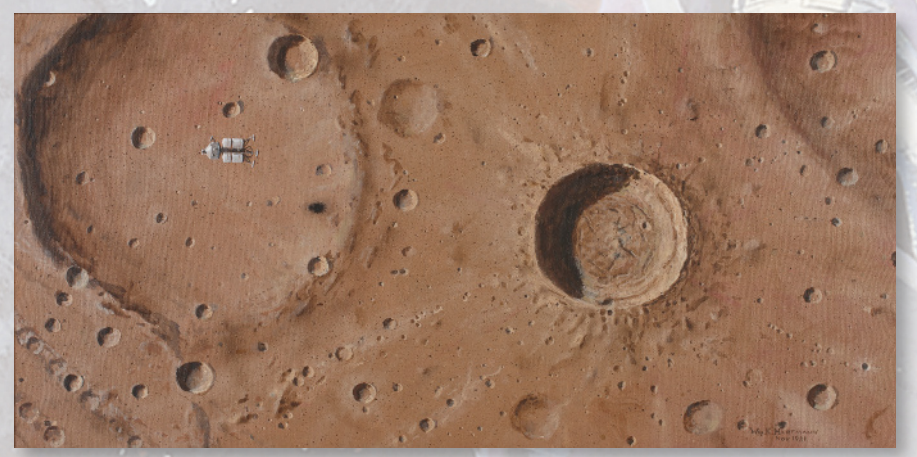
HARTMANN, WILLIAM K.

Untitled, [Spacecraft passing over asteroid], 1981

Acrylic on canvas, 29½ by 14½ inches (to sight), signed lower right "Wm K Hartmann. Nov 1981." Framed.

An imaginative rendering of a spacecraft passing over the surface of the marred surface of an asteroid. William Hartmann is internationally known as a planetary scientist, as well as an astronomical painter and writer. Amongst other works, he has co-authored the astronomy books *The Grand Tour, Cylces of Fire,* and *Out of the Cradle.*

$ 1,200-1,500



30

MODELS & HARDWARE

LOTS 31–41

31

LUNAR GLOBE

Oxford, London, New York: [Produced by Paul Räth Verlag for] Pergamon Press, [ca. 1963]

A 33 cm diameter lunar globe comprised of twelve paper gores and two polar calottes, 1:10,400,000 scale, mounted within metal half meridian ring on wooden stand.

Based on the photography of Luna 3, the Soviet spacecraft launched in 1959 which was the first space probe to photograph another planetary body, and the first mission to photograph the far side of the moon. Two of the twelve gores remain blank, as photography had not reached that far at the time of publication. The cartouche reads in part: "*the map material was prepared by the Central Research Institute of Geodesy, Aerial Photography and Cartography together with the Shternberg State Astronomic Institute of the U.S.S.R.*"

$ 1,200-1,500

31

32

THREE PLANETARY GLOBES

The Moon, Mercury, and Mars. Manufactured for the National Aeronautics and Space Administration ... Chicago, Illinois: Replogle Globes, Inc., 1981

3 Globes: Mars, Mercury, and Earth's Moon (approx. 8½ inches, 5½ inches, and 4¼ inches in diameter, respectively). Each globe is comprised of twelve paper gores, 1:32,000,000 scale (1 ~ 32 km, 1 inches ~ 500 mi), bears a small explanatory printed label, and is accompanied by a wooden cradle base.

Based on cartography by the U.S. Geological Survey, these limited edition globes were made by Replogle Globes for NASA's Planetary Geology Programs, Office of Space Science.

$ 2,500-3,500

32

33

33

CUSTOM COMMAND/SERVICE MODULE (CSM) MODEL

Spacecraft model in 4 parts, 20 inches tall, constructed from injected-molded plastic and metal on wooden base. Likely done by the Walter J. Hyatt Company, probably for Lockheed, ca 1965. Service Module details include Service Propulsion System engine nozzle, and four reaction control thruster assemblies. The Command Module features a removable magnetic apical section lifting to reveal molded parachutes and canisters; topped with a removable metal boost protective cover and attached Launch Escape Assembly, complete with hinged canards opening to reveal small pitch control motor. A see through window with red & yellow Lockheed logo reveals the blue solid rocket propellant.

An excellent early model of the vehicle that brought the astronauts safely back to Earth. This CSM model was very likely made by Hyatt for the Lockheed Propulsion Company, as Lockheed was granted the contract for the Launch Escape System in 1962.

$ 5,000-7,000

34

NORTHRUP HL-10 MODEL

Wooden model, 1/15th scale, 16 inches long, 11 inch wingspan, with NASA metal label reading "*Aerospace Edu*[cational] *Serv*[ice] *Project,*" wooden stand with metal Northrup/Noriar label (mislabeled M-2/F-2).

The Northrup HL-10 was one of five heavyweight lifting designs flown at NASA's Flight Research Center in Edwards, California. With "HL" standing for "Horizontal Landing," the HL-10 was used to study how to safely land a low lift-over-drag vehicle designed for re-entry from space.

$ 1,500-2,500

35

X-30 NATIONAL AEROSPACE PLANE MODEL

Fiberglass model, 36 inches long, 17 inch wingspan, on wooden stand with brass plaque reading *"36" NASP National Aerospace Plane"* and metal label reading *"NASA US Gov't Aerospace Education Services Program 3105."* Manufactured by Penwal Industries for NASA's AESP Program, ca 1982. Cracks to base of one tail-fin with subsequent chipping to paint.

Oversize model of the X-30 NASP National Aero-Space Plane, a conceptual single-stage-to-orbit spacecraft that never made it to the prototype phase as the program was cancelled in the early 1990s after years of development. It was to be a scram-jet based aircraft, with a maximum speed of Mach 8.

$ 1,500-2,500

35

36

LOCKHEED MARTIN X-33 SUBORBITAL SPACEPLANE MODEL

Wood and resin model, 1/50 scale, 16 inches long with 18 inch wingspan on wooden base, unknown manufacturer, ca. 1990. Some chips, and tailfins repaired.

The Lockheed Martin X-33 was an unmanned, subs-scale technology demonstrator for the VentureStar orbital spaceplane, planned to be a single-stage-to-orbit reusable launch vehicle. Developed in the 1990s by Lockheed Martin under the US government funded Space Launch Initiative, the program was eventually cancelled in 2001.

$ 3,000-5,000

36

37

DELTA 29-10 ROCKET MODEL

1975 Collier Trophy Award, McDonnell Douglas

1:68 scale, 23 inch tall wood and composite rocket model on wood and metal stand with metal plaque reading "*MCDONNELL DOUGLAS. IN COMMEMORATION OF THE 1975 COLLIER TROPHY AWARD TO JOHN F. CLARK FOR THE LANDSAT PROGRAM ERTS-B LAUNCHED JANUARY 22, 1975 BY DELTA MODEL 2910.*"

The Collier Trophy was awarded annually "for the greatest achievement in aeronautics or astronautics in America, with respect to improving the performance, efficiency, and safety of air or space vehicles, the value of which has been thoroughly demonstrated by actual use during the preceding year."

$ 1,500-2,500

37

38

38

APOLLO COMMAND MODULE REACTION-CONTROL SYSTEM PROPELLANT TANK

39½ inch-diameter empty ellipsoidal-shaped tank crafted from two joined titanium alloy hemispheres, manufactured by Sargent Industries for NASA, ca. 1970. Red identifying labels, as well as one paper label.

Two such tanks were located in each reaction control quadrant, with one containing fuel and another an oxidizer. When brought together, they ignited, causing thrust which was used to steer the spaceship. This particular tank was sent as a gift from the Vice President of Sargent Industries to be used in a student's project. In a letter sent to the student, the Vice President explains the manufacturing process and use of the tank, noting that it's normal selling price was $3000.

$ 2,500-3,500

39

SPACE SHUTTLE ORBITER COMPUTER PROCESSOR

ONE OF THE EARLIEST PRODUCTION MODELS WITH SERIAL NUMBER 04

Contained inside an all metal outer case with interior gold-plated electronics having a total weight of 54 pounds. Seven data ports and an analog hour meter (reading 7292 hours) are located between dual hand brackets at the front. A side ID tag reads in part: "*MFG by IBM Corp. Owego, NY for Rockwell Int. Space Division, CII, MC615-0001-0093, Contract No. NAS9-14000, Part No. 6247300-231, Serial No. 04, Date of MFG - 9/20/78, Model Type - Production.*" Along two sides "*GROUND USE ONLY*" has been stenciled in red. With numerous Rockwell blue and white inspection tags plus multiple quality control stamps.

Development of the Space Shuttle flight General Purpose Computers (GPC) began in early 1972. This unit is one of the first four production units created, having serial number 04. There were five sets of GPCs in the Shuttle Orbiter, each with two major components constructed as group units – the IOP and a central processing unit (CPU). All were interconnected via data transmission cables along common party lines. This allowed dual and in some case triple redundancy for all flight functions.

The IOPs were designed to format and transmit computer commands to, and receive responses from all the Orbiter's flight systems. Additional functions include maintaining interaction status with its own CPU and the other GPCs. These activities were performed by a series of 24 independent data processors and 24 data buses that transmitted serial digital data.

$ 5,000-7,000

40

ISAYEV ROCKET ENGINE

Unfired V-751 liquid propellant sustainer powerplant, approx. 39 by 14 by 14 inches, constructed from various alloys, numerous inspection marks, primarily in red, mounted onto black metal stand, apparently un-fired. Russia, ca. 1957. Designed by the Design Bureau of Russian rocket engineer Alexei Isayev.

Rocket engineer Alexei Isayev was the force behind the Russian space program. His engines powered the vehicles that launched the first artificial satellites, including the *Sputnik-1*, the first man into space, and the first unmanned probes to Venus and the moon. He also specialized in small-scale, liquid fueled rocket engines, such as this engine for a S-75 Dvina, a command-guided, high-altitude surface-to-air missile (SAM) - the most widely used air defense missile in history. A striking reminder that the space programs grew from research and development done by the military.

PROVENANCE

Ex Air & Space Collection of scramjet rocket engineer, Professor Alexander Roudakov

$ 6,000-9,000

39

41

WIND TUNNEL TEST MODEL

Fiberglass test model finished in high-gloss metallic paint, 10 feet 4 inches long with 4 rotating tailfins measuring 26 inches across, and 4 fixed nosefins each 9 inches across. Housed in the original 10 foot 8 inch long , heavy-duty NASA hinged transport case.

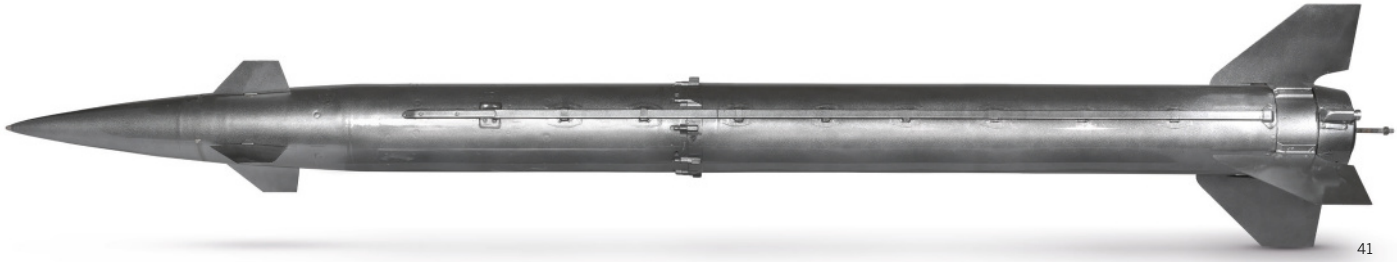
A complete, aerodynamic wind tunnel test model, from the largest aerospace testing facility in Europe, the Central Institute of Aviation Motors (CIAM). Constructed ca 1980 in a joint effort between the Russian Central Institute of Aviation Motors (CIAM) and the American National Aeronautic and Space Administration (NASA).

PROVENANCE

Ex Air & Space Collection of scramjet rocket engineer, Professor Alexander Roudakov

$ 8,000-12,000

40



41

SOVIET SPACE PROGRAMS

LOTS 42–51

42

42

FULL SCALE CUSTOM SPUTNIK-1 MODEL

Full scale, custom-built model of the *Sputnik-1* satellite. Polished metal sphere 23 inches in diameter consisting of two hemispheres joined, with four external antennae, each made from three pieces joined, two antennae measuring 9 feet 7 inches, and two measuring 10 feet long, made by Retro Rocket ca 1994.

An impressive, faithfully produced full-scale model of the *Sputnik-1* satellite. *Sputnik-1* first orbited Earth on October 5, 1957 and was visible all around the Earth. Its surprise flight gave birth to the American sputnik crisis, and launched the space race. Another Retrorocket Sputnik model was built for Neil Armstrong's museum in Ohio.

$ 8,000-12,000

43

43

SOKOLOV, ANDREI

Two paintings of the satellite Sputnik, "СПУТНИК ЛЕТИТ!" ["Sputnik Flies!"], "ПЕРВЫИ В МИРЕ" ["The First Ever"], Russia, ca. 1958

Two 12 by 16¼ inch mixed media on paper depictions of the satellite Sputnik, both mounted to approx 19 by 23 inch board. One with paper label reading "СПУТНИК ЛЕТИТ" affixed to board below image.

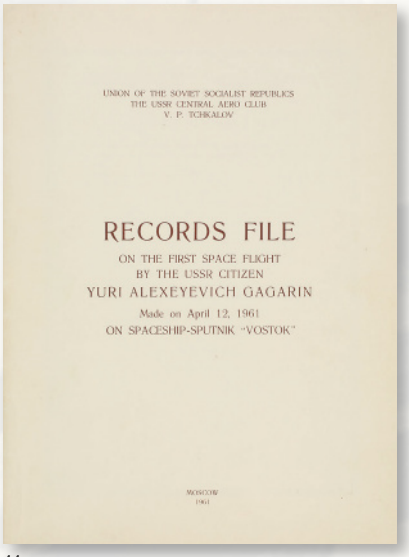
Two period works depicting the moment that became known as the "Shock of the Century." Andrei Sokolov is known as the premier Russian artist documenting space flight history. Born in Leningrad in 1931, Sokolov was originally trained as an architect and attended Moscow State University, where he developed an interest in science fiction. The flight of Sputnik had a profound effect on him, and he began to devote himself to the space genre because of the groundswell of public appeal of the nascent Soviet space age. He went on to become the chosen instrument of the USSR to graphically depict the Soviet space program - especially after forming a long lasting friendship with the Soviet national hero Alexei Leonov. "Sputnik Flies!" was the first work listed in Sokolov's 1959 Solo Exhibition in Moscow.

REFERENCES

"Sputnik Flies" Exhibited: выставка произведении Андрея Конcманмновча Соколоваб 1959 [An Exhibition Catalogue of the Art of Andrei Sokolov, 1959]; "The First Ever" illustrated in: A Leonov/ A Sokolov К Звездам [To the Stars], 1970.

$ 4,000-5,000

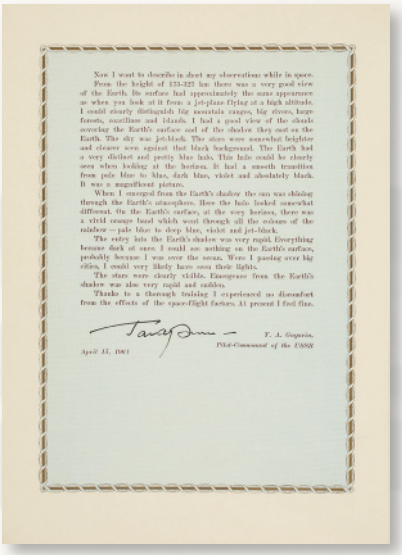
43


UNION OF THE SOVIET SOCIALIST REPUBLICS
THE USSR CENTRAL AERO CLUB
V. P. TCHKALOV

RECORDS FILE
ON THE FIRST SPACE FLIGHT
BY THE USSR CITIZEN
YURI ALEXEYEVICH GAGARIN
Made on April 12, 1961
ON SPACESHIP-SPUTNIK "VOSTOK"

MOSCOW
1961

44


Now I want to describe in short my observations while in space. From the height of 175-327 km there was a very good view of the Earth. Its surface had approximately the same appearance as when you look at it from a jet-plane flying at a high altitude. I could clearly distinguish big mountain ranges, big rivers, large forests, coastlines and islands. I had a good view of the clouds covering the Earth's surface and of the shadow they cast on the Earth. The sky was jet-black. The stars were somewhat brighter and clearer seen against that black background. The Earth had a very distinct and pretty blue halo. This halo could be clearly seen when looking at the horizon. It had a smooth transition from pale blue to blue, dark blue, violet and absolutely black. It was a magnificent picture.

When I emerged from the Earth's shadow the sun was shining through the Earth's atmosphere. Here the halo looked somewhat different, On the Earth's surface, at the very horizon, there was a vivid orange band which went through all the colours of the rainbow – pale blue to deep blue, violet and jet-black.

The entry into the Earth's shadow was very rapid. Everything became dark all once. I could see nothing on the Earth's surface, probably because I was over the ocean. Were I passing over big cities, I could very likely have seen their lights.

The stars were clearly visible. Emergence from the Earth's shadow was also very rapid and sudden.

Thanks to a thorough training I experienced no discomfort from the effects of the space-flight factors. At present I feel fine.

Y. A. Gagarin,
Pilot-Cosmonaut of the USSR

April 12, 1961

44


Pilot-cosmonaut Y. A. Gagarin in his flight suit

44

44

GAGARIN, YURI

"Records File on the First Flight by the USSR citizen Cosmonaut Yuri Alexeyevich Gagarin Made on April 12, 1961 on Spaceship-Sputnik 'Vostok.'" *Moscow: Union of the Soviet Socialist Republics, The USSR Central Aero Club, 1961*

THE OFFICIAL ENGLISH-LANGUAGE REPORT OF THE FIRST HUMAN JOURNEY INTO OUTER SPACE, EVIDENTLY PREPARED FOR SUBMISSION TO THE FÉDÉRATION AÉRONAUTIQUE INTERNATIONALE AND SIGNED BY COSMONAUT YURI GAGARIN AND THE CHIEF ENGINEERS OF THE SOVIET SPACE PROGRAM.

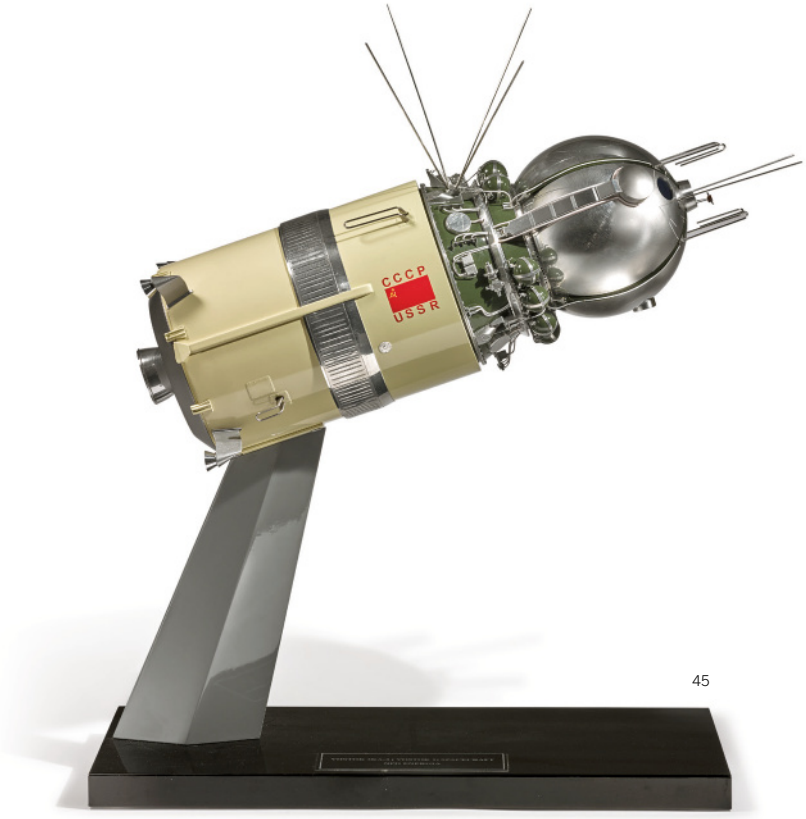
"On the 12th of April, 1961, the Soviet spaceship–sputnik VOSTOK was put in orbit around the Earth with me on board." With this simple and yet sensational statement, Major Yuri Gagarin began his personal "Report" on his mission into outer state, the final and most compelling section of the "Records File on the First Flight ... on Spaceship–Sputnik 'Vostok.'"

The early years of the Space Race were dominated by the Soviet Union, who achieved a series of astonishing "firsts" in space (as well as some dramatic but unpublicized failures) while American astronauts were still flying sub-orbital missions. But no event demonstrated Soviet superiority—or stoked American fears—like the successful launch, orbit, and recovery of Yuri Gagarin. Science fiction had come to life and the possibilities and applications of space travel seemed without limit.

Gagarin describes his preparation for the flight and details his activities during it: "During the whole period of flight I was carrying out fruitful work under the programme. I ate and rank [*sic*] and maintained continuous radio communication with the Earth on different channels by telephone and telegraph. I controlled the operation of the spaceship equipment, sent reports to the Earth and recorded any observations in the logbook and on a magnetophone. During the whole period of weightlessness my work capacity was fully preserved, and I felt fine. Then in conformity with the flight programme at a definite time a command was given to descend, the brake power unit was switched on and the spaceship acquired a velocity necessary for landing. The landing predetermined by the flight programme was effected and I was back on the Earth happy to see my dear Soviet people."

The pioneering cosmonaut also recorded his observations of the earth from space. "From the height of 175–327 km there was a very good view of the Earth. Its surface had approximately the same appearance as when you look at it from a jet-plane flying at a high altitude. I could clearly distinguish big mountain ranges, big rivers, large forests, coastlines and islands. I had a good view of the clouds covering the Earth's surface and of the shadow they cast on the Earth. The sky was jet-black. The stars were somewhat brighter and clearer seen against that black background. The Earth had a very distinct and pretty halo. This halo could be clearly seen when looking at the horizon. It had a smooth transition from pale blue to blue, dark blue, violet and absolutely black. It was a magnificent picture."

Gagarin's report follows nine other text sections: "Card of General Data," giving general information about the flight and records achieved (flight duration, flight altitude, and weight lifted), pseudonymously signed by Soviet space engineers as V. A. Plaxin and I. G. Borisenko — "Statement of weighing of spaceship–sputnik 'VOSTOK,'" giving the weight as 4,725 kilograms, with pseudonymous signatures of Plaxin, Borisenko, V. I. Bodrikov, and V. M. Stolmikov — "Statement of launching of rocket with spaceship–sputnik 'VOSTOK,'" stating that lift-off took place at 9.07 Moscow time, with pseudonymous signature of Plaxin — "Statement of landing of VOSTOK spaceship," describing the landing as taking place at 10.55 Moscow time, with pseudonymous signature of Borisenko — "Statement of defining of flight duration ...," described as 108 minutes, with pseudonymous signatures of Plaxin and Borisenko — "Statement of defining of maximum flight altitude ...," given as 327 km, with pseudonymous signatures of Plaxin and Borisenko — "Results of data processing of orbital measurements taken during the spaceship–sputnik 'VOSTOK' flight," stating that "data processing" by "electronic computers" established that the period of orbital revolution was 89:34 minutes, with the average distance from the Earth's surface being 327 km and the minimum being 181 km — "Technique of orbit elements determination ...," displaying numerous computational equations over the pseudonymous



45

name of A. I. Sragovich — "Report on the arrangement of the spaceship–sputnik 'VOSTOK' and its special equipment," listing sixteen major systems and units carried by the space craft, with pseudonymous signature of N. F. Konstantinov.

Following Gagarin's concluding report are five leaves each with an original tipped-in black and white photograph with a printed caption, comprising Gagarin in military uniform, Gagarin in his flight suit, Gagarin about to board Vostok, an interior view of Vostok, and Gagarin speaking by telephone with Nikita Khrushchov after the completion of his mission.

The Soviets used pseudonyms in the "Records File," in order to maintain the secrecy of the identities of the individual engineers and designers behind the flight. Konstantin Feoktistov was one of the titans of the Soviet Space Program, with major responsibility for assigning and coordinating the work of dozens of research and design institutes; he was also himself a cosmonaut. Feoktistov signed the "Report on the arrangement of the spaceship–sputnik 'VOSTOK' and its special equipment," with an inversion of his actual name: "N. F. Konstantinov." Apparently, Sergei Korolev, the legendary Chief Designer of the Soviet Space Program, signed throughout as "V. A. Plaxin."

The "Records File" also carefully obscures the fact that Vostok included a parachute ejection system for Gagarin. While it now seems irrelevant, had the Soviets revealed at the time that the Vostok spaceship was designed to eject Cosmonaut Yuri Gagarin for a separate descent by parachute (the Vostok capsule itself landed too heavily), their space flight might have been disqualified for certification as a successful flight: the pilot, under the rules for aviation records, must return with his aircraft.

While evidently prepared for submission to the Fédération Aéronautique Internationale, the present copy was not sent. According to Feoktistov, a number of minor typographical errors were discovered—including "left-off" for "lift-off"; "slight suit" for "flight suit"; and "rank" for "drank"—and it was reprinted. The full "Records File" consists of a printed title-page, and sixteen numbered leaves that include the ten text reports (printed on patterned paper similar to that used for stocks and bonds) and the five photographs.

THE "RECORDS FILE ON THE FIRST FLIGHT BY THE USSR CITIZEN COSMONAUT YURI ALEXEYEVICH GAGARIN" IS ONE OF THE GREAT RECORDS OF SPACE HISTORY AND HUMAN ACHIEVEMENT: A DOCUMENTARY MONUMENT FROM THE DAWN OF THE SPACE AGE, AND—WITH GAGARIN'S OWN SIGNED STATEMENT ON HIS MISSION—A NARRATIVE TO STAND WITH EXPLORATIONS AND VOYAGES OF COLUMBUS, VESPUCCI, AND MAGELLAN.

PROVENANCE

Cosmonaut Engineer Konstantin Feoktistov (Sotheby's, *Russian Space History*, 16 March 1996, lot 39)

$ 50,000-80,000

45

VOSTOK 1 (VOSTOK 3KA-3) SPACECRAFT MODEL

Project presentation model, NPO Energia, ca. 1987

Large 1:8 scale, 21 inches long by 7 inches in diameter custom handmade model in metal & composite, on stand with plaque reading "*VOSTOK 3KA-3 (VOSTOK-1) SPACECRAFT NPO ENERGIA.*"

An excellent, high fidelity model made for exhibition purposes by NPO Energia, the Russian manufacturer of the Vostok. *Vostok-1* was launched from the Baikonur Cosmodrome carrying Cosmonaut Yuri Gagarin, on April 12, 1961, making him the first human in space. The Vostok program, pursued in secret by the Russians in competition with the United States Project Mercury, was one of the Soviet Union's greatest triumphs, along with their launch of the *Sputnik-1* which sparked the Space Race.

$ 10,000-12,000

46

46

LUNA 9 AUTOMATIC LUNAR STATION SPACECRAFT MODEL

Project Presentation Model, Lavochkin Research and Production Association Design Bureau, ca. 1987

Large 1:10 scale, 19½ inch tall highly detailed, custom handmade model in metal with some elements of plastic composite on square base with plaque reading "*Luna 9 Automatic Lunar Station Project Presentation Model. January 31, 1966 - February 6, 1966. Lavochkin research and Production Association.*" One area with expert restorations.

A very fine highly detailed model, made by the manufacturer of the Luna 9 spacecraft. Luna 9 was an unmanned mission of the Soviet Union's Luna program. On 3 February 1966, the Luna 9 became the first spacecraft to achieve a soft landing on the moon, or any other planetary body other than Earth, as well as the first to transmit photographic data back to Earth from the surface of another planetary body.

$ 8,000-10,000

47

TWO BOOKS

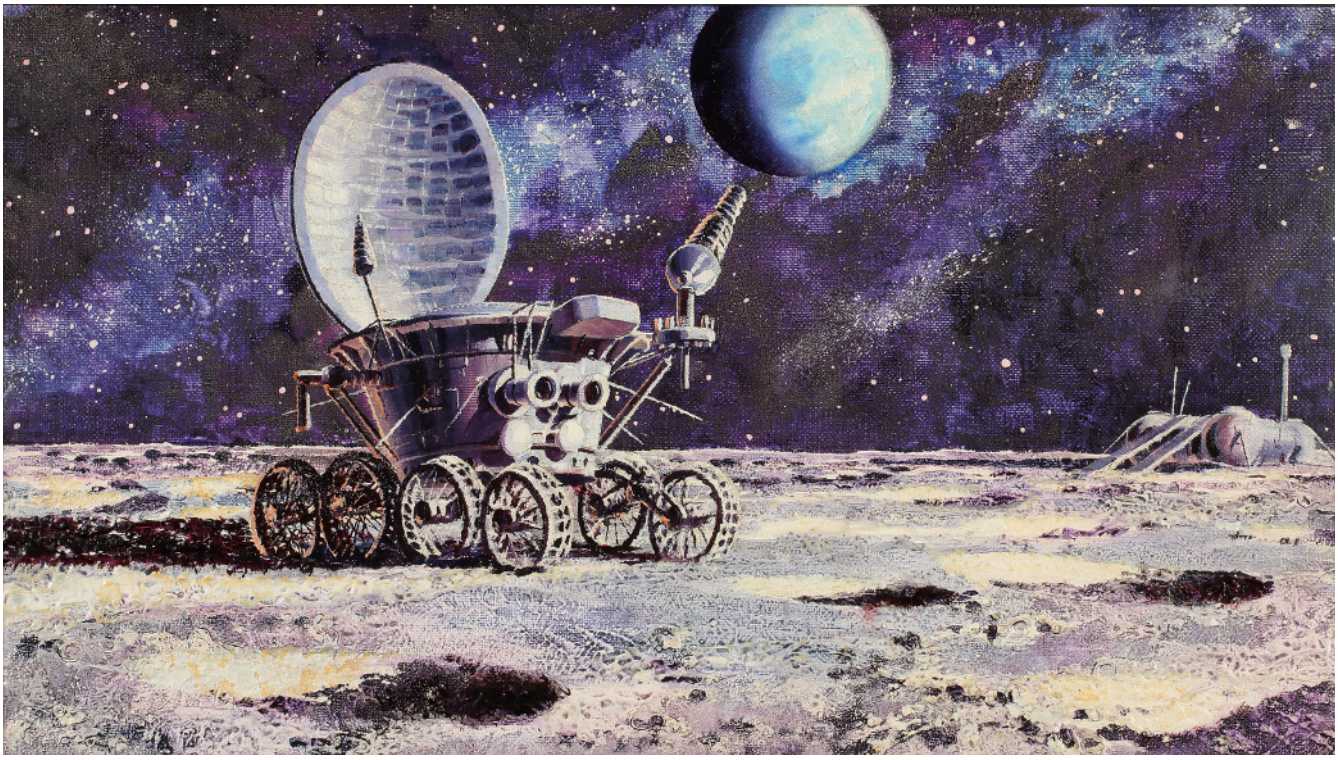
Signed by various cosmonauts, Moscow, 1963, 1977

Together 2 volumes. Герои звездных трасс [Heroes of the starry path], 1963. Original pictorial wrappers (6½ x 5 inches). SIGNED by bYKOVSKY and tERESHKOVA on the upper wrapper. — Космонавты СССР [Cosmonauts of the USSR], 1977. Blue cloth gilt, pictorial dust-jacket (3¾ x 2¾ inches). SIGNED by gLAZKOV, POPOVICH, VOLYNOV, KHRUNOV, LAZAREV, KLIMUK, ARTYUKHIN, DEMIN, GUBAREV, ZYDOV, and lyakhov.

PROVENANCE

Vladimir Kholkhov (Sotheby's Russian Space History, 11 December 1993, lot 47A) — Present Owner

$ 2,000-3,000



48

48

SOKOLOV, ANDREI & ALEXEI LEONOV

"УТРО ЛУНОХДА-*1*" [Morning of *Lunokhod-1*], ca. 1970

Acrylic on orgalit over board, 27½ by 15½ inches (to sight), framed to 31 by 20 inches. Verso signed in Russian "А А ЛЕОНОВБ А К СОКОЛОВ УТРО 'ЛУНОХДА-*1*'" [A A Leonov, A K Sokolov. "Morning of 'Lunokhod-1'"]. Verso with paper label, and several other pen and pencil markings. Numbered "N 95" on paper label and board in red pencil.

A detailed depiction of the *Lunokhod-1*, the Soviet unmanned lunar rover on the morning of its having landed on the lunar surface, with the landing stage of the *Luna-17* Soviet automatic station in the background. One of a series of 3 known paintings executed by Sokolov and Leonov of the *Lunokhod-1*, with one depicting it prior to its descent from the landing stage (illustrated in Sokolov & Leonov's book *Life Among Stars),* and another featuring it in a crater (illustrated on the same page as the present work, in Sokolov & Leonov's book *Star-Roads*). This work appears and is discussed in the Russian documentary "Алексеи Леонов - у бездны на краю" [Alexei Leonov - "At the Edge of the Abyss"]. A version of this was used in a 1972 Soviet postage stamp (Michel no. 4046).

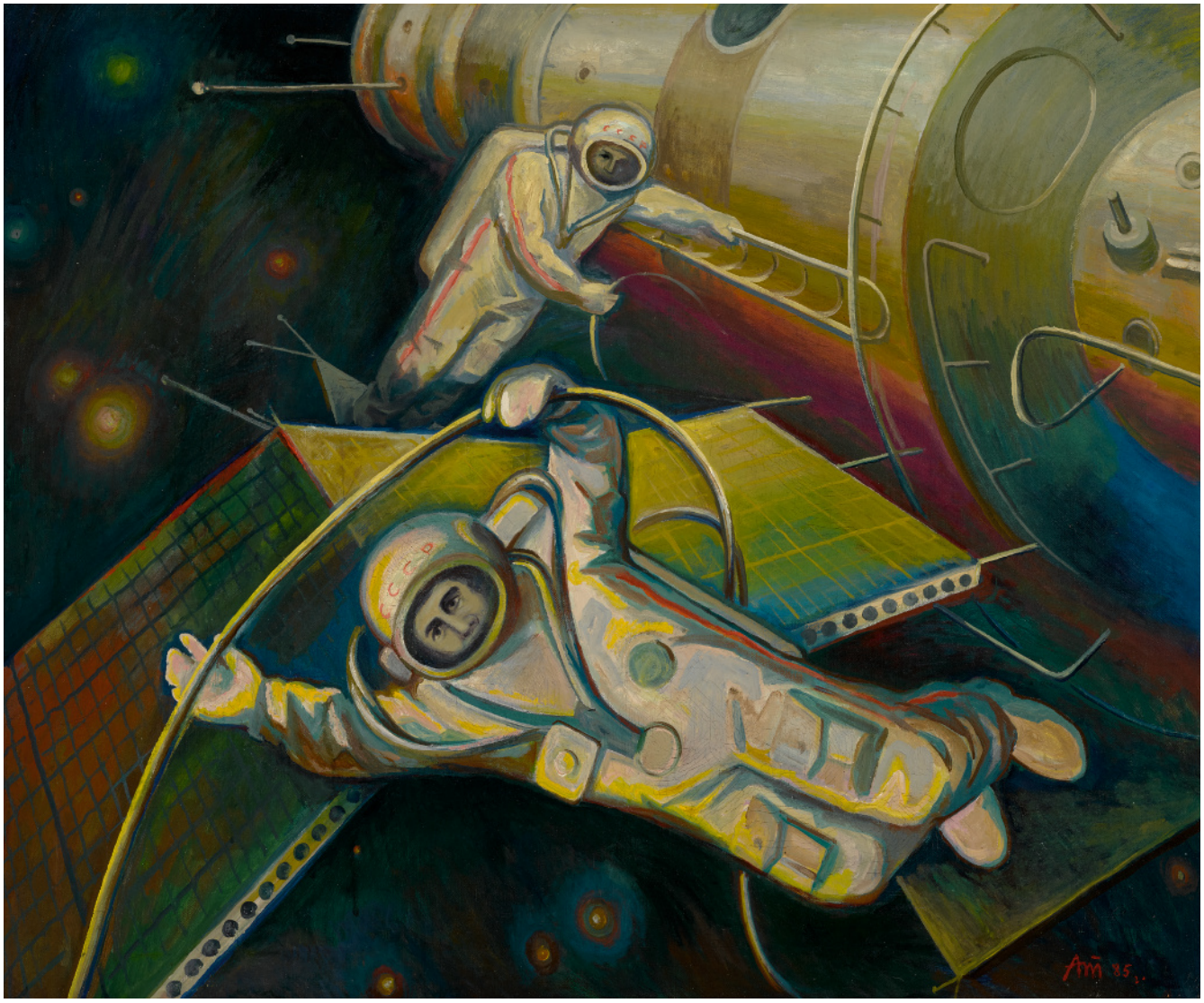
Cosmonaut Alexei Leonov, the first man to do a spacewalk, had an important impact on the work of Sokolov, and the two men became close friends. Leonov collaborated with Sokolov on a number of projects, in particular assisting with the realistic depiction of views from orbit as one who had seen them. Together, the two held joint exhibitions throughout Russia and Europe, and a number of books have been published of their collaborations. The National Air & Space Museum has a collection of works by Sokolov and Leonov.

REFERENCES

Illustrated in: A. Leonov & A. Sokolov, ЗВЕЗДНЫЕ ПУТИ/*Star-Roads,* p. 41; see Leonov & Sokolov, *Life Among Stars,* p. 33; "Алексеи Леонов - у бездны на краю" [Alexei Leonov - "At the Edge of the Abyss"], at 27:49.

$ 8,000-12,000

47



49

49

THE RESCUE OF SALYUT 7

[Cosmonauts Dzhanibekov & Savinkyh repair the *Salyut 7* Space Station Photovoltaic Array], unidentified artist [A.M.], 1985.

Oil on canvas, 41½ by 49½ inches, signed lower right "A.M" and dated [19]'85.

A depiction of Cosmonauts Vladimir Dzhanibekov and Victor Savinikh conducting a spacewalk to repair the Photovoltaic Array of the *Salyut 7* space station. The two cosmonauts battled bitter cold and extreme conditions to rescue the up-to-then successful space station, which had suddenly fallen silent and unresponsive after a cascade of electrical shortages had knocked out the radio transmitters and receivers. Its rescue by Dzhanibekov and Savinikh was one of the boldest, most complicated in-space repair efforts ever accomplished.

$ 6,000-8,000

SOYUZ TM-6/TM-5 SPACECRAFT MODEL

Model of Soyuz TM presented to Lyakhov in commemoration of his mission of 29 August - 7 September 1988

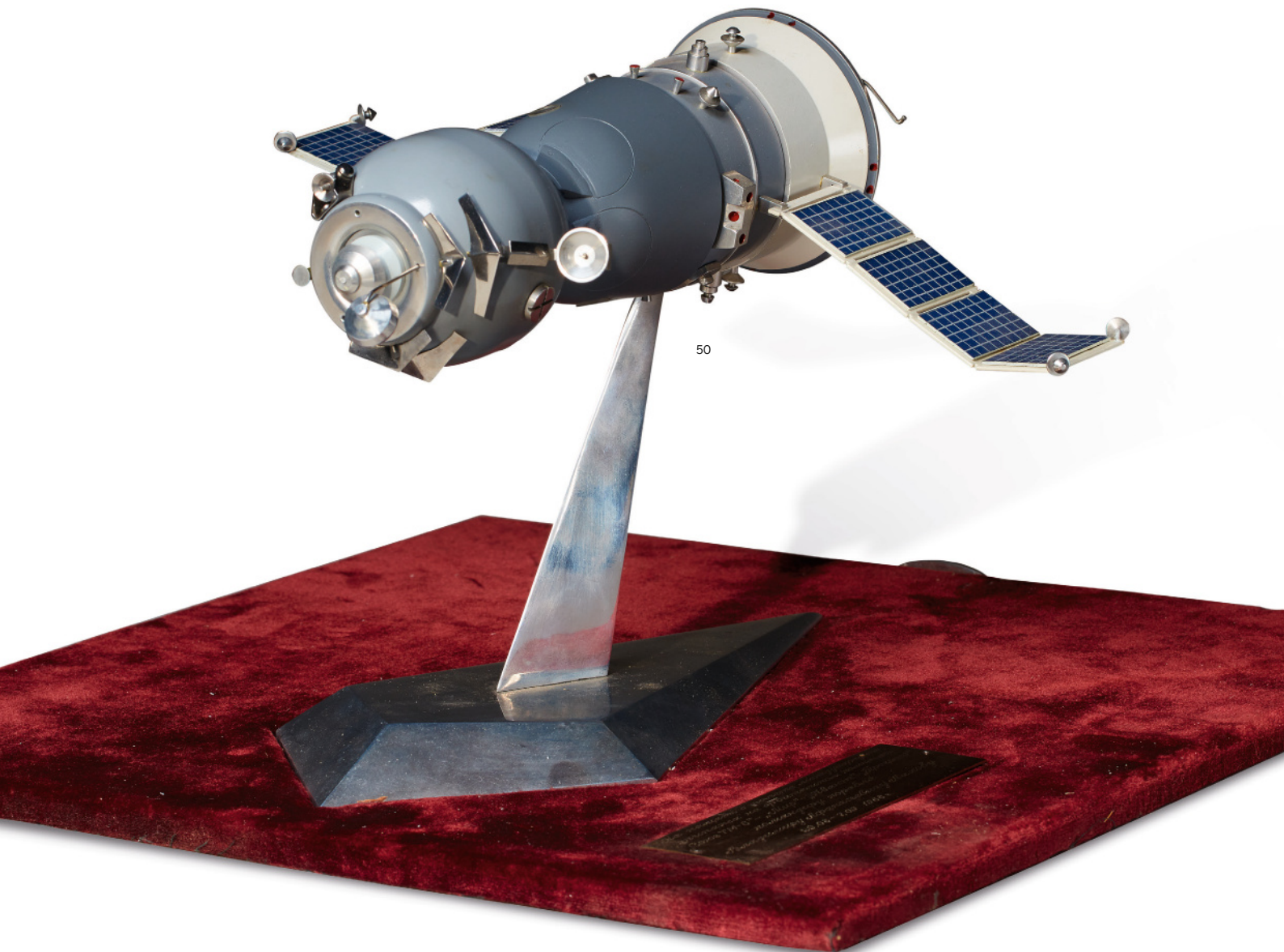
Approximately 1/40 scale, 8 inches long by 9½ inches (width of solar array), steel and plastic model of the Soyuz TM spaceship with grey, cream, red, green, and blue enamel; on stainless steel base mounted to red velvet board with brass plaque inscribed (in translation): *"In memory of the flight of the international crew on the Soyuz TM-6/Mir/Kvant/ Progress orbital complex: to the ship's commander Vladimir Afanasyevich Lyakhov, 29 August - 7 September 1988."*

In his third space mission, Lyakhov participated in the flights of Soyuz TM-5 and TM-6, which brought to the Mir space station two international crews with Bulgarian and Afghan cosmonauts. Soyuz TM-5 was launched 7 June 1988 with a crew of three. Lyakhov was commander of Soyuz TM-6, launched 29 August, whose crew of three brought the Afghan cosmonaut Abdul Ahad Mohmand to Mir. On 6 September Lyakhov and Mohmand returned in Soyuz TM-5. This was one of the most challenging descents of the Soviet space program. Because of several systems errors, Lyakhov had to override and cancel the automated retrofire commands. After an unplanned 24 hours in the capsule, without water, food, and toilet facilities, the retrofire was completed successfully, and the craft landed very close to its target.

PROVENANCE

Cosmonaut Vladimir Lyakhov (Sotheby's Russian Space History, 11 December 1993, lot 165) — Present owner

$ 6,000-9,000



51

51

SOYUZ TMA-3 ROCKET MODEL

Project Presentation Model, RKK Energia, 2003

Extra-large 1:45 scale, 63 inch tall, custom handmade model in glass, reinforced plastic and metal, on wood and metal stand with plaque reading "*SOYUZ TMA-3 SPACE ROCKET MODEL RKK ENERGIA, 2003.*"

The Soyuz is the most recognizable and frequently used of the Russian Rockets. It was first launched in 1966, and was developed from the earlier Voshkod rocket. The Soyuz TMA-3 was the 7th Soyuz to fly to the International Space Station, carrying Russian Cosmonaut Alexander Kalerim, NASA Astronaut Michael Foale, and Spanish ESA Astronaut Pedro Duque.

$ 6,000-8,000

PROJECT MERCURY

LOTS 52–64

52

THE ORIGINAL SEVEN

Large color photograph, 20 by 16 inches.

SIGNED BOLDLY by SCOTT CARPENTER, GORDON COOPER, and WALLY SCHIRRA. Cooper has INSCRIBED at upper left corner: "*THE ORIGINAL SEVEN.*"

The iconic image of the Mercury Astronauts wearing their silver space suits and helmets.

$ 2,500-3,500

52

53

THE MERCURY FLYERS

Large color photograph, 16 by 20 inches.

INSCRIBED and SIGNED: "*Project Mercury Astronauts, The Original 7, GORDON COOPER, Faith 7.*" Additionally SIGNED and INSCRIBED: "*SCOTT CARPENTER, Aurora 7*" and "*WALLY SCHIRRA, ∑7.*"

The Mercury Astronauts pose in front of an F-106 jet, wearing aircraft flight gear.

$ 1,500-2,000

53

54

THE FOLLOWING LOT WAS ORIGINALLY IN THE COLLECTION OF ASTRONAUT GORDON COOPER

GORDON COOPER'S ALTITUDE CHAMBER BLUEPRINT

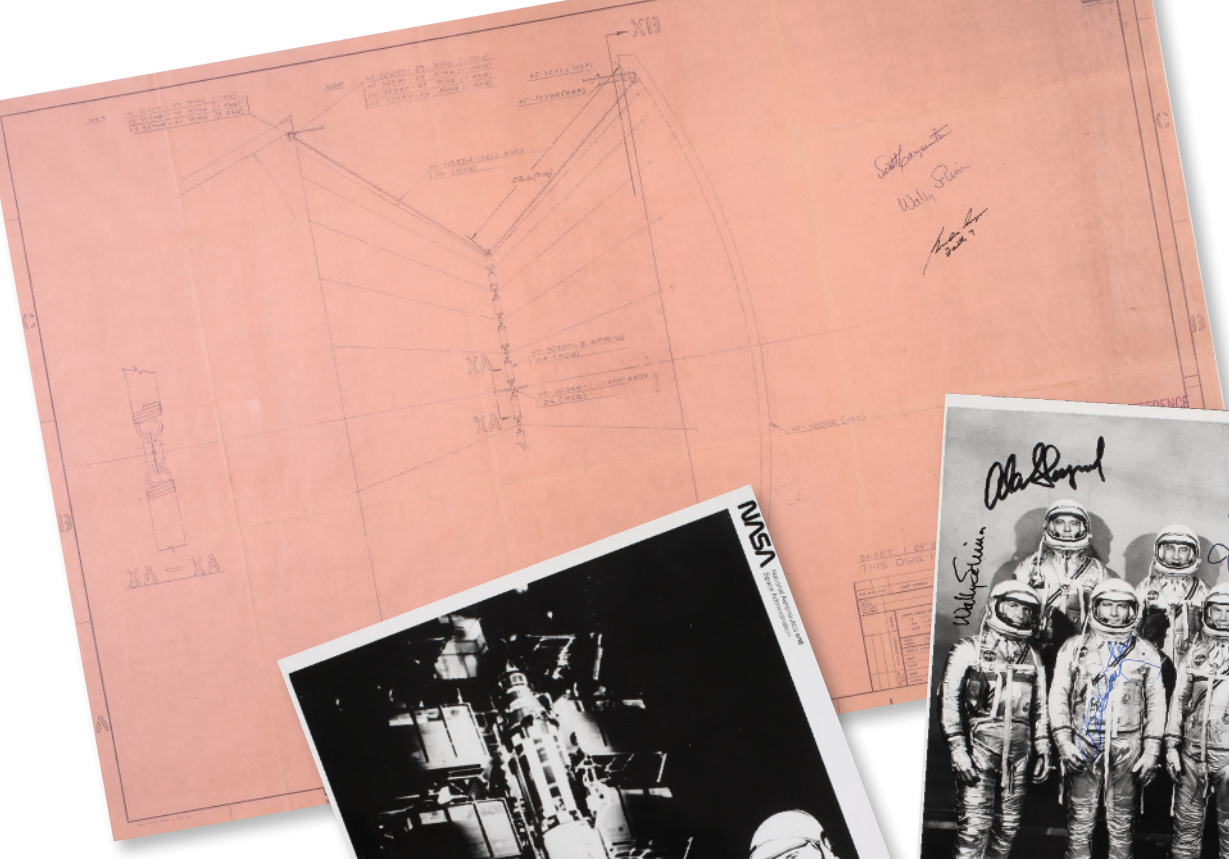
Hanger "S," Capsules 12B, 15A, 17 & 20 (Altitude Chamber) blueprint, McDonnell Aircraft Corp., April 25, 1960, 18 by 73 inches, half scale of master drawing.

INSCRIBED and SIGNED: "*From my notebook, GORDON COOPER, Faith 7, Capsule 20.*"

Two drawings of the Mercury spacecraft are illustrated, one related to the overall placement in the Altitude Chamber and the other detailing the various electrical interfaces. *Full details available online.*

$ 1,500-2,000

54 (DETAIL)



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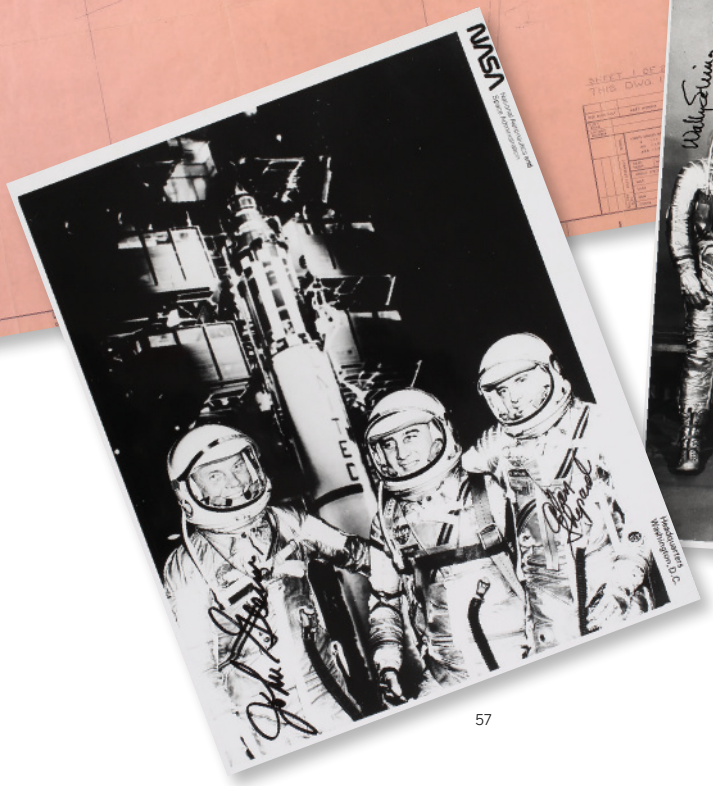

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MERCURY HEAT SHIELD DRAWING BLUEPRINT - SIGNED

E. O. Extension Drawing blueprint. McDonnell Aircraft Corporation, St. Louis, MO, March 24-25, 1961. 22 by 34 inches,¼ scale. Stamped: *"Reference Only, APR-5, 1961."*

BOLDLY SIGNED by SCOTT CARPENTER and WALLY SCHIRRA. SIGNED and INSCRIBED: *"gordon cooper, Faith 7"* and "*MAX FAGET, mercury designer.*"

Illustrated is a deployed Mercury heat shield showing the locations of spacecraft main base ring, clamp, and spring assemblies with the latter two having an enlarged drawing. These assemblies allowed deployment of a "landing bag" between the spacecraft and heat shield which would lessen the vehicle's impact during a planned ocean "splashdown" or possible unscheduled solid surface landing.

$ 1,200-1,800

56

THE MERCURY SEVEN

Black and white photograph, 10 by 8 inches, printed NASA captions on verso.

SIGNED by SCOTT CARPENTER, GORDON COOPER, JOHN GLENN, WALLY SCHIRRA, D. K. SLAYTON, and ALAN SHEPARD.

All the Mercury Astronauts pose in two rows while wearing the spacesuits and helmets.

$ 2,500-3,500

57

BEST OF THE ORIGINAL SEVEN

Black and white photograph, 10 by 8 inches, printed NASA captions on verso.

SIGNED by JOHN GLENN and ALAN SHEPARD.

John Glenn, Gus Grissom, and Alan Shepard pose in their space suits with a Mercury-Redstone rocket in the background. These three men were the top three Mercury Astronauts chosen to compete for the United States first manned space mission, Mercury Redstone 3.

$ 1,000-1,500

58

FIRST DAY OF ISSUE POSTAL COVER - SIGNED

ISSUED ON THE DAY OF JOHN GLENN'S ORBITAL FLIGHT

Postal envelope, 4 by 6 ½ inches, with a First Day of Issue Cape Canaveral postmark dated February 20, 1962. The envelope has the 4 cent "*U.S. Man in Space, Project Mercury*" stamp which was first issued on this date.

SIGNED by SCOTT CARPENTER, GORDON COOPER, JOHN GLENN, WALLY SCHIRRA, D. K. SLAYTON, and ALAN SHEPARD.

$ 3,000-4,000

59

MERCURY ATLAS 8 ORBITAL CHART FOR SIGMA 7 – SIGNED WITH FLIGHT INFORMATION

SCHIRRA RECORDS HIS LAUNCH AND LANDING TIMES

Mercury Orbit Chart MOC-4. Color Earth map, USAF Aeronautical Chart and Information Center for NASA, June 1962, 8½ by 33 inches.

INSCRIBED and SIGNED: "*The Six Orbits of Sigma 7, WALLY SCHIRRA*" along the lower center. *Full details available online.*

$ 1,500-2,000

60

MERCURY ATLAS 9 ORBITAL CHART FOR FAITH 7 - SIGNED WITH FLIGHT INFORMATION

Mercury Orbit Chart MOC-6, 1st Edition. Color Earth map, USAF Aeronautical Chart and Information Center for NASA, February 1963, 10½ by 35½ inches.

INSCRIBED and SIGNED along the top center border: "*I have liftoff and the clock in operating... Faith 7 on the way! GORDON COOPER.*" Additionally INSCRIBED and SIGNED: "*The 22 Orbits for Faith 7, Gordon Cooper*" along the lower center border. *Full details available online.*

$ 1,500-2,000

61

THE MERCURY SPACECRAFT

INSCRIBED WITH THEIR ACTUAL FLIGHT DATES

Color photograph, 10 by 8 inches.

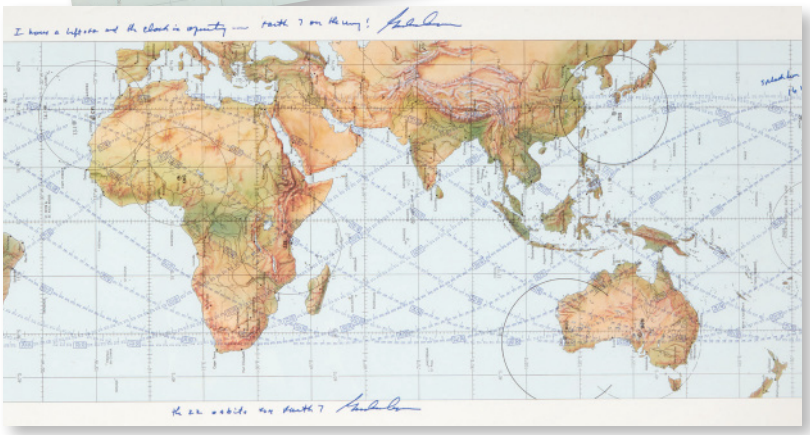
SIGNED and INSCRIBED: "*SCOTT CARPENTER, Aurora 7, 5/62*; *WALLY SCHIRRA, E7, 10/62*" and "*GORDON COOPER, Faith 7, 5/63*." Cooper has written: "*The Mercury Spacecraft*" along the upper left corner.

A drawing of the Mercury spacecraft with escape tower and re-entry retro rockets.

$ 1,000-1,500

58

59



60 (DETAIL)

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62

NASA MERCURY PRESS RELEASE PHOTOGRAPH COLLECTION

CONTAINS 15 PHOTOS EACH SIGNED BY THE ASSOCIATED ASTRONAUT, INCLUDING SCOTT CARPENTER, WALLY SCHIRRA AND GORDON COOPER.

All are 10 by 8 inches in black and white with printed NASA text on verso. *Full details available online.*

$ 1,500-2,000

63

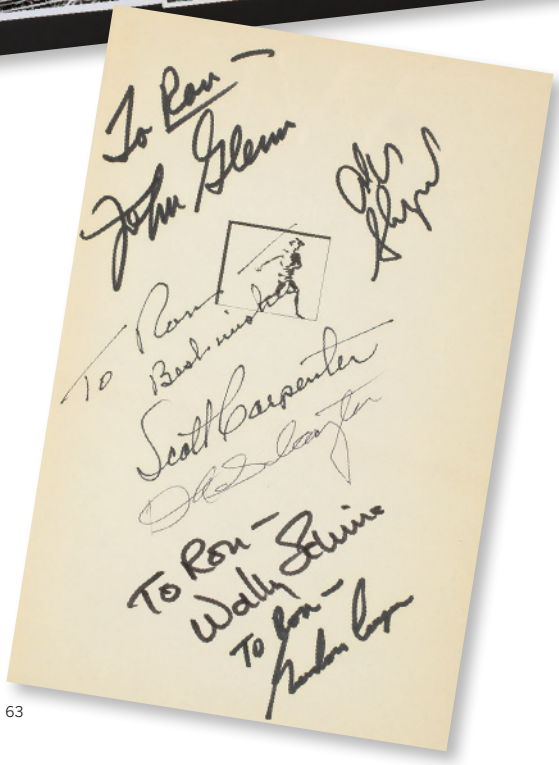
[MERCURY 7 ASTRONAUTS]

We Seven. By the Astronauts Themselves. New York: Simon & Schuster, 1962

8½ by 6 inches. Boards, in the original dust-jacket. Some tears and chips to jacket.

FIRST EDITION. SIGNED AND INSCRIBED "*TO RON, JOHN GLENN*", "*TO RON, BEST WISHES, SCOTT CARPENTER*", "*TO RON - WALLY SCHIRRA*", "*TO RON, GORDON COOPER*", AND SIGNED "*ALAN SHEPARD*", AND "*DEKE SLAYTON*".

$ 3,000-5,000



63

64

GEMINI G1C SPACESUIT THERMAL COVERLAYER

Thermal Coverlayer for the Gemini G1C Spacesuit, made for Gus Grissom by the David Clark Company, ca. 1962

Aluminized coated cover layer, 54½ inches tall from ankle to top of collar, label at inside back neck reading "*Cover Layer* G-1C-1,"(Suit model G-1C, serial number 1) NASA Meatball logo to left chest, two 3 inch diameter holes for oxygen inlet & outlet connectors to front, as well as two smaller holes, likely for communication & bio medical connectors, open at rear to accommodate the change of zipper placement (front the earlier wrap-around design to a vertical back zipper), edges with the white crochet-type stitching characteristic of the suits developed by the David Clark Company. Several areas of orange discoloration, the typical result of oxidization of the aluminized coating.

Project Gemini was critical to the objective of landing a man on the moon, and the US astronauts logged nearly 1000 hours of spaceflight during the course of the program. The astronauts were given a variety of different tasks that were not assigned to the previous project Mercury, including conducting spacewalks, and living in cramped quarters for extended periods of time. As such, their suits needed to be adapted to the new program requirements. They had to provide a high level of versatility as the astronauts would have to wear them for 14 days, while at the same time be functional while pressurized. They had to provide a minimum level of micrometeoroid protection, as well as help the astronauts maintain a level body temperature. The G1C were earliest series of Gemini suits made by the David Clark company, and retained the aluminized silver coating of the Mercury suits (in fact, early photos of the Gemini astronauts show them in the silver suits rather than the white suits that were flown). One major departure from the design in the Mercury suits was the placement of the zipper; on the Mercury suits, there were two zippers, with one wrapping around the waist from the crotch on one side, to just above the waist on the other - the second zipper extended diagonally across the front of the torso, from the hip to the shoulder. This dual wrapping zipper closure meant that donning the suit was slow and complicated. The David Clark Company changed this configuration, so that the suit could be stepped into from the back, and then closed with a vertical zipper running from the crotch area up the back of the suit. This particular cover layer was made for Gus Grissom, one of the smaller astronauts (measuring 5'5"), who was pilot of the second Project Mercury flight, as well as command pilot on Gemini 3. He was assigned as commander of the Apollo 1 mission, and died in the tragic fire during the pre-launch test. Young's *Spacesuits: The Smithsonian National Air and Space Museum Collection,* identifies the G1C suit number 001 as being the one made for Gus Grissom.

REFERENCES

Shayler, *Gemini - Steps to the Moon*, 2001; Young, *Spacesuits: The Smithsonian National Air and Space Museum Collection,* p. 143; see Monchaux, *Spacesuit: Fashioning Apollo.*

PROVENANCE

De-accessioned and disposed of by the National Air & Space Museum in 1980.

$ 40,000-60,000

64

65

THE FOLLOWING LOT WAS ORIGINALLY IN THE COLLECTION OF ASTRONAUT GORDON COOPER

GORDON COOPER'S GEMINI PHOTOGRAPH COLLECTION

HIS LETTER REFERENCES JFK'S NATIONAL GOAL OF LANDING ON THE MOON

A collection of 45 NASA Gemini Program related black and white photographs, all 8 by 10 inches and most having official NASA text on verso. Includes survival training with gag shots, details of the Gemini spacecraft, and some of Neil Armstrong working with equipment and other astronauts.

WITH GORDON COOPER'S signed provenance letter which reads in part: "*The enclosed 45 Gemini photographs include many of the training and day-to-day tasks that I and my fellow astronauts performed. The competition for flight slots was intense but we all worked together to achieve the national goal of landing men on the moon by the end of the 1960 decade.*" *Full details available online.*

$ 1,200-1,800

65 (PART)

66

THE FOLLOWING LOT WAS ORIGINALLY IN THE COLLECTION OF ASTRONAUT GORDON COOPER

COOPER'S GEMINI 5 TRAINING BLUEPRINTS

USED BY COOPER DURING 1965

Control System Orbit Attitude Maneuver System (OAMS) Propulsion. Mission: GT-5. NASA Manned Spacecraft Center, 11 May 1965. Single sheet, 11 by 17 inches. WITH: *Spacecraft 5 Estimated OAMS Propellant Depletion with Permeation Effects Included.* Single sheet, 11 by 17 inches. *Full details available online.*

Both blueprints INSCRIBED and SIGNED: "*My training notes from 1965, GORDON COOPER*".

$ 1,000-1,500

67

THE FOLLOWING LOT WAS ORIGINALLY IN THE COLLECTION OF ASTRONAUT GORDON COOPER

COOPER'S HAND-DRAWN GEMINI 5 POD SEPARATION SEQUENCE

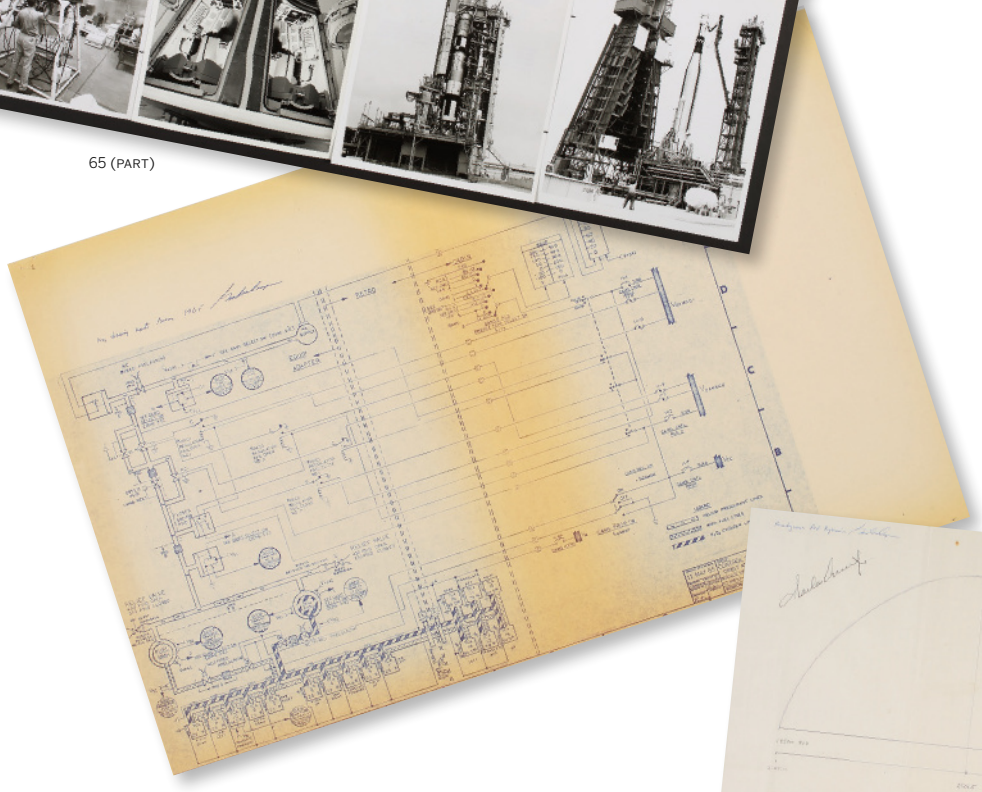
RARE FLIGHT TRAINING ITEM CREATED BY AN ASTRONAUT

Manuscript notes and drawing by Gordon Cooper. Large single sheet, approximately 16 by 20 inches, folded.

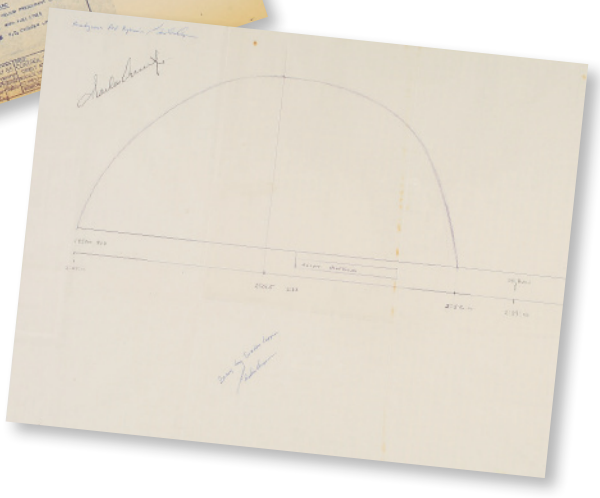
INSCRIBED and SIGNED: "*Rendezvous Pod Dynamics, GORDON COOPER*" and again with: "*Drawing by Gordon Cooper, GORDON COOPER.*" Additionally SIGNED by GT-5 Pilot CHARLES CONRAD.

During training for Gemini 5, Gordon Cooper drew this flight dynamics diagram which illustrates the orbital period and mission timeline of the REP (Rendezvous Evaluation Pod). The REP was a small equipment pod released from the Gemini 5 spacecraft and designed to test rendezvous and guidance capabilities. *Full details available online.*

$ 2,000-3,000



66 (PART)



67 (DETAIL)

68

THE BEGINNING OF "EIGHT DAYS OR BUST" - CREW SIGNED

THE FIRST STEP WHICH TAKES THE LEAD IN THE SPACE RACE FROM THE SOVIETS

Large color photograph, 20 by 16 inches.

Boldly INSCRIBED and SIGNED: "*GT 5 Launch, 21 AUG 1965, GORDON COOPER*" and "*Eight Days or Bust, CHARLES CONRAD.*"

An ultra-sharp image of Gemini-Titan 5 rocket rising from Launch Complex 19 at Cape Canaveral with the Titan engine rocket plume seen in the background.

$ 1,500-2,000

69

GEMINI 5'S LIGHT HEARTED MOMENT - CREW SIGNED

CONRAD JOKES WITH COOPER AFTER THEIR FLIGHT

Color photograph, 10 by 8 inches.

INSCRIBED and SIGNED: "*You need a shave, CHARLES CONRAD*" and "*Maybe tomorrow! GORDON COOPER.*"

Gemini 5 Astronauts Gordon Cooper and Charles "Pete" Conrad share a light moment on the recovery ship after their record breaking 8 day flight during August 1965.

$ 1,500-2,000

70

THE FIRST MANNED SPACE RENDEZVOUS

GEMINI 6 NOSE TO NOSE WITH GEMINI 7

Large color photograph, 16 by 20 inches.

Boldly INSCRIBED and SIGNED: "*First Rendezvous, Gemini 6 & 7, 15 Dec 1965, TOM STAFFORD,*" and SIGNED "*WALLY SCHIRRA, CDR.*"

Gemini 6 pilot Tom Stafford photographs the Gemini 7 spacecraft after the first manned space flight rendezvous some six hours after the Gemini 6 launch from Cape Canaveral on December 15, 1965.

$ 2,500-3,500

68

69

70

71

71

PAMELA LEE

"GRAVITY"

Giclée print, 16 by 20 inches, signed "Pamela Lee 02/10" at lower left in gold pen.

SIGNED and INSCRIBED by BUZZ ALDRIN "*01: 03: 27: 51. 'I've been having a ball floating around in here. BUZZ ALDRIN.'*" A fine giclée print, number 2 of only 10 produced, of Pamela Lee's portrait of Buzz Aldrin sitting in the Gemini XII capsule, his famous slide rule floating weightlessly in front of him- Buzz's keen ability to calculate orbital mechanics with a slide rule is well-known. Pamela Lee is a renowned space artist whose work is widely used in popular magazines, science fiction works, and television productions. She cooperated with Soviet artists during the Young Astronaut/Cosmonaut exchange program in the USSR in 1986, and participated in the NASA art program.

$ 4,000-6,000

72

GEMINI POSTAL COVER COLLECTION

CONTAINS 8 ENVELOPES WITH 14 TOTAL ASTRONAUT SIGNATURES, INCLUDING GORDON COOPER, CHARLES CONRAD, WALLY SCHIRRA, THOMAS STAFFORD, FRANK BORMAN, JAMES LOVELL, GENE CERNAN AND RICHARD GORDON

All envelopes are 3 ½ by 6 ½ inches. *Full listing and details available online.*

$ 1,500-2,000

72

73 (PART)

74

73 (PART)

74

73

NASA GEMINI PRESS RELEASE PHOTOGRAPH COLLECTION

CONTAINS 16 PHOTOS WITH 24 TOTAL ASTRONAUT SIGNATURES, INCLUDING CHARLES CONRAD, TOM STAFFORD, JAMES MCDIVITT, GORDON COOPER, WALLY SCHIRRA, FRANK BORMAN, JAMES LOVELL, AND DICK GORDON

All are 10 by 8 inches in black and white with most having printed NASA text on verso. *Full listing and details available online.*

$ 2,500-3,500

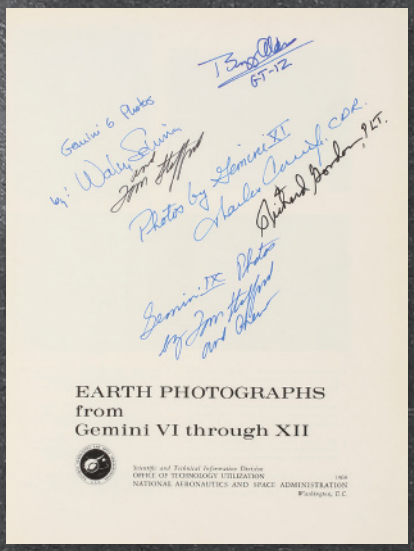
74

NASA GEMINI COLOR PHOTOLITHOGRAPH COLLECTION

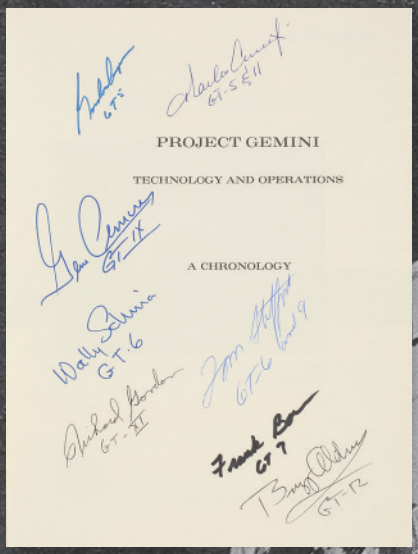
CONTAINS 10 PHOTOS WITH 14 TOTAL ASTRONAUT SIGNATURES, INCLUDING JAMES MCDIVITT, GORDON COOPER, CHARLES CONRAD, TOM STAFFORD, WALLY SCHIRRA, FRANK BORMAN, RICHARD GORDON, AND DAVE SCOTT

All are official NASA released images being 10 by 8 inches, most with official NASA text on either recto or verso. *Full listing and details available online.*

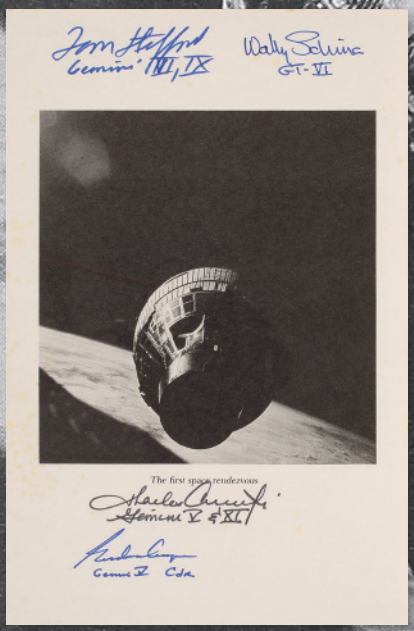
$ 1,500-2,000



75 (PART)



76



77

75

PHOTOGRAPHS TAKEN BY THE GEMINI ASTRONAUTS - TWO VOLUMES, EIGHT ASTRONAUT SIGNATURES

DESCRIBES THE FIRST ERA OF MAN OBTAINING PHOTOGRAPHIC IMAGES FROM EARTH ORBIT

Earth Photographs from Gemini III, IV, and V. NASA SP-129. Washington: 1967. ix, 266 pp. 11 by 9 inches. Original red cloth. INSCRIBED and SIGNED on the title page: "*Gemini V Photos by GORDON COOPER*" and SIGNED by CHARLES CONRAD.

Earth Photographs from Gemini VI through XII. NASA SP-171. Washington: 1968. x, 266 pp. 11 by 9 inches. Original red cloth. INSCRIBED and SIGNED on the half-title page: "*Gemini 6 Photos by: WALLY SCHIRRA and TOM STAFFORD: Gemini IX photos by TOM STAFFORD and Crew; Photos by Gemini XI, CHARLES CONRAD, CDR & RICHARD GORDON, PLT*"; and "*BUZZ ALDRIN, GT-12.*"
Full details available online.

$ 2,500-3,500

76

THE CHRONOLOGY OF GEMINI PROGRAM EVENTS

HAVING EIGHT SIGNATURES THAT INCLUDES FOUR GEMINI CREWS

GRIMWOOD, HACKER, & VORZIMMER. *Project Gemini, Technology and Operations, A Chronology*. NASA SP-4002. Washington: 1969. xvi, 308 pp. 10 ¼ by 8 inches. Original blue printed wrappers.

SIGNED and INSCRIBED on the half-title page:"GORDON COOPER, GT-5; CHARLES CONRAD, GT 5 & 11; WALLY SCHIRRA, GT 6; TOM STAFFORD, GT 6 and 9; FRANK BORMAN, GT 7; GENE CERNAN, GT-IX; RICHARD GORDON, GT XI" and "BUZZ ALDRIN, GT 12." These include the signatures from the Gemini 5, 6, 9, and 11 flight crews. *Full details available online.*

$ 2,000-3,000

77

ORIGINALLY IN THE COLLECTION OF NASA-GEMINI SENIOR MANAGER JAMES C "JIM" ELMS

GEMINI PROGRAM HISTORY PROPELLED BY THE TITAN LAUNCH VEHICLE

HAVING SIX SIGNATURES THAT INCLUDES THREE GEMINI CREWS

HACKER, Barton C. and GRIMWOOD, James M. *On the Shoulders of Titans, A History of Project Gemini.* NASA SP-4203. Washington: 1977. xx, 308 pp. 9¾ by 6¾ inches. Original green printed wrappers.

SIGNED and INSCRIBED on the half-title page: "*BUZZ ALDRIN, GT 12; RICHARD GORDON, GT-XI*" and "*JIM ELMS*." SIGNED and INSCRIBED on the frontispiece: "*GORDON COOPER, Gemini V Cdr; CHARLES CONRAD Gemini V & XI; WALLY SCHIRRA, GT VI*" and "*TOM STAFFORD, Gemini VI, IX*." These include the signatures from the Gemini 5, 6, and 11 flight crews. *Full details available online.*

$ 1,500-2,000

SESSION TWO

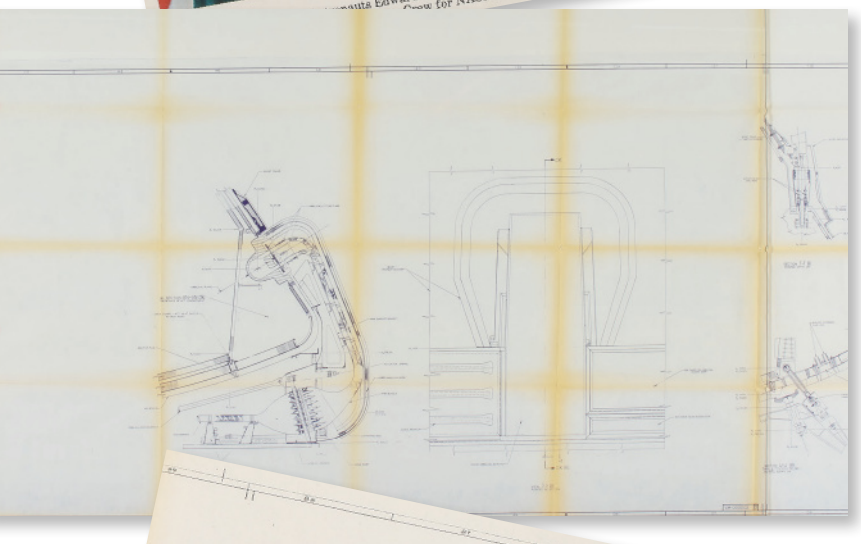
NEW YORK
THURSDAY
20 JULY 2017
2PM

LOTS 78–173

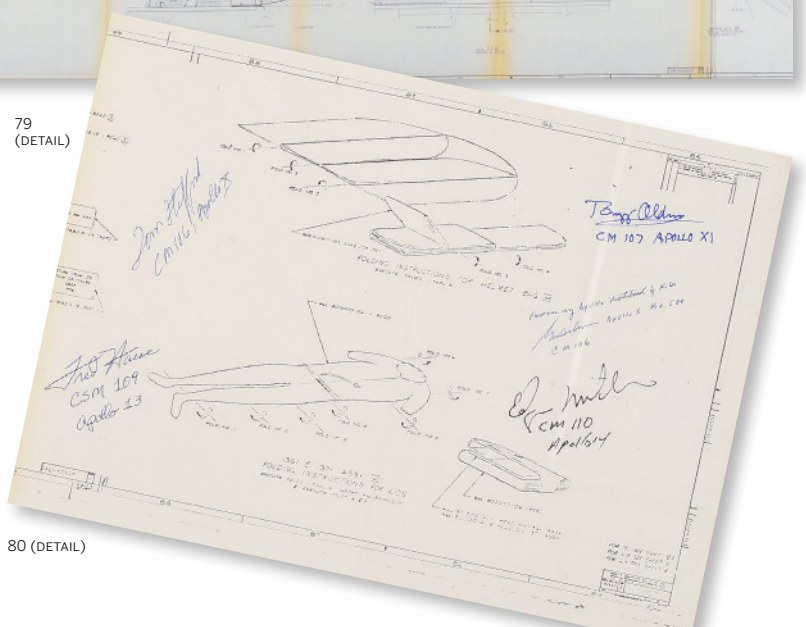
APOLLO PROGRAM THROUGH APOLLO 10

LOTS 78–94

78



79 (DETAIL)



80 (DETAIL)

78

APOLLO 1 - SIGNED BY THE CREW

Apollo 1 Crew-Signed Color NASA Photolithograph

10 by 8 inch photolithograph of the astronauts in their aircraft flight suits posing with a model of a Block I Command Module. Mounted between two sheets of beveled plexiglass. WITH: 6½ inch diameter embroidered souvenir crew patch, and 6 vintage NASA photographs.

SIGNED BY EDWARD WHITE, GUS GRISSOM, and ROGER CHAFFEE.

Apollo 1 was the first mission in the manned lunar landing program, which was scheduled to launch on February 21, 1967. Tragedy struck during a launch rehearsal test on January 27th, with a cabin fire killing all three crew members and destroying the command Module. Investigations later determined that the cause of the fire was electrical; it spread rapidly due to the flammable nylon material of their suits (later changed to flame-retardant beta-cloth) and the high pressure, pure oxygen atmosphere of the cabin. Items signed by the full crew are very rare.

$ 6,000-9,000

79

APOLLO COMMAND MODULE WINDOWS AND PYROTECHNICS

SIGNED BY TWELVE APOLLO ASTRONAUTS

Blueprint, North American Aviation, Downey, CA, 1966. Sheet 12 of 13, 30 by 86 ½ inches, various scales based on a 54 by 140 inch master drawing.

Boldly SIGNED by BUZZ ALDRIN, ALAN BEAN, GORDON COOPER, WALT CUNNINGHAM, CHARLES M. DUKE JR., RICHARD GORDON, FRED HAISE, EDGAR MITCHELL, WALLY SCHIRRA, RUSTY SCHWEICKART, TOM STAFFORD, and AL WORDEN. Each has inscribed his Apollo flight number.

Illustrated are the Command Module (CM) large cabin side window and narrow rendezvous window comprising of two inner glass panes, the thick heat shield glass, and outer micro-meteoroid glass (omitted from later flights to save weight).

Full details available online.

$ 3,000-4,000

80

GORDON COOPER'S COMMAND MODULE BLUEPRINT

FILM STOWAGE, CREW PERSONAL EQUIPMENT, PPK'S, AND MORE

North American Aviation blueprint, pre-folded, expanding to 10½ by 36 inches with 3 binder hole punches at the left edge.

INSCRIBED and SIGNED by GORDON COOPER: *"From my Apollo Notebook & files, GORDON COOPER, Apollo X B. U. (Back-up) CDR, CM 106."* Additionally SIGNED and INSCRIBED with their individual Command Module and Apollo flight numbers by BUZZ ALDRIN, ALAN BEAN, WALT CUNNINGHAM, CHARLES M. DUKE, JR., FRED HAISE, EDGAR MITCHELL, and TOM STAFFORD. *Full details available online.*

$ 2,000-3,000

81

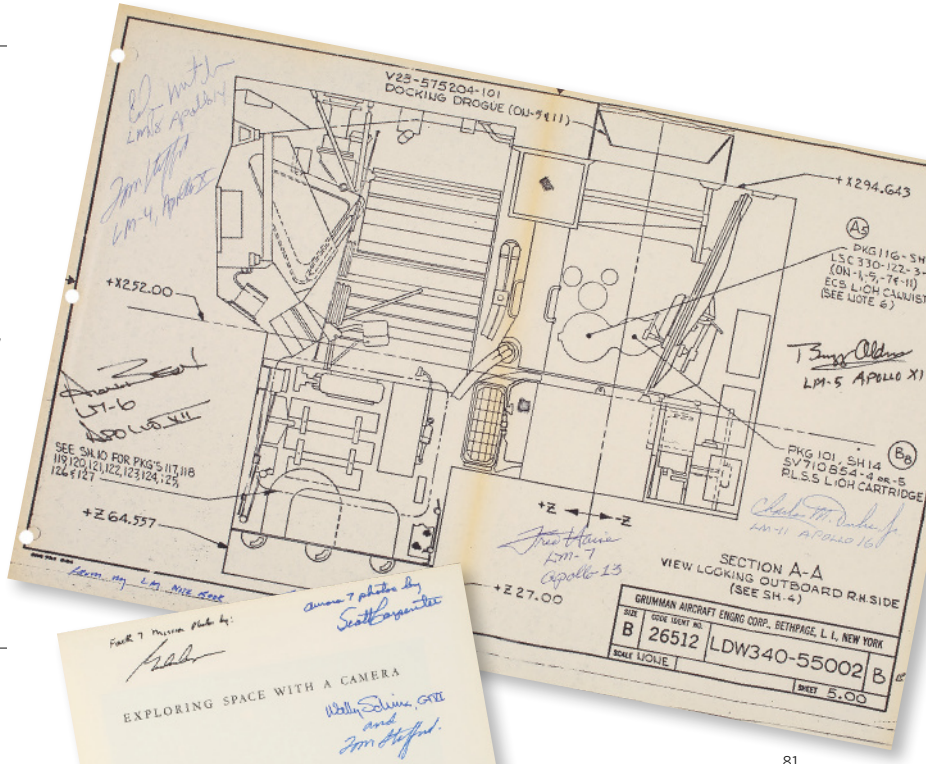
GORDON COOPER'S LUNDAR MODULE BLUEPRINT

Blueprint LDW340-55002, Section A-A, View Looking Outboard, R.H (Right Hand) Side. Grumman Aircraft Engineering Corp., Bethpage, NY. 10 ½ by 16 inches. Scale "none."

INSCRIBED and SIGNED by GORDON COOPER: *"From my Apollo Notebook & files, GORDON COOPER, Apollo X B. U. (Back-up) CDR, CM 106."* Additionally SIGNED by BUZZ ALDRIN, ALAN BEAN, FRED HAISE, CHARLES M. DUKE, JR., EDGAR MITCHELL, and TOM STAFFORD. Each astronaut has INSCRIBED their individual Lunar Module and Apollo flight numbers.

A drawing showing the Lunar Module Ascent Stage with components located along right hand interior side. *Full details available online.*

$ 2,000-3,000



81

82

ASTRONAUTS USE OF CAMERAS IN SPACE EXPLORATION

CORTRIGHT, EDGAR M., editor. Exploring Space with a Camera. NASA SP-168. Washington: 1968. x, 214 pp. 11½ by 9 inches. Original blue cloth.

INSCRIBED with photographic credits and SIGNED by seven astronauts, all on the half title page: *"Aurora 7 photos by SCOTT CARPENTER; Faith 7 mission photos by GORDON COOPER; Gemini 5 mission photos by GORDON COOPER & CHARLES CONRAD; WALLY SCHIRRA, GT VI and TOM STAFFORD; GT – XI Photos by RICHARD GORDON; GT 12 Photos by BUZZ ALDRIN."*

A collection of the best photographs taken from space during the first decade of space exploration. *Full details available online.*

$ 3,000-4,000

82

83

APOLLO POSTAL COVER COLLECTION

CONTAINS 10 ENVELOPES WITH 15 TOTAL ASTRONAUT SIGNATURES, INCLUDING WALLY SCHIRRA, JAMES LOVELL, RUSTY SCHWEICKART, TOM STAFFORD, FRANK BORMAN, GORDON COOPER, CHARLES CONRAD, ALAN BEAN, FRED HAISE, RON EVANS, AND JACK SCHMITT

All envelopes are 3 ½ by 6 ½ inches. *Full listing and details available online.*

$ 1,500-2,000

83

84 (PART)

85 (PART)

86

84

NASA APOLLO PRESS RELEASE PHOTOGRAPH COLLECTION

CONTAINS 11 PHOTOS WITH 14 TOTAL ASTRONAUT SIGNATURES, INCLUDING WALLY SCHIRRA, WALT CUNNINGHAM, FRANK BORMAN, JAMES LOVELL, JAMES MCDIVITT, ALAN BEAN, FRED HAISE, EDGAR MITCHELL, CHARLIE DUKE, AND GENE CERNAN

All are 10 by 8 inches in black and white with all having printed NASA text on verso. *Full listing and details available online.*

$ 1,500-2,000

85

NASA APOLLO COLOR PHOTOLITHOGRAPH COLLECTION

CONTAINS 15 PHOTOS WITH 17 TOTAL ASTRONAUT SIGNATURES, INCLUDING WALLY SCHIRRA, WALT CUNNINGHAM, DAVE SCOTT, TOM STAFFORD, BUZZ ALDRIN, CHARLES CONRAD, ALAN BEAN, FRED HAISE, AND EDGAR MITCHELL

All are official NASA released images being 10 by 8 inches, most with official NASA text on either recto or verso. *Full listing and details available online.*

$ 2,000-3,000

86

APOLLO LION BROTHERS CREW MISSION EMBLEMS

Cloth crew mission emblems, 12 total with sizes from 3 ½ to 5 inches in diameter. Embroidered by Lion Brothers of Owens Mills, Maryland beginning in 1967.

Flight crew emblems for all Apollo manned missions. These cloth emblems are noted for their detailed artistry and exceptional quality of the official NASA crew designs. The Apollo 12 through 17 emblems are hallmarked in the form of their respective mission number "hidden" in the embroidery. Hallmarks are located in Apollo 12's Clipper ship dust trail, in a horse mane just below the sun for Apollo 13, upside-down in the white lunar surface for Apollo 14, just above the "D" in Worden on the Apollo 15 emblem, under the gold vector on the right for Apollo 16, and in the shoulder of god Apollo for Apollo 17.

$ 1,200-1,800

87

KENNEDY SPACE CENTER APOLLO SATURN LAUNCH VIEWING BADGES

ISSUED TO FLIGHT SUPPORT PERSONNEL, VIP'S, GUESTS, AND THE PRESS CORPS

A collection of 18 multi-colored Apollo – Saturn IB and V support and launch viewing badges issued by the Kennedy Space Center between 1969 and 1975. All are 2 ½ by 4 inches in size with many having the corresponding Apollo crew mission emblem on the front side. *Full listing and details available online.*

See catalogue note at SOTHEBYS.COM

$ 1,200-1,800

87 (PART)

88

WALLYS SHIRRA'S NEW JERSEY FLAG CARRIED ON APOLLO 7

FLOWN on *Apollo 7*, a New Jersey state flag, made of silk, 4 by 6 inches. INSCRIBED and SIGNED: "*Flown on Apollo 7, WALLY SCHIRRA.*" Mounted between paragraphs on a Typed Letter Signed by Schirra. *Full details available online.*

$ 2,000-3,000

88

89

APOLLO 7 CREW DURING A LIGHT-HEARTED MOMENT - CREW SIGNED

POSING WITH LEATHER AVIATION FLIGHT HELMETS AND GOGGLES!

Black and white photograph, 10 by 8 inches with official NASA text on verso.

SIGNED by the entire Apollo 7 crew: WALLY SCHIRRA, DONN EISELE, and WALT CUNNINGHAM.

The Apollo 7 astronauts wearing their while space suit pose with leather aviation helmets and googles prior to simulation tests at North American Aviation, the prime contractor for the Apollo Command/Service Modules.

$ 1,500-2,000

89

90

APOLLO 8 CHART FOR LUNAR PHOTOGRAPHY

IDENTICAL TO THE CHART CARRIED TO THE MOON

Apollo Target of Opportunity Flight Chart (ATO), Apollo Mission 8, 21 December 1968 Launch Date. Aeronautical Chart and Information Center of the USAF for NASA. December 2, 1968. First Edition. 14 by 58 inches. Scale 1:7,500,000. Small date stamp of *"Mar 27, 1970"* on verso at far lower left corner.

Boldly INSCRIBED and SIGNED: *"First Manned Lunar Orbit Photography, JAMES LOVELL, Apollo 8."*

Apollo 8 astronauts Frank Borman, James Lovell, and Willian Anders used an identical chart from this production on their 1968 lunar flight. They captured some of the most stunning photographs of the entire Apollo Program, especially the Earth rise above the lunar horizon. That image latter became part of the six cent U.S. postage stamp issued just before the Apollo 11 lunar landing of 1969. *Full details available online.*

$ 2,500-3,500

91

APOLLO 8 PHOTOGAPHY

Analysis *of Apollo 8 Photography and Visual Observations. NASA SP-201. Compiled by NASA Manned Spacecraft Center.* Washington, DC: Office of Technology Utilization, NASA, 1969

8½ by 11 inches, 337 pp. Flexible printed covers, with pochette affixed to inside rear cover. Light soiling to covers. Complete with 4 large Lunar 1: 7 5,000,000 scale Photography Index charts (Chart 1: Stereographic Strip 70mm; Chart 2: Sequence Photography 16 mm; Chart 3: Targets of Opportunity 70 mm; Chart 4: Targets of Opportunity 70 mm), each 58 x 10½ inches, folded and tucked into pochette as issued.

CHART 1 SIGNED "JAMES LOVELL" AND "FRANK BORMAN" [BOTH APOLLO 8], CHART 2 SIGNED "BUZZ ALDRIN APOLLO XI" AND "GENE CERNAN APOLLO XVII", CHART 3 SIGNED "RICHARD GORDON APOLLO XVII", "ALAN BEAN APOLLO XII", "EDGAR MITCHELL APOLLO 14", AND CHART 4 SIGNED "AL WORDEN APOLLO 15 CMP", "DAVE SCOTT APOLLO 15 CDR", CHARLIE DUKE APOLLO 16, LMP, LANDING SITE [ARROW POINTING TO SITE]." *Full details available online.*

See catalogue note at SOTHEBYS.COM

$ 2,000-3,000

92

APOLLO 8 - EARTH PASSING OVER THE MOON

Large color photograph, 30¾ by 29¾ inches

SIGNED and INSCRIBED by FRANK BORMAN in gold marker at the top left corner:

"24 December 1968
075:47:46 Anders: "Hand me that roll of color quick will you?"
075:47:48 Lowell: "Oh man, that's great!
075:47:50 Anders: "Hurry, quick!"
075:47:54 Borman: "Gee!"
075:47:55 Lowell: "It's down here?"
075:48:01 Anders: "Hurry up!"
075:48:06 Borman: "Got one?"
075:48:08 Anders" "Yeah! I'm looking for one.
FRANK BORMAN
CDR Apollo 8
December 1968

In this image, Borman has inscribed a conversation between Anders, Lovell, and himself, who had been taking images of the lunar surface, when they caught sight of the Earth on the horizon, which prompted Borman to exclaim: *"Oh, my God! Look at that picture over there! Here's the earth coming up. Wow, is that pretty!"*

$ 3,000-5,000

90 (DETAIL)

91 (DETAIL)

91 (PART)

92

93

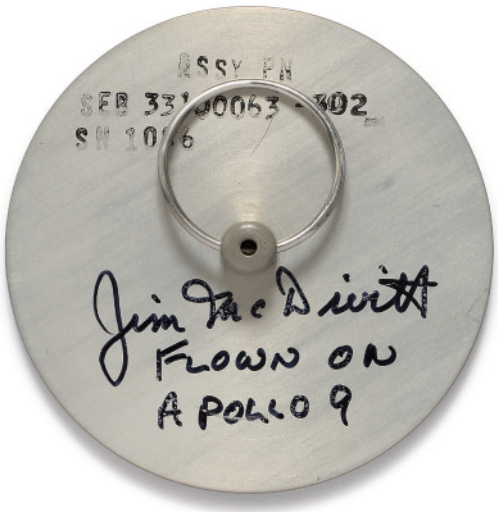
FROM THE COLLECTION OF PETE FADIS

FLOWN APOLLO 9 ALTIMETER COVER

Command Module altimeter cover, aluminum, 2½ inches in diameter, original velcro square to recto, assembly part number "*SEB 33100063-302*" serial number "*1006.*"

SIGNED and INSCRIBED "*JIM MCDIVITT FLOWN ON APOLLO 9.*" With signed provenance letter from McDivitt. The Command Module altimeter was used to indicate pressure altitude of the Command Module up to 60,000 feet. Commonly referred to as a "Light Plug", such covers were developed to allow the astronauts to create a darker environment to better sleep in.

$ 3,000-5,000



93 (ACTUAL SIZE)

94

MASCOT OF THE APOLLO 10 LM CREW - SIGNED

Snoopy Astronaut doll, produced in China by Determined Distributions of San Francisco for United Feature Syndicate, 1969. Plastic and fabric, 10 inches tall. With the original display box.

INSCRIBED and SIGNED by Apollo 10 Lunar Module Pilot Gene Cernan: "*Snoopy, LM-4, GENE CERNAN, Apollo X LMP*" on the back of Snoopy's helmet.

From the *Peanuts* comic strip, the beagle *Snoopy* in a space suit and helmet. *Peanuts* creator Charles Schulz gave his full blessing to NASA for *Snoopy* to be adopted as the mascot for the Manned Flight Awareness (MFA) Program. MFA used *Snoopy* as a "spokesperson" to emphasize such topics as flight safety and good quality control during spacecraft manufacturing. The Apollo X LM crew of Commander Tom Stafford and Gene Cernan named their Lunar Module *Snoopy* partly to bring greater recognition to the MFA program. In the same spirit, Apollo X Command Module Pilot John Young named his spacecraft *Charlie Brown*.

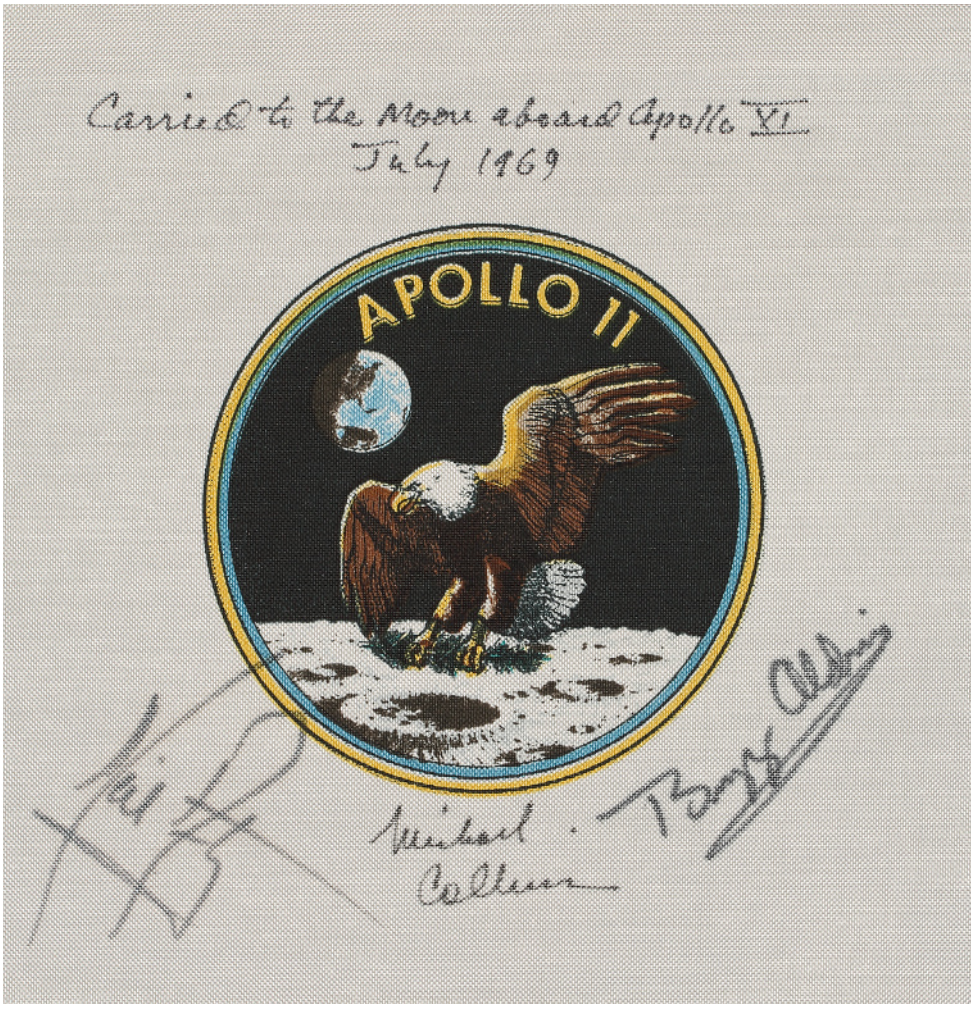
$ 2,000-3,000

94

94 (DETAIL)

APOLLO 11

LOTS 95–136



95

95

FROM THE COLLECTION OF APOLLO 11 COMMAND MODULE PILOT MICHAEL COLLINS

COLLINS' FLOWN CREW-SIGNED APOLLO 11 EMBLEM

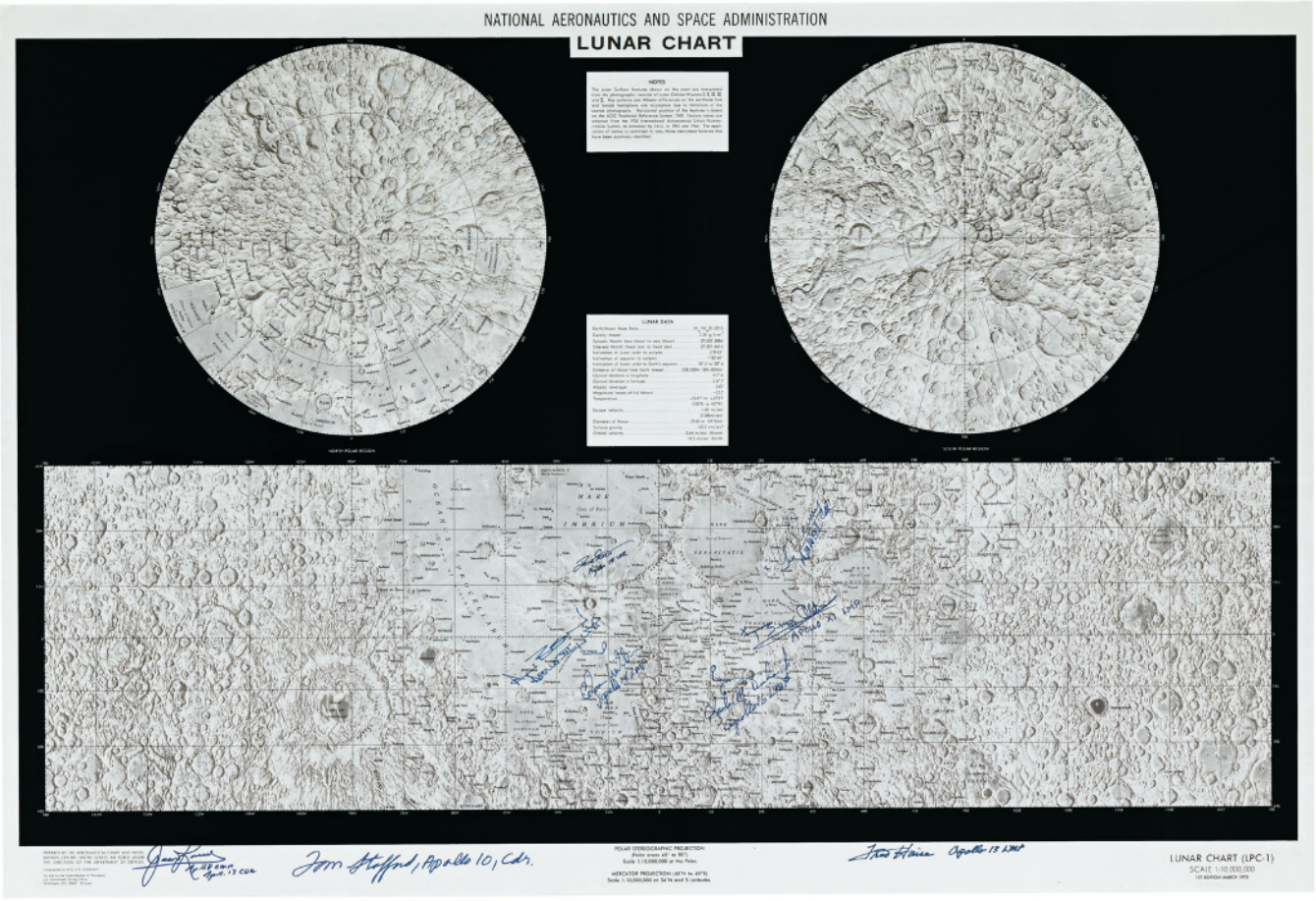
ONE OF THE VERY FEW FLOWN NEIL ARMSTRONG SIGNED MISSION ARTIFACTS

FLOWN Apollo 11 crew emblem 3½ inches in diameter printed on 6 by 6 inch swatch of white Beta-cloth depicting an eagle flying over the surface of the moon, claws gripping an olive branch. Emblems of this type were worn on all of the Apollo 11 astronauts' space suits.

SIGNED by the Apollo 11 crew: *"NEIL ARMSTRONG", "BUZZ ALDRIN", "MICHAEL COLLINS"* and additionally INSCRIBED above emblem by Collins: *"CARRIED TO THE MOON ABOARD APOLLO XI, JULY 1969."*

With Michael Collins' manuscript provenance note, printed on his personal letterhead, which reads: "*I hereby certify that the accompanying crew signed Apollo XI Beta cloth patch was carried by me to the moon in July 1969, and has been in my personal possession ever since. MICHAEL COLLINS. Apollo XI CMP*".

$ 40,000-60,000



96

96

LARGE LUNAR CHART - SIGNED BY A MEMBER OF EVERY LUNAR FLIGHT CREW

Lunar Chart LPC-1. Aeronautical Chart and Information Center, USAF for NASA. March 1970. First Edition. 25¾ by 38 inches. Scale 1:10,000,000. Color lithographed moon map with two stereographic projections of the North and South poles. The full lunar equatorial area is shown in Mercator projection between 45 degrees North and South latitude. Small date stamp of *"Apr 17, 1970"* on verso at far lower left corner.

Lunar landing crew members have marked their landing sites with an *"X"* or circle. SIGNED and INSCRIBED: *"BUZZ ALDRIN, Apollo XI LMP; ALAN BEAN, Apollo XII; EDGAR MITCHELL, Apollo 14 LMP; DAVE SCOTT, Apollo 15 CDR; CHARLES M. DUKE, JR., Apollo 16 LMP"*; and *"GENE CERNAN, Apollo XVII CDR."*

SIGNED and INSCRIBED with their missions and flight titles along the bottom margin: *"JAMES LOVELL, Apollo 8 CMP, Apollo 13 CDR"*; *"TOM STAFFORD, Apollo 10, Cdr"*; and *"FRED HAISE, Apollo 13 LMP."*

A magnificent chart symbolizing Man's first exploration of another celestial body. Signed by nine Apollo astronauts, each being a member of nine lunar missions conducted during the 20th Century. Large features such as mares and craters are identified by name. A square legend block near the chart center lists *"Lunar Data"* including diameter, surface gravity, orbital velocity, temperature, and mean distance from the Earth.

$ 20,000-30,000

97

NASA APOLLO 11 PRESS RELEASE PHOTOGRAPH COLLECTION

CONTAINS 10 PHOTOS, WITH 4 SIGNED BY BUZZ ALDRIN

All are 10 by 8 inches in black and white and each has printed NASA text on verso. Includes four images of EVA (moonwalk) training and Neil Armstrong using lunar contingency soil sample collection device. *Full listing and details available online.*

$ 2,500-3,500

97 (PART)

98

APOLLO 11 - STEP BY STEP PLANS FOR SURFACE EXPLORATION

INCLUDES THE PROCEDURE TO COLLECT THE FIRST LUNAR SOIL SAMPLE

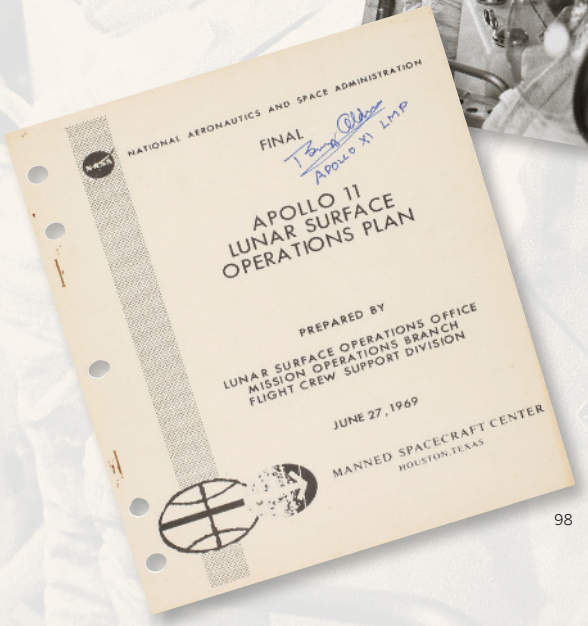
Apollo 11 Lunar Surface Operations Plan, Final Edition. Houston, TX: NASA/MSC, June 27, 1969. vii, 184 pp. Diagrams and charts with 4 folded tables. 10 ½ by 8 inches. Card stock covers, punched, staples removed.

BOLDLY SIGNED and INSCRIBED: *"BUZZ ALDRIN, Apollo XI LMP"* on the front cover.

NASA planning left nothing to chance. This is particularly true as to the execution of lunar surface exploration. This document details not only the nominal (expected) procedures for man's first moonwalk (Extra Vehicular Activity or EVA), but such contingencies as if only one astronaut could perform the exploration, for either a full 2 hours and 40 minutes or only a 49 minute minimum time period. If communication difficulties occurred, deployment of special equipment could be performed, but that would reduce the time for lunar sample collection and experiment deployment. Some 60 pages and two fold-out tables cover the nominal EVA, with some 25 pages and two additional fold-out tables scripting the other possibilities. Tasks such as physical movement on the surface (yes, there were uncertainties), television deployment, photography, spacecraft inspection, lunar geology, experiment deployment, and EVA termination are extensively described.

Most important from a science and human perspective was return of lunar material, wherein the procedure is described in detail. *Full details available online.*

$ 6,000-8,000



98

99

APOLLO 11 - THE MASTER STOWAGE LIST FOR THE FLIGHT COMPONENTS

INCLUDES PLACEMENT AND USE OF THE CONTINGENCY LUNAR SAMPLE BAG

Apollo 11, Apollo Stowage List, Mission AS 506, CM107/LM-5. Houston, TX: NASA/MSC, July 15, 1969. 117 pp. 8 by 10 ½ inches. Card stock covers, staples removed. Additional text on the cover reads: *"FINAL RELEASE, This Issue Documents the AS-FLOWN Configuration."*

BOLDLY SIGNED and INSCRIBED: *"BUZZ ALDRIN, LMP"* on the front cover.

The official manifest of all equipment to be placed aboard the Apollo 11 space vehicles – the Command Module *"Columbia"* and Lunar Module *"Eagle."* As the lists indicate, some flight items were launch from Earth in either the CM or LM, then transferred from one vehicle to the other (and sometimes back again), depending upon the mission requirement.

Of particular interest is the listing for the bag that held the first collected lunar material for return to Earth. Defined as *"Decontamination Bag, Contingency Lunar SRC (Sample Return Container)"* with part number *"V36-788034,"* first located in List A on page 34.

This stowage list tracks the location and movement of all other flight materials such as flight plans, checklists, food, and crew personal equipment. Lunar surface items stowed on exterior or in the LM from List B include lunar tongs, scoop, hammer, television camera, large metal SRC's, and film cameras. There are a large number of associated space suit equipment items to enable Neil Armstrong and Buzz Aldrin to exit the LM and become the first humans explore the lunar surface.

Full details available online.

$ 4,000-6,000

100

APOLLO 11 - THE DETAILED REPORT OF THE FIRST LUNAR LANDING

Apollo 11 Mission Report. NASA SP-238. Washington: 1971. x, 217 pp. Illustrations. 10 ½ by 8 inches. Original printed wrappers.

SIGNED by BUZZ ALDRIN on the title page.

Astronauts Neil Armstrong, Buzz Aldrin, and Michael Collins assisted in the compilation of a Pilot's Report that covers all aspects of the flight including the Saturn V launch, docking and translunar injection, entry into lunar orbit, Lunar Module Eagle's descent and landing, lunar lift-off, and the return to Earth. The Lunar Module computer problems during landing and initial touchdown point location difficulties are addressed in considerable detail. Numerous pages plot the exact descent trajectory and final landing point.

Surface location diagrams show where the initial contingency sample, the larger bulk and documented sampling were obtained. Actual lunar photography has been annotated pointing to exactly where rock and soil samples were collected, and the first collection of lunar soil is described.

Full details available online.

$ 2,000-3,000

101

APOLLO LUNAR SAMPLE COLLECTION BAG

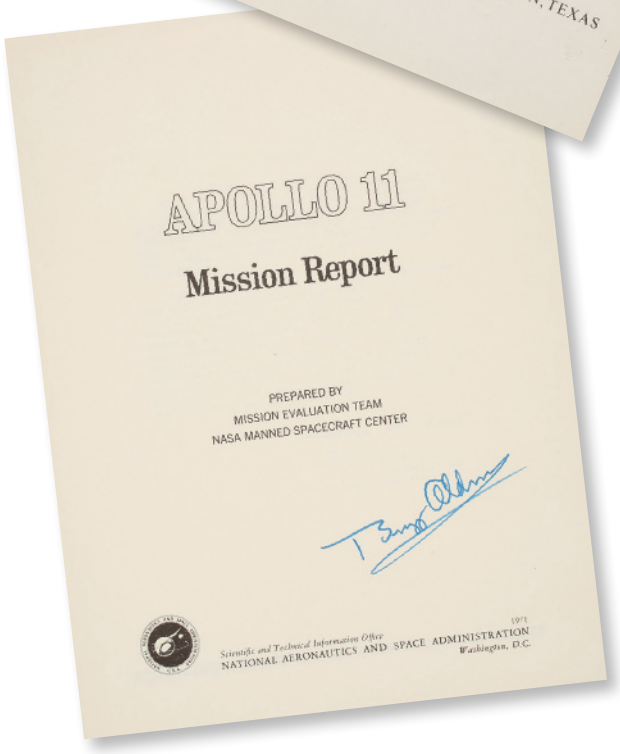
THE TYPED USED ON SEVERAL APOLLO LUNAR LANDING MISSIONS

Lunar Sample Collection Bag constructed from Teflon and aluminum. An identification ID of *"8H"* is stenciled in silver near the middle of the bag. Cylindrical in shape, 5 inches tall and 3 ¼ inches in diameter with an aluminum top ring with handle tab to assist closure once the lunar material was collected.

This bag is very similar to the type placed at the end of the contingency soil sampler device used by Neil Armstrong to collect the first sample of the Moon. It was designed to be closed easily by a pressurized space suit glove while in the lunar environment (total airless vacuum). The aluminum tab and ring allowed the lunar material to be secured when bent closed. Refinement of lunar sample collection methods established an identification system of individual bags. This allowed each sample collection to be "documented" by means of an astronaut communicating where a particular sample was obtained giving the associated bag number. Additionally, surface photographs taken before and after the sampling process allowed scientists to locate exactly where the sample was taken relative to other lunar surface features. For Apollos 12 and 14, bags of this type were placed on a tool carrier and filled by the astronaut's hand while using a lunar scoop.

$ 2,500-3,500

99



100

101

“That’s one small step for a man, one giant leap for mankind.”

Neil Armstrong's photograph of "Buzz" Aldrin standing in the Sea of Tranquility, Armstrong's image reflected in the visor (Detail from lot 116)

102

FLOWN TO THE MOON ON APOLLO 11

FLOWN APOLLO 11 CONTINGENCY LUNAR SAMPLE RETURN OUTER DECONTAMINATION BAG, 1969

12 by 8½ inches, white Beta-cloth and polyester with rubberized nylon and brass zipper closure, labelled "*LUNAR SAMPLE RETURN*" in large block letters above zipper, part number "*V36-788034*" and serial number "*06362AAJ1885*" printed on inner seam of bag. INTERIOR OF BAG WITH REMNANTS OF LUNAR DUST FROM THE APOLLO 11 MISSION. 10 inch and 6 inch long parallel tears to underside of bag.

THE BAG USED BY NEIL ARMSTRONG ON APOLLO 11 TO BRING BACK THE VERY FIRST SAMPLES OF THE MOON EVER COLLECTED — AN EXCEPTIONALLY RARE ARTIFACT FROM MANKIND'S GREATEST ACHIEVEMENT — LANDING A MAN ON THE MOON. NEARLY ALL OF THE EQUIPMENT FROM THAT HISTORIC MISSION IS HOUSED IN THE US NATIONAL COLLECTION AT THE SMITHSONIAN. THIS THE ONLY SUCH ARTIFACT AVAILABLE FOR PRIVATE OWNERSHIP.

DURING THE FIRST FEW MINUTES OF MAN'S FIRST LUNAR EXPLORATION, ARMSTRONG COLLECTED NEARLY 500 GRAMS OF MATERIAL FINER THAN 1 CM, AS WELL AS 12 ROCK FRAGMENTS LARGER THAN 1 CM FROM AN AREA JUST A FEW STEPS AWAY FROM THE LUNAR MODULE *EAGLE,* IN THE REGION KNOWN AS THE *SEA OF TRANQUILITY*. GIVEN THE THEN-UNKNOWN NATURE OF LUNAR MATERIAL, THIS SPECIALLY DESIGNED BETA-CLOTH DECONTAMINATION BAG WAS USED TO PREVENT POTENTIAL CONTAMINATION OF THE LUNAR SAMPLES PRIOR TO EXAMINATION BY SCIENTISTS, AS WELL AS TO PROTECT THE COMMAND MODULE AND PLANET EARTH FROM POTENTIAL LUNAR PATHOGENS.

On July 16th, 1969 at 9:32 EDT the world watched as the Apollo 11 space vehicle launched, carrying on board its crew: Mission Commander Neil Armstrong, Lunar Module Pilot Edwin "Buzz" Aldrin, Jr., and Command Module Pilot Michael Collins. After a 2½ hour checkout period, the Saturn V rocket's third stage injected Command Service Module (CSM) *Columbia* and Lunar Module (LM) *Eagle* into the translunar phase of the mission, and at approximately 76 hours, the spacecraft was inserted into lunar orbit. At 100 hours the LM was undocked, and about 90 minutes later, the descent orbit insertion maneuver was performed with a near 30 second burn of the descent propulsion system. Approximately 70 minutes later, Neil Armstrong and Buzz Aldrin touched down onto the lunar surface aboard the *Eagle* in the *Sea of Tranquility*. (See LOT 100, *Apollo 11 Mission Report*)

PROVENANCE

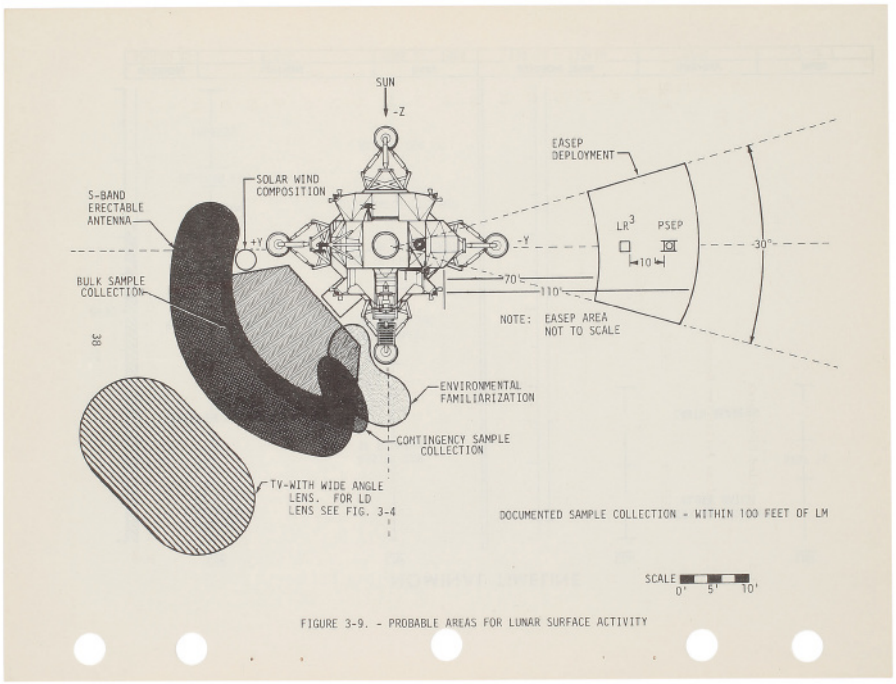
Full details and documentation available upon request.

$ 2,000,000-4,000,000

continued

Neil Armstrong simulating scooping up a lunar sample during lunar surface simulation training at the Manned Spacecraft Center in April, 1969 (detail from lot 97)

Contingency sample collection area next to LM (Detail from lot 98)



102

On July 20th, 1969, at 109 hours and 42 minutes after launch, Neil Armstrong became the first human to set foot on the moon. An estimated 530 million people watched the live broadcast of the momentous event and heard Armstrong speak the now-legendary words: "That's one small step for a man, one giant leap for mankind." After stepping onto the lunar surface, Armstrong immediately set about performing the most important scientific task of the mission — the collection of the contingency lunar sample. *"The contingency sample was taken in view of the sequence camera... Two scoopfuls filled the sample bag with approximately 1.03 kilograms of surface material... Both scoopfuls included small rock fragments... visible on the surface from the lunar module windows."* (LOT 100, *Apollo 11 Mission Report,* p 11-10)

THE COLLECTION OF THE CONTINGENCY LUNAR SAMPLE ABOVE ALL OTHERS WAS THE TOP PRIORITY, as described in the *Apollo 11 Lunar Surface Operations Plan* (LOT 98): *"The nominal plan is to conduct three sample collections of lunar surface material. They are, in order of priority, the contingency, the bulk, and the documented sample collection. The contingency sample... will assure the return of a small sample in a contingency situation where a crewman may remain on the surface for only a short period of time. One to two kilograms of loose material will be collected near the LM ladder and the sample bag restowed in the suit pocket to be carried into the ascent stage when the crewman ingresses"* (LOT 98, p 21). Nothing was left to chance in the mission, and the exact, step-by-step process for collecting the contingency lunar sample was described for the astronauts in detail: *"Remain within a few feet of ladder, remove the CSC* [Contingency Sample Container] *from suit pocket. Deploy the CSC handle and pull strap at base of bag to open. Collect sample, in undisturbed area. Pull locking pin on handle release lever. Press release lever and separate handle from lip/bag assembly. Discard handle under or away from LM. Detach bag from lip assembly. Discard lip assembly under or away from LM. Seal sample bag. Restow and secure bag in suit pocket."* (LOT 98, p 42)

The full contingency sample collection procedure proceeded as follows (from the *Apollo 11 Technical Air-to-Ground Transcript*):

04 13 33 58 LMP (Aldrin, observing from the LM): "Okay. The contingency sample is down and it's ***. Looks like it's a little difficult to dig through the initial crust."

04 13 34 12 CDR (Armstrong): "This is very interesting. It's a very soft surface, but here and there where I plug with the contingency sample collector, I run into a very hard surface, but it appears to be very cohesive material of the same sort. I'll try to get a rock in here. Just a couple.

04 13 34 54 LMP (Aldrin): "That looks beautiful from here, Neil.

04 13 34 56 CDR (Armstrong): "It has a stark beauty all its own. It's like much of the high desert of the United States. It's different but it's very pretty out here. Be advised that a lot of the rock samples out here, the hard rock samples, have what appear to be vesicles in the surface. Also, I am looking at one now that appears to have some sort of phenocryst." .....

04 13 36 35 CDR (Armstrong): "That [spacesuit] pocket open, Buzz?"

04 13 36 35 LMP (Aldrin): Yes, it is. It's not up against your suit though. Hit is back once more. More toward the inside. Okay. That's good."

04 13 36 37 CDR (Armstrong): "That [the contingency sample] in the pocket?"

04 13 36 42 LMP (Aldrin): "Yes, push down."

04 13 36 55 CDR (Armstrong): "Got it?"

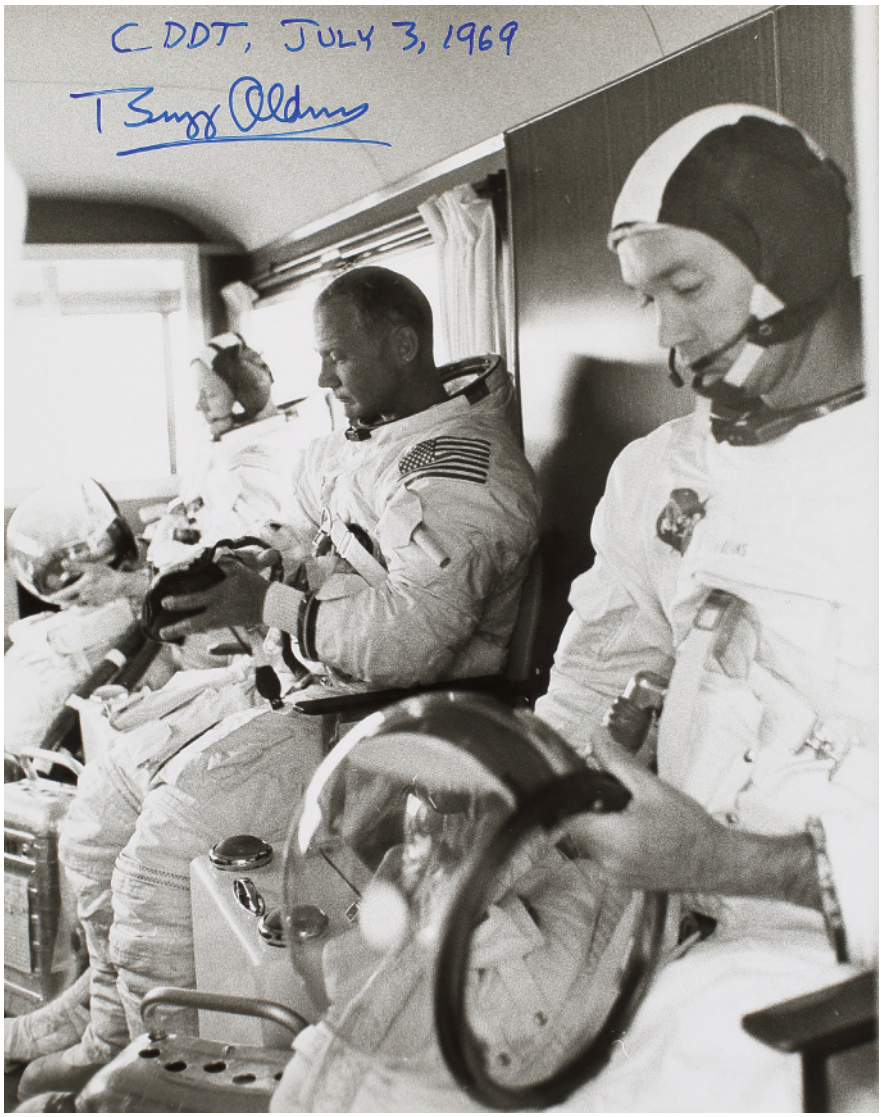
04 13 36 57 LMP (Aldrin): "No. It's not all the way in. Push it. There you go."

04 13 37 08 CDR (Armstrong): "Contingency sample is in the pocket. My oxygen in 81 percent. I have no flags, and I'm in minimum flow."

04 13 37 22 CC (CapCom): "This is Houston. Roger, Neil."

Approximately 20 minutes after Armstrong stepped onto the lunar surface, Buzz Aldrin joined him. The TV camera was then positioned about 30 feet from the LM onto a tripod, and about 30 minutes later, the astronauts spoke with President Nixon via telephone link. Armstrong and Aldrin then continued to perform their EVA (Extra Vehicular Activity, ie. Moonwalk), which lasted more than 2½ hours, and in which they both ranged up to 300 feet from the LM. During this period, Aldrin deployed the Early Apollo Scientific Experiments Package (EASEP), which included Lunar Passive Seismology, Laser Ranging Retro-Reflector, and Solar Wind Composition tests. Armstrong and Aldrin then gathered and verbally reported on the bulk lunar samples. Aldrin returned to the LM after just under two hours on the lunar surface, and Armstrong followed him approximately 41 minutes later. After spending a total of 21 hours, 36 minutes on the lunar surface, Armstrong and Aldrin fired the engine of the ascent stage of the LM, and at 128 hours three minutes into the mission, docked with the CSM (Command Service Module) *Columbia*.

continued



The Apollo 11 astronauts relaxing after the Countdown Demonstration Test for launch. From L to R: CDR Neil Armstrong, LMP "Buzz" Aldrin and CMP Michael Collins (detail from lot 97)

Listed in three different spots on the *Apollo 11 Final Stowage List* (LOT 99) as *"Decontamination Bag, Contingency Lunar SRC* [Sample Return Container]," the present bag was first stored inside the Decontamination Bag for the Sample Return Container No. 1(Large Rock Box) which was located in stowage locker A8 of the Command Module (LOT 99, List A, page 34). Upon docking with the LM after taking off from the lunar surface, the decontamination bags were then transferred by CM Pilot Michael Collins to Neil Armstrong through a small hatch located between the LM and the CM. All of the items that were to be transferred from the LM to the CM were first cleaned using a vacuum brush attached to the lunar module suit return hose. The suction was low, and so the task was not only tedious for the astronauts, but also not 100% effective, as evidenced by the lunar dust found in the present bag. After the items were vacuumed, they were then transferred from the LM to the CM, and the present bag was then placed in stowage locker A5 (LOT 99, List E, p. 79). The bag is last listed on page 114 of the Stowage list, to confirm final placement for the CM's entry back into the Earth's atmosphere and ocean splashdown.

A discussion of the bag between Mission Commander Neil Armstrong and Command Module Pilot Michael Collins can be found in the *Apollo 11 Command Module On-Board Voice Transcript*:

05 09 12 58 CDR (Armstrong): "If you want to have a look at what the moon looks like, you can open that up and look. Don't open the bag though."

05 09 14 17 CMP (Collins): "What was that bag?"

05 09 14 20 CDR (Armstrong): "Contingency Sample."

05 09 14 23 CMP (Collins): "Rock?"

05 09 14 25 CDR (Armstrong): "Yes, there's some rocks in it, too. You can feel them, but you can't see them; they're covered with that – graphite."

05 09 14 39 CMP (Collins): "...compared to – "

05 09 14 45 CDR (Armstrong): "Looks like powdered graphite to me."

On July 21, trans-Earth injection of the CSM began, and re-entry procedures were initiated on July 24, 44 hours after leaving lunar orbit. The Service Module (SM) separated from the CM, turned to a heat-shield forward position, and re-entered Earth's atmosphere. At 195 hours, 18 minutes and 35 seconds on July 24th, the Apollo 11 capsule splashed down into the Pacific Ocean bringing its crew safely back home.

The crew was then retrieved by helicopter and taking to the primary recovery ship, the USS Hornet. Precautions were taken to avoid back-contamination by any lunar organisms, so the crew donned biological isolation garments, and then were placed, along with the lunar samples, in the Mobile Quarantine Facility for transport to the Lunar Receiving Laboratory in Houston. After arrival at the Manned Spacecraft Center in Houston, the spacecraft, samples, and the crew were sent to the Lunar Receiving Laboratory quarantine area where they underwent post-landing analysis and observation. On August 10, 1969, the Apollo 11 crew and spacecraft were released from quarantine after no abnormal medical reactions were observed.

Still containing remnants of lunar dust, this seemingly modest bag has undergone an incredible journey from the Earth to the moon and back, and to us here 48 years later. Due to an error very early on, the bag was misidentified and nearly thrown in the trash and its true identity remained hidden up until just two years ago when it found its way into a seized assets auction held on behalf of the US Marshall's Service. The current owner purchased the bag along with a box full of other space-related odds and ends, and on a hunch, decided to send the bag to NASA for testing. It was determined that not only did the bag contain lunar dust, but it was in fact the very bag used by Neil Armstrong to bring back the contingency lunar sample. A legal battle to determine the rightful ownership of the bag ensued, with the current owner being awarded full ownership and clear title by a Federal judge — MAKING THIS THE ONLY SUCH ARTIFACT AVAILABLE FOR PRIVATE OWNERSHIP.

THIS IS INDEED THE RAREST AND MOST IMPORTANT SPACE EXPLORATION ARTIFACT TO EVER BE OFFERED -A TRUE FIRST OF FIRSTS; AN ITEM USED TO PROTECT THE FIRST LUNAR SAMPLE, COLLECTED BY THE FIRST MAN ON THE MOON, DURING THE FIRST LUNAR LANDING. ALL OTHER NON-EXPENDABLE ITEMS FROM THE APOLLO 11 MISSION ARE HOUSED IN THE US NATIONAL COLLECTION AT THE SMITHSONIAN - NO OTHER NON-EXPENDABLE OBJECT FROM THAT MISSION HAS EVER BEEN SOLD, UNDERLINING THE RARITY OF THIS OBJECT. ALL OTHER MAJOR SPACE EXPLORATION ARTIFACTS THAT HAVE SOLD HAVE BEEN EITHER RUSSIAN, OR FROM LATER US MISSIONS. SOME OF THESE INCLUDE:

·The *Vostok* Spaceship sold in these rooms for $2,882,500 in 2011

·The Excalibur Almaz Space Capsule for $1,300,000 in 2014 (Lempertz)

·The Bulova worn by CDR Scott on Apollo 15 for $1,625,000 in 2014 (RR)

·The rotational hand-controller used by CDR Scott on Apollo 15 for $610,064 in 2014 (RR)

·The emblems from LMP Irwin's spacesuit, worn on Apollo 15, for $358,000 in 1996 (Chrsitie's)

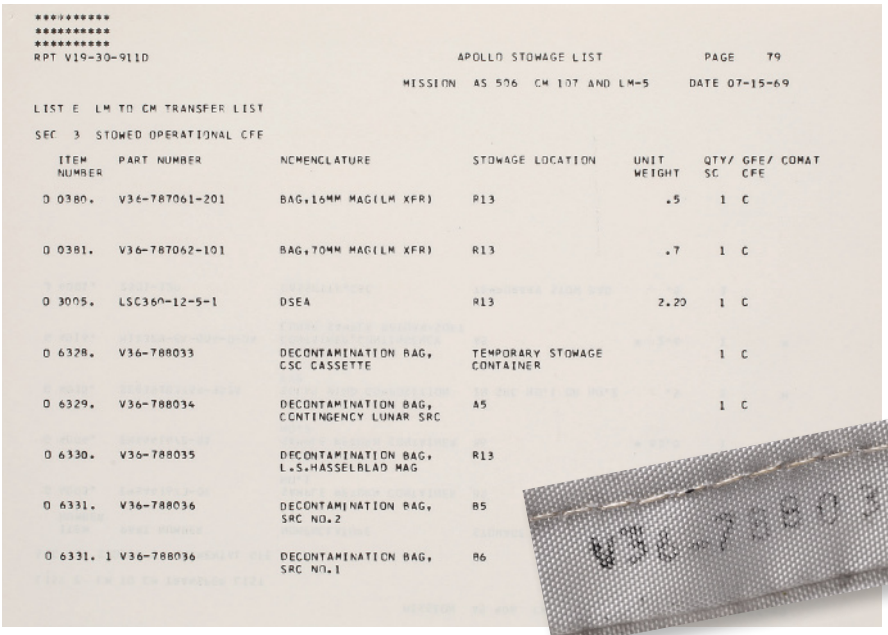
THIS BAG HOWEVER, IS MUCH MORE THAN JUST AN ARTIFACT OF SPACE EXPLORATION — IT IS AN ARTIFACT FROM HUMANITY'S GREATEST ACHIEVEMENT, AND THE ONLY EXAMPLE OF ITS KIND THAT IS AVAILABLE FOR PRIVATE OWNERSHIP. WHEN LOOKING AT IT IN THE BROADER CONTEXT OF UNIQUE ITEMS THAT HAD NEVER BEFORE BEEN OFFERED AT PUBLIC AUCTION, SIMILAR ITEMS INCLUDE:

·The *Tyrannosaurus Rex* skeleton known as "Sue,"sold in these rooms for $8,360,000 in 1997

· The 1933 Double Eagle Gold Coin, sold in these rooms for $7,590,000 in 2002

REFERENCES

NASA, *Apollo 11 Stowage List. Mission AS 506 CM 107/LM-5. Apollo 11. July 15, 1969.* Houston: Manned Spacecraft Center, July 15, 1969; NASA, *Apollo 11 Final Flight Plan. AS-506/CSM-107/ LM-05. July 1, 1969.* Houston: Manned Spacecraft Center, July 1, 1969; NASA, *Apollo 11 Mission Report.* Houston: Manned Spacecraft Center, November, 1969; NASA, *Apollo 11 On-Board Voice Transcription - Command Module*, July, 1969; NASA, *Apollo 11 Technical Air-to-Ground Voice Transcription,* July, 1969; NASA, *Apollo 11 PAO Mission Commentary Transcript*, July 1969



RPT V19-30-911D — APOLLO STOWAGE LIST — PAGE 79

MISSION AS 506 CM 107 AND LM-5 — DATE 07-15-69

LIST E LM TO CM TRANSFER LIST

SEC 3 STOWED OPERATIONAL CFE

ITEM NUMBER	PART NUMBER	NOMENCLATURE	STOWAGE LOCATION	UNIT WEIGHT	QTY/ SC	GFE/ CFE	COMAT
D 0380.	V36-787061-201	BAG,16MM MAG(LM XFR)	R13	.5	1	C	
D 0381.	V36-787062-101	BAG,70MM MAG(LM XFR)	R13	.7	1	C	
D 3005.	LSC360-12-5-1	DSEA	R13	2.20	1	C	
D 6328.	V36-788033	DECONTAMINATION BAG, CSC CASSETTE	TEMPORARY STOWAGE CONTAINER		1	C	
D 6329.	V36-788034	DECONTAMINATION BAG, CONTINGENCY LUNAR SRC	A5		1	C	
D 6330.	V36-788035	DECONTAMINATION BAG, L.S.HASSELBLAD MAG	R13				
D 6331.	V36-788036	DECONTAMINATION BAG, SRC NO.2	B5				
D 6331. 1	V36-788036	DECONTAMINATION BAG, SRC NO.1	B6				

Above Apollo 11 Stowage List page in which the bag is listed, under the heading "Decontamination bag, contingency lunar SRC" (Detail from lot 99)

102, Part number printed on inside seam of bag

"Buzz" Aldrin standing next to the American flag (Detail from lot 117)

103

103, Part number printed on inside seam of bag

103

APOLLO LUNAR SAMPLE RETURN BAG

AN INITIAL DESIGN TO BRING BACK THE FIRST LUNAR SAMPLES

Large Beta Cloth lunar soil and equipment containment bag, 21 ¼ by 20 ½ inches. The front has three 2 by 4 inch heavy weave labels with the top label reading: *"CONTINGENCY SAMPLE, CLOSEUP CAMERA FILM CASSETTE."* The middle label reads: *"GEOLOGY FILM CASSETTE,"* and the bottom label is blank. The back side has an 18 inch heavy zipper opener along the top edge. The interior of the bag is marked with part number of V36-784014-21 and serial number 06362 AAJ 4184, along with two inspection stamps.

NASA began establishing plans for the handling of lunar material to be brought back by Apollo astronauts as early as 1963. This included planning and construction of the Lunar Receiving Laboratory (LRL) at the then called Manned Spacecraft Center (MSC) in Houston, Texas, between 1964 and 1968. It was critical that procedures and facilities be established to provide a safe quarantine environment to prevent any possible Earth contamination from possible microorganisms from the Moon.

That mandated that initial flight objectives be the biological containment of the flight crew, the actual lunar samples, and any equipment that came into contact with these lunar samples. As for the latter two, a requirement to clean and isolate the materials that were exposed to the lunar environment was established. Upon docking with the Command Service Module (CSM) after leaving the lunar surface, the Lunar Module (LM) crew members were to have a vacuum cleaning system and contamination containment bags passed to them from the Command Module Pilot. The LM crew vacuumed the first collected lunar samples contained in a Teflon contingency sample bag, all the lunar picture film cassettes, and the two large Sample Return Containers (SRC's or rock boxes) which were closed while out on the lunar surface. They also vacuumed cleaned their space suits, gloves, and helmets. These tasks would keep any free floating lunar material from entering the Command Module to a minimum.

This Contingency Sample bag represents some of the first planning for the system to secure the first lunar samples and for the protection the inhabitants of Earth. It was planned hold not only the first lunar samples, but lunar film experiments as listed – the cassettes containing film from the closeup and geology cameras. Final plans for the first lunar landing flight established the requirement to make individual contamination Beta cloth bags for each individual item being returned from the lunar surface – the two large metal SRC's, closeup camera cassette (now in combination with the geology cassette), 70mm film magazines from the Hasselblad camera, and first samples taken from the Moon's surface, the contingency sample.

$ 25,000-35,000

104

ORIGINALLY FROM THE COLLECTION OF APOLLO 11 LUNAR MODULE PILOT BUZZ ALDRIN

FLOWN APOLLO 11 FLIGHT PLAN SHEET

ONE OF THE FEW SHEETS DESCRIBING CREW ACTIVITIES WHILE ON THE MOON

FLOWN *Apollo 11 Flight Plan*, pp 3-73/3-74, a single sheet printed recto and verso. NASA/JSC, July 1, 1969. 8 x 10 ½ inches. With a Typed Letter Signed by BUZZ ALDRIN.

It was just over 3 hours since Neil Armstrong and Buzz Aldrin had made the first manned lunar landing in human history. This sheet describes a planned rest period, but actually, the mission times between 106 and 108 hours had Armstrong and Aldrin busily preparing to leave Eagle and step out onto the lunar surface. It was a fortunate move because getting the life support "back packs" and other equipment ready to use out on the lunar surface took longer than planned. Aldrin writes about his experience just after this historic event and how this sheet represents some of the most significant events during the entire flight.

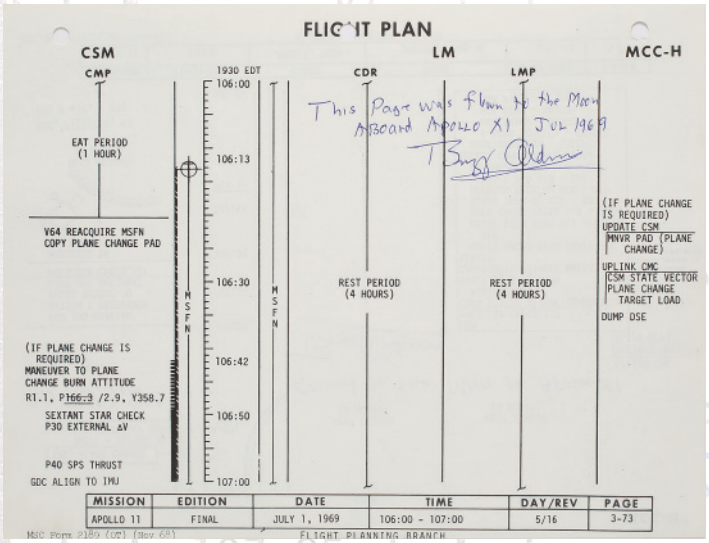
Accompanied by BUZZ ALDRIN'S signed provenance letter on his personal stationery which reads: *"Enclosed with this letter is a sheet numbered 3-73 and 3-74 from the Apollo 11 Flight Plan, Part No. SKB32100080-350, S/N 1001. It is part of the entire document that was carried to the Moon in Command Module Columbia during the first lunar landing mission during July 16 to 24, 1969. This sheet is from the detailed timeline section and covers hour 106 through the beginning of hour 108 in the mission.*

Page 3-73 lists one of the 4 hours that was scheduled to be a rest period just about 3 hours after Man's first landing on the lunar surface. Page 3-74 lists the next hour of that period. Needless to say, Neil and I had an abundance of energy after this historic event and starting a rest period was the last thing on our minds. At about 104 hours 30 minutes into the mission, Neil asked and received concurrence from Mission Control to start the EVA or moon walk activities about 5 hours earlier than was written in the flight plan. Thus, we were actually doing EVA Prep work during this period of the mission which consisted of strapping on our PLSS (Portable Life Support Systems) or "back packs," then doing space suit pressure and communication checks.

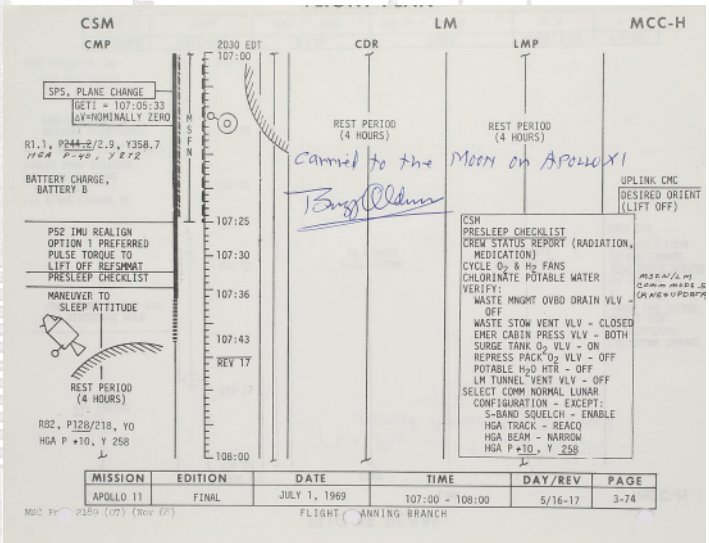
The flight plan was probably the single most important document related to the success of our mission. It provided a time schedule of crew activities and spacecraft maneuvers to accomplish the first lunar landing. This page in particular from Ground Elapsed Time (GET) standpoint has some of the most significant events that occurred during the entire Apollo 11 flight.

This page has been in my private collection since 1969. I have written on page 3-73: "This page was flown to the Moon aboard Apollo XI, JUL 1969" and signed it along the top part of that page. At the top of page 3-74, I have written: "Carried to the Moon on Apollo XI" and signed that page also. Additionally, a copy of the flight plan cover is enclosed."

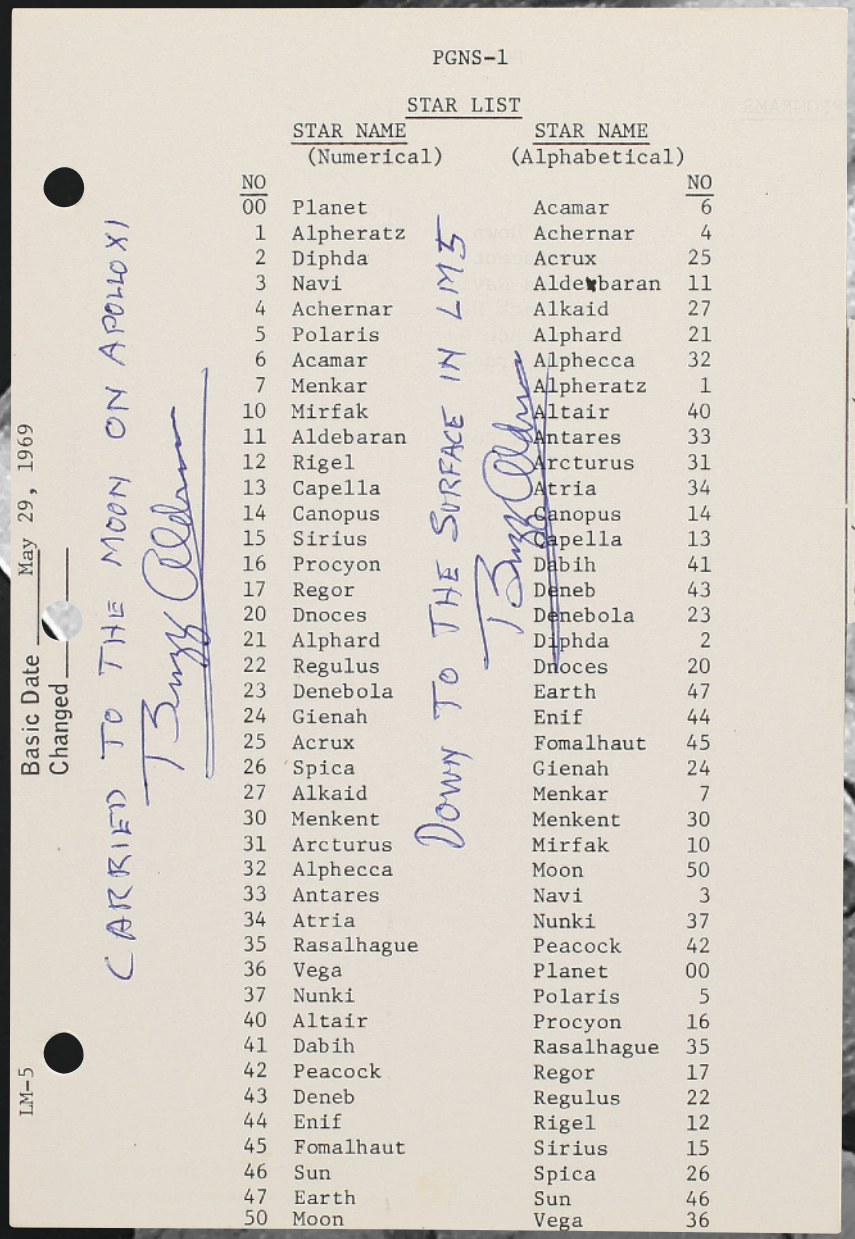
$ 20,000-30,000



104



104



PGNS-1

STAR LIST

NO	STAR NAME (Numerical)	STAR NAME (Alphabetical)	NO
00	Planet	Acamar	6
1	Alpheratz	Achernar	4
2	Diphda	Acrux	25
3	Navi	Aldebaran	11
4	Achernar	Alkaid	27
5	Polaris	Alphard	21
6	Acamar	Alphecca	32
7	Menkar	Alpheratz	1
10	Mirfak	Altair	40
11	Aldebaran	Antares	33
12	Rigel	Arcturus	31
13	Capella	Atria	34
14	Canopus	Canopus	14
15	Sirius	Capella	13
16	Procyon	Dabih	41
17	Regor	Deneb	43
20	Dnoces	Denebola	23
21	Alphard	Diphda	2
22	Regulus	Dnoces	20
23	Denebola	Earth	47
24	Gienah	Enif	44
25	Acrux	Fomalhaut	45
26	Spica	Gienah	24
27	Alkaid	Menkar	7
30	Menkent	Menkent	30
31	Arcturus	Mirfak	10
32	Alphecca	Moon	50
33	Antares	Navi	3
34	Atria	Nunki	37
35	Rasalhague	Peacock	42
36	Vega	Planet	00
37	Nunki	Polaris	5
40	Altair	Procyon	16
41	Dabih	Rasalhague	35
42	Peacock	Regor	17
43	Deneb	Regulus	22
44	Enif	Rigel	12
45	Fomalhaut	Sirius	15
46	Sun	Spica	26
47	Earth	Sun	46
50	Moon	Vega	36

Basic Date May 29, 1969
Changed ____

CARRIED TO THE MOON ON APOLLO XI
T Buzz Aldrin

DOWN TO THE SURFACE IN LM 5
T Buzz Aldrin

LM-5

STARS, PROGRAMS, VERBS

105 (RECTO)

105

ORIGINALLY FROM THE COLLECTION OF APOLLO 11 LUNAR MODULE PILOT BUZZ ALDRIN

FLOWN APOLLO 11 CHECKLIST SHEET TAKEN TO THE LUNAR SURFACE

AN IMPORTANT REFERENCE TO ENABLE NAVIGATION ALIGNMENTS AFTER THE LUNAR LANDING

FLOWN *Apollo 11 LM G and N Dictionary*, page PGNS-1/PGNS-2, a single sheet printed recto and verso. NASA/MSC, May 29, 1969. 5½ by 8 inches, having a tab extension that reads: *"STARS, PROGRAMS, VERBS."* With a Typed Letter Signed by BUZZ ALDRIN.

Almost immediately after the first lunar landing, Neil Armstrong and Buzz Aldrin performed the complex task of realigning their onboard navigation equipment. This required taking star sightings though an onboard telescope. Their computer would recognize a number code for individual stars and the crew used this sheet as a reference guide to verify each star correctly. This realignment told the computer where they were, relative to select star measurements and readied Lunar Module *Eagle* for an emergency lift-off or an early return from the lunar surface.

The reverse side lists computer programs for flight operations. Neil Armstrong had just successfully guided *Eagle* to the lunar landing using programs 64, 65, and 66. That final program, *"66 Landing Phase (ROD),"* allowed Armstrong to manually guide *Eagle* to a desired landing point while the computer controlled engine thrust. He manually made small changes in descent thrust with commands via the Rate of Descent (ROD) switch. Several other programs including 32, 33, 72, 73, 75, and 76 enabled Armstrong and Aldrin to leave the Moon and return to Michael Collins in CSM *Columbia*.

105 (VERSO)

Accompanied by BUZZ ALDRIN'S signed provenance letter on his personal stationery which reads: *"Accompanying this letter is sheet labeled PGNS-1 and PGNS-2 from the Apollo 11 LM G and N Dictionary, Part No. SKB32100074-361, S/N 101. The dictionary was carried to the Moon on the flight of Apollo 11 during July 16 to 24, 1969. Then the entire Guidance and Navigation (G and N) Dictionary, including this page, was taken to the surface of the Moon in lunar module Eagle during the first lunar landing on July 20, 1969. PGNS stands for Primary Guidance and Navigation Section. Each side of this sheet has a tab that reads: "STARS, PROGRAMS, VERBS."*

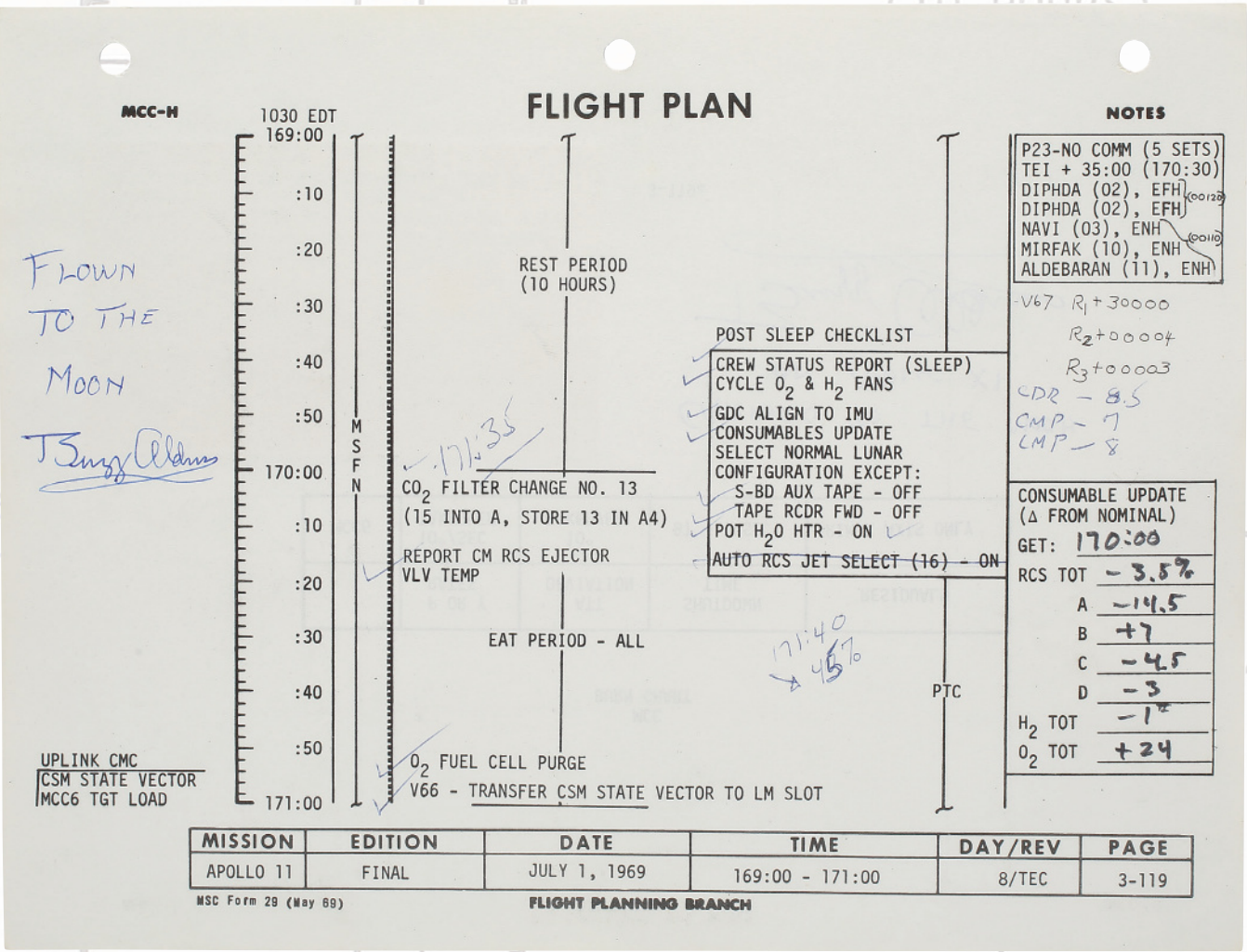
This sheet was one of the few celestial aids we had on the lunar surface. PGNS-1 has four columns of information, the first two being a listing in octal or base 8 format with its associated star name. Our guidance and navigation computer used octal numbers to recognize stars. For our convenience, the next two columns list the stars alphabetically with their octal code number.

Side PGNS-2 list the actual computer program numbers and their associated name which incidentally fairly well described what the program was designed to perform.

The complete dictionary was a vital document to the success of our mission. It not only provided definitions of computer codes, but contained detailed information on steps required to operate flight equipment associated with the first lunar landing.

The sheet has been in my private collection since 1969. I have written on side PGNS-1: "Carried to the Moon on Apollo XI," and signed it along the left margin. In addition I wrote: "Down to the lunar surface in LM 5" and signed again along the center margin. I have also enclosed a copy of the cover of this dictionary."

$ 25,000-35,000



106 (RECTO)

106

ORIGINALLY FROM THE COLLECTION OF APOLLO 11 LUNAR MODULE PILOT BUZZ ALDRIN

FLOWN APOLLO 11 FLIGHT PLAN SHEET

WITH EXTENSIVE MISSION NOTES MADE BY MOON WALKERS ARMSTRONG AND ALDRIN

FLOWN *Apollo 11 Flight Plan,* pp 3-119/3-119a, a single sheet printed recto and verso. NASA/JSC, July 1, 1969. 8 x 10 ½ inches. Detailed flight annotations by Neil Armstrong in blue ink and by Buzz Aldrin with a black marker. Includes a Typed Letter Signed by BUZZ ALDRIN.

At this point in the mission, the Apollo 11 crew was beginning their last full day in space prior to their planned return to Earth with a splashdown the next day. Neil Armstrong verified completion of tasks listed on page 3-119 with twelve separate check marks. He also logs five other entries being two event times and the hours of sleep for each crew member. Buzz Aldrin makes eight numeric update entries related to consumables in the notes section column. Plans to prepare for MCC 6 (Mid Course Correction, a Service Propulsion System rocket engine burn) were cancelled due to the precise trajectory they maintained after leaving the Moon, giving the crew a bit more time to enjoy their breakfast of reconstituted (just add water) food packs.

Accompanied by BUZZ ALDRIN'S signed provenance letter on his personal stationery which reads: *"Enclosed with this letter is a sheet numbered 3-119 and 3-119a from the Apollo 11 Flight Plan, Part No. SKB32100080-350, S/N 1001. It is part of the entire document that was carried to the Moon in Command Module Columbia on the first lunar landing mission during July 16 to 24, 1969. This sheet is from the detailed timeline section*

MCC
BURN CHART

	P OR Y RATES	ATT DEVIATION	SHUTDOWN TIME	RESIDUALS
MCC6	10°/SEC TAKEOVER	10° TAKEOVER	BT + 1 SEC	TRIM X AXIS ONLY

W-MATRIX

IN THE EVENT OF A LOSS OF COMM THE W-MATRIX WILL BE INITIALIZED TO THE VALUES LISTED BEFORE THE NEXT SCHEDULED BATCH OF SIGHTINGS.

NOTE

THE W-MATRIX IS INITIALIZED ONLY ONCE ON THE TRANSEARTH LEG.

IF A LOSS OF COMM OCCURS AFTER EI-24 HRS (GET 171:00) AND PROVIDED THE EI-24 HRS ENTRY PAD UPDATE HAS BEEN RECEIVED, THE CURRENT CMC STATE VECTOR WILL PROVIDE REENTRY CAPABILITY, AND NO NAVIGATION MARKS WILL BE MADE.

CARRIED TO THE MOON ON APOLLO XI

T Buzz Aldrin

3-119a

106 (VERSO)

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and covers from hour 169 to the beginning of hour 171 in the mission.

Page 3-119 lists the last hour of a rest period. In the notes column on the right side, Neil Armstrong recorded the length of sleep in hours for each crew member. These notes read: "CDR - 8.5, CMP - 7, LMP - 8." Neil communicated this information to Mission Control after our wake-up call. He also checked off eight steps of the Post Sleep Checklist and lined-out the Auto RCS Jet step. Neil made the other entries of "171:35," and "171:40 -> 45%," then made four additional check marks. I completed the Consumable Update data box entries with: "170:00, -3.5%, -14.5, +7, -4.5, -3" which was the mission time and the total percent change in our Service Module Reaction Control System with the other 4 numbers actual use from the A, B, C, and D rocket engine groups. My last entries of: "-1#, +24" were the hydrogen and oxygen quantity changes in pounds up to that time.

Page 3-119a has burn chart associated with the MCC6 (Mid Course Correction) burn number 6. This grid includes pitch and yaw rates, attitude deviation, engine shutdown time, and residuals. Our entry trajectory was so precise that plans for the MCC6 burn were not carried out. This gave us a longer period to enjoy our breakfast.

The flight plan was probably the single most important document related to the success of our mission. It provided a time schedule of crew activities and spacecraft maneuvers to accomplish the first lunar landing.

This page has been in my private collection since 1969. I have written on side 3-119: "Flown the Moon" and signed that page. I have also signed side 3-119a with: "Carried to the Moon on Apollo XI" and signed that page below the burn chart. Additionally, a copy of the flight plan cover is enclosed."

$ 25,000-35,000

107

ORIGINALLY FROM THE COLLECTION OF APOLLO 11 LUNAR MODULE PILOT BUZZ ALDRIN

FLOWN APOLLO 11 COMMAND MODULE SKIN FRAGMENT

An approximately ¼ by ¼ inch FLOWN foil segment mounted on a 3 by 8 inch Typed Note Signed by Buzz Aldrin. This foil material served as the thermal protection layer on the very outer surface of Command Module *Columbia*. It was exposed to the vacuum of space for some 195 hours including almost 60 hours in lunar orbit, and traveled over 500,000 miles.

BUZZ ALDRIN'S Typed Note Signed reads: *"The segment placed here was removed from Apollo 11 Command Module Columbia after the first lunar landing mission of July 16 to 24, 1969. This flown segment is from my personal collection."*

$ 1,500-2,000

108

ORIGINALLY FROM THE COLLECTION OF APOLLO 11 LUNAR MODULE PILOT BUZZ ALDRIN

APOLLO 11 - AN EMBLEM COVER, LIFE INSURANCE FOR ALDRIN'S FAMILY

FEATURING THE APOLLO 11 EMBLEM, THE RAREST AND HIGHLY DESIRABLE

Apollo 11 Life Insurance Cover measuring approximately 4 by 6 inches with a color crew emblem cachet. Kennedy Space Center (KSC) postmark of July 16, 1969, being the launch date for Apollo 11. Numbered on the verso by Aldrin with his identifier number *"BA02."* The envelope is displayed between paragraphs of a Typed Signed Letter by BUZZ ALDRIN.

SIGNED by NEIL ARMSTRONG, MICHAEL COLLINS, and BUZZ ALDRIN prior to their Apollo 11 flight.

With BUZZ ALDRIN'S provenance letter which he describes the story of this envelope: *"This postal cover with the Apollo 11 emblem cachet is one of the 'insurance covers' signed by the Apollo 11 crew prior to our launch in July 1969. Since we were unable to obtain adequate life insurance due to the high risk nature of being an astronaut, we signed this group of covers and evenly distributed them to our families for safe keeping while we performed our mission. If an unfortunate event prevented our safe return, the covers would have provided a limited financial means of support to our families.*
The cover displayed above has been in my private collection since 1969 and has an identifier of BA02 written on the reverse side. It was signed by the Apollo 11 crew - Neil Armstrong, Michael Collins, and myself prior to our launch back in 1969. The cover was postmarked on the launch day of Apollo 11 at the Kennedy Space Center on July 16, 1969. Four days later, on July 20, Neil Armstrong and I became the first humans to land and walk on another celestial body - the Moon."

$ 12,000-18,000

107

108

109

ORIGINALLY FROM THE COLLECTION OF APOLLO 11 LUNAR MODULE PILOT BUZZ ALDRIN

APOLLO 11 - ALDRIN'S CREW SIGNED POSTAL COVER

POSTMARKED ON THE LUNAR LANDING DAY - JULY 20, 1969

An Apollo 11 Life Insurance Cover measuring approximately 4 by 6 inches with a cachet featuring two astronauts exploring the lunar surface with their Lunar Module and planet earth in the background. Postmarked at Houston, Texas on the date of the Apollo 11 lunar landing and moon walk, July 20, 1969. Numbered on the verso by Aldrin with his identifier number *"BA24."* The envelope is displayed between paragraphs of a Typed Signed Letter by BUZZ ALDRIN.

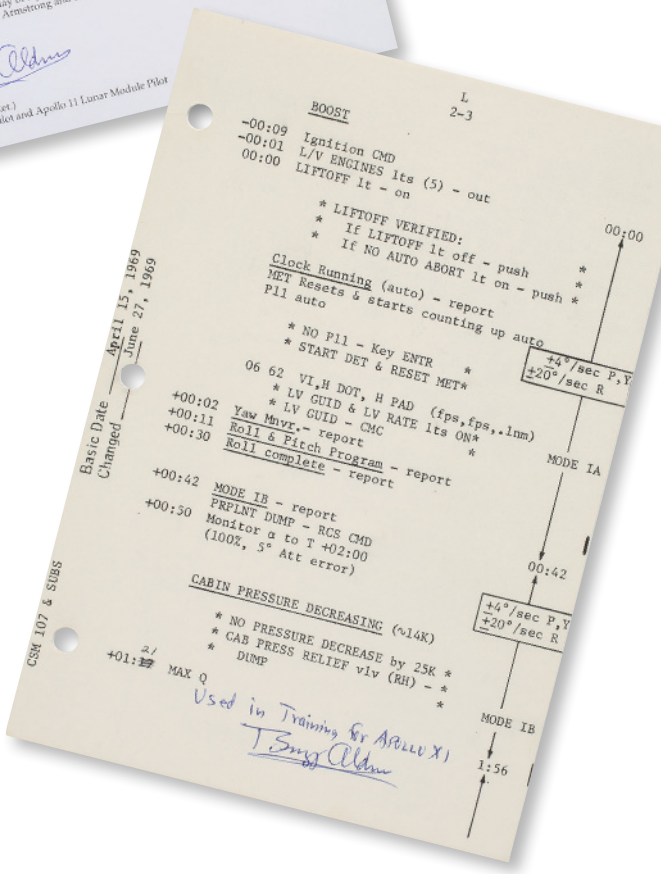
SIGNED by NEIL ARMSTRONG, MICHAEL COLLINS, and BUZZ ALDRIN prior to their Apollo 11 lunar landing mission.

With BUZZ ALDRIN'S provenance letter which he describes the story of this cover: *"This Manned Spacecraft Center Stamp Club postal cover with a lunar exploration scene and a small Apollo 11 emblem is one of the "insurance covers" signed by the Apollo 11 crew prior to our launch in July 1969. Since we were unable to obtain adequate life insurance due to the high risk nature of being an astronaut, we signed this group of covers and evenly distributed them to our families for safe keeping while we performed our mission. If an unfortunate event prevented our safe return, the covers would have provided a limited financial means of support to our families.*

The cover displayed above has been in my private collection since 1969 and has the identifier of BA24 written on the reverse side. It was signed by the Apollo 11 crew—Neil Armstrong, Michael Collins, and myself prior to our launch. The cover was postmarked on the lunar landing day of Apollo 11 at Houston, Texas, on July 20, 1969. Just a few hours after landing, Neil Armstrong and I became the first humans to walk on another celestial body—the Moon."

$ 8,000-12,000

109



110

110

ORIGINALLY FROM THE COLLECTION OF APOLLO 11 LUNAR MODULE PILOT BUZZ ALDRIN

APOLLO 11 - LAUNCH CHECKLIST TRAINING SHEET

TIME CORRECTION FOR 'MAX Q' MADE BY NEIL ARMSTRONG

Apollo 11 Launch Operations Checklist, page 2-3 / 2-4, a single sheet having crew activities performed just after lift-off. Printed recto and verso. NASA/MSC, April 1 and 15, 1969, revised June 27, 1969. 8 x 5½ inches. With a Typed Letter Signed by BUZZ ALDRIN.

Checklist sheet INSCRIBED and SIGNED by BUZZ ALDRIN: *"Used in training for Apollo XI, BUZZ ALDRIN"* on page 2-3.

BUZZ ALDRIN'S provenance letter reads in part: *"Accompanying this letter is a page numbered 2-3 and 2-4 from the CSM 107 (Apollo 11) Launch Operations Checklist, SKB32100080-306. The pages are part of the complete manual that was used in the Command Module Apollo Mission Simulator at the Manned Spacecraft Center in Houston, Texas. The page is from Section 2 titled: Boost-Insertion – TLI.*

The entire checklist, including this actual page, was used by all three Apollo 11 crew members: Neil Armstrong, Michael Collins, and myself... Neil had the command responsibility to initiate an abort if the launch profile deviated from the planned events outlined in this checklist section and make vocal confirmation of many events on these pages.

The launch profile was the most intense training we as a crew performed together. The simulator teams would give us all types of warning messages and problems to solve during a simulated launch... This training was a key step which enabled our flight to make the first manned lunar landing on July 20, 1969.

Both sides of this checklist page have boost events starting with ignition at T-9 seconds through the first 6 minutes of powered flight. Neil made a correction to the Max Q time. The major events included liftoff, a roll and pitch of the vehicle, inboard engine cutoff, the remaining first stage engines shutting down, staging, the S-II ignition, and our escape tower jettison...

I kept this checklist after our mission as a reminder of the all the training that took place back in 1969. I have written on page 2-3: "Used in training for Apollo XI" and signed it along the bottom of that page. A copy of the checklist cover page is included."

$ 1,000-1,500

111

112

113

111

APOLLO 11 CREW SIGNED NASA PHOTO

Color photograph with "A Kodak Paper" watermark, 10 by 8 inches, NASA image "S-69-31739", May 1969

Vintage official NASA portrait of the Apollo 11 Crew in their white space suits in front of a lunar back-drop.

SIGNED by NEIL ARMSTRONG, MICHAEL COLLINS, and BUZZ ALDRIN, AND INSCRIBED "*To Nick Petrou - With Thanks for Making Lunar TV a Reality.*"

$ 5,000-7,000

112

APOLLO 11 CREW — SIGNED BY ARMSTRONG, ALDRIN, & COLLINS

Three 7½ by 9½ inch color photographs of the Apollo 11 crew, each in their EVA suits posing in front of a large photograph of the moon. Framed and matted together with an Apollo 11 patch, a NASA patch, and an engraved brass plaque to 29¼ by 18¾ inches.

SIGNED by BUZZ ALDRIN, NEIL ARMSTRONG, AND MICHAEL COLLINS. INSCRIBED by ALDRIN: "*We came in peace for all mankind* BUZZ ALDRIN *Apollo XI.*"

$ 5,000-7,000

113

APOLLO 11 - ALDRIN AT TRANQUILITY BASE, JULY 20, 1969 - LUNAR LANDING DAY

THE MOST RECOGNIZED LUNAR SURFACE PHOTOGRAPH OF ALL TIME

Large color photograph, 16 by 20 inches.

INSCRIBED and SIGNED: "*Tranquilly Base, July 20, 1969,* BUZZ ALDRIN."

The Apollo Program's most iconic image, Buzz Aldrin on the lunar surface. The photograph was taken by Neil Armstrong moments after Aldrin set foot on the Moon.

$ 2,500-3,500

114

ALDRIN DESCENDS TO THE LUNAR SURFACE

Vintage color photograph, 8 by 10 inches. A full frame lunar surface Hasselblad photograph with red NASA frame ID number at upper left. Verso reads: *"A Kodak Paper."*

SIGNED by BUZZ ALDRIN with his INSCRIPTION of *"LMP"* (Lunar Module Pilot) added.

Aldrin prepares to step off the ladder of Lunar Module *Eagle* to become the second human to set foot upon the Moon.

$ 1,500-2,000

115

ARMSTRONG PHOTOGRAPHS ALDRIN WITH LUNAR EXPERIMENTS

Vintage color photograph, 8 by 10 inches. Full frame lunar surface Hasselblad photograph with red NASA frame ID number at upper left. Verso reads: *"A Kodak Paper."*

BOLDLY SIGNED by BUZZ ALDRIN.

Aldrin finishes deployment of the Passive Seismic Experiment. Lunar Module Eagle, the U.S. Flag, and the television camera can be seen in the background. Photograph taken by Neil Armstrong.

$ 1,500-2,000

116

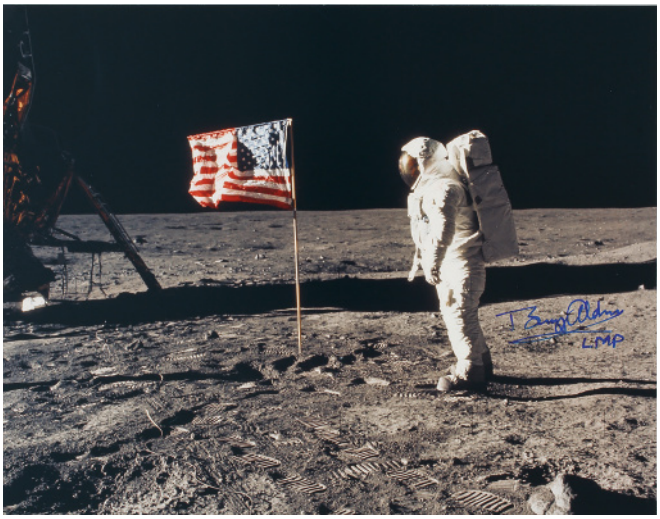
APOLLO 11 - BUZZ ALDRIN AT TRANQUILITY BASE

Large color photograph, 15¾ x 20 inches.

SIGNED and INSCRIBED by BUZZ ALDRIN at upper left corner: "04:06:45:40 *Standing at Tranquility Base* BUZZ ALDRIN *and* NEIL ARMSTRONG, *the first men ever to land on the Moon.* BUZZ ALDRIN *LMP Apollo XI 20 July 1969."*

An iconic image of Buzz Aldrin taken by Neil Armstrong, whose reflection is visible in the visor of Aldrin's spacesuit.

$ 3,000-5,000



117

118

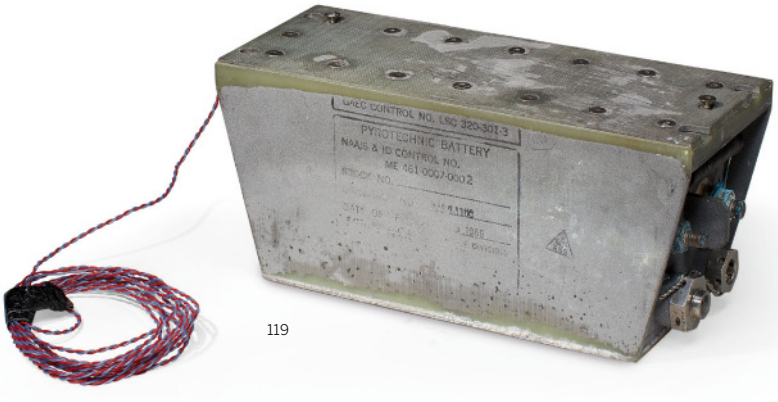
OFFICIAL CONTRACTOR LUNAR LANDER MODEL

ISSUED BY THE SPACECRAFT BUILDER GRUMMAN

Model of the Lunar Module (LM) made from injected-molded plastic for the Grumman Aircraft Engineering Corporation (GAEC) of Bethpage, Long Island, NY. GAEC was the prime NASA contractor for the Lunar Module (LM). The model stands 7 inches tall with four metal landing legs approximately 8 inches apart. The upper Ascent Stage is detachable from the lower Descent Stage. The complete model is removable from a 10 ½ inch circular base which has NASA and Grumman logos and the wording: *"LUNAR MODULE."*

The LM made one unmanned and one manned earth orbital flight and carried out eight manned lunar missions of which six landed on the moon. The vehicle served as a "life boat" during the Apollo 13 mission after the Service Module explosion. An emergency firing of its descent engine put Apollo 13 on a safe trajectory back to Earth and the vehicles oxygen system kept the crew alive during that time.

$ 3,000-4,000



119

117

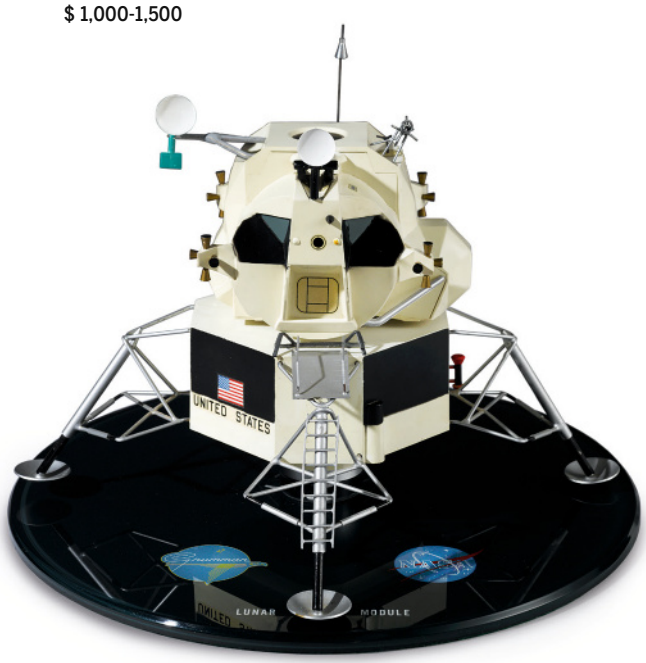
ALDRIN WITH THE STARS AND STRIPES

Color photograph, 8 by 10 inches.

SIGNED by BUZZ ALDRIN with his INSCRIPTION of *"LMP"* added.

Aldrin stands next the United States flag after deployment on the lunar surface. This photograph best symbolizes the accomplishment of John F. Kennedy's goal of landing a man on the moon.

$ 1,000-1,500



118

119

APOLLO LUNAR MODULE (LM) PYROTECHNIC BATTERY

PROVIDED THE "CHARGE" TO THE LM EXPLOSIVE DEVICES

LM battery contained within a gray metal body having 16 bolts securing a top plate. Overall measurements of 7 inches long, 3 inches tall, and 2 ¾ inches wide. A thin red and blue spooled connecting wire is attached. Two bolt ties and battery positive/negative terminals are at one end with an ID stamp reading: *"Exide Missile and Electronics Division, ESB Incorporated, Raleigh, NC. Serial No. 311, Model No. 264."* An additional stamp along the body length reads in part: *"GAEC Control No. LSC 320-301-3, PYROTECHNIC BATTERY, NAA/S & ID Control No. ME 461-0007-002, NAS 9-1100 (Contract Number), Date of MFR – 1969."*

The Lunar Module had two pyrotechnic batteries, one in the Descent Stage and one in the Ascent Stage, which supplied the electrical impulse to ignite explosive charges. Numerous LM systems became operational after these charges were ignited including landing gear, pressurization of the reaction control subsystem (RCS) plus the Ascent / Descent propellant tanks. Additionally, the actual separation between the Ascent and Descent stages during lunar lift-off or an inflight abort required this battery power.

$ 1,500-2,000

120

LUNAR SURFACE EQUIPMENT BLUEPRINTS

SIGNED BY ASTRONAUTS WHO USED THE TOOLS ON THE MOON

Small Keeper - Lunar Dust Brush blueprint. NASA, Houston, TX, January 31, 1970, 22 x 34 inches, enlarged scale of 2 to 1. Revised February 24, 1970.

BOLDLY SIGNED and INSCRIBED with their individual Apollo flight and Lunar Module number by: *"BUZZ ALDRIN, LM-5 Apollo XI, ALAN BEAN, LM-6 Apollo XII, EDGAR MITCHELL, LM-8 Apollo 14" and "CHARLES M. DUKE, JR., LM-11 Apollo 16."*

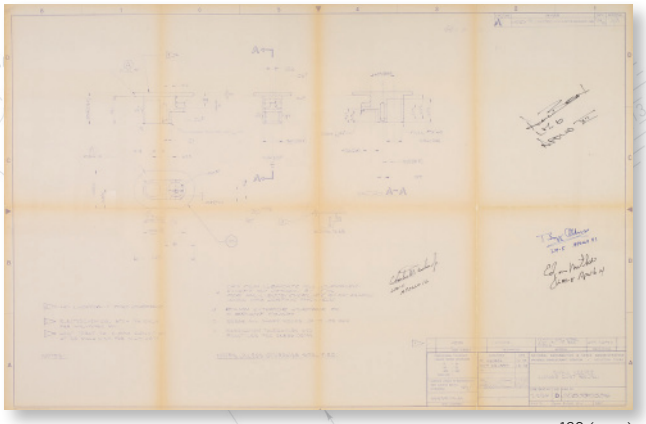
The Apollo lunar dust brush was use by astronauts on the moon's surface to remove lunar dust from flight equipment and their space suits.

WITH: *Lunar Dust Brush*, Screw blueprint. NASA, Houston, TX, February 9 and 18, 1970, 17 by 22 inches, Scale 1:1. Revised February 25 and March 3, 1970.

BOLDLY SIGNED and INSCRIBED: *"BUZZ ALDRIN, Apollo XI LMP"* and "EDGAR MITCHELL, *LM-8 Apollo 14."*

Provides two illustrations of a screw component for the lunar dust brush. *Full details available online.*

$ 1,200-1,800



120 (PART)

121

FROM THE CAPE TO EARTH ORBIT AND TOWARD THE MOON

Apollo Earth Orbit Chart (AEO), Apollo 11 Mission... for July 1969 Launch Dates. Color Earth maps, 3 sheets total, each 13½ by 41 ½ inches. Sheet 1 plots the first orbit, sheet 2 plots the second orbit and the nominal (planned) Translunar Injection (TLI) ground track, and sheet 3 plots the third orbit including the back-up TLI path.

A group of three Earth charts plotting the launch and orbital ground track of Apollo 11, starting at lift-off from the Kennedy Space Center, Cape Kennedy, Florida. *Full details available online.*

$ 1,000-1,500

121

122

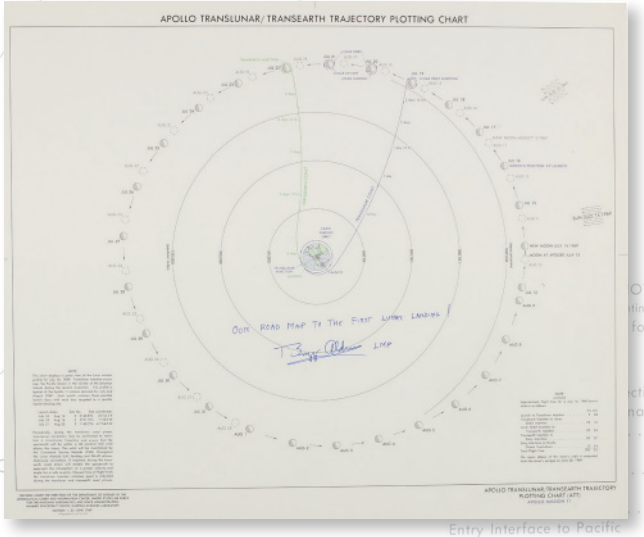
APOLLO 11 TRAJECTORY CHART

A ROAD MAP TO THE MOON FOR THE FIRST LUNAR LANDING

Apollo Translunar / Transearth Trajectory Plotting Chart (ATT), Apollo Mission 11. June 23, 1969, 20 by 24 inches.

Boldly INSCRIBED and SIGNED: *"Our road map to the First Manned Lunar Landing! BUZZ ALDRIN, LMP." Full details available online.*

$ 2,000-3,000



122

123

APOLLO 11 LM DESCENT CHART TO TRANQUILITY BASE

LM Descent Monitoring Chart - Sheet 2, 16 July 1969 Launch Date – Landing Site No. 2 and LM Descent Monitoring Chart - Sheet 3A, 16 July 1969 Launch Date – Landing Site No. 2. Both first editions. 11 by 77 inches.

Boldly SIGNED by BUZZ ALDRIN next to the landing site ellipse known as Tranquility Base.

The two descent charts are identical to the Lunar Orbiter based photography charts carried by Neil Armstrong and Buzz Aldrin inside Lunar Module (LM) *Eagle*. In this case, sheets 2 and 3A are combined to create a continuous chart over six feet long with numerous lunar land mark locations identified in bold black wording. *Full details available online.*

$ 3,000-4,000

124

APOLLO 11 - LANDING SITE CHART - SIGNED

Julius Caesar, Lunar Shaded Relief – LSR 60. Defense Mapping Agency for NASA. Includes a detailed legend and gridded full sphere lunar near side map locator image at bottom left hand corner. First edition, September 1978. 22 by 29 inches, scale 1:1,000,000.

INSCRIBED and SIGNED: *"First Lunar Landing, July 20, 1969, BUZZ ALDRIN."* He has marked the Apollo 11 landing site with a large "X."

The chart illustrates approximately half of Mare Tranquillitatis with numerous large and small craters, including the ones Neil Armstrong and Buzz Aldrin used to navigate to their lunar landing. Other features shown are wrinkled ridges and highland areas to the west of the Apollo 11 landing site which is located near the bottom center of the chart.

$ 2,500-3,500

125

APOLLO 11 PHOTOGRAPHY CHART FOR LUNAR ORBIT

Apollo Target of Opportunity Flight Chart (ATO), Apollo Mission 11, 16 July 1969 Launch Date. March 4, 1969. First Edition. 14 by 58 inches. Date stamp of "*Mar 27, 1970*" on verso at far lower left corner.

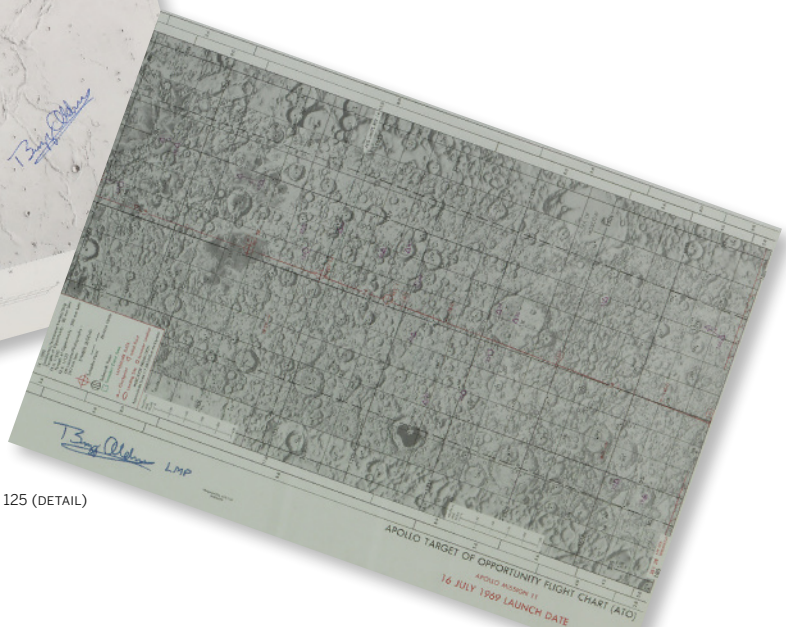
SIGNED and INSCRIBED: "BUZZ ALDRIN, *LMP.*"

This chart has an identification ID of *"SKB 32100097-301"* which is a flight equipment part number and is printed within the legend block. It is identical to the chart issued to Armstrong, Aldrin, and Collins for their mission. An important objective of Apollo 11's lunar orbit operations was to identify and photograph possible future landing sites for missions. Planning as of 1969 was to have nine more lunar landings through Apollo 20. This chart locates the surface "targets of opportunity" with colored geometric arrows and markings. Shutter speeds, f-stops, and lens size recommended are listed inside the legend block section.

$ 2,000-3,000

123 (DETAIL)

124



125 (DETAIL)

126

APOLLO ZONE FILM CHART

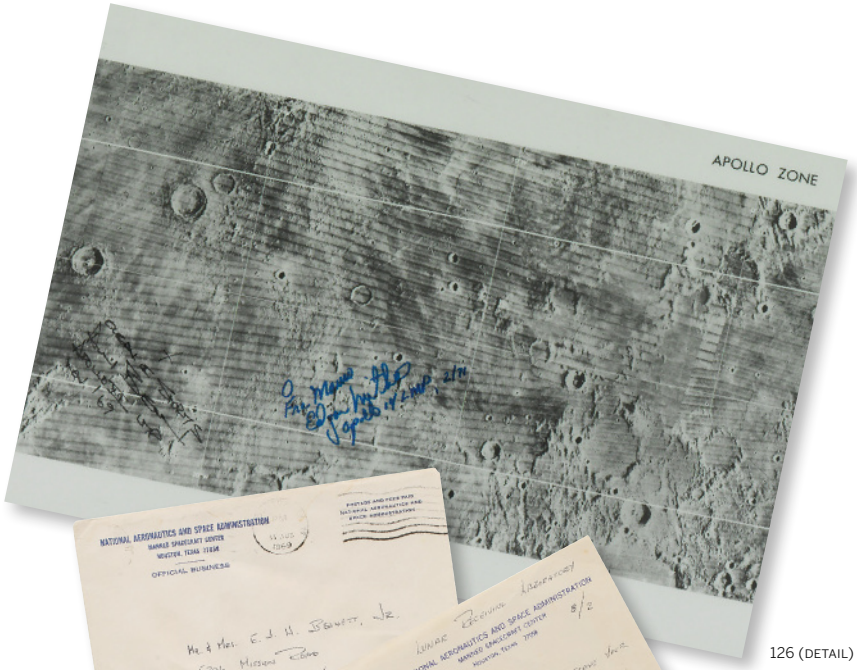
LANDING POINTS FOR THE FIRST APOLLO MISSIONS

Apollo Zone. Cronopaque film lunar equatorial zone chart based on Lunar Orbiter 4 photography. Army Map Service for NASA/MSC Mapping Sciences Laboratory. 10½ by 52 inches.

INSCRIBED with their landing dates and SIGNED a member from the first three Apollo lunar landings as follows: *"BUZZ ALDRIN, Apollo XI, 7 – 20 – 69; Ocean of Storms, ALAN BEAN, Apollo XII LMP, Nov '69" and "Fra Mauro, EDGAR MITCHELL, Apollo 14 LMP, 2 / 71."* Each has marked his landing site with an "X" or a circle.

Full details available online.

$ 3,000-4,000



126 (DETAIL)

127

ARMSTRONG, NEIL

Autograph letter signed ("Neil"). 1 page (8 by 5¼ inches). Lunar Receiving Laboratory, NASA Manned Spacecraft Center, Houston, Texas, August 2, 1969, to Ted & Lane Bennett in Kansas.

Horizontal fold, small square tape-stain to recto, with autograph NASA envelope postmarked 15 Aug 1969 and stamped "*Delayed in Quarantine at Lunar Receiving Laboratory M.S.C - Houston, Texas.*"

A FINE AUTOGRAPH LETTER FROM NEIL ARMSTRONG, WRITTEN FROM QUARANTINE FOLLOWING THE APOLLO 11 LUNAR LANDING.

"It was a genuine pleasure to receive your note among the few that have drifted in through the quarantine. It's a pleasure to get away from the continual debriefing sessions and enjoy some memories through letters from friends. The market has been very unkind. Apparently I can't leave the Planet for even a short time without the economic situation getting out of control. -

"Thanks for the congratulations & the beautiful verse. Did you do it yourself? Janet joins me in best wishes & in looking forward to meeting again.

"All the best -

"Neil."

$ 4,000-6,000

127

128

128

THE EXPEDITIONS OF THE APOLLO PROGRAM TO THE MOON

Cortwright, Edgar M., editor. *Apollo Expeditions to the Moon*. NASA SP-350. Washington: 1975. xi, 313 pp. Illustrations. 12 by 9 inches. Pictorial cloth binding.

Signed by 14 astronauts, which includes a member from every manned Apollo flight, on the frontend papers which illustrates the Apollo lunar mission profile. Signatures include: BUZZ ALDRIN, ALAN BEAN, GENE CERNAN, WALT CUNNINGHAM, CHARLES DUKE, RICHARD GORDON, FRED HAISE, JAMES LOVELL, EDGAR MITCHELL, RUSTY SCHWEIKART, WALLY SCHIRRA, DAVE SCOTT, TOM STAFFORD, and AL WORDEN. Each has added their individual Apollo flight number(s).

Perhaps the best NASA released book on the Apollo Program based on text written and photographs or images illustrated. *Full details available online.*

$ 4,000-6,000

129

131

130

129

THE HISTORY OF THE MANNED APOLLO LUNAR SPACECRAFT

SIGNED BY TWELVE APOLLO ASTRONAUTS

BROOKS, Courtney G., James M. GRIMWOOD and Loyd S. SWENSON. *Chariots for Apollo: A History of Manned Lunar Spacecraft.* NASA SP-4205. Washington: GPO, 1979. xvii, 538 pp. 10 by 7 inches. Cloth.

SIGNED and INSCRIBED by TWELVE Apollo Astronauts with their individual Apollo flight number(s). On the frontispiece verso: ALAN BEAN, GENE CERNAN, GORDON COOPER, WALT CUNNINGHAM, CHARLES M. DUKE, RICHARD GORDON, FRED HAISE, EDGAR MITCHELL, TOM STAFFORD, WALLY SCHIRRA, and AL WORDEN on the frontispiece verso. SIGNED by BUZZ ALDRIN on the frontispiece photograph of him walking on the lunar surface during Apollo 11.

Full details available online.

$ 2,500-3,500

130

THE COMPLETE APOLLO PROGRAM FROM BEGINNING TO END

COMPTON, William D. *Where No Man Has Gone Before, A History of Apollo Lunar Exploration Missions.* NASA SP-4214. Washington: 1989. xiii, 415 pp. Illustrations. 10 by 7 inches. Original blue printed wrapper.

SIGNED and INSCRIBED with their individual Apollo flight number(s) by: BUZZ ALDRIN, GORDON COOPER, WALT CUNNINGHAM, RICHARD GORDON, FRED HAISE, EDGAR MITCHELL, WALLY SCHIRRA, and TOM STAFFORD. Additionally INSCRIBED and SIGNED on the frontispiece: *"Painting by ALAN BEAN, Apollo 12"* above his painting of Astronaut Dave Scott dropping a hammer and feather while on the lunar surface during Apollo 15.

Full details available online.

$ 1,500-2,000

131

APOLLO - THE LUNAR PROGRAM SEEN THROUGH PICTURES

OVERSIZE PUBLICATION WITH OVER 100 PHOTOGRAPHS

CHAPPELL, Russell E. *Apollo*. NASA EP-100. Washington: 1973. 63 pp. Extensive illustrations. Oversized, 14 by 10 ½ inches. Original pictorial printed wrapper.

Having eleven Apollo astronaut signatures on the front end papers. To signify their Apollo earth orbit flight, SIGNED and INSCRIBED: *"WALT CUNNINGHAM, Apollo 7"* and *"WALLY SCHIRRA, Apollo 7" on a deep space photograph of the earth, along with: "GORDON COOPER, Apollo 10 B.U. (BackUp) CDR."*

To signify their Apollo lunar orbit or lunar landing flights, SIGNED and INSCRIBED: *"BUZZ ALDRIN, Apollo XI; ALAN BEAN, Apollo 12; CHARLES CONRAD, Apollo XII; CHARLIE DUKE, Apollo 16, RICHARD GORDON, Apollo XII; FRED HAISE, Apollo 13, EDGAR MITCHELL, Apollo 14"* and *"TOM STAFFORD, Apollo X, Cdr"* on or around a deep space photograph of a full Moon.

Full details available online.

$ 2,500-3,500

132

COLLINS, MICHAEL.

Liftoff. The Story of America's Adventure in Space. New York: Grove Press, 1988

10 by 7 inches. Original cloth and boards in original dust-jacket.

FIRST EDITION, SIGNED and INSCRIBED "*Best wishes to Dan Glennon, MICHAEL COLLINS*", and signed "*BUZZ ALDRIN APOLLO XI*", "*GENE CERNAN APOLLO XVII*", "*CHARLIE DUKE APOLLO 16*", "*AL WORDEN APOLLO 15*" "*PAUL WEITS SL-2 STS-6*", "*ALAN BEAN APOLLO 12*", '*JERRY CARR. CRD SKYLAB III*', "*JAMES LOVELL*", "*RICK SEARFOSS. STS-58, 76, 90*", "*WALLY SCHIRRA*", "*DAVE SCOTT*", "*ED GIBSON SPT SKYLAB III*", "*BILL POGUE PLT SKYLAB III*", "*WALT CUNNINGHAM*", "*EDGAR MITCHELL APOLLO 14*", "*RICHARD GORDON APOLLO XII*", "*GUENTER F. WENDT PAD LEADER*", "*JACK LOUSMA SL-3, STS-3*", "*SCOTT CARPENTER AURORA 7*", "*RUSTY SCHWEICKART APOLLO 9*", "*TOM STAFFORD APOLLO X*", "*SY LIEBERGOT. APOLLO EECOM*", "*BRUCE MCCANDLESS II. STS 41-B, -31. CAPCOM APOLLO 10, 11, 14*", "*[CYRILLIC] VALERI NIKOLAYEVICH [ROMAN] KUBASOV SOYZ (SIC) -6, -36, ASTP*", and "*[CYRILLIC]LEONOV [ROMAN] ALEXEI LEONOV. VOSHKOD-2, SOYUZ-9*".

$ 2,000-3,000

132

133

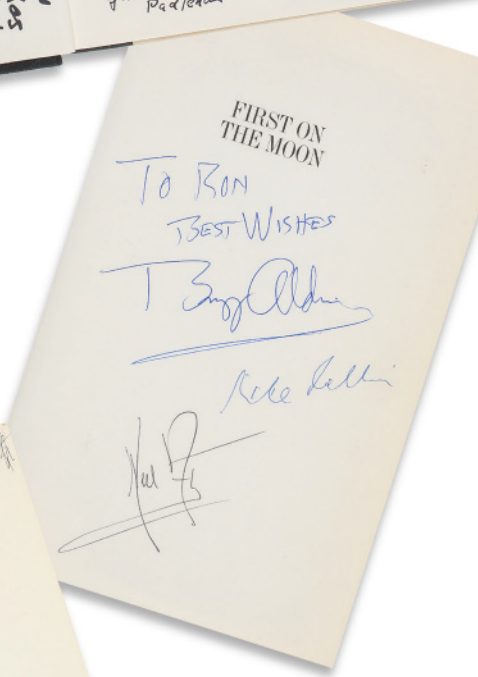
APOLLO 11 - SIGNED BY THE CREW

First on the Moon. A Voyage with Neil Armstrong, Michael Collins, Edwin Aldrin Jr. Boston: Little, Brown & Co, [1970]

9½ by 6½ inches. Original cloth and boards in the original dust-jacket.

FIRST EDITION, THIRD PRINTING. SIGNED "NEIL ARMSTRONG", "MIKE COLLINS", AND SIGNED & INSCRIBED "TO RON, BEST WISHES, BUZZ ALDRIN".

$ 2,500-3,500



133

134

EX PAUL CALLE COLLECTION

CALLE, PAUL

[Armstrong suiting up on morning of Apollo 11 launch], July 16, 1969

Pen-and-ink on paper, 9 by 12 inches, signed lower right "Paul Calle".

An original sketch by Calle of Neil Armstrong suiting up before the launch of the Apollo 11 mission. On July 16, 1969, Paul Calle was with the Apollo 11 astronauts as they had breakfast and prepared for their historic expedition to the moon. He was the only artist to document the activities of Armstrong, Collins, and Aldrin as they suited up for their mission. His on the spot pen-and-ink sketches stand as an artistic impression of three men destined to make history for all mankind.

$ 6,000-9,000

134

135

136

135

PAUL CALLE & NEIL ARMSTRONG

Artist's Proof of Calle's "First Man on the Moon"

Lithographic print, 11 by 7½ inches (to sight), matted, glazed and framed together with sheet of four 1969 10¢ "First Man on the Moon" stamps. "A/P First Man on the Moon" in pencil to lower right.

SIGNED by NEIL ARMSTRONG and PAUL CALLE.

Lithograph of the famous Calle artwork of Neil Armstrong stepping onto the moon, used on the 1969 10¢ stamp.

$ 3,000-5,000

136

SPACESUIT DEVELOPMENT

Mock-up of a Thermal Micrometeroid Garment (TMG) Cover Layer for A7L EV (Extra -Vehicular)-type Spacesuit, [International Latex Corportation Corporation], ca. 1969

White PTFE (Teflon)-coated Beta-cloth cover layer with quilted inner lining, approx. 60 inches tall. Large American flag patch to left shoulder, NASA meatball logo patch to right chest, marked "#16" in black pen at inside neck. Front of suit with 6 snap studs to chest area, 4 to crotch area, 1 at back of neck, and 1 to middle of back. Open back, exposed threads from apparent removal of pockets to thighs and arms, 1½ inch diameter hole to front, likely for life support hose, some foxing to outer layer, and staining to inner layer.

The International Latex Corportation, later known as ILC Dover, has been the designer and producer of the space suit pressure garment for NASA since the beginning of the Apollo program. They developed the first highly mobile space suit, the A7L, which made it possible for the astronauts to walk on the moon and in fact, every American astronaut to go into space since the Apollo program did so in an ILC Dover suit. Each full suit took about 5,000 hours to complete, and cost approximately $1,000,000 to produce. The suits were tailor-made for the astronauts, and underwent rigorous testing and painstaking study to get just right.

The Thermal Micrometeoroid Garment (TMG) is the outer layer of a spacesuit, and served three purposes. First, to insulate the astronaut from the extreme cold of space, second, to protect them from solar radiation, and third, to protect them from micrometeoroids that could potentially puncture the suit and cause depressurization.

REFERENCES

For two excellent histories of spacesuit development, and in particular the development of the A7L, see Monchaux, *Spacesuit: Fashioning Apollo* and Young, *Spacesuits: The Smithsonian National Air and Space Museum Collection.*

PROVENANCE

Acquired from ILC Dover, ca. 1973

$ 4,000-6,000

APOLLO 12

LOTS 137–139

137

APOLLO XII CREW SIGNED LAUNCH COVER

CREW COVER PLANNED TO BE CARRIED TO THE MOON

An Apollo XII Crew Cover measuring approximately 4 by 6 inches with a color cachet featuring the Apollo XII crew emblem, the names of the Command/Service Module "*Yankee Clipper*" and Lunar Module "*Intrepid.*" All above a pair of gold Naval Aviator wings. Postmarked at the Kennedy Space Center, Florida on the date of the Apollo XII launch, November 14, 1969. The envelope is displayed below a paragraph of a Typed Signed Card by Charles Conrad.

SIGNED by CHARLES CONRAD, DICK GORDON, and ALAN BEAN prior to their Apollo 12 lunar landing mission.

Displayed with CHARLES CONRAD'S provenance TYPED CARD SIGNED in which he describes the story of this cover. *Full details available online.*

$ 1,000-1,500

138

FLOWN APOLLO XII 70MM HASSELBLAD FILM SEGMENT

TAKEN FROM ROLL THAT WAS CARRIED TO THE LUNAR SURFACE

70mm Hasselblad camera film segment, ½ by ¼ inch. Taped onto a certificate issued and signed by Richard W. Underwood, Supervisory Aerospace Technologist at the NASA Manned Space Center in Houston, Texas.

The certificate is INSCRIBED and SIGNED: "*From my personal collection, CHARLES CONRAD.*"

Full details available online.

$ 1,500-2,000

139

APOLLO 12 - ALAN BEAN DESCENDING TO THE LUNAR SURFACE

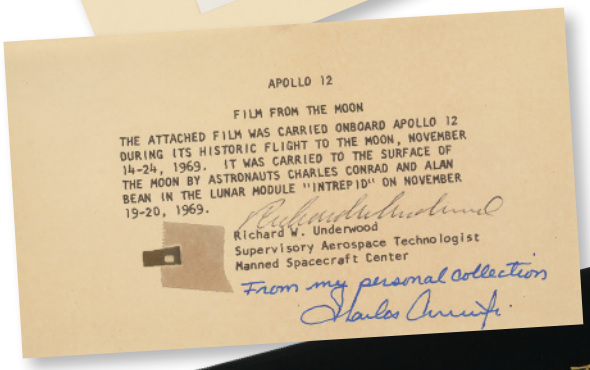
Large color photograph, 20 by 16 inches.

SIGNED and INSCRIBED by BEAN in gold pen: "*My first steps into the Ocean of Storms, an alien world unlike our planet Earth. ALAN BEAN Apollo 12 1969.*"

On 14 November 1969, mere months after Apollo 11's groundbreaking space flight, Charles "Pete" Conrad, Richard Gordon, and Alan Bean set out on Apollo 12 to undertake the second manned lunar landing mission. After the lunar module touched down in the Ocean of Storms (or "Pete's Parking Lot," as Conrad later joked), Conrad and Bean undertook two lunar EVAs. Bean is pictured here descending onto the lunar surface from the LM.

$ 1,500-2,500

137



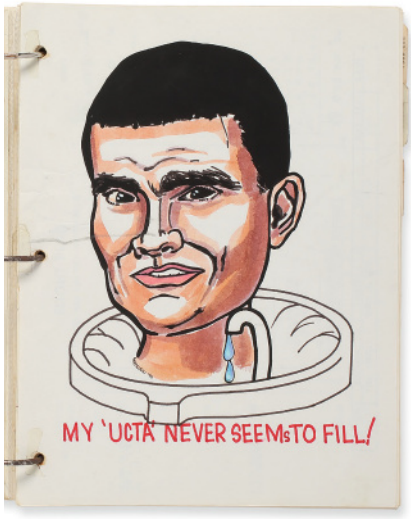
138

139

APOLLO 13

LOTS 140–150

140, CDR James Lovell



LMP Fred Haise

CMP Jack Swigert

"HOUSTON, WE'VE HAD A PROBLEM HERE."

140

"HOUSTON, WE'VE HAD A PROBLEM HERE." THE FLOWN APOLLO 13 FLIGHT PLAN

Apollo 13. Flight Plan. Part No. SKB32100082-350. S/N: 1001. [Houston: Manned Spacecraft Center, March 16, 1970]

8½ by 10½ inches, 352 pp divided into 7 tabbed sections ("Detailed Timeline," "Abbreviated Timeline," "CSM Consumables," "P-27 State Vector," and "CDR Food Log," "CMP Food Log," and "LMP Food Log." With 3 full page original color caricatures (one for each astronaut) signed and dated by Johnson Space Center artist Barbara Matelski, 1 black & white cartoon depicting the astronauts infected with German measles by Matelsi, and 1 folding chart (Alternate Mission 3 Summary Flight Plan). Notations in black felt-tip pen by Mission Commander James Lovell, notations by Command Module Pilot Jack Swigert in blue ball-point pen, notations by Lunar Module Pilot Fred Haise in pencil, pre-flight notations by Ken Mattingly in red felt-tip pen, late check list changes done by flight plan preparer in very fine-tip black pen. Three-hole punched and bound with three binder rings as issued, original heavy card stock covers. Front cover signed and inscribed by Fred Haise and signed by Jim Lovell and Jack Swigert.

SIGNED AND INSCRIBED BY LUNAR MODULE PILOT FRED HAISE, AND SIGNED BY MISSION COMMANDER JIM LOVELL AND COMMAND MODULE PILOT JACK SWIGERT TO THE APOLLO 13 LEAD FLIGHT PLANNER: *"TO BOB - A TRULY PERFECT FLIGHT PLAN AS FAR AS WE GOT. WE KNOW IT WOULD HAVE LED US BY THE HAND THE REST OF THE WAY ALSO. THANKS FOR THIS REMARKABLE DOCUMENT WHICH WE CARRIED TO THE MOON ON ODYSSEY 11-17 APRIL 1970. FRED HAISE. JAMES LOVELL. JACK SWIGERT."*

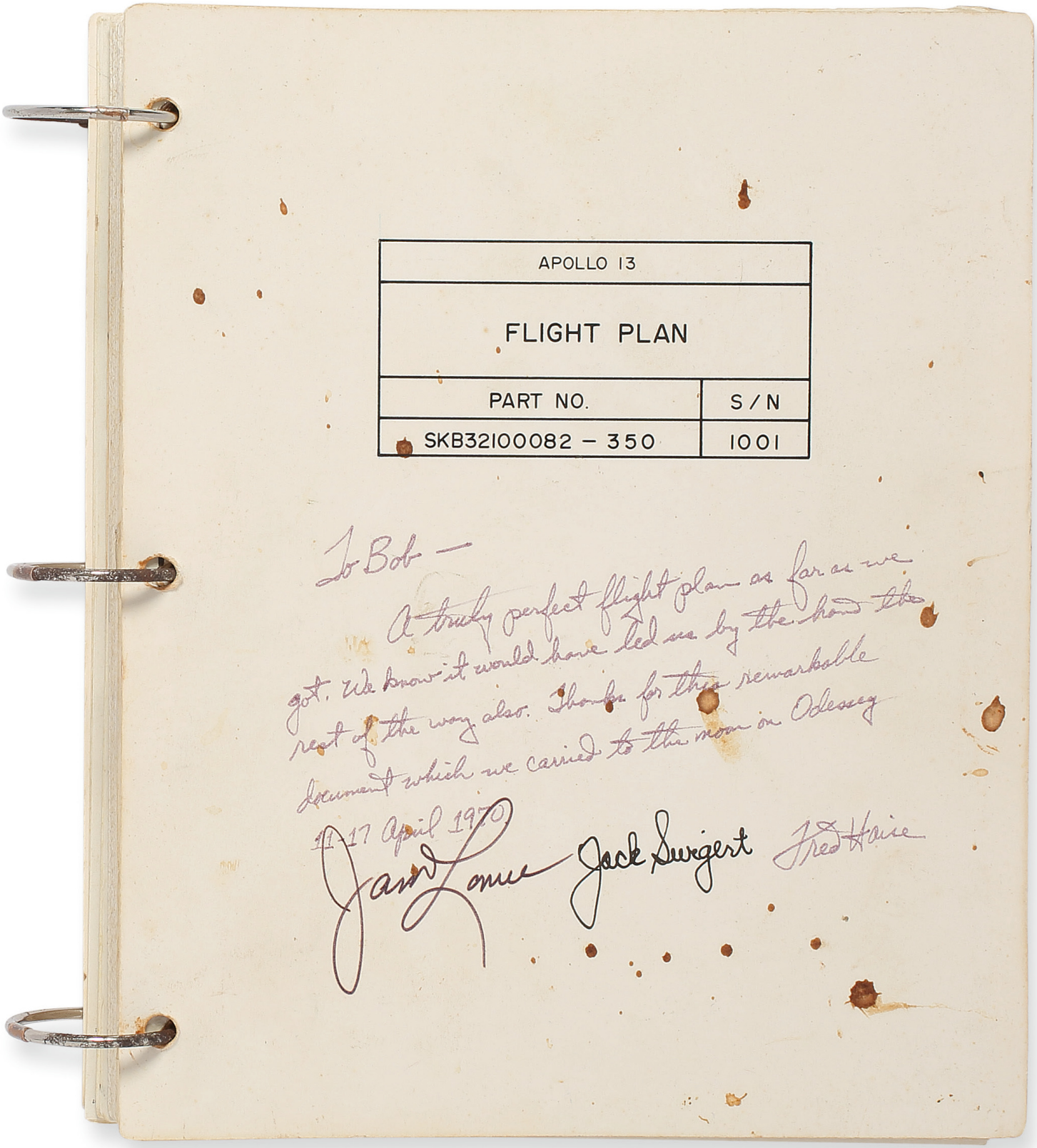
WITH MANUSCRIPT NOTATIONS BY ALL THREE CREW MEMBERS, RECORDING IN EXACTING DETAIL THE ACTIONS TAKEN BY THE CREW DURING THE MISSION, INCLUDING THE CRUCIAL CHANGES TO THE FLIGHT PLAN COMMUNICATED TO THEM BY CAPCOM AFTER THE EXPLOSION, AND THE INNOVATIVE PROCEDURES THAT SAVED THE CREW'S LIVES. AN INCREDIBLE EYE-WITNESS ACCOUNT OF THE MOST DRAMATIC AND HARROWING MISSION OF THE APOLLO PROGRAM. THE IMPORTANCE OF THIS DOCUMENT CANNOT BE OVERSTATED.

PROVENANCE

Presented as a gift from the Apollo 13 Crew to Turnage Robert "Bob" Lindsey, the Lead Flight Planner for Apollo 13. By descent to current owner

$ 30,000-40,000

continued



APOLLO 13	
FLIGHT PLAN	
PART NO.	S/N
SKB32100082 – 350	1001

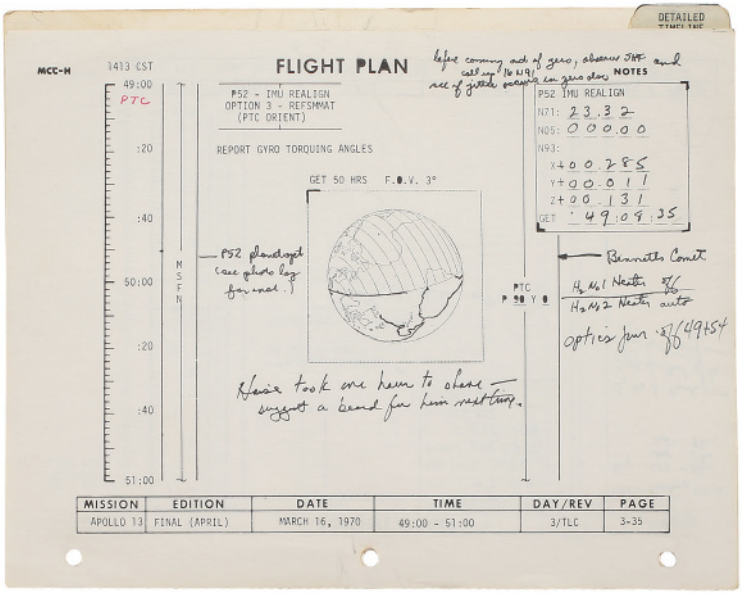
To Bob —

A truly perfect flight plan as far as we got. We know it would have led us by the hand the rest of the way also. Thanks for the remarkable document which we carried to the moon in Odyssey

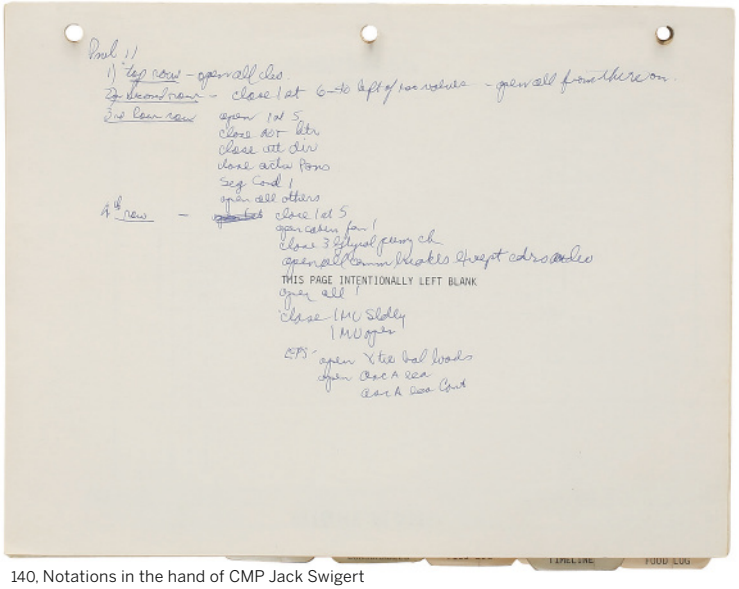
17 April 1970

Jim Lovell Jack Swigert Fred Haise

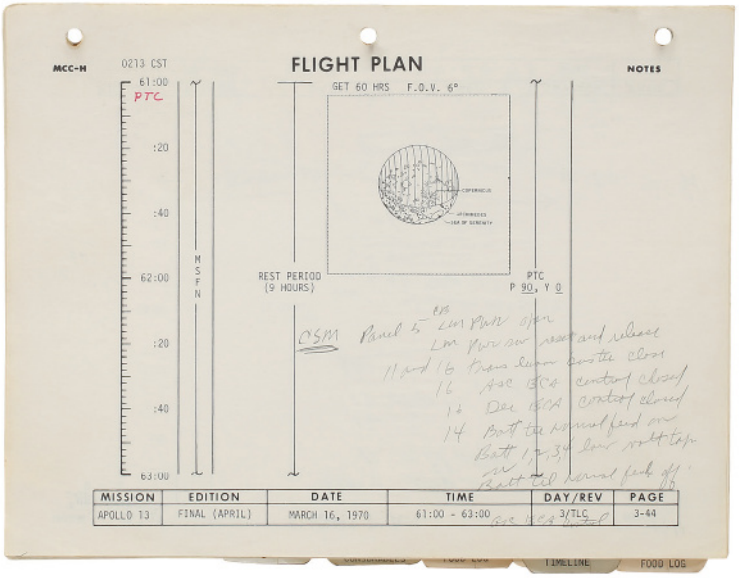
140



140, Notations in the hand of CDR James Lovell



140, Notations in the hand of CMP Jack Swigert



140, Pencil notations in the hand of LMP Fred Haise

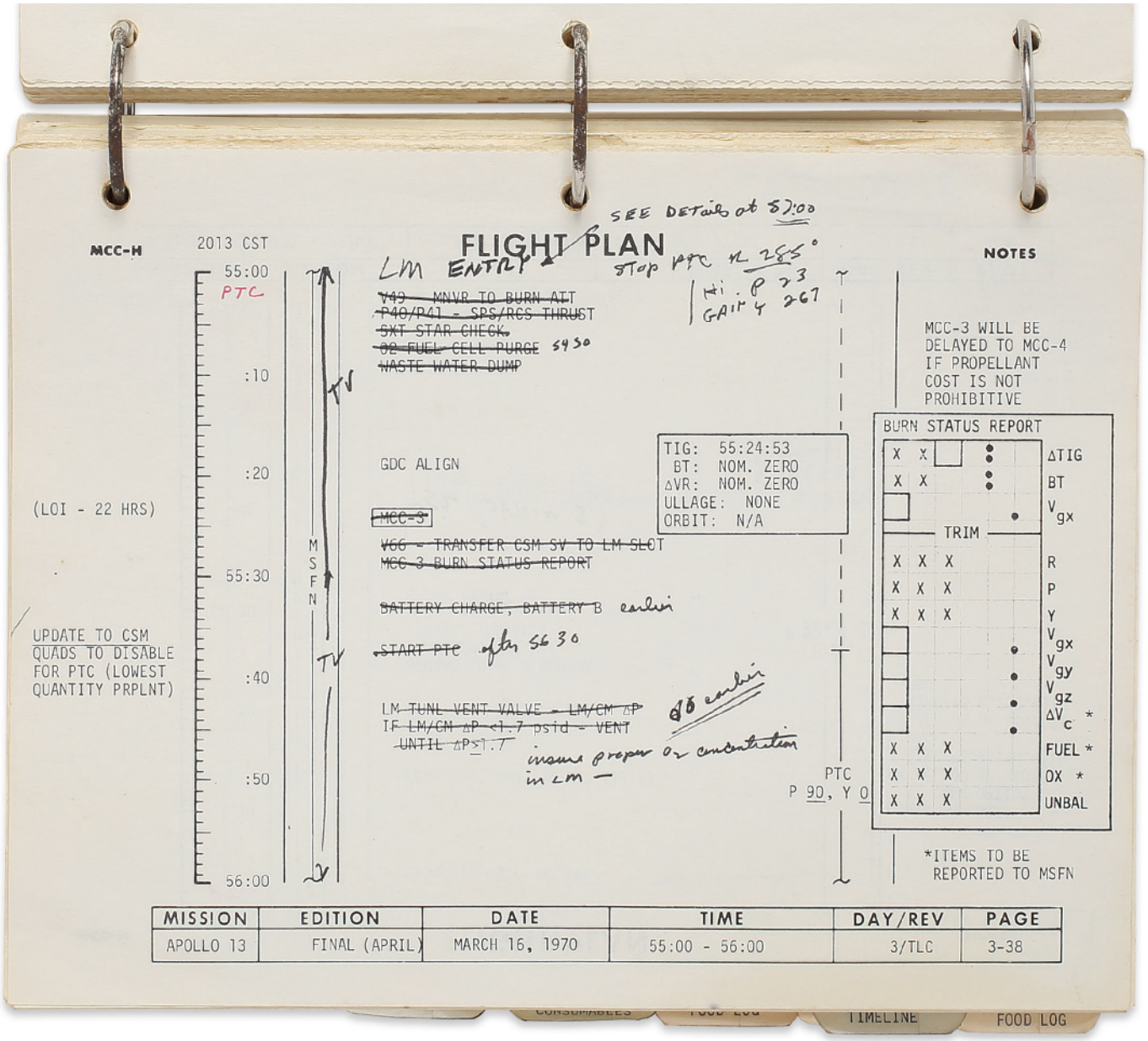
The Apollo 13 mission was meant to culminate in a third lunar landing, with Mission Commander James "Jim" Lovell, and Lunar Module Pilot Fred Haise voyaging to the lunar surface on board the Lunar Module *Aquarius* while Command Module Pilot Jack Swigert orbited in the Command Module *Odyssey*. Things did not go according to plan. At just under 56 hours into the mission, an oxygen tank explosion resulted in a major loss to electrical power to the Command and Service Module, forcing the crew to cancel the lunar landing and move into the *Aquarius,* using it as a lifeboat in order to survive a four day journey around the moon and return back to Earth. With people on the ground from both NASA and the contractor team working around the clock, an alternate flight plan was developed, as recorded in the present document, and various procedures were developed resulting in the safe return of the Crew despite seemingly insurmountable obstacles. The mission stands out as a paragon of teamwork and first-class training.

The caricatures depict Lovell in his spacesuit pointing to a list of rules for the mission "*Repeat after me…*", Fred Haise with a hose dripping water protruding from the neck of his spacesuit, captioned "*My 'UCTA'* [Urine Collection & Transfer Assembly] *never seems to fill!*", and Jack Swigert standing on a soapbox on the lunar surface, mouth open wide saying "*Mah fellow constituents…*". Swigert was elected to Congress after leaving NASA, but died before being sworn in. NASA and the astronauts were a fun-loving bunch, and in fact they were known to sneak cartoons or pictures of Playboy bunnies into flight plans or cuff checklists. It is remarkable to note, that even in the midst of very serious events, the crew still kept their humor, as can be seen on page 3-35 for example, when Lovell notes "*Haise took one hour to shave - suggest a beard for him next time.*"

The drama that unfolded during the Apollo 13 mission is well known, in large part due to the eponymous blockbuster Hollywood film, which was an adaptation of the book by Jim Lovell and Jeffrey Kluger, *Lost Moon: The Perilous Voyage of Apollo 13.* As is often the case with film adaptations of books, it is sometimes necessary to simplify or change certain details in order to best adapt a story to film. Such is the case involving the front cover of the present Flight Plan. In the film, when a procedure is devised to make the Command Module's square filters work in the Lunar Module's round receptacles in order to deal with the dangerous levels of carbon dioxide in the spacecraft, CAPCOM, in relaying the procedure tells Fred Haise (played by Bill Paxton) to "Rip the cover off"; Haise in turn tells Jack Swigert (played by Kevin Bacon) "He wants you to rip the cover off the Flight Plan." Swigert does so, saying "With pleasure." This scene is not however, a precise accounting of events. If one carefully reads over the NASA *Apollo 13 Air-to-Ground Voice Transcription,* one can clearly see that the crew was in fact instructed to use an "LM Cue card", and that they did in fact use the "LM EVA Cue Card" and NOT the cover of the Flight Plan:

03 18 09 17 CAPCOM: "Okay, I think the equipment you'll need will be two command module lithium hydroxide canisters, a roll of gray tape, the two LCGs, because we're going to use the bags from the LCGs, and one - **one LM Cue card - one of those cardboard cue cards which you will cut off about an inch and a half out from the ring.** Now I think that's all we'll need. Over"

03 18 10 53 COMMANDER: "Okay. That's two lithium hydroxide canisters, one roll of that special gray tape, two LCGs which we're going to use the bags from, one **LM cue card** and…"



140, Notations in the hand of CDR James Lovell

03 18 10 53 CAPCOM: "Okay. That's affirmative, Jim. If you'll just cut the **cue card**, which is a handy piece of stiff paper the right size, about an inch and a half from the rings. Just cut off the ring holes, in other words, and you'll have a card about 11 inches long and probably 6 inches wide, something like that."

.....

03 18 37 32 CAPCOM: "Okay Jack. The next step is to get the **EVA cue card** and use it to form an arch over the top of the canister... You see Jack, what we're going to do is slip the bag over this whole assembly and the **cue card** will serve to keep the bag from being sucked down against the screen..." (see Tapes 61/1 p 410-62/5 p 421 of the *Apollo 13 Technical Air-to-Ground Voice Transcription* for the complete procedure.)

REFERENCES

NASA, *Apollo 13 Technical Air-to-Ground Voice Transcription.* Houston: Manned Spacecraft Center, April 1970; NASA, *Apollo 13 Final Flight Plan AS-508/CSM-109/LM-7.* Houston: Manned Spacecraft Center, March 16, 1970; NASA, *Apollo Stowage List. Mission AS 508 CM 109/LM-7. Apollo 13. April 21st, 1970.* Houston: Manned Spacecraft Center, April 21st, 1970; NASA, *Apollo 13 Mission Report.* Houston: Manned Spacecraft Center, September 1970.

Fred W. Haise
April 11, 2005

FWH

The United States flag displayed below was carried around the moon on the flight of Apollo 13 during April 11 to 17, 1970. The flag was stowed in my Lunar Module Personal Preference Kit (PPK) and was scheduled to be taken to the lunar surface during third manned lunar landing. However, at about 56 hours into the mission, an oxygen tank explosion in our Service Module caused a major loss of electrical power to the Command Module. Jack Swigert first radioed: *OK, Houston, we've had a problem here.* Then Commander James Lovell clearly called Mission Control with: *Houston, we've had a problem!*

This event caused a scrub of the lunar landing and forced us to move into the Lunar Module in order to survive a four day journey around the moon and return back to earth. Countless individuals from NASA and our contractor teams worked around-the-clock to ensure our safe return.

The flag has been in my personal space artifact collection since 1970 which is now 35 years after the dramatic flight of Apollo 13. I have written "Flown around the moon on Apollo 13, Fred Haise, LMP" along the lowest white bar.

Sincerely,

Fred W. Haise

Fred W. Haise
Apollo 13 Lunar Module Pilot

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141

FROM THE COLLECTION OF APOLLO 13 LUNAR MODULE PILOT FRED HAISE

FLOWN TO THE MOON ON APOLLO 13

Stars and Stripes planned by Fred Haise to be taken to the lunar surface on Apollo 13

FLOWN United States flag, made from silk, 4 by 6 inches, INSCRIBED on the lowest white bar with: "*Flown around the moon on Apollo 13 FRED HAISE LMP.*" in blue pen. Mounted between paragraphs on a typed letter dated April 11, 2005 describing the dramatic events of Apollo 13

The typed letter reads: "*The United States flag displayed below was carried around the moon on the flight of Apollo 13 during April 11 to 17, 1970. The flag was stowed in my Lunar Module Personal Preference Kit (PPK) and was scheduled to be taken to the lunar surface during third manned lunar landing. However, at about 56 hours into the mission, an oxygen tank explosion in our Service Module caused a major loss of electrical power to the Command Module. Jack Swigert first radioed: 'OK, Houston, we've had a problem here.' Then Commander James Lovell clearly called Mission Control with: 'Houston, we've had a problem!'*

This even caused a scrub of the lunar landing and forced us to move into the Lunar Module in order to survive a four day journey around the moon and return back to earth. Countless individuals from NASA and our contractor teams worked around-the-clock to ensure our safe return.

The flag has been in my personal space artifact collection since 1970 which is now 35 years after the dramatic flight of Apollo 13. I have written "Flown around the moon on Apollo 13, Fred Haise, LMP" along the lowest white bar."

$ 12,000-18,000

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FROM THE COLLECTION OF APOLLO 13 LUNAR MODULE PILOT FRED HAISE

FLOWN TO THE MOON ON APOLLO 13

Flown Apollo 13 Beta Cloth Emblem - Signed

FLOWN Apollo 13 Beta emblem, 4 inches in diameter. Printed on Beta cloth, 8 inches square.

SIGNED by LOVELL above the emblem: "*JAMES LOVELL, Apollo 13 CDR*". SIGNED and INSCRIBED by HAISE below the emblem: "*Flown to the moon on Apollo 13, FRED HAISE, Apollo 13 LMP.*"

The Apollo 13 astronauts had artist Lumen Winter create an emblem from an idea the crew had of the mythical god Apollo driving a horse drawn chariot across the sky dragging the sun behind him. Winter's design features three horses traveling from the earth to the moon, symbolizing the Apollo crew of three astronauts.

$ 4,000-6,000

143

FLOWN TO THE MOON ON APOLLO 13

Apollo 13 - Flown Microfiche Bible

FLOWN King James Bible on microform, (Cleveland and New York: World Publishing Company, ca. 1964 and produced in microform by NCR, 1964), the microfilm measuring 1½ by 1½ inches, edition no. 715. Mounted on NASA letterhead on a typed letter signed by JAMES LOVELL, JOHN SWIGERT, AND FRED HAISE.

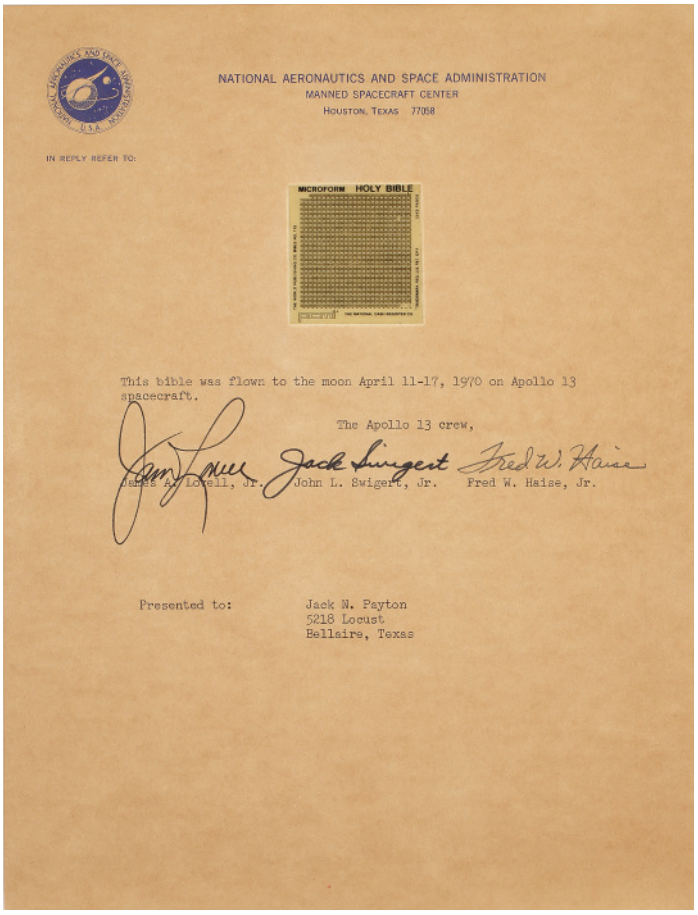
After the tragic fire that killed all three crew members of the Apollo I mission in 1967, Reverend John M. Stout, who had joined NASA in 1962, along with his family established the Apollo Prayer League. The group's primary purpose was to pray for the safety of the astronauts, and membership rapidly grew to embrace over 40,000 NASA employees. Its goals, among others, were to provide humanitarian relief worldwide and to land the Bible on the Moon. Size and weight restrictions mandated by NASA meant that the only printing format of the Bible that could be taken was in Microform. Hundreds of Bibles were taken along on the aborted Apollo 13 mission of April 1970, many of which were reissued following the spacecraft's miraculous return.

This Microform bible is mounted on an affidavit signed by the crew of Apollo 13, which states: "*This bible was flown to the moon April 11-17, 1970 on Apollo 13 spacecraft.*"

PROVENANCE

Jack N. Payton

$ 4,000-6,000



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APOLLO 13 FLOWN CREW AND AEROSPACE EMBLEMS

Two cloth emblems flown on Apollo 13 by Fred Haise, both mounted on a 9 by 14 inch mat board which reads: *"These patches were flown to the Moon on Apollo 13 Spacecraft by a former student. April 11-17, 1970."*

The mat board is SIGNED: *"FRED W. HAISE."*

Mounted on the left is a 5 inch tall USAF Aerospace Research Pilot School cloth emblem. It features a green colored slide rule over an outline of a high speed jet, all against a dark blue background. A 4 inch Apollo XIII crew emblem is mounted on the right side with the words "*Ex Luna Scientia*" meaning "*From the Moon Knowledge.*" *Full details available online.*

$ 4,000-6,000

144

145

FLOW APOLLO 13 CAMERA STOWAGE STRAP

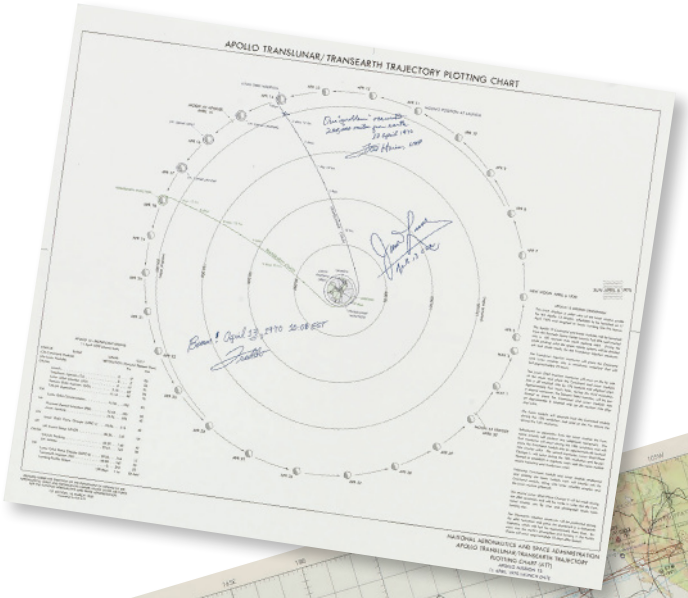
FLOWN A8 [Aft 8] Command Module equipment locker stowage strap. Made of heavy weave synthetics, 1 by 13 inches with metal end-plate connectors. One is a dual snap plate near the strap center and the other is located at one end. It has a peg type connector with a partly readable ID of *"V36-78... 01-5... 22 N."* There are four eye-let holes at the opposite end to allow the peg connector to be inserted to form a loop strap. The woven synthetic material has a partly readable ID stamp of *"V36 780. .. 21."* with an inspection stamp. Included are copies of NASA transfer and Smithsonian Air and Space Museum deaccession papers plus an image of the actual flown A8 locker.

The strap has been SIGNED and INSCRIBED: *"FRED HAISE, Apollo 13."*

The Command Module had system of stowage lockers and the A8 locker was mounted below the crew couches on the aft bulkhead. This locker had four storage areas with outer doors labels that included: *"RETURN 70MM CAMERA, 70MM FILM MAG, LUNAR SURF CAMERA, 16MM MAG, TRANSFER BAG, DECONTAM BAG, ROCK SAMP CONTAINER, HEADSET, EXERCISER, AND PILOT PREFERENCE KIT."* This particular strap sizing would allow securing Pilot Preference Kit Beta cloth bags.

$ 2,500-3,500

145



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146 (DETAIL)

146

APOLLO 13 EARTH ORBITAL CHART

ILLUSTRATES THE ONLY MISSION EVENTS THAT FOLLOWED THE FLIGHT PLAN

Apollo Earth Orbit Chart (AEO), Apollo Mission 13 for April 1970 Launch Date. March 3, 1970. Color Earth map, first edition. 13 by 42 inches.

SIGNED and INSCRIBED: *"JAMES LOVELL, Apollo 13 CDR and FRED HAISE, Apollo 13 LMP."* Additionally INSCRIBED by HAISE with mission events: "*Launch at 2:13 pm EST, April 11, 1970*" and "*Splash – April 17, 1970.*" He has marked the splashdown area with an "*X.*"

Full details available online.

$ 1,200-1,800

147

APOLLO 13 TRAJECTORY CHART - BOOM!

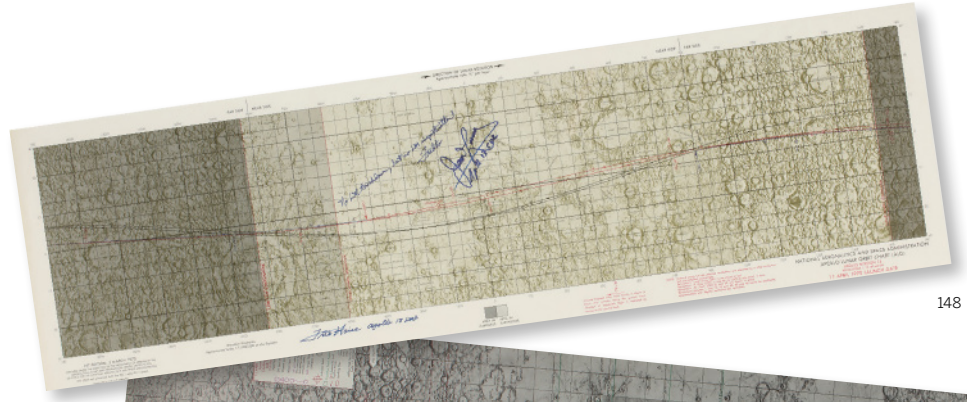
THEIR PROBLEM OCCURRED 200,000 MILES FROM EARTH!

Apollo Translunar / Transearth Trajectory Plotting Chart (ATT), Apollo Mission 13. Diagram with extensive annotations and crew signatures. First Edition, March 16, 1970, 24 by 20 inches.

INSCRIBED and SIGNED *"Our 'problem' occurred 200,000 miles from earth, 13 April 1970, FRED HAISE, Apollo 13 LMP."* He has marked an *"X"* where the explosion occurred along the flight path and added: *"Boom! Apollo, April, 13, 1970, 10:08 pm EST, Freddo"* with the number 13 underlined to emphasize the coincidental numbering of the flight and explosion date. In addition, BOLDLY SIGNED and INSCRIBED: *"JAMES LOVELL, Apollo 13 CDR."*

One of the best graphic representations showing how far from Earth the Apollo 13 spacecraft was when the Service Module's oxygen tank exploded. *Full details available online.*

$ 2,500-3,500



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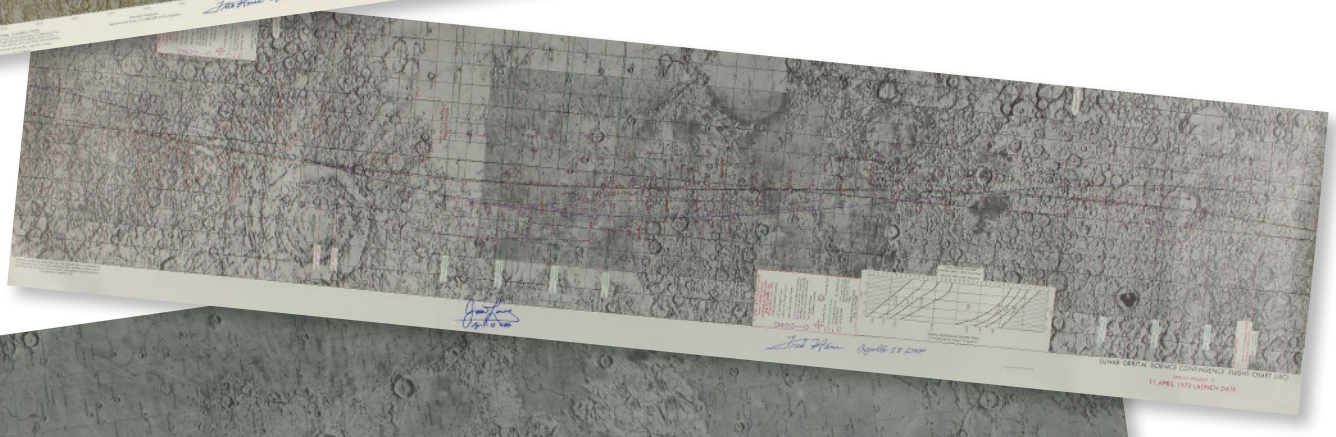

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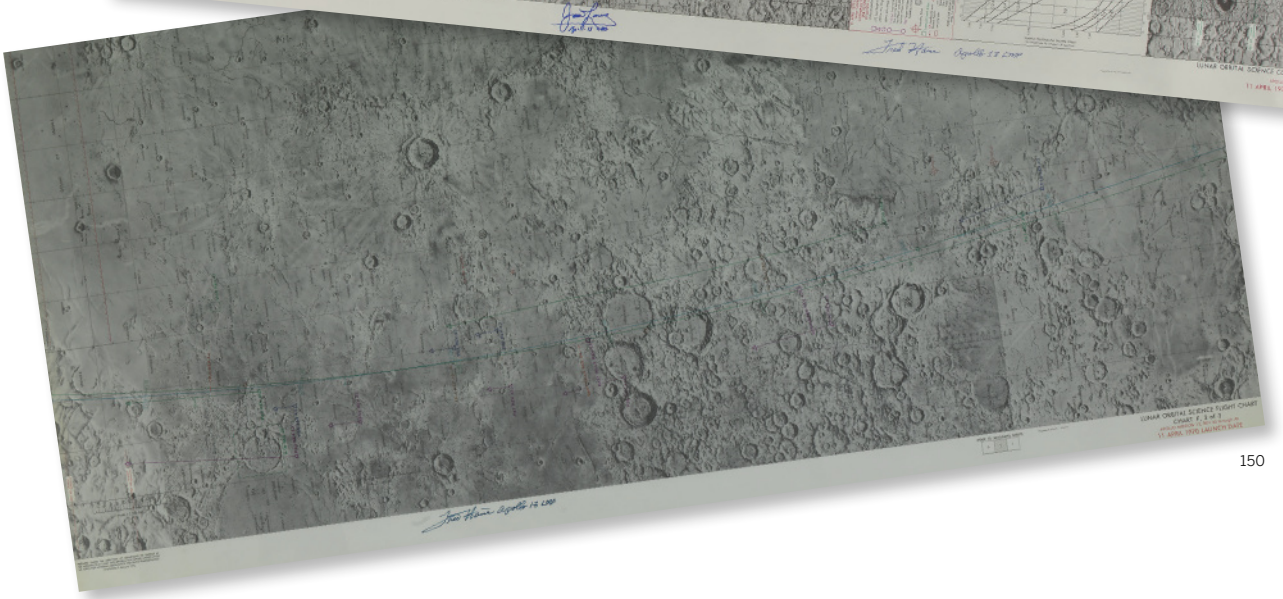

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148

APOLLO 13 LUNAR ORBIT CHART

THE CREW AVOIDS AN IMPACT WITH THE MOON!

Apollo Lunar Orbit Chart (ALO), Apollo Mission 13 for 11 April 1970 Launch Date. Color lunar map, First Edition, March 5, 1970. 12 by 40½ inches.

BOLDLY SIGNED and INSCRIBED: *"JAMES LOVELL, Apollo 13 CDR"* and *"FRED HAISE, Apollo 13 LMP."* ADDITIONALLY INSCRIBED and SIGNED BY HAISE: *"No LM touchdown, but no LM impact either! Freddo."* That inscription by Fred Haise pointedly sums up their mission in one phrase. Yes, the Service Module explosion cancelled their lunar landing but the crew safely maneuvered their crippled spacecraft for a flight around the Moon, and with these changes clearly avoided any possible impact. An inadequately controlled engine burn or miscalculation could have possibly sent them to a lunar impact.

$ 1,500-2,000

149

APOLLO 13 - LUNAR PHOTOGRAPHIC PLANS

Lunar Orbital Science Contingency Flight Chart, Apollo Mission 13, 11 April 1970 Launch Date. First Edition, March 4, 1970. 14 by 58 inches. Scale 1:7,5000,000.

SIGNED and INSCRIBED: *"JAMES LOVELL, Apollo 13 CDR"* and *"FRED HAISE, Apollo 13 LMP."*

This chart has identification ID of "*SKB 32100082-326",* which is the flight part number printed within the legend block and is identical to the chart issued to Lovell, Swigert, and Haise for their mission. This chart locates lunar surface "targets of opportunity" with colored geometric arrows and markings. Shutter speeds, f-stops, and lens size (either 80 or 250 mm) recommendations are listed inside the legend block section.

$ 2,000-3,000

150

LUNAR ORBIT PHOTO TASKS FOR APOLLO 13

Lunar Orbital Science Flight Chart, Chart F, 2 of 3, Apollo Mission 13. February 2, 1970. First Edition. 27 by 58 inches. Issued for the April 11, 1970 launch date. Scale 1:2,500,000 with nautical mile distance markers found in two locations.

SIGNED and INSCRIBED: *"FRED HAISE, Apollo 13 LMP"* along the lower white border.

A highly detailed near side chart with the Apollo 13 landing site ellipse marked in red and covers the landing areas of Apollo 11 and 12 plus the future landing sites of Apollo 14, 16, and 17. *Full details available online.*

$ 1,500-2,000

APOLLO 14

LOTS 151-157

151

151

APOLLO 14 DOCKING RING PYROTECHNIC CHARGE HOLDER

WITH ASSOCIATED HARDWARE USED TO CONDUCT EXPLOSIVE TESTS

Two MDF (Mild Detonating Fuse) Charge Holders, when joined, make a 33 inch diameter ring. Each having a yellow North American Rockwell (NAR) Temporary Parts Removal Tag, reading in part: "*Charge Holder, S/C 110."* One charge holder is marked *"V36-596031-7 B, SN (Serial Number) 157"* and the other *"V36-596031-9 "C," SN 155, MR 374060"* with a NAR inspection stamp, number 330. Both have a white label NAM 14 inspection stamp. There are twenty ½ inch bolts attached to the outer circumference with *"NAS 1101 C3"* marked on the head of each bolt. Included is a plastic bag with a blank yellow NAR tag having a manuscript note on the reverse side of: *"Hardware for Charge Holders."*

Additionally, two spacer and pins contained in an unopened plastic bag that has a yellow NAR tag reading in part: *"Part Number V36-596041, Spacer & Pins, 2 ea., S/C 110."* Three of the NAR tags have the manuscript date of "*2/14/72*" and a green circular label with a date stamp of *"SEP 12, 73."*

Pyrotechnic devices on the Apollo vehicles provided a convenient system to preform flight operations such as initial pressurization of spacecraft propellant systems, Lunar Module (LM) landing gear deployment, LM ascent/descent stage separation, and the final separation of the Command/Service Module (CSM) and LM. There were over 200 pyrotechnic devices used on each Apollo lunar mission.

All of the above hardware is associated with tests conducted after docking problems which occurred on the Apollo 14 flight of 1971. Charge holders like these were used on Apollo flights to make the final separation between the CSM and LM prior to leaving lunar orbit and returning to the Earth. This represents last major set of hardware used in tests described below which included an actual docking ring and docking ring flange assembly.

On Apollo 14, docking problems between the CSM and LM almost scrubbed the lunar landing. Finally after six attempts and some 2 hours of effort, the vehicles finally linked-up properly. Fortunately, when Alan Shepard and Edgar Mitchell returned from the lunar surface, the docking system worked correctly on the first attempt. However, Mission Control had the crew return the docking probe for post flight inspections. The probe was mechanism that makes the first connection with the LM.

From the NASA MSC 05101 post flight report titled: *"Apollo 14 Mission Anomaly Report No. 1 - Failure To Achieve Docking Probe Capture Latch Engagement,"* states that *"the failure to achieve capture-latch engagement has been narrowed to either foreign material restricting the normal function of the capture latch mechanism or jamming of the translation cam."* Modifications for future flights included improved cleanliness requirements, using a removable cover for the probe head to minimize foreign contamination prior to flight, and certain probe mechanical modifications.

To describe the charge holders and testing, a paraphrase from *NASA Technical Note TN D-7141, Spacecraft Pyrotechnics Systems, March 1973* follows. The docking ring separation system core charge consisted of two strands of 6-grain Hexanitrostilbene (HNS) Mild Detonating Fuse (MDF) with an adhesive to assist potting (setting) of this explosive material into the charge holder. On December 8, 1971, during verification tests, a failure to completely sever the docking ring occurred. As a result, the design of the docking ring separation system and its redundancy capabilities were investigated. This analysis discovered the possibility of cross-sectional voids developing during the potting process into the charge holder groove. Additional tests were performed afterwards and in the next year (1972) to verify the results of corrective action.

Included is a copy of NASA MSC (now JSC) internal records (Voucher # 6093-003, page 54 of 60) listing these components including an ART (Artifact) number, description, part number, serial number (if any), and from which associated spacecraft. In this case the spacecraft (S/C) was is 110, being Apollo 14. It most probable that these charge holder components were used in either the above docking ring separation tests or companion tests with the flown Apollo 14 docking probe, the docking ring listed, and docking ring flange listed. Both the flange and charge rings retain residual smearing from the explosive tests. It is believed a recording error has the wrong part number for the holders listed on this paperwork. Hardware was transferred to the National Air and Space Museum (NASM) via number 6341-001 in 1977 and later deaccessed by NASM (NASM number 5809).

$ 20,000-30,000


Edgar D. Mitchell

The Texas state flag displayed below was flown to the moon in the Apollo 14 Command Module Kitsilver-k between January 31 to February 9, 1971. It was stowed in my Personal Preference Kit (PPK) and made 34 orbits of the moon, traveling nearly a quarter million miles from earth. Apollo 14 was commanded by Alan Shepard, the first American to fly in space, with Stuart Roosa serving as Command Module Pilot. I was the Lunar Module Pilot and made the third manned lunar landing of the Apollo Program. During that time, Al and Shepard on February 5. We spent just over 33 hours on the moon. We traveled over ½ mile I made two lunar surface explorations, each lasting over 4 hours. We traveled over ½ mile from our lunar tander during our second surface exploration, the longest distance covered by foot during the Apollo Program.

Flown to the moon on Apollo 14

I was born on September 17, 1930 in Hereford, Texas. My family soon moved to New Mexico, near Roswell. During my early childhood, I actually walked by the home of Dr. Robert Goddard on my way to school. He was building and flying his early rockets out in the open unpopulated plains near Roswell. At that time I did not realize that his rickety efforts would help shape my future. Dr. Goddard's work established the bases for technology utilized by the Germans during World War II, which in turn led to the eventual development of the Saturn rockets. These large rockets, and in particular the Saturn V, enabled my Apollo 14 flight to the moon.

I have inscribed and signed this flag with: "Flown to the moon on Apollo 14. Edgar Mitchell" on the lower red bar.

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Edgar Mitchell Apollo 14 LMP Fra Mauro Base Feb 1971

153


"I have been in His brightest shining heaven and seen such things that no man, once returned from there, has wit or skill to tell about."
"Paradiso"
Dante
Edgar Mitchell
6th man on the moon
Apollo 14

154

152

APOLLO 14 FLOW TEXAS FLAG

MITCHELL DESCRIBES HIS EARLY CHILDHOOD IN TEXAS AND NEAR DR. ROBERT GODDARD'S HOME

FLOWN on Apollo 14, a Texas state flag, 4 by 6 inches. Included is a 5 x 7 inch color print of Dr. Mitchell in his Florida home office holding a Texas flag from his collection.

INSCRIBED and SIGNED: "*Flown to the moon on Apollo 14, EDGAR MITCHELL*" on the large red lower bar. Mounted between paragraphs on a Typed Letter describing Mitchell's Apollo 14 lunar flight and his early childhood.

Full details available online.

$ 3,000-4,000

153

APOLLO 14 - MITCHELL WITH OLD GLORY

PHOTOGRAPHED BY MERCURY AND APOLLO ASTRONAUT ALAN SHEPARD

Large color photograph, 16 by 20 inches.

SIGNED and INSCRIBED "*EDGAR MITCHELL, Apollo 14 LMP, Fra Mauro Base, Feb 1971.*"

Apollo 14 Lunar Module Pilot Edgar Mitchell stands next to the United States flag. He and Alan Shepard deployed "Old Glory" during their first lunar moonwalk on February 5, 1971.

$ 1,000-1,500

154

APOLLO 14 - EDGAR MITCHELL ON THE LUNAR SURFACE

Large color photograph, 20 by 16 inches.

Boldly SIGNED and INSCRIBED by MITCHELL: "*I have been in his brightest shining heaven and seen such things that no man once returned from there has wit or skill to talk about. "Paradiso" Dante EDGAR MITCHELL 6th man on the moon Apollo 14.*"

After landing in the Fra Mauro formation on 5 February 1971 — the original site planned for Apollo 13's aborted lunar landing — Mitchell and CDR Alan Shepard conducted two lunar EVAs. In addition to the standard set of surface experiments, Shepard famously brought along a makeshift six iron golf club and took a couple of swings, becoming the first "Lunar Golfer." As Mitchell remarked at the time: "*Beautiful day for a game of golf.*"

$ 2,000-3,000

155

APOLLO 14 - THE LUNAR MODULE AT FRA MAURO

Large color photograph, 16 by 20 inches.

SIGNED and INSCRIBED by MITCHELL at top left corner: *"Antares at Fra Mauro* EDGAR MITCHELL *Apollo 14."*

An image of Apollo 14's Lunar Module "Antares" — named after one of the brightest stars in the night sky — in the Fra Mauro Highlands.

$ 1,500-2,500

156

APOLLO 14 CREW VISITS THE WHITE HOUSE

NIXON IS PRESENTED THE SEXTANT EYEPIECE USED DURING THE FLIGHT

Black and white photograph, 8 by 10 inches, with printed NASA press release captions on verso.

SIGNED by ALAN SHEPARD, STUART A. ROOSA, and EDGAR MITCHELL.

During a White House dinner on March 1, 1971, the Apollo 14 crew presents the flown eyepiece from Command Module *Kittyhawk's* sextant to President Richard Nixon.

$ 1,500-2,000

157

APOLLO 14 - TARGET POINT FOR FRA MAURO BASE

Apollo 14 Landing Site – Fra Mauro. Published by the U.S. Army Topographic Command for NASA, 1971. 17 by 22 inches. Scale 1:8,000.

BOLDLY INSCRIBED and SIGNED: *"We were 'Right on the Landing Site,'* EDGAR MITCHELL, *Apollo 14 LMP."* Commander Alan Shepard radioed the comment "Right on the landing site" just after touching down at Fra Mauro Base.

The chart features a shaded relief drawing having a large landing ellipse with the Fra Mauro landing point at the center. The flight path for the Lunar Module is plotted with 1,000 foot markers from the center point. A cross range line is plotted perpendicular from the approach path with 1,000 foot markers. Shepard and Mitchell used the craters marked Cone, Triplet, and Star during their descent to verify landing point accuracy.

$ 1,200-1,800

155

156

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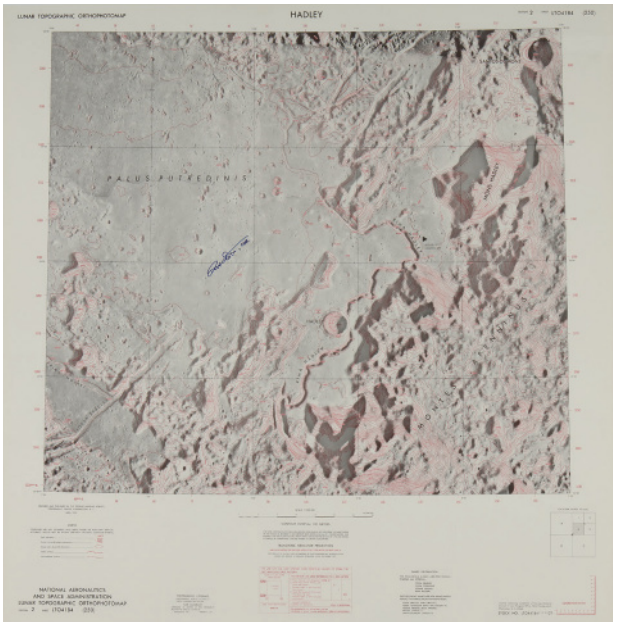

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APOLLO 15

LOT 158-160

158

APOLLO 15 - AN AIR FORCE SALUTE TO THE STARS AND STRIPES

SIGNED and INSCRIBED "DAVE SCOTT, Apollo 15, 1971."

Apollo 15 Commander and Air Force Colonel Dave Scott salutes the United States with Lunar Module Falcon and Mount Hadley in the background.

$ 1,000-1,500

159

APOLLO 15 - THE HADLEY BASE LUNAR LANDING SITE

Hadley, Lunar Topographic Orthophotomap. Lunar chart based on Apollo 15 photographs, published by the Defense Mapping Agency for NASA, 1975, 25½ by 27 inches.

SIGNED AND INSCRIBED: *"DAVE SCOTT, CDR."*

Details of geologically complex landing area of Apollo 15 are shown from a compilation of photographs taken from the flight. The areas included are Rima Hadley, Mons Hadley, and numerous craters. A large back pennant marks the exact landing spot. Red 100 meter interval contour lines denote the extreme elevation between low lands and the high mountain peaks. Detailed chart information is contained in the lower margin.

$ 1,000-1,500

160

APOLLO 15 - DAVE SCOTT CONDUCTING EXPERIMENTS ON THE LUNAR SURFACE

Large color photograph, 16 by 20 inches.

SIGNED and INSCRIBED by SCOTT on right side: "*Man must explore but this is exploration at its greatest! DAVE SCOTT Apollo 15 CDR 1971.*"

Dave Scott is shown here conducting experiments on the lunar surface. Apollo 15 was the first of the so-called "J missions" — from 30 July to 2 August 1971, CDR Dave Scott and LMP James Irwin conducted three lunar EVAs, spending a total of 18½ hours outside their lunar module. In addition to the unprecedented duration of the lunar landing, the mission was noteworthy for a number of firsts, including the first use of the lunar rover.

$ 1,500-2,500

APOLLO 16

LOT 161-164

161

APOLLO 16 - 71 HOURS ON THE MOON

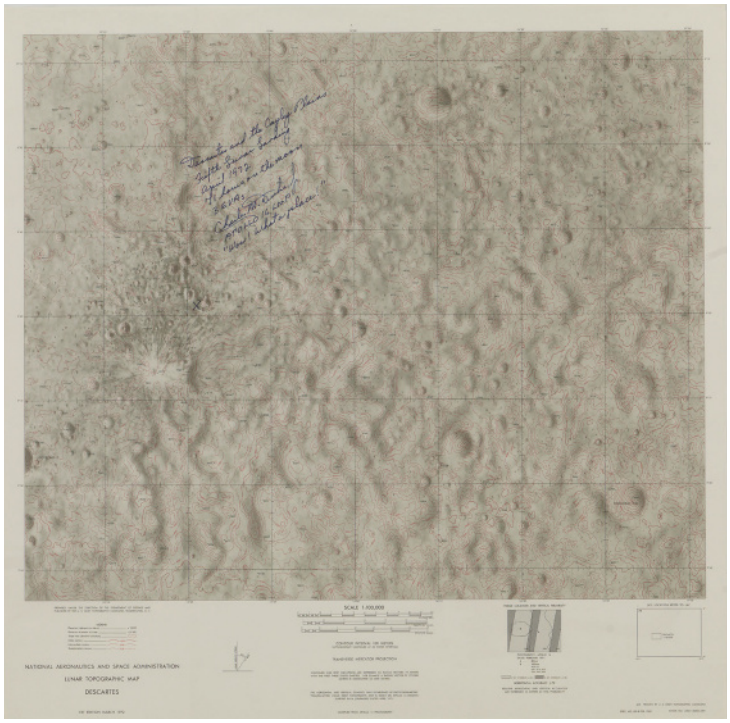
"Wow! What a place!"

Descartes. Lunar Topographic Map, U.S. Army Topographic Command for NASA. Displayed in Transverse Mercator Projection with a detailed legend. March 1972, First Edition. 25½ by 25¼ inches. Scale 1:100,000.

BOLDLY INSCRIBED and SIGNED near the Apollo 16 landing area: *"Descartes and the Cayley Plains, Fifth Lunar Landing, April 1972. 71 hours on the Moon, 3 EVAs. CHARLES M. DUKE, JR., Apollo 16 LMP. WOW! What A Place!"* Duke has marked the Apollo 16 landing point with an *"X."*

This landing site chart was compiled from Apollo 14 orbital photographs and features the lunar highland regions surrounding the Apollo 16 landing site. Contour lines are plotted at 100 meter intervals with supplementary contours at 50 meter intervals. Three separate bar scales have measurement in kilometers, nautical miles, and statute miles.

$ 1,000-1,500



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GEOLOGY OF APOLLO 16 LANDING AREA, WITH LARGE COLOR MAP OF THE IMBRIUM BASIN OF THE MOON - SIGNED BY APOLLO 16 MOONWALKER CHARLIE DUKE

ULRICH, HODGES AND MUEHLBERGER. *Geology of the Apollo 16 Area-Central Lunar Highlands. United States Geological Survey Professional Paper 1048.* Washington: United States Government Printing Office, 1981

11½ by 9 inches. 539 pp. Printed paper wrappers, housed in the original portfolio case together with 12 large plates, including 9 with panoramic photographs, 1 black & white map, and two color maps.

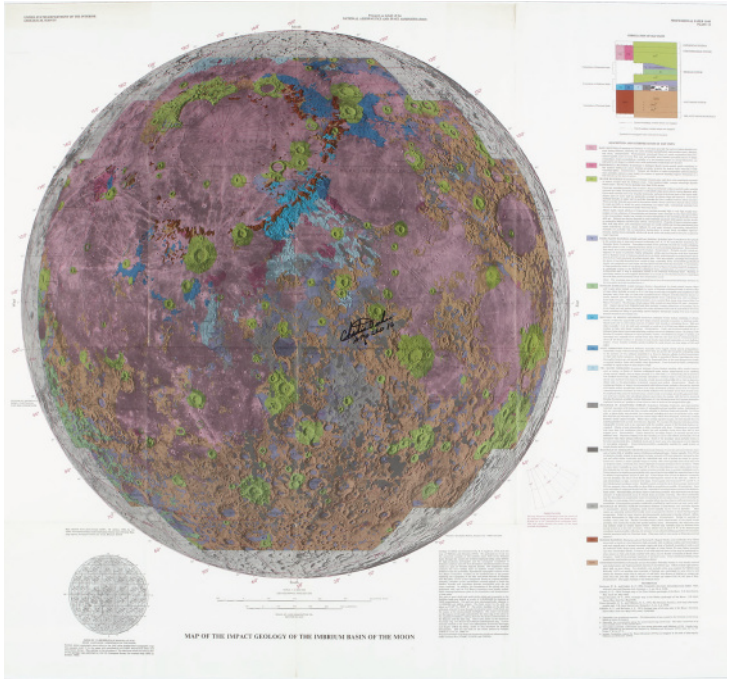
WITH: Extra copy of plate 12, [EGGLETON, R.E.] "Map of the Impact Geology of the Imbrium Basin of the Moon", a color 1: 5,000,000 scale geologic map, 36¼ by 33½ inches. Folded as issued. Some faint wrinkles, else fine.
MAP SIGNED BY APOLLO 16 LUNAR MODULE PILOT AND MOONWALKER OVER HIS LANDING SITE "CHARLIE DUKE APOLLO 16"

A monumental undertaking, this report contains the final results compiled by the Apollo Field Geology Investigations Team for the Apollo 16 mission. The large color map shows in extraordinary detail the impact geology of the Imbrium Basin region of the moon, with the Apollo 16 landing site visible in the hilly region around Descartes crater.

REFERENCES

See Spudis, *The Geology of Multi-Ring Impact Basins: The Moon and Other Planets.*

$ 1,000-1,500



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APOLLO 16 - YOUNG DRIVING THE LUNAR ROVER

Large color photograph, 16 by 20 inches.

SIGNED and INSCRIBED by YOUNG at lower left: *"Well Houston, when Charlie's in here its a lot less bouncy!"* JOHN YOUNG *Apollo 16 CDR April 1972."*

An image of CDR John Young driving the lunar rover. Apollo 16 was the second of three missions that utilized a rover to explore the lunar surface, allowing the astronauts greater freedom and mobility, prompting LMP Charlie Duke to comment: "*Man this is the only way to go, right in this Rover*."

$ 2,000-3,000

164

APOLLO 16 - CHARLIE DUKE ON THE LUNAR SURFACE

Large color photograph, 16 by 20 inches.

SIGNED: "CHARLIE DUKE Apollo 16."

An image of Duke on the lunar surface during the penultimate Apollo mission. When the 36 year old astronaut descended from the Lunar Module into the Descartes Highlands, he became the tenth and youngest person to walk on the Moon, prompting the LMP to exclaim: "*Fantastic! Oh, that first foot on the lunar surface is super, Tony!*"

$ 1,500-2,500

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"Well Houston, When
its a lot less bouncy
John Young
Apollo 16 CDR

APOLLO 17

LOT 165-169

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APOLLO 17 - GENE CERNAN DRIVING THE LUNAR ROVER

Large color photograph, 16 by 20 inches.

SIGNED and INSCRIBED by CERNAN at upper left corner: *"Driving the lunar rover in the Valley of Taurus-Littrow - "No better way to explore the Moon!" GENE CERNAN Apollo XVII-CDR Dec 1972."*

Apollo 17 marked the final usage of a lunar rover (among other lasts), and further distinguished itself during the lengthy three lunar EVAs undertaken by Cernan and LMP Harrison Schmitt. The final Apollo mission holds the record for longest moon landing, longest total extravehicular activities, largest lunar sample collected, and longest time in lunar orbit.

$ 2,000-3,000

166

APOLLO 17 - HARRISON SCHMITT IN THE TAURUS-LITTROW VALLEY

Large color photograph, 16 x 20 inches.

SIGNED and INSCRIBED by SCHMITT at lower right corner: "*EVA at Split Rock Boulder at Taurus-Littrow site HARRISON SCHMITT Apollo 17 LMP.*

Lunar Module Pilot Harrison Schmitt is shown here during an Apollo 17 EVA. Apollo 17 was the final manned Moon landing of the Apollo program, making CDR Eugene Cernan and Schmitt the eleventh and twelfth men (respectively) to have walked on the Moon's surface.

$ 2,000-3,000

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APOLLO 17 - CERNAN SALUTES THE LAST STARS AND STRIPES

Large color photograph, 11 by 14 inches.

Boldly SIGNED and INSCRIBED: *"GENE CERNAN, Apollo XVII CDR, Dec 1972."*

Apollo 17 Commander Gene Cernan holds and salutes the last United States flag placed on the lunar surface.

$ 1,500-2,000

168

TAURUS LITTROW - LAST LUNAR FOOTSTEPS OF THE 20TH CENTURY

Taurus Littrow. Lunar Topographic Orthophotomap. Defense Mapping Agency for NASA with detailed legend. September 1972. First edition. 24 by 30 inches. Scale 1:250,000.

BOLDLY INSCRIBED and SIGNED at the lower margin: *"The valley of Taurus Littrow, Last lunar footsteps of the 20th Century. GENE CERNAN, Apollo XVII, December 1972."*

Compiled from Apollo 15 orbital photographs and features the bright mountains and dark valleys of the Taurus Littrow region surrounding the Apollo 17 landing site. Contour lines are plotted at 100 meter intervals. Detailed descriptions ar located along the lower margin.

$ 2,500-3,500

169

APOLLO 17 - GENE CERNAN SETTING UP THE FINAL LUNAR FLAG

Large color photograph, 16 by 20 inches.

SIGNED and INSCRIBED by CERNAN at upper left corner: *"Setting up the final "lunar flag" of Apollo program Dec 11, 1972 GENE CERNAN Apollo XVII "Last Man on the Moon.""*

A photograph depicting CDR Cernan holding the fluttering American flag with his left hand, which the mission transcripts reveal to be a choreographed routine between Cernan and LMP (and photographer) Harrison Schmitt. After they finished, Cernan reflected aloud on the importance of the moment, noting: *"It's got to be one of the most proud moments of my life. I guarantee you ... Houston, I don't know how many of you are aware of this, but this - this flag has flown in the MOCR since Apollo 11. And we very proudly deploy it on the Moon, to stay for as long as it can, in honor of all those people who have worked so hard to put us here and to put every other crew here and to make the country, United States and mankind, something different than it was"*

$ 2,500-3,500

MOONWALKERS

LOTS 170-172

170

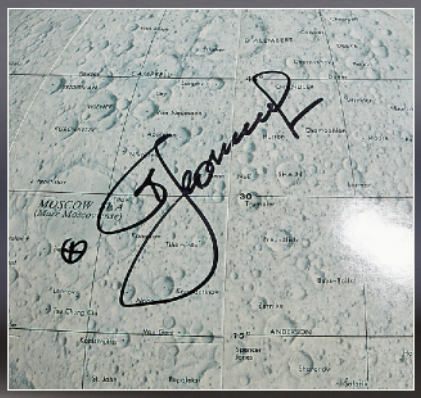
LUNAR GLOBE SIGNED BY THE FIRST SPACEWALKER COSMONAUT ALEXEI LEONOV, AND 8 ASTRONAUTS, INCLUDING ONE MOONWALKER FROM EACH MISSION

Replogle Lunar Globe, USA, ca. 1969

A 12 inch diameter lunar globe, 180 mi. per inch scale on round clear acrylic stand. Two sets of 12 thick printed glossy paper gores over pasteboard, each pole with metal pin. Apollo 11 landing site printed in Sea of Tranquility, with no other landing sites indicated.

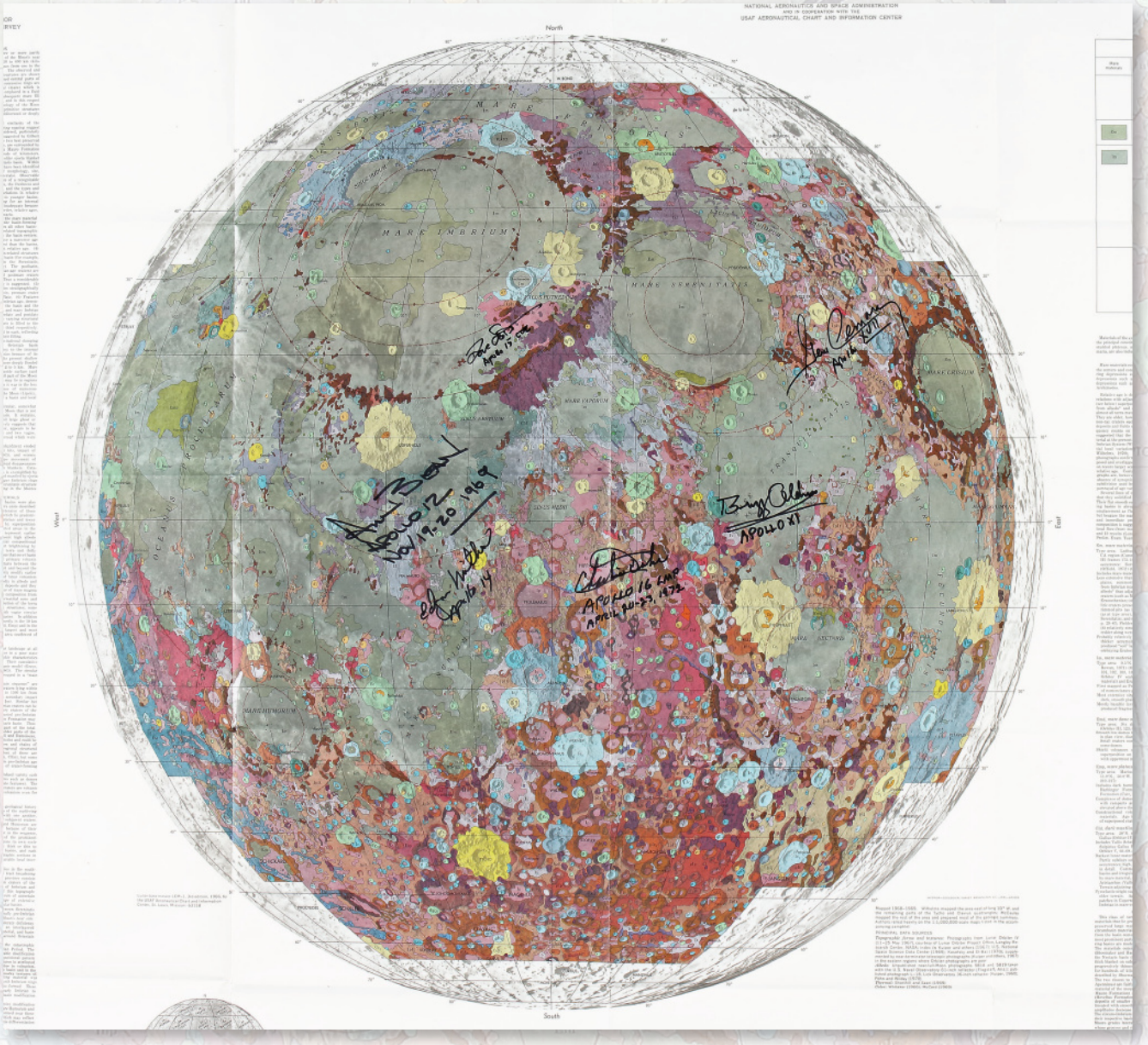
SIGNED: "LEONOV" NEAR THE MARE MOSCOVENSE, "BUZZ ALDRIN APOLLO XI" OVER THE SEA OF TRANQUILITY, "ALAN BEAN APOLLO 12" AND "RICHARD GORDON APOLLO XII" NEAR THE OCEAN OF STORMS, "EDGAR MITCHELL APOLLO 14" AT FRA MAURO, "DAVE SCOTT APOLLO 15" AND "AL WORDEN APOLLO 15" AT THE HADLEY/APPENINES, "CHARLIE DUKE APOLLO 16" AT THE DESCARTES HIGHLANDS, AND "GENE CERNAN APOLLO XVII" AT TAURUS LITTROW.

$ 4,000-6,000



170 (DETAIL)

170



172 (DETAIL)

171

LARGE COLOR GEOLOGIC MAP OF THE NEARSIDE OF THE MOON, SIGNED BY A MOONWALKER FROM EACH LUNAR LANDING

WILHELMS, DON E. AND JOHN F. MCCAULEY. "Geologic Map of the Near Side of the Moon. Map I-703" From: *Geologic Atlas of the Moon. Near Side of the Moon.* Washington, DC: U.S. Geological Survey, 1971

Color 1:5,000,000 scale geologic map, 53 by 35 inches, folded and housed in original Department of the Interior United Stated Geological Survey envelope, together with original 7 pp informational pamphlet. Fine.

SIGNED AND INSCRIBED BY A MOONWALKER FROM EACH OF THE SIX LUNAR LANDINGS NEXT TO THEIR RESPECTIVE LANDING SITES: APOLLO 11: "BUZZ ALDRIN APOLLO XI"; APOLLO 12: "ALAN BEAN APOLLO 12 NOV 19-20 1969"; APOLLO 14: "EDGAR MITCHELL APOLLO 14"; APOLLO 15: "DAVE SCOTT APOLLO 15 CDR"; APOLLO 16: "CHARLIE DUKE APOLLO 16 LMP APRIL 20-23 1972" AND APOLLO 17: "GENE CERNAN APOLLO XVII".

A striking and extraordinarily detailed map of the near side of the moon, revealing in vivid color the incredibly varied geological features of the lunar surface. Prepared on behalf of the National Aeronautics and Space Administration (NASA) in cooperation with the USAF Aeronautical Chart and Information Center, and done as part of the Department of the Interior's United States Geological Survey for their Geologic Atlas of the moon, the map was based on the results of the telescopic mapping program as well as on data provided by the unmanned lunar exploration program, in particular the regional coverage of Lunar Orbiter IV.

REFERENCES

Cortwright, *Exploring Space with a Camera,* pp 109-111.

$ 3,000-5,000

172

LARGE SCALE COLOR MAPS OF THE APOLLO LANDING SITES, SIGNED BY CORRESPONDING ASTRONAUTS

Collection of 11 large scale highly detailed color maps depicting the 7 Apollo landing sites. From: *Department of the Interior United States Geological Survery. Geological Atlas of the Moon.* Washington DC: U.S. Geological Survey, 1970-72. Housed in the original Department of the Interior United States Geological Survey envelops (Apollo 13 lacking envelope). Apollo 11-14 with explanatory text pamphlets.

Apollo 11: "Geologic Map of Apollo Landing Site 2 (Apollo 11). Part of Sabine D Region Southwestern Mare Tranquilitatis. Map I-619" by Maurice J. Grolier, 1970. 40¾ by 24 inches. SIGNED "BUZZ ALDRIN APOLLO XI" "'ROGER TRANQUILITY, COPY YOU ON THE GROUND!' CHARLIE DUKE APOLLO 11 CAPCOM", "BRUCE MCCANDLESS APOLLO 'EVA' CAPCOM [FLOURISH]"

Apollo 12: "Geologic Map of the Lansberg P Region of the Mpoon. Lunar Orbiter Site III P-9 Oceanus Procellarum Including Apollo Landing Site 7 (Apollo 12). Map I-627" by H. A. Pohn, 1971. 41 by 28½ inches. SIGNED "ALAN BEAN APOLLO 12. OUR HOME, NOVEMBER 19 & 20, 1969."

Apollo 13: "Geologic Map of the Far Mauro Region of the Moon - Apollo 13" by R.E. Eggleston, 1970. 38¾ by 29 inches. SIGNED "FRED HAISE"

Apollo 14: "Geologic Map of Part of the Fra Mauro Region of the Moon. Apollo 14 Pre-Mission Map. Map I-708." by T.W. Offield, 1970. Sheet (1) 27 by 45½ inches, sheet (2) 40¾ by 22½ inches. SHEET 1 SIGNED & INSCRIBED "WE WENT TO THE MOON AS TECHNICIANS, WE RETURNED AS HUMANITARIANS. EDGAR MITCHELL, APOLLO 14 LMP"

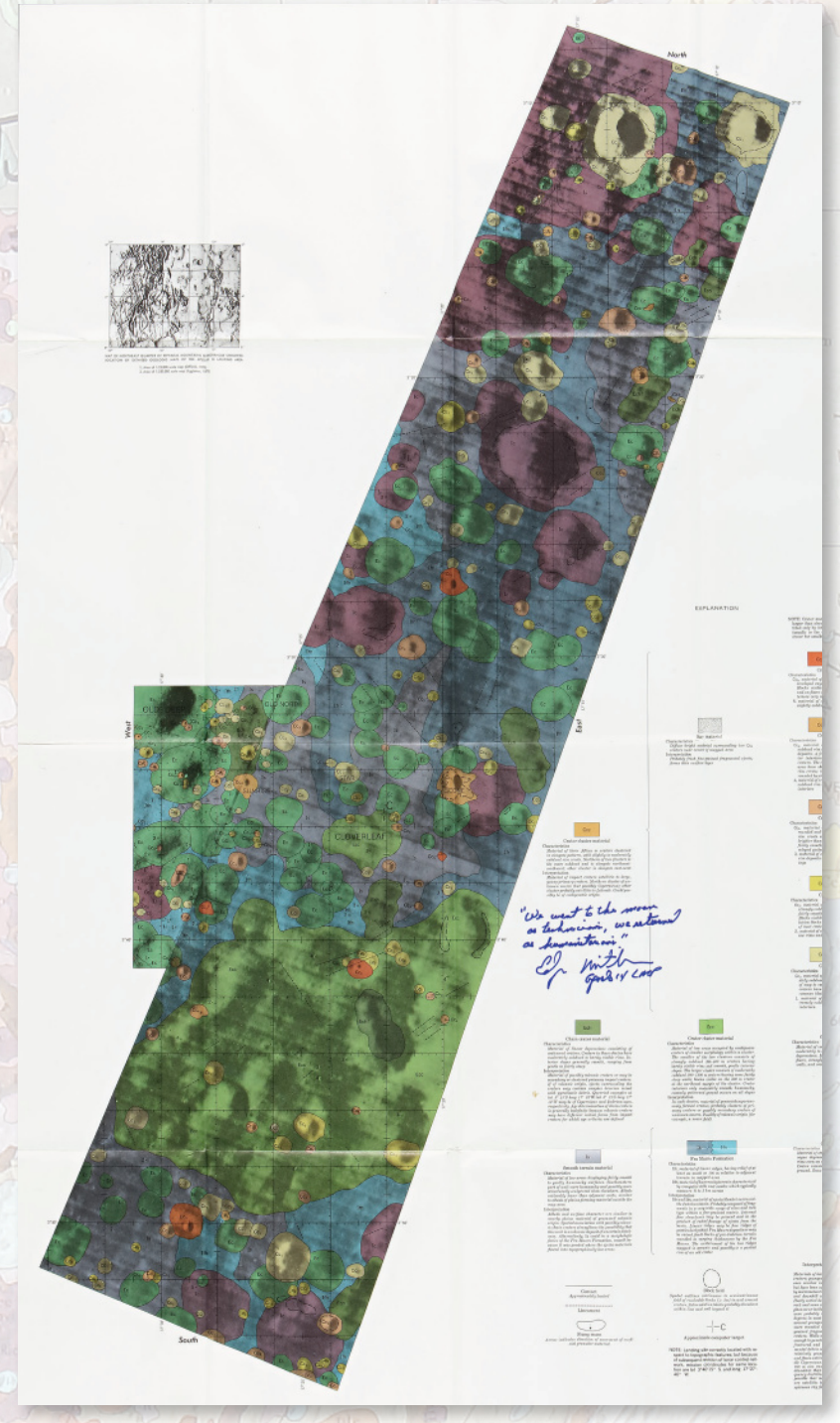
Apollo 15: "Geologic Map of the Appenine-Hadley Region of the Moon. Apollo 15 Pre-Mission Map. Map I-723" by M.H. Carr and Farouk El-Baz. Sheet (1) 48 by 30 inches, sheet (2) 46 by 28 inches. SHEET 2 SIGNED "DAVE SCOTT. APOLLO 15 CDR".

Apollo 16: "Geologic Map of the Descartes Region of the Moon. Apollo 16 Pre-Mission Map. Map I-748" by Daniel J. Milton, 1972. Sheet (1) 37½ by 21 inches, sheet (2) 44 by 30 inches. SHEET 2 SIGNED & INSCRIBED: "WHAT A RIDE TO NORTH RAY. CHARLIE DUKE. APOLLO 16 LMP"

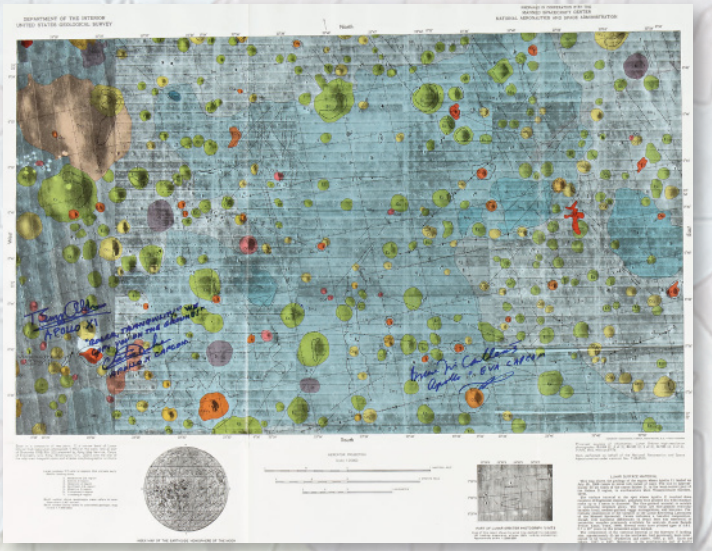
Apollo 17: "Geologic Map of the Taurus-Littrow Region of the Moon. Apollo 17 Pre-Mission Map. Map I-800" by David H. Scott, Baerbel Koesters, and M.H. Carr, 1972. Sheet (1) 46 by 25½ inches, sheet (2) 45 by 33 inches. SHEET 1 SIGNED "GENE CERNAN APOLLO XVII"

A spectacular collection of the extremely detailed geologic maps of the Apollo program landing sites done the United Stated Geological Survey, prepared in cooperation with the Manned Spacecraft Center and NASA, this set heightened by the signatures and inscriptions of astronauts that flew on the missions.

$ 4,000-6,000

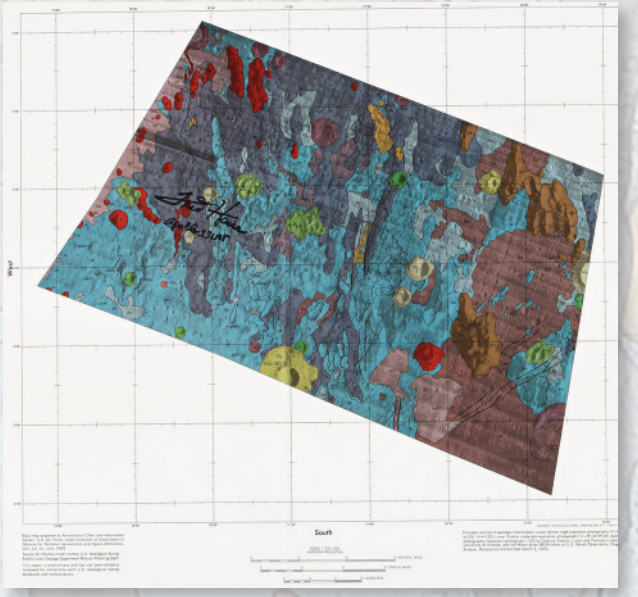


172, PART (Detail-Apollo 14)



172, PART (Detail-Apollo 11)

172, PART (Detail-Apollo 12)



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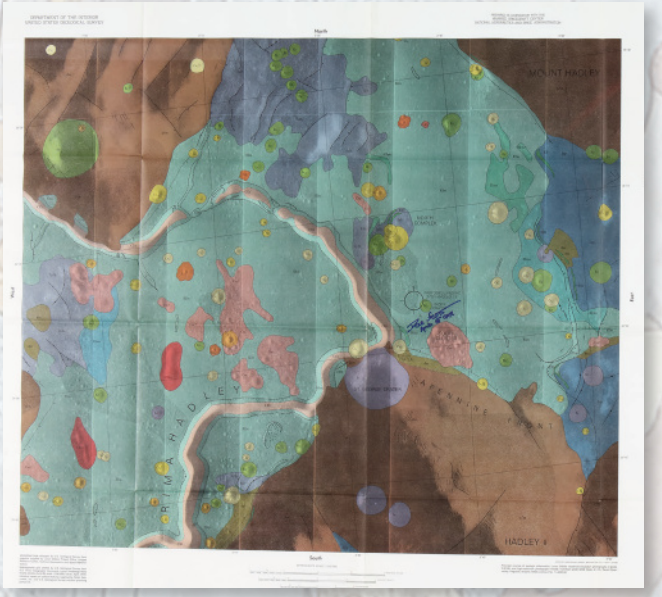

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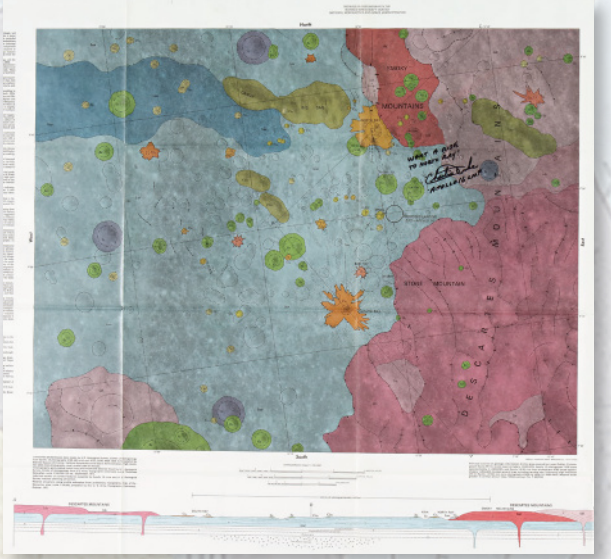
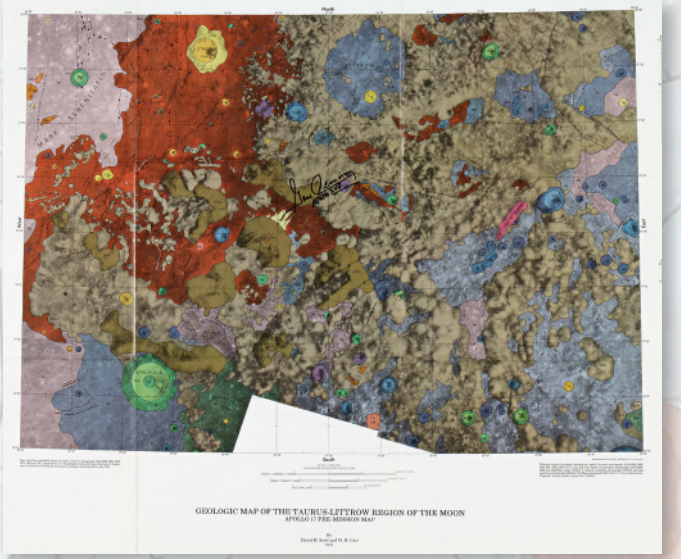


172, PART (Detail-Apollo 16)



172, PART (Detail-Apollo 17)

Skylab Prime Crews

173

SKYLAB

LOT 173

173

ALL THE SKYLAB CREWS

SIGNATURES FROM ALL NINE FLIGHT MEMBERS

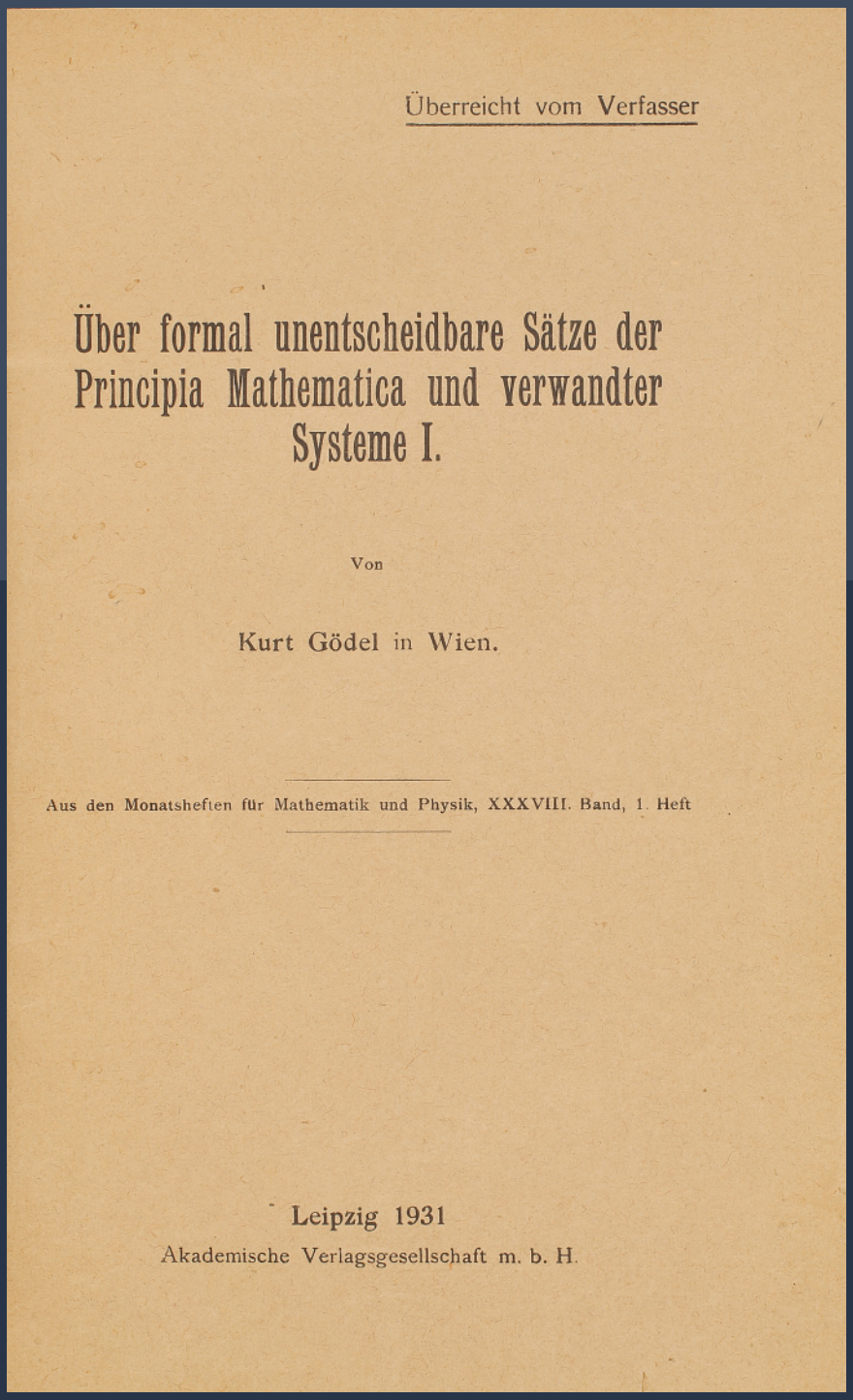
Color photolithograph, 8 by 10 inches, with printed NASA captions on recto and verso.

SIGNED by the first Skylab crew of CHARLES CONRAD, JOE KERWIN, AND PAUL WEITZ; the second Skylab crew of ALAN BEAN, OWEN CARRIOTT; and the third Skylab crew of JERRY CARR, ED GIBSON, and BILL POGUE.

An artist's painting of the Skylab space station in Earth orbit is in the center and is surrounded with inset portraits of all nine Skylab astronauts. Each astronaut has signed his name near his portrait. A description of the Skylab Program with brief astronaut biographies is printed on verso.

$ 1,500-2,000

END OF SALE



Überreicht vom Verfasser

Über formal unentscheidbare Sätze der Principia Mathematica und verwandter Systeme I.

Von

Kurt Gödel in Wien.

Aus den Monatsheften für Mathematik und Physik, XXXVIII. Band, 1. Heft

Leipzig 1931
Akademische Verlagsgesellschaft m. b. H.

KURT GÖDEL
"Über formal unentscheidbare Sätze der Principia Mathematica und verwandter Systeme I." Offprint from: Aus des Monatshften für Mathematik und Physik, XXXVIII. Band, 1. Akademsiche Verlagsgesellschaft, 1931.

First Edition, Author's Presentation offprint issue of Gödel's famed paper containing his incompleteness theorems.

History of Science and Technology
Auction New York
December 2017

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ANDY WARHOL. *$(4)*, 1982

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The following terms and conditions (the "Online Terms") provide important information related to live online bidding via BIDnow, eBay, Invaluable, and any other Online Platform through which bidding is made available ("Online Platforms").

These Conditions are in addition to and subject to the same law and our standard terms and conditions of sale, including the authenticity guarantee and any other terms and are not intended in any way to replace them. By participating in this sale via any Online Platform, you acknowledge that you are bound by the Conditions of Sale applicable in the relevant sale and by these additional Conditions.

1. The procedure for placing bids via Online Platforms is a one-step process; as soon as the "Bid Now" button is clicked, a bid is submitted. By placing a bid via any Online Platform, you accept and agree that bids submitted in this way are final and that you will not under any circumstances be permitted to amend or retract your bid. If a successful bid is sent to Sotheby's from your computer, phone, tablet, or any other device, you irrevocably agree to pay the full purchase price, including buyer's premium and all applicable taxes and other applicable charges.

2. If you have the leading bid, it will be indicated on the screen with the statement "Bid with you" (on BIDNow) or "You're the highest bidder" (on eBay) or "Bid with you" (on Invaluable). If a bid is placed online simultaneously with a bid placed by a bidder in the room or on the telephone (a "floor" bid), the "floor" bid generally will take precedence; the auctioneer will have the final discretion to determine the successful bidder or to reopen bidding. The auctioneer's decision is final.

3. The next bidding increment is shown on the screen for your convenience. The auctioneer has discretion to vary bidding increments for bidders in the auction room and on the telephones, but bidders using Online Platforms may not be able to place a bid in an amount other than a whole bidding increment. All bidding for this sale will be in the domestic currency of the sale location, and online bidders will not be able to see the currency conversion board that may be displayed in the auction room.

4. The record of sale kept by Sotheby's will be taken as absolute and final in all disputes. In the event of a discrepancy between any online records or messages provided to you and the record of sale kept by Sotheby's, the record of sale will govern.

5. Online bidders are responsible for making themselves aware of all salesroom notices and announcements. All sale room notices will be read by the auctioneer at the beginning, where appropriate, or during the sale prior to a relevant lot being offered for sale. Sotheby's recommends that online bidders log on at least ten minutes before the scheduled start of the auction to ensure that you have heard all announcements made by the auctioneer at the beginning of the sale.

6. Sotheby's reserves the right to refuse or revoke permission to bid via Online Platforms and to remove bidding privileges during a sale.

7. Purchase information shown in the "Account Activity" section of BIDnow, the "Purchase History" section of the "My eBay" page on eBay and the "Account Activity" section of the "My Invaluable" page on Invaluable is provided for your convenience only. Successful bidders will be notified and invoiced by Sotheby's after the sale. In the event of any discrepancy between any online purchase information and the invoice sent to you by Sotheby's following the respective sale, the invoice prevails. Terms and conditions for payment and collection of property remain the same regardless of how the winning bid was submitted.

8. Sotheby's offers online bidding as a convenience to our clients. Sotheby's will not be responsible for any errors or failures to execute bids placed via Online Platforms, including, without limitation, errors or failures caused by (i) a loss of connection to the internet or to the BIDnow, eBay, Invaluable or other Online Platform software by either Sotheby's or the client; (ii) a breakdown or problem with the BIDnow, eBay, Invaluable or other Online Platform software; or (iii) a breakdown or problem with a client's internet connection, mobile network or computer. Sotheby's is not responsible for any failure to execute an online bid or for any errors or omissions in connection therewith.

9. Live online bidding via all Online Platforms will be recorded.

10. In the event of any conflict between these Online Terms and Sotheby's Conditions of Sale and Terms of Guarantee, Sotheby's Conditions of Sale and Terms of Guarantee will control.

11. In the event of any conflict between these Online Terms and any term in any agreement between the User and eBay, these Online Terms will control for purposes of all Sotheby's auctions.

12. In the event of any conflict between these Online Terms and any term in any agreement between the User and Invaluable, these Online Terms will control for purposes of all Sotheby's auctions.

BUYING AT AUCTION

The following will help in understanding the auction buying process as well as some of the terms and symbols commonly used in an auction catalogue. All bidders should read the Conditions of Sale and Terms of Guarantee in this catalogue, as well as the Glossary or any other notices. By bidding at auction, bidders are bound by the Conditions of Sale and Terms of Guarantee, as amended by any oral announcement or posted notices, which together form the sale contract among Sotheby's, the seller (consignor) of the lot and any bidders, including the successful bidder (purchaser).

1. SYMBOL KEY

☐ Reserves
Unless indicated by a box (☐), all lots in this catalogue are offered subject to a reserve. A reserve is the confidential minimum hammer price at which a lot will be sold. The reserve is generally set at a percentage of the low estimate and will not exceed the low estimate of the lot. If any lots in the catalogue are offered without reserve, such lots will be designated by a box (☐). If every lot in a catalogue is offered without a reserve, the Conditions of Sale will so state and this symbol will not be used for each lot.

○ Guaranteed Property
The seller of lots with this symbol has been guaranteed a minimum price from one auction or a series of auctions. This guarantee may be provided by Sotheby's or jointly by Sotheby's and a third party. Sotheby's and any third parties providing a guarantee jointly with Sotheby's benefit financially if a guaranteed lot is sold successfully and may incur a loss if the sale is not successful. If the Guaranteed Property symbol for a lot is not included in the printing of the auction catalogue, a pre-sale or pre-lot announcement will be made indicating that there is a guarantee on the lot.

△ Property in which Sotheby's has an Ownership Interest
Lots with this symbol indicate that Sotheby's owns the lot in whole or in part or has an economic interest in the lot equivalent to an ownership interest.

∋ Irrevocable Bids
Lots with this symbol indicate that a party has provided Sotheby's with an irrevocable bid on the lot that will be executed during the sale at a value that ensures that the lot will sell. The irrevocable bidder, who may bid in excess of the irrevocable bid, will be compensated based on the final hammer price in the event he or she is not the successful bidder or may receive a fixed fee in the event he or she is the successful bidder. If the irrevocable bidder is the successful bidder, the fixed fee (if applicable) for providing the irrevocable bid may be netted against the irrevocable bidder's obligation to pay the full purchase price for the lot and the purchase price reported for the lot shall be net of such fixed fee. If the irrevocable bid is not secured until after the printing of the auction catalogue, a pre-sale or pre-lot announcement will be made indicating that there is an irrevocable bid on the lot. If the irrevocable bidder is advising anyone with respect to the lot, Sotheby's requires the irrevocable bidder to disclose his or her financial interest in the lot. If an agent is advising you or bidding on your behalf with respect to a lot identified as being subject to an irrevocable bid, you should request that the agent disclose whether or not he or she has a financial interest in the lot.

V Interested Parties
Lots with this symbol indicate that parties with a direct or indirect interest in the lot may be bidding on the lot, including (i) the beneficiary of an estate selling the lot, or (ii) the joint owner of a lot. If the interested party is the successful bidder, they will be required to pay the full Buyer's Premium. In certain instances, interested parties may have knowledge of the reserve. In the event the interested party's possible participation in the sale is not known until after the printing of the auction catalogue, a pre-sale or pre-lot announcement will be made indicating that interested parties may be bidding on the lot.

◉ Restricted Materials
Lots with this symbol have been identified at the time of cataloguing as containing organic material which may be subject to restrictions regarding import or export. The information is made available for the convenience of bidders and the absence of the symbol is not a warranty that there are no restrictions regarding import or export of the Lot; bidders should refer to Condition 12 of the Conditions of Sale. Please also refer to the section on Endangered Species in the information on Buying at Auction.

∏ Monumental
Lots with this symbol may, in our opinion, require special handling or shipping services due to size or other physical considerations. Bidders are advised to inspect the lot and to contact Sotheby's prior to the sale to discuss any specific shipping requirements.

♁ Premium Lot
In order to bid on "Premium Lots" (♁ in print catalogue or ✧ in eCatalogue) you must complete the required Premium Lot pre-registration application. You must arrange for Sotheby's to receive your pre-registration application at least three working days before the sale. Please bear in mind that we are unable to obtain financial references over weekends or public holidays. Sotheby's decision whether to accept any pre-registration application shall be final. If your application is accepted, you will be provided with a special paddle number. If all lots in the catalogue are "Premium Lots", a Special Notice will be included to this effect and this symbol will not be used.

2. BEFORE THE AUCTION

The Catalogue A catalogue prepared by Sotheby's is published for every scheduled live auction and is available prior to the sale date. The catalogue will help familiarize you with property being offered at the designated auction. Catalogues may be purchased at Sotheby's or by subscription in any categories. For information, please call +1 212 606 7000 or visit sothebys.com. Prospective bidders should also consult sothebys.com for the most up to date cataloguing of the property in this catalogue.

Estimates Each lot in the catalogue is given a low and high estimate, indicating to a prospective buyer a range in which the lot might sell at auction. When possible, the estimate is based on previous auction records of comparable pieces. The estimates are determined several months before a sale and are therefore subject to change upon further research of the property, or to reflect market conditions or currency fluctuations. Estimates should not be relied upon as a representation or prediction of actual selling prices.

Provenance In certain circumstances, Sotheby's may print in the catalogue the history of ownership of a work of art if such information contributes to scholarship or is otherwise well known and assists in distinguishing the work of art. However, the identity of the seller or previous owners may not be disclosed for a variety of reasons. For example, such information may be excluded to accommodate a seller's request for confidentiality or because the identity of prior owners is unknown given the age of the work of art.

Specialist Advice Prospective bidders may be interested in specific information not included in the catalogue description of a lot. For additional information, please contact either a Sotheby's specialist in charge of the sale (all of whom are listed in the front of the catalogue), or Sotheby's Client Services Department. You may also request a condition report from the specialist in charge.

The Exhibition An exhibition of the auction property will be held the week prior to the auction on the days listed in the front of the catalogue. There you will have the opportunity to view, inspect and evaluate the property yourself, or with the help of a Sotheby's specialist.

Salesroom Notices Salesroom notices amend the catalogue description of a lot after our catalogue has gone to press. They are posted in the viewing galleries and salesroom or are announced by the auctioneer. Please take note of them.

Registration Sotheby's may require such necessary financial references, guarantees, deposits and/or such other security, in its absolute discretion, as security for your bid. If you are not successful on any lot, Sotheby's will arrange for a refund (subject to any right of set off) of the deposit amount paid by you without interest within 14 working days of the date of the sale. Any exchange losses or fees associated with the refund shall be borne by you. Registration to bid on Premium Lots must be done at least 3 business days prior to the sale.

3. DURING THE AUCTION

The Auction Auctions are open to the public without any admission fee or obligation to bid. The auctioneer introduces the objects for sale — known as "lots" — in numerical order as listed in the catalogue. Unless otherwise noted in the catalogue or by an announcement at the auction, Sotheby's acts as agent on behalf of the seller and does not permit the seller to bid on his or her own property. It is important for all bidders to know that the auctioneer may open the bidding on any lot by placing a bid on behalf of the seller. The auctioneer may further bid on behalf of the seller, up to the amount of the reserve, by placing responsive or consecutive bids for a lot. The auctioneer will not place consecutive bids on behalf of the seller above the reserve.

Bidding in Person If you would like to bid, you must register for a paddle upon entering the salesroom. The paddle is numbered so as to identify you to the auctioneer. To register, you will need a form of identification such as a driver's license, a passport or some other type of government issued identification. If you are a first-time bidder, you will also be asked for your address, phone number and signature in order to create your account. If you are bidding for someone else, you will need to provide a letter from that person authorizing you to bid on that person's behalf. Issuance of a bid paddle is in Sotheby's sole discretion.

Once the first bid has been placed, the auctioneer asks for higher bids, in increments determined by the auctioneer. To place your bid, simply raise your paddle until the auctioneer acknowledges you. You will know when your bid has been acknowledged; the auctioneer will not mistake a random gesture for a bid.

If you wish to register to bid on a Premium Lot, please see the paragraph above.

All lots sold will be invoiced to the name and address in which the paddle has been registered and cannot be transferred to other names and addresses. Sotheby's reserves the right to refuse to accept payment from a source other than the buyer of record.

Absentee Bidding If it is not possible for you to attend the auction in person, you may place your bid ahead of time. In the back of every catalogue there is an absentee bid form, which you can use to indicate the item you wish to bid on and the maximum bid you are willing to make. Return the completed absentee bid form to Sotheby's either by mail or fax. When the lot that you are interested in comes up for sale, a Sotheby's representative will execute the bid on your behalf, making every effort to purchase the item for as little as possible and never exceeding your limit. This service is free and confidential. For detailed instructions and information, please see the Absentee Bid Form and Guide for Absentee Bidders instructions at the back of this catalogue.

Telephone Bidding In some circumstances, we offer the ability to place bids by telephone live to a Sotheby's representative on the auction floor. Please contact the Bid Department prior to the sale to make arrangements or to answer any questions you may have. Telephone bids are accepted only at Sotheby's discretion and at the caller's risk. Calls may also be recorded at Sotheby's discretion. By bidding on the telephone, prospective buyers consent thereto.

Online Bidding If you cannot attend the auction, it may be possible to bid online via BIDnow, eBay, Invaluable or other Online Platforms for selected sales. This service is free and confidential. For information about registering to bid via BIDnow, please see www.sothebys.com. For information about registering to bid on eBay, please see www.ebay.com/sothebys. For information about registering to bid on Invaluable, please see www.invaluable.com/invaluable/help.cfm. Bidders utilizing any online platform are subject to the Online Terms as well as the relevant Conditions of Sale. Online bidding may not be available for Premium Lots.

Employee Bidding Sotheby's employees may bid in a Sotheby's auction only if the employee does not know the reserve and if the employee fully complies with Sotheby's internal rules governing employee bidding.

US Economic Sanctions The United States maintains economic and trade sanctions against targeted foreign countries, groups and organizations. There may be restrictions on the import into the United States of certain items originating in sanctioned countries, including Burma, Cuba, Iran, North Korea and Sudan. The purchaser's inability to import any item into the US or any other country as a result of these or other restrictions shall not justify cancellation or rescission of the sale or any delay in payment. Please check with the specialist department if you are uncertain as to whether a lot is subject to these import restrictions, or any other restrictions on importation or exportation.

Hammer Price and the Buyer's Premium For lots which are sold, the last price for a lot as announced by the auctioneer is the hammer price. A buyer's premium will be added to the hammer price and is payable by the purchaser as part of the total purchase price. The buyer's premium will be the amount stated in the Conditions of Sale.

Currency Board As a courtesy to bidders, a currency board is operated in many salesrooms. It displays the lot number and current bid in both U.S. dollars and foreign currencies. Exchange rates are approximations based on recent exchange rate information and should not be relied upon as a precise invoice amount. Sotheby's assumes no responsibility for any error or omission in foreign or United States currency amounts shown.

Results Successful absentee bidders will be notified after the sale. Absentee bidders will receive a list of sale results if they enclose a stamped self-addressed envelope with their absentee bid form. Printed lists of auction prices are available at our galleries approximately three weeks following each auction and are sent on request to catalogue purchasers and subscribers. Results may also be obtained online at sothebys.com.

International Auctions If you need assistance placing bids, obtaining condition reports or receiving auction results for a Sotheby's sale outside the United States, please contact our International Client Services Department.

4. AFTER THE AUCTION

Payment If your bid is successful, you can go directly to Post Sale Services to make payment arrangements. Otherwise, your invoice will be mailed to you. The final price is determined by adding the buyer's premium to the hammer price on a per-lot basis. Sales tax, where applicable, will be charged on the entire amount. Payment is due in full immediately after the sale. However, under certain circumstances, Sotheby's may, in its sole discretion, offer bidders an extended payment plan. Such a payment plan may provide an economic benefit to the bidder. Credit terms should be requested at least one business day before the sale. However, there is no assurance that an extended payment plan will be offered. Please contact Post Sale Services or the specialist in charge of the sale for information on credit arrangements for a particular lot. Please note that Sotheby's will not accept payments for purchased lots from any party other than the purchaser, unless otherwise agreed between the purchaser and Sotheby's prior to the sale.

Payment by Cash It is against Sotheby's general policy to accept single or multiple related payments in the form of cash or cash equivalents in excess of the local currency equivalent of US $10,000. It is Sotheby's policy to request any new clients or purchasers preferring to make a cash payment to provide: verification of identity (by providing some form of government issued identification containing a photograph, such as a passport, identity card or driver's license), confirmation of permanent address and identification of the source of the funds.

Payment by Credit Cards Sotheby's accepts payment by credit card for Visa, MasterCard, and American Express only. Credit card payments may not exceed $50,000 per sale. Payment by credit card may be made (a) online at https://www.sothebys.com/en/invoice-payment.html, (b) by calling in to Post Sale Services at +1 212 606 7444, or (c) in person at Sotheby's premises at the address noted in the catalogue.

Payment by Check Sotheby's accepts personal, certified, banker's draft and cashier's checks drawn in US Dollars (made payable to Sotheby's). While personal and company checks are accepted, property will not be released until such checks have cleared, unless you have a pre-arranged check acceptance agreement. Application for check clearance can be made through the Post Sale Services.

Certified checks, banker's drafts and cashier's checks are accepted at Sotheby's discretion and provided they are issued by a reputable financial institution governed by anti-money laundering laws. Instruments not meeting these requirements will be treated as "cash equivalents" and subject to the constraints noted in the prior paragraph titled "Payment By Cash".

Payment by Wire Transfer To pay for a purchase by wire transfer, please refer to the payment instructions on the invoice provided by Sotheby's or contact Post Sale Services to request instructions.

Sales and Use Tax New York sales tax is charged on the hammer price, buyer's premium and any other applicable charges on any property picked up or delivered in New York State, regardless of the state or country in which the purchaser resides or does business. Purchasers who wish to use their own shipper who is not a considered a "common carrier" by the New York Department of Taxation and Finance will be charged New York sales tax on the entire charge regardless of the destination of the property. Please refer to "Information on Sales and Use Tax Related to Purchases at Auction" in the back of the catalogue.

Collection and Delivery
Post Sale Services
+ 1 212 606 7444
FAX: + 1 212 606 7043
uspostsaleservices@sothebys.com

Once your payment has been received and cleared, property may be released. Unless otherwise agreed by Sotheby's, all purchases must be removed by the 30th calendar day following a sale.

Shipping Services Sotheby's offers a comprehensive shipping service to meet all of your requirements. If you received a shipping quotation or have any questions about the services we offer please contact us.

Collecting your Property As a courtesy to purchasers who come to Sotheby's to collect property, Sotheby's will assist in the packing of lots, although Sotheby's may, in the case of fragile articles, choose not to pack or otherwise handle a purchase.

If you are using your own shipper to collect property from Sotheby's, please provide a letter of authorization and kindly instruct your shipper that they must provide a Bill of Lading prior to collection. Both documents must be sent to Post Sale Services prior to collection.

The Bill of Lading must include: the purchaser's full name, the full delivery address including the street name and number, city and state or city and country, the sale and lot number.

Sotheby's will contact your shipper within 24 hours of receipt of the Bill of Lading to confirm the date and time that your property can be collected. Property will not be released without this confirmation and your shipper must bring the same Bill of Lading that was faxed to Sotheby's when collecting. All property releases are subject to the receipt of cleared funds.

Please see the Conditions of Sale for further details.

Endangered Species Certain property sold at auction, for example, items made of or incorporating plant or animal materials such as coral, crocodile, ivory, whalebone, tortoiseshell, rhinoceros horn, rosewood, etc., irrespective of age or value, may require a license or certificate prior to exportation and additional licenses or certificates upon importation to another country. Sotheby's suggests that buyers check on their government wildlife import requirements prior to placing a bid. Please note that the ability to obtain an export license or certificate does not ensure the ability to obtain an import license or certificate in another country, and vice versa. It is the purchaser's responsibility to obtain any export or import licenses and/or certificates as well as any other required documentation. In the case of denial of any export or import license or of delay in the obtaining of such licenses, the purchaser is still responsible for making on-time payment of the total purchase price for the lot.

Although licenses can be obtained to export some types of endangered species, other types may not be exported at all, and other types may not be resold in the United States. Upon request, Sotheby's is willing to assist the purchaser in attempting to obtain the appropriate licenses and/or certificates. However, there is no assurance that an export license or certificate can be obtained. Please check with the specialist department or the Shipping Department if you are uncertain as to whether a lot is subject to these export/import license and certificate requirements, or any other restrictions on exportation.

The Art Loss Register As part of Sotheby's efforts to support only the legitimate art market and to combat the illegitimate market in stolen property, Sotheby's has retained the Art Loss Register to check all uniquely identifiable items offered for sale in this catalogue that are estimated at more than the equivalent of US$1,500 against the Art Loss Register's computerized database of objects reported as stolen or lost. The Art Loss Register is pleased to provide purchasers with a certificate confirming that a search has been made. All inquiries regarding search certificates should be directed to The Art Loss Register, First Floor, 63-66 Hatten Garden, London EC1N 8LE or by email at artloss@artloss.com. The Art Loss Register does not guarantee the provenance or title of any catalogued item against which they search, and will not be liable for any direct or consequential losses of any nature howsoever arising. This statement and the ALR's service do not affect your rights and obligations under the Conditions of Sale applicable to the sale.

SELLING AT AUCTION

If you have property you wish to sell, Sotheby's team of specialists and client services representatives will assist you through the entire process. Simply contact the appropriate specialist (specialist departments are listed in the back of this catalogue), General Inquiries Department or a Sotheby's regional office representative for suggestions on how best to arrange for evaluation of your property.

Property Evaluation There are three general ways evaluation of property can be conducted:

(1) In our galleries
You may bring your property directly to our galleries where our specialists will give you auction estimates and advice. There is no charge for this service, but we request that you telephone ahead for an appointment. Inspection hours are 9:30 am to 5 pm, Monday through Friday.

(2) By photograph
If your property is not portable, or if you are not able to visit our galleries, you may bring in or send a clear photograph of each item. If you have a large collection, a representative selection of photographs will do. Please be sure to include the dimensions, artist's signature or maker's mark, medium, physical condition and any other relevant information. Our specialists will provide a free preliminary auction estimate subject to a final estimate upon first-hand inspection.

(3) In your home
Evaluations of property can also be made in your home. The fees for such visits are based on the scope and diversity of property, with travel expenses additional. These fees may be rebated if you consign your property for sale at Sotheby's. If there is considerable property in question, we can arrange for an informal "walkthrough."

Once your property has been evaluated, Sotheby's representatives can then help you determine how to proceed should you wish to continue with the auction process. They will provide information regarding sellers' commission rates and other charges, auction venue, shipping and any further services you may require.

SOTHEBY'S SERVICES

Sotheby's also offers a range of other services to our clients beyond buying and selling at auction. These services are summarized below. Further information on any of the services described below can be found at sothebys.com.

Valuations and Appraisals Sotheby's Valuations and Appraisals Services offers advice regarding personal property assets to trusts, estates, and private clients in order to help fiduciaries, executors, advisors, and collectors meet their goals. We provide efficient and confidential advice and assistance for all appraisal and auction services. Sotheby's can prepare appraisals to suit a variety of needs, including estate tax and planning, insurance, charitable contribution and collateral loan. Our appraisals are widely accepted by the Internal Revenue Service, tax and estate planning professionals, and insurance firms. In the event that a sale is considered, we are pleased to provide auction estimates, sales proposals and marketing plans. When sales are underway, the group works closely with the appropriate specialist departments to ensure that clients' needs are met promptly and efficiently.

Financial Services Sotheby's offers a wide range of financial services including advances on consignments, as well as loans secured by art collections not intended for sale.

Museum Services Tailored to meet the unique needs of museums and nonprofits in the marketplace, Museum Services offers personal, professional assistance and advice in areas including appraisals, deaccessions, acquisitions and special events.

Corporate Art Services Devoted to servicing corporations, Sotheby's Corporate Art Services Department can prepare appraisal reports, advise on acquisitions and deaccessions, manage all aspects of consignment, assist in developing arts-management strategies and create events catering to a corporation's needs.

INFORMATION ON SALES AND USE TAX RELATED TO PURCHASES AT AUCTION

To better assist our clients, we have prepared the following information on Sales and Use Tax related to property purchased at auction.

Why Sotheby's Collects Sales Tax
Virtually all State Sales Tax Laws require a corporation to register with the State's Tax Authorities and collect and remit sales tax if the corporation maintains a presence within the state, such as offices. In the states that impose sales tax, Tax Laws require an auction house, with a presence in the state, to register as a sales tax collector, and remit sales tax collected to the state. New York sales tax is charged on the hammer price, buyer's premium and any other applicable charges on any property picked up or delivered in New York, regardless of the state or country in which the purchaser resides or does business.

Where Sotheby's Collects Sales Tax
Sotheby's is currently registered to collect sales tax in the following states: California, Colorado, Connecticut, Florida, Illinois, Maryland, Massachusetts, Minnesota, Missouri, New Jersey, New York, Ohio, Pennsylvania, Texas and Washington. For any property collected or received by the purchaser in New York City, such property is subject to sales tax at the existing New York State and City rate of 8.875%.

Sotheby's Arranged Shipping If the property is delivered into any state in which Sotheby's is registered, Sotheby's is required by law to collect and remit the appropriate sales tax in effect in the state where the property is delivered.

Client Arranged Shipping Property collected from Sotheby's New York premises by a common carrier hired by the purchaser for delivery at an address outside of New York is not subject to New York Sales Tax, but if the property is delivered into any state in which Sotheby's is registered, Sotheby's is required by law to collect and remit the appropriate sales tax in effect in the state where the property is delivered. New York State recognizes shippers such as the United States Postal Service, United Parcel Service, FedEx, or the like as "common carriers". If a purchaser hires a shipper other than a common carrier to pick up property, Sotheby's will collect New York sales tax at a rate of 8.875% regardless of the ultimate destination of the goods. If a purchaser utilizes a freight-forwarder who is registered with the Transportation Security Administration ("TSA") to deliver property outside of the United States, no sales tax would be due on this transaction.

Where Sotheby's is Not Required to Collect Sales Tax Sotheby's is not required to collect sales tax on property delivered to states other than those listed above. If the property is delivered to a state where Sotheby's is not required to collect sales tax, it is the responsibility of the purchaser to self-assess any sales or use tax and remit it to taxing authorities in that state.

Sotheby's is not required to collect sales tax for property delivered to the purchaser outside of the United States.

Restoration and Other Services
Regardless of where the property is subsequently transported, if any framing or restoration services are performed on the property in New York, it is considered to be a delivery of the property to the purchaser in New York, and Sotheby's will be required to collect the 8.875% New York sales tax.

Certain Exemptions Most states that impose sales taxes allow for specified exemptions to the tax. For example, a registered re-seller such as a registered art dealer may purchase without incurring a tax liability, and Sotheby's is not required to collect sales tax from such re-seller. The art dealer, when re-selling the property, may be required to charge sales tax to its client, or the client may be required to self-assess sales or use tax upon acquiring the property.

Local Tax Advisors As sales tax laws vary from state to state, Sotheby's recommends that clients with questions regarding the application of sales or use taxes to property purchased at auction seek tax advice from their local tax advisors.

Photography:

Scott Elam
Peter Kutscher
Pauline Shapiro

Sotheby's EST. 1744

ABSENTEE/TELEPHONE BIDDING FORM

Sale Number N09759 | **Sale Title** SPACE EXPLORATION | **Sale Date** 20 JULY 2017

Please see the important information regarding absentee bidding on the reverse of this form.
Forms should be completed in ink and emailed, mailed or faxed to the Bid Department at the details below.

SOTHEBY'S ACCOUNT NUMBER (IF KNOWN)

TITLE FIRST NAME LAST NAME

COMPANY NAME

ADDRESS

POSTAL CODE COUNTRY

DAYTIME PHONE MOBILE PHONE FAX

EMAIL

Please indicate how you would like to receive your invoices: ❑ **Email** ❑ **Post/Mail**

Telephone number during the sale (Telephone bids only) _____

Please write clearly and place your bids as early as possible, as in the event of identical bids, the earliest bid received will take precedence. Bids should be submitted at least 24 hours before the auction.

LOT NUMBER	LOT DESCRIPTION	**MAXIMUM USD PRICE OR TICK ✓ FOR PHONE BID** (EXCLUDING PREMIUM AND TAX)
		$
		$
		$
		$
		$
		$
		$
		$
		$
		$
		$
		$

We will send you a shipping quotation for this and future purchases unless you select one of the check boxes below. Please provide the name and address for shipment of your purchases, if different from above.

NAME AND ADDRESS

POSTAL CODE COUNTRY

❑ I will collect in person

❑ I authorize you to release my purchased property to my agent/shipper (provide name) _____

❑ Send me a shipping quotation for purchases in this sale only

I agree to be bound by Sotheby's "Conditions of Sale" and the information set out overleaf in the Guide for Absentee and Telephone Bidders, which is published in the catalogue for the sale. I consent to the use of this information and any other information obtained by Sotheby's in accordance with the Guide for Absentee and Telephone Bidders and Conditions of Sale.

SIGNATURE PRINT NAME DATE

BID DEPARTMENT 1334 YORK AVENUE, NEW YORK NY 10021 | TEL +1 212 606 7414 | FAX +1 212 606 7016 | EMAIL BIDS.NEWYORK@SOTHEBYS.COM

GUIDE FOR ABSENTEE AND TELEPHONE BIDDERS

If you are unable to attend an auction in person, you may give Sotheby's Bid Department instructions to bid on your behalf by completing the form overleaf. This service is confidential and available at no additional charge.

General

This service is free and confidential.

Please record accurately the lot numbers, descriptions and the top hammer price you are willing to pay for each lot.

We will try to purchase the lot(s) of your choice for the lowest price possible and never for more than the maximum bid amount you indicate.

"Buy" or unlimited bids will not be accepted.

Alternative bids can be placed by using the word "OR" between lot numbers. Then if your bid on an early lot is successful, we will not continue to bid on other lots for you. Or, if your early bids are unsuccessful, we will continue to execute bids for alternative lots until a bid is successful.

Bids must be placed in the same order as in the catalogue.

The form should be used for one sale only – please indicate the sale number, title and date on the form.

Please place your bids as early as possible, as in the event of identical bids the earliest received will take precedence. Wherever possible bids should be submitted at least twenty-four hours before the auction.

Where appropriate, your bids will be rounded down to the nearest amount consistent with the auctioneer's bidding increments.

Absentee bids, when placed by telephone, are accepted only at the caller's risk and must be confirmed by letter or fax to the Bid Department on +1 212 606 7016.

Please note that the execution of written bids is offered as an additional service for no extra charge at the bidder's risk and is undertaken subject to Sotheby's other commitments at the time of the auction; Sotheby's therefore cannot accept liability for error or failure to place such bids, whether through negligence or otherwise.

Successful bidders will receive an invoice detailing their purchases and giving instructions for payment and clearance of goods. Unsuccessful bidders will be advised.

Please note Sotheby's reserves the right to refuse to accept payment from a source other than the buyer of record.

All bids are subject to the conditions of sale and terms of guarantee applicable to the sale printed in the sale catalogue. Buyer's premium in the amount stated in paragraph 3 of the Conditions of Sale in the back of the sale catalogue will be added to the hammer price as part of the total purchase price, plus any applicable sales tax.

In the event that you are successful, payment is due immediately after the sale unless otherwise agreed in advance. Payment may be made by bank transfer, credit card (which may be subject to a convenience fee), check or cash (up to US$10,000). You will be sent full details on how to pay with your invoice. It is against Sotheby's general policy to accept single or multiple related payments in the form of cash or cash equivalents in excess of US$10,000.

It is Sotheby's policy to request any new clients or purchasers preferring to make a cash payment to provide: proof of identity (by providing some form of government issued identification containing a photograph, such as a passport, identity card or driver's license) and confirmation of permanent address.

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Important

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Please note that we may contact you to request a bank reference. In addition Sotheby's requires a copy of government issued photo ID in order to generate a new account. If you have opened a new account with Sotheby's since 1 December, 2002, and have not already done so, you will be asked to present appropriate documentation confirming your identity before your lots or sale proceeds can be released to you.

For Written/Fixed Bids

- Bids will be executed for the lowest price as is permitted by other bids or reserves.
- "Buy" or unlimited bids will not be accepted and we do not accept "plus one" bids. Please place bids in the same order as in the catalogue.
- Always indicate a "top limit" — the amount up to which you would bid if you were attending the auction yourself.
- Alternative bids can be placed by using the word "or" between lot numbers.
- Where appropriate your written bids will be rounded down to the nearest amount consistent with the auctioneer's bidding increments.

For Telephone Bids

Please clearly specify the telephone number on which you may be reached at the time of the sale, including the country code. We will call you from the saleroom shortly before your lot is offered.

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STAR LIST

NO	STAR NAME (Numerical)	STAR NAME (Alphabetical)	NO
00	Planet	Acamar	6
1	Alpheratz	Achernar	4
2	Diphda	Acrux	25
3	Navi	Aldebaran	11
4	Achernar	Alkaid	27
5	Polaris	Alphard	21
6	Acamar	Alphecca	32
7	Menkar	Alpheratz	1
10	Mirfak	Altair	40
11	Aldebaran	Antares	33
12	Rigel	Arcturus	31
13	Capella	Atria	34
14	Canopus	Canopus	14
15	Sirius	Capella	13
16	Procyon	Dabih	41
17	Regor	Deneb	43
20	Dnoces	Denebola	23
21	Alphard	Diphda	2
22	Regulus	Dnoces	20
23	Denebola	Earth	47
24	Gienah	Enif	44
25	Acrux	Fomalhaut	45
26	Spica	Gienah	24
27	Alkaid	Menkar	7
30	Menkent	Menkent	30
31	Arcturus	Mirfak	10
32	Alphecca	Moon	50
33	Antares	Navi	3
34	Atria	Nunki	37
35	Rasalhague	Peacock	42
36	Vega	Planet	00
37	Nunki	Polaris	5
40	Altair	Procyon	16
41	Dabih	Rasalhague	35
42	Peacock	Regor	17
43	Deneb	Regulus	22
44	Enif	Rigel	12
45	Fomalhaut	Sirius	15
46	Sun	Spica	26
47	Earth	Sun	46
50	Moon	Vega	36

CARRIED TO THE MOON ON APOLLO XI
T Buzz Aldrin

DOWN TO THE SURFACE IN LM5
T Buzz Aldrin

Basic Date May 29, 1969
Changed ____

LM-5

STARS, PROGRAMS, VERBS