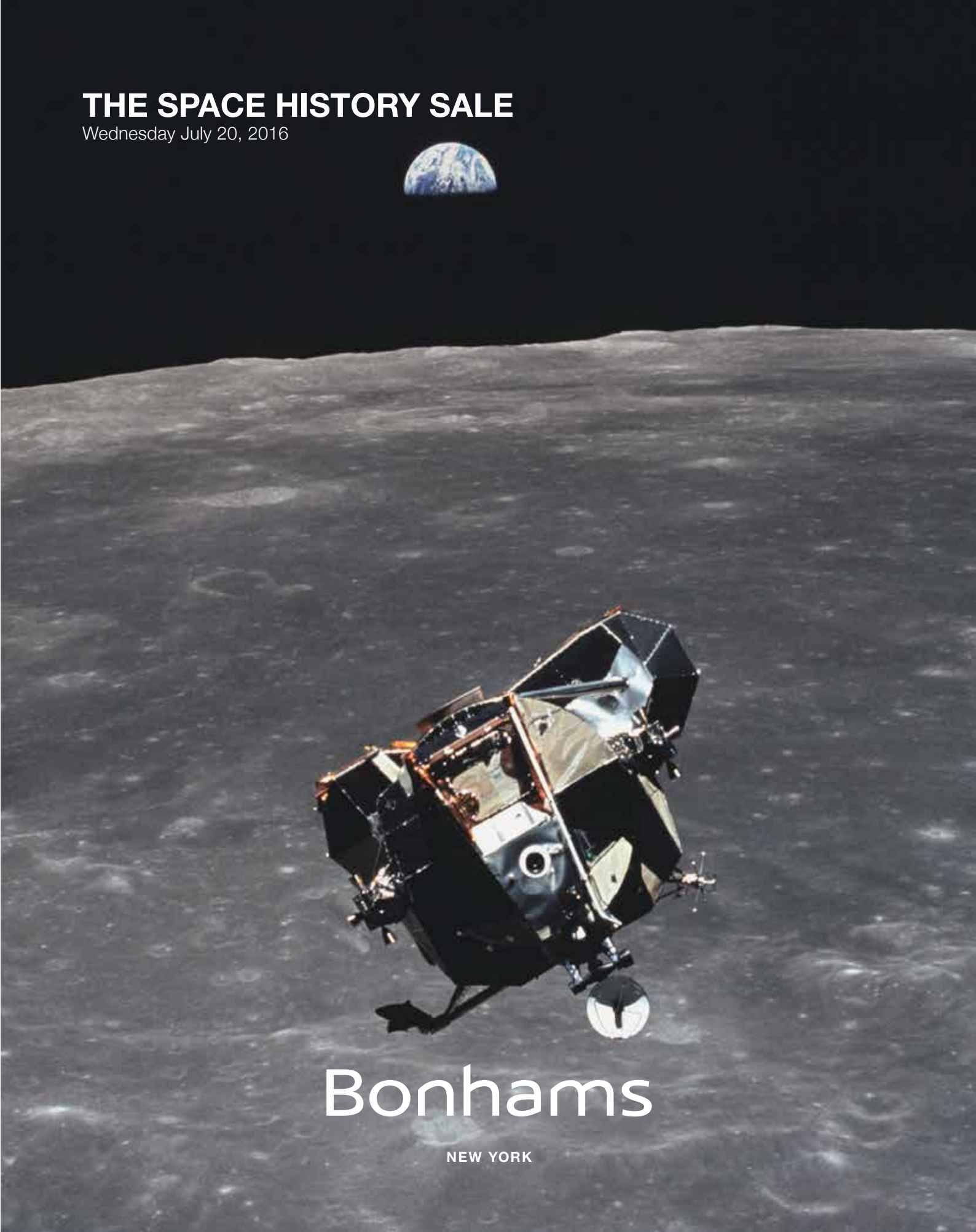
THE SPACE HISTORY SALE

Wednesday July 20, 2016



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CARRIED IN
LUNAR SURFACE

THE SPACE HISTORY SALE

Wednesday July 20, 2016 at 1pm
New York

BONHAMS
580 Madison Avenue
New York, New York 10022
bonhams.com

PREVIEW

Saturday	July 16,	12pm-5pm
Sunday	July 17,	12pm-5pm
Monday	July 18,	10am-5pm
Tuesday	July 19,	10am-5pm
Wednesday	July 20,	10am-12pm

SALE NUMBER: 23378
Lots 1 - 289

CATALOG: $35

BIDS
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To bid via the internet please visit
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Please note that telephone bids must be submitted no later than 4pm on the day prior to the auction. New bidders must also provide proof of identity and address when submitting bids.

Please contact client services with any bidding inquiries.

Please see pages 143 to 146 for bidder information including conditions of sale, after-sale collection and shipment.

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ILLUSTRATIONS

Front cover:
The Apollo 11 Lunar Module Ascent Stage returning from the lunar surface with astronauts Neil Armstrong & Buzz Aldrin on board. (JSC AS11-44-6642). See Lot 179

Inside front cover: Lot 165

Session 1: Lot 17
Session 2: Lot 70
Session 3: Lot 92
Session 4: Lot 109
Session 5: Lot 115
Session 6: Lot 138 (detail)
Session 7: Lot 174
Session 8: Lot 223
Session 9: Lot 285

Inside back cover: Lot 166

Back cover: Lot 23

INTRODUCTION

We are very pleased to be presenting our eight annual Space History auction, to take place this year on the 47th anniversary of the first manned lunar landing, completed by Astronauts Neil Armstrong and Buzz Aldrin during the Apollo 11 mission on July 20th, 1969.

This year we are offering several important items flown on that mission, including a Navigational Chart taken to the lunar surface (lot 165). This important chart shows the Lunar Module *Eagle's* projected descent path, and was used during the anxious minutes while Armstrong and Aldrin were awaiting the "GO" for Powered Descent Initiation. Other flown Apollo 11 items include a Flight Plan Sheet from mission day one, containing annotations by both Armstrong and Aldrin (lot 166), a crew signed beta cloth emblem (lot 164), and a Checklist Sheet taken to the lunar surface, which illustrates the final configuration for the *Eagle's* circuit breakers (lot 167).

As a counterpart to our flown American material, we are very excited open the sale with a selection of excellent models and flown items from several Soviet Missions. These include a very rare full scale model of the Sputnik, the world's first artificial satellite (lot 1). Built to test for ground Electromagnetic Compatibility and Interference, it comes with a period Tesla model receiver, and is still operational. A Flown Space Navigation Indicator from the Soyuz-3 Mission (lot 15) is another highlight, as well as a very fine Flown Navigational Celestial Globe from Soyuz 18 (lot 17). A flown Sokol KV-2 space suit from ISS expedition 6 (lot 23) rounds out the Soviet section.

This section is followed by a selection of American Gear, Models, & Hardware. Two stand-out lots are an impressive five-part original Gemini trainer assembly (lot 30), used to train the astronauts at the Manned Spacecraft Center in Houston, as well as a wonderful collection of right hand castings for 15 Astronauts, used in their development of their spacesuit gloves (lot 25). This section is followed by a variety of items from Projects Mercury and Gemini, many signed, or flown.

Following this is a section of beautiful lunar and planetary photography, including an excellent selection of photos from several Lunar Orbiter missions (lots 113-130).

We are saddened to note the passing of the last surviving Apollo 14 crew-member, Dr. Edgar Mitchell earlier this year. All Apollo lunar flight missions, Apollo 8, 10 through 17, are represented, with numerous flown and signed items, including a motion picture sight ring used on the moon during the Apollo 15 mission (lot 243), Edgar Mitchell's flown Texas state flag (lot 220), and a large Lunar Near Side chart, signed by a member of every Apollo lunar landing crew, including Dr. Mitchell (lot 163). The sale closes out with a section of items from the Apollo Soyuz Test Program, as well as items from the Shuttle era, including three grouping of Robbins medallions from the personal collection of Astronaut John Fabain (lots 284, 287, & 289).

It was only four years ago that President Obama signed into law a bill clarifying the Mercury, Gemini, and Apollo crew members have "full ownership of and clear title to" any expendable item used in their missions, and furthermore that the Federal Government will have "no claim of ownership" to artifacts that have subsequently been sold, traded, or gifted by the astronauts. Partly as a result of this legislation, this years' sale is full of some of the most exciting material to have come to the market.

The Space History sale will preview in our New York galleries July 16-20, and we look forward to seeing you there. Since the material in the sale is generally in excellent condition, we have for the most part not given condition details in our descriptions. For condition information, or for information on bidding, please contact any member of the department.

CASSANDRA HATTON
Director, History of Science and Technology

ORDER OF SALE

Soviet Models, Hardware, & Gear	Lots 1-23
American Gear, Models & Hardware	Lots 24-76
Project Mercury	Lots 77-98
Project Gemini	Lots 99-110
Lunar Orbiter, Earth, & Planetary Photography and Images	Lots 111-136
Apollo Program Through Apollo 10	Lots 137-163
Apollo 11	Lots 167-194
Apollo 12-17	Lots 197-277
Skylab, ASTP, & Shuttle	Lots 278-289

SOVIET MODELS, HARDWARE, & GEAR

Lots 1 - 23

Lot 17

1 W

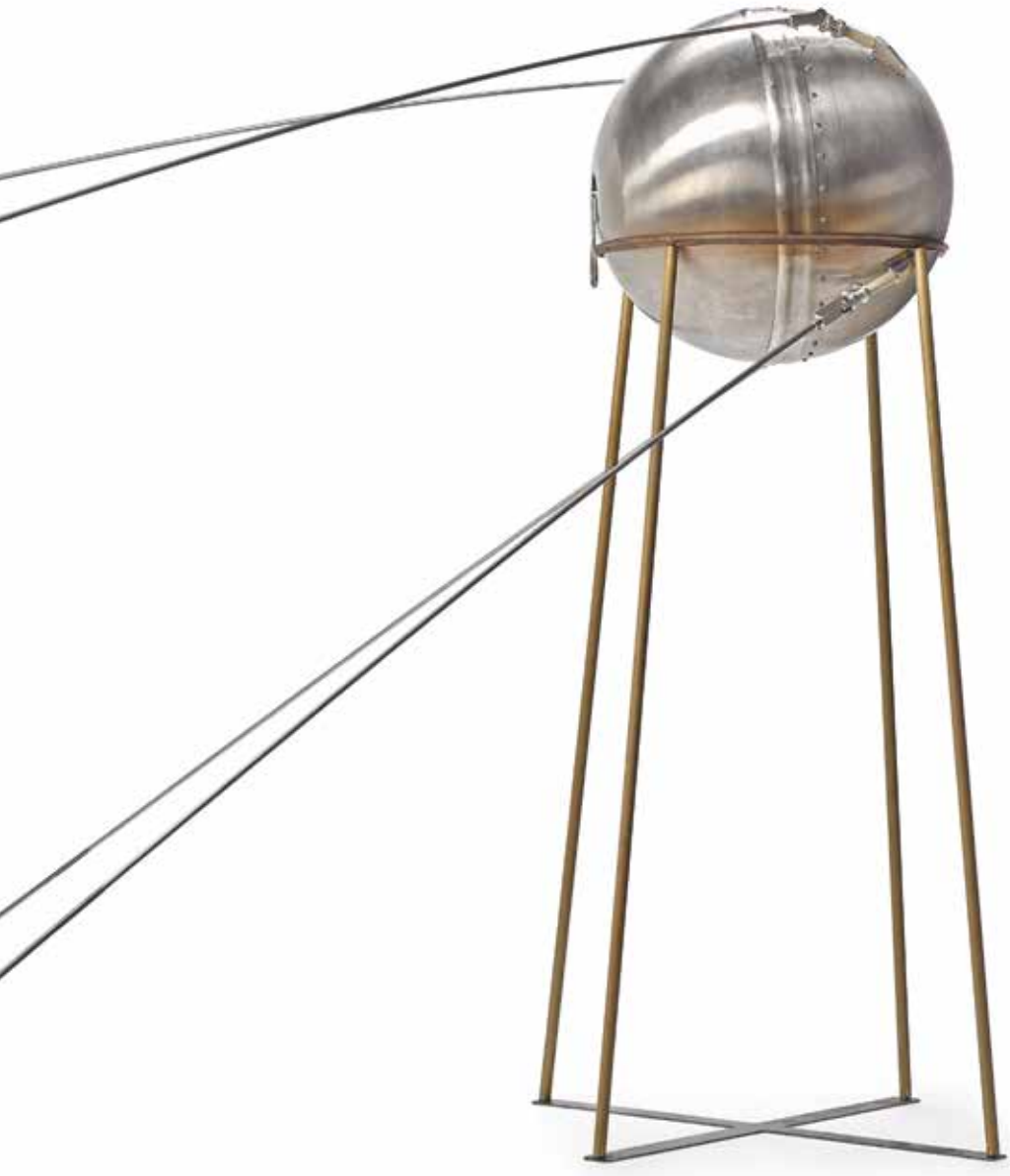
FULL SCALE VINTAGE SPUTNIK-1 EMC/EMI LAB MODEL
A full scale vintage test model of the *Sputnik-1* satellite, serial number "*ОКБ-1/003/1957*", with live transmitter (still operational, with a new 12v battery). Polished metal sphere with 4 external antennae, approx 23 inches in diameter on manganese brass stand with anti-static o-ring, stand approx 4 feet 9 inches tall, stand and model together approx 6 feet 6 inches tall, and approx 100 lbs. Produced at the ОКБ-1[OKB-1], the Experimental Design Bureau-1 factory, also known as the S. P. Korolev Rocket and Space Corporation Energia, in 1957 sometime prior to the launch of the *Sputnik-1*. Complete with vintage *Tesla* Maj 620A broadcast receiver, approx 24 x 18 x 13 inches, and 42 lbs, made in Prague ca 1955-56.

Provenance
From the Air & Space Collection of scramjet rocket engineer, Professor Alexander Roudakov.

An exceptionally rare vintage test model of the *Sputnik-1* satellite, one of only a few made to test ground Electromagnetic Compatibility (EMC) and Electromagnetic Interference (AMI) testing. While there are only four known vintage replicas of the *Sputnik-1* (two in private hands, one just outside Moscow at the Energia Corporate Museum, the company that descended from Korolev's Experimental Design Bureau, and one which does not have the internal components of that at Energia Corp, at the Museum of Flight in Seattle, Washington), we do not know of any other test models.
An incredible and impressive artifact from the dawn of the space age.

The *Sputnik-1* artificial satellite first orbited the Earth on October 5, 1957. Visible all around the Earth, it launched the American Sputnik crisis and gave birth to the Space Race.

$10,000 - 15,000



2

3

2
SPUTNIK-1 MODEL
Custom handmade 1:4 scale model of the Soviet Sputnik-1 satellite in polished aluminum on curved aluminum stand, approx 22 inches tall, with 4 19½ inch polished steel antennas, mounted on 9 x 14 inch black lacquer base with plaque reading "*Sputnik-1 Model, The first artificial Earth satellite, USSR October, 4, 1957*."

A precise representation of the antennas and brackets, hatches, and head mounting screws. An important piece representing the birth of the Space Race.

$3,000 - 5,000

3
EARLY RUSSIAN LUNAR DIRECT ASCENT SPACECRAFT
Approx 1:41 scale model of an early Russian Lunar Direct Ascent spacecraft with landing gear deployed, plastic, resin and metal, 8¾ inches tall.

Direct Ascent was one of several strategies for a moon landing wherein the spacecraft and attached landing module would be launched directly to the moon, where it would land tail first. It would then launch off of the moon to return Earth. This method, which would require an enormous launch vehicle and was considered by both the United States and the USSR, was an alternative to the *Earth Orbit Rendezvous* (EOR) and *Lunar Orbit Rendezvous* (LOR) methods. The Apollo missions successfully made use of the LOR method, and the Soviets would have gone with a similar method had their *N1* rocket not failed to launch.

$1,000 - 1,500

4

VOSTOK 1 (VOSTOK 3KA-3) SPACECRAFT MODEL

Project presentation model, NPO Energia, c.1987. Large 1:8 scale, 21 inches long and approx 7 inches in diameter, mounted onto 18 x 10 x 1 inch black stand with plaque reading *"VOSTOK 3KA-3 (VOSTOK 1) SPACECRAFT NPO ENERGIA."*

A very highly detailed model made for exhibition purposes by NPO Energia, the Russian company that manufactured the actual Vostok. The *Vostok 1* was launched on April 12, 1961 from Baikonur Cosmodrome with cosmonaut Yuri Gagarin, making him the first human in space. The Space Race between the Soviet Union and the United States, the two Cold War superpowers, began just before the Soviet Union launched the world's first artificial satellite, Sputnik 1, in 1957. The Soviet Union secretly pursued the Vostok program in competition with the United States Project Mercury, and was one of the the Soviet space program's greatest triumphs, putting a man into space before the Americans.

$10,000 - 12,000

5

5
ZENIT-2—USSR'S FIRST SPY SATELLITE
1:41 scale model of the Zenit-2 satellite, plastic, resin, metal and cloth, 6½ inches tall on turned metal stand with wooden base, unknown Russian manufacturer, c.1980.

Zenit-2, the Soviet Union's first spy satellite, was a converted *Vostok* spacecraft which carried cameras instead of a cosmonaut. Flown under the guise of scientific exploration, it (and its later variants) flew from 1961-1994 under the *Kosmos* mission series designation.

$800 - 1,200

6
VENERA-3 SPACECRAFT 3MV-3 MODEL
THE FIRST SPACECRAFT TO IMPACT ON THE SURFACE OF ANOTHER PLANET
Project presentation model, large 1:10 scale, 19½ inches tall, approx 24 inches wide with 2 hinged 6½ inch solar panels, each capped with approx 5 inch diameter hinged semi-spherical radio communication instruments, "*союз советских социалистических республик*" stenciled in red around central portion of body, and "*CCCP*" stenciled in red four times around base. Body made of composite material reinforced with metal, power parts in steel, large spherical antenna in metal mesh, plastic, and copper, cylinders in polished aluminum, small details in polystyrene, objective lens in polished plexiglass, solar panels of sheet aluminum and painted plexiglass, the whole body strapped by central steel flanges. Lavochkin Research and Production Association, c.1990. Mounted onto black plastic base, with plaque reading *"VENERA-3 SPACECRAFT 3MV-3. NOVEMBER 1965*."

Launched from a Tyazheliy Sputnik rocket in Kazahkstan on November 16, 1965, *Venera 3* was Soviet spacecraft designed to explore the surface of Venus. It contained a radio communication system, scientific instruments, electrical power sources, and medallions bearing the Coat of Arms of the Soviet Union. It's ultimate fate is still unknown, as its communications systems failed before it reached the planet, but it is assumed that it crash-landed on Venus on March 1, 1966, making it the first spacecraft to impact on the surface of another planet. This year marks the 50th anniversary of the launch and assumed landing of the spacecraft.

$10,000 - 15,000

7

7
EXTRA-LARGE SCALE SOYUZ ROCKET MODEL
Hand-painted aluminum and plastic model in two parts, 42 inches tall on 3½ inch tall base, Samara, 1960s.

A highly detailed model of the most recognizable and frequently used of the Russian rockets, made by Samara, the factory that produces the actual Soyuz rockets. Used to launch the Soyuz spacecraft as part of the Soyuz program, it was first flown in 1966, and was developed from the earlier Voshkod rocket.

$1,200 - 1,800

6

8

9

8
LUNOKHOD-1 MODEL
Approx. 1:15 scale *Lunokhod-1* model, 2¼ inches tall (not including antenna), 4½ inches long, metal and painted resin, on 13 x 9 inch painted resin model lunar surface on wood base. Model with hinged lid, fully directional antenna, and eight moving wheels.

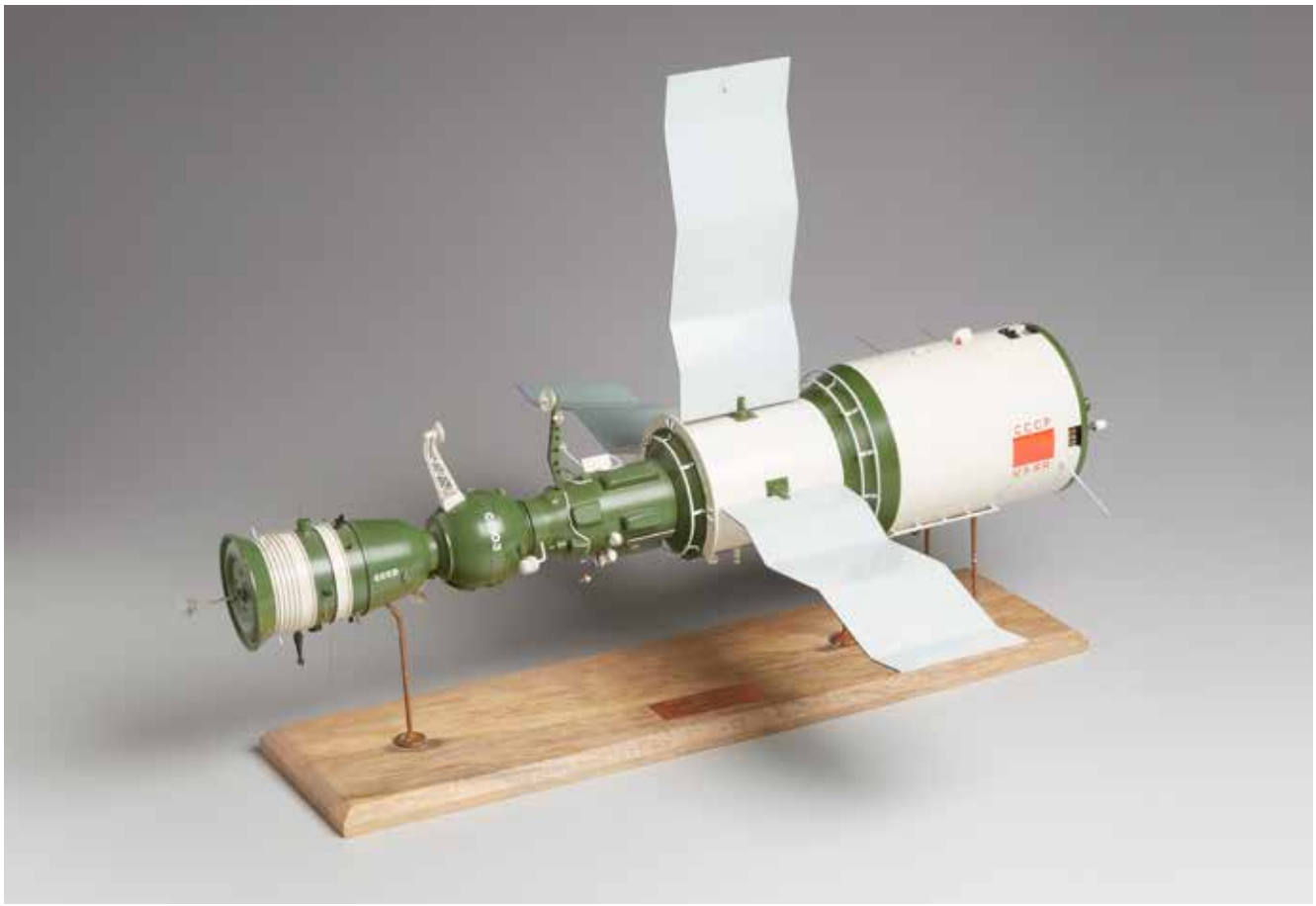
Lunokhod-1 was one of two unmanned lunar rovers sent to the moon by the Soviet Union. Carried to the moon by the *Luna-17* spacecraft, and launched by the *Proton* rocket on November 10, 1970, it was the first remote controlled robotic rover to be operated on a body other than earth. It ran during the lunar day, using solar cells which were mounted to the underside of the lid to recharge during occasional breaks. The lid was lowered at night, and the unit was kept at operating temperature by a radioisotope heating unit. Shaped like a tub and mounted on 8 wheels, it measures 4 feet 5 inches tall, 7 feet 7 inches long, and weighs nearly a ton. It was equipped with four television cameras, a cone-shaped antenna, a helical antenna, and several extendable devices used to test the lunar regoltih.

$2,000 - 3,000

9
FIRST ROBOTIC PROBE TO LAND ON THE MOON
LUNA 16 MODEL
Metal, plastic & resin 1:18 scale model,
unknown Russian manufacturer, ca. 1980.

The Luna Program was a series of unmanned, robotic spacecraft missions sent to the Moon by the Soviet Union from 1959 to 1976. Luna 16 was the first robotic probe to land on the Moon and return a sample of lunar soil to Earth in September, 1970. The probe was launched by the Proton-K/D rocket and is portrayed in this model in its complete configuration after its descent to the Moon's surface. The top section of the probe would disconnect during the ascent stage before its return to earth, leaving the lower section on the Moon's surface to continue transmission of lunar temperature and radiation data.

$2,000 - 3,500



11

10

APOLLO SOYUZ TEST PROJECT

1:50 scale model of the American Apollo CSM and Russian Soyuz, by Pacific Miniatures of Alhambra, CA, wood and painted metal, 17 inches long assembled. The two vehicles are connected by a black Docking Module (DM) which provided a functional docking port for each spacecraft. The entire model is mounted above a 7-inch oval wood base with a plaque reading: "*Apollo-Soyuz Test Project, Scale 1/50, Space Division, Rockwell International*," label to underside of base reads "*NASA PROPERTY. JPL-NAS7-100. MODEL NUMBER M-438.*"

$2,500 - 3,500

10

11

DOCKED SALYUT TO SOYUZ MODEL

Large model of docked Salyut 6-Soyuz 26, 21 inches long, with three 8 x 3 inch solar panels, body in green and white with white and red lettering. On wood base, with engraved plaque reading: "*ОРБИТАЛЬНАЯ КОСМИЧЕСКАЯ СТАНЦИЯ 'САЛЮТ 6 - СОЮЗ' 11.XII.1977*" [Trans: Orbital Space Station. 'Salyut 6 - Soyuz' 11.XII.1977].

Salyut 6 was the Soviet space station, prior to Mir, and was in operation for almost five years. Soyuz 26 took the first long-duration crew to Salyut. A problem with the docking hatch had prevented Soyuz 25 from connecting successfully. An attractive, highly detailed model.

$4,000 - 6,000

12 W ¤

SOVIET SURFACE-TO-AIR MISSILE ENGINE

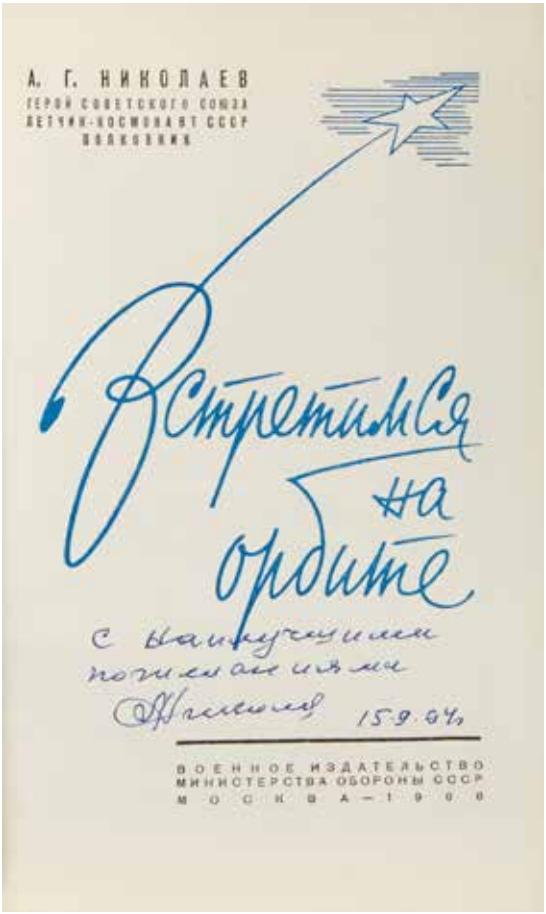
Liquid propellant sustainer powerplant, 39 x 14 x 14 inches, approximately 140lb when crated. Designed by the bureau of celebrated rocket engine designer Alexei M. Isayev. Constructed of various alloys, various inspection marks mostly in red. Apparently unfired.

Alexei Isayev specialized in small-scale, liquid-fuelled rocket engines for Soviet manned and unmanned spacecraft. From 1957 to 1967 his engines powered the rockets carrying the first artificial satellites, the first man in space, and the first unmanned probes to the Moon and Venus. At the same time, he worked on engines for surface-to-air missiles (SAMs) and air-to-sea missiles.

The present engine is for a S-75 Dvina, a high-altitude, command-guided, SAM. Since its first deployment in 1957 it has become the most widely-deployed air defense missile in history. The missile came to the world's attention when an S-75 battery, using the newer, longer-range and higher-altitude V-750VN missile shot down the U-2 spy plane of Francis Gary Powers as he was flying over the Soviet Union on May 1, 1960. A Soviet missile crew in Cuba used an S-75 on October 27, 1962 to shoot down the U-2 flown by Rudolf Anderson—the only combat death of the Cuban Missile Crisis.

Technically S-75 refers to the complete battery, the missile itself being known as a V-750. The missile is in two stages, consisting of a solid-fuel booster and a storable liquid-fuel upper stage. The booster fires for about 4–5 seconds and the main engine for about 22 seconds, by which time the missile is traveling at about Mach 3. The present engine is from the upper stage. The American U-2 spy plane flew at high altitudes, and for the S-75 to reach it, a more powerful engine was needed; the present engine is a version of that high-power rocket. An unusual artifact of the Cold War and a reminder that the space programs were largely an offshoot of military research and development.

$3,000 - 5,000



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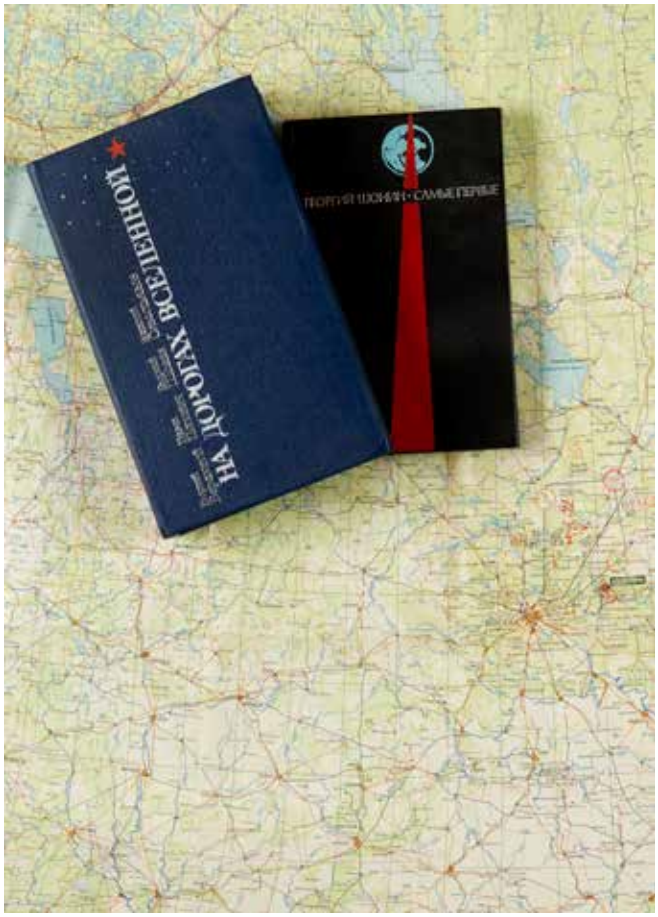


14

THE FOLLOWING LOT WAS ORIGINALLY IN THE COLLECTION OF COSMONAUT ANDRIAN G. NIKOLAEV

13
VOSTOK 3 & SOUYZ 9
NIKOLAEV, ANDRIAN. *Встрйтимся На Орьить.* [We Shall Meet in Orbit], Moscow, 1966. [WITH]: *Космос - Дорота Бйз Конца* [Cosmos: Road Without End], Moscow, 1974.

Provenance
Cosmonaut Andrian G. Nikolaev; Sotheby's *Russian Space History*, 1996, lot 168.

THE AUTHOR'S OWN HEAVILY ANNOTATED COPY OF *"WE SHALL MEET IN ORBIT*," BOTH BOOKS SIGNED AND INSCRIBED BY NIKOLAEV WITH A BRIEF DESCRIPTION OF THE CONTENTS, AS WELL AS AN AUTOGRAPH SIGNED NOTE BY HIM MOUNTED TO REAR FLY-LEAF OF EACH VOLUME. *"We Shall Meet in Orbit*" is Nikolaev's autobiographical account of his voyage aboard *Vostok-3*; "*Cosmos: Road Without End*" is his account of his flight aboard *Soyuz-9*.

$800 - 1,200

THE FOLLOWING LOT WAS ORIGINALLY IN THE COLLECTION OF COSMONAUT GEORGY S. SHONIN

14
GAGARIN'S FLIGHT MAP
МОСКВА; ЛЕНИНГРАЦ. [Moscow; Leningrad]. Printed flight map, 50 x 35¼ inches, notations in colored pencil, some minor tears at folds. [WITH]: SHONIN, GEORGY, *Самые Перые* [The Very First], Moscow, 1976 AND: SHONIN ET AL, *На Цорогах Вселенной* [On the Roads of the Universe], Kiev, 1988. Together two volumes, 8vo.

Provenance
Cosmonaut Georgy S. Shonin; Sotheby's *Russian Space History*, 1996, lot 144.

GAGARIN'S FLIGHT MAP, GIVEN BY HIM TO GEORGY SHONIN. A letter by Shonin in Russian accompanying this lot reads in part: [trans] "*ON A FLIGHT DAY IN MARCH 1968, I ARRIVED FOR MY ASSIGNMENT WITHOUT MY FLIGHT MAP. THERE WAS NO TIME FOR ME TO CHART THE COURSE ON A NEW MAP AND YURI GAVE ME HIS OWN MAP. I WAS NOT QUICK ENOUGH IN RETURNING HIS CHART TO HIM: GAGARIN PERISHED A FEW DAYS LATER. THE COURSE ON THE MAP WAS IN YURI'S HAND. THE PLACE OF HIS DEATH AT NOVOESLOVO WAS MARKED BY ME* [on the map] *SEVERAL YEARS LATER."*

$800 - 1,200

THE FOLLOWING LOT WAS ORIGINALLY IN THE COLLECTION OF COSMONAUT GEORGY T. BEREGOVOY

15

FLOWN SOYUZ-3 SPACE NAVIGATION INDICATOR

ИНК-2С ГЛОБУС [INK-2S Globus], flown space navigation indicator with unflown on-ground transformer.

Approx 5 inch in diameter rotating terrestrial metal globe with printed paper gores, housed in a 7 x 11 inch casing of machined aluminum alloy and protected by a hemispheric clear plastic globe with cross-shaped sight. With orbit counter, control and calibration switches, digital gauges, and latitude and longitude gauges. With unflown clear plexiglass sided 9 x 16 inch ground transformer unit, unit framed in aluminum alloy with peg and multi-pin connecting cable.

Provenance

Cosmonaut Georgy T. Beregovoy;
Sotheby's *Russian Space History*, 1996, lot 145.

FLOWN SOYUZ-3 SPACE NAVIGATION INDICATOR, removed from the *Soyuz-3* spacecraft by Cosmonaut Beregovoy after his day-long flight. Intended to dock in space with the orbiting *Soyuz-2*, the mission, which launched on October 26, 1968, failed after several complications. Beregovoy built the accompanying ground transformer to power up the unit. Essentially a mechanical computer, the space navigation indicator displayed the nadir of the spacecraft on a rotating terrestrial globe, indicating the spacecraft's location relative to Earth coordinates. It was also used to calculate day and night while in orbit, to plot landing coordinates, and to calculate open windows for communication.

$30,000 - 40,000

THE FOLLOWING LOT WAS ORIGINALLY IN THE COLLECTION OF COSMONAUT ANDRIAN G. NICOLAEV

16
FLOWN ON SOYUZ 9—AN EXHAUSTIVE MANUSCRIPT ON LIFE IN SPACE
"БОРТОВОЙ ЖУРНАЛ КОСМИЧЕСКОГО КОРАБЛЯ «СОЮЗ-9»
[Trans: On-Board Flight Journal for Spacecraft *Soyuz-9*, 1970].
9¼ x 7 inch log-book, over 400 pp (3-247, 249-502, 600-639) in black, blue, red, orange, purple, and green ink on graph paper, including 11 unnumbered pp with manuscript annotations, and 9 blanks. Bound with three rings into blue textured-cloth covers with the arms and cipher of the USSR to upper cover.

Provenance
Cosmonaut Andrian G. Nicolaev; Sotheby's *Russian Space History*, 1996, lot 161.

AN EXHAUSTIVE, HIGHLY DETAILED MANUSCRIPT ON LIFE IN SPACE.

Written while weightless in orbit on the record setting voyage of the *Soyuz-9*, the log begins with 200 pages giving an orbit by orbit account of activities. Each orbital account begins with a chart divided into 10 minute segments, with shading indicating night and day-time, and provides details on the activities planned. Some of the detailed notes include: A description of the moon (orbit 48); notes on experiments being conducted, including a drawing of a battery showing the results of a mercury experiment (orbit 65); A description of how a floating particle of debris flew into the eye of Nikolaev and "caused a sharp pain" until Sevastyanov wiped it away (orbit 159); The cosmonauts being congratulated on setting a new world record for space flight distance and duration (orbit 252); details on the descent, with a dotted line indicating "separation," "atmospheric entry," "parachute," and "landing" (orbit 287). Following the orbital log are tables completed in space, as well as printed operational instructions. This section is followed by several un-numbered pages which record radio transmissions received while in space, including one from NEIL ARMSTRONG :"*June 2, 1970, 17:30. 'Best wishes to the crew of Soyuz 9. Success to your mission and good landing.' American Cosmonaut Neil Armstrong*." There are also several pages of miscellaneous notes which give a picture of conditions in the spacecraft, including *"Soft urine receptacles are not convenient,"* "*Forks and can openers should be tied by separate strings so they don't get tangled*," "*Canned meat tastes good and we eat it with gusto*," "*Cottage cheese paste should be more liquid*." Also included are equipment inventories, control manuals, details on emergency procedures and explanations of medical equipment and the waste system, as well as observations on celestial navigation, optical effects, and a very detailed record of all food and drink consumed while on board. A series of unnumbered pages containing psychological questions, including inquiries on dreams is followed by reports on photographic experiments.

A handwritten provenance letter in Russian by Nicolaev reads [trans]: *"LOG BOOK KK SOYUZ #9. THIS IS THE ORIGINAL LOG BOOK OF THE SHUTTLE SOYUZ 9, PILOTED BY CHIEF OF AIR SHUTTLE COSMONAUT OF THE USSR A.G. NICOLAEV, AND COSMONAUT RESEARCHER, V.E. SEVASTIANOV ... JUNE 1 THROUGH JUNE 19, 1970."*

$6,000 - 9,000

THE FOLLOWING LOT WAS ORIGINALLY IN THE COLLECTION OF COSMONAUT PYOTR KLIMUK

17

SOYUZ 18—FLOWN NAVIGATIONAL CELESTIAL GLOBE

Black metal alloy celestial globe, approx 11.5 cm in diameter, etched with circles of celestial latitude and longitude, constellation figures, ecliptic and perpendicular of ecliptic. Major stars pierced for illumination from internal battery-powered bulbs (non-functioning). Rotating within plastic armature.

Provenance

Cosmonaut Pyotr Klimuk; Sotheby's *Russian Space History*, 1993, lot 91.

FLOWN NAVIGATIONAL CELESTIAL GLOBE USED BY COSMONAUT PYOTR KLIMUK ON SOYUZ 18. Soyuz 18, which lasted from May 24-July 26, 1975, was a manned mission to *Salyut 4*, the second and final crew to man the space station. The second space mission for both Commander Pyotr Ilyich Klimuk, and Flight Engineer Visaly Sevastyanov, it marked a Soviet space endurance record at the time of 63 days.

Soviet Cosmonauts used navigational celestial globes on the Soyuz spacecraft to supplement their ground-based navigation systems. They would adjust the constellations on the globe to match the stars that they could see, which allowed them to determine their position. Instruments such as this were absolutely crucial to the cosmonauts, and were much more dependable than any computer systems, which were susceptible to system failure.

$30,000 - 40,000

THE FOLLOWING LOT WAS ORIGINALLY IN THE COLLECTION OF COSMONAUT ALEKSANDR S. IVANCHENKOV

18

RECORD SETTING FLOWN NAVIGATION GLOBE AND ORBITOMETER FROM THE SALYUT 6 SPACE STATION

In-flight navigation globe "*Globus*" and orbit counter from the *Salyut 6* space station. A 5 inch diameter metal globe covered with colored paper gores, globe mounted onto moving armature, loose calibrated dial affixed to base, small circular paper labels over portions of USSR (likely identifying ground control units). Some wear to gores with loss in one place. With provenance letter from Cosmonaut Aleksandr Ivanchenkov in Russian.

Provenance

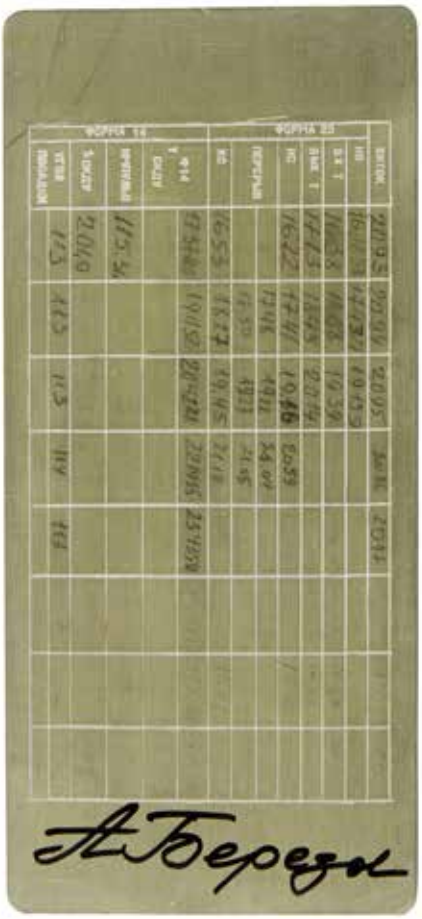
Cosmonaut Aleksandr S. Ivanchenkov;
Sotheby's *Russian Space History*, 1996, lot 236.

FLOWN NAVIGATION GLOBE AND RECORD-SETTING ORBITOMETER FLOWN ON THE *SALYUT-6* SPACE STATION. Cosmonaut Alexandr Sergeyevich Ivanchenkov was the flight engineer aboard the *Soyuz 29* spacecraft and the *Salyut 6* orbiting station, where he, along with pilot V.V. Kovalenok, established the record for the longest stay in space, at 140 days, 14 hours and 48 minutes after arriving on June 15, 1978. Used on the *Salyut-6* space station to mark the number of revolutions in a given flight, this orbitometer counted 2400 orbits, and had to be replaced while the two cosmonauts were still in flight.

A handwritten provenance letter by Ivanchenkov in Russian reads in part: [trans]: *"'GLOBUS.' THIS IS THE END OF THE SECOND SPACE SHUTTLE FLIGHT TO THE SPACE STATION SALYUT 6. COMMANDER KOVALENOK AND FLIGHT ENGINEER IVANCHENKOV WERE THE FIRST COSMONAUTS TO EXCEED ONE HUNDRED DAYS IN SPACE ... THE NAVIGATIONS SYSTEM (GLOBUS), CEASED TO FUNCTION AND COUNT THE ORBITS AROUND THE EARTH. THIS WAS BECAUSE IT WAS OUTDATED. WE HAD A SECOND BACKUP NAVIGATION SYSTEM ON BOARD BROUGHT BY A SERVICE SHUTTLE ... FLIGHT ENGINEER IVANCHEMKOV DECIDED TO BRING THIS UNIQUE INSTRUMENT BACK TO EARTH AS A SOUVENIR."*

$6,000 - 9,000

19



20

19
"MERKURII" CONTROL PANEL FROM SPACE STATION MIR
A KEY PIECE OF HARDWARE FROM THE MIR SPACE STATION.
Space Station control panel, 13 x 7 x 5½ inches, metal, glass and composite materials, three metal panels labelled "*Д2А*" & "*СОРТ СУБК*, "*Д2Б*" & "*СОРТ СУБК*," and "*Д2Г*" & "*ТМ КРД СПОП1*" respectively, each metal panel with 9 smaller lit panels each, several smaller round lit indicators, 3 buttons reading "*ВКЛ*" [ON], "*ОТКЛ*" [OFF], and "*КОНТР*" [COUNTER]. "*ПКСМ 1*" stenciled above bottom edge, to the right of this is "*21ОО = А186*" written in black pen. Label affixed to top of unit reads: "*ПКСМ. ДП2. 390. 245. N306*". Mounted onto metal stand with plaque reading: "*CONTROL PANEL 'MERKURII' SPACE STATION MIR*."

The *Merkurii* control panel was used in the manual system control loops of the research modules on the MIR space station, was planned to be utilized in the manual control loop of the MIR-2 basic module. The MIR space station spent 15 years in orbit, which amounted to 3 times its planned lifetime. It hosted 125 cosmonauts and astronauts from 12 different nations, and supported 17 space expeditions, including 28 long-term crews. After more than 86,000 total orbits, MIR re-entered Earth's atmosphere on Friday, March 23, 2001, at 9 a.m. Moscow time. The 134-ton space structure broke up over the southern Pacific Ocean.

$3,000 - 5,000

THE FOLLOWING TWO LOTS WERE ORIGINALLY IN THE COLLECTION OF COSMONAUT ANATOLY N. BEREZNOVOY

20
FLOWN SOYUZ T-5 NAVIGATIONAL LAP PLOTTING BOARD
Brushed aluminum rectangular board with rounded edges, 4 x 8¾ inches, 9-column table for plotting navigational parameters incised and lettered in white, two velcro strips to underside. Last three columns rubbed, verso lightly scratched.

Provenance
Cosmonaut Anatoly N. Bereznovoy, with the first five columns filled in by him in pencil, and his signature in black marker; Sotheby's *Russian Space History*, 1996, lot 271.

A plotting board used by Berezovoy to plot calculations for orbits 2093-2097 while aboard Spyuz T-5. It provides, in Moscow time, the time of the space craft's entry and exit from the earth's shadow, the time of firing and duration of the engine firing during an emergency descent from orbit, prime radio frequency times with earth, and the number of the orbit. A handwritten provenance letter in Russian by Berezovoy reads in part: [trans] "*THIS PLOTTER WAS FLOWN IN SPACE FOR 211 DAYS: FROM THE START OF THE SOYUZ-T5 SS ON MAY 13, 1982 TILL THE LANDING OF THE SOYUZ-T7 SS ON DECEMBER 10, 1982. AT THE EXCHANGE OF THE SPACE SHIPS WITH THE VISITING EXPEDITION (L. POPOV, A. SEREBROV, S. SAVITSKAYA) I BROUGHT THE PLOTTER FROM SOYUZ T-5 ABOARD SOYUZ T-7 AND ADJUSTED IT TO THE CONTROL PANEL... A. BEREZOVOY*."

$800 - 1,200

21

22 (part)

21
ALTIMETER USED DURING THE LANDING OF SOYUZ T-7
FLOWN IN SPACE FOR 211 DAYS
Soviet made altimeter, face lettered "*сделано в ссср*" [made in the USSR], elastic wristband, adjustable ribbed outer ring calibrated for 1000 meters, inner dial calibrated for kilometers, suede backing signed by Berezovoy.

Provenance
Cosmonaut Anatoly N. Berezovoy;
Sotheby's *Russian Space History*, 1996, lot 284.

A handwritten provenance letter by Berezovoy reads in part: [trans]:"*THIS INSTRUMENT BELONGS TO THE EQUIPMENT OF SOYUZ-T SPACE SHIP. IT IS DESIGNED TO DETERMINE THE ALTITUDE OF THE DESCENT MODULE (DM) RE-ENTRY VEHICLE (CA) IN WHICH COSMONAUTS LAND ... THIS ALTIMETER [IS] ... PUT ON THE LEFT SLEEVE OF THE SOKOL KB2* (sic) *SPACE SUIT. THE ALTIMETER IS INDISPENSABLE AT THE START TO IMMEDIATELY DETERMINE THE ALTITUDE OVER THE GROUND IN CASE OF AN EMERGENCY WITH THE ROCKET ON THE DM RETURN TO EARTH OR IN CASE OF AN URGENT DESCENT FROM THE ORBIT AT SOYUZ-T SPACE SHIP DEPRESSURIZATION ... THE INSTRUMENT WAS FLOWN IN SPACE FOR 211 DAYS AND RETURNED TO THE EARTH ON DECEMBER 10, 1982 ABOARD SOYUZ T-7 SPACE SHIP. AFTER THAT IT WAS KEPT AT MY HOUSE MUSEUM. ON ITS BACK SIDE I PUT MY AUTOGRAPH. A. BEREZOVOY.*"

$1,000 - 1,500

22
FLOWN RUSSIAN SURVIVAL AND RESCUE EQUIPMENT
A LIFE PRESERVER CARRIED ON SOYUZ 14
AND BEACON CARRIED ON SOYUZ 17
The flown life preserver consists of dual orange 12 inch wide and 34 inch tall inflatable underarm "water wing" floats, with each having a 7 x 4 x 2 inch gray nylon container and snap closures. An open container allows viewing of one float, and each has a sewn label which reads (translated): "*28 ASP-74 Right/Left Float, OTK 81835109.*" Compressed gas cylinders inflate the floats via pull strings, but dual tubes allow manual inflation in case of cylinder failure. An approximately 18 inch long nylon strap connects the float containers.

This life preserver was issued to Cosmonaut Yuri Artyukhin. He was the flight engineer aboard Soyuz 14 and flew with command cosmonaut Pavel Popovich during July 1974. They docked to the orbiting Salyut 3 space station and spent over 15 days testing various military space flight applications. Artyukhin died on August 4, 1998.

With a copy of a Russian manuscript letter signed by Mr. Sukov (head of the Cosmonaut Rescue Crew) reading (translated): "*In July 1977, I was participating in the preparation of the crew for the spaceships. Space engineer and a crew member of Souz-14, U.L. Artuhin gave me as a gift several objects that took important place in successful completion of the space flight. The objects are: cellular (sputnikovaya) radio station #3445, flashlight FM 1n1231008.*"

The flown rescue equipment is a cosmonaut survival radio and beacon having a metal base unit 6 x 4 ½ x 2 inches, housing electrical components of the radio and beacon with markings that read in part (translated): "*Bottle Discharge... on the metal base unit.*" Additional markings on a white band along an approximately 12 inch diameter inflatable spherical base of the buoy reads: "*KOMAR – 2M No. 08800-10886700.*" A bright orange inflatable triangular cone buoy approximately 20 inches tall is attached to the sphere which can be inflated automatically or manually. The base has two pull strings and a 12 inch long power umbilical. Included is a 6 inch long orange sleeve that contains an articulated antenna and additional equipment. The inflated buoy would float in case of an emergency landing on water. The beacon and radio were still useful if the spacecraft touchdown occurred in a remote land area to assist search and rescue crews.

The antenna case and buoy sphere have been SIGNED by ALEKSEI GUBAREV and were issued to him for use on Soyuz 17.

Gubarev was selected as a cosmonaut in 1963 and Soyuz 17 was his first space flight, flying with cosmonaut Georgi Grechko. They docked their Soyuz 17 spacecraft to the orbiting Salyut 4 space station and worked for over 29 days during January/February 1975. His second spaceflight was Soyuz 28 in 1978.

$400 - 600

23

FLOWN SPACE SUIT FROM ISS EXPEDITION 6

SPACE SUIT WORN BY FLIGHT ENGINEER DON PETTIT ON HIS DRAMATIC RETURN TO EARTH ABOARD THE SOYUZ TMA-1, FOLLOWING THE COLUMBIA DISASTER

"Sokol KV-2" ("Falcon" in Russian) pressure suit, manufactured by Zvedza, and tailor-made for Pettit. White nylon canvas with royal blue trim, approximately 68 inches tall, consisting of an outer restraint layer of white nylon canvas with royal blue trim and an internal pressure bladder of rubber and rubberized material. Integral helmet with soft hood and hinged polycarbonate visor with blue anodized aluminum visor flange. Integrated pressure regulator with anodized aluminum inlet valve at center of body below helmet. Front opened with two zippers. Anodized aluminum umbilical inlets for electrical, air and coolant lines resting on torso, and pressure equalization valve on chest. *Research & Development Production Enterprise Zvezda* patch attached to chest, between zippers. Support sling running from chest to back using webbed belts and metal clips. Arms with trussed sleeves with adjustable articulating cables, webbed belt lashings, pressure gauge on left sleeve covered by protective gasket; detachable gloves. American flag patch affixed to upper left arm. Adjustable webbed straps, marked in mm, attached to metal rings on side seams and along crotch. Lace-up crotch covered with triangular placket. Legs with pleated knees, each with two utility pockets and integral soled shoes. Gloves marked "ДП" and "ГП-7Д-11Б-0530809" at cuff. Doles of the boots marked "52-4-44." Name tag in Roman and Cyrillic reads: "D. Pettit" and "Д. ПЕТТИТ." Pressure valve marked "ОТВЕРНУТЬ ДО СРЕДНЕГО УПОРА ПЕРЕД ПОЛЕТОМ РДСП 3М 01" [unscrew fully to medium before flight RDSP 3M 01]. Supported on external frame. With: 21 page inventory and inspection manual for the Sokol KV-2 entitled "*ИЗДЕЛИЕ СОКОЛ - КВ2. ПАСПОРТ 2АР-9001-1000-01ПС. На ИЗДелие No 0370212. Размер 54-3-2-4.*" [Product Sokol – KV2. Passport 2AP-9001-1000-01PS. Product No. 0370212. Size 54-3-3-4]. Manual filled out, with numerous signatures and stamps.

Flight Engineer Donald R. Pettit, Ph.D. (b. 1955) was a staff scientist at Los Alamos National Laboratory before being selected by NASA. A veteran of three spaceflights, he logged more than 370 days in space and over 13 EVA hours. He lived aboard the ISS (International Space Station) for 5 1/2 months during Expedition 6, again for 6 1/2 months as part of the Expedition 30/31 Crew, and was a member of the STS-126 crew. Following the Space Shuttle Columbia disaster of February 1, 2003, Pettit was one of the first Americans to return to Earth aboard the Soyuz TMA-1 spacecraft after NASA grounded the shuttle program pending numerous safety changes. Pettit, along with commander Ken Bowersox and flight engineer Nikolai Budarin, crash-landed in Kazakhstan with a malfunction-caused ballistic entry, resulting in the crew being lost for hours before being found by ground rescue teams.

The Sokol space suit was, and still is, worn by all who fly on the Soyuz spacecraft. The suit was developed in 1973-1979 with the goal of supporting a suited astronaut for up to 30 hours in a pressurized cabin and two hours in an unpressurized one. Described by manufacturers NPP Zvezda as a rescue suit, the KV-2 is designed to keep the wearer alive in the event of an accidental depressurization rather than being used outside the spacecraft in a spacewalk or EVA. The suit was developed following the disastrous loss of the Soyuz 11 crew in 1971 through sudden depressurization and was first used on the Soyuz T-2 mission, launched on June 5, 1980. By 2003, 220 flight models and 63 test and training suits had been manufactured.

The wearer climbed into the suit through the zippered front opening, sealing the suit by gathering folds of the space suit cloth and wrapping rubber bands around them. The suit was one-piece, including the helmet, but excluding the detachable gloves. Internal wiring and lack of ventilation (the wearers had to carry their own ventilator to avoid overheating) made the suit uncomfortable to move around in. Ventilating air is provided at 150 l/minute and oxygen at 20 l/minute in pressurized operation. Each suit was individually fitted to the Kazbek-U seats of the Soyuz spacecraft, which had custom-fitted molded liners. The helmet's soft cover could only fit over the head when lying in the seat and was otherwise folded back.

$25,000 - 35,000

AMERICAN GEAR, HARDWARE, & MODELS

Lots 24 - 76

Lot 70

24

US NAVY MARK IV FULL PRESSURE SUIT

WHAT BECAME THE MERCURY SPACE SUIT

Navy Mark IV mod 2 full pressure suit, with helmet. Nylon shell with rubber pressure bladder, size "Medium Large Long" approx 74 inches tall. Detachable hard fiberglass gold colored helmet by B.F. Goodrich with aluminum helmet sealing ring, 2 hinged polycarbonate visors securing to aluminum flange (1 clear, 1 tinted), lambskin ear cups, leather crown pad labeled "*3601 HEADPIECE, MK IV MOD 2. FULL PRESSURE SUIT. TYPE I. STOCK NO. RG 8476-736-4394-LF 50. MFG'D BY THE B.F. GOODRICH CO, DATE MFG'D 10 61. CONTRACT NO. N 383-70891'A. U.S. NAVY.*" Plastic communications microphone with part number "*ROANWELL CORP. 10387*" attached to communications wire labeled "*CORD ASSY ROANWELL P/N 39410*", cloth-covered rubber and metal oxygen cable labeled "*A.R.D.C. P/N 12040. SUN VALLEY, CALIF. MFD 65*", aluminum cable end-connector labeled "*ARDC. SUN VALLEY CAL. PAT'D. 3082394. P/N 8675. SER. NO. 1337*", cable helmet connector labeled "*THE FIREWELL CO., INC. PART NO. F2827100I1A. SPEC. NO. TYPE 11. SERIAL NO. 2774*", silver earpad adjustor nob, oxygen regulator dial inside helmet labeled "*CARLETON CONTROLS CORP. EAST AURORA, NEW YORK. U.S. PART NO. 1465006-1. SERIAL NO. 1458. CONTRACT NO. N156-45395. VALVE, OXYGEN, MAKEUP*". Back of helmet with USN decal, BF Goodrich label, and decal reading "*RESCUE. 1. PUSH BUTTON AFT. 2. LIFT VISOR*". Suit neck with aluminum helmet sealing ring, two 4½ inch long vertical zippers, pressure suit marked inside neck "*JOHN NORRIS. USN 005764. 737*", outer shell marked "*37*" under chin, and "*M.L.L. 1106* on neck of pressure suit inside vertical zipper, webbed nylon straps connected to metal wire pulley system running from back to front of neck. The sleeves strap and buckle adjustments, adjustable lacing from shoulder to wrist. Right shoulder with "*USN*" patch, left shoulder with large US Navy patch which bears Naval emblem. Upper entry zipper passing across chest, running from left shoulder to lower right waist, lower entry zipper running from right side of crotch, up around back and across hips to right hip, webbed nylon cross-chest strap, large "*USN*" patch to right side of chest, large "*GRUMMAN*" patch to left side of chest, 1 life-support port-hole to each side of torso. Back of legs with adjustable lacing from hip to ankle, altimeter at left thigh, 5 inch vertical zippers at ankles, metal valve at left ankle labeled "*RV-D7. 3.5/4.0 PSIG*", both legs with large nylon pocket below knee with 3 nylon straps and 5 push-snaps. No gloves or outer boots.

Provenance

Property of an institution.

First introduced in the late 1950s, the Navy Mark IV pressure suit was designed by Russell Colley, to help provide an Earth-like atmosphere in un-pressurized high-altitude flights. Prior to the Mark IV, high altitude pressure suits had problems with both weight and mobility - these problems were solved in the Mark IV by using elastic cord to arrest ballooning of the suit. The Mercury space suit was basically a modified version of the Mark IV suit, with the most notable modification being an aluminized nylon outer layer to assist thermal control. NASA selected the B.F. Goodrich Company to fabricate them, and production began in 1959. The suits were very snug fitting, and the Phase 1 suits provided limited mobility while pressurized, especially in terms of bending the arms and legs– in the second Phase of the suit, break-lines were sewn into the shoulders, knees and elbows to alleviate some of the difficulties in movement. "The fabric was made by the Minnesota Mining and Manufacturing Company (3M), and the silver color came from an aluminized powder coating glued to the green nylon fabric used for the exterior layer, prior to suit construction. Unfortunately, during the intervening years, this coating has in most instances, worn away. Many of these early spacesuits now have brown and green patches where the aluminized coating has deteriorated and the glue and nylon have begun to show through, and give the appearance of being 'rusty'" (Amanda Young, *Spacesuits. The Smithsonian National Air and Space Museum Collection* p 30).

$6,000 - 9,000

25
SPACESUIT DEVELOPMENT
ASTRONAUT HAND CASTS USED IN MAKING THE SPACE SUIT GLOVES. ILC Industries, Dover, c.1967.
15 life-size plaster casts with gold-hued finish, each mounted onto wooden base with identifying brass name plaques, the name of each astronaut written in pencil at base of hand.

Provenance
Joseph Pappano, project manager for ILC Industries assigned the Apollo Spacesuit Project; by descent to the current owners.

A fantastic collection of plaster casts of the right hands of 15 NASA astronauts: NEIL ARMSTRONG, BUZZ ALDRIN, DAVE SCOTT, TOM STAFFORD, WALLY SCHIRRA, PETE CONRAD, JIM LOVELL, JOHN YOUNG, RUSTY SCHWEICKART, WALT CUNNINGHAM, JIM MCDIVITT, GENE CERNAN, DON LIND, DONN EISELE, and FRANK BORMAN, from molds used in making the astronaut space suit gloves. Spacesuit gloves were custom made precisely for the wearer, and the pressure bladder inside the gloves was dip molded from the casts so as to ensure that the fit was perfect. Each glove was then made directly on the plaster casts of the hands.

$6,000 - 9,000

26
APOLLO SPACE SUIT BETA CLOTH SEGMENT
APOLLO SPACE SUIT MATERIAL. A segment of Beta cloth material, approximately one inch inch square. Mounted onto an 11 x 8 inch display certificate with images of Astronaut Charles Duke posing in his space suit and exploring the lunar surface. Sample number 707 of 2500.

The certificate reads in part: "Beta cloth was one of the several different layers that comprised the outer cover of the Apollo space suit. The material provided a nonflammable, high-temperature flame barrier... It was utilized for space flight as a result of the 1967 Pad 34 Apollo 1 (AS-204) spacecraft fire".

$150 - 200

27
MATERIAL USED FOR ROVER SEAT BELTS, LUNAR EQUIPMENT TETHERS, AND MORE
APOLLO – SKYLAB PBI MATERIAL. A segment of PBI cloth material, approximately one inch square. Mounted onto an 11 x 8 inch display certificate with an image of Astronaut Alan Bean wearing a PBI support harness and diagrams of the PBI Command Module couch restraint harness. Sample number 757 of 2500.

The certificate reads in part: "*The attached sample is PBI (polybenzimidazole), a high-temperature resistant polymeric fiber containing characteristic imide groups. PBI is a strong and rugged material. It was used for many Apollo Program applications including the command module restraint harnesses, lunar module crew harnesses, lunar rover seat belts, the lunar rock transfer belt, and lunar equipment tether. PBI was later used in the Skylab program for space suit support harnesses, sleeping bags, and certain parts of crew inflight clothing.*"

$150 - 200

28
MATERIAL SAMPLE OF SKYLAB'S FLIGHT COVERALLS
USED FOR ALL THREE MANNED FLIGHTS
Skylab Inflight Clothing Material. A segment of Durette® cloth material, approximately one inch square. Mounted onto an 11 x 8 inch display certificate with image of Astronaut Alan Bean wearing his Durette® jacket during his SL-3 mission. Sample number 757 of 2500.

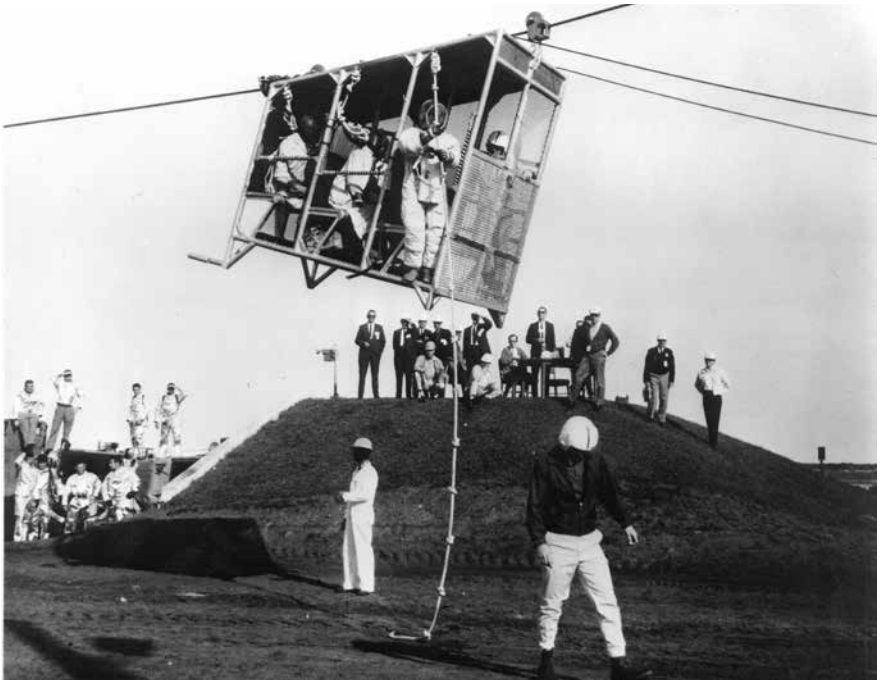
The certificate reads in part: "*The attached sample is Durette,® the Monsanto Company's trademark for its modified aromatic polyamide. It is characterized by low flammability, comfort, durability, and ease of fabrication. Durette® was used as the primary material in the Skylab inflight clothing which included jackets, pants, boots, and gloves.*"

$150 - 200

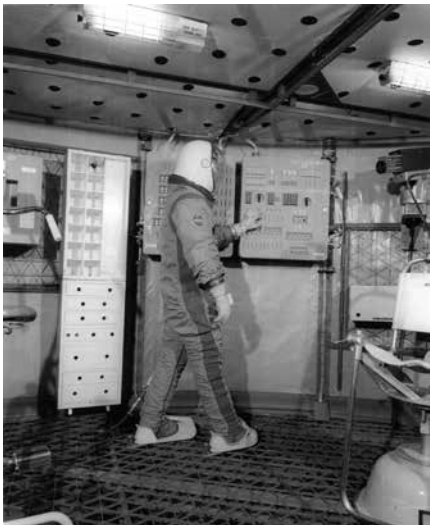
26

27

28



29 (part)



29 (part)

29 (part)

29
ASTRONAUT TRAINING
Collection of 13 vintage gelatin silver prints (8 x 10 inches, 3 being duplicates), 7 vintage color photographs (5 x 7 inches), and 12 color transparencies (4 x 5 inches), 9 being NASA Press photos (6 NASA-Marshall Space Flight Center in Huntsville Alabama, 1 Public Information Office George C. Marshall Space Flight Center, 1 NASA Houston, 1 Manned Spacecraft Center Houston, 3 Newsbureau, Bendix Corporation), and 1 German press photo, ranging in date from 1963-1971.

An excellent collection of photographs relating to astronaut training, including photos of the Lunar Module Mission Simulator, the Apollo Training Facility and the Manned Spacecraft Center in Houston, astronauts training underwater, and astronauts testing a Slide Wire Egress System, amongst others.

$1,500 - 2,500

30 W

ORIGINAL GEMINI 133P TRAINER ASSEMBLY

FIVE PART ELECTRICAL SYSTEM & ATTITUDE AND MANEUVER CONTROL SYSTEM. Burtek, Inc for McDonnell Corp of St. Louis, MO, under contract #NAS9-170 for NASA, February & March, 1963. Together five modules, 3 for the *Attitude & Maneuver Control System Trainer Assembly*, and two for the *Electrical System Trainer Assembly*, as follows:

1. Metal panel in 3 parts, central panel approx 10 feet wide and labeled "*GEMINI ELECTRICAL SYSTEM - POWER SOURCE. GT-10, 11*," each hinged side panel approx 4 feet wide, the whole opening fully to approx 18 feet 7 inches, 5½ feet tall, 2½ feet deep. Mounted onto 10½ x 2½ foot platform with casters, 1300 lbs. Metal manufacturer plaque mounted to back reads:
"*GEMINI 133P. TRAINER ASSEMBLY ATTITUDE ELECTRICAL SYSTEM. PANEL 1 OF 2 [BUT 1 OF 5]. CONTRACTOR MCDONNELL. ST. LOUIS MISSOURI. MANUFACTURED BY BURTEK INC. TULSA OKLAHOMA. MFG. DATE MO. 3 YR. 1963. CONTRACT NO. NAS9-170. PART NO. 52E095001-1. SERIAL NO. 1. POWER REQ'TS VOLTS 115. AMPS 45. WEIGHT 1300. MFG. INSP [STAMP]. CONTR. INSP. GOV'T INSP. [STAMP]. U.S. PROPERTY*." Panels with highly detailed and complicated back-lit flow diagrams show the flow of water, oxygen, hydrogen, fuel cell power and others through the electrical system.

2. Metal panel in 2 parts, central panel approx 10 feet and labeled "*GEMINI ELECTRICAL SYSTEM - SEQUENTIAL CIRCUITS. GT-10, 11. LANDING & POST LANDING*," left hinged side panel approx 4 feet wide labeled "*TIME REFERENCE SYSTEM*," right hinged panel lacking, the whole unfolding to 14½ feet wide, 5½ feet tall, 2½ feet deep. Mounted onto 10½ x 2½ foot platform, 1100 lbs. Metal manufacturer plaque mounted to back reads:
"*GEMINI 133P. TRAINER ASSEMBLY ATTITUDE ELECTRICAL SYSTEM. PANEL 2 OF 2 [BUT 2 OF 5]. CONTRACTOR MCDONNELL. ST. LOUIS MISSOURI. MANUFACTURED BY BURTEK INC. TULSA OKLAHOMA. MFG. DATE MO. 3 YR. 1963. CONTRACT NO. NAS9-170. PART NO. 52E095002-1. SERIAL NO. 1. POWER REQ'TS VOLTS 115. AMPS 30. WEIGHT 1100. MFG. INSP [STAMP]. CONTR. INSP. GOV'T INSP. [STAMP]. U.S. PROPERTY*," sticker above metal plaque reads: "*N.A.S.A. U.S. GOVERNMENT PROPERTY. NAS 9-170-49*."
Panels with highly detailed and complicated back-lit flow diagrams showing the movement of Recovery Light Circuits, Signals from the Launch Vehicle, Bus Sequence Control, Common Control Bus, and power Main Bus through the Time Reference System including the Event Timer & Electronic Timer, the Boost Insert & Abort system, the Launch Vehicle system, the Retrograde System, and the Landing & Post Landing Systems.

3. Seated metal instrument panel module with attitude hand controller labeled "*SIMULATED*" & instructor's control panel labeled "*GEMINI ATTITUDE & MANEUVER CONTROL SYS CONSOLE. INSTRUCTOR'S CONTROL PANEL*." Seated instrument panel approx 5 feet 8½ inches at widest point, mounted onto approx 6 x 3 foot base with casters, instructor's control panel mounted to wooden cabinet directly behind chair module. Together approx 450 lbs. Metal manufacturer plaque reads: "*GEMINI 133P. TRAINER ASSEMBLY ATTITUDE & MANEUVER CONTROL SYSTEM. PANEL 1 OF 5. CONTRACTOR MCDONNELL. ST. LOUIS MISSOURI. MANUFACTURED BY BURTEK INC. TULSA OKLAHOMA. MFG. DATE MO. 2 YR. 1963. CONTRACT NO. NAS9-170. PART NO. 52E095003-1. SERIAL NO. 1. POWER REQ'TS VOLTS. AMPS. WEIGHT 450. MFG. INSP [STAMP]. CONTR. INSP. GOV'T INSP. [STAMP]. U.S. PROPERTY*." Instrument panel with simulated Attitude Display Indicators, Flight Director Controllers, Incremental Velocity Indicator, Platform Controls and Indicators, Manual Data Insertion Unit, Computer Controls and Indicators, as well as AC Power Selector.

4. Metal panel in 2 parts, central panel approx 10 feet wide and labeled "*GEMINI ATTITUDE & MANEUVER CONTROL SYSTEM - ACME*," left hinged side panel approx 4 feet wide, the whole unfolding to approx 14½ feet wide, 5½ feet tall, 2½ feet deep. Mounted onto 10½ x 2½ foot platform, 1050 lbs. Metal manufacturer plaque reads: "*GEMINI 133P. TRAINER ASSEMBLY ATTITUDE & MANEUVER CONTROL SYSTEM. PANEL 2 OF 5. CONTRACTOR MCDONNELL. ST. LOUIS MISSOURI. MANUFACTURED BY BURTEK INC. TULSA OKLAHOMA. MFG. DATE MO. 2 YR. 1963. CONTRACT NO. NAS9-170. PART NO. 52E095004-1. SERIAL NO. 1. POWER REQ'TS VOLTS 115. AMPS 30. WEIGHT 1050. MFG. INSP [STAMP]. CONTR. INSP. GOV'T INSP. [STAMP]. U.S. PROPERTY*." Central panel with highly detailed and complicated back-lit flow panels diagramming the Attitude Control electronics, left panel consists of Attitude Control Module and Digital Computer Panel and has back-lit flow panels, as well as two different rotating Flight Director/ Attitude Indicator globes embedded in panel with protective window.

5. Metal panel approx 10 feet wide, 5½ feet tall, 2½ feet deep, labeled "*GEMINI ATTITUDE & MANEUVER CONTROL SYSTEM - OAMS*." Mounted onto 10½ x 2½ foot platform, 600 lbs. Metal manufacturer plaque reads: "*GEMINI 133P. TRAINER ASSEMBLY ATTITUDE & MANEUVER CONTROL SYSTEM. PANEL 3 OF 5. CONTRACTOR MCDONNELL. ST. LOUIS MISSOURI. MANUFACTURED BY BURTEK INC. TULSA OKLAHOMA. MFG. DATE MO. 2 YR. 1963. CONTRACT NO. NAS9-170. PART NO. 52E095005-1. SERIAL NO. 1. POWER REQ'TS VOLTS 115. AMPS 7. WEIGHT 600. MFG. INSP [STAMP]. CONTR. INSP. GOV'T INSP. [STAMP]. U.S. PROPERTY*." Panel with highly detailed and complicated back-lit flow diagrams showing the movement of fuel, oxidizer, and pressurant through the Orbit Attitude and Maneuvering System (OAMS). This panel still fully operational.
A video of it being operated can be viewed online at:
www.bonhams.com/video/21986.
The additional panels are presumed to need some minor electrical work to be brought up to operational condition.

A remarkable system used to train the Gemini astronauts at the Manned Spacecraft Center in Houston. Essentially a duplicate of the display panels and instruments found inside the Gemini spacecraft, the system was used to learn the Attitude control and Maneuver Electronics System (ACME), the Orbit Attitude Maneuvering System (OAMS), the Time Reference System, the Sequential Circuits, the Landing & Post landing Procedures, use & control of the Power Source, amongst many other skills.

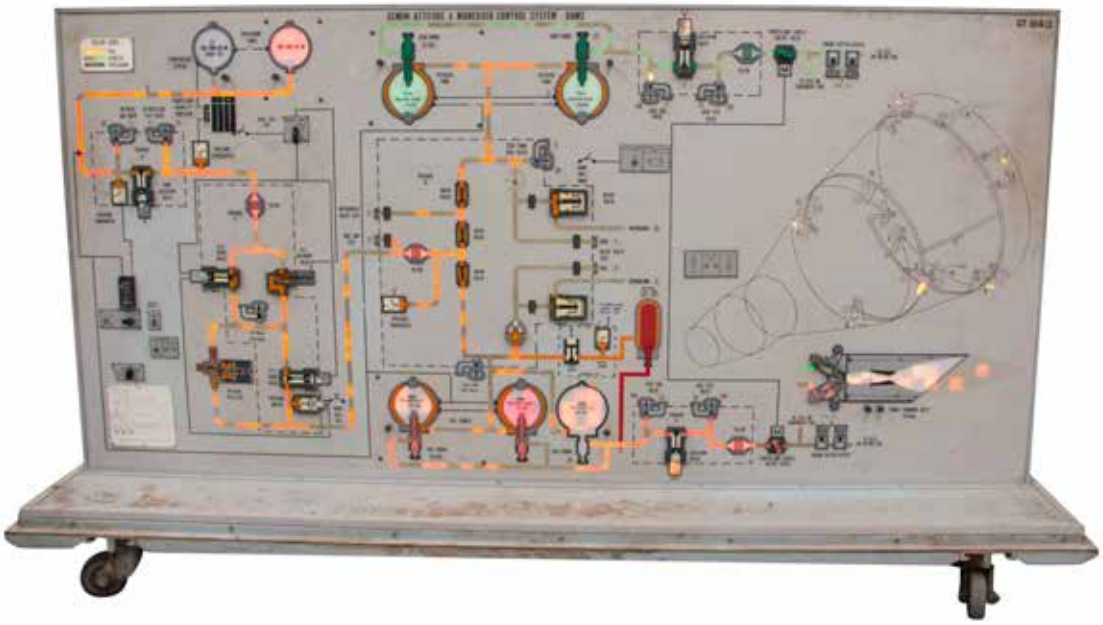
The ACME provided the control circuity to attain and maintain a desired spacecraft velocity or attitude, and included four separate sub-systems; the Attitude Control Electronics (ACE), the Orbit Attitude and Maneuver Electronics (OAME), a Power Inverter, and two identical Rate Gyro Packages. The OAMS controlled the spacecraft attitude and provided maneuver capability from the time of launch vehicle separation until the initiation of the retrograde phase of the mission. The OAMS responded to commands from the ACME. The Time Reference System provided the facilities for performing all timing functions aboard the spacecraft, and included an electronic timer, a time correlation buffer, a mission elapsed time digital clock, an Accutron clock and a mechanical clock. The maneuver hand controller found on the seated instrument panel commanded translational maneuvers of the spacecraft in the vertical, longitudinal, and horizontal planes. A detailed guide to the full systems covered by the trainer is available upon request.

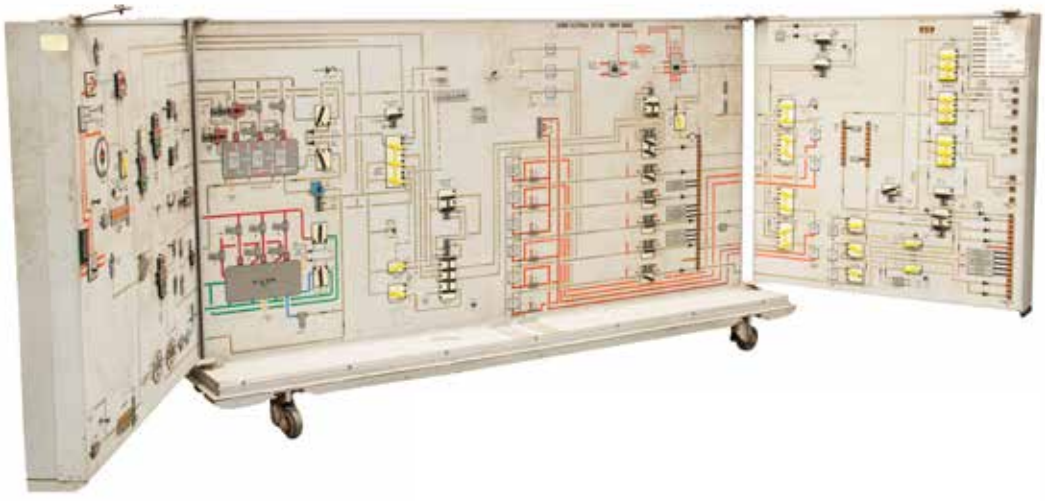
Project Gemini was NASA's second human spaceflight program, started in 1961 and concluding in 1966. The spacecraft carried a two person crew, ten of which flew manned low Earth orbit missions between 1965 and 1966.

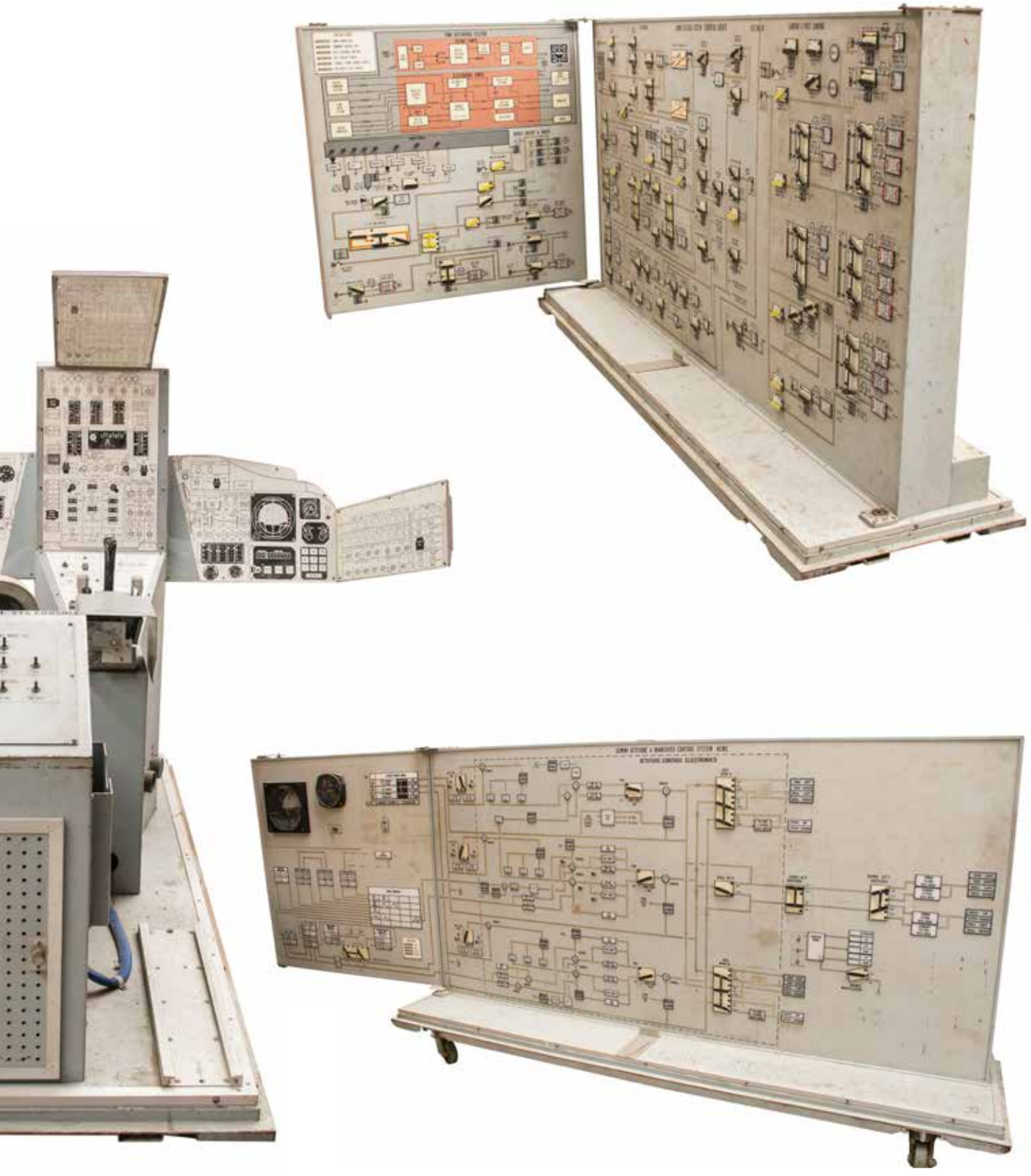
Please note that this lot is being sold *in situ*, and is currently located in Houston, Texas. Interested parties who wish to view the lot are invited to contact the specialist for this sale, Cassandra Hatton (+1 212 461 6531, cassandra.hatton@bonhams.com), to make arrangements.
The successful buyer will be responsible for the timely disassembly if required, removal and shipping of this lot from its current location at buyer's expense by no later than August 20, 2016.

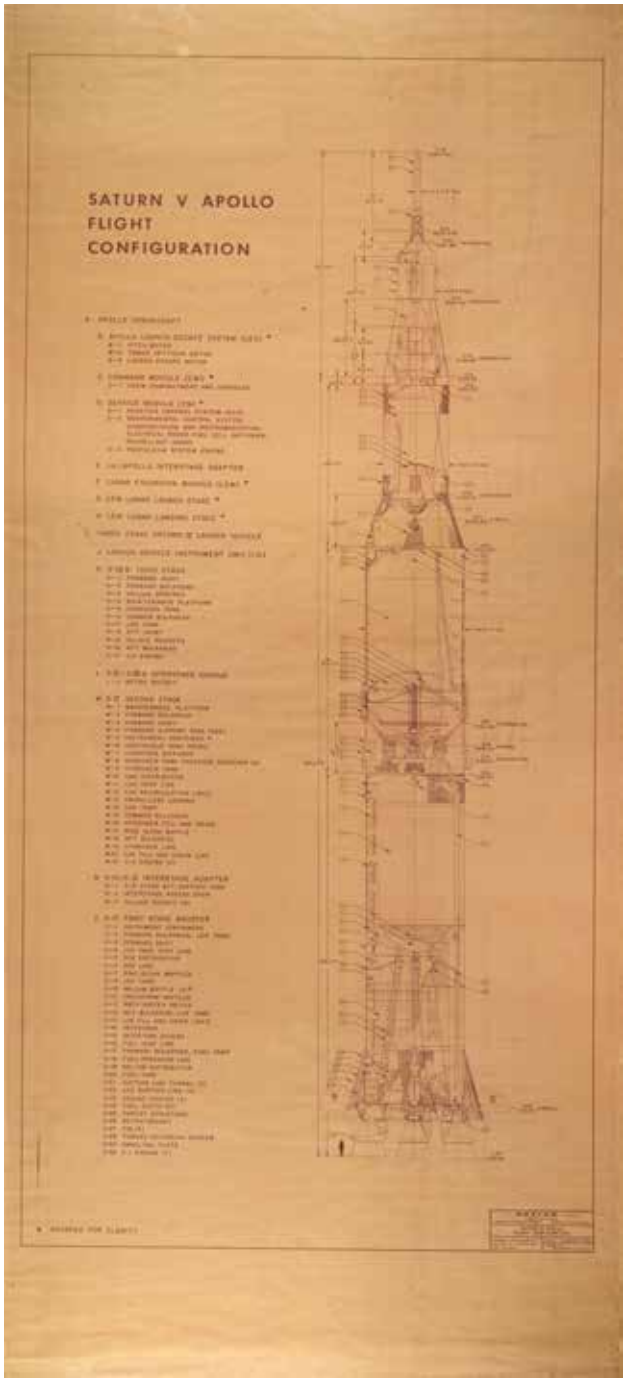
$60,000 - 90,000

(see images overleaf)









31

31
BOEING—HUGE SATURN V FLIGHT CONFIGURATION CHART
SATURN V APOLLO FLIGHT CONFIGURATION. The Boeing Company Space Division Launch Systems Branch, Huntsville, Alabama, 1 January, 1966.
36½ x 86 inch chart. Some light crinkles to edges from being rolled.

A more than 7 foot tall highly detailed chart showing the flight configuration of the Saturn V rocket, which was manufactured by Boeing, with information about the various parts of the Apollo Spacecraft, and the three stages of the Saturn Launch Vehicle.

$1,000 - 1,500

32

33

32
LARGE APOLLO SPACECRAFT DIAGRAM, SIGNED
Halftone diagram of the Apollo Command and Service Modules (CSM) including the Launch Escape SubSystem (LES). 27 x 19 inches.

Boldly SIGNED and INSCRIBED with their individual CM and Apollo flight numbers: "*RUSTY SCHWEIKART, CSM 104, Apollo 9; RICHARD GORDON, CSM 108, Apollo XII; FRED HAISE, CSM 109, Apollo 13;*" and "*AL WORDEN, CSM 112, Apollo15.*"

This extensively illustrated drawing shows internal equipment and structures of the CSM. Over 30 individual components are identified. The side hatch, docking probe, main display console, and attitude control rocket engines are just a few of the components identified with the Command Module. The Service Module has the high gain antenna, large propulsion system engine nozzle, multiple pressure tanks, fuel cells, and the "quad" attitude control rocket engines clearly shown.

The 33 foot long LES was the means of escaping the Saturn booster rocket in the event of a catastrophic malfunction. It employed a four nozzle, solid propellant rocket system to pull the Command Module away from the booster. Several components are identified including the pitch control motor, the "Q-Ball," and dual canards that provided aerodynamic lift to move the CM out of an exploding booster's path.

$1,000 - 1,500

33
APOLLO COMMAND MODULE HEAT SHIELD
USED FOR FORMULATION TESTING
Avco epoxy novolac resin fiberglass honeycomb matrix ablative heat shield with wooden base, 3½ x 4 inches. Bottom of base with circular indentation and labelled "*2026-39 New Formulation S/N 2*" in black pen.

Provenance
Property of an institution.

The Avco Corporation's AVCOAT 2026-39 material was used for the heat shield on NASA's Apollo Command Module and will be employed by NASA for its next generation Orion spacecraft. Heat shields were used to remove heat by convection from the spacecraft upon reentry.

$600 - 900

34

34 (bottom view)

34

APOLLO COMMAND MODULE ROCKET ENGINE, SIGNED

A BI-PROPELLANT ENGINE TO ALLOW THE CREW TO SAFELY RETURN FROM THE MOON

Apollo Command Module rocket engine, manufactured by Rocketdyne, Model SE-8. Constructed of steel and ablative material, 14 inches long and 3½ inches wide at the nozzle base. Fuel and oxidizer valve assemblies are at the top with the associated electrical wiring connections. An ablative nozzle is at the bottom. Internal components consist of a block of ablative material and sleeve, refractory throat insert, and a stainless steel shell. A Rocketdyne ID label reads in part: "*Propulsion System Component, Part Name: Rocket Engine Assy., Part No. 99-106003, Date of MFG. 5-21-64, Model No. SE-8, Serial No. 4054407.*" With additional manufacturing information on the engine casing plus inspection stamps. Printed diagrams included.

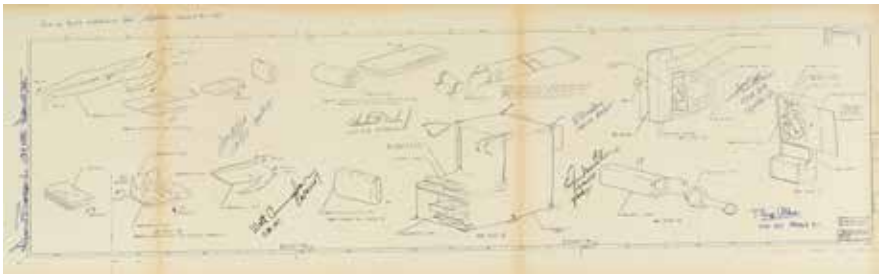
SIGNED and INSCRIBED: "*WALLY SCHIRRA, Apollo 7; TOM STAFFORD, Apollo 10;*" and "*FRED HAISE, Apollo 13.*"

A set of 12 of these bi-propellant engines provided the Command Module with rotation control, rate damping, and attitude control after separation from the Service Module and during re-entry. The engine has had several test firings.

$6,000 - 8,000

35

37



36

35
APOLLO COMMAND MODULE HELIUM PRESSURE REGULATOR
USED IN THE REACTION CONTROL SYSTEM (RCS)
RCS Helium Pressure Regulator Unit, 6½" wide by 5" tall, primary regulator vent with label reading "*FAIRCHILD HILLER CORPORATION. STRATOS-WERSTERN. MANHATTAN BEACH, CALIFORNIA. PN 63-036-08. SERIAL NO. 03825M940569. MFD MO 1 YR 70, U.S. SWB 9*," label with 1 inspection stamp, additional yellow label reading "*RUBBER CURE DATE 1Q70*," secondary regulator vent with label reading "*REGULATOR UNIT, PRESSURE, HELIUM, RCS. NAA/S&ID NO. CONTRACT NO. NAS9-150. NAA/S&ID INSP. SERIAL NO. SWB 9, ANA 401*," each vent port surrounded by yellow label reading "*VENT PORT DO NOT PLUG*," base of primary regulator labelled "*VHT #1 SWB 27*" "*VHT #2 SWB 27*," base of secondary regulator labelled "*IPNA 678. 63-1073-1F. SWB18. CN 1565. 63-036-08 S. S3*," base of each regulator stamped "*63752 H. SWB 37*."

A critical piece of hardware. Each helium pressure regulator assembly consists of two individual pressure regulators connected in series. A flow limiter at the outlet of the main stage valve of the secondary unit restricts maximum flow through the regulator assembly, so that the propellant tanks are protected if the regulator fails open. This unit is a test unit, identical to that which was used on manned Apollo flights.

$1,200 - 1,800

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

36
GORDON COOPER'S COMMAND MODULE BLUEPRINT, SIGNED
CREW PERSONAL EQUIPMENT, LM DOCKING TARGET, AND MORE
Blueprint, North American Aviation, pre-folded, expanding to 10½ x 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. CDR.*"

Additionally SIGNED and INSCRIBED with their individual CM and Apollo flight numbers by BUZZ ALDRIN, ALAN BEAN, WALT CUNNINGHAM, CHARLES M. DUKE, JR., FRED HAISE, EDGAR MITCHELL, TOM STAFFORD, and AL WORDEN."

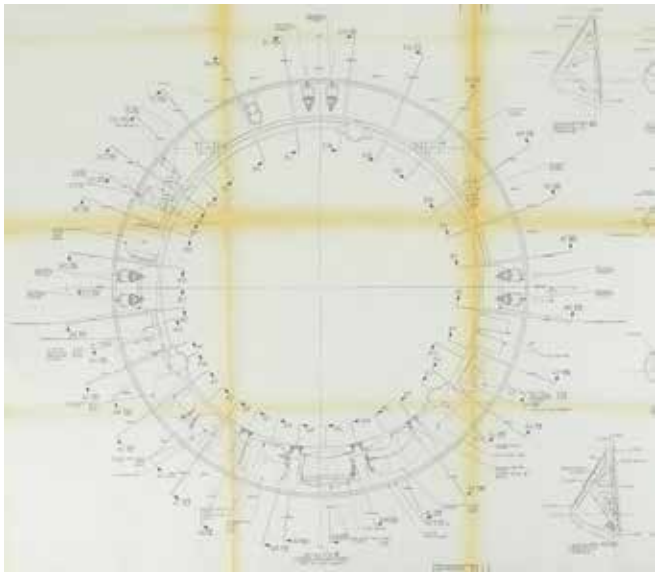
Astronaut personal equipment illustrated includes a crewman constant wear garment, flight coveralls, temporary stowage bag, and sleep restrain, all with individual folding instructions. Additional equipment shown includes crewman towels, communications unit with umbilical, and the window mounted LM docking target. The center of the blueprint has a drawing of the stowage device to house the crew equipment.

$1,500 - 2,000

37
APOLLO GRUMMAN LUNAR MODULE RCS HEATER ASSEMBLY
4 inch long RCS heater assembly, metal with rubber-coated copper lead wires, base of assembly stamped *SN427* and with label reading: "*U.S. HEATER ASSEMBLY. GAEC P/N LS C310-601-11. COX P/N 2253-11. COX & COMPANY, INC. NEW YORK, 10003.* In it's original packaging with red label reading "*CAUTION - ABSOLUTELY NO POSITIVE VOLTAGE TO BE APPLIED TO BLACK LEAD*, sealed with original data card which reads: "*DATA CARD. NOMENCLATURE: HEATER ASSEMBLY. MANUFACTURER: COX & COMPANY, INC. SERIAL NO. 427. MANUFACTURER'S PART NO: 2253-11. GAEC CONTROL NO.: LSC310-301-11 CHG. LTR.: J. CONTRACT NO. 4-01360 NAS 9-1100. CLEANLINESS LEVEL: LEVEL C OF LSP-14-0011. DATE OF PACKAGING: 8/25/67. MANUFACTURERE'S INSP. STAMP: '25'. GAEC INSP. STAMP: 1144.*" Housed in the original plastic coated protective bag, bag with original label (form G725) which lists information such as part name, serial numbers, manufacturing code, and the like. With large bright orange label reading "*TRACEABLE PART*."

The Heater Assembly was part of the Lunar Module Reaction Control System (RCS), which consisted of four clusters of thrusters, as well as a fuel feeding system, and control electronics and computers.

$700 - 1,000



38 (detail)

39

40

38
COMMAND MODULE REACTION CONTROL SYSTEM
ILLUSTRATES SE-8 ROCKET ENGINE LOCATIONS AND SIGNED BY 12 ASTRONAUTS
Blueprint, North American Aviation, Downey, CA, 1966.
68 x 30 inches, ¼ scale.

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 individual Apollo flight number.

An extremely detailed blueprint with a top view of the outer aft compartment which houses the Command Module's Reaction Control System (RCS). Eight rocket engines are shown with their associated fuel, oxidizer, and helium pressure tanks. These engines allowed the crew to control roll, pitch, and yaw movements after separation from the Service Module and during re-entry into the earth's atmosphere. Other components are RCS control box, uprighting system compressor, potable and waste water tanks. Thirty-three additional drawings show cross sections of the aft section just above the heat shield. Structural support, electrical connections and equipment, fuel/oxidizer lines, as well as the rocket engines and tanks are shown from this perspective and labeled.

$2,500 - 3,500

39
APOLLO SPACECRAFT PROPELLANT METER
USED IN CONJUNCTION WITH THE APOLLO TRAINER
A PROPELLANT QUANTITY display meter, 3 inches tall, 4 inches wide, and 6 inches deep. All metal construction with gray and yellow paint coatings. The OXIDIZER readout has a four digit light display. The FUEL readout has three digit light display. Both have 1/10 value accuracy. A red metal identification tag reads in part: "*For use on Ground Instrument Trainer only. Part No. 564467, Serial No. 12. LINK Div., General Precision, Inc. Binghamton, N.Y.*" An additional white label tag reads: "*MFG. NO. 15, Dec 28 '65, F-1731*" with the letter "*B*" in manuscript.

The meter was used with the Block I Apollo Command Module (CM) ground training simulator equipment either for oxidizer and fuel values from the Service Module rocket engine systems or the Command Module's attitude control system. Dual multi-pin ports at the opposite end allow cable hook-ups to provide data for the digital display readouts.

$500 - 700

40
GRUMMAN APOLLO LUNAR MODULE ASCENT STAGE COMPONENT
ASCENT STAGE REAR SUPPORT TRUSS
Made from aluminum alloy, with titanium fittings and fasteners. 5 feet 2 inches long, 4 inches in diameter. Part number: "*LDW820M10901-1 SNHMP58 ASS'Y # 1*." With original protective plastic shipping casing, 2 feet, 9.5 inches, labeled "*Critical Part*."

Provenance
Property of an institution.

An integral component which ensured the support and stability of the Ascent Stage. The Ascent Stage of the Lunar Module was the control center and the manned portion of the lunar lander which consisted of three main sections; the aft equipment bay, the midsection, and the crew compartment.

$1,500 - 2,500

42

43

41
GRUMMAN APOLLO LUNAR MODULE ASCENT STAGE COMPONENT
Support truss, aluminum alloy, 22.5 inches long; with titanium fitting & fasteners, tapered ends terminating in riveted hinge assemblies. In original hard plastic shipping case marked "*Critical Part*" in red, and "*LDW-280-142224-15 Ext. U.S. NASA*", strut marked "*83326*" in black marker, one end with several wires terminating in two metallic plugs wrapped around circumference, marked "*CKT-1-1*" and "*C-K-2*."

Provenance
Property of an institution.

An integral component which ensured the support and stability of the Ascent Stage. The Ascent Stage of the Lunar Module was the control center and the manned portion of the lunar lander which consisted of three main sections; the aft equipment bay, the midsection, and the crew compartment.

$500 - 800

42
GRUMMAN APOLLO LUNAR MODULE DESCENT STAGE
SUPER CRITICAL HELIUM TANK SUPPORT TRUSS
Aluminum alloy truss with titanium fittings and fasteners, tapered ends terminating in riveted hinge assemblies. 46 x 3 inches. Labelled "*LDW280-17283 11*" in red lettering midway down the shaft. The rightmost section has several wires terminating in two metallic plugs wrapped around the circumference and held in place with adhesive tape.

Provenance
Property of an institution.

The Lunar Modules of the Apollo Program required helium as part of a lightweight cryogenic pressurization system to engage their propulsion systems for the Descent Stage to the Lunar surface, alongside a propulsion system that used hypergolic propellants and a gimballed pressure-fed ablative cooled engine that was capable of being throttled.

$1,000 - 1,500

43 W
GRUMMAN APOLLO LUNAR MODULE LANDING GEAR MAIN COMPONENT
LUNAR MODULE PRIMARY LANDING STRUT, THE LARGEST PIECE OF THE LANDING GEAR ASSEMBLY
Lunar Module Leg Main Strut with both telescoping pieces, aluminum alloy, with titanium fittings and fasteners, first piece approx 6 feet 4 inches long and 6½ inches in diameter, second part approx 6 feet long and 7 inches in diameter, end cap approx 15 inches tall and 6½ in diameter. Metal labels read "*TSI T4587-2 S/N 56065 S/B 510724-2*" and " *TSI T4587-2 S/N 56067 S/B 10724-2*", body of struts labeled in red "*LDW 938-10248-1*", "*ITM320-51502-1 ASSY*", "*LTM320-51501-3 ASSY*" and "*67831 MFR.*". Without the two adapter rings which connect the three pieces.

Provenance
Property of an institution.

The largest piece of the landing gear assembly. The landing gear assemblies of the Lunar Module extend from the front and rear of both sides of the descent stage. They consist of struts, trusses, a footpad, as well as a locking and deployment mechanism. The left, right, and aft footpads have a lunar surface sensing probe. The landing gear not only buffers the impact of the lunar landing, but also prevents the vehicle from tipping over, and supports it during lunar stay and lunar launch. The lunar surface landing probes are stowed against the primary strut until the landing gear is deployed.

$3,000 - 5,000

44

GRUMMAN APOLLO LUNAR MODULE— TRACKING LIGHT COVER ASSEMBLY

14 inch diameter round metal cover turned into a shallow cone, 6 metal grommets along seam, two metal Grumman plaques reading: :"*COVER ASSEMBLY TRACKING LIGHT. PT NO. LDW420-42301-3. SER NO. 3. CONTRACT NO. NAS 9-1100. MFD BY GRUMMAN AIRCRAFT ENGRG CORP. BETHPAGE, N.Y. US FS CODE 26512*" and "*SET-PROTECTIVE, LIGHT COVERS. PART NO. LDW420-42301-1-1. SERIAL NO. 3. DSGN CONT NO. -1-1 CONSISTS OF -3 (1) & -7 (5). CONTR NO. NAS 9-1100. MFD. BY GRUMMAN AIRCRAFT ENGINEERING CORP. BETHPAGE, NEW YORK. US. FS CODE 26512.*" White stencilled text (mostly rubbed away) reads"*WARNING. REMOVE COVER DURING PROLONGED OPERATION OF LAMP*" and *"LDW420-42303-1 ASSY*." Red letters stamped perpendicular to metal plaques read *"LDW 420-42301 001*."

A crucial piece of the Lunar Module (LM), the Cover Assembly protected the flashing tracking light which was mounted onto the front of the LM. Designed to make it easier for the Command Module (CM) Pilot to see the LM, the tracking light had a total life of 30 hours, and flashed at the rate of 60 flashes per minute. the tracking light had numerous other functional and design requirements, including being compatible for use with CSM scan telescope sextant optics during darkside lunar and earth operations.

$1,200 - 1,800

45

LUNAR MODULE CUT PYROTECHNIC BATTERY

LM battery housed in a gray metal body with 16 bolts securing a top plate having overall measurements of 7 inches long, 3 inches tall, and 2 ¾ inches wide. A thin red and blue connecting wire (spooled with electrical tape) is attached. Positive and negative terminals plus two bolt ties are at one end with an ID stamp reading: "*Exide Missile and Electronics Division, ESB Incorparated, 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 pyro batteries, one in the Descent Stage and one in the Ascent Stage. They supplied the electrical impulse to ignite explosive charges for LM systems including landing gear deployment, reaction control subsystem (RCS) pressurization, Ascent and Descent propellant tank pressurization, and ascent / descent stage separation.

$2,000 - 3,000

46

LUNAR MODULE WINDOW PROTECTOR

Approx 24 x 24 x 27 inch triangular polycarbonate lunar module window protector. With circular label featuring illustration of Lunar Module, reading "*LM 12 GRUMMAN. EXTENDED STAY. MANNED LUNAR MODULE*", and large octagonal label reading "*CAUTION. COATED OPTICS. HANDS OFF*".

Provenance
Property of an institution.

An important item for protecting the windows of the Grumman lunar module, used for shipping.

$800 - 1,200

44

47

GRUMMAN APOLLO LUNAR MODULE DESCENT STAGE INSULATION

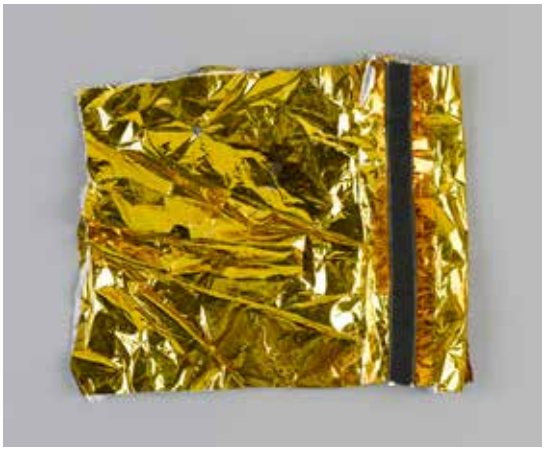
DESCENT STAGE THERMAL BLANKET SECTION
Consisting of aluminized polymide (Kapton-H film), aluminized polyester (mylar), fiberfax, inconel mesh, nickel foil, and mylar tape. 12 by 15 inches, one side with 12 inch velcro strip.

Provenance
Property of an institution.

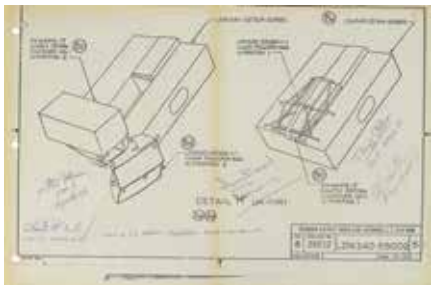
The thermal blanket played a key role in protecting the Descent Stage. Part of the thermal shield, it was used in conjunction with a titanium heat shield to protect the bottom of the Descent Stage from engine heat, as well as part of the protection for the engine compartment. The titanium shields coupled with the thermal blankets were mounted on supports which kept them at least a half inch away from the main structure.

$2,000 - 3,000

45



47



48

49

50

51

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

48
GORDON COOPER'S LUNAR SAMPLE EQUIPMENT BLUEPRINT - SIGNED
Blueprint LDW340-55002. Grumman Aircraft Engineering Corp., Bethpage, NY.
10 1/2 x 16 inches. Scale "none."

INSCRIBED and SIGNED by GORDON COOPER: "*From my LM notebook, Gordon Cooper, Apollo X B.U. CDR, LM 4.*"
Additionally SIGNED by BUZZ ALDRIN, ALAN BEAN, FRED HAISE, EDGAR MITCHELL and CHARLES M. DUKE, JR. plus INSCRIBED with their individual Lunar Module and Apollo flight numbers.

Two drawings show the Modularized Equipment Stowage Assembly (MESA) with the position locations of the Sample Return Container (to hold lunar dust and rocks) and the Lunar Transfer Bag (used to bring samples and other items back inside the LM).
The MESA allowed astronauts easy access to LM stored equipment while working on the lunar surface.

$1,200 - 1,800

49
LUNAR MODULE INTERNAL COMPONENTS BROCHURE
INCLUDES ASTRONAUT SIGNATURES FROM EACH MANNED LM FLIGHT
NASA/Grumman Apollo Lunar Module.
Bethpage, NY: Grumman, 1969. Eight acetate sheets having color overlaying drawings of multiple LM structures and components.
10 x 8 inches. Stapled covers.

The front cover is SIGNED and INSCRIBED with their Apollo flight(s) and Lunar Module number(s) by: BUZZ ALDRIN, ALAN BEAN, GENE CERNAN, WALT CUNNINGHAM, CHARLES M. DUKE, JR., FRED HAISE, EDGAR MITCHELL, RUSTY SCHWIECKART, TOM STAFFORD, and AL WORDEN.

A promotional brochure released by Grumman during the Apollo Program which lists 118 separate components. Color drawings of the LM are on the front and back of each acetate sheet. Components are identified by a fold-out legend on the back cover.

$1,500 - 2,000

50
GRUMMAN LUNAR MODULE DOCUMENTS
Approx 226 pages of Grumman documents relating to the construction and testing of the Grumman Lunar Module, including folding blueprints and diagrams, schematics, quality testing notes, technical reports such as the "Design Feasibility Test Report for Wire Termination Sealants", "electrical Power Subsystem", "Plan for Qualification of RTV-21/ RTV-9811 Potting Material" Lunar Module connector application, a "Failure Analysis Laboratory Report" for the Microelectronic and Circuit Design Section of the Electronic Systems Center, and much more, many documents heavily annotated.
Bound together in a black binder, worn.

A highly technical and fascinating collection of documents on the testing and construction of the Grumman Lunar Module.

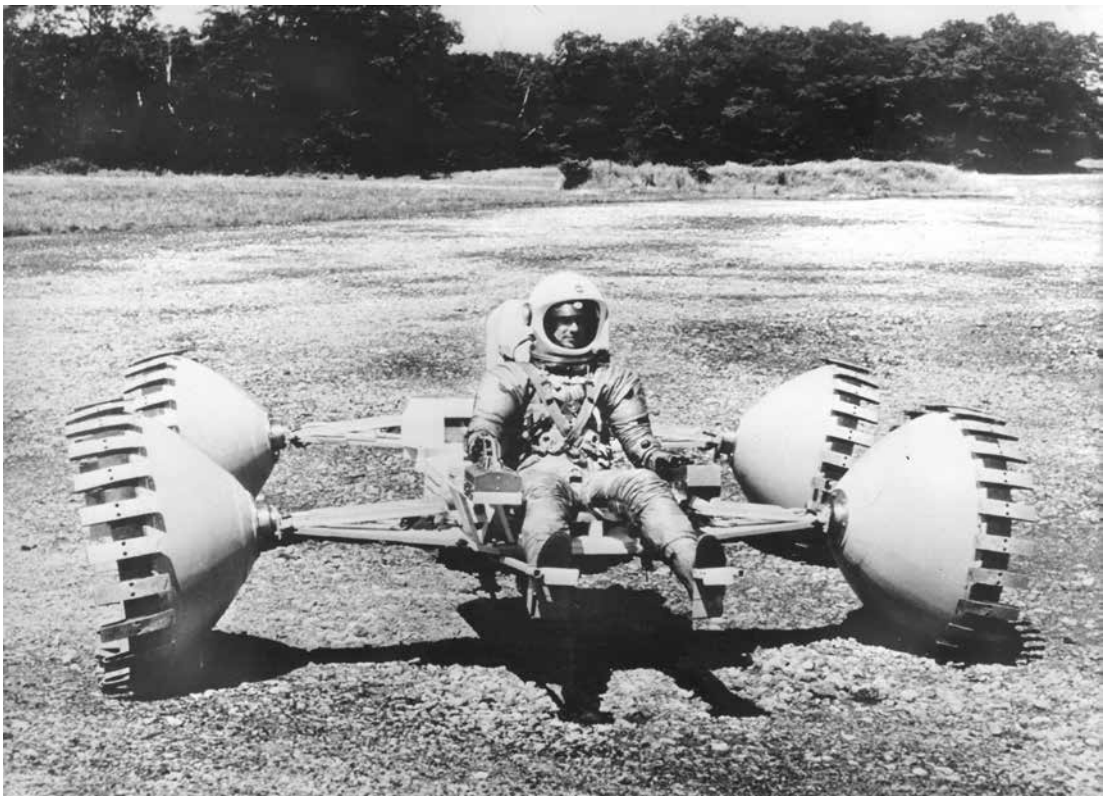
$1,000 - 1,500

51
LUNAR DUST BRUSH COMPONENTS BLUEPRINT
SIGNED BY ASTRONAUTS WHO USED IT WHILE ON THE MOON
Large Keeper - Lunar Dust Brush blueprint.
NASA, Houston, TX, January 31, 1970,
22 x 34 inches, enlarged scale of 2 to 1.

BOLDLY SIGNED and INSCRIBED with their individual Apollo flight and Lunar Module number by: BUZZ ALDRIN, ALAN BEAN, EDGAR MITCHELL, and CHARLES M. DUKE, JR.

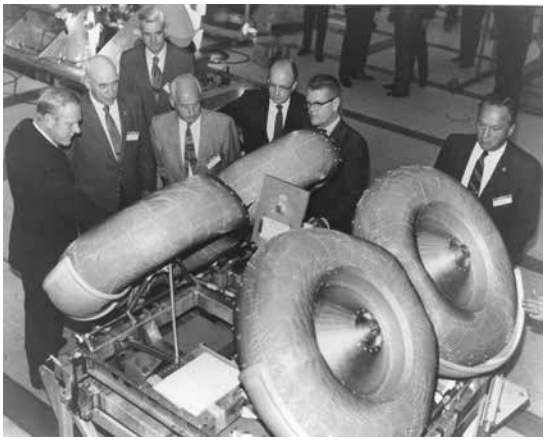
The Apollo lunar dust brush was use by astronauts on the moon's surface to remove lunar dust from flight equipment and their space suits. This blueprint illustrates five different views of the "large keeper," an oval device on the dust brush handle which assisted with locking and right-angle movement of the handle relative to the brush bristle head. Written design specifications include: "*Dry film lubricate all exterior surfaces except as shown... Break all sharp edges...*" Accompanied by a dual image 8 x 10 inch black and white NASA photograph of the brush itself, showing the keeper on the handle. Printed NASA text on the photograph verso.

$700 - 900



52 (part)

52 (part)



52 (part)

52

LUNAR ROVER DEVELOPMENT

Collection of 11 vintage gelatin silver prints and 4 vintage NASA lithographs, one 8½ x 6 inches, the rest 8 x 10 inches, 3 being NASA press photos (from the NASA-Marshall Space Flight Center in Huntsville, Alabama), 7 being German press photos (Captioned to versos in German), ranging in date from 1966-1971. WITH: Press release from Bell Aerosystems Company dated 3/31/1969, announcing their preliminary design study done under a $250,000 contract awarded by the NASA Manned Spacecraft Center in Houston, for a one-man Lunar Flying Vehicle.

An excellent collection of photographs relating to the development of the Lunar Rover, including photos of early prototypes & engineering mock-ups, and astronauts in training.

$2,000 - 3,000

53

54

53
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

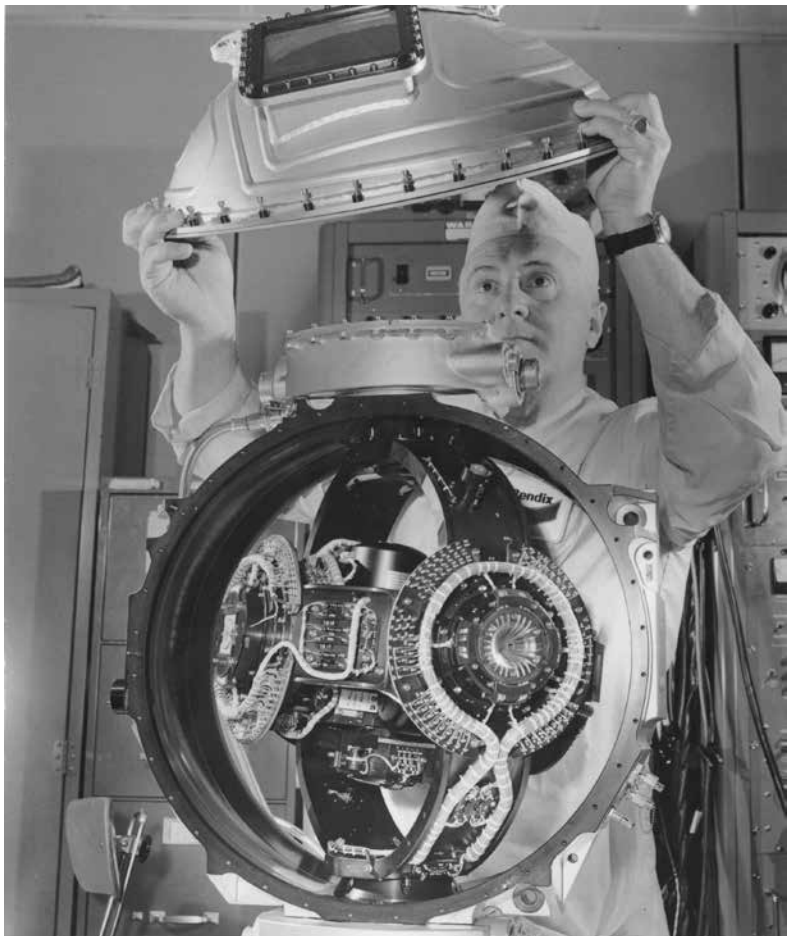
54
NASA TEKTRONIX RM529 WAVEFORM MONITOR
USED TO CALIBRATE AND MONITOR VIDEO FROM LAUNCHES
19 x 20 x 5½ inch metal, glass, and composite material cathode-ray oscilloscope specifically designed for video-waveform monitoring at television transmitters and studio facilities. Front panel with central glass monitor. Left half of front panel with metal pull-handle, Release knob, labels reading "*MCDONNELL C9103*" and "*NASA CALIBRATION PROGRAM. CALIBRATION NOT REQUIRED. DV QA17*," Tektronix Logo, a Power ON/OFF toggle switch, Trace Rotation port, as well as a Vertical control panel, which includes dials labeled Input, Position, Response, Volts Full Scale, DC Restorer, and Calibrator, two blue metal labels reading "*NASA CAL/CERT KSC Z57923*" and "*NASA CAL MSC C14220*". Labeled "*TYPE RM 529 WAVEFORM MONITOR*" below Vertical Controls. Left half of panel with Serial number 013393, Focus, Intensity and Scall Illum knobs, Horizontal controls, including Position, Display, Mag, Line Selector, Field, and Sync, metal pull handle, and release knob. Labeled "*TEKTRONIX, INC. PORTLAND, OREGON. U.S.A.*" below Horizontal controls. Top cover labeled: "*RM 529. TOP COVER ONLY. 390-0054-00*." Back panel with EXT CAL Inputs, power cable, Fuse knob, EXT NEG SYNC Input, Video Input, and metal label plate reading: "*CONNECTED FOR 115 V. OPERATING RANGE 115 V ± 10%. 50-60~.*"

Introduced in 1966, the Tektronix Type RM529 Waveform Monitor was a self-contained cathode-ray oscilloscope. With it, any portion of the television-signal waveform could be displayed on a 5-inch rectangular cathode-ray tube. Used to monitor the video feed at both the Manned Spacecraft Center in Houston, the famous Mission Control known as the Johnson Space Center after 1973, as well as at the Kennedy Space Center.

$2,000 - 4,000

55 (part)

55 (part)



55 (part)

55
APOLLO TECHNICAL SYSTEMS;
HARDWARE, COMPUTING, GROUND CONTROL.
Collection of 32 vintage gelatin silver prints (ranging from 7 x 9½ to 8 x 10 inches) being primarily press photos (4 French Guyana Press, 3 UNIVAC news, 4 Sperry Rand Corp, 1 Westinghouse, 1- Newsbureau/ BENDIX, 6 German press, 3 NASA, 1 unattributed), ranging in date from 1965-1969.

An excellent collection of photographs of hardware, computing & electrical systems, and the like, including a UNIVAC console, a telemetry receiving system, an inertial guidance system for the Saturbn V, a Crawler, Marshall Center headquarters, assembly of the Apollo X spacecraft, the blockhouse of NASA's Saturn launch complex, the Lunar Module test Article 8, and much more.

$1,500 - 2,500

56

57

58

56
NASA SPACE SHUTTLE FLIGHT DECK SIMULATOR PANEL 08
26½ x 17 inch control panel, in metal, aluminum alloy, copper, plastic, and plastic covered wire, front with 32 toggle switches, 6 rotating dials, and 4-digit number counter. Associated circuitry on back of panel.

Provenance
Property of an institution.

LEARNING TO CONTROL THE SPACE SHUTTLE. Used by astronauts during training, this overhead center right instrument panel contains controls for the Radar Altimeter, Lighting, the OMS Kit, the Forward RCS, and the right seat center console flood.

$3,000 - 5,000

57
SPACE SHUTTLE SIMULATOR MISSION ELAPSED TIME PANEL
Metal and glass rectangular panel, 11 x 5 x 2 inches, labeled "*MET*," left digital screen measuring 2½ x 1½ inches labeled "*DAYS*," right digital screen measuring 5¼ x 1½ inches labeled "*HRS MIN SEC*," 1 x 2½ power port to lower panel.

Provenance
Property of an institution.

Used by NASA on the space missions, most notably those of the Space Shuttle, the *Mission Elapsed Time Panel* (MET) was used to keep times of all events occurring after launch because of the fact that so much of the mission depends on the time of launch. The MET is set to zero at the moment of liftoff, and counts forward in increments of seconds, minutes, hours, and days.

$800 - 1,200

58
SPACE SHUTTLE MID-DECK STORAGE LOCKER WITH UMS ASSEMBLY
Aluminum alloy locker, 18 x 21 x 10½ inches, housing 8 x 8 x 9½ inch Urine Monitoring System (UMS) Assembly, c.1982. Locker exterior painted white, door labelled "*MF71G*" above a rectangular Velcro patch. Door opens on a bottom-mounted hinge and is held closed by a winged screw attached to a bolt at each top corner. The screws are tied to the bolts with short cords when not in place. The four corners of the locker from front to back are each lined with six mounts for affixing screws to bolt the locker in place during flight. The UMS Assembly is made of blue-painted aluminum with four white Velcro rectangles attached to the rear, a 1 x 1½ x 3½ inch depression in its left side and an unpainted metal carrying handle attached to the right side of its front. The top right front corner of the UMS houses a separate black painted aluminum section housing a Lucite-bodied hexagonal screw attached to the UMS body with a short piece of wire. Two metal screws housing partially foil-covered translucent plastic hoses are positioned next to the hexagonal screw on the UMS body and are stenciled "*SSP*." The leftmost hose is bound to a larger, black and blue plastic ribbed tube with black adhesive tape, both of which terminate in a single grey-painted plastic and metal screw assembly. The free end of the tube terminates in a grey-painted hard plastic L-Tube labelled "*C UPC R 6 NIBCO RVC-I*." The rightmost hose is likewise attached to a similar tube and terminates with it at a grey-painted hard plastic tube assembly with a Velcro square attached. The free end of the tube ends in a diagonally cut hard grey-plastic pipe, held in place with a white plastic cuff with an adjustable metal band. Another translucent hose is screwed to the bottom left corner of the UMS with a metal assembly with raised letters and numbers reading "*210 PAT 3,703,528*" below a diamond pattern grip. This hose terminates in a similar metal assembly screw and has a foil covered tube with Velcro and nylon strap attachments at its midpoint. At the center of the UMS' front section is a black-painted circular raised area with an ellipse-shaped hole and a section of grey painted white plastic piping.

Provenance
Property of an institution.

The Mid-Deck of the various Space Shuttles housed numerous storage lockers for holding various kinds of equipment. In this piece's case, the locker held the Shuttle's Urine Monitoring System (UMS), providing for collection, volume measurement, and sampling of void-by-void urine in 0-g or 1-g environments.

$1,000 - 1,500

59

60

59 W
NASA FLIGHT SIMULATOR CHAIR
Flight simulator chair, painted metal with vinyl seat, back, and arm cushions, 32 inches tall, 23 wide and 23 deep, each arm mounted with one 5 x 5 x 5 inch metal box, right box fitted with red press button and toggle switch, with 7½ inch rotational hand controller, left box translational hand controller, each box connected to power box fitted to bottom of seat, one side of power box with red "*ON/OFF*" switch, taped label reading "*JL/RX*," and male power connector, other side connected to cables and marked in black "*JL/TX*" and with male VGA-type connector labelled in marker "*R5232*," underside of chair with blank paper label reading: "*NASA LYNDON B JOHNSON SPACE CENTER. MOVE IDENTIFICATION,* and additionally stenciled "*DATE MFG. CHROMCRAFT CORPORA[TION]. ST. LOUIS, MISSOURI. INT. FED. SPEC. AA-C-00. FSN: 7110-273-8782. OCTOBER 16, 19*[70-illegible]."

This "robotics chair" was used at Johnson Space Center during the early days of the space shuttle program to train astronauts on remote maneuvering systems operations. This meant one of two things, depending on what software was being used. The astronaut could view a screen that showed a virtual Shuttle Remote Manipulator System - the famous 50-foot-long "Canadarm" manufactured in Canada and used to lift satellites out of the cargo bay, or retrieve satellites already in orbit for repair. (The most famous example of this was the re-focusing of the Hubble Space Telescope, which ensured decades of awe-inspiring pictures.) The translational hand control on the left controlled the hand (or "end effector") so it could grapple or release items, while the rotational hand control on the right controlled the pitch, roll, and yaw of the "wrist joint" near the end. This simulated what astronauts in orbit would experience, using similar rotational and translational hand controllers in the orbiter's aft flight deck flight crew station.

Using different software, this same chair was used to simulate the use of thrusters so the space shuttle could maneuver for docking. This first occurred during the STS-71 mission in 1995, when the shuttle *Atlantis* docked with the Russian space station Mir. For the remainder of the space shuttle program, many astronauts arrived at, or left, the International Space Station using the docking maneuvers practiced years before in this simulator.

$2,000 - 3,000

60
SPACE STATION BEAM CONNECTORS
AN EARLY PROTOTYPE DESIGN
A pair of structural beam connectors, each 11 inches long and 3 inches in diameter. Constructed of aluminum alloy with a black paint checker-board design to assist assembly. Opposing U-shaped connectors lock together with a half-twist from either end when mated together.

Some early space station designs from the late 1980's and early 1990's envisioned truss and beam architecture as the core structure for a proposed United States earth orbiting space station. This hardware would be carried into orbit by the Space Shuttle. An astronaut would assemble these components using this type of connector during space walk or ExtraVehicular Activity (EVA).

$700 - 900

62

61

61
LOCKHEED SEQUENCE TIMER ASSEMBLY
Lockheed Missiles & Space Company, 1966.
Metal Sequence Timer Assembly, approx 11 inches tall and 6 inches in diameter, manufacturer label reads: "*LOCKHEED MISSILES & SPACE COMPANY. SEQUENCE TIMER. P/N 1381205-503. CCA NO. 1059 1281. NAS 3-8987. SOE 1389083*." Bottom portion of assembly with four round copper male pin connector ports labeled: "*D2JI*," "*D2J2*," "*D2J3*," and "*D2J4*," base with numerous yellow and white inspection stickers, removable cover stenciled with: "*LMSC FT 87*," "*1062764-5*," and "*S/N 111*," opening to reveal 24 bars each with 5 dials marked with numbers 0-9, rotating with an 18 gear mechanism. With original Engineering Job Release Ticket packet.

Used to provide event programming capabilities in the guidance and control system of an aerospace vehicle.

$800 - 1,200

62
AMERICAN BALLISTIC MISSILE TECHNOLOGY.
POLARIS MISSILE UMBILICAL POWER CABLE AND CANNON ASSEMBLY.
Power cable and cannon assembly in steel, rubber, steel mesh, and plastic covered copper wire. Approx 47 inches long, 2 inches wide at the narrowest point, 6 inches at widest. Spring powered handle labeled "*CANNON*" and with serial number "*GB3PI*", attached to one end of rubber cable labeled "*A3Q63*", printing on handle reads:"*PLUG, UMBILICAL MAIN. CUST. P/N P2363132 REV. LTR. BASIC. CONTRACT NO. NOW63-0050*" and "*CANNON P/N GM100124-1, S/N P1022 ASSY. DATE 3Q63. CANNON ELECTRIC CO*". Plaque with circular panel of perforations labeled "*CANNON*", two 25 inch long metal mesh cables connected to rubber cable, each metal mesh cable with approx 3 inch long section of rubber tubing on one end, labeled :"*TO MISSILE---->*", and two 4 inch sections of rubber tubing at other end, labeled: "*NAME: HOSE ASSY UMBILICAL CABLE. PART NO. 2333530. SER. NO. 103. CONTR. NO. NOW 62 1020*". Each metal mesh cable with two metal hose clamps labeled: "*AEROQUIP. M650076-1. 2333530*" and "*MIL-H-25579. 1500PSI. OCT. 6392582 P*". Metal mesh cables threaded through metal and rubber loop labeled: "*2333522*", ends of cables connected together with coupler labeled "*TITEFLEX. X218-10. PAT. APPLIED FOR.*"

Provenance
Property of an institution.

The Polaris was a solid-fuel nuclear-armed two-stage submarine launched ballistic missile. Built during the Cold War for the United States Navy by Lockheed Missiles and Space Company (now Lockheed Martin), the Polaris had its first test launch at Cape Canaveral on January 7, 1960. While it was not the first submarine launched nuclear missile, its use of solid-propellant propulsion was considered revolutionary, as it permitted a substantial reduction in the size of the missile. Not only was the Polaris substantially smaller and lighter than earlier ballistic missiles, it also benefited from a superior launch system, enabling the missile to be propelled to the surface from a fully submerged submarine. Prior to this, in order to launch a missile, submarines had to surface, placing them at risk of being detected. The Polaris was so successful, that it was later adopted by the British and became the pillar of its nuclear deterrent force during the 1970s and 80s. The umbilical cable was attached to a guidance and control system, providing a path for the exchange of electronic signals between the missile and the submarine before missile launch.

$2,000 - 3,000

63

64

63
MERCURY SPACECRAFT NOSE CONE & ANTENNA COMPARTMENT MODEL
1:3 scale metal nose cone & antenna compartment model for the Mercury spacecraft, 19 inches tall and approx 11 inches in diameter at base. With paper label reading:"*MCDONNELL COMPANY. FIRST FREE MAN IN SPACE*."

Provenance
Property of an institution.

Strapped to the Recovery Section of the spacecraft, the Nose Cone contained the Antenna Compartment. Five antennae were needed to fulfill the mission requirements, due to the wide range of frequencies and types of output - these included a Retro Package HF Dipole antenna and a main Bicone antenna, as well as a compact UHF Recovery antenna, a HF recovery Whip antenna, and an auxiliary UHF Beacon antenna.

$1,000 - 1,500

64
MERCURY SPACECRAFT HEAT SHIELD & RETROPACK MODEL
1:3 scale black & silver metal heatshield & retropack model for the Mercury spacecraft, approx 25 inches in diameter. With paper label reading:"*MCDONNELL AIRCRAFT CORPORATION*."

Provenance
Property of an institution.

The heatshield was located at the base of the spacecraft, and consisted of an aluminum honeycomb covered with multiple layers of fiberglass. Strapped to the heat shield was a retropack, which consisted of three small rockets which were used to brake the spacecraft during re-entry.

$1,000 - 1,500

65

66

65
GEMINI TITAN II ROCKET MODEL
A 1: 36 scale model, resin composite, 36 inches tall on 10 x 8½ x 2 inch wooden base. Base with brass plaque reading *"Gemini Titan"*, and impressed NASA meatball logo in red, white and blue. Philippines, c.2000.

SIGNED and INSCRIBED on capsule:
JIM MCDIVITT. GEMINI IV COMMANDER."

$2,000 - 3,000

66
SATURN V ROCKET MODEL
Model of the Saturn V in two parts (S-IB first stage in one part & S-IVB second stage with Service Module, Command Module, and Launch Escape System in one part), composite material, metal, and wood, 31 inches tall when assembled, approx. 1:140 scale, on 7 x 7 x 1 inch wooden base with metal plaque which reads "*George C. Marshall Space Flight Center. Graphic Engineering and Model Studies Branch. Huntsville, Alabama. SATURN V.*" Many parts identified with decals. Each rocket stage is identified with large red decals near the center point of each stage.

Model of the Apollo launch vehicle. Designed by Werner von Braun, it had a 100% success rate during thirteen flights, including the ten manned missions of Apollo 8-17. To this day it is the tallest, heaviest, and most powerful rocket ever operated.

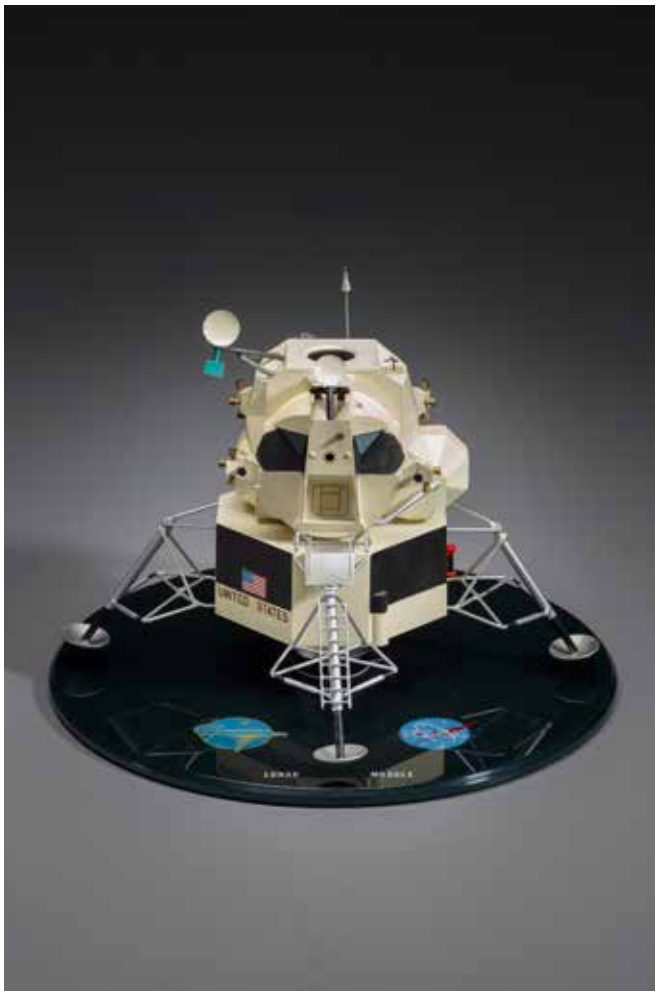
$4,000 - 6,000

67
NASA LUNAR LANDING RESEARCH VEHICLE (LLRV) MODEL
23 x 14 inch model in wood, metal and resin composite, in original NASA box measuring 29 x 21 x 15 inches. Box with NASA "meatball" label, numerous "*Fragile. Handle with Care*" and "*Delicate Instruments. Do Not Drop - Fragile*" labels, and original NASA mailing label addressed : "*US CIVIL SERVICE COMMISSION INCENTIVE AWARDS OFFICE*". Model in need of extensive repairs.
PROVENANCE: From the estate of Col Emil "Jack" Kluever, the only pilot to fly LLRV No 2.

A very rare model of the Lunar Landing Research vehicle.
The Moon landings of 1969 and after were the result of careful simulations run by NASA under the aegis of the Apollo Program. Accordingly, several Lunar Landing Research Vehicles (LLRV) manufactured by Bell Aerosystems Company were tested at Edwards Air Force Base in California by a number of Army and Air Force pilots. A former helicopter test pilot, Col. Emil "Jack" Kluever was the only pilot to fly LLRV No. 2, which was flown six times during its flight test program at Edwards in early 1967.

$3,000 - 5,000

68



69

68
LUNAR ROVER MODEL
A 21 inch long, 14 inch wide approx 1:6 scale, custom built model ca 1969 of the Apollo Lunar Rover, wood, rubber, copper mesh, cloth, gold-colored foil, and metal. With large grey rubber tires and orange painted dust-guards, gold foil covered model camera, copper mesh dish antenna mounted to front center, two side-by-side seats, American flag and control panel decals, and two small, unattached wooden silver painted lunar rakes. Battery wired to underside for movement at one time.

Provenance
From the estate of Academy Award winner Edward Faught.

Edward Faught was awarded an Academy Award in 1970 for his contributions as an Associate Producer on the Academy Award-winning program *Apollo: A Journey to the Moon.* which aired on NBC in November, 1969. It is likely that this model was one built for use on that program.

The Apollo Lunar Rover was designed to operate on the lunar surface despite the low-gravity vacuum of the moon. Three lunar rovers were driven on the moon, first by the Apollo 15 astronauts Jim Irwin and David Scott, second on Apolo 16 by Charles Duke and John Young, and third, on Apollo 17 by Harrison Schmidt and Gene Cernan.

$2,500 - 3,500

69
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 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.

$2,500 - 3,500

70

70
SATURN APOLLO APPLICATIONS CLUSTER CONFIGURATION MODEL
VERY RARE ORIGINAL MODEL OF THE APOLLO APPLICATIONS CONFIGURATION IN ORIGINAL CASE
Model made by the NASA-George C. Marshall Space Flight Center (MSFC) Graphic Engineering and Models Branch in Huntsville, Alabama c.1968. Metal, wood, and plastic, partly transparent, 1/96 scale, 12.5 inches tall. The AAP Cluster features an Orbital Workshop (OWS) section with cut-out portion giving a view onto the activities of three crewmen on two separate platform levels as well as an instrument panel, exercise bicycle, and chair. With two removable OWS Solar Array Panels, Instrumentation Unit (IU) section with removable partially transparent nose-cone, fixed spacecraft Lunar Module Adapter (SLA), Airlock Module, Structural Transition Section, and Multiple Docking Adapter. Also included are a Command Service Module (CSM) section, a Lunar Module (LM) section with Apollo Telescope Mount and four ATM Solar Array Panels. The CSM and LM can be placed in the "docked" position via push-snap connectors located on the Multiple Docking Adapter. Fixed onto a wooden base along with a ground crew member, with MSFC plaque. The whole fitting into an original 16 x 11 x 6.5 inch foam-lined wood carrying case, painted blue, with decals reading "*A.A.P. No. 30*" and "*FRAGILE*," U.S. Government Shipment Label dated 7-12-68, as well as original address labels from the George Marshall Space Flight Center addressed to the Transportation Officer at NASA.

Provenance
Ms. Rose A. Benas, a member of the special staff of the Manned Space Flight Administration, NASA.

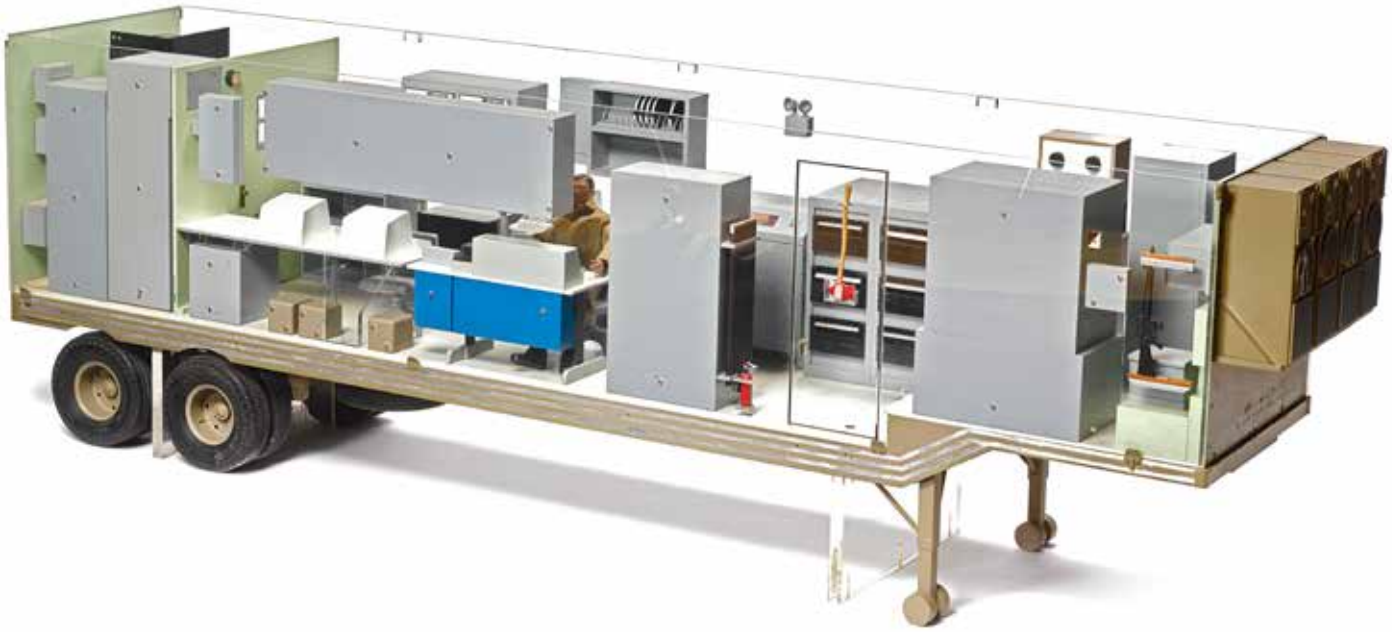
During the mid-1960s, the Apollo Applications Program (AAP) had envisioned not only Earth orbital survey missions but lunar orbit mapping and extended lunar landing flights. Through the later 1960s, AAP was scaled back to Earth orbit operations and utilized the tanks inside the S-IVB. They would not contain fuel but could be turned into a habitable module with scientific equipment stored inside prior to launch. This program, known as SKYLAB, had three manned missions, with visits from a total of nine astronauts from 1973-74.

$6,000 - 8,000

71

71
SPACE SHUTTLE CHALLENGER STACK MODEL
A highly detailed 1:50 scale fiberglass model of the Space Shuttle Challenger, shuttle measures 28 inches tall with 21 inch wingspan, mounted to 37 inch tall orange external fuel tank, and flanked by two white 34 inch tall solid rocket boosters. Mounted onto heavy triangular iron stand, measuring together 45½ inches tall.

$2,000 - 3,000



72 W

HUGE SPACE SHUTTLE COLUMBIA
MOBILE COMMAND CENTER TRAILER MODEL

Over 6 feet long, nearly 2 feet tall, and 15 inch wide detailed hand-built engineer's model on wood base with removable metal back and cover, plexiglass walls giving an unobstructed view of the interior which includes various computer systems, electrical panels, storage cabinets, fans, power boxes, printer, etc, smaller details such as clocks, a first aid kit, fire extinguishers, an escape hatchet, rope and a rifle, and a model of a man sitting at the controls. The various control panels fitted with highly detailed decals, the whole supported with 8 rubber tires at rear reading "*Firestone Transteel Radial. Protector Ply XR4*", additional spare tire mounted to underside, General Electric, ca. 1980.

HUGE DETAILED ENGINEER'S MODEL, THE ONLY ONE BUILT, of a mobile command center trailer used during the space Shuttle *Columbia* landing at Robins Air Force Base, on August 20, 1989. Ferried atop a special NASA Boeing 747 jumbo jet, the *Columbia* was forced to divert its planned landing at the Kennedy Space Center to Robins Air Force Base due to poor weather conditions.

$4,000 - 6,000

72 (detail, interior)

73 (detail, interior)

73 W

HUGE SPACE SHUTTLE COLUMBIA
MOBILE GROUND CONTROL BUS MODEL

5 feet long, 1 foot 4 inches tall, and 1½ foot wide detailed hand-built engineer's model in metal and composite materials, large plexiglass viewing window on roof and at rear giving unobstructed view of the interior which includes various computer systems, electrical panels, power boxes, as well as a model of a man sitting at the controls. The various control panels fitted with highly detailed decals, the whole supported with 6 rubber tires reading "*Firestone Transteel Radial. Protector Ply XR4*," decal below passenger and driver side windows read: "*US AIR FORCE. 81C 940. FOR OFFICIAL USE ONLY*," decals on rear viewing window read: "*US AIR FORCE 81C 940*, and "*AFMPC RAFB*," front license plate reads *AFMPC RAFD*." General Electric, c.1989.

HUGE DETAILED ENGINEER'S MODEL, THE ONLY ONE BUILT, of a mobile command center bus used during the space Shuttle *Columbia* landing at Robins Air Force Base, on August 20, 1989. Ferried atop a special NASA Boeing 747 jumbo jet, the *Columbia* was forced to divert its planned landing at the Kennedy Space Center to Robins Air Force Base due to poor weather conditions.

$3,000 - 5,000

74 W

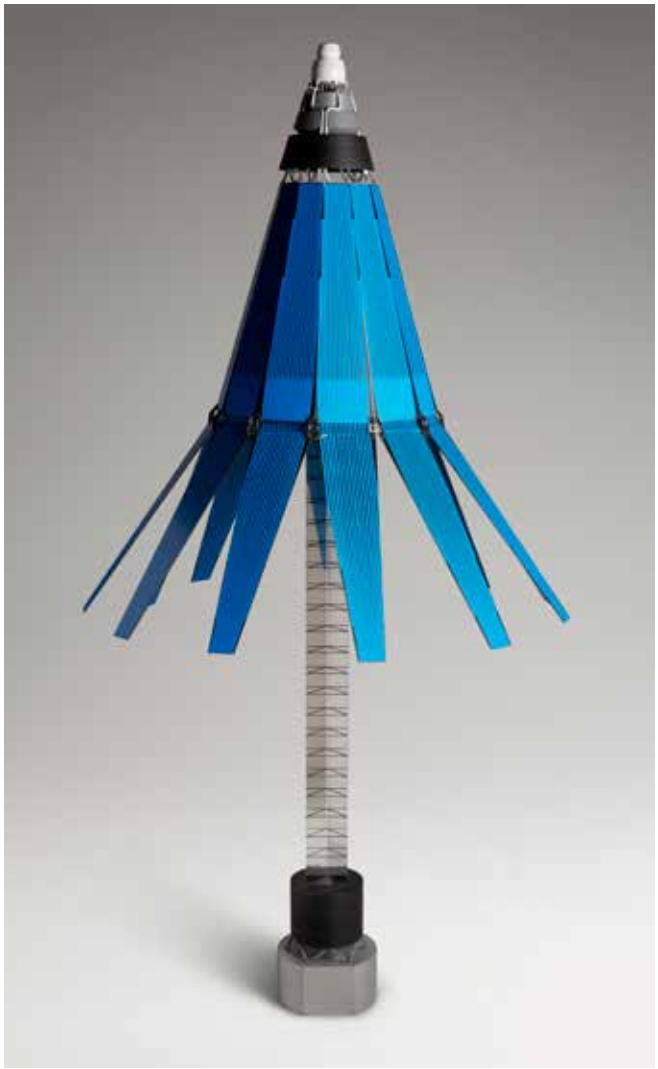
HUGE SPACE SHUTTLE COLUMBIA
MOBILE GROUND CONTROL ARMY JEEP AND TRAILER

4 feet 2 inches long, 1 foot 2 inches wide, and 2 feet tall detailed hand-built engineer's model of an Army Jeep, with 2 feet 1 inch long, 1 foot 2 inch wide and 1 foot 2 inch tall trailer, both in metal and composite materials, plexiglass viewing windows on roof, back and sides giving unobstructed view of the interior which includes various computer systems and electrical panels. The various control panels fitted with highly detailed decals, the whole supported with 12 rubber tires, plus 1 spare, reading "*Firestone Transteel Radial. Protector Ply XR4*," stencils on either side of hood and at bumper read "*US ARMY. NLO92Q*," a few decals to exterior, including two inclinometers, trailer stenciled on either side with "*WARNING NOISE AREA. MAY CAUSE HEARING LOSS. USE PROPER EAR PROTECTION*", back of trailer stenciled with "*OPEN TO RUN*". General Electric, c.1989.

HUGE DETAILED ENGINEER'S MODEL, THE ONLY ONE BUILT, of a mobile command center Army Jeep and trailer used during the space Shuttle *Columbia* landing at Robins Air Force Base, on August 20, 1989. Ferried atop a special NASA Boeing 747 jumbo jet, the *Columbia* was forced to divert its planned landing at the Kennedy Space Center to Robins Air Force Base due to poor weather conditions.

$3,000 - 5,000

74 (detail, interior)



75

76

75
GEODETIC SATELLITE MODEL
Large scale model of a Geodetic Satellite. 37½ inch tall plexiglass pole topped with 16½ inch tall conical satellite with ten 21 inch long folding blue panels.

Employed by the United States Navy, the GeoSat was an Earth observation satellite launched in 1985. The goal of the GeoSat mission was to provide information on the marine gravity field.

$1,500 - 2,500

76
LANDSAT III SATELLITE MODEL
1:4 scale model satellite by General Electric, c.1977. Metal & wood, with mirrored panels on sensory ring, and various antennae. 16 x 15 inches on 16½ x 16½ x 1½ inch wooden base. Base with blue plaque which reads: "*LANDSAT 3. GENERAL ELECTRIC. SCALE 1/4*." WITH: *NASA Landsat 3 Reference Manual*, Valley Forge Space Center, General Electric Space Division, c.1978.

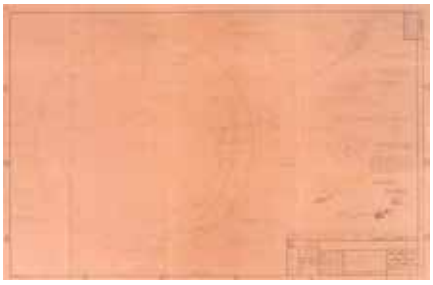
A large scale model of the lower portion of the Landsat 3 satellite. The Landsat program was implemented to use Earth Resources Survey Satellites as a research tool to show that remote sensing from space is a practical approach to efficient management of Earth's resources.

$3,000 - 5,000

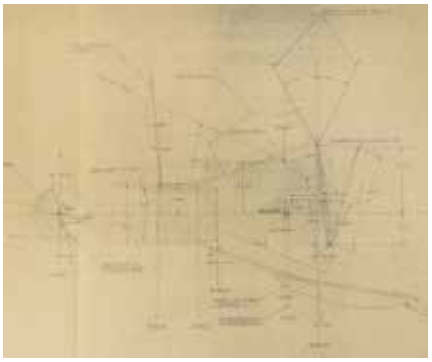
PROJECT MERCURY
Lots 77 - 98

Lot 92

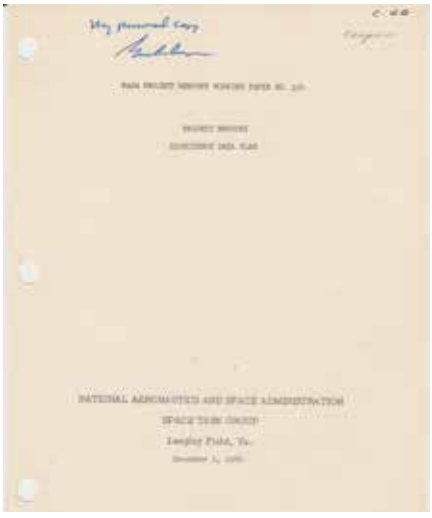
77



78



79 (part & detail)



80 (part)

77
MCDONNELL MERCURY BROCHURE, SIGNED
PROJECT MERCURY. 4 pp. 11 x 9 inches. SIGNED and INSCRIBED with their respective spacecraft and flight designations: "*Scott Carpenter, Aurora 7; Gordon Cooper, Faith 7*" and "*Wally Schirra ∑(Sigma) 7.*"

Descriptions of all critical Mercury flight phases are provided with eight artist illustrations. The cover portrays the Mercury spacecraft in earth orbit with the moon seen in the distance.

$400 - 600

78
MERCURY HEAT SHIELD DRAWING BLUEPRINT, SIGNED
SIGNATURES INCLUDE MERCURY SPACECRAFT DESIGNER DR. MAX FAGET
E. O. Extension Drawing blueprint. McDonnell Aircraft Corporation, St. Louis, MO, March 28, 1961. 22 x 34 inches, folded, 1/4 scale and as noted. Stamped: "Reference Only, APR 10, 1961."

BOLDLY SIGNED by SCOTT CARPENTER and WALLY SCHIRRA. SIGNED and INSCRIBED: "*GORDON COOPER, Faith 7*" and "*MAX FAGET, Mercury Designer.*"

Illustrated is a 1/4 scale circular Mercury heat shield showing structural points with respective angular distance in degrees. Outer skin bolt pattern placements are marked representing 219 equal spacings. Twenty-four cutouts are shown with a single full scale detail of a fitting designed to be inserted into each cutout with printed information reading: "Max. gap between fitting and cutout .05, surfaces of cutout to be covered with .0015 or .002 Inconel foil. Inconel foil to be spot welded, max. spot weld spacing .25." Another full scale drawing is a cross section of the outer edge heat shield and spacecraft side wall.

$800 - 1,200

79
MERCURY PARAGLIDER BLUEPRINT, SIGNED BY MAX FAGET
GEOM(ETRY) MERCURY PARAGLIDER CONTROL AND STORAGE blueprint. McDonnell Aircraft Corporation, St. Louis, MO, May 24/25, 1961. 24 x 50 inches, folded, 1/10 scale.

BOLDLY SIGNED and INSCRIBED: "*MAX FAGET, Mercury Designer.*"

Illustrated are side and aft views of the Mercury spacecraft with paraglider airfoil control attach points, associated center-of-gravity (CG) marks, and astronaut hatch location. The placement of the heatshield under the spacecraft is shown and described: "*...lowered serves as landing skid and shock absorber.*" Astronaut viewing lines are drawn being defined as maximum up vision and down vision. A separate drawing shows the paraglider stowage location in the spacecraft nose section.

The Mercury paraglider was a concept for returning the spacecraft to dry land using a triangular shaped inflatable airfoil. This would save the expense of numerous U.S. armed forces ships and aircraft during an ocean landing. Various engineering problems prevented the paraglider's use in time for the Mercury Program, but the concept was modified for use in "hang gliding" just a few years later.

$700 - 900

80
GORDON COOPER'S INTERNAL DOCUMENT FROM LANGLEY FIELD, VA, SIGNED
INCLUDED IS COOPER'S 7 PAGE MERCURY ASTRONAUT BIOGRAPHIES DOCUMENT
Project Mercury Bioscience Data Plan, NASA Project Working Paper No. 164. Langley Field: NASA Space Task Group, December 1, 1960. 10½ x 8 inches. 9 pp. Cream card stock covers, punched. Internal distribution copy with manuscript "*C. 23*" (Copy 23) written at the upper right hand corner. SIGNED at the upper right hand corner: "*Cooper*" by Gordon Cooper in 1960 upon receiving this copy.

Cooper had particular interest in this subject because his flight was the longest of the Mercury Program, some 34 hours in space. Manned space exploration covered not only observations about the unexplored reaches beyond the Earth's atmosphere but physical and mental reactions to man within this environment. The document describes plans for physiological and psychological measurements during the prelaunch, flight, and post flight periods. An operational overview of the Mercury spacecraft environmental control system is included plus the method to record astronaut biomedical data.

ADDITIONALLY: *Biographies, Project Mercury Astronauts.* Washington, DC: NASA, May 1961. 10½ x 8 inches. 7 pp. Cream card stock covers, punched.

Issued just prior Alan Shepard's first manned Mercury flight and contains a full one page biography on each of the seven Mercury astronauts in alphabetical order: Carpenter, Cooper, Glenn, Grissom, Schirra, Shepard, and Slayton. Date of birth, educational background, military service, and family information are some of the biographical information included.

BOTH documents are INSCRIBED and SIGNED: "*My Personal Copy, GORDON COOPER*" on the front cover page.

$400 - 600

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

81
GORDON COOPER'S MERCURY PHOTOGRAPH COLLECTION
IN HIS SIGNED LETTER: "A BIT OF HOT WATER WITH THE NASA BRASS"
A group of 25 black and white photographs, all 8 x 10 inches with most having printed captions on verso. Features astronaut training, spacecraft development, mission related photographs from Cooper's Mercury Atlas 9, and various other Mercury subjects.

With GORDON COOPER'S signed provenance letter, reading in part: "*The enclosed 25 Mercury photographs really provide a visual representation of the amazing pace of events that occurred during the Mercury Program which enabled Gemini and Apollo to succeed. It really was the golden age of space exploration and it was over in just a few short years. Many of us in the astronaut corps thought that the next 30 years after the moon landings would result in even greater achievements, but sadly that has yet to happen.*
Looking through this set of Mercury photographs brings back my memories of those very challenging and busy days. It was a time that I will always remember." The letter has three additional paragraphs describing his two spaceflights, back-up crew assignments and includes the Gemini 5 crew emblem description: "*Our logo was 8 Days or Bust which got Pete and me in a bit of hot water with the NASA brass. But Gemini 5 made it through all eight days....*"

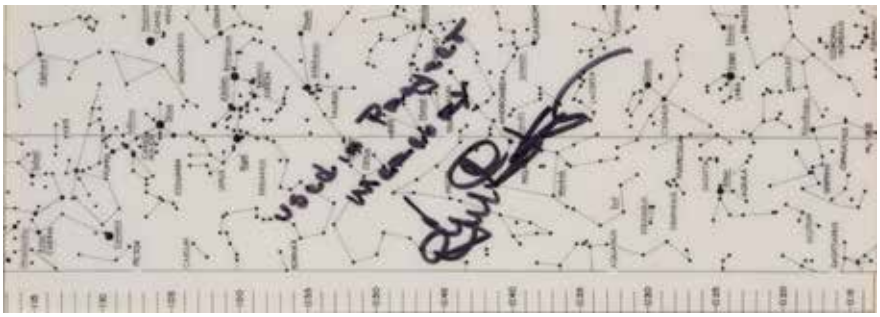
$500 - 700

82
THE MERCURY MISSION CONTROL CENTER, SIGNED
Black and white photograph, 8 x 10 inches, October 1960. Printed captions on verso reading in part: "*Mercury Control Center Main Control Room, RCA Inspector – Acceptable.*"

SIGNED by SCOTT CARPENTER, GORDON COOPER, and WALLY SCHIRRA.

An early photograph of the just completed Mercury Control room showing two rows of consoles, the large earth orbit map with associated ground tracking stations, countdown clock, elapsed time clock, orbit counter, retrofire countdown clock, and numerous other flight information displays.

$400 - 600



83 (part)

83
GENE KRANZ - MERCURY, GEMINI & APOLLO COLLECTION
Together three items. 1. Rectangular star chart, 3¾ x 10 inches. Laminated, one hole punched at head of chart. 2. 14 x 11 inch NASA "*Superior Achievement Award*" awarded to Kranz, dated November 23, 1966. 3. 10 x 8 inch black & white photo of Gene Kranz at mission control smoking a cigar.

STAR CHART SIGNED & INSCRIBED: "*USED IN PROJECT MERCURY. EUGENE KRANZ*." Part of a full set of charts used by the Mercury astronauts. The chart was used in conjunction with a clear plastic overlay which was in the shape of a spacecraft window. By doing so, the astronaut was able to have the same view as would an astronaut from the space capsule window. The "*Superior Achievement Award*" was given to Kranz in "recognition of [his] outstanding contribution to the manned space flight program" during the Gemini program, and the photo, which is SIGNED EUGENE KRANZ, depicts Kranz smoking a celebratory cigar following the safe return of Apollo 13.

$1,000 - 1,500

84
JOHN GLENN PREPARES FOR HIS ORBITAL FLIGHT
Black and white photograph, 10 x 8 inches, printed NASA captions on verso.

SIGNED by JOHN GLENN.

Astronaut Glenn wearing his space suit and helmet enters his *Friendship 7* spacecraft during tests at Cape Canaveral.

$500 - 700

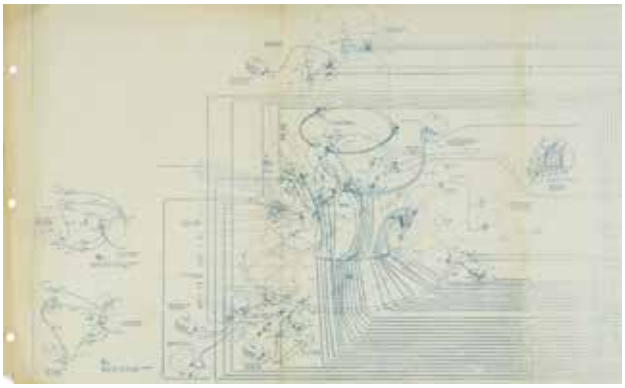
81

82

84

87

85



86 (part & detail)

85
MERCURY ASTRONAUT SIGNED GLENN FIRST DAY COVER
ISSUED ON THE DAY OF JOHN GLENN'S ORBITAL FLIGHT
Postal envelope having a First Day of Issue Cape Canaveral postmark dated February 20, 1962, 4 x 6 ½ inches. The envelope features the 4 cent "*U.S. Man in Space Project Mercury*" stamp first issued on this date.

SIGNED by JOHN GLENN, ALAN SHEPARD, D. K. SLAYTON, SCOTT CARPENTER, GORDON COOPER, and WALLY SCHIRRA. Additionally SIGNED by BETTY GRISSOM representing her late husband Virgil "Gus" Grissom who was lost during the Apollo 1 launch pad fire of 1967.

$1,200 - 1,800

86
WALLY SCHIRRA'S MERCURY SPACECRAFT BLUEPRINT, SIGNED
ILLUSTRATES THE COMPLEXITIES HIS SPACECRAFT S/C NUMBER 16 Hunts(ville) Hangar & Redstone Pad Routing Chart Schematic, Redstone Pad, Capsule 15, 16, & 17 blueprint, McDonnell Aircraft Corporation, Saint Louis, MO, c.1960. 12 x 39 inches, folded. 1/3 scale of master drawing.

Blueprint BOLDLY SIGNED and INSCRIBED: "*WALLY SCHIRRA, S/C # 16.*"

An outline drawing of the Mercury spacecraft is illustrated having the relative locations of onboard electrical components and their associated pad test cables. Placement of various "squib" and booster simulators are shown, plus a drawing of the pre-launch cooling assembly.

Included is a typed letter on WALLY SCHIRRA's personal stationery, having the WSM watermark, reading in part: "*Attached is an interesting blueprint diagram that we used back during my Mercury days. It is one of the many essential items such as manuals, checklists, diagrams, and charts that we Mercury astronauts used on a daily basis to prepare for flights into the unknown. This particular blueprint shows a representative outline of Mercury capsules 15, 16 and 17. We later used capsule (spacecraft or S/C) number 16 from my six orbit Sigma 7 flight during October 1962. There were a large number of tests performed on each Mercury vehicle by McDonnell personnel.... I have signed this blueprint and written my S/C number (16) on the right side of this blueprint.*"

$800 - 1,200

87
MERCURY ATLAS 8 ORBITAL CHART FOR *SIGMA 7***, SIGNED**
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 x 33 inches.

INSCIRBED and SIGNED: "*The Six Orbits of Sigma 7, WALLY SCHIRRA*" along the bottom center.

All six orbits of the MA-8 flight are plotted with circles representing the foot print for ground coverage by the Mercury world-wide tracking stations. Schirra has inscribed the date and time of his launch near the Cape Canaveral area of the chart with: "*7:15 am, 3 Oct '62*" and his flight time "*9 hr 13m*" near the splashdown bull's eye close to Midway Island in the Pacific Ocean.

$600 - 800

88
MERCURY-ATLAS 8
1 x 1 x 1 ionch cube FLOWN heat shield plug from *Sigma 7*, mounted on 3¾ x 3¾" wood base, base with metal plaque which reads "*HEAT SHIELD FROM 'SIGMA SEVEN.' MERCURY-ATLAS 8. WALTER M. SCHIRRA. OCTOBER 3, 1962.*"

FLOWN heat shield plug from the fifth US manned spaceflight. During his 9-hour mission, Schirra orbited Earth six times.

$800 - 1,200

89
SCHIRRA AND *SIGMA 7* **LIFT OFF FROM COMPLEX 14**
Color photograph, 10 x 8 inches. SIGNED and INSCRIBED: "*WALLY SCHIRRA, ∑ (Sigma) 7, OCT 62.*"

A wide angle view of Launch Complex 14 at Cape Canaveral showing the Mercury Atlas 8 vehicle as it climbs past the bright red launch gantry.

$400 - 600

90
SCHIRRA IN ORBIT
Color photograph, 8 x 10 inches. SIGNED by WALLY SCHIRRA.

A close-up of Schirra inside his spacecraft during his six orbit flight of October 3, 1962.

$300 - 400

91
FAITH 7 **LAUNCH CLOSE-UP**
Color photograph, 10 x 8 inches. INSCRIBED and SIGNED: "*Faith 7 Launch, 15 May 1963, GORDON COOPER.*"

Flames of the Atlas rocket are clearly seen as Cooper's Faith 7 spacecraft moves past the launch gantry.

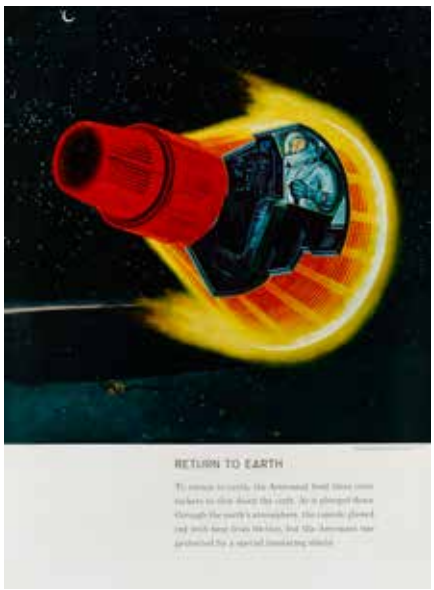
$300 - 400

89

90


88


91



92 (part)

92 (part)

92 (part)

92
PROJECT MERCURY MANNED SPACE FLIGHTS POSTER EXHIBIT
US ASTRONAUT ORBITS EARTH PAPER SHOW.
8 linen-backed color posters, 33 x 38 inches,
with original black & white exhibit instruction sheet, ca. 1963.

An excellent and rare collection of large exhibit posters apparently produced by the United States Information Agency to promote Project Mercury. This type of poster exhibit was never intended for sale to the public, and would have been sent by the USIA to U.S. Embassies around the world to showcase Project Mercury. We have not seen another complete set come to market. The first poster with portraits and information on the 6 flown Mercury Astronauts; the second with information and photos of the Project Mercury Mission Control Room at Cape Canaveral on February 20, 1962; the third with a photo of an unidentified Mercury astronaut in his silver spacesuit, as well as of the launch of the Mercury Atlas rocket; the fourth of an unidentified astronaut in his silver spacesuit floating against a black background; the fifth with an illustration of the Mercury capsule in flight around the Earth; the sixth with an illustration showing a cross section of the Mercury capsule; the seventh with an illustration with cross section of an astronaut in the capsule as it re-enters earth's atmosphere, the capsule glowing red with friction; the eighth with three photos showing the recovery of the capsule including it's return to earth via parachute, it floating in the ocean, and it being lifted by rescue helicopters to an aircraft carrier.

$1,000 - 1,500

93

94 (part)

93
RESULTS OF THE FIRST, SECOND & THIRD MANNED ORBITAL SPACEFLIGHTS
SIGNED BY GUS GRISSOM, JOHN GLENN, SCOTT CARPENTER, & WALLY SCHIRRA
Together four (4) reports, each 10¼ x 7¾ inches.
All in original blue printed wrappers.

1. *Results of the First United States Manned Orbital Space Flight*, February 20, 1962. [Houston]: MSC, [1962]. 204 pp.
SIGNED & INSCRIBED: "*TO PETE GIST & FAMILY. GUS GRISSOM*" on upper cover.
2. Another copy.
SIGNED & INSCRIBED:"*BEST REGARDS. JOHN GLENN, JR.*" on title page.
3. *Results of the Second United States Manned Orbital Space Flight, May 24, 1962*. Washington: GPO/NASA SP-6, 1962. 107 pp.
SIGNED by SCOTT CARPENTER on upper cover.
4. *Results of the Third United States Manned Orbital Space Flight, October 3, 1962*. Washington: GPO/NASA SP-12, 1962. 120pp.
SIGNED and INSCRIBED: "*LEO - I DIDN'T SEE YOU THERE WITH ME, BUT THE FEELING THAT YOU WERE THERE WAS MOST APPARENT - WALLY SCHIRRA.*"

Flight results include spacecraft systems, photography and space science experiments, re-entry and recovery issues, spacecraft and launch vehicle performance, mission operations, aeromedical analysis, plus a pilot's report.

$1,200 - 1,800

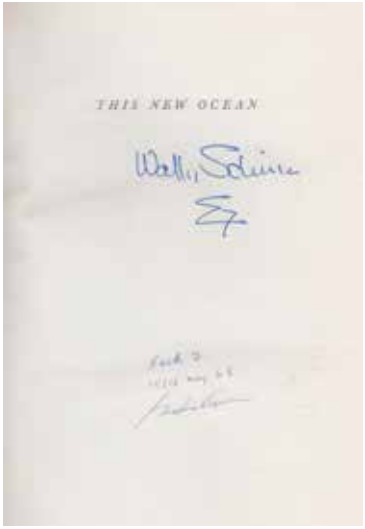
94
MERCURY ASTRONAUT TRAINING AND FLIGHT INFORMATION, SIGNED
ASTRONAUT TRAINING, FACT SHEET #290. Houston: NASA, MSC. Illustrated, 8 pp, 10½ x 8 inches. Features the Mercury Astronauts in their spacesuits on the cover page. Additional photographs and text describe training by the newly selected Gemini and first Apollo astronauts (Groups Two and Three).

Project Mercury, Launch Chronology. Houston: NASA, MSC. Single sheet, 10½ x 8 inches. Details Mercury flights from August 1959 to May 1963, including Little Joe, Redstone, and Atlas.

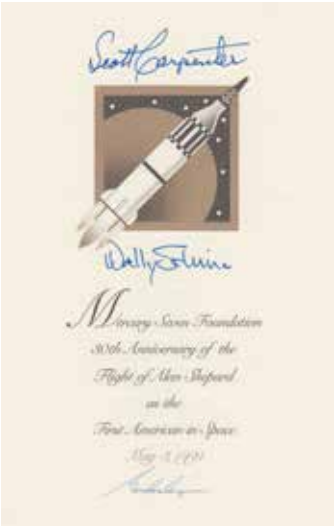
BOTH documents are SIGNED by SCOTT CARPENTER, GORDON COOPER, and WALLY SCHIRRA on the front page.

$500 - 700

95



96



97

95
SURVIVAL SCHOOL FOR THE MERCURY 7, SIGNED BY 6
10 x 8 inch black & white photograph of the original Mercury 7 in desert training garb.

SIGNED BY: GORDON COOPER, SCOTT CARPENTER, JOHN GLENN, ALAN SHEPARD, WALLY SCHIRRA, and DEKE SLAYTON.

Before being allowed to fly, NASA wanted to ensure that its Mercury 7 astronauts could survive in the event of a crash landing upon re-entry. This image depicts the Mercury 7 in desert training garb while at the first survival school, which took place in the deserts of Nevada in 1960.

$1,200 - 1,800

96
SWENSON, LOYD S., JAMES M. GRIMWOOD AND CHARLES C. ALEXANDER
THIS NEW OCEAN. A HISTORY OF PROJECT MERCURY. Washington: GPO/ NASA SP-4201, 1966. 681 pp. Illustrations and diagrams, two folding charts. 10 x 7 ½ inches. Original cloth.

INSCRIBED and SIGNED on the half-title page: "*Faith 7, 15/16 May 63, GORDON COOPER*" and "*WALLY SCHIRRA ∑ (Sigma) 7.*"

One of the most detailed publications ever written on Project Mercury. Subjects include early design and flight concepts, spacecraft and booster development, test flights, and mission support. All six manned Mercury flights are reviewed in minute detail.

$300 - 400

97
ALAN SHEPARD AND *FREEDOM 7*, THIRTY YEARS LATER, SIGNED
Event Program, Mercury Seven Foundation. Washington, DC, May 3, 1991. 8 pp, 8 ½ x 6 inches, staple binding with a single sheet insert.

SIGNED by SCOTT CARPENTER, GORDON COOPER, and WALLY SCHIRRA on the front cover.

Describes the celebration dinner for Alan Shepard and the 30th anniversary of the first manned Mercury flight, Freedom 7. The Mercury Seven Foundation, founded by the Mercury Seven Astronauts, provides college scholarships to deserving students. This evening's activities were hosted by retried NBC-TV/Radio reporter Roy Neil.

$400 - 600

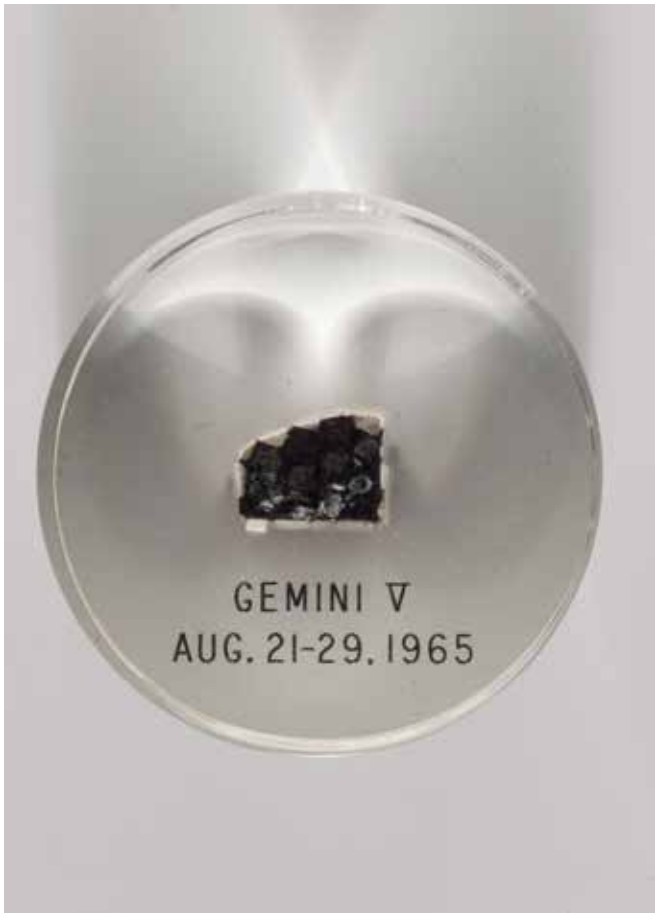
98
MERCURY 7—SIGNED THE FIRST FOUR AMERICANS TO ORBIT THE EARTH
RASMUSSEN, ROBERT L., ARTIST. *Mercury 7. Space ... The Pioneers.* National Aviation Museum Foundation. 21 x 29 inch lithograph, signed and numbered in pencil to lower right by artist.

LIMITED EDITION, NO 247/300. SIGNED by JOHN GLENN, SCOTT CARPENTER, WALLY SCHIRRA and GORDON COOPER, four Mercury astronauts and the first four Americans to orbit the Earth, which they did on the Atlas Rocket. The print depicts the *Atlas Rocket* blasting into orbit, with a Project *Mercury* insignia in the foreground.

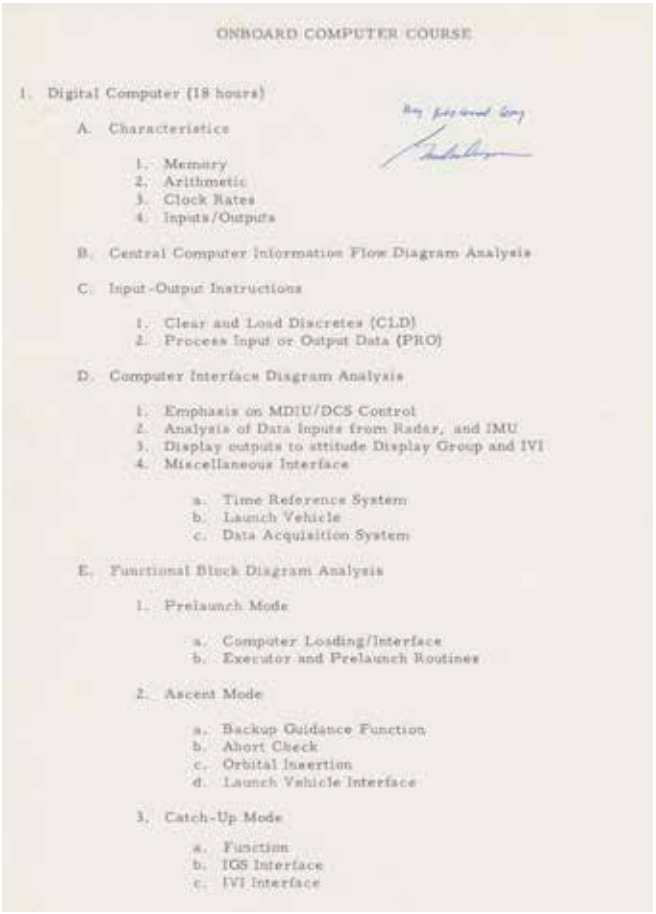
$2,000 - 3,000

PROJECT GEMINI
Lots 99 - 110

Lot 109



99



ONBOARD COMPUTER COURSE

1. Digital Computer (18 hours)

A. Characteristics

1. Memory
2. Arithmetic
3. Clock Rates
4. Inputs/Outputs

B. Central Computer Information Flow Diagram Analysis

C. Input-Output Instructions

1. Clear and Load Discretes (CLD)
2. Process Input or Output Data (PRO)

D. Computer Interface Diagram Analysis

1. Emphasis on MDIU/DCS Control
2. Analysis of Data Inputs from Radar, and IMU
3. Display outputs to attitude Display Group and IVI
4. Miscellaneous Interface

a. Time Reference System
b. Launch Vehicle
c. Data Acquisition System

E. Functional Block Diagram Analysis

1. Prelaunch Mode

a. Computer Loading/Interface
b. Executor and Prelaunch Routines

2. Ascent Mode

a. Backup Guidance Function
b. Abort Check
c. Orbital Insertion
d. Launch Vehicle Interface

3. Catch-Up Mode

a. Function
b. IGS Interface
c. IVI Interface

100 (part)

THE FOLLOWING TWO LOTS WERE ORIGINALLY IN THE COLLECTION OF ASTRONAUTGORDON COOPER

99
GORDON COOPER'S FLOWN GEMINI 5 HEAT SHIELD SEGMENT
EXPOSED TO SPACE FOR A THEN WORLD RECORD OF 8 DAYS FLOWN
Gemini 5 heat shield approximately ¾ x ¾ x 2 inches.
Encased in a Lucite cylinder 3 inches tall and 3 inches in diameter.
The base of the cylinder in engraved: "*GEMINI V, AUG. 21-29, 1965.*"

With L. GORDON COOPER's signed provenance card which reads: "*This ablative material was taken from the Gemini V spacecraft after the flight. I was commander of the mission. Charles Conrad and I flew a record breaking eight day flight. Our successful completion of Gemini V marked the beginning of the U.S. lead in manned space exploration. I was presented this heat shield segment in a ceremony after the flight.*"

The card is signed: "*L. GORDON COOPER,*"
a rare form of his signature.

$2,000 - 3,000

100
COOPER'S 1965 GEMINI 5 TRAINING SHEETS, SIGNED
ONBOARD COMPUTER COURSE. March, 1965. 2 pp. 10 x 8 inches, loose leaf. Details of an 18 hour Gemini digital computer course and outlines flight phases for computer use.
LOGIC CHOICE. 1965, single sheet, 10 x 8 inches. Lists computer code logic for various functions.

The first is INSCRIBED and SIGNED: "*My personal copy, GORDON COOPER*" and the second is INSCRIBED and SIGNED: "*My personal training notes from 1965, GORDON COOPER.*"

Additionally, Cooper's two carbon copies, each 8 ½ x 5 inches, of his military eyewear prescription dated 12 DEC 73. One is stamped in red ink: "*Impact Resistant Lenses, Conforms to FDA Regulations, Glass – Plastic.*"

$300 - 400

101

102 (part)

101
PREPARING FOR EIGHT DAYS OR BUST, CREW SIGNED
Color photograph, 8 x 10 inches. SIGNED and INSCRIBED: "*GORDON COOPER, Gemini V - Cdr*" and "*CHARLES CONRAD, Gemini V PLT.*"

Cooper and Conrad pause for a photograph during training while wearing their spacesuits and flight helmets.

$500 - 700

THE FOLLOWING LOT WAS ORIGINALLY IN THE COLLECTIONS OF ASTRONAUTS TOM STAFFORD AND WALLY SCHIRRA

102
PHOTOGRAPH COLLECTIONS FROM THE GEMINI 6 CREW
First, a group of 30 black and white photographs from Stafford's days as a Gemini astronaut, including flight and training photographs from his Gemini 6 and 9 missions. 10 x 8 inches with most having printed captions on verso.

With TOM STAFFORD'S signed provenance note, reading: "*The enclosed 30 photographs show some of the training and flight events from my two Gemini missions. Several of my fellow Gemini Astronauts are shown during training activities. There are a few of me at the McDonnell manufacturing plant during Gemini spacecraft familiarization activities.*
My first space mission was Gemini 6 with Wally Schirra in command. We made the world's first manned spacecraft rendezvous with Gemini 7 already in orbit on December 15, 1965. My next flight was command of Gemini 9 in June 1966. We planned to dock with a vehicle already in orbit but the launch shroud failed to jettison. It really looked like an 'angry alligator' up there in earth orbit.
I then commanded the Apollo 10 lunar mission of May 1969 and the Apollo Soyuz mission in July of 1975. These photographs illustrate how Gemini Program activities were critical steps in our national effort to achieve a lunar landing before the end of 1969."

Second, a group of 18 black and white photographs from Wally Schirra's personal collection made on trips during his NASA days and when working in private industry. Events include his receiving awards, an honorary degree received while in Pittsburgh, PA, and western United States adventures and gags. Sizes vary from 5 x 3 to 10 x 8 inches with some having notes or ID stamps on verso. With a 4 x 7 inch envelope with Schirra's Rancho Santa Fe, California address printed on verso.

$500 - 700

THE FOLLOWING TWO LOTS WERE ORIGINALLY IN THE COLLECTION OF ASTRONAUT TOM STAFFORD

103
STAFFORD'S MEDALLION CARRIED ON GEMINI 6
MEDALLION CARRIED ON THE FIRST SPACE RENDEZVOUS
FLOWN Gemini 6 medallion, sterling silver, 1 inch in diameter. Carried on the Gemini 6 flight by Tom Stafford. The crew mission emblem is on the obverse with the flight dates engraved on the reverse. Affixed to and removable from a Typed Card Signed by TOM STAFFORD.

WITH TOM STAFFORD'S signed provenance card, reading in part: "*The Gemini 6 medallion attached to this card is one that I carried on the Gemini 6 flight of December 15 – 16, 1965. The flight was commanded by Wally Schirra who was selected as one of the first NASA astronauts in 1959. Wally and I made the world's first manned spacecraft rendezvous with Gemini 7 already in orbit on December 15. This was one of the most important accomplishments of the entire Gemini Program. Rendezvous would be one of the flight techniques used during Apollo to enable lunar surface exploring astronauts to return from the moon after landing.*"

$1,000 - 1,500

104
STAFFORD'S GEMINI POSTAL ENVELOPES WITH LETTERS
STAFFORD TELLS OF THE TRAGEDY DURING GEMINI 9 TRAINING
The first postal envelope has a US Navy Recovery Force rubber stamp cachet. USS *Wasp* postmark dated December 16, 1965, the splashdown date of Gemini 6. SIGNED by WALLY SCHIRRA and TOM STAFFORD. The 4 x 6 ½ inch envelope is displayed between paragraphs of a Typed Letter Signed by THOMAS STAFFORD.

THOMAS P. STAFFORD'S signed provenance letter reads in part: "*The Gemini 6 envelope displayed below is from my personal collection. The envelope was postmarked on the splashdown date of Gemini 6 – December 16, 1965. Gemini 6 was my first space mission with Wally Schirra as commander. We made the first manned space flight rendezvous with Gemini 7 already in orbit. Our flight proved that orbital rendezvous was indeed possible which was a critical step to enable the Apollo Program to accomplish President John F. Kennedy's goal of making the first manned lunar landing before the end of the 1960s.... Wally and I signed this envelope after our Gemini 6 flight.*"
The second postal envelope has an Orbit Covers cachet featuring the Gemini 9 "crews" and related mission events. Cape Canaveral postmark dated 3 June 1966, the launch date of Gemini 9. SIGNED by GENE CERNAN and TOM STAFFORD. The 4 x 6 ½ inch envelope is displayed between paragraphs of a Typed Letter Signed by THOMAS STAFFORD.

THOMAS P. STAFFORD'S signed provenance letter reads in part: "*The Gemini 9 envelope displayed below is from my personal collection.... It has images of the first crew for Gemini 9, Commander Elliott See and Charles Bassett. Sadly, they were both killed in a T-38 crash near the McDonnell manufacturing plant at St. Louis where the Gemini 9 spacecraft was being built. I was then named commander of Gemini 9 which was my second space mission with Eugene Cernan as pilot.*

As with my first space mission, an Agena rendezvous target vehicle failed to reach orbit prior to our Gemini 9 launch. The NASA team was able to fly a smaller vehicle known as the ATDA, or Augmented Target Docking Adapter. A protective aerodynamic shroud failed release completely preventing a planned docking. I called the ATDA an angry alligator during the flight. Gene was able to make a spacewalk on Gemini 9 but his space suit helmet visor fogged-up restricting his vision. Only after some very tense moments both in space and with controllers on the ground was Gene finally able to climb back into Gemini 9. We returned to earth on June 6, 1966...."

$600 - 800

105
RENDEZVOUS WITH GEMINI VII— SIGNED BY STAFFORD & SCHIRRA
Approx 8 x 9½ inch color photograph of the Gemini VII spacecraft. Matted, glazed and framed together with Gemini VI cover, and American flag patch to 12½ x 22½ inches.

SIGNED: "*TOM STAFFORD*" and "*WALLY SCHIRRA*." This striking image depicts the Gemini VII spacecraft with nose towards the camera, Earth in the background. Taken from the Gemini VI spacecraft during rendezvous on December 15, 1965.

$600 - 900

103

104 (part)


105

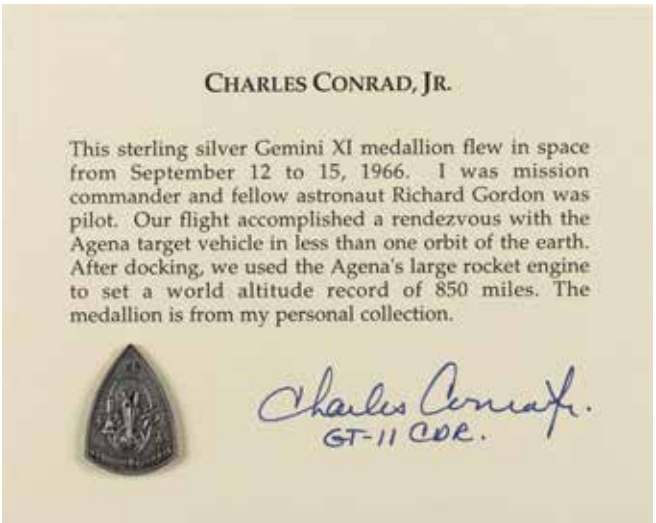
106

106
TWO NAVAL ACADEMY GRADUATES FLOAT IN THEIR GEMINI "BOAT"
GEMINI 6 RETURNS AFTER HISTORY'S FIRST MANNED SPACE RENDEZVOUS
Large color photolithograph issued by McDonnell Aircraft Corporation, 11 x 17 inches. A caption at the center lower margin reads: "*Gemini 6 recovery 16 December 1965 after accomplishing its historic space rendezvous with Gemini 7. GEMINI SPACECRAFT. Designed and built by MCDONNELL, St. Louis for the National Aeronautics and Space Administration.*"

SIGNED and INSCRIBED: "*TOM STAFFORD, GT-6*" and "*WALLY SCHIRRA, GT-VI.*"

$400 - 600

THE FOLLOWING LOT WAS ORIGINALLY IN THE COLLECTION OF ASTRONAUT CHARLES CONRAD



107

107
CONRAD'S MEDALLION CARRIED ON GEMINI 11
FLOWN Gemini 11 medallion made from sterling silver, 1 x ¾ inches. The crew mission emblem is on the obverse with the engraving of "Gemini XI, Sept. 12 – 15, 1966," the actual flight dates. Affixed to (and removable from) a 4 1/2 x 6 inch Typed Card Signed by CHARLES CONRAD.

CHARLES CONRAD's typed provenance card reads: "*This sterling silver medallion flew in space from September 12 to 15, 1966. I was mission commander and fellow astronaut Richard Gordon was pilot. Our flight accomplished a rendezvous with the Agena target vehicle in less than one orbit of the earth. After docking, we used the Agena's large rocket engine to set a world altitude record 850 miles. The medallion is from my personal collection.*"

The mission emblem symbolizes the flight objectives – rendezvous and docking with the Agena target vehicle, using the Agena to fly to a higher orbit, and spacewalks to test the ability to work in space. Conrad, of course, was one of just twelve men to walk on the Moon. He also has the distinction of being one of only four astronauts to fly two Gemini missions and one of only three astronauts to fly four space missions prior to Space Shuttle flights starting in 1981.

$1,000 - 1,500

108

108
GEMINI "ORBIT COVERS" COLLECTION
EACH SIGNED BY ITS RESPECTIVE CREW
A set of three postal envelopes or "covers" designed and issued by "Orbit Covers" for Gemini 5, 6 and 11. Each bares a Cape Canaveral hand-cancelled postmark made on the respective Gemini launch date. Each cover is illustrated with the Gemini flight crew and planned mission events. All 4 x 6 ½ inches.

The Gemini 5 cover is SIGNED by GORDON COOPER and CHARLES CONRAD.
The Gemini 6 cover is SIGNED by WALLY SCHIRRA and TOM STAFFORD.
The Gemini 11 cover is SIGNED by CHARLES CONRAD and RICHARD GORDON.

$600 - 800

109

110

109
GEMINI'S LAST SPACEWALK
ALDRIN SEEN HIGH ABOVE THE EARTH
WITH OLD GLORY ON HIS SHOULDER
Large color photograph, 20 x 16 inches. SIGNED and INSCRIBED:
"*BUZZ ALDRIN, Gemini XII EVA, Nov 1966.*"

James Lovell photographs Buzz Aldrin
during his Gemini 12 spacewalk.

$1,000 - 1,500

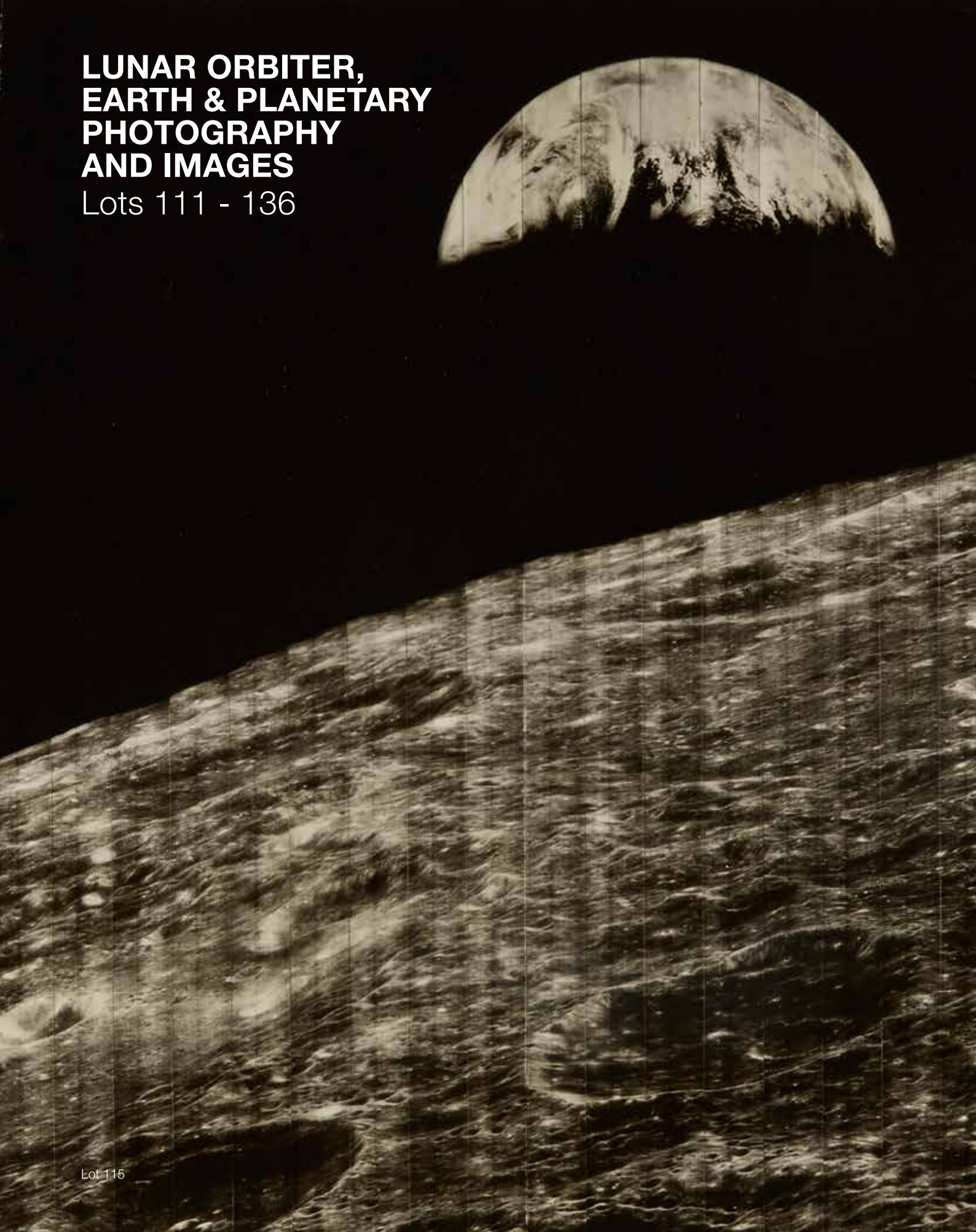
110
THE ENDING OF THE TEN MANNED FLIGHT GEMINI PROGRAM
Color photograph, 8 x 10 inches. INSCRIBED and SIGNED:
"*The End of Gemini, BUZZ ALDRIN, GT XII.*"

Space suited Gemini XII astronauts Buzz Aldrin and James Lovell
address the recovery team after their successful four day space mission.

$500 - 700

LUNAR ORBITER, EARTH & PLANETARY PHOTOGRAPHY AND IMAGES

Lots 111 - 136



Lot 115

112

111

111 (part & detail)

111
RANGER VIII AND RANGER IX LUNAR PHOTOGRAPHY
1. [RANGER VIII.] National Aeronautics and Space Administration. *Ranger VIII Photographs of the Moon. Photographic Edition.* Pasadena: Jet Propulsion Laboratory, December 15, 1965. 170 photographs, 13 3/4 and 10 3/4 inches (sheet), backed by linen. Printed booklet, ix, 17 pp; tabbed section dividers. Original vinyl folding case. Marginal spotting to verso of a small number of photographs, case soiled with some splitting at seams.
2. [RANGER IX.] National Aeronautics and Space Administration. *Ranger IX Photographs of the Moon. Photographic Edition.* Pasadena: Jet Propulsion Laboratory, December 15, 1965. 170 photographs, 13 3/4 x 10 3/4 inches (sheet), backed by linen. Printed booklet viii, 17 pp; tabbed section dividers. Original vinyl folding case. Some marginal spotting to versos, heavier to first few and last few plates, case soiled with some splitting at joint of lid.

SOLD WITH: One reel of Kodak film from Ranger VIII and one from Ranger IX; AND WITH: an incomplete copy of the *Consolidated Lunar Atlas. Supplement Numbers 3 and 4 to the USAF Photographic Lunar Atlas.* Tucson: 1967. Lacking photos C20, D15-21, E13 from part I and DIV from part II.

The Ranger missions provided the first images of the moon not taken from earth based telescopes, and were a crucial first step towards the moon landing. The present lot comprises the official NASA publication of Ranger VIII and IX, the final two of the three successful Ranger missions (the first six ended in failure).

$3,000 - 5,000

112
"MOONSHOT"
ALLAN TODD, ARTIST. 19 x 14 inch gouache on illustration board, framed and glazed to 24 x 19 inches. Signed lower right "*Allan Todd*." Manuscript notation to verso of illustration board reads: "*Moonshot by Allen Todd, (Northrop Design Artist) to specs of Fred Spencely March 1958."*

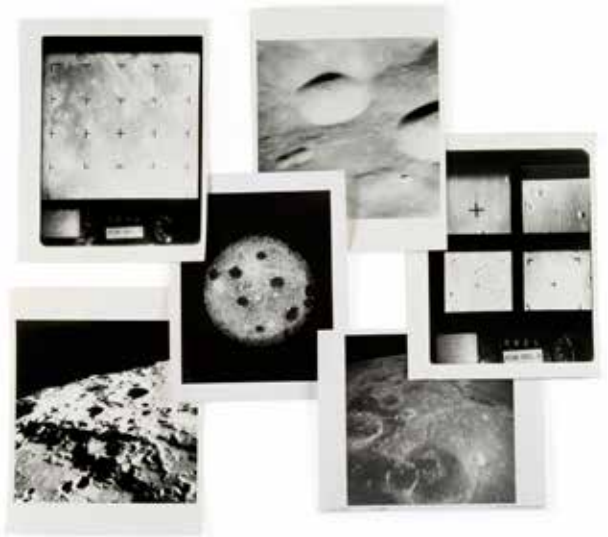
An attractive conceptual illustration of four astronauts on the lunar surface, two being in the background next to a direct ascent rocket, and two in the foreground conducting lunar surface experiments, with Earth fully visible in the starry sky. Executed more than a decade before a manned space craft landed on the moon, the direct ascent rocket depicted is one of the methods initially considered both by the United States for the Apollo moon landing, as well as by the Soviets. The US decided against it in favor of the Lunar Orbit Rendezvous (LOR) method, as direct ascent would have required an enormous launch vehicle.

$1,500 - 2,500

LUNAR ORBITER PHOTOGRAPHY

The Lunar Orbiters were a series of five unmanned spacecraft placed in orbit around the Moon by NASA during 1966 and 1967 with the primary objective of obtaining detailed images of potential Apollo manned landing sites. Their onboard cameras were a technological feat that almost defies belief. Each Orbiter carried a Kodak camera equipped with two lenses, a lower resolution (or wide-angle) 80 mm lens, and a 610mm high-resolution (or telephoto) lens. Each exposure resulted in two simultaneous photographs, a wide-angle view, and a telephoto view. The exposures were made onto a roll of 70 mm film, which was moved during exposure to compensate for the spacecraft's velocity. The film was then processed on board the Orbiter, by a method Kodak invented called Bimat—somewhat akin to the Polaroid process.

Next, the developed film passed through an analog scanner which transmitted the data back to Earth by radio (technology largely derived from television broadcasting and developed by the R&D wing of CBS). The data was gathered by three NASA Deep Space Network receiving stations: Goldstone, CA; South Africa, or later Madrid, Spain; and Woomera, Australia. The data was then sent on to the Army Map Service and the NASA Langley Research Center (LRC). The video signal was converted into variations of light on a cathode ray tube, and the image produced was captured on positive film by a 35 mm camera. Each film positive is known as a framelet, and the Orbiter's original photograph is recreated by placing the framelets side by side. That film positive is considered zero-generation, and from it were produced negatives, from them contact prints, and so forth.



113 (part)

114 (part)

113

LUNAR PHOTOGRAPHY

Approximately 110 photographs of the moon, 7 x 7 to 7 x 9 inches, from various missions, gelatin silver prints, along with a group of instructional aids, ephemera, and geological photos from Earth. Together with approximately 15 enlargements. Overall very good condition.

A collection of small format lunar photographs including several from various Lunar Orbiters and a small group of Apollo 16 metric mapping photographs, as well as teaching materials, originating from the collection of a volcanologist involved in mapping lunar landing sites for the Apollo missions.

See Bowker & Hughes, *Lunar Orbiter Photographic Atlas of the Moon* (Washington D.C.: National Aeronautics and Space Administration, 1971).

$1,200 - 1,800

114

LUNAR ORBITER I

A group of 28 photographs, 20 x 16 inches, gelatin silver prints, from Lunar Orbiter I, comprised of 26 medium resolution and 2 high resolution images, including 12 duplicate images among the medium res, mission and frame number in margins, some curling and light marginal creasing or wear, sold with a group of 15 negatives from the same mission.

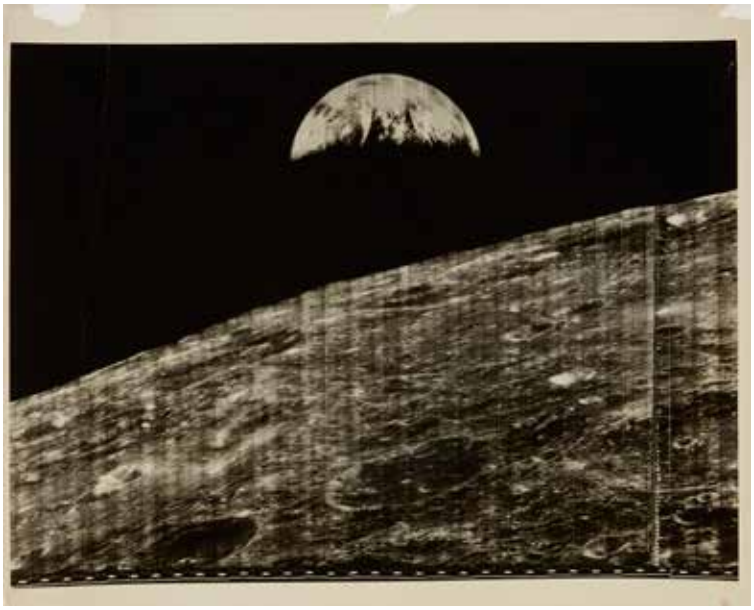
Images from the first of five Lunar Orbiter missions. Lunar Orbiter I was designed to survey the moon for Apollo landing sites; the photographs were taken netween August 18 and 29, 1966.

The Lunar Orbiter cameras were a technological feat that almost defies belief. Each Orbiter carried a Kodak camera equipped with two lenses, a lower resolution (or wide-angle) 80 mm lens, and a 610 mm high-resolution (or telephoto) lens. Each exposure resulted in two simultaneous photographs, a wide-angle view, and a telephoto view. The exposures were made onto a roll of 70 mm film, which was moved during exposure to compensate for the spacecraft's velocity.

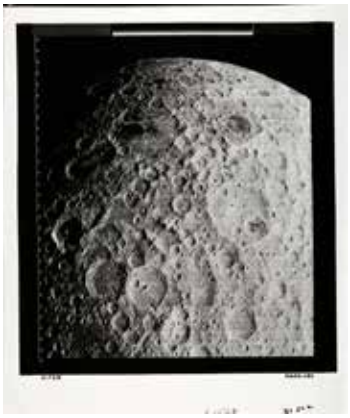
The film was then processed on board the Orbiter, by a method Kodak invented called Bimat—somewhat akin to the Polaroid process. Next, the developed film passed through an analog scanner which transmitted the data back to Earth by radio (technology largely derived from television broadcasting and developed by the R&D wing of CBS). The data was gathered by three NASA Deep Space Network receiving stations: Goldstone, CA; South Africa, or later Madrid, Spain; and Woomera, Australia. The data was then sent on to the Army Map Service and NASA Langley. The video signal was converted into variations of light on a cathode ray tube, and the image produced was captured on positive film by a 35 mm camera. Each film positive is known as a framelet, and the Orbiter's original photograph is recreated by placing the framelets side by side. That film positive is considered zero-generation, and from it were produced negatives, from them contact prints, and so forth. Complete list of images available on request.

See Bowker & Hughes, *Lunar Orbiter Photographic Atlas of the Moon* (Washington D.C.: National Aeronautics and Space Administration, 1971).

$2,500 - 3,500



115



116

117 (part)

118

115
LUNAR ORBITER I
THE FIRST IMAGE OF THE EARTH AS SEEN FROM THE MOON Gelatin silver print, 16 x 20 inches, August 23, 1966. Without image number in margin but image I-101-H2, faint toning, long vertical crease at left edge, scuffs in upper margin outside image.

Possibly the most famous of the Lunar Orbiter images, showing a crescent earth near the moon's curved limb.

$2,500 - 3,500

116
LUNAR ORBITER II — SOUTH POLE AND MARE INGENII
Gelatin silver print, 24 x 20 inches, image II-075-M.

An outstanding image of the south-east hemisphere, showing craters Gagarin, Jules Verne, Pavlov and many others, as wells as Mare Ingenii and, on the horizon, the south pole.

See Bowker & Hughes, *Lunar Orbiter Photographic Atlas of the Moon* (Washington D.C.: National Aeronautics and Space Administration, 1971).

$700 - 900

117
LUNAR ORBITER II
A group of 6 photographs, 24 x 20 inches, gelatin silver prints, from Lunar Orbiter II, all high resolution images, captions in margins identifying mission and image number, some curling and light marginal creasing or wear.

Comprising image numbers II-033-H2, II-033-H3, II-034-H3, II-075-H2, II-075-H3, and one misidentified in the caption as II-033-H2. Lunar Orbiter II was, like LO I, intended to survey the moon for Apollo landing sites. It launched November 6, 1966 and produced 211 photographs between November 18 and 25.

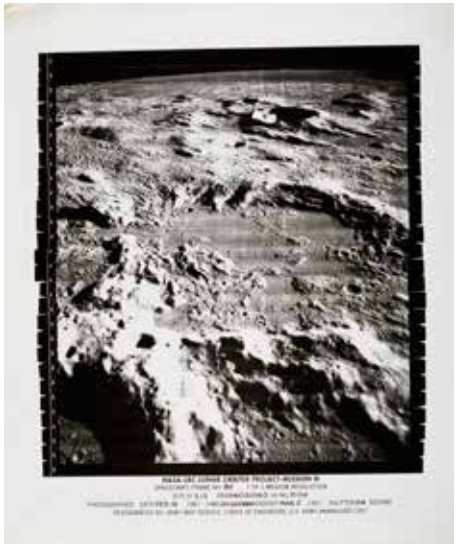
See Bowker & Hughes, *Lunar Orbiter Photographic Atlas of the Moon* (Washington D.C.: National Aeronautics and Space Administration, 1971).

$1,000 - 1,500

118
LUNAR ORBITER III — HORTENSIUS CRATER
Gelatin silver print, 24 x 20 inches, image III-123-M, medium resolution. February 20, 1967. Creasing to upper margin, tear to upper left corner outside of image area.

A striking oblique view of Hortensius crater and nearby domes.

$500 - 700



119 (part)

120

121

119
LUNAR ORBITER III
A group of 5 photographs, 24 x 20 inches, gelatin silver prints, from Lunar Orbiter III, comprised of 3 medium resolution and 2 high resolution images, captioned in margins, some marginal wrinkling, two long tears to 214 extending into image.

Five attractive images from Lunar Orbiter III, featuring prominent craters and horizon views. Including III-85-M, III-213-M, III-214-M, III-121-H-1, III-121-H-3. Launched on February 5, 1967, Lunar Orbiter III (LO3) produced 211 photographs taken during 54 orbits, only 75% were successfully transmitted back to earth. Essentially a site-confirmation mission, LO3 had the task of re-photographing 12 potential landing sites identified by Lunar Orbiters I and II. NASA was able to utilize the photograph data to narrow the landing site selection down to 8 possibilities. Aside from potential landing sites, LO3 also took imagery of secondary sites of scientific interest on the far side of the moon and at higher latitudes on the lunar nearside.

See Bowker & Hughes, *Lunar Orbiter Photographic Atlas of the Moon* (Washington D.C.: National Aeronautics and Space Administration, 1971).

$1,000 - 1,500

120
LUNAR ORBITER III—THEOPHILUS CRATER
Gelatin silver print, 24 x 20 inches, Image III-078-M, medium resolution. February 17, 1967. Faint marginal creasing.

Oblique view of Theophilus crater, a prominent impact crater that is among those visible from Earth 5 days after the new moon.

$700 - 900

121
LUNAR ORBITER III—KEPLER CRATER
Gelatin silver print, 24 x 20 inches, Image III-162-M, medium resolution. February 25, 1967.

A beautiful oblique view of Kepler crater.

$700 - 900

122
LUNAR ORBITER IV—FULL LUNAR DISC & DRAMATIC VIEW OF THE MARE ORIENTALE
Together 4 gelatin silver prints from frame 4182, 17 x 21 inches each, including high res images 182 H1, H2, & H3 which tile together to form a 17 x 63 inch panorama, and medium res image 182 M.

Part of the suite of images taken by Lunar Orbiter IV of the *Mare Orientale* and *Oceanus Procellarum* and their immediate environs. Includes 3 high resolution images, comprising views of the large craters Vasco da Gama, Balboa, and Dalton, as well as Russell, Stuve, and Hedin. The 1 medium resolution image of the lunar disc with shows the *Oceanus Procellarum* with a dramatic view of the *Mare Orientalis* at its center, being a massive ringed impact basin, most of which lies on the far side of the moon - barely an edge of it is visible from earth. The objective of Lunar Orbiter IV (LO4) was to provide an expanded photographic survey of the lunar surface, providing far higher resolution imagery than was available from ground based telescopes. Launched on May 4, 1967, LO4 completed 30 successive orbits and took 199 exposures which covered 99% of the lunar surface.

See Bowker & Hughes, *Lunar Orbiter Photographic Atlas of the Moon* (Washington D.C.: National Aeronautics and Space Administration, 1971). (image overleaf)

$1,500 - 2,500

123
LUNAR ORBITER IV—LUNAR DISC WITH GASSENDI CRATER, MARE HUMORUM, & OCEANUS PROCELLARUM
Together 4 gelatin silver prints from frame 4143, 17 x 21 inches each, including high res images 143 H1, H2, & H3 which tile together to form a 17 x 63 inch panorama, and medium res image 143 M.

Part of the suite of images taken by Lunar Orbiter IV of the *Oceanus Procellarum* and its immediate environs. Includes 3 high resolution images, comprising views of the *Mare Humorum* (143H1), Gassendi Crater (143H2) which was photographed multiple times for several Apollo missions due to its proximity to a runner up location for an Apollo 17 landing site (see *Apollo Over the Moon: A View from Orbit*, Chapter 5, "Craters"), and the ruined 112-km in diameter Flamsteed P (143H3), with the Surveyor-1 landing site located in the North East quadrant. The medium resolution image of the lunar disc displays *Oceanus Procellarum*, with the *Mare Humorum* at its center, as well as the *Mares Inibrium, Insularum, Cognitum, Nubium*, and *Paul Epidemiarum*." The objective of Lunar Orbiter IV (LO4) was to provide an expanded photographic survey of the lunar surface, providing far higher resolution imagery than was available from ground based telescopes. Launched on May 4, 1967, LO4 completed 30 successive orbits and took 199 exposures which covered 99% of the lunar surface.
See Bowker & Hughes, *Lunar Orbiter Photographic Atlas of the Moon* (Washington D.C.: National Aeronautics and Space Administration, 1971).
(image overleaf)

$1,500 - 2,500

124
LUNAR ORBITER IV:
A GROUP OF 11 LARGE FORMAT PHOTOGRAPHS FROM THE MISSION
A group of 11 photographs, 24 x 20 inches, gelatin silver prints, from Lunar Orbiter IV, all high resolution images, numbered in margins, a few minor creases, overall fine.

High resolution images from the penultimate Lunar Orbiter mission. Comprises frames IV-60-H2, IV-76-H2, IV-121-H2, IV-130-H3, IV-133-H1, IV-136-H3, IV-166-H3, IV-172-H2, IV-173-H3, IV-179-H2, and IV-189-H3.

See Bowker & Hughes,
Lunar Orbiter Photographic Atlas of the Moon
(Washington D.C.: National Aeronautics and Space Administration, 1971).
(see image, p.74)

$2,000 - 3,000

125
LUNAR ORBITER IV —
OCEANUS PROCELLARUM & ENVIRONS
Together 2 sheets, each sheet made up of five 17 x 32 inch gelatin silver prints on vintage 1967 Kodak Paper from frame 4189, consisting of high res images 189 H1, H2, & H3. Each print watermarked "*A Kodak Paper*" on verso, and annotated in left margin with "*IV 33D H-189 LF 127 G4-73*". The two sheets, which are separately matted, framed and glazed, together form a 17 x 64 inch panorama.
Part of the suite of images taken by Lunar Orbiter IV of the *Oceanus Procellarum* and its immediate environs. Includes all 3 high resolution images from frame 189, comprising views of crater Respold (H3), craters Gerard, Bunsen, and Lavoisier (H2), and craters Aston, Ulugh Beigh, and Voskresenkiy (H1). The objective of Lunar Orbiter IV (LO4) was to provide an expanded photographic survey of the lunar surface, providing far higher resolution imagery than was available from ground based telescopes. Launched on May 4, 1967, LO4 completed 30 successive orbits and took 199 exposures which covered 99% of the lunar surface.

See Bowker & Hughes, *Lunar Orbiter Photographic Atlas of the Moon*, Washington D.C.: National Aeronautics and Space Administration, 1971.
(image overleaf)

$3,000 - 5,000

126
LUNAR ORBITER IV —
MARE SMYTHI AND ENVIRONS
Together 2 sheets, each sheet made up of five 17 x 32 inch gelatin silver prints on vintage 1967 Kodak Paper from frame 4018, consisting of high res images 18 H1, H2, & H3. Each print watermarked "*A Kodak Paper*" on verso, and annotated in left margin with "*IV 6C H-18 LF 09 G4-5*". The two sheets, which are separately matted, framed and glazed, together form a 17 x 64 inch panorama.

Part of the suite of images taken by Lunar Orbiter IV of the *Mare Smythi* and its immediate environs. Includes all 3 high resolution images from frame 18, comprising views of Craters Jansky & Kepler (18H1), the *Mare Marginis* and craters Goddard, Ibn Yunis, & Al-Biruni (18H2), and craters Joliot, Rayleigh, and Hubble (18H3).
The objective of Lunar Orbiter IV (LO4) was to provide an expanded photographic survey of the lunar surface, providing far higher resolution imagery than was available from ground based telescopes. Launched on May 4, 1967, LO4 completed 30 successive orbits and took 199 exposures which covered 99% of the lunar surface.
See Bowker & Hughes, *Lunar Orbiter Photographic Atlas of the Moon*, Washington D.C.: National Aeronautics and Space Administration, 1971.
(image overleaf)

$3,000 - 5,000

127
LUNAR ORBITER V —
CRATER COPERNICUS
Together 4 gelatin silver prints from frame 5150, 17 x 21 inches each, including high res images 150 H1, H2, & H3 which tile together to form a 17 x 63 inch panorama, and medium res image 150 M.

Part of the suite of images taken by Lunar Orbiter V of Copernicus crater and its immediate environs. Includes 3 high resolution images, comprising views of a portion of the central peaks (150H1), the crater floor with a few of the central peak "clusters" still visible (150H2), and the jumbled terrain of the inner crater walls (150H3), as well as 1 medium resolution image of the left 90% of the entire crater. Launched on August 1, 1967, Lunar Orbiter V was the final LO mission, and was tasked with taking additional detailed photographs of potential Apollo landing sites. Between August 6 and 18 it took 174 photographs during 69 orbits.

See Bowker & Hughes,
Lunar Orbiter Photographic Atlas of the Moon
(Washington D.C.: National Aeronautics and Space Administration, 1971).
(image overleaf)

$1,200 - 1,800

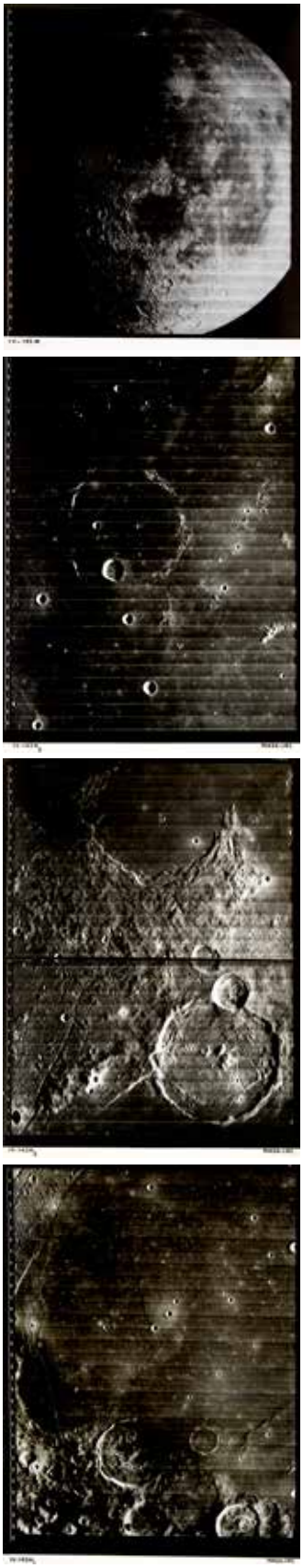
128
LUNAR ORBITER V
A group of 62 photographs, 24 x 20 inches, gelatin silver prints, from Lunar Orbiter V, August 1967, comprised of 22 medium resolution and 40 high resolution images, including 1 duplicate medium res image, cropping tape or marks to six images, corners of two images torn, four or five plates toned in spots, a few marginal creases, overall very good condition.

A large group of images from the final Lunar Orbiter mission, which provided additional Apollo landing site photos and other high-priority scientific sites on both the near and farside. Complete list of images available on request.

See Bowker & Hughes,
Lunar Orbiter Photographic Atlas of the Moon
(Washington D.C.: National Aeronautics and Space Administration, 1971).
(see image, p.74)

$6,000 - 8,000

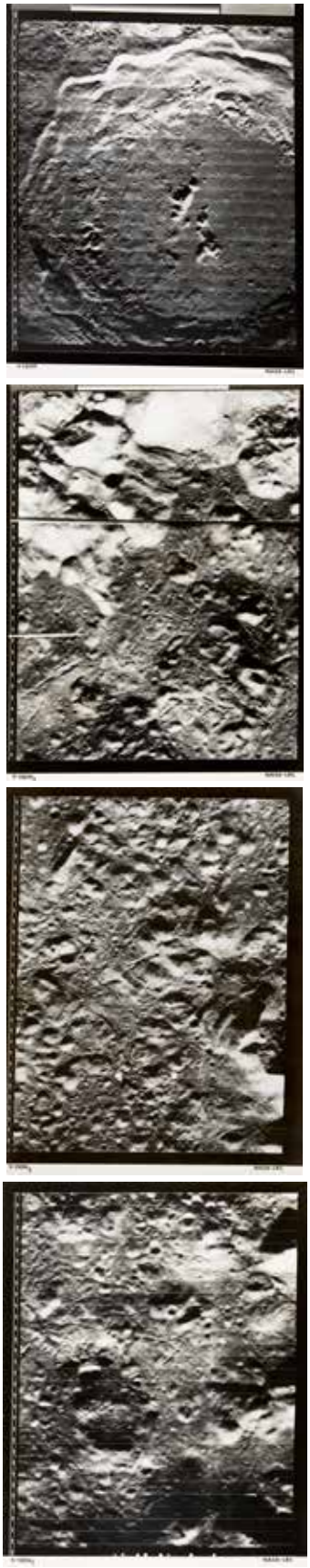
122



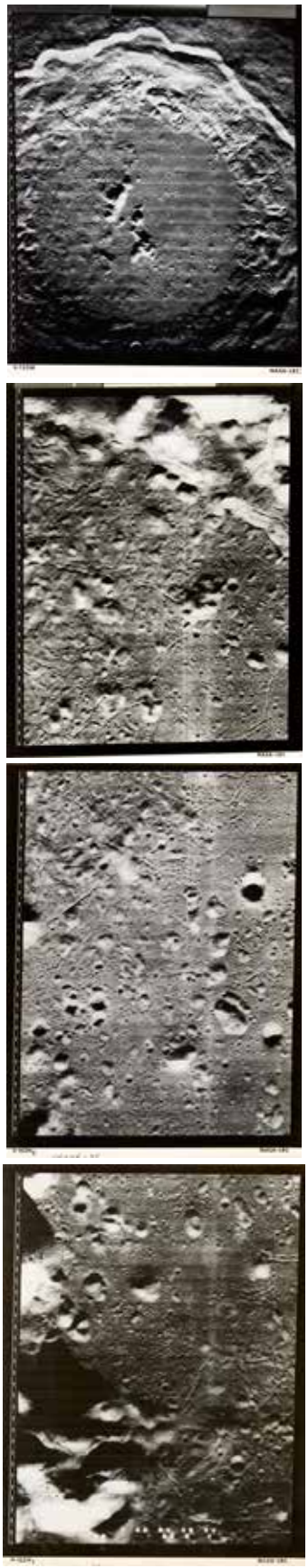
123

125 (assembled for reference)

126 (assembled for reference)



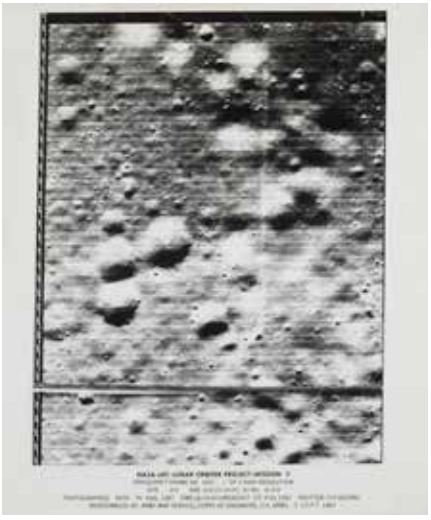
127



129

124 (part)

128 (part)



130 (part)

129
LUNAR ORBITER V —
CRATER COPERNICUS
Together 4 gelatin silver prints from frame 5152, 17 x 21 inches each, including high res images 152 H1, H2, & H3 which tile together to form a 17 x 63 inch panorama, and medium res image 152 M.

Part of the suite of images taken by Lunar Orbiter V of Copernicus crater and its immediate environs. Includes 3 high resolution images, comprising views of the central peaks, the crater floor, and the local ejecta blanket, as well as 1 medium resolution image of the right 90% of the entire crater. Frame 152H1 captures one of the central peaks that was photographed at exceptionally high resolution by the *Lunar Reconnaissance Orbiter* in 2012. Launched on August 1, 1967, Lunar Orbiter V was the final LO mission, and was tasked with taking additional detailed photographs of potential Apollo landing sites. Between August 6 and 18 it took 174 photographs during 69 orbits.

See Bowker & Hughes, *Lunar Orbiter Photographic Atlas of the Moon* (Washington D.C.: National Aeronautics and Space Administration, 1971).

$1,200 - 1,800

130
LUNAR ORBITER V —
FOUR HIGH RESOLUTION PHOTOGRAPHS
ALL GELATIN SILVER PRINTS, EACH 24 X 20 INCHES IN SIZE.
Launched on August 1, 1967, Lunar Orbiter V was the final LO mission, and had the objective of taking additional detailed photographs of potential Apollo landing sites. Known as the "APOLLO ZONE" this area was along the near side equator where a majority of Lunar Orbiter Program photographs were taken. Between August 6 and 18, Lunar Orbiter V took 174 photographs during 69 orbits.

Photograph one. Caption along the lower border reads: "*NASA - LRC Lunar Orbiter Project - Mission V, Spacecraft Frame No. 100, 1 of 3 High Resolution, Site 24, GRE 03051200, KI No. 5/20, Photographed: Date: 14 AUG 1967, TIME: 06:10:20.93, READOUT: 23 AUG 1967, SHUTTER .02 Second. Reassembled by: Army Map Service, Corps of Engineers, US Army, 3 SEPT 1967.*" This frame is located on the lunar near side approximately 4 degrees South Latitude and 4 degrees East Longitude. Hundreds of small craters within the Hipparchus Crater region can be seen. High resolution frames can resolve lunar details up to 2 meters in diameter.

Photograph two. Caption along the lower border reads: "*NASA - LRC Lunar Orbiter Project - Mission V, Spacecraft Frame No. 104, 3 of 3 High Resolution, Site 26.1, GRE 08051190, KI No. 5119, Photographed: Date: 14 AUG 1967, TIME: 12:40:36.42, READOUT: 23 AUG 1967, SHUTTER .04 Second. Reassembled by: Army Map Service, Corps of Engineers, US Army, SEPT 15, 1967.*" The frame is located on the lunar near side approximately 24 degrees North Latitude and 2 degrees East Longitude. Close-up of the Apennine mountain region having bright sunlight off the surface with shadowing seen along the upper center of the image. South of the Apollo 15 landing area.

Photograph three. Caption along the lower border reads: "*NASA - LRC Lunar Orbiter Project - Mission V, Spacecraft Frame No. 106, 2 of 3 High Resolution, Site 26.1, GRE 08051190, KI No. 5119, Photographed: Date: 14 AUG 1967, TIME: 12:41:27.62, READOUT: 23 AUG 1967, SHUTTER .04 Second. Reassembled by: Army Map Service, Corps of Engineers, US Army, 16 SEPT 1967.*" This frame is located on the lunar near side approximately 25 degrees North Latitude and 3 degrees East Longitude. Three rows of mountains are seen with dark shadows toward the top center. The photograph has additional close-ups of the Apennine mountains, very close to the Apollo 15 landing site.

Photograph four. Caption along the lower border reads: "*NASA - LRC Lunar Orbiter Project - Mission V, Spacecraft Frame No. 119, 1 of 3 High Resolution, Site 28, GRE 060511500, KI No. 5115, Photographed: Date: 14 AUG 1967, TIME: 22:02:59.50, READOUT: 22 AUG 1967, SHUTTER .04 Second. Reassembled by: Army Map Service, Corps of Engineers, US Army, 7 SEPT 1967.*" The rough terrain inside Alphonsus crater is evident on this lunar near side image located approximately 13 degrees South Latitude and 4 degrees West Longitude. Prior to the Apollo lunar landings, some scientists thought this area had active volcanism because of occasional sights of light flashes. This was one of several lunar sights that had unusual events known as Transient Lunar Phenomenon.

$400 - 600

131
MARS PHOTOGRAPHIC COLLECTION
MULTIPLE MISSION ORBITAL AND SURFACE VIEWS OF MARS
A collection of 24 official NASA photographs, eight in color and sixteen in black and white photographs, all 8 x 10 inches. Almost all with blue mimeographed official NASA captions on verso.

Mars orbital photographs are from both Mariner 9 (1971/72) and Viking (1976/78). Mars surface images are from Viking (1976). Photographs of the Mariner, Viking Orbiter, and Viking Lander are included.

$500 - 700

132
VIKING VIEWS FROM ORBIT AND THE FACE ON MARS
25 JPL INTERNAL IMAGE PROCESSING LABORATORY PHOTOGRAPHS
Twenty-four black and white photographs, all 8 x 10 inches. Period 1970's JPL processing onto Kodak paper. Each image has a gray scale exposure calibration strip and three image intensity histograms. All have their individual MTIS run number identification and with listing of being either "Rectilinear" or "Orthographic" in projection. Included is the "Face on Mars" image which was the subject of much controversy and conjecture during the late 1970s and early 1980s.

An impressive group of images obtained from the Viking Orbiters showing the diverse geologic details of the Martian planet. The Image Processing Lab of the Jet Propulsion Laboratory was responsible for the design and development of the application software required to reconstruct these photographic products. Digital image processing was required to produce products suitable for quantitative and qualitative scientific interpretation.

$500 - 700

133
SAMPLE SATURN
12 x 9 inch airbrush and stencil on board. Framed. Note to back of frame reads "*SAMPLE 'SATURN' ARTISTS PROOF 6/80 for 'Euphoria' 'UFORIA.' Melvin Simon Production* [Illegible Signature]."

ARTIST'S PROOF, #6/80 done of the planet Saturn for the 1981 Science Fiction-Comedy film *UFOria*, which was written and directed by John Binder. Though filming was completed in 1981, the film was not released until 1985.

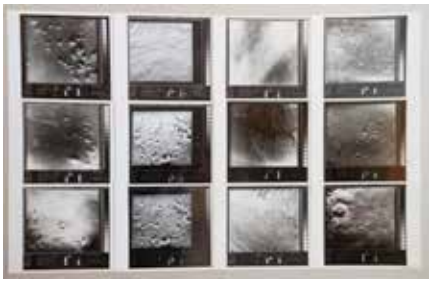
$1,000 - 1,500

134
THE OUTER PLANETS — PIONEER AND VOYAGE PHOTOGRAPHS
JUPITER, SATURN'S RINGS AND MOONS, THE MOONS OF URANUS
A collection of 16 official NASA photographs, all 8 x 10 inches, 15 in black and white, 1 in color. All with blue mimeographed official NASA captions on verso.

Consisting of Pioneer 11 images of Jupiter (1974), Voyager 1 and 2 color image of Jupiter's moon Io,Voyager 2 images of Saturn and Saturn moons (1981), and Voyager 2 Uranus moons and ring (1986). Photographs of the spacecraft and other images are included.

$400 - 600


131 (part)


132 (part)

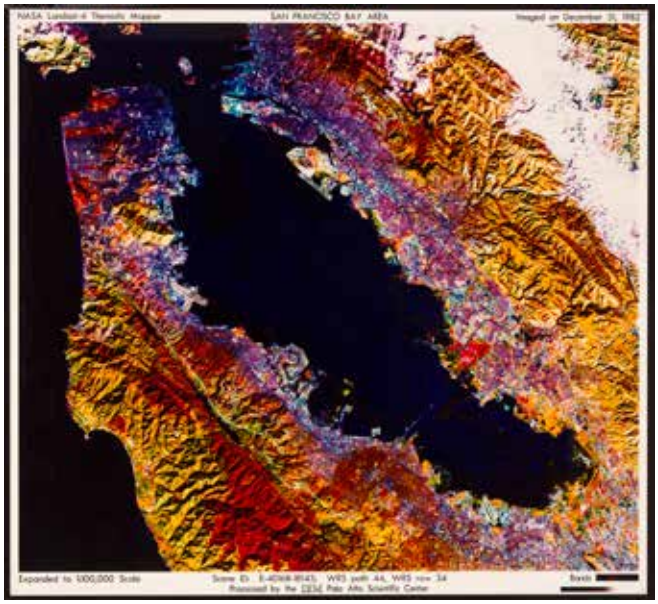

133


134 (part)

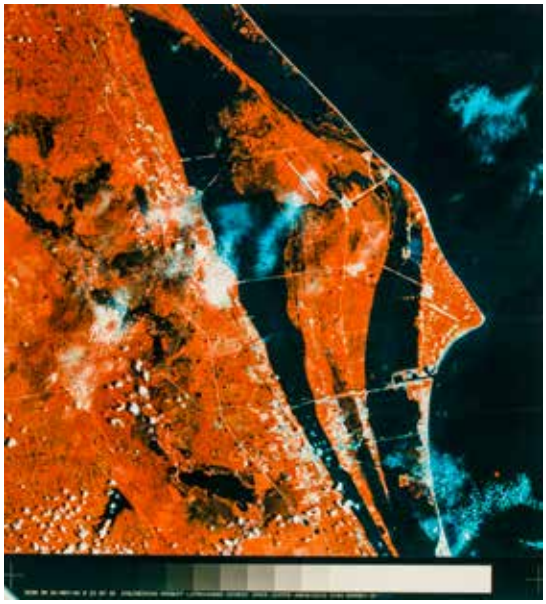
LANDSAT COLOR PHOTOGRAPHS OF THE EARTH

The Landsat series of unmanned Earth imaging satellites began in 1972, with the then named Earth Resources Technology Satellites 1 to 3. With the launch of Landsat 4 in 1982 and Landsat 5 in 1984, a new generation of images was acquired with an instrument called the Thematic Mapper (TM). It provided resolution of ground objects down to 30 meters (a then civilian record) in seven different spectral bands (three visible and four infrared).

Images are archived in a Path / Row numbering system based on the ground path of the satellite's near polar orbit. This orbit allows a return ground pass over the same site every 16 days. Data from these satellites have aided in the understanding of global climate change as well providing the basis for detailed cartographic work and geologic maps.



135



136

135

THE BAY AREA FROM SPACE

SAN FRANCISCO AND SURROUNDING AREAS AS SEEN BY LANDSAT 4

Large period color photograph, 25 x 25 inches. Captions along the upper and lower border reads: "*NASA Landsat 4 Thematic Mapper, SAN FRANCISCO BAY AREA, Imaged on December 31, 1982. Expanded to 1:100,000 Scale. Scene ID E-40168-18143. WRS path 44, WRS row 34. Processed by the IBM Palo Alto Scientific Center, Bands 2,4,5.*"

This image covers the entire city of San Francisco and all of the bay area south and east of the city. Surrounding areas to the south include Daly City, Brisbane, San Mateo, Redwood City, Menlo Park, Palo Alto, Stanford, Sunnyvale, and San Jose. Across the bay are the cities of Oakland, Alameda, San Leandro, Hayward, Union City, and Fremont.

The Golden Gate, San Francisco-Oakland, San Mateo, and Dumbarton Bridges are clearly visible as well as Alcatraz and Treasure Islands.

Thematic Mapper spectral bands 2 (visible), 4 and 5 (both infrared) were used to complete this color images. Bands 4 and 5 make all live vegetation appear yellow to red in color, with urban areas appearing mostly pink to purple. Both the bay waters and Pacific Ocean area appear near-black due to limited water reflectance in these spectral bands. There is a white cloud/fog area in the upper right-hand corner.

$800 - 1,200

136

CAPE CANAVERAL AND THE KENNEDY SPACE CENTER

UNMAMMED LANDSAT 4 VIEWS THE LAUNCH AREAS FOR U.S. MANNED SPACE FLIGHT

Large period color photograph, 24 x 24 inches. Caption along the bottom edge read in part: "*Scan on 01-May-84 @ 20:07:45, Engineering Product, L4TM8104000, Kennedy Space Center.*" This image was an early processing test product of Thematic Mapper image data from Landsat 4 on Kodak paper.

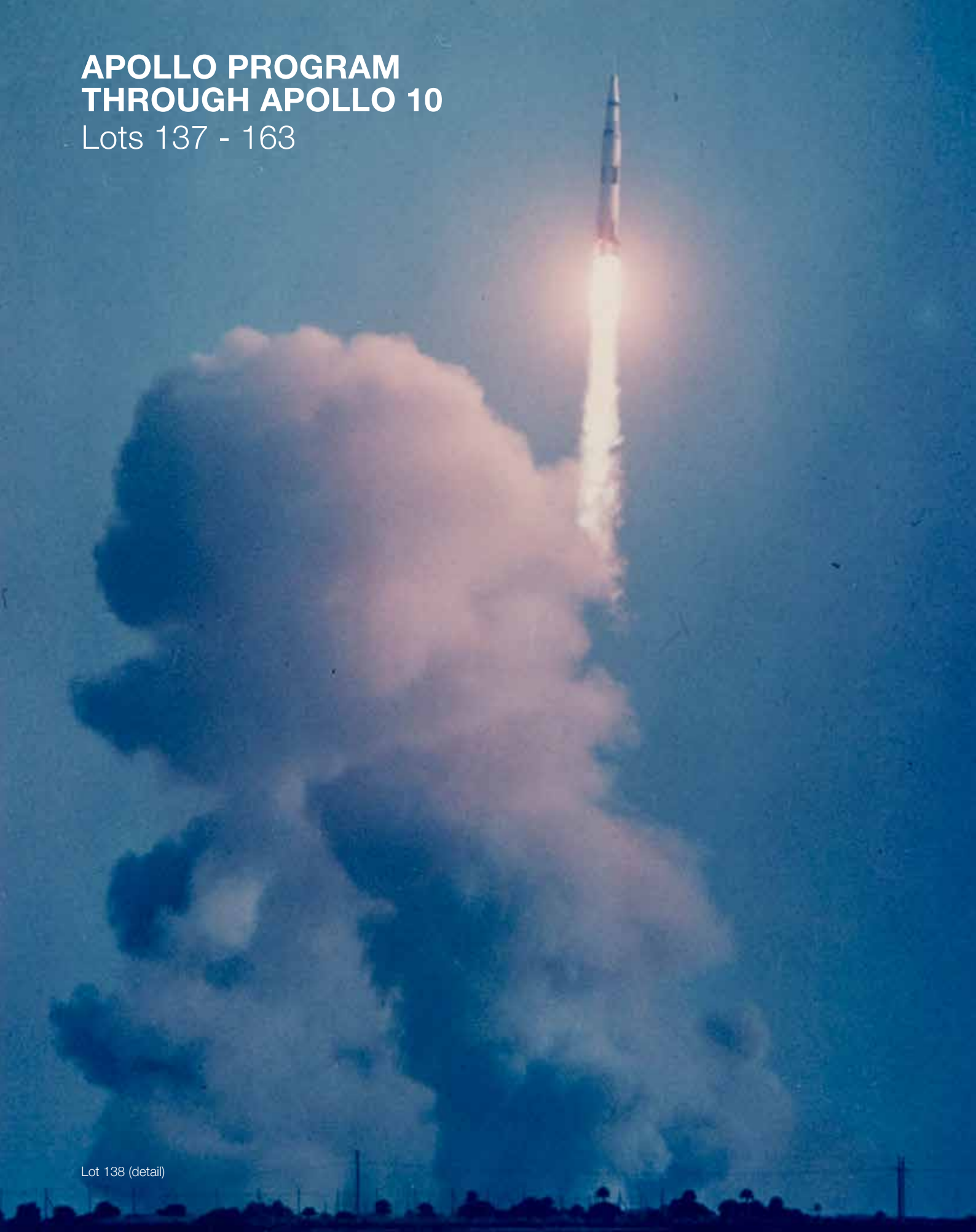
All the early launch complexes from Cape Canaveral are clearly seen including the long "Skid Strip" aircraft landing runway. This area launched all the manned and unmanned Mercury and Gemini spacecraft, plus the unmanned Saturn I and IB vehicles. Apollo 7, the first manned Apollo also was launched from Cape Complex 34. Just north of the Cape are the facilities of the Kennedy Space Center including the square shaped Vehicle Assembly Building (VAB), the long Space Shuttle landing runway, and Launch Complex 39A and 39B.

Port Canaveral, Cocoa, and Cocoa Beach are located near the lower edge with the city of Titusville at the center left, having partial cloud cover. A Thematic Mapper infrared band makes all area vegetation appear red.

$700 - 900

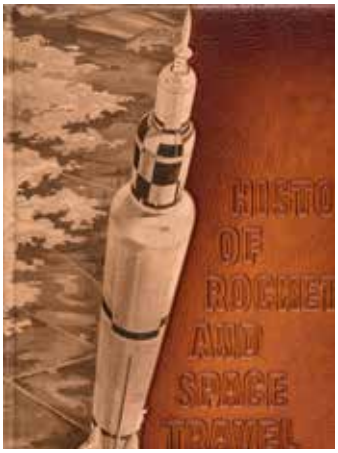
APOLLO PROGRAM THROUGH APOLLO 10

Lots 137 - 163

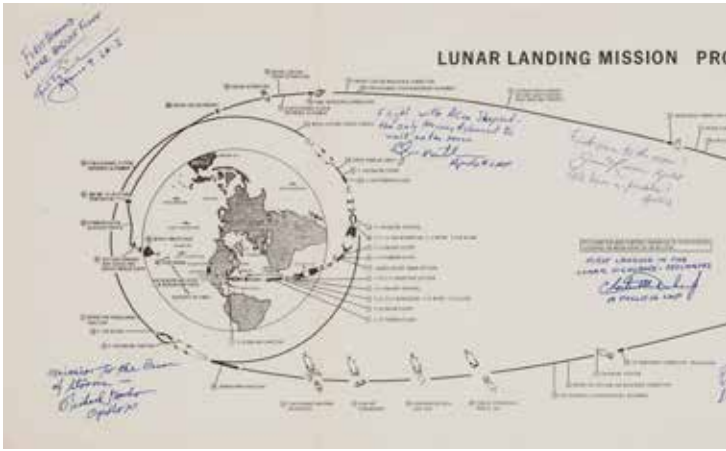


Lot 138 (detail)

138



139



137

137
A VOYAGE TO THE MOON, MANNED LUNAR LANDING PROFILE
WITH DETAILED INSCRIPTIONS BY SEVERAL LUNAR EXPLORERS
Lunar Landing Mission Profile. Large lithograph, folded. 11 x 30 inches. U.S. Government Printing Office (GPO) identification "*8 69 – 80 3.*"

INSCRIBED and SIGNED at the Upper Left Earth Orbit area: "*First Manned Lunar Module Flight, RUSTY SCHWEIKART, Apollo 9 LM – 3.*"
Near the Profile Center section: "*First Men to the Moon! JAMES LOVELL, Apollo 8, We Have A Problem! Apollo 13.*"
Above the Upper Lunar Drawing right side: "*PinPoint Landing Near Surveyor III, ALAN BEAN, Apollo XII.*"
Near the Earth Orbit area: "*Mission to the Ocean of Storms – RICHARD GORDON, Apollo XII.*"
At the Lower Profile Center Section: "*Planned Third Lunar Landing – But BOOM! FRED HAISE, Apollo 13 LMP.*"
Near the Earth Orbit area: "*Flight with Alan Shepard – the only Mercury Astronaut to walk on the Moon – EDGAR MITCHELL, Apollo 14 LMP.*"
Near the Lower Lunar Orbit drawing: "*Three days at Hadley Rille and First Use of the Lunar Rover – AL WORDEN, Apollo 15 CMP.*"
At the Profile Center: "*First Landing in the Lunar Highlands – Descartes. CHARLES M. DUKE, JR. Apollo 16 LMP.*"
To the right of the Profile Title: "*First LM to Lunar Orbit, Apollo X. Last Man on the Moon, GENE CERNAN, Apollo XVII.*"

One of the best visual representations of the flight procedures required to accomplish the Apollo lunar landing. The diagram has 85 labeled steps illustrating the complexity of a lunar mission. The outward bound journey starts with the Saturn V launch, placement of CSM / LM into earth orbit, then the engine burn to put these vehicles on a trajectory to the moon. Then it depicts CSM / LM docking, possible mid-course corrections and the all-important insertion into lunar orbit. The method to accomplish the moon landing and return are shown with dual lunar drawings. The remaining events are the steps to leave lunar orbit and return to Earth with a splashdown in the Pacific Ocean.

$8,000 - 12,000

138
APOLLO VI —
SATURN V LIFT OFF, SIGNED BY LOVELL
10½ x 13¼ inch vintage color photograph mounted to 16 x 20 inch matte. Matte slightly bumped at upper right corner. Captioned on matte at lower left of image in black ink "*Apollo VI*" and signed at lower right *Dr. Vin Ve mooten. 1968.*" Paper label affixed to back of matte reads *"Gift of Dr. Vincent Ve mooten of Dallas. He is an amateur photographer. If you would like additional prints, he will be glad to furnish them to you.*"

SIGNED and INSCRIBED on matte:*"APOLLO SATURN V LIFT OFF—JAMES LOVELL. APOLLO 8. 13.*" Accompanied by a typed provenance letter signed by Lovell which reads: "*This Saturn V launch photo is from my personal collection of space artifacts. James A Lovell, Gemini 7—Pilot, Gemini 12—Commander, Apollo 8—Command Module Pilot, Apollo 13—Commander.*"

$1,500 - 2,500

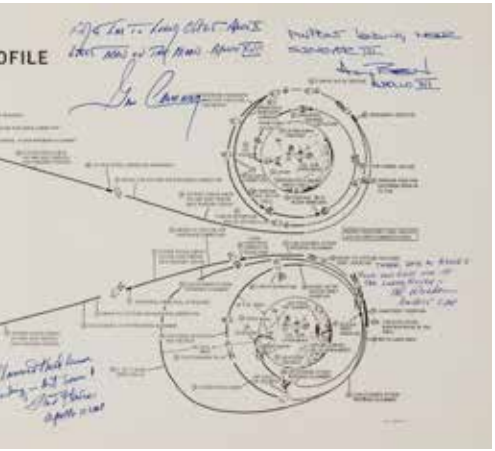
139
ONE OF WERNHER VON BRAUN'S MOST FAMOUS BOOKS
VON BRAUN, WERNHER and FREDERICK I. ORDWAY III. *History of Rocketry and Space Travel.* New York: Thomas Y. Crowell, 1966. xi, 244 pp. 11 x 9 inches. Original pictorial spine and left side cover onlay over handcrafted mission leather, lettered in blind.

SIGNED and INSCRIBED with their individual space missions(s): "*BUZZ ALDRIN, Gemini XII, Apollo XI; ALAN BEAN, Apollo 12, Skylab II (SL-3); WALT CUNNINGHAM, Apollo 7; CHARLES M. DUKE, Apollo 16; FRED HAISE, Apollo 13; EDGAR MITCHELL, Apollo 14*" and "*TOM STAFFORD, Gemini 6, 9, Apollo 10, ASTP.*" All on the half title page.

A thousand years of rocketry is described with the lure of traveling to other worlds. The efforts of Tsiolkovsky, Goddard, Oberth, and others are described, and the rapid development of the A4 (V2) rocket by Germany during World War II. The steps to the modern age of space exploration are covered, including actual flights until 1966. Current plans for the then future Apollo moon landings are described. Extensively illustrated.

$2,000 - 3,000

140
FREDERICK C. DURANT, III (1916 - 2015) INVOLVED WITH VON BRAUN'S EXPLORER I LAUNCH EFFORT
LATER ASTRONAUTICS DEPARTMENT HEAD OF THE SMITHSONIAN INSTITUTION
BROOKS, C.G., J.M. GRIMWOOD and L.S. SWENSON. *Chariots for Apollo: A History of Manned Lunar Spacecraft. NASA SP-4205.*



140 (detail)

141

142

Washington: GPO, 1979. xvii, 538 pp.
10 x 7 inches. Cloth.

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

Fredrick C. Durant, III, was involved in rocketry and early spaceflight studies starting just after World War II. He worked on initial efforts to design the first United States satellite, which eventually evolved into the launch of Explorer I during January 1958. In 1964, he became assistant director and head of the newly form Astronautics Department of the Smithsonian Institute until his retirement in 1980. This book was originally in his personal collection. He placed his Chevy Chase, Maryland address label on the inside front cover.

This NASA historical volume describes the development and construction of the Apollo Command and Service Modules by NASA and North American Aviation. The evolution of NASA's lunar mission architecture dictated the developments of the Lunar Module whose construction task was awarded to Grumman Aircraft of Bethpage, Long Island, New York. Progress and results from actual spacecraft flights are covered including unmanned missions, the first manned flight of Apollo 7 and the first manned flight of the Lunar Module on Apollo 9. The three lunar flights of Apollo 8, 10, 11 are described in the context of how all the previous efforts enabled these flights to be successfully completed.

$2,500 - 3,500

141
APOLLO NEWS REFERENCE FOR THE CSM
APOLLO SPACECRAFT NEWS REFERENCE. National Aeronautics and Space Administration, Manned Spacecraft Center, North American Aviation, Inc., Space and Information Systems Division, [c 1966].
8.5 x 11 inch manual, 140 pp, illustrated, punched at spine & bound with prongs into original printed card covers.

An early edition, with *SC009* being the last flight mentioned (first unmanned flight of an Apollo spacecraft) of this excellent detailed news reference for the Apollo program.
A news distribution manual issued to provide the media with all of the reference material relating to the Apollo missions. Divided into three sections, the first provides a summary of the program, including its aims, the basic components of the Apollo spacecraft and Saturn launch vehicles, and brief descriptions of the Apollo missions. The second part contains more detailed information on the spacecraft and its systems, as well as additional reference information on the program, and the third part is a series of appendices, including a glossary of aerospace terms and a word index.

$800 - 1,200

142
APOLLO, SKYLAB, AND ASTP LION BROTHERS CREW MISSION EMBLEMS
Cloth crew mission emblems, 18 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, Skylab, and ASTP 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 have hallmarks 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. The Skylab series of emblems changed the hallmark method to the first letter of the flight crew's last name.

Skylab I has the "CKW" placed to the right of the Skylab space station, Skylab II has the "BGL" upside-down in the sun just above the "S" in Skylab, and for Skylab 3 the "CGP" makes up part of the green leaves of the tree inside the large "3."

The Apollo Soyuz emblem with crew names has "ASTP" in the earth ocean surrounded by clouds.

$600 - 800

GORDON COOPER

The Apollo 1 cloth crew "patch" displayed with this letter was given to me by Virgil "Gus" Grissom in 1966 and is one of the first production runs of this emblem. Gus and I were both selected by NASA in 1959 as part of the Mercury "Original Seven" Astronauts. Gus flew the second manned Mercury flight in 1961, a 15 minute sub-orbital flight using a Redstone rocket. Next he commanded Gemini 3, the first manned Gemini flight during March 1965. Then Gus started extensive training for Apollo flights and was selected to command Apollo 1 in 1966.

WHITE GRISSOM CHAFFEE APOLLO 1

It came as a shock to us in the Astronaut Office as well as the entire nation and the world that he with crew members Edward White and Roger Chaffee were killed in a launch pad spacecraft fire on January 27, 1967. Gus and the Apollo 1 crew gave their lives to help the United States reach the goal of landing on the moon by the end of 1969.

Gordon Cooper
Mercury and Gemini Astronaut
Apollo 10 Back-up Commander

143

144

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

143
GORDON COOPER'S APOLLO 1 CREW EMBLEM
RECEIVED JUST PRIOR TO THE DEATHS OF GRISSOM, WHITE, AND CHAFFEE
Circular Apollo 1 crew emblem, 3 ½ inches in diameter. Features a Command/Service Module in earth orbit with the moon in the distance. Displayed with a Typed Letter Signed by GORDON COOPER.

GORDON COOPER'S signed provenance letter reads: "*The Apollo 1 cloth crew 'patch' displayed with this letter was given to me by Virgil 'Gus' Grissom in 1966 and is one of the first production runs of this emblem. Gus and I were both selected by NASA in 1959 as part of the Mercury 'Original Seven' Astronauts. Gus flew the second manned Mercury flight in 1961, a 15 minute sub-orbital flight using a Redstone rocket. Next he commanded Gemini 3, the first manned Gemini flight during March 1965. Then Gus started extensive training for Apollo flights and was selected to command Apollo 1 in 1966.*
It came as a shock to us in the Astronaut Office as well as the entire nation and the world that he with crew members Edward White and Roger Chaffee were killed in a launch pad spacecraft fire on January 27, 1967. Gus and the Apollo 1 crew gave their lives to help the United States reach the goal of landing on the moon by the end of 1969."

$1,200 - 1,800

THE FOLLOWING TWO LOTS WERE ORIGINALLY IN THE COLLECTION OF ASTRONAUT WALLY SCHIRRA

144
APOLLO 7 FLOWN SNOOPY PIN WITH "WHITE ROOM" DOOR SIGN
ORIGINALLY FROM THE COLLECTION OF WALLY SCHIRRA
FLOWN ½ x ¼ inch Snoopy Pin carried on Apollo 7 by Wally Schirra. WITH: 19 x 11 inch Apollo 7 Snoopy "What's Up" sign from the *White Room* door. The two matted together to 23½ x 26½ inches, with a 9 x 7 inch color photograph of the Apollo 7 crew standing in front of the White Room door (with aforementioned sign in background), Three small nail holes to sign (where previously affixed to door) as well as a few minor creases. With: Cancelled check endorsed by Schirra.

FLOWN "Snoopy" pin carried by Wally Schirra on Apollo VII. Snoopy "What's Up" *White Room* door sign SIGNED: WALLY SCHIRRA. Crew photo SIGNED and INSCRIBED: *"WE'RE BACK. WALLY SCHIRRA."*

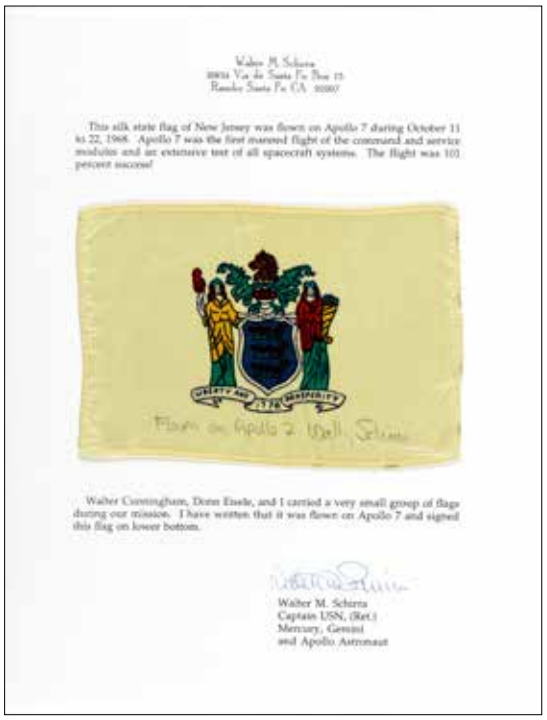
The "White Room" was the environmental chamber through which the Command Module was accessed prior to lift off. Included with this lot is a typed provenance letter from Wally Schirra on his personal letterhead which reads in part: "*The items that you referred to, namely ... an Apollo 7 Snoopy pin, were from my personal collection, and were flown on Apollo 7. Walter M. Schirra*."

$2,500 - 3,500

145
WALLY SCHIRRA'S NEW JERSEY FLAG CARRIED ON APOLLO 7
FLOWN on Apollo 7, a New Jersey state flag, made of silk, 4 x 6 inches. Inscribed and signed: "*Flown on Apollo 7, Wally Schirra.*" Mounted between paragraphs on a Typed Letter Signed by Schirra.

WALTER M. SCHIRRA'S signed provenance letter reads in part: "*This silk state flag of New Jersey was flown on Apollo 7 during October 11 to 22, 1968. Apollo 7 was the first manned flight of the command and service modules and an extensive test of all spacecraft systems... Walter Cunningham, Donn Eisele, and I carried a very small group of flags during our mission.*"

$2,000 - 3,000


Walter M. Schirra
[illegible]

This silk state flag of New Jersey was flown on Apollo 7 during October 11 to 22, 1968. Apollo 7 was the first manned flight of the command and service modules and an extensive test of all spacecraft systems. The flight was 101 percent success!

Walter Cunningham, Donn Eisele, and I carried a very small group of flags during our mission. I have written that it was flown on Apollo 7 and signed this flag on lower bottom.

Walter M. Schirra
Captain USN, (Ret.)
Mercury, Gemini
and Apollo Astronaut

145

146
DOCKING COLLAR ABLATIVE MATERIAL FROM THE APOLLO 7 COMMAND MODULE
ABLATIVE MATERIAL FLOWN ON APOLLO VII. A segment of ablative material approximately ¼ x 1 inch in size. Mounted on an 11 x 8 ½ inch color display certificate with multiple captioned images and illustrations describing how ablative material was used during the mission. Sample number 269 of 500. With copies of NASA/MSC transfer papers to the Smithsonian's National Air and Space Museum (NASM) and NASM deassession papers. Plus a copy of the "*Temporary Parts Removal Tag*" which reads in part: "*Part Number: V36-316046, Authority: ASHUR 101543, Model: Ablative Ring, Mark for shipment of: PFT S/C 101.*"

The certificate reads in part: "*Attached is a section of ablative heat shield material that was flown on the flight of Apollo VII during October 11 – 22, 1968. Apollo VII was the first manned Apollo flight and a major test of the command and service modules in earth orbit. This ablative material was one of the several ring sections that surrounded the docking collar of the command module. It was designed to dissipate heat by vaporizing during atmospheric re-entry, protecting the docking collar area from temperature extremes. This ablative heat shield is a composite material of a phenol resin impregnated onto woven linen material. This sample made 163 orbits of the earth during the Apollo VII mission.*"

$300 - 400

146

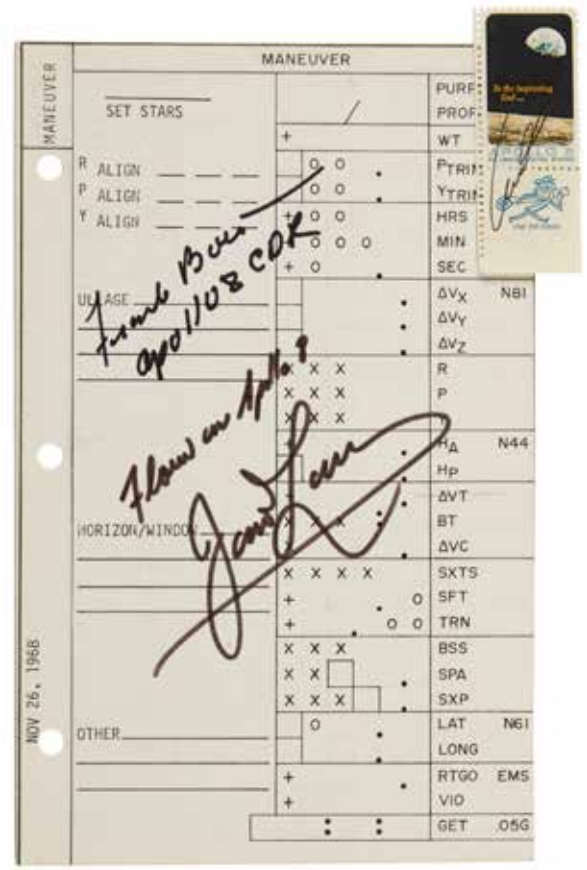
147
FIRST MANNED APOLLO FLIGHT HEADS TO ORBIT - SIGNED
AFTER A 21 MONTH DELAY DUE TO THE APOLLO 1 FIRE
Color photograph, 10 by 8 inches.

SIGNED by Apollo 7 Commander WALLY SCHIRRA. INSCRIBED and SIGNED: "*WALT CUNNINGHAM, 11 OCT 1968, APOLLO 7,*" the mission launch date.

The Apollo 7 Saturn IB launch vehicle is seen rising behind the heavy concrete blockhouse of Cape Canaveral's Complex 34 launch site.

$300 - 400

147



151

149

148

148
APOLLO 7 ASTRONAUTS ABOARD THE USS ESSEX, CREW SIGNED
Black and white photograph, 8 x 10 inches with printed NASA captions on verso. SIGNED by WALLY SCHIRRA, WALT CUNNINGHAM, and DONN EISELE.

The verso caption reads in part: "*Apollo 7 astronauts... pose for photographers on flight deck of USS Essex, their prime recovery ship. The space pilots splashed down at 7:11 am EDT, October 22, 1968, 200 nautical miles south-southwest of Bermuda at the end of their 163rd revolution.*"

$1,000 - 1,500

149
APOLLO 7 FIFTH ANNIVERSARY POSTAL ENVELOPE, CREW SIGNED
Postal envelope having an 8 cent Decade of Achievement stamp and Smithsonian Milestones of Flight address label, 4 x 6 ½ inches.
SIGNED by WALLY SCHIRRA, WALT CUNNINGHAM, and DONN EISELE.

The envelope features a cachet of the Apollo 7 mission emblem and is number nine in a series of milestone covers issued by the Smithsonian Institution, National Air and Space Museum. A folded insert inside the envelope describes the Apollo 7 flight and the Milestone series of envelopes being issued.

$700 - 900

150
APOLLO 8—BATTERY PLATE FLOWN ON THE FIRST MANNED EXPEDITION TO ORBIT THE MOON
Approx ½ inch in diameter FLOWN battery plate mounted onto approx 2 inch in diameter brass plaque, obverse engraved with "*BATTERY PLATE ORBITED THE MOON APOLLO VIII - BORMAN LOVELL ANDERS,*", and reverse with *EAGLE PICHER IND. ELECTRONICS DIVISION COUPLES DEPT.*" Encased in an approx. 3" diameter cut-diamond shaped lucite paperweight.

The Eagle Picher Company was the primary supplier of batteries for the NASA space missions.

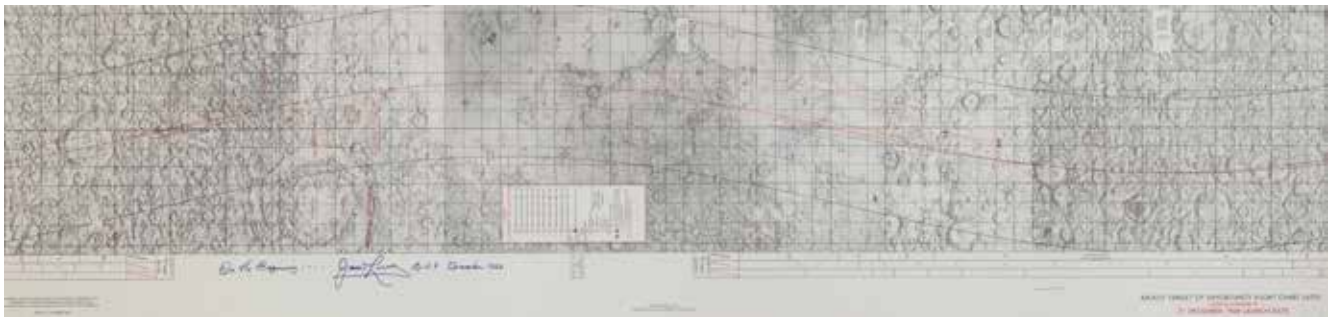
$800 - 1,200

151
APOLLO 8 FLOWN MANEUVER CARD, SIGNED BY FRANK BORMAN & JAMES LOVELL WITH APOLLO 8 STAMP SIGNED BY WILLIAM ANDERS
FLOWN blank 5 x 8 inch Apollo 8 "Maneuver" card dated Nov 26, 1968.

SIGNED and INSCRIBED: "*FLOWN ON APOLLO 8, JAMES LOVELL*" and "*FRANK BORMAN. APOLLO 8 CDR*".
WITH: Apollo 8 "Earthrise" stamp, SIGNED: "*[WILLIAM A] ANDERS*."

Apollo 8 became the first manned space flight to leave Earth's atmosphere. Entering lunar orbit on Christmas eve, December 24th, 1968, Mission Commander Frank Borman, Command Module Pilot James Lovell, and Lunar Module Pilot William Anders did a live broadcast, showing pictures of the Earth and the Moon. The broadcast was finished with the crew members each reading in turn passages from the book of Genesis. The Apollo 8 "Earthrise" stamp bears the quote "*In the beginning God...*" in reference to this reading.

$3,000 - 5,000



152

152
APOLLO 8 LUNAR CHART INSCRIBED WITH "IN THE BEGINNING..."
THE FIRST MEN IN LUNAR ORBIT READ FROM GENESIS
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. Part number SKB 32100097-301. First Edition, 2 December 1968. 14 x 58 inches. Scale 1:7,500,000. A full line plot of the median lunar orbit ground track is shown in red. Near side and far side lunar shadow terminator areas have line marker ticks plotted perpendicular to the spacecraft orbital path. The limit of earth shine is plotted near the 75W longitude spot.

INSCRIBED and SIGNED: "*In The Beginning..., JAMES LOVELL, Apollo 8, December 1968.*" This inscription references the Apollo 8 crew's reading from the Book of Genesis during Christmas Eve in 1968 while in lunar orbit.

Identical to the flown Apollo 8 chart issued to Frank Borman, William Anders, and James Lovell - having the SKB 32100097-301 part number printed inside a legend block. That block has either circular or triangular symbol indicators with nine different colors defining either a 250mm or 80mm single frame photography targets. There are over 50 numbered photographic targets plotted. An important task for this 10 orbit lunar mission was to photograph possible future Apollo landing sites and areas of scientific interest.

$2,000 - 3,000

153

153
EARTHRISE, SIGNED BY THE APOLLO 8 CREW
10 x 8 inch vintage color photograph on Kodak paper of the earth rising over the moon. A few minor crease, a few areas with evidence of adhesive removal in margin.

SIGNED BY FRANK BORMAN, JAMES LOVELL and BILL ANDERS.

$800 - 1,200

154

154
APOLLO 8 EARTHRISE—SIGNED BY THE CREW
21 x 17" vintage color photograph of the Earthrise, mounted on board. Some scuffs to black portions of photo.

SIGNED and INSCRIBED:*"TO MIKE WITH BEST WISHES TO AN 'OUT OF THIS WORLD' LAWYER & FRIEND. BILL ANDERS, APOLLO 8. FRANK BORMAN. JAMES LOVELL."* One of the most iconic images of the space program, it was listed in *Life* Magazine's *100 Photographs that Changed the World*, in which the adventure photographer Galen Rowell called it "the most influential environmental photograph ever taken." (*100 Photographs that Changed the World*, p 172)

$1,000 - 1,500

155

156 (front, actual size)

156 (reverse, actual size)

157

155
EARTH FROM SPACE—SIGNED
Large color photograph, 23 x 19½ inches, of the Earth from space, with orbiting satellite. Framed.

SIGNED by DAVE SCOTT, RUSTY SCHWEICKART, and JIM MCDIVITT.

$800 - 1,200

THE FOLLOWING LOT WAS ORIGINALLY IN THE COLLECTION OF ASTRONAUT TOM STAFFORD

156
THOMAS STAFFORD'S APOLLO 9 ROBBINS MEDALLION
FLOWN Apollo 9 medallion made by the Robbins Company, 1 inch in diameter, minted from sterling silver. The crew mission emblem is on the obverse with the crew names, mission dates, and serial number "*274*" engraved on the reverse. With a Typed Letter Signed by THOMAS P. STAFFORD on his business stationery.

Accompanied by THOMAS P. STAFFORD'S signed provenance letter reads in part: "*Enclosed with this letter is a sterling silver medallion carried on the flight of Apollo 9. It is one of the Robbins series of medallions made for our Apollo flight program and has serial number 274 engraved on the reverse side along with the Apollo 9 mission dates of 'March 3 - 13 1969.'*

Apollo 9 was the first manned test flight of the Lunar Module by Commander James McDivitt and Lunar Module Pilot Rusty Schweickart. Dave Scott was the Command Module Pilot. Their flight proved that the Lunar Module was able to perform all mission tasks and cleared the way for my lunar flight with another Lunar Module just 2 months later in May of 1969. These successes enabled Apollo 11 to make the first lunar landing during July 1969."

$2,500 - 3,500

157
APOLLO 9 & GEMINI IV STAR CHART USED IN TRAINING, SIGNED BY JIM MCDIVITT
APOLLO CELESTIAL DISPLAY DEVICE.
Prepared by the U.S. Army Map Service. Corps of Engineers, under NASA Purchase Request No T-27508-G, revised and augmented by FCS, MSC, NASA, accuracy verified by Morehead Planetarium, Chapel Hill, N.C. February, 1967.
Four sided 3D folding celestial display device, 6½ x 11 inches when folded flat, housed in original printed mylar sleeve.

SIGNED & INSCRIBED: "*JIM MCDIVITT. USED IN TRAINING. GIV A9*."

$800 - 1,200

158
FIRST MEN TO FLY THE LUNAR MODULE, CREW SIGNED
Color photolithograph, 8 x 10 inches. NASA captions printed along the front bottom border and on verso.

SIGNED by JAMES McDIVITT and DAVE SCOTT. SIGNED and INSCRIBED: "*RUSTY SCHWEICKART, Apollo 9 LMP.*"

The Apollo 9 crew poses in their white space suits with their Apollo Saturn V launch vehicle in the background.

$400 - 600


158

159
APOLLO 9 DURING SIM TRAINING AT KSC, CREW SIGNED
WITH A RARE SMILE AND SIGNATURE FROM THE ICY COMMANDER - ALAN SHEPARD
Black and white photograph, 8 x 10 inches. Printed NASA/KSC captions on verso.

SIGNED by JAMES McDIVITT, RUSTY SCHWEICKART, and DAVE SCOTT. Additionally signed by ALAN SHEPARD.

The NASA/KSC caption reads in part: "*February 25, 1969, Kennedy Space Center, FLA. – Apollo 9 Command Module Pilot David R. Scott, right, appears to be the center of attention during (a) lighter moment today....*" Alan Shepard, Chief of the Astronaut Office, offers a rare smile to Dave Scott while near consoles of the Apollo spacecraft simulators at KSC. Known in some circles as the "Icy Commander," Shepard rarely showed any emotions. He was America's first man in space and later commanded Apollo 14 in 1971, becoming the fifth man to walk on the Moon.

$800 - 1,200


159

160
SCHWEICKART PHOTOGRAPHS SCOTT ABOVE THE EARTH, SIGNED
FIRST TIME TWO U.S. ASTRONAUTS PERFORM AN EVA AT THE SAME TIME
Color photograph, 8 x 10 inches.
SIGNED by DAVE SCOTT. SIGNED and INSCRIBED: "*RUSTY SCHWEICKART, Apollo 9 LMP.*"

Command Module Pilot Dave Scott stands in the open hatch of Command/Service Module *Gumdrop*. Photographed by Rusty Schweickart during his own spacewalk near the front porch area of Lunar Module Spider.

$400 - 600


160

161

162

THE FOLLOWING LOT WAS ORIGINALLY IN THE COLLECTION OF ASTRONAUT TOM STAFFORD

161
THOMAS STAFFORD'S FLOWN CREW BETA EMBLEM
CARRIED IN LM "SNOOPY" TO WITHIN 50,000 FEET OF THE MOON
FLOWN Apollo 10 Beta cloth crew emblem, 3 x 3 inches, shield shaped, printed on white Beta cloth approximately 9 inches square. With a Typed Letter Signed by TOM STAFFORD on his business stationery.

Accompanied by THOMAS P. STAFFORD'S signed provenance letter reads in part: "*Enclosed is an Apollo 10 Beta cloth emblem. It is exactly the same emblem worn on our Apollo 10 spacesuits and the same material used as the fire protection layer of the Apollo suits. It was carried onboard Lunar Module 'Snoopy' to within 50,000 feet of the Moon's surface during May 18 – 26, 1969 flight of Apollo 10.*"

$1,200 - 1,800

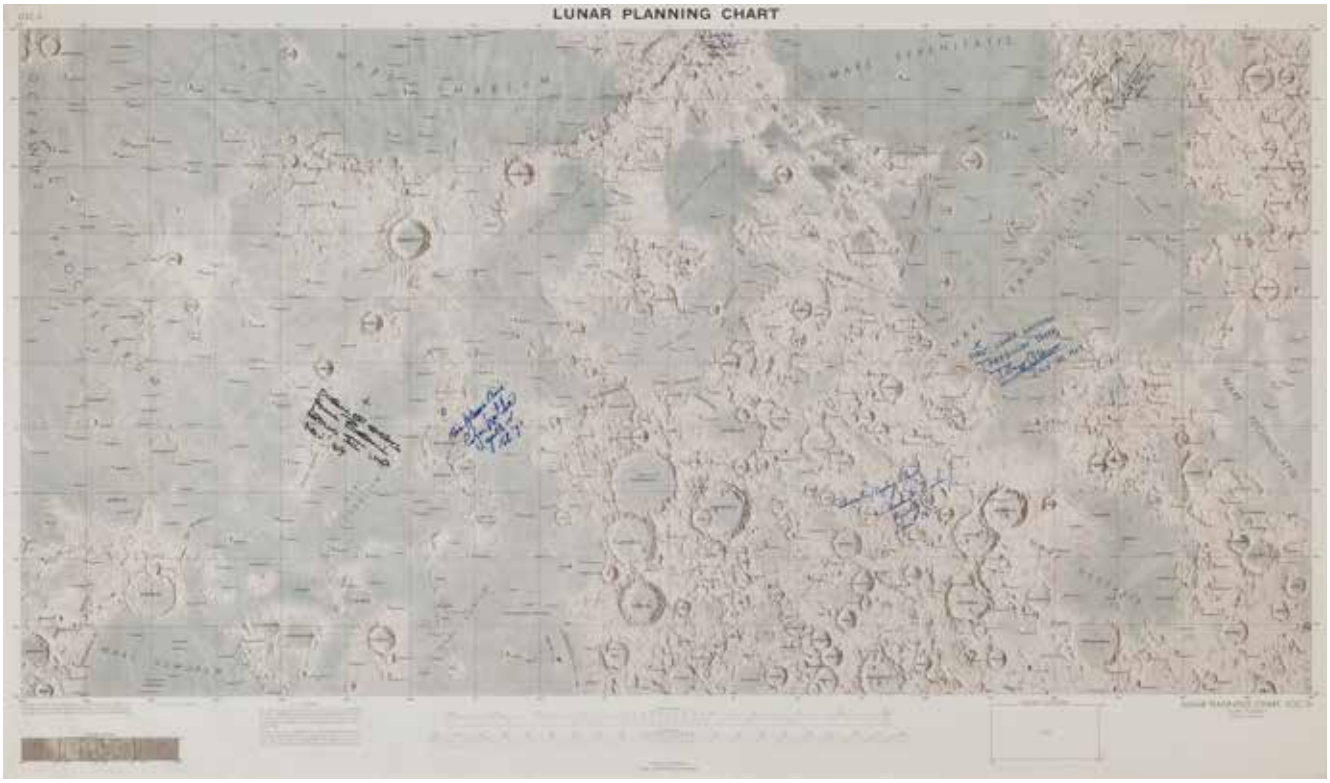
162
SNOOPY—MASCOT OF THE APOLLO X LM CREW, SIGNED
SNOOPY Astronaut doll, produced in China by Determined Distributions of San Francisco for United Feature Syndicate, 1969. Made from plastic and textile, 10 inches tall. With original red and blue display box. The Peanuts comic strip character Snoopy in a space suit and helmet.

INSCRIBED and SIGNED by TOM STAFFORD: "*Snoopy, LM-4 Call Sign, Tom Stafford, Apollo X Cdr, May 69*" on the back of Snoopy's helmet.

Snoopy was adopted by NASA with the full blessing of creator Charles Schulz as the Manned Flight Awareness (MFA) Program mascot. The program 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 Stafford and Cernan named their Lunar Module Snoopy partly to bring greater recognition to the MFA program. Apollo X Command Module Pilot John Young named his spacecraft Charlie Brown.

$1,000 - 1,500



163
LARGE LUNAR NEAR SIDE CHART,
SIGNED BY 20TH CENTURY SURFACE EXPLORERS
LANDING DATE AND SITE NAME INSCRIPTIONS BY
A MEMBER OF EVERY APOLLO LUNAR LANDING CREW
Lunar Planning Chart (LOC - 2). Aeronautical Chart and Information Center, Edition 1, July 1969. Color lithographed moon map in Mercator projection. 29 x 49 inches. Scale 1:2,500,000 at the equator.

BOLDLY INSCRIBED and SIGNED with:
"First Lunar Landing, Tranquillity Base, BUZZ ALDRIN, July 20, 1969"
"Ocean of Storms, ALAN BEAN Apollo XII LMP, Nov 1969"
"Fra Mauro Base, EDGAR MITCHELL Apollo 14, Feb '71"
"Hadley Rille, DAVE SCOTT, Jul / Aug 1971"
"Descartes / Cayley Plains, CHARLES M. DUKE, JR., Apollo 16, April 1972"
and
"The Valley of Taurus Littrow, GENE CERNAN Apollo XVII, Dec '72."

A highly detailed lunar chart signed by a member of each Apollo lunar landing crew. In addition to their signatures and inscriptions, each astronaut has marked his landing site with either an "X" or a circle. All mare and large craters are labeled including unusual features such as rilles and ejecta rays. One of the largest lunar maps ever produced for NASA.

$15,000 - 20,000

APOLLO 11
Lots 164 - 194

Lot 174

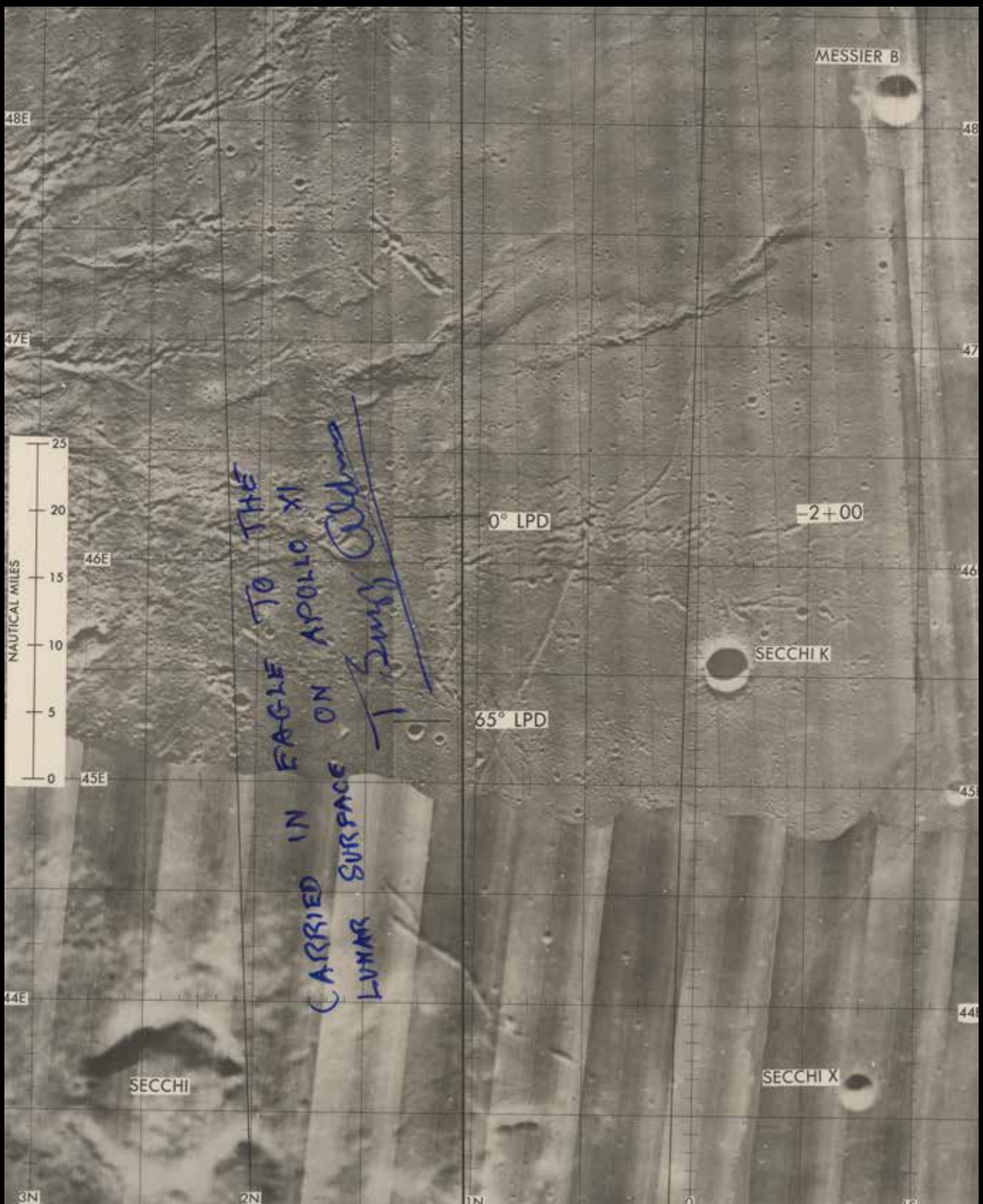
ORIGINALLY IN THE COLLECTION OF APOLLO 11 COMMAND MODULE PILOT MICHAEL COLLINS.

164
MICHAEL COLLINS' FLOWN CREW-SIGNED APOLLO 11 EMBLEM
ONE OF THE VERY FEW FLOWN NEIL ARMSTRONG SIGNED MISSION ARTIFACTS
A FLOWN Apollo 11 Beta cloth crew emblem, 3 ½ inches in diameter, printed on white Beta cloth 6 inches square.

SIGNED by the Apollo 11 crew: NEIL ARMSTRONG, MICHAEL COLLINS, and BUZZ ALDRIN. Additionally inscribed by Collins above the emblem with: "*Carried to the moon aboard Apollo XI, July 1969.*" A rare flown mission artifact signed by the first man to step on the moon – Neil Armstrong.

With MICHAEL COLLINS' manuscript provenance note, reading: *"I certify that the enclosed 6" by 6" Beta cloth Apollo XI crew patch, signed by Neil Armstrong, Buzz Aldrin, and myself, is from my Personal Preference Kit flown to the moon in 1969. All three signatures date back to 1969. I added the inscription at the top approx. 25 years later. Michael Collins, Nov. 1, 2004.*"

$50,000 - 70,000


MESSIER B
48E
47E
46E
45E
44E
0° LPD
65° LPD
-2+00
SECCHI K
SECCHI X
SECCHI
NAUTICAL MILES
25
20
15
10
5
0
3N
2N
CARRIED IN THE EAGLE TO THE LUNAR SURFACE ON APOLLO XI

THE FOLLOWING 9 LOTS WERE ORIGINALLY IN THE COLLECTION OF ASTRONAUT BUZZ ALDRIN

165
FLOWN APOLLO 11 NAVIGATIONAL CHART TAKEN TO THE LUNAR SURFACE
MAPPING THE START OF THE FIRST MANNED LUNAR DESCENT
FLOWN Apollo 11 LM photographic film section chart, 25 nautical mile scale and a descent engine burn time mark of minus 2+00, the descent path track line plotted near the center of chart, prominent craters in the Secchi series labeled, 8.5 x 10.5 inches. With a Typed Letter Signed by BUZZ ALDRIN.

An important lunar map showing the LM's projected descent path, used during the anxious minutes while Armstrong and Aldrin were awaiting the "GO" for Powered Descent Initiation.

BUZZ ALDRIN'S signed provenance letter reads: "*This LM descent navigational chart was flown to the Moon's surface in Lunar Module Eagle during the flight of Apollo 11. It was used to verify our descent track while Neil Armstrong and I prepared for the Power Descent Initiation (PDI) engine burn on July 20, 1969. The time period covered on this chart starts from about 3 minutes before this burn, then counts down to just about one minute before the PDI burn.*

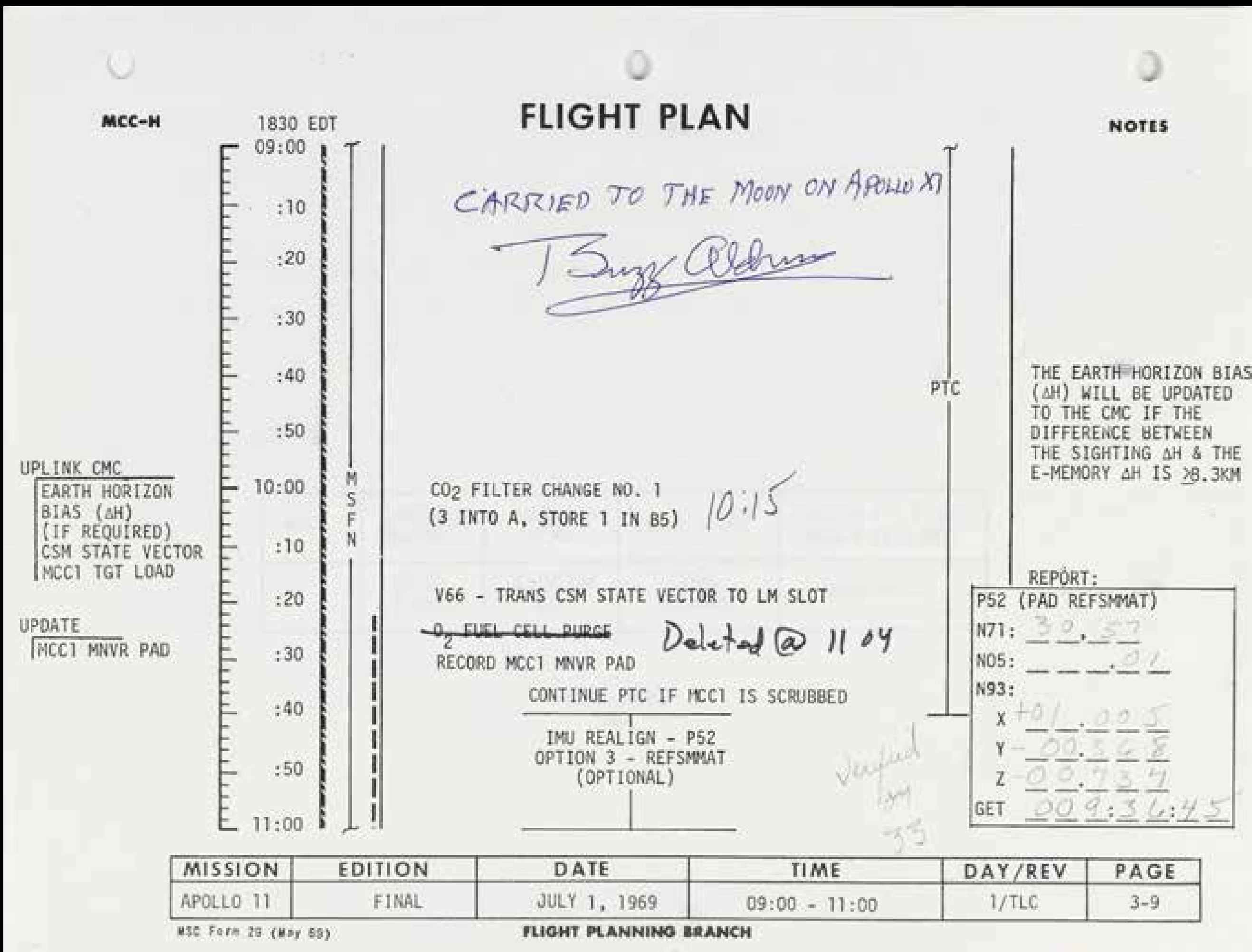
During this part of the flight, Mission Control had been trying to radio Neil and myself that we were "GO" for PDI, but we could not hear them. With assistance from Michael Collins in Columbia, the [sic] we finally heard the radio call. I then called off items from the LM Activation Checklist and said: "Hit VERB 77, Okay, sequence camera coming on."

If the PDI burn did not occur as planned, Neil and I could wait one more orbit, but once the burn started, there was only just enough fuel to make one attempt at the lunar landing. We were flying over the Secchi series of craters as shown on this chart and were exactly on center along the dark descent path line. This chart provided critical verification that Eagle was on course before the PDI burn was to occur.

The chart was one of a series taped together which provided a continuous map of our flight path and, like Neil and myself, logged over 22 hours on the lunar surface. It was exposed to the vacuum of the lunar surface while inside the LM during our lunar surface EVA.

I have written 'Carried in Eagle to the lunar surface on Apollo XI' and signed the chart under the nautical mile scale. This chart has been in my private collection since our return from the Moon in July 1969."

$25,000 - 35,000



MCC-H

FLIGHT PLAN

NOTES

1830 EDT

09:00

:10

:20

:30

:40

:50

10:00

:10

:20

:30

:40

:50

11:00

MSFN

CARRIED TO THE MOON ON APOLLO XI

Buzz Aldrin

UPLINK CMC
- EARTH HORIZON BIAS (ΔH) (IF REQUIRED)
- CSM STATE VECTOR
- MCC1 TGT LOAD

UPDATE
- MCC1 MNVR PAD

CO_2 FILTER CHANGE NO. 1
(3 INTO A, STORE 1 IN B5) 10:15

V66 - TRANS CSM STATE VECTOR TO LM SLOT

~~O_2 FUEL CELL PURGE~~ Deleted @ 11 04

RECORD MCC1 MNVR PAD

CONTINUE PTC IF MCC1 IS SCRUBBED

IMU REALIGN - P52
OPTION 3 - REFSMMAT
(OPTIONAL)

PTC

THE EARTH HORIZON BIAS (ΔH) WILL BE UPDATED TO THE CMC IF THE DIFFERENCE BETWEEN THE SIGHTING ΔH & THE E-MEMORY ΔH IS ≥8.3KM

REPORT:
P52 (PAD REFSMMAT)
N71: 30.37
N05: .01
N93:
X +01.005
Y -00.568
Z -00.734
GET 009:36:45

MISSION	EDITION	DATE	TIME	DAY/REV	PAGE
APOLLO 11	FINAL	JULY 1, 1969	09:00 - 11:00	1/TLC	3-9

MSC Form 29 (May 69)

FLIGHT PLANNING BRANCH

166

FLOWN APOLLO 11 FLIGHT PLAN SHEET—MISSION DAY ONE

SOME OF THE FIRST WORDS AND DATA VALUES WRITTEN BY NEIL ARMSTRONG IN THE FLIGHT PLAN

FLOWN Apollo 11 Flight Plan, pp 3-9/3-9a, a single sheet printed recto and verso. NASA/MSC, July 1, 1969. 10 ½ x 8 inches. Detailed annotations in pencil by Neil Armstrong and in ink by both Armstrong and Buzz Aldrin. With a Typed Letter Signed by BUZZ ALDRIN.

The Apollo 11 crew was completing their first day in space and securing systems prior to the first rest period. After Neil Armstrong logged the numbers from the P52 guidance platform alignment, he inscribed "*Verified on 33*" as a reminder that they had checked these results using the star *Antares*.

Accompanied by BUZZ ALDRIN'S signed provenance letter which reads in part: "*Enclosed with this letter is a sheet numbered 3-9 and 3-9a 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. This sheet is from the detailed timeline section and covers hour nine to the beginning of eleven in the mission. It has an extensive set of data recorded by Commander Neil Armstrong during the flight.*

Page 3-9 lists a carbon dioxide filter change. Neil Armstrong logged that change taking place at '10:15' into the mission. Neil then recorded our guidance platform realignment program (P52) N71 values of '30, 37,' the N05 values of '.01' and the X, Y, Z N93 values of '+01.005, -00.368, 00.737.' He logged this alignment occurring at a GET of '009:36:45' (hours, minutes, seconds) into the mission. These were the REFSMMAT or Reference Stable Member Matrix values based on star observations through the sextant. Neil also wrote 'Verified on 33' meaning that is realignment was verified using star number 33 which was Antares. I wrote that the oxygen full cell purge was 'Deleted @ 11 04' into the mission and lined-out that event.

Page 3-9a has a table of values associated with Mid Course Correction (MCC) number 1. Our trajectory was precise enough at that point that MCC1 was not required ... This page has been in my private collection since 1969."

Aldrin has inscribed and signed page 3-9 with "*Carried to the Moon on Apollo XI, BUZZ ALDRIN.*" A copy of the flight plan front cover is enclosed.

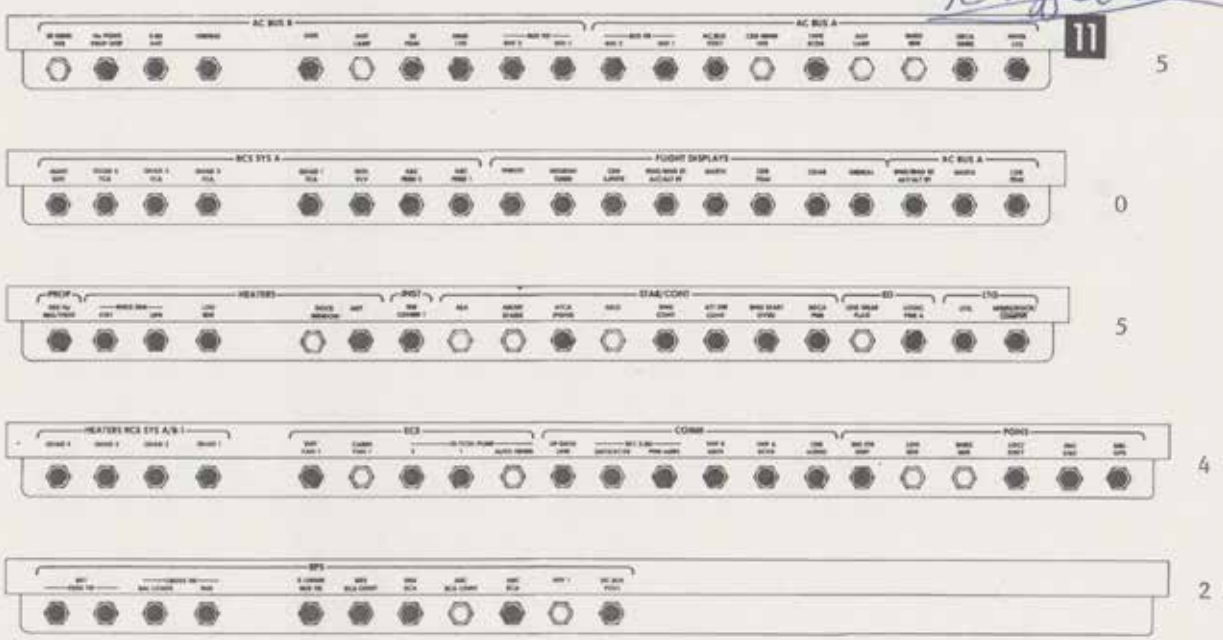
$18,000 - 25,000

LM-5

Basic Date May 26, 1969
Changed July 4 F

ACT-64

Carried in EAGLE to the LUNAR surface on APOLLO XI
Buzz Aldrin



167

FLOWN APOLLO 11 CHECKLIST SHEET TAKEN TO THE LUNAR SURFACE

ILLUSTRATES THE FINAL CONFIGURATION FOR EAGLE'S CIRCUIT BREAKERS PRIOR TO THE LUNAR LANDING - PLUS ALDRIN DESCRIBES HOW A BROKEN BREAKER COULD HAVE STRANDED ARMSTRONG AND HIM ON THE MOON

FLOWN Apollo 11 LM Activation Checklist, page ACT-64/ACT-65, a single sheet printed recto and verso. NASA/MSC, May 26, 1969, changed July 4, 1969. 5½ x 8 inches. With a Typed Letter Signed by BUZZ ALDRIN.

During this period of the mission, Neil Armstrong and Buzz Aldrin are inside Lunar Module *Eagle*. They are verifying circuit breaker settings prior to undocking from Michael Collins inside Command Module *Columbia*. Within six hours, Armstrong and Aldrin would become the first men to land on the Moon.

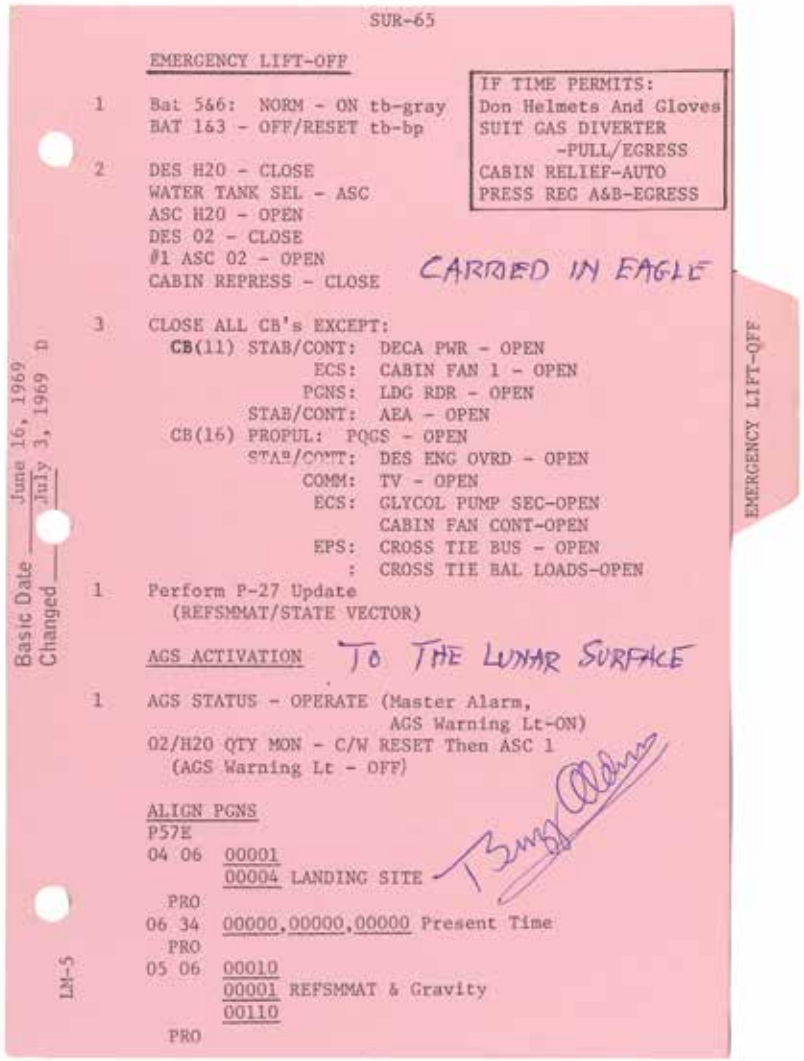
BUZZ ALDRIN'S signed provenance letter reads: "*Enclosed with this letter is a sheet numbered ACT-64 and ACT-65 from the Apollo 11 LM Activation Checklist. The entire checklist was carried to the Moon on the flight of Apollo 11 during July 16 to 24, 1969. Then the checklist, including this sheet, was taken to the surface of the Moon in Lunar Module Eagle during the first lunar landing on July 20, 1969. This sheet has the last settings for our circuit breakers prior to undocking from Command Module Columbia and Eagle's powered flight.*

Side ACT-64 has a diagram defining the configuration of circuit breakers on panel 11. This panel was slightly behind and above Commander Neil Armstrong's position in Eagle. Panel 11 was set as illustrated when we undocked at about 100 hours and 15 minutes into the Apollo 11 mission. A black circle indicates the breaker should be "pushed in" or engaged to allow current flow. A white circle indicates the breaker should be "pulled out" to break the flow of electrical current, thus preventing operation of that part of Eagle's systems. Systems on this panel included our AC Buses, Flight Displays, Heaters, Communications, and Environmental Control.

Side ACT-65 has the diagram for panel 16 which was located on my side of the LM. Systems on this panel included our Propulsion, Stabilization and Control, Communications, and Lighting. A critical issue arose after our lunar landing and EVA. I noticed that the ascent engine arming breaker push/pull switch was broken. It is illustrated on side ACT-65 at the second row under 'STAB/CONT.' Apparently during movement wearing our large space suit 'backpacks,' either Neil or I bumped into this panel and broke off that particular switch. This switch was the direct means of arming our Ascent Stage engine which would allow us to leave the lunar surface. Mission Control verified that the switch was open, meaning that the engine was currently unarmed. If we could not get the engine armed, we would be stranded on the Moon. They advised us to leave the switch in the open position until the timeline called for it to be engaged. I started to think of ways to activate the switch if pushing it by hand failed. As it turned out, a pen I used to record notes in this and other checklists was the perfect tool to engage this circuit breaker.

This sheet has been in my private collection since 1969. On side ACT-64, I have written: 'Carried in Eagle to the lunar surface on Apollo XI' and signed it along the top. On side ACT-65, I have signed by name along the top and again along the bottom."

$20,000 - 25,000


SUR-65

EMERGENCY LIFT-OFF

IF TIME PERMITS:
Don Helmets And Gloves
SUIT GAS DIVERTER
-PULL/EGRESS
CABIN RELIEF-AUTO
PRESS REG A&B-EGRESS

1 Bat 566: NORM - ON tb-gray
BAT 1&3 - OFF/RESET tb-bp

2 DES H2O - CLOSE
WATER TANK SEL - ASC
ASC H2O - OPEN
DES O2 - CLOSE
#1 ASC O2 - OPEN
CABIN REPRESS - CLOSE

CARRIED IN EAGLE

3 CLOSE ALL CB's EXCEPT:
CB(11) STAB/CONT: DECA PWR - OPEN
ECS: CABIN FAN 1 - OPEN
PGNS: LDG RDR - OPEN
STAB/CONT: AEA - OPEN
CB(16) PROPUL: PQGS - OPEN
STAB/CONT: DES ENG OVRD - OPEN
COMM: TV - OPEN
ECS: GLYCOL PUMP SEC-OPEN
CABIN FAN CONT-OPEN
EPS: CROSS TIE BUS - OPEN
: CROSS TIE BAL LOADS-OPEN

1 Perform P-27 Update
(REFSMMAT/STATE VECTOR)

AGS ACTIVATION

TO THE LUNAR SURFACE

1 AGS STATUS - OPERATE (Master Alarm,
AGS Warning Lt-ON)
O2/H2O QTY MON - C/W RESET Then ASC 1
(AGS Warning Lt - OFF)

ALIGN PGNS
P57E
04 06 00001
00004 LANDING SITE
PRO
06 34 00000,00000,00000 Present Time
PRO
05 06 00010
00001 REFSMMAT & Gravity
00110
PRO

Basic Date June 16, 1969
Changed July 3, 1969 D

LM-5

EMERGENCY LIFT-OFF

168
FLOWN APOLLO 11 CHECKLIST SHEET FOR A LUNAR SURFACE ABORT
LIST THE STEPS FOR AN EMERGENCY LIFT-OFF OF EAGLE FROM THE MOON
FLOWN Apollo 11 LM Lunar Surface Checklist, page SUR-65/SUR-66, a single sheet printed recto and verso. Full sheet red tinting to assist quick location with tabs reading "*EMERGENCY LIFT-OFF.*" NASA/MSC, June 16, 1969, changed July 3 and 8, 1969. 5½ x 8 inches. With a Typed Letter Signed by BUZZ ALDRIN.

The Lunar Surface Checklist had several contingency sections including these emergency lift-off instructions.

BUZZ ALDRIN'S signed provenance letter provides extensive details and reads in part: "*...this sheet was carried to the surface of the Moon in Lunar Module Eagle during the first lunar landing on July 20, 1969. This sheet lists procedures for one of the most difficult emergency conditions that could occur on the Moon – EMERGENCY LIFT-OFF.*

If conditions arose where Neil Armstrong and I had to make an immediate lift-off from the Moon, we would have referred to this sheet. SUR-65 advises if time permitted, that we don our space suit helmets and gloves. We would then configure our ascent batteries, set various water and oxygen values, then close all circuit breakers except for the ones listed. Next we would run a P27 which was a computer program to revise our lunar lift-off time and then activate our AGS or Abort Guidance Section of our navigation system. The final steps were to align our PGNS or Primary Guidance and Navigation Section with the landing site coordinates, current mission time, and our Reference Stable Member Matrix (REFSMMAT) and Gravity values.

Side SUR-66 lists additional steps required for an emergency lift-off such as computer inputs or our Inertial portionof the Coupling Data Unit (ICDU) angles. Then we would initialize our AGS with a series of computer verb commands and noun values. Needless to say, these were all very a complicated series of steps Neil and I would have performed in order to safely leave the lunar surface. Fortunately, we did not have to implement these procedures. Events after our lunar landing were all successful, including an over 2 hour lunar surface exploration period during July 20 and 21, 1969...

This sheet has been in my private collection since 1969. I have written on side SUR-65: Carried in Eagle to the Lunar Surface and signed it along the right side. I have also written on SUR-66: Carried in Eagle to the Lunar Surface on Apollo XI and signed it along the right side."

$15,000 - 20,000

169

170

169
ALDRIN'S 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 material was used as a 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.

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.*"

$700 - 900

170
ALDRIN'S APOLLO 11 CREW SIGNED POSTAL COVER
LIFE INSURANCE FOR THE FAMILIES
An Apollo 11 Life Insurance Cover measuring approximately 4 x 6 inches with a cachet featuring two astronauts exploring the lunar surface. 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 "BA12." 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 history 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 BA12 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."

$7,000 - 9,000

173

171

172

171
ARMSTRONG USED LAUNCH CHECK LIST TRAINING SHEET—BOOST PHASE
THE COUNTDOWN TO LAUNCH AND A FLIGHT TO THE MOON
Apollo 11 Launch Operations Checklist, page L 2-1 and L 2-2, a single sheet printed recto and verso. NASA/MSC, April 15, 1969, revised June 27, 1969. 8 x 5½ inches. With a Typed Letter Signed by BUZZ ALDRIN and copy of the checklist front cover.

INSCRIBED and SIGNED by BUZZ ALDRIN: "*Used in training for Apollo XI, BUZZ ALDRIN*" on page 2-1.

BUZZ ALDRIN'S provenance letter reads in part: "*Accompanying this letter is a page numbered 2-1 and 2-2 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 simulator ... The sheet is from Section 2 titled: Boost-Insertion – TLI.*

The entire checklist, including this page, was used by all three Apollo 11 crew members: Neil Armstrong, Michael Collins, and myself. This section was extensively used by used by Neil Armstrong.... Neil had the command responsibility to initiate an abort if the launch profile deviated from the planned events outlined in this checklist section... The launch profile was the most intense training we as a crew performed together.

The simulator teams would give us all types of waring 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... This page lists boost preparations starting from 20 minutes before our simulated launch to just 45 seconds before planned ignition... I kept this checklist after our mission as a reminder of all the training that took place back in 1969...."

$800 - 1,200

172
LAUNCH EMERGENCY CHECKLIST SHEET—FIRE DANGERS
CREW PROCEDURES AND REFLECTIONS ON THE FATAL APOLLO 1 FIRE
Apollo 11 Launch Operations Checklist, page 5-3 / 5-4, a single sheet in red tint to assist quick location during emergencies. Printed recto and verso. NASA/MSC, April 15, 1969, revised June 16, 1969. 8 x 5½ inches. With a Typed Letter Signed by BUZZ ALDRIN and copy of the checklist front cover.

INSCRIBED and SIGNED by BUZZ ALDRIN:
"*Used in training for Apollo XI, BUZZ ALDRIN*" on page 5-3.

BUZZ ALDRIN'S provenance letter reads in part: "*Accompanying this letter is a page numbered 5-3 and 5-4 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 simulator ... The sheet is from Section 5 titled: Launch Emergency Procedures.*

"Side 5-3 has the remaining steps to follow in case of a Launch Escape System failure plus emergency procedures on how to separate the CSM from the Saturn V booster, with additional steps if we were at the TransLunar Injection (TLI) stage. The last part of this page has procedures to extinguish a fire while in orbit while wearing our spacesuits. Side 5-4 has the remaining steps for fire extinguishment with space suits donned plus the beginning of steps to deal with a fire if we were not wearing space suits. A fire in the spacecraft is an extremely dangerous occurrence because Neil, Mike, and I clearly remember the tragic loss of fellow astronauts Gus Grissom, Ed White, and Roger Chaffee due to such an event while on the launch pad back in January 1967...."

$700 - 900

173
APOLLO 11 CREW SIGNED INSURANCE COVER
RARE INSURANCE COVER COMMONLY KNOWN AS THE TYPE 2
Apollo 11 Life Insurance Cover measuring approximately 4 x 6 inches. Blue Dow-Unicover cachet having images of the Apollo 11 crew members and a drawing titled: "*Apollo XI, The First Step...*" with the additional title of: "*First Manned Lunar Landing.*" Kennedy Space Center (KSC) postmark of 16 July 1969, the launch date for Apollo 11.

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

This cover is one of three different designs used by the Apollo 11 crew to serve as a form of "live insurance" for their families. If catastrophic event during the mission occurred, preventing Neil Armstrong, Michael Collins, and Buzz Aldrin's safe return, this cover could have been used by family members to provide financial support. This design as well as the Apollo 11 emblem and lunar surface exploration designs were evenly distributed to the families after they were postmarked at the Kennedy Space Center on July 16 or Houston, Texas on July 20, 1969.

$5,000 - 7,000

174

174
APOLLO 11 AT TRANQUILLITY BASE, JULY 20 - 21, 1969
ALDRIN INSCRIBES AND SIGNS HISTORY'S BEST KNOWN LUNAR PHOTOGRAPH
Large color photograph, 16 x 20 inches. BOLDLY INSCRIBED and SIGNED: "*Tranquillity Base, July 20 – 21, 1969, BUZZ ALDRIN.*"

The Apollo Program's most iconic image, taken by Neil Armstrong: Buzz Aldrin standing on the Moon. Inscribed with the dates of Man's first lunar landing and surface exploration by Armstrong and Aldrin.

$2,500 - 3,500

175

175
THE BEGINNING OF MAN'S EPIC JOURNEY TO THE MOON - JULY 16, 1969
Color photograph, 10 x 8 inches. Printed on "*A KODAK PAPER.*"

INSCRIBED and SIGNED: "*July 16th 1969, BUZZ ALDRIN, Apollo XI LMP.*"

The Saturn V rocket rises from the launch pad carrying Neil Armstrong, Michael Collins, and Buzz Aldrin to a rendezvous with the Moon and the first lunar landing.

$800 - 1,200

176

176
COLUMBIA AND EAGLE SEPARATE
THE BEGINNING OF MAN'S FIRST LUNAR LANDING
Color photograph, 8 x 10 inches with red NASA identification number at upper left. Full frame 70mm Hasselblad image and period printing using "*A KODAK PAPER.*"

INSCRIBED and SIGNED: "*Photo by, BUZZ ALDRIN, Apollo XI*"

CSM Columbia has just undocked and begins a slow separation from LM Eagle just prior to flying over the landing site in Sea of Tranquillity. Armstrong and Aldrin would descend and land on the moon during the next orbit.

$1,500 - 2,000

177

178

179

177
ALDRIN WITH THE STARS AND STRIPES
Color photolithograph, 8 x 10 inches with NASA descriptive text along the lower border and on verso. BOLDLY SIGNED and INSCRIBED: "*BUZZ ALDRIN, LMP.*"

Aldrin stands next the United States flag after deployment on the lunar surface. One of the most significant images from the lunar landing that symbolizes the accomplishment of John F. Kennedy's goal of landing a man on the moon.

$1,000 - 1,500

178
ALDRIN WITH LUNAR EXPERIMENTS
Color photolithograph, 8 x 10 inches, with NASA descriptive text along the lower border and on verso.

SIGNED by BUZZ ALDRIN.

Neil Armstrong photographs Buzz Aldrin while he verifies operation of experiments he and Armstrong have just placed on the lunar surface.

$800 - 1,200

179
EAGLE'S RETURN TO LUNAR ORBIT
Color photograph, 8 x 10 inches with red NASA identification number at upper left. Full frame 70mm Hasselblad image and period printing using "*A Kodak Paper.*"

SIGNED by BUZZ ALDRIN.

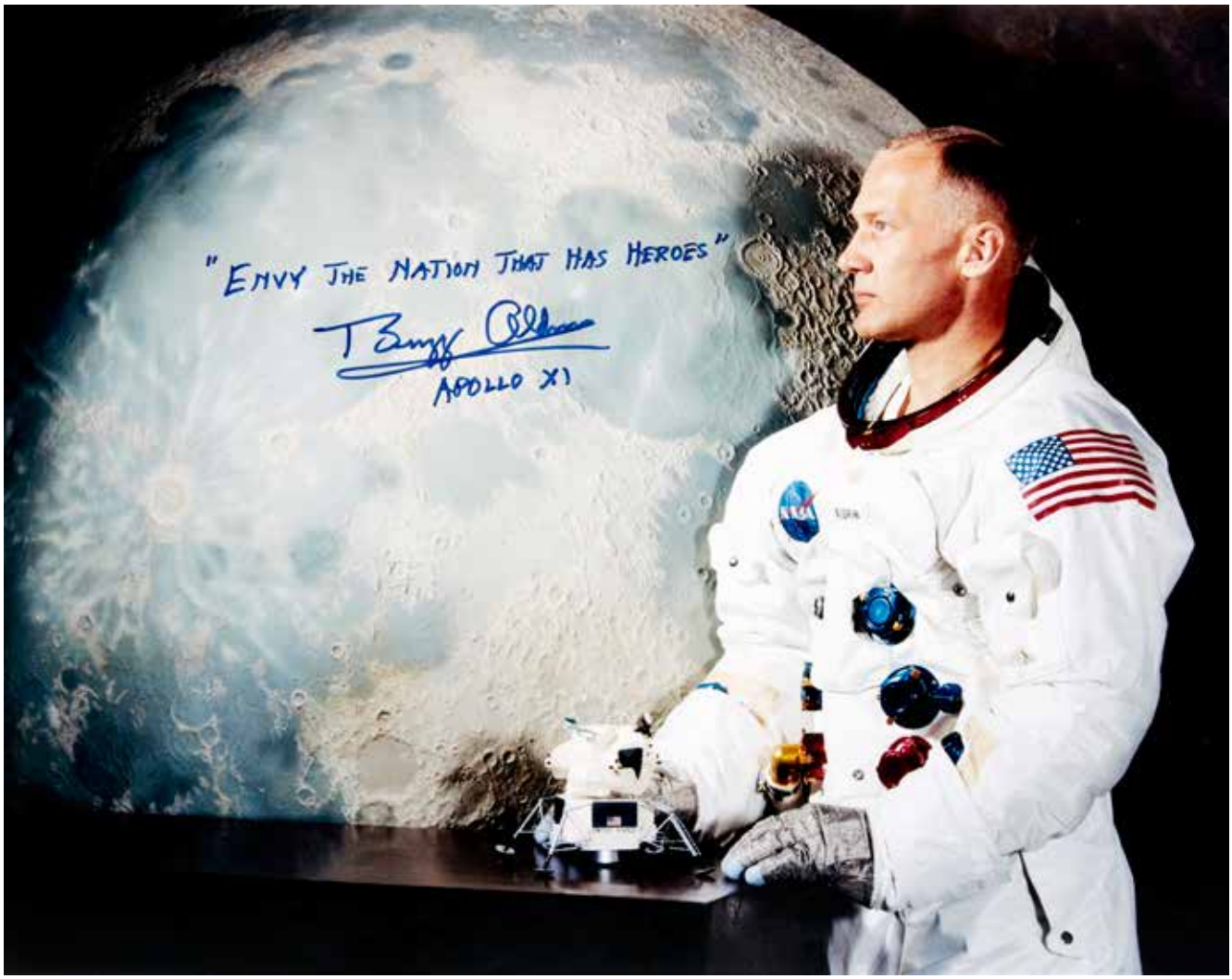
Michael Collins photographs the Eagle Ascent Stage soon after Armstrong and Aldrin lifted off the lunar surface on July 21, 1969. The earth is seen rising in the background.

$1,500 - 2,000

180
EAGLE ON BETA CLOTH
An Apollo 11 Beta cloth emblem, 3 ½ inches in diameter, printed on white Beta cloth 6 inches square.

SIGNED by BUZZ ALDRIN and MIKE COLLINS.

$800 - 1,200



182

181
SECOND MAN ON THE MOON, SIGNED BY ARMSTRONG
6½ x 6½ color photograph of Buzz Aldrin on the lunar surface, taken by Neil Armstrong just after Aldrin stepped onto the Moon.

SIGNED BY NEIL ARMSTRONG.
One of the Apollo program's most iconic images.

$3,000 - 5,000

182
ENVY THE NATION THAT HAS HEROES
Color photograph, 16 x 20 inches.

SIGNED and INSCRIBED:
"*Envy the Nation that has Heroes, BUZZ ALDRIN, APOLLO XI*."

Large profile portrait of Apollo XI lunar module pilot and second man on the moon Buzz Aldrin posing with a model of the lunar lander with large image of the moon in the background.

$2,000 - 3,000

181

184

183

183
APOLLO 11, SIGNED BY COLLINS
36 x 54 inch print of Apollo 11 Command Module Pilot Michael Collins' official NASA portrait.

SIGNED AND INSCRIBED: "*MICHAEL COLLINS. APOLLO XI CMP. JULY 16-24, 1969*."

$2,000 - 3,000

184
APOLLO 11 CREW—SIGNED BY ARMSTRONG, ALDRIN & COLLINS
Three 7½ x 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 engraved brass plaque to 29½ x 17¾ inches.

SIGNED: "*NEIL ARMSTRONG*," "*BUZZ ALDRIN*," and "*MICHAEL COLLINS*."

$4,000 - 6,000

187

185

186

185
BUZZ ALDRIN'S FIRST STEP ON THE MOON—SIGNED BY NEIL ARMSTRONG
Color photolithograph 11 x 14 inches.

SIGNED:"*NEIL ARMSTRONG*."

One of the Apollo Program's most iconic images, a photo of Buzz Aldrin taken by Neil Armstrong just after Aldrin stepped onto the Moon. Armstrong and the Lunar Module are both visible in Aldrin's faceplate.

$1,000 - 1,500

186
APOLLO 11—SIGNED BY ALDRIN
"ASTRONAUT BUZZ ALDRIN ON THE SEA OF TRANQUILITY"
16 x 20 inch color print of Buzz Aldrin on the lunar surface, Apollo program emblem to lower left, Apollo 11 emblem to lower right. Captioned in manuscript in blue ink at upper margin "*Astronaut Buzz Aldrin on the Sea of Tranquility*," limitation statement to lower left in manuscript in blue and red ink reads *"This special edition print has been limited to 75 autographed copies, each annotated and signed by Astronaut Buzz Aldrin, of which this is copy number 66.*" Matted, framed and glazed to 24 x 28 inches.

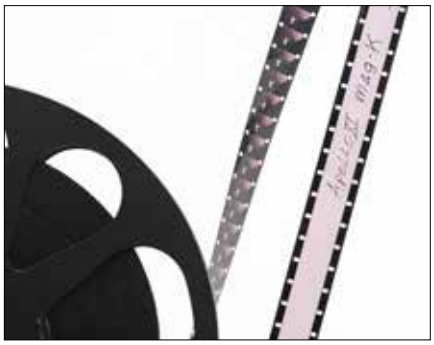
LIMITED EDITION, NO 66/75. SIGNED AND INSCRIBED: *"JULY 20, 1969. 'WE CAME IN PEACE FOR ALL MANKIND'. BUZZ ALDRIN. LUNAR MODULE PILOT. APOLLO XI."*

$1,500 - 2,500

187
WE CAME IN PEACE FOR ALL MANKIND
BUZZ ALDRIN AFTER HE STEPS ONTO THE MOON
Large color photograph, 16 x 20 inches.

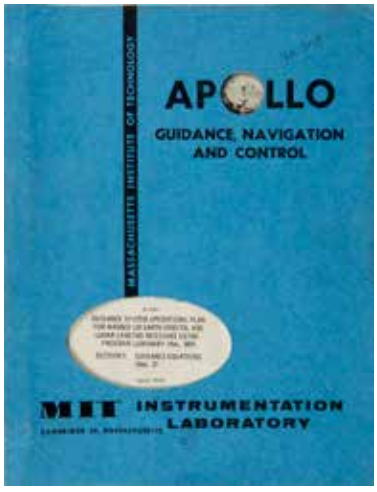
SIGNED and INSCRIBED: "*BUZZ ALDRIN. APOLLO 11. 'WE CAME IN PEACE FOR ALL MANKIND.'*" One of the Apollo Program's most iconic images. The photograph was taken by Neil Armstrong just after Aldrin stepped onto the Moon.

$2,000 - 3,000



188 (part,detail)

189 (part)



190

191

188
APOLLO 11 SEQUENCE PHOTOGRAPHY
Collection of 4 16mm reels, each 7 inch diameter, reels labeled as containing magazines A through L; accompanied by *Apollo 11 Photography: 70-mm, 16-mm, and 35-mm Frame Index.* Houston: National Space Science Data Center, February 1970. NSSDC 70-02; *Data Users' Note: Apollo 11 Lunar Photography.* Greenbelt, MD.: National Space Science Data Center, April 1970. NSSDC 69-059A-01; and *Apollo Mission 11 Photography Indexes.* [No place]: Department of Defense, October 1969. Reels appear to be in excellent condition, publications with some light wear, but also excellent.

"Apollo 11 represented man's first opportunity to directly observe scientific phenomena on the lunar surface. Both the surface and orbital photography of the mission served not only to document man's first lunar landing and the extravehicular activities of the astronauts, but also to identify scientific areas and experiments for study in future missions.
The photographic equipment and materials carried by Apollo 11 were designed specifically: (1) to photograph 'targets of opportunity,' i.e., scientifically interesting sites, and potential Apollo landing sites as time and circumstances permitted; (2) to obtain photographs of the lunar landing module and lunar surface activities after LM landing; (3) to obtain vertical and oblique stereo strips of nearside and farside regions of scientific interest; (4) to record mission operational activities; and (5) to obtain documentation for subsequent landing crew training purposes" (from "Photographic Objectives" in NSSDC 69-059A-01). The above reels include the lunar material gathered by the 16mm Maurer Data Acquisition cameras. According to the index, the above reels contain scenes of the Earth and space; IVA with Armstrong, Aldrin and Collins; sequence of LM undocking from CSM; sequence of CSM tracking LM to maneuver for docking; lunar surface; LM during ascent; LM landing on lunar surface; EVA with Armstrong; and the EVA flag sequence.

$2,000 - 3,000

189
APOLLO 11 LUNAR SAMPLE PHOTOGRAPHS
Group of 87 color or silver gelatin print photographs on 45 sheets, approximately 8 x 10 inches, [Houston, 1969-70], most with printed NASA identification number or with number added to the negative, generally excellent condition, accompanied by "Sample Information Summary #5" as a chart showing cumulative weight of the samples and 3-pages of figure captions.

An interesting collection of photographs showing the lunar sample bounty collected by the The Apollo 11 crew. Images vary with some in a "mug shot" format, microscopic details, images of the samples being processed at the Lunar Receiving Laboratory in Houston, and numerous shots of the rocks in situ on the lunar surface.

$1,200 - 1,800

190
APOLLO 11 TECHNICAL MANUAL
APOLLO GUIDANCE, NAVIGATION, AND CONTROL. GUIDANCE SYSTEM OPERATIONS PLAN FOR MANNED LM EARTH ORBITAL AND LUNAR LANDING MISSIONS USING PROGRAM LUMINARY. Cambridge, Massachusetts: MIT Instrumentation Laboratory, April, 1969.
8½ x 11 inches, bound at spine with prongs into original blue printed cardstock covers with circular cut-out. "*LUM 5 (Rev. 2) Apollo 11*" written in black ink on spine.

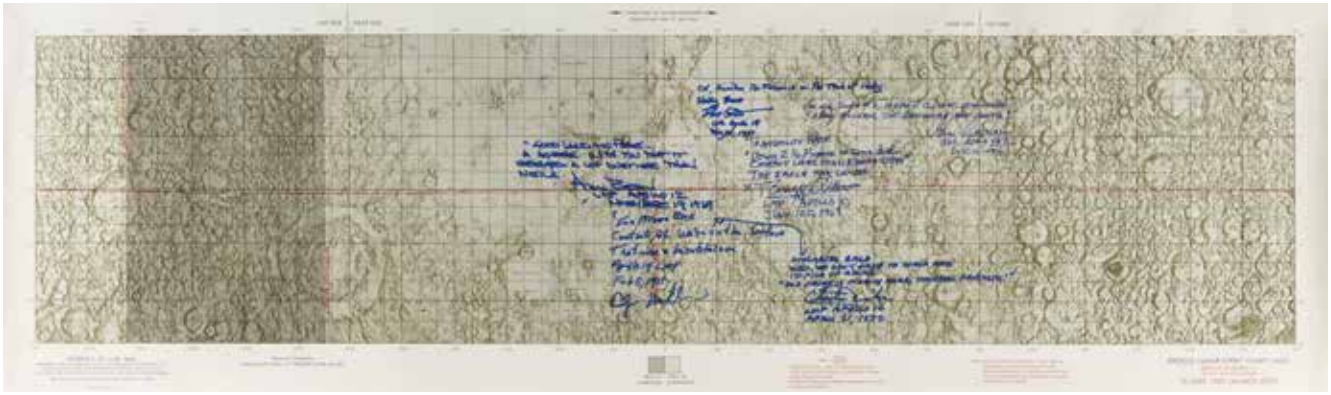
An excellent manual for the Apollo onboard guidance, navigation, and control systems. One of the many challenges faced by NASA was to find a way to navigate a spacecraft from Earth to the moon. Ultimately, NASA chose the MIT Instrumentation Lab to develop the system for both the Apollo lunar and command modules.

$700 - 1,000

191
APOLLO 11 SATURN V FLIGHT MANUAL, SIGNED BY COLLINS
SATURN V FLIGHT MANUAL. SA 506. MSFC-MAN-506. [Huntsville, Alabama]: NASA/MSFC, February 25, 1969; changed June 10, 1969.
8.5 x 11" approx. 230 pp. Cream card-stock covers, punched. Spine tanned, light foxing to edges of back cover, small rust mark to upper edge of front cover.

SIGNED and INSCRIBED: "*MICHAEL COLLINS. APOLLO XI CMP.*" Prepared to provide the astronaut with a single source reference on the functions and characteristics of the SA-506 and launch vehicle and the AS-506 flight mission, the Saturn V flight manual is divided into 10 sections with two appendices. The first is a general description of the rocket, the second gives details on its performance, the third covers emergency detection and procedures, the fourth-sixth cover the S-IC, S-II and S-IVB stages, the seventh covers the instrument unit, the eighth the ground support interface, the ninth gives details on mission control monitoring, and the tenth section covers mission variables and constraints.

$1,000 - 1,500



192

193

194

192
APOLLO 11 LUNAR ORBIT CHART, SIGNED & INSCRIBED BY 6 MOONWALKERS, ONE FOR EACH MOON LANDING
APOLLO LUNAR ORBIT CHART (ALO), APOLLO MISSION 11, 1ST AND 30TH REVOLUTIONS, 16 JULY 1969 LAUNCH DATE. 20 June, 1969. First Edition. 12 x 40¾ inches.
SIGNED AND INSCRIBED OVER THEIR LANDING SITES:
APOLLO 11: "*TRANQUILITY BASE. 'DOWN 2½, PICKING UP SOME DUST ... CONTACT LIGHT, OKAY, ENGINE STOP.' THE EAGLE HAS LANDED. BUZZ ALDRIN. LMP APOLLO XI. JULY 20, 1969.*"
APOLLO 12: "*'GOOD LANDING PLACE ... I AGREE WITH YOU THAT IT SEEMED A LOT DUSTIER THAN NEILS. ALAN BEAN LMP APOLLO 12. NOVEMBER 19, 1969.*"
APOLLO 14: "*FRA MAURO BASE. CONTACT AL. WE'RE ON THE SURFACE. THAT WAS A BEAUTIFUL ONE. APOLLO 14 LMP. FEB 5, 1971. EDGAR MITCHELL*."
APOLLO 15: "*OK HOUSTON, THE FALCON IS ON THE PLAIN AT HADLEY. HADLEY BASE. DAVE SCOTT. CDR APOLLO 15. JULY 30, 1971*."
APOLLO 16: "*DESCARTES BASE. WELL, WE DIDN'T HAVE TO WALK FAR TO PICK UP ROCKS. 'OLD ORION IS FINALLY HERE, HOUSTON. FANTASTIC!' CHARLIE DUKE, LMP APOLLO 16. APRIL 21, 1972.*"
APOLLO 17: "*GOING DOWN AT 2, 10 FEET ... CONTACT ...ENGINE STOP. 'OKAY HOUSTON, THE CHALLENGER HAS LANDED!' GENE CERNAN. CDR APOLLO XVII. DEC 11, 1972*."

$8,000 - 12,000

193
APOLLO 11 LANDING REGION — SIGNED BY MICHAEL COLLINS
MARE NECTARIS AND VICINITY. Army Map Service (AM), Corps of Engineers, U.S. Army, Washington D.C., 1961. Provisional edition. 10 x 14" 3D lunar plastic relief topographic map, 1:5,000,000 horizontal scale, 1:1,000,000 vertical scale, 5:1 vertical exaggeration.

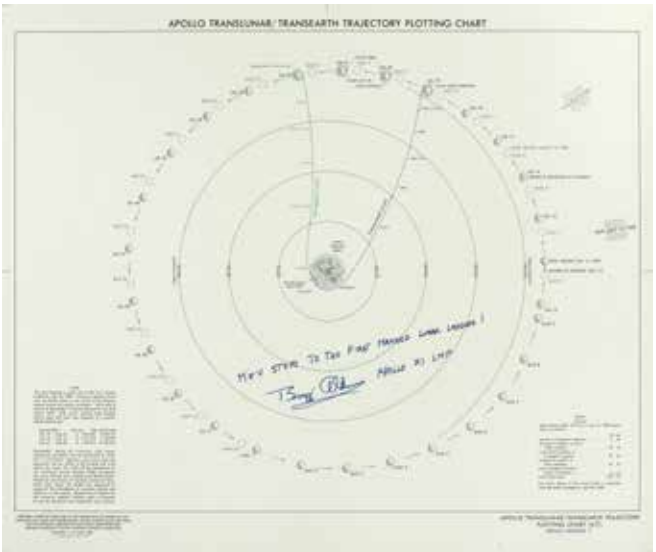
SIGNED BY MICHAEL COLLINS. A color 3D lunar relief topographic map of the Apollo 11 landing region.

$1,500 - 2,000

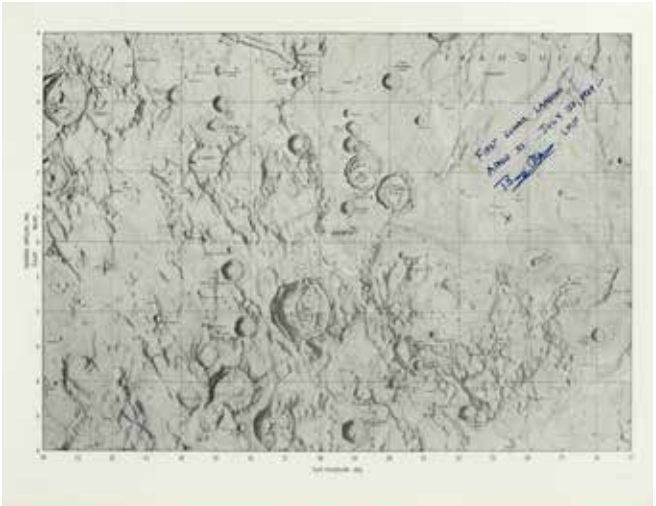
194
THE BEGINNING OF APOLLO 11'S FLIGHT TO THE MOON
APOLLO EARTH ORBIT CHART (AEO), APOLLO 11 MISSION... FOR JULY 1969 LAUNCH DATES. Color Earth maps, 3 sheets, each 13½ by 41 ½ inches. Chart 1 plots all aspects the first orbit, chart 2 plots the second orbit with the nominal Translunar Injection (TLI) ground track, and the last chart plots the third orbit including the back-up TLI path.

This group of three Earth charts plots the launch and orbital ground track of Apollo 11 after lift-off from the Kennedy Space Center. Orbital paths on all three sheets illustrate the full launch direction azimuth from 72 to 108 degrees. Circular plots along the orbital ground tracks indicated communication tracking sites with red circles denoting tracking ships.

$500 - 700



195



196

195
KEY STEPS FOR A LUNAR LANDING
SIGNED APOLLO 11 TRAJECTORY CHART
Apollo Translunar / Transearth Trajectory Plotting Chart (ATT), Apollo Mission 11. June 23, 1969, 24 x 20 inches. A printed flight time summary based on the July 16 launch and detailed notes section are located in opposite lower corners.

BOLDLY INSCRIBED and SIGNED: "*Key Steps to the First Manned Lunar Landing! BUZZ ALDRIN, Apollo XI LMP.*"

The chart is centered on a north polar view of the Earth and displays the July/August 1969 orbital path of the moon around the Earth. The Apollo 11 flight profile is plotted and events such as earth launch, translunar injection, lunar and earth coast phases, lunar orbit insertion, lunar landing - liftoff, and transearth injection are included.

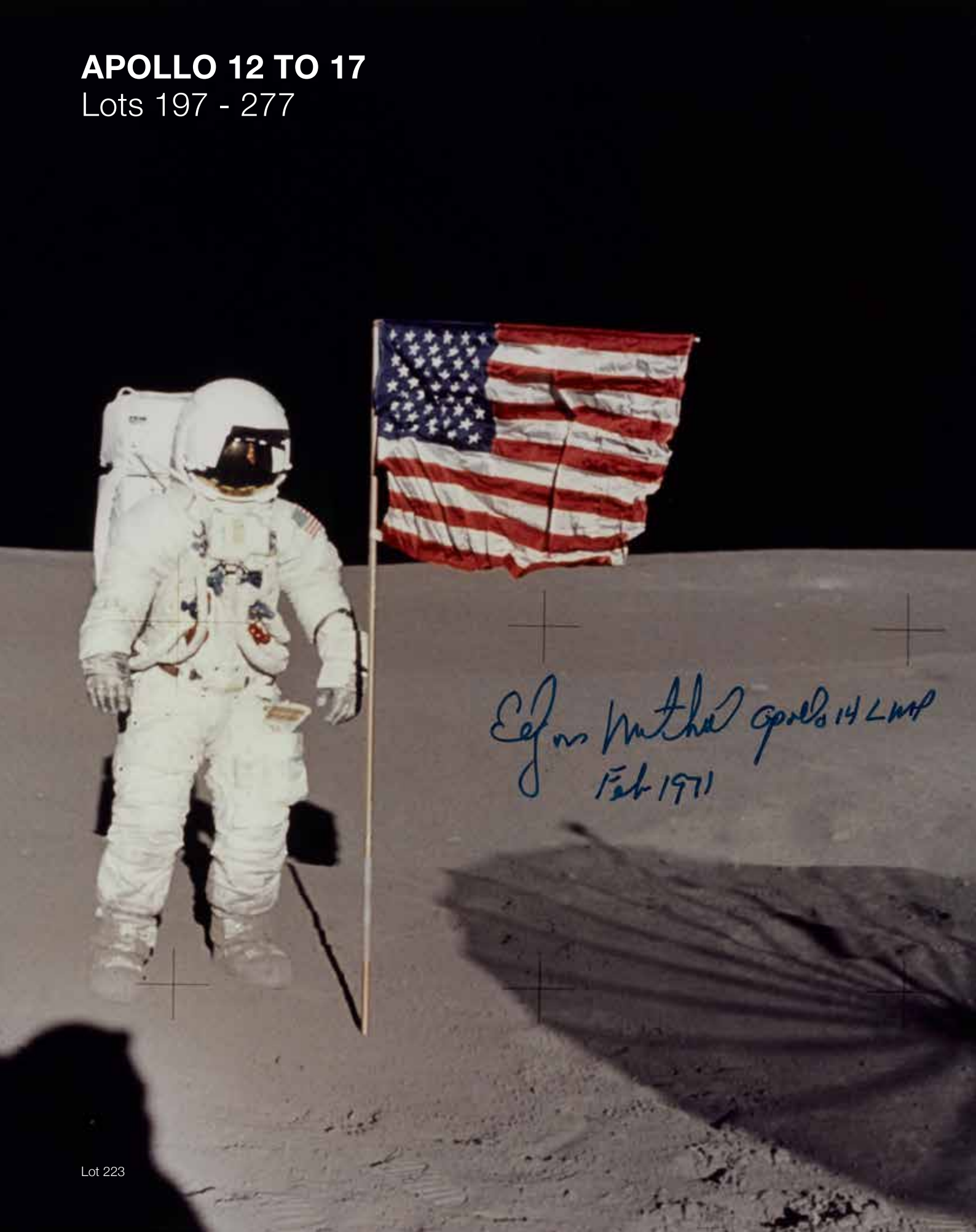
$2,000 - 3,000

196
FIRST LUNAR LANDING CHART
EXTENSIVE INSCRIPTION BY BUZZ ALDRIN
A chart of the Mare Tranquillitatis and surrounding areas, captioned "*MSC – 6132 – 69.*" Lunar east longitude is marked in degrees from 10 to 27 along the bottom and latitude is marked from 0 to 6 degrees north and south. Issued for internal NASA Manned Spacecraft Center (MSC) used prior to and during the Apollo 11 mission. 17 x 22 inches.

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

$2,000 - 3,000

APOLLO 12 TO 17
Lots 197 - 277



Lot 223

Actual size

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

197
FLOWN APOLLO 12 ROBBINS MEDALLION, A GIFT FROM "PETE"
COOPER REFLECTS ON HIS OWN LUNAR MISSION PROSPECTS WITH APOLLO 13
FLOWN Apollo 12 Robbins medallion, sterling silver, 1¼ inches in diameter. The crew mission emblem is on the obverse with the mission dates and serial number 147 engraved on the reverse. With a Typed Letter Signed by GORDON COOPER.

COOPER'S provenance letter reads: "*This medallion was carried on the Apollo XII flight by my old friend Charles "Pete" Conrad during November 14 to 24, 1969. He was the commander of this mission which made the second lunar landing of the Apollo Program at the Ocean of Storms. Pete really made a pin-point landing - right next to the crater that the robotic Surveyor III spacecraft landed in just over 2 years before. He and Alan Bean then made two lunar surface explorations and were able to bring back parts of the Surveyor III for study.*

Pete and I flew together back in 1965 on Gemini 5. We made the longest mission then to date, staying 8 days in earth orbit. That length was about the time NASA planned for the first lunar landing missions and the Gemini 5 flight proved that man could survive that long in space with no ill effects.

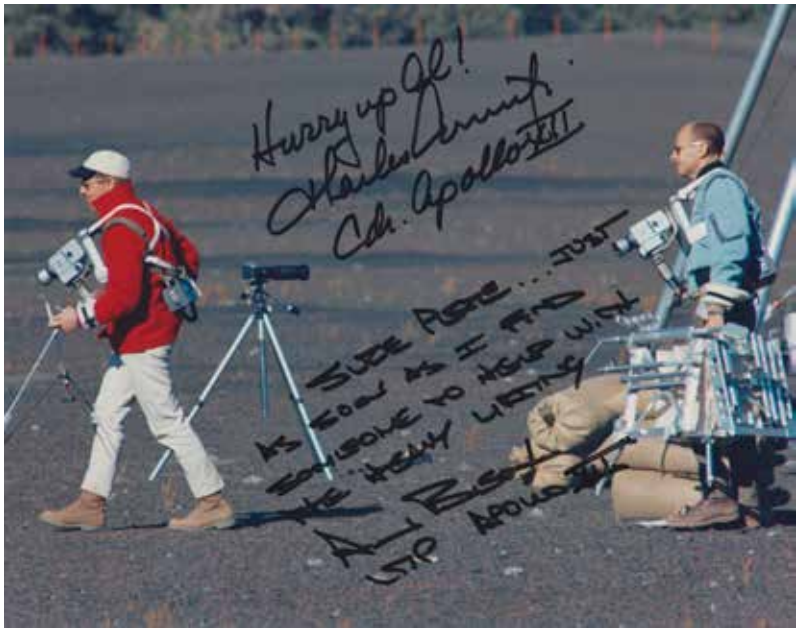
This medallion has serial number 147 engraved on the back side and is one of the Robbins series of medallions made for flight crews during the Apollo Program. I served as back-up commander on Apollo 10 which had the first Lunar Module flown to lunar orbit in May of 1969. That mission served as a 'dress rehearsal' for Apollo 11 because Apollo 10 did all the mission sequence flight steps except for the actual lunar landing. The lessons learned and techniques demonstrated on Apollo 10 proved that indeed Apollo 11 could land on the moon which happened just 2 short months later in July 1969.

Normal Apollo crew rotations from back-up crew to prime fight crew was as follows – the back-up crew would be named the prime crew of the third mission down the line in the Apollo flight program. For instance, Tom Stafford, John Young, and Gene Cernan backed-up the prime Apollo 7 crew of Wally Schirra, Donn Eisele, and Walt Cunningham. Tom's crew was then in line to fly Apollo 10, the third mission after Apollo 7. Base on this rotation, I should have been selected as commander of Apollo 13. However, office 'politics' in the Astronaut Corps, the return to flight status of Alan Shepard after the correction of an inner ear disorder, and the view points of certain NASA managers allowed for the selection of Shepard ahead of me for command of Apollo 13. Shepard fell behind in training and was allowed to switch to commander of Apollo 14, moving Jim Lovell and his crew up to Apollo 13.

Of course, if I had received command of Apollo 13, it would have been my 'lost moon.' I would not have been able to walk on the moon because of the flaw in the oxygen tank which caused the explosion. That explosion made any chance of landing impossible because the Lunar Module was needed to make the return to earth. No one knew that flaw had happened until an exhaustive review of flight equipment and procedures after the accident. If I had been selected for command on Apollo 13, there would not have been a falling behind in training because of my extensive work experience during back-up on Apollo 10. Shepard was very fortunate to be pulled from command of '13' and placed on '14.' As it turned out, he was the only one of us Mercury guys to actually fly to and land on the moon."

$5,000 - 7,000

199



200

198

198
FLOWN APOLLO 12 GOLD STAR
FLOWN ½-inch five point gold-colored star mounted onto a 2½ x 4 inch presentation card. The Apollo XII mission dates, spacecraft and crew names are printed on the card.

Presented by the Apollo XII crew to individuals that provided key support to the success of the Apollo XII flight.

$600 - 800

199
APOLLO 12 PORTRAIT, CREW SIGNED
Color photolithograph, 10 x 8 inches, with NASA text on verso. SIGNED and INSCRIBED: "*CHARLES CONRAD Apollo XII Cdr, RICHARD GORDON Apollo XII CMP,*" and "*ALAN BEAN Apollo XII LMP.*"

The Apollo XII astronauts pose in white space suits in front of a Lunar Module Trainer and surrounded by lunar surface experiments.

$400 - 600

200
THE SPACE ROOKIE GETS STUCK WITH A HEAVY LOAD, SIGNED
A TEASING PETE CONRAD WRITES - HURRY UP, AL!
Color photograph, 8 x 10 inches.
BOLDLY INSCRIBED and SIGNED: "*Hurry up Al! CHARLES CONRAD, Cdr. Apollo XII*" and "*Sure Pete... Just as soon as I find someone to help with the heavy lifting, ALAN BEAN, LMP Apollo XII.*"

The Apollo XII moon landing astronauts practice lunar surface activities, with Commander Charles "Pete" Conrad carrying the light weight gnomon (vertical scale device on a tripod) and lunar tongs. Alan Bean, training for his first flight, has to struggle with the large hand tool carrier as Conrad moves quickly ahead of him.

$500 - 700

201

201
OFF TO THE MOON!
THE BEGINNING OF MAN'S SECOND LUNAR LANDING
Color photograph, 8 x 10 inches. INSCRIBED and SIGNED: "*Off to the Moon! RICHARD GORDON, Cmp*
SIGNED and INSCRIBED: "*ALAN BEAN, Apollo XII LMP*" and "*CHARLES CONRAD, Cdr. Apollo XII.*"

The Apollo XII crew walks to the transfer van on the morning of November 14, 1969. They would lift-off during a heavy rain storm which caused lightning discharges through the Saturn V rocket. Fortunately, the launch was not aborted and the flight continued to make the second manned lunar landing.

$600 - 800

202

202
LIGHTING DOES STRIKE TWICE IN THE SAME PLACE — AT THE APOLLO XII SATURN V
CREW SIGNED APOLLO XII LAUNCH PHOTOGRAPH
Color photograph, 10 x 8 inches, of the Apollo XII Saturn V launch during a rainstorm on November 14, 1969. The launch tower and spacecraft access arm are clearly visible surrounded by a dark angry sky.

INSCRIBED and SIGNED:
"*Apollo XII Launch, RICHARD GORDON, CMP.*"
SIGNED and INSCRIBED:
"*CHARLES CONRAD, Apollo XII Cdr.*" and "*ALAN BEAN, LMP.*"

Some 36 seconds after liftoff while passing through heavy cloud cover, the Saturn V triggered a lightning discharge emanating from the first stage and down to the ground. Then at 52 seconds, a second strike occurred. These events caused multiple spacecraft systems to go off-line and disrupt telemetry to Mission Control. A knowledgeable flight controller suggested flipping a rarely used control panel switch with the phrase "SCE (Signal Conditioning Equipment) to Aux" (the auxiliary position). Luckily, Alan Bean was familiar with the location, saving valuable seconds during the potential crisis.
Various Command/Service Module systems had to be reset, but the Saturn V itself was unaffected and continued to power the crew into earth orbit.

$800 - 1,200

203

203
APOLLO 12 LUNAR SURFACE
PANONRAMIC VIEW AT THE SURVEYOR 3 SPACECRAFT
PROVIDES A PROSPECTIVE OF SURVEYOR 3'S VIEW OF THE MOON
Large black and white photograph, 20 x 24 inches. Captions along the lower border reads in part: "*Prepared by Mapping Sciences Laboratory, Science & Applications Directorate, Manned Spacecraft Center, January 1970.*" Large photographs of this type were created just after to flight to assist with post mission analysis.

During Conrad and Bean's second lunar surface moon walk, they photographed, inspected, and returned parts from the Surveyor 3 spacecraft located some 600 feet from their Lunar Module.
The astronauts completed a partial Hasselblad panoramic (pan) photography of the area which has Surveyor 3's TV camera and extendable sample collection arm at the left and center. The lunar horizon can be seen along the top and numerous small craters at the pan center and to the right. Surveyor 3 landed some 31 months before the flight of Apollo 12 during November 1969. Parts returned by Conrad and Bean assisted understanding of long term exposure of flight equipment on the lunar surface.

$500 - 700

204

205

206

204
APOLLO 12—ALAN BEAN IN THE OCEAN OF STORMS
SIGNED AND INSCRIBED BY BEAN
30 x 30" black and white photograph on Kodak paper.

SIGNED and INSCRIBED:
THIS BEAUTIFUL PRINT BRINGS BACK A LOT OF GREAT MEMORIES OF PETE AND ME ON THE OCEAN OF STORMS.

Taken by Commander Charles "Pete" Conrad, Lunar Module pilot Alan Bean is seen with the hand tool carrier and his chest-mounted Hasselblad camera during the second EVA on Apollo 12. Conrad's reflection is clearly visible on Bean's helmet visor.

$2,000 - 3,000

205
APOLLO 12—PLANS FOR MAN'S SECOND LUNAR LANDING, SIGNED BY BEAN
APOLLO 12 FINAL FLIGHT PLAN. APOLLO AS-507/CSM-108/LM-6
Houston, TX: NASA/MSC, October 15, 1969.
8 x 10½ inches. Approximately 240 pages, with 4 fold-out sheets. Light blue card stock covers, punched and stapled at spine. Block of ten "First Man on the Moon" stamps affixed to front cover, an eleventh stamp affixed to lower right, and four postmarks from the launch date of the Apollo 12 mission, reading "*Cape Canaveral, FL. NOV 14 AM 1969. 32920*." Front cover detached, coffee stains to upper edges.

SIGNED BY ALAN BEAN on front cover. Includes: general flight plan notes including space suit wearing schedules, communications and power periods, photographic nomenclature, and various equipment operations schedules; mission objectives which are mainly focused on the lunar surface activities; mission timeline, including contingency plans in the case of trouble extracting the LM, docking issues, or the failure of the LM descent engine.

$1,000 - 1,500

206
EARTH FROM SPACE, SIGNED BY ALAN BEAN
9½ x 7 inch vintage color photograph of Earth from space mounted to 14 x 11" board. Lower left corner of board bumped.

SIGNED and INSCRIBED:
"TO LOUIS - THANKS FOR YOUR THOUGHTS - I ENJOYED VISITING WITH YOU. ALAN BEAN, US ASTRONAUT."

$800 - 1,200

209

207

207
FLOWN ON APOLLO 13—LUNAR MODULE MALFUNCTION PROCEDURES
SIGNED BY HAISE & LOVELL
FLOWN on Apollo 13, LM *Malfunctions Procedures*, pp 62A/62B from the *Apollo 13 LM Malfunctions Procedures Checklist*, part no. SKB32100076, serial no. 1001. Single sheet printed recto and verso. NASA/MSC, Apollo 13 Flight Data File, March 16, 1970. 8½ x 10½ inches. With certificate and digital copy of full checklist.

SIGNED and INSCRIBED:
"*FLOWN ON APOLLO 13, APRIL 11-17, 1970. FRED W HAISE. APOLLO 13 LMP*,"
and "*JAMES LOVELL, APOLLO 13 CDR*."

The Apollo 13 crew lost the use of their primary rocket engine, the Service Module's (SM) Service Propulsion System (SPS), due to an oxygen tank explosion some 55 hours into the mission. This forced the crew to use their Lunar Module (LM) with its separate oxygen and power as a "life boat" to survive. They needed the LM's Descent Propulsion System (DPS) rocket engine to place them back onto a trajectory that would allow them to be in the precise place to safely enter the earth's atmosphere. The DPS, designed to land the LM on the Moon, had sufficient fuel to make the engine burns needed for the nearly 4 days to return to the earth.

$2,000 - 3,000

208

208
APOLLO 13 EMBLEM COVER, SIGNED
Postal envelope, 3½ x 6½ inches. Launch day postmark from the Kennedy Space Center, dated April 11, 1970. The cachet features the Apollo XIII mission emblem.

SIGNED by JAMES LOVELL
and FRED HAISE.

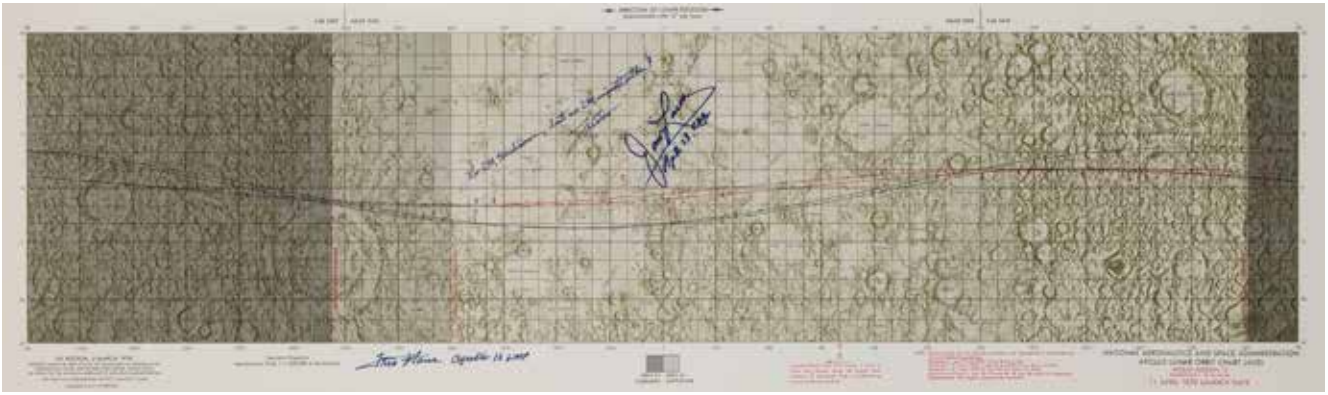
$300 - 400

209
APOLLO 13 EARTH ORBITAL CHART, SIGNED
HAS THE ONLY FLIGHT EVENTS THAT WENT ACCORDING TO PLAN, BUT...
Apollo Earth Orbit Chart (AEO), Apollo Mission 13 for April 1970 Launch Date. Color Earth map, first edition, March 3, 1970. 13 x 42 inches. With a Houston, TX April 17, 1970 postmark (date of splashdown) on a "First Man on the Moon" stamp.

SIGNED and INSCRIBED:
"*FRED HAISE, Apollo 13 LMP.*" He has marked the splashdown area with an "*X*."

Circular plots in black represent the ground station communication coverage areas with the ones in red being the ocean station tracking ships. Orbital paths show the full launch range azimuths of 72 to 108 degrees. During this part of the mission, almost all events went as planned. But during the Saturn V flight under second stage thrust, "pogo" or longitudinal oscillations caused the center J-2 engine to shut down. The remaining four J-2's and a longer than planned burn of the third stage allowed Apollo 13 to achieve the desired orbit.

$800 - 1,200



211

210
**BOOM! APRIL 13, 1970 —
NOT YOUR TYPICAL DAY IN SPACE**
ANNOTATED BY CREW MEMBERS THAT SURVIVED THE DEEP SPACE EMERGENCY
Apollo Translunar / Transearth Trajectory Plotting Chart (ATT), Apollo Mission 13. Diagram in color with extensive descriptions in nine paragraphs and astronaut signatures. First Edition, March 16, 1970. 24 x 20 inches.

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

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! April 13, 1970, 10:08 pm EST, Freddo*" with the number 13 underlined to emphasize the coincidental numbering of the flight and date.

A vivid illustration of how far away from Earth the Apollo 13 spacecraft was when the Service Module's oxygen tank exploded. The complex steps of a lunar mission are illustrated from a north polar view. Earth launch, lunar and earth coast phases, lunar orbit insertion, lunar landing - liftoff, the transearth injection, and earth return are all dimensionally illustrated. Significant Apollo 13 flight events with times are listed in the lower left corner and an eight paragraph mission description is located along the right side.

$2,000 - 3,000

211
APOLLO 13 AND NO LUNAR IMPACT, SIGNED
ASTROS ARE GRATEFUL THEIR ENGINE BURN SENDS THEM AROUND AND NOT INTO 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 x 40½ inches.

Boldly SIGNED and INSCRIBED:
"*JAMES LOVELL, Apollo 13 CDR*" and "*FRED HAISE, Apollo 13 LMP.*" Additionally INSCRIBED with HAISE'S grateful comment of: "*No LM touchdown, but no LM impact either! Freddo.*"

This lunar chart shows the planned orbital paths for CSM Odyssey and the landing point for LM Aquarius. The oxygen tank explosion forced the crew to correct their flight path so they could safely swing around the moon and return to Earth. A miscalculation or inadequate engine burn could have possibly sent Apollo 13 to a collision with the moon - thus the inscription by Fred Haise on this chart.

$1,000 - 1,500

212
APOLLO 13—LUNAR LANDMARK MAP PAGE SIGNED BY LOVELL
8 x 10½ inch Lunar Landmark map page H-2 from *Apollo 13 Lunar Landmarks Map (CSM)* April 11, 1970, featuring a black & white photograph of the lunar surface. Three punch holes on left edge, identification tab taped to upper right edge, some silvering along edges.

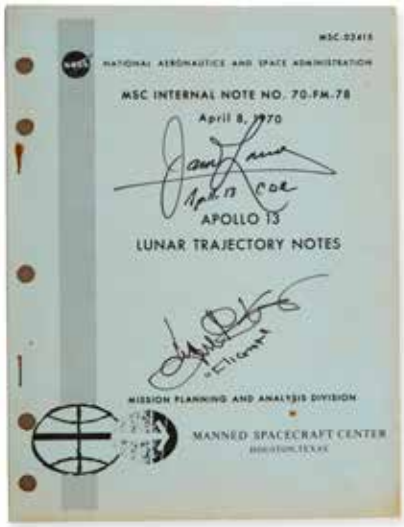
SIGNED:
"*JAMES LOVELL. APOLLO 13 CDR.*"

$800 - 1,200

210

212

213



214

215

213
APOLLO 13—SIGNED BY HAISE
PRELIMINARY APOLLO 13 FLIGHT PLAN. AS-508/ CSM-109/ LM-7. Houston, Texas: MSC, Flight Planning Branch Flight Crew Support Division, February 6, 1970.
8 x 10½ inches, approx 217 pp. Diagrams thoughout. Punched and bound at spine with prongs. Some wear at spine and edges.

Provenance
Bob Rahn, part of the Douglas/NASA ground crew (notation to lower cover).

SIGNED and INSCRIBED on upper cover:
"*VINTAGE COPY USED BY THE DESIGNERS OF THE COMMAND MODULE TO PREPARE FOR THE MISSION. FRED HAISE. APOLLO 13 LMP.*"

$1,500 - 2,500

214
APOLLO 13 LUNAR TRAJECTORY NOTES, SIGNED BY HAISE & LOVELL
APOLLO 13 LUNAR TRAJECTORY NOTES. MSC INTERNAL NOTE NO. 70-FM-78. MSC-02415. Houston, TX: NASA/MSC, April 8, 1970.
8 x 10½ inches, 184 pp. Diagrams throughout. Card stock covers, punched and stapled. Some minor rust marks from staples.

SIGNED AND INSCRIBED: "*JAMES LOVELL APOLLO 13 CDR*" AND "*EUGENE F KRANZ 'FLIGHT'*". Kranz was lead Flight Director during Apollo 13, and his comments on calmly working through rescue options later inspired the movie's tagline "Failure is not an option."

$1,000 - 1,500

215
APOLLO 13—OPERATIONS HANDBOOK LUNAR MODULE
APOLLO OPERATIONS HANDBOOK LUNAR MODULE (LM7, 8, AND 9). VOLUME II OPERATIONAL PROCEDURES. Bethpage, NY: Grumman Aerospace Corporation, January 14, 1970.
8 x 10½ inch manual, 854 pp, punched at spine and bound into turquoise covers with metal prong, "*LM 7*" in ink to spine, light foxing to fore-edges.

One of the most in-depth manuals to be published for the Lunar Module, with details on all systems, subsystems, and their interface relationships, as well as all normal, back-up, and contingency procedures. The seventh Lunar Module (LM7) flew as *Aquarius* on the Apollo 13 mission, famously being used as a "lifeboat" when the crew was forced to completely shut down the Command Module (CM) in order to save its batteries for re-entry, following the explosion of one of their oxygen tanks, and the failure of all fuel cells. Had they not been able to use the LM, the accident would in all certainty have been fatal.

$800 - 1,200

216
APOLLO 13—SIGNED BY HAISE & LOVELL
An approx. 1:15 scale model of the Apollo 13 spacecraft in 4 parts (Lunar Module Descent & Ascent Stages, Command Module, and Service Module) in plastic, metal and composite materials by Danbury Mint, docked together on black base. Command Service Module measures approx 8 inches in length, Lunar Module approx. 8 inches tall.

SIGNED by FRED HAISE on Ascent Stage of Lunar Module and by JAMES LOVELL on base.

$1,000 - 1,500

217
APOLLO 13—SIGNED BY LOVELL, HAISE & KRANZ
1:25 scale highly detailed Apollo Command Module Capsule by Executive Series Displays, ca. 2012, caste resin on black wooden stand with Apollo 13 emblem sticker, approx 6 inches tall on stand, 6¼ inches in diameter. [WITH] 1:200 scale Saturn V model, unknown manufacturer, wood and resin, 22 inches tall on 1½ inch wooden stand. One fin on rocket bent with some loss to paint.

Capsule stand SIGNED by FRED HAISE and JIM LOVELL, rocket stand SIGNED by FRED HAISE, JIM LOVELL and GENE KRANZ.

$3,000 - 5,000

218
APOLLO 13 COLOR HASSELBLAD POSITIVES
Group of 292 duplicate color positives from magazines AS13 61-II and AS13 62-JJ in the astronauts' Hasselblad cameras, being primarily strips of two frames each, housed in manila sleeves, the majority with original glassine protectors.

1. Magazine AS13 61-II, 135 images, frames 8741-8879 (missing 8839, 8839 & 8862): Numerous shots of the lunar disc from varying distances, shots of the earth crescent from the Lunar Module window with portions of LM & LM equipment visible, and interior shots of the spacecraft.

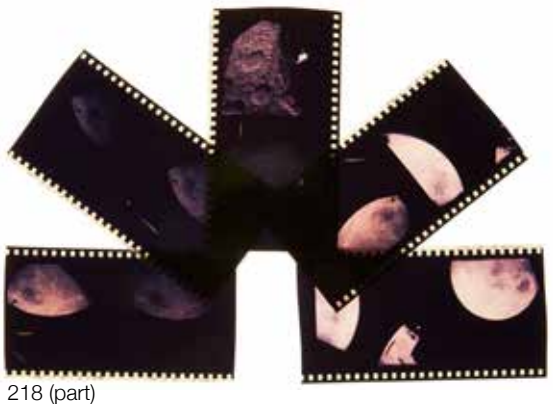
2. Magazine AS13 62-JJ, 157 images, frames 8880-9039 (missing 9003, 9004, & 9039a): Showing interiors of the spacecraft including the transfer tunnel to the Lunar Module, equipment, and astronauts, various views of the lunar surface including several where the deactivated command module is visible within the frame, views of the earth and moon cresent.

There were four 70mm cameras brought on the Apollo 13 mission, but only two were used. A total of 584 exposures were made on seven magazines of film, with 489 images on color film, and 95 on black & white.

$3,000 - 5,000


216


217


218 (part)

219

220

221

219
EMBLEM FLOWN ON APOLLO 14, SIGNED BY MITCHELL
FLOWN Apollo 14 emblem, printed on 10 x 9 inch Beta cloth. Carried on Apollo 14 by Lunar Module Pilot Edgar Mitchell.

SIGNED and INSCRIBED:
"*FLOWN TO THE MOON ON APOLLO 14. EDGAR MITCHELL*."

$1,500 - 2,500

THE FOLLOWING LOT WAS ORIGINALLY IN THE COLLECTION OF ASTRONAUT EDGAR MITCHELL

220
EDGAR MITCHELL'S TEXAS FLAG CARRIED ON APOLLO 14
BORN IN TEXAS WITH DESCRIPTIONS OF CHILDHOOD EXPERIENCES NEAR DR. ROBERT GODDARD'S HOME
FLOWN on Apollo 14, a Texas state flag, 4 x 6 inches. Included is a 5 x 7 inch color print of Dr. Mitchell in his Florida home office holding this flown Texas flag.
INSCRIBED AND SIGNED: "*Flown to the moon on Apollo 14, Edgar Mitchell*" in the large red lower bar. Mounted between paragraphs on a Typed Letter describing Mitchell's lunar flight and early childhood.

The typed letter reads: "*The Texas state flag displayed below was flown to the moon in the Apollo 14 Command Module Kittyhawk 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 with Alan Shepard on February 5. We spent just over 33 hours on the moon. During that time, Al and I made two lunar surface explorations, each lasting over 4 hours. We traveled over ½ mile from our lunar lander during our second surface exploration, the longest distance covered by foot during the Apollo Program.*
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 rocketry efforts would help shape my future. Dr. Goddard's work established the basis for technology utilized by the Germans during World War II, which in turn led to the eventual development of the Saturn rockets. Those 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."

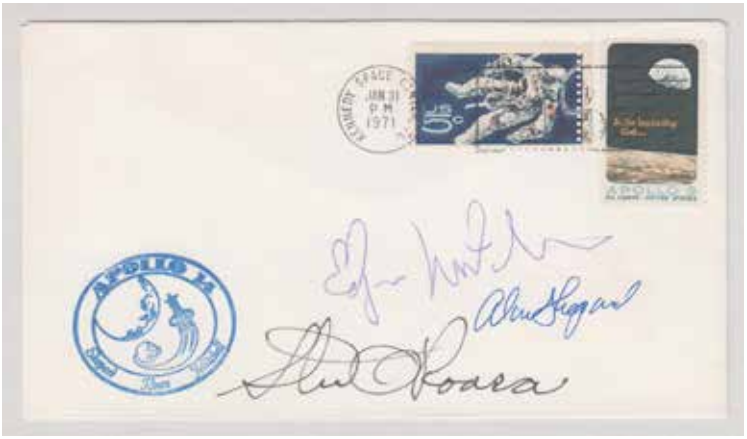
$2,500 - 3,500

221
APOLLO 14 BEGINS TRAVEL TO THE LAUNCH PAD, CREW SIGNED
SHEPARD TO START HIS SECOND FLIGHT, AFTER A 10 YEAR WAIT
Black and white photograph, 8 x 10 inches, with printed NASA press release captions on verso. Shepard was reinstated to flight status after an operation corrected an inner ear disorder. His first flight was some 10 years earlier in 1961.

SIGNED by ALAN SHEPARD and EDGAR MITCHELL.
SIGNED and INSCRIBED: "*STUART A. ROOSA, Apollo 14 CMP.*"

The Apollo 14 crew wearing their space suits and helmets prepare to enter the transfer van and head to Launch Complex 39A to begin their lunar landing mission. The Apollo 14 crew emblem can be seen on the van door.

$1,200 - 1,800



222

223

224

225 (part)

226 (part)

222
APOLLO 14 CREW SIGNED LAUNCH COVER
AN OFFICIAL NASA BLUE RUBBER STAMP CACHET
Postal envelope, 3½ x6½ inches. Launch day postmark from the Kennedy Space Center, dated January 31, 1971. The blue rubber stamp cachet features the Apollo 14 mission emblem.

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

Starting with the Gemini 5 flight of August 1965, the on-site Kennedy Space Center Post Office began a series of official NASA rubber stamp cachets for major launch events. The Apollo series usually utilized the crew mission emblem cachet for that particular launch. This postal envelop or "cover" is the rubber stamp cachet issued for the launch of Apollo 14.

$1,200 - 1,800

223
MITCHELL AND THE US FLAG ON THE MOON AT FRA MAURO
Large color photograph, 11 x 14 inches. Astronaut Edgar Mitchell on the lunar surface next to the United States flag.

SIGNED and INSCRIBED:
"*EDGAR MITCHELL, Apollo 14 LMP, Feb. 1971.*"

$600 - 800

224
MITCHELL DEPLOYS THE TV CAMERA AT FRA MAURO
Color photograph, 8 x 10 inches. Astronaut Edgar Mitchell deploying and adjusting the lunar TV camera with boulders seen near the horizon.

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

$250 - 350

225
APOLLO 14 SIGNED LITHOGRAPH SET—LAUNCH AND FLAG
Two color photolithographs, 10 x 8 (launch) and 8 x 10 inches, with official NASA text on lower border and on verso.

Launch image SIGNED and INSCRIBED: "*EDGAR MITCHELL, Apollo 14.*"
Shepard holding US Flag on the lunar surface INSCRIBED and SIGNED: "*Photo by EDGAR MITCHELL, LMP.*"

$300 - 400

226
APOLLO 14 SIGNED LITHOGRAPH SET — LUNAR SURFACE IMAGES
LUNAR MODULE ANTARES SHINES LIKE A JEWEL IN THE SUN
Two color photolithographs, each 8 x 10 inches, with official NASA text on lower border and on verso.
Lunar Module image SIGNED and INSCRIBED: "*EDGAR MITCHELL, LMP.*"
Lunar surface experiments image SIGNED and INSCRIBED:
"*EDGAR MITCHELL, Apollo 14.*"

$300 - 400

228

227

227
MITCHELL NEAR CONE CRATER — APOLLO 14 PANORAMIC IMAGES
THE GREATEST DISTANCE TRAVELED ON FOOT BY ASTRONAUTS FROM THEIR LUNAR MODULE
Large black and white photograph, 20 x 24 inches. Captions along the upper and lower border read in part: "*APOLLO 14 PANORAMA - Boulder Field High on Flank of Cone Crater at Point of Maximum Distance from Lunar Module, EVA 2.*" Large photographs of this type were created just after to flight to assist with reconstruction of the exact path taken by the astronauts during their EVA.

Astronauts Shepard and Mitchell traveled as quickly as possible on foot up the rugged slope of Cone Crater trying to reach the rim during their second EVA (moonwalk). Mission Control advised them to stop their climb and begin geologic sampling and panoramic (pan) photography before oxygen constrains forced them to return to their Lunar Module. This large photograph has the Hasselblad pan obtained near the edge of Cone Crater with the first series of images facing north to east along the top and the second series continuing the view toward the south then west. Astronaut Mitchell is seen in this pan.

$500 - 700

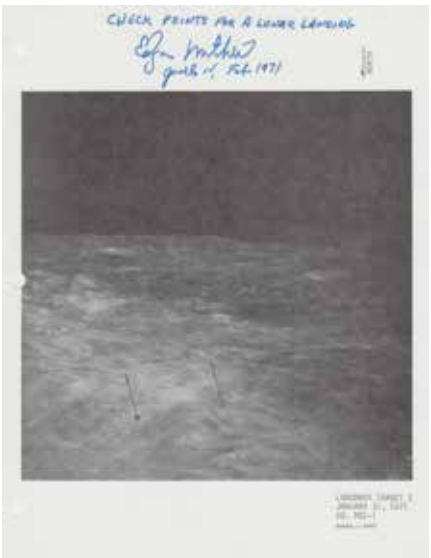
229

228
APOLLO 14 EARTH ORBITAL CHART, SIGNED
THE SLIGHTLY DELAYED BEGINNING OF THE SECOND ATTEMPT TO LAND AT FRA MAURO
Apollo Earth Orbit Chart (AEO), Apollo Mission 14 for January 31, 1971 Launch Date. Color Earth map, first edition, November 6, 1970. 13 x 42 inches.

SIGNED and INSCRIBED:
"*EDGAR MITCHELL, Apollo 14 LMP.*"

Circular plots in black represent the ground station communication coverage areas with the ones in red being the ocean station tracking ships. Orbital paths show the full launch range azimuths of 72 to 108 degree. Apollo 14 was the first Saturn V launch were the launch azimuth changed due to a 40 minute delay because of weather restrictions at Cape Kennedy. These updated restrictions were introduced because of lighting discharges through the Saturn V rocket on Apollo 12 due to heavy clouds and rain at launch.

$400 - 600



230

229
ROAD MAP TO FRA MARUO, SIGNED
PATH RETRACES THE ILL-FATED APOLLO 13 FLIGHT
Apollo Translunar / Transearth Trajectory Plotting Chart (ATT), Apollo Mission 14. Diagram in color with extensive description in eight paragraphs. First Edition, December 16, 1970.
24 x 20 inches.

INSCRIBED and SIGNED: "*A Road Map to the Moon, EDGAR MITCHELL, Apollo 14 LMP.*"

The chart is centered on a north polar view of the Earth and displays the January/February 1971 orbital path of the moon around the Earth. The Apollo 14 flight profile is plotted and events such as earth launch, translunar injection, lunar and earth coast phases, lunar orbit insertion, lunar landing - liftoff, and transearth injection are included. Significant Apollo 14 flight events with times are listed in the lower left corner and an eight paragraph mission description is located along the right side.

$500 - 700

230
LUNAR LANDMARK PHOTO TARGET TRAINING MAPS
FOR FLIGHT USE AND SUPPORT CREW TRAINING
LANDMARK TARGET 1, 2, and 3 (two versions of each), and *SIM OBLIQUE 30° LANDMARK TARGET 6,* all *January 31, 1971. ED. MSC-1.*
Lithographed photographic target maps, eight sheets, 10½ x 8 inches. Varying scales, punched for ring binding.

INSCRIBED and SIGNED: "*Check points for a lunar landing, EDGAR MITCHELL, Apollo 14, Feb 1971*" along the upper margin of sheet one.

Each sheet has a high oblique angle lunar surface image taken during Apollo 12 to assist training for Apollo 14. The Fra Mauro landing site of Apollo 14 was some 110 miles east of Apollo 12's landing site, thus many of that flight's orbital images were useful for "14." The CSM orbital track for revolution 16 is plotted on six of the sheets and orbit 30 on one sheet. Lunar Module *Antares* landed as scheduled just two orbits prior (revolution 14). The CSM flight plan called for "zero phase observations" (sun light coming from directly behind the CSM) at this time. Included is a photocopy of page 3-128 from the *Apollo 14 Flight Plan* listing events for the CSM zero phase activities planned during lunar revolution 16.

$600 - 800

231
LUNAR MODULE FLIGHT AND LANDING PARAMETERS, SIGNED
ILLUSTRATIONS AND CHARTS FOR ANTARES' CRITICAL LUNAR FLIGHT TASKS
Apollo 14 Descent - Ascent Summary. NASA/MSC/FOD Mission Planning and Analysis Division, Branch LAB, Date 1/19/71. NASA MSC 3579-71. 17 x 21 inches.

INSCRIBED and SIGNED: "*We made it down despite the radar, EDGAR MITCHELL, Apollo 14 LMP.*" Mitchell's comment refers to LM landing radar problems that might have scrubbed the lunar landing.

This chart features two lunar maps and three mission diagrams. The large map at the top plots the LM descent path to the landing site with a table having descent milestones and their associated altitude/flight speeds. The second map shows the planned lunar surface exploration traverses.

The middle diagram has the LM descent, plotting range verses altitude from the landing site. The diagram on the right has Commander Shepard's view out his left side LM window with important craters labeled. The last diagram has the LM's Ascent Vertical Rise plotted with altitude, altitude rate, time from lunar lift-off verses the down range position.

$700 - 900

232
LANDING SITES AS SEEN FROM ORBIT, SIGNED
IDENTICAL TO THE ONE CARRIED ON THE MISSION
CSM Orbit Monitor Chart (CDM), Sheet 4 of 4, Apollo Mission 14 – Site Fra Mauro, January 31, 1971 Launch Date. Lunar map, second edition, December 7, 1970. 16 x 39 inches. Scale 1:650,000.

Boldly SIGNED and INSCRIBED near his landing site ellipse: "*EDGAR MITCHELL, Apollo 14 LMP.*"

This map is identical to the flown map with the only difference being that the flown version was connected into a continuous loop then folded for "accordion-type" viewing capability. The high resolution map shows surface features as small as 1,000 feet and has the ground tracks of orbits 3 and 12 plotted as full length continuous white lines. Large white numbers of "*16, 17, 18, 19, 20*" are equally spaced to provide panel sequencing numbers when folded into accordion style. A legend in the white bottom border area defines the shape of markings for the terminator, initial point, folding ticks, and the Command Module on-board chart limits. The landing ellipses for both the Apollo 12 and 14 sites are clearly marked.

$800 - 1,200

232

233
TARGET POINT FOR ALAN SHEPARD, SIGNED
APOLLO 14 LANDING SITE—FRA MAURO. Published by the U.S. Army Topographic Command for NASA. 1970. 17 x 22 inches. Detailed plots of the planned approach path, down and cross ranges. Scale 1:8,000.

Boldly INSCRIBED and SIGNED: "*We were 'Right on the Landing Site,' Edgar Mitchell, Apollo 14 LMP.*" The landing site remark is a quote made by Commander (CDR) Alan Shepard just after his pin-point landing. Mitchell has marked the landing point with an "*X.*"

The chart uses a shaded relief drawing with a large landing ellipse having the Fra Mauro landing site at the center. The Lunar Module approach path 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 markers. Key approach sequence identification craters are labeled including Cone, Triplet, and Star.

$800 - 1,200

234
SITE CHART AND EVA'S OF THE THIRD LUNAR LANDING, SIGNED
MITCHELL SKETCHES THE PATHS OF BOTH LUNAR SURFACE TRAVERSES
Fra Mauro. Published by the U.S. Army Topographic Command for NASA. 17 x 22 inches. Scale 1:10,000.

INSCRIBED and SIGNED: "*Fra Mauro Base, Apollo 14. Edgar Mitchell, Feb 1971.*" He has marked the exact landing point with an "*X.*" Additionally he has drawn the traverse foot-path of both EVA's or moon walks. The first EVA is drawn with a small dotted line west of the landing point. The much longer second traverse is drawn with a continuous solid line toward Cone Crater and labeled by Mitchell with: "*EVA-2.*"

The chart is compiled from Lunar Orbiter photography which clearly shows Cone Crater. This crater was the prime objective of the second moon walk. The planned and actual landing site was just west of Triplet Crater.

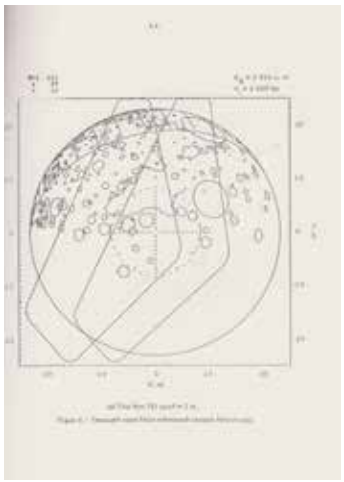
$1,000 - 1,500

231

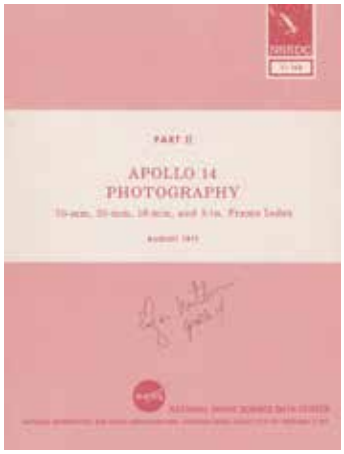
233

234

235 (part)



236



237

238

235
APOLLO 14 LUNAR SURFACE TRAVERSE MAPS, SIGNED
TO BE UTILIZED IF ANTARES LANDED LONG AT SITE 2
Landing Site 2 Traverse Maps, 3-LS-2, EVA-1 and 4-LS-2, EVA-2. January 1971. Scale 1:5,000. With detailed objectives for each EVA on verso in a column and row format. Identical to flown version.

EVA 1 Map INSCRIBED and SIGNED: "*LM-2 Backup Landing Site and EVA Traverse Map, EDGAR MITCHELL, Apollo 14 LMP.*"
EVA 2 Map INSCRIBED and SIGNED: "*LM-2 Backup Landing Site and EVA 2 Traverse Map, EDGAR MITCHELL, Apollo 14.*"

Each map has a number and letter grid system for locating surface features. The EVA 1 map's verso side lists tasks including ALSEP deployment with collection for both comprehensive and documented lunar rock sampling. There are Station Stop sites plotted and traverse lines having stops defined as A, h, i, and j. These sites are west/southwest of the Lunar Module. The EVA 2 map has a long surface traverse with 7 stops plotted and defined as k, m, n, o, p, q, and r. These include craters Star Rim, Star Center, and Doublet. The verso has detailed geologic tasks for both the CDR and LMP.

$800 - 1,200

236
COMMAND MODULE SIMULATOR
WINDOW VIEWS DURING FLIGHT, SIGNED
FEATURES EARTH, LUNAR, AND STAR VIEWS
DURING CRITICAL FLIGHT PHASES
Computer Analysis, Relative Earth-Moon Size as Seen from Spacecraft Window, Left and Right Eye Views Superimposed, Sequence: Earth-Moon. Internal Manned Spacecraft Center training document. 35 pp, 10 ½ x 8 inches, single staple binding.

SIGNED and INSCRIBED:
"*EDGAR MITCHELL, Apollo 14*" on the cover sheet.

The training document illustrates views visible from the Command Module docking/rendezvous windows. Flight phases include the earth/moon as seen after the TransLunar Injection (TLI) engine cutoff plus 10, 20, 30, 45 and 60 hours. Next are multiple lunar/earth views after the TransEarth Injection (TEI) engine cutoff plus 1, 5, 15, 25, 35, 45, and 55 hours. The last series has nine views of the earth and viewable stars from 17 minutes down to 1 minute prior to entry back into the earth's atmosphere. Nautical mile distance from either the earth or moon plus spacecraft velocity are listed for each image.

$400 - 600

237
SUMMARY OF ALL PHOTOGRAPHY FROM
THE THIRD LUNAR LANDING MISSION
INCLUDES LUNAR SURFACE LISTINGS FROM BOTH EVAS
Apollo 14 Photography, 70-mm, 35-mm, 16-mm, and 5 in. Frame Index, NSSDC 71-16b. NASA/Goddard Space Flight Center, National Space Science Data Center. 139 pp, 10½ x 8 inches, loose leaf.

SIGNED and INSCRIBED:
"*EDGAR MITCHELL, Apollo 14*" on the cover sheet.

The index consists of a summary page for each film magazine and describes individual film frames in a line/column format. Details include camera focal length, approximate photo scale if applicable, principal point latitude/longitude, sun angle, photo quality, and a short description. One of the most comprehensive listing of Apollo 14 photographs ever compiled.

$400 - 600

241

238
APOLLO 14, SIGNED BY SHEPHARD
11 x 14 inch color photograph of Apollo 14 Commander Alan Shepard on the lunar surface next to the American flag.

SIGNED: "*ALAN SHEPARD*." Shepard became the fifth and oldest person to walk on the moon, and was the only member of the Mercury 7 to eventually do so.

$700 - 1,000

239
APOLLO 14—FINAL FLIGHT PLAN
APOLLO 14 (JAN 31, 1971) AS-509/CSM-110/ LM-8 FINAL FLIGHT PLAN. Houston, TX: NASA/ MSC, December 2, 1970.
8½ by 11 inches. Approximately 350 pp. Light blue card stock covers, punched. Detached front cover lightly soiled & worn. Names of previous owners to front cover ("Mumford" and "Olsen").

SIGNED: "*EDGAR MITCHELL/APOLLO 14 LMP*". The final flight plan for the Apollo 14 flight, which details all aspects of the mission, including the mission objectives, the Earth Orbit Phase, the Translunar Injection Phase, the Translunar Coast Phase, the Lunar Orbit/Descent Phase, the Lunar Surface Phase, the Rendezvous/TEI and the Entry Interface amongst other topics.

$700 - 1,000

240
APOLLO 14 LANDMARK MAP, SIGNED BY ED MITCHELL
[APOLLO 14 LANDMARK TARGET MAP] DE-2. JANUARY 31, 1971. Printed November 16, 1971. 8 x 10½ inch black & white map, hole-punched at edge. Scale 1: 1,250,000.

SIGNED: "EDGAR MITCHELL, APOLLO 14 LMP" above the *Ocean of Storms* area.

$800 - 1,200

241
APOLLO 14 LANDING SITE "GUIDED TOUR," SIGNED & INSCRIBED BY MITCHELL
40 x 8 inch panoramic color photo of the Apollo 14 landing site, captioned in lower margin "*Apollo 14 - Lunar Module Pilot Edgar Mitchell works the tv camera as a brilliant sun glare is reflected from Lunar Module 'Antares', in the background are the slopes of Cone Crater*."

SIGNED AND INSCRIBED: "*FRA MAURO LANDING SITE BY EDGAR MITCHELL. APOLLO 14 LUNAR MODULE PILOT. FEBRUARY 5, 6 1971*". Mitchell has additionally annotated the photo drawings arrows to indicate the items on the photo, which read from left to right: "*FIRST FUNCTIONAL TV CAMERA ON THE MOON*," "*ME*," "*HIGH GAIN ANTENNA*," "*CONE CRATER*," "*FLAG*," "*ANTARES*," "*TRIPLET CRATERS*," and "*SOLAR WIND EXPERIMENT*."

$1,000 - 1,500

242
APOLLO 14 LUNAR SAMPLE PHOTOGRAPHS
Group of 156 silver gelatin print photographs, 8 x 10 inches, [Houston, 1971], each with printed NASA identification number, generally excellent condition.

The Apollo 14 crew collected and returned with approximately 43kg of lunar samples, which were interned at the Lunar Receiving Laboratory in Houston. The above group includes multiple images of some of the 65 larger samples in a "mug shot" format. Each photograph shows the original orientation in which the sample was found, the sample number and scale. Includes *Apollo 14 Preliminary Science Report.* Washington: NASA, 1971. A fascinating group.

$2,000 - 3,000

239

240

242

THE FOLLOWING 4 LOTS WERE ORIGINALLY IN THE COLLECTION OF ASTRONAUT JIM IRWIN

243

MOTION PICTURE RING SIGHT USED ON THE MOON DURING APOLLO 15

PERHAPS THE ONLY LUNAR SURFACE RING SIGHT STILL IN PRIVATE HANDS

FLOWN Maurer DAC (Data Acquisition Camera) sighting ring. Circular metal ring, 1¼ inches in diameter with an optical component at the center. A flat metal "shoe" guide allows the ring to be mounted at the top back corner of the 16mm Maurer motion picture camera. An approximately ½ inch square of white Velcro is attached at the top. Part Number SEB3310031-204 and Serial Number 1051 are engraved around inner metal circular section of the sight. With a Typed Letter Signed by MRS. JAMES B. IRWIN. Plus two sheets copied from the Apollo 15 equipment stowage list and a diagram showing parts and numbers of the DAC camera system including the ring sight.

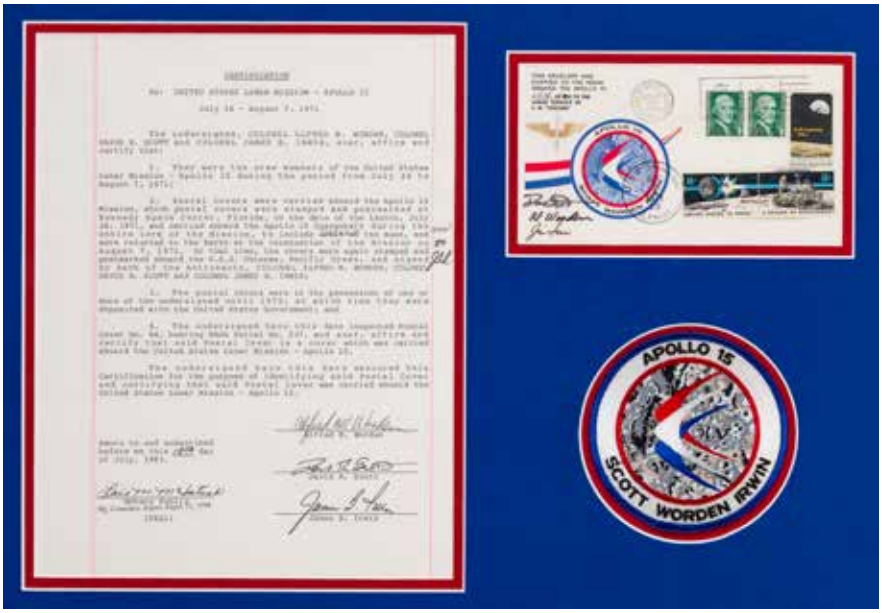
MRS. IRWIN'S signed provenance letter reads: "*The enclosed camera ring sight was flown to the surface of the moon during the flight of Apollo 15. It was used by my late husband James B. Irwin inside the Lunar Module (LM) which was named Falcon. The Data Acquisition Camera (DAC) camera was mounted along Jim's viewing window located at the interior right-hand side of the LM. That camera recorded the undocking of Falcon from Command/Service Module Endeavor, then Falcon's descent past the Apennine Mountains. It captured views of Hadley Rille just prior to the LM's touchdown on the lunar surface. During the lift-off from the moon, Falcon flew directly over the Rille and Jim was able to record some magnificent views of this unusual lunar feature.*

The ring sight has the following engravings: "P/N (Part Number) SEB3310031-201, S/N (Serial Number) 1051" on one side and S/N 1051 on the opposite side. As described in the spacecraft operations manual, the ring sight was "an accessory used on the 16 mm camera as an aiming aid when the camera is hand-held. The concentric light and dark circular rings, as seen superimposed on the view, aid the user in determining the angular field of view of the sight. It is attached to the camera by its shoe sliding into a C rail. It is also used on the 70 mm camera."

Additionally, enclosed with this letter is a copy of page 48 from the official equipment listing by NASA titled: "Apollo Stowage List, Mission J-1, CM-112/LM-10, APOLLO 15, August 10, 1971 – Final Release, This Issue Documents the AS-FLOWN Configuration." Page 48 contains equipment from "List B" which has items placed inside the Lunar Module prior to the Apollo 15 launch from the Kennedy Space Center on July 26, 1971. The ring sight is the second to last item listed on page 48 and includes the part number, stowage location, and unit weight. This camera ring sight was on the lunar surface for over 66 hours between July 31 and August 2, 1971. It is perhaps the only lunar surface ring sight kept by any Apollo astronaut because it was part of flight equipment slated to stay in the Lunar Module. After the LM crew re-docked with Endeavor, the lunar rocks and other essential equipment was transferred over to the Command Module. The LM was then de-orbited and crashed back into the moon as part of a seismic experiment to understand the composition of the moon's surface. This ring sight was stored out of daylight since 1971 and still retains the concentric rainbow type coloration when light passes through the ring."

$12,000 - 15,000

244



245

244
CASSETTE PLAYER EARPHONE ASSEMBLY FLOWN ON APOLLO 15
USED IN COMMAND MODULE ENDEAVOR
FLOWN gray earphone device being 39 inches long with jack plug at the opposite end. With a Typed Letter Signed by MRS. JAMES B. IRWIN.

MRS. IRWIN's signed provenance letter reads: "*This earphone was carried and used by my late husband, Astronaut James Irwin during his flight to the moon – the Apollo 15 mission of July and August 1971. It was used in conjunction with an audio cassette player which played a selection of music tapes. Most of Jim's time during the flight was accounted for down to the second, but there were brief periods prior to or after planned sleep and/or during meal periods that would allow listening to tapes through this earphone inside Command Module Endeavor.*

Apollo 15 was launched on 26 July 1971 and returned to earth on 7 August 1971. It was the fourth lunar landing of the Apollo Program and the first used of the Lunar Roving Vehicle. Jim spent over 66 hours on the lunar surface and was the eighth man to set foot upon the moon."

$800 - 1,200

245
UNAUTHORIZED POSTAL ENVELOPE CARRIED TO THE LUNAR SURFACE ON APOLLO 15
NEVER APPROVED BY NASA BEFORE THE FLIGHT FLOWN Apollo 15 postal cover, 3.5 x 6.5 inches, having a cachet of the Apollo 15 crew emblem, a CSM blazing ahead of a red, white, and blue contrail, and early Army Air Corps pilot wings with a dual blade propeller. Additionally, there are two postmarks, one from the Kennedy Space Center (KSC) dated July 26, 1971 (launch date) and the other from the U.S.S. Okinawa dated August 7, 1971 (splashdown and crew recovery date). The upper left-hand corner reads: "This envelope was carried to the moon aboard the Apollo 15. #64 of 400 to the lunar surface in L.M. Falcon." Mounted and framed together with an Apollo 15 emblem, and an affidavit SIGNED by ALFRED M. WORDEN, DAVID R. SCOTT, and JAMES B. IRWIN. The NASA confiscated serial number 037, noted on the affadavit, appears to recto of envelope. WITH: Copy of *People* Magazine, July 25, 1994, which contains a short article on Irwin, as well as a photo of him with some flown Apollo 15 covers.

A COMPLEX HISTORY AND PERHAPS MOST CONTROVERSIAL OF LUNAR SURFACE ARTIFACTS.

All personal flight crew items planned for flight on an Apollo mission were required to be submitted in writing for NASA approval. This envelope is one of the set not reported by Commander David Scott prior to the Apollo 15 mission. During the very early hours of July 26, 1971, this group of covers was postmarked with the Kennedy Space Center post office stamp cancelling machine, stored in a fire-retardant Beta cloth bag, then presented to Commander Scott. He stored the envelopes in one of his spacesuit pockets and carried them to the lunar surface. After recovery, the recently issued space theme "Decade of Achievement" dual 8-cent stamp was added and cancelled on the USS Okinawa.

Background: Sometime in 1970, a German stamp dealer named Herman Sieger made contract with David Scott through a third party. Sieger wanted around 100 envelops to be carried to the lunar surface and offered the three Apollo 15 crew members compensation to be held in a German savings account. The actual number of covers was increased to 400, with the crew keeping 298, less 2 that were damaged and not flown. Instructions were given to Sieger not to sell his 100 covers until after the end of the Apollo Program.

However, virtually all of those 100 covers were sold before the end of 1971. Around mid-summer 1972, this story came to the attention of the world press. A U.S. government investigation led to the confiscation of the remaining covers. NASA stated at the time: "The Apollo 15 crew exercised poor judgment in their actions. Therefore, Astronauts Scott, Worden and Irwin will be reprimanded and their actions given due consideration in their selection for future assignment."

In the early 1980's, Apollo 15 crew member Al Worden took the lead and got an out-of-court settlement from NASA for the return of the confiscated covers. Once returned, the Apollo 15 crew signed individual notarized affidavits dated 19 July 1983 certifying that each cover was flown to the lunar surface. The fact that the U.S. Postal Service had plans for NASA to carry over 200,000 special postal covers on a Space Shuttle flight during 1983 no doubt helped change the space agency's hard stance against the Apollo 15 crew.

$7,000 - 10,000

246

247

248

246
NASA TRAINING FILMS
ORIGINALLY FROM THE COLLECTION OF JIM IRWIN
An excellent collection of 27 NASA 16 mm training films, all in the original canisters, ranging in size from 7 inches to 12½ inches in diameter, with the original labels, some marked *NATIONAL AERONAUTICS AND SPACE ADMINISTRATION MANNED SPACECRAFT CENTER, HOUSTON, TEXAS*", others "*NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON D.C. 20546*", others "*NASA HQ'S*", SEVERAL WITH "*NASA MANNED SPACECRAFT CENTER PTL AUDIOVISUAL BRANCH*" labels, and one with a "*HIGH FLIGHT FOUNDATION*" label. The films have all been digitized for conservation purposes, and the digital copies (on dvd) accompany the lot.

As follows:
1. NASA HQ'S HQ-AD-27. "Examining the Moon". Apollo Digest Series MSC-7. 7 minutes, sound & color. Copy 244. 2. Film Serial HQKSR9 "Returning from the Moon". 28 minutes, 20 seconds. Sound & color. Copy 102. 3. MSC-69-500. "Apollo 8 - Go For TLI." 22 minutes. Sounds & color. Copy 132. 4. NASA HQ'S. HQ-AD-14. "The First Short Step", Apollo Digest Series MSFC-1. 7 minutes. Black & white. No sound. Copy 119. 5. NASA HQ's. HQ-AD-11 "Saturn Second Stage", Apollo Digest Series MSFC-5. 4 minutes 30 seconds, no color, no sounds. Copy 167. 6. High Flight Foundation, "Apollo 15". No sound. 7. MSC-65-266. "All Systems Go" (MSC) (Gemini Prep). 26 minutes. Color & sounds. Copy 11. 8. MSC-72-580. APOLLO 16 - "Nothing so hidden...", 28 minutes, sound & color. Copy 57. 9. MSC-66-326. "Gemini VIII, THIS IS HOUSTON FLIGHT", 25 minutes, sound & color. Copy 9. 10. MSC-69-525. "Benefits from Space", 12 minutes, sound & color. Copy 97. 11. MSC-70-531. "Lunar Samples of Apollo 11", 7.5 minutes, sounds & color. Copy 15. 12. HQ-AD-2. "Apollo Mission Highlights" (Short Version Apollo Digest Series Col. Pos. Snd. Rel. Prt. 186", 5 minutes, sound & color. Copy 4. 13. HQ-AD-21. "Testing Apollo" Apollo Digest Series KSC-8 Col. Pos. Snd. Rel. Prt. 184. 5 minutes, sounds & color. Copy 42. 14. HQ-AD-23. "Guidance and Navigation" Apollo Digest Series MSC-11 Col. Pos. Snd. Rel. Prt. 231. 6.5 minutes, sound & color. Copy 98. 15. MSC-65-243F. "Flight Controller Orientation Gemini Systems - Propulsion and Control System" (Section VI). 11 minutes, sounds & color. Copy 6. 16. "Post Landing Recovery MSC 254. Gemini. 15 minutes, sound & color. Copy 9. 17. MSC-67-339. "The Twelve Gemini", 16 minutes, sound & color. Copy 43. 18. Film Serial HQ 055. "Saturn - A Giant Step to the Moon", 15 minutes, sound & color. Copy 39. 19. MSC-68-462. "Apollo in Persepctive", 14 minutes, sound & color. Copy 52. 20. "Flight Crew Support Division - Report #2" MSC-233. Dec'64., 14 minutes, sound & color. Copy 28. 21. Film Serial HQ-63-103. "America in Space", 14 minutes, sound & color. Copy 115. 22. MSC-67-333 "Gemini X Quick Look", 9 minutes, sound & color. Copy 31. 23. HQ-AD-7. "The Lunar Module." Apollo Digest Series MSC-4 Col. Pos. Snd. Rel. Prt. 180, 5 minutes, sound & color. Copy 31. 24. HQ-AD-6. "Command Module", 6 minutes, sound & color. Copy 165. 25. HQ - AD-19. "Assembling Apollo" Apollo Digest Series KSC-5 Col. Pos. Snd. Rel. Prt. 204, 5 minutes 40 seconds, sound & color. Copy 89. 26. HQ-AD-22. "Mission Control" Apollo Digest Series MSC-6 Col. Pos. Sd. Rel. Prt. 192, 5 minutes 20 seconds, sound & color. Copy 76. 27. HQ-AD-4. "Astronaut Training" Apollo Digest Series MSC-8 Col. Pos. Sd. Rel. Prt 268, 7 minutes 30 seconds, sound & color. Copy 114.

$3,000 - 5,000

247
RELAXING BEFORE A FLIGHT TO THE MOON, SIGNED
Black and white photograph, 10 x 8 inches, with printed NASA text on verso which reads in part: "*July 24 ... James B. Irwin plays tennis today a few miles away from the Apollo/Saturn space vehicle... Irwin was playing tennis with Backup Lunar Module Pilot Harrison H. Schmitt.*"

SIGNED and INSCRIBED: "*JIM IRWIN, Apollo 15 LMP.*"

$400 - 600

248
THE WONDERS OF THE UNKNOWN AT HADLEY
HADLEY, LUNAR TOPOGRAPHIC ORTHOPHOTOMAP. Lunar chart based on Apollo 15 photographic data. Published by the Defense Mapping Agency for NASA, April 1975. 27 x 25.5 inches.

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

The geologically complex landing area of Apollo 15 is shown from a detailed compilation of photographs taken from that flight. The areas included are Mons Hadley, Rima Hadley, and numerous craters. The long and winding shape of Hadley Rille is clearly seen next to site of Man's fourth lunar landing. The landing site itself is marked with a large back pennant and the chart has red 100 meter interval contour lines derived from the Apollo 15 Service Module SIM (Scientific Instrument Module) Bay. Detailed information is contained in the lower margin. Scott referenced the "Wonders of the Unknown" during his initial steps onto the lunar surface.

$500 - 700

249
EXPLORATION AT ITS GREATEST
SCOTT SALUTES THE STARS AND STRIPES
Large color photograph, 16 x 20 inches.
SIGNED and INSCRIBED: "*DAVE SCOTT, Apollo 15, 1971.*"

Apollo 15 Commander Dave Scott salutes the United States with Lunar Module Falcon and Mount Hadley in the background. "Exploration at its greatest" was part of Scott's initial words on the lunar surface.

$700 - 900

250
APOLLO 15 LUNAR SURFACE PHOTO—SILVER SPUR
Large black and white photograph, 11 x 14 inches. Obtained using the 500mm telephoto lens.

Hasselblad frame A15-84-11250 using a 500mm telephoto lens focused on "Silver Spur," a mountain outcrop which exhibits several layers of lineations, suggesting the structural make-up of this feature. It is named for geologist Lee Silver who played a major role in instructing Scott and Irwin on lunar geology. The photo was made by David Scott during a Stand-Up EVA (SEVA) just after the lunar landing. Scott and Irwin depressurized the LM and Scott opened the LM's docking hatch, stood-up through the hatch to take a series of detailed lunar surface photographs using the 500mm telephoto lens attached to a Hasselblad camera.

$400 - 600

251
APOLLO 15 LUNAR SURFACE PHOTO -
THE LUNAR MODULE FROM STATION 6
A DISTANCE VIEW OF THE LM TAKEN ON THE SLOPE OF HADLEY DELTA
Large black and white photograph, 11 x 14 inches. Obtained using the 500mm telephoto lens.

Hasselblad frame A15-84-11324 taken during the second EVA. The LM is almost 3 miles away facing to the west. The ALSEP experiment site is also easily seen approximately 300 feet west of the lunar lander. Dune Crater spans then entire image foreground with Pluton crater just above the LM.

$800 - 1,200

252
APOLLO 15 VIEWS THE WESTERN WALL OF HADLEY RILLE
EXTENSIVE PHOTOGRAPHIC EXAMINATION OF HADLEY RILLE
Large black and white photograph, 20 by 24 inches. Caption along upper top reads: "*EVA 3 RILLE MOSAIC.*" This series of over lapping Hasselblad images obtained using the 500mm telephoto lens. Large photographs of this type were created just after to flight to assist with post mission analysis.

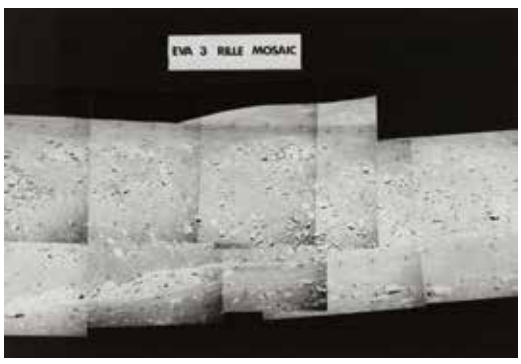
On their final moon surface exploration (EVA 3), Astronauts Scott and Irwin visited the rim of Hadley Rille that was located due west of their landing site. This panoramic image features 9 overlapping Hasselblad photographs looking at the western wall of Hadley Rille revealing hundreds of large rocks and boulders. The rille is believed to be collapsed lava tube or channel which occurred very early in the Moon's history.

$500 - 700


249

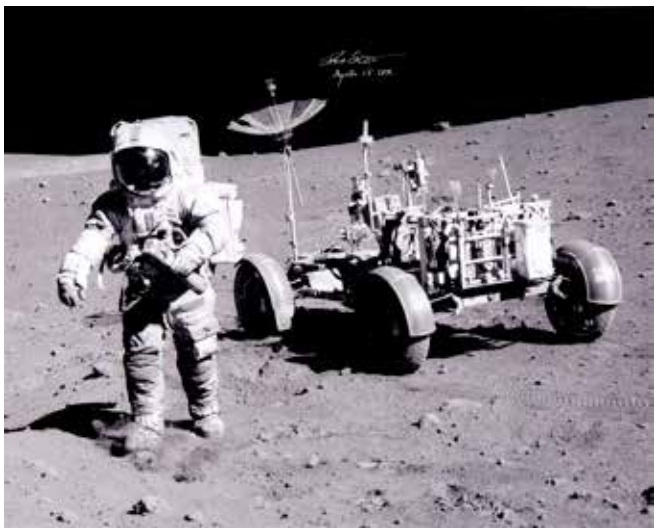

250


251



252

253



254

255

253
APOLLO 15 LANDING SITE SEEN FROM ORBIT
Two black and white photograph, each 11 x 14 inches. Developmental test processing with different exposure levels. Inverted image.

Details from a Hasselblad frame taken while in lunar orbit showing the Apollo 15 landing site with the long winding track of Hadley Rille surrounded by the rugged Hadley and Apennine Mountains.

$400 - 600

254
APOLLO 15 LUNAR SURFACE VIEW— DAVE SCOTT IN FRONT OF LUNAR ROVER
Black and white photograph, 16 x 20 inches.

SIGNED: "*DAVE SCOTT, Apollo 15 CDR*."

The Apollo 15 commander in front of the lunar rover, with Hasselblad camera in hand, and Hadley Rille over his shoulder.

$1,000 - 1,500

255
THE LUNAR GRAND PRIX
Color photolithograph, 8 x 10 inches, printed caption along bottom margin with NASA text on verso. Charles Duke photographs John Young as he drives the lunar rover during "high speed" tests.

INSCRIBED and SIGNED:
"*Photo by CHARLIE DUKE, Apollo 16 LMP.*"

$300 - 400

256
APOLLO 16 LUNAR SURFACE VIEWS OF SOUTH RAY CRATER
A DRAMATIC SERIES OF 500MM TELEPHOTO HASSELBLAD PHOTOGRAPHS
Three large black and white photographs, each 11 x 14 inches. These combined overlapping photographs create an image approximately 11 by 30 inches. The mosaic is comprised of Apollo 16 lunar surface images AS16-112-18246, 18247, and 18256.

Astronaut Charles Duke recorded these panoramic views of South Ray Crater while at Station Stop 4 during Apollo 16's second lunar surface exploration known as EVA 2. This exploration site provided a higher elevation viewing angle, being up the base of Stone Mountain. South Ray Crater is some 2 ½ miles away.

$700 - 900


256

257
INSPECTION OF SHADOW ROCK
LUNAR SOIL SHADED FROM THE SUN FOR MILLIONS OF YEARS
Large black and white photograph, 11 x 14 inches. Full frame Hasselblad image.

Apollo 16 Hasselblad frame A16-106-17413 taken during EVA 3 at Station Stop 13. John Young inspects the dark shadow area under a large lunar boulder. Mission support geologists were excited to obtain soil samples within the shadow because the area faced south and has been shaded from intense solar radiation for perhaps tens to hundreds of millions of years.

$400 - 600


257

258
APOLLO 16—JOHN YOUNG JUMPING SALUTE
9½ x 7½ inch color photograph of Apollo 16 Commander John Young on the lunar surface. Matted, glazed and framed together with a 3 inch Apollo 16 mission patch.

SIGNED: "*JOHN YOUNG. APOLLO 16*." The famous image of Commander John Young doing his jumping American flag salute with the lunar lander and rover in the background. Young completed three EVAs in the Descartes Highlands with Lunar Module Pilot Charles Duke, making him the ninth person to walk on the moon.

$1,200 - 1,800


258

259

260

259
APOLLO 16—"LAUNCH MORNING"
MCCALL, ROBERT. 1919-2010.
Watercolor & ink on paper, 15 x 22.5", signed lower right "*McCall*", captioned at upper right *"Launch Morning Apollo 16. April 16, 72, Crew Quarters. Time 9:02 AM - A beautiful spring day - clear skies - perfect for the start of another mission to Earth's moon*," and along left margin "*Tension builds now - the moment of truth nears - much is in the balance - like the entire future of our space program, though today spirits are especially high - yesterday NASA announced the site for the launches, to come, of the space shuttle - Kennedy Space Center!!*" Matted, framed & glazed.

Original watercolor painting by the legendary space artist, depicting the Apollo 16 crew as they prepare for launch, including portraits of Charlie Duke, John Young, and Ken Mattingly in their suits. One of thirteen unique pieces painted by McCall during the NASA missions; most of these pieces were accomplished in "real time' with McCall painting them as the events occurred live. McCall was the premiere space artist. Chosen by NASA to document the space program, he was present at nearly every launch. He painted the giant mural at the National Air & Space Museum in Washington, D.C. which depicts man's conquest of the moon, and famously did the artwork for the *2001: A Space Odyssey* movie posters.

$3,000 - 5,000

260
MASSIVE APOLLO 17 LUNAR SURFACE RELIEF MAP
APOLLO 17 LANDING SITE—TAURUS-LITTROW. Prepared and published for the National Aeronautics and Space Administration by the Defense Mapping Agency Topographic Center, Washington, D.C., [nd]. High-relief topographical map depicting the dramatic terrain of the Apollo 17 landing site at Taurus-Littrow, produced by the Defense Mapping Agency Topographic Center for NASA, plastic, 44 x 34 inches. 1:40,0000 scale. Some creases at upper edge and corners, two minor tears at upper right corner, pin-holes at corners.
WITH: Five 15 x 5 inch panoramic color photos of the lunar surface in the Apollo 17 landing site area.

SIGNED by GENE CERNAN in pencil over the landing site, the valley Taurus-Littrow. A striking high-relief map of the lunar surface, one of a few that were produced before each lunar landing mission to help the astronauts and others pictures it in advance. The landing region at Taurus-Littrow is dominated by impressive North and South Massifs that rise well over a mile above the landing site (greater than the depth of the Grand Canyon). It was selected as the Apollo 17 landing site because it fulfilled objectives of sampling highland material and young volcanic material in the same location. Several landmarks are noted on the map including "Bear Mountain," named after a mountain near Harrison Schmitt's home town of Silver City, New Mexico. Another area is named "Tortilla Flats," commemorating John Steinbeck. Cernan often refers to his three day stay on the moon as his "Camelot"—the crater next to Challenger bears this name. Given its size and nature, this period map must represent a rare survival.

$2,500 - 3,500

261
TAURUS LITTROW LANDING AREA MAP WITH SPECIAL INSCRIPTION
THE LAST LUNAR FOOTSTEPS DURING THE 20TH CENTURY
Taurus Littrow, Lunar Topographic Orthophotomap. Published by the Defense Mapping Agency for NASA. First Edition, September 1972. 24 x 30 inches. Scale 1:250,000.

Boldly INSCRIBED and SIGNED: "*The Valley of Taurus Littrow, Last Lunar Footsteps of the 20th Century. GENE CERNAN, Apollo XVII, December 1972.*"

The landing site chart is based on Apollo 15 metric camera photographic data having red contour lines at 100 meter intervals. The metric camera was located in the Apollo 15 Service Module SIM (Scientific Instrument Module) Bay. A detailed chart description is located along the lower margin.

$1,500 - 2,000

261

262
CERNAN SALUTES THE LAST STARS AND STRIPES
Large color photograph, 11 x 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

262

263
APOLLO 17 LUNAR SURFACE PHOTO — ORANGE SOIL DISCOVERY
ASTRONAUTS DIG A TRENCH TO OBTAIN SAMPLES
Large black and white photograph, 11 x 14 inches. Full frame Hasselblad image.

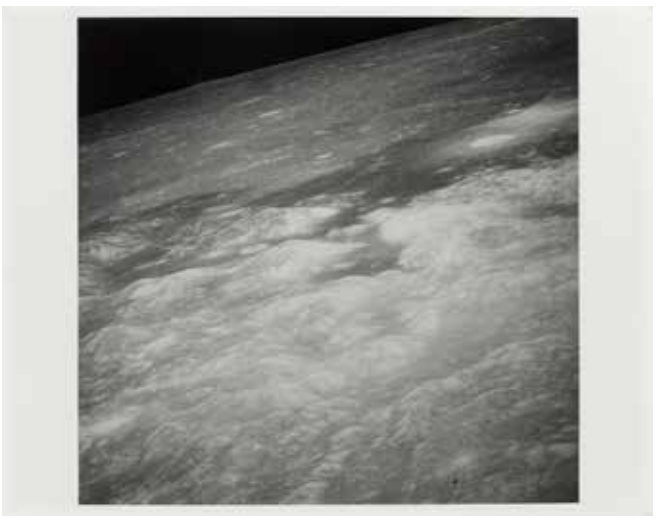
Hasselblad frame A17-137-20990 taken during the second Apollo 17 surface exploration at Station Stop 4. Footprints are next to a shallow trench made to collect samples of the just discovered orange soil. The device mounted on a tripod is known as the "gnomon," which displayed the local vertical direction on uneven surfaces. A color scale bar mounted on the forward leg assisted photographic calibration and color balance. The edge of Shorty Crater is seen along the upper right-hand corner.

$600 - 800

263

264

265



266

264
MAN'S LAST WALK ON THE MOON
SCHMITT TAKES AN IMAGE OF THE LM DURING THE LAST EVA
Large black and white photograph, 11 by 14 inches. Full frame Hasselblad image.

Hasselblad frame A17-141-21517 showing Lunar Module *Challenger* in the distance with the Surface Electrical Properties (SEP) Experiment transmitter in the foreground. A SEP receiver was mounted on the Lunar Rover and made measurements at numerous station stops during Apollo 17's EVAs. Rover tracks and footprints are visible in the near foreground.

$500 - 700

265
LAST MAN ON THE MOON OBTAINS A CORE SAMPLE
THE ROVER'S FENDER FIX IS VISIBLE ABOVE THE RIGHT REAR WHEEL
Large black and white photograph, 11 x 14 inches. Full frame Hasselblad image.

Hasselblad frame A17-143-21837 showing Gene Cernan in the process of hammering a core tube into the lunar surface at Station 9 during the third and final EVA. The right side of the lunar rover is seen at the left frame edge with the right rear fender repair visible. Early during the first EVA, Cernan accidentally damaged part of the fender assembly with his geologic hammer. The crew used a lunar map and duct tape to repair the assembly, as seen in the photograph. In the right foreground, an explosive charge with receiving antenna is visible. It was part of the Lunar Seismic Profiling Experiment and was detonated after the crew left the lunar surface to generate seismic waves to study the lunar subsurface.

$500 - 700

266
THE VALLEY OF TAURUS LITTROW AS SEEN FROM ORBIT
THE FINAL MANNED LANDING SITE OF THE 20TH CENTURY
Large black and white photograph, 11 x 14 inches. Full frame Hasselblad orbital image.

Hasselblad frame A17-148-22770 showing the Apollo 17 landing site from lunar orbit. The Taurus Littrow Valley is located near the center of the frame having darker lunar material than the surrounding mountains which were called "Massifs" in this area.

$400 - 600

267
APOLLO 17—LAST MAN ON THE MOON
Large black and white photograph, 16 by 20 inches.

SIGNED and INSCRIBED: "*GENE CERNAN. APOLLO XVII. LAST MAN ON THE MOON*." Showing the use of the Lunar Rover during Apollo 17.

$1,200 - 1,800

268
APOLLO 17 LUNAR SURFACE VIEW—LUNAR ROVER IN FRONT OF TRACY'S BOULDER
Color photograph, 16 x 20 inches.

SIGNED and INSCRIBED:"*'America's Challenge of Today has Forged Man Destiny of Tomorrow.' GENE CERNAN, Apollo XVII - CDR. Dec 1972*."

Showing the Apollo 17 lunar rover parked in front of then named "Split Rock," while at Station Stop 6 during Apollo 17's third lunar surface exploration (EVA 3). It is now known as "Tracy's Boulder" - Gene Cernan observed Alan Bean's 1984 oil painting of the rock, and having drawn his daughter's initials in the lunar soil, commented that he wished that he had drawn them on the rock, as the photographs of the rock had become such iconic images of the Apollo 17 mission. Alan Bean then added Tracy's name to his painting, and names it "Tracy's Boulder."

$800 - 1,200

269
FINAL APOLLO CREW RETURNS TO EARTH WITH SMILES
PERHAPS TOO LONG OF A STAY IN SPACE FOR SCHMITT!
Black and white photograph, 8 x 10 inches. Printed captions on the top border with NASA press release information on verso.

INSCRIBED and SIGNED: "*Great – It was a day to remember, GENE CERNAN*" and "*Great to be back after a successful mission, RON EVANS, Apr 86*" the date he made this inscription.
INSCRIBED and SIGNED: "*That nurse looks good to me! Jack Schmitt.*" Schmitt was the only bachelor to walk on the moon.

The Apollo 17 crew is photographed as they step off the recovery helicopter and onto the deck of the USS *Ticonderoga*. The crew recovery marked the end of the Apollo lunar landing program.

$700 - 900

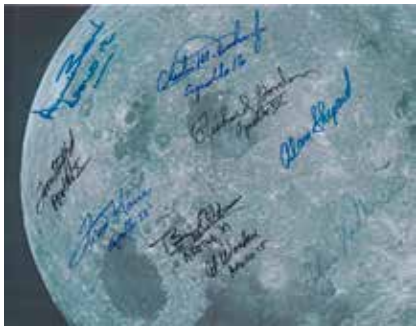

267


268

269

271

270



272

270
LAST LM LIFT-OFF POSTAL COVER, CREW SIGNED
Postal envelope with a LM lift-off, Lunar Rover on the moon, and crew sketch cachet. Cape Canaveral postmark dated December 14, 1972, the date of the Apollo 17 lunar lift-off. A printed caption reads: "*Apollo 17 with Cernan and Schmitt lift off moon at 5:55pm EST Dec 14 with 249 lbs of lunar rocks and soil from 3 EVA's of 22 hrs 5 min. Traveling 22.5 moon mi. Challenger joins Evans & America at 8:04 pm. Challenger impacts on moon 1:50 am Dec 16 1972.*"

SIGNED by GENE CERNAN, RON EVANS, and JACK SCHMITT.

$500 - 700

271
APOLLO 17—"LIVE FROM MISSION CONTROL"
MCCALL, ROBERT. 1919-2010.
Watercolor on paper, 17½ x 12 inches, signed lower left "*Robert McCall*," and titled in lower margin "*Apollo XVII - Live from Mission Control, Dec 15, '72*." Matted, framed and glazed.

Original watercolor painting by legendary space artist Robert McCall of Apollo 17 Commander and last man on the moon, Gene Cernan, while performing an EVA (Extra Vehicular Activity) on the lunar surface.

One of thirteen unique pieces painted by McCall during the NASA missions; most of these pieces were accomplished in "real time' with McCall painting them as the events occurred live. McCall was the premiere space artist. Chosen by NASA to document the space program, he was present at nearly every launch. He painted the giant mural at the National Air & Space Museum in Washington, D.C. which depicts man's conquest of the moon, and famously did the artwork for the 2001: A Space Odyssey movie posters.

$8,000 - 12,000

272
MOON IMAGE SIGNED BY NINE LUNAR VOYAGERS
INCLUDES THE APOLLO 14 MOON WALKERS PLUS 3 OTHERS
Color photolithograph, 8 x 10 inches. Printed captions along lower white border which reads in part: "*The mare Crisium, Nectaris, Tranquility and Fertility pictured here.*"

SIGNED by ALAN SHEPARD and EDGAR MITCHELL.
SIGNED and INSCRIBED with their individual Apollo flight number by Moonwalkers: BUZZ ALDRIN, ALAN BEAN, and CHARLES DUKE.
SIGNED and INSCRIBED with their individual Apollo flight number by lunar voyagers: RICHARD GORDON, FRED HAISE, TOM STAFFORD, and AL WORDEN.

$1,200 - 1,800

273
SATURN V AND APOLLO MODELS —
SIGNED BY 11 ASTRONAUTS, 1 FROM EACH MISSION
Together 3 models by Toys & Models Corp, under license from Boeing Mgt Co., resin composite, metal, and wood. 1:200 scale Saturn V rocket model, 21½ inches tall on 6½ x 6½ x 1 inch wooden base. WITH: 1:48 scale Apollo model consisting of 6 x 6 x 5 inch Lunar Module (LM) in two parts (Ascent Stage and Descent Stage) docked with 6 inch long Command Service Module in two parts (CM and SM), together on a 10½ by 6 inch wooden oval base.

SIGNED AND INSCRIBED: *"WALT CUNNINGHAM. APOLLO 7"* (CM), "*JAMES LOVELL. APOLLO 8*" (CM), "*RUSTY SCHWEICKART. APOLLO 9 LMP*" (LM), "*TOM STAFFORD. APOLLO X CDR*" (SV), "*MICHAEL COLLINS. APOLLO XI CMP*" (CM), "*ALAN BEAN. APOLLO 12 LMP*" (SV), "*FRED HAISE. APOLLO 13 LMP*" (CM), "*ED MITCHELL. APOLLO 14*" (CM), "*AL WORDEN. APOLLO 15 CMP*" (SV), "*CHARLIE DUKE. APOLLO 16*" (CM), "*GENE CERNAN. APOLLO X LMP. APOLLO XVII CDR*" (SV).

$3,000 - 5,000


273

274
APOLLO PROGRAM BETA CLOTHS
1. Apollo XII beta cloth, 9 x 9 inches. SIGNED: "*CHARLES CONRAD*," "*RICHARD GORDON*," and "*ALAN BEAN*."
2. Apollo XIII beta cloth, 8 x 8 inches. SIGNED: "*JAMES LOVELL. APOLLO 13 CDR*" and "*FRED HAISE. APOLLO 13 LMP*."
3. Apollo XVI beta cloth, 9 x 9 inches. SIGNED and INSCRIBED: "*THE VOYAGE OF A LIFETIME. CHARLIE DUKE*."
4. Apollo XVII beta cloth, 9 x 9 inches. SIGNED and INSCRIBED: "*FROM THE LAST MAN ON THE MOON - GENE CERNAN. APOLLO XVII CDR*."
5. Apollo X beta cloth, 9 x 9 inches. Unsigned.

$1,000 - 1,500


274

275
COLLECTION OF NASA LITHOGRAPHS,
PHOTOGRAPHS AND MORE
Group of approx 69 NASA lithos and photographs (29 color & 40 black & white), 1 transparency of a concept for a 1980 Space Base, 3 4 x 5 inch color positives, a Marshall Space Flight Center Vicinity Map, 5 postcards, 1 Vinyl pochette with Eldo/Cecles logo containing 6 color slides of the erection of the stages of the Europa rocket for launch at the Eldo Equatorial Base, 1 German booklet on the Apollo 11 program, with 12 color slides, 1 brochure for the Eldo Cecles Europa launch.

A varied collection, which includes numerous illustrations of conceptual shuttle vehicles and shuttle related images, lunar surface photographs, NASA press photos, training photos, hardware, rocket launches, and more.

$800 - 1,200


275 (part)

276

277

276
NAVAL AVIATION IN SPACE
SIGNED BY 9 NAVAL ASTRONAUTS, INCLUDING THE FIRST MAN ON THE MOON, THE FIRST AMERICAN IN SPACE, AND THE FIRST AMERICAN TO ORBIT THE EARTH. 22 x 28 inch lithograph, signed and numbered lower right in pencil *"224/1000. R.L. Rasmussen*." Horizontal crease through middle. Matted, glazed and framed to 27 x 33 inches.

LIMITED EDITION LITHOGRAPH, SIGNED by: NEIL ARMSTRONG, JOHN GLENN, ALAN SHEPARD, GENE CERNAN, WALLY SCHIRRA, PETE CONRAD, JIM LOVELL, JACK LOUSMA, and RICK HAUCK. Signed at an event at the Naval Aviation Museum, the lithographs feature various scenes from the American space program.

$1,000 - 1,500

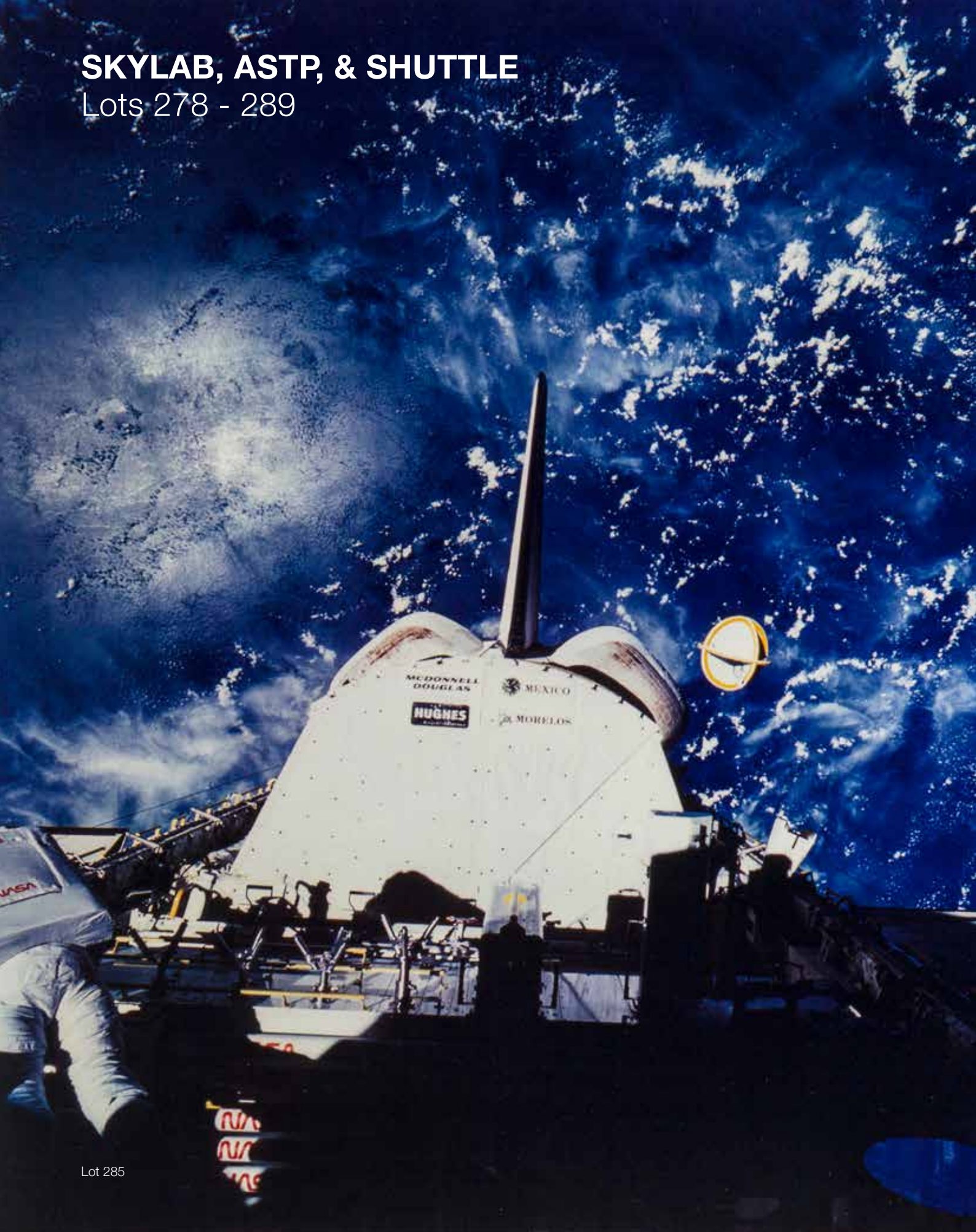
277
APOLLO REUNION, SIGNED BY 11 OF THE 12 MOONWALKERS, AND 22 OF THE 24 MEN TO GO THE MOON
THE APOLLO REUNION, JULY 6, 1986, WASHINGTON, D.C.
17 x 22 inch poster on heavy card stock with image of three small children looking up at the moon. Blind-stamp to lower left corner reading "*Lively & Rutland. P.C. Corporate District of Columbia Seal. 1985*."

SIGNED BY CHARLES CONRAD, RON EVANS, STU ROOSA, DICK GORDON, CHARLIE DUKE, MICHAEL COLLINS, JIM MCDIVITT, JOHN YOUNG, WALT CUNNINGHAM, JIM LOVELL, BUZZ ALDRIN, DON EISELE, BILL ANDERS, DAVE SCOTT, FRANK BORMAN, FRED HAISE, TOM STAFFORD, ALAN BEAN, JIM IRWIN, AL WORDEN, RUSTY SCHWEICKART, ALAN SHEPARD, GENE CERNAN, JACK SCHMITT, EDGAR MITCHELL, & KEN MATTINGLY, INCLUDES THE FULL CREWS OF Apollo 8, 9, 10, 12, 14, 15, 16 & 17, 11 OF THE 12 MOONWALKERS, AND 22 OF THE 24 MEN WHO WENT TO THE MOON.

$12,000 - 18,000

SKYLAB, ASTP, & SHUTTLE

Lots 278 - 289



Lot 285

278

278

28 DAYS IN ORBIT—CONRAD'S SKYLAB I MISSION EMBLEM

CONRAD'S LETTER PROVIDES DETAILS ON A RECORD BREAKING FLIGHT

FLOWN Skylab I cloth emblem, 4 inches in diameter. Features the Skylab Space Station in orbit above the earth as our planet eclipses the sun. The emblem is display above paragraphs on a Typed Letter Signed by CHARLES CONRAD.

CHARLES CONRAD'S signed provenance letter reads in part: *"The above patch has 'CKW' to the right of the Skylab space station, which are the initials from our last names. I was the commander of the first manned flight to Skylab. The mission was delayed ten days in order to make plans for repairing the damage that occurred just minutes into the launch of Skylab, also known as the SL-1 mission. This patch was carried with us during the launch of the SL-2 vehicle on May 25, 1973, and flew in space for 28 days. My crew and I made the repairs during that time to enable a full duration mission. We returned to earth on June 22, 1973.*"

$1,500 - 2,000

279

279

SKYLAB EARTH RESOURCES EXPERIMENT PACKAGE SITE BOOK

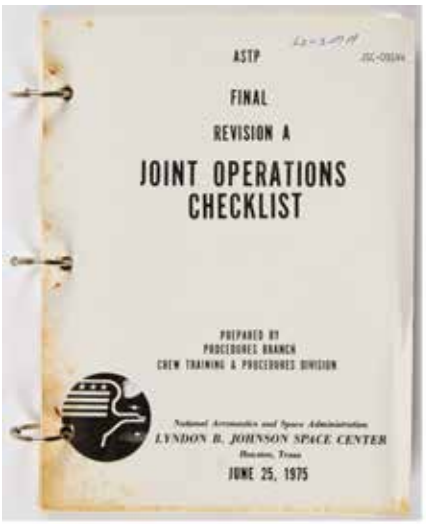
JACK LOUSMA'S COPY

Skylab EREP Site Book. [Washington D.C.: NASA Lyndon B. Johnson Space Center, 1978].

8 x 10" manual, approx 155 maps (including color minimum zoom photomaps on kodak paper, Skylab Science Site area maps, and minimum zoom maps). Punched at spine and bound into cream cardstock covers with two rings. Paper label to front cover reads *SKYLAB EREP SITE BOOK. J. Lousma*. "*Lousma* in blue pencil and "*SL-2 Change Sheet*" in black pen on first page, " *This list an update of the Feb. 8 list. Ron W. Volume 2 Index*" in blue ink to second page. WITH: Lousma's large folding color map *S-191 SITE MAP - UNITED STATES*, St. Louis, MO, Defense Mapping Agency Aerospace Center, 22 January, 1973. Pen notations in margin of map read: "*S-191 Site Assignments. Crewman #2 SL-3 Lousma*." AND: 2 page manuscript list of landing sites from the map, presumably in Lousma's hand.

The Earth Resources Experiment Package (EREP) tested the use of sensors that operated in the infrared, microwave, and visible portions of the electromagnetic spectrum to monitor and study the earth's resources. Jack Lousma (b. 1936) was the backup Docking Module Pilot of the United States Flight Crew for the *Apollo-Soyuz Test Project* (ASTP), was the pilot for *Skylab 3* (he spent 11 hours on two spacewalks outside the *Skylab* space station, and was a member of the astronaut support crews for Apollo 9, 10, and 13, and was the CAPCOM recipient of the famous Apollo 13 message "*Houston, we've had a problem*."

$1,500 - 2,500



280

280

APOLLO-SOYUZ TEST PROJECT CHECKLIST — JACK LOUSMA'S COPY

ASTP FINAL REVISION A JOINT OPERATIONS CHECKLIST. JSC-09144. Prepared by Procedures Branch Crew Training & Procedures Division. Houston, Texas: NASA/Lyndon B. Johnson Space Center, June 25, 1975.

6 x 8 inch booklet, punched at spine and bound with three rings. Some foxing at edges of front cover.

Provenance

"Lousma" in pen to front cover.

The Apollo–Soyuz Test Project (ASTP) of 15 – 24 July 1975, was the first joint U.S - Soviet space flight, and the last flight of an Apollo spacecraft. The superpowers had agreed to conduct a joint

space mission as early as April 1972, leaving ample time to make preparations such as this Joint Operations Checklist.
Jack Lousma (b. 1936) was the backup Docking Module Pilot of the United States Flight Crew for the *Apollo-Soyuz Test Project* (ASTP), was the pilot for *Skylab 3* (he spent 11 hours on two spacewalks outside the *Skylab* space station, and was a member of the astronaut support crews for Apollo 9, 10, and 13, and was the CAPCOM recipient of the famous Apollo 13 message "*Houston, we've had a problem*."

$1,000 - 1,500

THE FOLLOWING TWO LOTS WERE ORIGINALLY IN THE COLLECTION OF ASTRONAUT TOM STAFFORD

281
TOM STAFFORD'S FLOWN APOLLO-SOYUZ MISSION EMBLEM
CARRIED ON THE FIRST US MANNED RENDEZVOUS WITH A RUSSIAN SPACECRAFT
FLOWN cloth crew mission emblem, 4 inches in diameter. The emblem illustrates the first docking of a US and USSR and has all crew members last names. Mounted between paragraphs on a Typed Letter Signed by TOM STAFFORD on his business stationery.

TOM STAFFORD'S signed provenance letter which reads: "*This Apollo-Soyuz cloth emblem displayed below was carried in space on the historic Apollo-Soyuz Test Project during July 15-24, 1975. It was placed in my personal preference kit (PPK) on board the Apollo Command Module.*"

$1,000 - 1,500

281

282
STAFFORD'S ASTP FLOWN BETA CLOTH
FLOWN Apollo Soyuz crew emblem, 3 ½ inches in diameter. Printed on a white Beta cloth section 5 ½ inches square. Displayed with a Typed Letter Signed by THOMAS P. STAFFORD on his business stationery.

THOMAS P. STAFFORD'S signed provenance letter reads: "*This Apollo-Soyuz Beta cloth emblem was carried in space on the historic Apollo-Soyuz Test Project during 15 – 24, 1975. It was placed in my personal preference kit (PPK) on board the Apollo command module. Beta cloth material was designed for fire protection was used in our Apollo spacesuits.*"

$800 - 1,200

282

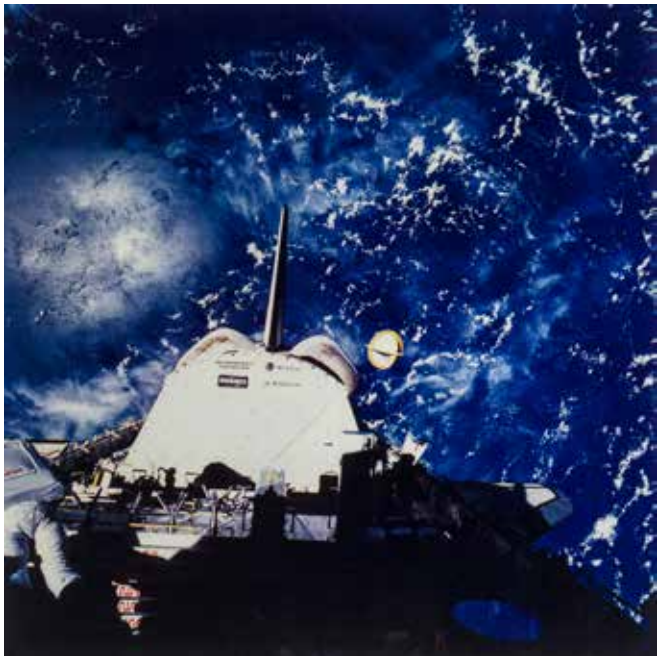
283
SIGNED ASTP STAMP SHEET
SIGNATURES OF THE U.S. AND RUSSIAN COMMANDERS
A full sheet of 10 cent Apollo Soyuz stamps, 10 x 9 inches, featuring two different artist renderings of the space vehicles in earth orbit.

SIGNED by TOM STAFFORD and ALEXEI LEONOV along the left side white border. Each was the commander of his respective flight vehicle during the first joint manned flight between the United States and Soviet Union.

$300 - 400

283

284



285

THE FOLLOWING LOT FROM THE PERSONAL COLLECTION OF ASTRONAUT JOHN FABIAN

284
FIRST FOUR SHUTTLE FLIGHTS & FIRST FLIGHT BY AN AMERICAN FEMALE ASTRONAUT
SILVER ROBBINS MEDALLIONS FOR STS 1-4 & STS-7
FROM THE PERSONAL COLLECTION OF ASTRONAUT JOHN FABIAN
Five (5) unflown sterling silver Robbins Medallions, STS-1-3 & 7 medallions approx 1½ inches in diameter, oblong STS-4 medallion 2 inches across. Mission emblem and crew names on obverse, mission dates and crew names on reverse, each engraved on edge with serial numbers 121 (of unknown #), 84 (of 271), 70 (of 207), 79 (of 206) and 77 (203) respectively. In the original cases.

Accompanying this lot is a typed provenance letter from Astronaut John Fabian which reads: "*This collection of Space Shuttle Robbins Medallions represents 5 of the earliest shuttle missions. It includes two highly historic flights. STS-1 was the first flight in April 1981 with a crew of John Young and Bob Crippen. STS-7 carried Sally Ride, America's first female astronaut into space in June 1983. I was also a member of the memorable flight. The face of the medallions features the crew-designed mission patch, including the names of the crewmembers. The obverse side in engraved with the launch and landing dates and the rim of the medallions is engraved with its serial number. The Astronaut Office at the NASA Johnson Space Center in Houston, Texas manages the order and sale of these medallions. They are only available to current and former astronauts. They are more than rare. I hereby certify that, as an active astronaut, I purchased these 5 medallions and that they have been a part of my personal collection since that time. John Fabian, Astonaut.*"

$4,000 - 5,000

285
"MCCANDLESS ON SHUTTLE ARM"
Dye transfer photograph, 19 x 19 inches, of Astronaut Bruce McCandless during an EVA on the arm of the Space Shuttle Challenger in Earth orbit. Framed.

Taken during Mission STS-41-B, 3-11 February, 1984. STS-41-B was the tenth NASA Space Shuttle mission and the fourth flight of the Space Shuttle Challenger. Two communications satellites were launched on the mission, which was also notable for including the first untethered spacewalk.

$1,500 - 2,500

286

287

286
"FOR SALE"
Dye transfer photograph, 19 x 19 inches, of Mission Specialists Dale A. Gardner and Joseph P. Allen IV holding up a "*For Sale*" sign while suspended from the Remote Manipulator System after recapture of the Westar VI geosynchronous communications satellite. The tail of the Space Shuttle Discovery is visible in the lower section of the photo, with the Earth in the background.

Taken during Mission STS-51-A, November 8-15, 1984. STS-51-A was the 14th flight of NASA's Space Shuttle program, and the second flight of Space Shuttle Discovery. The mission saw the first instance where two communications satellites were deployed and two others retrieved from orbit for repairs. Following the recovery of the Western Union owned Westar VI, astronauts Gardner and Allen humorously held up a "For Sale" sign as if trying to find someone willing to purchase the malfunctioning satellite.

$1,500 - 2,500

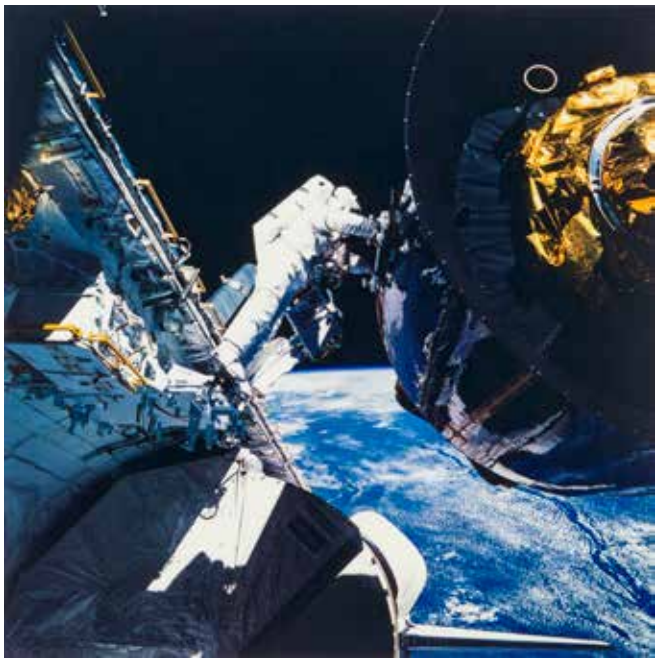
THE FOLLOWING LOT FROM THE PERSONAL COLLECTION OF ASTRONAUT JOHN FABIAN

287
CHALLENGER DISASTER & FIRST FLIGHT OF ATLANTIS
SILVER ROBBINS MEDALLIONS FOR STS-51F, -51G, -51I, -51J & -51L
FROM THE PERSONAL COLLECTION OF ASTRONAUT JOHN FABIAN
Five (5) unflown sterling silver Robbins Medallions, approx 1½" in diameter. Mission emblem and crew names on obverse, mission dates and crew names on reverse, each engraved on edge with serial numbers 111 (of 202), 105 (of 206), 99 (of 239), 79 (of 180) and 99 (239) respectively. In the original cases.

Accompanying this lot is a typed provenance letter from Astronaut John Fabian which reads: "*This collection of Space Shuttle Robbins Medallions represents 5 of the earliest shuttle missions. It includes two highly historic flights. STS-51L was the devastating mission that ended with the explosion of the Challenger and the loss of 7 astronaut lives. STS-51-G was an international flight with a French astronaut and a Sudi who is the son of the current King of Saudia Arabia. I was also a member of that memorable flight. The face of the medallions features the crew-designed mission patch, including the names of the crew members. The obverse side is engraved with the launch and landing dates and the rim of the medallions is engraved with its serial number. The Astronaut Office at the NASA Johnson Space Center in Houston, Texas manages the order and sale of these medallions. They are only available to current and former astronauts. They are more than rare. I hereby certify that, as an active astronaut, I purchased these 5 medallions and that they have been a part of my personal collection since that time. John Fabian, Astonaut.*"

STS-51F was the eight flight of the Space Shuttle *Challenger*—part of its payload was the *Carbonated Beverage Dispenser Evaluation*, an experiment in which *Coca-Cola* and *Pepsi* tried to make their beverages available to astronauts. STS-51I was the sixth flight of the Space Shuttle *Discovery*. STS-51J was the first flight of the Space Shuttle *Atlantis*. STS-51L was the the first flight in which a non-government civilian, schoolteacher Christa McAuliffe, had flown aboard the Shuttle. The mission ended catastrophically; the *Challenger* was completely destroyed mere seconds after lift-off, resulting in the death of all seven crew members. The Rogers Commission, which included the Nobel prize winning physicist Richard Feynman, determined the cause of the disaster to be due to a failure in the sealing of the O-rings.

$3,000 - 4,000



288

289

288
FISHER ON EVA
Dye transfer photograph, 19 x 19 inches, of Mission Specialist Dr. William F. Fisher on EVA. The Earth is visible in the background. Mislabeled on verso as "Ross on EVA." Framed.

Taken during Mission STS 51-I, on September 1, 1985, the photo shows mission specialist Dr. William F. Fisher on the first of two EVAs to repair the malfunctioning Syncom IV-3/Leasat-3. STS 51-I was the 20th mission of NASA's Space Shuttle Program, and the sixth flight of the Space Shuttle *Discovery*.

$1,500 - 2,500

THE FOLLOWING LOT FROM THE PERSONAL COLLECTION OF ASTRONAUT JOHN FABIAN

289
LAST THREE MISSIONS BEFORE THE CHALLENGER DISASTER
SILVER ROBBINS MEDALLIONS FOR STS-61A, B, & C
FROM THE PERSONAL COLLECTION OF ASTRONAUT JOHN FABIAN
Three (3) unflown sterling silver Robbins Medallions, each approx 1½ inches in diameter, mission emblem and crew names on obverse, mission dates and crew names on reverse, each engraved on edge with serial numbers 75 (of 198), 91 (of 190), and 87 (of 202) respectively. In the original cases.

Accompanying this lot is a typed provenance letter from Astronaut John Fabian which reads: "*This collection of Space Shuttle Robbins Medallions represents 3 of the earliest shuttle missions. STS 61-B and STS-61C deployed a total of 5 communications satellites to enhacne international connectivity. STS-61A featured a crew of 8, including two Germans and on Dutchman, with a European Science laboratory. The face of the medallions features the crew-designed mission patch, including the names of the crew members. The obverse side is engraved with the launch and landing dates and the rim of the medallions is engraved with its serial number. The Astronaut Office at the NASA Johnson Space Center in Houston, Texas manages the order and sale of these medallions. They are only available to current and former astronauts. They are more than rare. I hereby certify that, as an active astronaut, I purchased these 3 medallions and that they have been a part of my personal collection since that time. John Fabian, Astonaut.*"

STS-61A, also known as *D-1*, was funded and directed by West Germany (hence the designation *D-1*, for *Deutschland*).STS-61B carried the first and to this day only Mexican astronaut, Rodolfo Neri Vela, and STS-61C and was the last shuttle mission before the Space Shuttle *Challenger* disaster.

$2,000 - 3,000

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CHINESE SNUFF BOTTLES

featuring the Elsa Glickman Collection

Monday September 12, 2016

New York

INQUIRIES
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bruce.maclaren@bonhams.com

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NEW YORK

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2. On the fall of the auctioneer's hammer, the highest bidder shall have purchased the offered lot in accordance and subject to compliance with all of the conditions set forth herein and (a) assumes full risk and responsibility therefor, (b) if requested will sign a confirmation of purchase, and (c) will pay the purchase price in full or such part as we may require for all lots purchased. No lot may be transferred. Any person placing a bid as agent on behalf of another (whether or not such person has disclosed that fact or the identity of the principal) may be jointly and severally liable with the principal under any contract resulting from the acceptance of a bid.

Unless otherwise agreed, payment in good funds is due and payable within five (5) business days following the auction sale. Whenever the purchaser pays only a part of the total purchase price for one or more lots purchased, we may apply such payments, in our sole discretion, to the lot or lots we choose. Payment will not be deemed made in full until we have collected good funds for all amounts due.

Payment for purchases may be made in or by (a) cash, (b) cashier's check or money order, (c) personal check with approved credit drawn on a U.S. bank, (d) wire transfer or other immediate bank transfer, or (e) Visa, MasterCard, American Express or Discover credit, charge or debit card. A processing fee will be assessed on any returned checks. Please note that the amount of cash notes and cash equivalents that can be accepted from a given purchaser may be limited.

The purchaser grants us a security interest in the property, and we may retain as collateral security for the purchaser's obligations to us, any property and all monies held or received by us for the account of the purchaser, in our possession. We retain all rights of a secured party under the California Commercial Code. If the foregoing conditions or any other applicable conditions herein are not complied with, in addition to other remedies available to us and the consignor by law, including without limitation, the right to hold the purchaser liable for the purchase price, we at our option may either (a) cancel the sale, retaining as liquidated damages all payments made by the purchaser or (b) resell the property, either publicly or privately, and in such event the purchaser shall be liable for the payment of any deficiency plus all costs and expenses of both sales, our commission at our standard rates, all other charges due hereunder, attorneys' fees, expenses and incidental damages. In addition, where two or more amounts are owed in respect of different transactions by the purchaser to us, to Bonhams 1793 Limited and/or to any of our other affiliates, subsidiaries or parent companies worldwide within the Bonhams Group, we reserve the right to apply any monies paid in respect of a transaction to discharge any amount owed by the purchaser. If all fees, commissions, premiums, bid price and other sums due to us from the purchaser are not paid promptly as provided in these Conditions of Sale, we reserve the right to impose a finance charge equal to 1.5% per month on all amounts due to us beginning on the 31st day following the sale until payment is received, in addition to other remedies available to us by law.

3. We reserve the right to withdraw any property and to divide and combine lots at any time before such property's auction. Unless otherwise announced by the auctioneer at the time of sale, all bids are per lot as numbered in the catalog and no lots shall be divided or combined for sale.

4. We reserve the right to reject a bid from any bidder, to split any bidding increment, and to advance the bidding in any manner the auctioneer may decide. In the event of any dispute between bidders, or in the event the auctioneer doubts the validity of any bid, the auctioneer shall have sole and final discretion either to determine the successful bidder or to re-offer and resell the article in dispute. If any dispute arises after the sale, our sales records shall be conclusive in all respects.

5. If we are prevented by fire, theft or any other reason whatsoever from delivering any property to the purchaser or a sale otherwise cannot be completed, our liability shall be limited to the sum actually paid therefor by the purchaser and shall in no event include any compensatory, incidental or consequential damages.

6. If a lot is offered subject to a reserve, we may implement such reserve by bidding on behalf of the consignor, whether by opening bidding or continuing bidding in response to other bidders until reaching the reserve. If we have an interest in an offered lot and the proceeds therefrom other than our commissions, we may bid therefor to protect such interest. CONSIGNORS ARE NOT ALLOWED TO BID ON THEIR OWN ITEMS.

7. All statements contained in the catalog or in any bill of sale, condition report, invoice or elsewhere as to authorship, period, culture, source, origin, measurement, quality, rarity, provenance, importance, exhibition and literature of historical relevance, or physical condition ARE QUALIFIED STATEMENTS OF OPINION AND NOT REPRESENTATIONS OR WARRANTIES. No employee or agent of Bonhams is authorized to make on our behalf or on that of the consignor any representation or warranty, oral or written, with respect to any property.

8. All purchased property shall be removed from the premises at which the sale is conducted by the date(s) and time(s) set forth in the "Buyer's Guide" portion of the catalog. If not so removed, daily storage fees will be payable to us by the purchaser as set forth therein. We reserve the right to transfer property not so removed to an offsite warehouse at the purchaser's risk and expense, as set forth in more detail in the "Buyer's Guide." Accounts must be settled in full before property will be released. Packing and handling of purchased lots are the responsibility of the purchaser. Bonhams can provide packing and shipping services for certain items as noted in the "Buyer's Guide" section of the catalog.

9. The copyright in the text of the catalog and the photographs, digital images and illustrations of lots in the catalog belong to Bonhams or its licensors. You will not reproduce or permit anyone else to reproduce such text, photographs, digital images or illustrations without our prior written consent.

10. These Conditions of Sale shall bind the successors and assigns of all bidders and purchasers and inure to the benefit of our successors and assigns. No waiver, amendment or modification of the terms hereof (other than posted notices or oral announcements during the sale) shall bind us unless specifically stated in writing and signed by us. If any part of these Conditions of Sale is for any reason invalid or unenforceable, the rest shall remain valid and enforceable.

11. These Conditions of Sale and the purchaser's and our respective rights and obligations hereunder are governed by the laws of the State of California. By bidding at an auction, each purchaser and bidder agrees to be bound by these Conditions of Sale. Any dispute, controversy or claim arising out of or relating to this agreement, or the breach, termination or validity thereof, brought by or against Bonhams (but not including claims brought against the consignor by the purchaser of lots consigned hereunder) shall be resolved by the procedures set forth below.

MEDIATION AND ARBITRATION PROCEDURES

(a) Within 30 days of written notice that there is a dispute, the parties or their authorized and empowered representatives shall meet by telephone and/or in person to mediate their differences. If the parties agree, a mutually acceptable mediator shall be selected and the parties will equally share such mediator's fees. The mediator shall be a retired judge or an attorney familiar with commercial law and trained in or qualified by experience in handling mediations. Any communications made during the mediation process shall not be admissible in any subsequent arbitration, mediation or judicial proceeding. All proceedings and any resolutions thereof shall be confidential, and the terms governing arbitration set forth in paragraph (c) below shall govern.

(b) If mediation does not resolve all disputes between the parties, or in any event no longer than 60 days after receipt of the written notice of dispute referred to above, the parties shall submit the dispute for binding arbitration before a single neutral arbitrator. Such arbitrator shall be a retired judge or an attorney familiar with commercial law and trained in or qualified by experience in handling arbitrations. Such arbitrator shall make all appropriate disclosures required by law. The arbitrator shall be drawn from a panel of a national arbitration service agreed to by the parties, and shall be selected as follows: (i) If the national arbitration service has specific rules or procedures, those rules or procedures shall be followed; (ii) If the national arbitration service does not have rules or procedures for the selection of an arbitrator, the arbitrator shall be an individual jointly agreed to by the parties. If the parties cannot agree on a national arbitration service, the arbitration shall be conducted by the American Arbitration Association, and the arbitrator shall be selected in accordance with the Rules of the American Arbitration Association. The arbitrator's award shall be in writing and shall set forth findings of fact and legal conclusions.

(c) Unless otherwise agreed to by the parties or provided by the published rules of the national arbitration service:

(i) the arbitration shall occur within 60 days following the selection of the arbitrator;

(ii) the arbitration shall be conducted in the designated location, as follows: (A) in any case in which the subject auction by Bonhams took place or was scheduled to take place in the State of New York or Connecticut or the Commonwealth of Massachusetts, the arbitration shall take place in New York City, New York; (B) in all other cases, the arbitration shall take place in the city of San Francisco, California; and

(iii) discovery and the procedure for the arbitration shall be as follows:

(A) All arbitration proceedings shall be confidential;

(B) The parties shall submit written briefs to the arbitrator no later than 15 days before the arbitration commences;

(C) Discovery, if any, shall be limited as follows: (I) Requests for no more than 10 categories of documents, to be provided to the requesting party within 14 days of written request therefor; (II) No more than two (2) depositions per party, provided however, the deposition(s) are to be completed within one (1) day; (III) Compliance with the above shall be enforced by the arbitrator in accordance with California law;

(D) Each party shall have no longer than eight (8) hours to present its position. The entire hearing before the arbitrator shall not take longer than three (3) consecutive days;

(E) The award shall be made in writing no more than 30 days following the end of the proceeding. Judgment upon the award rendered by the arbitrator may be entered by any court having jurisdiction thereof.

To the fullest extent permitted by law, and except as required by applicable arbitration rules, each party shall bear its own attorneys' fees and costs in connection with the proceedings and shall share equally the fees and expenses of the arbitrator.

LIMITED RIGHT OF RESCISSION

If within one (1) year from the date of sale, the original purchaser (a) gives written notice to us alleging that the identification of Authorship (as defined below) of such lot as set forth in the **BOLD TYPE** heading of the catalog description of such lot (as amended by any saleroom notices or verbal announcements during the sale) is not substantially correct based on a fair reading of the catalog (including the terms of any glossary contained therein), and (b) within 10 days after such notice returns the lot to us in the same condition as at the time of sale, and (c) establishes the allegation in the notice to our satisfaction (including by providing one or more written opinions by recognized experts in the field, as we may reasonably require), then the sale of such lot will be rescinded and, unless we have already paid to the consignor monies owed him in connection with the sale, the original purchase price will be refunded.

If, prior to receiving such notice from the original purchaser alleging such defect, we have paid the consignor monies owed him in connection with the sale, we shall pay the original purchaser the amount of our commissions, any other sale proceeds to which we are entitled and applicable taxes received from the purchaser on the sale and make demand on the consignor to pay the balance of the original purchase price to the original purchaser. Should the consignor fail to pay such amount promptly, we may disclose the identity of the consignor and assign to the original purchaser our rights against the consignor with respect to the lot the sale of which is sought to be rescinded. Upon such disclosure and assignment, any liability of Bonhams as consignor's agent with respect to said lot shall automatically terminate.

The foregoing limited right of rescission is available to the original purchaser only and may not be assigned to or relied upon by any subsequent transferee of the property sold. The purchaser hereby accepts the benefit of the consignor's warranty of title and other representations and warranties made by the consignor for the purchaser's benefit. Nothing in this section shall be construed as an admission by us of any representation of fact, express or implied, obligation or responsibility with respect to any lot. THE PURCHASER'S SOLE AND EXCLUSIVE REMEDY AGAINST BONHAMS FOR ANY REASON WHATSOEVER IS THE LIMITED RIGHT OF RESCISSION DESCRIBED IN THIS SECTION.

"Authorship" means only the identity of the creator, the period, culture and source or origin of the lot, as the case may be, as set forth in the **BOLD TYPE** heading of the print catalog entry. The right of rescission does not extend to: (a) works of art executed before 1870 (unless these works are determined to be counterfeits created since 1870), as this is a matter of current scholarly opinion which can change; (b) titles, descriptions, or other identification of offered lots, which information normally appears in lower case type below the **BOLD TYPE** heading identifying the Authorship; (c) Authorship of any lot where it was specifically mentioned that there exists a conflict of specialist or scholarly opinion regarding the Authorship of the lot at the time of sale; (d) Authorship of any lot which as of the date of sale was in accordance with the then generally-accepted opinion of scholars and specialists regarding the same; or (e) the identification of periods or dates of creation in catalog descriptions which may be proven inaccurate by means of scientific processes that are not generally accepted for use until after publication of the catalog in which the property is offered or that were unreasonably expensive or impractical to use at the time of such publication.

LIMITATION OF LIABILITY

EXCEPT AS EXPRESSLY PROVIDED ABOVE, ALL PROPERTY IS SOLD "AS IS." NEITHER BONHAMS NOR THE CONSIGNOR MAKES ANY REPRESENTATION OR WARRANTY, EXPRESS OR IMPLIED, AS TO THE MERCHANTABILITY, FITNESS OR CONDITION OF THE PROPERTY OR AS TO THE CORRECTNESS OF DESCRIPTION, GENUINENESS, ATTRIBUTION, PROVENANCE OR PERIOD OF THE PROPERTY OR AS TO WHETHER THE PURCHASER ACQUIRES ANY COPYRIGHTS OR OTHER INTELLECTUAL PROPERTY RIGHTS IN LOTS SOLD OR AS TO WHETHER A WORK OF ART IS SUBJECT TO THE ARTIST'S MORAL RIGHTS OR OTHER RESIDUAL RIGHTS OF THE ARTIST. THE PURCHASER EXPRESSLY ACKNOWLEDGES AND AGREES THAT IN NO EVENT SHALL BONHAMS BE LIABLE FOR ANY DAMAGES INCLUDING, WITHOUT LIMITATION, ANY COMPENSATORY, INCIDENTAL OR CONSEQUENTIAL DAMAGES.

SELLER'S GUIDE

SELLING AT AUCTION

Bonhams can help you every step of the way when you are ready to sell art, antiques and collectible items at auction. Our regional offices and representatives throughout the US are available to service all of your needs. Should you have any further questions, please visit our website at **www.bonhams.com/us** for more information or call our Client Services Department at +1 (800) 223 2854 ext. 23550.

AUCTION ESTIMATES

The first step in the auction process is to determine the auction value of your property. Bonhams' world-renowned specialists will evaluate your special items at no charge and in complete confidence. You can obtain an auction estimate in many ways:

- Attend one of our Auction Appraisal Events held regularly at our galleries and in other major metropolitan areas. The updated schedule for Bonhams Auction Appraisal Events is available at **www.bonhams.com/us.**
- Call our Client Services Department to schedule a private appointment at one of our galleries. If you have a large collection, our specialists can travel, by appointment, to evaluate your property on site.
- Send clear photographs to us of each individual item, including item dimensions and other pertinent information with each picture. Photos should be sent to Bonhams' address in envelopes marked as "photo auction estimate". Alternatively, you can submit your request using our online form at **www.bonhams.com/us**. Digital images may be attached to the form. Please limit your images to no more than five (5) per item.

CONSIGNING YOUR PROPERTY

After you receive an estimate, you may consign your property to us for sale in the next appropriate auction. Our staff assists you throughout the process, arranging transportation of your items to our galleries (at the consignor's expense), providing a detailed inventory of your consignment, and reporting the prices realized for each lot. We provide secure storage for your property in our warehouses and all items are insured throughout the auction process. You will receive payment for your property approximately 35 days after completion of sale.

Sales commissions vary with the potential auction value of the property and the particular auction in which the property is offered. Please call us for commission rates.

PROFESSIONAL APPRAISAL SERVICES

Bonhams' specialists conduct insurance and fair market value appraisals for private collectors, corporations, museums, fiduciaries and government entities on a daily basis. Insurance appraisals, used for insurance purposes, reflect the cost of replacing property in today's retail market. Fair market value appraisals are used for estate, tax and family division purposes and reflect prices paid by a willing buyer to a willing seller.

When we conduct a private appraisal, our specialists will prepare a thorough inventory listing of all your appraised property by category. Valuations, complete descriptions and locations of items are included in the documentation.

Appraisal fees vary according to the nature of the collection, the amount of work involved, the travel distance, and whether the property is subsequently consigned for auction.

Our appraisers are available to help you anywhere and at any time. Please call our Client Services Department to schedule an appraisal.

ESTATE SERVICES

Since 1865, Bonhams has been serving the needs of fiduciaries – lawyers, trust officers, accountants and executors – in the disposition of large and small estates. Our services are specially designed to aid in the efficient appraisal and disposition of fine art, antiques, jewelry, and collectibles. We offer a full range of estate services, ranging from flexible financial terms to tailored accounting for heirs and their agents to world-class marketing and sales support.

For more information or to obtain a detailed Trust and Estates package, please visit our website at **www.bonhams.com/us** or contact our Client Services Department.

BUYER'S GUIDE

BIDDING & BUYING AT AUCTION
Whether you are an experienced bidder or an enthusiastic novice, auctions provide a stimulating atmosphere unlike any other. Bonhams previews and sales are free and open to the public. As you will find in these directions, bidding and buying at auction is easy and exciting. Should you have any further questions, please visit our website at **www.bonhams.com** or call our Client Services Department at +1 (800) 223 2854 ext. 3550.

Catalogs
Before each auction we publish illustrated catalogs. Our catalogs provide descriptions and estimated values for each "lot." A lot may refer to a single item or to a group of items auctioned together. The catalogs also include the dates and the times for the previews and auctions. We offer our catalogs by subscription or by single copy. For information on subscribing to our catalogs, you may refer to the subscription form in this catalog, call our Client Services Department, or visit our website at **www.bonhams.com/us**.

Previews
Auction previews are your chance to inspect each lot prior to the auction. We encourage you to look closely and examine each object on which you may want to bid so that you will know as much as possible about it. Except as expressly set forth in the Conditions of Sale, items are sold "as is" and with all faults; illustrations in our catalogs, website and other materials are provided for identification only. At the previews, our staff is always available to answer your questions and guide you through the auction process. Condition reports may be available upon request.

Estimates
Bonhams catalogs include low and high value estimates for each lot, exclusive of the buyer's premium and tax. The estimates are provided as an approximate guide to current market value based primarily on previous auction results for comparable pieces, and should not be interpreted as a representation or prediction of actual selling prices. They are determined well in advance of a sale and are subject to revision. Please contact us should you have any questions about value estimates.

Reserves
Unless indicated by the ¤ symbol next to the lot number, which denotes no reserve, all lots in the catalog are subject to a reserve. The reserve is the minimum auction price that the consignor is willing to accept for a lot. This amount is confidential and does not exceed the low estimate value.

Auction House's Interest in Property Offered at Auction
On occasion, Bonhams may offer property in which it has an ownership interest in whole or in part or otherwise has an economic interest. Such property, if any, is identified in the catalog with a ▲ symbol next to the lot number(s).

Bonhams may also offer property for a consignor that has been guaranteed a minimum price for its property by Bonhams or jointly by Bonhams and a third party. Bonhams and any third parties providing a guarantee may benefit financially if the guaranteed property is sold successfully and may incur a financial loss if its sale is not successful. Such property, if any, is identified in the catalog with a ○ symbol next to the lot number(s).

Bidding at Auction
At Bonhams, you can bid in many ways: in person, via absentee bid, over the phone, or via Bonhams' live online bidding facility. Absentee bids can be submitted in person, online, via fax or via email.

Valid Bonhams client accounts are required to participate in bidding activity. You can obtain registration information online, at the reception desk or by calling our Client Services Department.

By bidding at auction, whether in person or by agent, by absentee bid, telephone, online or other means, the buyer or bidder agrees to be bound by the Conditions of Sale.

Lots are auctioned in consecutive numerical order as they appear in the catalog. Bidding normally begins below the low estimate. The auctioneer will accept bids from interested parties present in the saleroom, from telephone bidders, and from absentee bidders who have left written bids in advance of the sale. The auctioneer may also execute bids on behalf of the consignor by placing responsive or consecutive bids for a lot up to the amount of the reserve, but never above it.

We assume no responsibility for failure to execute bids for any reason whatsoever.

In Person
If you are planning to bid at auction for the first time, you will need to register at the reception desk in order to receive a numbered bid card. To place a bid, hold up your card so that the auctioneer can clearly see it. Decide on the maximum auction price that you wish to pay, exclusive of buyer's premium and tax, and continue bidding until your bid prevails or you reach your limit. If you are the successful bidder on a lot, the auctioneer will acknowledge your paddle number and bid amount.

Absentee Bids
As a service to those wishing to place bids, we may at our discretion accept bids without charge in advance of auction online or in writing on bidding forms available from us. "Buy" bids will not be accepted; all bids must state the highest bid price the bidder is willing to pay. Our auction staff will try to bid just as you would, with the goal of obtaining the item at the lowest bid price possible. In the event identical bids are submitted, the earliest bid submitted will take precedence. Absentee bids shall be executed in competition with other absentee bids, any applicable reserve, and bids from other auction participants. A friend or agent may place bids on your behalf, provided that we have received your written authorization prior to the sale. Absentee bid forms are available in our catalogs, online at **www.bonhams.com/us**, at offsite auction locations, and at our San Francisco, Los Angeles and New York galleries.

By Telephone
Under special circumstances, we can arrange for you to bid by telephone. To arrange for a telephone bid, please contact our Client Services Department a minimum of 24 hours prior to the sale.

Online
We offer live online bidding for most auctions and accept absentee bids online for all our auctions.
Please visit **www.bonhams.com/us** for details.

Bid Increments
Bonhams generally uses the following increment multiples as bidding progresses:

$50-200	by $10s
$200-500	by $20/50/80s
$500-1,000	by $50s
$1,000-2,000	by $100s
$2,000-5,000	by $200/500/800s
$5,000-10,000	by $500s
$10,000-20,000	by $1,000s
$20,000-50,000	by $2,000/5,000/8,000s
$50,000-100,000	by $5,000s
$100,000-200,000	by $10,000s
above $200,000	at auctioneer's discretion

The auctioneer may split or reject any bid at any time at his or her discretion as outlined in the Conditions of Sale.

Currency Converter
Solely for the convenience of bidders, a currency converter may be provided at Bonhams' auctions. The rates quoted for conversion of other currencies to U.S. Dollars are indications only and should not be relied upon by a bidder, and neither Bonhams nor its agents shall be responsible for any errors or omissions in the operation or accuracy of the currency converter.

Buyer's Premium
A buyer's premium is added to the winning bid price of each individual lot purchased, at the rates set forth in the Conditions of Sale. The winning bid price plus the premium constitute the purchase price for the lot. Applicable sales taxes are computed based on this figure, and the total becomes your final purchase price.

Unless specifically illustrated and noted, fine art frames are not included in the estimate or purchase price. Bonhams accepts no liability for damage or loss to frames during storage or shipment.

All sales are final and subject to the Conditions of Sale found in our catalogs, on our website, and available at the reception desk.

Payment
All buyers are asked to pay and pick up by 3pm on the business day following the auction. Payment may be made to Bonhams by cash, checks drawn on a U.S. bank, money order, wire transfer, or by Visa, MasterCard, American Express or Discover credit or charge card or debit card. All items must be paid for within 5 business days of the sale. Please note that payment by personal or business check may result in property not being released until purchase funds clear our bank. For payments sent by mail, please remit to Cashier Department, 220 San Bruno Avenue, San Francisco, CA 94103.

Sales Tax
California, Arizona, Colorado, Connecticut, Florida, Georgia, Illinois, Nevada, New York, Massachusetts, Pennsylvania, Texas, Washington state and Washington DC residents must pay applicable sales tax. Other state or local taxes (or compensating use taxes) may apply. Sales tax will be automatically added to the invoice unless a valid resale number has been furnished or the property is shipped via common carrier to destinations outside the states listed above.

Shipping & Removal
Bonhams can accommodate shipping for certain items. Please contact our Cashiers Department for more information or to obtain a quote. Carriers are not permitted to deliver to PO boxes.

International buyers are responsible for all import/export customs duties and taxes. An invoice stating the actual purchase price will accompany all international purchases.

Collection of Purchases
Please arrange for the packing and transport of your purchases prior to collection at our office. If you are sending a third party shipper, please request a release form from us and return it to +1 (212) 644 9009 prior to your scheduled pickup. To schedule collection of purchases, please call +1 (212) 644 9001.

Handling and Storage Charges
Please note that our offices have requirements for freight elevator usage. Please contact us to schedule an elevator appointment for pickup of any large or awkward items. Bonhams will hold all purchased lots in our gallery until Thursday July 28 without penalty. After July 28 collection of lots will be by appointment only. Please call +1 (212) 644 9001 at least 24 hours in advance to make an appointment.

Storage charges of $5 per lot, per day will begin accruing for any lots not collected by the 31st day after the auction. Bonhams reserves the right to remove uncollected sold lots to the warehouse of our choice at the buyer's risk and expense. Handling and storage fees will apply.

Auction Results
To find out the final purchase price for any lot following the sale, please call our automated auction results line at +1 (800) 223 2854 ext. 3400. All you need is a touch-tone telephone and the lot number. Auction results are usually available on the next business day following the sale or online at **www.bonhams.com/us.**

IMPORTANT NOTICE TO BUYERS

COLLECTION & STORAGE AFTER SALE

Please note that all oversized lots listed below, that are not collected by **4PM ON THURSDAY JULY 28** will be removed to the warehouse of Cadogan Tate Fine Art Storage Limited. Lots not so listed will remain at Bonhams; provided, however, **THAT IF BUYERS OF LISTED LOTS ALSO BUY OTHER NON-LISTED ITEMS, THESE OTHER LOTS WILL ALSO BE REMOVED TO THE WAREHOUSE OF CADOGAN TATE**, so that all lots remain together and buyers can collect their entire purchases from one location. For any questions please refer to the Bonhams department. **LOTS WILL BE AVAILABLE FOR COLLECTION FROM CADOGAN TATE BEGINNING AT 10AM ET ON MONDAY AUGUST 1.**

Address
Cadogan Tate
301 Norman Ave
Brooklyn, NY 11222

Lots will be available for collection 24hrs following transfer to Cadogan Tate every business day from 9.30am to 4.30pm ET.

Collections appointments must be booked 24 hours in advance (subject to full payment of all outstanding amounts due to Bonhams and Cadogan Tate) by contacting Cadogan Tate at +1 (917) 464 4346.

HANDLING & STORAGE CHARGES

Please note: For sold lots removed to Cadogan Tate there will be transfer and insurance charges but no storage charge due for lots collected within 7 days of the transfer date. For sold lots that remain at Bonhams, there will be no storage charge for lots collected within 21 days of the sale date.

The per-lot charges levied by Cadogan Tate Fine Art Storage Ltd are as follows (plus any applicable sales tax):

FURNITURE/LARGE OBJECTS
Transfer $75
Daily storage..... $10
Insurance (on Hammer + Premium + tax) 0.3%

SMALL OBJECTS
Transfer $37.50
Daily storage..... $5
Insurance (on Hammer + Premium + tax) 0.3%

Please contact Catherine More at Cadogan Tate Fine Art Storage at
+1 (917) 464 4346
+1 (347) 468 9916 (fax)
c.more@cadogantatefineart.com

For more information and estimates on domestic and International shipping, please contact Catherine More at
+1 (917) 464 4346 or
c.more@cadogantatefineart.com

PAYMENT

All amounts due to Bonhams and all charges due to Cadogan Tate Fine Art Storage Ltd must be paid by the time of collection of the property from their warehouse.

TO MAKE PAYMENT IN ADVANCE
Telephone +1 (917) 464 4346 to ascertain the amount due, payable by cash, check, or credit card.

PAYMENT AT TIME OF COLLECTION
May be made by cash, check, or credit card.

Lots will only be released from Cadogan Tate's warehouse upon production of the "Collection Slip" obtained from the Cashier's office at Bonhams.

The removal and/or storage by Cadogan Tate of any lots will be subject to their standard Conditions of Business, copies of which are available at Bonhams.

PLEASE NOTE
Cadogan Tate does not accept liability for damage or loss, due to negligence or otherwise, exceeding the sale price of such goods, or at their option the cost of repairing or replacing the damaged or missing goods.

Cadogan Tate reserves a lien over all goods in their possession for payment of storage and all other charges due them.

OVERSIZED LOTS MARKED WITH A 'W'

1
12
30
43
59
72
73
74

CONTACTS

OFFICERS

Laura King Pfaff
Chairman

Matthew Girling
Chief Executive Officer

Leslie Wright
Vice President, Trusts and Estates

Jon King
Vice President, Business Development

Vice Presidents, Specialists
Susan F. Abeles
Rupert Banner
Gary Espinosa
Judith Eurich
Alan Fausel
Mark Fisher
Martin Gammon
Dessa Goddard
Jim Haas
Scot Levitt
Mark Osborne
Hadji Rahimipour
Brooke Sivo
Catherine Williamson

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(305) 228 6600, Miami
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Chinese Works of Art & Paintings
Bruce MacLaren, (917) 206 1677

Collectors' Motorcars & Motorcycles
Rupert Banner, (212) 461 6515
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Sale title: **The Space History Sale**	Sale date: **Wednesday July 20, 2016**
Sale no. **23378**	Sale venue: **New York**

General Bid Increments:

$10 - 200 .....by 10s	$10,000 - 20,000 .....by 1,000s
$200 - 500 .....by 20 / 50 / 80s	$20,000 - 50,000 .....by 2,000 / 5,000 / 8,000s
$500 - 1,000 .....by 50s	$50,000 - 100,000 .....by 5,000s
$1,000 - 2,000 .....by 100s	$100,000 - 200,000 .....by 10,000s
$2,000 - 5,000 .....by 200 / 500 / 800s	above $200,000 .....at the auctioneer's discretion
$5,000 - 10,000 .....by 500s	The auctioneer has discretion to split any bid at any time.

Customer Number	Title
First Name	Last Name
Company name (to be invoiced if applicable)	
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City	County / State
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Telephone bidders: indicate primary and secondary contact numbers by writing ① or ② next to the telephone number.

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SHIPPING

Shipping Address (if different than above):

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Please note that all telephone calls are recorded.

Type of bid (A-Absentee, T-Telephone)	Lot no.	Brief description (In the event of any discrepancy, lot number and not lot description will govern.) If you are bidding online there is no need to complete this section.	MAX bid in US$ (excluding premium and applicable tax) Emergency bid for telephone bidders only*

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Your signature:	Date:

MCC-H

FLIGHT PLAN

1830 EDT

09:00
:10
:20
:30
:40
:50
10:00
:10
:20
:30
:40
:50
11:00

MSFN

CARRIED TO THE MOON ON APOLLO XI

T Buzz Aldrin

UPLINK CMC
- EARTH HORIZON BIAS (ΔH) (IF REQUIRED)
- CSM STATE VECTOR
- MCC1 TGT LOAD

UPDATE
- MCC1 MNVR PAD

CO_2 FILTER CHANGE NO. 1 (3 INTO A, STORE 1 IN B5) 10:15

V66 - TRANS CSM STATE VECTOR TO LM SLOT

~~O_2 FUEL CELL PURGE~~ Deleted @ 11 04

RECORD MCC1 MNVR PAD

CONTINUE PTC IF MCC1 IS SCRUBBED

IMU REALIGN - P52
OPTION 3 - REFSMMAT
(OPTIONAL)

PTC

Verified on 33

NOTES

THE EARTH HORIZON BIAS (ΔH) WILL BE UPDATED TO THE CMC IF THE DIFFERENCE BETWEEN THE SIGHTING ΔH & THE E-MEMORY ΔH IS ≥8.3KM

REPORT:

P52 (PAD REFSMMAT)
N71: 30,37
N05: ____.01
N93:
X +01.005
Y -00.368
Z -00.737
GET 009:36:45

MISSION	EDITION	DATE	TIME	DAY/REV	PAGE
APOLLO 11	FINAL	JULY 1, 1969	09:00 - 11:00	1/TLC	3-9

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