Bonhams

ting apprepted Wary B To some the Denert of Man. Ch. Derwin. [The multiple of suiple nipri of marking to twenty her much himpe & polyginits the monogenities In the do so we while The comment of alice species, to quette Senting wer the h tuber a thing the hand here is set the of articling, and by and the on test of a line of a lin Their is unit sally accepted . We have the he intifielde it is to kearthe an to value of the term

History of Science and Technology, including Air and Space

Los Angeles | 5 November, 2020



lot 21

History of Science and Technology, including Air and Space

Los Angeles | 5 November, 2020 10 am – History of Science and Technology (lots 1 - 72) 12pm – Air and Space (lots 73 - 206)

BONHAMS

7601 W. Sunset Boulevard Los Angeles CA 90046 **bonhams.com**

SALE NUMBER

26078 Lots 1 - 206

AUCTION INFORMATION

Bonded pursuant to California Civil Code Sec. 1812.600; Bond No. 57BSBGL0808

ILLUSTRATIONS

Front Cover: lot 2 Inside Front Cover: lot 21 Rear Cover: lot 59

PREVIEW BY APPOINTMENT:

Monday November 2, 10pm-5pm Tuesday November 3, 10pm-5pm Wednesday November 4, 10am-5pm

INQUIRIES

Los Angeles Adam Stackhouse Specialist in Charge (310) 623 – 2084 adam.stackhouse@bonhams.com

Catherine Williamson VP/Director catherine.williamson@bonhams.com +1 323 436 5442

Caren Roberts-Frenzel Junior Specialist caren.roberts@bonhams.com +1 323 436 5409

New York

lan Ehling Director + 1 (212) 644 9094 ian.ehling@bonhams.com

Tom Lamb Director Business Development + 1 (917) 921 7342 tom.lamb@bonhams.com

Darren Sutherland Senior Specialist +1 (212)461 6531 darren.sutherland@bonhams.com

Tim Tezer Junior Specialist +1 (917) 206 1647 tim.tezer@bonhams.com

Leslie To Administrator + 1 (917) 206-1661 leslie. to@bonhams.com

BIDS

Register to bid online by visiting www.bonhams.com/26078

Alternatively, contact our Client Services department at: **bids.us@bonhams.com** +1 (323) 850 7500

IMPORTANT NOTICES

Please note that all customers, irrespective of any previous activity with Bonhams, are required to have proof of identity when submitting bids. Failure to do this may result in your bid not being processed.

For absentee and telephone bids we require a completed Bidder Registration Form in advance of the sale. The form can be found at the back of every catalogue and on our website at www.bonhams.com

and should be returned by email to the specialist department or to the Client Services department at bids. us@bonhams.com. Please note we cannot guarantee bids within 24 hours of the sale.

Lots marked "W" are oversized and therefore your purchases may be subject to alternative shipping and storage methods. For further information, please refer to the Oversized Lots page.

COVID-19 SAFETY STANDARDS

Bonhams' galleries are currently subject to government restrictions and arrangements may be subject to change.

Preview: Lots will be made available for in-person viewing by appointment only. Please contact the specialist department on science.us@bonhams.com, or (310) 623 – 2084 to arrange an appointment before visiting our galleries. In accordance with Covid-19 guidelines, it is mandatory that you wear a face mask and observe social distancing at all times. Additional lot information and photographs are available from the specialist department upon request.

Bidding: We are unable to offer in-person bidding for this auction.

Payment, Collections & Shipping:

We strongly encourage contactless payment of invoices prior to collection via wire transfer or credit card through your MyBonhams account. In-person or third-party collections from our galleries are scheduled in advance with our Client Services team.

© 2020 Bonhams & Butterfields Auctioneers Corp. All rights reserved.

Foreword

Welcome to the History of Science and Technology auction, 2020 edition. This has certainly been a strange year, and our relationship to technology has been laid bare in a way no one anticipated. Stuck at home on zoom calls all day? Ordering your food and other supplies with your phone? Managing your children's remote learning? Contact tracing via app? Worried about the large and small ramifications of living through a global pandemic? How is technology making things better and worse?

Like everybody else, the auction industry has had to adapt to this moment. We moved quickly in April to transition our spring and summer sales to an online-only format before introducing a life-hybrid format that merges the immediacy of a tradition auction with the ease and universality of online auctions. Interestingly, the moment the industry is having now (fully integrated online bidding across all sales) is what was envisioned over 20 years ago, and what we've been creeping toward since then, until the moment when the pandemic pushed us at last off the end of the dock.

This sale, more than any other we are holding this year, speaks to the historical moment we are in. It offers us a chance to look backwards, sometimes only a few decades or so, to chart the acceleration of scientific advances and technological changes leading to this moment. The sale opens with a small grouping of Charles Darwin material that includes a what is likely the most important of his manuscript leaves in private hands. In it Darwin not only discusses human evolution, but specifically points toward humankind's monogenetic origins. We also offer a first edition of his landmark *On the Origin of Species…* as well as a first edition copy of *The Descent of Man.*

Those of us stuck in our homes since March have a greater appreciation for the entertainment industry than before. Our small but important selection of motion picture cameras includes an extremely early example of a Lumière Cinématographe from 1896; a British Prestwich No.4, the finest camera of its time; and a very early (c.1912) color motion picture camera by the surgeon Eugène Louis Doyen. We follow this with an intriguing 1936-1937 technical record of Los Angeles' first television station, W6XAO.

A group of material passed down from the estate of Institute of Advance Studies economist Oskar Morgenstern (best known as one of the founders, with John von Neumann, of the mathematical field of game theory) includes a group of rare signed and inscribed offprints and letters from the great logician Kurt Gödel. This year we have an especially nice section of computing history property from the collector Serge Roubé, including printed works from John Napier, George Boole, and Charles Babbage to works like *Digital Computer Newsletter, Computers and Automation*, and the Harvard Mark I Manual which was written mainly be Howard Aiken and Grace Hopper. The Roube collection also includes early calculating devices like a very good replica of a Pascaline, a selection of arithmometers, circular slide rules, and early home computers.

The section highlight is the Texas Instruments Cal-Tech prototype handheld calculator which marks a key moment in microelectronics. This comes directly from the estate of its creator, Jerry Merryman. The TI handheld calculator was the "killer app" for the integrated circuit. Its usefulness made it immensely popular, and led to a greater desire for microelectronics in everyday life.

Early on in the pandemic we decided to merge the Air and Space auction into the present History of Science and Technology sale. We've always thought the two fit together, as many of the greatest technological achievements of the 20th century were produced in service of the Space Race. For this sale, however, the Air & Space property will be a separate, second session in order to provide bidders with a better sense of the sale timing.

The session begins with the Wright Brothers, but quickly moves into space travel and the star lot: an original Gemini 133P Trainer Console used by the Gemini astronauts at the Manned Spacecraft Center in Houston. Our console is serial number 1; purportedly only two consoles were ever made, so the likelihood of astronauts like Neil Armstrong, Buzz Aldrin, Gus Grissom, Ed White, Michael Collins, etc. using this one is very high. The Gemini program developed and tested all of the most important techniques necessary for a Moon shot: rendezvous and docking in space, amount of time spent in space and effectively performing EVAs.

The session also includes a nice selection of flown items from Project Gemini, Apollo (including a complete microform Holy Bible flown to the Lunar surface aboard the Apollo 14 Lunar Module) and the Apollo-Soyuz Test Project, a wonderful selection of photographs, detailed models, and an extensive selection of sterling silver Robbins medallions. The sale will be available to view by private appointment in our Los Angeles gallery November 2nd through the 4th. Please feel free to reach out to me with any questions or to set up a viewing.

Adam Stackhouse Specialist in Charge.



DARWIN, CHARLES. 1809-1882.

On the Origin of Species by Means of Natural Selection. or the Preservation of Favoured Races in the Struggle for Life. London: John Murray, 1859. 8vo (197 x 122 mm). Half-title verso with quotations from W. Whewell and Bacon only, folding lithographic diagram by William West after Darwin at p 116, with the 32-page publisher's catalog, dated June 1859, bound in at the end. Some light spotting to early and later leaves. Publisher's blind-stamped green cloth, spine gilt, by Edmonds and Remnants, with their ticket on the lower paste-down, fawn colored end-papers. The volume slightly shaken with use, light wear to joints and head and foot of spine, front inner hinge split, with front end-paper almost detached, crack appearing along lower inner hinge.

Provenance: William Tothill of Stoke Bishop [Bristol, UK] (late 19th-century penciled signature at upper right of front free end-paper, and child-like signature on verso of the same leaf); by descent to the present owner.

"A turning point, not only in the history of science, but in the history of ideas in general" (DSB).

FIRST EDITION of the "most important single work in science" (Dibner). "The publication of the *Origin of Species* ushered in a new era in our thinking about the nature of man. The intellectual revolution it caused and the impact it had on man's concept of himself and the world were greater than those caused by the works of Copernicus, Newton, and the great physicists of more recent times ... Every modern discussion of man's future, the population explosion, the struggle for existence, the purpose of man and the universe, and man's place in nature rests on Darwin" (Ernst Mayr, Introduction to the Harvard University Facsimile Edition, Cambridge, 1964). Dibner *Heralds of Science* 199; Freeman 373 (binding variant "b," no priority); Garrison-Morton 220; Grolier *Science* 23b; Norman 593; *Printing and the Mind of Man*, 344b.

USD90,000 - 120,000

hing appripted Warg B The multiple of night night of marting has thereafy been that and the for at and with for + monogenities In them its so ut admit The comment of alice spice, the section - settle J. determining whether is not the Strikings wer that he cuther as their, the fint, huwen's estile of estiling, and and or test the word of to lar no definition pt Here i unit salf accepted . We have the he intefithe it is to header on to value of the Term

To some the Denent of Man. Ch. Derwin [Ih multiple of suiple might finger / multiple of polygonis les thereby here much himple & polygonis hes thereby here yell sometime is at an altree for a more openistic the there we so at armit

(detail)

A HIGHLY IMPORTANT DARWIN MANUSCRIPT

DARWIN, CHARLES. 1809-1882. Autograph Manuscript Leaf Signed ("*Ch. Darwin*") and explicitly "*The Descent of Man*," being an early draft on the origin of the human species which was eventually published in Descent of Man, 1 p, 167 x 210 mm, 12 lines in two different inks, c.1856-1865, written on the lower half of a folio, separated from the larger leaf along the top edge, old folds, the earlier text with numerous emendations and corrections, with additional corrections and additions in darker ink, c. 1868-1870, old folds.

A HIGHLY IMPORTANT MANUSCRIPT LEAF ON THE THEORY OF EVOLUTION APPLIED TO HUMAN ORIGINS - an exceptional manuscript leaf for *The Descent of Man*, articulating the central theme, and differing markedly from the published text. An early draft that ultimately evolved into page 228 of the first edition text, this outstanding leaf addresses the question of whether humanity is one or many in species. Likely repurposed from Darwin's manuscript "big book," *Natural Selection*, which he began in 1856 and continued adding to throughout the 1860s, this draft evinces Darwin wrestling with the critical issue of how to apply the evolutionary framework of speciation to the scientific analysis of humanity and its races.

The culmination of Darwin's theory of evolution, *The Descent of Man* demonstrates that all human beings are members of a single species. For the first time in print, Darwin scientifically analyzes the human being in evolutionary perspective, a subject he had been pressed on before but had studiously avoided because of the controversy stirred by the topic. Darwin here explicitly introduces a new evolutionary principle – sexual selection – which he uses to explain the variegation among the races of mankind. The final chapter of *Descent*, "On the Races of Man," of which this leaf forms part, contains Darwin's most important and original contribution to the issue of human evolution, testifying to the unity of the human species and explaining the basis for mankind's variegated races. It has recently been argued, in particular by Desmond and Moore in *Darwin's Sacred Cause* (University of Chicago Press, 2009), that Darwin was motivated to prove the theory of evolution for the express purpose of demonstrating the common origin of mankind.

Darwin repurposed leaves and portions of leaves from his *Natural* Selection manuscript throughout his later career, beginning with the first edition of *On the Origin of Species* in 1859. Indeed, Darwin's original title for the *Origin* was "An abstract of an Essay on the Origin of Species," which publisher John Murray smartly rejected. Autograph notes found in books from Darwin's library (e.g., Nott and Gliddon's 1855 book *Types* of Mankind) indicate that Darwin originally intended to discuss human evolution in chapter six of his *Natural Selection* manuscript, but ultimately abandoned the attempt because of an insufficiency of hard scientific data, and because he had not yet fully developed the evolutionary principle of sexual selection. According to R.C. Stauffer, who edited a scholarly reconstruction of *Natural Selection* in 1975, "There are now folios missing from the surviving Natural Selection manuscript and other folios with part of the text cut away. These gaps can often be related to topics which were treated in both works and it seems evident that he simply incorporated passages from the older manuscript into the new one by transferring what he had already written to save himself recopying" (Stauffer, *Charles Darwin's Natural Selection*, Cambridge, 1975).

Unknown to scholarship, and highlighting Darwin's continuing difficulty with the formal definition of the term "species" even at this late juncture in his scientific career, this leaf is a critical resource for our understanding of the historical development of Darwin's argument in the *Descent*, as well as the general development of his theory of evolution. The present leaf contains both contemporary and later edits to the text, the later edits being made in a darker ink matching that used in Darwin's signature and the titling of the leaf as "*Descent of Man.*" While the original leaf could have been composed from 1856 and later, the earliest written record we locate of the phrase "Descent of Man" is a February 6, 1868 letter to Ernst Haeckel in which Darwin uses the phrase in reference to his newly undertaken work. Significant textual differences between this leaf and the final printed form of the text suggest that these dark-ink edits likely date to 1868.

Darwin manuscript leaves directly addressing human evolution are exceedingly rare, and those both signed and titled by Darwin even moreso. As the surviving manuscript of *Natural Selection* in fact contains very little directly pertinent to human evolution, and as surviving leaves of *The Descent of Man* are relatively few in number (significantly rarer than known manuscript leaves from the *Origin*), the present leaf is one of only a relatively small number of extant Darwin manuscript sources directly treating human evolution. Directly addressing human evolution and the definition of "species," and comprising a key passage from the most important chapter of Descent, the present leaf is one of the finest and most important Darwin autographs in private hands.

REFERENCE: Stauffer, R. C. ed. *Charles Darwin's Natural Selection;* being the second part of his big species book written from 1856 to 1858. Cambridge: Cambridge University Press, 1975.

USD250,000 - 350,000



DARWIN, CHARLES. 1809-1882.

The Descent of Man, and Selection in Relation to Sex. London: John Murray, 1871.

2 volumes. Green Levant morocco gilt by Bayntun.

*With: a uniformly-bound late edition of On the Original of Species.

FIRST EDITION, FIRST ISSUE, OF DARWIN'S FIRST PRINTED USE OF THE WORD "EVOLUTION." as well as his first work to deal explicitly with evolution in man. Referred to as his "book on man," Darwin's Descent was the inexorable culmination of his theory of evolution, but he avoided commenting on the subject in print for many years fearing political repercussions. "This is really two works. The first demolished the theory that the universe was created for Man, while in the second Darwin presented a mass of evidence in support of his earlier hypothesis regarding sexual selection" (Garrsion Morton 170). Freeman 937; Norman 599.

USD2,000 - 3,000

4

NEWTON, ISAAC, SIR.

Opuscula mathematica, philosophica et philologica. Lausanne & Geneva: Marc-Michel Bousquet, 1744.

3 volumes. 4to (264 x 205 mm). 64 folding engraved plates, 2 folding letterpress tables outside collation. Period plain wrappers, title penned to each spine.

FIRST COLLECTED EDITION of Newton's mathematical, philosophical and philological treatises, "a fine piece of bookmaking" (Babson). The work is complete as published in three volumes, although eight were originally envisaged. Babson 9; Wallis 2.

USD1,500 - 2,500

5

WESLEY, JOHN. 1703-1791.

Primitive Physick or, an Easy and Natural Method of Curing Most Diseases. Philadelphia: Joseph Crukshank, [1770]. 12mo.

SECOND AMERICAN EDITION. Rare American edition of this popular compendium of home remedies from the Methodist minister. Austin 2028; Evans 11932; Guerra a-463.







MASCAGNI, PAOLO, 1755-1815,

6

Anatomia Universale. Florence: 1833.

2 volumes, comprising text and plate volumes. Folio (454 x 310 mm). Letterpress title to text volume, plate volume with 75 engraved anatomical plates, each in colored and uncolored outline states. Some scattered spotting, mostly to margins. Contemporary Italian red half morocco, spines labeled in gilt, joints and extremities very lightly rubbed.

FIRST EDITION IN ITALIAN AND FIRST "SMALL-FORMAT" EDITION. The smaller format edition, itself a generous folio, was prepared by the original artist/engraver of the elephant folio edition Serantoni, who realized that the life-size version, the labor of Mascagni's entire career, would be seen and owned by only a few. The original 88 plates were increased to 150 plates so that certain details could be separated out, and in some cases, this resulted in a clearer presentation of the subject matter than in the large format edition. A fine wide-margined set of Mascagni's important work on the anatomy of the human body. The work is rare on the auction market with just 4 copies in the last 20 years. Welcome IV, 73; Garrison-Morton 1104.

USD6,000 - 8,000





7 BELTRAMI, EUGENIO. 1835-1900.

Intorno ad alcuni di propagazione del calore. Bologna: Gamberini & Parmeggiani, 1887. 4to. Original printed wrappers.

Italian mathematician Eugenio Beltrami was the first to prove the consistency of non-Euclidean geometry by modeling it on a surface of constant curvature, the pseudosphere and using the Beltrami-Klein model. His use of differential calculus for problems of mathematical physics indirectly influenced Gregorio Ricci-Curbastro and Tullio Levi-Civita in their development of tensor calculus.

USD800 - 1,200







o EDISON, THOMAS. 1847-1931.

Albumen print portrait signed ("Thos A Edison"), 11 5/8 by 7 1/8 inches laid down to board, being a youthful portrait of Edison in suit and tie, inscribed and dated "*To Fred Ott / from his friend … Orange NJ Jany 22, 89,*" very fine.

A handsome portrait of the great inventor, signed and inscribed to an employee at his laboratory.

USD1,500 - 2,500

9

10

8

THOMAS EDISON CIGAR CUTTERS

Pair of gold cigar cutters on single gold chain, each about 2×1 inches, late 19th century, engraved with initials "T.A.E," one engraved with fine floral and foliate design.

Provenance: Profiles in History, Sale 25, July 28, 2006, Lot 1.

An unusual memento from the cigar-smoking "Wizard of Menlo Park."

USD1,000 - 2,000



10

EDISON, THOMAS. 1847-1931.

Photograph Signed ("Thos A Edison"), gelatin silver print portrait of a mature Edison in his laboratory, 8 1/2 by 6 5/8 inches, mounted to 11 7/8 by 9 7/8 inches, inscribed on the mount to Alva Ott, very fine. *Provenance*: sold Profiles in History, Sale 25, July 28, 2006, Lot 1.

Alva Ott is likely either the wife or child of Fred Ott, an Edison lab employee who is best remembered for having starred in two of Edison's earliest surviving motion pictures, *Edison Kinetoscopic Record of a Sneeze* and *Fred Ott Holding a Bird*, both filmed in 1894.

USD1,000 - 2,000

11 TESLA, NIKOLA. 1856-1943.

Experiments with Alternate Currents of High Potential and High Frequency. A Lecture Delivered before the Institution of Electrical Engineers, London. With A Portrait and Biographical Sketch of the Author. New York, W.J. Johnson Company, 1896. 12mo. Frontispiece portrait of the author, illustrations throughout. Original dark green cloth, spine stamped in gilt. Fine.

Particularly attractive copy of this work that includes the lecture that made Tesla famous.

USD1,000 - 1,500



11

12 DOLL ET CIE TOY STEAM PLANT & WORKSHOP 1920s

Copper boiler mounted on tinplate brick effect oven with chimney, boiler with pressure gauge, water level glass, safety valves and whistle, piping to horizontal twin cylinder engine with slip eccentric gear, ball governor, spoked flywheel and pulley, mounted on a green painted tinplate base 38 x 32cm and 50cm high (15 x 12 1/2in and 19 1/2in high) together with a workshop shafting, thrashing machine, double hammer, circular saw, drill, grinder, press all mounted on a wooden base and separate lathe.

Not often seen with the separate workshop.

USD600 - 900

13

WIMSHURST INFLUENCE MACHINE

Electrostatic generator, various materials, 1925, 10 x 12 x 8 inches. The Wimshurst machine, developed by James Wimshurst in the early 1880s to generate high voltages, works by having two wheels spinning in opposite directions with two crossed bars with metal brushes and a spark gap formed by two metal spheres. Leyden jars, an early type of capacitor, are used to temporarily store the voltages.

USD500 - 800





13



LUMIÈRE CINEMATOGRAPHIC COLLECTION, CIRCA 1896 AN EXTREMELY EARLY EXAMPLE

Cinématographe, No 145, J. Carpentier, Paris, c.1896, J. Carpentier, walnut-veneered case of dovetail construction, 35mm., hand-cranked, with winding handle, the front with brass anodized panel engraved *"CINÉMATOGRAPHE Auguste et Louis Lumière Breveté S.G.D.G. J Carpentier, Ingénieur Constructeur Paris,"* the mechanism with sprocketless double pin movement for Lumière perforated film, glass pressure plate, internal film mechanism and an anodized brass-bound lens engraved *"G. Krauss & Cie, Paris, No. 15949, Anast-Zeiss f/8 136mm. Bte - S.G.D.G."*

WITH:

No.1 Lumière presentation projector, Paris, J. Carpentier, c.1896, walnut body stamped *no. 1*, the metal case stamped *"J. Carpentier Paris no. H111 23,"* with hand-cranked mechanism and a brass-bound lens. AND WITH:

Supplementary Ross 5½ inch lens engraved Rapid Symetrical Sold by Adams & Co London no. 57276. Ross London; three Cinématographe tin film cannisters; a wooden single spool feed magazine; a later wooden two spool magazine, an anodized brass internal take up magazine; and a rare Lumière film winder, with brass hand-cranked pulley and velvet-lined film guide, on a walnut base.





The Lumière brothers were the first to develop a consistent working system for capturing and projecting moving pictures on celluloid. They patented their camera, the Cinématographe in 1895 and made their first film with it, *Sortie de l'usine Lumière de Lyon*, that same year. The first 10 examples of their camera were produced that year, but were prototypes not available for sale. It was in 1896 that they were available to the public and the present example comes from that batch of 240 produced, numbered 10-250. Only about 450 total examples of this model were known to have been produced before the design was altered in 1898. The present projector is one of the only known cased examples. Coe, Brian. *The History of Movie Photography* 1981; Auer, Michel & Michel Ory. *Histoire de la Caméra Ciné Amateur*, 1979; Ariel, Peter. *Ariel Cinematographica Register* Band 4, no. 986. 1989.

USD70,000 - 90,000



15 **PR**

PRESTWICH MODEL 4

35mm motion picture camera, London, Prestwich Manufacturing Co., c. 1898, hand-cranked, in polished mahogany with fine dovetail construction with original brass and wood winding handle, footage counter with silvered dial, brass fittings, 400ft. film capacity, two detachable mahogany pulley-operated film magazines, the mechanism with a centrally-mounted 28-tooth single sprocket movement with two double roller sprocket guards, intermittent movement activated by a claw mechanism, direct through the film focusing, interior plate stamped "PRESTWICH MANUFACTURING CO TOTTENHAM LONDON PATENT NO. 1578," with an E. Krauss Paris Zeiss Protar f/6.3 54mm. lens no. 33394

John Alfred Prestwich (1874-1952) founded the Prestwich Manufacturing Company in 1895. He was a very capable engineer who made some of the most highly-considered cinema cameras during the final years of the 19th century. He is best remembered today outside of film circles for his J.A.P. motorcycle engines. He collaborated with William Friese Greene, another film pioneer, to make a camera and projector that reduced flicker. The Prestwich Model 4 was one of four different models introduced in 1898. It was constructed on an entirely different principle from previous cameras. It was equipped with the newly patented claw movement with a single centrally-placed sprocket, moving continuously and acting as a combined feed and take-up sprocket, a function generally performed until then by an upper and lower sprocket. It had a film capacity of 400ft and the feed and take-up magazines both could be detached and attached in daylight - and one of the first cameras to have detachable magazines at all. Focusing was directly through the film. The Model 4 is extremely rare on the market.

USD15,000 - 20,000



COLOR CINEMATOGRAPHIC CAMERA: EUGÈNE LOUIS DOYEN *NO. 1*

Color motion picture camera, c.1912, hand-cranked, with a walnut, brass and polished aluminum body, wood and brass winding handle, triple gate with three colored glass filters (red, blue and green), three lenses with fine screw adjustment, film transport movement with three double-claw mechanisms and disc shutter with three semi-circular apertures, one for each color.

Eugène Louis Doyen (1859-1916) was a prominent and controversial French physician who had a keen interest in photography and later, after seeing a Lumière show, cinematography. He would go on to film his surgery experimenting with stereoscopic techniques, microcinematography and with color film. Although his surgical films raised protest from his colleagues in France, who considered his films degrading to the profession, Doyen's work was better received outside of his own country where they were seen for their intended educational merits. *La Séparation de Doodica-Radica*, 1902, which demonstrates the separation of conjoined twins, is one of the more notable films. The film was also controversial as one of the cameramen distributed pirated copies of the film that were shown outside of the educational medical context. This led to one of the first copyright battles over a film.

The present camera, marked no.1, is the only known extant example of Doyen's experimental color motion picture cameras. The camera, which follows an additive color method, uses black and white film stock that has been specially treated to make it responsive to the colors red, green and blue. The film simultaneously passes through a triple gate with 3 lenses and 3 colored-glass filters. The three images taken must be in exact register with the perforations on the film strips so that all 3 will align when shown through a special projector, which also uses the corresponding color filters.

Doyen's fascination with color cinematography was curtailed by World War I and had he lived past the war, he would doubtlessly have continued his explorations.

USD20,000 - 30,000



17

BROADCAST TELEVISION 1935-1937

"LOST" RECORDS OF LOS ANGELES' FIRST TELEVISION STATION LUBCKE, HARRY R. & others. 2 cloth binders, 4to, approximately 450 pp total, labeled on spine: "Receiver / 1936-7" & "Camera / 1937," Los Angeles, 1935-1937, being the technical records of Los Angeles television station W6XAO, consisting of manuscript material, typed documents, original circuit diagrams, blueprints, photographs, etc.

Los Angeles Cadillac dealer Don Lee branched out into the broadcast world in 1926 with the purchase of KFRC in San Francisco. He continued to buy a number of stations along the California Coast and formed the Don Lee network, which was affiliated with Columbia Broadcasting System. He was given a license to begin experimental television broadcasts in 1931 with station W6XAO. The early broadcasts consisted of still images at a low resolution, but by the time of the present technical records, and under the leadership of Lee's son Tommy Lee, the station was pushing the boundaries with higher resolution images and synchronized picture and sound.

The technical mastermind behind the station was young engineer Harry R. Lubcke, who had begun his career in television working with Philo T. Farnsworth in 1929 and later would go on to be the third president of the Television Academy. Many of the manuscript notes throughout the two volumes are from Lubcke, but also by Wilbur E. Thorp and William S. Klein. Included are notes and plans on ultra high frequency receivers,

much on transmitters, many strategies at synchronization, parts lists for various components, technical explorations of particular components and circuits, detailed performance sheets titled "Reception Reports," which provide some indication of what was broadcast throughout the day, technical analysis of the broadcasts and detailed description of the many experiments and tests the engineers performed. The binder also includes an 8 x 10-inch photograph of Lubcke demonstrating television at California Institute of Technology's Annual Exhibit as well as 3 smaller photographs showing Lubcke standing beside the transmitting anttenna atop the Don Lee Building and the receiving anttenna at Caltech. The first album ends with some programming sheets for the Paramount news presentation that detail the stories covered including notes on the picture quality.

The second album deals with all aspects of the television camera and capturing images: camera design, mount, lenses, lighting, supply lists, signal amplification, much on synchronization, etc.

From the second album: "Puppets offer several advantages to television production: (1) they can be illuminated intensely, (2) they are not as expensive as living actors, and (3) they can be operated on small stages." A fascinating look into the experimental era of television broadcasting.

USD3,000 - 5,000

Matter and templanter than the second on from

18 EINSTEIN, ALBERT. 1879.1955

Autograph Manuscript Initialed ("A.E."), [Pasadena, 1931] 1p, 4to, in German, to Pazifistischen Studenten Südkalifornien, paper evenly toned.

EINSTEIN'S AFFIRMS HIS BELIEF IN PACIFISM.

Written during Einstein's time at Caltech in Pasadena, he informs the Pacifist Students of California that he in unable to appear at their presentation. In part, translated: *"[Further, is is not in the sense of the Oberlaender Trust to whom I am indebted for my trip this year to California that the speech held under its auspices be affected in its effective from more or less similar speeches by me of fairly similar content. "I have therefore been forced to decide retroactively to stay away from*

your presentation. However, please do no think therefore that it is less near to my heart. I am rather convinced that the decisive pacifistic activities of student youth is of great importance.]"

USD5,000 - 7,000

19

EINSTEIN, ALBERT. 1879.1955

Letter Signed ("A. Einstein"), 2 pp (recto/verso), 4to, [Princeton], April 19, 1949, in German, to Dora Stern, paper evenly toned.

EINSTEIN COMMENTS ON THE HOLOCAUST.

Einstein offers his help to a fellow emigre and laments on the public's fatigue with the holocaust. In part, translated: "[Too many such sad accounts have appeared and people are no longer receptive to these shameful things, so that publishing it would entail a great risk for the publisher. People either do not want to hear about it, or want to forget as quickly as possible what they themselves have gone through.]"

USD4,000 - 6,000

that when eccentees and the benefits with mint well with manufiling for these beamingson Harry-sectors eith balls batter als sources at this for the fortune belowing with the sile of a survey of the fortune the within to be greens, one not other ferdilate that, the the state with an alars sound firsthing tog, on for the also multiply each minimum termine.

1. Transtein

Altert Shetifr.

19

Die Falme' in Eine Symbol dapte Hass noch der Mensels am Herdentier. A. Cometin. 49.

20 EINSTEIN, ALBERT. 1879-1955.

Autograph Quotation Signed ("A. Einstein. 49"), "*Die Fahn' ist ein Symbol dafür dass noch der Mensch ein Herdentier,*" 1 p, trimmed, 69 x 143 mm, 1949, professionally conserved tear to right hand margin, some toning to margins from old matte, backed on paper, and mounted. *Provenance:* Collection of James May; Exhibited "Einstein: A Centenary Exhibition," Smithsonian, National Museum of History and Technology, now the National Museum of American History, opening March 3, 1979, item 87 in catalogue.

"The flag is a symbol of the fact that man is still a herd animal."

EINSTEIN ON POLITICS, framed autograph couplet of an oft-quoted Einstein aphorism, with an excellent exhibition history.

USD8,000 - 12,000





21 **EINSTEIN, ALBERT & KURT GÖDEL**

Original color slide, 50 x 50 cm including Kodachrome mount, Princeton, [December 5, 1947], depicting Einstein and Gödel walking, mount evenly toned, image bright.

Provenance: Oskar Morgenstern, by descent.

Classic image of two of the great figures of the 20th century strolling in Princeton. Economist Oskar Morgenstern, who proportedly captured this image recounts that toward the end of his life Einstein confided that his "own work no longer meant much, that he came to the Institute [of Advanced Study at Princeton] merely ... to have the privilege of walking home with Gödel."

According to a note on a period print held by the family, this photo was taken the day that Einstein and Morgenstern accompanied Gödel to his U.S. Citizenship exam. The story was recounted by Morgenstern years later: Gödel had claimed that he found an inconsistency in the U.S. Constitution that would allow the country to fall into a dictaorship, much like what he had experienced in Austria. The two friends advised him to not mention this during the exam. Of course, the exam somehow veered into this territory and Gödel was about to launch into his discovery, but the judge, Phillip Forman, who had known Einstein, quickly changed the subject as he saw Gödel's direction and soon brought the exam to a succesful close.

22

GROUP PHOTO OF ALBERT EINSTEIN, JOHN VON NEUMANN, **OSKAR MORGENSTERN**

Sepia-toned silver gelatin print, 8x10-inches, dated May 1952 on verso, penciled identifications in Oskar Morganstern's hand on verso, with creases, image strong.

Provenance: Oskar Morgenstern, by descent.

Group photo taken on the occasion of a meeting organized by Mario Laserna in celebration of the University of the Andes, which he helped to found in his native Bogota, Colombia. Pictured are, front row: Dana Munro, Whitney Oates, Albert Einstein, Mario Laserna, Marston Morse, Solomon Lefschetz; back row: John von Neumann, Oskar Morgenstern, and Samuel Wilks.

USD1,000 - 2,000

USD1,000 - 2,000



23 GÖDEL, KURT. 1906-1978.

Group of 5 offprints, each signed and inscribed:

1. Russell's Mathematical Logic. Offprint from: Volume V of The Library of Living Philosophers, The Philosophy of Bertrand Russell, [1944]. 8vo. Original printed wrappers. Pp. 125-153. SIGNED & INSCRIBED by Gödel in German. Ownership signature of Oskar Morgenstern.

2. What is Cantor's Continuum Problem? Offprint from: American Mathematical Monthly Vol LIV, No.9, November 1947. 8vo. Original blue printed wrappers. Pp.515-525. SIGNED & INSCRIBED by Gödel on the front wrapper. With ownership signature of Oskar Morgenstern and several of his notes within.

 A Remark About the Relationship Between Relativity Theory and Idealistic Philosophy. Offprint from: Volume VII of The Library of Living Philosophers, Albert Einstein: Philosopher-Scientist, 1949. 8vo. Self wrappers. Pp 557-562. SIGNED & INSCRIBED in German by Gödel on the first page. Indentification of the author in the hand of Morgenstern.
Rotating Universes in General Relativity Theory. Offprint from: Vol.I of Proceedings of the International Congress of Mathematicians, 1950. 8vo.
Original buff printed wrappers. Pp 175-181. SIGNED & INSCRIBED by Gödel on the front wrapper. Ownership signature on the front wrapper and brief marginalia within from Oskar Morgenstern.

5. *Dialectica.* Offprint from: Volume 12, No.3-4 of *International Review* of *Philosophy of Knowledge*, 1958. 8vo. Original tan printed wrappers. Pp. [280]-287. SIGNED & INSCRIBED by Gödel on the front wrapper. Ownership signature of Oskar Morgenstern.

*AND WITH: An Example of a New Type of Cosmological Solutions of

Einstein's Field Equations of Gravitation. From: Vol. 21, No. 3 of *Reviews of Modern Physics,* July, 1949. 4to. Self-wrappers. Ownership signature of Oskar Morgenstern.

Provenance: Oskar Morgenstern, by descent.

GÖDEL PRESENTS HIS OFFPRINTS TO OSKAR MORGENSTERN. Economist Oskar Morgenstern, who is best known for his work with John von Neumann founding the mathematical field of game theory with their book *Theory of Games and Economic Behavior*, was, along with Albert Einstein, among Gödel's closest friends at the Institute for Advance Studies, Princeton. Morgenstern held Gödel in high esteem. He wrote in a 1974 journal entry: "Gödel alone remains - perhaps the most wondrous man one can imagine. Hardly anyone knows him. If I were nearer his level (and what a distance that would be to cover!) I would write his life. Perhaps even so I should record some of his thoughts and doings, since the world will know little what kind of man he is. A man of whom von Neumann & Weyl have said to me more than once: the greatest logician since Leibniz or Aristotle."

Signed and inscribed presentation copies of Gödel's offprints are extremely rare on the market, much less to fellow Institute of Advanced Study colleagues.

USD40,000 - 60,000

"My true fortune - other than my wonderful wife and children - was & still is - living with genius" (Oskar Morgenstern in a 1974 journal entry).



24

24

GÖDEL, KURT. 1906-1978.

3 Autograph Letters Signed ("Kurt Gödel" & "Kurt"), Princeton, 1966-1968, each 1 p, two are to Dorothy Morgenstern, one to Oskar Morgenstern, a thank you letter, concerning family matters and illness, and a letter of condolence.

Provenance: Oskar Morgenstern, by descent.

Oskar Morgenstern, along with Albert Einstein, was among Gödel's closest friends at the Institute for Advance Studies at Princeton. The present letters show a more personal side of relationships at the Institute as Gödel shares with Oskar and his wife Dorothy Morgenstern the health of his family including his brother and mother, vacations as well as a trip to Austria, from which both Oskar Morgenstern and Gödel had roots. See the previous lot for more on the relationship between the two.

USD2,000 - 3,000

25 GÖDEL, KURT & OSKAR MORGENSTERN.

Original color slide, 50 x 50 cm including Kodachrome mount, Princeton, 1950s, depicting Morgenstern and Gödel standing beside the latter's house, mount evenly toned, image bright. *Provenance:* Oskar Morgenstern, by descent.

USD1,000 - 2,000

3 m school or work 5 is one of allowant a ted to be b to A person alor stective ave coldo. loes not got any vilamin C develops such remarks. His loady falls apart, and he Accurate the headen that his lody talk a store A agent this that withmin t is required got for the agenthesis of connective triand, the collegen filens that had he borses , 10 of many which a solution parts of the loody topothic. we a general asun ance our parks of the proof in many est to control Then the short and martine including coldvinues. the various weekaniams that protect meetine

26 PAULING, LINUS. 1901-1994.

Autograph Manuscript Signed ("Linus Pauling"), 15 pp, 4to, [1976], entitled "Why You Need Vitamin C to Fight Your Cold."

Lengthy article by one of the most important chemists of the 20th century and one of the founders in the fields of quantum chemistry and molecular biology. In his later years he tireless promoted vitamin therapies, especially using vitamin C. The present article is from that period and appeared in *The Good Drugs Do to Better Your Health* supplement of *Medical Tribune*, September 15, 1976. In part, from the opening of the article: "*Vitamin C is* one of the most important of our foods. A person who does not get any vitamin C develops scurvy. His body falls apart, and he dies. The reason that his body falls apart is that vitamin C is required for the synthesis of connective tissue, the collagen fibers that hold the bones, skin, and other parts of the body together. Vitamin C is also involved in many other physiological reactions, including the various mechanisms that protect us against disease."

USD6,000 - 8,000



27 NAPIER, JOHN. 1550-1617.

Logarithmorum canonis descriptio. Lyon: Barthalemy Vincent, 1620. 3 parts in one volume. 4to (190 x 126 mm). 3 titles, first printed in red and black, woodcut diagrams. Contemporary vellum, some pages browned, small worm whole trace in the upper right corner (not effecting text), one page in second title with repaired tear.

Provenance: The Computer History Collection of Serge Roubé.

This edition (the second of the *Constructio* and first Continental edition of the *Descriptio*) was published together with a small appendix containing annotations by Henry Briggs on base-ten logarithms. Napier, the 8th Laird of Merchiston, entered St. Andrews University at the age of 13, although he did not earn a degree. By occupation he was a landowner, and seems to have spent more of his energy on his devout and nearly militant dedication to Protestantism, treating mathematics as a leisure time activity. Nonetheless, his work led him to the discovery of logarithms, as explained in these two publications, as well as seminal work on spherical trigonometry and the invention of a machine that calculates the products and quotients of numbers using numbered rods known as "Napier's bones." Brunet IV:39; See PMM 116 (1614 edition).

USD2,000 - 3,000



28

28

NAPIER, JOHN. 1550-1617.

Rabdologiae seu numerationis per virgulas libri duo. Leiden: Peter Rammasen, 1626.

12mo (135 x 73 mm). 9 folding plates and tables, illustrations in the text. Contemporary vellum, title penned to spine. Browned, repaired close tear to title, spine repaired.

Provenance: The Computer History Collection of Serge Roubé.

SECOND EDITION of Napier's posthumous work describing the use of Napier's rods.

USD2,000 - 3,000



29 PASCAL'S CALCULATOR

6-digit Pascaline, brass body on wooden footed base, 285 x 127 x 73mm (11 1/4 x 5 x 2 7/8 inches), 6 windows with sliding bar revealing printed number cylinders, 6 brass spoked input wheels. underside with brass door that opens to reveal inner gears, c. 1920.

Provenance: The Computer History Collection of Serge Roubé.

Attractive replica of the calculator that 19-year old Blaise Pascal invented in 1642 in order to assist his father in his work as a tax collector. The younger Pascal was awarded a Royal Privilege to produce and market what is considered the first mechanical calculator to add and subtract. It is thought that only 20 were ever produced and only 9 are now known to exist.

USD6,000 - 9,000





30 POLENI, GIOVANNI. 1683-1761.

Miscellanea, hoc est I. Differtatio de barometris, & thermometris, II.

Machinae Arithmeticae, ejusque usus descriptio, III. De Sectionibus conicis parallelorum in horologiis solaribus tractatus. Venice: Alvise Pavani, 1709. 4to (217 x 155 mm). Engraved allegorical vignette to title of reason taming the savage beast, 9 engraved folding plates. Modern boards, custom cloth clamshell case.

Provenance: Erwin Tomash (bookplate); The Erwin Tomash Library on the History of Computing, Sotheby's September 18-19, 2018; the Computer History Collection of Serge Roubé.

FIRST EDITION. Poleni discusses barometers, thermometers and sundials, but, most interestingly, the mechanical pinwheel calculator that he had built. It is one of the first printed descriptions of such a device.

USD2,500 - 4,000

31

31

LEUPOLD, JACOB. 1674-1727.

Theatrum arithmetico-geometricum, Das ist schau-plats der rechen- und mess-kunst.... Leipzig: Christoph Zunkel, 1727.

Folio (360 x 235 mm). Title in red and black, 45 engraved plates, one of which with volvelle. Modern half vellum over plain boards, custom cloth clamshell case. Repair to corner of title, occasional scattered spotting to text and some instances of browning to plates.

Provenance: Erwin Tomash, (bookplate); The Erwin Tomash Library on the History of Computing, Sotheby's September 18-19, 2018; the Computer History Collection of Serge Roubé.

FIRST EDITION of this well-illustrated work on calculation and measurement with engravings of calculating machines such as Napier's Bones, Gaspar Schott's Organum Mathematicum, that of Rene Grillet, Giovanni Poleni, Gottfried Wilhelm Leibnitz's stepped reckoner, as well as mathematical, drafting tools, and even methods used for counting with the fingers or body. Hooke & Norman *Origins of Cyberspace* 6

USD1,500 - 2,500

ab VIII



32

32

GALLON, JEAN GAFFIN. 1706-1775.

Machines et inventions approuvees par l'Academie Royale des Sciences.... Paris: Gabriel Martin, Jean-Baptiste Coignard, fils and Hippolyte-Louis Guerin, 1735.

6 volumes only. 4to (256 x 189 mm). Titles printed in red and black, 433 plates, all but 2 are folding. Contemporary calf, spine gilt, custom cloth clamshell cases. Some wear to bindings.

Provenance: Bern Dibner (1897-1988); Burndy Library (bookplate); Erwin Tomash (bookplate); The Erwin Tomash Library on the History of Computing, Sotheby's September 18-19, 2018; the Computer History Collection of Serge Roubé.

FIRST EDITION of this well-illustrated work describing French inventions. Of particular interest is the section on Blaise Pascal's calculator in the 4th volume. This set without the 7th volume as usual, which was published much later in 1777.

33

PICAULT, ÉMILE LOUIS. 1833-1915.

 $L^{\prime} \acute{e}$ Bronze sculpture, signed ("E. Picault"), 540 x 185 mm (21 1/4 x 7 inches).

Provenance: The Computer History Collection of Serge Roubé.

Finely cast sculpture that pays homage to the great 18th century figures in the study of electricity. It depcicts a scientist with a Leyden jar in one hand, electrodes in the other. A voltaic pile and another Leyden jar rest on the ground behind him.

USD1,000 - 2,000

USD2,500 - 4,000



JOSEPH-MARIE JACQUARD [1752-1834]

A La Mémoire de J.M. Jacquard. [Lyon]: Didier Petit et Cie, 1839. Fine woven silk portrait, approximately 790 x 630 mm, framed to 1040 x 840 mm, being the portrait view of Jacquard after Claude Bonnefond seated in a workshop interior, model of his loom with loose punch cards, tools and measuring drums arranged on racks behind, view through the musket-ball broken window of a town.

Provenance: The Computer History Collection of Serge Roubé.

THE MOST FAMOUS IMAGE IN THE EARLY HISTORY OF COMPUTING.

Jacquard's loom, a mechanical loom that used a series of punched cards that corresponded to an intended design, would go on to revolutionize not only the textile industry but, with its programmable nature, would go on to have a major influence on computing, directly influencing Charles Babbage who used Jacquard punched cards in the design of his Analytical Engine. Ada Lovelace had pointed out: "We may say most aptly that the Analytical Engine weaves algebraical patterns just as the Jacquard-loom weaves flowers and leaves."

The city of Lyon commissioned Bonnefond to paint the Jacquard portrait in 1831 and later Lyon manufactuer Didier Petit et Cie commssioned this silk version which was produced by the specialist weaver Michel-Marie Carquillat using 24,000 punched cards. They were apparently produced to order beginning in 1839. With the delicate shading and detail, many contemporary viewers had been fooled into thinking this an engraving.

USD6,000 - 8,000





36



35 BOOLE, GEORGE. 1815-1864.

An Investigation of The Laws of Thought on which are founded the Mathematical Theories of Logic and Probabilities. London: Macmillan & Co, 1854. 8vo. Publisher's cloth, rebacked with original spine laid-down. *Provenance:* Henry Middleton (ownership signature to front pastedown and to title; the Computer History Collection of Serge Roubé.

FIRST EDITION OF AN IMPORTANT WORK IN THE HISTORY OF COMPUTING, this a later issue with Boole's name on spine and Macmillan imprint only. The first full expression of a practical system of algebraic logic (i.e., "Boolean logic"). "Boole invented the first practical system of logic in algebraic form, which enabled more advances in logic to be made in the decades of the nineteenth century than in the twenty-two centuries preceding" (Norman 266). In 1937, Claude Shannon would recognize that Boole's true/false values were analogous to the open and closed states of electric circuits, opening the door for binary computing. Norman 266. Hook & Norman Origins of Cyberspace 224.

USD1,500 - 2,500

36

BABBAGE, CHARLES. 1791-1871.

Passages from the Life of a Philosopher. London: Longman, Green, Longman, Roberts & Green, 1864.

8vo. Wood-engraved frontispiece. Without publisher's catalog. Original green cloth, spine gilt-lettered. Pale foxing to title, rebacked preserving original spine, hinges reinforced, slight lean, corners bumped.

Provenance: George M. Tandy (ownership inscription dated 1865 on half-title); the Computer History Collection of Serge Roubé.

FIRST EDITION OF BABBAGE'S FINAL BOOK, CONTAINING THE ONLY FIRST-PERSON ACCOUNT OF THE DIFFERENCE AND ANALYTICAL ENGINES PUBLISHED IN BABBAGE'S LIFETIME. "It is difficult to think of Memoirs of another man of science which make such entertaining reading" (Hyman p 248). "Chapters V–VII contain Babbage's accounts of his Difference Engines nos. 1 and 1, along with Sir Nicholas Harris Nicolas's statement on the Difference Engine drawn up from Babbage's papers. Chapter VIII contains Babbage's only published description of the design of his Analytical Engine, a universal calculator capable of any type of mathematical calculation, which embodied 'almost all the important functions of the modern digital computer' (Campbell-Kelly 1994, 23). The frontispiece shows the only portion of Babbage's own bibliography of his published works" (Hook & Norman Origins of Cyberspace 84). From Gutenberg to the Internet 6.2.

USD1,200 - 1,800

37

POSSELT, EMMANUEL ANTHONY. 1858-1921.

The Jacquard Machine Analyzed and Explained: With an Appendix on the Preparation of Jacquard Cards, and Practical Hints to Learners of Jacquard Designing. Philadelphia: Pennsylvania Museum and School of Industrial Art, 1888. 4to (278 x 194 mm). Illustrated throughout, 2 folding plates. Original pebbled brown cloth stamp in gilt. Spotting to covers, spine sunned and corners worn, hinges cracked.

Provenance: George Moon, New Bedford, MA (ownership inscription dated Jan 1, 1888); the Computer History Collection of Serge Roubé.

RARE FIRST EDITION OF THE MOST DETAILED BOOK ON THE JACQUARD LOOM. "This extensively illustrated work is the most detailed published account of the design and operation of the Jacquard loom, on which Jacquard himself appears to have never published any details" (OOC). The Jacquard loom was the first machine to use punched cards to control a sequence of operations, an important advance towards the development of computer programming. Babbage planned to use punched cards to store programs in his Analytical engine. Hook & Norman Origins of Cyberspace 355.

USD2,000 - 3,000

SCIENTIFIC INSTRUMENTS

13 items including:

1. DE COLMAR, THOMAS. *Instruction pour se servir de l'Arithmometre Machine a Calculer*. Paris, 1868. 8vo. One folding plate. Original printed wrappers.

2. SENNETT, ALFRED RICHARD. *Carriages without Horses Shall Go Being a Reprint of a Paper on Horseless Road Locomotion*. London, 1896. 8vo. Plates. Original printed wrappers.

3. FERGUSON, JAMES. *Select Mechanical Exercises: Shewing how to Costruct Different Clocks, Orreries, and Sun-dials...* London, 1773. 8vo. 9 folding engraved plates. Contemporary sheep. FIRST EDITION.

 CAJORI, FLORIAN. A History of the Logarithmic Slide Rule and Allied Instruments. New York, 1909. 80. Plates. Original cloth. FIRST EDITION.
ECKERT, WALLACE J. Punch Card Methods in Scientific Computation. [New York], 1940. 80. Library cloth.

6. MICHELSON, ALBERT ABRAHAM. "The Echelon Spectrocope." Offprint from: *The Astrophysical Journal*, vol.8, no.1. Chicago, 1898. Illustrations in text. Original printed wrappers. FIRST SEPARATE EDITION, PRESENTATION COPY, inscribed by Michelson on the front wrapper: "Compliments of the Author."

7. MICHELSON and EDWARD WILLIAMS MORLEY. "On the Relative Motion of the Earth and of the Luminiferous Ether." Offprint from: *The Sidereal Messenger*, vol.6, no.9. Northfield, MN: Carleton College Obseratory, 1887. 80. Original printed wrappers. FIRST SEPARATE EDITION.

8. MACMUNN, CHARLES A. *The Spectroscope in Medicine*. London, 1880. 8vo. Plates. Original cloth. FIRST EDITION.

9 & 10. THURSTON, ROBERT H. *A Manual of the Steam-engine.* New York, 1907. 2 volumes, 8vo. Plates. Original cloth. Sixth edition.

11.BOJANO, THOMAS DE. Rapport sur la machine a calculer dite

Arithmometer inventee par M. Thomas (De Colmar) et Perfectionnee. [Paris]: Societe D'Encouragement Pour L'Industrie Nationale, April 21, 1824. Self-wrappers.

12. PAYEN, LOUIS. Arithmometre Machine a Calculer Instructions, Methodes Simple et Extra Rapide. Paris: Bureaux & Atleliers, [1853]. Original printed wrappers.

13. Lot also includes an advertising circular for the 1908/1909 Payen Arithmometre.

Provenance: Computer History Collection of Serge Roubé.

USD2,000 - 3,000

39

LOUIS PAYEN 2C ARITHMOMETER

no 2569, Paris, 1890s, ebonized wooden case, lid with inlaid brass lining and lettered "Arithmometre," hinged lid opening to 20 window result register, 11 window revolution register, 10 input levers, 708 x 182 x 98 mm (27 3/4 x 7 1/4 x 3 3/4 inches), with L.Payen imprint.

Provenance: The Computer History Collection of Serge Roubé.

The Arithmometer was patented by Thomas de Colmar in France in 1820 and it was the first digital mechanical calculator robust enough and reliable enough to be used regularly in an office environment. This Arithmometer could add and subtract two numbers directly and could perform multiplications and divisions effectively by using a movable accumulator for the result. Manufactured from 1851 until 1915, it became the first commercially successful mechanical calculator and made it a key tool in the radical transition from written to mechanical calculation that took place during the second half of the 19th century.

USD1,000 - 2,000

40

LOUIS PAYEN P3B ARITHMOMETER

No 3632, Paris, c.1900, oak case with incline mechanism, hinged lid opening to 16 wndow result register, 9 window revolution register, 8 input levers, 589 x 187 x 114 mm (23 1/4 x 7 3/4 x 4 1/2 inches), with L.Payen imprint. *Provenance:* The Computer History Collection of Serge Roubé.

USD1,000 - 2,000



38



39



40

38





41

LOUIS PAYEN: ALPHONSE DARRAS P4B ARITHMOMETER

No 5519, Paris, 1902 or later, oak case with incline mechanism, hinged lid opening to 16 window result register, 9 window revolution register, 9 input levers, $610 \times 185 \times 140 \text{ mm} (24 \times 7 \ 1/4 \times 5 \ 1/2)$ inches), with L. Payen imprint and with the VLP/AD logo. Provenance: The Computer History Collection of Serge Roubé.

Veuve L. Payen took over the company after her husband Louis died in 1902. Alphonse Darras, who later bought the company, built many of these instruments.

USD1,000 - 2,000

42

THE ADDER KEYBOARD CALCULATION MACHINE

No 6243, London: The Adder Cash Register Syndicate Ltd, c.1903, with 2 rows of 5 keys from 1-10, zero key, 3 window display, case in brushed finished shaped metal over cast metal, in original brown leather traveling case with blue velvet lining, 170 x 110 x 113 mm (6 3/4 x 4 1/4 x 4 1/2 inches).

Provenance: The Computer History Collection of Serge Roubé.

USD800 - 1,200

43 VEUVE L. PAYEN P4 ARITHMOMETER

No 1671, Paris, after 1902, footed mahogany case with brass corners and incline mechanism, hinged lid opening to 12 window result register, 7

window revolution register, 7 input levers, $488 \times 180 \times 155$ mm (19 1/8 x 7 1/8 x 6 1/8 inches), with Payen/Vo. L Payen imprint and with the VLP logo, Alphonse Darras label inside upper case lid.

Provenance: The Computer History Collection of Serge Roubé.

Produced by Veuve L. Payen, Louis Payen's widow who took over the company after his death in 1902. Alphonse Darras manufactured many of these examples.

USD1,000 - 2,000

EGLI "THE MILLIONARE" CALCULATING MACHINE

no. 2517, Zurich, before 1905, 1895 patent, mahogany case, brass shell-form handles at sides, hinged lid, printed instructions and dividing tool underside of lid, device with 10-digit selector swith, 8 input levers, 8 window "divisor" register, 8 window "dividend" register, 16 window result register, 667 x 305 x 195 mm (26 1/4 x 12 x 7 3/4 inches). *Provenance:* The Computer History Collection of Serge Roubé.

"The Millionaire," designed by Swiss engineer Otto Steiger, was capable of direct multiplication. Hans Egli began making the calculating machine based on Steiger's patent soon after.

USD2,000 - 3,000

45

ANALYTICAL MACHINE

LUDGATE, PERCY. 1883-1922. *On a Proposed Analytical Machine.* Dublin: The Royal Dublin Society, 1909.

8vo (280 x 184 mm). Original blue printed wrappers, uncut and unopened. Wrappers lightly sunned at edges, otherwise an excellent copy. Old library stamp to front wrapper.

Offprint from: The Scientific Proceedings of the Royal Dublin Society. Volume XII (N.S.), Number 9.

Provenance: the Computer History Collection of Serge Roubé.

FIRST APPEARANCE, offprint issue, of Ludgate's calculating machine, developed independently of Babbage's design and today considered closer to the modern computer than Babbage's. Portable and based on multiplication rather than addition, Ludgate's engine could also be programmed and was "the result of about six years' work, undertaken ... with the object of designing machinery capable of performing calculations, however, intricate or laborious, without the immediate guidance of the human intellect" (p 77). The machine was never built, and sadly, Ludgate's original drawings of it have been lost. Rarely encountered as a separate offprint. Randell *Origins of Digital Computers* (3d ed), pp 73-87 (reprinting this paper), 489. See Hook & Norman *Origins of Cyberspace* p 72.

USD800 - 1,200

46



44

SCIENTIFIC PROCEEDINGS
ROYAL DUBLIN SOCIETY.
94.303.01x1.36.30 10906.009
on a motoric analyzical material
PRETY 6. APSIATE
TEALS Pressure at the angle and a sector Statute at the angle and a sector Statute at the sector at

EGLI MADAS CALCULATING MACHINE

No 8966, Zurich, c.1913, japanned brass, 10 window result register, 9 window revolution register, 9 input levers, carriage bell, $605 \times 195 \times 145$ mm (23 3/4 x 7 5/8 x 5 1/2 inches), Union Zeiss, Frankfurt label to top and Plysan at side, rubber feet.

Provenance: The Computer History Collection of Serge Roubé.

The MADAS (Multiplication, Automatic Division, Addition, Subtraction), was an improvement on Egli's earlier calculating machine "The Millionaire." The MADAS was based on a stepped gear mechanism and could perform automatic division.

USD800 - 1,200







Mathematical Tables and Aids to Computation



47

THACHER CYLINDRICAL SLIDE RULE MODEL 4012

No 5343, New York: Keuffel & Esser, c.1920, multi-faceted cylindrical slide rule with wood end caps, affixed to wooden base by brass guides, instructions to base, mahogany lided case with matching serial number, Keuffel & Esser label inside case lid, 545 x 144 x 135 mm (21 1/2 x 5 5/8 x 5 1/2 inches).

*WITH: THACHER, EDWIN. *Directions for Using Thacher's Calculating Instrument.* New York: Keuffel & Esser, 1920. Original wrappers. *Provenance:* The Computer History Collection of Serge Roubé.

Edwin Thacher was an engineer at the Keystone Bridge Company. He designed the circular slide rule, which was patented in 1881, to assist in his calculations designing railway bridges. The cylindrical form allowed for what would be a 59-foot conventional slide rule to take up less than 2 feet. The rule includes scales for multiplication and division as well scales for finding squares and square roots.

USD800 - 1,200

48

FULLER CYLINDRICAL SLIDE RULE CALCULATOR

No 6858/37, London: W.F. Stanley, c.1920, printed sliding drum scales read from the central inscribed lacquered brass bar, mahogany caps and handle, in fitted mahogany case with holding bracket, W.F.Stanley label inside lid; 432 mm (17 inches) long.

Provenance: The Computer History Collection of Serge Roubé.

USD800 - 1,200

49

MATHEMATICAL TABLES AND OTHER AIDS TO COMPUTATION

Mathematical Tables and other Aids to Computation. Washington, D.C.: National Research Council, 1943-1959.

Volumes 1-13. 8vo. Library cloth with original wrappers bound in. *Provenance*:National Advisory Committee for Aeronautics Library, Langley Memorial Aeronautical Laboratory (stamps and bindings); the Computer History Collection of Serge Roubé

FIRST EDITION of the first 13 volumes of the first journal devoted to computing. A quarterly journal published by the NRC's committee of the same name, MTAC was founded by the committee's chairman, Raymond C. Archibald, professor of mathematics at Brown University, The journal appeared under the above title until 1960, when, reflecting the obsolescence of mathematical tables caused by the development of electronic digital computers, the name was changed to Mathematics of Computation. MTAC is a primary periodical source of information on the electromechanical and electronic digital computers designed and built during the late 1940s and early 1950s, as well as on the scientific uses of punched-card machines, mechanical desk calculators,etc. Among the more notable papers published in the journal are A.D. Booth's "Development and A.P.E. (X.) C." (1954); Comrie's "Application of Commercial Calculating Machines to Scientific Computing" (1946); Goldstine & Goldstine's "The Electric Numerical Integrator and Computer (ENIAC)" (1946), containing the first widely published description of that machine; Huskey's "Characteristics of the Institute for Numerical Analysis Computer" (1950), describing the SWAC computer; Rajchman's "The Selectron - a Tube for Selective Electrostatic Storage" (1950); Alt's "A Bell Telephone Laboratories Computing Machine" (1948), describing Stibitz's Model V relay computer; and Lyndon's "The Zuse Computer" (1947), containing the first widely distributed description of Zuse's Z4 machine.

USD1,500 - 2,500



HARVARD MARK I MANUAL

[HOPPER, GRACE.] Staff of the Computation Laboratory. *A Manual of Operation for the Automatic Sequence Controlled Calculator.* Cambridge: Harvard University Press: 1946.

4to. 17 full-page photographic illustrations. Original blue cloth. Shelfwear, corners bumped.

Provenance: The Computer History Collection of Serge Roubé.

THE FIRST COMPUTER MANUAL AND THE "FIRST EXTENDED ANALYSIS OF WHAT IS NOW KNOWN AS COMPUTER PROGRAMMING" (OOC p 299). Authored primarily by Howard Aiken and Grace Hopper. The electromechanical Harvard Mark I ("Automatic Sequence Controlled Calculator") became operational in 1944 and was "the first programmable calculating machine to actually produce mathematical tables, fulfilling the dream of Charles Babbage originally set out in print in 1822" (OOC). "Aiken's Mark I opened the eyes of many to the possibilities of large-scale, programmed automatic computing. Actual witnesses to the developments of the mid 1940's ... agree that its dedication inaugurated the computer

age" (Cohen Howard Aiken p 303).

The Mark I's then-unique Manual was no less significant. In the words of computer historian Paul Ceruzzi, the Manual was "a milepost that marked the state of the art of machine computation at one of its critical places: where, for the first time, machines could automatically evaluate arbitrary sequences of arithmetic operations. Most of this volume ... consists of descriptions of the Mark I's components, its architecture, and operational codes for directing it to solve typical problems ... The Manual is one of the first places where sequences of arithmetic operations for the solution of numeric problems by machine were explicitly spelled out. It is furthermore the first extended analysis of what is now known as computer programming since Charles Babbage's and Lady Lovelace's writings a century earlier. The instruction sequences, which one finds scattered throughout this volume, are thus among the earliest examples anywhere of digital computer programs" (Introduction to the Babbage Institute reprint edition, 1985). Hook & Norman. *Origins of Cyberspace* 411.

USD800 - 1,200



VON NEUMANN ARCHITECTURE

BURKS, ARTHUR W., HERMAN H. GOLDSTINE, AND JOHN VON NEUMANN. *Preliminary Discussion of the Logical Design of an Electronic Computing Instrument.* [Princeton: Institute for Advanced Studies, September 1947.]

4to (277 x 204 mm). [6], 42 II. Reproduced typescript. Original buff printed wrappers. Backstrip repaired, few scuffs to front cover.

Provenance: H.F. De Francesco (ownership inscription to front wrapper); the Computer History Collection of Serge Roubé.

THE FIRST MAJOR PUBLICATION ON THE DESIGN ARCHITECTURE FOR STORED-PROGRAM COMPUTERS, also known as the von Neumann or Princeton architecture and THE FOUNDATION FOR MODERN GENERAL-PURPOSE DIGITAL COMPUTING, second edition. This paper was preceded by Von Neumann's "First Draft of a Report on the EDVAC" but the present is the first regularly distributed work, albeit still in mimeograph form. The "stored program concept" is the notion that instructions, just like data, can be reduced to numerical format and stored in the internal memory of the computer. It has been called the single largest innovation in the history of the computer; among other things, this critical breakthrough: greatly simplified the preparation and revision of computer programs; permitted ready use of standard "subroutines" or packages of calculations; and accommodated complex problem solving by allowing the interim results of the ongoing processing of data to determine what course the program would follow, in a sense, allowing the computer to "modify its own program." The innovation is described here in disarmingly simple language: "1.3. Conceptually we have discussed above two different forms of memory: storage of numbers and storage of orders. If, however, the orders to the machine are reduced to a numerical code and if the machine can in some fashion distinguish a number from an order, the memory organ can be used to store both numbers and orders." The first edition of this paper appeared in July 1946; this edition contains an expanded account of the arithmetic processes and a report of further experiments. Following the Preliminary Discussion, Goldstine and Von Neumann wrote the three-volume companion, Planning and Coding of Problems for an Electronic Computing Instrument. These four papers together were the only source on this topic available until 1950 and 1951 with the distribution of Wilkes, Wheeler and Gill's Preparation of Programs for an Electronic Digital Computer. Hook & Norman Origins of Cyberspace 959.

USD2,000 - 3,000



52 SEMICONDUCTORS

6 Items:

1. BARDEEN, JOHN & WALTER H. BRATTAIN. "The Transistor, a Semi-Conductor Triode" in: *The Physical Review,* second series, vol. 74, no. 2, July 1948, 4to, original printed paper wrappers.

2. ____. "The Physical Principles Involved in Transistor Action" in: *The Bell System Technical Journal*, vol. 28, no. 2, April 1949, 8vo, original printed paper wrappers. *Origins of Cyberspace* 450.

3. Another edition, in: *The Physical Review,* second series, vol. 75, no 8, April 1949. 4to. Original printed wrappers.

4. SCOTT, THOMAS R. *Transistors and Other Crystal Valves*. London: Macdonald and Evans, 1955. 8vo. 2 pages of photographic plates. Original cloth, dust-jacket.

5. SHOCKLEY, WILLIAM BRADFORD, JR. *Electrons and Holes in Semiconductors.* Toronto: Van Nostrand, 1953, 8vo. Photographic frontispiece. Original cloth, dust-jacket. Third printing. *Origins of Cyberspace* 904.

6. SHOCKLEY, WILLIAM, and W.T. READ JR. "Statistics of the Recombinations of Holes and Electrons" in: *The Physical Review*, second series, vol. 87, no. 5, September 1952, 4to, original printed wrappers. *Provenance:* The Computer History Collection of Serge Roubé.

USD800 - 1,200



OFFICE OF NAVAL RESEARCH: DIGITAL COMPUTER NEWSLETTER

SMITH, ALBERT E., A.J. NEUMANN, et al, eds. *Digital Computer Newsletter.* [Washington]: Office of Naval Research, Mathematical Sciences Division, April 21, 1949 - July, 1961 & July 1962.

48 issues: complete run from vol 1, no 1 to vol 13, no 3; plus vol 14, no 3; a duplicate vol 13, no 1/2; and vol 1, no 1 present in 2 formats. 4to. Stapled and hole-punched newsletters, from 4 to 50 pp each.

WITH: Mimeographed draft of April 1949 issue included cover circular. Overall excellent condition, mimeographed issue a little worn.

Provenance: Office of Naval Research, Chicago (accession time-stamps, some correspondence included); The Computer History Collection of Serge Roubé.

COMPLETE RUN OF THIS VERY EARLY AND RARE COMPUTING HARDWARE NEWSLETTER. It predates by almost 5 years the first issue of the Journal of the ACM (Association for Computing Machinery). The first issue is present here both in mimeographed draft with a circular letter by the first editor, Albert Smith, and as a regularly published newsletter. The first is time-stamped May 2, 1949 and the latter July 18, 1949. Following World War II, the Office of Naval Research played a vital role in the development of high-speed digital computing. "ONR was the first to commit itself to the support of a wide range of basic research efforts, including several computer projects" (Stern From ENIAC to UNIVAC p 99). ONR funded Project Whirlwind at MIT, the Mark III at Harvard, and the IAS Computer at Princeton, as well as research in numerical analysis and Grace Hopper's work on automatic programming. Part of its mission was to disseminate information about the advances being made, which led to its support of conferences and seminars-beginning with the Moore School Lectures in 1946-and the publication of the present journal. In the spring of 1949, Albert E. Smith of the ONR's "Computer Branch" circulated a draft Digital Computer Newsletter (included), stating that its purpose was "to provide a medium for the interchange, among interested persons, of information concerning recent developments in various digital computer projects." Smith added that, "If it is thought to be of sufficient interest, similar letters will be prepared at regular intervals." Publication of the Newsletter continued into the 1960s, and during its early years it was the only available source for the information it provided. Articles in the Newsletter were short, often a paragraph or two, and informal - almost chatty. The first issue, in April 1949, covered 10 American systems in just 4 pages. Among other things, it discussed the installation of two "new panels" on the ENIAC and the resulting benefits; testing and current operating efficiency of the EDVAC; the ongoing construction of the

IAS Computer at Princeton; the development schedule for the Navy's Mark III; and the status and plans for the Whirlwind I. By October 1953, vol 5, no 4, the Newsletter had grown to 18 pages and covered 24 computers, including JOHNNIAC, ILLIAC, RAYDAC, MIDAC, ORACLE and OARAC. It also reported on data processing and conversion equipment, computing services, computer courses and notices. Among the computer reports were details about the logistics of the move of the IAS Computer to its "permanent location in the computer building at the Institute," and news that the EDVAC had "broken all previous records of available weekly machine time for BRL machines" at 159.9 hours. Not in *Origins of Cyberspace*. EXTREMELY RARE.

USD3,000 - 5,000



54

SWISS MODEL 45 NEMA CIPHER MACHINE

Type T-D (Tasten-Druecker-Maschine) enciphering machine, serial number TD 5050. Switzerland: Zellweger AG, c.1950.

The machine with ten wheels, four of which are coding wheels, one a reflector (right side red wheel, similar to the enigma construction), and the other 5 all driving wheels, mounted under hinged cover with letter-counter, lamp panel and standard keyboard layout, 4v electrical input and mains input to the right side. The inside of the lid, with coiled lamp cable and power cable, one spare lamp panel, 16 spare bulbs, 2 extra wheel cases and a contact cleaning brush. The military black metal case, lid with white stenciled numbers 505 and TD505 and special printed period label indicating its use in time of war, leather carrying handle, lock and key present. The interior of the case in perfect condition, the exterior of the case with a few scrapes. The carrying case 14 $1/2 \times 12 3/4 \times 5 1/2$ in (365 x 325 x 140 mm); together with a NEMA instruction booklet in French and German, dated April 1947, stamped 705, marked secret.

A FINE AND RARE SWISS NEMA MACHINE, ALMOST MINT AND PREVIOUSLY IN SWISS MILITARY STORAGE, the counter reading just

87 key touches. The NEMA is an example of the new breed of ciphering machines which developed from the German Enigma wartime series. In this case it was developed by the Swiss, following the realization that their Enigma K series, sold to them by the Germans before the war was completely compromised by the codebreakers of most of Europe. In the 1941, a team of professors from Bern and other universities, began to develop this new machine, a prototype of which was completed in 1944, and the machine manufactured from spring 1945. The name NEMA derives from NEu MAschine, made by Zellweger AG in Uster. 640 machines (numbered 100-740) were built, the first was in active service by 1947, and many of the higher numbered machines (such as this one), have the special label pasted onto lid, and were put straight into military storage to be used in case of future war.

USD5,000 - 8,000

55 UNIVAC

Programming for the Univac System. [New York]: Remington Rand: January 1953.

4to. With 3 charts in back pocket. Original blue cloth, slipcase. Mild shelfwear, light sunning to spine.

Provenance: Saul Gorn, 1912-1992, Moore School professor in Computer Science (ownership inscription to f.f.e.); the Computer History Collection of Serge Roubé.

EXTREMELY RARE UNIVAC PROGRAMMING MANUAL, being the first revision of the Programming Manual dated March 23, 1951. The text not only provides detailed instructions but also practice exercises for the reader. We locate no copies of this or any earlier UNIVAC Programming Manual in auction records. This rarity is consistent with its provenance. Saul Gorn was at B.R.L. from 1951-1955 and joined the Moore School in 1955. In 1957 he became the first director of the University of Pennsylvania Computer Center which used a very early UNIVAC I. He was a "central figure in the philosophy of computer language design" (Lee. *Computer Pioneers* p 342).

USD800 - 1,200




THE COMPUTING MACHINERY FIELD

56



56 CON

COMPUTERS AND AUTOMATION

BERKELEY, EDMUND C., ed. *Computing Machinery Field.* — *Computers and Automation.* New York: Edmund C. Berkeley and Associates, January, 1953-December, 1956. Vol 2, no 1 to Vol 5, no 12.

4 volumes. 4to. Advertisements, illustrations, some wrappers bound in. Library cloth.

Provenance: Rensselaer Polytechnic Institute Library (inkstamps, spine markings); The Computer History Collection of Serge Roubé..

"THE FIRST COMPUTER JOURNAL ISSUED BY A COMMERCIAL PUBLISHER" (OOC 469). Volume 1 consisted of three dittoed numbers and is exceedingly rare. Berkeley's periodical published a number of early, important articles, including: HOPPER, "Compiling Routines," (May 1953). OOC 663. * BOOTH, "Mechanical Translation," (May 1953). OOC 492 ("Booth's first paper on mechanical translation"). * ASIMOV, "Robots I Have Known," (October 1954). OOC 437 (discussing Asimov's "invention of the word 'robotics'"). * ASIMOV, "Question," (March 1955). OOC 438 (a short story describing "a giant supercomputer that becomes so complex it finally attains humanlike consciousness"). * GILCHRIST, "Computers and Weather Prediction," (March 1955). OOC 632 (discussing advances at the IAS). Further papers are detailed in OOC.

The publication also published a running update of many reference materials for the new industry, including a "List of Automatic Computers," "Who's Who in the Computer Field," a "Roster of Organizations in the Computer Field," a "Glossary of Computer Terms," reports on new publications, and summaries of industry conferences. *Origins of* 469 (also without vol 1).

USD800 - 1,200

57 COMPUTER INDUSTRY STOCK ANALYSIS

LITTLE, ARTHUR D., INC. *The Electronic Data Processing Industry. Present Equipment, Technological Trends, Potential Market.* New York: White, Weld & Co., Members New York Stock Exchange, [1956]. 4to. With addendum laid in. Illustrated throughout. Original blue cloth

4to. With addendum laid in. Illustrated throughout. Original blue cloth stamped in gilt.

Provenance: the Computer History Collection of Serge Roubé.

ONE OF THE FIRST AND MOST THOROUGH PUBLISHED INVESTMENT REPORTS ON THE NASCENT COMPUTER INDUSTRY with history, operation of modern computers, market analysis, trends, etc. Like other publications of the period, it includes short descriptions of current machines (e.g., "Giant Brains Now on the Market," pp 47-50). However, unlike any other publications, it contains a detailed, 20-page "Buyer's Guide" to the major producers of digital computers, focusing on the prospects of the companies. IBM's outlook was described as "especially favorable" (p 68). Hook & Norman. Origins of Cyberspace 770.

USD800 - 1,200

58 FORTRAN

[BACKUS, JOHN. 1924-2007.] Fortran Introductory Programmer's Manual, etc. New York: I.B.M., March-May, 1957.

Multiple items bound together. 4to. Library cloth with plastic cover. Some sections in early photocopy.

Provenance: Institut fur Praktische Mathematik, Technische Hochschule, Darmstadt (stamp); the Computer History Collection of Serge Roubé.

FORTRAN was the first widely-used high-level programming language. John W. Backus and his assembled team at IBM developed it for scientific and engineering applications. The present book compiles some early material including a pre-publication version of *Fortran Introductory Programmer's Manual* in 3 sections with addenda; *The Fortran Automatic Coding System for the IBM 704 EDPM; The Fortran Automatic Coding System;* and the volume closes with copies of two update letters from IBM.

USD800 - 1,200



TEXAS INSTRUMENTS CAL-TECH PROTOTYPE HANDHELD CALCULATOR

1965-1967

Original milled aluminum hinged case finished in black, 155 x 105 x 43 mm, 18-button keypad including zero bar, number readout window, power switch, power charger plug, opens to reveal clear panel cover array of 4 Large-Scale Integration silicon "slices" and 3 shift register chips on a circuit board, thermal printer with thin paper roll, black plexiglass panel covering potted battery group and discretionary circuitry for power supply, etched on the bottom: "SC / 4USE."

* Lot also includes an additional unfinished prototype case containing battery array.

Provenance: From the estate of Jerry Merryman.

Texas Instruments president Patrick Haggerty had found great success a decade early when he struck upon the idea of miniaturizing the radio by using TI's then new transistors. The pocket radio quickly became a pervasive piece of technology that introduced consumers to the transistor and the wonders of miniaturization, but which also gained the attention of IBM head Thomas Watson, Jr. who insisted that his engineers use transistors in the company's computers. TI became one of IBM's major suppliers for the chips.

Haggerty had this in mind when, in 1965, he was brainstorming with his deputy director of semicondutor research Jack Kilby, one of the inventors of the integrated circuit (IC) who would later be awarded the Nobel Prize for the invention. Haggerty wanted a new product, a "killer app" really, that would help to sell consumers on the IC, which had up until then mainly

been used for military purposes where the benefits of miniaturization were more important than the costs. Haggerty had tossed up a few different product ideas, but the hand-held calculator powered by batteries seemed to Kilby to be the product that was possibly achievable. He set about assembling a team and picked Jerry Merryman of the Semiconductor Research and Development department to be the project's manager. In order to keep the project a secret, they used a code name. An earlier research project had been code named "Project M.I.T." so in keeping with that line, this became known as "Cal-Tech" although it had nothing to do with the research university. Kilby later admitted that it was a poor choice for a name and it would have been a simple matter to determine what the team was developing.

Merryman, who had attended Texas A&M, but hadn't remained long enough to obtain a degree, had a reputation as a problem solver and was frequently consulted by his colleagues. Even Patrick Haggerty would stop by to run ideas past the brilliant electrical engineer. He was the perfect choice for a project where nothing could be taken off of the shelf, everything had to be developed from scratch. There were no ready-made keypads, no low powered printers and no ICs as complex as what would be required for a hand-held calculator.

In a marathon 72-hour design session with limited sleep, Merryman managed to completely layout the calculator's logic on paper (a copy of which is included in this lot). In order to test the design he, along with his colleagues, filled a room with an enlarged version using commercially-built ICs. The setup was also used eventually to test each of the newly completed ICs.



"Silly me, I thought we were just making a calculator, but we were creating an electronic revolution"

Jerry Merryman on NPR's All Things Considered, 2013.

Merryman and his team would spend almost 2 years developing every aspect of the machine. Dr. James Van Tassel, the other major player on the project, solved the problem of the keyboard as well as many other issues to do with fabrication. The ICs proved to be one of the major hurdles. At the time, the most complex IC that one could buy had about 20 transistors on it. Merryman's design, divided into 4 chips, would require about 8,000. In an article in Invention & Technology, Merryman recounts the story of going to TI's chip-making facilities with his circuit layout and telling them he wanted an 83-percent yield - this is, he wanted 83 percent of the eight-transistor NAND gates in a chip to work. "They all fell on the floor laughing, saying 'We've never seen anything better than 25 percent.'" Merrymen explained his approach to them: "I'm going to be using lowpower circuits and very wide tolerances in the voltages and currents that'll work and simple layouts and wide conductors and so on." Merryman also increased the odds of getting a usable chip by including more than twice the NAND gates than what were actually needed.

The chips, actually thin circular silicon wafer slices, proved unreliable despite the precautions. The team went back and used a microscope to trace the connections, find the problems and repair them - all on a less than 1-inch diameter chip. Whereas most chips of the time contained 14 or 16 leads connecting them to one another, these had 122, which required Van Tassel to develop a package that would protect the structure and facilitate connection.

Kilby, Merryman and Van Tassel were ready to apply for a patent in September 1967 and after two revisions, in 1971 and 1972, received U.S. Patent No. 3,819,921 on June 25, 1974 (a copy of which is included in the lot).

Although completed in 1967, the electronics were so advanced for the time that it took years for a production model to be issued. Canon had bought the rights to issue the calculator which they did with their Pocketronic issued on April 14, 1971. The 4-function calculator that weighed 2 1/2 pounds and cost \$150 was a huge success. 5 million pocket calculators were sold in the US in 1972 and sales continued to grow as the costs came down. "As Haggerty had predicted, the new microelectronic gadget created a market that had simply not existed before. Tens of millions of people who never considered purchasing an adding machine or a slide rule decided they wanted to own a pocket calculator" (Reid p 137).

This consumer interest in microelectronics would continue as the IC was developed to create the microprocessor. "Patrick Haggerty had been proven right. Microelectronics did pervade nearly every aspect of society, replacing traditional means of control in familiar devices and creating new aspects of human activity that were previously unknown. By shrinking from the room-sized ENIAC to the pinhead-sized microprocessor, the computer had imploded into the basic fabric of life" (Reid p 145). May, Mike. "How the Computer Got Into Your Pocket," in *Invention & Technology* Spring 2000; Reid, T.R. *The Chip.* 1984; Zygmmont, Jeffrey. *Microchip.* 2003.

USD30,000 - 50,000



60 TEXAS IN

TEXAS INSTRUMENTS "LARGE-SCALE INTEGRATION" INTEGRATED CIRCUITS

Group of silicon integrated circuit slices, Dallas, 1965-1967, varying condition.

WITH: Group of 5 custom shift register chips, Dallas, 1965-1967, each with 28 pins, mixed materials.

An interesting peek into a forgotten avenue of integrated circuitry. Largescale integration as developed at Texas Instruments by Jerry Merryman, with help from Dr. James Van Tassel and Gaynel Lockhart, involved a great leap in the capacity of an integrated circuit. Whereas complex ICs of the time contained 20 transistors, LSI, using 3 interconnected layers, sought to place 100 times the transistors on a single chip and increase the transistor yield rate from 25 to 83 percent. Merryman attempted to accomplish this by using "low-power circuits and very wide tolerances in the voltages and currents that'll work and simple layouts and so on" (May p50). Unfortunately, the chips came back from manufacturing unreliable. Merryman and his team had to put each chip under a microscope and trace out the connections, find problems and either fix or reroute to avoid them. The present lot includes some of the original chips used in the development of the first hand held calculator. Each are numbered and some include a single-word note of their function. Merryman apparently had some sense of the importance of the work as one of the circuit slices is encased in resin for preservation and display.

The shift register chips here were also produced especially for use in the hand held calculator for the working memory. May, Mike. "How the Computer Got Into Your Pocket," in *Invention & Technology* Spring 2000; Reid, T.R. *The Chip.* 1984; Scrupski, Steve. "LSI in Practice" in: *EE: The Electrical Engineer* October 1966; Zygmmont, Jeffrey. *Microchip.* 2003.

USD5,000 - 7,000



61 MERRYMAN, JERRY DALE. 1932-2019.

Collection of notes and technical drawings related to the invention of the hand-held calculator and other projects.

Jerry Merryman, who spent much of his professional career with electronics giant Texas Instruments, had a fascination with electronics from a young age. He became his small town's radio repairman by age 11. He spent a couple of years at Texas A&M University, but hadn't remained long enough to graduate. He joined TI in 1963 in the Semiconductor Research and Development department. He had sufficiently proven his abilities by 1965 when the deputy department director Jack Kilby, who would go on to be awarded the Nobel prize for his development of the integrated circuit, handed Merryman the lead in designing a hand-held calculator, a device that would go on to change the course of electronics - as well as the world as we know it.

The present archive includes much on the digital hand-held calculator but also material on a number of other of Merryman's project at Texas Instruments and on his own. A fascinating look into the work of one of the great American electrical engineers.

Former TI colleague Dr. Vernon Porter was quoted on Merryman's passing: "I've known hundreds of scientists, professors, Nobel prize-winners and so on. Jerry Merryman was the most brilliant man that I've ever met. Period. Absolutely, outstandingly brilliant."

USD4,000 - 5,000



62 WOZNIAK, STEVE & STEVE JOBS.

Blue Box, 1972. An original first iteration "blue box" populated circuit board made by Steve Wozniak and marketed by Steve Jobs and Wozniak, 51 x 72 mm, with speaker wire and 9volt battery connector.

Provenance: Purchased directly from Steve Wozniak by the consignor in Autumn 1972 during a drive together from Sunnyvale to Los Angeles.

While "phone phreakers" (hobbyists who were fascinated by the phone system) had used a "blue box" since the 1950s to avail themselves of free phone service, the first digital blue box was designed by Steve Wozniak in 1972. It was marketed and sold by Wozniak (who took the phone phreak name "Berkeley Blue"), Jobs (known as "Oaf Tobar"), and friends in Berkeley and throughout California in 1972 and 1973. Wozniak cites the number of boxes they produced at 40 or 50, while Jobs put the number at 100; but certainly many of those were confiscated as phone phreaking arrests increased throughout 1973 to 1975, in part due to the commercial distribution of the devices. These blue boxes represent the first commercial collaboration between the two Apple computer giants, and the circuit boards the first printed boards by Woz. Very few of the Wozniak originals have survived and even fewer of these first iteration boards as Wozniak soon changed the circuit board layout to accommodate a less expensive membrane keypad. The early models would have been made by Wozniak himself.

In 1971. Esquire magazine published an article titled "Secrets of the Little Blue Box," subtitled "A story so incredible it may even make you feel sorry for the phone company," about a loose band of engineers who had figured out how to hack Bell telephones automatic switching systems, moving freely through Bell's "trunk" telephone systems with the use of specific frequency tones generated by "blue boxes." The story of these "phone phreaks" was a sensation, and one particularly important reader was a young engineering student at Berkeley named Steve Wozniak. As Wozniak recalls, his first move after reading the piece was to call his good friend Steve Jobs, then still a senior in high school, and the next day they jumped in Woz's car and headed to the Stanford Linear Accelerator library to comb through the stacks searching for clues that would substantiate the details presented in the Esquire account. They found it, according to Wozniak: "I froze and grabbed Steve and nearly screamed in excitement that I'd found it. We both stared at the list, rushing with adrenaline. We kept saying things like 'Oh,!' and 'Wow, this thing is for real!' I was practically shaking, with goose bumps and everything. It was such a Eureka moment" (Wozniak, p.100). As they drove back to Berkeley they discussed the possibility of creating a "blue box" in a state of elation, and within three weeks Wozniak had devised one. Finding the frequencies produced by the analog blue box to vary widely, he then designed the world's first digital blue box. In his biography, he recalls, "I swear to this day-the day I'm



"If it hadn't been for the Blue Boxes, there would have been no Apple. I'm 100% sure of that."

Steve Jobs

telling you this and the day you're reading it—I have never designed a circuit I was prouder of: a set of parts that could do three jobs at once instead of two. I still think it was incredible" (Wozniak, p.102).

Over the next few weeks, with the fortuitous assistance of "Captain Crunch," a blue boxer named John Draper who featured prominently in the Esquire article and became an instant hero to hackers and phreakers everywhere, Wozniak honed his design, eventually creating the world's first digital blue box, which was able to produce a much more consistent frequency than the analog contraptions that had existed previously. Now equipped with a "blue box," the two young men and their friends explored the phone system, including Wozniak's famous story about reaching the Vatican, and pretending to be Henry Kissinger calling for the Pope (who was unfortunately asleep at the time). Before long, Jobs came up with a plan to market these boxes to willing Berkeley students eager to make free phone calls. They would knock on random doors in the Berkeley dorms and ask for a made-up name, who of course was not available. They would explain they were looking for the guy who makes all the free phone calls, you know, with the blue box. If their mark expressed interest or curiosity, they would proceed to sell him a box. With Jobs' novel marketing plan and Wozniak's design, they ended up earning about \$6000 on the project, making blue boxes for \$40 in parts, and selling them for \$150.

According to Bill Claxton, who Captain Crunch notes as being in the dorm the first time he went to meet Woz, the earliest blue boxes used solid keys

(this present iteration), which were quickly replaced with a soft keypad (as the example sold in these rooms on December 6, 2017) in order to make the boxes more affordable. Looking back on the entire experience, Steve Jobs would observe, "Woz and I learned how to work together, and we gained the confidence that we could solve technical problems and actually put something into production." Lapsley, Phil. Exploding the Phone: the Untold Story of the Teenagers and Outlaws Who Hacked Ma Bell. (New York, 2013). Wozniak, Steve. IWoz: computer geek to cult icon (New York, 2006). Isaacson, Walter. Steve Jobs. (New York, 2011).

USD8,000 - 12,000







63

DATA GENERAL NOVA 2 MODEL 8352

16-Bit Minicomputer, Southboro, MA, 1973, rackmount chassis, front panel with 26 switches, LED indicators, rear with 5 serial ports, 2 fans, 619 x 480 x 280 mm (24 3/4 x 19 x 10 1/4 inches). 2 boards inserted, and with 3 additional boards:

- 1. DGC Nova General Purpose Interface, 1970. Hand wired.
- 2. Basic I/O Control, with handwritten label "300 Baud Device I/O."
- 3 . DGC Nova Cassette I/O. Hand-wired.

Provenance: The Computer History Collection of Serge Roubé.

Data General Corporation (DGC) was formed by several Digital Equipment Corporation (DEC) employees including project manager of the PDP-8, considered the first real minicomputer, who developed an idea for a 16-bit minicomputer with a CPU contained on a single board. It was rejected by DEC head Ken Olsen. The Nova found success in the scientific community and it went through several iterations. The Nova 2 simplified earlier designs and took advantage of increasing chip densities to fit both the CPU and the memory on a single board.

DGC Nova series had an influence on the design of computers such as the Xerox Alto and the Apple I and the front panel design is said to be a direct inspiration for the front panel of the MITS Altair.

USD1,000 - 2,000

64

INTEL INTELLEC-8

8-Bit Microcomputer, 1973, aluminum case with hinged top and magnetic closures, face plate with 48 LEDs, 31 switches, ZIF socket and key switch; containing 10 modules, cooling fan, 5 serial ports at back, Modules include:

1. F/P Controller, PWA 0000161, Intel 1973.

- 2. Intel 8080 I CPU, PWA 1000244, 1974.
- 3-5. [RAM card] 05-0042, Intel 1972.
- 6. Intel PROM Memory Module, imm 6-26, 1973.
- 7. Intel I/O Module, PWA 1000263, imm8-61, 1974.
- 8. I/O module, imm8-80, PWA 0000138, Intel, 1973.
- 9. I/O module, imm8-60, PWA 0000136, Intel, 1973.
- 10. PROM Programmer Module, Intel 1973.

WITH: Intellec 8 Reference Schematic Drawing. Santa Clara: 1973; 8/Mod 80 Monitor V3.0; Intellec 8/Mod 8 Operator's Manual Version II; Reference Manual.

Provenance: Computer History Collection of Serge Roubé.

One of America's first microcomputers, the Intel Intellec-8 was produced in relatively limited numbers and was extremely expensive. Intel led the way, demonstrating what the 8080 microprocessor could do while others, such as MITS and its Altair 8800, took the 8080 to the masses. It's generally considered the first widespread microprocessor. Intel eventually left the computer business to others while they went on to become the dominant supplier of microprocessors.

USD2,000 - 3,000

65

ALTAIR 8800

8-bit microcomputer by MITS, c.1974, metal case with removable top, face panel with 36 LEDs, 25 switches, cooling fan, additional power supply and interface cables at back, containing 9 modules: 1 & 2. Processor Technology CPU.

- 3. Processor Technology EXB, 1975.
- 4. MITS PIO, rev 0.
- 5. MITS 4K RAM DD, Rev. 0.1
- 6. MITS 4K RAM DD, Rev. 0.2
- 7. Processor Technology, 1976, (unidentified) Rev.B.
- 8 & 9. MITS 88 SIOB Serial TTL with attached MITS Modern board.
- Provenance: The Computer History Collection of Serge Roubé.

THE MODEL THAT INSPIRED GATES AND ALLEN TO FORM MICROSOFT.

MITS ALTAIR 8800 holds the distinction of being the first microcomputer to catch on with the hobbyist market. It was originally offered in kit form for \$439 or assembled for \$621. Bill Gates, then in his Sophomore year at Harvard, and Paul Allen came across the December 1974 issue of Popular Electronics which featured the Altair on the cover and decided to join the computer revolution by writing a BASIC interpreter that would run on Altair's Intel 8080 microprocessor. "It would become the first commercial native high-level programming language for a microprocessor. And it would launch the personal computer software industry" (Isaacson p 332).

This appears to be a purpose-built by a professional with a pair of custom wire-wrap CPU boards. An interesting example. Isaacson. The Innovators. NY: [2014].

USD2,000 - 3,000

66 IMSAI 8080

8-bit microcomputer, c.1975, metal case with removable top, 174 x 439 x 498 mm, faceplate with 22 alternating red and blue switches, numerous LEDs, reverse with 3 serial ports, fan. Containing 9 boards:

1. Unlabeled custom wired board

2. Jade JGZ80 Rev C, 1979 Compu/Time with Zilog Z80A microprocessor.

3-6. WMC MEM-3, Mikos 1980.

7. Custom I/O board.

8. Jade Double Disk Controller.

9. IO-4, Solid State Music, 1977.

*WITH: Dual 8-inch floppy disk drive, MFE Model 751 double-sided, double density drive & Shugart 800 single-sided, double density drive; housed together in single case. *AND WITH: Various manuals and documentation.

Provenance: The Computer History Collection of Serge Roubé.

Former IBM employee William Millard formed IMS in 1972 as a computer consulting and engineering concern. He and his chief engineer Joe Killian were impressed with the then new Intel 8080 chip and began development of the IMSAI 8080 using MITS Altair 8800's S-100 bus. By late 1975 they were shipping what was to be the first Altair clone. IMS were able to correct many shortcomings of the original Altair 8800 by providing a larger power supply, a 22 slot motherboard, and easier wiring of the front panel. Willard famously went on to found ComputerLand and become known as the "father" of modern computer retailing. Many are familiar with the IMSAI 8080 from the 1983 film *WarGames* where the main character uses one to hack a military supercomputer and almost causes a nuclear war.

USD1,000 - 2,000

67

HEWLETT-PACKARD 9825A DESKTOP COMPUTER

Palo Alto, 1976, molded plastic case with full QWERTY keyboard, 8 system command keys, 4 display keys, 4 line keys, 4 character keys, 12 function keys, alpha-numeric LED display, 16-character thermal printer, data cartridge port, 4 expansion cartridge ports in front, fan and power supply at back, 490 x 380 x 115 mm (19 1/4 x 15 x 14 1/2 inches).

WITH: 3 expansion cartridges inserted:

1. Matrix 98211A.

- 2. String-Adv. Programminf 98210A.
- 3. 9826A Plotter Gen I/O Extended I/O.

AND WITH: 3 interface cards:

1. 98035A OPT.001 Real Time Clock.

2. 98034A HP-IB Interface.

3. 98032A 16Bit I/O OPT.062 Plotter.

AND WITH: Large group of manuals and data cartridges.

Provenance: The Computer History Collection of Serge Roubé.

Hewlett-Packard's 9825 16-bit computers were well ahead of their time, preceding the 16-bit IBM 5150 by 5 years. The 9825A was fully programmable with HPL (High-Level Programming Language) and eventually a BASIC compiler was created. The present example is the original version and features the low profile keyboard that was replace in 1980 with a standard typewriter-style keyboard.

USD1,000 - 2,000

68

PROCESSOR TECHNOLOGY SOL-20

Group of 3 8-Bit microcomputers by Processor Technology, 1976-1978, with QWERTY keyboard and number pad, walnut sides, metal top,

one of the units issued as Sol-10, but brought up to Sol-20 specs.

WITH: 2 Processor Technology Helios II dual disc drives.

WITH: Sol Printer 2.

AND WITH: Collection of system manuals and software for the Sol 20 including for Fortran, Basic, Sol Music System (including cable and module), as well as games and other material. *Provenance:* The Computer History Collection of Serge Roubé.

THE FIRST HOME COMPUTER. Processor Technology's Sol-20, designed by Lee Felsenstein, one of the original members of the Homebrew Computer Club, was the first assembled microcomputer to include a built-in keyboard and television output. The computer was a progression of the S-100 bus systems like the Altair 8800 and the Imsai 8080, but was made more accessible in an effort to transcend the hobbyist market. A large and complete group - rarely seen with the Helios II dual drives, printer, documentation and software.





68







69 DIGITAL SPEECH SYNTHESIZER

AI CYBERNETIC SYSTEMS Model 1000 Speech Synthesizer, Rev C, populated S-100 bus circuit board, University Park, New Mexico, 1976, with 3.5mm monaural output jack, in original box addressed to IBM Development Lab in Poughkeepsie, NY, includes original warranty card in self addressed envelope.

Early implementation of digital voice synthesis for S-100 bus computers which predated the Texas Instruments LPC Speech Chips. Extremely rare, especially in the original packaging.

USD1,000 - 2,000

70

[JOBS, STEVE. 1955-2011.]

Printed pass, 2 1/4 x 3 3/4 inches, Glen Helen, CA, September 3-5, 1982, being a backstage pass for the "US" Festival produced by Bill Graham Presents, with "Special Guest / Steve Jobs" on verso, in period mylar sleeve.

Pioneered (and financially-backed) by Steve Wozniak, the US festival was intended to be "a kind of Super Bowl of rock concerts" using the newest technologies such as jumbo video screens, air conditioned tents with video games, and what Steve Wozniak claimed was the very first concert satellite linkup to the USSR. Held over Labor Day weekend in 1982 (and again around Memorial Day in 1983) the festival featured major acts including Talking Heads, The Police, Santana, The Kinks, Tom Petty & the Heartbreakers, Fleetwood Mac, the Grateful Dead and Jerry Jeff Walker.

USD1,500 - 2,500

71 APPLE MACINTOSH EVOLUTION

Group of 3 original molded plastic faceplates, Apple Inc, 1983-1984: 1. Apple Lisa, 235 x 452 mm, P/N 620-5111-B, from the original Apple Lisa, featuring slots for 2 5 1/4-inch "Twiggy" disk drives. 2. Apple Macintosh Prototype, 335 x 245 mm, P/N 815-0752 REV A, from a prototype Apple Macintosh, featuring a single slot for a 5 1/4-inch "Twiggy" disk drive, with serial number label.

3. Apple Macintosh, 335 x 245 mm, P/N 810-0373, from original Apple Macintosh with single 3 1/2-inch disk drive slot, serial number space left blank.

The Apple Lisa and Apple Macintosh projects both borrowed some of the ideas gleaned from visits to Xerox PARC, most notably the graphical user interface (GUI) that would eventually go on to become ubiquitous. The Apple Lisa project was aimed at business users, while the Macintosh was originally conceived as a high-volume, low-cost Swiss army knife of a computer. Steve Jobs was heavily involved in the Lisa project, but was eventually ousted, which is when he found the Macintosh and eventually forced out its originator, Jef Raskin.

The Lisa was released on January 19, 1983, but fared poorly due partly to its high price, but also because of the unreliable FileWare disk drives (code named "Twiggy" after the 1960s British fashion model). It was one of these same drives that was being used in the Macintosh prototypes. When the reports of failure began to come in, it became apparent that they wouldn't be feasible. The team scrambled, under the direction of Jobs, to develop their own 3.5-inch drive with Japanese company Alps based on the latest Sony drive, but realized, excepting Jobs, that they would never make it in time for the projected ship date. The team had to secretly work with Sony until Jobs was ready to acknowledge this—at one point having to hide a Sony employee in the closet to maintain the





secret. The finished Macintosh used the new disk format which featured the same data rate as the Twiggy, was more robust than a 5 ¼ inch floppy and small enough to fit into a shirt pocket. Reportedly, Jobs had all of the existing "Twiggy" prototypes destroyed.

The prototype face plate above was saved from a bin of Apple parts destined for the incinerator. It not only was the 5 1/4-inch drive slot, but also lacks the front vent that would appear in the official issue, lacks any way to perform an emergency disk ejection, and bears a smooth finish rather than the textured finish. The 3rd item above, rescued from the same bin, appears to be the officially-issued faceplate for the original Macintosh, although it lacks a serial number in the allotted space beside the front vent.

USD3,000 - 5,000

72

JOBS, STEVE. 1955-2011.

Original patent award plaque presented to Steve Jobs by Apple on the occasion of his design for the design of the Macintosh case, 307 x 204 mm, with engraved stainless steel plate reproducing US Patent No. 285,688 for the Macintosh computer housing, with second plate beneath engraved, "Presented to Stephen P. Jobs/ by apple computer inc./ 1987", upper plate fastened at corners with decorative washer and screws to walnut mount.

STEVE JOBS' PATENT AWARD PLAQUE FOR THE MACINTOSH CASE DESIGN. Apple's early motto, "Simplicity is the ultimate sophistication," encapsulates the company's approach to innovation and design. Beginning with Steve Wozniak's elegant circuit board designs of the Apple 1 and Apple II, the sleek case of the Apple II series, the company hit its stride with the Macintosh, from its "friendly" case design inspired by Jobs' interest in Bauhaus design philosophy and the Braun products of Dieter Rams to the GUI (graphical user interface) borrowed from Xerox after a number of visits to their PARC labs.

Jobs, who had been ejected from the Lisa project just a few months earlier, took over as project manager of Macintosh in January 1981, immediately butting heads with team leader Jef Raskin. Raskin had envisioned a computer that would sell for \$1,000 and be a simple all-in-one unit. He even supplied the name based upon his favorite apple. Raskin left the company, however, and went on to develop the unremarkable Canon Cat, and Jobs refocused the project, sacrificing portability for a more distinctive design. "He plopped down a phone book and declared, to the horror of the engineers, that it shouldn't have a footprint larger than that" (Isaacson p 128).

The case was designed by Jerry Manock and Terry Oyama with Jobs' constant input. Oyama remarked, "even though Steve didn't draw any of the lines, his ideas and inspiration made the design what it is. To be honest, we didn't know what it meant for a computer to be 'friendly' until Steve told us." The patent for the case design, issued to all three, was finally awarded in 1987, two years after Jobs left the company to start NeXT. Curiously, whether a joke or a mistake, the above patent award plaque bears the incorrect spelling "Stephen." Jobs did not hold the plaque in a place of esteem, but left it at Jackling House after he moved out, eventually gifting it to a friend. Isaacson. *Steve Jobs.* NY: [2011].

USD8,000 - 12,000

SIMPLICITY IS THE ULTIMATE SOPHISTICATION.



ORVILLE WRIGHT. 1871-1948.

Stability of Aeroplanes. [Philadelphia]: J.B. Lippincott, 1914. Offprint from: *The Journal of the Franklin Institute,* September, 1914. 8vo. 8pp. Original printed wrappers. Provenance: Orville Wright (with stamp signed by co-executor Harold S. Miller).

ORVILLE WRIGHT'S OWN COPY. Rare offprint of Wright's discussion of longitudinal equilibrium in aircraft.

USD1,000 - 2,000

74

ORVILLE WRIGHT. 1871-1948.

The Beginning of Human Flight. New York: The Wright Company, [1916]. 8vo. 4pp. Self-wrappers. Front wrapper with image of 1903 flight at Kitty Hawk.

Provenance: Orville Wright (with stamp signed by co-executor Harold S. Miller).

ORVILLE WRIGHT'S OWN COPY. Produced upon the first public exhibition of the 1903 Flyer, held at the Massachusetts Institute of Technology, and coinciding with the dedication of several new buildings from June 11-14, 1916.

USD1,000 - 2,000

75

SIKORSKY S-40 FLYING BOAT: ENGINEER'S DRAWING

"Sikorsky 4 Engined Passengers & Mail Amphibion. Type S-40." Sikorsky Aviation Corp, signed "I. Sikorsky" dated 5/23/29. An early original engineers drawing of the S-40 Sikorsky airplane, with 28 seats, in pencil on drafting paper. 815 x 1490 mm. Showing 5 elevations and angles of the plane, drawn at a 1:40 scale. A few rust marks on verso, small chips from the upper left and right corners, presumably where it had been previously fixed to a wall.

THE LARGEST AMPHIBIOUS AIRCRAFT OF ITS TIME, the S-40 was Pan American's first large Flying Boat, of which only 3 were built. Its maiden voyage was on November 31st 1931, from Washington D.C. with Mrs Hoover christening the plane and with Charles Lindbergh at the helm. Despite being large and cumbersome, they served as the flagships of Pan Am's clipper fleet, notching up over 10 million miles flown before they were retired in 1943.

The S-40 was originally conceived in late 1928, and this drawing shows the design both as a seaplane with floats and also with landing wheels for land use. The plan came about with the collaboration of Sikorsky Aviation and Juan Trippe, the President of Pan American Airways, who was looking for a larger passenger carrying airplane to carry his passengers around the world. In many ways the S-40 was the prototype for the later S-42. In the 1935 S-40A the landing wheels were eliminated.

USD2,500 - 3,500







74







76

WERNHER VON BRAUN & GERMAN ROCKETRY

A framed group of signatures including:

1. VON BRAUN, WERNHER. RAF Rocket Mail cover signed, postmarked April 3, 1971. Also signed by WILLY MESSERSCHMITT and HERMAN OBERTH. 3 x 5 inches.

2. FIESLER, GERHART. 50th Anniversary of the King's Cup Air Race flown cover signed, July 15, 1972, 3 x 5 inches.

3. FIESLER, GERHART. Photograph Signed ("Fiesler"), 3 x 5 inch silver gelatin print.

4. DANNENBERG, KONRAD. Photograph Signed, 6 x 8 inch silver gelatin print of V-2 rocket.

5. KROLL, GUSTAV. Photograph Signed, 6 x 8 inch image of v-2 rocket. All items framed together to 31 $1/2 \times 38 1/2$ in.

USD800 - 1,200

SPUTNIK ROCKET - 8K71-PS

77

Fiberglass, metal and plastic model of the Sputnik Rocket with the Sputnik-1 satellite at the top, black painted wood base, 1:30 scale, 1220 mm (48 inches) tall; 327mm (12 7/8 inches) square base.

Impressive model of the rocket that, on October 4, 1957, sent the world's first satellite into space. The Sputnik was based on the R7 Semyorka ICBM. A detail that wasn't missed by the US as it incited a scramble to catch up with the Soviets. The present models shows excellent detail, down to the gleaming Sputnik-1 satellite with its antennae under the cone-shaped payload fairing atop the payload base.

USD5,000 - 7,000

SECOND PRINTING THE The S Am by M Illu be THE ASTRONAUTS and SOME to a la and a: BOY, WHAT A 12 IDE! alan B. Shepard J-SISIGI 100 fc will en sule m 135-td missile of the this m Mercu send a The of this literall. With Martin accour and of qualifi rigorot lection flight a

ALAN SHEPARD AND THE MERCURY SEVEN

BOOK SIGNED & INSCRIBED BY SHEPARD THE DAY HE BECAME THE FIRST AMERICAN IN SPACE

Martin Caidin's *The Astronauts*, Signed & Inscribed by ALAN SHEPARD and on the facing page: Alan Shepard, Virgil Grissom, John Glenn Jr., M. Scott Carpenter, Wally Schirra, Gordon Cooper Jr., Donald K. Slayton) and by the author at the bottom.

Provenance: NBC News correspondent Jay Barbree from the author (with letter from the author attesting to the circumstances of the inscription).

"BOY, WHAT A RIDE!"

SIGNED & INSCRIBED by Alan B. Shepard Jr. and dated "5/5/61," the day that he made history as the first American to travel into space aboard the Mercury-Redstone 3 spacecraft. The only known copy signed that day. The lot is accompanied by a notarized letter from author Martin Caidin describing the circumstances of the inscription. In part: "Astronaut Deke Slayton carried Jay Barbree's signed copy of The Astronauts signed by

the Mercury Seven to Grand Bahama Island with him where, on the day of his flight, astronaut Alan B. Shephard Jr. signed the second blank page, opposite the earlier autographs, with what became the headline on that day: "Boy what a ride!"

On that historic day, Jay Barbree's copy of The Astronauts signed by the Mercury Seven became the only copy autographed by Alan B. Shepard, Jr. on the date he made America's first flight into space."

USD8,000 - 12,000





80

79 THE MERCURY SEVEN FLYERS, SIGNED

Large color photograph, 16 x 20 inches.

SIGNED and INSCRIBED: "SCOTT CARPENTER, Aurora 7" and "WALLY SCHIRRA, Σ 7." ADDITIONALLY INSCRIBED and SIGNED: "Project Mercury Astronauts, The Original Seven, GORDON COOPER, Faith 7." An F-106 fighter jet used for flight training is the back-drop for the seven Mercury astronauts wearing their respective military service flight suits. This single photograph was a major factor that prompted NASA to standardize flight suits to the now well-known light blue fabric. Standing left to right are Scott Carpenter, Gordon Cooper, John Glenn, Virgil "Gus" Grissom, Wally Schirra, Alan Shepard, and Donald Slayton.

USD800 - 1,200

80

MERCURY PROGRAM COLLECTION

SIX EARLY BOOKLETS WITH 13 MERCURY ASTRONAUT SIGNATURES The collection consists of the following:

1. *The Earth-Orbiting Flight of Astronaut Carpenter*. NASA, 1962. 8 pp. 8 x 10 inches. Paper wrapper.

SIGNED and INSCRIBED: "SCOTT CARPENTER, Aurora 7" on the front cover.

Carpenter describes the firefly phenomenon he saw in space. Well illustrated with several fully captioned training, flight, and post-flight photographs. Direct comments from Carpenter include: "*The launch was much easier, much smoother than I had been led to believe ... They (Fireflies) look like snow, like a small snowflake that's caught in an eddy, in a rising air current. They have random movements, they are brilliant – more brilliant than any star ... Each time I hit the capsule a cloud of particles would fly off ... The capsule must be covered with frost, and that rap on the side would knock the frost off." His mission experiments and recovery are also described.*

2. Astronaut M. Scott Carpenter, Aurora 7. Washington: GPO/NASA for the Manned Spacecraft Center, 1962. 40 pp. 10 x 8 inches. Original blue printed wrappers.

BOLDLY SIGNED by SCOTT CARPENTER on the front cover.

Carpenter replaces Donald Slayton to fly the second Mercury orbital mission. Carpenter's family, astronaut selection, spacecraft tests, and Aurora 7 post flight astronaut tours are just some subjects of the over 70 captioned photographs. One topic is training and Carpenter's actual flight assignment reading: *"The study requirements on all astronauts are great but those of the prime and backup pilot are much heavier...."* In Carpenter's case this was more condensed since he was named to replace Donald K. 'Deke' Slayton as prime pilot in mid-March (1962) when it was determined that the latter had an irregular heart beat and a board of civilian cardiologists recommended that he not fly the mission." Pictures of Carpenter's return to his home state of Colorado are included.

3. 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).

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

4. 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. Diagram of the Mercury spacecraft and instrument panel on verso.

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





5. Three into Space. NASA (1962). Full page illustrations, 10 pp, 101/2 x 8 inches. Original paper wrappers. Images from the three orbital Mercury flights of John Glenn, Scott Carpenter, and Wally Schirra. BOLDLY SIGNED and INSCRIBED: "WALLY SCHIRRA, ∑ 7, 3 Oct 1962" and "SCOTT CARPENTER, Aurora 7, 24 May 1962" on the front cover.

6. ALAN SHEPARD AND FREEDOM 7, THIRTY YEARS LATER. Event Program, Mercury Seven Foundation. Washington, DC, May 3, 1991. 8 pp, 8 1/2 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.

USD700 - 900

81

MERCURY ASTRONAUT COLOR PHOTOGRAPHIC COLLECTION

INCLUDES 12 PHOTOS HAVING 12 ASTRONAUT AUTOGRAPHS The collection has color 8 x 10 photographs comprised of: 1. Three different photographs featuring Scott Carpenter in his silver Mercury space suit, one of Carpenter in a life raft next to a Mercury spacecraft, one of Carpenter entering his Aurora 7 spacecraft with his inscription of "24 May 1962," and one of his Atlas rocket launch with his inscription of "Aurora 7 Launch, 24 May 1962." All SIGNED by SCOTT CARPENTER.

2. Three Wally Schirra Mercury photographs. His official NASA business suit portrait, his space suit portrait made prior to his Sigma 7 flight, and his observation of his Sigma 7 logo being painted on his spacecraft. All SIGNED by WALLY SCHIRRA.

3. Three Gordon Cooper Mercury photographs. One of him in his silver Mercury space suit during training, another inside the Mercury simulator with his inscription of "Mercury Training," and this Atlas launch with his inscription of "Faith 7 Launch, 15 May 1963." All SIGNED by GORDON COOPER.

USD800 - 1,200

82

MERCURY SEVEN ASTRONAUT-SIGNED & INSCRIBED PORTRAIT COLLECTION

Group of 7 8x10-inch photo-litho portraits, c.1961.

Includes individual portraits of Virgil Grissom, John Glenn Jr., Scott Carpenter, Gordon Cooper, Jr., Donald Slayton, Alan B. Shepard Jr., Walter Schirra.

Provenance: Charles M. Grant, Jr., Chief of NASA's MSC Technical Information Division during the period.

USD2,000 - 3,000



83 w

ORIGINAL GEMINI 133P TRAINER ATTITUDE & MANEUVER CONTROL SYSTEM CONSOLE

USED AT MSC TO TRAIN FOR PROJECT GEMINI

Seated instrument panel approx 5 feet 8½ inches at widest point, gimbal system with attitude hand controller labeled "SIMULATED" and central joystick; mounted onto approx 6 x 3 foot base with casters, instructor's control panel mounted to wooden cabinet directly behind chair module, Burtek Inc for McDonnell, 1963.

The instructor's control panel labeled: "GEMINI ATTITUDE & MANEUVER CONTROL SYS CONSOLE. INSTRUCTOR'S CONTROL PANEL." 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."

Seated 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.

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 and control of the Power Source, among many other skills.

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. It was an important step on the way to the moon. Its essential objectives were demonstrating space flight up to almost 14 days - well above the 8-days necessary to journey to the Moon and back, methods of extra vehicular activity (EVA) and orbital maneuvers necessary to for rendezvous and docking with another spacecraft. The Gemini spacecraft was consequently a more complicated vehicle than the Mercury and the astronauts would have had to spend considerably more time training on simulators such as this. In some cases, such as during Gemini 8 when the spacecraft began to dangerously tumble, it was the thorough knowledge of the controls that helped command pilot Neil Armstrong avert disaster. Dave Scott, the pilot on the mission said of the event: "The guy was brilliant. He knew the system so well. He found the solution, he activated the solution, under extreme circumstances ... it was my lucky day to be flying with him."

USD20,000 - 30,000





85

84 GEMINI IV: FIRST AMERICAN TO WALK IN SPACE

Group of 4 photographs, 11 x 14 inches, on Kodak paper, c.1965, depicting Ed White's 1965 EVA, light edgwear, generally very good.

Ed White became the first American to walk in space during the second crewed mission of Project Gemini. Along with Command Pilot James McDivitt, the two orbited the Earth 66 times during the 4-day mission. The EVA was a highlight for Ed White, seen in the above images in his white space suit, the Hand-Held Maneuvering Unit (called a "zip gun" by some of the astronauts) is visible in each of the shots as is the Earth below. White was reluctant to return to the spacecraft when his time with up and said upon entering: "I'm coming back in ... and it's the saddest moment of my life."

USD3,000 - 5,000

85

GORDON COOPER'S GEMINI 5 FLOWN UNITED STATES FLAG

WITH LETTER FROM COOPER DESCRIBING THE MISSION FLOWN United States Flag made from silk, 4 by 6 inches, mounted with an 8 by 20 ½ inch color Gemini Earth orbit map showin locations and circular range limits of the world-wide tracking stations. Plus a Typed Letter Signed by Gordon Cooper. All on and removable from a 22 by 24 inch light blue mat board.

GORDON COOPER has INSCRIBED the map with his Gemini 5 launch date of "8/21/65" plus drawn an arrow to the launch site at Cape Canveral. Additionally he has marked an "X" at the Gemini 5 splashdown area plus added the date of "8/29/65." All in pencil.

Provenance: Originally from the collection of Astronaut Gordon Cooper.

GORDON COOPER'S signed provenance letter which reads: "This large United States flag was carried into earth orbit. My second space mission was called Gemini 5, also known as Gemini-Titan (GT) 5. The Titan name refers to the booster rocket that launched me and follow astronaut Charles "Pete" Conrad, Jr. into earth orbit on August 21, 1965.

Some of our mission objectives were to demonstrate and evaluate the Gemini spacecraft during an orbital flight lasting up to eight days. A flight this long would approximate the length of time a trip to the moon and back would last. Our flight would allow medical experts to evaluate the effects of weightlessness on the human body for that period of time. Pet and I made it through all eight days with no harm what so ever.

Another flight objective was to evaluate orbital rendezvous and guidance techniques using a detachable radar "pod." The pod separated from our spacecraft about two hours after launch and gave us good data. Low pressure in our fuel cell's oxygen tank caused us to conserve electrical power and terminate the planned rendezvous activities with the pod. The pressure finally stabilized at a lower desirable level but the fuel cell still provided electrical power. We were slowly able to complete more of the planned tasks as the flight progressed.

We fired our retro-rockets on orbit 120 over the Hawaiian Islands and began our re-entry into earth's atmosphere. We landed about 100 miles from our prime recovery ship the USS Lake Champlain on August 29, 1965.

Pete and I did carry a few personal items such as flags, medallions, and crew patches. I am particularly fond for our crew patch which featured a covered wagon which reflected the pioneering spirit of this early Gemini flight. Our successful completion of Gemini 5 marked the beginning of the United States lead in manned space exploration."

USD2,500 - 3,500

86 "GEMINI 5, YOU NEED A SHAVE!" CREW SIGNED

CONRAD POKES FUN AT COOPER'S EIGHT DAY BEARD! Color photograph, 10 x 8 inches.

BOLDLY INSCRIBED and SIGNED: "You need a shave! CHARLES CONRAD" and "Maybe tomorrow! GORDON COOPER." The Gemini 5 astronauts have time for a humorous verbal exchange after recovery by the USS Lake Champlain. Both have not shaved for eight days since their flight began on August 21, 1965.

USD800 - 1,200

87

GEMINI V FLOWN HEAT SHIELD FRAGMENT

August 21-28, 1965.

Approximately 20 x 30 mm pie slice-shaped fragment encased in Lucite, 75×65 mm cylinder overall.

Provenance: Charles M. Grant, Jr., Chief of NASA's MSC Technical Information Division during the period.

NASA set the lofty goal of doubling the previous record of time in space of 4 days set by the Soviets with Vostok 5. Gemini V, crewed by Gordon Cooper Jr. and Charles Conrad Jr. managed to reach the goal of 8 days, the time determined that it would take for a spacecraft to reach the Moon and return to Earth.

The present heat shield fragment displays the characteristic charred surface layer and provides a cross-sectional view of the honeycomb form of the silicone elastomer material of the deeper layers.

USD1,000 - 2,000

88

THE GEMINI 6 RENDEZVOUS WITH GEMINI 7

MANKIND'S FIRST HISTORIC SPACECRAFT MEETING IN SPACE Large-format color photograph, 16 x 20 inches.

INSCRIBED and SIGNED: "Gemini 6 & 7, Tom Stafford, Plt, 15 Dec 1965." SIGNED by WALLY SCHIRRA with "Cdr" added.

After launch scrubs in both October 1965 and just 3 days earlier on December 12, 1965; Gemini 6 Astronauts Wally Schirra and Tom Stafford perform man's first space flight rendezvous with the Gemini 7 spacecraft already in orbit. The December 12 scrub was the most serious because the Titan rocket engines actually started, but immediately shut down. If the Gemini 6 crew aborted via their ejection seats, they might have been seriously injured. It could also have delayed many Gemini Program plans with possible impacts to the Apollo Program plans and schedules.

USD800 - 1,200















89

GEMINI XI MISSION EMBLEM CARRIED ON THE FLIGHT

PRESENTED TO GORDON COOPER FROM CHARLES "PETE" CONRAD FLOWN cloth Gemini XI mission emblem, 4 ¼ inches tall and 3 inches wide. The central feature is a gold Roman numeral "XI" rising from the Earth with a white contrail behind. The mission's objectives are illustrated with a docked Gemini spacecraft and Agena vehicle with the large elliptical gold stitched orbit representing the high altitude orbit planned for this flight. A tethered spacewalking astronaut symbolizes Richard Gordon's planned EVA's. The crew member's last names are at the bottom in white thread. The emblem is displayed on a Typed Letter Signed by GORDON COOPER using his personal stationery. Displayed with a 10 by 8 inch color photograph of Conrad and Cooper exiting the crew suiting trailer as they start their journey to the launch pad. All mounted on and removable from a 12 ½ by 19 ½ inch dark blue mat board.

GORDON COOPER'S signed provenance letter in full: "This flown Gemini XI emblem displayed below was presented to me by fellow Gemini Astronaut Charles "Pete" Conrad. Pete and I flew together on Gemini 5 during August 1965. We were the first space flight crew to have our own personal space mission "patch" that we wore on our space suits. We carried a few extra of our own mission "patches" on the Gemini 5 flight as did later crews on their flights during the Gemini program. Pete carried a few like this one below on the Gemini XI flight during September 12 through 15, 1966. He and Richard Gordon docked with an Agena target vehicle and used its large rocket engine to establish a new world high altitude record of 850 miles. Richard did a couple of spacewalks on the flight too.

Pete had one of the most distinguished careers of any astronaut. Not only did he fly two Gemini missions, he was the third man to walk on the Moon during Apollo 12 in 1969 then commanded the first Skylab mission in 1973."

USD2,500 - 3,500

90

JAMES LOVELL'S FLOWN GEMINI 12 MISSION EMBLEM

Flown Gemini XII embroidered cloth emblem in black orange and gold, November 1966.

Provenance: From the personal collection of Gemini XII Commander James Lovell with his signed certification letter.

James Lovell's SIGNED letter on his "Lovell Communications" letterhead, in full: "I hereby certify that this embroidered patch was flown with me on board my Gemini XII mission in November, 1966. / The patch is from my personal collection of space artifacts and has been in my possession since the mission. / James A. Lovell / Gemini 7 - Pilot / Gemini 12 - Commander / Apollo 8 - Command Module Pilot / Apollo 13 - Commander."

USD1,000 - 2,000

91

GEMINI XII: THE FIRST SPACE SELFIE

BUZZ ALDRIN TAKES A SELF-PORTRAIT DURING HIS SPACEWALK Color photograph, 10 x 8 inches.

SIGNED and INSCRIBED: "BUZZ ALDRIN, GT-12."

The Earth loomed below as Aldrin turned the camera on himself to document this historic EVA where he became the first astronaut to work outside the spacecraft for a lengthy period without tiring. Aldrin's interest in scuba diving informed the underwater EVA training which has been used ever since.

USD500 - 700

GEMINI XII: THE END OF THE GEMINI PROGRAM

Two crew color photographs, 10 x 8 and 8 x 10 inches, both signed by Aldrin.

1. James Lovell and Buzz Aldrin pose in their blue flight suits while standing in a full scale Gemini spacecraft training vehicle. SIGNED by BUZZ ALDRIN.

2. James Lovell and Buzz Aldrin give speeches to the men on the USS Wasp after their November 1966 Gemini XII flight. INSCRIBED and SIGNED: "The End of Gemini, BUZZ ALDRIN, GT XII, PLT."

GEMINI: GROUP OF 3 "RED NUMBER" PHOTOGRAPHS 3 Color photographs, 8 x 10 inches, 1965-1966, with red NASA

1. S-65-63220: Gemini-Titan 7 as seen from Gemini-Titan 6 during the

2. S-66-62882: Gemini-Titan 12 docked to Aegna, hatch open, flying

3. S-66-59986: Gemini capsule floating back to Earth beneath its parachute, November 15, 1966. The final moments of the final Gemini

identification number in upper margin

historic rendezvous in space, December 15, 1965.

above Baja, California, November 12, 1966.

USD600 - 900



92



93

94

93

Including:

mission.

USD1,000 - 2,000

LUNAR PHOTOGRAPHY: RANGER PROGRAM

Ranger VII [VIII; X]: Photographs of the Moon. [Pasadena]: NASA & Jet Propulsion Laboratory, August 27, 1964-December 15, 1965. 3 volumes. Folio (367 x 300 mm). 539 loose linen-backed photographs, bound text in each volume. Original pale blue snapped cases. Includes Ranger VII, Part I: Camera "A" Series with 199 photographs; Ranger VIII with 170 photographs; Ranger IX with 170 photographs.

The Ranger Program provided the first close-up images of the lunar surface. While the first 6 Ranger spacecraft failed for various reasons, Ranger VII, VIII & IX transmitted the images that were used by NASA to plot Apollo landing sites. Ranger VIII crashed just 43 miles from the landing site of Apollo 11.

USD1,500 - 2,500













95 SATURN WIND TUNNEL ROCKET ENGINE NOZZLE

ORIGINAL WORKING SCALE MODEL USED AT NASA LEWIS RESEARCH CENTER

Various metals, 8 1/2 inches tall, [1964], being a rocket engine nozzle, with evidence of having been fired.

Provenance: NASA scientist Oral Mehmed.

An original engine nozzle used for wind tunnel tests in the early to mid 1960s at NASA's Lewis Research Center (now known as Glenn Research Center). It was part of a liquid-fueled five-engine working scale model used in the development of the Saturn family of rockets.

USD1,000 - 1,500

96

APOLLO OPERATOR MANUALS

COLLECTION OF ORIGINAL NORTH AMERICAN AVIATION APOLLO MANUALS

Group of 16 manuals, 10 1/2 x 8 inches through 5 3/4 x 8 3/4 inches, Downey, Califorina, 1962-1967.

Titles include:

- 1. Block II CSM Propulsion Subsystem.
- 2. Electrical Power Subsystem Block II CSM.
- 3. Structures and Mechanical Subsystems.
- 4. Environmental Control System Block II.
- 5. Guidance and Navigation Subsystem.
- 6. Stabilization & Control Subsystem.
- 7. Electrical Power System Study Guide.
- 8. Stabilization & Control Subsystem Block II.
- 9. CSM/LM Docking and Crew Transfer Block II Handout.
- 10. Environmental Control System Study Guide.
- 11. Electrical Power Subsystem.
- 12 & 13. Sequential Systems (SECS, EDS, LES, ELS).
- 14. Telecommunications System.
- 15. Apollo Spacecraft Familiarization.
- 16. Preliminary Apollo Ground Handling System Study.

WITH: 3 North American Rockwell Space Shuttle Program manuals, 1970-1979:

- 1. Space Shuttle Program, Executive Summary, Part 2.
- 2. Proposal to Accomplish Phase B Space Shuttle Program.
- 3. Space Shuttle System Capabilities.

An amazing collection of firsthand material for both the Apollo spacecraft and the Space Shuttle.

USD1,000 - 2,000

97

APOLLO 7 WALTER CUNNINGHAM BETA CLOTH INFLIGHT JACKET

White Jacket Assy./Inflight Coverall Garment with 6-snap front, graygreen interior lining, "W. CUNNINGHAM" Beta cloth label on left chest above Apollo 7 Beta cloth emblem, NASA "meatball" on right chest beside reinforced medical inlet hole, pockets to each shoulder (one with velco closure, the other with snap closure), US flag to left shoulder, size medium regular, B. Welson & Co., May 8, 1968, serial number 1134, NASA tag with part # correction, cancelled in red marker, repair to lower left abdomen.

Label inside collar reads: Jacket Assy. SEB 13100062-713

Inflight Coverall Garment SEB 13100062-205 Size: Med. Reg. S/N: 1134 Contract No.: NAS 9-7720 Date of Mfg.: 5/8/68 Mfg. By: B. Welson & Co.

Possibly flown - identical to the Inflight jacket Cunningham wore during Apollo 7.

USD2,000 - 3,000

98 APOLLO 7 SILVER ROBBINS MEDALLIONS

2 Apollo 7 Robbins medallions, sterling silver, obverse with mission emblem, verso with mission dates, 1968, both restrikes without serial number.

Apollo 7 was the first successful mission of the Apollo Program. The crewmembers were Walter Schirra, Don Eisele, and Walter Cunningham.

USD800 - 1,200

99

APOLLO 8: EARTHRISE ORIGINAL "RED NUMBER" PHOTOGRAPH Color photograph, 8 x 10 inches, 1968, with red NASA identification number in upper margin: "AS8-14-2383" Bill Anders classic image taken with a Hasselblad fitted with a 250 mm telephoto lens. The account of the photo was captured by the onboard tape recorder: Anders: Oh my God, look at that picture over there! There's the Earth comin' up. Wow, is that pretty! Borman: Hey don't take that, it's not scheduled. [shutter click]

Anders: You got a color film, Jim? Hand me a roll of color, quick, would you?

Lovell: Oh man, that's great. Anders: Hurry. Lovell: Where is it? Anders: Quick Lovell: Down here? Anders: Just grab me a color. A color exterior. Hurry up. Got one? Lovell: Yeah, I'm looking' for one. C 368. Anders: Anything. Quick. Lovell: Here. Anders: Well, I think we missed it. Lovell: Hey, I got it right here [in the hatch window]. Anders: Let me get it out this one, it's a lot clearer. Lovell: Bill, I got it framed, it's very clear right here! [shutter click] Lovell: Got it? Anders: Yep. Lovell: Take several, take several of 'em! Here, give it to me! Anders: Wait a minute, just let me get the right setting here now, just calm down. Lovell: Take -Anders: Calm down, Lovell! Lovell: Well, I got it right - aw, that's a beautiful shot...Two-fifty at f/11. [shutter click] Anders: Okay. Lovell: Now vary-vary the exposure a little bit. Anders: I did, I took two of 'em here.

USD2.000 - 3.000

Lovell: You sure you got it now?

100 APOLLO 8: EARTH VIEW

 $\label{eq:original_states} \begin{array}{l} \textit{ORIGINAL "RED NUMBER" PHOTOGRAPH} \\ \textit{Color photograph, 8 x 10 inches, 1968, with red NASA identification} \\ \textit{number in upper margin: "AS8-16-2608," NASA text to verso. \end{array}$

Anders: Yeah, we'll get - well, it'll come up again, I think.

USD800 - 1,200





99











101 EARTHRISE: APOLLO 8

Earthrise. Color photograph taken by Bill Anders from the Command Service Module, 16 x 20 inches, on Kodak paper, tiny crease in upper right, otherwise excellent. With Novaspace certificate.

SIGNED & INSCRIBED by Commander Frank Borman, "Our view of Earth from Apollo 8 / December 24, 1968 / Frank Borman / Apollo 8 CDR."

USD1,000 - 2,000

102

MICHAEL COLLINS SIGNED EARTHRISE

"Earthrise," color photograph taken by Bill Anders from the Command Service Module during Apollo 8 in 1968, 16 x 20 inches. *SIGNED & INSCRIBED BY MICHAEL COLLINS AS APOLLO 11 CMP.*

USD1,200 - 1,800



APOLLO STOWAGE BAG FOR 16MM FILM MAGAZINES

Beta cloth film stowage bag, 8½ inches square. Having two large identification labels that read: "16 MM FILM, A9 RETURN." An additional label inside the bag reads: "R56-786528-81, M/U28 116, Non-Flight Hardware" with an inspection stamp. Two large closure snap buttons are located at top opening.

A Beta cloth film storage bag used during Apollo training. The bag was designed to hold several 16 mm Data Acquisition Camera (DAC) motion picture film magazines then snap closed using the dual large snap buttons. The A9 labeling indicates that this bag would be stored in the Command Module's (CM) Lower Equipment Bay A9 (Aft 9) storage location, prior to return to earth. DAC's were used in both the CM and Lunar Module. They were even taken out onto the lunar surface and placed on the lunar rover.

USD500 - 700

104 CHICAGO CITY FLAG FLOWN ON APOLLO 10

FASTEST FLOWN FLAG FOR CHICAGO

FLOWN Chicago city flag, made of silk, 4 by 6 inches. Displayed between paragraphs of a Typed Signed Letter by THOMAS P. STAFFORD on his business stationery. Mounted on and removable from a 12 by 14 $\frac{1}{2}$ inch light blue mat board.

The flag is INSCRIBED and SIGNED: "Flown to the Moon on Apollo X, TOM STAFFORD," below the lower edge under the bottom blue bar.

THOMAS P. STAFFORD'S signed provenance display letter reads: "The Chicago city flag displayed below was flown to the Moon on Apollo X during May 18-26, 1969. I was commander of this mission which tested critical flight maneuvers that would enable Apollo 11 to make the first lunar landing just two months later in July 1969. I carried this flag inside our Lunar Module named 'Snoopy' where Gene Cernan and I approached within 50,000 feet of the lunar surface.

Just prior to the beginning of the Apollo X re-entry into the Earth's atmosphere on May 26, John Young, Gene, and I, as well as this flag, established the all-time record for the fastest speed ever flown by man - 24,791 nautical miles per hour or the equivalent of 28,528 statute miles per hour. No other Apollo crew matched or exceeded this speed. Therefore, this flag is one of the fastest flown space artifacts to exist from the Apollo Program. This speed record will not be broken until an astronaut crew returns from a mission to Mars sometime during the twenty-first century."

USD3,000 - 5,000

105

APOLLO 10 FLOWN PHOTOGRAPHIC MAP

"FLOWN TO THE MOON"

Original map sheet, 2 pp (recto/verso), NASA, [1969], with printed tab and holes punched for in flight use.

SIGNED & INSCRIBED BY LUNAR MODULE PILOT GENE CERNAN: *"Flown to the Moon on Apollo X / Gene Cernan."* This flown map provides a satellite view of Point Chimanche in the Dominican Republic on one side and Pt.Quest, Tortue Island, Haiti on the other.

USD2,000 - 3,000

106

APOLLO 10: 3 "RED NUMBER" PHOTOGRAPH

3 Color photographs, 8 \times 10 inches, 1969, with red NASA identification number in upper margin.

Includes:

1. AS10-27-3873: Command Service Modules as photographed from the Lunar Module, the Lunar surface below, May 22, 1969, NASA text printed on verso.

2. AS10-27-3880: Command Service Modules photographed from the Lunar Module, above Mare Smythii on the Lunar service, May 22, 1969, NASA text printed on verso.

3. AS10-34-5117: Lunar Module docking, May 23, 1969, NASA text on sheet taped to verso.

USD1,000 - 2,000

D. BURRY AND DECEME, IN

In part of the large sequence of the part of a series part of the large strengthener behavior in part of the second of the set of the part of the second se



Promote P. Stational, U.S. Space, U.S. Strand, Phys. Rev. B 1, annual April 1999, Rev. R. S. Strandson, April 1, Space Rev. Lett.

104



105







108



107 APOLLO 10 FLOWN EARTH MAP

FLOWN AROUND THE MOON 31 TIMES

Original map sheet,200 x 260 mm, 2 pp (recto/verso), Army Map Service for NASA, 1968, with printed tab and holes punched for in flight use. *SIGNED & INSCRIBED BY LUNAR MODULE PILOT GENE CERNAN: "Flown to the Moon on Apollo X / Gene Cernan / Apollo X LMP"* This flown map details areas in the Gulf of Guinea in Western Africa.

USD1,500 - 2,500

108^w

LUNAR GLOBE

Visual-Relief Lunar Globe. Chicago: Denoyer-Geppert, May, 1969. 16-inch lunar globe, 1:8,533,150 scale, 21¾" tall on stand. Printed paper gores showing the lunar surface in raised relief; surmounted by a metal finial; the half-circular brass meridian fork holding a rotating calibrated meridian; and with conforming flat band moveable calibrated mylar scale between the North and South Poles; raised on a faux-wood grained domed round metal base.

Provenance: Jet Propulsion Laboratory scientist Dr. Conway W. Snyder.

FIRST EDITION. "In 1969, to commemorate the Apollo 10 mission, Denoyer Geppert designed a special lunar globe that the astronauts of the mission presented to President Nixon. Contracted by NASA, Denoyer Geppert created the first complete Moon globe, using the Apollo 10 film footage and photographs of the far side of the moon. 200 first edition globes of this type were produced, the first of which went to President Nixon and four others to special members of Congress" (American Globe Preservation Society, AMGS Newsletter, March 2012, p 4).

USD2,000 - 3,000

109

ARMSTRONG USED LAUNCH FLIGHT ABORT TRAINING SHEET, TLI CONFIGURATION

FOR AN EMERGENCY RETURN OF COLUMBIA BACK TO EARTH. Apollo 11 Launch Operations Checklist, page 4-11 and 4-12, a single sheet printed recto and verso. NASA/MSC, April 15, 1969, revised June 27, 1969. 8 x 5½ inches. Red tinted for quick reference during an emergency. With a Typed Letter Signed by BUZZ ALDRIN using his personal stationery and copy of the checklist front cover.

Provenance: Originally from the personal collection of Buzz Aldrin.

INSCRIBED and SIGNED: "Used in training for Apollo XI, BUZZ ALDRIN" on page 4-11.

BUZZ ALDRIN'S signed provenance letter reads in part: "Accompanying this letter is a sheet numbered 4-11 and 4-12 from the CSM 107 (Apollo 11) Launch Operations Checklist, SKB32100080-306. It was part of the complete manual that was used in the Command Module simulator ... The sheet is from Section 4 titled: Abort Procedures.

The entire checklist, including this page, was used by all three Apollo 11 crew members: Neil Armstrong, Michael Collins, and myself. We referred to this section almost every time we performed a launch simulation because the simulator team would often put us in a situation that required us to execute an abort.

Side 4-11 has the steps for an abort if an emergency arose during TransLunar Injection, and we had to return to earth immediately. We would separate from our S-IVB, the third stage of the Saturn rocket, and get into a retro attitude. Side 4-12 has blank spaces to log the real-time spacecraft attitude coordinates. Needless to say, this would not have been an enjoyable condition, having started our burn to send us to the Moon. Neil would make the command decision onboard for this abort.... I have written on page 4-11: 'Used in training for Apollo XI' and signed that page."

USD1,200 - 1,800

110 APOLLO 11 OFFICIAL PORTRAIT

NASA "BLUE NUMBER" PHOTOGRAPH

Color photograph, 8 x 10 inches, 1969, with blue NASA identification number in upper margin: "S-69-31739" The Apollo 11 crew of Commander Neil Armstrong, Command Module Pilot Michael Collins, and Lunar Module Pilot Edwin "Buzz" Aldrin pose in their white space suits prior to the first lunar landing mission of July 1969.

USD800 - 1,200



110



Group of 3 8 x 10-inch portraits, each signed, excellent condition.

A complete set of three portraits of the astronauts in their white space suits. Neil Armstrong signs and inscribes: *"To Dave / Best Regards / Neil Armstrong."* Buzz Aldrin signs and inscribes: *"We Came in Peace / Buzz Aldrin / Apollo XI."* Michael Collins portrait is signed only.

USD2,000 - 3,000

112 **APOLLO 11 LAUNCH** Large format color photograph, 16 x 20 inch. *SIGNED* by Michael Collins as "Apollo XI CMP."

Powerful image of the Saturn V rocket propelling Apollo 11 on its Moonward journey.

USD1,000 - 2,000













113

113

APOLLO 11 CREW-SIGNED PHOTO

INSCRIBED BY NEIL ARMSTRONG TO APOLLO 11 MSC FLIGHT DIRECTOR

Photograph Signed on mount ("Neil Armstrong," "Michael Collins" & "Buzz Aldrin") and inscribed, 7 x 9 1/4 inches, [1969], mounted to board, depicting the 3 Apollo 11 crewmembers in spacesuits before a backdrop of the Moon.

Neil Armstrong expresses his appreciation to longtime Manned Spacecraft Center at Houston (MSC) Flight Director Clifford Charlesworth, who served from 1962-1970. He served as the Flight Director for Gemini 11 and Gemini 12, one of the Flight Directors for Apollo 8, as well as the first moon landing, Apollo 11. He finished with Apollo 12 before moving to the Earth observation satellite program and later the Space Shuttle program. Armstrong here personally inscribes the photo: *"To Cliff Charlesworth with our sincere appreciation for your friendship and your professional performance as our 'flight."* He also adds *"Apollo 11 — "* after Aldrin's signature.

USD5,000 - 7,000

114 APOLLO 11

Lunar Module Eagle. Color photograph taken by Michael Collins from the Apollo 11 Command Module, 16 x 20 inches, on Kodak paper. Includes certificate of authenticity from Novaspace. Excellent condition.

SINGED BY MICHAEL COLLINS at the upper right: "Michael Collins — Apollo XI CMP." Depicting the Lunar Module Eagle above the lunar surface, with the Earth rising in the background.

USD1,000 - 2,000





116

115

ALDRIN SIGNED APOLLO 11 TRAJECTORY CHART

KEY STEPS FOR THE FIRST LUNAR LANDING! Apollo Translunar / Transearth Trajectory Plotting Chart (ATT), Apollo Mission 11. June 23, 1969, 24 x 20 inches. Includes a printed flight time summary based on the July 16 launch and detailed notes section. Located

at opposite lower corners of the chart.

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, trans-Lunar injection, Lunar and Earth coast phases, Lunar orbit insertion, Lunar landing - liftoff, and trans-Earth injection are included.

USD2,000 - 3,000

116

NEIL ARMSTRONG'S ICONIC "VISOR" IMAGE OF BUZZ ALDRIN NASA "RED NUMBER" PHOTOGRAPH

Color Photograph, 8 x 10 inches, with red NASA identification number in upper margin: "AS-40-5903."

Neil Armstrong's classic photograph of Buzz Aldrin at the Sea of Tranquility during the Apollo 11 Lunar EVA.

USD3,000 - 5,000



117



118



117 TRANQUILITY BASE, JULY 20, 1969

Large color photograph, 16 x 20 inches.

The Apollo Program's most iconic image, taken by Neil Armstrong: Buzz Aldrin standing on the Moon. Inscribed with the date of Man's first lunar landing and first step onto the lunar surface. Boldly *SIGNED & INSCRIBED:* "Tranquillity Base, July 20, 1969, Buzz Aldrin."

USD2,000 - 3,000

118

APOLLO 11 "RED NUMBER" PHOTOGRAPHS

Group of 5 photographs, 1969, each with red identification number in margin.

Including:

- 1. AS11-44-6610: View of Moon limb, Crater 308 & 309
- 2. AS11-45-6712: Stereoview of a stone on the Lunar surface, with NASA press release information stamped in purple on verso.
- 3. AS11-40-5853: View of a Lunar crater from Tranquility Base, publicity slip taped to vero.
- 4. AS11-37-5512: "Old Glory" on the Lunar Surface, publicity slip taped to verso.

5. AS11-40-5920: Lunar Module strut with landing pad, solar wind experiment and US flag visible in background.

*AND WITH:

- 2 NASA "black number" photographs taken by Michael Collins from the Command Module:
- 1. AS11-44-6609: Crater Daedalus on the Lunar farside.
- 2. AS11-44-6665: View of the entire nearside surface of the Moon.

USD1,500 - 2,500

119

APOLLO 11 LARGE FORMAT SIGNED PHOTOGRAPH

16 x 20-inch color photograph of Buzz Aldrin standing before the American flag planted on the Lunar surface, 1969. SIGNED by Neil Armstrong, Buzz Aldrin and Michael Collins on the mount below the photograph and with cancelled first day issue First Man on the Moon stamp, Washington, September 9, 1969 & July 20, 1969, 20 x 24 inches overall. WITH: 16 x 20-inch color photograph of Buzz Aldrin descending Lunar Module ladder. With same cancelled first day stamp on mount.

Attractive and unusual Apollo 11 presentation pieces featuring Neil Armstrong's photographs of Buzz Aldrin on the Lunar surface.

USD3,000 - 5,000

120 APOLLO 11: BUZZ ALDRIN DESCENDS THE LM LADDER NASA "RED NUMBER" PHOTOGRAPH

Color photograh, 8 x 10 inches, 1969, with red NASA identification number in upper margin: "AS11-40-5868," titled in pen on verso.

Neil Armstrong's photograph of Aldrin as he descends the Lunar Module ladder for his first step on the Moon.

USD800 - 1,200

121

THE LANDING SITE FOR EAGLE IN THE SEA OF TRANQUILITY

EXTENSIVELY INSCRIBED AND SIGNED BY BUZZ ALDRIN Mare Tranquillitatis lunar chart having the area where Neil Armstrong made history's first lunar landing. A NASA Manned Spacecraft Center chart identification of "MSC – 6132 – 69" is printed at the lower right corner. 17 by 22 inches.

BOLDLY INSCRIBED and SIGNED: "First Lunar Landing, Apollo XI, July 20, 1969, BUZZ ALDRIN, Apollo XI" and his additional marking of the Apollo 11 landing site with an "X."

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. Mission planners created this internal Manned Spacecraft Center chart a few months before the flight in 1969. Elevation contour lines are plotted at 600 foot intervals.

USD1,500 - 2,000

122

BUZZ ALDRIN SIGNED APOLLO 11 LUNAR CHART

Apollo Lunar Orbit Chart, [Washington,] Aeronautical Chart and Information Center for Department of Defense, June 20, 1969, First Edition, SIGNED by Buzz Aldrin.

FIRST EDITION, SIGNED "Buzz Aldrin APOLLO XI," directly over Mare Tranquillitatis, listed here as "Landing Site 2." Produced just one month before the historic first crewed landing on the Moon. Unfortunately, there were some problems with the computer's landing target when they arrived - it was in a field strewn with boulders. Commander Neil Armstrong had to take the controls and land the spacecraft while Lunar Module Pilot Buzz Aldrin called out navigational data. They touched down with only seconds of fuel left before they would have had to abort the landing.

USD2,000 - 3,000



120









124

123

FLOWN APOLLO 11 COMMAND MODULE THERMAL LAYER SEGMENT

IN SPACE FOR SOME 195 HOURS AND MADE 30 ORBITS OF THE MOON

FLOWN foil segment, being approximately 5/8 by one half inch, mounted on a Typed Note Signed by Buzz Aldrin. Included is an 8 by 10 inch official NASA photolithograph of the Apollo 11 astronauts in their space suits. Both displayed on an approximately 14 x 12 inch blue mat board. The photolithograph is SIGNED and INSCRIBED: "*BUZZ ALDRIN, Apollo XI LMP.*"

Provenance: Originally from the collection of Buzz Aldrin.

BUZZ ALDRIN'S signed provenance note reads: "The segment placed here was removed from Command Module Columbia after the first manned lunar landing mission during July 16 to 24, 1969. This flown segment is from my personal collection."

Part of Command Module *Columbia*'s thermal protection system was a highly reflective layer that covered the entire outer surface. This skin segment traveled some 500,000 miles during the Apollo 11 flight and was exposed to the vacuum of space for over 195 hours. The thirty lunar obits lasted almost 60 hours.

USD2,000 - 3,000

124

THE ICONIC APOLLO 11 PHOTOGRAPH AT TRANQUILITY BASE, JULY 20, 1969

ALDRIN INSCRIBES AND SIGNS HISTORY'S BEST KNOWN LUNAR PHOTOGRAPH

Large color photograph, 16 x 20 inches.

BOLDLY INSCRIBED and SIGNED: "Tranquillity Base [sic], Apollo XI, USA on the MOON! July 20, 1969, BUZZ ALDRIN."

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

USD1,500 - 2,000

125 APOLLO 11 MEDALLION WITH FLOWN MATERIAL

INCLUDES ALDRIN-SIGNED PRESENTATION CERTIFICATE. Silver colored medallion 1-1/4 inches in diameter. The obverse features the image of Buzz Aldrin next to the US Flag with the words: "The Eagle has Landed, July 20, 1969." The reverse reads: "This medallion contains metal from spacecrafts Columbia and Eagle, that took Astronauts Armstrong, Aldrin and Collins on their historic Apollo 11 mission that resulted in the first landing of man on the Moon."

With an 8.5 x 11 inched color presentation certificate which reads: "Manned Flight Awareness, National Aeronautics and Space Administration, John F. Kennedy Space Center. Apollo 11 Medallion Presented to (blank line). In recognition of your contribution to the United States space program."

The certificate illustrates both sides of the medallion. The Manned Flight Awareness Program was a NASA effort to ensure awareness of important aspects for manned space flight including quality control of space equipment, flight procedures, and communications between all members of the NASA and contractor teams.

WITH: NASA Apollo Achievement Award certificate, 8 x 10.5 inches. It reads in part: "In appreciation of dedicated service to the nation as a member of the team which has advanced the nation's capabilities in aeronautics and space, and demonstrated them in many outstanding accomplishments culminating in Apollo 11's successful achievement of man's first landing on the moon, July 20, 1969." It has the printed signature of Thomas Paine, NASA Administrator at the lower right corner.

USD500 - 700



2 8x10 inch color photographs:

1. Aldrin during the LM's checkout, taken by Neil Armstrong. SIGNED and INSCRIBED: "*BUZZ ALDRIN, Apollo XI LMP*." Aldrin is removing his sunglasses from his white flight coveralls prior to the beginning of Eagle's inspection.

2. Aldrin's official NASA Apollo 11 portrait.

SIGNED and INSCRIBED: "BUZZ ALDRIN, Apollo XI LMP." Aldrin is also wearing his EVA (moonwalk) gloves and has his helmet at his

USD500 - 700

127

side.

OLD GLORY ON THE MOON

ARMSTRONG AND ALDRIN PLANT THE US FLAG ON THE MOON Color photograph, 8 x 10 inches.

INSCRIBED and SIGNED: "Best Wishes, BUZZ ALDRIN."

Neil Armstrong and Buzz Aldrin work together to place the United States flag on the Moon. Image is an enlargement of a 16mm motion picture frame which recorded moonwalk activities.

USD500 - 700



125



126





128

APOLLO 11 CREW SIGNED PROJECT MERCURY FIRST DAY COVER

APOLLO 11 CREW CELEBRATES PROJECT MERCURY Project Mercury First Day Cover, 4 x 6 inches, bearing the cancelled 4 cent Project Mercury Stamp, cancelled at Cape Canaveral, February 20, 1962, also bearing 6 cent Airmail stamp cancelled at Houston Texas, August 10, 1969 with Manned Space Center "Delayed in Quarantine" stamp.

SIGNED BY THE THREE MEMBERS OF THE APOLLO 11 CREW WHILE IN QUARANTINE. Unusual first day cover signed by Neil Armstrong, Buzz Aldrin and Michael Collins apparently while in quarantine after their historic flight to the Moon. The cover was originally cancelled on February 20, 1962, the day that John Glenn returned after the first American orbital spaceflight, and then resent over 7 years later when the US had finally achieved its goal of landing on the Moon. The second cancel bears the date August 10, 1969, the day that the Apollo 11 crew was released from quarantine.

USD2,000 - 3,000





129

APOLLO 11: MOONWALK DOCUMENTARY

Moonwalk One. United States Information Service, 1970. 2 parts, on 2 15-inch reels of 16 mm color print sound film, contained in brown metal canisters with red and white labels of the Film Division, National Library (of Australia), Canberra.

NASA approached documentary filmmakers Francis Thompson and Alexander Hammid with the idea of producing a film about the Apollo program, culminating with the first Moon landing. They obtained funding from MGM, but the studio later pulled their support. As the Apollo 11 launch approached, NASA contacted Thompson again with a less ambitious budget proposal, and he in turn brought on editor Theo Kamecke, who assembled footage in various formats from multiple sources to put the film together. *Moonwalk One* was critically acclaimed, winning a special award at the Cannes Film Festival, but was not a commercial success. It was re-released in a "director's cut" on DVD in 2009.

USD800 - 1,200

130

APOLLO-ERA PHOTOGRAPH ARCHIVE

Collection of approximately 95 black and white gelatin silver print photographs, 8 x 10 inches, being official NASA press photographs, late 1960s.

*With "Apollo 11 Color TV Coverage of Splashdown and Recovery" press kit. Yellow printed folder containing printed press information and 4 black and white silver gelatin print photographs, Western Union International, July 1969.

An engrossing archive of press photographs from the Apollo era with images such as the famous "Earth Rise" taken during Apollo 10, images of the Moon, Apollo crew shots, images of Apollo launches, images of Buzz Aldrin on the Lunar surface, etc. Each with NASA printed press information on the verso.

USD600 - 800


131

Assessment Team.

131 APOLLO 12 EKG READING DURING LUNAR EVA SIGNED BY ALAN BEAN

Electrocardiogram strip from NASA Mission Control during first Lunar EVA, November 19, 1969, SIGNED ("Alan Bean") as Apollo 12 LMP. *Provenance:* Dr. Lawrence Kuznetz, member of the Apollo 12 Metabolic

A unique item from the second manned Lunar landing showing the EKGs and respiration rates of all three members of the crew: Command Module Pilot Richard Gordon Jr.; Commander Charles "Pete" Conrad Jr.; and Lunar Module Pilot Alan Bean. Each set of readings is labeled with the corresponding astronaut's title. A document from Dr. Kuznetz describes the piece and its importance to the mission. In part: *"This EKG was used by the Flight Surgeon in Mission Control to assess the astronaut's physiological condition while walking on the lunar surface, while the pulse rates derived from the EKG, together with data from the Liquid Cooled Garment (LCG) and the spacesuit Portable Life Support System Oxygen tank (PLSS 02) were used by the Metabolic Assessment Team (MAT) and the EVA flight controller to determine the LMP's work task (metabolic) rate for various lunar surface activities; spacesuit consumable usage rate; remaining allowable time on the surface; bingo safety limit time left and other parameters.*

Together with similar data from Apollo 11, this represents the first time such information was ever recorded for humans on the surfaces of another planetary body. As such, in is considered to be historic information. The EKG signals for this chart were created in real time by 3-lead EKG transducers and pressure transducers (for respiration) worn on the skin of the astronaut and connected to his Bio-harness. The Bio-harness transmitted the data via the spacesuit PLSS communication system to the Lunar Module, which in turn sent it via the Deep Space Network to NASA's Mission Control in Houston, where it generated this strip in real time. During the two Apollo 12 EVAs, this data was crucial for determining the health of astronauts, the performance of their spacesuits, the energy cost of working on the lunar surface, the allowable time remaining for the EVA and other critical information."

USD4,000 - 6,000



132

132 APOLLO 12 US FLAG FLOWN TO THE LUNAR SURFACE

OLD GLORY IN THE OCEAN OF STORMS

United States flag, 4×6 inches, SIGNED & INSCRIBED by Richard Gordon and Alan Bean, mounted to board with Apollo 12 mission patch, presentation measuring 13 x 8 inches.

The flag is SIGNED by Richard Gordon as CMP & INSCRIBED: "To the surface of the Moon," and by Alan Bean as LMP. Mount with printed tag below mounted mission emblem patch reading: "Sailed with Yankee Clipper and Intrepid to the Ocean of Storms, November 1969," and additionally signed by full Apollo 12 crew: Charles Conrad, Jr., Dick Gordon and Alan Bean.

USD6,000 - 8,000





134



135

133

FLOWN APOLLO 12 70MM HASSELBLAD FILM SEGMENT

TAKEN FROM ROLL THAT WAS CARRIED TO THE LUNAR SURFACE 70mm Hasselblad camera film segment, ½ by ¼ inch. Placed upon a certificate issued by and with his certification signature "Richard W. Underwood." He was a Supervisory Aerospace Technologist at the NASA Manned Space Center in Houston, Texas. Placed above an 8 by 10-inch color photolithograph of Alan Bean on the lunar surface which is SIGNED and INSCRIBED: "ALAN BEAN, Apollo 12." All on and removable from a 12 ½ by 15 ½ inch tan mat board.

Provenance: Originally from the collection of Astronaut Charles Conrad.

The certificate is INSCRIBED and SIGNED: *"From my personal collection, CHARLES CONRAD."* Additionally SIGNED by Apollo 12 Lunar Module Pilot ALAN BEAN.

The certificate reads: "Apollo 12, Film from the Moon. The attached film was carried onboard Apollo 12 during its historic flight to the Moon, November 14-24, 1969. It was carried to the surface of the Moon by Astronauts Charles Conrad and Alan Bean in the Lunar Module 'Intrepid' on November 19-20, 1969."

USD1,200 - 1,800

134

APOLLO 12 NASA "RED NUMBER" PHOTOGRAPHS

2 Color photographs, 8 x 10 inches, 1969, with red NASA identification number in margin, both with publicity slip taped to verso. Including:

1. S-12-46-6790: Alan Bean during the first Lunar EVA.

2. AS12-46-6791: Alan Bean unloads ALSEP RTG fuel element during the first Lunar EVA.

USD800 - 1,200

135

APOLLO 12 CREW SIGNED COLLECTION

EACH ITEM SIGNED BY ALL THREE CREW MEMBERS. 3 items:

1. Color photolithograph, 10 x 8 inches, with NASA text on verso. SIGNED by CHARLES CONRAD and ALAN BEAN. SIGNED and INSCRIBED: *"RICHARD GORDON, Apollo XII CMP."*

The Apollo XII astronauts pose in white space suits in front of a Lunar Module Trainer with lunar surface experiments in the foreground.

2. Apollo XII crew emblem Beta Cloth, approximately 9 inches square. BOLDLY SIGNED by CHARLES CONRAD, DICK GORDON, and ALAN BEAN around their mission emblem.

This Beta cloth is from the same run of emblems actually sewn onto the Apollo XII flight suits. Beta cloth was the fire protection layer of the Apollo space suit.

3. Apollo XII postal envelope with a full color crew emblem cachet. Post marked at Cape Canaveral, FL on November 19, 1969, the lunar landing date for Apollo XII.

SIGNED by CHARLES CONRAD, RICHARD GORDON, and ALAN BEAN.

USD600 - 900



SOVIET LUNA 16 UNMANNED LUNAR PROBE MODEL

Model in metal and plastic, on painted wood base with plaque reading "Luna 16 Robotic Probe - Lavochkin Research and Production Association Design Bureau." Height: 14-3/8 inches (365 mm); base 16-3/8 x 16-1/2 inches (416 x 419 mm). 1:10 scale.

Luna 16 was the first robotic lunar lander to collect a sample of lunar soil and return it to earth. It was launched September 12, 1970, arriving after NASA's Apollo 11 and 12 missions.

USD8,000 - 12,000





137 APOLLO 13 FLOWN SCHEMATIC

Printed schematic, "Sequential Power Distribution," 265 x 503 mm, [1970], folded, with labeled tab, excellent condition.

SIGNED & INSCRIBED by Lunar Module Pilot Fred Haise: "Flown to the Moon aboard Apollo 13 / Fred Haise LMP," and by Commander Jim Lovell: "James Lovell / CDR Apollo 13."

The schematic relates to Command Service Module power distribution system, the very system that partially failed after an explosion and threatened the lives of the three astronauts leading to a combined heroic effort of both NASA Mission Control and the astronauts.

USD4,000 - 6,000

138

APOLLO 13 FLOWN MALFUNCTION PAGE

SIGNED BY JAMES LOVELL AND FRED HAISE

Lunar Module Malfunction Procedures, March 16, 1970, 2 pp (recto and verso), SIGNED ("Fred Haise Apollo 13" & "James Lovell Apollo 13 CDR"), being pp 73-74 from the Flight Data File.

Apollo 13 was meant to be the third Apollo mission to land on the Moon, but an oxygen tank in the Service Module (SM) failed two days into the mission. The SM life support and propulsion system went down and this forced the crew and Mission Control to find a way to bring the astronauts safely home as the whole world watched. The present sheet was flown aboard the Lunar Module, which became the makeshift life support system for the Command Module, and details the malfunction procedures for the 16mm and 70mm cameras.

LUNAR ORBIT PHOTO TASKS FOR APOLLO 13 THE COMPLETE CHART A SERIES CONSISTING

THE COMPLETE CHART A SERIES CONSISTING OF FOUR MAPS

Lunar Orbital Science Flight Chart, Chart A, 1 of 4, 2 of 4, 3 of 4, and 4 of 4, Apollo Mission 13, REV 1 through 18. First Edition, February 2, 1970. Aeronautical Chart and Information Center, USAF for NASA. All 21¹/₂ x 43 inches. Issued for the April 11, 1970 launch date with spacecraft part number SKB 32100082-327. Scale 1:2,500,000 with nautical mile distance markers found in two locations. Each with three vertical folds making 4 equal sized segments.

ALL charts SIGNED and/or INSCRIBED by FRED HAISE. Charts 1, 2, and 4 have Haise's additional inscription of: "*Apollo 13 LMP*." Chart 3 has Haise's inscription of: "*Where Jim and I planned to land!*" with a long arrow drawn to the red landing ellipse.

These four charts cover the entire lunar surface (near and far sides, no longitude gaps) from 20 degrees North and South latitude. Continuous tracks for orbits 1 through 18 are plotted in three colors at the near centers of each chart. Two have legends defining camera lens to use and symbols for the landing site, subsolar point, subearth point, photo targets, and visual observation limits.

USD1,000 - 1,500

140

APOLLO 13 LUNAR CHART WITH 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 40-1/2 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.

USD800 - 1,200

141

APOLLO 13 CELEBRATION

Original printed sign, 557 x 708 mm, Chicago, [May 1, 1970], "Chicago Welcomes / Apollo XIII" in red, white and blue. The world collective held their breath when two days into the mission, the Apollo 13 command service module oxygen tank exploded. A heroic effort from NASA's mission control and the crew of commander Jim Lovell, command module pilot Jack Swigert and lunar module pilot Fred Haise brought the astronauts safely back to Earth.

The present sign is from the May 1st Chicago Apollo 13 tickertape parade where it was reportedly attended by half a million people. Included is an original photograph of the parade with an example of the sign visible.

USD1,000 - 2,000



139



140



141



142 APOLLO 14 LUNAR BIBLE

COMPLETE HOLY BIBLE FLOWN TO THE SURFACE OF THE MOON Microform Holy Bible, 25 x 25 mm (1 x 1 inch), World Publishing, [1971], numbered in pen on the left margin "14c18," contained in ornate gold metal presentation setting and in deluxe leather presentation folder. Carried by Lunar Module pilot Edgar Mitchell in his Personal Preference Kit (PPK) during Apollo 14 aboard the Lunar Module Antares.

Accompanied by a letter of provenance. In full: *"I certify that this Holy Bible listed in the official Apollo Prayer League Lunar Bible Registry and containing all 1,245 pages of the King James Bible.*

"Was flown by Astronaut Edgar D. Mitchell to the Surface of the Moon on February 5, 1971 on the Lunar Module Anteres on behalf of Reverend John M. Stout, Director of the Apollo Prayer League.

"In 1968 a group of individuals associated with NASA program formed the Apollo Prayer League, an organization dedicated to the prayerful support of NASA employees and the Apollo astronauts. A primary goal of the group was to land a Bible on the moon in honor of astronaut Edward White Jr., who died January 27, 1967 in the Apollo 1 fire. White had wanted to carry a Bible to the moon.

"Members of the Apollo Prayer League employed at the Manned Spacecraft Center in Houston made a special multi-focal 'First Lunar

	THE APOLLO PRAYER LEAGUE
	Contraction of the second seco
	I CERTIFY that this HOLY BIBLE Listed in the official Apollo Prayer League Lunar Bible Registry and containing all 1,245 pages of the King James Bible.
	Was flown by Astronaut Edgar D. Mitchell to the Surface of the Moon on February 5, 1971 on the Lunar Module Anteres on behalf of Reverend John M. Stout, Director of The Apollo Prayer League.
	In 1968 a group of individuals associated with NASA program formed The Apollo Prayer League, an organization dedicated to the prayerful support of NASA employees and the Apollo astronauts. A primary goal of the group was to land a Bible on the moon in honor of astronaut Edward White Jr., who died January 27, 1967 in the Apollo 1 fire. White had wanted to carry a Bible to the moon.
	Members of The Apollo Prayer League employed at the Manned Spacecraft Center in Houston made a special multi-focal "First Lunar Bible" comprised of Ed White's Revised Standard Version and the King James Version. Bible societies in fifty-seven different countries participated in the project.
	This Lunar Bible is a replica of the King James Version used in making the composite Bible. This Lunar Bible also landed on the surface of the moon and was returned to Reverend Stout, where it has remained as part of his private collection. It was released this 24 th day of April 2009 for placement in this selected museum.
	ATTESTED:
	Edgar D. Mitchell Apollo 14 Lunar Module Pilot

Bible' comprised of Ed White's Revised Standard Version and the King James Version. Bible societies in fifty-seven different countries participated in the project.

"The Lunar Bible is a replica of the King James Version used in making the composite Bible. This Lunar Bible also landed on the surface of the moon and was returned to Reverend Stout, where it has remained as part of his private collection. It was released this 24th day of April 2009 for placement in this selected museum.

Attested: Edgar D. Mitchell / Apollo 14 Lunar Module Pilot; John M. Stout / Director, The Apollo Prayer League."



143

MITCHELL & THE US FLAG ON THE MOON AT FRA MAURO

Large-format color photograph, 16×20 inches. Astronaut Edgar Mitchell on the lunar surface next to the United States flag.

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

Alan Shepard takes Mitchell's picture during the first lunar surface exploration of Apollo 14 (EVA-1).

USD600 - 900

144

APOLLO 15 FLOWN BETA CLOTH UTILITY BAG

HELPED TO SAVE THE MISSION

Beta cloth CM Utility Towel Assy., NASA part no SEB42100079-204, approx. 8 x 13 inches, B. Welson Co, February 26, 1969, serial no 1115, SIGNED & INSCRIBED by Dave Scott and with a signed certificate by Scott.

SIGNED AND INSCRIBED BY DAVE SCOTT: "FLOWN ABOARD APOLLO 15, June 26 - Aug 7, 1971 / Dave Scott / Apollo 15 CDR."

Accompanied Dave Scott-signed certificate. In part: "This particular bag played an essential role in the recovery from an emergency during Apollo 15. Soon after departure from Earth orbit and on the way to the Moon, the crew encountered a severe water leak of unknown origin inside the spacecraft. In zero-G water adheres to any surface and accumulates in globs that break off and float freely to any other surface. This results in two dangerous situations: (1) the water may adhere to a switch and cause a short circuit in the electrical system and potentially a fire; and/or (2) the loss of water in an Apollo spacecraft will result in the loss of cooling for especially the guidance and navigation equipment - such a loss could terminate the mission and even preclude successful recovery on Earth. Fortunately the towels in this particular bag were readily accessible and quickly retrieved to soak up the floating water and prevent these hazards from occurring. Subsequent procedures from MCC enabled the crew to find and fix the leak. (signature) / Dave R. Scott / Commander, Apollo 15."

USD4,000 - 6,000



144



We want the state of the state of the state is a state of the state o

The designed water was an experiment of the wave relation of the second of the plane. The manipplication was been as a second of the second of the second second water and the second s

The perturbative leng period or research of the is in the interactive from a remerging where period or research of the is in the interactive concentration of the int

bits the sum the function means of these lastings and processing in operating controls controls a susception of the sum to be controls and the control and the sum to be controls and the control and the control and the sum to be controls and the control and the sum to be controls and the control and the control and the control and the sum to be controls and the control and the control

Dere Stith

144





145

145 APOLLO 15 FILM GROUP

Collection of 70mm and 16mm film positives. Including:

1. 7 individually wrapped 70mm rolls, each with original printed label. Includes magazines: LL, MM, OO, PP, RR, SS & WW.

2. 70mm spool containing magazines KK, TT, NN.

3. 3 16mm color reels, each in metal cannister with original NASA-MSC label. Includes: "Mag BB Ascent," "Mag EE Lunar Surface" and "Mag AA Descent."

Provenance: Jet Propulsion Laboratory scientist Dr. Conway W. Snyder.

Apollo 15 was the 4th manned mission that landed on the moon. It was the first to use the Lunar Roving Vehicle. The above positives include both the 70mm Hasselblad positives in color and black and white where applicable and include footage of all three EVAs on the lunar surface as well as footage of Lunar orbit and the Transearth coast. The 16mm film is all color footage of the ascent and descent of the Apollo spacecraft as well footage of the lunar surface.

USD2,000 - 3,000

146

APOLLO 15: GROUP OF 4 "RED NUMBER" PHOTOGRAPHS

4 Color photographs, 8 \times 10 inches, 1971, with red NASA identification number in margin

Includes:

1. S-15-86-11601: Jim Irwin at the Lunar Rover Vehicle during the first EVA.

2. AS15-87-11847: Dave Scott taking core samples on the Lunar surface, August, 1971, NASA text slip taped to verso.

AS15-88-11901: The Lunar Roving Vehicle alone during the 3rd EVA.
 AS15-88-11972: The Command Service Modules in Lunar orbit photographed from the Lunar Module.

*WITH: Period gelatin silver print photograph, AS15-85-11471 in black in upper margin.

USD1,000 - 2,000





148



147 APOLLO 15: USS OKINAWA

Original Apollo 15/USS Okinawa navy canvas jacket, "Apollo-15 / USS / Okinawa / LPH-3," August 7, 1971, size medium, SIGNED by Al Worden and Dave Scott on the chest.

The USS Okinawa (LPH-3) recovered the Apollo 15 command module on August 7th, after a 12-day mission to the Lunar surface. The present jacket would have been offered for sale aboard the USS Okinawa during the time and was signed some time later by Command Module Pilot Al Worden and Commander Dave Scott. The jackets are rare on the market, especially signed.

USD1,000 - 2,000



148

APOLLO 15 LUNAR EVA

Large format color photograph, 16 x 20 inch. *SIGNED* by Dave Scott as "Apollo 15 CMR."

Evocative James Irwin photo of Dave Scott with the Lunar Rover among the sloping Lunar landscape of Hadley Rille.

USD1,000 - 2,000

149

DAVE SCOTT SALUTES THE STARS AND STRIPES

EXPLORATION AT ITS GREATEST 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 spoken from the lunar surface. Photographed by Janes Irwin during the second lunar surface exploration (EVA 2).

USD600 - 900

APOLLO 16: FAR ULTRAVIOLET CAMERA/SPECTROGRAPH

Ultraviolet camera lens and ultraviolet light converter, mixed materials, before 1972.

Provenance: Estate of Dr. Kenneth Leslie Hallam (1930-2015). Dr, Hallam was a NASA astrophysicist and optical engineer. He oversaw science instrument development at the NASA Goddard Space Flight Center in Greenbelt, Maryland including work on the Hubble Space Telescope.

Dr. George Carruthers developed a portable ultraviolet camera for use on the Moon during Apollo 16 based off of his patent for an "Image Converter for Detecting Electromagnetic Radiation Especially in Short Wave Lengths." The present components likely come from the development process some time preceding the mission. Unlike the example that flew - and which is still on the Lunar surface, the present example is not gold plated, but is likely made of milled aluminum and other metals and is fitted with glass lenses. Dr. Carruthers was asked to explain the camera's use on A16 for a general audience: "the most immediately obvious and spectacular results were really for the Earth observations, because this was the first time that the Earth had been photographed from a distance in ultraviolet light, so that you could see the full extent of the hydrogen atmosphere, the polar auroris and what we call the tropical airglow belt."

The lot also includes a series of 12 3x4-inch glass slides explaining various aspects of the camera.

USD1,000 - 2,000

151

CHARLIE DUKE SIGNED LUNAR TOPOGRAPHIC MAP

"THAT FIRST FOOT ON THE LUNAR SURFACE IS SUPER!" National Aeronautics and Space Administration Lunar Topographic Orthophotomap, Washington: Defense Mapping Agency, November 1974, Edition 1, Sheet LTO78D2, SIGNED AND INSCRIBED by Charlie Duke. Apollo 16 Lunar Module Pilot Charlie Duke signs and inscribes close to the Apollo 16 landing site in the heavily cratered Lunar highlands. In full: "Fantastic! Oh, that first foot on the Lunar surface is super! / Charlie Duke / Apollo 16 LMP."

USD600 - 800

152

APOLLO 16: 8 "RED NUMBER" PHOTOGRAPHS

 $8\ {\rm Color}\ {\rm photographs}, 8\ {\rm x}\ 10\ {\rm inches},\ 1972,\ {\rm with}\ {\rm red}\ {\rm NASA}\ {\rm identification}\ {\rm number}\ {\rm in}\ {\rm margin}$

Including:

1. S-72-35347: Apollo 16 spacecraft at launch.

 S-72-37001: Thomas Mattingly II and Charlie Duke during EVA.
 AS16-107-17446: LM pilot Charlie Duke with Lunar Rover at Station 4 near Stone Mountain, April 22, 1972, NASA text slip taped to verso.
 AS16-113-18294: Command Service Modules taken from teh Lunar Module above the Lunar surface, April XX, 1972, NASA text slip taped to verso.

5. AS16-113-18374: Commander John Young at the deployment site of the ALSEP during the mission's first Lunar EVA, taken by Charlie Duke, April 21, 1972, NASA text slip taped to verso.

6. AS16-114-18427: Charlie Duke near Plum Crater during the first Lunar EVA, April 21, 1972, NASA text slip taped to verso.

7. S16-115-18559: John Young driving the Lunar Rover during the 3rd Lunar EVA, the shadow of the Lunar Module in the foreground, April 23, 1972, NASA text slip taped to verso.

8. AS16-116-18578: John Young beside the Lunar Rover during the first Lunar EVA, April 21, 1972, NASA text slip taped to verso.



150



103

154

153

APOLLO 16 MISSION CHART COLLECTION

WOW! MAN, LOOK AT THAT!

1. Theophilus, Lunar Shaded Relief — 78. Defense Mapping Agency for NASA with detailed legend. First edition, September 1978. 29 x 22 inches. The 78th chart of the LSR series showing the rugged highland region of the Apollo 16 landing site. Latitude and longitude are plotted down to 1/12 degree tick marks.

INSCRIBED and SIGNED with his first words immediately after landing: "Contact, Stop, Whuump! Wow! Man, look at that! Old Orion is finally here, Houston. Fantastic! CHARLES M. DUKE, JR, Apollo 16 LMP." Additionally, Duke has marked the Apollo 16 landing site with an "X" and inscribed the lunar stay dates of "April 20 – 23, 1972." The chart illustrates the difficulty of landing in the lunar highlands.

2. Apollo Earth Orbit Chart (AEO), Apollo 16 Mission, For April 16, 1972 Launch Date. Aeronautical Chart and Information Center, USAF for NASA. February 15, 1972. First Edition. Earth Map in color, 13-1/2 by 42 inches. The first orbit is drawn in light blue with the second in dark blue. The TransLunar Injection (TLI) burn is plotted in red over the Pacific Ocean. The black jagged circular areas are the ground tracking station coverage footprints.

BOLDLY SIGNED and INSCRIBED: "CHARLES M. DUKE, Jr., Apollo 16 LMP" in Pacific Ocean area.

3. Apollo Lunar Orbit Chart (ALO), Apollo Mission 16, Trajectory for CSM Revolutions 1, 39, 41, 60, 62, and 75. April 16, 1972 Launch Date. Aeronautical Chart and Information Center, USAF for NASA. February 16, 1972. First Edition. Moon Map in color, 12 by 41-1/2 inches. Multiple colors provide easy indemnification of lunar orbit tracks. The Lunar Module Orion's Powered Descent (PDI) start point is marked plus the landing ellipse. Major mare areas and larger craters are identified.

BOLDLY SIGNED and INSCRIBED: "CHARLES M. DUKE, Jr., Apollo 16 LMP" near his landing site.

USD600 - 900

154

APOLLO 17 FLOWN FOOD PACKETS

"FLOWN ON THE LAST MISSION TO THE MOON" Contingency Feeding System containing 3 food packets in 2 sealed packages, each approximately 70 x 180 mm, each in zippered "Food

Restrainer Pouch," 1972, sealed and unused.

SIGNED & INSCRIBED BY GENE CERNAN: "These 3 Food Packets Flown on the Last Mission to the Moon / Gene Cernan / Apollo XVII - CDR."

USD5,000 - 7,000

155

APOLLO 17 LUNAR SURFACE FLOWN LM FLIGHT DATA FILE PAGE

Lunar Module Contingencies Flight Data File, 2 pp (recto/verso), August 31, 1972, SIGNED & INSCRIBED by Gene Cernan, *FLOWN ABOARD THE LUNAR MODULE TO THE SURFACE OF THE MOON*. Gene Cernan's inscription in full: *"Flown to Taurus Littrow / Gene Cernan / Apollo XVII."* Cernan refers to the LM landing site of the Taurus-Littrow valley where the crew would spend over 3 days. The sheet addresses procedures for AB, CB and COMM activation.

USD4,000 - 6,000

156

APOLLO 17 LUNAR FLOWN BETA CLOTH EMBLEM

SIGNED BY COMMANDER GENE CERNAN Apollo 17 Beta cloth mission emblem, 1972, SIGNED & INSCRIBED approximately 7 x 7 inches.

"Flown Aboard 'America' / Gene Cernan / Apollo XVII CDR." Apollo 17 was the final time humans walked on the moon and included the longest Moon landing, longest total Lunar EVAs, longest time in Lunar orbit and the largest Lunar sample. The Apollo 17 mission insignia, this example, flown aboard the Command Service Module America for the 12 and a half day mission, was designed by artist Robert McCall with input from the astronauts. It features the god Apollo over the outline of an eagle with red bars and stars of the US flag, the eagle's wing touches the Moon in the upper right, the planet Saturn and a galaxy appear in the open space on the right side.

USD3,000 - 4,000

158

157

APOLLO 17: GENE CERNAN SIGNED LUNAR MAP

Mare Serenitatis. Washington: GPO, 1976. Original printed map, 635 x 635 mm, folded, excellent condition.

BOLDLY SIGNED by Apollo 17 Commander Gene Cernan with an arrow pointing to the A17 landing site.

USD600 - 800

158

LITTROW: THE LAST LUNAR LANDING SITE BY MAN DURING THE 20TH CENTURY

EXTENSIVELY INSCRIBED BY COMMANDER GENE CERNAN. Littrow, Lunar Topographic Orthophotomap. Lunar chart based on Apollo 15 and 17 photographic data including ITEK and Fairchild cameras. Published by the Defense Mapping Agency for NASA, October 1974. 27 x 25.5 inches.

Boldly INSCRIBED and SIGNED: "The Valley of Taurus Littrow. Home of the final steps of Apollo, Dec 11 – 14, 1972. GENE CERNAN, Cdr Apollo XVII."

A large black pennant marks the last landing area of the Apollo Program near the lower left corner of the chart. Contour lines are marked in red every 100 meters partly based on laser altimeter data from both the Apollo 15 and 17 Service Module SIM (Scientific Instrument Module) Bays. A detailed chart description is located along the lower margin.

USD800 - 1,200

159

APOLLO MOONWALKER-SIGNED LUNAR PLANNING CHART

Lunar Earthside Chart (LEC-1), Washington: US GPO, July 1968, First edition, SIGNED & INSCRIBED with mission title by 6 astronauts. SIGNED BY A MOONWALKER FROM EACH OF THE 6 APOLLO MISSIONS TO LAND ON THE MOON. Signatures include:

- 1. BUZZ ALDRIN APOLLO 11.
- 2. ALAN BEAN Apollo 12.
- 3. EDGAR MITCHELL Apollo 14.
- 4. DAVE SCOTT Apollo 15.
- 5. CHARLIE DUKE Apollo 16.
- 6. GENE CERNAN Apollo 17.

USD8,000 - 12,000

160

APOLLO ERA: GROUP OF 7 MSC TEAM PLAQUES

Awarded to Richard J. Stachurski, as Network Controller, Mission Control Center Painted ceramic, each 250 x 185 mm (10 x 7 1/2 inches). Includes: 1. Apollo 7 1968. 2. Apollo 8, 1968 3. Apollo 9, 1969. 4. Apollo 10, 1969. 5. Apollo 12, 1969. 6. Apollo 13, 1970. 7. Apollo 14, 1971.

Stachurski was an Air Force colonel who was assigned to the Apollo Program. He has published articles and a book about his experience at Manned Spacecraft Center working at the Mission Control Center. It is unknown how many the the MSC team plaques were made, but the handsome awards are rarely encountered.

USD3,000 - 5,000

30+1418 COR FROM THE EARTH TO THE MOON Andal Callum april II CMP and Have apollo 13 LMP BO Workere Arolois

Harman R. Schmitt Ronald E. Strate

162

161 APOLLO PROGRAM

161

VERNE, JULES. From the Earth to the Moon Direct in Ninety-Seven Hours and Twenty Minutes: And a Trip Round It. New York: Charles Scribner's Sons, 1905.

8vo. Original red cloth. Illustrated.

SIGNED BY 10 APOLLO ASTRONAUTS, each with their mission(s) listed: Rusty Schweickart - Apollo 9 Lunar Module Pilot; Walter Cunningham - Apollo 7 Lunar Module Pilot; Tom Stafford - Apollo 10 Commander; Michael Collins - Apollo 11 Command Module Pilot; Al Worden - Apollo 15 Command Module Pilot; Dave Scott - Apollo 9 Command Module Pilot & Apollo 15 Commander; James Lovell - Apollo 8 Command Module Pilot & Apollo 13 Commander; Frank Borman - Apollo 8 Commander; Fred Haise - Apollo 13 Lunar Module Pilot; and Charlie Duke - Apollo 16 Lunar Module Pilot.

Jules Verne's 1865 vision of space travel a century before humanity would realize the dream was mentioned by Neil Armstrong before Apollo 11: "A hundred years ago, Jules Verne wrote a book about a voyage to the Moon. His spaceship, Columbia [sic], took off from Florida and landed in the Pacific Ocean after completing a trip to the Moon. It seems appropriate to us to share with you some of the reflections of the crew as the modern-day Columbia completes its rendezvous with the planet Earth and the same Pacific Ocean tomorrow."

USD3,000 - 5,000

JULES VERNE'S FROM THE EARTH TO THE MOON SIGNED BY 10 APOLLO ASTRONAUTS.

162

OFFICIAL NASA APOLLO COLOR PHOTOLITHOGRAPH COLLECTION

INCLUDES 12 LITHOS HAVING 15 ASTRONAUT AUTOGRAPHS 11 color and 1 black and white 8 x 10 photolithographic prints with official NASA captions along the front white borders and on verso. The collection is comprised of:

 Walt Cunningham Apollo 7 portrait in his blue aircraft flight suit next to a large Saturn IB rocket model. SIGNED by WALT CUNNINGHAM.
 The Apollo 7 crew in their white space suits. SIGNED by WALLY SCHIRRA and WALT CUNNINGHAM.

3) The Apollo 9 crew in their white space suits at the Kennedy Space Center. SIGNED by JIM McDIVITT, DAVE SCOTT, and RUSTY SCHWEICKART who INSCRIBES "Apollo 9 LMP."

4) Four flight images from the Apollo 9 mission. SIGNED by DAVE SCOTT next to a photograph of him during his stand-up EVA.

5) Official NASA photolithograph released for the Apollo 11 fifth anniversary. SIGNED by BUZZ ALDRIN.

6) Fred Haise's Apollo 13 space suit portrait. SIGNED and INSCRIBED: *"FRED HAISE, Apollo 13 LMP."*

7) The Apollo 13 crew wearing coat and ties, including replacement astronaut John "Jack" Swigert. SIGNED by FRED W. HAISE, Jr.
8) Edgar Mitchell Apollo 14 space suit portrait. SIGNED and INSCRIBED: "EDGAR MITCHELL, Apollo 14, 6th man to walk on the moon."

9, 10, and 11) An Apollo 15 space suit crew portrait, a wide angle image of the Apollo 15 Saturn V launch, and a black/white image of Dave Scott on the moon with Hadley Rille in the background. EACH SIGNED by DAVE SCOTT.

12) Apollo XVII crew space suit portrait with a lunar rover and their Saturn V rocket at the Kennedy Space Center in the background. SIGNED and INSCRIBED: "*GENE CERNAN, Apollo XVII.*"

USD1,000 - 1,500

163

APOLLO ASTRONAUT-SIGNED LUNAR CHART

SIGNED BY 6 APOLLO ASTRONAUTS
Lunar Farside Chart (LMP-2), Washington: US GPO, January 1970, First edition, SIGNED & INSCRIBED with mission title by 6 astronauts.
LUNAR FARSIDE CHART SIGNED BY:
1. WALTER CUNNINGHAM - Apollo 7.
2. FRANK BORMAN - Apollo 7.
3. RUSTY SCHWEICKART - Apollo 9.
4. JIM STAFFORD - Apollo 10.

5. RICHARD GORDON - Apollo 12.

6. JAMES LOVELL - Apollo 13.

USD2,000 - 3,000

164

SKYLAB 2 SILVER ROBBINS MEDALLION

Skylab 2 Robbins medallion, sterling silver, mission emblem to obverse, mission dates to reverse, 1973.

The first crewed mission to the U.S. orbital space station Skylab. The crewmembers were Pete Conrad, Joseph Kerwin and Paul Weitz.

USD500 - 700

165 SKYLAB ASTRONAUT-SIGNED IMAGE

SIGNED BY ALL 9 PRIME CREWMEMBERS

Photolithograph depicting Skylab and 9 crewmembers, 8x10-inches, SIGNED by all 9 prime crewmembers, c.1973-1974.

Includes signatures of: Charles "Pete" Conrad, Joe Kerwin, Paul Weitz, Alan Bean, Owen Garriott, Jack Lousma, Bill Pogue, Ed Gibson and Jerry Carr, printed text on verso. Very good condition.

Skylab was the United States' first space station. Three crewed missions operated the station between May 1973 and February 1974. Hundreds of experiments were conducted on the station, which included an orbital workshop and a Solar observatory. The station was to be re-boosted, but due to delays with the Space Shuttle program, Skylab's orbit decayed and it disintegrated in the atmosphere on July 11, 1979.

USD800 - 1,200

166

APOLLO-SOYUZ CREW MEDAL

brass medal designed by Konstantin Dmitrievich Hrenkov, 60 mm diameter, Mytishchi, Soviet Union, 1975, made in two halves that "dock" together to form a single piece, the obverse commemorating the "*First International Space Docking*" in English and Russian, with the two spacecraft on opposite halves of the medal; the reverse featuring U.S. and Soviet Russian flags, and the date "1975." Contained in white plastic case with felt-line base and clear acrylic insert.

One of only a very few medals produced. It was made along with the examples that were flown and "docked" in space during the Apollo-Soyuz mission.

STAFFORD, BURKE AND HECKER, INC. INCOMPANY STREET ALEXANDRA, VIRGINA UNIT

This Apollo-Sovuz Beta cloth omblem was carried in space on the historic Apollo-Sovuz Test Project during July 15 – 24, 1975. It was placed in my personal preference kit (PPK) on board the Apollo Command Module.

Beta cloth was used for a fire protection layer in our Apollo spacesnits. This emblem has been signed by all Apollo and Soyuz crew members. I have written 'Flown on ASTP, 15 – 24 July 75, Tom' on the emblem.

168

167 APOLLO-SOYUZ TEST PROJECT

BERKEY, JOHN. 1932-2008. Original painting for the TV Guide cover of the Apollo-Soyuz Mission coverage, July 12-18, 1975. Oil on board, 380 x 260 mm, signed ("Berkey") lower left, matted and framed.

John Berkey, who had done work for NASA, is best known for his promotional artwork for the original Star Wars trilogy. The above piece captures the spirit of the Apollo-Soyuz Test Project with an American astronaut and a Soviet cosmonaut reaching toward each other for a handshake in space, an image of the Earth looms in the lower right corner.

USD3,000 - 5,000

168

TOM STAFFORD'S ASTP FLOWN BETA CLOTH

FLOWN Apollo Soyuz crew emblem, 3-1/2 inches in diameter. Printed on a white Beta cloth section 5-1/2 inches square. Displayed with descriptive text on TOM STAFFORD business stationery.

The Beta emblem is SIGNED by TOM STAFFORD, D.K. SLATON, VANCE BRAND, ALEXEI LEONOV, and VALERY KUBASOV. Additionally INSCRIBED and SIGNED: "*Flown on ASTP, 15-24 July 1975, Tom*" [Stafford].

The letter text reads: "This Apollo-Soyuz Beta cloth emblem 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.

Beta cloth was used for a fire protection layer in our Apollo spacesuits. This emblem has been signed by all Apollo and Soyuz crew members. I have written 'Flown on ASTP, 15 – 24 July 75, Tom' on the emblem."

USD1,000 - 1,500

169

STAFFORD'S FLOWN ASTP BETA CLOTH EMBLEM

Apollo/Soyuz beta cloth emblem, 140 x 145 mm, the printed emblem itself 88 mm diameter, SIGNED AND INSCRIBED by Stafford: "FLOWN ON ASTP – July 15-24, 1975 – Tom Stafford." Fine condition.

Stafford, along with Vance Brand and Deke Slayton, flew the historic Apollo/Soyuz Test Project mission in 1975, the first joint U.S./Soviet space mission.

USD800 - 1,200

169

170

APOLLO SOYUZ FLIGHT PHOTOGRAPH COLLECTION AND THE FIRST USA-USSR HANDSHAKE IN SPACE

ALL SIGNED BY THE COSMONAUT OR ASTRONAUT PICTURED All are approximately 10 x 8 or 8 x 10 inches, four in color, two in black and white:

1. Black and white photograph of Alexei Leonov and Valery Kubasov in their space suits prior to the Soyuz launch on July 15, 1975. SIGNED by LEONOV and KUBASOV.

2. Color photograph of Apollo Commander Tom Stafford shaking hands with Soyuz Commander Alexei Leonov at the moment of the first opening of their common docking vehicle on July 17, 1975. SIGNED by STAFFORD and LEONOV.

3. Color photograph of accomplished artist Alexei Leonov poses for a photograph while finishing a sketch of Tom Stafford during the Apollo Soyuz flight. SIGNED by LEONOV.

4. Color Photograph of Flight Engineer Valery Kubasov performing experiments inside the Docking Module during the Apollo Soyuz flight. SIGNED by KUBASOV.

5. Color photograph of Tom Stafford and Valery Kubasov inside the Docking Module. SIGNED by STAFFORD and KUBASOV.

6. Black and white photograph of Alexei Leonov and Valery Kubasov in their space suits after their Soyuz spacecraft landing on July 21, 1975. SIGNED by LEONOV and KUBASOV.

USD600 - 900

171

DR. MAX FAGET SPACE COLLECTION

A SET OF SEVENTEEN BOOKS FROM DR. FAGET'S PERSONAL LIBRARY

Dr. Maxime "Max" A. Faget (1921–2004) received a bachelor of science degree in mechanical engineering from Louisiana State University in 1943, then served as a U.S. Navy submarine officer in the South Pacific during World War II. After the war, he joined the National Advisory Committee for Aeronautics (NACA) in 1946. When NACA became NASA in 1958, he was heavily involved in Project Mercury as the lead spacecraft designer and developed the concept for the Mercury escape rocket which was later applied during the Apollo Program. His next work was in the development of the Space Shuttle during the very late 1960's and early 1970's. During his career he wrote or co-author dozens of technical papers and books on many topics relating to aircraft, rocketry, spacecraft design and reentry. Dr. Faget retired from NASA in 1981.

This collection includes:

1. CARPENTER, M. SCOTT, ET AL. *We Seven. By the Astronauts Themselves.* New York: Simon and Schuster, 1962. 375 pp. 6 by 8½ inches. Original cloth. Book club edition.

SIGNED by SCOTT CARPENTER, WALLY SCHIRRA, and GORDON COOPER on the front endpapers which illustrate a Mercury Atlas launch. Schirra and Cooper have added their individual Mercury spacecraft names.

Each of the Mercury astronaut has written multiple chapters on his program development support assignment and personal training experiences. Shepard, Grissom, Glenn, and Carpenter have chapters on their actual space flights.

2. ALDRIN, BUZZ with Wayne Warga. *Return to Earth.* New York: Random House, 1973. 338 pp. 6 by 8 ½ inches. Original quarter cloth. SIGNED by BUZZ ALDRIN on the title page. Aldrin describes the Apollo 11 flight and the difficulties of his "return to earth."

3. BENFORD, TIMOTHY B. & Brian Wilkes. *The Space Program Quiz and Fact Book.* New York: Harper and Row, 1985. 257 pp. 6 by 9 inches. Paper wraps.

SIGNED BY BOTH AUTHORS & INSCRIBED by Brian Wilkes on the half title page: "To Max Faget, One of the unsung heroes of America's space programs - ." Includes signed manuscript letter by Brian Wilkes which reads: "Dr. Faget, Best success in your new ventures. Any comment would be greatly appreciated." A fact-filled illustrated book on space exploration in a question and answer format.

4 & 5. FAGET, MAX. *Los Vuelos Espaciales Tripulados.* Santiago De Chile: Editorial Pomaire, 1968. 191pp. 5 ½ by 8 inches. Wraps. Two copies of the Spanish translation of Dr. Faget's 1965 book: *Manned Space Flight.* Contains all the illustrations as in his original work.

6. NASA SP-12, Results of the Third United States Manned Orbital Space Flight, October 3, 1962. Washington: GPO, 1962. 120pp. 8 by 10 ½ inches. Original blue wrappers. A detail review with graphs and illustrations of Wally Schirra's Mercury Sigma 7 flight.

7. *NASA SP-4201. This New Ocean.* Washington: GPO, 1966. 511pp. 7 by 10 inches. Original blue wrappers. An extensive history of the Mercury Program with additional data found in seven appendices.

8. *NASA SP-4402. Origins of NASA Names.* Washington: GPO, 1976. 227pp. 7 by 10 inches. Original wrappers. Describes and illustrates the origins and history of many NASA programs including launch vehicles, satellites, manned space flight, sounding rockets, and NASA facilities.

9. NASA EP-25. Space Exploration – Why and How. Washington: GPO, 1964. 8 by 10 ½ inches. 20pp. Original wrappers. Focus is on space around the earth, the earth's atmosphere and weather, the moon, and the planets. Extensively illustrated.

10 & 11. The Apollo Saturn 6 flight. NASA MSC Internal Note 66-FM-67. AS 502 Spacecraft Reference Trajectory. Houston, TX: NASA/MSC, 7 July 1966. Vol. I and II. 72 and 237 pp. 8 by 10 ½ inches. Stock covers with stapled bindings. Details of the second Saturn V flight. Volume I describes the purpose and scope of the flight, mission description, test objectives, and performance of the Command and Service Modules. Includes numerous charts and graphs. Volume II tabulates the AS-502 nominal mission trajectory

12. Apollo 11 Lunar Landing Mission Press Kit. Washington: GPO, 1969. 250pp. 8 by 10 ½ inches. Original wrappers. Ten anniversary souvenir edition, July 20, 1979. Identical to the original July 6, 1969 release covering all aspects on the Apollo 11 lunar landing flight. Extensively illustrated.

13. NASA EP-95. On the Moon with Apollo 16, A Guidebook to the Descartes Region. Washington: GPO, 1972. 290pp. 8 by 10 ½ inches.

Original wrappers. Contains extensive details for the fifth lunar landing mission of the Apollo Program. Includes landing site description, the lunar rover, lunar surface science, orbital science, and flight crew information.

14. A Shuttle Chronology 1964 --- 1973. Abstract Concepts to Letter Contract. Volume I, Abstract Concepts to Engineering Data, Defining the Operational Potential of the Shuttle. Houston, TX: NASA/JSC, December 1988. 289 pp. 8 ½ by 11 inches. Card stock with stapled binding. An exhaustive compilation of early Space Shuttle information.

15. COVINGTON, JAMES W. *History of Apollo Launch and Support Facilities*. Part I. Loose leaf comment edition, copy number 60. Labeled: "For Internal Use Only, Not For Public Release or Citation." 70 pp. Describes the history associated with Apollo launch complex 34, 37, and 39 at the Kennedy Space Center.

16. United Press International. *Gemini, America's Historic Walk in Space.* Englewood Cliffs, N.J.: Prentice-Hall Inc., 1965. 98pp. 9 by 11 inches. Original pictorial boards with dust jacket.

A photo-filled book featuring all aspects of the Gemini 4 flight and the first United States spacewalk by Ed White.

17. WINTER, FRANK H. *Prelude to the Space Age. The Rocket Societies: 1924-1940.* Washington: Smithsonian Institution Press, 1983. 207pp. 8 ½ by 11 inches. Original illustrated wrappers. An extensive history of early rocketry.

USD1,000 - 1,500

172 ATLAS FAMILY CONTRACTOR'S ROCKET MODELS

Group of 3 Contractor's Models General Dynamics, pre-1994.

 Advance Launch System, General Dynamics Space Systems Division, various materials, 618mm tall on 150mm wide base, 1/150 scale.
 Atlas IIA, General Dynamics Commercial Launch Services, various

materials, 588mm tall on 150mm wide base.

3. Titan/Centaur, General Dynamics Space Systems Division, various materials, 290mm tall on 175mm wide wooden base.

An interesting group of General Dynamics models showing variety of its Atlas-focused projects. The Atlas IIA was used to send a number of satellites into orbit. The third example is the Titan/Centaur upper stage used in Atlas rockets. The present example probably dates to the 1970s.

USD2,000 - 3,000

173

173

MOSAIC IMAGES OF MARS

51 large format silver gelatin photographs, most mosaic images of the surface of Mars, 13 $1/4 \times 19 1/2$ to 20 $\times 24$ images, with large format color print, 14 \times 18 inches, of the surface of Mars, a few with corners clipped, some penciled annotations on the verso, generally good condition. *Provenance:* Jet Propulsion Laboratory scientist Dr. Conway W. Snyder. Dr. Snyder served as Project Scientist on Viking Mars and was considered the most knowledgeable person on the red planet.

USD1,000 - 2,000

174

KIM POOR ORIGINAL PAINTING OF SATURN

Saturn from Dione, mixed media on canvas, 15 x 36 inches, signed ("P"), March, 1981, titled and stamped on the verso, framed. *Provenance:* Part of the Other Worlds traveling exhibition; featured in November 1983 issue of *Omni*, the November 1983 issue of *Science Digest* and the September 1981 issue of *L5 News*.

PUBLISHED VIEW OF SATURN FROM ITS MOON DIONE, printed in multiple publications and even appearing at the top of the artist's personal letterhead. The Tucson-based space artist was inspired by the then new high resolution images sent by the Voyager 1 probe that were being transmitted back to Earth beginning in November 1980.

USD3,000 - 5,000

175 SOYUZ-SALYUT PROGRAM

NOTES ON EMERGENCY IN-FLIGHT SPACESUIT REPAIR Manuscript notes with diagrams and hand-drawn illustrations by Oleg F. Gerasimenko-Kartenko, being the working notes on determining the repair procedure for an Orlan spacesuit to be done while in space, 7 pp, most 8-1/2 x 11-3/4 inches (216 x 298 mm), one approximately 23-1/2 x 12 inches (597 x 305 mm), torn at one end. Four pages are signed ("O.I. Герасименко") and dated October 29, 1983.

Provenance: Sotheby's *Russian Space History* March 16, 1996, lot 137, consigned to that sale directly by engineer Oleg F. Gerasimenko-Kartenko.

An interesting working manuscript in which Gerasimenko-Kartenko, an engineer specializing in the durability of spacecraft, had to quickly determine a solution for an in-flight spacesuit repair. The repairs were done after a planned spacewalk aboard Salyut-7 had to be scrapped in October 1983, due to a detected leak in the Orlan D-Model spacesuit shell. A procedure was devised to test for the location of the leak, and once it was found in the left foot, these procedures were transmitted to the Cosmonauts (Vladimir Lyakhov and Alexander Alexandrov), who were able to carry it out on October 29th. This allowed them to install the two additional solar batteries on the exterior of Salyut-7 needed to meet the power consumption needs on board the space station. The mission had other technical problems, including a fuel leak, which had to be repaired by the next crew to reach the space station, in February 1984. A fascinating view of a Soviet space engineering rescue.

USD3,000 - 4,000

176 w

SOVIET SOYUZ TM-12 SPACECRAFT MODEL

Fiberglass, metal and plastic model of a Soyuz-TM-12 spacecraft atop a Soyuz FG rocket, 1,634 mm (64-1/2 inches) tall, on 247 mm (9 3/4 inches) square black painted base, with plaque reading: *Soyuz TM-12 Space Rocket Model / MIR Space Station Expedition / May 18, 1991 / RKK Energia.* Decorated on the removable upper stage with Soviet and British flags.

RKK PROJECT PRESENTATION MODEL of one of the last Soviet flights to Mir. The Soviet Union would dissolve just a couple of months after the TM-12's return to Earth. Helen Sharman, the first British astronaut as well as the first woman to visit the space station Mir, flew aboard this flight as part of Project Juno, a privately-funded British spaceflight program.

USD5,000 - 7,000

177

178

177 SDAC

SPACE SHUTTLE COLUMBIA ORIGINAL CONTRACTOR'S MODEL

painted fiberglass, Downey, California: Rockwell International, c.1981, Rockwell International label bearing "Space Shuttle 1/100 Scale," Wesco Models label to underside of wood base.

A highly detailed 1:100 scale model of the Space Shuttle Columbia with articulated bay doors, shuttle measures 14 inches tall with 10 inch wingspan, mounted to 17 3/4 inch tall orange external fuel tank, and flanked by two white 17 1/4 inch tall solid rocket boosters. Mounted onto circular wooden base measuring together 23 1/4 inches tall.

USD2,000 - 3,000

SPACE SHUTTLE COLUMBIA TILE GROUP Group of tile samples various sizes and shapes and fiberglass blanket sample. Lot includes 3 large High-temperature reusable surface insula

178

sample. Lot includes 3 large High-temperature reusable surface insulation (HRSI) tile samples coated in black borosilicate with identification numbers in yellow and 5 smaller samples.

HRSI tiles, made from 99% pure silica glass fibers, were used where the re-entry temperature is below 649 degrees centigrade. The identification numbers on the tiles denotes that exact location they were to be placed on the orbiter.

USD1,000 - 2,000

179

179

SPACE SHUTTLE COLUMBIA INSTRUMENT PANEL BLUEPRINTS

Collection of 6 large blueprints, each approximately 3467×193 mm and 3 small plans, each approximately 400×280 mm, rolled, in original mailing tube from NASA.

Collection showing the complete instrument panel of the Space Shuttle Columbia. A fascinating collection that shows the original mechanical and analogue Shuttle instrument layout. The existing shuttles were updated with "glass cockpits" in the early 2000s.

USD800 - 1,200

180

SPACE SHUTTLE: ROBBINS SILVER MEDALLION GROUP STS 2, 4, 51-B, 51-J, 61-A, 61-B, 61-C

Group of 7 Robbins medallions, sterling silver, Mission emblem and crew names on obverse, mission dates and crew names on reverse, 1981-1986. WITH: 13 Robbins medallions in bronze including: STS-3, STS-6, STS-7, STS-8, STS-9, STS-41-C, STS-41-D, STS-41-G, STS-51-A, STS-51-C, STS-51-D, STS-61A(x2).

A collection of Robbins medallions covering a selection of early Shuttle missions and just predating the Space Shuttle Challenger disaster which was to happen with STS-51-L, the mission after STS-61-C.

USD4,000 - 6,000

181 CHALLENGER DISASTER

STS-51-L Robbins medallion, sterling silver, obverse with mission emlem, reverse 1986

The 25th mission of the Shuttle program, which ended in disaster during the spacecraft's ascent phase killing the 7-member crew. Students throughout the country were especially traumatized as they tuned in live to witness the first teacher in space, Christa McAuliffe. A special Presidential commission charged with finding the cause of the disaster, the Rogers commission, found that 2 o-ring seals failed on the right Solid Rocket Booster.

USD1,000 - 2,000

182 SPACE SHUTTLE: ROBBINS SILVER MEDALLION GROUP STS 26, 27, 29, 30, 28

Group of 5 Robbins medallions, sterling silver, mission emblem and crew names on obverse, mission dates and crew names on reverse, 1988-1989.

A RETURN TO FLIGHT. STS-26, September 29 - October 3, 1988, was the first mission after the Challenger disaster on January 28, 1986. Space Shuttle Atlantis in STS-27 was the most damaged spacecraft to land on Earth successfully. Atlantis' Thermal Protection System tiles were damaged during the ascent when insulating material from the right-hand solid rocket booster nose cap hit the orbiter. Had the shuttle not made it, it may have been the end of the program.

USD2,500 - 3,500

183 SPACE SHUTTLE: ROBBINS SILVER MEDALLION GROUP

STS 34, 33, 32, 36, 31

Group of 5 Robbins medallions, sterling silver, mission emblem and crew names on obverse, mission dates and crew names on reverse, 1989-1990.

STS-34 was responsible for deploying the Galileo probe that studied Jupiter and its moons. STS-32 was, up to the time, the longest shuttle mission at almost 11 days. STS-31 launched the Hubble Space Telescope into Earth orbit.

USD2,500 - 3,500

184 SPACE SHUTTLE: ROBBINS SILVER MEDALLION GROUP STS 41, 38, 35, 37, 39

Group of 5 Robbins medallions, sterling silver, mission emblem and crew names on obverse, mission dates and crew names on reverse, 1990-1991.

STS-41 launched the Ulysses probe to explore the polar regions of the Sun. STS-35 included Apollo-Soyuz Test Project veteran Vance Brand as commander. STS-37 launched the Compton Gamma Ray Observatory and included the first spacewalks since 1985.

STS 40, 43, 48, 44, 42

Group of 5 Robbins medallions, sterling silver, mission emblem and crew names on obverse, mission dates and crew names on reverse, 1991-1992.

STS-40 was the first to carry 3 women crew members, the most up to that time. The first email from space was sent during STS-43 using AppleLink on a Macintosh Portable. The main objective of STS-42 was to study the effects of microgravity on living organisms.

USD2,500 - 3,500

185

186

186 SPACE SHUTTLE: ROBBINS SILVER MEDALLION GROUP STS 45, 49, 50, 46, 47

Group of 5 Robbins medallions, sterling silver, mission emblem and crew names on obverse, mission dates and crew names on reverse, 1992.

STS-45 carried the first Atmospheric Laboratory for Applications and Science (ATLAS-1) experiments. STS-49, the maiden flight of the Space Shuttle Endeavour, included the only 3-person EVA in the course of the capture and relaunch of an Intelsat VI satellite. STS-50 was the first to land at Kennedy Space Center and was the longest Space Shuttle mission at just under 14 days. STS-47 included Mae Carol Jemison, the first black woman to travel into space as well as the first married couple in space.

USD2,500 - 3,500

187 SPACE SHUTTLE: ROBBINS SILVER MEDALLION GROUP

STS 52, 53, 54, 56, 55, 57

Group of 5 Robbins medallions, sterling silver, mission emblem and crew names on obverse, mission dates and crew names on reverse, 1992-1993.

Some of Star Trek creator Gene Roddenberry's ashes were carried aboard STS-52. STS-56 carried aboard the Atmospheric Laboratory for Applications and Science-2 (ATLAS-2) which collected data on the relationship between the sun's output and the Earth's middle atmosphere and how these factors affect the ozone layer. STS-55, also called D-2, was the second U.S./German Shuttle mission. STS-57 carried the pressurized Spacehab module in which a number of experiments were performed.

Group of 5 Robbins medallions, sterling silver, mission emblem and crew names on obverse, mission dates and crew names on reverse, 1994.

STS-65 was a Spacelab flight that included the International Microgravity Laboratory (IML-2). STS-66 included the Atmospheric Laboratory for Applications and Sciences – 3 (ATLAS-03), which studied the effects of the

Group of 5 Robbins medallions, sterling silver, mission emblem and crew names on obverse, mission dates and crew names on reverse, 1993-1994.

STS-51 launched the Advanced Communications Technology Satellite (ACTS) into orbit. STS-58 was primarily devoted to the physiological effects of the weightless environment of space. STS-61 was the first Hubble Space Telescope servicing mission. STS-60 was the first of the US/Russian Shuttle-Mir Program.

USD2,500 - 3,500

STS 59, 65, 64, 68, 66

Sun on the Earth's climate.

USD2,500 - 3,500

189

189

190

190 SPACE SHUTTLE: ROBBINS SILVER MEDALLION GROUP STS 63, 67, 71, 70, 69

Group of 5 Robbins medallions, sterling silver, mission emblem and crew names on obverse, mission dates and crew names on reverse, 1994-1995.

STS-63 was the 2nd mission of the US/Russian Shuttle-Mir Program and carried out the first rendezvous of the Shuttle with the Mir space station. It was also the first mission to include a female pilot, Eileen Collins. STS-67 included the Astro-2 Spacelab module wherein experiments related to ultraviolet spectral regions were conducted. STS-71 was the 3rd mission of the US/Russian Shuttle-Mir Program and the first to dock at the Russian space station Mir. STS-70 was the first flight of the Block 1 orbiter main engine. STS-69 was the 100th successful crewed NASA spaceflight.

STS 73, 74, 72, 75, 76

Group of 5 Robbins medallions, sterling silver, mission emblem and crew names on obverse, mission dates and crew names on reverse, 1995-1996.

STS-73 was the second United States Microgravity Laboratory (USML-2) Spacelab mission. STS-74 was the 3rd mission of the US/Russian Shuttle-Mir Program and the 2nd docking of the Shuttle with the space station Mir. STS-72 captured and returned the Japanese microgravity research spacecraft Space Flyer Unit (SFU). STS-75 was to carry the Tethered Satellite System Reflight (TSS-1R) into orbit, but the tether broke after 5 hours, before it was fully deployed the full 20.7 km. STS-76 was a US/ Russian Shuttle-Mir Program mission that carried Sharon Lucid, the first woman to live on the space station Mir.

USD2,500 - 3,500

191

192

SPACE SHUTTLE: ROBBINS SILVER MEDALLION GROUP STS 77, 78, 79, 80, 81

Group of 5 Robbins medallions, sterling silver, mission emblem and crew names on obverse, mission dates and crew names on reverse, 1996-1997.

STS-77 was devoted to opening the the commercial space frontier. STS-79 was the first to fly to the completed space station Mir. It retrieved US astronaut Sharon Lucid after 188 days in space. STS-80 was the longest Shuttle mission ever at 17 days, 15 hours and 53 minutes.

USD2,500 - 3,500

192

193 SPACE SHUTTLE: ROBBINS SILVER MEDALLION GROUP

STS 82, 83, 84, 94, 85

Group of 5 Robbins medallions, sterling silver, mission emblem and crew names on obverse, mission dates and crew names on reverse, 1997.

STS-82 was the 2nd mission to service the Hubble Space Telescope. STS-83 had technical problems with Fuel Cell #2 and the mission was cut short. STS-94 was the STS-83 reflight and included the Microgravity Science Laboratory (MSL) that was to be used on the earlier mission. STS-85 included the Cryogenic Infrared Spectrometers and Telescopes for the Atmosphere-Shuttle Pallet Satellite-2 (CRISTA-SPAS-2).

USD2,500 - 3,500

193

194 SPACE SHUTTLE: ROBBINS SILVER MEDALLION GROUP STS 86, 87, 89, 90, 91

Group of 5 Robbins medallions, sterling silver, mission emblem and crew names on obverse, mission dates and crew names on reverse, 1997-1998.

STS-87 included the United States Microgravity Payload (USMP-4) and marked the first EVA of a Japanese astronaut. STS-90 was the last flight of the European Space Agency's Spacelab laboratory module. Included on the flight was Neurolab, which was focused on the effects of microgravity on the nervous system. STS-91 was the final Space Shuttle mission the space station Mir.

USD2,500 - 3,500

195 SPACE SHUTTLE: ROBBINS SILVER MEDALLION GROUP STS 95, 88, 96, 93, 103

Group of 5 Robbins medallions, sterling silver, mission emblem and crew names on obverse, mission dates and crew names on reverse, 1998-1999.

Project Mercury astronaut John Glenn became, at 77, the oldest person to fly into space on STS-95. STS-88 was the first Shuttle mission to the International Space Station (ISS), but STS-96 was the first to dock at the ISS. Eileen Collins became the first female shuttle Commander on STS-93. The primary payload was the Chandra X-ray Observatory. STS-103 was a Hubble Space Telescope servicing mission.

USD2,500 - 3,500

196 SPACE SHUTTLE: ROBBINS SILVER MEDALLION GROUP STS 99, 101, 92, 97

Group of 4 Robbins medallions, sterling silver, mission emblem and crew names on obverse, mission dates and crew names on reverse, 2000.

ST-99 was the last solo flight of the Space Shuttle Endeavour. The focus was the Shuttle Radar Topography Mission (SRTM) project. STS-101 was a mission to the ISS and the first with the "glass cockpit." STS-92 was the 100th Space Shuttle mission. STS-97 was the final spaceflight of the 20th century, returning December 11, 2000.

USD2,000 - 3,000

195

STS 98, 102, 100, 104, 105

Group of 5 Robbins medallions, sterling silver, mission emblem and crew names on obverse, mission dates and crew names on reverse, 2001.

STS-98 was the first human spaceflight in the 21st century, the payload was the Destiny Laboratory Module, which it delivered to ISS. STS-100 installed the ISS Canadarm2 robotic arm. STS-105 was the final flight of the Space Shuttle Discovery before its update with a "glass cockpit," which had already been installed in Columbia and Atlantis.

USD2,500 - 3,500

198

SPACE SHUTTLE: ROBBINS SILVER MEDALLION GROUP STS 108, 109, 110, 111, 112

Group of 5 Robbins medallions, sterling silver, mission emblem and crew names on obverse, mission dates and crew names on reverse, 2001-2002.

STS-108 was the final servicing of the Hubble Space Telescope and the final successful flight of the Space Shuttle Columbia. The launch of the STS-112 had an incident during launch: the ET bipod ramp shed a chunk of foam that caused a dent ~4" wide and 3" deep into the metal SRB-ET Attach Ring near the bottom of the left Space Shuttle Solid Rocket Booster. Of course, just two missions later, STS-107 would end in disaster when a chunk of foam also broke off, but this time struck the left wing of the orbiter causing damage to the heat shield that led to the internal wing structure failing during reentry and the Shuttle breaking apart, killing the entire crew.

USD2,500 - 3,500

199 SPACE SHUTTLE COLUMBIA DISASTER

STS-107 Robbins medallion, sterling silver, obverse with mission emblem, reverse with launch and return dates, 2003.

STS-107 was the 113th flight of the Space Shuttle program and the final flight of Space Shuttle Columbia when it broke up upon re-entry into Earth's atmosphere killing all 7 crew members. The cause of the disaster was found to be caused during launch when foam from the external fuel tank broke off and damaged heat shield tiles in the wing.

USD800 - 1,200

201

200 SPACE SHUTTLE: ROBBINS SILVER MEDALLION GROUP STS 113, 114, 121, 115, 116

Group of 5 Robbins medallions, sterling silver, mission emblem and crew names on obverse, mission dates and crew names on reverse, 2002-2006.

STS-113 was the final mission before the Columbia disaster and it would be 29 months after that tragic event that STS-114 launched on July 26, 2005. Unfortunately, their was still debris separating from the external tank during ascent, although no disaster occurred. It would be another year before modifications to the flight hardware could be satisfactorily completed for STS-121. The successful repair and safety techniques opened regular Shuttle launches again. STS-116 saw the first spaceflight of a Scandinavian astronaut (Christer Fuglesang).

USD2,500 - 3,500

201 SPACE SHUTTLE: ROBBINS SILVER MEDALLION GROUP STS 117, 118, 120, 122, 123

Group of 5 Robbins medallions, sterling silver, mission emblem and crew names on obverse, mission dates and crew names on reverse, 2007-2008.

STS-117 was he 250th orbital human spaceflight. STS-118 was the first flight with Mission Specialist Educator onboard. Teacher and astronaut Barbara Morgan was part of the Educator Astronaut Project the successor to NASA's Teacher in Space Project, which ended with the Space Shuttle Challenger disaster in 1986. STS-120, the second commanded by a woman, Pamela Melroy in this case, delivered the U.S. Harmony module to the ISS. STS-122 delivered the European Space Agency Columbus science laboratory to the ISS. STS-123 delivered the Japanese Experiment Logistics Module (ELM-PS) as well as the Canadian Special Purpose Dexterous Manipulator (SPDM).

USD2,500 - 3,500

202

202

SPACE SHUTTLE: ROBBINS SILVER MEDALLION GROUP

STS 124, 126, 119, 125, 127, 128

Group of 6 Robbins medallions, sterling silver, mission emblem and crew names on obverse, mission dates and crew names on reverse, 2008-2009.

STS-125 marked the final flight to the Hubble Space Telescope and the last solo flight of Atlantis. STS-128 included the Multi-Purpose Logistics Module Leonardo, which contained experiments for studying the physics and ghemistry of microgravity.

205

INTERNATIONAL SPACE STATION: ROBBINS SILVER MEDALLION GROUP

ISS EXPEDITIONS 1, 2, 3, 4, 5

Group of 5 Robbins medallions, sterling silver, mission emblem and crew names on obverse, mission dates and crew names on reverse, 2000-2002.

ISS Expeditions are the long-duration missions aboard the International Space Station, the collaborative project of NASA, Roscosmos (Russia), JAXA (Japan), ESA (Europe) and CSA (Canada), a low Earth orbit scientific research laboratory.

USD2,000 - 3,000

204

INTERNATIONAL SPACE STATION: ROBBINS SILVER MEDALLION GROUP

ISS EXPEDITIONS 6, 7, 8, 9, 10

Group of 5 Robbins medallions, sterling silver, mission emblem and crew names on obverse, mission dates and crew names on reverse, 2002-2005.

USD2,000 - 3,000

205 INTERNATIONAL SPACE STATION: ROBBINS SILVER MEDALLION GROUP

ISS EXPEDITIONS 11, 12, 13, 14, 15 Group of 5 Robbins medallions, sterling silver, mission emblem and crew names on obverse, mission dates and crew names on reverse, 2005-2007.

USD2,000 - 3,000

206

INTERNATIONAL SPACE STATION: ROBBINS SILVER MEDALLION GROUP

ISS EXPEDITIONS 16, 17, 18, 19, 20

Group of 5 Robbins medallions, sterling silver, mission emblem and crew names on obverse, mission dates and crew names on reverse, 2007-2009.

USD2,000 - 3,000

END OF SALE

Conditions of sale

The following Conditions of Sale, as amended by any published or posted notices or verbal announcements during the sale, constitute the entire terms and conditions on which property listed in the catalog shall be offered for sale or sold by Bonhams & Butterfields Auctioneers Corp. and any consignor of such property for whom Bonhams acts as agent. By participating in this sale, you agree to be bound by these terms and conditions.

If live online bidding is available for the subject auction, additional terms and conditions of sale relating to online bidding will apply; see www.bonhams.com/WebTerms for the supplemental terms. As used herein, "Bonhams," "we" and "us" refer to Bonhams & Butterfields Auctioneers Corp.

As used herein, the term "bid price" means the price at which a lot is successfully knocked down to the buyer. The term "purchase price" means the aggregate of (a) the bid price, (b) a PREMIUM retained by us and payable by the buyer (the "buyer's premium"), EQUAL TO 27.5% OF THE FIRST \$12,500 OF THE BID PRICE, PLUS 25% OF THE AMOUNT OF THE BID PRICE ABOVE \$12,500 UP TO AND INCLUDING \$600,000, PLUS 20% OF THE AMOUNT OF THE BID PRICE ABOVE \$600,000 UP TO AND INCLUDING \$6,000,000, PLUS 14.5% OF THE AMOUNT OF THE BID PRICE ABOVE \$6,000,000, and (c) unless the buyer is exempt by law from the payment thereof, any Alabama, Arizona, California, Colorado, Connecticut, Florida, Georgia, Hawaii, Idaho, Illinois, Iowa, Indiana, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Nebraska, Nevada, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, Texas, Utah, Virginia, Washington, D.C., Washington state, West Virginia, Wisconsin, Wyoming or other state or local sales tax (or compensating use tax) and other applicable taxes. With regard to New York sales tax, please refer to the "Sales and Use Tax" section of these Conditions of Sale.

2. In order to bid at the sale, prospective bidders must submit to Bonhams a completed bidder registration form (appearing at the end of this catalog) and any other requested information or references. New bidders and bidders who have not recently updated their registration information must pre-register to bid at least two business days before the sale. Individuals will be required to provide government-issued proof of identity and proof of address. Entity clients will be required to provide documentation including confirmation of entity registration showing the registered name, confirmation of registered address, documentary proof of officers and beneficial owners, proof of authority to transact on behalf of the entity and governmentissued proof of identity for the individual who is transacting on the entity's behalf.

We may also request a financial reference and /or deposit from bidders before approving the bidder registration. In the event a deposit is submitted and you are not the successful bidder, your deposit will be returned to you. If you are the successful bidder, any such deposit will be credited to offset the appropriate portion of the purchase price.

We reserve the right to request further information, including regarding the source of funds, in order to complete bidder identification and registration procedures (including completing any anti-money laundering and/or anti-terrorism financing checks we may require) to our satisfaction. If our bidder identification and registration procedures are not satisfied, we may, in our sole discretion, decline to register any bidder or reject any bid or cancel any sale to such bidder.

Every bidder shall be deemed to act as a principal unless prior to the commencement of the sale there is a written acceptance by Bonhams of a bidder registration form completed and signed by the principal which clearly states that the authorized bidding agent is acting on behalf of the named principal. Absent such written acceptance by Bonhams, 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. Every bidder shall be responsible for any use of its assigned paddle or bidding account, regardless of the circumstances.

You represent and warrant that: (i) you have provided 3 us with true and correct copies of valid identification and proof of residence and, if applicable, financial and/ or corporate documents; (ii) neither you, your principal (if applicable, and subject to Bonhams' prior written acceptance pursuant to paragraph 2 above), nor any individual or entity with a beneficial or ownership interest in either or in the purchase transaction is on the Specially Designated Nationals List maintained by the Office of Foreign Assets Control of the U.S. Department of the Treasury nor subject to any other sanctions or embargo program or regulation in effect in the United States, European Union, England and Wales, or other applicable jurisdictions; (iii) if you are acting as an agent for a principal, you have conducted appropriate due diligence into such principal, and agree that Bonhams shall be entitled to rely upon such due diligence, you will retain adequate records evidencing such due diligence for a period of five (5) years following the consummation of the sale, and will make these records available for inspection upon Bonhams' request; (vi) neither the purchase transaction (including your bidding activity) nor the purchase funds are connected with nor derive from any criminal activity, and they are not designed to nor have they or shall they, violate the banking, anti-money laundering, or currency transfer laws or other regulations (including without limitation, import-export laws) of any country or jurisdiction, or further any other unlawful purpose, including without limitation collusion, anti-competitive activity, tax evasion or tax fraud.

You acknowledge and agree that we may rely upon the accuracy and completeness of the foregoing warranties.

4. 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.

Unless otherwise agreed, payment in good, cleared funds is due and payable within five (5) business days following the auction sale. Whenever the buyer 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 received good, cleared funds for all amounts due. Title in any purchased property will not pass until full and final payment has been received by Bonhams. Accounts must be settled in full before property is released to the buyer. In the event property is released earlier, such release will not affect the passing of title or the buyer's obligation to timely remit full payment.

We reserve the right to refuse to accept payment from a source other than the registered bidder or buyer of record. Once an invoice is issued, we cannot change the buyer's name on an invoice.

Payment for purchases must be made in the currency in which the sale is conducted. Bonhams' preferred payment method is by wire transfer. For final purchases exceeding US \$25,000.00, all payments must be in the form of wire transfer unless other arrangements have been approved in advance. For final purchases below US \$25,000.00, payment may also be made in or by the following methods: (i) Cash. Please note that the amount of cash that can be accepted from a given purchaser is limited to US\$5,000 per auction sale (whether by single or multiple related payments). If the amount payable exceeds that sum, the balance must be paid by another method. (i) Cashier's check, money order, or personal check with approved credit drawn on a U.S. bank. A processing fee will be assessed on any returned checks. (ii) Visa, MasterCard, American Express or Discover debit or credit card issued in the name of the purchaser or record.

Only one debit or credit card may be used for payment of an account balance. This method of payment may not be available to first time purchasers.

To the fullest extent permitted by applicable law, the buyer grants us a security interest in the property, and we may retain as collateral security for the buyer's obligations to us, any property and all monies held or received by us for the account of the buyer, in our possession. We also retain all rights of a secured party under the Uniform Commercial Code (which shall mean the New York Uniform Commercial Code, except where the Uniform Commercial Code of another state governs the perfection of a security interest in collateral located in that state), and you agree that we may file financing statements without your signature. If the foregoing conditions or any other applicable conditions herein are not complied with, in addition to all other remedies available to us and the consignor by law, we may at our election: (a) hold the buyer liable for the full purchase price and any late charges, collection costs, attorneys' fees and costs, expenses and incidental damages incurred by us or the consignor arising out of the buyer's breach: (b) cancel the sale, retaining as liquidated damages all payments made by the buyer; and/or (c) cancel the sale and/or resell the purchased property, at public auction and/or by private sale, and in such event the buyer shall be liable for the payment of all consequential damages, including any deficiencies or monetary losses, and all costs and expenses of such sale or sales, our commissions at our standard rates, all other charges due hereunder, all late charges, collection costs, attorneys' fees and costs, expenses and incidental damages. In addition, where two or more amounts are owed in respect of different transactions by the buyer 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 buyer. If all fees, commissions, premiums, bid prices and other sums due to us from the buyer 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 (or, if lower, the maximum nonusurious rate of interest permitted by applicable law), 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.

5. 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.

6. 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, re-open the bidding, or to cancel the sale and re-offer and resell the article in dispute. If any dispute arises after the sale, our sales records shall be conclusive in all respects.

We further reserve the right to cancel the sale of any property if (i) you are in breach of your representations and warranties as set forth in paragraph 3 above; (ii) we, in our sole discretion, determine that such transaction might be unlawful or might subject Bonhams or the consignor to any liability to any third party; or (iii) there are any other grounds for cancellation under these Conditions of Sale.

 If we are prevented by fire, theft or any other reason whatsoever from delivering any property to the buyer or a sale otherwise cannot be completed, our liability shall be limited to the sum actually paid therefor by the buyer and shall in no event include any compensatory, incidental or consequential damages.

8. All lots in the catalog are offered subject to a reserve unless otherwise indicated in the catalog. The reserve is the confidential minimum bid price at which such lot will be sold and it does not to exceed the low estimate value for the lot. 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 up to the reserve to protect such interest. If the auctioneer determines that any opening or subsequent bid is below the reserve for a lot, (s)he may reject such opening bid and withdraw the item from sale. CONSIGNORS ARE NOT ALLOWED TO BID ON THEIR OWN ITEMS.

9 Other than as provided in the Limited Right of Rescission with respect to identification of authorship, all property is sold "AS IS" and any statements contained in the catalog or in any advertisement, bill of sale, announcement, condition report, invoice or elsewhere as to period, culture, source, origin, media, measurements, size, quality, rarity, provenance, importance, exhibition and literature of historical relevance, merchantability, fitness for a particular purpose, or physical condition ARE QUALIFIED STATEMENTS OF OPINION AND NOT REPRESENTATIONS, WARRANTIES, OR ASSUMPTION OF LIABILITY. Neither Bonhams nor the consignor shall be responsible for any error or omission in the catalog description of any property. 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.

10. 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 this catalog. If not so removed, daily storage fees will be payable to us by the buyer as set forth therein. We reserve the right to transfer property not so removed to an offsite warehouse at the buyer's risk and expense, as set forth in more detail in the "Buyer's Guide." Packing and handling of purchased lots are the responsibility of the buyer and at the buyer's entire risk, as are the identification, application for, and cost(s) of obtaining of any necessary export, import, restricted material (e.g. endangered species) or other permit for such lots.

For an additional fee, Bonhams may provide packing and shipping services for certain items as noted in the "Buyer's Guide" section of the catalog.

11. The copyright in the text of the catalog and the photographs, digital images and illustrations of lots in the catalog belong to Bonhams or our licensors. You will not reproduce or permit anyone else to reproduce such text, photographs, digital images or illustrations without our prior written consent. Bonhams and the consignor make no representation or warranty as to whether the buyer acquires any copyrights on the purchase of an item of Property.

12. Bonhams may, in our discretion, as a courtesy and free of charge, execute bids on your behalf if so instructed by you, provided that neither Bonhams nor our employees or agents will be liable for any error or default (whether human or otherwise) in doing so or for failing to do so. Without limiting the foregoing, Bonhams (including our agents and employees) shall not be responsible for any problem relating to telephone, online, or other bids submitted remotely through any means, including without limitation, any telecommunications or internet fault or failure, or breakdown or problems with any devices or online platforms, including third-party online platforms, regardless of whether such issue arises with our, your, or such third-party's technology, equipment, or connection. By participating at auction by telephone or online, bidders expressly consent to the recording of their bidding sessions and related communications with Bonhams and our employees and agents, and acknowledge their acceptance of these Conditions of Sale as well as any additional terms and conditions applicable to any such bidding platform or technology.

13. These Conditions of Sale shall bind the successors and assigns of all bidders and buyers 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. No act or omission of Bonhams, its employees or agents, nor any failure thereof to exercise any remedy hereunder, shall operate or be deemed to operate as a waiver of Bonhams' rights under these Conditions of Sale. If any part of these Conditions of Sale is for any reason invalid or unenforceable, the rest shall remain valid and enforceable.

14. These Conditions of Sale and the buyer's and our respective rights and obligations hereunder shall be governed by and construed and enforced in accordance with the laws of the State of New York. 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 buyer of lots consigned hereunder) shall be resolved by the procedures set forth below.

15. You accept and agree that Bonhams will hold and process your personal information and may share and use it as required by law and as described in, and in line with Bonhams' Privacy Policy, available at website at www. bonhams.com/legals/. If you desire access, update, or restriction to the use of your personal information, please email data.protection@bonhams.com.

SALES AND USE TAX

New York sales tax is charged on the hammer price, buyer's premium and any other applicable charges on any property collected or delivered in New York State, regardless of the state or country in which the buyer resides or does business. Buyers who make direct arrangements for collection by a shipper who is considered a "private" or "contract" carrier by the New York Department of Taxation and Finance will be charged New York sales tax, regardless of the destination of the property. Property collected for delivery to a destination outside of New York by a shipper who is considered a "common carrier" by the New York Department of Taxation and Finance (e.g. United States Postal Service, United Parcel Service, and FedEx) is not subject to New York sales tax, but if it is delivered into any state in which Bonhams is registered or otherwise conducts business sufficient to establish a nexus, Bonhams may be required by law to collect and remit the appropriate sales tax in effect in such state. Property collected for delivery outside of the United States by a freightforwarder who is registered with the Transportation Security Administration ("TSA") is not subject to New York sales tax.

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 the fees and expenses of mediation. 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 mediation, arbitration 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 or international arbitration

Conditions of sale - Continued

service agreed to by the parties, and shall be selected as follows: (i) If the arbitration service has specific rules or procedures, those rules or procedures shall be followed; (ii) If the 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 an arbitration service, the arbitration shall be conducted by Judicial Arbitration and Mediation Services, Inc. ("JAMS") or another national or international alternative dispute resolution ("ADR") provider of Bonhams' choice, and the arbitrator shall be selected in accordance with JAMS' Streamlined Arbitration Rules and Procedures or the rules of the other ADR provider selected by Bonhams. 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 arbitration service:
 - (i) The arbitration shall occur within 60 days following the selection of the arbitrator;
 - (ii) The arbitration shall be conducted in New York, New York; 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 New York 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 arbitration.

LIMITED RIGHT OF RESCISSION

If within one (1) year from the date of sale, the original buyer (a) gives written notice to us alleging that the identification of Authorship (as defined below) of such lot as set forth in the UPPERCASE 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.

Conditions of sale - Continued

If, prior to receiving such notice from the original buyer alleging such defect, we have paid the consignor monies owed him in connection with the sale, we shall pay the original buyer the amount of our commissions, any other sale proceeds to which we are entitled and applicable taxes received from the buyer on the sale and make demand on the consignor to pay the balance of the original purchase price to the original buyer. Should the consignor fail to pay such amount promptly, we may disclose the identity of the consignor and assign to the original buyer 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 buyer only and may not be assigned to or relied upon by any subsequent transferee of the property sold. The buyer hereby accepts the benefit of the consignor's warranty of title and other representations and warranties made by the consignor for the buyer'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 BUYER'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 UPPERCASE 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 UPPERCASE 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 BUYER 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 BUYER EXPRESSLY ACKNOWLEDGES AND AGREES THAT IN NO EVENT SHALL BONHAMS BE LIABLE FOR ANY DAMAGES INCLUDING, WITHOUT LIMITATION, ANY COMPENSATORY, INCIDENTAL OR CONSEQUENTIAL DAMAGES. IN NO EVENT SHALL THE AGGREGATE LIABILITY OF BONHAMS AND ITS CONSIGNOR TO A PURCHASER EXCEED THE PURCHASE PRICE ACTUALLY PAID FOR A DISPUTED ITEM OF PROPERTY.

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 (323) 850 7500.

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 Evaluation Events held regularly at our galleries and in other major metropolitan areas. The updated schedule for Bonhams Auction Evaluation 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

BUYING AND BIDDING 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 email our Client Services Department at bids.us@bonhams. com.

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 subscription to ur 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.

Reserve

All lots in a catalog are subject to a reserve unless otherwise indicated. The reserve is the minimum price that the seller is willing to accept for a lot. This amount is confidential and does not exceed the low estimated 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, or via email. Irrespective of previous bidding activity a valid Bonhams client account is required to participate in bidding activity. You will be required to provide governmentissued proof of identity and residence, and if you are a company, your certificate of incorporation or equivalent documentation with your name and registered address, government issued proof of your current address, documentary proof of your beneficial owners and directors, and proof of authority to transact. 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 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 Los Angeles, San Francisco and New York galleries.

By Telephone

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

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

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 Bonhams Client Services Department, 7601 W Sunset Boulevard, Los Angeles, California 90046.

Sales Tax

Residents of states listed in Paragraph 1 of the Conditions of Sale must pay applicable sales tax. Other state or local taxes (or compensation 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 in the Conditions of Sale. If you wish to use your resale license please contact Client Services for our form.

Collection of Purchases

Scheduling an appointment and payment in full prior to arrival will facilitate the quick release of your property. If you are sending a third-party to collect, please provide details to our Client Services Department at **invoices.us@bonhams.com** prior to your scheduled pickup or we will be unable to release your property.

For your convenience, pre-allocated 30-minute collection time slots are available Monday through Friday between 9am – 4:30pm. To schedule collection of purchases, please contact our Client Services Department on +1 (323) 850 7500.

Shipping & Removal

Bonhams can accommodate shipping for certain items. If you wish to receive a Bonhams Shipping quote, please confirm as such at the time of registration. 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.

Handling and Storage Charges

Storage charges of \$5 per lot, per day will begin accruing for any lots not collected within 14 calendar days of the auction.

Bonhams reserve the right to remove uncollected sold lots to the warehouse of our choice at the buyer's risk and expense. Further transfer, handling, storage and full value protection fees will apply if move to a warehouse of our choice.

Oversized (W) Lots - Collection and Storage

Please note that all lots marked with a **W** in the catalogue are oversized and subject to additional storage and shipping methods. All additional lots purchased with **W** lots are considered group lots and will be subject to the same terms as **W** lots.

We encourage you to collect **W** lots from Bonhams by 5pm on Wednesday, 11 November to avoid accruing additional storage fees. If failed to collect by the above date, **W** lots and additional purchases may be transferred to offsite storage at Box Pack & Ship on Thursday, 12 November at the purchaser's risk and expense. Please note, for sold lots removed to Box Pack & Ship there will be transfer and full value protection charges but no daily storage charges due for lots collected within 5 business days of the transfer. The per-lot charges levied by Box Pack & Ship Services are as follows (plus any applicable sales tax):

FURNITURE/LARGE OBJECTS

SMALL OBJECTS

 All purchases will be available for collection on Friday, 13 November from Box Pack & Ship. Collections appointments must be booked 24 hours in advance with Box Pack & Ship (subject to full payment of all outstanding amounts due to Bonhams and Box Pack & Ship).

For more information regarding storage, shipping, or collection from Box Pack & Ship please contact Box Pack & Ship directly at: +1 323 432 2477 or daniel@ boxpackship.net

Address: 3800 S. Main Street Los Angeles, CA 90037

All amounts due to Bonhams and all charges due to Box Pack & Ship must be paid by the time of collection of the property. Payment may be made by cash, check, or credit card.

Oversized lots

83, 176

Auction Registration Form

(Attendee / Absentee / Online / Telephone Bidding) Please circle your bidding method above.

		0	
			1
	1		1
1	1		
1	1		
1	1		
1	1		
1	1		
1	1		
1	1		

Bonhams

		Sale title: History of Science and Technology, including Air and Space	Sale date: 5 November, 2020	
use onl	 אין (ע	Sale no. 26078	Sale venue: Los Angeles	
be conduc le, and yc by such t ale in cor le and otl s check n I purchase	Ad in accordance r bidding and buy- ms and conditions. Inction with the er published notices General Bid Increments: \$10 - 200by 10s \$10,000 - 20,000by 1,000s \$200 - 500by 20 / 50 / 80s \$20,000 - 50,000by 2,000 / 5,000 / 8,000s \$500 - 1,000by 50s \$50,000 - 100,000by 5,000s \$10,000 - 20,000by 100s \$100,000 - 200,000by 5,000s \$2,000 - 5,000by 100s \$100,000 - 200,000by 10,000s \$2,000 - 5,000by 200 / 500 / 800s \$100,000 - 200,000by 10,000s \$2,000 - 10,000by 200 / 500 / 800s above \$200,000at the auctioneer's discretion tinds clear our			
a U.S. bank.		Customer Number	Title	
a the table below, please ich you wish to place bids at Bids will be rounded down refer to the Buyer's Guide in a relating to instructions to Company name (to be invoiced if applicable)		First Name	Last Name	
		Company name (to be invoiced if applicable)		
oids on yo your beh	ur behalf. Bonhams alf but will not be	Address		
uted bids.		City	County / State	
New clients are requested to - passport, driving license, ID Post / Zip of		Post / Zip code	Country	
iess - utilit lients shou	- utility bill, bank or credit s should also provide a company registration thorizing the individual to the provide this may would		Telephone daytime	
r authorizi				
I. For high ers referer	her value lots you may nce.	Telephone bidders: indicate primary and secondary cornext to the telephone number.	ntact numbers by writing $\textcircled{1}$ or $\textcircled{2}$	
u have fo	raotten vour	E-mail (in capitals)		
/w.bonha	ms.com, please	By providing your email address above, you authorize Bonhams to s and partner organizations. Bonhams does not sell or trade email add	By providing your email address above, you authorize Bonhams to send you marketing materials and news concerning Bonhams and partner organizations. Bonhams does not sell or trade email addresses.	
		I am registering to bid as a private client	I am registering to bid as a trade client	
f ng quote (ect my pu	if applicable)	Resale: please enter your resale license number here	We may contact you for additional information	
egistrati	on Form and		ING	
nent		Shipping Address (if different than above):		
		Address: Country:		
		City: Post/ZIP code:		
		Please note that all telephone calls are recorde	d.	
₋ot no.	Brief description (In the event of any of you are bidding online)	on of any discrepancy, lot number and not lot description will govern.) If ng online there is no need to complete this section. MAX bid in US\$ (excluding premium and applicable tax) Emergency bid for telephone bidders on		

Paddle number (for office use only)

General Notice: This sale will be conducted in accordance with Bonhams Conditions of Sale, and your bidding and buying at the sale will be governed by such terms and conditions. Please read the Conditions of Sale in conjunction with the Buyer's Guide relating to this sale and other published notices and terms relating to bidding.

Payment by personal or business check may result in your property not being released until purchase funds clear our bank. Checks must be drawn on a U.S. bank.

Notice to Absentee Bidders: In the table below, please provide details of the lots on which you wish to place bids at least 24 hours prior to the sale. Bids will be rounded down to the nearest increment. Please refer to the Buyer's Guide in the catalog for further information relating to instructions to Bonhams to execute absentee bids on your behalf. Bonhams will endeavor to execute bids on your behalf but will not be liable for any errors or non-executed bids.

Notice to First Time Bidders: New clients are requested to provide photographic proof of ID - passport, driving license, ID card, together with proof of address - utility bill, bank or credit card statement etc. Corporate clients should also provide a copy of their articles of association / company registration documents, together with a letter authorizing the individual to bid on the company's behalf. Failure to provide this may result in your bids not being processed. For higher value lots you may also be asked to provide a bankers reference.

Notice to online bidders; If you have forgotten your username and password for <u>www.bonhams.com</u>, please contact Client Services.

If successful

Type of bid

(A-Absentee, T-Telephone)

I will collect the purchases myself Please contact me with a shipping quote (if applicable) I will arrange a third party to collect my purchase(s)

Please email the completed Registration Form and

requested information to: Bonhams Client Services Department 7601 W. Sunset Blvd Los Angeles, California 90046 Tel +1 (323) 850 7500 bids.us@bonhams.com

You instruct us to execute each absentee bid up to the corresponding bid amount indicated above.

* Emergency Bid: A maximum bid (exclusive of Buyer's Premium and tax) to be executed by Bonhams **only** if we are unable to contact you by telephone or should the connection be lost during bidding.

BY SIGNING THIS FORM YOU AGREE THAT YOU HAVE READ AND UNDERSTAND OUR CONDITIONS OF SALE AND SHALL BE LEGALLY BOUND BY THEM, AND YOU AGREE TO PAY THE BUYER'S PREMIUM, ANY APPLICABLE TAXES, AND ANY OTHER CHARGES MENTIONED IN THE BUYER'S GUIDE OR CONDITIONS OF SALE. THIS AFFECTS YOUR LEGAL RIGHTS.



Bonhams

7601 W. Sunset Boulevard Los Angeles, California 90046

> +1 323 850 7500 bonhams.com

AUCTIONEERS SINCE 1793