The Space Sale
Celebrating the 40th Anniversary of the First Manned Lunar Landing
Thursday July 16, 2009 at 1pm
New York

Bonhams
580 Madison Avenue
New York, New York 10022
www.bonhams.com

Preview
Saturday July 11, 12pm to 5pm
Sunday July 12, 12pm to 5pm
Monday July 13, 10am to 5pm
Tuesday July 14, 10am to 5pm
Wednesday July 15, 10am to 5pm
Thursday July 16, 10am to 12pm
(Limited viewing)

Bids
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Sale Number: 17402
Lots 1 - 385

Catalog: $30

Please see pages 2 to 4 for bidder information including conditions of sale, after-sale collection and shipment

To view this fully illustrated catalog online:
www.bonhams.com/us

Illustrations
Front cover: Lot 97
Back cover: Lot 206
Session page: Lot 318

Automated Results Service
+1 (800) 223 2854

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 we act as agent. As used herein, "Bonhams," "we" and "us" refer to Bonhams & Butterfields Auctioneers Corp.

1. As used herein, the term "bid price" means the price at which a lot is successfully knocked down to the purchaser. The term "purchase price" means the aggregate of (a) the bid price, (b) a PREMIUM retained by us and payable by the purchaser EQUAL TO 22% OF THE FIRST $100,000 OF THE BID PRICE, 20% OF THE AMOUNT OF THE BID PRICE ABOVE $100,000 UP TO AND INCLUDING $500,000, AND 12% OF THE AMOUNT OF THE BID PRICE OVER $500,000, and (c) unless the purchaser is exempt by law from the payment thereof, any California, Arizona, Georgia, Illinois, Massachusetts, Nevada, New York, Pennsylvania, Texas, Washington state, or other state or local sales tax (or compensating use tax) and other applicable taxes. However, if the purchaser pays for all lots purchased by it from the sale in cash or by "cash equivalent" (which term is defined to include cashier's check or money order, approved check, wire transfer or other immediate bank transfer), and makes such payment in full by the payment due date specified in Paragraph 2 below, a discounted buyer's premium rate of 20% will apply to the first $100,000 of the bid price.

2. On the fall of the auctioneer's hammer, the highest bidder shall have purchased the offered lot in accordance and subject to compliance with all of the conditions set forth herein and (a) assumes full risk and responsibility therefor, (b) if requested will sign a confirmation of purchase, and (c) will pay the purchase price in full or such part as we may require for all lots purchased. No lot may be transferred. Any person placing a bid as agent on behalf of another (whether or not such person has disclosed that fact or the identity of the principal) may be jointly and severally liable with the principal under any contract resulting from the acceptance of a bid.

Unless otherwise agreed, payment in good funds is due and payable within five (5) business days following the auction sale. Whenever the purchaser pays only a part of the total purchase price for one or more lots purchased, we may apply such payments, in our sole discretion, to the lot or lots we choose. Payment will not be deemed made in full until we have collected good funds for all amounts due.

Payment for purchases may be made in or by (a) cash, (b) cashier's check or money order, (c) personal check with approved credit drawn on a U.S. bank, (d) wire transfer or other immediate bank transfer, or (e) Visa or MasterCard credit or debit card. A processing fee will be assessed on any returned checks. Please note that the amount of cash notes and cash equivalents that can be accepted from a given purchaser may be limited.

The purchaser grants us a security interest in the property, and we may retain as collateral security for the purchaser's obligations to us, any property and all monies held or received by us for the account of the purchaser, in our possession. We retain all rights of a secured party under the California Commercial Code. If the foregoing conditions or any other applicable conditions herein are not complied with, in addition to other remedies available to us and the consignor by law, including without limitation, the right to hold the purchaser liable for the purchase price, we at our option may either (a) cancel the sale, retaining as liquidated damages all payments made by the purchaser or (b) resell the property, either publicly or privately, and in such event the purchaser shall be liable for the payment of any deficiency plus all costs and expenses of both sales, our commission at our standard rates, all other charges due hereunder, attorneys' fees, expenses and incidental damages. In addition, where two or more amounts are owed in respect of different transactions by the purchaser to us, to Bonhams 1793 Limited and/or to any of our other affiliates, subsidiaries or parent companies worldwide within the Bonhams Group, we reserve the right to apply any monies paid in respect of a transaction to discharge any amount owed by the purchaser. If all fees, commissions, premiums, bid price and other sums due to us from the purchaser are not paid promptly as provided in these Conditions of Sale, we reserve the right to impose a finance charge equal to 1.5% per month on all amounts due to us beginning on the 31st day following the sale until payment is received, in addition to other remedies available to us by law.

3. We reserve the right to withdraw any property and to divide and combine lots at any time before such property's auction. Unless otherwise announced by the auctioneer at the time of sale, all bids are per lot as numbered in the catalog and no lots shall be divided or combined for sale.

4. We reserve the right to reject a bid from any bidder, to split any bidding increment, and to advance the bidding in any manner the auctioneer may decide. In the event of any dispute between bidders, or in the event the auctioneer doubts the validity of any bid, the auctioneer shall have sole and final discretion either to determine the successful bidder or to re-offer and resell the article in dispute. If any dispute arises after the sale, our sales records shall be conclusive in all respects.

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

6. If a lot is offered subject to a reserve, we may implement such reserve by bidding on behalf of the consignor, whether by opening bidding or continuing bidding in response to other bidders until reaching the reserve. If we have an interest in an offered lot and the proceeds therefrom other than our commissions, we may bid therefor to protect such interest. CONSIGNORS ARE NOT ALLOWED TO BID ON THEIR OWN ITEMS.

7. All statements contained in the catalog or in any bill of sale, condition report, invoice or elsewhere as to authorship, period, culture, source, origin, measurement, quality, rarity, provenance, importance, exhibition and literature of historical relevance, or physical condition ARE QUALIFIED STATEMENTS OF OPINION AND NOT REPRESENTATIONS OR WARRANTIES. No employee or agent of Bonhams is authorized to make on our behalf or on that of the consignor any representation or warranty, oral or written, with respect to any property.

8. All purchased property shall be removed from the premises at which the sale is conducted by the date(s) and time(s) set forth in the "Buyer's Guide" portion of the catalog. If not so removed, daily storage fees will be payable to us by the purchaser as set forth therein. We reserve the right to transfer property not so removed to an offsite warehouse at the purchaser's risk and expense, as set forth in more detail in the "Buyer's Guide." Accounts must be settled in full before property will be released. Packing and handling of purchased lots are the responsibility of the purchaser. Bonhams can provide packing and shipping services for certain items as noted in the "Buyer's Guide" section of the catalog.

9. The copyright in the text of the catalog and the photographs, digital images and illustrations of lots in the catalog belong to Bonhams or its licensors. You will not reproduce or permit anyone else to reproduce such text, photographs, digital images or illustrations without our prior written consent.

10. These Conditions of Sale shall bind the successors and assigns of all bidders and purchasers and inure to the benefit of our successors and assigns. No waiver, amendment or modification of the terms hereof (other than posted notices or oral announcements during the sale) shall bind us unless specifically stated in writing and signed by us. If any part of these Conditions of Sale is for any reason invalid or unenforceable, the rest shall remain valid and enforceable.

11. These Conditions of Sale and the purchaser's and our respective rights and obligations hereunder are governed by the laws of the State of California. By bidding at an auction, each purchaser and bidder agrees to be bound by these Conditions of Sale. Any dispute, controversy or claim arising out of or relating to this agreement, or the breach, termination or validity thereof, brought by or against Bonhams (but not including claims brought against the consignor by the purchaser of lots consigned hereunder) shall be resolved by the procedures set forth below.

Mediation and Arbitration Procedures

(a) Within 30 days of written notice that there is a dispute, the parties or their authorized and empowered representatives shall meet by telephone and/or in person to mediate their differences. If the parties agree, a mutually acceptable mediator shall be selected and the parties will equally share such mediator's fees. The mediator shall be a retired judge or an attorney familiar with commercial law and trained in or qualified by experience in handling mediations. Any communications made during the mediation process shall not be admissible in any subsequent arbitration, mediation or judicial proceeding. All proceedings and any resolutions thereof shall be confidential, and the terms governing arbitration set forth in paragraph (c) below shall govern.

(b) If mediation does not resolve all disputes between the parties, or in any event no longer than 60 days after receipt of the written notice of dispute referred to above, the parties shall submit the dispute for binding arbitration before a single neutral arbitrator. Such arbitrator shall be a retired judge or an attorney familiar with commercial law and trained in or qualified by experience in handling arbitrations. Such arbitrator shall make all appropriate disclosures required by law. The arbitrator shall be drawn from a panel of a national arbitration service agreed to by the parties, and shall be selected as follows: (i) If the national arbitration service has specific rules or procedures, those rules or procedures shall be followed; (ii) If the national arbitration service does not have rules or procedures for the selection of an arbitrator, the arbitrator shall be an individual jointly agreed to by the parties. If the parties cannot agree on a national arbitration service, the arbitration shall be conducted by the American Arbitration Association, and the arbitrator shall be selected in accordance with the Rules of the American Arbitration Association. The arbitrator's award shall be in writing and shall set forth findings of fact and legal conclusions.

c) Unless otherwise agreed to by the parties or provided by the published rules of the national arbitration service:

(i) the arbitration shall occur within 60 days following the selection of the arbitrator;

(ii) the arbitration shall be conducted in the designated location, as follows: (A) in any case in which the subject auction by Bonhams took place or was

scheduled to take place in the State of New York or the Commonwealth of Massachusetts, the arbitration shall take place in New York City, New York; (B) in all other cases, the arbitration shall take place in the city of San Francisco, California; and

(iii) discovery and the procedure for the arbitration shall be as follows:

(A) All arbitration proceedings shall be confidential;

(B) The parties shall submit written briefs to the arbitrator no later than 15 days before the arbitration commences;

(C) Discovery, if any, shall be limited as follows: (I) Requests for no more than 10 categories of documents, to be provided to the requesting party within 14 days of written request therefor; (II) No more than two (2) depositions per party, provided however, the deposition(s) are to be completed within one (1) day; (III) Compliance with the above shall be enforced by the arbitrator in accordance with California law;

(D) Each party shall have no longer than eight (8) hours to present its position. The entire hearing before the arbitrator shall not take longer than three (3) consecutive days;

(E) The award shall be made in writing no more than 30 days following the end of the proceeding. Judgment upon the award rendered by the arbitrator may be entered by any court having jurisdiction thereof.

To the fullest extent permitted by law, and except as required by applicable arbitration rules, each party shall bear its own attorneys' fees and costs in connection with the proceedings and shall share equally the fees and expenses of the arbitrator.

Limited Right of Rescission

If within six (6) months from the date of sale, the original purchaser (a) gives written notice to us alleging that the identification of Authorship (as defined below) of such lot as set forth in the BOLD TYPE heading of the catalog description of such lot (as amended by any saleroom notices or verbal announcements during the sale) is not substantially correct based on a fair reading of the catalog (including the terms of any glossary contained therein), and (b) within 10 days after such notice returns the lot to us in the same condition as at the time of sale, and (c) establishes the allegation in the notice to our satisfaction (including by providing one or more written opinions by recognized experts in the field, as we may reasonably require), then the sale of such lot will be rescinded and, unless we have already paid to the consignor monies owed him in connection with the sale, the original purchase price will be refunded.

If, prior to receiving such notice from the original purchaser alleging such defect, we have paid the consignor monies owed him in connection with the sale, we shall pay the original purchaser the amount of our commissions, any other sale proceeds to which we are entitled and applicable taxes received from the purchaser on the sale and make demand on the consignor to pay the balance of the original purchase price to the original purchaser. Should the consignor fail to pay such amount promptly, we may disclose the identity of the consignor and assign to the original purchaser our rights against the consignor with respect to the lot the sale of which is sought to be rescinded. Upon such disclosure and assignment, any liability of Bonhams as consignor's agent with respect to said lot shall automatically terminate.

The foregoing limited right of rescission is available to the original purchaser only and may not be assigned to or relied upon by any subsequent transferee of the property sold. The purchaser hereby accepts the benefit of the consignor's warranty of title and other representations and warranties made by the consignor for the purchaser's benefit. Nothing in this section shall be construed as an admission by us of any representation of fact, express or implied, obligation or responsibility with respect to any lot. THE PURCHASER'S SOLE AND EXCLUSIVE REMEDY AGAINST BONHAMS FOR ANY REASON WHATSOEVER IS THE LIMITED RIGHT OF RESCISSION DESCRIBED IN THIS SECTION.

"Authorship" means only the identity of the creator, the period, culture and source or origin of the lot, as the case may be, as set forth in the BOLD TYPE heading of the print catalog entry. The right of rescission does not extend to: (a) works of art executed before 1870 (unless these works are determined to be counterfeits created since 1870), as this is a matter of current scholarly opinion which can change; (b) titles, descriptions, or other identification of offered lots, which information normally appears in lower case type below the BOLD TYPE heading identifying the Authorship; (c) Authorship of any lot where it was specifically mentioned that there exists a conflict of specialist or scholarly opinion regarding the Authorship of the lot at the time of sale; (d) Authorship of any lot which as of the date of sale was in accordance with the then generally-accepted opinion of scholars and specialists regarding the same; or (e) the identification of periods or dates of creation in catalog descriptions which may be proven inaccurate by means of scientific processes that are not generally accepted for use until after publication of the catalog in which the property is offered or that were unreasonably expensive or impractical to use at the time of such publication.

Limitation of Liability

EXCEPT AS EXPRESSLY PROVIDED ABOVE, ALL PROPERTY IS SOLD "AS IS." NEITHER BONHAMS NOR THE CONSIGNOR MAKES ANY REPRESENTATION OR WARRANTY, EXPRESS OR IMPLIED, AS TO THE MERCHANTABILITY, FITNESS OR CONDITION OF THE PROPERTY OR AS TO THE CORRECTNESS OF DESCRIPTION, GENUINENESS, ATTRIBUTION, PROVENANCE OR PERIOD OF THE PROPERTY OR AS TO WHETHER THE PURCHASER ACQUIRES ANY COPYRIGHTS OR OTHER Intellectual property rights in lots sold or as to whether a work of art is subject to the artist's moral rights or other residual rights of the artist. The purchaser expressly acknowledges and agrees that in no event shall Bonhams be liable for any damages including, without limitation, any compensatory, incidental or consequential damages.

SELLER'S GUIDE

SELLING AT AUCTION

Bonhams can help you every step of the way when you are ready to sell art, antiques and collectible items at auction. Our regional offices and representatives throughout the US are available to service all of your needs. Should you have any further questions, please visit our website at **www.bonhams.com/us** for more information or call our Client Services Department at +1 (800) 223 2854 ext. 3550.

Auction Estimates

The first step in the auction process is to determine the auction value of your property. Bonhams' world-renowned specialists will evaluate your special items at no charge and in complete confidence. You can obtain an auction estimate in many ways:

- Attend one of our Auction Appraisal Events held regularly at our galleries and in other major metropolitan areas. The updated schedule for Bonhams Auction Appraisal Events is available at **www.bonhams.com/us.**
- Call our Client Services Department to schedule a private appointment at one of our galleries. If you have a large collection, our specialists can travel, by appointment, to evaluate your property on site.
- Send clear photographs to us of each individual item, including item dimensions and other pertinent information with each picture. Photos should be sent to Bonhams' address in envelopes marked as "photo auction estimate". Alternatively, you can submit your request using our online form at www.bonhams.com/us. Digital images may be attached to the form. Please limit your images to no more than five (5) per item.

Consigning Your Property

After you receive an estimate, you may consign your property to us for sale in the next appropriate auction. Our staff assists you throughout the process, arranging transportation of your items to our galleries (at the consignor's expense), providing a detailed inventory of your consignment, and reporting the prices realized for each lot. We provide secure storage for your property in our warehouses and all items are insured throughout the auction process. You will receive payment for your property approximately 35 days after completion of sale.

Sales commissions vary with the potential auction value of the property and the particular auction in which the property is offered. Please call us for commission rates.

Professional Appraisal Services

Bonhams specialists conduct insurance and fair market value appraisals for private collectors, corporations, museums, fiduciaries and government entities on a daily basis. Insurance appraisals, used for insurance purposes, reflect the cost of replacing property in today's retail market. Fair market value appraisals are used for estate, tax and family division purposes and reflect prices paid by a willing buyer to a willing seller.

When we conduct a private appraisal, our specialists will prepare a thorough inventory listing of all your appraised property by category. Valuations, complete descriptions and locations of items are included in the documentation.

Appraisal fees vary according to the nature of the collection, the amount of work involved, the travel distance, and whether the property is subsequently consigned for auction.

Our appraisers are available to help you anywhere and at any time. Please call our Client Services Department to schedule an appraisal.

Estate Services

Since 1865, Bonhams has been serving the needs of fiduciaries – lawyers, trust officers, accountants and executors – in the disposition of large and small estates. Our services are specially designed to aid in the efficient appraisal and disposition of fine art, antiques, jewelry, and collectibles. We offer a full range of estate services, ranging from flexible financial terms to tailored accounting for heirs and their agents to world-class marketing and sales support.

For more information or to obtain a detailed Trust and Estates package, please visit our website at **www.bonhams.com/us** or contact our Client Services Department.

BUYER'S GUIDE

BIDDING & BUYING AT AUCTION

Whether you are an experienced bidder or an enthusiastic novice, auctions provide a stimulating atmosphere unlike any other. Bonhams previews and sales are free and open to the public. As you will find in these directions, bidding and buying at auction is easy and exciting. Should you have any further questions, please visit our website at **www.bonhams.com/us** or call our Client Services Department at +1 (800) 223 2854 ext. 3550.

Catalogs

Before each auction we publish illustrated catalogs. Our catalogs provide descriptions and estimated values for each "lot." A lot may refer to a single item or to a group of items auctioned together. The catalogs also include the dates and the times for the previews and auctions. We offer our catalogs by subscription or by single copy. For information on subscribing to our catalogs, you may refer to the subscription form in this catalog, call our Client Services Department, or visit our website at **www.bonhams.com/us**.

Previews

Auction previews are your chance to inspect each lot prior to the auction. We encourage you to look closely and examine each object on which you may want to bid so that you will know as much as possible about it. Except as expressly set forth in the Conditions of Sale, items are sold "as is" and with all faults; illustrations in our catalogs, website and other materials are provided for identification only. At the previews, our staff is always available to answer your questions and guide you through the auction process. Condition reports may be available upon request.

Estimates

Bonhams catalogs include low and high value estimates for each lot, exclusive of the buyer's premium and tax. The estimates are provided as an approximate guide to current market value based primarily on previous auction results for comparable pieces, and should not be interpreted as a representation or prediction of actual selling prices. They are determined well in advance of a sale and are subject to revision. Please contact us should you have any questions about value estimates.

Reserves

Unless indicated by the ° symbol next to the lot number, which denotes no reserve, all lots in the catalog are subject to a reserve. The reserve is the minimum auction price that the seller is willing to accept for a lot. This amount is confidential and does not exceed the low estimate value.

Auction House's Interest in Property Offered at Auction

On occasion, Bonhams may offer a lot in which it has an ownership interest, in whole or in part. Such property, if any, is identified in the catalog with a ¤ symbol next to the lot number.

Similarly, Bonhams may have an economic interest in a lot beyond its commission as a result of making an advance against anticipated proceeds to the consignor which is secured by the consigned property or where it has guaranteed the consignor a minimum auction price for consigned property. Such property, if any, is identified in the catalog with a ± symbol next to the lot number.

Bidding at Auction

At Bonhams, you can bid in many ways: in person, via absentee bid, or over the phone. Absentee bids can be submitted in person, online, via fax or via email.

Valid Bonhams client accounts are required to participate in bidding activity. You can obtain registration information online, at the reception desk or by calling our Client Services Department.

By bidding at auction, whether in person or by agent, by absentee bid, telephone or other means, the buyer or bidder agrees to be bound by the Conditions of Sale.

Lots are auctioned in consecutive numerical order as they appear in the catalog. Bidding normally begins below the low estimate. The auctioneer will accept bids from interested parties present in the saleroom, from telephone bidders, and from absentee bidders who have left written bids in advance of the sale. The auctioneer may also execute bids on behalf of the consignor by placing responsive or consecutive bids for a lot up to the amount of the reserve, but never above it.

We assume no responsibility for failure to execute bids for any reason whatsoever.

In Person

If you are planning to bid at auction for the first time, you will need to register at the reception desk in order to receive a numbered bid card. To place a bid, hold up your card so that the auctioneer can clearly see it. Decide on the maximum auction price that you wish to pay, exclusive of buyer's premium and tax, and continue bidding until your bid prevails or you reach your limit. If you are the successful bidder on a lot, the auctioneer will acknowledge your paddle number and bid amount.

Absentee Bids

As a service to those wishing to place bids, we may at our discretion accept bids without charge in advance of sale by telephone, by facsimile, online or in writing on bidding forms available from us. "Buy" bids will not be accepted; all bids must state the highest bid price the bidder is willing to pay. Our auction staff will try to bid just as you would, with the goal of obtaining the item at the lowest bid price possible. In the event identical bids are submitted, the earliest bid submitted will take precedence. Absentee bids shall be executed in competition with other absentee bids, any applicable reserve, and bids from other auction participants. A friend or agent may place bids on your behalf, provided that we have received your written authorization prior to the sale. Absentee bid forms are available in our catalogs, online at **www.bonhams.com/us**, at offsite auction locations, and at our San Francisco, Los Angeles and New York galleries.

By Telephone

Under special circumstances, we can arrange for you to bid by telephone. To arrange for a telephone bid, please contact our Client Services Department a minimum of 24 hours prior to the sale.

Online

Web users may place absentee bids online from anywhere in the world. To bid online, please visit our website at **www.bonhams.com/us**.

Bid Increments

Bonhams generally uses the following increment multiples as bidding progresses:

$50-200	$10 increments
$200 - 500	$25 increments
$500 - 1,000	$50 increments
$1,000 - 2,000	$100 increments
$2,000 - 5,000	$250 increments
$5,000 - 10,000	$500 increments
$10,000 - 20,000	$1,000 increments
$20,000 - 50,000	$2,500 increments
$50,000 - 100,000	$5,000 increments
$100,000 - 500,000	$10,000 increments

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' sales. 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. If you pay for all lots purchased by you in the auction in cash or cash equivalent (as defined), a reduced premium rate will apply, as set forth in the Conditions of Sale.

Unless specifically illustrated and noted, fine art frames are not included in the estimate or purchase price. Bonhams accepts no liability for damage or loss to frames during storage or shipment.

All sales are final and subject to the Conditions of Sale found in our catalogs, on our website, and available at the reception desk.

Payment

All buyers are asked to pay and pick up by 3pm on the business day following the auction. Payment may be made to Bonhams by cash, checks drawn on a U.S. bank, money order, wire transfer, or Visa or MasterCard. All items must be paid for within 5 business days of the sale. For payments sent by mail, please remit to Cashier Department, 220 San Bruno Avenue, San Francisco, CA 94103.

Please note that payment made by personal or business check may result in property not being released until purchase funds clear our bank.

Sales Tax

California, Arizona, Illinois, Nevada, New York, Massachusetts, Pennsylvania, Texas and Washington state residents must pay applicable sales tax. Other state or local taxes (or compensating use taxes) may apply. Sales tax will be automatically added to the invoice unless a valid resale number has been furnished or the property is shipped via common carrier to destinations outside the states listed above.

Shipping & Removal

It is the purchaser's responsibility to make arrangements with a third party shipper to remove purchased lots. Client Services is able to provide a list of frequently used shipping services.

International buyers are responsible for all import/export customs duties and taxes. An invoice stating the actual purchase price(s) will accompany all international purchases.

Collection of Purchases

Bonhams does not have staff available in its New York gallery to move or transport sold property. Please arrange for the packing and transport of your purchases prior to collection at our office. If you are sending a third party shipper, please request a release form from us and return it to +1 (212) 644 9009 prior to your scheduled pickup. To schedule collection of purchases, please call +1 (212) 644 9001.

Handling and Storage Charges

Please note that our offices have requirements for freight elevator usage. Please contact us to schedule an elevator appointment for pickup of any large or awkward items. Bonhams will hold all purchased lots in our gallery until Monday July 27th without penalty. After July 27th collection of lots will be by appointment only. Please call +1 (212) 644 9001 at least 24 hours in advance to make an appointment.

Bonhams reserves the right to remove uncollected sold lots to the warehouse of our choice at the buyer's risk and expense. Handling and storage fees will apply.

Auction Results

To find out the final purchase price for any lot following the sale, please call our automated auction results line at +1 (800) 223 2854 ext. 3400. All you need is a touch-tone telephone and the lot number. Auction results are usually available on the next business day following the sale or online at **www.bonhams.com/us.**

CONTACTS

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Prints and Photographs
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Matthew Haley, (212) 461 6531

Collectors' Motorcars & Motorcycles
Rupert Banner, (212) 461 6515

Contemporary Art
W. Tate Dougherty, (212) 644 9128
Morgan Osthimer, (212) 644 9020

Fine Arts
Alan Fausel, (212) 644 9039

Furniture, Decorative Arts and Silver
Victoria Ayers, (212) 461 6532

Japanese Works of Art
Jeff Olson, (212) 461 6516
Talia Andrei, (212) 461 9523

Jewelry and Watches
Virginia Salem, (212) 644 9046
Chrissy Nice, (212) 644 9035

Paintings - European
Deborah Coy, (212) 644 9108

Russian Fine and Decorative Arts
Yelena Harbick, (212) 644 9136

Trusts and Estates
Victoria Richardson, (212) 461 6518

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Dessa Goddard, ext. 3333

Books and Manuscripts
Adam Stackhouse, ext. 3266

Business Development
Martin Gammon, ext. 3207

Collectibles
Jaynes Friedman, ext. 3366
Consultant, Toys and Trains

Decorative Arts
Peter Scott, ext. 3326

Furniture and Decorative Arts -
American
Brooke Sivo, ext. 3238

Furniture and Decorative Arts -
European
Jeffrey Smith, ext. 3413

Jewelry and Watches
Deborah Boskin, ext. 3362

Made in California
Modern, Contemporary and
Latin American Fine Art
Holly Sherratt, ext. 3311

Motor Cars
Mark Osborne, ext. 3353
Malcolm Barber
Consultants:
Jonathan Stein
David Patridge
Barry Fandel
Tom Black
Christine Eisenberg

Museum Services
Laura King Pfaff, ext. 3210

Native American and
Pre-Columbian Art
Jim Haas, ext. 3294

Paintings and Sculpture -
California and American
Aaron Bastian, ext. 3241

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DIRECTOR'S FOREWORD

We're so pleased to present our inaugural Space Sale, celebrating the 40th anniversary of the first manned lunar landing and entirely devoted to the history of man's exploration of space. This sale consists of items acquired either directly from the astronauts or originally in their collections, and features every tier of space collecting from the very beginnings of America's quest to journey into space to the present day Space Shuttle program--including artifacts carried inside spacecraft and taken out on the lunar surface.

Since we are marking the anniversary of Neil Armstrong's first steps on the moon, it stands to reason that amongst the most coveted items offered are those from Apollo 11. Over 50 items related to this mission are offered, including the checklist pages carried by Armstrong and Aldrin as a reference aid, listing the actual steps in the descent sequence during man's first lunar landing. Using the steps described on these check list pages, Armstrong activated the final landing phase program that allowed him to gently place Eagle on the lunar surface, announcing: "Tranquility Base here, the Eagle has landed!" We are also offering a star chart used to take celestial measurements on the surface of the moon immediately after the Eagle's landing, and a sheet from the flown flight plan which has the actual point in the elapsed mission timeline that Neil Armstrong first set foot upon the moon.

Apollo 11 enthusiasts are by no means the only collectors who will find interest in this sale. There are significant artifacts from Apollo missions 14, 15, and 16. From the Apollo 16 mission comes one of the most highly estimated lots in the sale: a cuff mounted checklist used on the surface of the moon. Presented to backup Commander Fred Haise by astronaut Charles M. Duke after his Apollo 16 flight, the checklist was used during the second and third lunar surface exploration periods by Duke. This lot is being sold to benefit the non-profit Infinity Science Center, located near NASA's Stennis Space Center in Mississippi.

We also offer a lunar surface dust brush directly from the collection of Apollo 13 Astronaut Fred Haise and prized for its time spent on the moon. It was used during two Extra Vehicular Activities (EVAs), or Moonwalks, of the Apollo 14 mission to remove moon dust from the lenses of film and TV cameras. Also expected to inspire fierce bidding is a flight vehicle attitude hand controller assembly unit that was part of the Apollo 15 Lunar Module. Considering that Lunar Modules were never designed to return to earth, this lot's appearance on the market is extraordinarily rare.

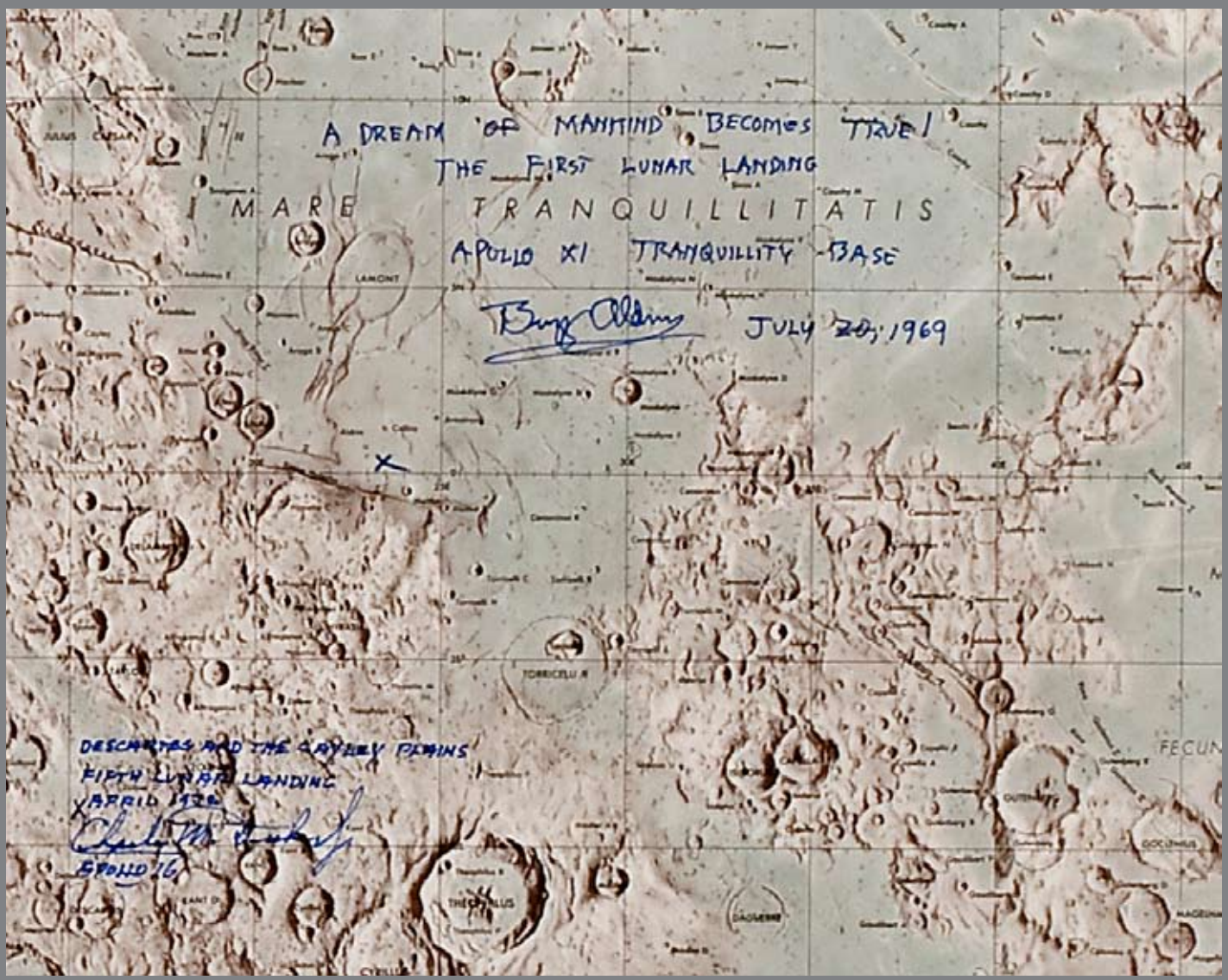
Early space engineering buffs will be excited to learn that property from the estate of venerated spacecraft design engineer Dr. Maxime Faget is also going on the block. Co-designer of the spacecraft for Project Mercury --the first U.S. manned space flight program--and a contributor to every U.S. human spacecraft from Mercury to the Space Shuttle, the late Dr. Faget was a true legend in the world of spacecraft design. From his estate we are offering period scale models of the Mercury spacecraft along with numerous models from later manned programs, including several rare prototype vehicles.

The Space Sale will preview in our New York gallery July 11-16. For details on condition or information on bidding, please contact any member of the department.

Catherine Williamson, Ph.D.
Director, Fine Books and Manuscripts

ORDER OF SALE

The Space Sale
Celebrating the 40th Anniversary of the First Manned Lunar Landing
Lots 1 - 385



MAXIME FAGET [1921-2004]

Maxime Faget was a lead designer of the original spacecraft for Project Mercury and is credited with contributing to the designs of every U.S. human spacecraft from Mercury to the Space Shuttle. He joined the staff of Langley Research Center in 1946 as a research scientist in the Pilotless Aircraft Research Division, and was later named head of the Performance Aerodynamics Branch. In 1958 he became one of the 35 engineers who formed the Space Task Group, creating the Mercury Spacecraft. Faget is credited with the familiar blunt-bodied design of the Mercury spacecraft (and those that followed), which solved the seemingly insurmountable problem of protecting the craft and its occupants from the hazards of re-entry.

MERCURY SPACECRAFT MODELS

The Mercury spacecraft models were all displayed inside Dr. Maxime Faget's NASA-Langley and later NASA-Manned Spacecraft Center offices. He often used these models to assist lectures to astronauts, in meetings, and for demonstrations to key dignitaries and visitors to these NASA centers. The following 15 lots are directly from the estate of Dr. Faget.

1
MERCURY MODEL.
Model of the Mercury spacecraft, steel, fiberglass and plastic, 32 inches tall when assembled and on a white-painted wood stand, with 3 major components:
1. A gray conical spacecraft, 9 by 8 inches, featuring a retro rocket package at the base of the heat shield, a 6 by 4 inch curved window showing a blue space-suited astronaut inside the pressure vessel in a form-fitting survival couch, controls next to the couch at the astronaut's fingertips; below oxygen bottles, fuel tanks, and various electronic equipment, the interior walls with outlines of the entry/exit hatch, an additional control panel, and a viewing window.
2. A cylindrical recovery compartment, 4 by 3 by 3 inches, which would hold the recovery parachute and other related equipment in the actual flight vehicle – each end with a set of three key-holes for attachment to the pressure vessel and the escape tower.
3. A capsule emergency separation device or escape tower with rockets, 18 inches long, that consists of a black metal tower assembly and a gray fiberglass rocket package with three small red nozzles, the base of the tower with three notched pegs marrying up with the recovery compartment.

Identical to the Mercury spacecraft model shown at the first public announcement of the seven pilots selected to be astronauts for Project Mercury. The press conference was held in Washington, on April 9, 1959, and was the climax of screening over 500 military test pilots beginning in 1958. During the press conference a reporter asked which astronaut was ready to go into space at that moment. All seven raised their hands and the press cameras clicked away. In that photograph, a model identical to this one is in front of the astronauts.
$10,000 - 15,000

2

PATENT FOR THE MERCURY SPACECRAFT.

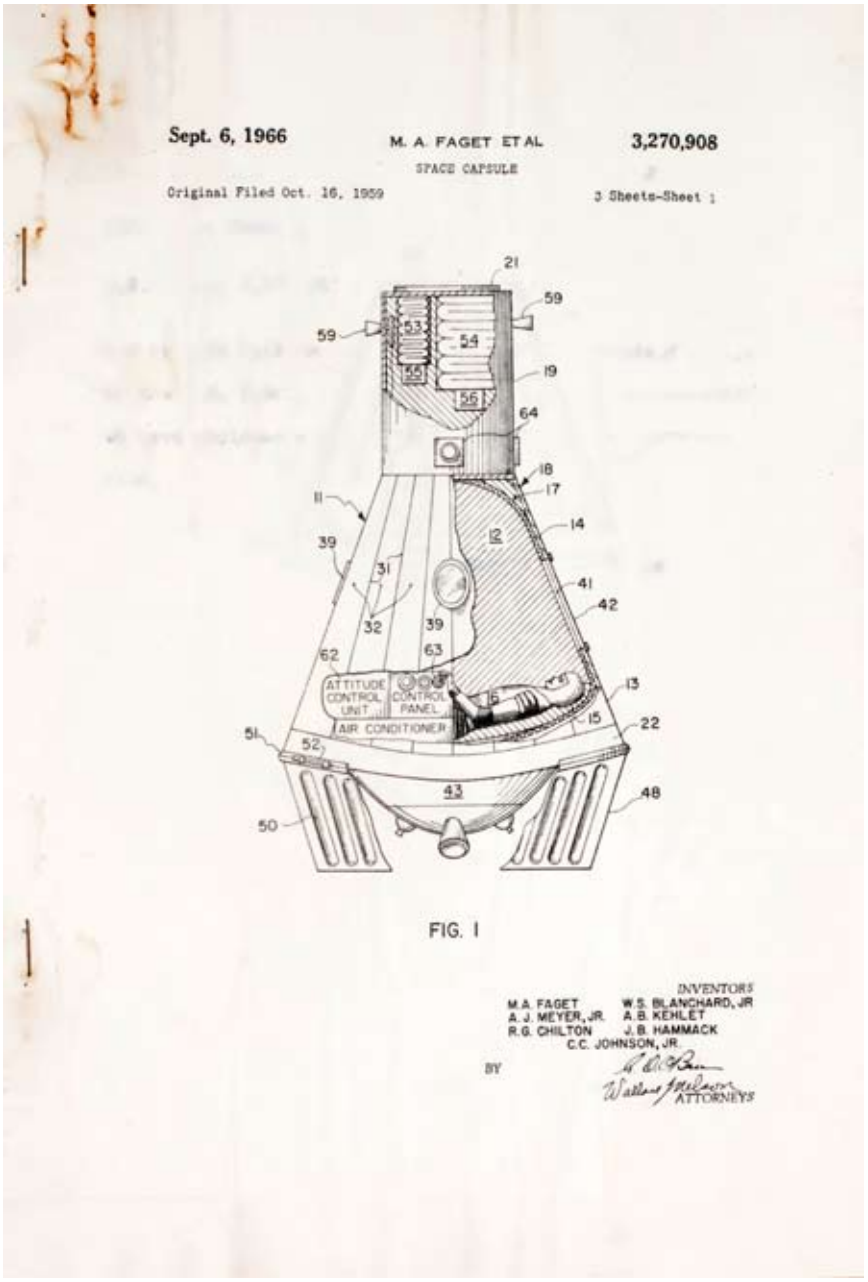
"Space Capsule," patent for the Mercury spacecraft, September 6, 1966. 5 pp. Accompanied by a Typed Letter Signed by Howard J. Osborn, Patent Counsel, October 18, 1962, 1 p, and a Typed Letter Signed by Marvin F. Matthews, Patent Counsel, July 21, 1967, 1 p, on US Government Memorandum letterhead, both to Maxime Faget. All 11 by 8 inches.

Maxime Faget was the lead member and co-inventor of what became the Mercury spacecraft. The patent, no 3,270,908, is a division of patent no 3,093,346, the application for which was made on October 16, 1959. Three pages of diagrams illustrate the capsule from various angles, with over 60 labeled parts.

The patent describes the spacecraft in detail and states: *"The invention described herein may be manufactured and used by or for the Government of the United States of America for government purposes without payment of any royalties thereon or therefor ... This invention relates generally to space vehicles, and more particularly to a manned capsule configuration capable of being launched into orbital flight and returned to the earth's surface ... It is an object of the present invention to provide a novel space satellite capable of achieving orbital flight."*

The letter from Matthews reads: *"Our records fail to indicate that you have received a copy of the U.S. Patent issued on your invention. Accordingly, we have enclosed a copy of said patent for your personal file."*

$1,500 - 2,000



2

3

NACA RESEARCH MEMORANDA.

A set of three National Advisory Committee for Aeronautics (NACA) Research Memoranda, authored or co-authored by Maxime Faget:

1. "Flight Tests of a Two-Dimensional Wedge Diffuser at Transonic and Supersonic Speeds." August 11, 1948. 21 pp. Illustrations and diagrams. Cover stamped: *"Author's Personal Copy"* and *"Classification Changed to Unclassified: Date 8-18-54."* One of Faget's earliest works.
2. [With:] R.S. Watson and W.A. Bartlett. "Free-Jet Test of a 6.5-inch-diameter Ram-Jet Engine at Mach Numbers of 1.81 and 2.00." March 7, 1951. 38 pp. Graphs and illustrations. Cover stamped: *"Author's Personal Copy"* and *"Classification Changed to Unclassified... May 25, 1956."*
3. [With:] B. Garland and J. Buglia. "Preliminary Studies of Manned Satellites, Wingless Configuration: Nonlifting." March 18, 1958. Marked *"Review Copy"* with the confidential status changed by hand to *"Declassified"* and initialed by Maxime Faget. This paper introduces the flight concept that was ultimately used for Project Mercury.

All 10½ by 8 inches, card stock covers, stapled.

$700 - 900

4

NACA LETTERS AND PHOTOGRAPHS.

Two Typed Letters Signed by Hugh L. Dryden, NACA Director, March 13 and September 30, 1958, to Maxime Faget. Each 1 p. 10½ by 8 inches. Together with 25 official black and white NACA photographs, 10 by 8 inches, of high altitude rocket preparations and launches from Wallops Island, Virginia (some duplicates, a few with printed captions).

The first letter invites Faget to become a member of the NACA Special Committee on Space Technology's ad hoc working group on re-entry. The second, written on the last day of the NACA's existence, expresses thanks to Faget for his efforts, noting that all NACA functions and responsibilities are being transferred to the newly created NASA; a copy of the official NASA proclamation of transfer is stapled to the letter.

$1,000 - 1,500

5
PRECISION NASA-LANGLEY MERCURY MODEL.
Model of the Mercury spacecraft, stainless steel and brass, 12½ inches tall. Includes the escape tower rocket assembly, with four rocket nozzles attached to the base of the rocket casing. The escape tower lattice structure seemingly brass painted black. The entire escape rocket assembly attaches to the spacecraft's top section with metal studs. 3-inch circular wood base. Housed together in original fitted wood carrying case, 15 by 5 by 4½ inches.

This model most likely was made by the same team of machinists who milled stainless steel Mercury spacecraft wind tunnel models for tests at the NASA-Langley Research center during the late 1950s and early 1960s.
$7,000 - 9,000

8

6
MERCURY MODEL.
Model of the Mercury spacecraft by Topping of Akron, OH, for McDonnell Aircraft, gray and white injection molded plastic, 6 inches tall and 4 inches wide. With three viewing ports in the white section and raised lettering in the gray areas, reading *"NASA - McDonnell"* twice and *"Project Mercury Manned Satellite Capsule"* twice, the bottom heat shield area being black.
$700 - 900

7
MERCURY PAPERS.
Five publications related to Project Mercury:
1. "Mercury-Redstone III Sub-Orbital Manned Flight." April 28, 1961. Issued to members of Congress, containing a description of the MR-3 flight and related activities.
2. "Results of the Second U.S. Manned Suborbital Space Flight, July 21, 1961." 1961. Covers all aspects of Gus Grissom's Liberty Bell-7 mission.
3. *Results of the Project Mercury Ballistic and Orbital Chimpanzee Flights.* NASA SP-39. 1963. Describes the adventures of "Ham" on the MR-2 sub-orbital flight and "Enos" on the MA-5 orbital mission.
4. "Project Mercury Astronauts: Biographies." [1961.]
5. Faget, M. and R. Piland. "Mercury Capsule and its Flight Systems." Presented at the Institute of the Aeronautical Sciences 28th Annual Meeting in New York, January, 1960.
All but the last Washington: NASA. Various lengths. Each 11 by 8 inches. Original bindings.
$600 - 800

10

8
THE MERCURY SPACECRAFT.
Color Lithograph Signed, 22 by 12 inches, featuring an artist's rendering of the Mercury spacecraft.

Signed by Mercury Astronauts and NASA Langley Space Task Group Members, 16 signatures in all. The astronaut autographs are: Scott Carpenter, W.M. Schirra, Jr, Alan B. Shepard, and D.K. Slayton. The Grissom, Cooper, and Glenn signatures are machine "autopens." Langley Space Task Group member autographs are: Aleck C. Bond, James A. Chamberlin, G. Barry Graves, Jr. Jack C. Heberlig, Kenneth S. Kleinknecht, Chris Kraft, John B. Lee, Paul E. Purser, Robert B. Voas, Walter C. Williams, and Willard Taub. Also included is the signature of Mercury Control Public Affairs officer Shorty Powers.
$1,200 - 1,800

9
FLOWN MA-2 HEAT SHIELD SEGMENT.
Circular heat shield segment, approximately 1 by 1 inch. Encased in lucite and on a square lucite stand, with a plaque reading: *"MA-2 Capsule No. 6 Ablation Shield Plug, McDonnell Aircraft Corporation."*

MA-2 was launched on 21 February 1961 on an 18-minute flight to test the re-entry effects on the Mercury Capsule number 6. Atmospheric friction during re-entry has charred the top surface of the heat shield. The flight obtained an altitude of 114 miles and flew over 1,400 miles down range from Cape Canaveral.
$700 - 900

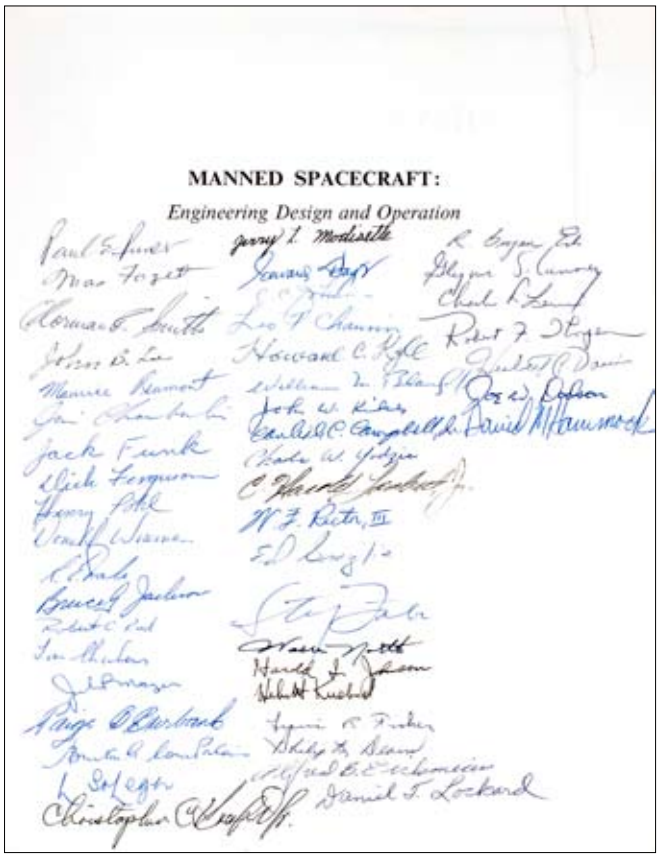
10
FLOWN MERCURY-REDSTONE 3 SPACECRAFT BOLT.
Steel bolt, ½ inch long. Encased in lucite cube and mounted on wooden base, with a plaque reading: *"Removed from Freedom '7' Spacecraft, Belgrade, Yugoslavia, May 1962."*

Astronaut Alan Shepard named his space vehicle *Freedom 7* prior to the MR-3 flight and had that name painted onto the spacecraft. This bolt was part of a Mercury Program exhibit sponsored by the United States Information Agency (USIA) in 1962.
$1,200 - 1,800

12

11
INTERNAL MA-6 REPORTS.
Four period internal distribution copies, related to the first manned US orbital flight:
1. Glenn, John. "Pilot's Flight Report." 31 pp.
2. "Description by John Glenn Taken from the Pilot's Debriefing Transcription of the MA-6 Astronomical, Meteorological, and Terrestrial Observations." 12 pp.
3. O'Keefe, J.A. "Report on the Results of the MA-6 Flight in the Field of Space Science." 18 pp. Gives probable reasons for the "fire-flies" seen by Glenn during his orbital flight.
4. "Summary of Results." 8 pp.
Each signed by Maxime Faget at head (*"Faget"*). 11 by 8 inches, stapled. Included is a copy of the 6 pp typescript written by Faget for the 25th anniversary of the MA-6 flight.

The first American to orbit the Earth touchingly describes a strange phenomenon seen through the spacecraft windows: *"Coming out of the night on the first orbit, at the first glint of sunlight on the capsule ... I could see nothing but luminous specks about the size of stars outside. I realized, however, that they were not stars ... The specks were luminous particles that were all around the capsule ... I would estimate that there were thousands of them. It was similar to looking out across a field on a very dark night and seeing thousands of fireflies ..."*
$700 - 900


MANNED SPACECRAFT:
Engineering Design and Operation

13

12
FLOWN MERCURY-ATLAS 9 HEAT SHIELD SEGMENT.
Heat shield segment, 1 by 1 inch cube. Encased in lucite and mounted on a wooden base, with a plaque reading: *"Ablation Shield Material from Project Mercury Spacecraft Faith 7, 22 Orbits, 15-16 May 1963."*

MA-9, piloted by Gordon Cooper, was the longest Mercury flight, lasting over 34 hours.
$1,500 - 2,000

13
PURSER, PAUL E, [MAXIME A. FAGET, & NORMAN F. SMITH.]
Manned Spacecraft: Engineering Design and Operation. New York: Fairchild Publications, 1964. Numerous illustrations. 11¼ by 8¾ inches. Leather binding, gilt edges.

Dr Faget's copy with 46 signatures of his collaborators, collected by him. Signed ("Max A. Faget") on the front free endpaper. During his career, Dr. Faget endeavored to have all his fellow authors sign the half-title. He succeeded with 46 of them: Paul Purser, Norman Smith, Christopher C. Kraft, Jr,. Glynn S. Lunney, C.C. Johnson, Warren North, Stan Faber, John Mayer, Ed Smylie, Robert C. Ried, Howard C. Kyle, Robert F. Thompson, Lewis R. Fisher, W.F. Rector, III, Jim Chamberlin, Jack Funk, Dick Ferguson, Henry Pohl, and Hubert P. Davis. A note in Dr. Faget's hand, loosely inserted, has five names he needed to add, with two crossed out after they had signed the book. This is one of the publications for which Dr. Faget is most noted; it is based on papers presented at the NASA Manned Spacecraft Center, Louisiana State University, University of Houston, and Rice University. A broad range of topics include design concepts, aerodynamics, mission analysis, life support and physiological issues, space suits, launch vehicles, and planned Apollo missions. Papers written by Dr. Faget include "Mission Objectives and Design Implications" and "Overall Design Concepts."
$3,000 - 5,000

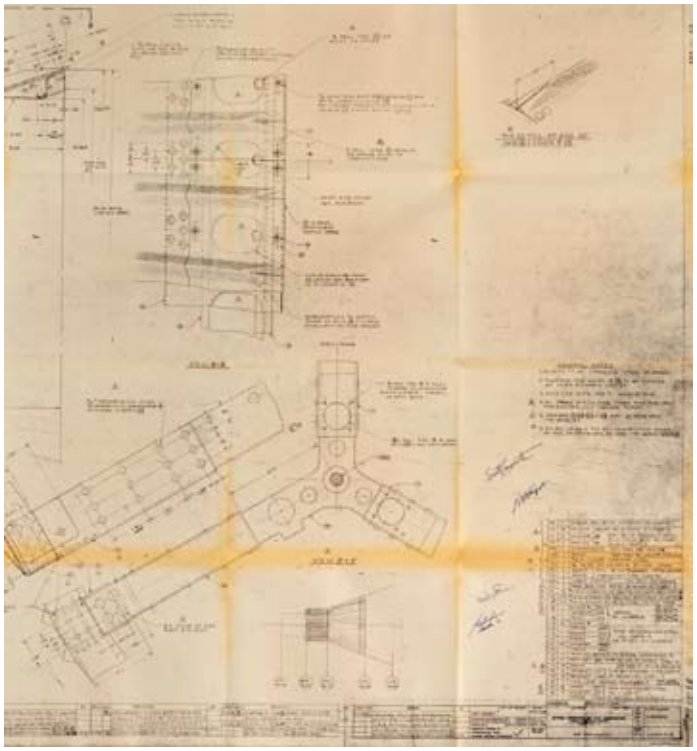
14

14
MERCURY SPACECRAFT LIFE RAFT.
Life raft, mainly Neoprene and nylon Rip-Stop, enclosed in a 14 by 9½ by 5½ inch silver-gray case with nine snap-buttons and a handle strap along the top. Two snaps buttons above the wording "*LIFE RAFT*" secure the top of a large front pocket. Opening the outer nine snap-buttons allows access to a pull-cord to deploy the raft. This cord would activate the large CO^2 cartridge (still enclosed) which would inflate the raft. A 5 by 8 inch card inside the front pocket reads "*6-18-63 Liferaft and CO2 cylinder checked this date* [with initials "GS"]. *To be checked every 90 days*."

The life raft was part of the Mercury survival equipment, designed for use after a launch abort or emergency landing following a space flight. A life raft of this design was actually used after Astronaut Scott Carpenter's Aurora 7 flight of May 1962. Due to an attitude mis-alignment during the retro-rocket sequence to return to earth, his spacecraft landed some 250 miles further down-range than planned.
$2,500 - 3,500

15
MERCURY-ERA NASA HARD HAT.
Hard Hat, high-impact plastic with interior support straps, approximately 12 inches in diameter for head sizes 6 1/8 to 8, early 1960s. With 2½ inch diameter color NASA decal at the front, interior label reads, in part: *"MSA Topgard Hat or Cap."*

Worn by Dr. Faget during various tests and observations during the Mercury, Gemini, and Apollo Programs.
$700 - 900

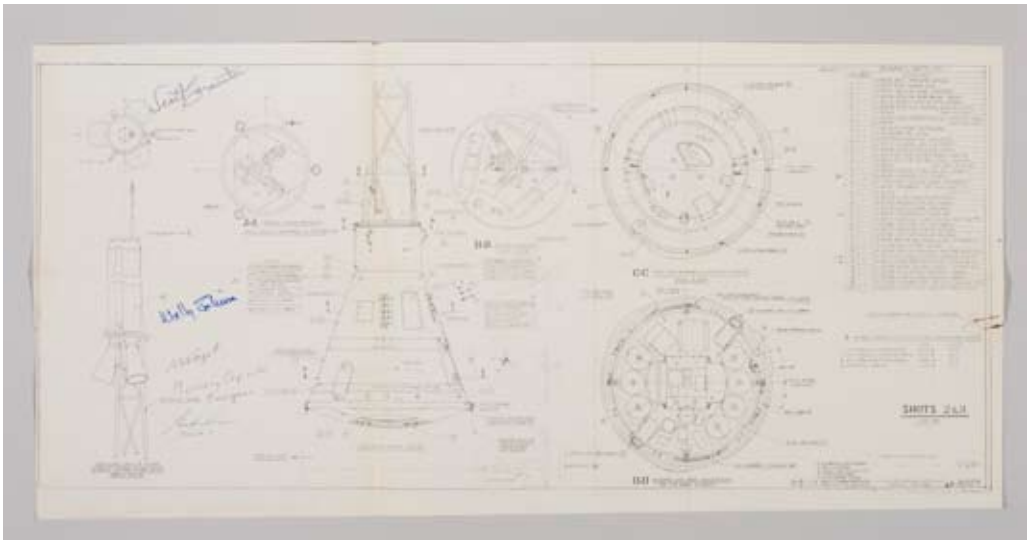

16 (detail)

MERCURY SPACECRAFT BLUEPRINTS

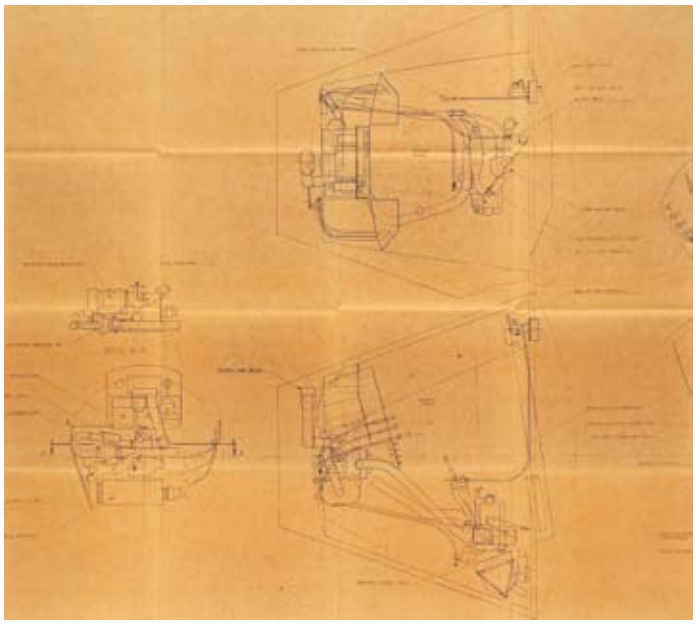
Scale blueprints recorded the Mercury spacecraft's design evolution from initial concept to the production stage. Hundreds, if not thousands, of changes were made, resulting in a large quantity of revised blueprints. Record keeping was rapidly becoming a burden because of the space required to store that much paper. Towards the end and after the conclusion of the Mercury Program, efforts were made to transfer the drawings onto micro-film. This was especially desired by space industry manufacturers in order to cut their storage costs. After they were recorded onto micro-film, the blueprints were mostly destroyed. It is doubtful that any very large collection of Mercury spacecraft paper blueprints exists today. The following lots represent one of the most significant collections of Mercury blueprints ever to come to public auction. To add to their historical significance, almost all have been autographed by Dr. Maxime Faget, co-designer of the Mercury spacecraft and/or by several Mercury Astronauts who were the pilots of this vehicle.

16
AFTERBODY.
"Afterbody," blueprint, NASA Langley Research Center, Langley Field, VA, March 19, 1959 with three 1959 revisions, 120 by 26 inches, scale full size with some sub-scale drawings.

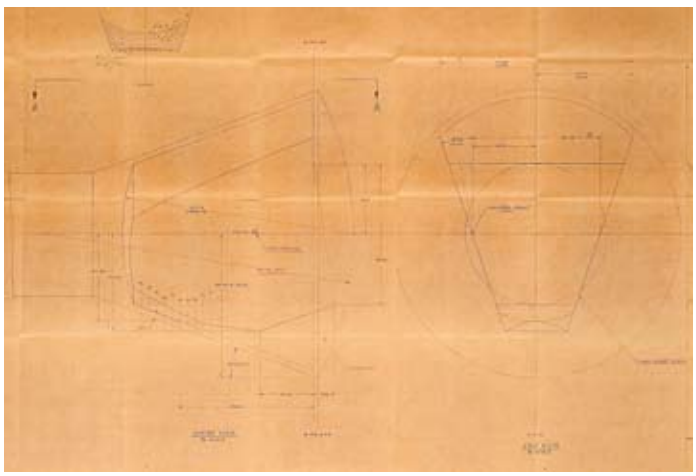
One of the earliest NASA blueprints of critical astronaut cabin components in the Mercury spacecraft. *Signed by Max Faget, Scott Carpenter, Wally Schirra, and Gordon Cooper (with Faith 7)*.
The Afterbody consisted of the pressurized astronaut compartment and pressure bulkhead. Illustrated at full scale are segments of the triangular structural beams at the base of the recovery compartment. Included is a circular section with a pitch-yaw axis view, along with a side wall of the pressurized cabin. A list of 33 items with descriptions is located at the lower right corner.
$1,000 - 1,500



17



18 (detail)



19 (detail)

17
LITTLE JOE.
"Little Joe Capsules - Shots 2 & 3 General Assembly," blueprint, L[angley] R[esearch], September 28, 1959 with October and November revisions, 26 by 12 inches, 1/8 scale.

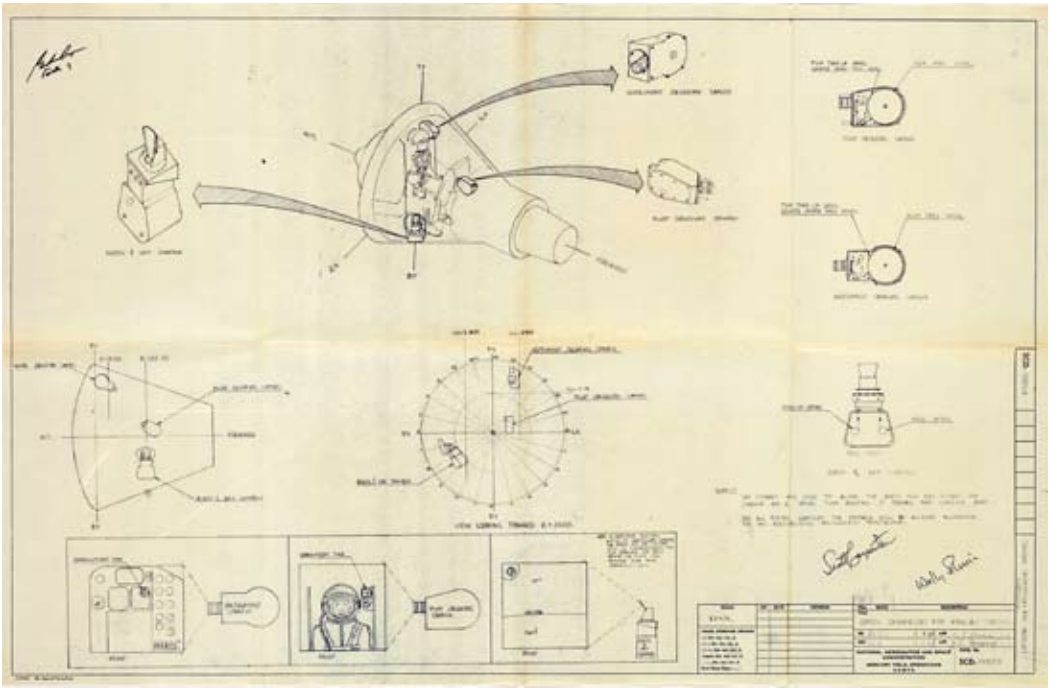
A detailed blueprint for "Little Joe," a rocket booster designed to test the Mercury spacecraft's structure and performance against aerodynamic loads during low altitude flight. *Signed by Scott Carpenter, Wally Schirra, Gordon Cooper (with Faith 7), and Max Faget (as Mercury Capsule Designer).*
Seven different views of the spacecraft and escape tower are featured with an item list defining and listing locations of 40 drawings or parts. Close-ups of the afterbody, on-board instrument deck, drogue cover, and recovery gear deck have additional hardware identified.
$600 - 800

18
INTERIOR ARRANGEMENT.
"Interior Arrangement," blueprint, McDonnell Aircraft Corporation, Saint Louis, MO, June 8, 1961, 75 by 36 inches, ¼ scale.

Signed by Scott Carpenter, Wally Schirra, Gordon Cooper (with Faith 7), and Max Faget (as Mercury Designer).
Featured is the instrument panel from a forward, side, and top point-of-view with associated surrounding equipment including the cabin vent valve handle, space suit environmental control system flow lines, and oxygen tanks. Two other illustrations show more details of the space suit system such as compressors, heat exchanger, water separator, and the carbon dioxide absorber.
$1,200 - 1,800

19
CABIN PRESSURE ENVELOPE.
"Cabin Pressure Envelope - Floatation [sic]," blueprints, McDonnell Aircraft Corporation, Saint Louis, MO, April 24-25, 1961. 2 sheets, the first with additional date stamp of June 8, 1961. 77 by 36 and 59 by 36 inches, both ¼ scale.

Two large blueprints illustrating the Mercury spacecraft pressurized compartment which provides buoyancy for the vehicle after ocean landing. *Both signed by Gordon Cooper (with Faith 7), and Max Faget (as Mercury Designer), the first also by Scott Carpenter and Wally Schirra.*
Illustrated are the top, end, and shear views of the entire Mercury spacecraft with the shear view showing the center of gravity and load lines, as well as the flat pattern development of the straight elements, side panels, and cantoned section of the spacecraft.
$1,000 - 1,500



20

20
CAMERA ORIENTATION.
"Camera Orientation for Mercury Capsules," blueprint, NASA Mercury Field Operations, January 3-4, 1961, 34 by 22 inches, scale *"none."*

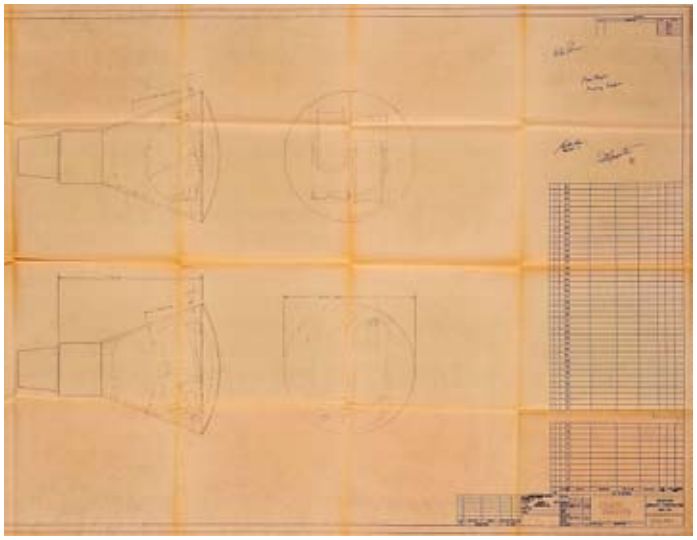
Signed by Scott Carpenter, Wally Schirra, and Gordon Cooper (with Faith 7).
A blueprint showing the locations and view angles of all three Mercury spacecraft onboard film cameras. The Pilot Observation Camera, Instrument Observing Camera, and the Earth and Sky Camera are shown with the film reel covers removed.
$1,000 - 1,500

21
ESCAPE CONCEPTS.
"Escape Concepts," blueprint, Goodyear Aircraft Corporation, Akron, OH, November 3, 1961, 55 by 36 inches, 1/10 scale.

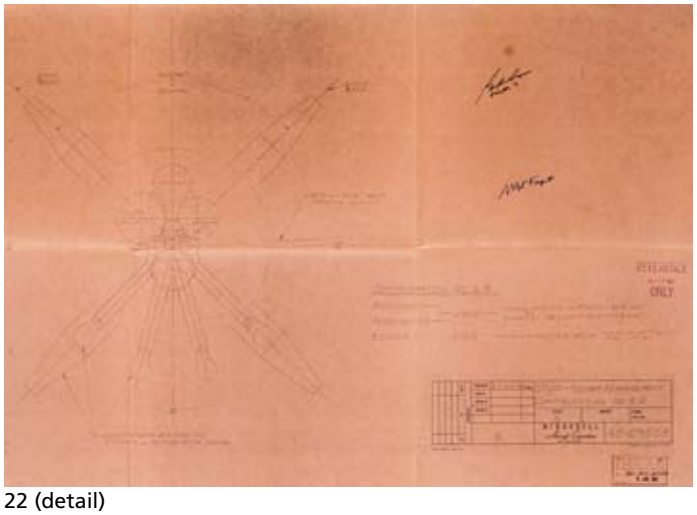
Signed by Scott Carpenter, Wally Schirra, Gordon Cooper (with Faith 7), and Max Faget (as Mercury Designer).
A blueprint showing modifications to the Mercury spacecraft for escaping the vehicle, which would eliminate the escape rocket tower. Two profile drawings of the Mercury spacecraft show the astronaut with a rocket motor attached to his couch which would provide a means of escape.
$600 - 800

22
ROCKET ARRANGEMENT CONFIGURATION.
"Study - Rocket Arrangement Configuration No. 6B," blueprint, McDonnell Aircraft Corporation, Saint Louis, MO, April 26, 1961, 2 date stamps for June 8 and May 17, 1961, 53 by 18 inches.

Signed by Max Faget and Gordon Cooper (with Faith 7).
A blueprint from a study to replace the Mercury escape tower that was on top of the spacecraft with a rocket pack attached to the base of the spacecraft heat shield. The left side illustrates the rocket pack between an outline of the Mercury spacecraft and the upper part of the Atlas launch vehicle. The right side shows an underside view of the escape rockets and fins. Plans were to use rocket engines Patriot and Cherokee from Thiokol and the P4 from Rocketdyne.
$700 - 900



21 (detail)



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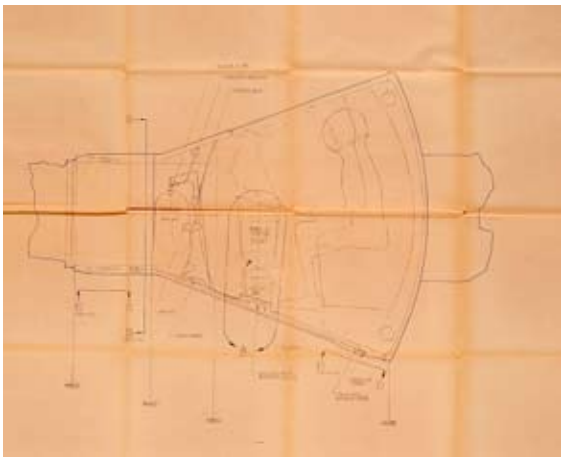


23 (detail)

23
COLD GAS SYSTEM, REACTION CONTROL SYSTEM.
"Study - Cold Gas System. R.C.S.," blueprints, McDonnell Aircraft Corporation, Saint Louis, MO, January 24-26, 1962, 3 sheets, 96 by 36, 84 by 36, and 76 by 36 inches, no scale given.

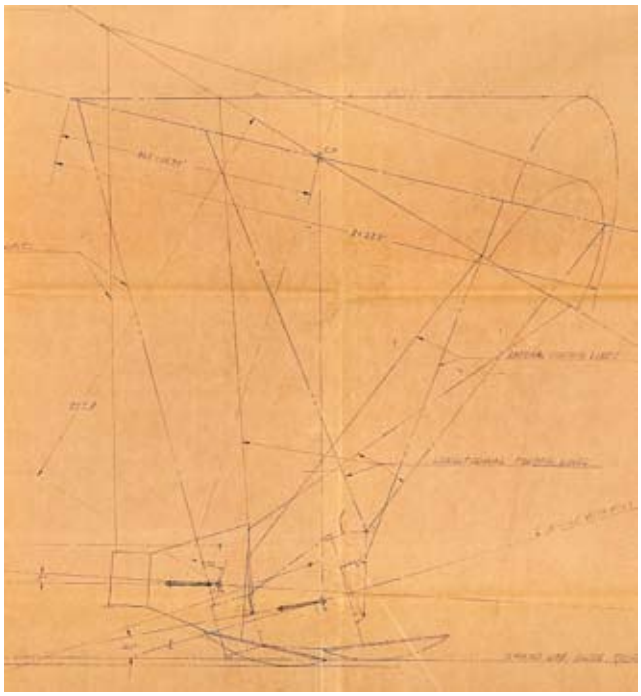
Each sheet signed by Scott Carpenter, Wally Schirra, and Gordon Cooper (with Faith 7), as well as Max Faget (as Mercury Designer). Dr. Faget has amusingly annotated one sheet with *"NA¢A -> NA$A."*
A series of three large blueprints illustrating modifications to the Reaction Control System (RCS) which would use nitrogen as the primary propellant. The Mercury spacecraft was using hydrogen peroxide as the fuel, but its unstable nature and other difficulties prompted this nitrogen use study.
$1,200 - 1,800

24
PARAGLIDER CONCEPTS.
Two large blueprints illustrating concepts for returning the Mercury spacecraft to dry land using a triangular shaped airfoil:
1. "Study - Mercury Paraglider Controls," blueprint, McDonnell Aircraft Corporation, Saint Louis, MO, June 18, 1961, 108 by 36 inches, ¼ scale.
2. "Geometry Layout - Mercury Paraglider Controls," blueprint, McDonnell Aircraft Corporation, Saint Louis, MO, May 22, 1961, 81 by 36 inches, 1/20 scale.

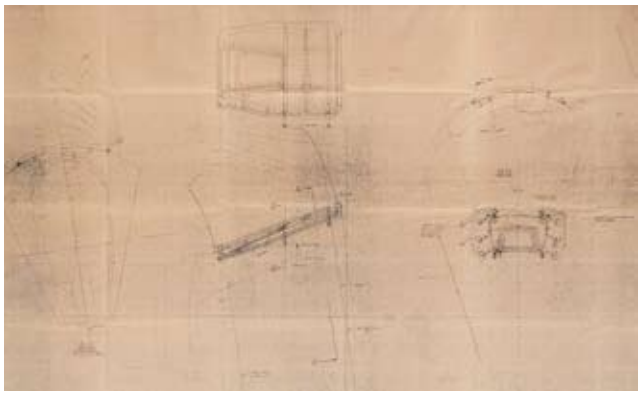
Both blueprints signed by Max Faget as Mercury Designer. The paraglider concept would save the expense of numerous armed services ships and aircraft during an ocean landing. Various engineering problems prevented paraglider use in time for the Mercury Program, but the concept became part of the basis for popular "hang gliding" just a few years later. Drawings include a side view showing an astronaut inside the Mercury spacecraft with the heat shield deployed as a landing skid and shock absorber. The paraglider airfoil is shown in various stages of stowage and deployment.
$1,000 - 1,500

25
MERCURY MARK II.
"Hatch Study, Mercury Mark II," blueprint, McDonnell Aircraft Corporation, Saint Louis, MO, June 7, 1961, approximately 126 by 36 inches, with drawings ¼ scale and *"as noted."*

Signed by Max Faget as Mercury Designer. Just after President Kennedy's May 1961 address calling for the US to send a man to the moon, plans to enlarge the Mercury spacecraft were well underway. This stepping stone project toward the Apollo lunar flights was initially called Mercury Mark II, but was later was renamed "Gemini." Depicts the astronaut couch, the ejection escape path, and latching system.
$700 - 900



24 (detail)



25 (detail)

The following four lots were all originally in the collection of Astronaut Walter M. (Wally) Schirra.

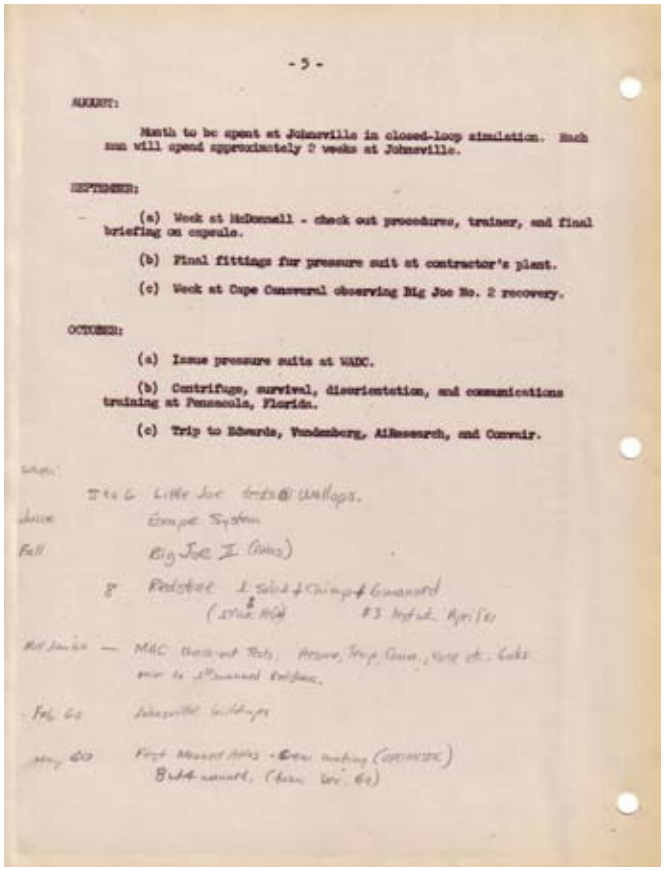
26
WALLY SCHIRRA'S TRAINING PROJECT OUTLINE.
The initial training schedule issued to the Mercury Astronauts after their selection in April 1959, and containing:
1. A calendar covering April through October 1959, 5 pp, listing dozens of meetings such as spacecraft configuration and escape, crew space layout, high altitude training in the Langley chamber, and familiarization with the spacecraft mock-up at McDonnell (MAC). Schirra has made several manuscript annotations, detailed notes about Little Joe and MAC check-outs, and remarked: *"8 Redstone - 1 Solo (1st wk Feb 60) + Chimp + 6 manned ... May 60, First manned Atlas - Crew mating (OPTIMISTIC), 8 with 4 manned (thru Dec. 60)."*
2. A list of Mercury study panel groups as of March 1959, 2 pp.
3. "Status Report no. 1," a confidential NASA/Langley STG (Space Task Group) report, 34 pp, for period ending January 31, 1959.
4. "General Background Material on Project Mercury," a NASA/Langley STG memo, March 23, 1959, 12 pp, with a few officials' names supplied in manuscript by Schirra.
Contained together in a pronged binder, 11 by 9 inches, the upper cover with a typed label signed by Wally Schirra.
$800 - 1,200

29

27
MA-8 DATA PAPERS.
A group of items belonging to Wally Schirra and relating to Mercury Atlas 8 (MA-8) which was the NASA designation for his Sigma 7 Mercury flight, comprising:
1. Manuscript notes by Schirra, 3 pp, one leaf listing over 20 flight sequence steps from Booster Engine Cut-off (*"BECO"*) to *"Retro Att[itude],"* another with 6 steps of *"Yaw Checks,"* with *"Chimp config"* and several other steps crossed-out, the last a *"Return from Drift"* page with 9 steps and with additional *"Chimp config"* steps crossed-out.
2. A memo, 10 pp, December 12, 1961, describing observations through the MA-6 capsule window.
3. A McDonnell weight change listing detailing spacecrafts 13, 16, 18 and 19, 3 pp, June 29, 1962.
4. 3 copies of a sheet listing MA-8 retrosequence information, July 10, 1962.
5. Schirra's distribution copy of the MA-8 Flight Test Reports, approximately 100 pp.
6. An orbital map for MA-8, color lithograph, 32 by 9 inches.
Contained together in a folder titled by Schirra in pencil *"MA-8 Data."*

"Chimp configuration" was Wally Schirra's name for a free drift that tested the Mercury's autopilot system; the majority of the flight time of MA-8 was spent in this state.
$1,000 - 1,500

28
MA-8 POST-MISSION PAPERS.
3 period distribution copies of typed reports sent to Wally Schirra, each signed by him on the cover:
1. "MA-8/16 Astronaut Self-Debriefing," USS *Kearsarge*, October 4, 1962, 28 pp. A typescript of the voice recording made by Schirra just after his recovery on the USS *Kearsarge* and describing in detail the six-orbit flight.
2. "Astronaut's Flight Report," 26 pp. A narrative by Schirra covering flight details including launch, orbital flight, and re-entry.
3. "MA-8 Press Conference," Houston, TX, October 7, 1962, 28 pp. A transcript of the NASA press conference with Astronaut Schirra, Administrator James Webb, Robert Gilruth, and "Shorty" Powers.
Each 11 by 8 inches, stapled.
$600 - 800



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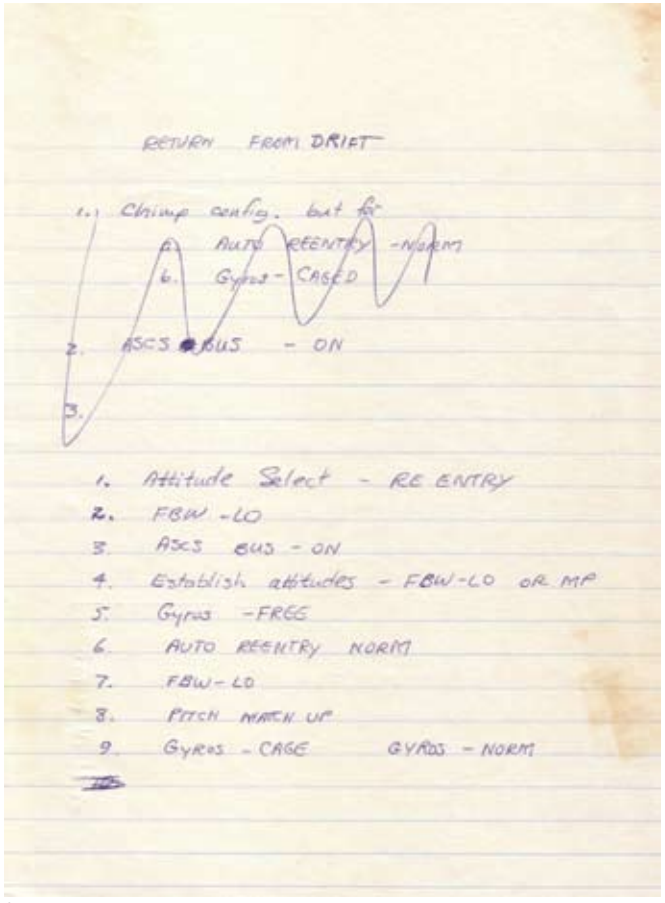

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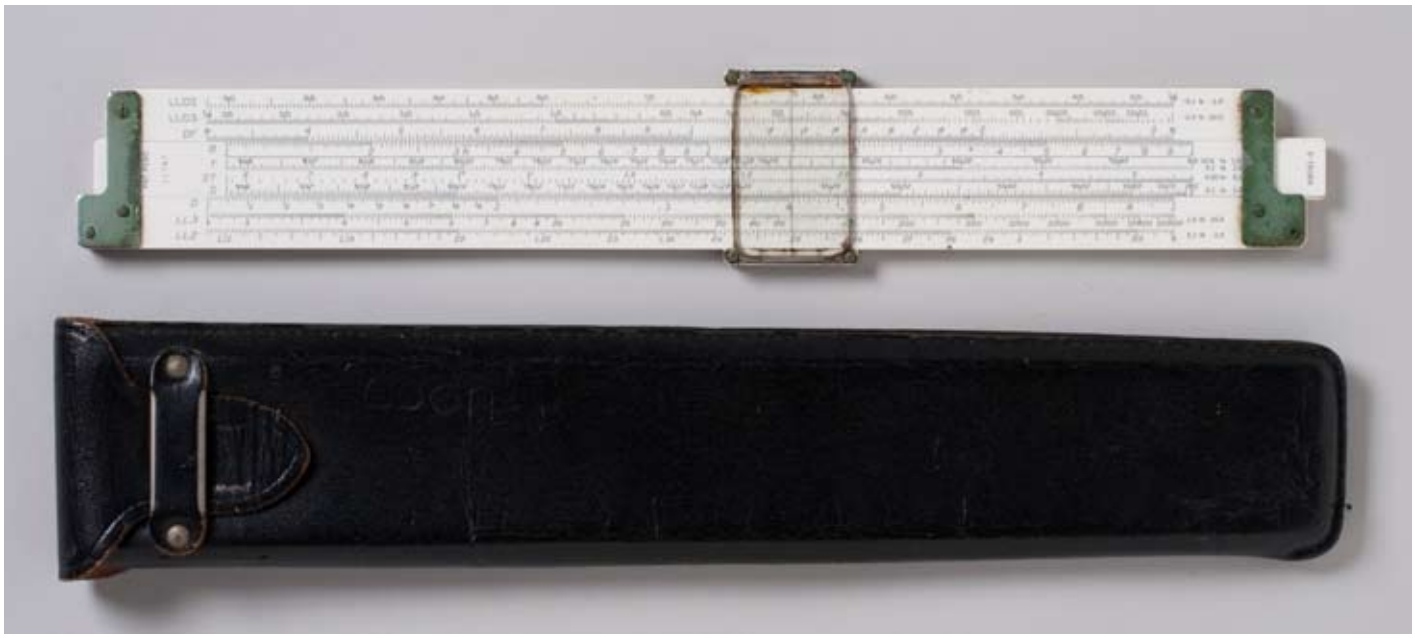


30

31

29
SCHIRRA'S MERCURY SOUVENIRS.
A group of around 30 items from Wally Schirra's Mercury collection comprising:
1. 5 booklets issued by General Dynamics and signed by Schirra: "Liberty Bell 7"; "Results of the Second U.S. Manned Suborbital Space Flight"; "Astronaut M. Scott Carpenter: Aurora 7"; "The Six Orbits of Sigma 7: Walter M. Schirra's Space Flight"; and "Mercury-Atlas MA-8 Launch Information and Notebook."
2. 8 black and white photographs of the Atlas booster, Launch Conductor, snapshots of Mercury "party" activities, and Schirra in space suit, signed.
3. Color photograph of Schirra, signed.
4. 4 color photolithographs of Mercury subject matter.
5. Postal cover, signed.
6. Large MA-8 orbit track map, 27 by 22 inches, signed.
7. A handful of other printed items.
Contained together in a folder titled *"Souvenirs"* in Schirra's hand.
See illustration on preceeding page.
$800 - 1,200

The following nine lots were all originally in the collection of Astronaut L. Gordon (Gordo) Cooper.

30
SLIDE RULE.
A slide rule by Keuffel and Esser, plastic lettered in black with metal end-brackets and glass lenses, 12 by 2 inches and ¼ inch thick, in leather case.

Accompanied by a Typed Letter Signed by Gordon Cooper on his personal stationery which reads in part: *"I purchased this slide rule in 1949 for use at flight school then continued to use it during my Air Force and NASA careers. I printed my name very faintly on the out side and again on the inner flap of the stowage case."*
$1,500 - 2,000

31
COOPER'S SUNGLASSES.
Standard-issue military sunglasses (model Flight Goggle 58, also known as Original Pilot Sunglass) by American Optical, in gold-colored metal with straight-prong supports and green lenses. Protective vinyl case, the plastic case-lining signed by Gordon Cooper.

Accompanied by a Typed Letter Signed by Gordon Cooper on his personal stationery which reads: *"These are the military sunglasses that I used while flying various aircraft as an astronaut with NASA during the 1960s. The aircraft I flew during that period included the F-102, F-106, T-33, and T-38 as well as my private Beech aircraft."*
$600 - 800

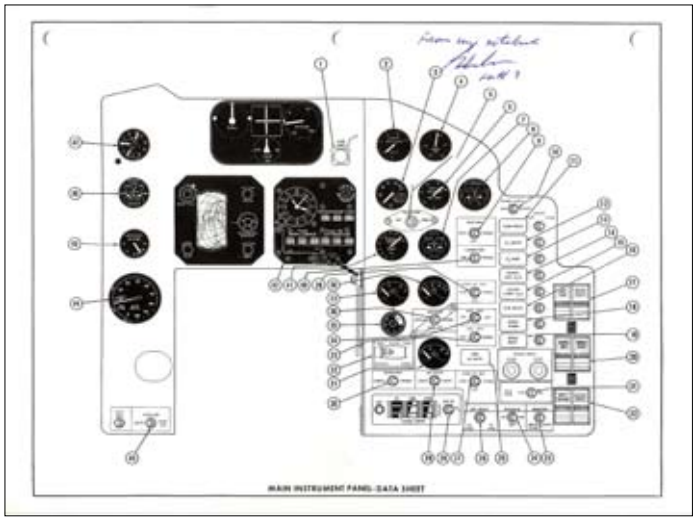
32
COOPER'S AVIATION FLIGHT COMPUTER.
A circular instrument used to compute air speed, mach number, and other parameters, 4½ inches in diameter. With stapled user's manual, signed by Gordon Cooper, and soft plastic case.

Accompanied by a Typed Letter Signed by Cooper on his stationery which reads: *"This was my MB-2A Air Navigation Computer that I used extensively during my Air Force career in the late 1950s and while as an astronaut for NASA in the 1960s. It was actually in my flight jacket while the well known photograph of the Mercury Seven astronauts in front of the F-106 jet was taken. The computer, instruction book, and carrying case were used on many flights to the Mercury and Gemini spacecraft manufacturing plant in St. Louis and to the Cape for space flight preparations."*
$600 - 800

33

33
THE ORIGINAL SEVEN ASTRONAUTS.
"Project Mercury: Research Providing Valuable Data for Manned Space Flight." NASA Langley Research Center, Langley Field, VA, April 1959. 4 pp. 10½ by 8 inches. The cover with portraits of all seven astronauts, with a diagram and description of the Mercury capsule, the interior pages with several photographs describing Langley's role in the development and tests of this space vehicle, together with a Typed Letter Signed by Gordon Cooper.

Brochure signed by the first seven US astronauts in the late 1950s. Signed vertically to the right of their respective portraits by Malcolm S. Carpenter, Leroy G. Cooper, Jr., John H. Glenn, Jr., Virgil I. Grissom, Walter M. Schirra, Jr., Alan B. Shepard, Jr., and D. K. Slayton, in the forms they used in the late 1950s. Cooper's letter reads in part: *"This brochure is from my personal collection and features the early signatures of my fellow Mercury Astronauts. We signed using our proper names with initials back in 1959. The length of our signatures changed over the years due to the large number of autograph requests NASA received during our tenure as astronauts. John Glenn, Scott Carpenter, and I were happy to sign items over the years. Gus Grissom was a real hard worker and was not as inclined to spend much time with such as task. Deke Slayton had the bad luck being pulled from flight status but managed to honor requests despite the heavy management role he assumed. Wally Schirra, or 'Jolly Wally' often let the requests pile up, but would eventually get most of them completed. Alan Shepard was all business and would run hot or cold to the effort, but mostly kept things on the cool side. As the complexity and the time demands of the Gemini and Apollo projects grew, we often had no choice but to employ use of machine produced signatures, often referred to as 'autopens.' The volume of requests was so large that we could easily have done nothing but sign our names all day long and never had time to complete training to accomplish the national goal of landing a man on the moon."*
$4,000 - 6,000



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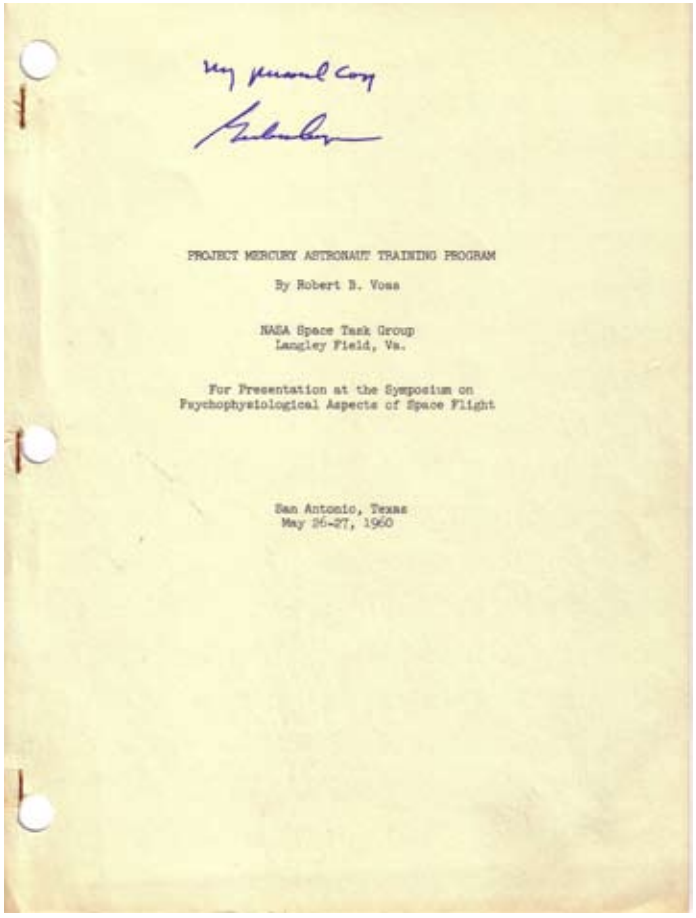


36

34
MERCURY INSTRUMENT PANEL DIAGRAMS.
"Main Instrument Panel - Data Sheet," a printed diagram on card stock illustrating more than 40 dials, switches, and instruments. 10 by 8 inches, 3 punch-holes at head. The verso with a similar diagram showing fuse panel, right console, and left console. The latter shows light activated status indicators such as *"Jett Tower," "Sep Capsule," "Fire Retro,"* and *"Landing Bag"* deployment as well as a large *"Abort"* button.

Inscribed *"From my notebook, Gordon Cooper, Faith 7."*
$600 - 800

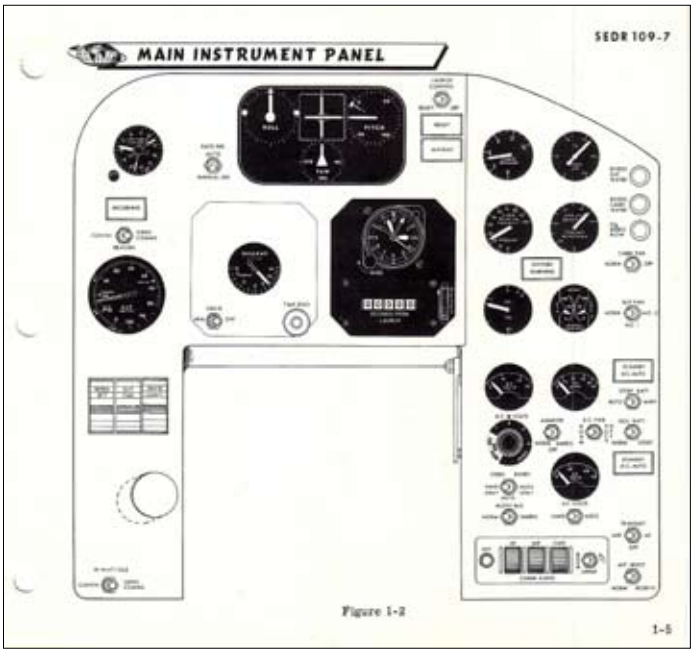
35
COOPER'S MERCURY TRAINING PAPERS.
A binder containing eleven groups of internal-use working papers, Space Task Group papers, meeting hand-outs, and spacecraft notes used by Gordon Cooper, 1960 to 1963. Topics include: planning schedules, the training program for Mercury Astronauts, a list of Service Engineering Department Reports (SEDR), "Project Mercury Bioscience Data Plan," "Summary of Mercury-Johnsville Centrifuge Program," flight plan procedures, and MA-9 debrief planning. Also includes a detailed "Weight History of Mercury Spacecraft," 30 pp, listing Mercury spacecraft components, as well as a pencil sketch, 17 by 11 inches, showing relative positions between the capsule and escape tower 5 seconds after staging. Lengths vary from a single sheet to 30 pp. 12 items are signed by Gordon Cooper and inscribed with *"My personal copy,"* or *"From my notebook."* One item additionally signed by Mercury astronauts Scott Carpenter and Wally Schirra. Together in a 3-ring binder, 12 by 10 inches.
$1,500 - 2,000

36
MA-9 MISSION FOLDER.
2 typescripts by Gordon Cooper, and another item:
1. Original Typescript, 5 pp, January 23, 1963, headed *"The following is a list of operational discrepancies by the pilot in the pre-flight activities preceding the launch of MA-9,"* with over 20 manuscript corrections and amendments by Cooper, as well as several pointed comments (*"This is absolutely ridiculous* [related to the addition of a last minute experiment] *and it is my opinion that if a crew is going to fly a spacecraft and a Project Office is to run the Project, then there must be authority given to them to adhere to these cutoff dates"*), the first leaf inscribed by Cooper *"From my personal files ... My working draft, corrections by Gordon Cooper."*
2. Original Typescript, 9 pp, no date, headed *"MA-9 Postflight Astronaut Training Report by Cooper"* with references to MA-8 and Schirra crossed out in the title, including several corrections in Schirra's hand (*"Go ahead on this Gordo, I buy the whole thing but I think you can get a better audience than I now - Wally"*), the report addressing pilot training via aircraft, engineering education, and physical training, and with an additional Cooper note reading *"Redo para on gym to read - Funding has been approved, but apparently will not be available for approx. 1 year,"* the title inscribed by Cooper *"From my NASA Mercury Files, Gordon Cooper."*
3. Distribution copy on Astronaut's Post-Recovery Activities for MA-9, 14 pp, including a list of topics for Cooper's debriefing after the flight.
Each 11 by 8 inches, the first two loose, the third stapled.

These papers give a possible insight as to why Cooper never flew again after Gemini 5.
$600 - 800

37 °
PROJECT MERCURY STANDARD-TIME AND DATE CHART.
Color plastic card inset with a rotating disk used to set the time at one ground station and determine the time at another, 5 by 4 inches.

A polar azimuthal projection (putting 360 degrees within 180 degrees) shows all Mercury ground stations and plots a three orbit ground track of a spacecraft.
Accompanied by a Typed Letter Signed by Cooper, reading in part: "*This little device was a fun item distributed by the ground network folks to allow a quick time reference between any two ground stations across the globe.*"
$250 - 350



40

41

38 °
LIFE MAGAZINE COVER.
Color Lithograph Signed and Inscribed by Gordon Cooper (*"From my Personal Collection / Gordon Cooper / Faith 7"*), 13½ by 10½ inches, being the cover sheet for the May 24, 1963 issue of *Life Magazine*.

Featuring a wonderful image of Gordon Cooper in his space suit as he heads for the launch pad prior to his Faith 7 mission. Accompanied by a Typed Letter Signed by Cooper which reads in part: "*The good folks a Life Magazine sent me a few of these special printing cover sheets after my May 'Faith 7' mission. I have kept ten of them in my private collection since 1963.*" In the lower right this copy is identified as no. 2 of 10.
$200 - 300

39
MERCURY PROCEDURES MANUAL.
Simulation System—Langley Operation and Maintenance Manual. Prepared for National Aeronautics and Space Administration. Contract No. NAS 1-420. Bendix Corp.: December 1, 1960. Over 260 pages. Illustrated including folding diagrams. 9 by 11 inches. Punched and screw-pin bound in original red vinyl folder.

Describes the purpose, operation, and maintenance of the Mercury Procedures Trainer Room which was located at the NASA Langley Research Center in Virginia. *Signed on the title-page: "Wally Schirra / [Sigma] 7"*; "*Gordon Cooper / Faith 7"; and "Scott Carpenter Aurora 7*."
All Mercury astronauts trained for their flights using the simulation system based at Langley. Used in conjunction with the McDonnell Mercury capsule procedures trainer, this simulation system trained flight controllers that were to be based at remote locations around the world.
$600 - 800

40
FREEDOM 7 MANUAL.
Project Mercury. NASA Capsule Flight Operations Manual. Capsule 7 (Redstone). Mcdonnell Aircraft: October 15, 1960. Revised December 15, 1960. Approximately 80 pp. 5 by 7 inches. Loose leaf, punched.

The flight manual issued for the United States first manned space flight which was piloted by Alan Shepard in Mercury space capsule number 7, Freedom 7. Gives extensive information on capsule operations in three different sections: Normal Procedures, Emergency Procedures, and Trouble Shooting. Checklist steps performed by the astronaut include pre-launch, separation, capsule stabilization, re-entry, and landing. The emergency section pages have a red border. There are five folding diagrams of the instrument panel and capsule systems, some with manuscript notes.
$1,000 - 1,500

41
FLOWN AURORA 7 HEAT SHIELD SEGMENT.
Heat shield segment, approximately 1 inch cube. Mounted on a wooden base with a plaque reading: *"Heat Shield from Aurora Seven, Mercury-Atlas 7 - May 24, 1962, M. Scott Carpenter."*

Signed by the astronaut above the plaque. A cube taken from the heat shield of Astronaut Scott Carpenter's Aurora 7 spacecraft after the flight, the top ¼ inch charred by the intense frictional heat of re-entry into the Earth's atmosphere. Aurora 7 was traveling at approximately 17,500 miles per hour before the retro rockets slowed the vehicle to allow re-entry.
$1,500 - 2,000

42

43

42
MERCURY ATLAS 8 ORBITAL CHART.
"Mercury Orbit Chart MOC-4," color Earth map, Aeronautical Chart and Information Center, June 1962, 8½ by 33 inches.

Signed chart plotting all six orbits of Wally Schirra's MA-8 Sigma 7 space flight. Schirra has inscribed at the lower margin: "*The six orbits of Sigma Seven - Wally Schirra*" and, below the California tracking station: "*'I am really happy with this bird,' CAL, Orbit #2, Wally Schirra.*" He has also added the date and time of his launch at the Cape Canaveral area: "*7:15 am, 3 Oct '62*" and his flight time: "*9 hr 13m*" at the splashdown bull's eye just northeast of Midway Island in the Pacific Ocean.
$2,000 - 3,000

43
MERCURY ATLAS 9 ORBITAL CHART.
"Mercury Orbit Chart MOC-6," color Earth map, Aeronautical Chart and Information Center, February 1963, 10½ by 35½ inches.

Signed chart plotting all the orbits of Gordon Cooper's MA-9 Faith 7 space flight. Cooper has annotated the top margin with a quote from his original flight communication: "*Boy, what a beautiful view from up here. Surprises you every orbit. Cape Canaveral, Orbit 18, Gordon Cooper*" and inscribed in the lower margin: "*The 22 orbits of Faith 7 - Gordon Cooper.*" He has also added "*Launch, 15 May 63*" near Cape Canaveral and "*Splashdown at 22-1, 16 May 63*" at bull's eye just northeast of Midway Island in the Pacific Ocean.
$2,000 - 3,000

44
PROJECT MERCURY FLIGHT REPORTS.
1. *Results of the Second United States Manned Orbital Space Flight, May 24, 1962*. NASA SP-6. 1962. 107 pp. *Signed* on the front cover: "*Scott Carpenter / Aurora 7.*"
2. *Results of the Third United States Manned Orbital Space Flight, October 3, 1962*. NASA SP-12. 1962. 120 pp. *Signed* on the front cover: *"Wally Schirra / [Sigma] 7.*"
3. *Mercury Project Summary Including the Results of the Fourth Manned Orbital Flight, May 15 and 16, 1963*. NASA SP-45. 1963. 444 pp. *Signed* on the front cover: "*Gordon Cooper / Faith 7.*
Together, 3 volumes. Washington. 8 by 10¼ inches. Original blue wrappers.

Three books from the NASA SP (Special Publication) series, each signed by the astronaut who piloted the mission on the front cover. All have the flight communications transcript for their respective missions. SP-45 includes a summary of all Mercury missions using Little Joe, Redstone, and Atlas boosters with their associated spacecraft.
$600 - 800

45 °
ASTRONAUT-SIGNED BOOK.
Project Mercury: A Chronology. NASA SP-4001. Washington: 1963. 238 pp. Illustrated. 8 by 10¼ inches. Original printed wrappers.

Signed: "*Scott Carpenter Aurora 7,*" *"Wally Schirra [Sigma] 7,*" and "*Gordon Cooper Faith 7*" on the frontispiece, which depicts the Mercury Spacecraft with Escape Tower.
$400 - 600

49

46 °
HISTORY OF PROJECT MERCURY—SIGNED.
Swenson, Grimwood & Alexander. *This New Ocean. A History of Project Mercury*. NASA SP-4201. Washington: 1966. 681 pp. Illustrations & diagrams, two folding charts. 7½ by 10 inches. Original cloth.

First edition, signed and inscribed on the half-title page: "*Gordon Cooper Faith 7 / Wally Schirra [Sigma] 7 / Scott Carpenter Aurora 7.*"
$400 - 600

47 °
CARPENTER, M. SCOTT, ET AL.
We Seven. By the Astronauts Themselves. New York: Simon and Schuster, 1962. 352 pp. 7 by 9½ inches. Original cloth, dust-jacket.

First edition, signed by Scott Carpenter, Wally Schirra, and Gordon Cooper with their spacecraft numbers, on the front endpapers which illustrate a Mercury Atlas launch.
$300 - 500

48 °
DILLE, JOHN.
Americans in Space. New York: American Heritage, [1965]. 153 pp. Color illustrations. 7 by 10½ inches. Original cloth.

Signed by Gordon Cooper, Scott Carpenter and Wally Schirra with their spacecraft numbers, on the front endpapers which illustrate a Mercury Atlas launch.
$200 - 300

49 °
THE ORIGINAL SEVEN.
Large color photograph, 20 by 16 inches, c.1959, printed later.

The classic image of the seven Mercury Astronauts posing in their silver space suits, *signed by Scott Carpenter, Wally Schirra, and Gordon Cooper* with their Mercury spacecraft names, and additionally inscribed by Cooper *"The Original Seven."*
$600 - 800

50

51

50
MERCURY SEVEN.
Color photolithograph, 13 by 11 inches, matted to 20 by 16 inch board.

Signed by Scott Carpenter, Gordon Cooper, W. M. Schirra, Jr., Alan B. Shepard, Jr. and D. K. Slayton on the mat. Schirra has signed again along the jet above his picture. Depicts the Mercury Seven in their aircraft flight suits and standing in front of an F-106 jet.
$1,000 - 1,500

51
MERCURY CONTROL.
Black and white photograph, 10 by 8 inches, of the Mercury Astronauts with Flight Director Christopher Kraft in the Mercury Control Center, printed caption on verso.

Signed by Scott Carpenter, Gordon Cooper, John Glenn, Wally Schirra, Alan Shepard, and D. K. Slayton.
$800 - 1,200

58

52 °
AT THE PAD.
Black and white photograph, 10 by 8 inches, printed caption on verso.

Signed "Scott Carpenter / MA-7." Depicts a close-up of the Mercury-Atlas 7 space vehicle combination at Launch Complex 14, Cape Canaveral.
$100 - 200

53 °
ORBITAL SUNSET.
Color photograph, 6¼ by 9¼ inch image on 8 by 10 inch sheet, printed caption on verso.

An orbital sunset photographed by Scott Carpenter during his May 1962 Aurora 7 flight, and inscribed by him *"photo by Scott Carpenter."* This image was used on the title page of the book *We Seven* (see lot 47).
$150 - 250

54 °
MERCURY ATLAS 8 LAUNCH.
Color photograph, 6¼ by 9 inch image on 8 by 10 inch sheet, printed caption on verso.

Signed "Wally Schirra [Sigma] 7." Depicts the Sigma 7 launch from Cape Canaveral.
$150 - 250

55 °
EARTH VIEW.
Color photograph, 6¼ by 9½ inch image on 8 by 10 inch sheet, printed caption on verso.

Signed "Wally Schirra [Sigma] 7" - a view of the Earth photographed by him.
$200 - 300

56 °
LAUNCH CLOSE-UP.
Color photolithograph, 8 by 10 inches.

Inscribed "Faith Seven Launch, Gordon Cooper." Depicts the Mercury Atlas 9 (Faith 7) launch.
$150 - 250

57 °
CALCUTTA FROM ORBIT.
Color photograph, 8 by 10 inches including margins, printed caption on verso.

Inscribed "Faith 7 Mission Photo, Gordon Cooper" - a photograph by him of the Hooghly Channel near Calcutta.
$200 - 300

58
GEMINI SPACECRAFT ROCKET ENGINE.
A flight-qualified rocket engine, manufactured by Rocketdyne, model SE-6, steel, other metals, and ablative material, 10 inches long and 5 inches wide at the upper mounting bracket. Identification marks on the engine chamber read: *"208129, 20602-04989"* with numerous inspection stamps below these numbers. The fuel and oxidizer valve assemblies intact and with their electrical connectors.

Provided attitude and maneuvering control for the Gemini spacecraft. A set of 8 of these bi-propellant engines were located in the equipment section aft of the crew compartment which was part of the Orbit Attitude and Maneuver System (OAMS). Pitch, roll, and yaw spacecraft torques were obtained by firing these engines in pairs. Sixteen additional SE-6 engines made up the Reentry Control System (RCS) in the nose of the Gemini spacecraft. These engines produced 25 pounds of thrust. Each engine assembly consisted of a fuel and oxidizer valve with injection systems, a combustion chamber, and expansion nozzle.
The engine has been signed by Wally Schirra and Tom Stafford with each adding "GT-6." The SE-6 engines on their Gemini 6 spacecraft assisted these astronauts in performing the world's first manned space rendezvous with Gemini 7 in December 1965.
$2,500 - 3,500

59
PROJECT GEMINI FAMILIARIZATION.
"NASA Project Gemini Familiarization Manual: Long Range and Modified Configurations." St. Louis, MO: McDonnell Aircraft Corporation, March 15 1964. Upwards of 250 pp. Illustrated with folding diagrams and schematics on major structural assemblies, communications, cabin interior arrangement, electrical systems, environmental control, retrograde rockets, and landing systems. 11 by 8½ inches. Screw-pin binding with stiff covers, tabbed.

Signed by Buzz Aldrin, Gene Cernan, Gordon Cooper, Richard Gordon, Wally Schirra, Dave Scott and Tom Stafford on the title page with their Gemini Titan flight numbers.
A manual for use by astronauts and support personnel alike, with extensive details on the two man Gemini spacecraft. Signed by 7 Gemini Astronauts.
$1,500 - 2,000

59

60

60
GEMINI-TITAN II PRESS HANDBOOK.
"Gemini-Titan II Air Force Launch Vehicle: Press Handbook." Martin for NASA, 1965. Upwards of 140 pp. Illustrated with diagrams, half-tone images, and charts. 12 by 10 inches. Gray and black 7-ring binder, tabbed.

Signed by Buzz Aldrin, Gene Cernan, Gordon Cooper, Richard Gordon, Wally Schirra, Dave Scott, and Tom Stafford on the title page with their GT (Gemini Titan) flight numbers. Additionally signed by James Lovell on the first tabbed divider sheet.
A binder with information about the US Air Force Titan II rocket, used to launch the Gemini spacecraft into Earth orbit. The handbook covers Martin's role as the Gemini launch vehicle manufacturer. Subjects include a Gemini overview, Titan rocket history, pre-flight checkout, launch countdown and flight sequence, system details, launch pad complex 19, and launch vehicle management.
$1,500 - 2,000

61
GEMINI PRESS REFERENCE GUIDE.
Gemini Spacecraft Number Four. McDonnell Aircraft Corp for NASA, May 15, 1965. 94 pp. Illustrated, folding diagram of instrument panel, controls, and displays. 11 by 8½ inches. Loose-leaf, tabbed, unbound.

Signed by Buzz Aldrin, Gene Cernan, Gordon Cooper, Wally Schirra, and Tom Stafford with their Gemini-Titan flight numbers, on title and contents leaf. Written primarily for the media, with basic descriptions of the spacecraft structure, electrical system, environmental control, propulsion systems, the Gemini mission simulator, and spacecraft fabrication.
$800 - 1,200

62 (detail)

62
MEDALLION CARRIED ON GEMINI 3.
Flown on Gemini 3, a circular medallion, gold-plated sterling silver, 1 inch diameter, carried by Commander Virgil "Gus" Grissom. The obverse has the crew names and *"The Molly Brown"* with an illustration of a Gemini spacecraft floating on the water. The reverse is engraved with the flight date March 23, 1965.

Gemini 3 was the first manned test flight of the new two-astronaut spacecraft, demonstrating some of the ways the US might journey to the moon. "Molly Brown" was Grissom's nickname for the Gemini spacecraft, after the "unsinkable" Broadway heroine. Accompanied by a Typed Note Signed by Betty Grissom stating that the medallion was carried into space by her husband and that it is from his personal collection.
$1,200 - 1,800

64

63 (detail)

65

63
GEMINI 3 MISSION EMBLEM.
Circular cloth crew emblem, approximately 3½ inches, with the full names of astronauts Grissom and Young surrounding a Gemini spacecraft floating on water, mounted on a Typed Letter Signed by Mrs. Betty Grissom.

Betty Grissom's letter reads in part: *"Gus had lost his Mercury capsule after a short circuit blew the hatch. 'Molly Brown,' the unsinkable heroine from the Broadway musical, seemed the best choice by my husband for the name of his Gemini spacecraft. NASA never officially named Gemini 3 'Molly Brown,' but the name was enthusiastically used by the press during coverage of the March 23, 1965 flight."*
$700 - 900

The following two lots are from the estate of Dr. Maxime Faget.

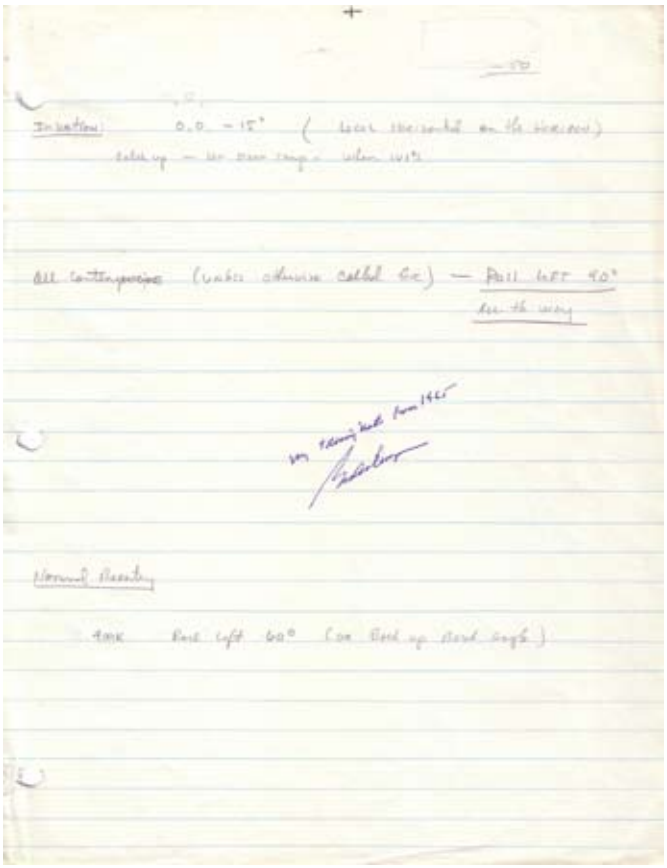
64
GEMINI-TITAN MODEL.
Model of the Gemini-Titan rocket, made by Topping, Inc. of Akron, OH for the Martin Company, white injection-molded plastic, 20 inches tall. The model's two first-stage engines mount directly into two metal prongs screwed into the base (which reads *"Gemini Martin"*). The second stage, Gemini adapter, and Gemini spacecraft all detachable from the first stage and each other.
$2,000 - 3,000

65
FLOWN GT-4 HEAT SHIELD SEGMENT.
Triangular heat shield segment, 1 by 2 inches. Encased in lucite, the base with text reading: *"GT-4, June 3, 1965."*

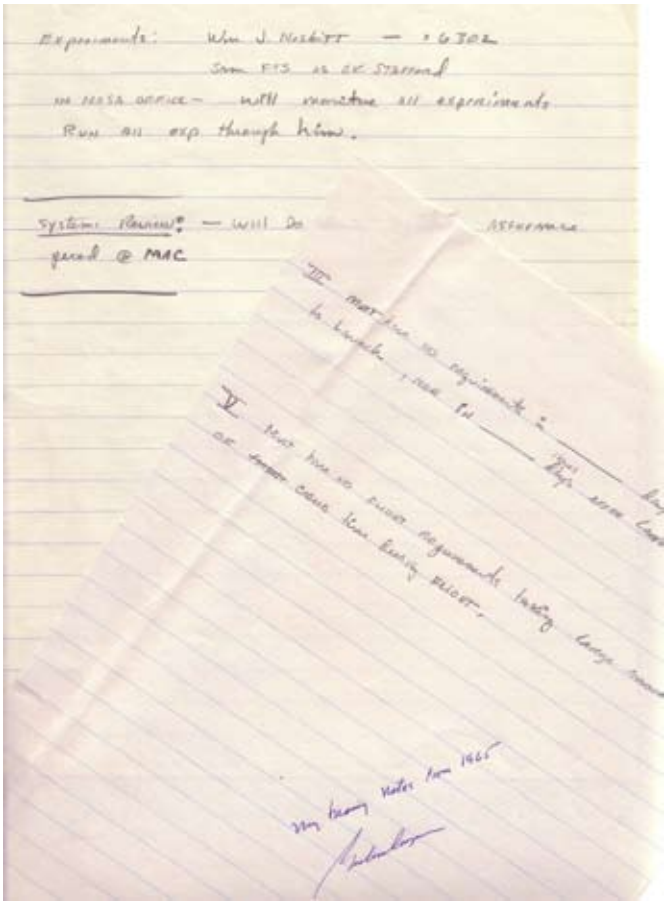
The date is that of the launch of Gemini-Titan 4, which carried James McDivitt and Ed White on a four-day earth orbital mission. White performed the United States' first EVA or spacewalk on the first day of the mission. The top quarter-inch of the segment has been charred black due to atmospheric friction during re-entry.
$1,500 - 2,000

The following six lots were originally in the collection of Astronaut L. Gordon (Gordo) Cooper.

66
COOPER'S GEMINI SPACECRAFT 5 FLIGHT TRAINING PAPERS.
Distribution copies of reports, briefing notes, or meeting hand-outs issued in 1965, and notes made by Gordon Cooper, comprising:
1. Spacecraft 5 procedures list. 2 pp.
2. Spacecraft 5 Briefing, with flight plan and operations handbook updates. 3 pp.
3. Gemini spacecraft circuit breaker listing with function definitions. 17 pp.
4. S/C 5 Fuel Cell Power System Briefing. 3 pp.
5. GT-5 Propulsion Astronaut Briefing. 5 pp.
6. Autograph Note, 1 p, being *"Items to be resolved from previous Systems Review,"* listing failure of guidance systems, *"8 ball in s/c [spacecraft],"* timing errors on retrofire, and computer #15 status.
7. Autograph Note, 1 p, on spacecraft *"insertion."*
8. "Alternate GT-5 Menu," 4 pp, photocopy, listing meals and calorie counts (*"Sausage patties ... cheese sandwiches (6) ..."*).
9. Electrical Sequential Systems Failures briefing. 4 pp.
10. "Analysis of the Gemini Rendezvous Radar False Lock On Problem." McDonnell Aircraft Corporation, April 28, 1965. 15 pp.
Together in loose-leaf binder, 10 by 12 inches. Variously inscribed, signed, annotated and marked up by Cooper.
$1,200 - 1,800


66

67
COOPER'S GEMINI EXPERIMENTS & COMPUTER TRAINING PAPERS.
Period distribution copies of different experiment reports, briefing notes, memos, or meeting hand-outs issued to, and notes made by, Gordon Cooper, comprising:
1. Carbon copy of a memo by Deke Slayton, July 1965, stating crews' concerns about *"the overemphasis on medical research versus medical care to ensure their wellbeing,"* with other pointed comments.
2. Autograph Note by Cooper, 2 pp, being *"Items to Resolve w/ Chuck Berry"* (chief of the Medical Operations Office at MSC), including diets, amount of samples needed pre- and post-flight, and the number of *"medical passes"* during the flight per day.
3. "Special Ground Tests in Support of Experiment D-7 [Space Object Radiometry] on the Gemini-Titan 5 Mission." July 26, 1965. 12 pp.
4. Briefing note on S-1 (Zodiacal light and Gegenschein photography). 4 pp.
5. In-Flight Medical Kit description with locator diagram. 2 pp.
6. Schematics and flow diagrams related to the onboard Gemini computer. 20 pp. 11 by 17 inches.
7. Computer course hand-out, 3 pp, with manuscript class notes by Cooper, 2 pp.
8. "Gemini Program: Flight Summary Report." MSC, July 1966. 30 pp. Card stock upper cover. Covering flights 1 through 7.
Contained together in loose-leaf binder, 10 by 12 inches. Most inscribed variously and signed by Cooper (*"My personal copy," "From my files," "My training notes from 1965"*).
$1,000 - 1,500


67

68
NEIL ARMSTRONG'S DISTRIBUTION COPY OF A GEMINI 5 MEMORANDUM.
Memorandum from the FM3/Flight Analysis Branch on "GT-4 retrograde attitude effect on reentry range capability." April 23, 1965. 6 pp, 4 graphs plotting various spacecraft retro angles versus the range from retrofire to the landing point. 8 by 10 inches. Stapled to original MSC routing slip.

Neil Armstrong's copy with his name written by a crew secretary ("N.A. Armstrong") in red ink at the upper right corner. An attached "MSC Routing Slip - Astronaut Office" has many astronaut names of those intended to view this memo including Alan Shepard and Deke Slayton. Neil Armstrong and Elliot See have both written their initials of "NAA" and "EJS, 6-10" (the date) on this routing slip. Armstrong was back-up commander for Gemini 5. Given to Gordon Cooper by Neil Armstrong for his support of the Gemini 5 mission. The first page of the memo has been *inscribed by Cooper* to this effect.
$600 - 800

70

69
GT5 CREW ACTIVITY REPORTS.
19 period distribution copies of official memos (many written by Neil Armstrong), confidential reports, or Gemini spacecraft work schedules. 1 to 7 pp, 8 by 10 to 11 by 17 inches. Together in a folder labeled in manuscript by Gordon Cooper: "*GT5 Crew Activities Repts*" and *signed* by Cooper. Cooper has further inscribed 16 sheets with: *"From my Gemini file, Gordon Cooper."*

There are seven different copies of 1- to 2-page memos written by Neil Armstrong which list GT-5 crew activities performed from April to July 1965. Trips listed are to McDonnell in St. Louis, Chapel Hill (NC, Planetarium), Martin in Denver, and Cape Canaveral. Armstrong's comments include: *"New launch date is pressing already minimum training time, [on experiment delays] a policy for deleting experiments ... should be enforced, Cape [simulator] is still in relatively poor shape,"* and, about the altitude chamber: *"No depress or VA for Armstrong/See. Egress kit hoses reversed."*
There are two 2-page confidential reports on the status of the Astronaut Maneuvering Unit, four milestone sheets on Gemini spacecraft completion, plus a carbon copy and approximately 5 other miscellaneous sheets on Gemini Program status.
$1,000 - 1,500

71 (detail)

70
COOPER'S GEMINI 5 CAMERA TRAINING NOTES & PHOTOGRAPHS.
A small archive, comprising:
1. 29 color photographs of the Earth taken by the Gemini 5 crew, numbered on verso in pencil by Cooper. Together with a manuscript list of locations, 6 pp, with flight ground elapsed time when they were taken. Areas include the Himalayas, China, India, and Iran - many of interest to the Department of Defense in 1965.
2. Distribution copy of a typed list covering all photography made during the mission, 7 pp, several manuscript amendments by Cooper, the last sheet inscribed on verso *"Gordon - Here are the logs & ident. sheets - Paul Haney, 4 p.m. 9/14/65."*
3. 5 black and white photographs of flight cameras and related experiments, printed captions on versos.
4. Manuscript notes by Cooper, 3 pp, the first headed *"Camera details"* covering the failure of film transport and light streaks on all film which were to be corrected prior the actual flight; the second giving number of film rolls and camera types needed; the third reading simply *"FLT: Debriefing: 1) Film evaluation FIASCO: 2)."* The first two inscribed and signed *"notes by Gordon Cooper."*
Mostly around 8 by 10 inches. The group together in a folder titled *"Training - Cams,"* and signed ("Gordon Cooper").
$1,000 - 1,500

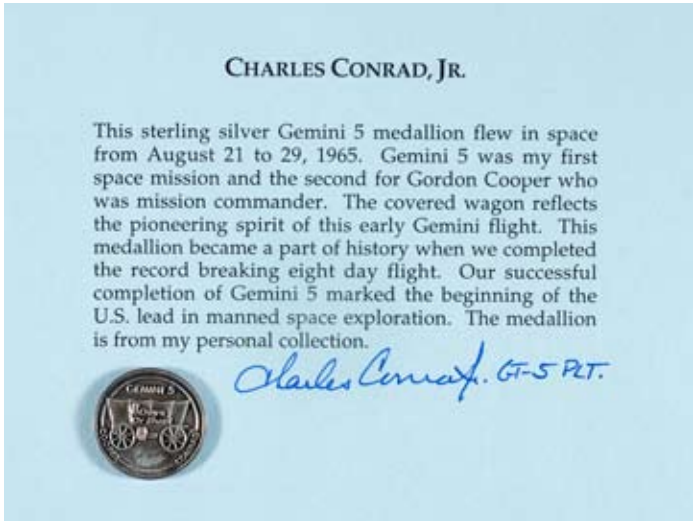
71
MISSION EMBLEM CARRIED ON GEMINI 5.
Flown cloth crew mission emblem carried by Commander Gordon Cooper, 4 inches in diameter, featuring a covered wagon with the wording *"8 days or bust."* Mounted onto a Typed Letter Signed by Gordon Cooper.

This was the very first manned space flight crew-designed mission emblem or "patch" to be worn on astronauts' space suits.
Gordon Cooper's letter reads in part: *"This patch flew in space on the Gemini 5 flight during August 21 to 29, 1965 ... The idea of the covered wagon came from a wooden model a family member had whittled. I felt it was the best way to symbolize the pioneering spirit of this early Gemini flight. The eight days or bust wording was a natural addition. However, NASA Administrator James Webb wanted the wording removed because any flight time short of eight days could be seen as a mission failure. We were directed to cover the wording with cloth on our flight space suits. Our mission completed all eight days and Gemini 5 marked the beginning of the US lead in manned space exploration."*
$3,000 - 4,000

The following lot was originally in the collection of Astronaut Charles "Pete" Conrad.

72
MEDALLION CARRIED ON GEMINI 5.
Flown Medallion, sterling silver, 1 inch in diameter. Carried on the Gemini 5 flight by pilot Charles Conrad. The crew mission emblem is on the front with motto *"8 Days or Bust."* Affixed to a 4¾ by 6½ inch blue descriptive card signed: "*Charles Conrad Jr. GT-5 PLT*."

Conrad's note reads, in part: "*Gemini 5 was my first space mission and the second for Gordon Cooper who was mission commander ... This medallion became part of history when we completed the record breaking eight day flight. Our successful completion of Gemini 5 marked the beginning of the U.S. lead in manned space exploration. The medallion is from my personal collection*."
$1,500 - 2,000



72

The following two lots were originally in the collection of Astronaut Thomas P. Stafford.

73
LARGE UNITED STATES FLAG CARRIED ON GEMINI 6.
Flown Flag, silk, 8 by 11 inches, inscribed towards the lower edge: *"Flown in Gemini 6 during the first space rendezvous with Gemini 7, Dec. 15-16, 1965, Tom Stafford."* Together with a Typed Letter Signed by Thomas P. Stafford.

Gemini 6 performed the first manned space flight rendezvous with Gemini 7 on December 15, 1965. Stafford's letter reads in part: *"The United States flag enclosed with this letter was carried on the Gemini 6 mission during December 15 and 16, 1965. Wally Schirra commanded the flight while I served as pilot. This flag became a part of history when we completed the world's first manned space flight rendezvous with Gemini 7 already in orbit on December 15. This flight technique was one of the most important capabilities demonstrated during the Gemini Program.*
A United States flag of this size, approximately 12 by 8 inches, is rare to be carried on a Gemini mission. The spacecraft had very limited interior room and non-essential weight constraints were paramount. Fuel, batteries for power and life support consumables were just a few of the critical heavy weight materials needed to perform our intricate rendezvous procedures. The flag is from my personal collection. It represents the effort of a nation that developed the techniques required to make a lunar landing possible before the end of the 1960s."
$3,000 - 4,000


73

74
FLOWN GEMINI 6 MISSION EMBLEM.
Cloth crew mission emblem carried on the flight by Gemini 6 Pilot Thomas Stafford, approximately 4 by 4 inches, hexagonal. Featuring two Gemini spacecraft in a rendezvous-type formation with a stitched outline using background stars to form the number "6." Mounted on a Typed Letter Signed by Thomas P. Stafford.

Stafford's letter begins similarly to that in the preceding lot, and continues: *"The patch has been in my private collection since 1965. The star constellations of Gemini and Orion as well as the star Sirius are shown on the patch which represents the celestial background where the rendezvous occurred. We patterned our own constellation of "6" using that background."*
$3,000 - 4,000

74 (detail)

75 (detail)

76

77

The following two lots were originally in the collection of Astronaut Walter (Wally) M. Schirra.

75
GTA-6 MISSION EMBLEM CARRIED ON GEMINI 6.
Cloth crew mission emblem carried on the flight by Gemini 6 Commander Wally Schirra, 4 inches, hexagonal. Mounted onto a Typed Letter Signed by Wally Schirra.

This cloth emblem features the original design for the Gemini 6 mission. Wally Schirra's letter reads: *"The GTA-6 or Gemini Titan Agena - 6 crew emblem displayed below was carried into space during December 15 and 16, 1965 on the Gemini 6 mission. I was flight commander while Tom Stafford served as pilot. GTA-6 was the original mission designation with a flight plan calling for our Gemini spacecraft to rendezvous and dock with an Agena target vehicle. That sequence is illustrated with the number '6' on the emblem. We would fly into orbit using a Titan rocket some 90 minutes after an Atlas rocket launched the Agena toward orbit. On October 25, 1965 the Atlas rocket worked fine, but the Agena's engine failed to ignite properly. The target vehicle never achieved orbit. Our flight was canceled that day but a plan for a rendezvous with the next manned Gemini flight was devised and accomplished in less than two months. This emblem became a part of history when we completed the world's first manned space flight rendezvous with Gemini 7 on December 15, 1965. This flight technique was one of the most important capabilities developed in the Gemini Program. I decided to carry a few of our original mission emblems as a reminder of the efforts made by the NASA - Industry team that made this historic event possible."*
$4,000 - 6,000

76
MEDALLION CARRIED ON GEMINI 6.
Flown Medallion, 1 inch in diameter, sterling silver. Carried on the Gemini 6 flight by Commander Wally Schirra. The crew mission emblem is on the front with the flight dates engraved on the reverse side.

Accompanied by a Typed Letter Signed by Wally Schirra, in which he discusses the problems with the Agena and the successful rendezvous with Gemini 7, and explains: *"We were able to update our space suit cloth patch design showing another Gemini spacecraft instead of the Agena. But there was not enough time to create new medallions before the flight, so we carried the original set made."*
$1,500 - 2,000

The following lot was originally in the collection of Astronaut L. Gordon (Gordo) Cooper.

77
MEDALLION CARRIED ON GEMINI 8 BY ARMSTRONG.
Circular medallion, gold-plated sterling silver, 1 inch across. Carried on the Gemini 8 flight by Commander Neil Armstrong. Features the crew mission emblem on obverse, the reverse engraved with the flight date of 16 March 1966 and the words *"First to dock in space."*

Accompanied by a Typed Letter Signed by Gordon Cooper, which reads in part: *"The medallion displayed below was flown onboard the Gemini 8 spacecraft on March 16, 1966 by mission commander Neil Armstrong ... At six hours and 34 minutes into their flight, Neil made space history as he performed the first docking of two vehicles while in orbit. This was one of the most important events in the Gemini Program which later helped Neil Armstrong to become the first man to walk on the moon."* Cooper describes the *"near disaster"* that followed the docking, caused by an attitude control rocket that would not shut down. He closes, *"Neil was back-up commander for my Gemini 5 flight and presented me with this medallion as a sign of our close friendship."*
$3,000 - 4,000

The following lot was originally in the collection of Astronaut Thomas P. Stafford.

78
MEDALLION CARRIED ON GEMINI 9.
Shield-shaped medallion, gold-plated sterling silver, 1 inch across. Carried on the Gemini 9 flight by Commander Thomas Stafford. Features the crew mission emblem on the front, the reverse engraved with the flight dates of June 3-6, 1966, and Stafford and Cernan's names.

Accompanied by a Typed Letter Signed by Thomas P. Stafford, which reads in part: *"The medallion enclosed with this letter was carried into space during June 3 through 6, 1966 on the Gemini IX mission. I commanded the flight while rookie astronaut Eugene Cernan served as pilot. The medallion is made of sterling silver and one of the very few that were gold plated."* He details the flight objectives and the problems encountered, concluding: *"We still had a lot to learn about working outside a spacecraft in 1966. Gemini 9 was originally assigned to fellow astronauts Elliot See and Charlie Bassett. Unfortunately, they lost their lives in a jet crash on February 28, 1966 at St. Louis, Missouri ... Since Gene and I were the back-up crew, we were then assigned the prime crew positions. We never wanted to get the mission assignment this way but the Gemini flight program had to continue."*
$1,500 - 2,000

78

The following lot was originally in the collection of Astronaut Walter M. "Wally" Schirra.

79
MEDALLION CARRIED ON GEMINI 10.
Circular medallion, silver-plated, 1 inch across. Carried on Gemini 10. The crew mission emblem on the obverse illustrates the Gemini spacecraft and Agena target vehicle orbiting around a large Roman numeral "X." The reverse is engraved with the flight dates July 18-21, 1966.

Gemini 10 was the first flight of Michael Collins, who would later fly with Neil Armstrong and Buzz Aldrin on the Apollo 11 lunar landing mission. Accompanied by a Typed Letter Signed by Wally Schirra, which reads: *"This ... medallion was flown on the flight of Gemini X during July 18 to 21, 1966. It was given to me after the flight by fellow astronauts John Young and Michael Collins."*
$1,500 - 2,000

79

The following two lots were originally in the collection of Astronaut Charles Conrad.

80
MISSION EMBLEM CARRIED ON GEMINI 11.
Cloth crew mission emblem carried on the flight by Gemini 11 Commander Charles Conrad, 4 by 3 inches. Mounted onto a Typed Letter Signed by Charles Conrad.

Conrad's letter reads in part: *"This Gemini XI cloth patch was one of the few originals made in 1966. I was mission commander with fellow astronaut Richard Gordon as pilot. This patch was carried on the Gemini XI flight during September 12 to 15, 1966. It is from my personal collection. The patch illustrates the major objectives of the mission ... we used the Agena to obtain a record 850 mile high orbit, which is shown by the large ellipse on the patch. Richard Gordon conducted an EVA which he linked a tether from our spacecraft to the Agena. Gemini XI proved to be an important step toward a manned landing on the moon."*
$3,000 - 4,000

80 (detail)

81

81
MEDALLION CARRIED ON GEMINI 11.
Flown medallion, arrow-shaped, 1 1/8 inches long, gold-plated sterling silver. Carried on the Gemini 11 flight. The crew mission emblem is on the obverse, and the flight dates of *"Sept 12-15 1966"* are engraved on the reverse.

Accompanied by a Typed Note Signed by Charles Conrad, in which he states that the medallion flew in space and is from his personal collection, and also that he "*was mission commander and fellow astronaut Richard Gordon was pilot. Our flight accomplished a rendezvous with the Agena target vehicle in less than one orbit of the earth*." The crew emblem illustrates the Gemini spacecraft and Agena target vehicle making increasingly larger orbits around the earth. A space-suited astronaut is also shown during a spacewalk.
$1,500 - 2,000

The following lot was originally in the collection of Astronaut Gordon Cooper.

82
MISSION EMBLEM CARRIED ON GEMINI 12.
Circular cloth crew mission emblem carried on the flight by the Gemini 12 crew, 3½ inches in diameter. Mounted on a Typed Letter Signed by Gordon Cooper.

Back-up Gemini 12 Commander Gordon Cooper describes flight crew selection "politics." His letter refers to the emblem and Aldrin's spacewalks: *"Gemini XII was a mighty fine ending to a flight program that made ten successful manned space flights.*
I then moved over to the lunar landing effort and was assigned as back-up commander for the Apollo 10 mission. That flight demonstrated all the steps needed for the first lunar landing by Apollo 11 except for the final 50,000 feet to the surface. I then expected to have a mission assigned to me for a lunar landing flight but management 'politics' and a 'tight' alliance between some of the Original Seven guys never allowed that assignment to occur."
$3,000 - 4,000

83
GEMINI 12 CONTROLS AND DISPLAYS.
Gemini Operations Handbook, Spacecraft 12, Final, Section II, Controls and Displays. NASA/MSC, 23 September 1966. Approximately 350 pp. Illustrated, folding diagram of the control panels. 8 by 10½ inches. Card stock covers, punched, tabbed.

Signed by Buzz Aldrin and by James Lovell on the front cover: "*Buzz Aldrin Gemini XII PLT / James Lovell Gemini XX CDR*." A detailed manual on how to fly Spacecraft 12.
Provenance: Walter J. Kapryan, Cape Canaveral Manager of the Gemini Program Office, with his ownership signature ("W. J. Kapryan") on the cover.
$600 - 800

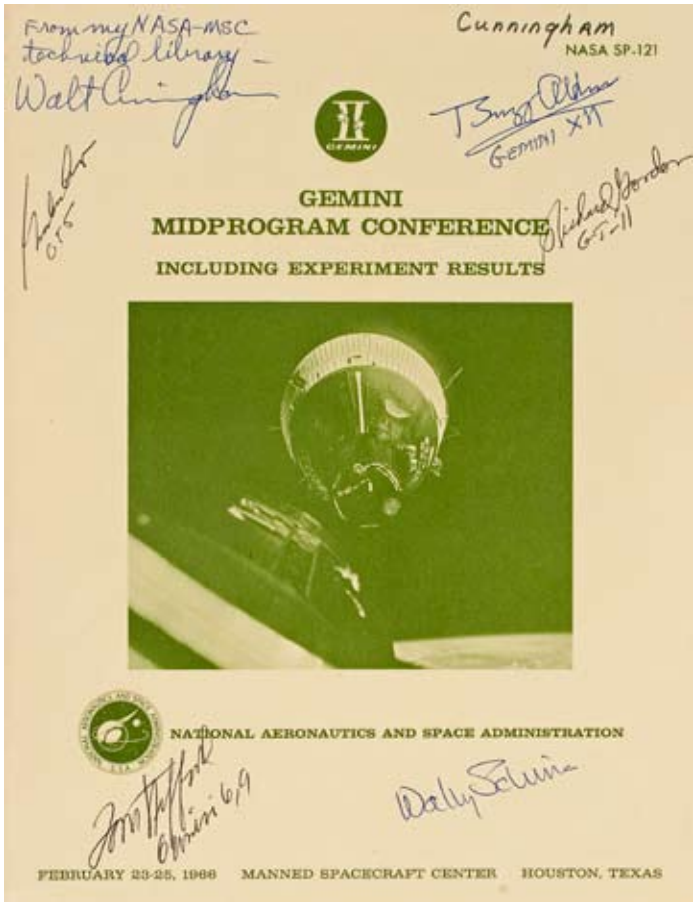
82 (detail)

The following five lots were originally in the collection of Apollo 7 Astronaut Walter (Walt) Cunningham.

84
GEMINI NETWORK PERFORMANCE.
Group of four reports summarizing the performance of the Manned Space Flight Network (MSFN) during four Gemini flights:
1. "Network Performance Analysis for the Gemini GT-7 and GT-7/6 Missions, Supplement Report 3." August 29, 1966. 99 pp.
2. "[...] GTA-9 and GT9-A Missions, Supplement Report 3." December 23, 1966. 72 pp.
3. "[...] GTA-11 Mission, Supplement Report 3." December 29, 1966. 75 pp.
4. "Gemini Program Mission Report, Gemini XII, Network Post Mission Report, Supplement Report 3." February, 1967. 143 pp.
Together, 4 items. Greenbelt, MD: Goddard Space Flight Center. 8 by 10½ inches. Stapled. Card stock covers. Each inscribed on the front cover *"From my NASA/MSC technical library, Walt Cunningham."*

The MSFN was a series of ground stations that collected and sent voice and telemetry from the orbiting Gemini spacecraft to Mission Control in Houston, Texas. The hub was the Goddard Space Flight Center. These supplements are actually separate sections of the overall Gemini Mission Report issued for each Gemini flight.
$600 - 800

85 °
GEMINI FLIGHT REPORTS.
Collection of three reports summarizing the post flight results on Gemini 7, 10, and 11:
1. "Spacecraft 7 RSS Fuel Cell Performance Analysis, Supplemental Report 8." McDonnell Aircraft Corp for MSC, March 9, 1966. 37 pp. Folding charts. *Inscribed* by Walt Cunningham on the front cover: " *From my NASA-MSC technical library, Walt Cunningham.*"
2. "GT-10 Post Flight Report, Supplemental Report 5." IBM for MSC, January 30, 1967. 85 pp. *Inscribed* by Walt Cunningham on the front cover: " *From my NASA-MSC technical library, Walt Cunningham.*"
3. "Foreign Deposits on Gemini XI Optical Windows, Supplemental Report 7." McDonnell Aircraft Corp for MSC, August 1967. 23 pp. Illustrated.
Together, 3 items. 8 by 10½ inches. Stapled. Card stock covers. Cunningham's name appears in the upper right corner of each report.
$500 - 700



87

90

86
GEMINI 12 FLIGHT REPORTS.
Collection of three reports covering the last manned flight of the program, Gemini 12:
1. "Gemini 12 Pilot's Report." NASA/JSC, November 23, 1966. 53 pp. Buzz Aldrin's original distribution copy, with his name crossed out and "Cunningham" written underneath. *Inscribed* by Walt Cunningham on the first page: "*From my NASA-MSC technical library, Walt Cunningham.*"
2. "Gemini PCM Tape Recorder Performance Summary. Supplemental Report 7." McDonnell Aircraft Corp for MSC, March 1, 1967. 27 pp. Card stock covers.
3. "GT-12 Post Flight Report, Supplement Report 5." IBM for MSC, February 21, 1967. 21 pp. Card stock covers.
Together, 3 items. 8 by 10½ inches. Stapled. Cunningham's name appears in the upper right corner of each report.
$600 - 800

87
GEMINI RESULTS.
Gemini Midprogram Conference. Including Experiment Results. NASA SP-121. Washington: 1966. 443 pp. 8 by 10¼ inches. Original printed wrappers.

Signed by Gemini astronauts and others on the front cover: "*Buzz Aldrin / Gemini XII*"; "*Gordon Cooper GT5*"; "*Richard Gordon GT-11*"; "*Tom Stafford / Gemini 6, 9*"; and "*Wally Schirra*." Further inscribed: "*From my NASA-MSC technical library—Walt Cunningham*."
$600 - 800

88
GEMINI CHRONOLOGY.
Grimwood, J.M., B.C. Hacker and P.J. Vorzimmer. *Project Gemini: Technology and Operations - A Chronology.* NASA SP-4002. Washington: 1969. 308 pp. Illustrations. 10 by 8 inches. Original printed wrappers.

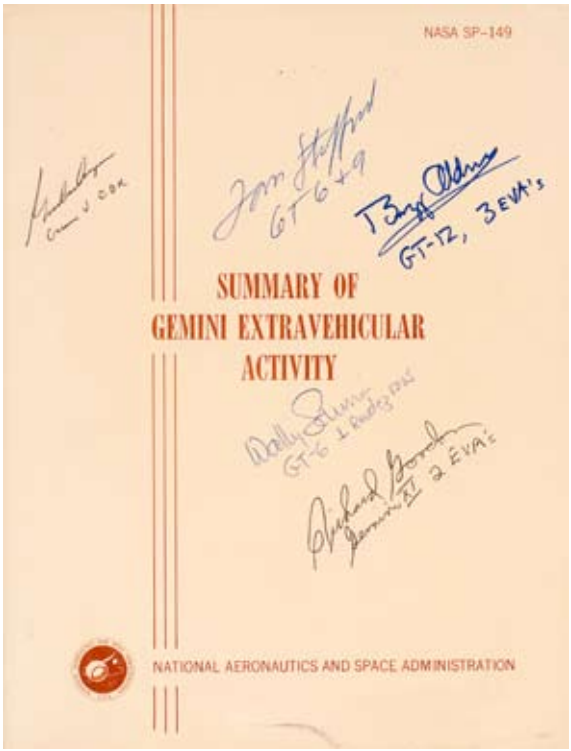
Inscribed on half-title "From my NASA-MSC technical library, Walt Cunningham, Apollo 7," and additionally signed by Buzz Aldrin, Gordon Cooper, Gene Cernan, and Tom Stafford with their Gemini flight numbers.
$700 - 900

89
GEMINI HISTORY.
Hacker, B.C. and J.M. Grimwood. *On the Shoulders of Titans: a History of Project Gemini.* NASA SP-4203. Washington: 1977. 625 pp. Illustrated, color plates of Earth photography. 10 by 7 inches. Original printed wrappers.

Signed by Buzz Aldrin, Wally Schirra, Gordon Cooper, Richard Gordon, and Tom Stafford on half-title or frontispiece, some with their Gemini flight numbers.
$600 - 800

90
THE END OF GEMINI.
Gemini Summary Conference. NASA SP-138. Washington: 1967. v, 345 pp. Color illustrations. 10 by 8½ inches. Original printed wrappers.

Signed by Aldrin, Conrad, Cooper, Gordon, Schirra, and Stafford on title page with their Gemini Titan flight numbers.
$600 - 800



91

91
GEMINI EVA.
Summary of Gemini Extravehicular Activity. NASA SP-149. Washington: 1967. Upwards of 300 pp. Original printed wrappers.

Signed by Buzz Aldrin, Gordon Cooper, Richard Gordon, Tom Stafford, and Wally Schirra on the front cover, with their Gemini mission numbers, some with the number of EVAs made.
$700 - 900

92
TECHNICAL DETAILS OF GEMINI.
Malik, P.W. and G.A. Souris. *Project Gemini: A Technical Summary.* NASA Contractor Report 1106. McDonnell Douglas Corp for MSC, June 1968. 343 pp. Illustrated with diagrams. 10½ by 8 inches. Original printed wrappers.

Signed by Aldrin, Cooper, Gordon, Schirra and Stafford on the cover, with their Gemini flight numbers.
$600 - 800

93
GEMINI PHOTOGRAPHY.
Three titles featuring orbital photographs made by Gemini flight crews, signed by many of the astronaut-photographers:
1. *Earth Photographs from Gemini III, IV, and V.* NASA SP-129. Washington: 1967. 266 pp. *Signed by Gordon Cooper ("Gemini V photos") and Charles Conrad on title.*
2. *Earth Photographs from Gemini VI Through XII.* NASA SP-171. Washington: 1968. 327 pp. *Signed by Charles Conrad, Tom Stafford, Richard Gordon and Wally Schirra on title, and inscribed by several with their personal photo credits.*
3. Cortright, Edgar M., editor. *Exploring Space with a Camera.* NASA SP-168. Washington: 1968. 214 pp. *Signed by Frank Borman, Charles Conrad, Scott Carpenter, Gordon Cooper, Tom Stafford, Richard Gordon and Buzz Aldrin on half-title mostly with their mission numbers.*
Together, 3 items. 12 by 9½ inches. Original cloth.
$700 - 900

94

94
THE GEMINI SPACECRAFT.
Color lithograph, 11 by 17 inches, featuring an artist's rendering of the Gemini spacecraft.

Signed by five Gemini astronauts: Buzz Aldrin, Gordon Cooper, Richard Gordon, Wally Schirra and Tom Stafford, with their Gemini flight numbers.
$600 - 800

95 °
GEMINI 6 RECOVERY.
Color photolithograph, 11 by 16 inches, featuring the Gemini 6 spacecraft after splashdown near the USS *Wasp*.

Signed at lower margin: "Wally Schirra / GT-6," "Tom Stafford / Gemini 6."
$500 - 700

96
FIRST RENDEZVOUS.
Large color photograph, 20 by 16 inches, showing the Gemini 7 spacecraft in orbit as photographed by pilot Tom Stafford from Gemini 6, with the nose of Gemini 6 visible in the foreground.

Inscribed *"First Rendezvous, Gemini 6 & 7, Dec. 1965, Tom Stafford, Plt,"* and additionally signed by Wally Schirra as commander.
$700 - 900

The following five lots are from the estate of Dr. Maxime Faget.

97
SATURN V MODEL.
Model of the Saturn V by the Marshall Space Flight Center (MSFC), plastic, composites, metal, and wood, 48 inches tall when assembled, approximately 1/96 scale. Many parts identified with decals. Housed in original MSFC wooden carrying case, 27 by 14 by 10 inches.
Each rocket stage is identified with large red decals near the center point of each stage. The first stage (S-IC) is screw-mounted onto a wooden base. Each of the five F-1 rocket engines are clearly visible at the base and painted in silver and red with touches of yellow and green. Four large stabilization fins with fairings are at the base of the S-IC.
A fully detachable interstage ring separates the S-IC from the S-II stage and includes the eight ullage rocket motors (these motors gave a brief burst forward to help "settle" the second stage liquid propellants into the engine pumps during flight).
The S-II stage includes the five silver and red J-2 rocket engines and the slanted interstage assembly with four small retro-rocket motors.
The smaller S-IVB/V or third stage fits into the slanted interstage. It has a single J-2 rocket engine and dual auxiliary propulsion and ullage motors at the base. The Instrument Unit (IU) is attached.
An all-metal silver and yellow-colored Lunar Excursion Module fits inside the plastic Spacecraft-LM Adapter (SLA) section which has a clear viewing port. The Ascent Stage and Descent Stage are detachable from each other and the SLA section. The LEM's landing legs can be deployed outward from their folded positions. A removable white Command/Service Module (CSM) and Launch Escape Tower (LES) are at the very top of the model. The Command Module can separate from the Service Module. There are 7 mission thrusters on the CSM and 3 on the LEM.
A metal plaque on the 8½-inch square wood base reads: "*George C. Marshall Space Fight Center, Huntsville, Alabama, Graphics Engineering and Models Branch, SATURN V.*" There is a 1-inch human figure on the wood base for scale.

MSFC was the lead NASA center for the development of the vehicle which took Man to the moon. The Apollo Saturn V rocket had a 100% success flight record. Nine Apollo crew traveled to the moon powered by the F-1's 1.5 million pound and J-2's 225,000 pound thrust engines. Six two-man LEM (later called LM) crews made landings there. In 1973, this vehicle's first and second stages put the Skylab space station into earth orbit. Included with the lot is a black and white photograph from 1966 of Dr. Faget with this Saturn V model in an MSC conference room area discussing aspects of a lunar mission with visiting foreign dignitaries. This model is a superb icon of the technological achievement made by the United States during the Space Race.
$10,000 - 15,000

98
LARGE NASA CSM MODEL.
Command/Service Module (CSM) Model, metal, 22 inches tall. The Command Module features a side-entry hatch with window (slightly loose) and a removable docking cone. The Service Module has all four "quad" thruster engines and the large Service Propulsion System (SPS) engine bell at the base. The Service Module rotates on the SPS bell to recreate the gimbal action during flight.

A black and white photograph featuring this model is included with the lot. It was taken during a meeting attended by Max Faget and the model can be seen along the back wall of the room. It was part of a larger model set which featured a Lunar Module on the same scale.
$7,000 - 9,000

99

APOLLO REACTION CONTROL ROCKET ENGINE.

A dual-valve rocket thruster with a full nozzle-exhaust bell assembly by Marquardt Corporation. 14 inches tall. 3 original labels identifying each major component (black label *"Engine - Rocket, Part No. X-228687-531, Serial No. 0122, Contract No. NAS9-8405,"* red label *"Value Assy - Solenoid, Fuel, Part No. X-228883, Ser. No. 083, Date - 3Q66,"* green label *"Valve Assy -Solenoid, Oxidizer, Part No. X-228684, Ser. No. 99, Date - 3Q66"*). A portion of the solenoids and nozzle cut away to allow viewing of interior components. The entire engine displayed on a 15 by 8 inch clear plexiglass base alongside a mounted presentation document.

Marquardt Corporation's 100-pound rocket engines of this type were used for attitude control for both the Apollo Command/Service Module and the Lunar Module. Each module had 16 of these reaction control engines clustered in groups of four. The document reads in part: *"Apollo Service Module RCS Thruster. Presented to Max Faget from The Propulsion and Power Division, December 1, 1981. We are proud to have traveled this road with you."* There is a list of manned programs (Mercury to Shuttle) and list of some of the equipment this division worked with during these flight programs.

$10,000 - 15,000

100

100
APOLLO LUNAR MODULE MODEL.
Model of the Apollo Lunar Module, designed by Grumman, plastic, metal and decals, 7 inches tall. The Ascent Stage detachable from the Descent Stage as in actual flight configuration. The complete vehicle is removable from the circular base (acrylic), which has text reading *"Lunar Module"* and with NASA and Grumman logos.

The Lunar Module (LM) made two Earth orbital missions, one being manned, and eight manned lunar missions, of which six LMs successfully landed on the surface.
$2,000 - 3,000

101
LM DESCENT ENGINE MODEL.
Model of the Lunar Module Descent Engine by TRW Systems, wood, plastic, and metal, 9 inches long. The thrust chamber is surrounded by engine components including a square gimbal ring, fuel and oxidizer lines with their associated valves, and a series of mechanical linkages. The nozzle extension is crafted from wood with a parquetry design. The entire engine is suspended above a wooden base at an angle. A plaque on the base reads: *"Project Apollo LEM Descent Engine TRW Systems."*

The Lunar Model Descent Engine had a variable throttle assembly which produced from approximately 1,000 to over 9,800 pounds of thrust. It was capable of multiple start-stops and was the means by which astronauts slowed their descent to land on the lunar surface. This engine also enabled the crew of Apollo 13 to change their flight path to return safely to the Earth.
$2,500 - 3,500

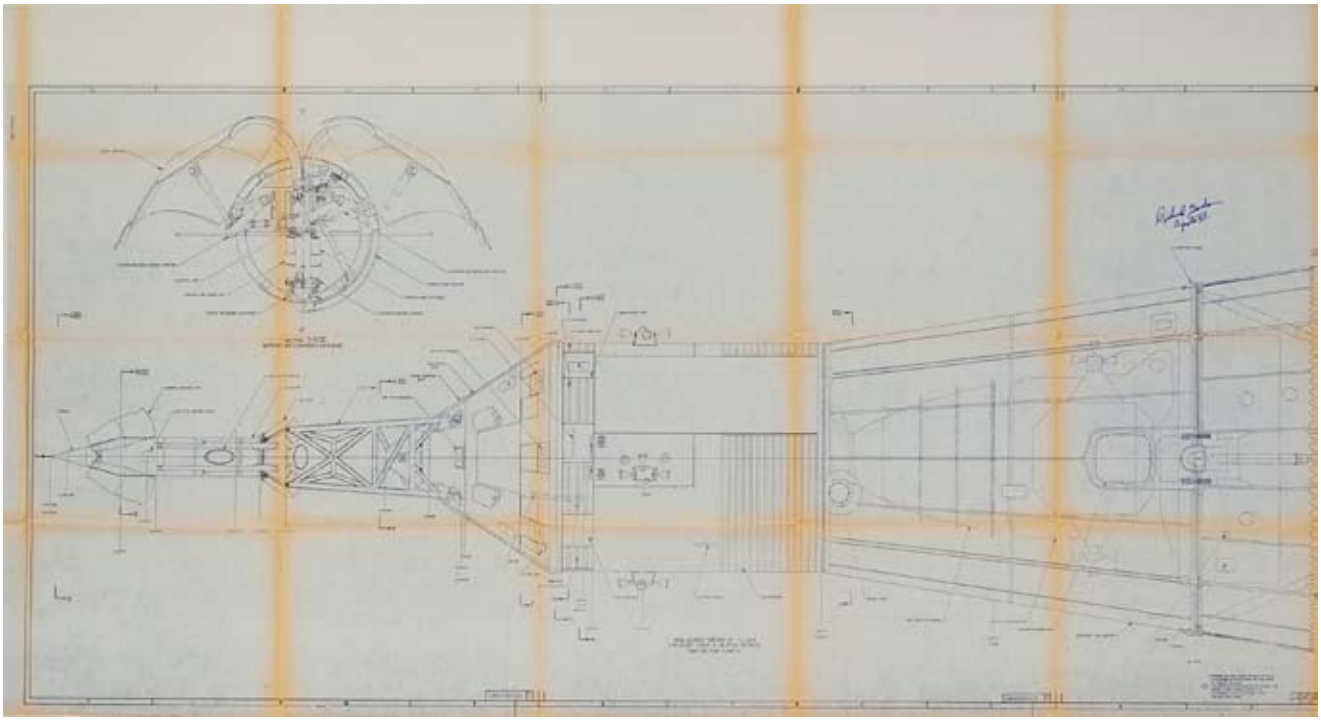
APOLLO SPACECRAFT BLUEPRINTS

As with the Mercury Program, scale blueprints were the medium that recorded the Apollo spacecraft's evolution. The lunar landing program was nearly a magnitude jump in difficulty when compared to Mercury and storing reams of paperwork rapidly became a problem. As was the case with Mercury, blueprints for Apollo were transferred to micro-film and most of the original papers were destroyed. The following five lots are some of the earliest drawings by the prime contractor for the Apollo spacecraft - North American Aviation, Inc. (NAA). They are from their Space and Information Systems Division at Downey, CA. Each has been boldly signed by the following Apollo Astronauts: Buzz Aldrin, Alan Bean, Gordon Cooper, Walt Cunningham, Charles Duke, Richard Gordon, Fred Haise, Edgar Mitchell, Wally Schirra, Rusty Schweickart, Tom Stafford, and Al Worden. Those astronauts have inscribed their individual Apollo flight number under their names. Cooper has added "Apollo X B. U. (Back Up) CDR (Commander)."

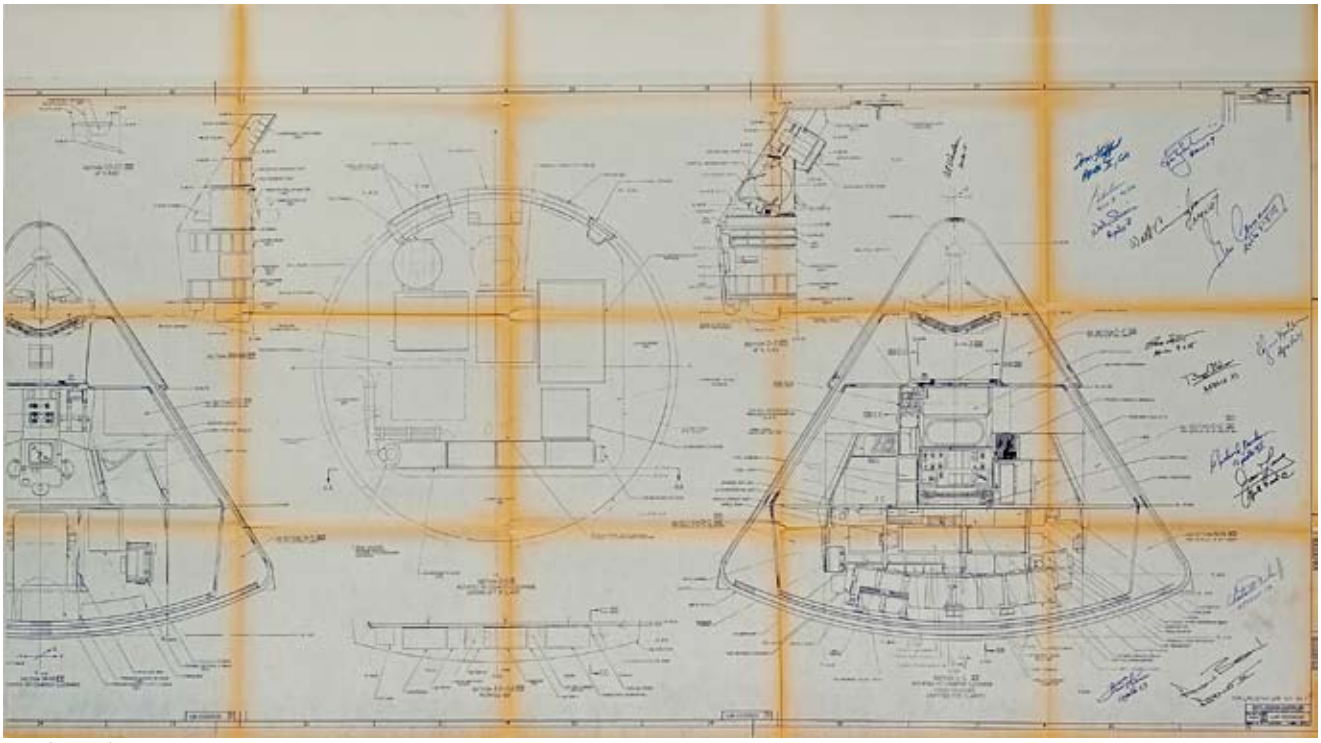
101

102
INBOARD PROFILE.
"Inboard Profile, Apollo Complete," blueprint, North American Aviation, Downey, CA, April 29, 1966, sheet 1 of 13, 67 by 30 inches, 1/8 scale based on the 140 by 54 inch master drawing.

Along with the 12 previously listed astronaut signatures, this blueprint is *additionally signed by Gene Cernan, James Lovell, and Dave Scott* with their mission numbers.
The entire stack - Lunar Module (LM), Command and Service Modules (CSM), and Launch Escape System (LES) - is shown in the configuration for placement atop the Saturn launch vehicle. The upper left corner has a nose view of the LES with canards deployed and showing their internal activation mechanisms. Canards allowed the LES an aerodynamic means to move the Command Module away from the Saturn booster during an emergency.
$2,000 - 3,000



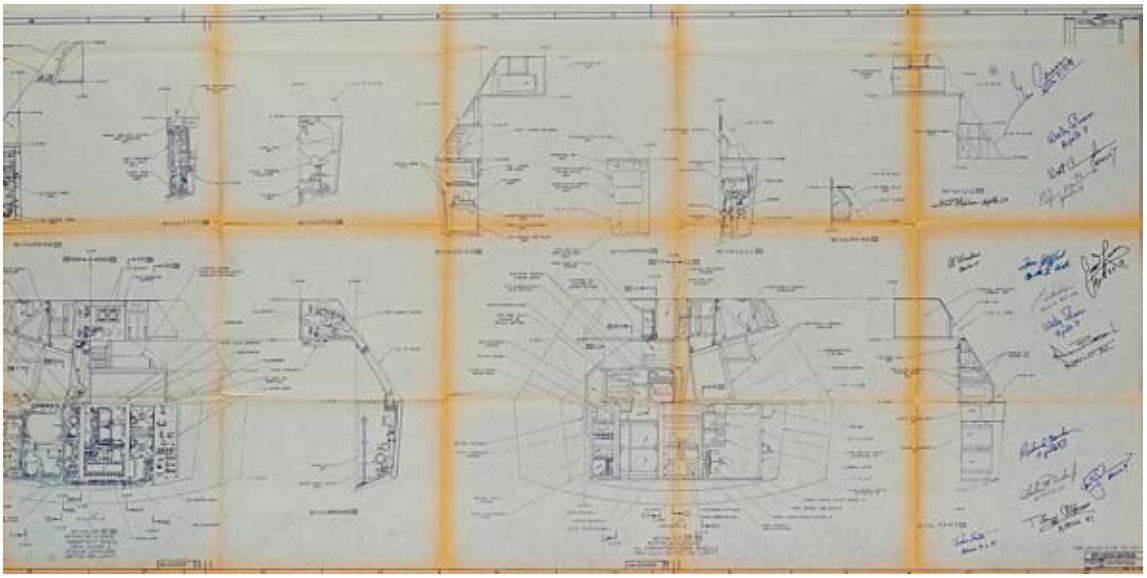
102 (detail)



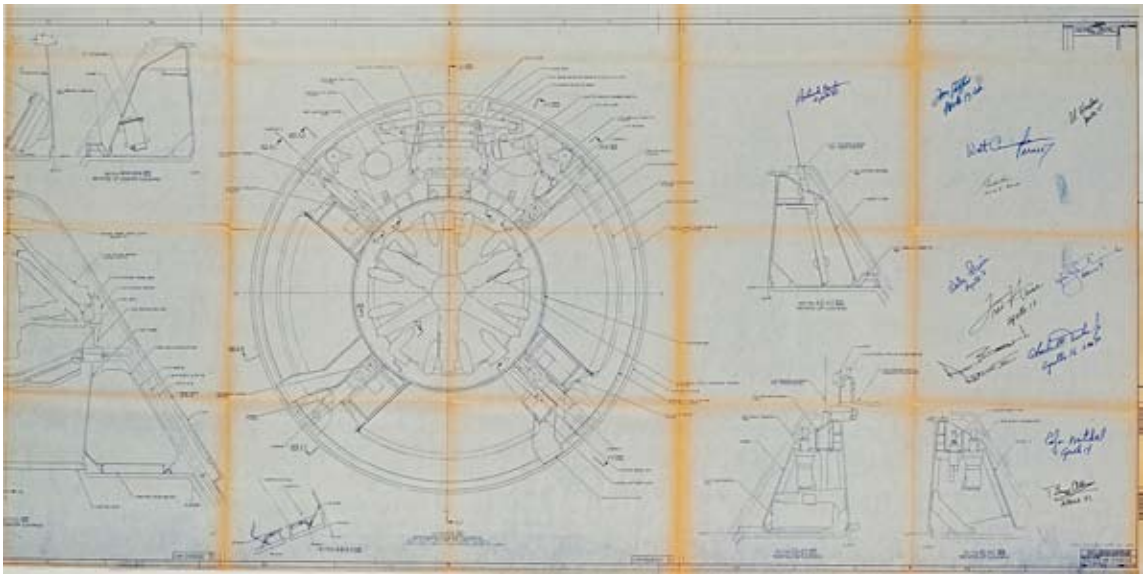
103 (detail)

103
APOLLO COMMAND MODULE.
North American Aviation blueprint, sheet number 3 of 13 in the "Profile" series, Downey, CA, c. 1966, 72 by 30 inches, ¼ scale based on the 140 by 54 inch master drawing.

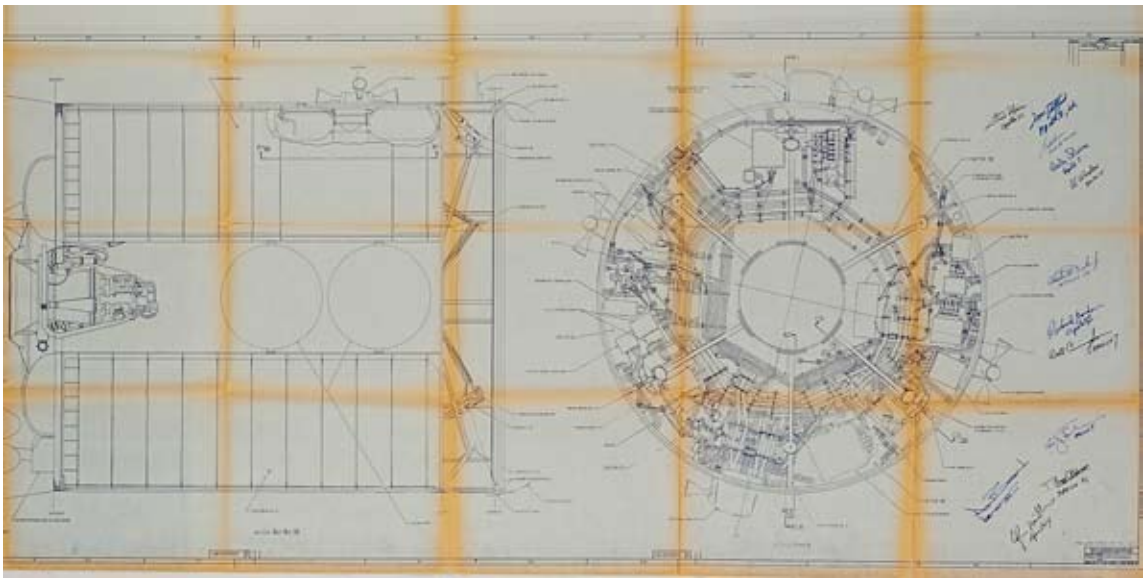
Along with the 12 previously listed astronaut signatures, *additionally signed by Gene Cernan, James Lovell, and Dave Scott* with their mission numbers. The Apollo Command Module (CM) is featured in two large cross-section views, one showing the hatch and window areas with space suit equipment locations, the other showing the navigation, environmental, and electronic equipment areas. Both include the docking probe and tunnel area, structural walls, and equipment stowage locations.
$1,500 - 2,000



104 (detail)



105 (detail)



106 (detail)

104
COMMAND MODULE CREW COMPARTMENT.
North American Aviation blueprint, sheet number 5 of 13 in the "Profile" series, Downey, CA, c. 1966, 70 by 30 inches, ¼ scale based on the 140 by 54 inch master drawing.

Along with the 12 previously listed Astronaut signatures, *additionally signed by Gene Cernan, James Lovell, and Dave Scott* with their mission numbers.
The Apollo Command Module (CM) crew compartment is featured with two large cross section views, showing the Environmental Control Subsystem (ECS) and astronaut personal equipment.
$1,200 - 1,800

105
COMMAND MODULE DOCKING SYSTEM.
North American Aviation blueprint, sheet number 6 of 13 in the "Profile" series, Downey, CA, c. 1966, 71 by 30 inches, ¼ scale based on the 140 by 54 inch master drawing.

With 12 astronaut autographs. The focus is on the Apollo CM docking equipment with large nose and cross section views of the drogue, docking ring, pitch attitude rocket engines, and adjacent spacecraft parachute equipment.
$1,000 - 1,500

106
APOLLO SERVICE MODULE.
North American Aviation blueprint, sheet number 8 of 13 in the "Profile" series, Downey, CA, c. 1966, 69 by 31 inches, ¼ scale based on the 140 by 54 inch master drawing.

With 12 astronaut autographs. The focus is on the Apollo Service Module (SM) with two very large illustrations. The first is a side view of the SM showing the 20,000 pound thrust Service Propulsion Subsystem (SPS) rocket with the large engine bell. The second view shows the circular top of the SM with electrical equipment and associated lines to power the Command and Service Module (CSM) combination.
$1,000 - 1,500

107
APOLLO COMMAND MODULE ROCKET ENGINE.
Apollo Command Module rocket engine, made by Rocketdyne, Model SE-8, steel and ablative material, 14 inches long and 3½ inches wide at nozzle base. Fuel and oxidizer valve assemblies are at the top with the associated electrical wiring connections. An ablative nozzle is at the bottom. Internal components consist of a block of ablative material and sleeve, refractory throat insert, and a stainless steel shell. A Rocketdyne ID label reads in part: *"Propulsion System Component, Part Name: Rocket Engine Assembly, Part No. 99-106003, Model No. SE 8-2, Date of Mfg. 2Q 64 (second quarter, 1964) Serial No. 4058366."*

A set of 12 of these bi-propellant engines provided the Command Module with rotation control, rate damping, and attitude control after separation from the Service Module and during re-entry. The engine has had several test firings.
Signed by Buzz Aldrin, Wally Schirra, and Tom Stafford on the engine casing with their Apollo mission numbers.
$4,000 - 6,000

107

109

111

108
APOLLO CONTROL PANEL INSTRUMENTS.
Two instruments used by Apollo astronauts in the Command Module Simulator at the Manned Spacecraft Center in Houston, Texas:
1. Reaction Control Subsystem (RCS) meter, with dual display meters, 4 by 2 by 5 inches. An additional ink stamp reads in part: *"Weston Part No. 248321."* The meter displays on the left the temperature in Fahrenheit (0 to 300) of either the CM RCS or SM RCS quads A, B, C, or D, and on the right the Helium tank pressure (0 to 5,000 - PSIA) for the same set of quads on the SM or the CM Helium tank 1 or 2.
2. Service Propulsion System (SPS) Engine Injector Valve indicator, 1 by 1 by 2½ inches. An ink stamp reads in part: *"Weston Part No. 254078."* The instrument's needle indicates open and closed. A set of four of these indicators were on the main control panel to show the status of the SPS fuel and oxidizer redundant valve systems A1, A2, and B3, B4.
Together, 2 pieces. Both manufactured by General Precision, Inc., of Binghamton, NY. With red labels reading in part: *"For Use on Ground Instrument Trainer Only."*
$700 - 900

109
APOLLO SM FLIGHT-QUALIFIED FUEL TANK.
Positive expulsion titanium fuel tank. Approximately 25 inches tall and 12 inches in diameter. A metal ID tag reads: "*Bell Aerosystems Company, Division of Bell Aerospace Corporation. Item Name: Tank (N2H4, UDMH) Positive Expulsion … Manufacturing Date: 12-15-65, Contract No. - NAS9-150.*" The tag also has additional identification, pressure ratings and control numbers.

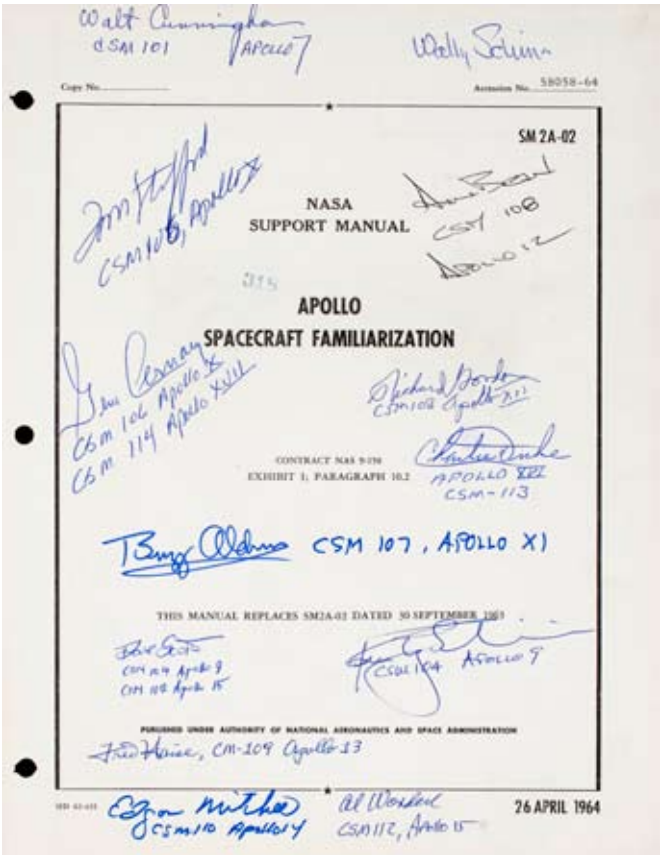
A flight-qualified tank designed to supply fuel to the attitude control rockets which were mounted on the exterior of the Service Module (SM). The SM reaction control system had four sets of four rocket engines that used hypergolic propellants. This is one of eight tanks designed to supply Unsymmetrical DiMethyl Hydrazine (UDMH) fuel for those engines. During flight operations, a teflon bladder inside the tank would be pressurized with helium to force the UDMH contained inside the tank out to the rocket engines. This was required due to the weightless conditions of space flight. With a copy of an Bell Aerospace description of these tanks.
$1,200 - 1,800

110 °
CONSOLE PANEL LIGHTING DISPLAY RETIRED FROM MISSION CONTROL.
Mission Control console panel lighting display by Loral Space Info Sys or Ford Aerospace & Communications Corporation, various metals with 18 plastic indicator lights, 10 by 3½ by 14 inches. Various inspection stamps dated as early as 1971. Labels from Ford (*"Control Indicator"*) and Loral (*"Panel, Indicator"*). The light indicator labels include *"RCA OUT," "TDRS 1 IN," "TDRS 2 IN," "VIDD INPUT," "VIDD OUTPUT,"* and *"BLDG 8 COLOR CONVERTER."*

Several groups of these 18-light displays were usually used at each flight controller console at Mission Control, Houston, during Gemini, Apollo, Skylab, and Shuttle flights. Displays of this type were retired after 30 years of service in the mid-1990's when Mission Control equipment was updated. This unit was last used for Space Shuttle support. Included are copies of two blueprint schematics from 1963-1964.
$400 - 600

111
NEWS REFERENCE FOR THE CSM–SIGNED BY 13 ASTRONAUTS.
Apollo Spacecraft News Reference. NASA and North American Aviation Inc., [1966]. 140 pp. Illustrated. 11 by 9 inches. Punched and held with prongs, card covers, tabs.

Signed by Buzz Aldrin, Alan Bean, Charles Conrad, Walt Cunningham, Charles Duke, Richard Gordon, Fred Haise, Edgar Mitchell, Wally Schirra, Rusty Schweickart, Dave Scott, Tom Stafford, and Al Worden on the front cover, with their individual Apollo flight numbers.
A news media distribution manual designed to provide a fundamental understanding of NAA's role with NASA in building the Apollo Command/Service Modules. Contents include an illustrated program summary, detailed descriptions of the spacecraft and associated sub-systems with diagrams, and the launch support requirements at the Kennedy Space Center.
$2,000 - 3,000



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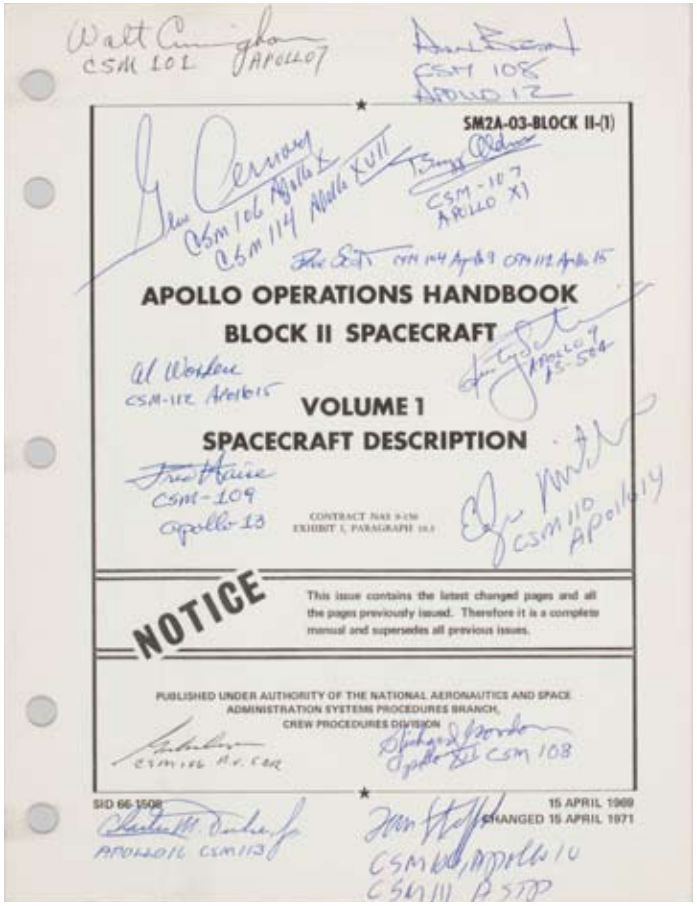


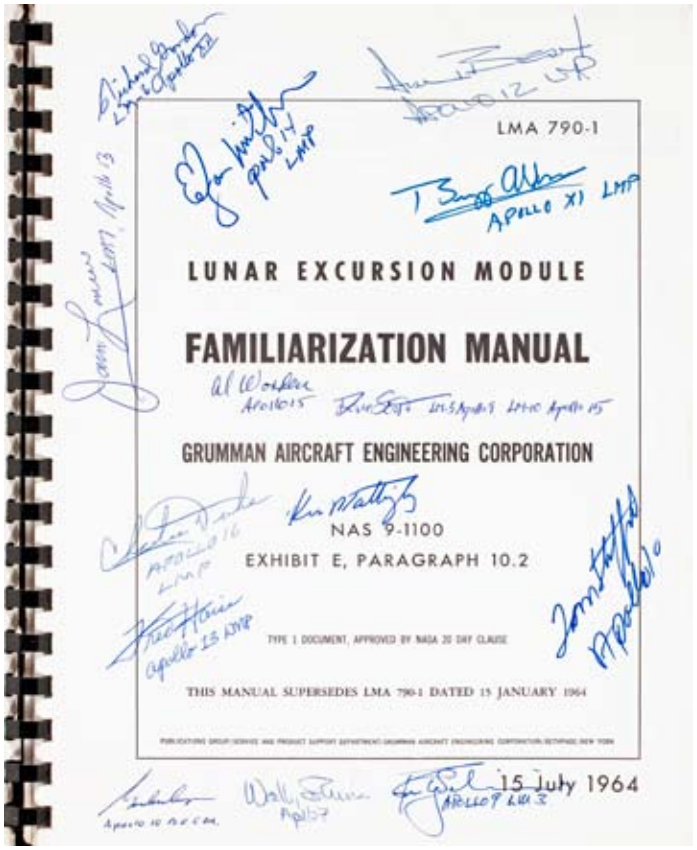
113

112
APOLLO SPACECRAFT FAMILIARIZATION FOR ASTRONAUTS.
Apollo Spacecraft Familiarization. Support Manual 2A-02. NASA, April 26, 1964. Upwards of 135 pp. 3 folding diagrams of the crew instrument panel and other systems. 11 by 8½ inches. Punched and held with prongs, card covers.

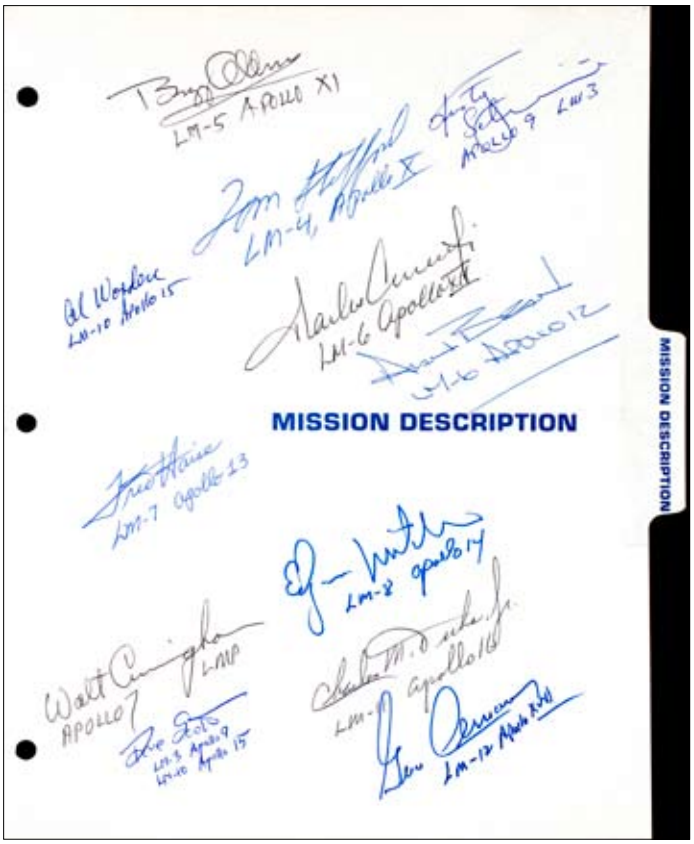
The Apollo spacecraft baseline manual, *signed by Buzz Aldrin, Alan Bean, Gene Cernan, Walt Cunningham, Charlie Duke, Richard Gordon, Fred Haise, Edgar Mitchell, Rusty Schweickart, Dave Scott, Tom Stafford, Al Worden and Wally Schirra* on title, all but the last giving their individual CSM vehicle and Apollo flight numbers.
A basic introduction to familiarize both new astronauts and mission support personnel with the Apollo mission concepts and spacecraft hardware to be used on a lunar mission.
$1,500 - 2,000

113
APOLLO OPERATIONS HANDBOOK–THE APOLLO BIBLE.
Apollo Operations Handbook, Block II Spacecraft, Volume 1 [only], Spacecraft Description. NASA, April 15, 1969-April 15, 1971 (updated). Approximately 1,100 pp. 10½ by 8 inches. Loose and punched as issued.

Signed by Buzz Aldrin, Alan Bean, Gene Cernan, Richard Gordon, Gordon Cooper, Charles M. Duke, Jr., Fred Haise, Edgar Mitchell, Rusty Schweickart, and Tom Stafford on the cover with their Apollo flight and CSM numbers. Publication details page additionally signed by James Lovell and Jim McDivitt in the same fashion.
The most extensive handbook published on the Apollo CSM, designed to provide astronauts and support teams with a complete understanding of vehicle systems and operations. In three sections: the first providing a spacecraft configuration overview; the second covering all spacecraft systems; the third covering functions of all spacecraft control panels.
$2,500 - 3,500



114



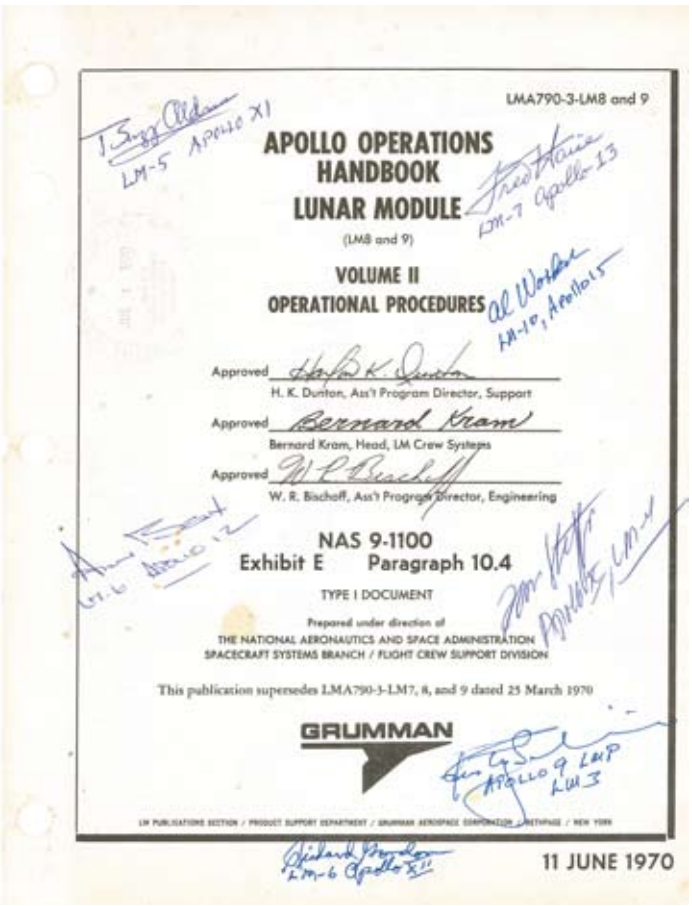
115

114
LUNAR LANDER FAMILIARIZATION.
Lunar Excursion Module Familiarization Manual. Grumman Aircraft Engineering Corp., October 15, 1965. Approximately 100 pp. Several folding tables and illustrations covering flight profiles, control panels, engine, and other systems. 11 by 8½ inches. Spiral binding, card stock covers.

Signed by Buzz Aldrin, Alan Bean, Charlie Duke, Fred Haise, and Edgar Mitchell on title as LMPs with their Apollo flight numbers. Additionally *signed by Gordon Cooper, Richard Gordon, James Lovell, Ken Mattingly, Rusty Schweickart, Dave Scott, Wally Schirra, Tom Stafford, and Al Worden,* with their Apollo flight and LM numbers where relevant.
A comprehensive overview of the LEM including mission description, vehicle structures, operational subsystems, pre-launch operations, and ground support equipment. The name LEM was later shortened to simply Lunar Module (LM).
$2,000 - 3,000

115
THE MEDIA GUIDE FOR THE LUNAR MODULE.
Apollo Spacecraft News Reference. NASA/MSC and Grumman Aircraft Engineering Corp., 1966. Upwards of 150 pp. 11 by 10 inches. Punched, tabbed, and in original blue binder.

Signed by Buzz Aldrin, Alan Bean, Gene Cernan, Charles Conrad, Charles Duke, Fred Haise, Edgar Mitchell, Rusty Schweickart, Dave Scott, Tom Stafford, Al Worden, and Walt Cunningham on first divider leaf with their Apollo flight and LM numbers, Cunningham as LMP.
Designed for distribution to the print, radio and television media, to provide an understanding of Grumman's role with NASA in building the Lunar Module. Contents include an illustrated lunar mission profile, detailed descriptions with diagrams of the spacecraft and associated sub-systems, and Grumman and LM history.
$2,500 - 3,500



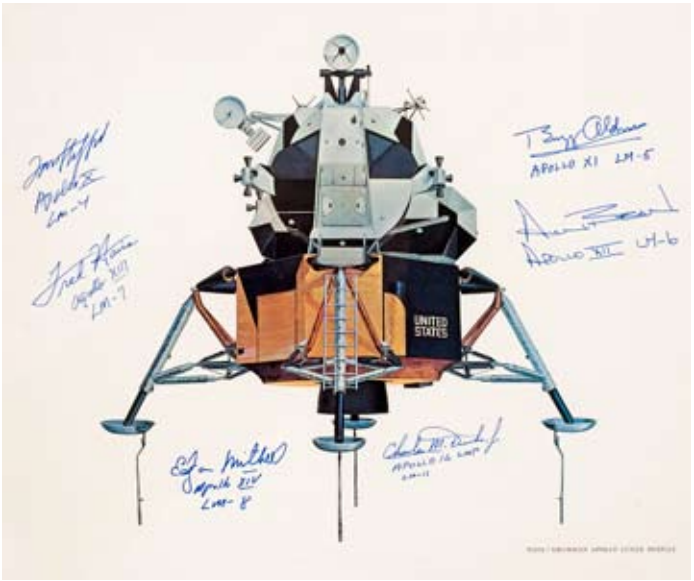
116

116
APOLLO OPERATIONS HANDBOOK–HOW TO FLY THE LUNAR MODULE.
Apollo Operations Handbook, Lunar Module (LM8 and 9), Volume II, Operational Procedures. Bethpage, NY: Grumman, June 11, 1970. Upwards of 800 pp. Diagrams, LM control panels on folding sheet. 10½ by 8 inches. Loose-leaf, punched.

The training handbook for astronauts, describing the step-by-step procedures for flying and operating the Apollo Lunar Module. *Signed by Buzz Aldrin, Alan Bean, Richard Gordon, Fred Haise, Rusty Schweickart, Tom Stafford, and Al Worden* on front cover, all with their LM and mission numbers.
This handbook was tailored for LMs 8 and 9, but the basics are valid for all LMs. Covers systems activation, reference data, control modes, general operations of the guidance systems, procedures for lunar surface navigation, rendezvous, ascent and descent engine burns, reaction control system burns, and contingency procedures.
$2,000 - 3,000

117
GRUMMAN LUNAR MODULE.
2 Grumman promotional publications:
1. "The Lunar Module." Grumman Aircraft Engineering Corporation, [c.1969]. 16 pp. 7 by 6 inches. Stiff card covers.
2. "Project Apollo - The Lunar Module." Grumman Aircraft Engineering Corporation, January 1968. 35 pp. 11 by 8½ inches. Stiff card covers.

Each signed by Buzz Aldrin, Alan Bean, Gordon Cooper, Charles Duke, Edgar Mitchell, and Tom Stafford on the cover or at foreword, with their Apollo flight and LM vehicle numbers.
$800 - 1,200



119

118
LUNAR MODULE INTERNAL COMPONENTS BROCHURE.
"NASA/Grumman Apollo Lunar Module." Bethpage, NY: Grumman, c. 1969. 5 pp, printed in color on overlaying clear acetate sheets. 10 by 8 inches. Stapled covers.

A promotional brochure released by Grumman during the Apollo program, which has been *signed by an astronaut from each manned LM flight: Buzz Aldrin, Alan Bean, Gene Cernan, Charles M. Duke, Jr., Fred Haise, James Lovell, Edgar Mitchell, Rusty Schwieckart, Tom Stafford, Al Worden, and Walt Cunningham,* with their Apollo mission and LM numbers. 118 separate components are labeled on double-sided illustrations of the LM, and identified by a folding legend on the back cover.
$1,000 - 1,500

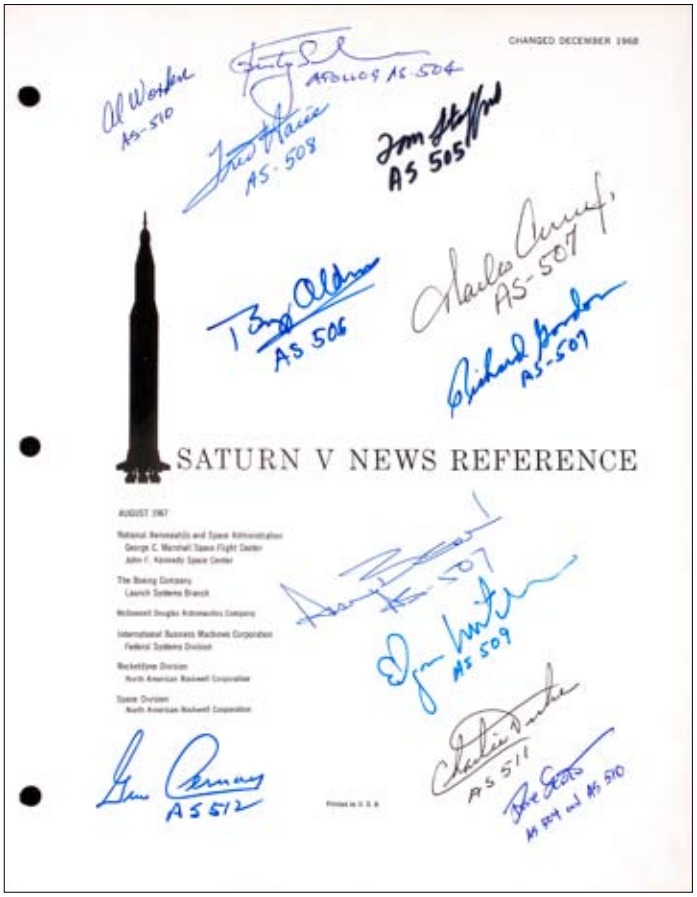
119
THE LUNAR MODULE.
"NASA/Grumman Apollo Lunar Module," large chromolithograph issued by Grumman, 22 by 26 inches (the platemark 16 by 20 inches).

Signed with their Apollo flight and LM numbers by Buzz Aldrin, Alan Bean, Charles M, Duke, Jr., Fred Haise, Edgar Mitchell, and Tom Stafford.
$1,500 - 2,000

120
MOON ROCKET NEWS REFERENCE.
Saturn V News Reference. NASA and 5 contractors, August 1967-December 1968 (updated). Upwards of 110 pp. 12 by 10 inches. Punched, tabbed, and in original gray binder.

Signed by Buzz Aldrin, Alan Bean, Gene Cernan, Charles Conrad, Charlie Duke, Richard Gordon, Fred Haise, Edgar Mitchell, Rusty Schweickart, Dave Scott, Tom Stafford and Al Worden on title and with their Apollo-Saturn vehicle numbers.
A news media distribution binder providing a fundamental understanding of NASA and industry's roles in developing, manufacturing, and launching the most powerful rocket ever flown into space.
$1,500 - 2,000

118



120

121

121
MEDIA REFERENCE FOR THE FIRST MANNED SATURN ROCKET.
Saturn IB News Reference. NASA and 4 contractors, December 1965. Upwards of 100 pp. 12 by 10 inches. Punched, tabbed, and in original binder.

Signed by Alan Bean, Jerry Carr, Charles Conrad, Tom Stafford, and Wally Schirra on title as commanders of each manned Saturn IB vehicle with their Apollo-Saturn vehicle numbers.
$1,200 - 1,800

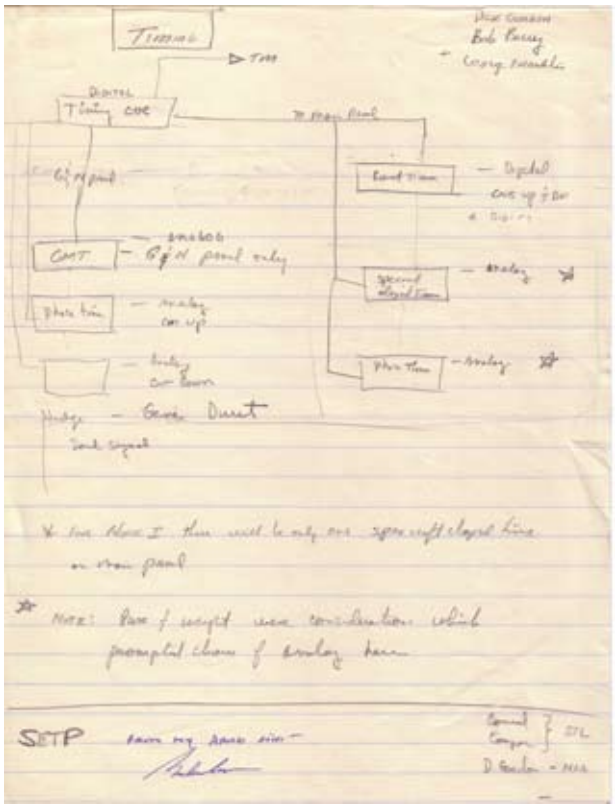
122
FIRST SATURN V ROLL-OUT.
Color photolithograph, 10 by 8 inches. Shows the Saturn V test vehicle (500-F) after it emerged from the Vehicle Assembly Building. Printed caption on verso.

Signed by Buzz Aldrin, Alan Bean, Charlie Duke, Richard Gordon, Fred Haise, Edgar Mitchell, and Tom Stafford with their individual Apollo flight numbers.
$600 - 800

The following four lots were originally in the collection of Astronaut L. Gordon (Gordo) Cooper.

123
GORDON COOPER'S GEOLOGY NOTEBOOKS.
A small archive including 2 notebooks, classroom hand-outs, and a petrology lab manual from 1964, all belonging to Gordon Cooper:
1. Notebook, 17 pp used, 9 by 6 inches, spiral-bound, board covers. With extensive classroom notes and sketches by Cooper, topics including crater formation, mineral properties, geologic time, and rock types, the upper cover with period inscription *"Geology - Cooper"* and later inscription *"Notes by Gordon Cooper."*
2. Official US Geological Survey Loose-Leaf Field Notebook, 13 pp used, 8 by 5 inches, original cloth. With extensive geology field notes and sketches by Cooper, notes focusing on observations of geologic layers such as sandstone, shale, limestone, and other strata layers, the first page inscribed *"Notes by Gordon Cooper."*
3. Laboratory Manual for Hand Specimen Petrology, 55 pp, 11 by 8 inches, original tape-backed printed card covers. Signed by Cooper on the cover.
4. 7 sheets with manuscript notations by Cooper, and other printed classroom handouts, various sizes.

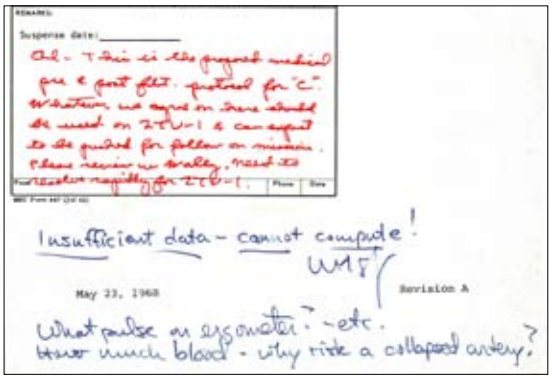
As the youngest Mercury Astronaut, Gordon Cooper considered he had a high probability of being assigned an Apollo lunar landing mission, and took geology training very seriously.
$1,500 - 2,000



124

124
PROJECT APOLLO PAPERS.
A collection of period distribution copies of memos, flight safety reports, crew schedules, and other program topics, collected by Gordon Cooper. Several were produced in the period following the tragic Apollo 1 fire. The collection includes:
1. A printed memo by Cooper, May 11, 1967, 2 pp, relating to Apollo spacecraft pyrotechnics, annotated by Wally Schirra: *"Gordo - We need a better sales pitch than this - because we had a bad fire, means we will NEVER have another - not that we must provide for a similar contingency - WMSJr."*
2. Numerous memoranda covering Saturn vehicle nomenclature updates (issued by Wernher von Braun), Saturn vehicle and stage numbering systems, Saturn V tower collision issues, LM propulsion systems status, and a security infraction report (*"Safe accidentally left open ... Alan Shepard is responsible"*).
3. Cooper's manuscript 1968-1969 timeline for Command/Service Modules 101 through 109, 21 by 9 inches, folded. With additional notes on back-up and support crew status (Cooper was back-up commander for Apollo 10, CSM 106).
4. "Crew Support Team Schedule." A printed, folded sheet, 21 by 12 inches. Milestone charts for CSMs (101 to 108) and LMs (3 to 6), with support team tasks.
5. 3 Apollo 10 crew training summaries for late 1968 and early 1969, several pages each.
6. A sheet of Cooper's manuscript notes related to the Apollo spacecraft clock.

Each item is signed by Cooper and inscribed as from his files, the whole contained together in a folder titled in manuscript by Cooper *"FLT Schedules"* and inscribed *"From my NASA Files, Gordon Cooper."* One of the memoranda, from John Young and dated October 16, 1967, gives a bleak prognosis for the planned lunar landing, and closes: *"the United States should not cop out on a national goal without an attempt at partial recovery."*
$1,000 - 1,500



130

125 °
COOPER'S PASSPORT.
US passport, issued to Gordon Cooper on September 5, 1975, 19 pp, 6 by 4 inches, green covers.

Accompanied by a Typed Letter Signed by Gordon Cooper, which reads: *"This was my United States Passport issued for the period beginning September 5, 1975 to September 4, 1980. It is a record of my trips to Australia, Saudi Arabia, Venezuela, and several other counties. Most were business trips while I worked for the Walt Disney Company."* Both the passport and ID photograph have been signed *"Leroy Gordon Cooper, Jr."*
$400 - 600

126
APOLLO I CREW EMBLEM.
Circular crew emblem, 3½ inches in diameter. Features a CSM in orbit over Earth with the moon in the distance. Mounted onto a Typed Letter Signed by Gordon Cooper.

Conrad's letter reads in part: *"The Apollo 1 cloth patch displayed below was one of the very first production runs for this emblem. It was given to me by Apollo 1 mission commander Virgil I. "Gus" Grissom at the end of 1966. It came as a shock to us in the Astronaut Office as well as the entire nation and the world that he and crew members Edward White and Roger Chaffee were killed in a spacecraft fire on the launch pad just a few weeks later in January 1967 ... Gus and the Apollo 1 crew gave their lives to help the United States reach the goal of landing on the moon by the end of 1969."*
$600 - 800

127 °
APOLLO I FIRE ACKNOWLEDGMENT CARDS.
3 printed cards, each approximately 5 by 4 inches, from the families of Virgil I. Grissom, Edward H. White II, and Roger Chaffee, expressing their thanks for letters of sympathy sent to them, the Chaffee card signed by Martha Chaffee.
$200 - 300

The following lot is from the estate of Dr. Maxime Faget.

128
FLOWN APOLLO 6 "SIDEBURNS" SEGMENT.
Segment of ablative material, 2 by 1½ by ½ inches. Encased in lucite, the reverse of the lucite reading: *"Apollo 6 SideBurns Experiment, April 2, 1968."*

Apollo 6 was the unmanned flight of Command/Service Module number 020 and Lunar Test Article-2R. It was the second flight of the Saturn V rocket. The "sideburns" experiment was a test of various ablative materials to determine how effective each was in thermal protection during re-entry into the earth's atmosphere.
$700 - 900

129

The following lot was originally in the collection of Astronaut Thomas P. Stafford.

129
ROBBINS MEDALLION CARRIED ON APOLLO 7.
Flown on Apollo 7, a sterling silver medallion, 1 inch in diameter. Features the Apollo 7 crew emblem of a CSM in orbit around the Earth above a Roman numeral VII, the crew names of Schirra, Eisele, and Cunningham along the outer lower edge. The reverse is engraved with the mission dates *"October 11 - 22, 1968"* and serial number *"74."*

Accompanied by a Typed Letter Signed by Thomas P. Stafford, which reads in part: *"The enclosed sterling silver medallion was carried into space during October 11 to 22, 1968 on the Apollo 7 mission. The Apollo 7 flight was commanded by Wally Schirra ... Wally has often said, the flight was* '101 percent successful!' *That phrase was a play on the fact that his Apollo spacecraft was identified as serial number 101 in all associated paperwork. Apollo 7 astronaut Walt Cunningham took the lead role in getting these medallions made by the Robbins Company. After the flight, the Apollo 7 flight crew distributed a limited number to key personal who expressed interest in receiving one before the flight. I was presented with this medallion by Wally after the flight. He did a great job as commander of Apollo 7 just as he did on my flight with him on Gemini 6 back in December of 1965."*
$1,500 - 2,000

The following 5 lots were originally in the collection of Astronaut Walter M. (Wally) Schirra.

130
SCHIRRA'S APOLLO PAPERS.
Period distribution copies of memos and reports issued before and after the flight of Apollo 7, with pointed comments by Wally Schirra. Contents include:
1. "Preflight and Postflight Medical Requirements," memorandum, 17 pp. With a Manned Spacecraft Center (MSC) routing slip having a manuscript note by Deke Slayton to Alan Shepard, which reads in part: *"Al - this is the proposed medical pre & post flt protocol for "C"... Please review w/ Wally. Need to resolve for 2TV-1."* There is an additional note on the cover by Schirra: *"Insufficient data - cannot compute! WMSJr What pulse on ergometer? etc. How much blood - why risk a collapsed artery?"*
2. "No More Middle Men!," minutes of a crew training meeting, 2 pp typescript and 4 pp mimeograph. Contains crew schedule changes and a training calendar.
3. "CM Interior Lighting SC 101 and Subs," printed diagrams and schematics, 7 pp.
4. "Station Coverage for the CSM 101 [Apollo 7] Mission," memorandum with timeline.
5. "CSM 101 Service Propulsion System Preliminary Flight Evaluation."
6. "Software Change on AS-205."
7. Distribution copy of a list written by Schirra of 15 discrepancies about Pad 34 egress issues.
8. Sheets of data plots, some manuscript.
9. 5 sheets of display screen data directly out of Mission Control.
Various sizes and lengths, mostly stapled.
$800 - 1,200


Walter M. Schirra
10834 Via de Santa Fe. Box 73
Rancho Santa Fe. CA 92067

This is the Fisher ink pen I used during the flight of Apollo 7 during October 11 through 22, 1968. It was used to make notations of flight plan updates, log instrument readings, and record general notes. The pen was stamped with the part number SEB12100051-204 and serial number (S/N) 1014 on the upper casing. Fisher pens utilized a pressurized cartridge which allowed inkto flow in the absence of gravity.

Apollo 7 was the first manned flight of the command and service modules. The mission objectives included extensive tests of all spacecraft systems and the demonstration of rendezvous capability. I was mission commander and flew with crew members Walter Cunningham and Donn Eisele.

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

132


Walter M. Schirra
10834 Via de Santa Fe. Box 73
Rancho Santa Fe. CA 92067

This is my Goody comb that I used during the flight of Apollo 7 during October 11 through 22, 1968. It was part of my personal hygiene kit carried on Apollo 7. The comb was important to have while preparing for our several television broadcasts from the spacecraft. No doubt it helped me win my Emmy for those live space TV shows!

Apollo 7 was the first manned flight of the command and service modules. The mission objectives included extensive tests of all spacecraft systems and the demonstration of rendezvous capability. I was mission commander and flew with crew members Walter Cunningham and Donn Eisele.

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

133


131 (detail)

131
US FLAG CARRIED ON APOLLO 7.
Flown on Apollo 7, a US flag, silk, 6 by 4 inches. Inscribed *"Flown on Apollo 7, Wally Schirra."* Mounted on a Typed Letter Signed by Walter M. Schirra.

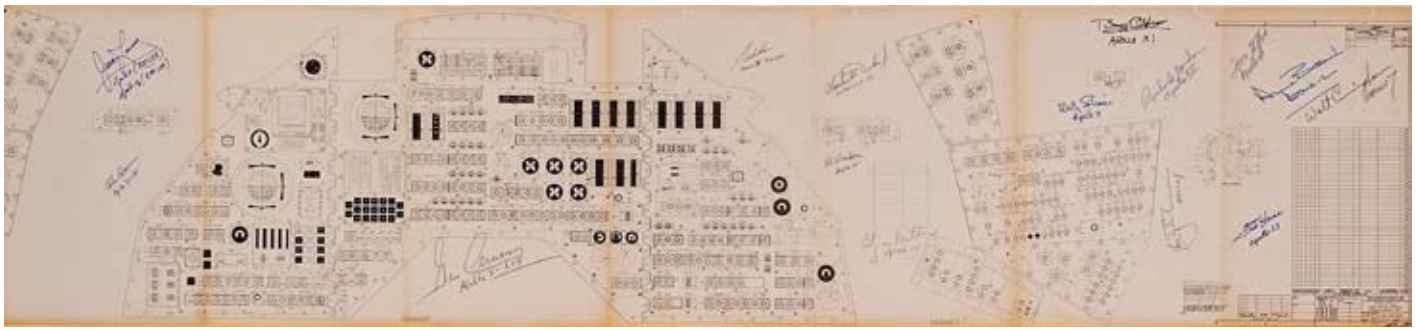
Schirra's letter reads: *"This United States flag was flown on Apollo 7 during October 11 to 22, 1968. Apollo 7 was the first manned flight of the command and service modules. The mission objectives included extensive tests of all spacecraft systems and the demonstration of rendezvous capability. The flight was 101 percent successful!*
Walter Cunningham, Donn Eisele, and I carried a very small number of flags during our mission. I have written that it was flown on Apollo 7 and signed the flag on the lower white stripe."
$3,000 - 4,000

132
FISHER "SPACE PEN" CARRIED ON AND USED DURING APOLLO 7.
Flown on Apollo 7, a metal ball-point pen, 5 inches long. With the remains of a white velcro tab, and identification numbers stamped on the upper casing.

Accompanied by a Typed Letter Signed by Wally Schirra, which reads in part: *"This is the Fisher ink pen I used during the flight of Apollo 7 during October 11 through 22, 1968. It was used to make notations of flight plan updates, log instrument readings, and record general notes ... Fisher pens utilized a pressurized cartridge which allowed ink to flow in the absence of gravity."*
$2,000 - 3,000

133
COMB CARRIED ON APOLLO 7–USED TO WIN AN EMMY.
Flown on Apollo 7, a metal comb made by Goody, and used by Wally Schirra during the flight, 5 inches long.

Accompanied by a Typed Letter Signed by Wally Schirra, which reads in part: *"This is my Goody comb that I used during the flight of Apollo 7 during October 11 through 22, 1968. It was part of my personal hygiene kit carried on Apollo 7. The comb was important to have while preparing for our several television broadcasts from the spacecraft. No doubt it helped me win my Emmy for those live space TV shows!"*
$1,500 - 2,000



140 (detail)

134
SCHIRRA PHOTOGRAPH COLLECTION.
A group of 75 photographs (55 black and white, and 20 color), collected by Schirra during the 1960s, 10 by 8 inches, most with printed captions on verso.

Photographs from each of Schirra's space flights are included. Several are of Mercury, Gemini, or Apollo training, launch vehicles, and post-space mission activities. Additional images include VIPs with Schirra at the Houston space center and a visit with President Johnson after Apollo 7.
$600 - 800

135 °
APOLLO 7 BETA CREW EMBLEM.
Apollo 7 crew mission emblem, 4 inches in diameter, printed on Beta cloth, 9 inches square.

Signed by Wally Schirra above the crew emblem.
$200 - 300

136 °
APOLLO 7 MISSION REPORT.
"Apollo 7 Mission Report." Houston, TX: NASA/MSC, December 1968. Upwards of 410 pp. 10½ by 8 inches. Heavy card stock covers, punched and with staples removed.

The extensive internal NASA report on the first manned Apollo flight, *signed by Wally Schirra as mission commander.*
Internal NASA mission reports are designed to be the single most comprehensive source of information on any particular flight.
$300 - 400

137
APOLLO 7 CREW RETURNS.
Black and white photograph, 10 by 8 inches. The image shows the Apollo 7 crew members on the USS *Essex* after splashdown and recovery in the Atlantic Ocean on October 22, 1968. Printed caption on verso.

Signed by Wally Schirra, Walt Cunninghan, and Donn Eisele.
$600 - 800

The following lot is from the estate of Dr. Maxime Faget.

138
FLOWN APOLLO 8 MYLAR.
Segment of mylar, 1 inch square. Encased in lucite disc, text on the disc reading: *"Apollo 8 Mylar, Command Module Thermal Coating."*

Mylar that was not burned off during re-entry after Apollo 8's return from the moon was cut into segments and presented to key NASA and industry personnel.
$1,000 - 1,500

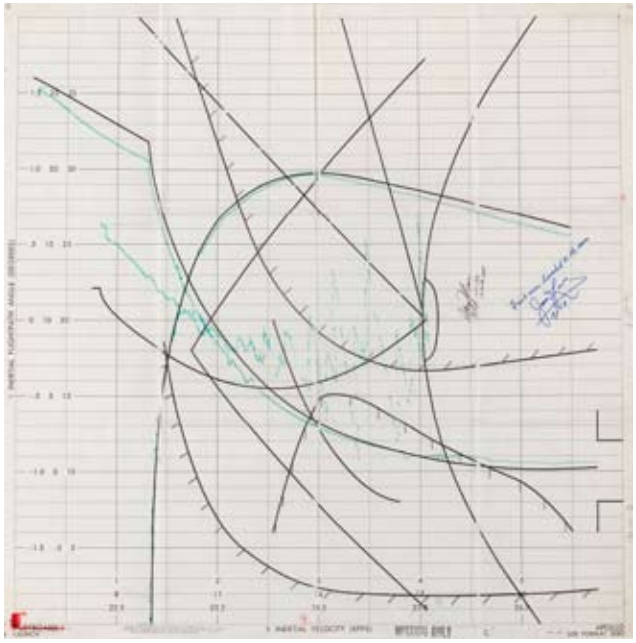
137

139 °
FLOWN MANNED FLIGHT AWARENESS MEDALLION.
Flown Apollo 8 Manned Flight Awareness (MFA) medallion, 1½ inches in diameter. Mounted onto a NASA MFA certificate with the printed signature of Apollo 8 Commander Frank Borman. The medallion obverse features a profile of the Apollo 8 crew faces with their last names and the December 21-27, 1968 mission dates.

Alongside the mounted medallion, on the certificate, is a printed reproduction of the reverse of the medallion, which reads: *"First Lunar Apollo Flight. In appreciation for your contribution to the Apollo Saturn Project, the Apollo 8 crew carried metal in this medallion on man's first flight to the moon."*
$150 - 250

140
APOLLO 8 COMMAND MODULE CONTROL PANEL.
"Design Layout - Main Display Console, Command Module 103," blueprint, North American Aviation, Downey, CA, April 5, 1967 with two revisions, the last dated March 12, 1968, approximately 79 by 11 inches, scale not given.

Signed by a total of 15 Apollo astronauts, each giving their Apollo flight numbers: Buzz Aldrin, Alan Bean, Gene Cernan, Gordon Cooper, Walt Cunningham, Charles Duke, Richard Gordon, Fred Haise, James Lovell, Edgar Mitchell, Wally Schirra, Rusty Schweickart, Dave Scott, Tom Stafford, and Al Worden.
A blueprint illustrating the locations of the critical command and flight controls of the spacecraft that took the first men to lunar orbit during December 1968. Signed by a member or members of every Apollo flight crew including Apollo 8 Command Module Pilot James Lovell.
The largest drawing is the Main Display Panel which was located in front of the astronaut couches and has two large flight attitude indicators, the re-entry monitor, caution and warning panel, 28 meters, and over 100 individual switches.
$2,500 - 3,500



141

142 (detail)

141
APOLLO 8 LAUNCH PLOTTING CHART.
"Plotboard 1: Launch," sheet from a pen plotter, stamped "Mission only," NASA, December 20, 1968, approximately 30 by 30 inches.

An artifact which recorded history from inside Mission Control during man's first journey to the moon on the Saturn V rocket.
Inscribed by Apollo 8 Command Module Pilot James Lovell: *"First men launched to the moon."* Additionally inscribed by a North American Aviation engineer with the time it was removed from the plotboard (December 21, 1968, 13:20:56 GMT).
On this chart, the launch vehicle Inertial Velocity in KFPS (1000 feet per second) is the x-axis, the Inertial Flight Path Angle in degrees being the y-axis. Several heavy pencil-lined curves were made prior to launch to indicate the nominal or expected flight paths. Three green line plots were made during the actual launch.
A Mission Control projection device allowed this chart to be viewed during launch on one of the large screens that faced all flight controllers. The green plotting line traces the heavy pencil outline almost perfectly during initial measurements. As the launch progressed, an alarming major deviation occurred about the mid-point on one of the plots. This could have potentially endangered the crew but was determined to be the result of "noisy" telemeter data. The mission was allowed to progress to the moon.
$4,000 - 6,000

143

142
LUNAR FLIGHT CHARTS FOR APOLLO 8.
A group of 8 lunar mission flight charts for Apollo 8. Various formats including September and November 1968 versions of the Apollo Lunar Flight Chart, a December 1968 Apollo Lunar Orbital Map base chart, October and December 1968 Target of Opportunity Planning Charts with primary photographic targets listed in red, three charts based on Lunar Orbiter photographs of the moon's equatorial region with prominent craters and areas labeled. Sizes range from 38 by 11 to 58 by 14 inches. All folded and contained in a heavy card stock pronged folder, the upper cover with *"Apollo Charts"* and NASA "meatball" labels.

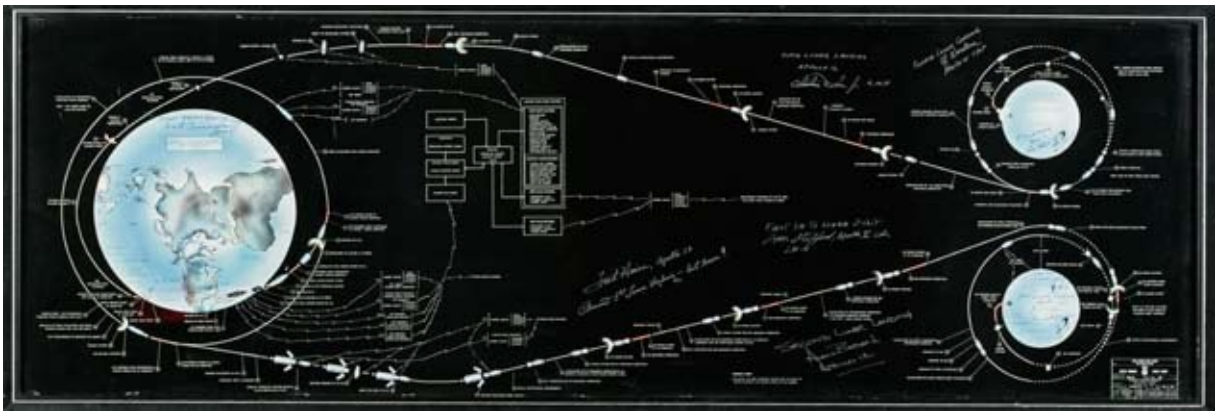
Mounting spy evidence gathered during 1968 suggested that the Russians were attempting to send a man around the moon to tarnish the significance of a lunar landing by the US planned for the next year. With political urging, NASA changed flight planning for Apollo 8 to a lunar orbital mission. Mission planners rushed to assemble all required navigational data, such as base edition lunar charts and projected launch date orbital maps. This folder contains charts used and preserved from that historic era.
The upper cover of the folder is inscribed by Fred Haise, *"Mission Planning Charts for Apollo 8, Fred Haise, Apollo 8 Back-up LMP."*
$1,200 - 1,800

143
THE PLAN FOR THE FIRST TRIP TO THE MOON.
Final Flight Plan Apollo 8, AS-503/CSM-103. Houston, TX: NASA/MSC, November 22, 1968. Upwards of 240 pp. 10½ by 8 inches. Heavy card stock covers, punched and with staple removed.

The step-by-step timeline for man's first flight to the moon, *signed by CMP James Lovell* on the front cover.
$700 - 900

144 °
APOLLO 8 SATURN V FLIGHT MANUAL.
Saturn V Flight Manual, SA 503. NASA, April 1, 1968. Upwards of 255 pp. Half-tone illustrations. 10 ½ by 8 inches. Original printed wrappers, punched.

Designed to provide astronauts with a single reference to the design and functions of the Saturn V vehicle that would carry the first men to lunar orbit.
$400 - 600



145

146 (detail)

145
APOLLO MANNED LUNAR LANDING.
"Apollo Manned Lunar Landing, GOSS - Mission Profile," large color lithograph, Daytona Beach, FL, General Electric Company for NASA/MSC, December 31, 1964, 18 by 54 inches, framed.

A magnificent representation of the critical steps required during an Apollo flight to land on the moon. Signed by several Apollo Astronauts who made this voyage.
There are 122 numbered steps along a path that leads from the Earth to the moon and back. The data flow of telemetry and communications is highlighted near the center, which is the backbone of the Ground Operations Support System (GOSS).
Key illustrated steps during the Apollo Saturn launch phase include ignition and separation of all stages, escape tower jettison, then orbital checkouts. Events before and after the Trans-Lunar Injection burn are attitude adjustments, S-IVB (Saturn third stage) re-ignition, CSM separation and docking with the LM, then LM extraction from the S-IVB. Several engine burns are shown, leading up to arrival of the CSM/LM at the moon, then various system check-outs to enable the lunar landing. Step 68 shows the LM during hover and then lunar touchdown, with step 72 having the crew outside exploring the surface.
A second moon in the diagram gives room for the steps required for the LM to leave the lunar surface, dock with the CSM, and prepare for the long engine burn to return to the earth. Several steps cover re-entry and splashdown in the Pacific Ocean.
Inscribed along the earth's rim: *"First Manned Apollo Flight, Walt Cunningham, Apollo 7."* Between the Earth and moon: *"First LM to lunar orbit, Tom Stafford, Apollo X Cdr, LM-4"* and *"Fred Haise, Apollo 13, Planned 3rd Lunar Landing but Boom!"* Near the lower moon, Alan Bean has written: *"Second Lunar Landing, Alan Bean, Apollo 12."* The upper right has two inscriptions: *"Fourth Lunar Landing, Al Worden, Apollo 15 CMP"* and *"Fifth Lunar Landing, Apollo 16, Charles M. Duke, Jr, LMP."* Dave Scott has written on the upper moon: *"4th lunar landing, Apollo 15, Dave Scott."* At the lower moon, Gene Cernan has written: *"First LM to Lunar Orbit, A-X, Last Lunar Landing, Apollo XVII, Gene Cernan."*
$8,000 - 12,000

146
LUNAR CHART—SIGNED.
"Lunar Chart LPC-1," lithographed moon map with two stereographic projections of both poles and Mercator projection, Aeronautical Chart and Information Center, March 1970 [but stamped on verso April 17, 1970], 25¾ by 38 inches.

Stunning lunar chart signed by nine Apollo astronauts—a member of every Apollo crew that made the voyage to the moon during the Twentieth Century.
One of the first NASA Apollo charts printed that provides complete coverage of the moon's surface.
Signed along the bottom margin: *"James Lovell / Apollo 8 CMP, Apollo 13 CDR"; "Tom Stafford, Apollo X, Cdr"*; and *"Fred Haise, Apollo 13 LMP."* Lunar landing crew members have signed next to X's marking their landing spots as follows: *"Buzz Aldrin / Apollo XI LMP"; "Alan Bean, Apollo XII"; "Edgar Mitchell / Apollo 14 LMP"; "Dave Scott / Apollo 15 CDR"; "Charles M. Duke, Jr. / Apollo 16 LMP"*; and *"Gene Cernan / Apollo 17 CDR."*
$7,000 - 9,000

149

147 °
FIRST MANNED LUNAR MODULE CREW.
Color photolithograph, 10 by 8 inches, of the Apollo 9 crew in their white space suits standing in front of their Saturn V launch vehicle at the Kennedy Space Center.

Signed by James McDivitt, Dave Scott, and Rusty Schweickart as Apollo 9 LMP.
$400 - 600

148 °
SPIDER AND GUMDROP IN ORBIT.
Color photograph, 10 by 8 inches, of Astronaut Dave Scott as he opens CSM Gumdrop's hatch while in Earth orbit, the photograph taken by Rusty Schweickart during his spacewalk outside LM Spider.

Signed by Dave Scott, and Rusty Schweickart as Apollo 9 LMP.
$300 - 400

The following 3 lots are from the Estate of Faye Stafford.

149
WATERCOLOR BY ASTRONAUT STAFFORD.
Original watercolor by Thomas Patten Stafford, signed lower right, 11 by 14 inches, matted and framed to 16 by 20 inches.

Perhaps the only work of art by four-time space explorer Thomas Patten Stafford to be offered at public auction. The image shows a farm house next to a country lane. It was painted by Stafford during the 1950s while he served in the United States Air Force.
$5,000 - 7,000

150

150
PRESIDENTIAL DINNER MEMENTOS.
A group of printed items, 2 signed or inscribed by Nixon, comprising: invitations on White House stationery for the Apollo 10 crew's June 30, 1969 dinner, a dinner honoring the Apollo 11 astronauts at the Century Plaza Hotel, Los Angeles, on August 13, 1969, and a March 1, 1971 dinner for the Apollo 14 astronauts; menus for the first and second dinners, the first signed by President Nixon ("Richard Nixon"); Nixon's place-setting card from the Apollo 10 dinner, inscribed *"Best to Faye, from Richard Nixon"*; a match book with the presidential seal; 2 Nixon inauguration medallions. The invitations and menus approximately 6 by 4 inches, the collection matted and framed to 27 by 29 inches.
$4,000 - 6,000

151
GOLD ROBBINS MEDALLION CARRIED IN SNOOPY ON APOLLO 10.
Flown Robbins medallion, 14k gold, featuring the Apollo 10 mission emblem and with the flight dates engraved on the reverse, 1 by 1 inch. Worked into a brooch after the flight with the medallion as a central plaque, accented with a single cut diamond, and an openwork surround of rope-twist motif.

The first time a gold Robbins medallion from this flight has been offered at public auction, one of only four carried on the mission. These medallions were manufactured by the Robbins Company, located in Attleboro, Massachusetts.
Accompanied by a Typed Letter Signed by Thomas P. Stafford, dated August, 1993, which reads in part: *"I carried the Apollo X medallion on the Apollo X mission that I commanded to the Moon during May 18-26, 1969. The medallion was carried in my PPK during the entire mission ... later transferred to the Lunar Module 'Snoopy' for my descent into low lunar orbit ... During the Apollo X reentry, my fellow crew members, Gene Cernan and John Young, and I established the all-time record for the highest speed ever attained by man — 24,790 miles per hour. This speed record will not be broken until a crew of astronauts returns from Mars sometime during the next century."*
$12,000 - 18,000

152

The following four lots were originally in the collection of Astronaut Thomas P. Stafford.

152
EXTRA LARGE UNITED STATES FLAG CARRIED ON APOLLO 10.
US flag, silk, 11 by 18 inches. Inscribed towards the lower edge *"Flown to the Moon on Apollo X, Tom Stafford."* Together with a Typed Letter Signed by Thomas P. Stafford.

Stafford's letter reads in part: *"This United States flag was carried to the moon on the Apollo X mission. It was one of the very few extra large flags taken on our mission ... Our flight lasted from May 18 to 26, 1969. Apollo X successfully tested techniques needed to accomplish the first lunar landing mission of July 1969. The flag has been in my private collection since 1969."*
$5,000 - 7,000

151

153
CHARM CARRIED ON APOLLO 10.
Flown Apollo 10 Medalet, 18k gold, ¾ inch diameter. With the engraved signatures of the Apollo 10 crew on the obverse. The wording *"Apollo X, May 18 - 26, 1969"* was engraved on the reverse after the mission. Preserved in a white plastic case with interior padding (unflown).

Accompanied by a Typed Letter Signed by Thomas Stafford, which reads in part: *"This disk was carried on the flight of Apollo X during May of 1969. Gene, John, and I carried a small number of these special disks to present to close personal friends after the flight."*
$1,500 - 2,000

153

154 (detail)

155 (detail)

156

157

154
BETA CLOTH EMBLEM CARRIED ON APOLLO 10.
Flown Apollo 10 crew emblem, 3½ inches in diameter, printed on Beta cloth section, 9 inches square.

Signed by Tom Stafford, John Young, and Gene Cernan, and inscribed by Stafford along the bottom edge: *"Flown to the Moon on Apollo X, May 18-26, 1969, T.P.S."* Together with a Typed Letter Signed by Tom Stafford discussing the emblem.
$5,000 - 7,000

155
CLOTH CREW EMBLEM CARRIED IN SNOOPY.
Flown on Apollo 10, a cloth crew emblem, 4 inches across. Mounted on a Typed Letter Signed by Thomas P. Stafford.

Stafford's letter reads in part: *"This cloth patch ... flew to within 50,000 feet of the lunar surface in our Lunar Module named Snoopy ... Over one billion viewers on earth watched the first color television from space and lunar orbit during the eight day flight. This patch has been in my private collection since 1969."*
$3,000 - 4,000

156
SNOOPY ASTRONAUT DOLLS–SYMBOLS OF THE APOLLO 10 LM CREW.
Two Snoopy Astronaut dolls, produced in China by Determined Distributions of San Francisco for United Feature Syndicate, 1969, plastic and textile, each 10 inches tall. In original boxes.

The *Peanuts* comic strip character in a space suit - the helmets inscribed *"Snoopy, LM-4 Call Sign, Tom Stafford, Apollo X Cdr, May 69"* or *"Snoopy LM-4 Gene Cernan, Apollo X LMP."*
Snoopy was adopted by NASA with the full blessing of creator Charles Shultz as the Manned Flight Awareness (MFA) Program mascot. The program used Snoopy as a "spokesperson" to emphasize such topics as flight safety and good quality control during spacecraft manufacturing. The Apollo X LM crew of Stafford and Cernan named their Lunar Module "Snoopy" partly to bring greater recognition of the MFA program. As symbols of their flight, the back of the dolls' helmets have been inscribed and signed by these astronauts. Apollo X Command Module Pilot John Young named his spacecraft "Charlie Brown."
$800 - 1,000

The following three lots are from the estate of Dr. Maxime Faget.

157
FLOWN APOLLO 11 MYLAR.
Segment of mylar, approximately 1 inch square. Encased in lucite disc, the disc reading: *"Apollo 11 Mylar, Command Module Thermal Coating."*

This mylar is part of the materials used on mankind's first voyage to land men on the Moon. It was removed from the Apollo 11 Command Module Columbia after re-entry and splashdown on July 24, 1969.
$1,200 - 1,800

158
DISTINGUISHED SERVICE MEDAL.
A Distinguished Service medal, 1½ inches across. The obverse with wording *"Distinguished Service - NASA"* and featuring a raised centerpiece of a vector and elliptical orbit shape. The edge alternating from fluted to Maltese cross-like design. The reverse engraved *"Maxime A. Faget, October 2, 1969"* being the presentation date. Together with miniature lapel pin in the same style, and ribbon rosette, each ½ inch across. The three pieces together in the original presentation box and with original signed award certificate.

This medal was NASA's highest award at that time. The framed certificate reads: *"The National Aeronautics and Space Administration Award to Maxime A. Faget, Director of Engineering and Development, the NASA Distinguished Service Medal. In recognition of his distinguished contributions to the success of the Apollo Program. His outstanding leadership and dedicated performance were essential elements in the fulfillment of this Nation's commitment to achieve the goal, during this decade, of landing a man on the Moon and returning him safely to Earth. The scientific and technological capability demonstrated by the flight of Apollo 11 has opened for all mankind the new era of interplanetary travel. Signed and sealed at Washington, D.C. this twenty-ninth day of September Nineteen Hundred and Sixty-Nine."* The certificate is signed by Tom Paine, the NASA Administrator in 1969.
$2,000 - 2,500

159
LUNAR ROCK SAMPLE PHOTOGRAPHS.
A group of photographs and internal memoranda collected by Maxime Faget, concerning the lunar samples returned from Apollo 11 and 12, and including:
1. 15 black and white photographs, 10 by 8 inches.
2. A set of 5 Lunar Receiving Laboratory (LRL) internal distribution papers titled *"Sample Information Summary"* describing the Apollo 11 lunar material.
3. Dr. Faget's copy of a 9 pp transcript sent to MSC Director Robert Gilruth of the excited conversations recorded by the team that first opened the Apollo 11 sample return containers or "rock boxes".
4. A Typed Letter Signed by Bryan Erb, LRL Manager, March 9, 1970, to Dr. Faget enclosing 18 color and black and white photographs, 10 by 8 inches, stating *"These photos show what are, perhaps, the most interesting examples of the various types of material returned."*
5. A 2 pp typed list of captions.
The first three items dating from July and August 1969.
$700 - 900

160
APOLLO 11 PREFLIGHT ACTION ITEMS.
"Apollo 11 Preflight Action Items." MSC Internal Document, May 29, 1969. Upwards of 75 pp. 11 by 8½ inches. Heavy card stock cover, punched and tabbed.

Signed by Buzz Aldrin as LMP on front cover, a critical document that assisted the timely departure of Apollo 11.
There are over 130 manuscript notes in various hands logging the results or status of various action items. Issues include *"Open Engineering"* such as space suit modifications (mods), PLSS mods, biological isolation garment mods, and life raft changes. A LM problem list contains the status of the guidance computer, water gun issues, the PLSS interface and oxygen leaks, cabin fan, carbon dioxide sensor, and various valves and assemblies. There were similar problems with the CSM such as water tank and relief value issues, COAS, and camera mounting problems. An *"Open Issues"* section addresses UV visor protection concerns, whether lunar surface items will be too hot to be handled by space suit gloves (*"Yes, they will be too hot!"*), space suit donning exercise, the reason for Armstrong's intra-vehicular glove change, Aldrin's helmet inspection, the status of the crew's emergency oxygen masks, and bio-instrumentation.
$1,500 - 2,000


158

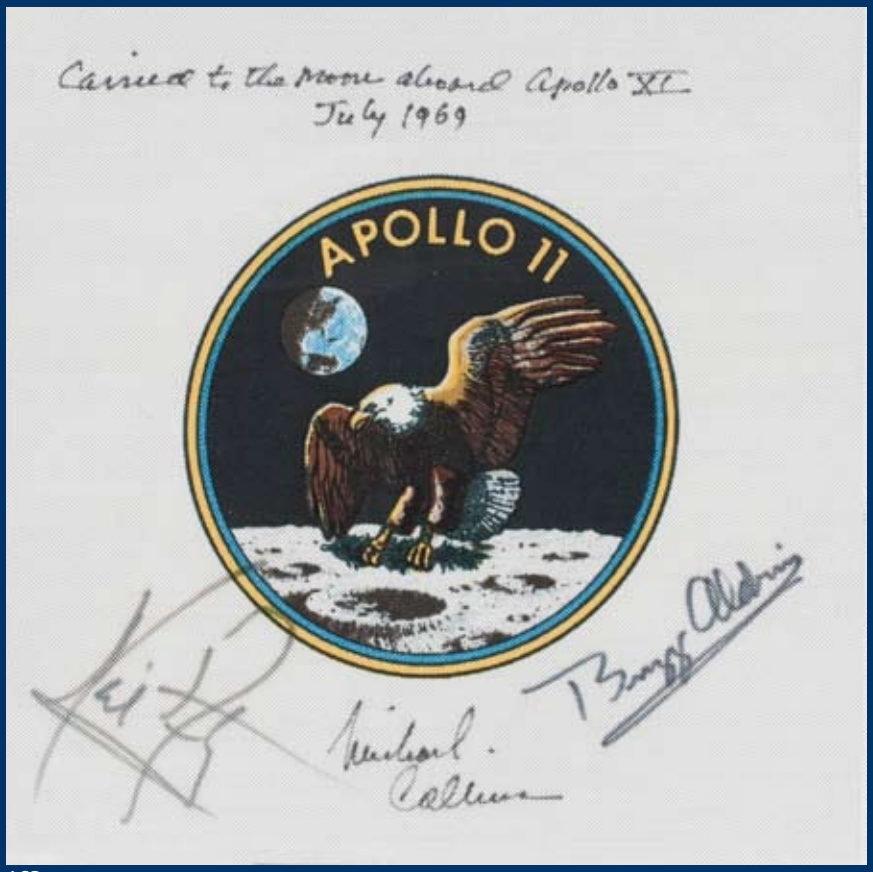

160

161

161

161
ARMSTRONG'S APOLLO SPACE SUIT COVER.
Neil Armstrong's A7L Apollo space suit cover. Beta cloth with a large center flap opening with interior zipper, multiple metal snap-buttons, and velcro attachments. The assembly approximately 24 by 21 inches (semi-circular). An interior label reading in part *"Item I/TMG Connector Cover, Part No. A7L-201109-01, Size ARMSTRONG, Serial No. 063, Date 12.68, Contract No. NAS 9-6100 (NASA), ILC Industries, Inc."*

Perhaps the only opportunity to acquire a fitted piece of equipment from Neil Armstrong's Apollo 11 training space suit. A policy established in the early years of the space program gave the Smithsonian Institution first refusal on space flown items in general, and space suit equipment in particular.
The present item is one of only three known covers made for each of Armstrong's A7L space suits - the training suit, the flight suit, and the flight back-up suit. The A7L model was the suit worn on the moon by the Apollo astronauts. The suits consisted of an inner Pressure Garment Assembly (PGA) that was pressurized with oxygen for breathing, and an outer Integrated Thermal Micrometeoroid Garment (I/TMG) that protected the astronaut from temperature extremes and hypervelocity micrometeoroid punctures while on the lunar surface.
Connectors for the primary and back-up oxygen supply, electrical supply, and water for space suit cooling were on the front torso area of the A7L suit. The present connector cover protected these connections during training exercises and while the suit was not in use, between training periods or during flight stowage. It was initially intended to prevent lunar dust from gathering around and jamming the connectors. The front flap allows access to the space suit purge value. Two curved side openings allow oxygen hoses to slide under the cover.
Included are three NASA black and white photographs of Armstrong and Aldrin during training, each wearing their connector covers. Any space suit material related to Armstrong is exceedingly rare.
$15,000 - 20,000

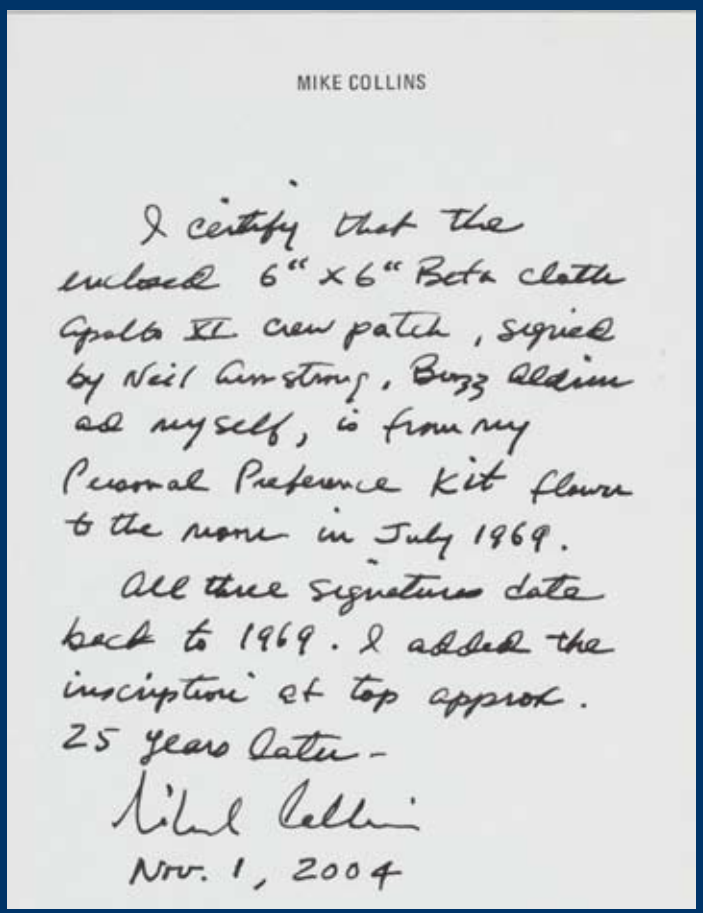


162

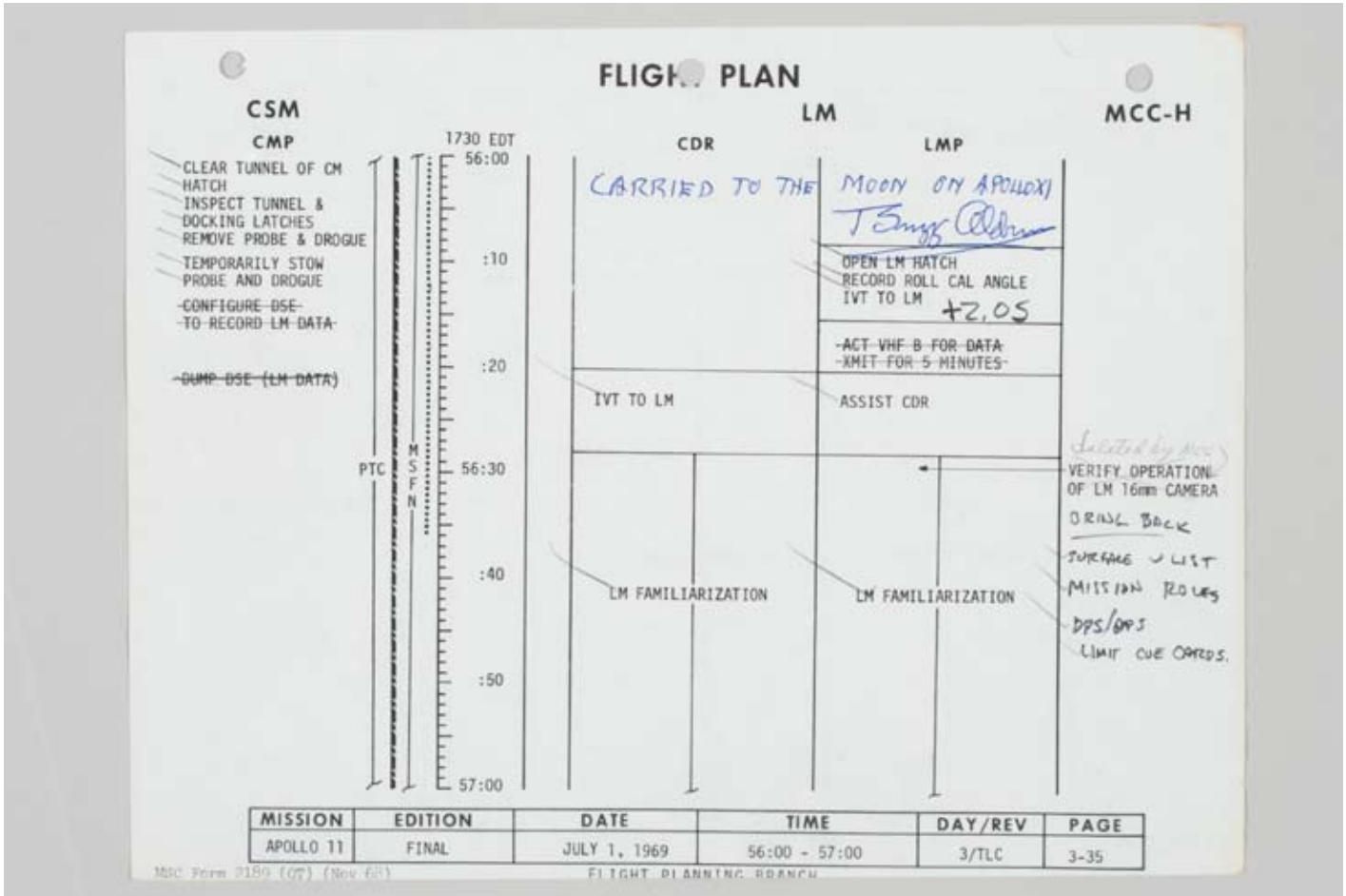
The following lot was originally in the collection of Apollo 11 Command Module Pilot Michael Collins.

162
BETA CLOTH EMBLEM CARRIED ON APOLLO 11.
Flown Apollo 11 emblem, 3½ inches in diameter, printed on Beta cloth, 6 inches square. Carried on Apollo 11.

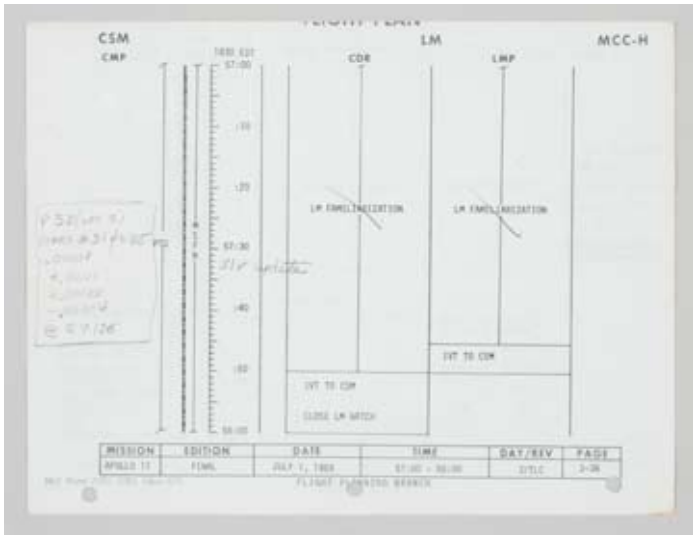
Signed by the Apollo 11 crew: Neil Armstrong, Michael Collins, and Buzz Aldrin. *Inscribed* by Michael Collins above the emblem: *"Carried to the Moon aboard Apollo XI, July 1969."* This is the emblem that was worn on all the Apollo 11 crew members' space suits - an eagle flying above the surface of the moon carrying an olive branch.
Together with an Autograph Letter Signed by Michael Collins: *"I certify that the enclosed 6" x 6" Beta cloth Apollo XI crew patch, signed by Neil Armstrong, Buzz Aldrin, and myself, is from my Personal Preference Kit flown to the moon in 1969. All three signatures date back to 1969. I added the inscription at top approx. 25 years later. Michael Collins, Nov. 1, 2004."*
$25,000 - 35,000



162



163



163

The following 13 lots were originally in the collection of Apollo 11 Lunar Module Pilot Buzz Aldrin.

163

FLOWN APOLLO 11 FLIGHT PLAN SHEET–THE FIRST INSPECTION OF EAGLE.

Apollo 11 Flight Plan, pp 3-35/3-36, a single sheet printed recto and verso, NASA/MSC, July 1, 1969, 10 ½ by 8 inches, annotated in pencil and ink by Armstrong, Aldrin and Collins.

The flown flight plan sheet defining the timeline for the first inspection of the lunar lander, with comments and notes made by Neil Armstrong, Buzz Aldrin, and Michael Collins during the flight.

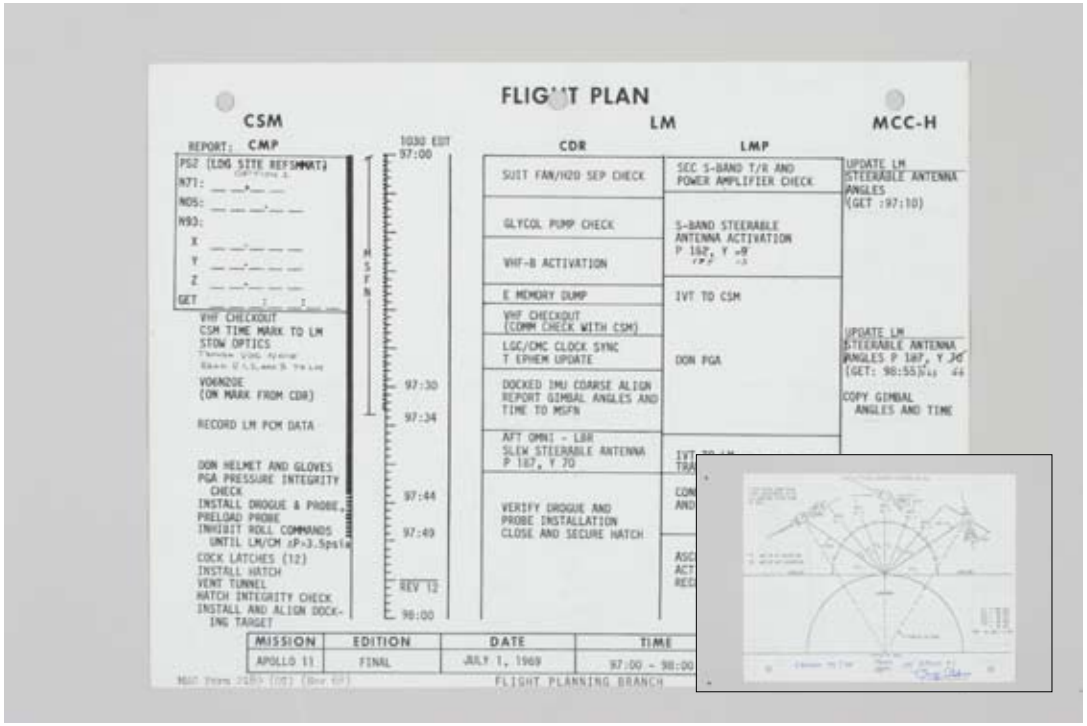
Accompanied by a Typed Letter Signed by Buzz Aldrin, which reads in part: *"Enclosed with this letter is a sheet numbered 3-35 and 3-36 from the Apollo 11 Flight Plan, Part No. SKB32100080-350, S/N 1001. It is part of the entire document that was carried to the Moon in Command Module Columbia during the first lunar landing mission. This sheet is from the detailed timeline section and covers hours 56 through the beginning of hour 58 in the mission. It contains extensive notes made during the flight by Neil Armstrong, Mike Collins, and myself.*

Page 3-35 outlines the initial check out of Lunar Module Eagle. I moved over to the LM first. Mike Collins recorded the roll calibration angle of '+2.05.' *Prior to Neil Armstrong entering the LM, he wrote in the right side column:* 'Bring Back - Surface [check] List, Mission Rules, DPS/APS, Limit Cue Cards.' *These were manuals and other items that we would be using during the first lunar landing. Mike Collins assisted us during this period by checking off each line item as they happened. Mike also recorded that the verification of the 16mm camera operation was* 'deleted by MCC' *and crossed out that step.*

Page 3-36 has Neil and I spending one more hour in the LM while Mike runs a P(rogram) 52 IMU (Inertial Measurement Unit) alignment. He drew his own data box and recorded: 'Stars #31 & #35, .00001, +.00111, +.00128, -.00014 @ 57:26.' *The decimal numbers were the REFSMMAT or Reference Stable Member Matrix values which were obtained at 57 hours and 26 minutes into our flight. Mike also wrote* 'S/V update' *near the 57 hour and 30 minute mark of the timeline along with the two check marks."*

Aldrin states that the Flight Plan was perhaps single most important document related to the success of the Apollo 11 mission. On page 3-35 he has written: *"Carried to the Moon on Apollo XI, Buzz Aldrin."* A copy of the flight plan cover is included.

$15,000 - 20,000



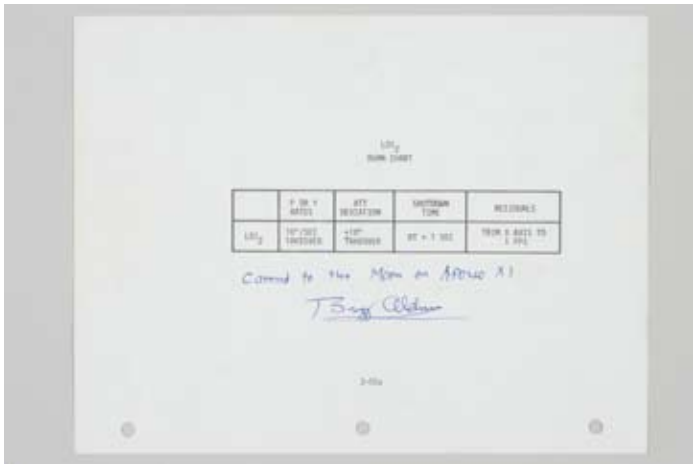
165

164
FLOWN APOLLO 11 FLIGHT PLAN SHEET–A KEY ENGINE BURN.
Apollo 11 flight plan, pp 3-50a, a single sheet printed recto and verso, NASA/MSC, July 1, 1969, 10 ½ by 8 inches, inscribed in ink by Buzz Aldrin.

The flown flight plan sheet listing the parameters for the critical Lunar Orbit Insertion number 2 (LOI 2) CSM Service Propulsion System engine burn. This adjusted lunar orbit of the CSM/LM to a point where LM Eagle could safely land on the lunar surface and return.
Accompanied by a Typed Letter Signed by Buzz Aldrin, which begins in a similar way to that in the preceding lot, and continues: *"Page 3-50a has a grid of terms and values associated with the LOI or Lunar Orbit Insertion number 2 engine burn … For LOI number 2, we used Columbia's SPS or Service Propulsion System, which was the large rocket engine at end of our Service Module. This burn occurred after two lunar orbits and was designed to have an orbit that would become gradually circular some 44 hours later. This was the time Lunar Module Eagle was scheduled to rendezvous with Columbia. A near circular orbit at that time greatly simplified the entire rendezvous sequence. If the LOI number 2 maneuver did not go correctly, it could have possibly made us cancel the first lunar landing."*
The letter also states that this sheet has been in Aldrin's collection since 1969. On page 3-50a below the grid, Buzz Aldrin has written the inscription *"Carried to the Moon on Apollo XI, Buzz Aldrin."* A copy of the flight plan cover is included.
$10,000 - 15,000

165
FLOWN APOLLO 11 FLIGHT PLAN SHEET–ARMSTRONG VERIFIES EAGLE'S STATUS.
Apollo 11 flight plan, pp 3-64/3-64a, a single sheet printed recto and verso, NASA/MSC, July 1, 1969, 10 ½ by 8 inches, inscribed in ink by Buzz Aldrin.

Accompanied by a Typed Letter Signed by Buzz Aldrin, which begins similarly to that in the preceding two lots, and continues: *"Side 3-64 has three columns of tasks listed for the CMP (Mike Collins), CDR (Neil Armstrong), and myself the LMP. At this time, both Neil and I were inside the LM checking out various systems. After an antenna check, I went back into Columbia and donned my pressure suit, then returned to Eagle. In just about 3 hours from this point, Neil and I would undock from Columbia and*



164

Mike Collins to being Man's first landing on another world - THE MOON! Side 3-64a has a drawing of several attitudes Columbia and Lunar Module Eagle were to maneuver to while in lunar orbit ... Due to the fact that the lunar gravity force is influenced by an uneven distribution of the Moon's mass about its center, obtaining a circular lunar orbit was difficult to achieve. To improve upon our preflight gravitational model, Mike took these series of landmark tracking measurements with our sextant which provided relative positions of our orbit and the planned landing site. Any updates based on these measurements could be incorporated to insure that Eagle could reach the planned landing site within the LM's propulsive capabilities.
The flight plan was probably the single most important document related to the success of our mission. It provided a time schedule of crew activities and spacecraft maneuvers to accomplish the first lunar landing."
The letter also states that this sheet has been in Aldrin's collection since 1969. He has inscribed on page 3-64a below the lunar orbital diagram: *"Carried to the Moon on Apollo XI, Buzz Aldrin."* A copy of the flight plan cover is included.
$12,000 - 18,000

P63 - P68

P63 BRAKING PHASE

1		V37E 63E	
2	F 06 61	TG,TFI	(min-sec)
		R3, CROSSRANGE (-NORTH)	(.1nm)
		SET EVNT TMR TO 60-TFI	
		N33E	
	F 06 33	TIG	(hrs,min,.01sec)
		KEY REL	
		PRO	
3	F 50 25	R1 00014 PERFORM IMU FINE ALIGN	
		(ACCEPT) PRO - See P52/6	
		(BYPASS) ENTR	
4	F 50 18	REQUEST MNVR TO FDAI RPY ANGLES	(.01°)
		(TO ADJUST YAW)	
		MNVR	
		MODE CONT: PGNS - ATT HOLD	
		PRO To 4	
		(AUTO) GUID CONT: PGNS	
		MODE CONT: PGNS - AUTO	
		PRO	
		(MAN) MODE CONT: PGNS - ATT HOLD	
		MNVR	
		MODE CONT: PGNS - AUTO	
		PRO	
		(BYPASS) Verify V77E	
		ENTR To 6	
5	06 18	AUTO MNVR TO FDAI RPY ANGLES	(.01°)
		MON AUTO MNVR To 4	

Basic Date May 29, 1969
Changed

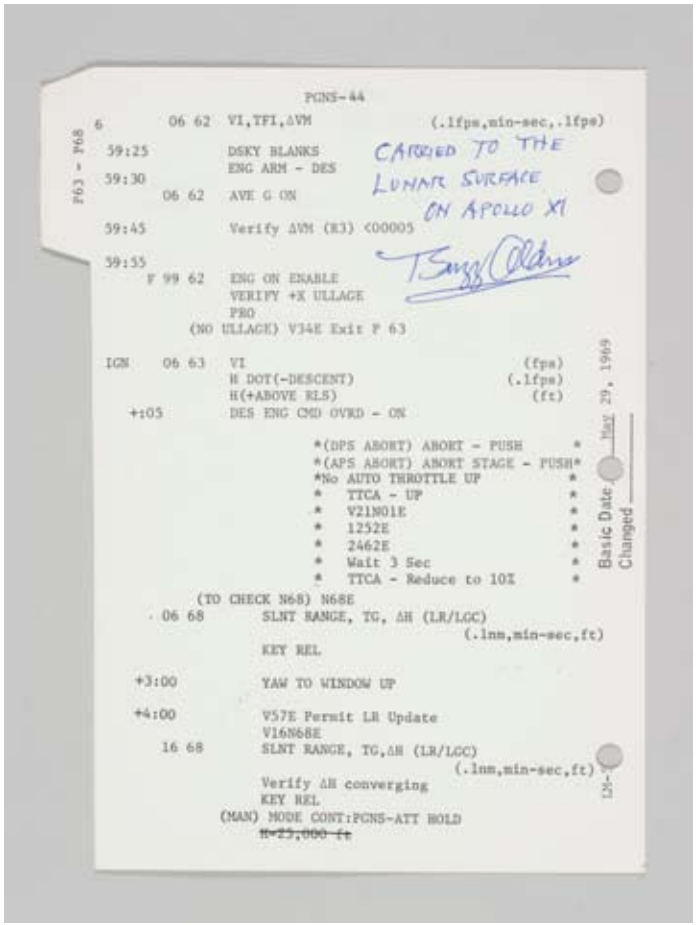
LM-5

USED BY NEIL ARMSTRONG DURING EAGLE'S LANDING ON APOLLO XI

T Buzz Aldrin

```
*F 50 25    00500 LR      *
*     TO DESCENT POS      *
*LDC ANT-DES,10 SEC,AUTO  *
*PRO                      *
*F 50 25    00203         *
*     GUID CONT-PGNS      *
*     MODE CONT-AUTO      *
*     THROT CONT-AUTO     *
*V 05N09E   01703 TIG     *
*               SLIPPED   *
*          V34E EXIT P63  *
```

PROG Lt-ON


PGNS-44

P63 - P68

6 06 62 V1,TFI,ΔVM (.1fps,min-sec,.1fps)

59:25 DSKY BLANKS
ENG ARM - DES

59:30 06 62 AVE G ON

59:45 Verify ΔVM (R3) <00005

59:55 F 99 62 ENG ON ENABLE
VERIFY +X ULLAGE
PRO
(NO ULLAGE) V34E Exit P 63

IGN 06 63 V1 (fps)
H DOT(-DESCENT) (.1fps)
H(+ABOVE RLS) (ft)
+:05 DES ENG CMD OVRD - ON

*(DPS ABORT) ABORT - PUSH *
(APS ABORT) ABORT STAGE - PUSH
*No AUTO THROTTLE UP *
* TTCA - UP *
* V21N01E *
* 1252E *
* 2462E *
* Wait 3 Sec *
* TTCA - Reduce to 10% *

(TO CHECK N68) N68E
06 68 SLNT RANGE, TG, ΔH (LR/LGC)
(.1nm,min-sec,ft)
KEY REL

+3:00 YAW TO WINDOW UP

+4:00 V57E Permit LR Update
V16N68E
16 68 SLNT RANGE, TG,ΔH (LR/LGC)
(.1nm,min-sec,ft)
Verify ΔH converging
KEY REL
(MAN) MODE CONT:PGNS-ATT HOLD
~~R=23,000 ft~~

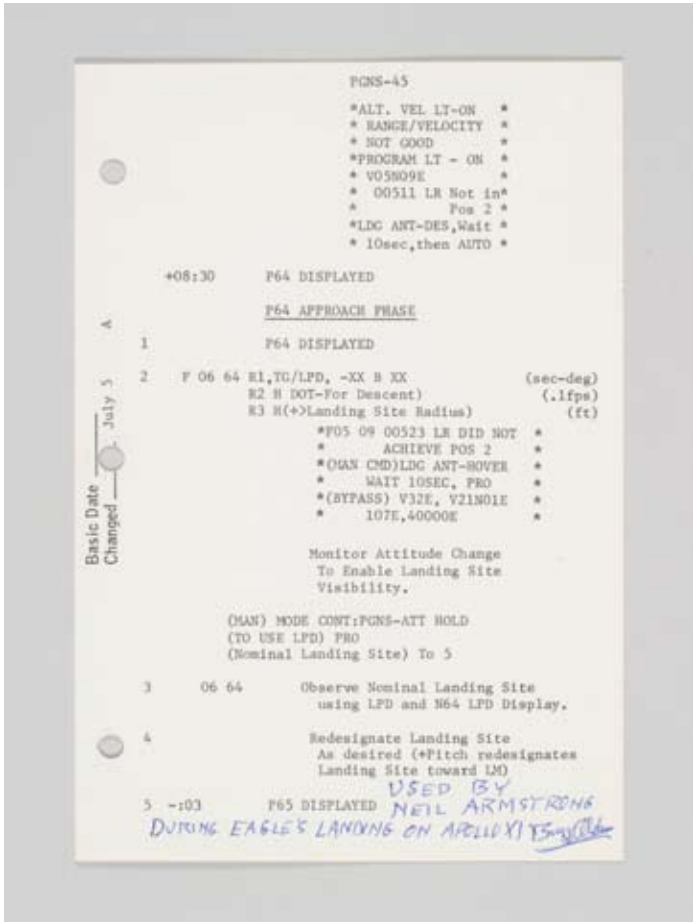
Basic Date Changed — May 29, 1969

125-

CARRIED TO THE LUNAR SURFACE ON APOLLO XI

Buzz Aldrin

166


PGNS-45

*ALT. VEL LT-ON *
* RANGE/VELOCITY *
* NOT GOOD *
*PROGRAM LT - ON *
* V05N09E *
* 00511 LR Not in*
* Pos 2 *
*LDG ANT-DES,Wait *
* 10sec,then AUTO *

+08:30 P64 DISPLAYED

P64 APPROACH PHASE

4

1 P64 DISPLAYED

2 F 06 64 R1,TG/LPD, -XX.X XX (sec-deg)
R2 H DOT-For Descent) (.1fps)
R3 H(+)Landing Site Radius) (ft)
*F05 09 00523 LR DID NOT *
* ACHIEVE POS 2 *
*(MAN CMD)LDG ANT-HOVER *
* WAIT 10SEC, PRO *
*(BYPASS) V32E, V21N01E *
* 107E,40000E *

Monitor Attitude Change
To Enable Landing Site
Visibility.

(MAN) MODE CONT:PGNS-ATT HOLD
(TO USE LPD) PRO
(Nominal Landing Site) To 5

3 06 64 Observe Nominal Landing Site
using LPD and N64 LPD Display.

4 Redesignate Landing Site
As desired (+Pitch redesignates
Landing Site toward LM)

5 -:03 P65 DISPLAYED

Basic Date Changed — July 5

USED BY NEIL ARMSTRONG DURING EAGLE'S LANDING ON APOLLO XI

Buzz Aldrin

166

166

FLOWN APOLLO 11 LUNAR MODULE LANDING SEQUENCE.

EAGLE'S LANDING SEQUENCE AND DESCRIPTION BY BUZZ ALDRIN.

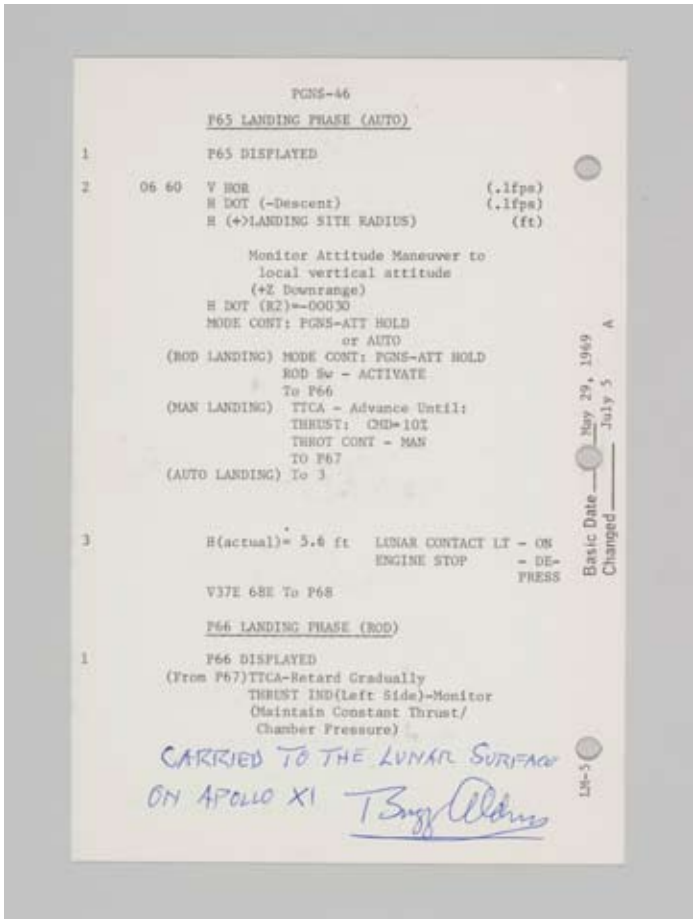
Three flown sheets from the Apollo 11 LM G & N dictionary, May-July 1969, 6 pp being "PGNS-43" to "PGNS-48," 8 by 5 ½ inches, each inscribed in ink by Buzz Aldrin.

Probably the most important sheets from the most significant flight event during the Apollo 11 mission. They list events and entry commands to enable Lunar Module Eagle to descend from lunar orbit and touch down on the moon's surface. Neil Armstrong and Buzz Aldrin followed these guidance computer programs closely as they descended into history and became the first humans to land on another celestial body - the moon. Accompanied by a Typed Letter Signed by Aldrin, which reads: *"Enclosed with this letter are three sheets numbered PGNS-43/44, PGNS-45/46, and PGNS-47/48 from the Apollo 11 LM G and N Dictionary, Part No. SKB32100074-361, S/N 1001. They are part of the entire manual that was carried to the lunar surface in Lunar Module Eagle on the first lunar landing mission during July 16 to 24, 1969. These sheets are from the Primary Guidance and Navigation Section and have the exact computer procedures to perform the Power Descent Initiation (PDI) sequence which enabled Neil Armstrong and I to land on the Moon. These are the most significant pages from the entire dictionary, and from my view point, some of the most important pages available to us during the entire flight. These steps enabled the actual landing by Man on the surface of the Moon.*

Sheet PGNS-43/44 has the P63 Braking Phase Program that started our descent to the surface. Neil Armstrong and I configured the flight computer for the P63 operations as listed on page PGNS-43. We had just finished the burn of Lunar Module Eagle's descent engine to put us in a lower orbit while behind the Moon. Once we were in view of the Earth and Mission Control, we reported the status of the burn which had been nearly perfect. Neil then completed the final steps of the P63 program listed on PGNS-44 up to the 'PRO' (proceed) command, where I then punched that particular button on the computer. 'IGN' (ignition) of our descent engine started and Neil verified all steps were completed at each point of time past ignition (+:05, +3:00 and +4:00). On page PGNS-43 I have inscribed: 'Used by Neil Armstrong during Eagle's landing on Apollo XI' *and on page PGNS-44 I have inscribed:* 'Carried to the lunar surface on Apollo XI.' *I have signed both sides of this sheet.*

All was going well until Neil and I saw our instrument panel flash a '1202' program alarm. We both queried Mission Control about this alarm because we had never seen it before in any simulation. After a few tense moments, Houston radioed us that we were 'GO on that alarm.' That was good news but not that reassuring when a few seconds later the same alarm occurred. The alarm coincided when I keyed the computer for information. The computer was basically telling us it had too many tasks to perform and was overloaded. About 3 minutes later an additional alarm, a '1201' flashed. Mission Control told us that it was of the same type as the '1202' and that we were still 'GO' for landing.

At about 8 and ½ minutes into the PDI sequence, Neil verified that the flight computer had initiated P64 or the Approach Phase Program. These are the steps listed on page PGNS-45. Neil was monitoring the sequence of events described on this page and the visual view out his window. He cross-checked our descent rate with the PDI descent grid from our LM Timeline Book. We had just pitched over and got our first good view of the general landing area. Neil became increasingly concerned because we were heading for a large crater surrounded by boulders. At around 500 feet above the lunar surface, Neil initiated P66 or Landing Phase Program which steps were located on pages PGNS-46 and PGNS-47. This allowed Neil to manually fly Eagle to the lunar surface with computer support. He slowed the descent rate to just a few feet per second and studied the surrounding terrain. Neil asked me about our fuel status and I indicated we had 8



PGNS-46

P65 LANDING PHASE (AUTO)

1 P65 DISPLAYED

2 06 60 V HOR (.1fps)
H DOT (-Descent) (.1fps)
H (+)LANDING SITE RADIUS) (ft)

Monitor Attitude Maneuver to
local vertical attitude
(+Z Downrange)
H DOT (R2)=-00030
MODE CONT: PGNS-ATT HOLD
or AUTO
(ROD LANDING) MODE CONT: PGNS-ATT HOLD
ROD Sw - ACTIVATE
To P66
(MAN LANDING) TTCA - Advance Until:
THRUST: CMD=10%
THROT CONT - MAN
TO P67
(AUTO LANDING) To 3

3 H(actual)= 5.6 ft LUNAR CONTACT LT - ON
ENGINE STOP - DE-
PRESS

V37E 68E To P68

P66 LANDING PHASE (ROD)

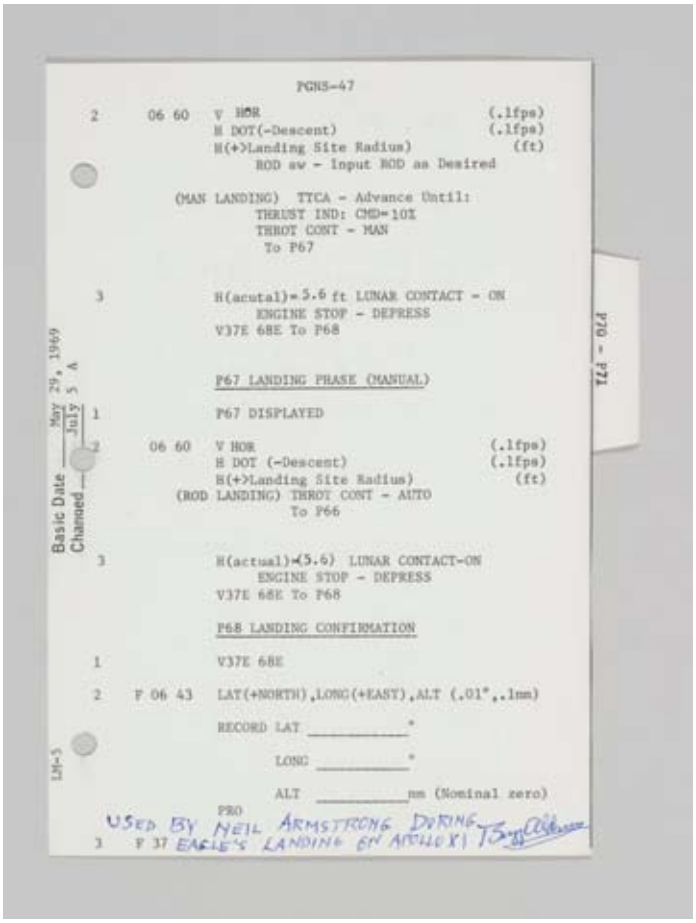
1 P66 DISPLAYED
(From P67)TTCA-Retard Gradually
THRUST IND(Left Side)-Monitor
(Maintain Constant Thrust/
Chamber Pressure)

CARRIED TO THE LUNAR SURFACE
ON APOLLO XI Buzz Aldrin

Basic Date May 29, 1969
Changed July 5 A

LM-5

166



PGNS-47

2 06 60 V HOR (.1fps)
H DOT(-Descent) (.1fps)
H(+)Landing Site Radius) (ft)
ROD sw - Input ROD as Desired

(MAN LANDING) TTCA - Advance Until:
THRUST IND: CMD=10%
THROT CONT - MAN
To P67

3 H(acutal)=5.6 ft LUNAR CONTACT - ON
ENGINE STOP - DEPRESS
V37E 68E To P68

P67 LANDING PHASE (MANUAL)

1 P67 DISPLAYED

2 06 60 V HOR (.1fps)
H DOT (-Descent) (.1fps)
H(+)Landing Site Radius) (ft)
(ROD LANDING) THROT CONT - AUTO
To P66

3 H(actual)=(5.6) LUNAR CONTACT-ON
ENGINE STOP - DEPRESS
V37E 68E To P68

P68 LANDING CONFIRMATION

1 V37E 68E

2 F 06 43 LAT(+NORTH),LONG(+EAST),ALT (.01°,.1nm)

RECORD LAT _____°
LONG _____°
ALT _____nm (Nominal zero)
PRO

3 F 37 USED BY NEIL ARMSTRONG DURING EAGLE'S LANDING ON APOLLO XI Buzz Aldrin

P70 - P71

Basic Date May 29, 1969
Changed July 5 A

LM-5

166

percent remaining. I was then able to glance outside and began to understand why we were still flying; the craters and rocks seemed to be everywhere.

As I continued to relay our altitude and descent rate to Neil, Mission Control radioed we had '60 seconds' of fuel remaining. I made more descent data calls. Then we heard '30 seconds' ring in our headsets. Neil was almost to the surface when a haze of dust was kicked up by engine exhaust. Neil lost his ability to see the surface and had to locate something just above the dust cloud. Finally he was able to see a rock that appeared fixed in the stream of dust. This gave Neil a surface reference and he expertly nulled out a slight backward drifting motion and corrected for a small sideways drift. Just as Neil placed Eagle gently on the lunar surface, I spoke the first words from the Moon: 'CONTACT LIGHT!' This was the indicator light on our control panel that told us that Eagle had touched the lunar surface. We had only about 20 seconds of fuel remaining onboard.

We immediately called out and performed the engine stop, safety commands, and secured our attitude control equipment. Then Neil radioed the words most people remember hearing from the Moon: 'Tranquillity Base here, the Eagle has landed.' Neil and I shook hands. At the bottom of PGNS-45 I have written: 'Used by Neil Armstrong during Eagle's landing on Apollo XI' *and signed that page. At the bottom of page PGNS-46, I have written:* 'Carried to the lunar surface on Apollo XI' *and have also signed that page. Next we initiated the P68 or Landing Confirmation Program steps at the bottom of page PGNS-47. The most important step was to record the LAT (+NORTH), LONG (+EAST), and ALT (.01, .1nm) values from our flight computer. Since Neil had this sheet near him for reference, it was easier for me to log those values in our LM Timeline Book. It turns out that these values were the first recorded information by human hands while on the surface of the Moon. At the bottom of this page I have written:* 'Used by Neil Armstrong during Eagle's landing on Apollo XI' *and signed that page. Page PGNS-48 has the P70 DPS (Descent Propulsion Section) Abort procedures. We would have used these steps if at any time during the landing sequence an emergency occurred requiring us to abort the landing and return to lunar orbit. At the bottom of this page I have written:* 'Carried to the lunar surface on Apollo XI' *and signed that page.*

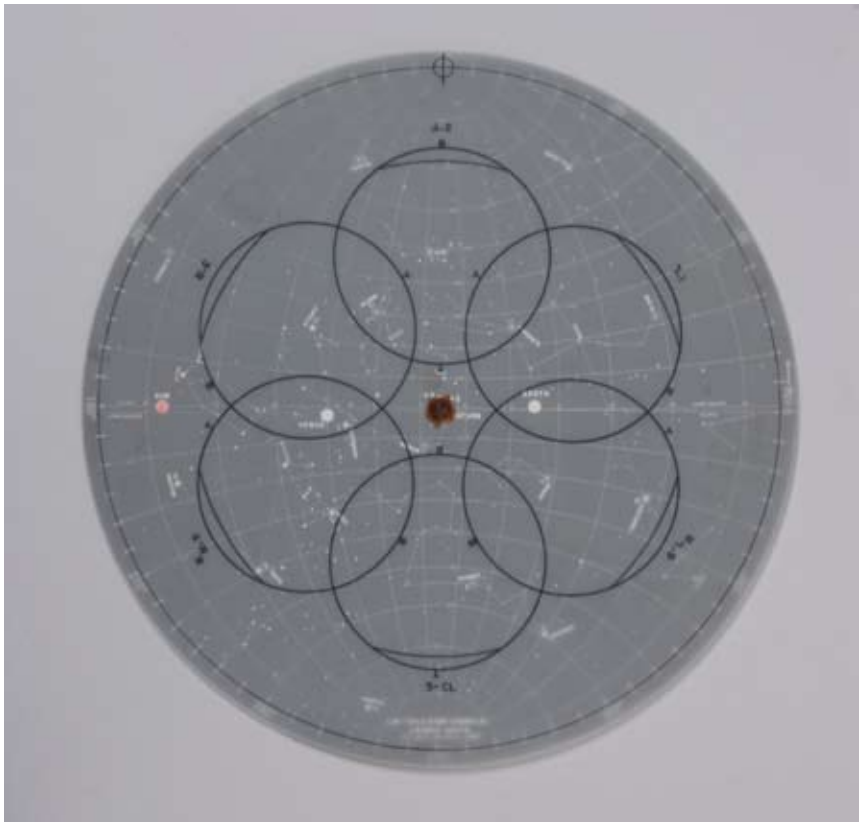
The flight plan actually had a rest period scheduled before our planned surface exploration. Needless to say, Neil and I had an abundance of energy and adrenaline surging through our bodies after this historic event and starting a rest period was the last thing on our minds. Neil asked and received concurrence from Mission Control to start the EVA activities about 5 hours early. The preparations in configuring our space suits and other equipment took a bit longer that planned but we soon began the depressurization of Eagle's cabin to allow us to open the hatch and step onto the lunar surface. At 109 hours and 24 minutes, which was 10:56 pm EDT on July 20, Neil Armstrong became the first human to step upon the Moon. He then said: 'That's one small step for a man, one giant leap for Mankind.'

Some 19 minutes after Neil's first step, I started down Eagle's ladder and set foot on the Moon. Not as well known as Neil's words but very appropriate, I spoke after stepping on the surface: 'Magnificent Desolation.' The lunar surface was indeed desolate, but had a striking beauty all its own. Gray was the dominate color, but that color changed in tone as I turned to various sun angles. Walking on the lunar surface was not difficult to get accustom to and I found the ballistic type trajectory of the surface dust kicked up by my boots fascinating to observe on this airless world. Walking and exploring on the Moon was something only eleven others experienced during the 20th century."

These sheets are originally from the collection of Apollo 11 Lunar Module Pilot Buzz Aldrin. It is doubtful that any other series of pages from the Apollo 11 flight will have greater historical importance than the present examples.

$125,000 - 175,000

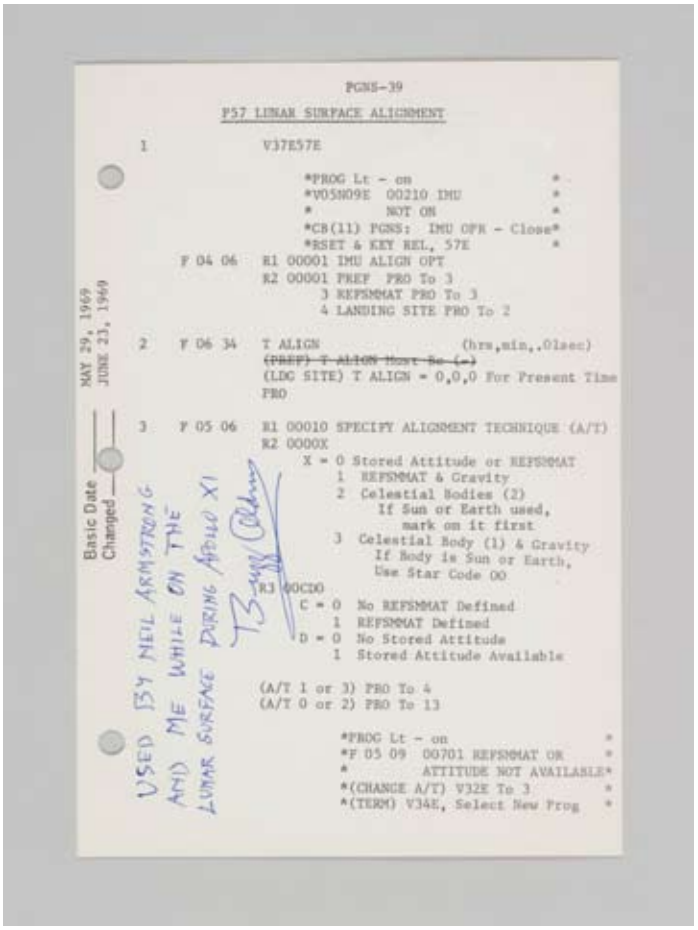
167



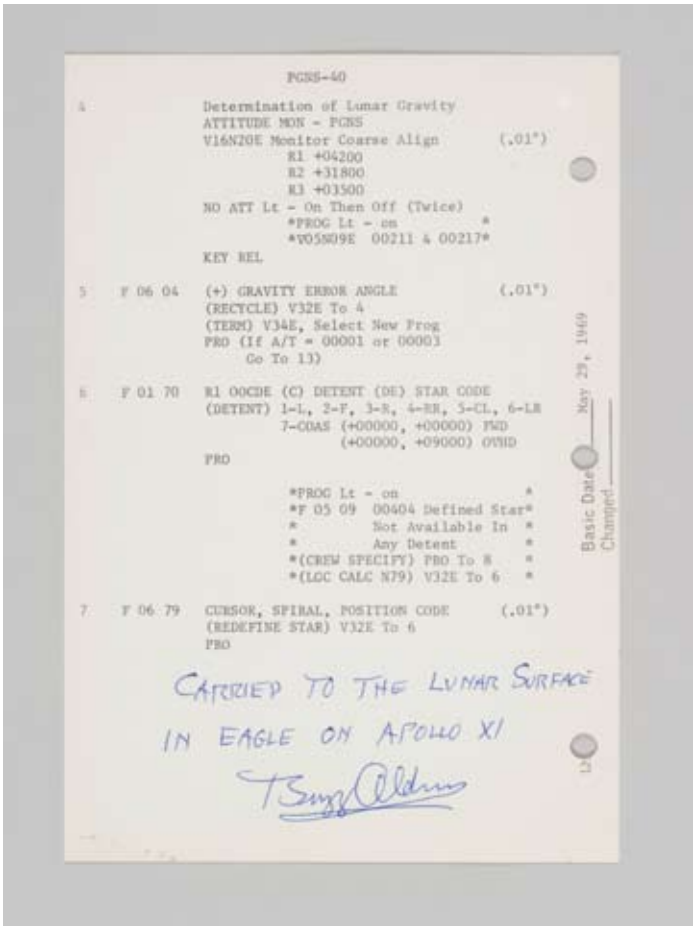
167

167
MAN'S FIRST CELESTIAL MEASUREMENTS MADE WHILE ON THE MOON.
Flown Apollo 11 Lunar Surface Star Chart, a circular device, 9 inches in diameter. Consists of 2 thin plastic discs rotating around a central rivet. The lower disc shows the Earth, sun, planets and star patterns against a black background. The upper disc is a semi-transparent overlay. The back of the chart has a square patch of Velcro at the center and an inscription in ink by Aldrin.

The navigational chart used by Neil Armstrong and Buzz Aldrin to determine their exact position on the lunar surface just after their historic lunar landing. One of the few flight devices returned from the lunar surface to have come onto the market. The companion device used some 20 hours later to update Eagle's navigational equipment just prior to lunar lift-off is currently displayed at the Smithsonian's National Air and Space Museum in Washington, D.C.
Accompanied by a Typed Letter Signed by Buzz Aldrin, which reads:
"Accompanying this letter is the actual star chart that Neil Armstrong and I used to determine our precise location just after we made history's first lunar landing on July 20, 1969. It is a circular device that has a movable translucent overlay with six over lapping circles. The stars and constellations are projected onto a black background above and below lines defined as the ecliptic and the lunar equator. The Sun, Earth, Venus, and other planets are marked as to their relative positions along the ecliptic plane. This star chart was the single most critical navigational device we used while on the Moon.
The chart has LM-TD+2 STAR CHART (A), LAUNCH JULY 16, 20 JULY 20:17:11 GMT *printed near the edge of 270 degree point. TD was short for Touchdown with +2 meaning that the chart had its highest accuracy within 2 hours of landing. Touchdown was to be 20:17:11 Greenwich Mean Time on July 20, assuming a July 16 earth launch. We landed at 4:17 pm Eastern Daylight Time (20:17 GMT) which was within a minute of the planned time.*
During the landing phase, we had several computer program alarms. They were unexpected and of the type we had never experienced during any training simulation. These alarms preoccupied Neil and I so much that we were concerned with a potential abort. Then Neil had to take command from our flight computer as it was sending us into a large boulder-filled crater. We landed with just seconds of fuel to spare, but well past our target point. I commanded the computer to give us our landing point then recorded that information on page 10 of our LM Timeline Book. That turned out to be the first writing by human hands on another celestial body.
Our Lunar Module's gyroscopic guidance equipment lost precision over time. It was imperative to re-align this equipment just after landing in case of an emergency lift-off or our inability to make such an adjustment for the scheduled lift-off some 22 hours after landing. We used this star chart in conjunction with our Alignment Optical Telescope (AOT). Neil logged over 30 measurements in our LM Data Card Book that I provided while using the AOT. Those circular areas on the chart overlay showed the AOT's field of view when moved to one of the six positions known as detents.
We did a series of dual star sightings using the AOT and this chart, then keyed in that information recorded in the LM Data Card Book while performing the P57 alignment procedures as define in our guidance dictionary. Completion of these tasks enabled us to carry out our lunar timeline and allowed Neil Armstrong to become the first human to set foot upon the Moon.
On the back of the star chart, there is a square velcro patch. It has an overall tint of gray with darker grayish material embedded within. Those gray areas are most likely lunar dust that came off our space suits or from various equipment such as the sample return container. I have inscribed and signed this side with: This star chart was used by Neil Armstrong and myself while on the lunar surface during July 20 - 21, 1969. Buzz Aldrin, Apollo XI Lunar Module Pilot."
$70,000 - 90,000



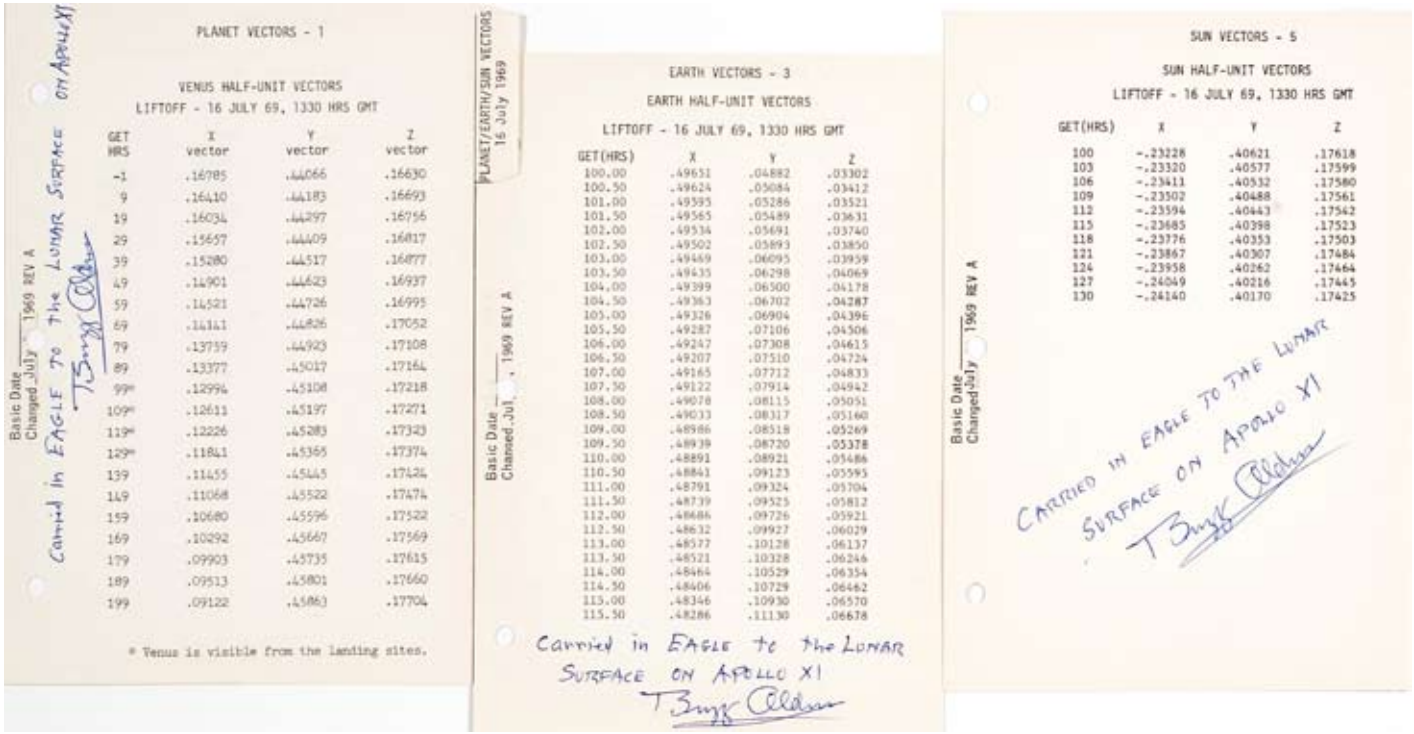
168



168

168
FLOWN APOLLO 11 LM G & N DICTIONARY SHEET–EAGLE'S NAVIGATION UPDATE.
Apollo 11 LM G & N Dictionary, pp PGNS-39/PGNS-40, a single sheet printed recto and verso, May-June 1969, 5 ½ by 8 inches, inscribed on each side by Buzz Aldrin.

The series of steps performed by Neil Armstrong and Buzz Aldrin to align their navigational equipment based on the celestial measurements made during their use of the lunar surface star chart and on board alignment telescope.
Accompanied by a Typed Letter Signed by Aldrin, which reads: *"Enclosed with this letter is a sheet numbered PGNS-39/40 from the Apollo 11 LM G and N Dictionary, Part No. SKB32100074-361, S/N 1001. It is part of the entire manual that was carried to the lunar surface in Lunar Module Eagle on the first lunar landing mission during July 16 to 24, 1969. This sheet is from the Primary Guidance and Navigation Section (PGNS) and has the exact computer procedures for Neil Armstrong and me to perform the P57 or Program 57 'Lunar Surface Alignment.' This alignment determined our exact landing point which was a critical step to enable a successful departure from the lunar surface.*
During our descent to the lunar surface, we had several computer program alarms. This caused Neil and I to be preoccupied with a potential abort and slowed the completion of milestones in the landing sequence. It soon appeared that we were headed toward a large boulder-filled crater, but Neil expertly flew Eagle downrange past that looming obstacle. Neil then gently landed on the surface. We had landed well past our target point but made it down safely. After engine shut down, I commanded the computer to give us our landing point. I recorded that information on page 10 of our LM Timeline Book which turned out to be the first writing by human hands on the lunar surface.
Side PGNS-39 has the first three steps for the P51 alignment. Neil lined-out part of step 2 and pulled our reference tables for the Earth and Sun toward the end of this dictionary. After those steps we moved to side PGNS-40 where the real work began. Since we landed long, our current computer position was a concern. Neil and I really wanted the most accurate position determination possible, which the P51 steps would provide.
I started the initial measurements using our Alignment Optical Telescope (AOT). Neil and I worked with the LM TD+2 Star Chart to locate stellar objects using the AOT. Neil logged over 30 measurements I took using the AOT on page 7 of our LM Data Card Book. The entire procedure for the P57 alignment was successful. It enabled us to carry out our complete lunar timeline and allowed Neil Armstrong to become the first human to set foot upon the Moon."
The dictionary sheet has been inscribed on both sides by Aldrin: on one side *"Used by Neil Armstrong and me while on the lunar surface during Apollo XI, Buzz Aldrin,"* and on the other *"Carried to the lunar surface in Eagle on Apollo XI, Buzz Aldrin."*
$15,000 - 20,000



PLANET VECTORS - 1

VENUS HALF-UNIT VECTORS
LIFTOFF - 16 JULY 69, 1330 HRS GMT

GET HRS	X vector	Y vector	Z vector
-1	.16785	.44066	.16630
9	.16410	.44183	.16693
19	.16034	.44297	.16756
29	.15657	.44409	.16817
39	.15280	.44517	.16877
49	.14901	.44623	.16937
59	.14521	.44726	.16995
69	.14141	.44826	.17052
79	.13759	.44923	.17108
89	.13377	.45017	.17164
99*	.12994	.45108	.17218
109*	.12611	.45197	.17271
119*	.12226	.45283	.17323
129*	.11841	.45365	.17374
139	.11455	.45445	.17424
149	.11068	.45522	.17474
159	.10680	.45596	.17522
169	.10292	.45667	.17569
179	.09903	.45735	.17615
189	.09513	.45801	.17660
199	.09122	.45863	.17704

* Venus is visible from the landing sites.

Basic Date Changed July 1969 REV A

Carried in EAGLE to the LUNAR SURFACE ON APOLLO XI

T Swigk Aldrin

PLANET/EARTH/SUN VECTORS 16 July 1969

EARTH VECTORS - 3

EARTH HALF-UNIT VECTORS

LIFTOFF - 16 JULY 69, 1330 HRS GMT

GET(HRS)	X	Y	Z
100.00	.49651	.04882	.03302
100.50	.49624	.05084	.03412
101.00	.49595	.05286	.03521
101.50	.49565	.05489	.03631
102.00	.49534	.05691	.03740
102.50	.49502	.05893	.03850
103.00	.49469	.06095	.03959
103.50	.49435	.06298	.04069
104.00	.49399	.06500	.04178
104.50	.49363	.06702	.04287
105.00	.49326	.06904	.04396
105.50	.49287	.07106	.04506
106.00	.49247	.07308	.04615
106.50	.49207	.07510	.04724
107.00	.49165	.07712	.04833
107.50	.49122	.07914	.04942
108.00	.49078	.08115	.05051
108.50	.49033	.08317	.05160
109.00	.48986	.08518	.05269
109.50	.48939	.08720	.05378
110.00	.48891	.08921	.05486
110.50	.48841	.09123	.05595
111.00	.48791	.09324	.05704
111.50	.48739	.09525	.05812
112.00	.48686	.09726	.05921
112.50	.48632	.09927	.06029
113.00	.48577	.10128	.06137
113.50	.48521	.10328	.06246
114.00	.48464	.10529	.06354
114.50	.48406	.10729	.06462
115.00	.48346	.10930	.06570
115.50	.48286	.11130	.06678

Basic Date Changed Jul 1969 REV A

Carried in EAGLE to the LUNAR SURFACE ON APOLLO XI

T Swigk Aldrin

SUN VECTORS - 5

SUN HALF-UNIT VECTORS
LIFTOFF - 16 JULY 69, 1330 HRS GMT

GET(HRS)	X	Y	Z
100	-.23228	.40621	.17618
103	-.23320	.40577	.17599
106	-.23411	.40532	.17580
109	-.23502	.40488	.17561
112	-.23594	.40443	.17542
115	-.23685	.40398	.17523
118	-.23776	.40353	.17503
121	-.23867	.40307	.17484
124	-.23958	.40262	.17464
127	-.24049	.40216	.17445
130	-.24140	.40170	.17425

Basic Date Changed July 1969 REV A

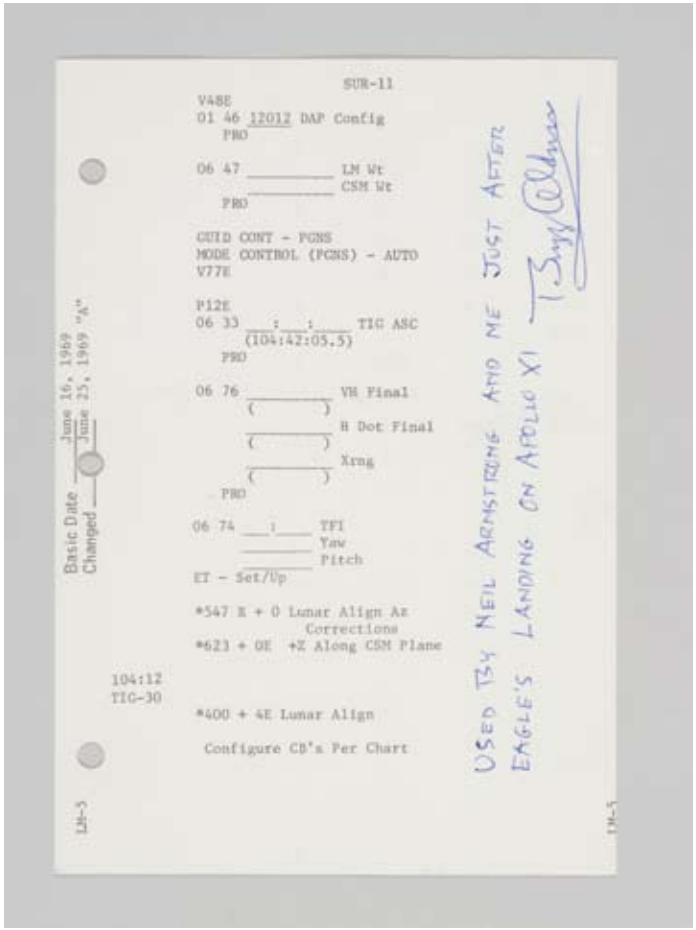
Carried in EAGLE to the LUNAR SURFACE ON APOLLO XI

T Swigk Aldrin

169

169
ALIGNMENT TABLES USED ON APOLLO 11 WHILE ON THE LUNAR SURFACE.
3 sheets from the flown Apollo 11 LM G & N Dictionary, Navigation subsection, July 1969, 8 by 5 ½ inches.

A set of three reference data tables to assist the alignment of Eagle's navigational equipment just after the first lunar landing and again before lift-off from the lunar surface. Each inscribed by Aldrin, *"Carried in Eagle to the lunar surface on Apollo XI,"* and signed by him on verso.
Each sheet is accompanied by a Typed Letter Signed by Aldrin, explaining that these sheets were *"carried to the Moon on the flight of Apollo 11 during July 16 to 24, 1969. Then the entire Guidance and Navigation (G and N) Dictionary, including this sheet, was taken to the surface of the Moon aboard Lunar Module Eagle during the first lunar landing on July 20, 1969."*
The first letter, accompanying the sheet titled *"Planet Vectors"* continues, *"Side 1 has the Venus half-unit vectors listed at 10 hour intervals. These vectors have an X, Y, and Z component and could be used to assist alignment of our IMU or Inertial Measurement Unit. Four of these vectors could be seen at Tranquility Base. Neil Armstrong and I used this sheet for reference while on the lunar surface. Side 2 has the half-unit vectors for the planets Mars, Jupiter, and Saturn. These planets were not as bright nor as easily seen as Venus, thus the number of useful intervals during the flight were fewer."*
The second accompanies *"Earth Vectors,"* and reads in part: *"Side 3 has the Earth half-unit vectors listed at 30 minute intervals starting at 100 hours GET or Ground Elapsed Time ... The GET times on this sheet begin during the period from when Neil Armstrong and I had undocked Eagle from Columbia and continued through the lunar descent, lunar landing, lunar stay, return to lunar orbit, and then rendezvous with Columbia. Side 4 has the remaining half-unit vectors up until 130 hours GET."*
"Sun Vectors" is explained by a third Aldrin letter, stating *"Side 5 has the Sun half-unit vectors listed at 3 hour intervals starting at 100 hours GET or Ground Elapsed Time ... These vectors were one of our detailed time based navigational references while we were in the LM. Neil and I used this sheet to verify the performance of the IMU while on the Moon and in flight ... The complete dictionary was a vital document to the success of our mission. It not only provided definitions of computer codes, but contained detailed information on steps required to operate flight equipment associated with the first lunar landing."*
$25,000 - 35,000



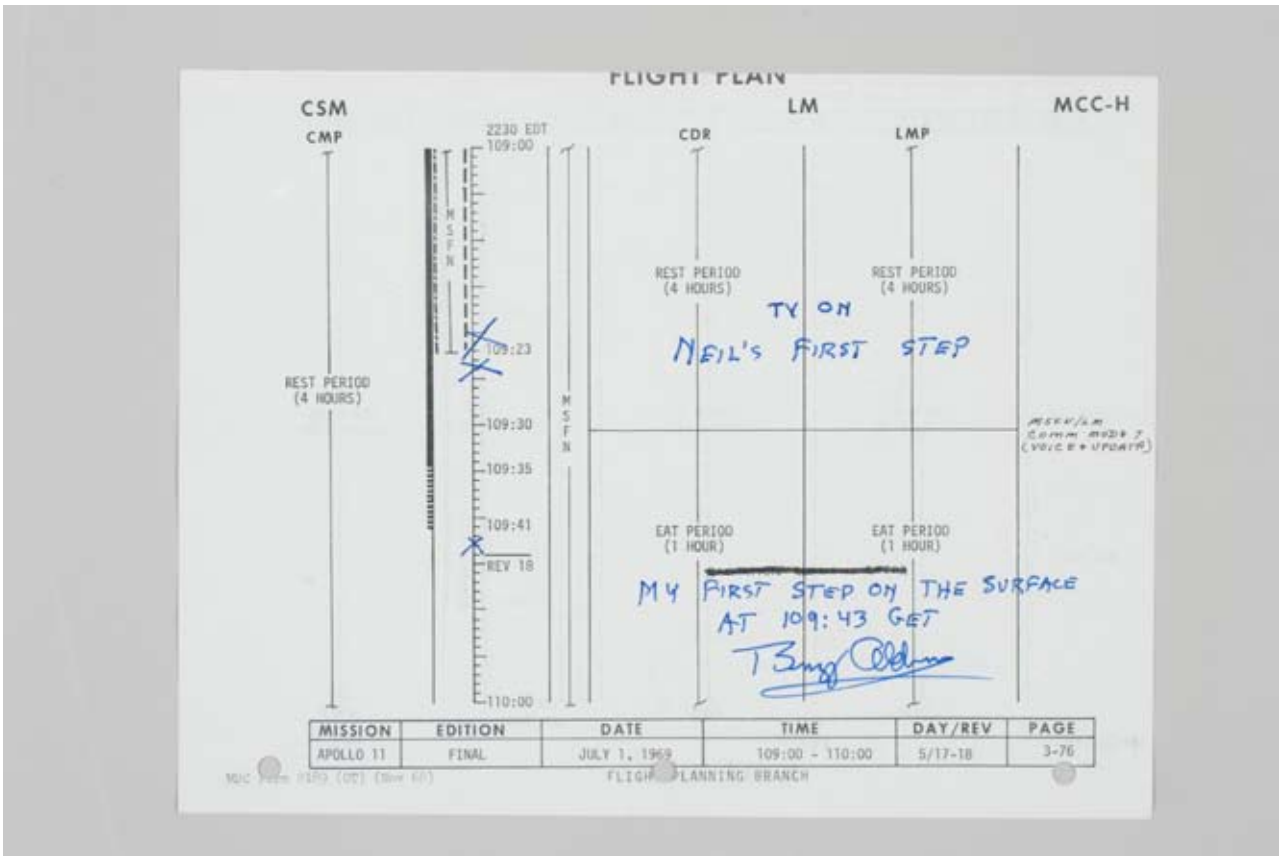
170

170
FLOWN APOLLO 11 LUNAR SURFACE CHECKLIST SHEET–SECURING EAGLE BEFORE THE MOON WALK.
Apollo 11 lunar surface checklist, pp SUR-11/SUR-12, a single sheet printed recto and verso, July 1969, 8 by 5 ½ inches, inscribed on each side by Buzz Aldrin.

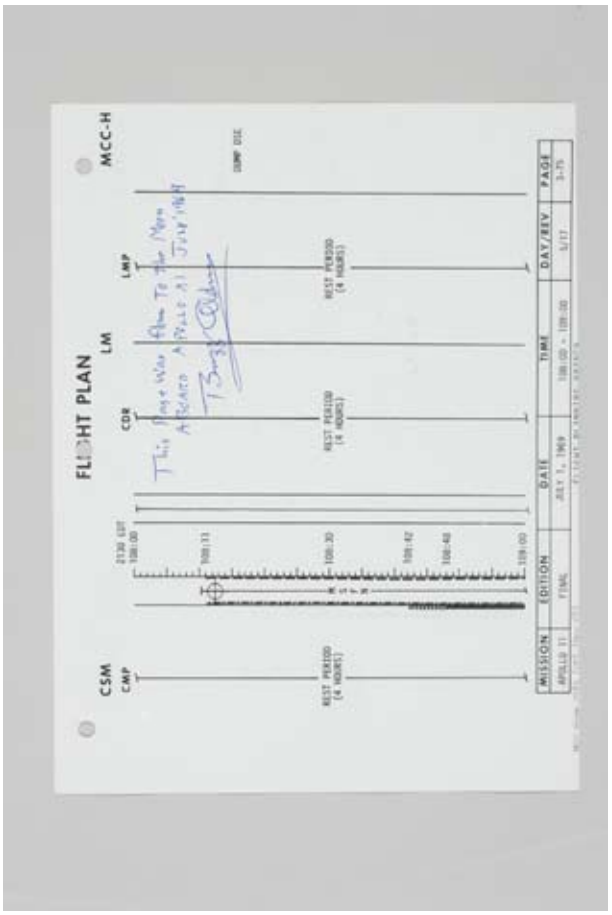
Critical parts of a long series of steps to place Lunar Module Eagle in a secure posture, so that Neil Armstrong and Buzz Aldrin could venture out of Eagle and onto the lunar surface.
Accompanied by a Typed Letter Signed by Buzz Aldrin, which reads in part: *"Accompanying this letter is a sheet numbered SUR-11 and SUR-12 from the Apollo 11 LM Lunar Surface Checklist, Part No. SKB32100074-363, S/N 1001. The checklist was taken to the Moon on the flight of Apollo 11 during July 16 to 24, 1969. Then the entire checklist, including this sheet, was carried to the surface of the Moon in Lunar Module Eagle during the first lunar landing on July 20, 1969. This sheet has the important steps Neil Armstrong and I performed in Eagle just about an hour after the first manned lunar landing.*
After landing we started a series of procedures listed in the initial pages of the Lunar Surface Checklist. The pages before SUR-11 had Neil and I preparing for a possible emergency lift-off some 2 hours after landing. That included a series of star sightings to align the navigational equipment to our exact position we now called 'Tranquillity Base.'
Side SUR-11 has the final steps Neil and I made to complete the lunar surface alignment of Eagle's navigational equipment just prior to 30 minutes from the possible emergency lift-off (TIG-30). We were at 104 hours and 12 minutes into the mission at the bottom of SUR-11 and began to configure circuit breaker panel 11 as per the chart on side SUR-12.
As we reviewed the panel chart on side SUR-12, we made sure that all breakers were set as indicated. A black circle indicates the breaker should be 'pushed in' or engaged to allow current flow. A white circle indicates the breaker should be 'pulled out' to break the flow of electrical current, thus preventing operation of that part of Eagle's systems. The emergency lift-off did not occur and just a few hours later Neil Armstrong and I became the first humans to walk on another celestial body, the Moon."
The checklist has been inscribed on both sides by Aldrin: on one side *"Used by Neil Armstrong and me just after Eagle's landing on Apollo XI, Buzz Aldrin,"* and on the other *"Flown to the lunar surface on Apollo XI, Buzz Aldrin."* Originally from his collection.
$15,000 - 20,000

171
FLOWN APOLLO 11 FLIGHT PLAN SHEET.
MAN SETS FOOT UPON THE MOON.
Apollo 11 Flight Plan, pp 3-75/3-76, a single sheet printed recto and verso, NASA/MSC, July 1, 1969, 10 ½ by 8 inches, inscribed by Buzz Aldrin.

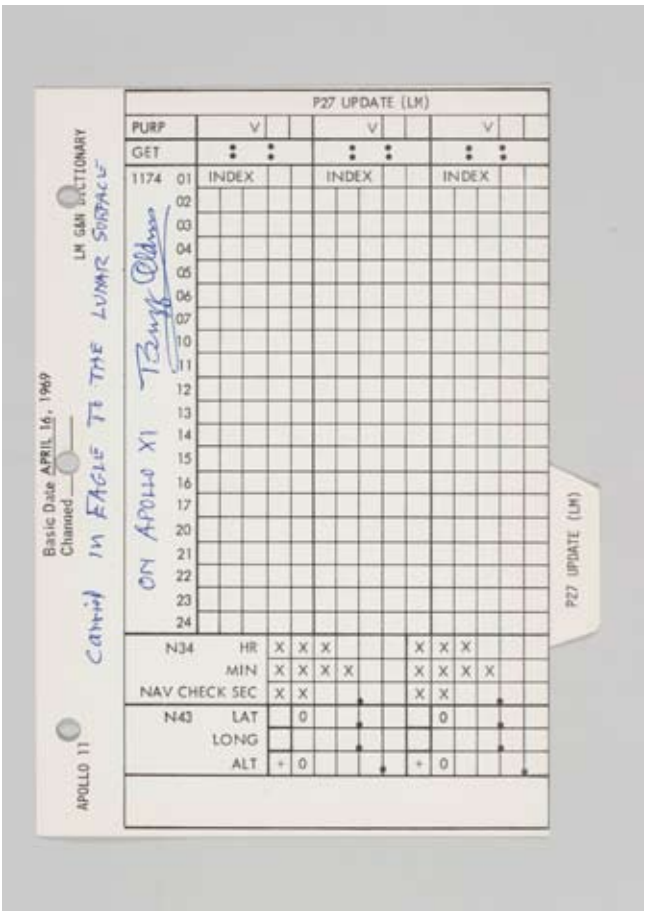
The Apollo 11 flight plan page during the time in the flight when Neil Armstrong set foot upon the moon. Accompanied by a Typed Letter Signed by Aldrin, which reads in part *"Enclosed with this letter is a sheet numbered 3-75 and 3-76 from the Apollo 11 Flight Plan, Part No. SKB32100080-350, S/N 1001. It is part of the entire document that was carried to the Moon in Command Module Columbia on the first lunar landing mission during July 16 to 24, 1969. This sheet is from the detailed timeline section and covers hour 108 to the beginning of hour 110 in the mission.*
Page 3-75 lists the last full hour of a rest period that was scheduled to start at about 3 hours after Man's first landing on the lunar surface. Page 3-76 lists the last half hour of that rest period then the beginning of our eat period prior to the EVA or moon walk preparations. Needless to say, Neil and I had an abundance of energy and adrenaline surging through our bodies after this historic event and starting a rest period was the last thing on our minds. At about 104 hours 30 minutes into the mission, Neil asked and received concurrence from Mission Control to start the EVA activities about 5 hours earlier than was written in the flight plan. Thus, we were actually finishing our EVA Prep work during this period in the mission which consisted of space suit pressure and communication checks, then the depressurization of Eagle's cabin to allow us to open the hatch and step onto the lunar surface. At 109 hours and 24 minutes, which was 10:56 pm EDT on July 20, Neil Armstrong became the first human to step upon the Moon. He then said the words that are now known by almost everyone living on the planet earth: 'That's one small step for a man, one giant leap for Mankind.'
Some 19 minutes after Neil's first step, I started down Eagle's ladder and set foot upon the Moon. Not as well known as Neil's words but very appropriate, I spoke after stepping on the surface: 'Magnificent Desolation.' The lunar surface was indeed desolate, but had a striking beauty all its own. Gray was the dominate color, but that color changed in tone as I turned to various sun angles. Walking on the lunar surface was not difficult to get accustom [sic] to and I found the ballistic type trajectory of the surface dust kicked up by my boots fascinating to observe on this airless world. Walking and exploring on the Moon was something only eleven others experienced during the 20th century. This page from a Ground Elapsed Time (GET) standpoint has the most significant events that occurred during the entire Apollo 11 flight."
Aldrin has inscribed the sheet *"This page was flown to the Moon aboard Apollo XI July 1969, Buzz Aldrin,"* and has marked at the appropriate points on the timeline *"TV ON"; "Neil's first step";* and *"my first step."*
A copy of the flight plan cover is included. Originally from the collection of Buzz Aldrin.
$40,000 - 50,000


FLIGHT PLAN
CSM
CMP
LM
CDR
LMP
MCC-H
2230 EDT
109:00
109:23
109:30
109:35
109:41
REV 18
110:00
REST PERIOD
(4 HOURS)
EAT PERIOD
(1 HOUR)
TV ON
NEIL'S FIRST STEP
MY FIRST STEP ON THE SURFACE
AT 109:43 GET
MISSION
EDITION
DATE
TIME
DAY/REV
PAGE
APOLLO 11
FINAL
JULY 1, 1969
109:00 - 110:00
5/17-18
3-76
FLIGHT PLANNING BRANCH

171


FLIGHT PLAN
MCC-H
LM
CDR
LMP
CSM
CMP
REST PERIOD
(4 HOURS)
MISSION
EDITION
DATE
TIME
DAY/REV
PAGE
APOLLO 11
FINAL
JULY 1, 1969

171


P27 UPDATE (LM)
PURP
GET
1174
INDEX
N34
HR
MIN
NAV CHECK SEC
N43
LAT
LONG
ALT
Basic Date APRIL 16, 1969
Channel
LM GNN DICTIONARY
CAPCOM IN EAGLE TO THE LUNAR SURFACE
ON APOLLO XI
APOLLO 11
P27 UPDATE (LM)

172

172
FLOWN APOLLO 11 LM G & N DICTIONARY SHEET.
Apollo 11 LM G & N Dictionary, P27 update (LM), a single sheet printed recto and verso, July 1969, 8 by 5½ inches, inscribed by Buzz Aldrin.

An extra flight data "pad" sheet that Neil Armstrong and Buzz Aldrin could use to log new or updated flight information.
Accompanied by a Typed Letter Signed by Buzz Aldrin, which reads in part: *"Accompanying this letter is a sheet labeled P27 Update (LM) from the Apollo 11 LM G and N Dictionary, Part No. SKB32100074-361, S/N 1001. The dictionary was carried to the Moon on the flight of Apollo 11 during July 16 to 24, 1969. Then the entire Guidance and Navigation (G and N) Dictionary, including this sheet, was taken to the surface of the Moon in Lunar Module Eagle during the first lunar landing on July 20, 1969. The dictionary had several pages devoted to the procedures and use of the words and numbers printed on this sheet. It is an example of the P27 data grids used in flight operations. Neil Armstrong and myself could use the P27 sheet to update our LGC (LM Guidance Computer) to new flight event times such as the lunar landing or rendezvous.*
PURP was short for purpose of the data to be used such as LDG or the landing time on the lunar surface. V was for the command load Verb to be used, either 70, 71, 72, or 73. The GET was the time Ground Elapsed Time for the data recorded in hours, minutes, and seconds. The 1174 01 area was for the index number of command words in octal format and the grids 2 through 24 were correction word identifiers if needed.
The HR, MIN, SEC were the actual hour, minute, and second in mission elapsed time for the confirmation of a ground track verification. The LAT, LON, and ALT were the latitude, longitude, and altitude for this ground track confirmation. N34 was the noun procedure for the time of the event and N43 was the noun procedure for the latitude, longitude, and altitude. This actual sheet was an excellent quick view reference for myself and Neil Armstrong during the flight. It could have been used for flight operations if necessary."
The letter also states that the sheet has been in his private collection since 1969 and that a copy of the G & N Dictionary cover is enclosed. The dictionary sheet is inscribed *"Carried in EAGLE to the lunar surface on Apollo XI, Buzz Aldrin."*
See illustration on page 67.
$7,000 - 9,000

173
FLOWN APOLLO 11 FLIGHT PLAN SHEET–A CRUCIAL ENGINE BURN.
Apollo 11 Flight Plan, p 3-100a, a single sheet printed recto and verso, NASA/MSC, July 1, 1969, 10½ by 8 inches, inscribed by Aldrin.

The flown flight plan sheet listing the parameters for the critical TransEarth Injection (TEI) CSM Service Propulsion System engine burn. This burn was the only means for the Apollo 11 crew to escape the lunar gravity field and return home to earth.
Accompanied by a Typed Letter Signed by Aldrin, which reads in part: *"Enclosed with this letter is a sheet numbered 3-100a from the Apollo 11 Flight Plan, Part No. SKB32100080-350, S/N 1001. It is part of the entire document that was carried to the Moon in Command Module Columbia on the first lunar landing mission during July 16 to 24, 1969. This sheet is from the detailed timeline section and was located at the beginning of hour 135 in the timeline.*
Page 3-100a has a grid of terms and values associated with the TEI or TransEarth Injection engine burn that used Columbia's SPS or Service Propulsion System. The SPS was the large rocket engine at end of our Service Module. This burn was our only means of escaping the lunar gravity field and return home to earth. If our engine did not ignite, we would be stranded in lunar orbit.
Neil Armstrong and I were very tired by the TEI time. We had accomplished the first lunar landing a day earlier, then made the first walk by humans on the surface of another world. We really did not get any sound sleep while on the lunar surface due the short sleep period scheduled and the elevated excitement level associated with all the events of the first lunar landing. Neil and I then fired Lunar Module Eagle's Ascent Stage engine and began the rendezvous sequence with Mike Collins still in Columbia."
The sheet is inscribed: *"Carried to the Moon on Apollo XI, Buzz Aldrin."* A copy of the flight plan cover is included.
$10,000 - 15,000

174
FLOWN APOLLO 11 FLIGHT PLAN SHEET–EXTENSIVE ANNOTATIONS.
Apollo 11 Flight Plan, pp 3-107/3-108, a single sheet printed recto and verso, NASA/MSC, July 1, 1969, 10½ by 8 inches, extensively annotated by Armstrong and Aldrin, inscribed later by Aldrin on each side.

One of the longest and most detailed set of notes made by Armstrong and Aldrin during the entire Apollo 11 flight. Accompanied by a Typed Letter Signed by Aldrin, which reads in part: *"Enclosed with this letter is a sheet numbered 3-107 and 3-108 from the Apollo 11 Flight Plan, Part No. SKB32100080-350, S/N 1001. It is part of the entire document that was carried to the Moon in Command Module Columbia on the first lunar landing mission during July 16 to 24, 1969. This sheet is from the detailed timeline section and covers from hour 146 to the beginning of hour 150 in the mission.*
The previous day, July 21, Neil and I had left the lunar surface after an approximately 22 hour stay and a 2 hour surface excursion. Once we completed rendezvous, we started preparations to return home to earth. Our Transearth Injection (TEI) engine burn had to work. If it did not, Neil Armstrong, Michael Collins, and myself would remain in lunar orbit, never to return.
The TEI burn did work and we were able to get several hours rest afterwards. At about 147 hours into the mission, Mission Control gave us a wake-up call. After the post sleep activities, we prepared for and made the MCC5 (Mid Course Correction) burn number 5 to refine our trajectory back to earth. On side 3-107, I recorded the hours of sleep for each of us with: 'CDR - 8, CMP - 8, LMP - 8.5' *plus checked-off six steps of the Post Sleep Checklist. I then made all eight entries in the Consumable Update box and made four other check marks. I logged the H2 Purge occurring* '@ 32' *minutes into hour 147 and wrote* 'charge Bat A UFN' *(Until Further Notice) along the bottom of the sheet.*
Side 3-108 lists steps just prior to the MCC5 burn. Commander Neil Armstrong checked-off the first 3 steps on this side and made a large check mark next to the IMU (Inertial Measurement Unit) P(rogram) 52 realignment step. At the right side, Neil recorded the following values in the P52 (PTC REFSMMAT) data block of: '14, 16' *for N(oun) 71,* '000.01' *for N(oun) 05, and the X, Y, Z components of N(oun) 93 of* '+00.265, +00.268, +00.012' *at a GET (Ground Elapsed Time) of* '149:19:30' *in hours, minutes, and seconds. PTC stands for Passive Thermal Control and REFSMMAT stands for Reference Stable Member Matrix. I then recorded the last comments of:* 'Waste H20 to 10%' *and* 'MCC 5 1/5 nom time' *meaning the burn would be about 5 feet per second at the nominal time."*
The sheet is inscribed on both sides by Aldrin: on one side *"Flown to the Moon, Buzz Aldrin,"* and on the other *"Carried to the Moon on Apollo XI, Buzz Aldrin."* A copy of the flight plan cover is included.
$15,000 - 20,000

TEI
BURN CHART

	P OR Y RATES	ATT DEVIATION	SHUTDOWN TIME	RESIDUALS
TEI	10°/SEC TAKEOVER	+10° TAKEOVER	BT + 2 SEC & ΔV_c = -40 FPS	TRIM X ~~AND Z~~ AXIS TO 0.2 FPS

TEI ABORT MODES			
TEI V_{GO}	BT	TRAJECTORY	ABORT MODE
3292.7 - 1436.0	0 - ~~90~~	LUNAR ORBIT	MODE III - AFTER 1 REV
1436.0 - 1207.0	~~00:40~~ ~~40~~ - ~~00:00~~ ~~100~~	UNSTABLE	MODE II - 2 SPS BURNS FOR ORBIT STABILIZATION AND WATER OR CLA LANDING.
1207.0 - 0	~~00:40~~ ~~100~~ - ~~00:59~~ ~~149~~	UNSTABLE/ HYPERBOLIC	MODE I - 1 BURN AT TEI + 2 HRS P37 AT SPHERE OF INFLUENCE HYPERBOLIC (ΔV 580 to 0, BT ~~125-149~~)

Carried to the Moon on APOLLO XI

T Buzz Aldrin

3-100a

173

FLIGHT PLAN

MCC-H

1330 EDT
148:00
:10
:20
:30
:40
:50
149:00
:10
:20
:30
:40
:50
150:00

MSFN

UPLINK
CSM STATE VECTOR
MCC5 TGT LOAD

UPDATE
MCC5 MNVR PAD

WIPE EXCESSIVE MOISTURE FROM TUNNEL HATCH AREA ✓

CARRIED TO THE MOON ON APOLLO XI

T Buzz Aldrin

V66 - TRANS CSM STATE VECTOR TO LM SLOT ✓

RECORD MCC5 MNVR PAD ✓

IMU REALIGN - P52
OPTION 3 - REFSMMAT ✓

EXT ΔV - P30

SPS/RCS THRUST - P40/41

Waste H_2O @ 10%

PTC

NOTES

P23-NO COMM, (5 SETS)
TEI + 13:00 (148:00)
ALPHERATZ (01), EFH
DIPHDA (02), EFH
MIRFAK (10), ENH
MIRFAK (10), ENH
ALDEBARAN (11), ENH

V67 R_1 +30000
R_2 +00004
R_3 +00005

P52 (PTC REFSMMAT)
N71: 14.16
N05: 00001
N93:
X +00.265
Y +00248
Z +00.012
GET 149:19:30

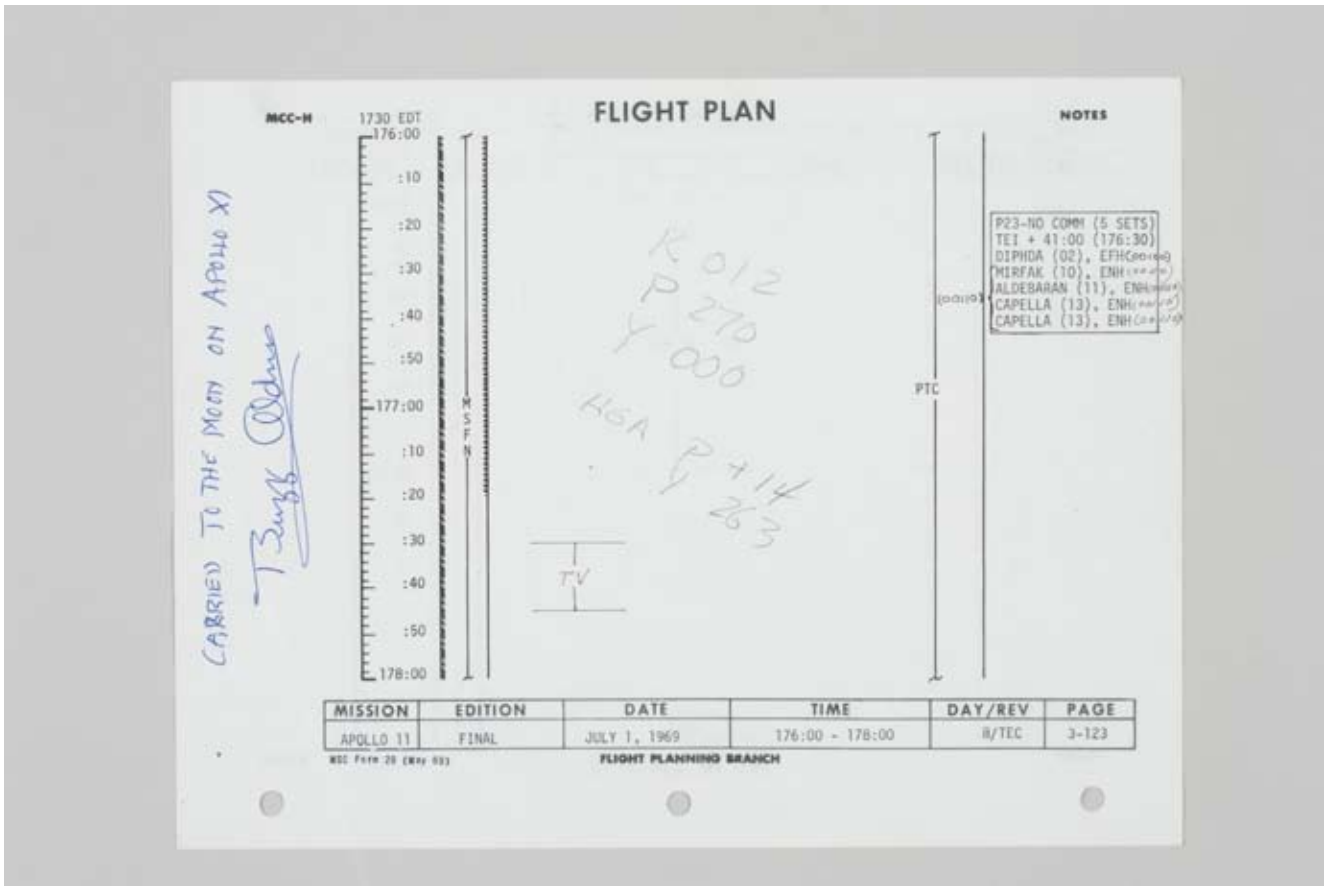
MISSION	EDITION	DATE	TIME	DAY/REV	PAGE
APOLLO 11	FINAL	JULY 1, 1969	148:00 - 150:00	7/TEC	3-108

NSC Form 20 (May 68)

FLIGHT PLANNING BRANCH

MCC 5 5'/s min time

174



175

175
FLOWN APOLLO 11 FLIGHT PLAN SHEET–THE TV BROADCAST.
Apollo 11 Flight Plan, pp 3-122/3-123, a single sheet printed recto and verso, NASA/MSC, July 1, 1969, 10½ by 8 inches, inscribed in pencil by Michael Collins (see below), and in ink by Aldrin.

The flown flight plan sheet listing the time period of the Apollo 11 crew's final TV broadcast, where they reflected on the historical significance of the lunar landing and thanked the American public for the decade of support that made it possible.
Accompanied by a Typed Letter Signed by Aldrin, which reads in part: *"Enclosed with this letter is a sheet numbered 3-122 and 3-123 from the Apollo 11 Flight Plan, Part No. SKB32100080-350, S/N 1001. It is part of the entire document that was carried to the Moon in Command Module Columbia on the first lunar landing mission during July 16 to 24, 1969. This sheet is from the detailed timeline section and covers from hour 174 to the beginning of hour 178 in the mission.*
Page 3-123 has the attitude and antenna angles that Mission Control radioed us about ½ hour before our last scheduled television transmission of the flight. Mike Collins logged the values of: 'R 012, P 270, Y 000' *which were the Roll, Pitch, and Yaw angles to place Columbia in the proper attitude. This allowed us to view the Earth out our number 1 window and the Moon out our number 5 window. Mike also logged:* 'HGA P +14, Y 263' *which were the Pitch and Yaw angles for our High Gain Antenna. Commander Neil Armstrong began our TV broadcast with a welcome to all viewers and a reference of how author Jules Verne wrote about a voyage to the Moon and the similarities to our actual flight. Neil then introduced Mike Collins who stressed that this flight might have look simple or easy, but indeed it was not. He noted the complicated machinery required including the Saturn V launch vehicle, our spacecraft, and rocket engines. He gave tribute to the thousands of American workers that made this all possible. Only through their 'blood, sweat, and tears' did we accomplish our mission.*
I then had the opportunity to address viewers around the world. I talked about the more symbolic aspects of the flight and how onboard we had the conclusion that 'this has been far more than three men on a voyage to the Moon. More, still than the efforts of a government and industry team. More even than the efforts of one nation. We feel that this stands as a symbol of the insatiable curiosity of all mankind to explore the unknown. Neil's statement the other day upon first setting foot on the surface of the Moon – "This is a small step for a man, but a great leap for mankind" - I believe sums up these feelings very nicely. We accepted the challenge of going to the Moon, the acceptance of this challenge was inevitable ... In retrospect, we have all been particularly pleased with the call signs that we very laboriously chose for our spacecraft, "Columbia" and "Eagle." We've been particularly pleased with the emblem of our flight, depicting the U.S. eagle bringing the universal symbol of peace from the Earth, from the planet Earth to the Moon, that symbol being the olive branch. It was our overall crew choice to deposit a replica of this symbol on the Moon.' Commander Neil Armstrong gave some final thoughts to viewers on Earth. He said: 'The responsibility for this flight lies first with history and with the giants of science who have preceded this effort. Next with the American people, who have through their will, indicated their desire. Next to four administrations and their Congresses for implementing that will. And then to the agency and industry teams that built our spacecraft, the Saturn, the "Columbia," the "Eagle," and the little EMU, the space suit and backpack that was our small spacecraft out on the lunar surface. We would like to give a special thanks to all those Americans who built those spacecraft, who did the construction, design, the tests, and put their - their hearts and all their abilities into those crafts. To those people, tonight, we give a special thank you. And to all the other people that are listing and watching tonight, God bless you. Good night from Apollo 11.' We closed the broadcast with a view of the Earth."
The sheet is inscribed *"Carried to the Moon on Apollo XI, Buzz Aldrin."* A copy of the flight plan cover is included.
$10,000 - 15,000

178

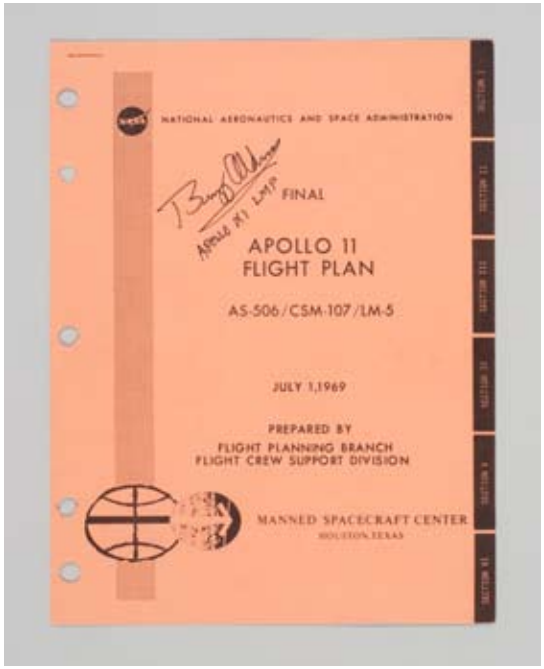
176
MINIATURE US FLAG CARRIED ON APOLLO 11.
Flown US flag decal, 1¼ by 1 inches, laminated onto a printed card, 5½ by 3½ inches.

The card reads: *"Flown on First Manned Lunar Landing, Apollo 11"* and has the Apollo 11 crew member names. It is inscribed on the verso *"Stan, Please accept this flag I had flown by Buzz Aldrin. Friendship is always appreciated. Riley D. McCafferty, 10/3/69."* McCafferty was a leading member of the Flight Simulation Division at MSC. He gave the flag to Stanley 'Stan' Faber, who was in the same department.
$1,200 - 1,800

177 °
FLOWN APOLLO 11 MANNED FLIGHT AWARENESS MEDALLION.
Apollo 11 Manned Flight Awareness (MFA) Medallion, metal, 1½ inches in diameter. The obverse features an astronaut standing on the lunar surface with the US flag, surrounded by the wording *"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."* Together with a NASA MFA certificate featuring an image of both sides of the medallion and reading in part *"Apollo 11 Medallion presented to [blank, no name added] in recognition of your contribution to the United States space program,"* signed by Buzz Aldrin.
$250 - 350

178
LUNAR ROCK BOX COVER.
Cover for the sample return box, thick Beta cloth with dual zippers, 12 by 20 by 8 inches. With four 2-inch square clear viewing windows. Interior and exterior flaps secured with velcro. Stamped with part number V36-788036 06362 AAJ1898 and with several inspection stamps. The left side of the large zipper area is marked *"SAMPLE RETURN BOX" and "CLOSE TO HERE FOR TRANSFER."* A label inside the flap reads: *"CM FWD [with arrow] HANDLE TO FOLD [with arrow]."*

A cover used in training, and identical to the actual flight-qualified version. Lunar rocks were placed in an aluminum storage box that was vacuum sealed on the lunar surface. The crew then placed the box inside the container covers of this type for the journey back to Earth, to prevent lunar dust from spreading inside the Lunar and Command Modules.
$2,000 - 3,000



182

The following two lots were originally in the collection of Apollo 11 Lunar Module Pilot Buzz Aldrin.

179
APOLLO 11 POSTAL COVER–A MEANS OF LIFE INSURANCE.
Apollo 11 Insurance Cover, approximately 6 by 4 inches. The envelope features the Apollo 11 crew emblem. Postmarked at the Kennedy Space Center on the date of the Apollo 11 launch, July 16, 1969. Signed prior to launch by Armstrong, Aldrin and Collins. Numbered on the verso by Aldrin with his identifier number *"BA03."*

Accompanied by a Typed Letter Signed by Aldrin, in which he explains, *"This postal cover with the Apollo 11 emblem cachet is one of the 'insurance covers' signed by the Apollo 11 crew prior to our launch in July 1969. Since we were unable to obtain adequate life insurance due to the high risk nature of being an astronaut, we signed this group of covers and evenly distributed them to our families for safe keeping while we performed our mission. If an unfortunate event prevented our safe return, the covers would have provided a limited financial means of support to our families.*
The cover displayed above has been in my private collection since 1969 ... It was signed by the Apollo 11 crew - Neil Armstrong, Michael Collins, and myself prior to our launch back in 1969. The cover was postmarked on the launch day of Apollo 11 at the Kennedy Space Center on July 16, 1969. Four days later, on July 20, Neil Armstrong and I became the first humans to land and walk on another celestial body - the Moon."
$4,000 - 6,000

180
"LIFE INSURANCE" FOR THE APOLLO 11 CREW.
Apollo 11 Insurance Cover, approximately 6 by 4 inches. The envelope features an illustration of astronauts exploring the lunar surface. Postmarked at Houston, Texas on the date of the Apollo 11 lunar landing and moon walk, July 20, 1969. Signed prior to launch by Armstrong, Aldrin and Collins. Numbered on the verso by Aldrin with his identifier number *"BA16."*

A further "insurance cover," this one postmarked with the lunar landing date. Accompanied by a Typed Letter Signed by Aldrin similar to that in the preceding lot.
$4,000 - 6,000

179

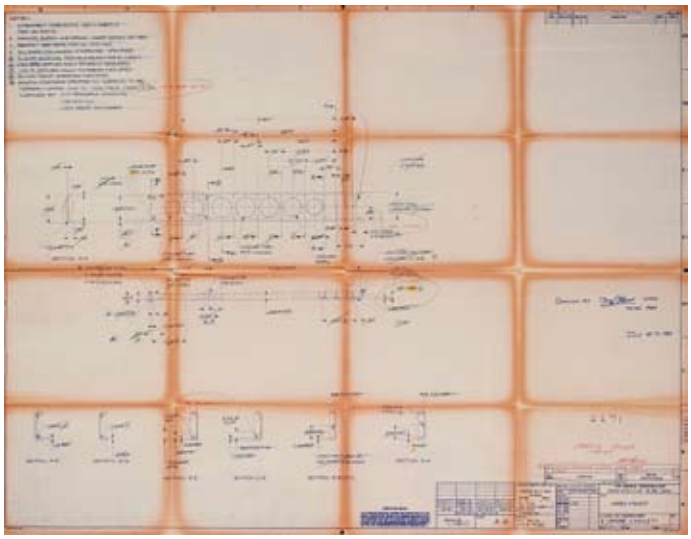
180

181
MISSION OPERATIONS REPORT.
Mission Operations Report, Apollo Supplement [for Apollo 11]. NASA, July 1969. v, 125 ll. Illustrated. 10½ by 8 inches. Loose-leaf, paper covers, punched and with staple-holes.

Signed on the cover by Buzz Aldrin as LM pilot on Apollo 11. A report for use by senior NASA managers that provides up-to-date, definitive, and complete information on Apollo 11.
$600 - 800

182
PLANNED STEPS FOR THE FIRST LUNAR LANDING.
Final Apollo 11 Flight Plan, AS-506/CSM-107/LM-5. Houston, TX: NASA/MSC, July 1, 1969. Upwards of 310 pp. 10½ by 8 inches. Card stock covers, punched and with traces of staples.

The complete hour-by-hour and step-by-step timeline for man's first lunar landing, with special inscriptions by LMP Aldrin at historic flight events. Buzz Aldrin has signed the front cover as Apollo 11's LM pilot. Additionally, on page 3-69, he has underlined the word *"touchdown"* and inscribed his - and man's - first words from the lunar surface (*"Contact Light"*) followed by his name. On page 3-76 at the exact Ground Elapsed Time (GET) that this event occurred, Aldrin has inscribed *"My first step on the surface at 109:43 GET, Buzz Aldrin."* On page 3-80, he has underlined *"Descend to surface"* and boldly inscribed his first words after stepping on the moon, *"Magnificent Desolation, Buzz Aldrin."*
The flight plan is divided into 6 sections covering general information, samples of flight maneuver update pads, a detailed timeline, consumables, test objectives, and a summary. The detailed timeline is the most extensive section (135 pp) and lists activities in a column format for the astronauts and related Mission Control activities. Each page in this section details one to two hours of flight time.
$2,500 - 3,500



187 (detail)

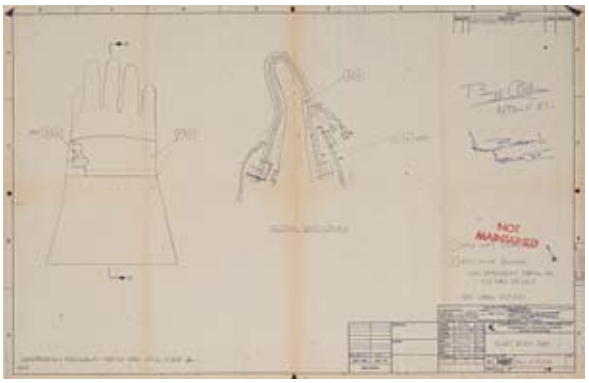
183
LUNAR SURFACE PLANS & OPERATIONS.
Final Apollo 11 Lunar Surface Operations Plan. Houston, TX: NASA/MSC, June 27, 1969. 184 pp. Illustrations, 4 folding tables. 10½ by 8 inches. Card stock covers, punched. Ownership inscription of Paul D. Lowman, Jr., a NASA lunar sample investigator, on front cover.

The most detailed manual written by NASA defining the exact plans and every step for Man's first exploration of the lunar surface. *The cover signed by Buzz Aldrin as LMP.*
The plan covers all lunar surface activities including initial surface familiarization, geologic sample collection, television set-up, experiment deployment, photography, and contingency plans. Page 41 includes the instructions *"Descend ladder to footpad ... Step to surface,"* and orders the commander to *"Evaluate and report walking capability"* during the first few tentative moments on the surface.
$1,000 - 1,500

184 °
LAUNCH SITE PRESS RELEASES.
Three press releases issued during the Apollo 11 launch:
1. "Apollo 11 - Lunar Landing." NASA/KSC, [1969]. 4 pp.
2. "Apollo 11." Grumman, [1969]. Envelope containing 14 leaves of text and diagrams describing the development of the LM by Grumman, with an artist's impression of the lunar landing.
3. "News: Apollo 11 Man on the Moon." North American Rockwell, [1969]. Folder signed by Buzz Aldrin and containing: a 42-page booklet titled "Apollo Lunar Mission"; a 4-inch Apollo 11 color crew emblem decal; five black and white photographs of Command Module construction and tests.
Mostly 10 ½ by 8 inches.
$200 - 300

185
APOLLO 11 EMBLEM WORN IN THE WHITE ROOM.
Apollo 11 crew emblem, 4 inches in diameter, printed on Beta cloth. Mounted onto a Typed Letter Signed by Guenter Wendt.

The letter reads: *"This Apollo 11 Beta Cloth patch was the official emblem issued by NASA to wear on my close-out garment during launch preparations for the Apollo/Saturn 506 mission. Apollo 11 was launched on July 16, 1969. The emblem was worn in the White Room at the end of swing arm number 9, which was at the 320 foot level of Launch Complex 39A. I was pad leader for checkout of the spacecraft and ingress of the astronauts during the countdown for Apollo 11."*
$600 - 800



188

186
LM-5 BLUEPRINTS.
2 blueprints illustrating and listing components inside and outside the Lunar Module, Grumman Aircraft Engineering Corp., Bethpage, NY, undated, each 16 by 11 inches, scale *"none."*

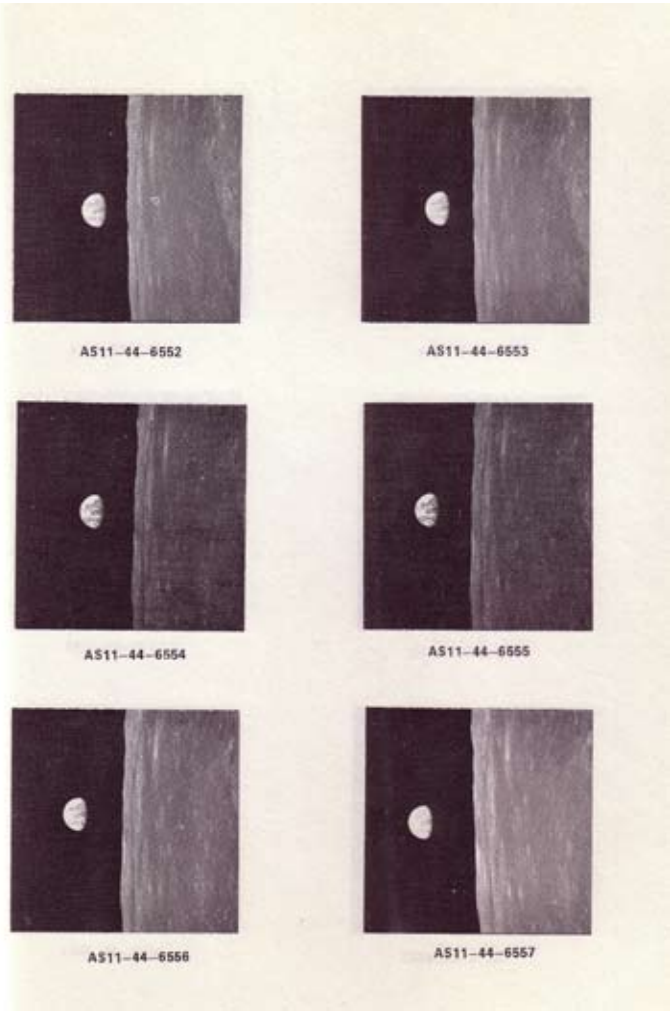
Both signed by Buzz Aldrin with "LM-5, Apollo XI."
The first sheet has drawings of the locations and storage areas for space suits and other interior equipment. A column titled *"LM-5 Stowage List Item"* includes the helmet stowage bags, visor assemblies, gloves, maintenance kit, and oxygen purge system. Locations for the sample return containers (moon rock boxes) and the solar wind experiment are shown. The second sheet has a drawing of the equipment stowage pallet in the LM Descent Stage and has a list of over 25 items. Locations of the lunar TV camera and cable, TV camera bracket, lunar scoop, hammer, and tongs are clearly shown.
$600 - 800

187
LUNAR SURFACE LASER RANGING RETRO-REFLECTOR.
"Arm Pivot," blueprint, Bendix Corporation, Ann Arbor, MI, January 28, 1969, 44 by 34 inches, scale full size.

Inscribed by Aldrin: *"Deployed by Buzz Aldrin while on the moon, July 20-21, 1969."* A blueprint of one of the first experiments deployed on the surface of the moon, which is still in use today. The LRRR reflects laser pulses from earth which are then measured to determine precise distance, lunar motion, and lunar/earth geophysical information. Illustrated is a side view of the LRRR with the arm pivot highlighted which would move the experiment to the proper angle to received laser pulses from the earth. There are multiple manuscript modifications and updates on the blueprint dating from January 1969.
$1,200 - 1,800

188
LUNAR SURFACE SPACE SUIT GLOVE.
"Glove ASSY [Assembly], TMG [Thermal Micrometeriod Garment]," blueprint, International Latex Corporation, Dover, DE, June 12, 1966, with multiple revisions, 34 by 22 inches, scale *"none."*

Signed by Buzz Aldrin and Alan Bean with their mission numbers.
An early blueprint illustrating specifications of the glove which would evolve into the one used by Armstrong and Aldrin while on the lunar surface. Shown are side and back views of the full glove assembly. The A6L Apollo space suit evolved into the A7L which was used on the Apollo flights. The glove consisted of a large wrist blanket for protection of the pressure suit wrist ring, and a metal weave of Chromel R with latex finger tips around the palm and finger areas. Some A6L components never needed updating and were used with A6L ID numbers on flights. International Latex Corporation had the NASA contract for the A6L and A7L Apollo space suits.
$700 - 900



194

189
LUNAR DUST BRUSH.
"Large Keeper - Lunar Dust Brush" and "Small Keeper - Lunar Dust Brush," 2 blueprints, NASA, Houston, TX, January 31, 1970, 34 by 22 inches, enlarged scale of 2 to 1.

Both blueprints signed by Buzz Aldrin, Alan Bean, Edgar Mitchell, and Charles M. Duke, Jr., with their LM and Apollo numbers.
Two blueprints illustrating specifications of the brush used by Apollo Astronauts to remove lunar dust from equipment and space suits. Both illustrate the keeper component to hold parts of the bristle and handle sections together. Accompanied by a black and white NASA photograph of the "broom" itself, with a printed caption on the verso.
$600 - 800

190 °
APOLLO 11 SPLASHDOWN MENU.
"Hornet Plus Three: Apollo 11 Splashdown Menu," printed menu, USS *Hornet*, July 24, 1969, 4 pp, stapled into printed card stock covers, 8 by 5 inches.

Signed by Buzz Aldrin on the front cover. The USS *Hornet* was the primary recovery ship for the Apollo 11 mission. President Richard Nixon attended the return of the Apollo 11 astronauts onto the hanger deck and greeted them after they were secured inside a quarantine facility. On offer at the splashdown dinner were lobster tails, filet mignon, and *"special splash down cake."*
$250 - 350

191 °
APOLLO 11 MISSION REPORT.
Apollo 11 Mission Report. NASA SP-238. Washington: 1971. [2], x, 217 pp. Illustrations. 10½ by 8 inches. Original printed wrappers.

Signed by Buzz Aldrin as LMP on title. Compiled from internal NASA/MSC reports and covering all major flight phases, with a pilots' report written by Armstrong, Aldrin, and Collins. Loosely inserted is a copy of a typed letter signed by Christopher C. Kraft, director of the MSC, dated April 24, 1973, presenting the Mission Report to *"the Apollo Team"* as a memento.
$400 - 600

192 °
LUNAR SAMPLE REPORT–ASTRONAUTS AND MOON ROCKS.
"Geologic Setting of the Lunar Samples Returned with Apollo XI." [USGS Investigation Team], September 1969. 93 pp. Illustrations. 11 by 8½ inches. Original tape-backed paper covers.

Signed by Buzz Aldrin as LMP on upper cover. This report is designed to assist investigators on how and where the Apollo 11 lunar samples were obtained. Due to the limited EVA time on the surface, Armstrong and Aldrin's photographic documentation of samples was limited or non-existent. This report uses surface photographic data, traverse maps, and laboratory images of the samples themselves to determine the best possible original locations of the lunar samples. A general description of the landing site and assessment of the EVA are included.
$300 - 500

193 °
APOLLO 11 PHOTOGRAPHY.
Two NASA-released documents explaining how and where the Apollo 11 mission photographs were made:
1. "Data Users' Note, Apollo 11 Lunar Photography." April 1970. v, 23 pp. Describes the films and cameras used during the flight.
2. "Apollo Mission 11 Photography Indexes." October 1969. 4 folding lunar surface map sheets, each 57 by 10 inches, with the image viewing angle of each frame marked.
Together, 2 items. 10½ by 8 inches. Card stock covers, stapled. *The front cover of each signed by Buzz Aldrin.*
$500 - 700

194 °
LUNAR PHOTOGRAPHY–EVERY MOON WALK FRAME.
"Apollo 11 70-mm Photographic Catalog." Greenbelt, MD, National Space Science Data Center, April 1970. Approximately 200 pp. Halftone illustrations throughout with images from each film magazine, six frame per page, as if contact prints. 10½ by 8 inches. Card stock covers, stapled.

Signed by Buzz Aldrin as LMP on the cover. A catalog containing reproductions of every usable 70mm film frame taken on the lunar surface by Armstrong and Aldrin, plus almost all others taken during other phases of the mission. Lunar surface images show the full sequence of Aldrin's descent down the LM ladder to the surface, panoramic frames, the one good picture of Armstrong on the moon, the iconic image of Aldrin on his EVA, experiment deployments, and inspection of the LM.
$400 - 600

195 °
APOLLO 11 SYSTEM OUTAGES.
Kalil, Ford, and Robert C. Wigand. "MSFN System Outages During the Apollo 11 (AS-506) Mission." Greenbelt, MD: GSFC, August 1969. v, 37 pp. 11 by 8 inches. Card stock covers, stapled.

Signed by Buzz Aldrin as LMP on the front cover. The problems of the Manned Spacecraft Network (MSFN) are summarized. Each ground station in the network is listed with the time of the associated outage. Data receiving aircraft, satellites, tracking antenna, and MSFN computer problems are noted.
$200 - 300

196
LUNAR PHOTOGRAPHY.
Musgrove, Robert G., editor. *Lunar Photographs from Apollos 8, 10, and 11.* NASA SP-246. Washington: 1971. vii, 119 pp. Color illustrations. 10½ by 8 inches. Original cloth gilt.

Inscribed on half-title: *"Apollo X photos by Tom Stafford and Crew"* in Stafford's hand; *"Apollo XI photos by Buzz Aldrin and crew"* in Aldrin's hand; and signed by Frank Borman, Commander of Apollo 8.
Includes lunar surface pictures taken from orbit during Apollo 8 and 10, and over 30 Apollo 11 moon walk pictures.
$600 - 800

197 °
NATIONAL GEOGRAPHIC.
["First Explorers on the Moon" in:] *National Geographic.* Washington, DC: National Geographic Society, December 1969. Volume 136, no 6. 10 by 7 inches. Original printed wrappers. Features an illustrated 62-page article of the first lunar landing, with a special 7-inch *"Sounds of the Space Age"* thin vinyl record.

Signed by Buzz Aldrin on the cover over the iconic photograph of him on the moon's surface.
$200 - 300

198
APOLLO 11 NASA PHOTOGRAPHS.
A group of 65 black and white mostly press-release photographs, 10 by 8 inches, printed captions on verso.

Images include crew training, spacecraft development and Saturn V tests, launch preparations and launch, flight and lunar surface images, crew recovery and post mission activities. Post-landing images include President Nixon on the recovery ship, moon rock analysis, and anniversary events.
$700 - 900

199 °
APOLLO 11 LAUNCH.
Color photograph, 10 by 8 inches, of the Apollo 11 launch from the Kennedy Space Center, printed caption on verso.

Signed by Buzz Aldrin with the mission and launch date on recto.
$250 - 350

200 °
COLUMBIA IN ORBIT.
Color photograph, 7½ by 7½ inches, of Apollo 11 Command and Service Module Columbia in lunar orbit, taken by Buzz Aldrin while in Lunar Module Eagle.

Inscribed by Aldrin, *"Photo by Buzz Aldrin, Apollo XI"* on recto.
$250 - 350

201 °
EAGLE ON THE MOON.
Color photograph, 7½ by 7½ inches, of Lunar Module Eagle on the lunar surface, taken by Armstrong while he and Aldrin explored the surface.

Inscribed by Aldrin, *"Eagle has landed, Buzz Aldrin, Apollo XI."*
$400 - 600

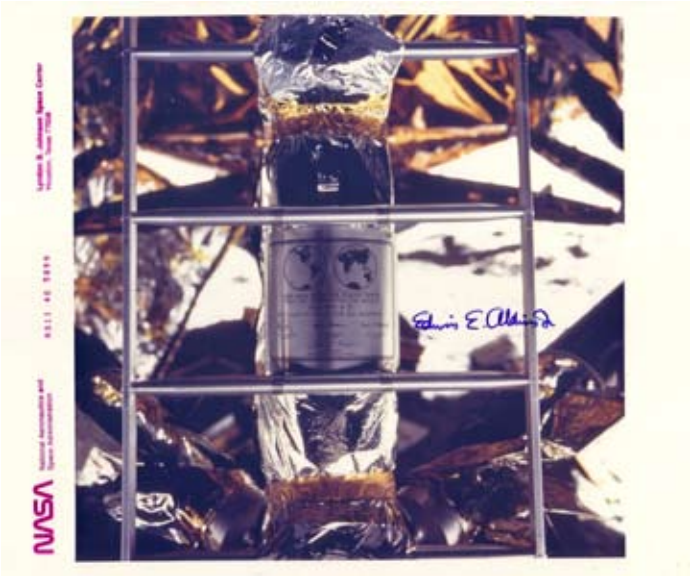
202 °
FINAL STEPS TO THE MOON.
Color photograph, 7½ by 7½ inches, of Buzz Aldrin as he prepares to jump off Eagle's ladder and step onto the lunar surface.

Inscribed *"My first step, Buzz Aldrin"* in image.
$300 - 500

200

201

202



204

206

203 °
FOOTPRINT ON THE MOON.
Color photograph, 10 by 8 inches, of Buzz Aldrin's space suit boot leaving a boot print that will last hundreds of thousands of years on the lunar surface, printed caption on verso.

Inscribed *"My bootprint, Buzz Aldrin"* on verso.
$400 - 600

204
WE CAME IN PEACE.
Color photograph, 10 by 8 inches, of the commemorative plaque left on ladder of the front landing leg on Lunar Module Eagle, printed caption on verso.

Signed on verso by Buzz Aldrin (*"Edwin E. Aldrin, Jr."*) using the exact form of his name as that used on the plaque. The writing on the plaque was read by Neil Armstrong to viewers of their televised moon walk. Items signed in this way by Aldrin are rare, since he legally changed his name to Buzz soon after his return to Earth.
$600 - 800

205 °
STARS AND STRIPES ON THE MOON.
Color photograph, 10 by 8 inches, taken from a 16mm motion picture frame at the moment Armstrong and Aldrin unfurled the US flag on the lunar surface.

Inscribed by Aldrin on verso: *"Old Glory on the Moon, Buzz Aldrin, Apollo XI."*
$400 - 600

206
HOME AGAIN.
Black and white photograph, 10 by 8 inches, of the Apollo 11 crew in the quarantine facility on USS *Hornet* and talking to President Richard Nixon, printed caption on verso.

Signed by Michael Collins and Buzz Aldrin, and inscribed by the latter: *"Return Safely to Earth."*
$600 - 800

207 °
LUNAR PAY DIRT.
Black and white photograph, 10 by 8 inches, of the Apollo 11 moon rocks being removed from their containment vessel inside the receiving lab at the Manned Spacecraft Center.

Inscribed by Aldrin in upper margin: *"Lunar Rocks Neil and I Gathered, Buzz Aldrin, Apollo XI."*
$300 - 400

208
MAGNIFICENT DESOLATION.
Large color photograph, 20 by 16 inches, of Buzz Aldrin on the lunar surface photographed by Neil Armstrong.

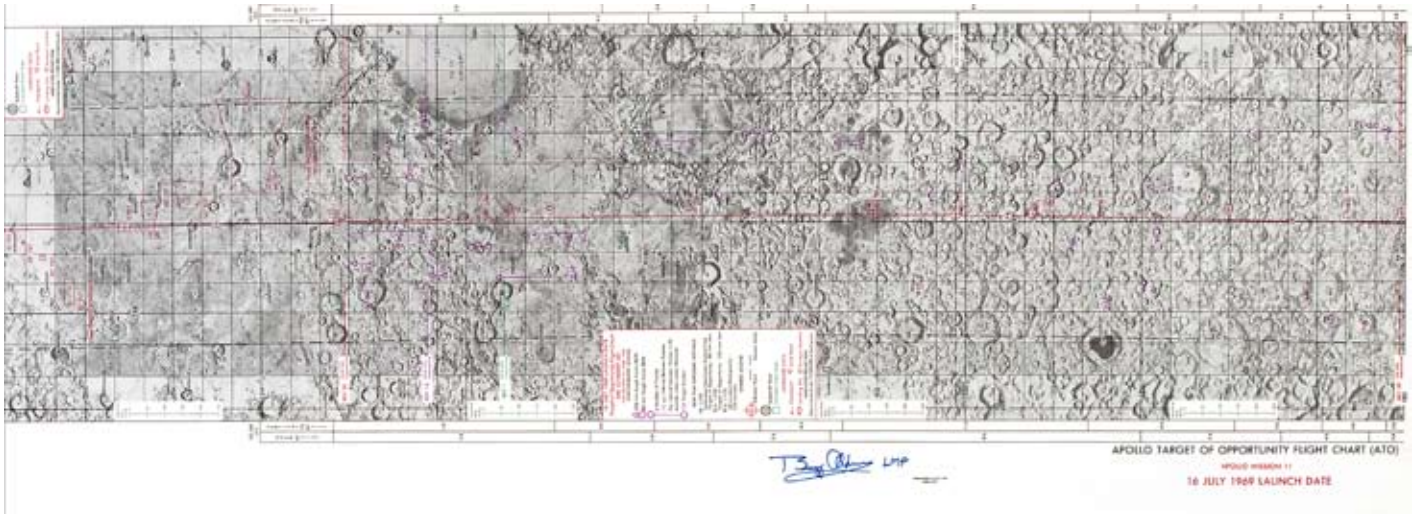
The iconic image of man on the moon, boldly inscribed with Aldrin's first words after stepping onto the surface: *"Magnificent Desolation, Buzz Aldrin."*
$600 - 800

209
NEIL ARMSTRONG SIGNED ECLIPSE CRUISE PROGRAM.
"African Eclipse Cruise: Staff Biographies and Course Offerings." Cunard/ Eclipse Cruises Inc., 1973. 17 pp. 10 by 6½ inches. Heavy card stock covers, stapled. Ownership inscription of Mark Chartrand, Astronomer American Museum-Hayden Planetarium, on front cover.

Issued by Cunard for passengers aboard the cruise ship Canberra during the African Eclipse of 1973. The program provides biographies of over 30 important explorers, scientists, and artists who made this cruise, and is signed by many of them, including: Neil Armstrong, Scott Carpenter, and Isaac Asimov; scientists and astronomers Dick Athey, Franklyn Branley, Mark Chartrand, and Fred Hess; Walter Sullivan, *New York Times* science editor.
$1,500 - 2,000

210
ARMSTRONG AND THE CHALLENGER ACCIDENT INVESTIGATION.
Color photolithograph, 10 by 8 inches, of the first launch of Space Shuttle Challenger in 1983, printed caption on verso.

This shuttle would be destroyed during launch less than three years later in January 1986.
Signed during the 1986 Presidential Commission hearings by Vice Chairman Neil Armstrong, Chairman William P. Rogers, Astronaut Sally K, Ride, Major Gen. Don Kutyna, and Admiral Richard Truly.
$1,500 - 2,000



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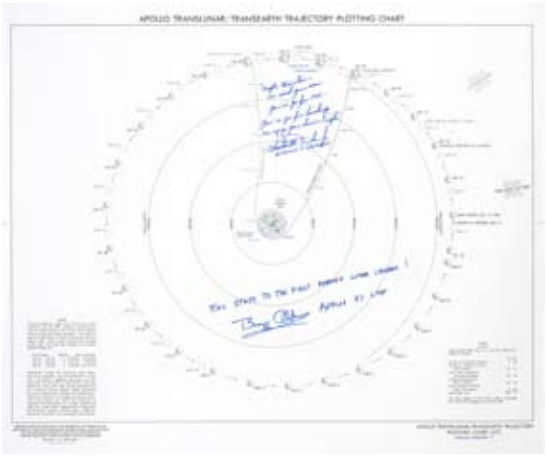


212

APOLLO 11 CHARTS

All charts were made for NASA by Aeronautical Chart and Information Center (ACIC) of the United States Air Force (USAF), unless otherwise noted. These charts were designed for use by astronauts and flight planner/controllers for training and flight support use. Earth and lunar orbit charts have full 360 degree longitudinal coverage and latitude coverage from usually from 45 degrees north and south from the equator.

211
THE BEGINNING OF THE PATH TO THE MOON.
"Apollo Earth Orbit Chart (AEO). Apollo Mission 11 … For July 1969 Launch Dates," color Earth maps, 3 sheets, 13½ by 41½ inches each.

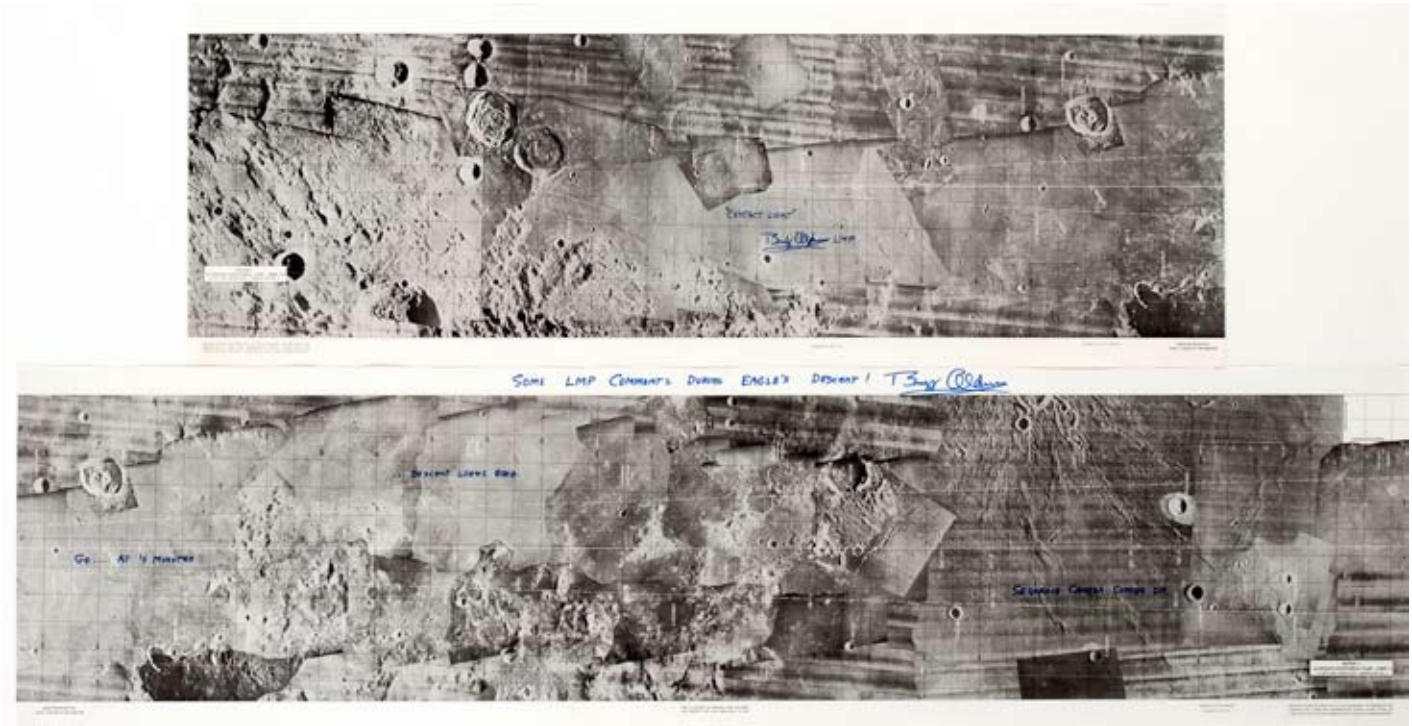
Series of three Earth charts, annotated by Buzz Aldrin, plotting the individual orbital paths of the Apollo 11 vehicle after launch from the Kennedy Space Center. Circular plots in black represent the ground communication coverage areas, the ones in red are ocean stationed tracking ships. Orbital paths on all three sheets show the full launch range azimuths of 72 to 108 degrees. Sheet 1 plots the launch path leaving Florida and the initial earth orbit. Signed: "*Buzz Aldrin, LMP.*" Sheet 2 plots the entire second earth orbit and shows the path of the first Translunar Injection (TLI) burn initiation opportunity. Inscribed: "*GO or NO-GO?*" Sheet 3 has the possible third earth orbit and the second TLI burn initiation opportunity. Inscribed: "*Go for TLI! Buzz Aldrin.*"
$800 - 1,200

212
APOLLO 11 TRAJECTORY CHART–JOURNEY TO THE MOON.
"Apollo Translunar / Transearth Trajectory Plotting Chart (ATT), Apollo Mission 11," Aeronautical Chart and Information Center, June 23, 1969, 24 by 20 inches.

Inscribed by Aldrin: *"Key steps to the first lunar landing! Buzz Aldrin, Apollo XI LMP."* Also inscribed and signed by capsule communicator (CapCom) Duke with: *"'Eagle, Houston - We read you now ... You're go for PDI ... You're go for landing ... We copy you down, Eagle.' Charles M. Duke, Jr., Apollo 11 CAPCOM."*
The chart is centered on a north polar view of the Earth and displays a month's orbital path of the moon around the Earth. The Apollo 11 flight profile is plotted and events such as earth launch, translunar injection, lunar and earth coast phases, lunar orbit insertion, lunar landing - liftoff, and transearth injection are listed.
$1,500 - 2,000

213
"TARGET OF OPPORTUNITY" CHART.
"Apollo Target of Opportunity Flight Chart (ATO). Apollo Mission 11. 16 July 1969 Launch Date," chart based on lunar orbiter photography, revised 26 June 1969, 14 by 58½ inches.

The Sea of Tranquility is shown towards the center of the chart. *Signed "Buzz Aldrin LMP" in the lower margin.*
$800 - 1,200



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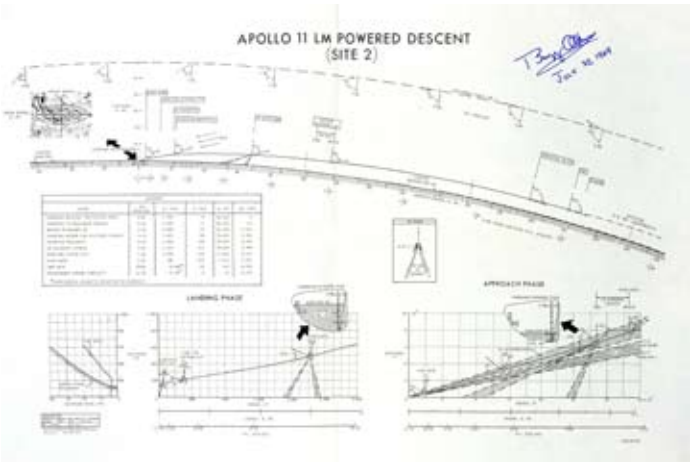

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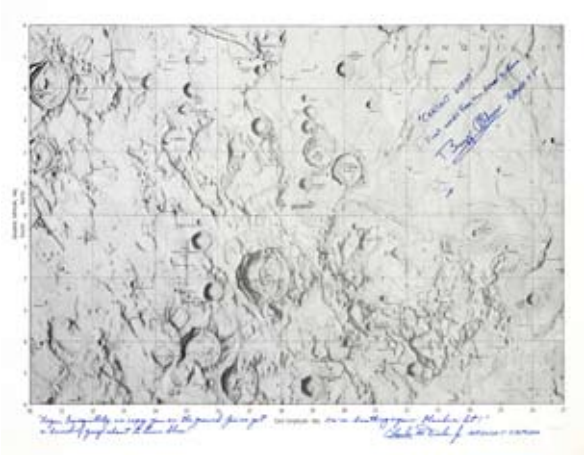
214
THE PATH OF THE FIRST LUNAR LANDING.
"Edition 1. LM Descent Monitoring Chart … 16 July 1969 Launch Date – Landing Site No. 2," 2 charts based on lunar orbiter photography, Sheet 2 and Sheet 3A, 12½ by 48 and 12½ by 36 inches respectively.

Two charts identical to the ones flown in the Lunar Module Eagle during the Apollo 11 mission showing the flight path from orbit down to the lunar landing site. Inscribed and signed by Buzz Aldrin with quotations from his Apollo 11 flight communications.
Sheet 2 marks events beginning 4 minutes before the LM's Power Descent Initiation (PDI) at the far right and counts down in white lettering at one minute intervals. The actual point of PDI is labeled and occurs near the chart center. An increasing time count is labeled at 20 second intervals until T + 4 minutes to the far left. During the flight period on this chart, the LM was face down which allowed Armstrong and Aldrin to view these lunar features outside their windows. Sheet 3A continues Sheet 2 and maps the final steps of Eagle's landing from 2+40 (minutes and seconds) into the PDI burn all the way down to the landing ellipse area some 9+ minutes into that burn. By PDI 4 minutes, Eagle had rolled to crew windows face up which allowed the landing radar to acquire the surface. Grid patterns printed in black mark every 30 minutes of latitude and longitude. The planned LM descent path center line and viewing limits are printed in white.
Buzz Aldrin has inscribed the maps near the points at which he made the original radio communications, as follows: "*Go …. At 4 Minutes,*" "*… Descent Looks Good,*" "*Sequence Camera Coming On,*" and "'*Contact Light' Buzz Aldrin LMP.*" The top margin of the first sheet is inscribed: "*Some LMP Comments During Eagle's Descent! Buzz Aldrin*."
$4,000 - 6,000

215
APOLLO 11 LM POWERED DESCENT.
"Apollo 11 LM Powered Descent (Site 2)," diagram, NASA/MSC/FOD Mission Planning and Analysis Division, June 27, 1969, 22 by 17 inches.

Signed *"Buzz Aldrin, July 20, 1969."* A highly detailed diagram illustrating the complex flight maneuvers required by Neil Armstrong and Buzz Aldrin to land safely on the surface of the moon.
The upper part features the full descent profile of Lunar Module Eagle starting with the fuel tank ullage before PDI, the start of PDI, throttle to full power, the rotation to crew windows up, and the LM "high gate" point. The approach phase and the landing phase are the lower side graphs, with altitude versus range to the landing point plotted. Each has the view expected from Armstrong's window and the descent path angles, radar view angles, and elapsed time into the engine burn. A smaller graph provides abort information. A summary table cross references landing events with the associated elapsed time, forward velocity, H and H dot parameters.
$700 - 900



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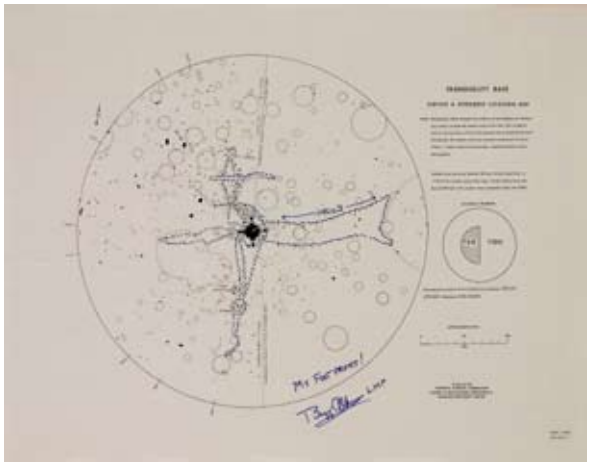

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218

216
TRANQUILITY BASE.
A chart of the Mare Tranqillitatis, captioned simply *"MSC-6132-69,"* 22 by 17 inches.

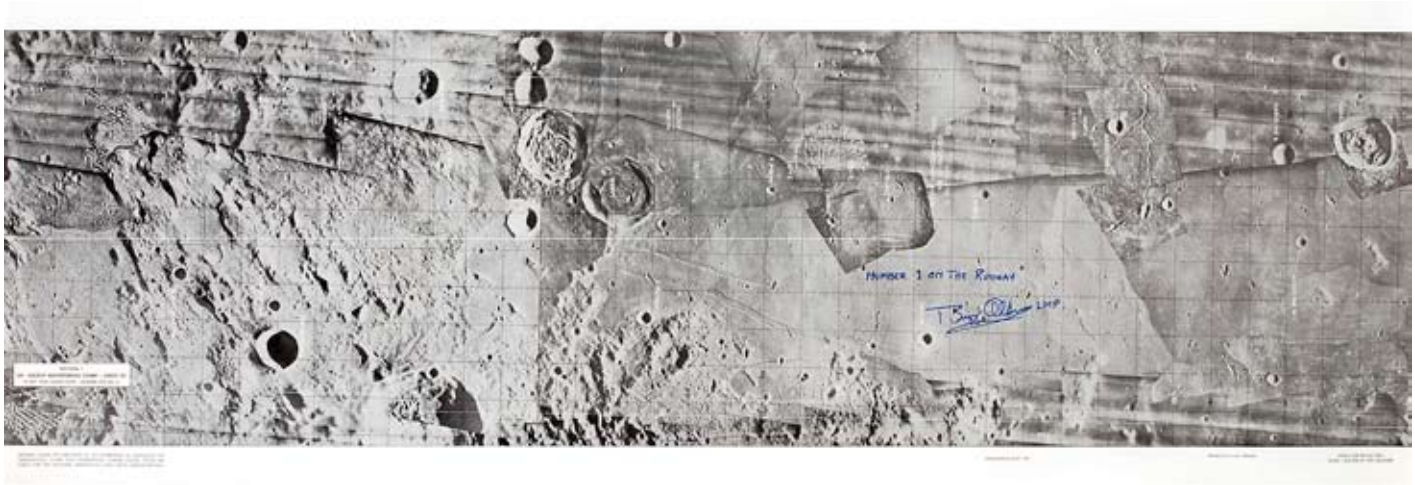
A chart of the area where man first landed on the moon, with inscriptions by the Lunar Module Pilot and Mission Control Capsule Communicator. All larger craters are identified and with elevation contours plotted. Inscribed by Aldrin with: *"'Contact light', first words from the lunar surface, Buzz Aldrin, Apollo XI,"* and marked with an X at the landing site. Apollo 11 CapCom Charles Duke has also inscribed *"Roger, Tranquillity, We copy you on the ground. You've got a bunch of guys about to turn blue! We're breathing again. Thanks a lot! Charles M. Duke, Jr., Apollo 11 Capcom."* This was the statement transmitted by Duke after Neil Armstrong's historic words of: "Houston, Tranquillity Base here. The Eagle has landed!"
$2,000 - 3,000

217
APOLLO 11 TRANQUILITY BASE MAP–FOOTSTEPS.
"Tranquillity Base: Surface and Experiment Locations Map," Mapping Sciences Laboratory, MSC, 1970, 22 by 17 inches.

A highly detailed surface map of the Apollo 11 landing area, partly based on surface photography by the crew. Inscribed *"My Footprints! Buzz Aldrin, LMP."* He has marked his footprints made during the moon walk, as well as Armstrong's sample collection trek to Little West crater. Eagle's position is shown at the center, and the map shows the locations of the TV camera, US flag, laser reflector, solar wind experiment, seismometer, and most craters.
$1,500 - 2,000

218
THE LUNAR MOONWALKS.
"Apollo 11, 12, and 14 Traverses," lithograph printed in green and black, prepared by the USGS for the Defense Mapping Agency for NASA, detailed legend, 29 by 21 inches.

Stunning graphic illustration of Man's expanding lunar surface footpaths over the first three landing missions, boldly inscribed and signed by three moonwalkers. This chart shows the brief excursion by Armstrong and Aldrin—staying within 200 feet of the LM, then Conrad and Bean's roughly 1,300 foot trek away from the LM, and finally the nearly one mile long traverse by Shepard and Mitchell toward Cone Crater.
Aldrin has signed next to the Little West Crater: "*July 20-21, 1969 / Buzz Aldrin LMP.*" Above the Apollo 12 map, Bean writes: "*Pete and I ran and walked around this small part of the Ocean of Storms on November 19 & 20, 1969. Alan Bean, Apollo XII.*" Lastly, underneath their route Mitchell has inscribed: "*The longest "Moon walk" during the Apollo program. Edgar Mitchell, Apollo 14, Feb. 1971.*"
Apollo 11 is at 1:250 scale and shows the Little West Crater area, the U.S. flag, and surface experiment areas. Apollo 12 is at 1:2,500 scale and outlines both surface explorations. Included are ALSEP placement, the mysterious large and small mounds, all surrounding craters, and the Surveyor III landing site of 1967. Apollo 14 is at 1:4,000 scale and has the dual traverses to the ALSEP area, geophone line placement, and the long trek to Cone Crater. The sample collection site of "C1" shows how close Shepard and Mitchell really were to the edge of Cone.
$3,500 - 4,500



219

219
"NUMBER 1 ON THE RUNWAY."
"Edition 1. LM Ascent Monitoring Chart—Sheet 3B. 16 July 1969 Launch Date—Landing Site No. 2," chart based on lunar orbiter photography, 12½ by 35¾ inches.

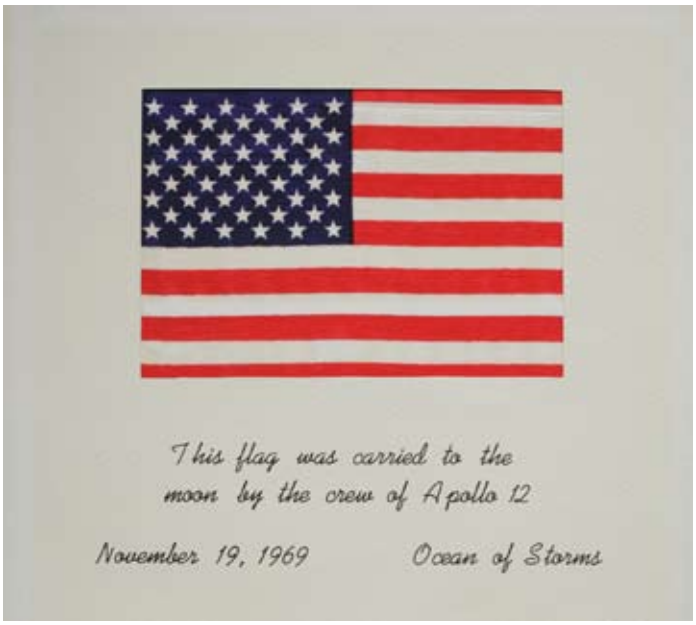
Ascent path chart identical to the one flown in the Lunar Module Eagle during the Apollo 11 mission, showing the flight path from Tranquility Base to lunar orbit.
Signed and inscribed by the Lunar Module Pilot, Buzz Aldrin: "'Number 1 on the Runway' / Buzz Aldrin LMP." The quote is the radio call Aldrin gave to Mission Control acknowledging that they had a GO for lunar lift-off.
A white line from the landing ellipse to the left shows the planned LM ascent path and has time hacks from lunar lift-off plus 2 through 7. Craters that the crew could view during their climb to lunar orbit are labeled.
$2,000 - 3,000

220
APOLLO 11 LM POWERED ASCENT.
"Apollo 11 LM Powered Ascent (Site 2)," diagram, NASA/MSC/FOD Mission Planning and Analysis Division, June 30, 1969, 22 by 17 inches.

Signed *"Buzz Aldrin, July 21, 1969."* The companion to the descent diagram (lot 215).
The upper part features the full ascent profile of Lunar Module Eagle starting with lift-off from the surface, pitch over, surface crater recognition, and orbit insertion. The altitude location of Columbia is plotted above Eagle's ascent profile.
The vertical phase of lift-off is shown with a down-range versus altitude graph plus two matching views as seen from Armstrong's docking window. A lunar map plots a wide view of the LM ground track up to the sunlight terminator point. A summary table cross-references lift-off and end of vertical rise with the corresponding elapsed time, altitude rate, altitude in feet, and several other CSM–LM related parameters.
$700 - 900

221
US FLAG CARRIED TO THE MOON ON APOLLO 12.
Flown Flag, silk, 3¾ by 5½ inches. Carried on Apollo 12. Mounted on 12 by 9 inch printed certificate.

This flag was carried inside Command Module Yankee Clipper. The certificate reads: "*This flag was carried to the moon by the crew of Apollo 12, November 19, 1969 - Ocean of Storms*." The bottom of the certificate bears a 3 by 2½-inch metal replica of the plaque on the landing leg of Lunar Module Intrepid which landed on November 19, 1969.
$4,000 - 6,000



221 (detail)

The following four lots were originally in the collection of Astronaut Charles Conrad.

222
APOLLO 12 CREW EMBLEM–CARRIED TO THE LUNAR SURFACE.
Flown Apollo 12 emblem, cloth, 4 inches in diameter. Features a Clipper ship above the moon. Mounted on a Typed Letter Signed by Charles Conrad on his personal stationery.

A crew "patch" taken to the lunar surface by Apollo 12 Commander Charles Conrad.
He explains: *"This Apollo XII cloth patch is from my personal collection. Our Apollo XII emblem had several variations made in patch form. Those variations consisted of different colors and shades of thread, the placement of the background stars, and thickness of the dust trail behind the clipper ship above the Moon. One production run even had a hidden number "12" in the dust trail. The blue and gold colors are symbolic of my all-Navy crew. Our mission to the Moon began on November 14, 1969. Alan Bean and I made the second lunar landing of the Apollo program on November 19. This patch was carried in the Lunar Module Intrepid and spent over 31 hours on the lunar surface. The flight lasted just over 10 days, returning to Earth on November 24, 1969."*
$7,000 - 9,000

223

223
APOLLO 12 LM STRAP WITH LUNAR DUST–USED INSIDE INTREPID ON THE MOON.
Flown Apollo 12 Lunar Module Interim Stowage Strap. Brown Teflon-coated fabric with 2 snap-buttons and 2 Velcro patches. 10 inches long. A printed label reads *"SEB 33100015-302, S/N 1149."*

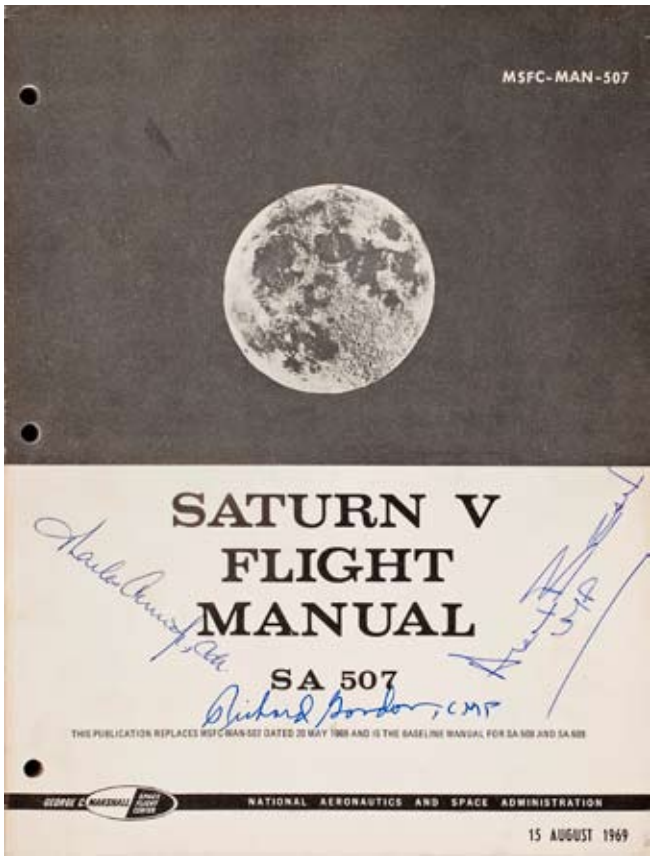
The Apollo 12 flight had two extensive surface explorations where Conrad and Bean accumulated a large amount of lunar dust on their space suits and flight equipment. During their 31-hour surface stay, this strap was exposed to lunar dust carried into the LM by the crew.
Accompanied by an Autograph Note Signed by Charles Conrad, which reads: *"This 'Interim Stowage Strap' ... was flown to the lunar surface aboard the Lunar Module Intrepid during the flight of Apollo XII. It was used to secure lunar exploration equipment and logged over 31 hours on the moon's surface during November 19-20, 1969. The strap is listed on page 63 of the Apollo XII stowage list. It has been in my personal collection since I returned from the moon."*
A copy of page 63 from the Apollo 12 stowage list is included, together with an analysis of the embedded material, on Conrad's personal stationery.
$15,000 - 20,000

222 (detail)

224
STARS AND STRIPES CARRIED TO THE LUNAR SURFACE.
Flown Apollo 12 lapel pin, 10k gold, ¾ inch. In the shape of the moon with a US flag near the center. The reverse with text reading: *"Flown to the Moon by an Intrepid crew, Apollo XII, November 1969,"* with Navy wings and the crew names.

Accompanied by an Autograph Note Signed by Commander Charles Conrad, which reads in part: *"This gold lapel pin is one of 50 flown to the lunar surface during the flight of Apollo XII … This pin was on the lunar surface for over 31 hours on November 19-20, 1969. This is a special engraving on the back of the pin. It is from my personal collection."*
$4,000 - 6,000

224



228

225
FLOWN APOLLO 12 70MM FILM SEGMENT.
70mm Hasselblad camera film segment, ½ by ¼ inch. Taped onto a certificate of Richard W. Underwood, Supervisory Aerospace Technologist at the Manned Space Center.

The film was taken from the Hasselblad camera film roll that was out on the lunar surface during moon walks.
The certificate is inscribed by Charles Conrad (*"From my personal collection, Charles Conrad"*) and signed by Apollo 12 Lunar Module Pilot Alan Bean.
$800 - 1,200

226
APOLLO 12 BETA CLOTH EMBLEM.
Apollo 12 crew emblem, 3 inches in diameter, printed on Beta cloth, 9 inches square.

Signed by the Apollo 12 crew: Charles Conrad, Alan Bean, and Richard Gordon.
$600 - 800

227
FLIGHT PLAN FOR THE SECOND LUNAR LANDING.
Final Apollo 12 Flight Plan, AS-507/CSM-108/LM-6. Houston, TX: NASA/MSC, October 15, 1969. Upwards of 275 pp. 10½ by 8 inches. Heavy card stock cover, punched and with staples removed.

Signed by Alan Bean and Richard Gordon on front cover as Apollo 12 LMP and CMP. The step-by-step timeline for the second lunar landing. The flight plan is divided into six sections covering general information, mission objectives, a detailed timeline, consumables, abbreviated timeline, and alternate missions.
$700 - 900

228
APOLLO 12 SATURN V FLIGHT MANUAL.
Saturn V Flight Manual - SA 507. NASA/MSFC, August 15, 1969. Upwards of 255 pp. Half-tone illustrations of fuel tanks, rocket engines, vehicle stages, and other structures. 10 ½ by 8 inches. Original printed wrappers, punched.

An authoritative reference to the Saturn V moon rocket, for the use of the Apollo 12 astronauts and their support crews, and *signed by Charles Conrad, Richard Gordon, and Alan Bean on the front cover with their roles.* Subjects covered are vehicle performance data, the emergency detection system, vehicle stages, range safety and guidance instrumentation, the lunar mission profile, and ground launch support facilities.
$800 - 1,200

229 °
TECHNICAL REFERENCE FOR APOLLO 12.
Technical Information Summary: Apollo 12 (AS-507). Apollo Saturn V Space Vehicle. Huntsville, AL: NASA, November 1, 1969. 94 pp. 11 by 8½ inches. Card stock covers, staples removed.

Signed by Charles Conrad, Richard Gordon, and Alan Bean on the front cover with their mission roles. A quick yet detailed reference guide to the Saturn V moon rocket. A yellow sheet loosely inserted states that this was the last document of this type to be printed for the Apollo flight program and should be retained for the remaining lunar missions. All major flight events, including the countdown sequence flow, are illustrated with a total of 57 line drawings.
$500 - 700

230 °
APOLLO 12 PRESS KITS.
Two general press releases by NASA Headquarters and the Department of Defense (DoD) related to details of the Apollo 12 flight, distributed at news centers at NASA HQ, KSC, MSC, and on the primary recovery ship USS *Hornet*:
1. "Press Kit ... Apollo 12." Washington: NASA/HQ, November 5, 1969. 104 pp. Punched and with staple-holes.
2. "Apollo 12 Press Kit. Manned Spacecraft Recovery Force." Norfolk, VA, 1969. 56 pp. Card stock covers, staple-holes.
Together, 2 items. 10½ by 8 inches.

Both signed by Charles Conrad, Richard Gordon, and Alan Bean on covers, some with their mission roles.
$400 - 600

231 °
LUNAR PHOTOGRAPHY FROM THE SECOND LUNAR LANDING.
"Apollo Mission 12 Lunar Photography Indexes." NASA, March 1970. 4 folding lunar surface map sheets, each 57 by 10 inches, with the image viewing angles of each frame plotted. 10½ by 8 inches. Card stock covers, stapled.

Signed by Charles Conrad, Richard Gordon, and Alan Bean on front cover with their mission roles. Covers photography from 70mm color, special SO-158 80mm magazines, and 16mm motion picture cameras from the CSM and LM.
$250 - 350

232 °
THE APOLLO 12 CREW.
Color photolithograph, 10 by 8 inches, of the Apollo 12 crew posing in front of a LM trainer while wearing their white space suits, printed caption on verso.

Signed by Charles Conrad, Richard Gordon, and Alan Bean on verso with their mission roles.
$300 - 400

233 °
CONRAD MEETS SURVEYOR 3.
Black and white photolithograph, 8 by 10 inches, of Astronaut Charles Conrad inspecting the robotic Surveyor 3 spacecraft during the second lunar EVA of Apollo 12, the LM visible on the far horizon, printed caption on verso.

Signed by the photographer, Alan Bean, on verso.
$100 - 200

FRED HAISE [Born 1933]

Fred Haise was a Marine Corps fighter pilot who joined NASA as a test pilot in 1959. He became an astronaut in 1966, and flew as the Lunar Module Pilot on the aborted Apollo 13 mission. He was also scheduled as Commander for the canceled Apollo 19 project and later flew three landing test flights as the Commander of the Space Shuttle Enterprise.

The following 18 lots are directly from the collection of Apollo 13 Lunar Module Pilot Fred Haise.

234
FLOWN US FLAG & APOLLO 8 EMBLEM PRESENTED TO FRED HAISE.
Flown US Flag, silk, 6 by 4 inches, and Flown Apollo 8 Crew Emblem, cloth, 4-inch triangle. Both carried on Apollo 8. Mounted on a printed certificate. Framed to 13 by 16 inches.

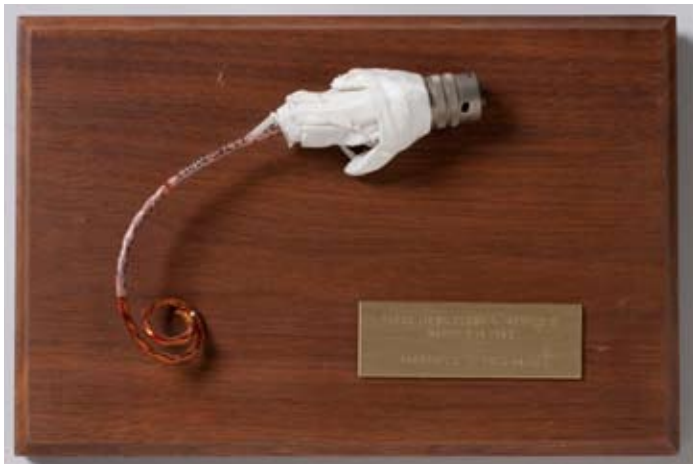
The certificate reads: "*Presented to Apollo 8 back-up Lunar Module Pilot Fred Haise from the Apollo 8 flight crew.*" It is signed by Frank Borman, James Lovell, and Bill Anders. The back of the frame has been inscribed: "*From my personal collection, Fred Haise, Apollo 8 Back-Up LMP.*"
$8,000 - 12,000

235
APOLLO 9 FLIGHT COMPONENT.
Flown on Apollo 9, a electrical connector with Beta cloth protective wrapper, 3 by 1 inches with a 6 inch long wire lead. Mounted on wooden presentation board with a brass plaque reading: *"These items flown on Apollo IX, March 3-13, 1969. Presented to: Fred Haise."* The back is covered with green felt and inscribed *"From my personal collection, Fred Haise, Apollo 9 Support Crew, Apollo 13 LMP."*
$1,500 - 2,000

236
STARS AND STRIPES CARRIED ON APOLLO 13.
Flown US Flag, silk, 6 by 4 inches.

Inscribed by Fred Haise: "*Flown around the moon on Apollo 13 Fred Haise LMP.*" Accompanied by a Typed Letter Signed by Haise, which reads in part: "*The United States flag displayed below was carried around the moon on the flight of Apollo 13 during April 11 to 17, 1970. The flag was stowed in my Lunar Module Personal Preference Kit (PPK) and was scheduled to be taken to the lunar surface during third manned lunar landing. However, at about 56 hours into the mission, an oxygen tank explosion in our Service Module caused a major loss of electrical power to the Command Module. Jack Swigert first radioed: 'OK, Houston, we've had a problem here.' Then Commander James Lovell clearly called Mission Control with: 'Houston, we've had a problem!' / This event caused a scrub of the lunar landing and forced us to move into the Lunar Module in order to survive a four day journey around the moon and return back to earth. Countless individuals from NASA and our contractor teams worked around-the-clock to ensure our safe return.*"
$5,000 - 7,000

234

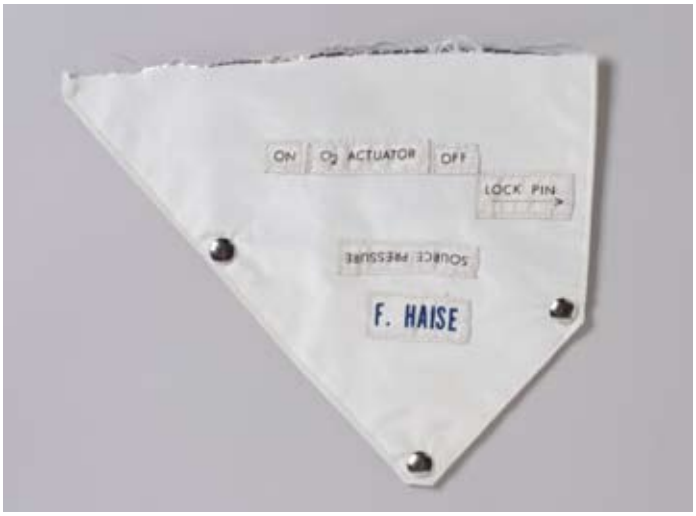

235

236 (detail)

237

237
FLOWN APOLLO 13 NASA EMBLEM AND NAME TAG.
NASA emblem and name tag, Beta cloth, the emblem 4 by 4 inches, the *"F. HAISE"* name tag 2½ inches long. Sewn onto a segment of the Portable Life Support System's (PLSS) thermal jacket cover made of Teflon-coated filament Beta cloth.

Planned to be part of lunar surface explorations - Fred Haise's identification tags removed from his space suit "backpack" prior to jettison of the Lunar Module during the flight of Apollo 13.
Accompanied by a Typed Letter Signed by Haise, which reads in part: *"Our flight was scheduled to land at the Fra Mauro region of the moon. Jim Lovell and I planned to take Lunar Module "Aquarius" down to the lunar surface for about 33 hours. During that period we would venture outside the LM wearing our space suits for two lunar surface EVAs lasting about 4 hours each. We of course needed oxygen to breathe and water for cooling during those EVAs. We each carried our own personal PLSS on our backs which supplied us those needs. They were identified by means of name tags sewn on the outer cover of their thermal jackets.*



238

Since the oxygen tank explosion forced cancellation of the lunar landing, our PLSS units were not used on the moon. After almost 4 days of emergency operations to enable our return to earth, we were at the point to jettison Aquarius before our re-entry in our Command Module "Odyssey." Prior to jettison, I cut this emblem and name tag from my PLSS cover as a reminder of what might have been."
The PLSS was secured to the back of each astronaut's Pressure Garment Assembly (PGA, commonly called the space suit) by means of straps and had hose connector assemblies to carry oxygen for breathing and water for cooling. The PLSS also removed exhaled gases and moisture from the PGA. The thermal jacket from where this NASA emblem and name tag were removed was designed to provide protection from thermal and micrometeoroid hazards encountered in the vacuum on the lunar surface.
$7,000 - 9,000

238
FLOWN APOLLO 13 OPS FLAP AND NAME TAG.
Flap segment from the Oxygen Purge System's (OPS) thermal jacket cover, Teflon-coated filament Beta cloth, 12 by 10 inches. Irregularly-shaped, with six identification and instruction Beta tags sewn on, which read *"ON," "O2 ACTUATOR," "OFF," "LOCK PIN [with arrow]," "SOURCE PRESSURE [upside down],"* and *"F. HAISE."* 3 metal snap-buttons are along the outer edges. The interior has 7 layers of perforated aluminized mylar and 6 layers of non-woven dacron, all to provide thermal and micrometeoroid protection.

Accompanied by a Typed Letter Signed by Fred Haise, which begins similarly to that in the preceding lot, and continues: *"During the EVAs we would wear our space suits with the Portable Life Support Systems (PLSS) and Oxygen Purge Systems (OPS) strapped onto our backs. The OPS was designed to provide an emergency supply of oxygen in case a failure occurred with our PLSS unit. That was comforting to know since we would be at least 30 minutes away from the LM while at the edge of Cone Crater."* He discusses the explosion that prevented the lunar landing, and explains: *"Prior to jettison, I cut this flap segment off my OPS cover that had my name and instruction tags. I have kept it in my personal collection as a reminder of the lost once in a life time opportunity."*
The OPS was mounted on top of the PLSS and both were worn on the back of each astronaut's Pressure Garment Assembly (PGA) by means of straps. The OPS was designed to supply the Extravehicular Mobility Unit (or EMU, which was the entire PGA, PLSS, and associated equipment) with an oxygen purge flow during possible failures of the EMU. It also prevented excessive carbon dioxide and provided limited cooling for the astronaut.
$5,000 - 7,000

239

239
SPACE SUIT STRAP-ON POCKET USED ON APOLLO 13.
Checklist and scissors pocket assembly, Beta cloth, designed to strap around the leg of a space-suited astronaut, comprising 2 bags. The larger bag is 9 by 7 by 2 inches, and has a large Velcro-sealed flap, a metal snap-button on the interior flap, and a label on the back reading *"Part No. A7L-201123-01, S/N 024, Code Ident. 74897."* The smaller bag is 9 by 3 inches and of similar design. A plastic tab is attached to its snap-button, with a 45-inch long brown nylon lanyard designed to be tied to the scissors. The tab is printed with *"SDB 42100118-702, SN 1054."* The 2 pockets are stitched onto twin 30-inch belts that allow placement around the space suit leg and are held in place by velcro connectors looping through 2 rectangular metal rings.

A space-suit leg strap-on checklist and scissors pocket assembly used by Fred Haise during the Apollo 13 flight. Accompanied by a Typed Letter Signed by Fred W. Haise, which reads in part: *"This pocket checklist assembly was strapped over my right space suited leg during launch and over my IVA coveralls at most other times during the Apollo 13 flight. The smaller pocket held my flight scissors. The brown lanyard was used to help secure those scissors during the weightless conditions of space flight. I used the scissors primarily to open food packages. Jim Lovell and Jack Sweigert used our flight scissors to manufacture the make-shift Lithium Hydroxide canister to reduce the carbon dioxide build-up in the Lunar Module. The assembly was a very useful component of our personal flight equipment."*
$6,000 - 8,000

240

240
FLOWN APOLLO 13 SUNGLASSES AND CASE.
Standard-issue military sunglasses (model Flight Goggle 58, also known as Original Pilot Sunglass) by American Optical, in gold-colored metal with straight-prong supports and green lenses. An identification stamp along the right support reads: *"SEB12100033-201 S/N 49."* Contained in a protective case, Beta cloth, with an interior plastic stiffener and snap-button fastener. A label on the front of the case reads: *"P/N SEB 12100034-203, S/N 1043."*

Accompanied by a Typed Letter Signed by Fred Haise, which reads in part: *"These sunglasses were worn and used on the flight of Apollo 13. They were helpful in reducing the glare of sunlight coming through the spacecraft windows. They would have greatly assisted my ability to identify landmarks on the moon had we followed the normal mission plan and entered lunar orbit."*
$3,000 - 4,000

241

241
FLOWN APOLLO 13 PILOT'S PREFERENCE KIT.
Draw-string bag, Beta cloth, 8 by 6 by 2 inches. A sewn-on Beta cloth tag reads: *"Kit Pilot's Preference, P/N SEB 12100018-202 S/N 1075."* A hand-written silver tape label reads: *"Shave Kit, 4 of 12."*

Accompanied by a Typed Letter Signed by Fred Haise, which reads in part: *"Apollo Astronauts were allowed to carry a small number of personal mementos inside Beta cloth containers called PPKs or Personal Preference Kits. But since these bags were a convenient design to carry all sorts of crew personal equipment, some were used to store hygienic items such as this 'Shave Kit.' This PPK has been in my personal collection since my return from the flight of Apollo 13. The number of items that one could carry was limited in both weight and volume. For example, I could not carry a set of Rosary beads for an aunt because of that constraint but did remove and carry the crucifix."*
$4,000 - 6,000

242

242
FLOWN APOLLO 13 WRIST WATCH STRAP.
Wrist watch strap, 22 inches long, ¾ inch wide. With 18 inches of Velcro loop and 3 inches of Velcro hook material on one side. A rectangular metal loop is at one end, and a dark green nylon identification tag at the other, read: *"P/N SEB 12100030-202, S/N 1074."*

This long strap allowed the Omega watch worn by Fred Haise during Apollo 13 to fit around the large left wrist of his Apollo space suit. Accompanied by a Typed Letter Signed by Haise, which reads in part: *"I wore this watch band around my left arm while wearing my space suit during the Saturn V launch phase. While wearing my IVA coveralls, I wrapped this strap several times around my arm before fastening the velcro closure."* The Omega Speedmaster Chronograph itself is in the Smithsonian NASM.
$1,500 - 2,000

243
ROBBINS MEDALLION CARRIED ON APOLLO 13.
Flown on Apollo 13, a Robbins medallion, sterling silver, 1 ½ inches in diameter. The crew mission emblem is on the obverse, the crew names and mission dates on the reverse.

Accompanied by a Typed Letter Signed by Fred W. Haise, which reads in part: *"Accompanying this letter is a Robbins sterling silver medallion that was flown on the flight of Apollo 13 during April 1970. The launch date of 'April 11, 1970' and our return date of 'April 17, 1970' are engraved on the reverse side. It is serial number 342 of the Robbins series for Apollo 13. We as a crew had the initial crew emblem idea of the mythical god Apollo driving his horse drawn chariot across the sky dragging the sun with him. We passed this idea to artist Lumen Winter who created the emblem of three horses traveling from the earth, symbolizing the three astronauts of an Apollo mission. He placed the horses above the moon with the sun in the background. It is interesting to note that this design resembles a painting he did for the St. Regis Hotel in New York City which featured three horses racing across a cloud-filled sky, with a fourth horse falling behind. It is a bit ironic about that fourth horse, because just a few days before our launch, Command Module Pilot Thomas K. (Ken) Mattingly had to be replaced by Jack Swigert due to a potential illness.*
That substitution dictated a return of the flown medallions to Robbins for melting and a restrike with a corrected die having the valid crew names on the back. Additionally, since we did not make a lunar landing, only two engraving blanks were placed on the reverse side for the launch and return dates.
I hereby certify that this Robbins medallion with serial number 342 is one of the genuine revised medallions made from the original flown metal. It has been in my personal space artifact collection since 1970 ... The flight was scheduled to be the third manned lunar landing mission, but those plans were aborted due to an oxygen tank explosion in our Service Module."
$4,000 - 6,000

244

245 (detail)

246

244
SNOOPY LAPEL PIN CARRIED ON APOLLO 13.
Flown Snoopy Lapel Pin, sterling silver, approximately ½ inch tall. Features the *Peanuts* comic strip character Snoopy wearing a space suit.

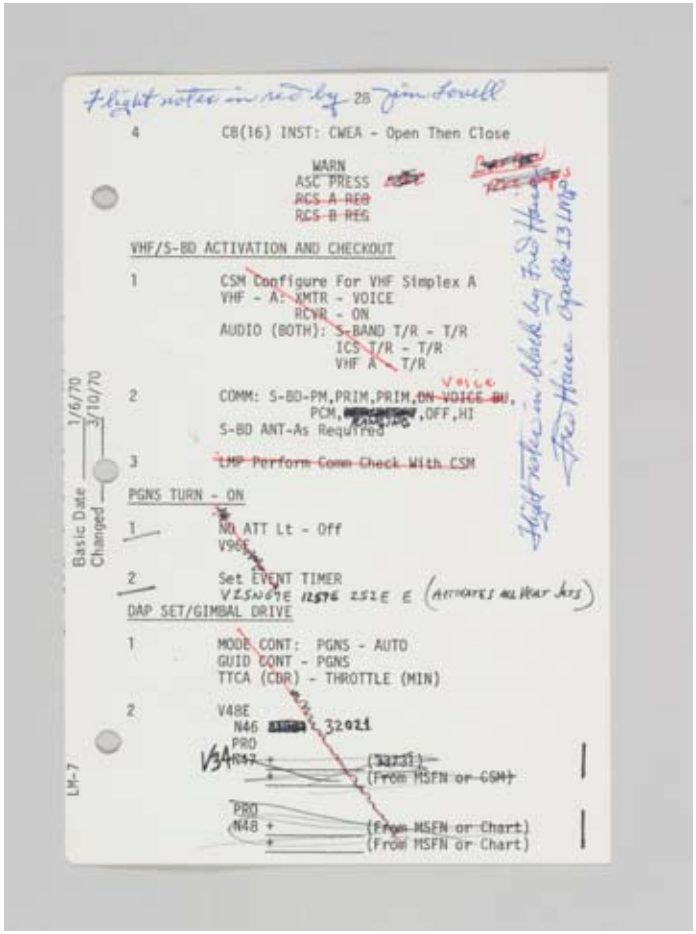
Accompanied by a Typed Letter Signed by Fred W. Haise, which reads in part: *"Accompanying this letter is a "Silver Snoopy" lapel pin which was carried around the moon on Apollo 13 during April 11 to 17, 1970 ... Snoopy was adopted as the official NASA Manned Flight Awareness (MFA) mascot early in the Apollo Program. These pins were awarded personally by an Astronaut to workers throughout the Apollo Program, both within NASA as well as contractors. These individuals were judged to have performed outstanding service toward the success of the Mission. This 'Silver Snoopy' has been in my personal space artifact collection since 1970 ... The flight was scheduled to be the third manned lunar landing mission, but those plans were aborted due to an oxygen tank explosion in the Service Module. James Lovell, Jack Swigert, and myself used the Lunar Module as a 'life boat' during the four day flight around the moon and back to earth."*
$2,000 - 2,500

245
EMBLEM CARRIED ON APOLLO 13.
Flown Apollo 13 emblem, 4 inches in diameter, printed on Beta cloth, 8 inches square.

Inscribed *"Flown to the moon on Apollo 13, Fred Haise, Apollo 13 LMP."*
$3,000 - 4,000

246
CREW EMBLEM CARRIED ON APOLLO 13.
Flown on Apollo 13, an embroidered cloth crew mission emblem, 4 inches in diameter. Mmounted under acrylic onto a shield-shaped wooden plaque. The back of the plaque is inscribed: *"This crew patch was flown on Apollo XIII. From my personal collection. Fred Haise, Apollo XIII LMP."*

"The Latin motto - *"ex luna, scientia"* ("from the moon, knowledge") - mimics the Naval Academy's "ex trident, scientia" ("from the sea, knowledge"). Unusually, the emblem does not carry the crew members' names" (Jim Lovell, interview in *Quest, The History of Spaceflight Magazine*, Spring 1995).
$3,000 - 4,000



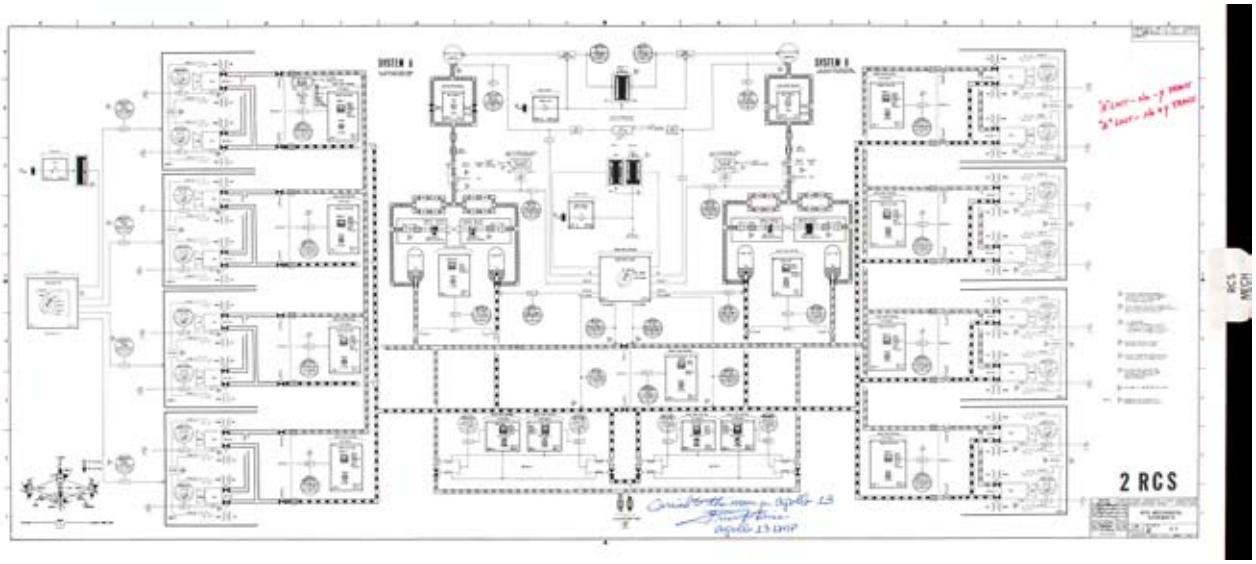
247

247
LOVELL AND HAISE'S NOTES DURING APOLLO 13.
Flown on Apollo 13, a sheet from the LM-7 Contingency Checklist, pp 28 and 29, 8 by 5½ inches, annotated in red, black and blue ink by James Lovell and Fred Haise.

A checklist sheet providing critical steps for rapid activation of the Lunar Module during emergency conditions on Apollo 13.
There are 19 annotations in red ink by James Lovell, associated with the Mid-Course Correction (MCC) burn that occurred at around 105 hours into the flight, after the Apollo 13 crew had come around the moon. Fred Haise modified Lovell's updates in black ink, and made his entries just before splashdown, when a final MCC burn was required before jettison of both the Service Module and Lunar Module.
Accompanied by a Typed Letter Signed by Haise, which reads in part: *"Accompanying this letter is a sheet numbered 28 and 29 from the Apollo 13 LM-7 Contingency Checklist carried and used on the flight of Apollo 13 during April 11 to 17, 1970 ... This sheet is from the 30 minute activation section which was designed to rapidly power-up our Lunar Module 'Aquarius.' Commander Jim Lovell and I made extensive updates and modifications to steps on this sheet due to our emergency situation. Those steps included our Mid Course Correction (MCC) burn just after looping around the moon and another burn just before splashdown. These burns were critical to enable a safe return to earth.*
The side numbered 28 has the last step of the Glycol Coolant Loop activation which was to open, then close those circuit breakers. Jim Lovell marked through two Reaction Control System (RCS) regulator warning lines with a red pen and added 'LGC' *(LM Guidance Computer) and* 'Caution Pre Amps.' *That meant that we would get a warning light for the LGC and a pre-amp caution light. He then made a red slash line meaning to delete step 1 of the VHF/S-BD ACTIVATION AND CHECKOUT and changed part of step 2 to just* 'Voice.' *Jim then completely lined-out step 3. The two long red slashes on the lower half of this side told us that all those steps could be omitted for the MCC burn that occurred after looping around the moon at 105 hours and 18 minutes into the mission. We used the LM's large Descent Propulsion System engine for that burn which lasted about 15 seconds.*
The side numbered 29 has the remaining steps of the DAP SET/GIMBAL DRIVE marked through with two red slashes. Jim then added 'Verify ASA cb 16 in for 10 Min' *in red ink. That meant to verify that the Abort Sensor Assembly (ASA) circuit breaker was engaged for at least 10 minutes before we activated the Abort Guidance System (AGS), which performed the MCC burn at 105 hours and 18 minutes. We used this system because it required less power than the primary guidance equipment. The steps of the RCS PRESS section were all marked out with 5 red slashes. I added the comment of:* 'See Note on Next Pg' *during events described in the next paragraph.*
As we approached the earth, Mission Control sent me instructions for the LM pre-entry procedures at about 128 hours into the flight. These updates were part of the complex steps to safely release 'Aquarius' from 'Odyssey' plus perform another MCC twenty-odd second burn using only the LM's attitude control thrusters. I crossed and marked out all of Jim's previous red ink writing with my black pen that was no longer valid or needed. Then at step 2 under the VHF/S-DB ACTIVATION AND CHECKOUT, I marked completely out the OFF/RESET part and added 'RANGING.' *That set up a better method of communications. Under PGNS TURN - ON, I blacked out the Jim's red slash, underlined steps 1 and 2 to make it clear these were needed to be done, then added the entry of:* 'V25 N07 E 1257E 252 E E (Activates All Vert. Jets).' *These were computer command entries to activate all of our upward (vertical) attitude control jets. At the bottom of this side, I marked out another of Jim's red slashes and the N46 31021 value. That was changed to* '32021.' *The steps starting with N47 were not needed, so I marked all those out and just added the* 'V24' *command. No further updates for this procedure were required on either side.*
After the flight I wrote on side 28 in blue ink with: 'Flight notes in red by Jim Lovell.' *On both sides I wrote and signed:* 'Flight notes in black by Fred Haise, Fred Haise, Apollo 13 LMP.' *On the bottom edge of side 29 I wrote:* 'Flight notes in red by Jim Lovell. Carried around the moon on Apollo 13.'"
$3,500 - 4,500

248
SYSTEMS DATA BOOK.
Flown on Apollo 13, a schematic from the LM Systems Data Book, a single folding sheet, 36 by 10 ½ inches, with an *"RCS MECH"* (Reaction Control System Mechanical) tab.

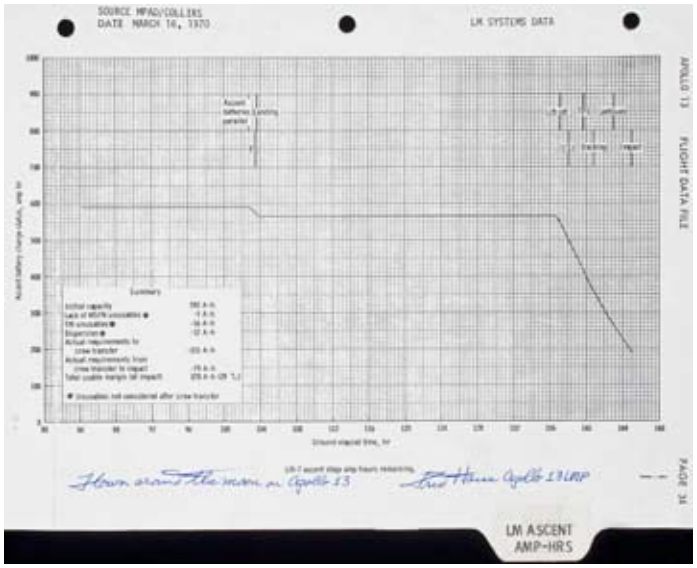
Accompanied by a Typed Letter Signed by Fred Haise, which reads in part: *"Accompanying this letter is a folded sheet ... carried on the flight of Apollo 13 during April 11 to 17, 1970 ... This particular sheet is the Reaction Control System Mechanical Schematic for the Lunar Module. It illustrates the RCS rocket engines with their corresponding fluid flow lines from the fuel and oxidizer tanks. The helium pressurization lines are also shown ... The 16 engines shown were 100 pound thrust rocket engines mounted in groups of four on the Ascent Stage of the LM.*
We could monitor the performance of these engines with dual indicator meters which provided readings on temperature, tank pressure, and the remaining fuel and oxidizer quantities. Our instrument panel also had eight 'talk back' switches that would show 'gray' if the valves to the engine pairs were open, 'barber pole' if the valves were closed, and 'red' if the values had failed. Similar type of indicators were also used for the SOV (Main Shutoff Valve) and ASC (Ascent) fuel and oxidizer tank valves. In addition, signal flow for the RCS Caution and RCS 'A' and 'B' Warning lights are shown.
I have inscribed and signed the schematic with: 'Carried to the moon on Apollo 13, Fred Haise, Apollo 13 LMP' *near the bottom center of the sheet."*
The sheet has annotations in red ink, written by Fred Haise prior to the Apollo 13 launch to remind the crew what spacecraft axis translation would be lost pending which RCS system, A or B.
$3,000 - 4,000



248

249
SYSTEMS DATA BOOK.
Flown on Apollo 13, a sheet from the LM Systems Data Book, pp 34-35, 10½ by 8 inches, with a tab reading *"LM Ascent amp-hrs"* and *"LM Descent O2"* on recto and verso.

Accompanied by a Typed Letter Signed by Fred W. Haise, which reads in part: *"Accompanying this letter is a sheet ... from the Apollo 13 LM Systems Data Book carried on the flight of Apollo 13 during April 11 to 17, 1970.*
Page 34 is a graph of the LM-7 ascent stage amp hours available. It plots the ascent battery charge status in amp hours versus the Ground Elapsed Time (GET) or time in the mission since launch. The key points are LM lift-off from the lunar surface, rendezvous, and docking with the CSM. We expected to have almost 600 amp hours at the start of the initial LM checkout with the power dwindling down to around 200 amp hours once the LM was jettisoned. The data plots on both of these graphs could be checked during the flight via our LM RCS and AMP gages located on the control panel. The reserve power and propellant carried were life saving consumables because our emergency situation required more than was planned for a nominal mission.
Page 35 is a graph of the LM Descent Oxygen profile that plots the total usable breathable oxygen from our Descent Stage in both pounds and percent remaining in versus the GET. The key points are lunar touchdown, our lunar EVAs, and lunar lift-off. We expected to have almost 100 pounds of oxygen at the beginning with that amount reduced to barely 10 pounds at LM liftoff. Of course the Service Module oxygen tank explosion caused the lunar landing to be canceled, but this oxygen was vital for our survival during the four days that were needed to return to the earth.
I have inscribed and signed page 34 with: 'Flown around the Moon on Apollo 13, Fred Haise, Apollo 13 LMP.'"
$2,000 - 3,000



249

250
BIBLE CARRIED TO THE MOON ON APOLLO 13.
The Holy Bible [Authorized version]. National Cash Register Company and World Publishing Company, [1960s?]. 1245 pp printed in rows and columns on a single square piece of Microform film. 1½ by 1½ inches. Mounted onto a Typed Letter Signed by James Lovell, John Swigert and Fred Haise on NASA/MSC stationery.

The Bible on Microform, reduced in area by a factor of 62,500 to 1. The letter states that *"This Bible was flown to the moon April 11-17, 1970, on the Apollo 13 spacecraft,"* and is signed by the crew.
$1,500 - 2,000

250

251

252

262

251
APOLLO 13 EVA TETHER.
An off-white tether, 30 feet long. Marked in black at each end either *"LMP"* or *"CDR,"* and with distances from the CDR end every 5 feet. An aluminum snap-hook device is at each end with *"Push to Lock"* buttons to secure each hook. The CDR end hook has part and serial number *"P/N SEB33100200-303 S/N 1074."* Both hooks are engraved with *"TNG"* (training) or *"TRNG ONLY."*

Accompanied by a Typed Letter Signed by Fred Haise, which reads in part: *"Jim Lovell and I used this tether during EVA training operations in preparation for the lunar surface explorations planned for Apollo 13. It was an emergency device that could assist rescue during circumstances such as one crewman slipping down the slope of a steep crater. Another possible situation would be to assist an injured crewman from the lunar surface into the LM or during emergency EVA operations between the LM and CSM. This tether has been in my personal collection sinse 1970."*
$600 - 800

252
THE AUTHORATIVE MANUAL FOR THE CSM SYSTEMS.
Command/Service Module Systems Handbook. CSM 108 through CSM 111. NASA/MSC: October 1, 1969. Over 160 pp. Over 60 very long folding diagrams and schematics on the CSM systems. 8 by 10½ inches. Card stock covers, punched.

The most technically detailed document released for the Apollo Command/Service Module, inscribed and signed by Fred Haise on the front cover: "*Used in Training for Apollo 13 - Fred Haise, Apollo 13 LMP.*"
CSM 108 was the CSM used on Apollo 13, 109 for Apollo 14, and 110 remained unflown. CSM 111 was used during the Apollo-Soyuz Test Program. This handbook was issued to Fred Haise prior to Apollo 13. Subjects include sequential, electrical, environmental, fuel cell and cryogenics, communications, instrumentation, guidance and navigation, service propulsion, reaction control, and miscellaneous systems. No other single manual provides more diagrams, schematics, system data flow, or drawings about the CSM.
$1,200 - 1,800

253
APOLLO 13 CSM LAUNCH CHECKLIST.
Apollo 13. CSM Launch Checklist. [NASA/MSC]: March 9, 1970. Upwards of 100 pp. 8 by 6 inches. Card stock covers, punched, tabbed, and bound with three metal rings.

Inscribed on the front cover *"My Personal Training Copy - Fred Haise, Apollo 13 LMP."*
This manual lists the events that occurred during the Saturn V launch and has specific steps to be carried out by the flight crew. Sections cover boost preps, launch trajectory, launch aborts, boost, orbit insertion and orbital check-outs, TLI preps, and booster (S-IV-B) separation. An emergency section printed on pink paper covers the MODE I to IV aborts. The last sections cover Earth re-entry procedures in the event that that the flight remained in Earth orbit and did not travel to the moon.
$700 - 900

254
CSM SYSTEMS DATA.
Apollo 13. CSM Systems Data. Part No. SKB32100082-340. [NASA/MSC]: March 9, 1970. Over 46 pp. Numerous folding diagrams and schematics. 8½ by 10½ inches. Card stock covers, punched, tabbed, and bound with three metal rings.

Inscribed on the front cover: "*My personal training copy - Fred Haise, Apollo 13 LMP.*" In 1970, Haise wrote his last name in block capitals in the upper right corner of front cover. A fully comprehensive manual providing exacting details of the Command/Service Module's (CSM) operational systems.
$600 - 800

255
LM MALFUNCTION PROCEDURES.
Apollo 13. LM Malfunction Procedures. Part Number SKB32100076-386. [NASA/MSC]: March 16, 1970. 80 pp. 8 by 10½ inches. Card stock covers, punched, tabbed.

Inscribed and signed on the front cover: "*My personal training copy - Fred Haise, Apollo 13 LMP.*" In 1970, Haise wrote his last name in block capitals in the upper right corner of front cover. Provides the LM crew with spacecraft details and the steps for possible corrective actions. Most sheets consist of flow-charts designed to provide Lovell and Haise with the proper sequence to diagnose and possibly correct the malfunction.
$600 - 800

256
TRAINING MANUALS.
Two training manuals designed for lunar surface use:
1. *Apollo 13. LM Data Card Book. Part No. SKB32100082-387*. [NASA/MSC]: March 17, 1970. Revision. 14 card stock pages, most being tabbed sheets. This manual consists mostly of blank data card "pads" to be filled in with the appropriate values or numbers during critical phases of the Lunar Module's flight and lunar stay. Data cards designed for crew entries are: LM Activation, Gyro Drift, PDI Rules, PDI 0 and PDI +12, PDI 1 and 2 Aborts, G&N Lunar Surface, Abort/Ascent, CSI and CDH (rendezvous maneuvers), P76/P27 Pads, and AGS SV/Impact. *Fred Haise has made 10 manuscript entries* on the Gryo Drift card during training in early 1970.
2. *Apollo 13. LM Rendezvous Charts, Part No. SKB32100076-392*. [NASA/MSC]: March 9, 1970. 10 card stock pages, most being tabbed sheets. This manual consists of tables, graphs, and blank entry pads to enable the proper rendezvous of LM Aquarius with CSM Odyssey. Card subjects include CSI and CDH Normal Ascent, Terminal Phase Initiation, first and second Mid Course Corrections, and Relative Trajectories.
Both are approximately 8½ by 10½ inches. Card stock covers, punched.

Inscribed by Fred Haise as his training copies. Additionally, in 1970, he wrote his last name in block capitals in the upper right corner of front cover.
$700 - 900

The following three lots contain LM Cue Cards used by James Lovell and Fred Haise for Apollo 13 training while inside the Lunar Module mission simulator.

257
FLIGHT STEPS FOR THE LM.
Two cue cards:
1. "DPS Burn," February 2, 1970, 5 by 7 inches. Lists 27 steps to perform a Descent Propulsion Section (DPS) engine burn. The verso has the Ascent Propulsion Subsystem (APS) steps and is dated 16 March 1970.
2. "Staging," March 24, 1970, 6 by 8 inches. Lists over 30 steps to perform stage separation of the LM's Ascent and Descent stages plus DPS Abort/APS Insertion. The verso has two columns of steps, one for DPS/Abort Insertion and the other APS Abort/Insertion. An area marked out with large dash marks defines "ABORT RULES" associated with these steps.

Both inscribed: "Training Reference Cue Card for Apollo 13. Fred Haise, Apollo 13 LMP."
$500 - 700

258
APOLLO 13 LM INSTRUMENT PANEL CUE CARDS.
A set of three signed cards designed to fit between various meters and dials located on the Lunar Module main instrument panel:
1. "PDI Aborts. April 11 Launch, MPAD Chart, 3/9/70, Amendment 2, Apollo 13, dated 3/13/70," four columns with the abort times and associated values for a PDI-1 and PDI-2 abort, 10 by 3 inches.
2. "CDR BUS - LMP BUS. Apollo 13, 3/16/70," steps to operate the LM's space suit support equipment, 5 by 1½ inches.
3. "DPS, APS, RCS, DAP Data Load. Apollo 13, 3/20/70," quick-reference information associated with these four LM systems, 10 by 4½ inches with notched out sections.
All have blue Velcro patches on the verso.

All have been *inscribed and signed* on the backs: "*Training - LM Panel Cue Card for Apollo 13 - Fred Haise, Apollo 13 LMP.*"
$600 - 800

259
WHEN TO ABORT.
"Mission Rule No-Go's," cue card, March 24, 1970, 8 by 10½ inches.

This card provides a synopsis of the potential equipment problems and at what point during the powered descent landing phase the event will cause a "no go" for landing. It covers environmental, propulsion, reaction control, and guidance issues. The verso, dated March 3, 1970, has a grid listing computer codes with definition and the appropriate action required by the flight crew. This side has been inscribed *"Training Reference Cue Card for Apollo 13. Fred Haise, Apollo 13 LMP."*
$500 - 700

260
THE APOLLO 13 LUNAR LANDING TARGET.
"Lunar Landing Site ... Fra Mauro," photographic training reference map, April 11, 1970, 11 by 8 inches, scale 1:25,000.

A large landing ellipse is plotted on the lunar surface, centered on the desired Apollo 13 lunar landing point. Cone Crater is clearly visible just inside the ellipse edge on the right side. The verso has a larger scale view of the landing area. Inscribed: *"A training reference for Apollo 13 - Fred Haise, Apollo 13 LMP."*
$300 - 400

261
APOLLO 13'S PATH TO LEAVE THE MOON.
"LM Ascent Monitoring Chart: Apollo 13, Launch Dates 11 April or 10 May 1970," photographic training reference map, March 1, 1970, 11 by 8 inches.

A double-sided photographic map identical to the lunar ascent chart carried on Apollo 13. Inscribed *"Like the chart we planned to use on Apollo 13 - Fred Haise, Apollo 13 LMP."*
The landing area at Fra Mauro is marked with an ellipse and the LM's Ascent Stage ground track is shown by a white line along the chart center.
$300 - 400

262
APOLLO 13 LM ORBIT MONITOR CHART.
"LM Orbit Monitor Chart, Apollo 13, Launch Dates 11 April or 10 May 1970," March 1, 1970, folded and taped so as to form 10-leaf, 11 by 8 inch booklet, flowing as continuous loop.

Inscribed by Fred Haise: *"Identical to the LM Orbit Monitor chart planned to be used post LM liftoff during Apollo 13. This copy used during training - Fred Haise, Apollo 13 LMP."*
A long folded chart covering the LM's ground track from lift-off through the first complete lunar orbit. An ellipse marks the landing area at Fra Mauro, while the LM's Ascent Stage ground track is shown by a white line running down center of the chart. Timing marks run alongside, and major craters and topographical features are labeled. The PDI point and the Apollo 11 and 12 landing areas are marked in red ink by Haise.
$700 - 900

264

263

263
DRINK CARRIED ON APOLLO 13.
Flown packet of dehydrated cocoa drink, 10 by 3 inches. With identification labels reading *"Serial no. FAU 525, 057,"* and *"COCOA, 5 oz. hot or cold water, 5-15 minutes."*

A drink packet carried on the flight of Apollo 13, but not consumed. Accompanied by a Typed Letter Signed by Fred W. Haise, which reads in part: *"Accompanying this letter is a "Cocoa" drink packet that was carried around the moon on the flight of Apollo 13 during April 11 to 17, 1970 ... The small blue velcro square on the packet indicates that this food was originally assigned to myself, the Lunar Module Pilot ... Several food items were never eaten during the flight due to an oxygen tank explosion in Service Module which, among other things, caused an electrical power loss to the Command Module. That power loss eliminated the ability to supply and heat water for food rehydration. James Lovell, Jack Swigert, and myself mainly consumed the 'wet pack' type of foods during the Apollo 13 mission. Those foods did not require rehydration to eat.*
This drink packet has been in my personal space artifact collection since 1970 which is now 35 years after the dramatic flight of Apollo 13. The flight was scheduled to be the third manned lunar landing mission, but those plans were aborted due to the above mentioned 'problem.'"
The drink packet has been inscribed *"Flown to the moon on Apollo 13, Fred Haise, Apollo 13 LMP."*
$4,000 - 6,000

264
FLOWN APOLLO 13 STOWAGE UNIT.
Debris closeout and pocket assembly from Apollo 13, Beta cloth, 42 by 10 inches. With four large storage pockets, each having draw-string and Velcro closures. 16 snap-buttons on front and back. Stamped with part number V36-601197-101 and serial number 06362. With additional inspection identification marks.

Inscribed *"Fred Haise, CM 109, Apollo 13 LMP"* on front and back. A large component from the ill-fated Apollo 13 Command Module Odyssey. Perhaps the last completely intact piece of flown equipment from this mission ever to be offered.
This assembly was mounted in the lower equipment bay of Odyssey and was a convenient place for James Lovell, Fred Haise, and Jack Swigert to stow flight plans, manuals, and other equipment. The metal snap-buttons allowed additional stowage pockets to be attached. Included are copies of NASA removal records and a color NASA photograph taken inside Odyssey just after splashdown showing part of this assembly. That picture shows an additional smaller pocket attached to the present assembly.
Included are copies of deaccession papers from the National Air and Space Museum (NASM).
$10,000 - 15,000

265
FLOWN APOLLO 13 ARMALON SEGMENT.
A square fragment of Armalon, 1 by 1 inch. Mounted on a 7 by 5 inch NASA presentation card which reads: *"A Piece of 'Odyssey' CSM 109."*

The card signed by James Lovell, Jack Swigert, and Fred Haise along with Apollo 13 Launch Director Walter J. Kapryan.
Armalon was a woven material used in the Apollo spacecraft crew couches. A small number of these cards were presented to key personnel responsible for the safe return of the Apollo 13 crew.
$1,200 - 1,800

266 °
APOLLO 13 EMBLEM WORN IN THE WHITE ROOM.
Apollo 13 crew emblem printed on Beta cloth, 4 inches in diameter. Mounted onto a Typed Letter Signed by Guenter Wendt.

Wendt was the launch pad close-out leader for all manned launches during Mercury, Gemini, Apollo, and Skylab. He wore this emblem on his launch pad garment during test preparations and the launch of Apollo 13. Wendt was stationed in the "White Room," located at the end of swing arm number 9 on the 320 foot level of the launch tower. He and his launch crew were primarily responsible for astronaut entry, check-out, and hatch closing of the spacecraft.
$300 - 500

267 °
MISSION OPERATIONS REPORT.
"Mission Operation Report: Apollo Supplement." NASA: April 1970. [2], v, 140 ll. 11 by 8½ inches. Paper covers, punched and stapled.

Signed by Fred Haise as LMP on front cover. Designed for use by senior NASA managers, and providing up-to-date, definitive, and complete flight information on Apollo 13. Describes the Saturn V rocket, CSM, LM, space suits, and ground support facilities, with illustrations, photographs, and tables. The Apollo 13 mission particulars, astronaut and lunar surface equipment and experiments (ALSEP, lunar drill, and future MET and future Rover) are covered with both text and extensive illustrations.
$400 - 600

268
MISSION PLANS FOR APOLLO 13.
Final Apollo 13 Flight Plan. AS-508/CSM-109/LM-7. NASA/MSC: March 16, 1970. Over 280 pp. 8 by 10½ inches. Pink card stock covers, punched.

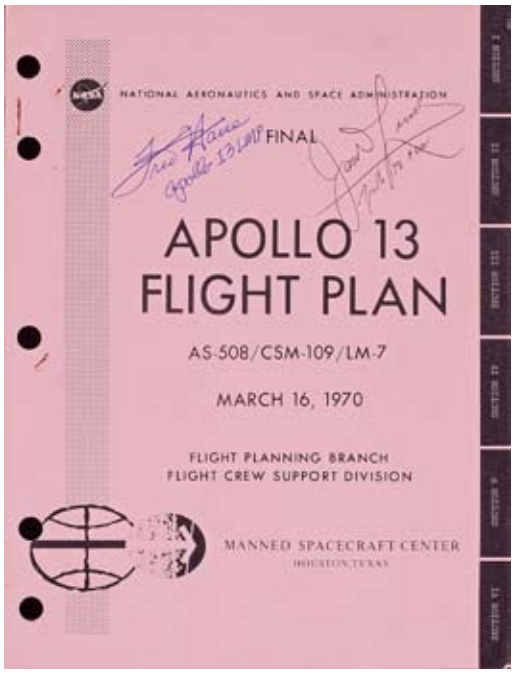
Signed and inscribed on the front cover: "*Fred Haise / Apollo 13 LMP*," "*James Lovell / Apollo 13 CDR.*" Additionally, Haise has marked the moment of the Apollo 13 explosion with an x-mark in the timeline (p 3-38) and inscribed: "*At 55:53 G.E.T. Cryo tanks stir then—BOOM! Fred Haise / Apollo 13 LMP.*"
The flight plan is divided into six sections covering general information, mission objectives, a detailed timeline, consumables, abbreviated timeline, and alternate missions. The detailed timeline is the most extensive section (over 190 pages) and lists activities in a column format for all three astronauts. Each page in this section usually details one hour of flight time, rest periods are usually 2 hours per page.
$1,000 - 1,500

269
APOLLO 13 LUNAR SURFACE PROCEDURES.
Final Apollo 13 Lunar Surface Procedures. Houston, TX: NASA/MSC, March 16, 1970. iv, [1], 184 pp. 8 folding tables and diagrams. 10½ by 8 inches. Heavy card stock covers, punched, stapes removed.

Signed by James Lovell and Fred Haise on the cover. The minute-by-minute plans of James Lovell and Fred Haise for their two lunar surface explorations. The EVAs were canceled due to the Service Module oxygen tank explosion. Covers all mission objectives and priorities with a description of the general landing area and provides a detailed script of all lunar surface activities, including experiment extraction and deployment, geologic sample collection techniques, and photography methods. The ALSEP equipment and lunar surface tools are described and illustrated. Contingency plans are provided: a one-man minimum time, and a one-man complete EVA-1 and EVA-2. Contents appear in the exact size and layout of the crew's EVA cuff checklists and in a long column format on the facing page. Traverse maps for the primary and two down-range landing sites are included. An appendix section lists the lunar surface operational constraints and the deployment procedures for the ALSEP equipment. A contingency procedure list for this equipment is the final section of this manual.
$800 - 1,200

270
APOLLO 13 MISSION RULES.
Final Flight Mission Rules, Apollo 13 (AS-508/109/LM-7). NASA/MSC: February 12, 1970. Upwards of 300 pp. 10½ by 8 inches. Heavy card stock covers, punched.

Signed by Fred Haise and James Lovell on the cover with their mission roles. Flight mission rules were referred to extensively as the Apollo 13 accident progressed. An extremely detailed document with every conceived launch and flight contingency covered with defined actions to be taken. Each defined malfunction had an associated decision ruling: mandatory, highly desirable, continue mission, go or no-gos, and terminate the function or the activity. The successful return of the flight crew required updates to be added to future mission rules.
$700 - 900



268

271 °
ABORT PLANS.
"Abort Trajectory Performance Studies: Apollo Mission Planning Task Force." Bethpage, NY: Grumman, October 15, 1964. 11 by 8 ½ inches. Upwards of 300 pp. Spiral-bound.

An early study that would come into use during Apollo 13. The upper cover is inscribed *"Parts of section six utilized for our return to earth on Apollo 13, Fred Haise, Apollo 13 LMP."*
Apollo lunar landing missions would be the most complex space flight to be performed during the 1960s. A meeting was held in 1964 which put together recommendations for abort steps during flight phases of the Saturn launch, earth orbit, translunar injection, translunar coast, lunar orbit, lunar module descent and ascent. Apollo 13 used concepts originally addressed in section 6, *"Translunar coast aborts."* Four possible engine burns are described, including one using the LEM engine. This method was employed during Apollo 13 to return the crew safely to Earth.
$400 - 600

272 °
APOLLO 13 RECOVERY.
"Apollo 13 Recovery Requirements." NASA/MSC: March 6, 1970. Upwards of 90 pp. Maps of the planned and possible abort landing areas. 10½ by 8 inches. Card stock covers, punched and stapled.

Signed by Fred Haise as LMP on the front cover.
The document provides an overview of the Apollo 13 flight events with extensive requirements for both NASA and DoD personnel.
$300 - 500

273
APOLLO 13 COMMENTARY.
Apollo 13 Spacecraft Commentary, April 11-17, 1970. MSC: [c.1970]. 5 volumes. Upwards of 900 pp in total; being photocopies issues by RSC, 11 by 8½ inches. Spiral-bound, card stock covers.

Each cover inscribed *"Every word said, ALMOST! ... Fred Haise, Apollo 13 LMP."* The transcripts of the "air-to-ground" communications during the entire flight of Apollo 13 - including the popularly misquoted *"Houston, we've had a problem."*
$1,000 - 1,500

The following lot is directly from the collection of Astronaut Fred Haise.

274
APOLLO 14 DUST BRUSH USED ON THE LUNAR SURFACE.
Flown Apollo 14 camera lens dust brush, metal handle, 8 inches long. A red cord is wrapped around one end of the brush, next to an identification part number (*"P/N SEB 33100402-301"*). The bristles 1 ½ inches long. Mounted onto a wooden presentation board with a plaque reading: *"Apollo 14, Jan. 31 - Feb. 9, 1971. To Fred, From Al, Stu, & Ed."*

A dust brush carried to, and used on, the lunar surface during the two EVAs of Apollo 14, and presented to Fred Haise after the flight.
Apollo 14 included the longest-distance lunar surface EVA performed entirely by foot during the Apollo Program. Alan Shepard and Edgar Mitchell stayed nearly 34 hours on the moon's surface. They made two surface explorations which NASA defined as extravehicular activities or EVAs. The first EVA lasted nearly 4 hours and 50 minutes with Shepard and Mitchell spending most of this time deploying the ALSEP (Apollo Lunar Surface Experiment Package). These experiments were left on the moon and automatically returned scientific data to Earth for several years. This dust brush was used during the EVA to ensure that camera lenses were free of lunar dust prior to photographs being taken of the US flag-raising, experiment deployments, and selective lunar sample gathering. These lunar surface cameras consisted of two space suit chest-mounted 70mm Hasselblad's, a 35mm stereo clasp camera, and a 16mm Maurer motion picture camera. The last two were mounted onto the Modularized Equipment Transporter (MET) which was essentially a two-wheeled hand-pulled cart used to carry scientific and geologic sampling equipment.
The second EVA had the astronauts outside for just over 4 hours and 30 minutes. They made a nearly a ¾-mile trek to the vicinity of Cone Crater. The objective was to reach the rim of Cone, but steep slopes, numerous smaller craters, and boulder fields slowed their progress. Uncertain if they could reach the Cone rim and still have time to collect and document lunar samples, they were directed by Mission Control to stop their march to Cone. They were surrounded by multiple boulders of varying sizes and shapes, with varying hues of brown to gray colors. Shepard and Mitchell knew that most of these boulders had originated from the debris created when Cone Crater was formed.
Since the MET had wheels, lunar dust was easily disturbed and could coat important equipment despite the fender dust guards. Scrambling up and down steep slopes, the astronauts sent additional dust flying. This dust brush was a simple but vital tool for keeping the camera lenses clean. While it was being used to clean the lenses, lunar dust would become embedded in the bristles.
Accompanied by a Typed Letter Signed by Fred Haise, which reads in part: *"The lunar camera lens dust brush which accompanies this letter was carried aboard Lunar Module Antares on the Apollo 14 flight. It was used outside on the lunar surface during both EVAs by Commander Alan Shepard and Lunar Module Pilot Edgar Mitchell. It proved to be a simple but important tool to make sure the cameras had dust-free lenses to record all the historic and scientific activities during this third manned lunar landing.*
My Apollo 13 flight was originally planned to land at the Fra Mauro site. An oxygen tank explosion in our Service Module some 56 hours into the flight caused the Apollo 13 lunar landing mission to be canceled and conduct an emergency return to earth. With Apollo 14 targeted again to land at Fra Mauro and with my extensive EVA training for that region including Cone Crater, it made sense for me to be CAPCOM for the second EVA during Apollo 14. My voice communications provided them with the change of plans Mission Control decided upon to balance reaching the rim of Cone verses collecting important samples.
Al and Ed, along with Command Module Pilot Stuart Roosa, gave me this brush as a thank-you for my efforts supporting their Apollo 14 flight."
$125,000 - 175,000

275
FIRST AMERICAN IN SPACE'S LUNAR VIEW.
Flown Command Module Window Glass from Apollo 14, thick silica glass in a red outer seal, 15 by 16 by 1 inch. An ID number on the glass edge itself reads: *"V16-321384."* A yellow Temporary Parts Removal Tag confirms the ID number and adds *"Serial/Lot Number L/N 101153840020, Authority TPS030 ASHUR 110011, R.H. (Right Hand) Crew Comp. Window, S/C 110, 4-28-71."* In original light blue wood transit case with several ID labels that read: *"MARKED FOR: M/F: BLDG. 3 WHSE, APOLLO CSM 110, BOX 25-G, ART#2151."* One of several shipping labels reads: *"U.S. Government Shipment ... From: Transportation Officer, Lyndon B. Johnson Space Center, Bldg. 420, Johnson Space Center, Texas, 77058 ... To: Rockwell International, Space Division, 12214 Lakewood Blvd. Downey, California."*

A flown artifact exposed to the vacuum of space for over 215 hours during the entire Apollo 14 flight—to the moon, in lunar orbit, and the return to Earth—a total distance of over half a million miles. This is an outer window glass from Kittyhawk, the Command Module of Apollo 14. Alan Shepard, America's first man in space and the commander of Apollo 14, along with Stuart Roosa and Edgar Mitchell were able to get some of their first close-up views of the moon through this window. The outer pane of the window was removed as part of the Apollo Window Meteoroid Experiment. This was a passive experiment which compared the pre-launch condition of this outer pane to its returned condition. The pane was scanned from 20X to 200X magnification to map all visible defects from meteoroid cratering. This could then be correlated with lunar rock cratering studies.
Included are copies of property transfer documents from NASA to the National Air and Space Museum (NASM) and deascession papers from NASM.
The red outer seal has been inscribed and signed: "*Apollo 14 CM window, Edgar Mitchell.*"
$25,000 - 35,000

276

277 (detail)

278 (detail)

The following lot was originally in the collection of Astronaut Stuart Roosa.

276
EMBLEM CARRIED ON APOLLO 14.
Flown Apollo 14 crew emblem, 4 inches in diameter, printed on Beta cloth, 9 inches square. Carried on Apollo 14 by Command Module Pilot Stuart A. Roosa.

Inscribed by Stuart Roosa at foot: *"This Beta cloth patch went to the Moon - A-14."* Additionally signed by Alan Shepard, Stuart Roosa, and Edgar Mitchell.
$4,000 - 6,000

The following two lots were originally in the collection of Astronaut Gordon Cooper.

277
CREW EMBLEM CARRIED ON APOLLO 14.
Flown Cloth Emblem, oval, 4 inches across. Features the Astronaut symbol rocketing from the Earth toward the moon. Mounted on a Typed Letter Signed by Gordon Cooper.

Gordon Cooper reflects on never flying on an Apollo lunar mission. His letter reads: "*The cloth patch displayed below was carried on the flight of Apollo 14, the third manned lunar landing. Lift-off was on January 31 and the crew returned to earth on February 9, 1971. Alan Shepard and Edgar Mitchell worked for over 9 hours outside their Lunar Module during two surface explorations. Al never made it up to the rim of Cone Crater, but didn't do too bad considering he was the 'oldest' man ever to walk on the moon! / Alan Shepard was the only one of us Mercury guys to make a lunar flight and actually walk on the moon's surface. I had hoped to command an Apollo mission before his, but it just did not work out that way*."
$2,500 - 3,500

278
EMBLEM CARRIED ON APOLLO 14–"BEEP BEEP YOUR ASS!"
Flown on Apollo 14, an oval back-up crew emblem, 4 inches across. Features cartoon characters, with the back-up crew members' names (Cernan, Evans, and Engle) around the border. Mounted onto a Typed Letter Signed by Gordon Cooper.

Cooper's letter reads: *"The cloth patch displayed below was carried on the flight of Apollo 14, the third manned lunar landing. The launch was on January 31 and the crew returned to earth on February 9, 1971. This patch illustrates the good-natured 'rivalry' between the prime and back-up crews. As cartoon character Wile E. Coyote rockets up from earth representing Shepard, Roosa, and Mitchell; he finds that the Road Runner is already on the moon with a U.S. flag and a '1st Team' banner. The '1st Team' was the back-up crew's nickname.*
The back-up crew made sure this and a few more identical patches were hidden in compartments or manuals which began to float free during the flight. Al Shepard responded to this 'gotcha' during the flight saying - 'Tell Cernan, Beep Beep Your Ass!' *via a private communications loop."*
$2,500 - 3,500

280

279 °
THE STEPS OF A LUNAR VOYAGE.
Apollo Mission Techniques. Mission H-2 and Subsequent. NASA/MSC: 1970. 4 volumes, comprising:
1. *Translunar Midcourse Corrections and Lunar Orbit Insertion*. April 6, 1970. Over 55 pp.
2. *Lunar Descent*. February 15, 1970. Over 85 pp.
3. *Lunar Powered Ascent*. February 9, 1970. Over 45 pp.
4. *Manual Ascent*. February 23, 1970. Over 40 pp.
8 by 10½ inches. Card stock covers, punched and stapled. Ownership inscription of Robert Parker, Apollo support crew member and later Space Shuttle Astronaut, on each cover.

Four signed internal-use NASA documents. Each front cover is signed by Edgar Mitchell ("*Edgar Mitchell / Apollo 14 LMP*"). Documents the methods and crew procedures to travel to, land on, and return from the lunar surface. Included are samples of actual flight navigational update entry pads, diagrams of maneuvers, flight program sequence steps, and flow charts with "Go - No Go" step branches. These flight methodologies and philosophies were used for all Apollo lunar landings including Apollo 11.
$400 - 600

280
APOLLO 14 CREW WALKS TO THE PAD.
Black and white photograph, 10 by 8 inches, of Alan Shepard, Stuart Roosa, and Edgar Mitchell in their white space suits as they begin their journey to the launch pad on 31 January 1971, printed caption on verso.

Signed: *"Best Wishes, Stuart Roosa," "Alan Shepard,"* and *"Out to Launch, Edgar Mitchell, Apollo 14."*
$600 - 800

281 °
SHEPARD AND OLD GLORY.
Color photolithograph, 10 by 8 inches, of Alan Shepard holding the US flag during the first lunar surface exploration of Apollo 14, printed caption on verso.

Inscribed "*Photo by Edgar Mitchell / LMP.*"
$100 - 200

282

JAMES BENSON IRWIN [1930-1991]

James Irwin was the Lunar Module Pilot for Apollo 15, and was the 8th person to walk on the moon. A graduate of the U.S. Naval Academy, he was an Air Force test pilot prior to joining NASA in 1966. During Apollo 15, Irwin logged over 295 hours in space and almost 67 hours on the surface of the moon, including over 18 hours of Extra-Vehicular Activity (EVA). The following 4 lots are from the estate of James Irwin.

282
ROBBINS MEDALLION CARRIED ON APOLLO 14.
Flown Apollo 14 medallion by Robbins, sterling silver, approximately 1¼ inches in diameter (oval). Features the crew mission emblem on the obverse, and the mission dates engraved on the reverse. Serial number 105 on the rim.

Accompanied by a Typed Letter Signed by Mrs James Irwin, which reads in part: *"This Apollo 14 Robbins medallion was obtained by my late husband, Astronaut James Irwin, from the Apollo 14 crew. He acquired this medallion while training for his own lunar landing mission, Apollo 15, which occurred during July and August of 1971."*
$2,500 - 3,500

283
THE DIRECT MEANS OF ATTITUDE CONTROL FOR LUNAR MODULE FALCON.
FLOWN ACA (Attitude Controller Assembly) from Lunar Module *Falcon*, the device contained within an 11 by 9½ by 5 inch wooden display case. The upper part is mounted flush at the top of the case, and comprises a 5 inch tall hand grip with a flexible boot base on a 6¾ by 4 inch top plate. Two 16½ inch long electrical connectors protrude from the top plate. The ACA mechanism is contained in a 3¾ by 6¾ by 5 inch metal housing, set within the wooden case. The top of the case bears a metal plaque reading: "*LMP Hand Controller from Falcon, Apollo 15. July 26-Aug. 2, 1971.*"

An actual piece of flight control equipment which assisted the landing of the first extended-duration lunar exploration flight of the Apollo Program.
The ACA allowed the astronaut to input pitch, roll, and yaw maneuvers by moving the hand grip forward and backward, side to side, or with a twisting action. These commands activated the four sets of four 100-pound Marquardt rocket engines mounted on the outside of the Ascent Stage at four equally distant points. When the ACA was engaged in the semi-automatic mode, an impulse proportional to the amount of hand grip movement was routed to the LM Guidance Computer (LGC). The LGC used this impulse to perform steering calculations and generated the rocket engine thrust-on commands. When the ACA was allowed to return to its neutral position after the maneuver, then the LGC maintained current attitude.
Each LM crew member had an ACA available for use as part of the overall safety redundancy design of the Lunar Module. The ACA was located at the right hand side of each crew member's flight station, just below the main control panel. The ACAs would be used during undocking from the Command Module prior to the lunar landing, setting and maintaining the proper attitude during the long engine burn to make the lunar landing, attitude control during the ascent from the lunar surface, and during rendezvous and re-docking phases with the Command Module.
Apollo 15 was the first of the NASA defined "J-series" lunar landing missions that employed the use of the lunar rover. This allowed the lunar landing crew to make three extend lunar surface explorations which lasted approximately 7 hours each.
Accompanied by a Typed Letter Signed by Mrs. James Irwin. It reads in part: "*This Attitude Controller Assembly (ACA) was used by my late husband, Astronaut James Irwin, during the flight of Apollo 15. The assembly provided the direct means for the Apollo 15 astronauts to perform attitude control maneuvers with Lunar Module 'Falcon.' The assembly was on the lunar surface inside 'Falcon' for over 66 hours. Jim removed this device after he left the lunar surface and just before the Apollo 15 crew released the Ascent Stage of 'Falcon' while in lunar orbit. This stage was then made to crash into the lunar surface. That created a simulated moonquake for the instruments Jim and other Apollo crews left on the lunar surface.*"
$200,000 - 300,000

285

284

284
APOLLO 15 FLIGHT JACKET US FLAG.
Flown US Flag, Beta cloth, 3 by 5 inches. Cut from the left shoulder of the Intravehicular Activity flight coverall jacket.

A Beta cloth US flag worn on the lunar surface while inside the lunar module Falcon, and removed by James Irwin from his coveralls prior to leaving the surface.
These Intravehicular Activity (IVA) coveralls were constructed mainly of a bleached Teflon material and consisted of a jacket, trousers, and a pair "booties." Two sets of these coveralls were stowed in Falcon prior to launch from the Kennedy Space Center, one for Commander David Scott, the other for Lunar Module Pilot James Irwin.
Both Scott and Irwin wore their coveralls inside Falcon when pressure suits were not required. To ensure the largest amount of lunar rocks could be returned, the LM crew jettisoned flight equipment no longer needed such these coverall garments and their space suit back-packs. Both men had additional coveralls available in the Command Module for use during their return home.
Accompanied by a Typed Letter Signed by Mrs James Irwin, which reads in part: *"My late husband, Astronaut James Irwin, removed this Beta cloth United States flag prior to his departure from the lunar surface ... This flag stayed on the lunar surface inside Falcon for over 66 hours ... It has been in our family collection of space artifacts since his return from the moon in August 1971."*
$6,000 - 8,000

285
APOLLO 15 LM FILM MAGAZINE STOWAGE BAG.
CARRIED TO THE LUNAR SURFACE.
Film magazine stowage bag, Beta cloth, 15 by 9 by 4 inches. With five large velcro-covered straps and velcro-sealed top edges. Labels on the top and side-pocket read respectively: *"70MM FILM MAGAZINE"* and *"16MM FILM MAGAZINE."* Together with a yellow paper North American Rockwell Corporation Space Division tag, reading in part: *"TEMPORARY PARTS REMOVAL TAG ... Serial Number 16 & 70mm FILM STOWAGE BAG ... 10/13/71,"* with several inspection stamps.

One of the largest pieces of equipment to be brought back from the lunar surface after extensive use inside Lunar Module Falcon. Repeated handling by the crew has embedded lunar dust into the straps and outer edges. This stowage case was housed on the right side of the LMP's flight station, and stored several 70mm and 16mm film magazines for photography outside the LM during EVA explorations. The Apollo 15 LM crew of Dave Scott and Jim Irwin performed three EVAs that lasted approximately 7 hours each. Dust kicked up by the lunar rover coated their suits; removing their suits back inside the LM, they transferred lunar dust on their hands to the straps and outer edges of this film stowage bag, leaving them a dirty gray color.
Included are copies of deaccession papers from the National Air and Space Museum (NASM).
$40,000 - 50,000

286 °
APOLLO 15 MISSION REPORT, SIGNED.
Apollo 15 Mission Report. Prepared by Mission Evaluation Team. NASA/MSC: December, 1971. Over 325 pp. Illustrated after flight photographs. Card stock covers, punched.

The extensive NASA internal report on the first use of the lunar rover during three EVA explorations of the lunar surface—signed by the mission commander on the front cover: "*Dave Scott / Apollo 15.*"
$300 - 500

287
THE APOLLO 15 CREW
Color photolithograph, 10 by 8 inches, of the Apollo 15 crew posing in their white space suits before an image of the lunar surface.

Signed by Dave Scott, Al Worden and Jim Irwin.
$600 - 800

288

The following lot is being sold to benefit the non-profit Infinity Science Center near the NASA Stennis Space Center in Mississippi. Infinity is currently under construction to create a new, state-of-the-art science center that will inspire and engage those who visit. Infinity will be a destination where visitors will explore the earth, oceans, and space through deepening levels of involvement, ranging from traditional gallery tours, hands-on experiments, and participation in activity-base missions.

288
FLOWN APOLLO 16 EVA CUFF CHECKLIST.
ASTRONAUT CHARLES DUKE'S SPACE SUIT CUFF CHECKLIST.
Cuff checklist, comprising 29 thin plastic printed leaves, spiral-bound and attached to a 7-inch curved metal wrist band (*"P/N SEB 33100302-302, S/N 1025"*). Each leaf 3½ inches square and with a reference tab on the fore-edge, 2 also with tabs on the top-edge (for immediate access to EVA 3 activities and EMU malfunction trouble-shooting steps). The wrist band has an 18-inch Velcro strap (*"P/N SEB 12100030-201, S/N 1087 ASSY"*). The whole assembly mounted on a wooden base with plaque reading: *"Presented to Fred Haise, EVA cuff checklist, with warmest personal regards from the crew of Apollo 16."*

The cuff checklist used by Lunar Module Pilot Charles Duke, Jr., during the second and third lunar surface explorations of the Apollo 16 mission. It was exposed directly to the lunar environment for over 12 hours during those exploration periods, and continued the tradition of bringing a smile to the astronauts' faces while providing back-up plans for the first lunar "Grand Prix."
Apollo 16, flown in April 1972, was the fifth lunar landing mission, and targeted the Descartes region of the moon, some 250 miles southwest of the Apollo 11 Tranquility Base site. This area was the first true highland region of the moon visited by Apollo astronauts and has brightly rayed craters with structural features similar to volcanic areas on the earth. Astronauts John Young and Charles Duke were scheduled to spend 73 hours at the Descartes landing site and to perform three EVAs. Just prior to the Lunar Module's descent from lunar orbit down to the landing site, the Command/Service Module developed problems associated with its large rocket engine, known as the Service Propulsion System (SPS). Since the SPS was the only means to leave lunar orbit and return to Earth, the lunar landing was delayed about six hours until the situation was deemed safe to continue the planned mission. This curtailed the overall lunar stay to 71 hours.
Apollo mission planners were well aware of the importance of making

288

every minute productive while astronauts explored the lunar surface. Neil Armstrong and Buzz Aldrin had a single "page" made of space suit material and placed directly on the left arms of their space suits, listing their surface activities. This was adequate for a single 2 ½ hour EVA, but the flights starting with Apollo 12 planned for at least 2 separate EVAs lasting at least 4 hours each. With the lunar rover flights of Apollos 15, 16, and 17, the exploration times were extended to 7 hours and 3 EVAs. In order to make certain the lunar explorers did not overlook planned tasks, spiral-bound cuff checklists were created to provide a detailed script of each task or activity. This put all the complex procedural steps of an EVA at the astronaut's fingertips. Young and Duke each had two individual cuff check lists for this mission, one for EVA 1 with the ALSEP deployment, and the present checklist for EVAs 2 and 3, which focuses on the true exploration and sample-gathering objectives.

The cover of the present checklist features a black and white Apollo 16 crew emblem. The verso has the printed signatures of those who prepared and approved this checklist, including Charles Duke, and the title *"Apollo 16 EVA 2 & 3, Lunar Surface Cuff Checklist LMP."* A date of 3/20/72 and LMP ascending page numbers are printed in the inner margin. Eleven and a half leaves are devoted to tasks associated with EVA 2. Two leaves cover steps associated with space suit connections prior to venting the LM's cabin atmosphere. That venting allowed the front hatch to open and the next steps of climbing down to the lunar surface. Once the preparations were completed around the LM and the lunar rover loaded, the crew found a special drawing on the next leaf. It features a drooling space-suited astronaut melting away in the arms of a buxom nude woman. The astronaut says: *"Happy Birthday Whatever Your Name Is."* This gag illustration continues the tradition started on Apollo 12 with the cuff checklists that had small images of Playboy pinups and Snoopy cartoons. These gags were master-minded by devious back-up and support crew members.

The next six leaves list the activities for lunar sites 4 through 10. These were called "Station Stops" and the checklist pages have plans of craters, placement positions for the rover, and suggested areas to take panoramic photography. Tasks listed include taking core samples, scientific measurements, and notes for geologic observations. Station 4 was located about one mile south of the LM on the slopes of Stone Mountain, and marked the highest point reached during their explorations. Stations 5 and 6 were located along craters at the base of Stone Mountain, with material that landed after the creation of nearby South Ray Crater. Station 7 was dropped as a stop to continue on to Stations 8 and 9, that were either on or very close to a bright ray from South Ray Crater. Station 10 was very close to the LM and was followed by activities to stow collection samples. This is listed on three additional pages (one and a half leaves).

EVA 3 begins with a full 2-page spread reviewing procedures and objectives for sampling lunar rocks and boulders. Three more leaves have the steps similar to the beginning of EVA 2. Six and a half leaves describe tasks planned for Stations 11 through 17. Due to time constraints related to the delayed landing, Young and Duke only explored the areas at Stations 11 and 13. Station 11 was at the very edge of North Ray Crater and was the greatest distance from the Lunar Module. At a boulder the crew called "House Rock" (due to its large size), Young took several pictures while Duke took samples. In those pictures, this checklist opened to the Station 11 pages can clearly be seen on Duke's left arm (a photolithograph is included in the lot). The crew then continued back toward the LM and stopped at Station 13 where they found a spot to gather lunar soil under a large boulder that was "permanently shadowed." This meant that soil was not exposed to millions of years of solar radiation after the boulder fell there from a nearby impact. A full page after the last task for Station 13 features the second gag cartoon. It shows Young blocking the view of the TV camera by hand with a "relieving" look on this face. A caption reads: *"Looks Bad, Feels Good."* Two additional pages cover steps to close out this final EVA.

As a contingency, a 2-page spread was included at the end of EVA 3 activities listing steps with a diagram for the first lunar "Grand Prix." In case this test was unable to be done in the original plan for EVA 1, a back-up period was set within the EVA 3 timeline. The "Grand Prix" involved Young driving the lunar rover at the highest speeds possible with Duke recording the sprint with a 16mm motion picture camera. Part of the objective was to have a visual record of how the rover bounced around and the amount of lunar dust kicked up by the wheels. This was actually done during EVA 1, thus not required at the end of EVA 3.

The final six leaves list trouble-shooting steps for eleven possible EMU malfunctions such as activation problems or loss of voice communications. Accompanied by a Typed Letter Signed by Back-up Commander Fred W. Haise, which reads in part: *"This Apollo 16 'Cuff Checklist' was presented to me by the crew of Apollo 16 as a thank-you for the role I played as the back-up Commander for this flight. Charlie Duke wore this checklist outside on the lunar surface during the last two exploration periods of Apollo 16, known as EVA 2 and EVA 3. It was exposed directly to the airless lunar environment for over 12 hours and spent approximately 71 total hours on the moon during April 20 to 23, 1972."*

$200,000 - 300,000


LOAD UP PLSS
0+43 PAN
1. HEDC (L. seat) to RCU
2. Pan, quad III: CRE 7'
report temp
3. HEDC (RCU) to L. seat
0+46 LRV PREP
1. HEDC & bag disp (R. seat)
to RCU
2. SCB (R. floorboard) to
R. seat bag
3. Support NAV INT
TURN ON DAC f4/250/1fps
EMU MALF
EVA 3
HAPPY BIRTHDAY
WHATEVER YOUR NAME IS
STA 8 TA 9 STA 4 TA 5,6 TA 7
PRESENTED TO
FRED HAISE
EVA CUFF CHECKLIST
WITH WARMEST PERSONAL REGARDS,
FROM THE CREW OF APOLLO 16
288


STA 11 QUAD UP EGRESS JULIE STA 12
STATION 13
NORTH RAY EJECTA BLANKET
130/0.7
186/4.3
LRV-270°
NO TV OR DUST
CDR
LMP
PAN
ROCK
SOIL (1 KG)
FRAME COUNT
EMU MALF
GRAN PKG STA 14 TA 15,16 TA 17 ETB
"LOOKS BAD --- FEELS GOOD"
PRESENTED TO
FRED HAISE
EVA CUFF CHECKLIST
WITH WARMEST PERSONAL REGARDS,
FROM THE CREW OF APOLLO 16
288

294

The following lot was originally in the collection of Thomas P. Stafford

289
ONE OF ONLY 98 ROBBINS MEDALLIONS CARRIED ON APOLLO 16.
Flown Apollo 16 Robbins medallion, sterling silver, 1 ½ inches in diameter. With the crew mission emblem on the obverse, and the mission dates engraved on the reverse. Serial number 89 on rim.

Accompanied by a Typed Letter Signed by Thomas P. Stafford, which reads in part: *"This medallion was presented to me by Apollo 16 Commander John Young while I was Deputy Director of Flight Crew Operations at the Manned Spacecraft Center. Apollo 16 was the fifth manned lunar landing and the second to use the lunar rover. The flight was the first to land in the highland regions of the Moon."*
$4,000 - 6,000

The following 5 lots are original training materials used by Fred Haise as back-up Commander for Apollo 16.

290
APOLLO 16 FINAL FLIGHT PLAN.
Apollo 16. April 16 Launch. Do Not Discard This Copy Baseline for May 15 & June 14 Launch. Final Flight Plan. NASA/MSC: March 6, 1972. Over 475 pp. 8 by 10½ inches. Green card stock covers, punched.

Inscribed by Fred Haise on the front cover: "*My Personal Training Copy—Fred Haise Apollo 16 BU CDR*." Haise also wrote his name in block capitals during 1972 in the upper right corner of the front cover. The flight plan is divided into six sections titled flight plan notes, charts and tables, detailed timeline, consumables, abbreviated timeline, and alternate missions. The detailed timeline is the most extensive section (394 pages) and lists activities in a column format. Each page in this section usually details one hour of flight time, rest periods are usually 2 hours per page.
$800 - 1,200

291
APOLLO 16 CSM LAUNCH CHECKLIST.
Apollo 16, April 16 Launch ... Revision A. CSM Launch Checklist. Houston, TX: NASA/MSC, March 7, 1972. Upwards of 120 pp. 8 by 6 inches. Card stock covers, punched, tabbed and bound with three metal rings.

Inscribed on the front cover *"My Personal Training Copy - Fred Haise, Apollo 16 BU CDR."*
Identical in size to the actual flight version of this manual, and listing Saturn V launch steps. Covers boost preps, launch trajectory, launch aborts, boost, orbit insertion and orbital check-outs, TLI preps, and booster (S-IV-B) separation. A section printed on pink paper covers the MODE I to IV aborts. The last sections cover Earth re-entry procedures in the event that the flight remained in Earth orbit and did not travel to the moon.
$700 - 900

292
APOLLO 16 CSM CHECKLIST.
Apollo 16 & 17, April 16 Launch ... Change A. CSM G&C Checklist. Houston, TX: NASA/MSC, March 15, 1972. Upwards of 125 pp. 8 by 6 inches. Card stock covers, punched, tabbed, and bound with three metal rings.

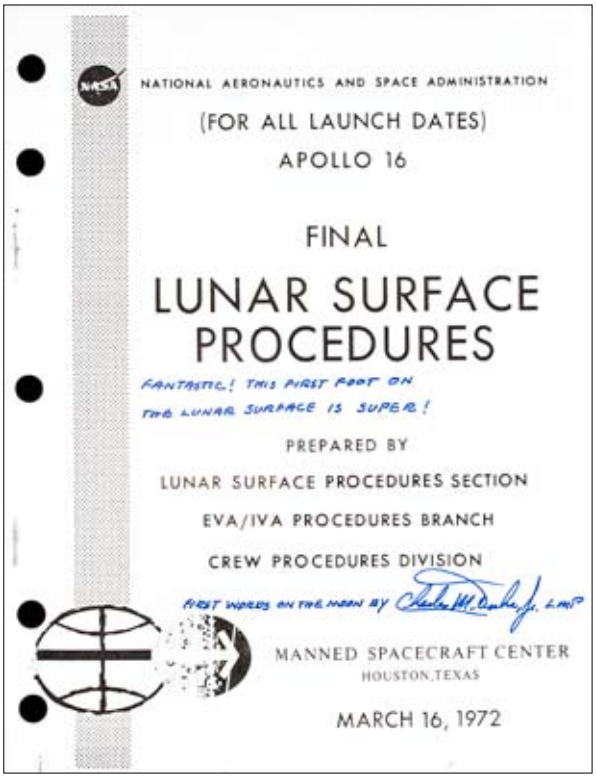
Inscribed on the front cover *"My Personal Training Copy - Fred Haise, Apollo 16 BU CDR."*
Identical in size to the actual flight version of this manual, and designed to be valid for both Apollo 16 and 17. The manual covers all aspects of the guidance and navigation (G & N) system of the Command Module. Alarm and star codes are identified plus all the program and procedures for operating the nav equipment by the flight crew. The steps for various flight maneuvers using the attitude control and the SPS systems are covered. Numerous graphs show predicted performance related to crew activities.
$600 - 800

293
LM TIMELINE BOOK.
Apollo 16. April 16. Do Not Discard This Copy Baseline for May 14, May 15, June 13, June 14 Launch. Basic LM Timeline. NASA/MSC: March 10, 1972. Over 44 pp. 11 by 8½ inches. Green card stock covers, punched and bound with three metal rings.

Inscribed and signed by Fred Haise on the front cover: "*My Personal Training Copy—Fred Haise Apollo 16 BU CDR*." Haise also wrote his name in block capitals during 1972 in the upper right corner of the front cover. Every step and function that the Apollo 16 LM crew needs to perform, starting from undocking to the actual lunar landing, is listed in a dual column page format.
$700 - 900

294
APOLLO 16 TRAINING STAR CHART.
"CSM Transearth Coast Star Chart, April 16, 1972 Launch," photographically printed on plastic, 8 by 16 inches, with stars and major constellations, and with the Earth, moon, sun, and planets colored by hand.

Inscribed on verso by Fred Haise: *"My Personal Training Copy, Fred Haise, Apollo 16 BU CDR."*
$600 - 800



296

295 °
SCIENCE ON THE MOON.
Apollo Lunar Surface Experiments Package Systems Handbook. ALSEP 4. NASA/MSC: August 1, 1970. Over 135 pp. 15 folding diagrams. 11 by 8 inches. Card stock covers, punched. Distribution list stamped and partially in manuscript on the front cover.

Due to the cancellation of the final three Apollo lunar landing missions, some components of ALSEP 4 were flown only on Apollo 15 or 16. The central station sections covers the structural, thermal control, electrical power, command and telemetry subsystems. Experiments described are the Passive Seismic Experiment (PSE), Active Seismic Experiment (ASE), Suprathermal Ion Detector Experiment (SIDE), Cold Cathode Gage Experiment (CCGE), Charged Particle Experiment (CPE), Laser Ranging Retro-Reflector (LRRR), and the Lunar Portable Magnetometer (LPM). Prioritization of experiments due to lunar mission reductions had the SIDE, CCGE, LRRR deployed on Apollo 15 and the ASE and LPM used only on Apollo 16.
$300 - 400

296
APOLLO 16 LUNAR SURFACE PROCEDURES.
Apollo 16 Final Lunar Surface Procedures. Houston, TX: NASA/MSC, March 16, 1972. 457 pp. 4 folding tables. 10½ by 8 inches. Card stock covers, punched.

Inscribed on the cover: *"Fantastic! This first foot on the lunar surface is super! First words on the moon by Charles M. Duke, Jr., LMP."*
The minute-by-minute plans of John Young and Charles Duke for their three lunar drives using the lunar rover. Includes: descriptions of the lunar rover, ALSEP equipment, and lunar surface tools; geological sampling objectives at the Cayley formation and the Descartes mountain area; EVA tasks in the exact form of the crew's EVA cuff checklists (but unlike in the cuff checklists, 'gag' illustrations are not included); 10 rover traverse maps like those carried on the lunar rover; a space suit equipment malfunction checklist.
$600 - 800

298

297 °
LUNAR GRAND PRIX.
Color photolithograph, 10 by 8 inches, of John Young putting the lunar rover through its paces while being photographed with a 16mm motion picture camera, printed caption on verso.

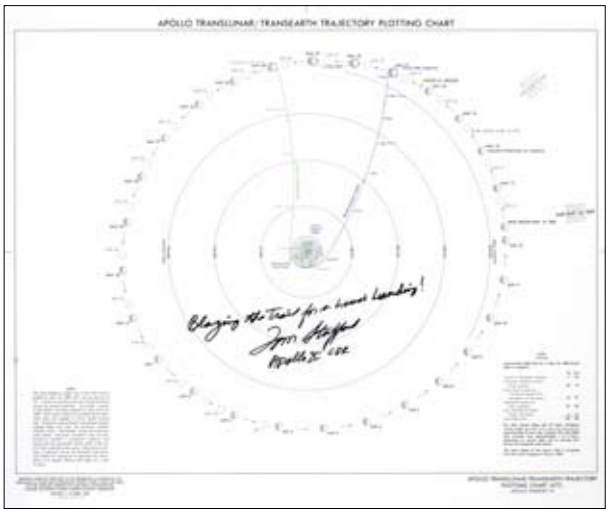
Inscribed: "*Photo by Charlie Duke Apollo 16 LMP.*"
$100 - 200

298
APOLLO 17 FINAL FLIGHT PLAN.
Apollo 17 ... Final Flight Plan. Houston, TX: NASA/MSC, October 23, 1972. Upwards of 500 pp. 10½ by 8 inches. Card stock covers, punched and with staples removed.

Signed by Lunar Module Pilot Harrison Schmitt (with Apollo 17) and by Gene Cernan as Apollo XVII CDR on the front cover.
The longest flight plan written for the Apollo Program, covering general flight plan notes, charts and tables, a detailed timeline of all flight events (over 400 pp), consumables, summary timeline, and alternate missions.
$1,000 - 1,500

299
PLANS FOR MAN'S LAST STEPS ON THE MOON.
Final Apollo 17 Lunar Surface Procedures. Volume 1: Nominal Plans. NASA/MSC: 6 November 1972. 311 pp. 6 folding charts. 10½ by 8 inches. Heavy card stock covers, punched.

The script for the final lunar surface exploration of the 20th century, signed by the mission commander on the front cover: "Gene Cernan / Apollo XVII CDR."
A detailed script of lunar surface operations and objectives for use by the Apollo 17 LM crew. Includes routes for all three lunar surface rover excursions and the locations of "station stops." A LM equipment locator, the lunar rover, ALSEP equipment, and lunar surface tools are all illustrated with descriptions. EVA steps and tasks are shown in the exact form of the crew's EVA cuff checklists and in a long column format on the facing page. Rover traverse maps like the ones actually carried on the lunar rover are illustrated.
$700 - 900



302

300
A REVIEW OF ALL APOLLO MISSIONS.
Apollo Program Summary Report. [JSC-09423]. NASA/JSC: April, 1975. Over 500 pp. Illustrated. Card stock covers, punched, staple removed.

Signed by at least one member of each manned Apollo crew. NASA's internal document that provides exhaustive multiple summaries of all aspects of the Apollo Program. No other single post-flight publication can compare. Each of the unmanned Saturn series (I, IB, and V) launches are covered plus Apollo spacecraft aborts (Little Joe II), and all the manned Apollo flights. A science summary reviews all lunar landings and describes geology findings, initial lunar experiment results, aspects of orbital science and photographic accomplishments. A vehicle development and performance summary expands on details of the Saturn rocket series, Little Joe II, the Command and Service Modules, the Lunar Module, and their subsystems. Included is information on flight crews, mission operations, biomedical and lunar quarantine, spacecraft manufacturing, launch site facilities and operations.
The front cover is signed with their Apollo flight numbers by: Buzz Aldrin, Alan Bean, Walt Cunningham, Charles M. Duke, Jr., Fred Haise, Edgar Mitchell, Wally Schirra, Dave Scott, Tom Stafford, and Al Worden. The title-page is signed: *"Gene Cernan, Apollo X - XVII, Rusty Schweickart, Apollo 9,"* and *"James Lovell."*
$2,000 - 3,000

APOLLO FLIGHT CHARTS All charts were made for NASA by the Aeronautical Chart and Information Center (ACIC) of the United States Air Force unless otherwise noted. These charts were designed for use by astronauts and flight planner/controllers for training and actual flight support use. Many charts are identical to the ones carried on their respective missions. Earth and lunar orbit charts have full 360 degree longitudinal coverage and latitude coverage from usually from 45 degrees north and south from the equator.

301
APOLLO 7 EARTH ORBIT CHART.
"Apollo Mission Chart (AMC) 7, Apollo 7 Mission," color Earth map, August 1968, printed on verso with ground track coordinates for revolutions 17-169, 13½ by 41 inches.

Boldly inscribed and signed by Cunningham and Schirra in the lower part of image: "Orbital tracks of the first manned Apollo flight - Walt Cunningham, Apollo 7" and "Wally Schirra Apollo 7 CDR." The chart plots earth orbit ground tracks from launch through orbit 16 with small rectangular boxes defining additional orbits when the ground track matches the first 16 orbits. Circular plots represent the ground communication coverage areas.
$600 - 800

302
APOLLO 10 TRAJECTORY CHART–THE DRESS REHEARSAL.
"Apollo Translunar / Transearth Trajectory Plotting Chart (ATT), Apollo Mission 10," diagram, April 15, 1969, 24 by 20 inches.

Inscribed: *"Blazing the Trail for a Lunar Landing! Tom Stafford, Apollo X CDR."*
The chart displays a polar view of the Apollo 10 mission profile which was a "dress rehearsal" for the first lunar landing. Events listed are launch, translunar injection, lunar and earth coast phases, lunar orbit insertion, and transearth injection.
$1,000 - 1,500

303
SIGNED BY THE ENTIRE APOLLO 12 CREW.
"Apollo Lunar Orbit Chart (ALO), Apollo Mission 12 … 14 November 1969 Launch Date," color lunar chart, October 8, 1969, 12 by 40¾ inches.

Signed by the crew of Apollo 11: "Alan Bean Apollo XII, "Charles Conrad, Jr., CDR," and *"Richard Gordon, CMP"* above the orbital plots. Command/Service Module orbits 1, 18, 19, 38, 39 and 45 are shown. The Apollo 12 landing area, site number 7, is marked with a red ellipse.
$1,500 - 2,000

304
APOLLO 12 LANDING SITE.
Two charts showing the challenges of making a pin-point landing on the moon, both signed by Alan Bean:
1. "LM Descent Monitoring Chart - (PDI to Landing), Site No. 7," lunar chart, October 8, 1969, 42 by 8 inches. Lunar Module Intrepid's ground track is shown by a white line down the center of the chart, with countdown "minute marks" showing the distance covered prior to PDI (Powered Descent Initiation). Major craters and other lunar features are labeled. *Signed by Alan Bean as Apollo 12 LMP.*
2. "Apollo 12, Site 7 Hazard Map," lunar chart, 1970, 22 by 17 inches. This map plots every small crater and boulder that could possibility be identified by the highest resolution Lunar Orbiter photography. Inscribed *"We made it down safely! Alan Bean, Apollo XII LMP."*

After the landing difficulties that had afflicted Neil Armstrong - including almost running out of fuel - NASA made a high-resolution chart for the next lunar landing site.
$800 - 1,200

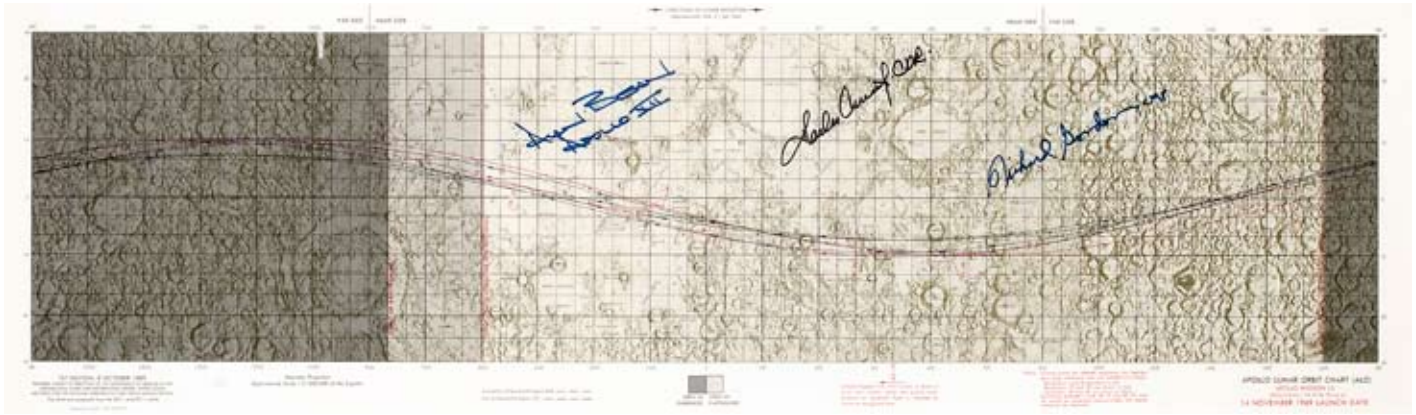
305
APOLLO 13 LAUNCH AND EARTH ORBITS.
"Apollo Earth Orbit Chart (AEO), Apollo Mission 13 for April 1970 Launch Date," color Earth map, March 3, 1970, 13 by 42 inches.

Signed *"Fred Haise Apollo 13 LMP."* Haise has also inscribed with the launch time and splashdown site: "*Launch at 2:13pm EST, April 11, 1970*" and "*Splash / April 17, 1970*" next to his x-mark. The spacecraft ground tracks are plotted from launch to the spacecraft translunar injection (TLI) burn during orbit 2.
$600 - 800

306
SIGNED BY LOVELL AND HAISE.
"Apollo Lunar Orbit Chart (ALO), Apollo Mission 13," color lunar chart, March 5, 1970, 12 by 40½ inches.

Boldly inscribed and signed by the LMP and CDR. Fred Haise has inscribed: "*No LM touchdown, but no LM impact either! Freddo*" as well as signing in the lower margin: "*Fred Haise Apollo 13 LMP.*" James Lovell has signed in the image: "*James Lovell / Apollo 13 CDR*."
See illustration on page 108.
$1,000 - 1,500

301



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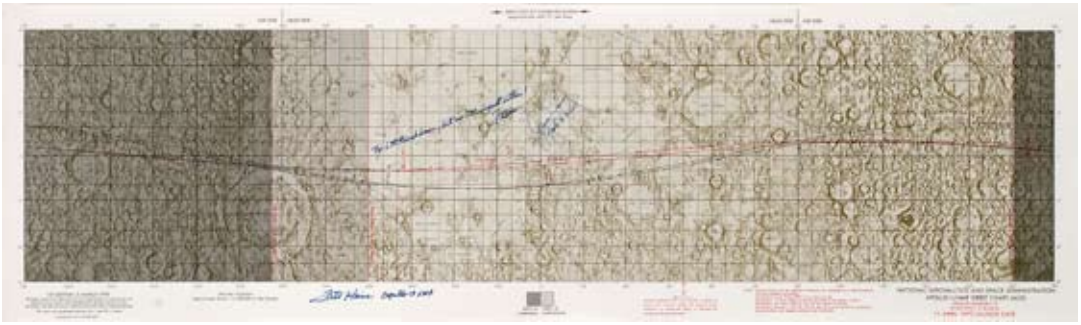
305



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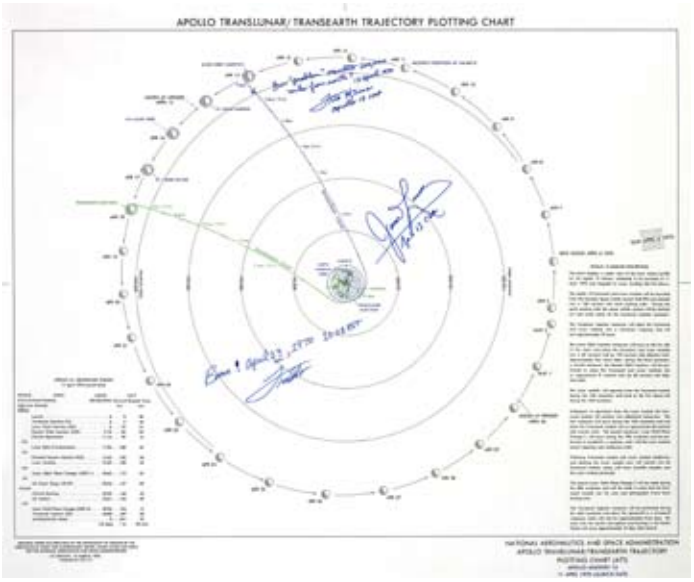
309



307

307
APOLLO 13 TRAJECTORY CHART–"HOUSTON, WE'VE HAD A PROBLEM."
"Apollo Translunar / Transearth Trajectory Plotting Chart (ATT), Apollo Mission 13," diagram, March 16, 1970, 24 by 20 inches.

A chart that vividly illustrates how far the Apollo 13 crew was from Earth when the explosion occurred. Inscribed by Fred Haise: *"Our 'problem' occurred 200,000 miles from earth! 13 April 1970, Fred Haise, Apollo 13 LMP."* He has marked an "X" where the explosion occurred on the flight path and added: *"Boom! April 13, 1970, 10:08 pm EST, Freddo"* with the number 13 underlined. Additionally signed by James Lovell as Commander. Illustrated is a polar view centered on the Earth of the Apollo 13 mission profile. Flight events shown are launch, translunar injection, lunar and earth coast phases, lunar orbit insertion, and transearth injection.
$1,500 - 2,000

308
APOLLO 13 FLIGHT PLANNING CHARTS.
Group of 30 folded Apollo charts, varying in size from 20 by 24 to 25 by 58 inches. Many stamped "*March 1970*" on verso. Loose in 30 by 22 inch card stock folder with labels and NASA logo affixed.

Detailed set of charts compiled for the planned third lunar landing which became an important mission reference and planning tool during the flight. *Inscribed* by Fred Haise on the front cover: "*Mission Planning Charts for Apollo 13, Fred Haise, Apollo 13 LMP.*" Included are the Apollo earth orbit chart, a CSM lunar orbit series, lunar orbit science series (A,B,C,D,E and F series with 3 to 4 charts in each series), and a LM orbit monitor group. Most charts have the ground tracks plotted for their respective spacecraft.
$1,500 - 2,000

309 °
APOLLO 14 EARTH ORBIT CHARTS.
1. "Apollo Earth Orbit Chart (AEO), Apollo Mission 14. For January 31, 1971 Launch Date," color Earth map, November 6, 1970, 13 by 42 inches. The spacecraft ground tracks are plotted from launch to the spacecraft translunar injection (TLI) burn during orbit
2. "Apollo Flight Chart (AFC), Apollo Mission 14," color Earth map, November 16, 1970, 10 by 33 inches. If the Apollo 14 flight failed to travel to the moon, an earth orbit mission would have been carried out. The photographic targets defined with this chart would have been taken by the crew.

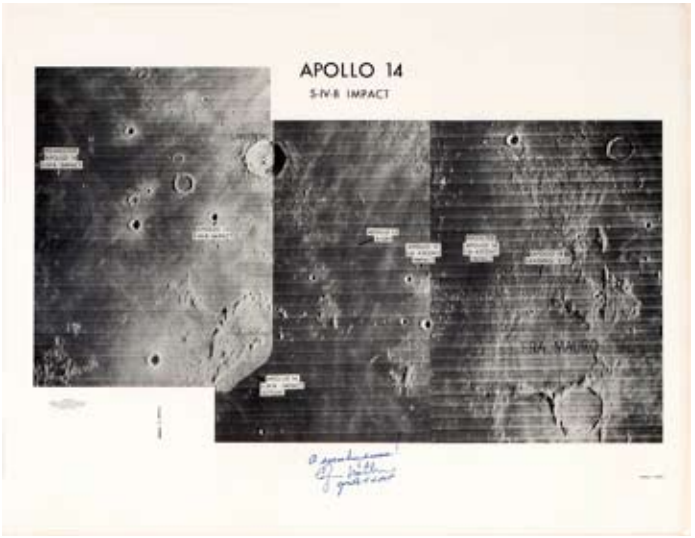
Two charts representing a normal lunar landing mission and an earth orbit only flight. Both are signed: "*Edgar Mitchell / Apollo 14 LMP.*"
$400 - 600

310

310 °
APOLLO 14 LUNAR CHARTS.
2 charts, both inscribed by Edgar Mitchell:
1. "Apollo Lunar Orbit Chart (ALO), Apollo Mission 14," lunar chart, November 16, 1970, 40 by 12 inches. Plotted are Command/Service Module orbits 1, 18, 20, and 34. The Fra Mauro landing site is marked with a red ellipse. *Signed by Edgar Mitchell as Apollo 14 LMP under the landing site ellipse.*
2. "Apollo Translunar / Transearth Trajectory Plotting Chart (ATT), Apollo Mission 14," diagram, December 16, 1970, 24 by 20 inches. An Earth polar view shows the Apollo 14 mission profile. Flight events shown are launch, lunar and earth coast phases, lunar orbit insertion, and earth landing. *Inscribed "A road map to the moon! Edgar Mitchell, Apollo 14 LMP."*
$500 - 700

311 °
APOLLO 14 S-IV-B IMPACT.
2 charts showing the impact site of the man-made "Moon quake," inscribed by Edgar Mitchell:
1. "Apollo 14 S-IV-B Impact Lunar Planning Chart," lunar chart, 21 by 17 inches. The predicted and actual Apollo 14 S-IV-B impact areas are marked, as are the Apollo 13 S-IV-B impact and Apollo 12 LM ascent stage impact areas.
2. "Apollo 14 S-IV-B Impact," lunar chart, 21 by 17 inches. Utilizing Lunar Orbiter images, this chart has an enlarged area showing the planning and actual Apollo 14 S-IV-B impact areas, the Apollo 12 ALSEP and Apollo 13 S-IV-B impact sites, plus the LM Ascent Stage impact sites for Apollo 12 and 14.

After the LM was extracted by the CSM from the Saturn V third stage (S-IV-B), that stage was intentionally impacted into the Moon during Apollo 14. This caused a calibrated "Moon quake" as measured by the lunar seismometer left by the Apollo 12 crew.
Both charts are inscribed *"A smashing success! Edgar Mitchell, Apollo 14 LMP."*
$400 - 600



311

312
THE APOLLO 14 LANDING AREA.
2 highly detailed charts of the Apollo 14 lunar landing area by the US Army Topographic Command for NASA:
1. "Apollo 14 Landing Site - Fra Mauro," 22 by 17 inches, scale 1:8,000. With the landing ellipse, down-range, and cross-range distances plotted. Inscribed *"We were 'right on the landing site.' Edgar Mitchell, Apollo 14 LMP,"* quoting part of Apollo 14 Commander Alan Shepard's first words from the moon after landing.
2. "Fra Mauro," 22 by 17 inches, scale 1:10,000. Utilizes Lunar Orbiter images of the Apollo 14 landing site. Inscribed *"Fra Mauro Base, Apollo 14. Edgar Mitchell, Feb. 1971,"* and with the exact landing site marked with a cross.
$700 - 900

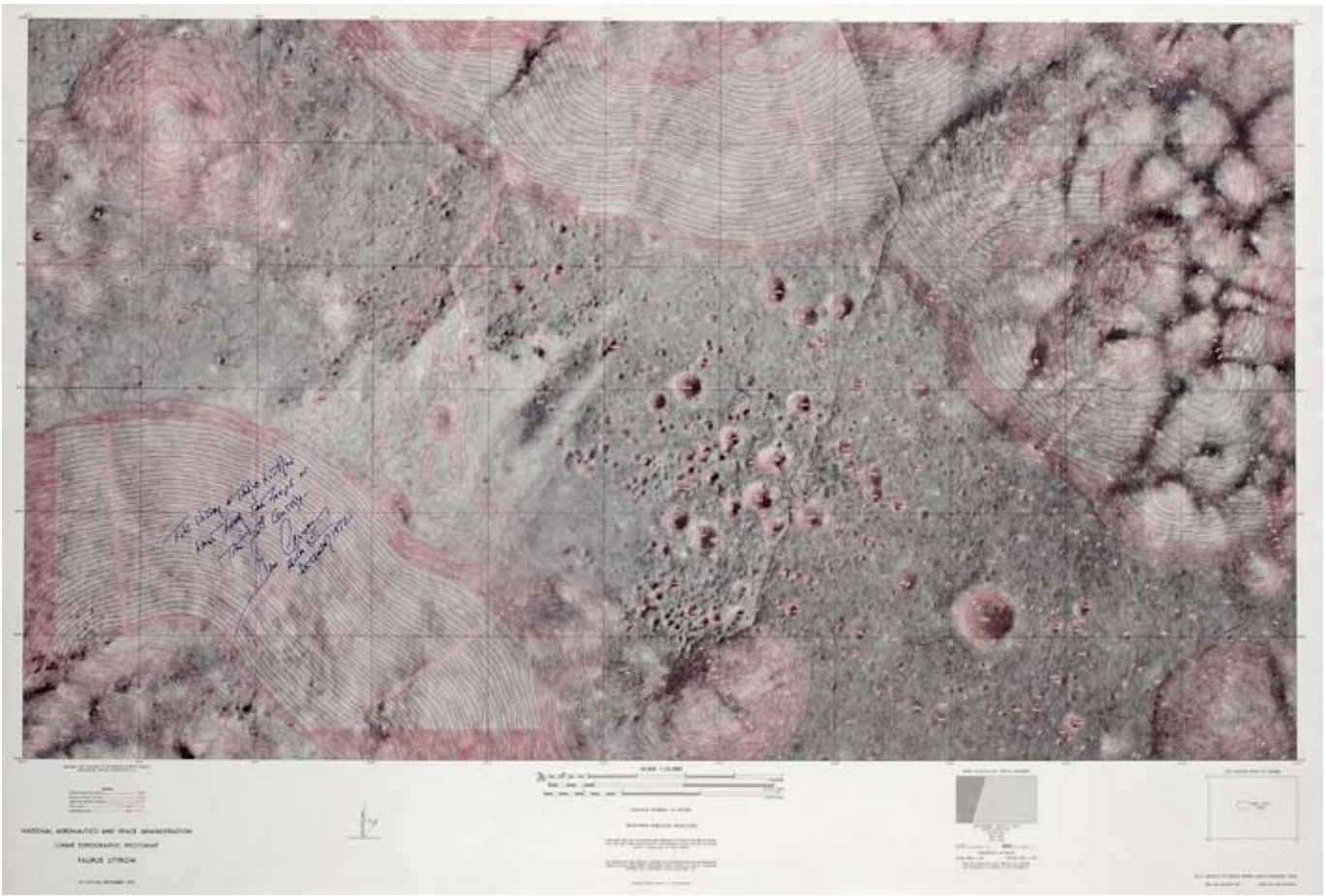
312


APOLLO FLIGHT CHART (AFC)

313


NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
APOLLO LUNAR ORBIT CHART (ALO)

315



317

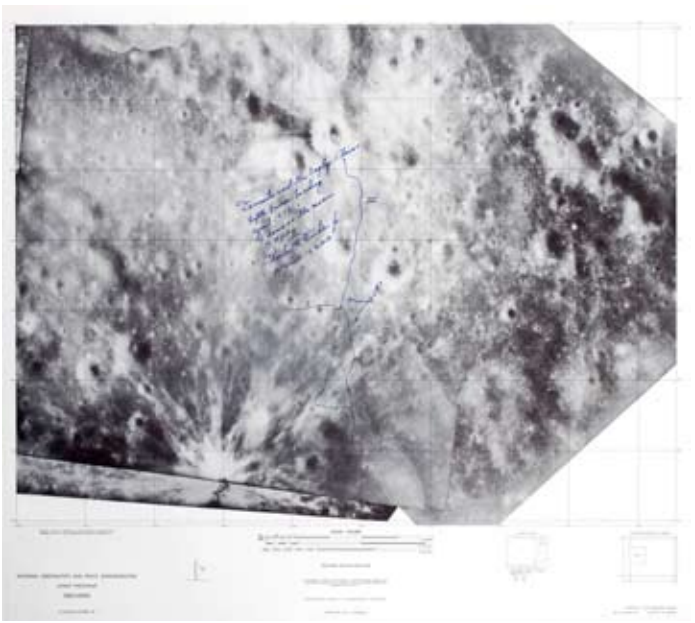
314

313 °
APOLLO 15 EARTH ORBIT CHARTS.
2 charts:
1. "Apollo Earth Orbit Chart (AEO), Apollo Mission 15," color Earth map, November 6, 1970, 42 by 13 inches. The spacecraft orbital ground tracks are plotted from launch to the spacecraft translunar injection (TLI) burn during orbit 2.
2. "Apollo Flight Chart (AFC), Apollo 15 Mission," color Earth map, June 1, 1971, 33 by 10 inches. Earth orbit chart that the shows photographic targets if the Apollo 15 lunar mission did not occur.

Two charts, both signed by the mission Commander: *"Dave Scott CDR."*
$400 - 600

314
APOLLO 15 LUNAR CHARTS.
2 charts:
1. "Apollo Lunar Flight Chart (ALF), Apollo Mission 15," lunar chart, 16 November 1970, 36 by 12 inches. *Signed: "Dave Scott CDR"* in lower margin. Plots the range of 74 planned CSM orbital ground tracks around the Moon.
2. "Lunar Uncontrolled Photomap, Rima Hadley," lunar chart, November 1971, 42 by 58 inches. *Signed: "Dave Scott / Apollo 15 CDR"* on map. One of the largest lunar landing site maps made during the Apollo program. The two large mountains of Hadley Delta and Mount Hadley with the long winding valley of Rima Hadley are labeled. The LM landing site, ALSEP experiment site, the three long traverses by the crew using the lunar rover and the twelve "station stops" where the crew stopped the rover to gather samples and make measurements, are all shown.

A lunar orbit chart and an extremely large landing site chart showing the traverses of the first lunar roving vehicle. Both signed by the mission commander.
$800 - 1,200



316

315
APOLLO 16 MISSION CHARTS—SIGNED BY DUKE.
2 signed charts:
1. "Apollo Earth Orbit Chart (AEO), Apollo Mission 16. For April 16, 1972 Launch Date," color Earth map, February 15, 1972, 13 by 42 inches.
2. "Apollo Lunar Orbit Chart (ALO), Apollo Mission 16. Trajectory for CSM Revolutions…," color lunar surface chart, February 16, 1972, 12 by 40 inches. CSM orbits 1, 39, 41, 60, 62, and 75 are plotted and the Descartes landing site is marked with a red ellipse.

An earth and lunar orbit chart for the fifth lunar landing. Each signed: "*Charles M. Duke, Jr. / Apollo 16 LMP.*"
$600 - 800

316
THE APOLLO 16 LANDING SITE—WITH MANUSCRIPT CHARTING BY DUKE.
"Lunar Photomap. Descartes," chart based on Apollo 14 500 mm photography, US Army Topographic Command for NASA, October 1971, 28 by 31¼ inches.

Inscribed by Charles Duke with his EVA routes hand-drawn in ink. Duke has traced the route of each of his three EVAs in black, green and blue ink respectively and inscribed in blue ink: "*Descartes and the Cayley Plains, Fifth Lunar Landing, April 1972, 71 hours on the Moon, 3 EVAs, Charles M. Duke, Jr., APOLLO 16 LMP.*" The bright South Ray Crater to the south of the Apollo 16 landing site is clearly depicted.
$800 - 1,200

317
THE APOLLO 17 LANDING SITE—THE LAST LUNAR LANDING OF THE APOLLO PROGRAM.
"Lunar Topographic Photomap. Taurus Littrow," chart based on Apollo 15 orbital photography, lithographed in black with red contour lines, Defense Mapping Agency for NASA, September, 1972, 29 by 43 inches.

Inscribed by Gene Cernan: "The valley of Taurus Littrow. Last lunar footsteps of the 20th Century. Gene Cernan, Apollo XVII, December 1972." He has marked the landing site with an "X." The North and South Massifs stand out between the area of the Apollo 17 landing site in the Taurus Littrow Valley.
$800 - 1,200

318 (detail)

318
LARGE LUNAR CHART–EXTENSIVELY INSCRIBED.
"Lunar Planning Chart (LOC-2)," lithographed lunar map in Mercator projection, May 1971, 45 by 42 inches, scale 1:2,750,000.

A magnificent lunar chart signed by six Apollo astronauts who marked their landing areas. Each has written an inscription related to their flight: *"A Dream of Mankind Becomes True! The First Lunar Landing, Apollo XI Tranquillity Base. Buzz Aldrin, July 20, 1969"; "Ocean of Storms. Second Lunar Landing. A Pinpoint Landing Next to Surveyor III. Alan Bean, Apollo XII"; "Fra Mauro Base, Third Lunar Landing, Feb. 1971. Edgar Mitchell, Apollo 14"; "Hadley Base, 4th Landing, July/Aug '71. Dave Scott, Apollo 15"; "Descartes and the Cayley Plains. Fifth Lunar Landing. April 1972. Charles M. Duke, Jr. Apollo 16"; "The Valley of Taurus Littrow. Sixth and Final Apollo Landing. December 1972. Gene Cernan, Apollo XVII."*
$10,000 - 15,000

319 °
APOLLO LUNAR ORBIT PHOTOGRAPHY
1. *Analysis of Apollo 8 Photography and Visual Observations*. NASA SP-201. Washington: 1969. 337 pp. 4 folding lunar orbit photo index maps in pocket at end. 9 by 11 inches. Original printed wrappers. *Signed by Frank Borman* on front cover. Gives the flight crew's report on observations with photographic experiment descriptions. All lunar images and frame numbers from Hasselblad magazines A through G are illustrated.
2. *Analysis of Apollo 10 Photography and Visual Observations.* NASA SP-232. Washington: 1969. 226 pages. 6 folding lunar orbit photo index maps in pocket at end. 9 by 11 inches. Original paper wrappers. *Signed by Tom Stafford with the inscription "CSM 106, LM 4"* on front cover. Includes crew descriptions made after the flight. All lunar images from eight Hasselblad magazines are illustrated.
$400 - 600

320

320
BILSTEIN, ROGER E.
Stages to Saturn: a Technological History of the Apollo/Saturn Launch Vehicles. NASA SP-4206. Washington: 1980. 511 pp. 10 by 7 inches. Original cloth.

Signed by seventeen astronauts: Buzz Aldrin, Alan Bean, Walt Cunningham, Charlie Duke, Richard Gordon, Fred Haise, Edgar Mitchell, Wally Schirra, Tom Stafford, Al Worden, Gene Cernan, Joe Kerwin, Jack Lousma, James Lovell, Rusty Schweickart, Dave Scott and Paul Weitz, on front free endpaper verso and half-title with their flight numbers.
$2,000 - 3,000

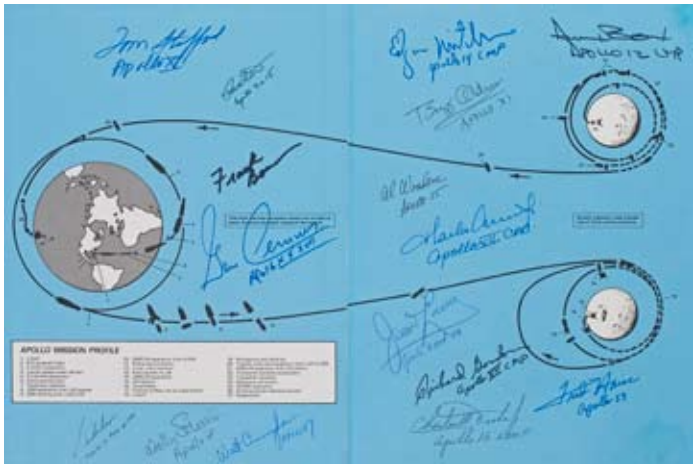
321
BROOKS, C.G., J.M. GRIMWOOD AND L.S. SWENSON.
Chariots for Apollo: a History of Manned Lunar Spacecraft. NASA SP-4205. Washington: 1979. 538 pp. 10 by 7 inches. Original cloth. Ownership inscription on front free endpaper of Carl R. Huss, NASA Mission Control team member then Mission Analysis manager at NASA/MSC.

Signed by Alan Bean, Charles Conrad, Gordon Cooper, Walt Cunningham, Charlie Duke, Richard Gordon, Fred Haise, Edgar Mitchell, Wally Schirra, Tom Stafford and Al Worden on frontispiece verso with their Apollo flight numbers. The frontispiece of Aldrin on the moon signed by him below. Half-title signed by Gene Cernan and Dave Scott. In all, fourteen signatures.
$1,500 - 2,000

322
APOLLO EXPEDITIONS TO THE MOON.
Cortwright, Edgar M., editor. *Apollo Expeditions to the Moon*. NASA SP-350. Washington: 1975. 313 pp. Illustrated. 9 by 12 inches. Color pictorial cloth binding.

Signed by many of the contributing astronaut authors, with their Apollo flight numbers added, including: Buzz Aldrin, Alan Bean, Gene Cernan, Charles Conrad, Walt Cunningham, Charles M. Duke, Jr., Fred Haise, James Lovell, Edgar Mitchell, Wally Schirra, Rusty Schweickart, Dave Scott, Tom Stafford, and Al Worden. Signatures appear on the front endpapers which illustrate a mission profile from the earth to the moon. Chapters written by astronauts include those by Aldrin, Collins, Conrad, Lovell, and Shepard. Other contributors include Wernher von Braun and Chris Kraft.
$2,000 - 3,000

321



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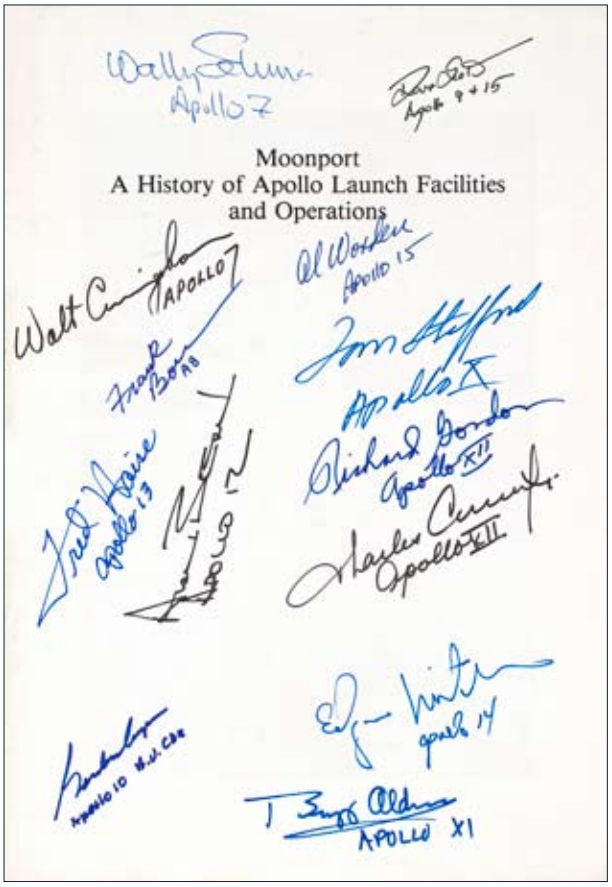
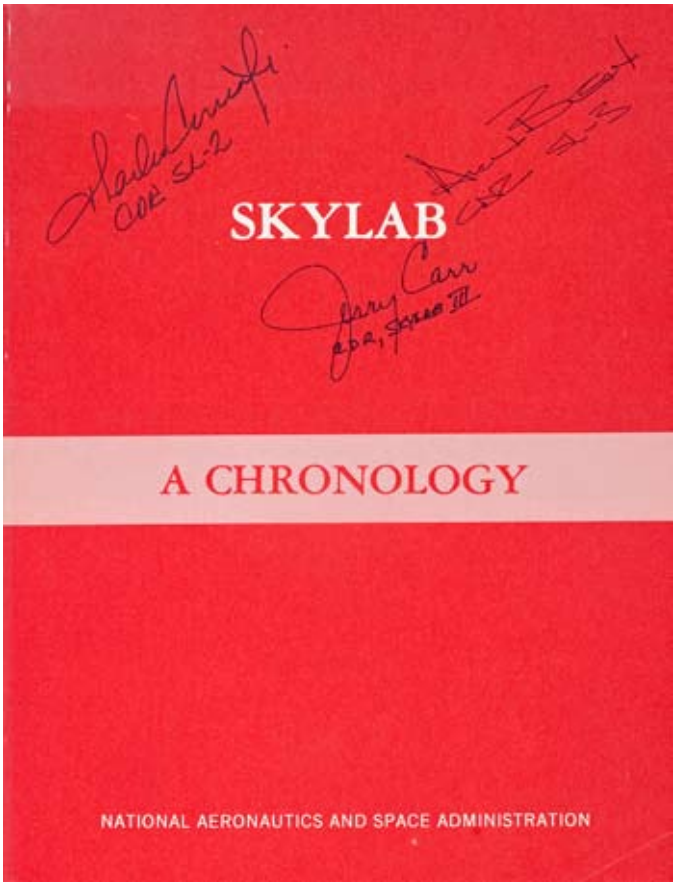
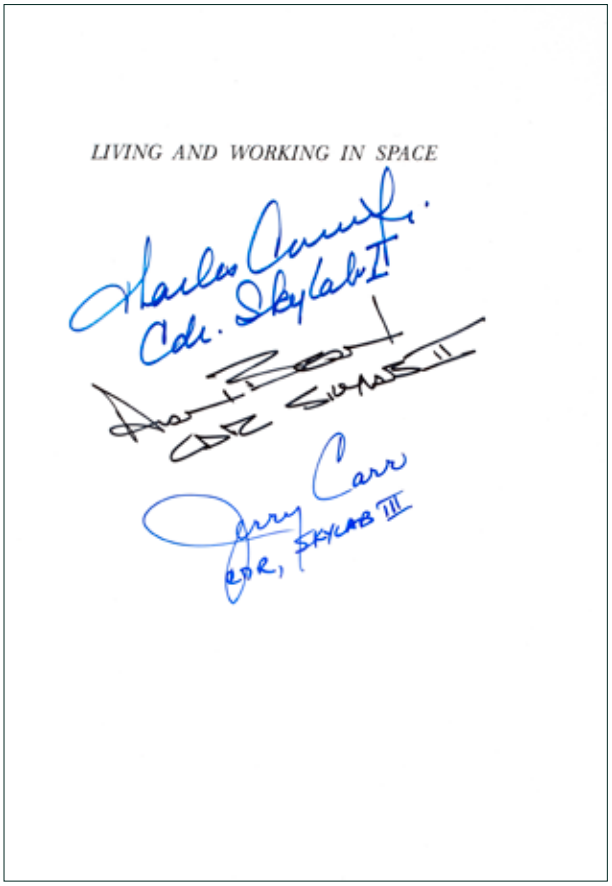


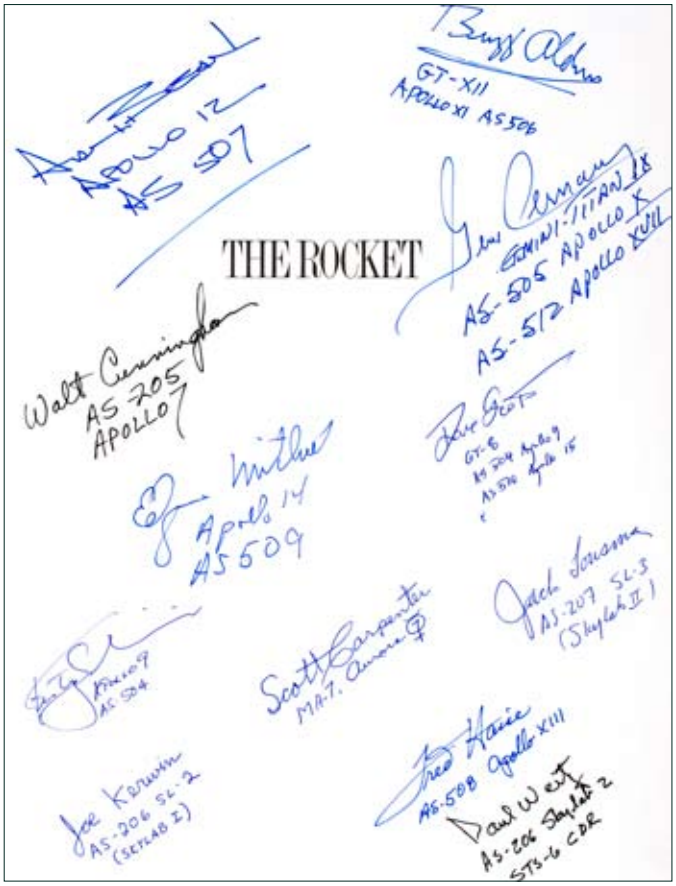
323



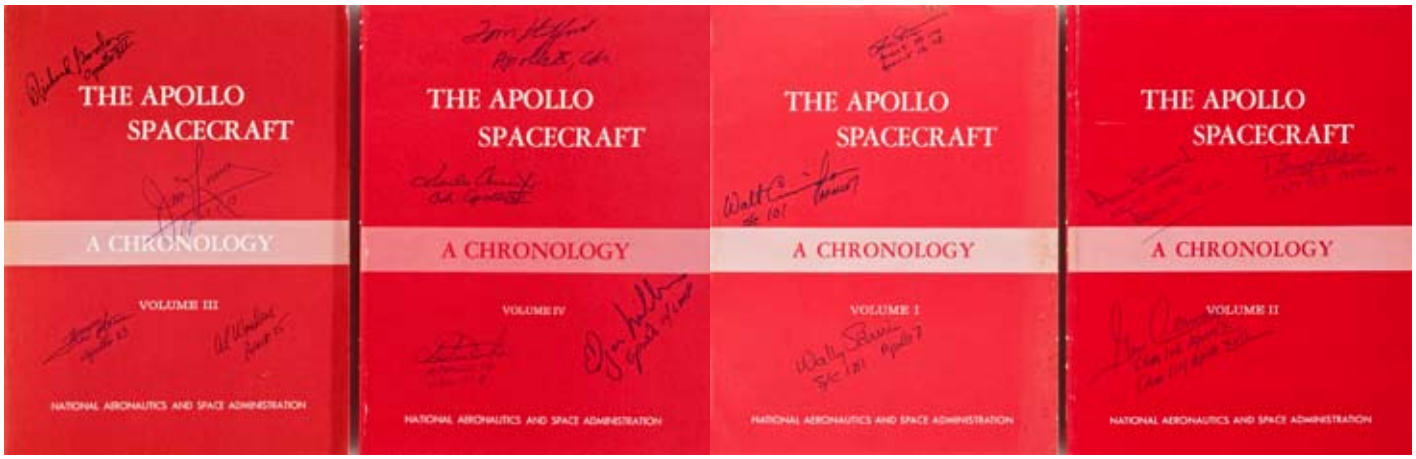
326



327



331



325

323
BENSON, CHARLES D. AND WILLIAM B. FLAHERTY.
Moonport: a History of Apollo Launch Facilities and Operations. NASA SP-4204. Washington: 1978. 636 pp. Illustrated. 10 by 7 inches. Original printed wrappers.

Signed by Buzz Aldrin, Alan Bean, Frank Borman, Charles Conrad, Gordon Cooper, Walt Cunningham, Richard Gordon, Fred Haise, Edgar Mitchell, Wally Schirra, Dave Scott, Tom Stafford, and Al Worden on half-title, with their Apollo flight numbers. An extremely thorough description of the world's only Moonport, signed by 17 astronauts who made the voyage.
$1,200 - 1,800

324
COMPTON, WILLIAM DAVID.
Where No Man Has Gone Before: a History of Apollo Lunar Exploration Missions. NASA SP-4214. Washington: 1989. 415 pp. 10 by 7 inches. Original printed wrappers.

Signed by Buzz Aldrin, Gordon Cooper, Walt Cunningham, Richard Gordon, Fred Haise, Edgar Mitchell, Wally Schirra, and Tom Stafford on the half-title with their Apollo flight numbers. The frontispiece signed and inscribed *"Painting by Alan Bean"* on the frontispiece.
$800 - 1,200

325
APOLLO CHRONOLOGY.
The Apollo Spacecraft: a Chronology. NASA SP-4009. Washington: 1969-1978. 4 volumes. xiv, 269; xiv, 277, [3]; xiv, 286, [2]; xiv, 463, [2] pp. 10¼ by 8 inches. Original printed wrappers.

Signed on various front covers by Walt Cunningham, Wally Schirra, Dave Scott, Buzz Aldrin, Alan Bean, Gene Cernan, Richard Gordon, Fred Haise, James Lovell, Al Worden, Charles Conrad, Charlie Duke, and Edgar Mitchell with their Apollo flight numbers and titles.
The day-by-day, year-by-year history of the Apollo Program signed by a crew member of each manned Apollo flight.
$2,000 - 3,000

326 °
SKYLAB CHRONOLOGY.
Newkirk, R.W. and I.D. Ertel. *Skylab: a Chronology.* NASA SP-4011. Washington: 1977. xvii, 458, [2] pp. 10¼ by 8 inches. Original printed wrappers.

Signed by Charles Conrad, Alan Bean, and Jerry Carr on front cover, as commanders and with their Skylab mission numbers.
$400 - 600

327
COMPTON, WILLIAM D. AND CHARLES D. BENSON.
Living and Working in Space: a History of Skylab. NASA SP-4208. Washington: 1983. 449 pp. Illustrations after photographs. 10 by 7 inches. Original printed boards.

Signed by each Skylab mission commander: Charles Conrad, Alan Bean, and Jerry Carr on half-title, each as commander with their Skylab flight number.
$600 - 800

328 °
EZELL, EDWARD C. AND LINDA N.
The Partnership: a History of the Apollo-Soyuz Test Project. NASA SP-2409. Washington: 1978. 555 pp. 10 by 7 inches. Original printed wrappers.

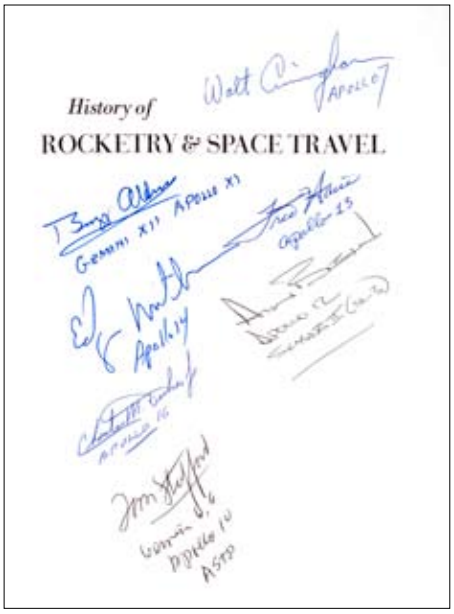
Signed by Tom Stafford as Apollo Commander, and ASTP Cosmonauts Alexei Leonov and Valeriy Kubasov on half-title.
$300 - 500

329
ASTRONAUT-AUTHORED AND SIGNED.
4 works:
1. Cooper, Gordon & Bruce Henderson. *Leap of Faith: an Astronaut's Journey into the Unknown.* New York: Harper Collins, 2000. 279 pp. 9½ by 6½ inches. Original boards, dust-jacket. *First edition, inscribed "Gordon Cooper, Faith 7" on title.*
2. Lovell, James & Jeffrey Kluger. *Lost Moon: the Perilous Voyage of Apollo 13.* Boston: Houghton Mifflin, 1994. 378 pp. 9½ by 6½ inches. Original cloth-backed boards, dust-jacket. *Signed by Lovell on title, and Fred Haise on frontispiece as Apollo 13 LMP.* Later impression.
3. Mitchell, Edgar & Dwight Williams. *The Way of the Explorer: an Apollo Astronaut's Journey Through the Material and Mystical Worlds.* New York: G.P. Putnam's Sons, 1996. 230 pp. 9½ by 6½ inches. Original boards, dust-jacket. *First edition, signed by the author and dated on half title.*
4. Stafford, Thomas P. and Michael Cassutt. *We Have Capture: Tom Stafford and the Space Race.* Washington: Smithsonian Institution, 2002. 288 pp. 9½ by 6½ inches. Original cloth-backed boards, dust-jacket. *First edition, inscribed on title "Tom Stafford, Gemini 6, 9, Apollo 10, ASTP."*
$600 - 800

332

333

334



335

330
ALDRIN, BUZZ. B.1930.
4 books written or co-authored by Buzz Aldrin and signed:
1. [With:] Armstrong, N. and M. Collins. *First on the Moon.* Boston: Little, Brown and Company, 1970. 434 pp. 10 by 6 inches. Original cloth, dust-jacket.
2. [With:] Warga, W. *Return to Earth.* New York: Random House, 1973. 338 pp. 9 by 6 inches. Original quarter cloth, dust-jacket. *Second printing.*
3. [With:] McConnell, M. *Men from Earth.* New York: Bantam Books, 1989. 312 pp. 9 ½ by 6 ½ inches. Original quarter cloth, dust-jacket.
4. [With:] Barnes, J. *The Return.* New York: Forge, 1999. 301 pp. 9 ½ by 6 ½ inches. Original glossy boards, dust-jacket. *Second printing.*
Together, 4 volumes. *First editions,* first printing except where stated otherwise, *signed by Aldrin* on half-titles or titles.
$700 - 900

331
BAKER, DAVID.
The Rocket: the History and Development of Rocket & Missile Technology. New York: Crown, 1978. 277 pp. Numerous diagrams and illustrations after photographs, many in color, 2 color folding plates of rocket planes/engines and comparative scale drawing of rocket vehicles. 13 by 10 inches. Original glossy boards, dust-jacket.

Signed by Buzz Aldrin, Alan Bean, Scott Carpenter, Gene Cernan, Walt Cunningham, Fred Haise, Joe Kerwin, Jack Lousma, Edgar Mitchell, Rusty Schweickart, Dave Scott, Paul Weitz on title with their Gemini-Titan, Apollo and Skylab flight numbers.
See illustration on page 114.
$1,500 - 2,000

332
BAKER, DAVID.
The History of Manned Space Flight. New York: Crown, 1981. 544 pp. Illustrated with photographs and diagrams. 13 by 10 inches. Original cloth, dust-jacket.

First edition, signed by Buzz Aldrin, Alan Bean, Scott Carpenter, Jerry Carr, Gene Cernan, Walt Cunningham, Charles M. Duke, Jr., Richard Gordon, Fred Haise, Joe Kerwin, Alexi Leonov, Jack Lousma, Edgar Mitchell,Rusty Schweickart, Dave Scott, Thomas P. Stafford, Paul Weitz, and Al Worden on half-title. Additionally signed by Wally Schirra on title over a picture of him in orbit during Apollo 7.
Considered by many to be the standard reference work on space flight. Signed by 18 astronauts and one cosmonaut.
$1,500 - 2,000

333
BENDINI, SILVIO, WERNHER VON BRAUN & FRED WHIPPLE.
Moon: Man's Greatest Adventure. New York: Abrams, 1973. 267 pp. 15 by 12 inches. Original cloth.

Signed by 14 astronauts, one of the earliest large-format publications on the moon and general space exploration. The Space Age is covered year-by-year from 1957, starting with Sputnik, and including Gagarin's flight, the Mercury Program, Gemini Program, unmanned lunar orbiters and landers, the Apollo Program, and the ultimate success of the first lunar landing, Apollo 11.
Signed by Buzz Aldrin, Alan Bean, Scott Carpenter, Gene Cernan, Gordon Cooper, Walt Cunningham, Charles M. Duke, Jr., Fred Haise, Joe Kerwin, Jack Lousman, Edgar Mitchell, Rusty Schweickart, Tom Stafford, and Paul Weitz, on half-title with their mission numbers and some with roles. The color frontispiece, the iconic image of Aldrin on the moon's surface by Armstrong, is boldly signed by the former: *"Buzz Aldrin, Apollo Eleven, July 20, 1969."*
$1,500 - 2,000

334
COOKE, HEREWARD LESTER.
Eyewitness to Space: Paintings and Drawings Related to the Apollo Mission to the Moon. New York: Abrams, 1976. Unpaginated. 17 by 13 inches. Tipped-in color plates. Original pictorial cloth.

Signed by 9 astronauts, one of the most authoritative art books relating to the early US manned space program, reproducing over 250 paintings and drawings from the NASA-sponsored art program from 1963 to 1970. Includes works from Chesley Bonestell, Paul Calle, Lamar Dodd, Robert McCall, Norman Rockwell, and James Wyeth.
Signed by Buzz Aldrin, Scott Carpenter, Gordon Cooper, Walt Cunningham, Charlie Duke, Fred Haise, Edgar Mitchell, Wally Schirra, and Tom Stafford on half-title with their mission numbers.
$800 - 1,200

335
VON BRAUN, WERNHER, AND FREDERICK ORDWAY.
History of Rocketry & Space Travel. New York: Thomas Y. Crowell, 1966. 244 pp. 11 by 9 inches. Original pictorial spine and upper cover onlay over crushed morocco lettered in blind.

Signed by Buzz Aldrin, Alan Bean, Gene Cernan, Gordon Cooper, Walt Cunningham, Charles M. Duke, Jr., Fred Haise, Alexi Leonov, Edgar Mitchell, Thomas P. Stafford, and Paul Weitz on the half-title, with their flight numbers.
$1,000 - 1,500

The following three lots are beta cloth crew emblems and NASA insignias made during the Apollo and Skylab programs for use on space suits. Beta cloth was the fire protection layer of the Apollo space suit.

336 °
NASA "MEATBALL" AND US FLAGS.
Three emblems printed on Beta cloth: one of NASA's emblem, 7 by 6 inches; and two US flags, 8 by 6 and 7 by 10 inches.

The smaller flag was worn on the Apollo crew flight jacket worn while inside the spacecraft. The larger flag was worn on the Apollo space suit. NASA's emblem was affectionately known as the "meatball."
$300 - 500

337
APOLLO CREW EMBLEMS.
Set of 10 Apollo emblems for Apollos 7 to 10 and 12 to 17. Printed on Beta cloth, varying in size from 8 by 8 to 9 by 9 inches.
$600 - 800

338 °
SKYLAB AND ASTP CREW EMBLEMS.
4 items:
1. Three Skylab crew emblems for Skylab 1, 2, and 3. Printed on Beta cloth, 9 by 9 inches
2. Apollo Soyuz Test Project mission emblem. Printed on Beta cloth, 5 by 5 inches.
$200 - 300

339

340

341

The following three lots are from the estate of Dr. Maxime Faget.

339
APOLLO APPLICATIONS PROGRAM (AAP) MODEL.
Model made by the NASA-Marshall Space Flight Center's (MSFC) Graphic Engineering and Model Studies Branch, plastic and metal, partly transparent, 17 inches tall. The "stack" features the top of a S-IVB rocket stage, an Instrument Unit (IU) with interior details, a clear Spacecraft-LM Adapter (SLA) section, and a transparent Command/Service Module (CSM). The long fuel and oxidizer tanks, fuel cells, and other pressure tanks are visible inside the Service Module (SM). One SM section has removable red tinted plastic. The Command Module (CM) shows the activities of two crewmen and the locations of various equipment including the main control panel. A Lunar Excursion Module (LEM) with deployable landing legs, an equipment transfer "Rack," and a Mission Module-LEM Truck Payload are included as separate vehicles. Each can be placed individually inside the SLA area, or in a "docked" position with the CSM via "push-snap" connectors. The CSM and SLA are detachable from each other and from the S-IVB-IU. The latter is fixed onto a wooden base, with a plaque reading: *"Apollo Applications Program, Scale: 1/4 inch = 1 foot."* Each major vehicle component is identified with red decals. The whole fitting into an original 19 by 11 by 8 inch wood carrying case which is painted blue and has decals reading *"A. A. P. No. 34"* and *"FRAGILE."*

During the time this model was made, in the mid-1960s, the Apollo Applications Program (AAP) had envisioned not only Earth orbital survey missions but lunar orbit mapping and extended lunar landing flights. The modules that fit into the SLA area of this model represent some of the lunar exploration aspects of AAP. Through the later 1960s, AAP was scaled back to Earth orbit operations and utilized the tanks inside the S-IVB. They would not contain fuel but could be turned into a habitable module with scientific equipment stored inside prior to launch. This program was known as Skylab and had three manned missions in 1973-74.
Included is a photograph from 1968 of Dr. Faget in his MSC office area discussing aspects of a lunar mission with visiting Rear Admiral Sun Tsu-Tsung of the Taiwan Navy. This AAP model can be seen at the side of the Admiral.
$4,000 - 6,000

342

340
LOCKHEED SPACE STATION MODEL.
Model of a Lockheed "Y"-design Earth-orbiting space station, painted wood and plastic, 7 inches tall with a 5-inch diameter base. Comprises a circular base representing the Earth and a 6-inch clear plastic "vector tower" from which the space station model is suspended. A magnet in the base holds the station 'above' the surface of the Earth. A small metal Lockheed logo is on the base. The NASA emblem is on the vector tower and the station.

This station was designed circa 1964. It would rotate in Earth's orbit to provide artificial gravity for the crew. Gravity would increase as crew members moved down the levels inside each of the "arms." The central hub provided a pressurized area for zero-G experiments.
$1,000 - 1,500

341
EARLY SPACE STATION MODEL.
Model of a prototype Space Station, composites, metal and decals, 20 inches tall. Comprises an Attitude Control Module at the base with four sets of "quad" attitude control thrusters. This module is attached to a Docking Port Assembly with two CSM's attached (up to four CSM's could dock at one time). A Saturn-type upper stage is attached to the docking area and tapers to a point. All sections removable and mounted to a circular wooden base.
$3,000 - 5,000

343

The following lot was originally in the collection of Astronaut Charles Conrad.

342
CARRIED TO THE FIRST US SPACE STATION BY CHARLES CONRAD.
Flown Skylab I Cloth Emblem, 4 inches in diameter. Carried on Skylab 2.

Accompanied by a Typed Letter Signed by Charles Conrad on his personal stationery, which reads in part: "*I was commander of the first manned mission to Skylab. Our flight was delayed ten days in order to make plans for repairing the damage that occurred just minutes into the launch of Skylab, known as the SL-1 mission. This patch was carried with us during the launch of SL-2 Saturn IB vehicle on May 25, 1973, and flew in space for 28 days. My crew and I made repairs to Skylab during that time to enable a full-duration mission. We returned to Earth on June 22, 1973. Charles Conrad, Skylab I CDR.*"
$2,500 - 3,500

PAUL J. WEITZ [Born 1932]

Paul Weitz was a Navy fighter pilot before being selected for the astronaut program in 1966. He served as pilot on the first manned Skylab flight (May-June, 1973), and was also spacecraft commander of the maiden voyage of the Orbiter Challenger. He retired from NASA service in 1994. The following four lots are directly from his collection.

343
THE "ORIGINAL 19": ASTRONAUTS SELECTED IN 1966 BY NASA.
Color photograph, 14 by 11 inches, of the 19 Group 5 astronauts selected by NASA in 1966.

Signed by every member except Ed Givens, who died in an automobile accident just months after his selection. The photograph is endorsed on the back: "*Our official "Group 5" (Original 19) photo taken and autographed in 1967. Paul Weitz (then) LCDR, USN.*"
This group of astronauts represents a microcosm of NASA history as viewed from their flight assignments. As it turned out, two would never fly, three would have to wait over 15 years to fly, four made their first flight in the Skylab Program, and less that half were to make the ultimate goal - an Apollo lunar flight, with only two having the honor of actually walking on the moon.
Signed by Jack Swigert* (Apollo 13), Bill Pogue (Skylab 3), Ron Evans* (Apollo 17), Paul Weitz (Skylab 1 and STS-6), Jim Irwin* (Apollo 15 Moonwalker), Jerry Carr (Skylab 3), Stewart A. Roosa* (Apollo 14), Al Worden (Apollo 15), Ken Mattingly (Apollo 16, STS-4, STS-51C), Jack Lousma (Skylab 2 and STS 3), Ed Mitchell (Apollo 14), Charlie Duke (Apollo 16), Don Lind (STS 51B), Fred W. Haise (Apollo 13), Joe Engle (STS 2 and 51I), Vance Brand (ASTP, STS 5 and 41B), John S. Bull* (did not fly in space), and Bruce McCandless, II (STS 41B).
* Deceased.
$2,000 - 3,000

344

345

344
FLOWN "P. WEITZ" NAME TAG.
Name identification tag, cloth, 1 by 4 inches, traces of original stitching that attached it to the garment.

Originally on one of Paul Weitz's tan inflight jackets worn during the first Skylab Mission. Inscribed on the verso: *"Flown on Skylab I, Paul Weitz, PLT."*
Accompanied by a Typed Letter Signed by Paul Weitz, which explains that this tag *"was originally on one of my tan inflight jackets that I wore during the first manned Skylab mission. Skylab I was the first flight to the Skylab space station which had a duration of 28 days during 1973.*
As our mission progressed, worn crew clothing was routinely disposed of after several days' use. Prior to disposal into the large aft waste tank, I removed this tag from my jacket."
Included is a color photograph of Weitz wearing his training version of this jacket.
$1,200 - 1,800

345
US FLAG CARRIED ON SKYLAB I.
Flown US Flag, Beta cloth, 3 by 5 inches, original stitching and Durette jacket material from which it was cut.

From one of Paul Weitz's tan inflight jackets, and cut off by him prior to disposing of the jacket toward the end of the mission. The flag is inscribed on the verso, *"Taken from my inflight jacket worn on Skylab I (SL-2), Paul Weitz, PLT."*
Accompanied by a Typed Letter Signed by Paul Weitz, which reads in part: *"The United States Beta cloth flag displayed with this letter was originally on one of my tan inflight jackets that I wore during the first manned Skylab mission. Skylab I was the first flight to the Skylab space station, which had a duration of 28 days during 1973. As our mission progressed, worn crew clothing was routinely disposed of after several days use. Prior to disposal into the large aft waste tank, I cut this flag from my jacket."*
Included is a color photograph of Weitz wearing his training version of this jacket.
$1,500 - 2,000

346
ROBBINS MEDALLION.
Unflown Skylab I Medallion, sterling silver, 1 ½ inches in diameter. Features the crew mission emblem on the obverse, with the mission dates engraved on the reverse. Serial number 72 of the Robbins medallions made for Skylab I.

Accompanied by a Typed Letter Signed by Paul Weitz, which describes the medallion, and explains, *"the design was executed by the late Kelly Freas, a well-known science fiction illustrator.*
The Skylab crew emblems designed for the program refer to the first, second, or third mission crews. Charles Conrad, Joe Kerwin, and myself were the first crew, with our mission designation being Skylab I. The SL-1 designation, refers to Skylab space station itself which was launched on a Saturn V rocket. The second launch of the Skylab Program, often seen as SL-2, was the launch that carried us to a 28 day flight aboard the Skylab space station. This medallion has been in my private collection since 1973."
Only 50 medallions, serial numbers F1 to F50, were carried on the first Skylab manned mission.
$600 - 800

347 °
SIGNED SKYLAB I EMBLEM.
Skylab 1 crew emblem, 4 inches in diameter, printed on Beta cloth, 9 inches square.

Signed by the Skylab I crew: Charles Conrad, Joe Kerwin, and Paul Weitz.
$350 - 500

348 °
THE "WE FIX ANYTHING" CREW
Color photolithograph, 10 by 8 inches, of the first Skylab crew posing in their orbital coveralls.

Signed by Joe Kerwin, Charles Conrad, and Paul Weitz.
$200 - 300

349
PAUL WEITZ'S TRAINING ATLAS.
Crewman 2. Skylab EREP Site Book Map Definitions. NASA/MSC: February, 1973. Over 250 pp. Color maps showing earth targets. 8 by 10½ inches. Card stock covers, punched.

Inscribed by Paul Weitz on both the front cover and on the index map: "*Used in training for Skylab I (SL-2), Paul Weitz, PLT.*"
This manual provides objectives and operational instructions for experiment S-191 (Infrared Spectrometer), part of the total Skylab EREP. S-191's primary goal was to make fundamental evaluations of the applicability and usefulness of sensing earth resources in the infrared from orbital altitudes. An additional objective was to determine the value of real-time identification of ground targets by an astronaut.
There is a 22 by 13 inch index map of the US, listing all targets, with annotations made by Paul Weitz.
$600 - 800

350 °
SKYLAB II BETA CLOTH EMBLEM.
Skylab II crew emblem, 3½ inches in diameter, printed on Beta cloth, 9 inches square.

Signed by the Skylab II crew: Alan Bean, Owen Garriott, and Jack Lousma.
$300 - 400

351 °
THE SECOND MANNED CREW.
Color photolithograph, 10 by 8 inches, of the second Skylab crew posing in their orbital coveralls, printed caption on verso.

Signed by Owen Garriott, Jack Lousman, and Alan Bean, the last two as SL2 Pilot and CDR. They completed a 59 day mission aboard Skylab.
$150 - 200

354

352 °
SKYLAB 3 BETA CLOTH EMBLEM.
Skylab 3 crew emblem, 3½ inches tall, printed on Beta cloth, 9 inches square.

Signed by the Skylab 3 crew: Jerry Carr, Ed Gibson, and Bill Pogue.
$250 - 350

353 °
THE FINAL SKYLAB FLIGHT CREW.
Color photolithograph, 10 by 8 inches, of the third Skylab crew posing in their white space suits, printed caption on verso.

Signed by Jerry Carr, Ed Gibson, and Bill Pogue, the first two as CDR and SPT. They completed an 84 day mission aboard Skylab.
$150 - 200

The following lot is directly from the estate of Dr. Maxime Faget.

354
APOLLO SOYUZ MODEL.
Model of the American Apollo CSM and Russian Soyuz, by Pacific Miniatures of Alhambra, CA, wood and painted metal, 17 inches long assembled. The two vehicles are connected by a black Docking Module (DM) which provided a functional docking port for each spacecraft. The entire model is mounted above a 7-inch oval wood base with a plaque reading: "*Apollo-Soyuz Test Project, Scale 1/50, Space Division, Rockwell International*."
$3,000 - 5,000

The following three lots are from the estate of Faye Stafford.

355
MAIL RUN BY THE SOYUZ.
Flown Postal Cover featuring the ASTP emblem and spacecrafts in flight, postmarked July 15, 1975 at the Baykonur Cosmodrome, 4½ by 6½ inches.

One of only 25 postal covers carried on Soyuz during the mission, which were later distributed evenly to all 5 crew members.
Signed by Tom Stafford, Vance Brand, D. K. Slayton, Aleksei Leonov, and Valery Kubasov during the mission on July 17, 1975, and inscribed on verso: *"Flown in Soyuz and signed by all crew members during the flight of ASTP, Tom Stafford."*
$3,000 - 4,000

357

356
RUSSIAN STAMP SHEET CARRIED ON ASTP.
Flown Russian stamp sheet, 3½ by 5 inches. With an image of the ASTP emblem and crew members. Canceled at the Baykonur Cosmodrome on 15 July 1975 just prior to the Soyuz launch and carried on the mission.

Signed by mission commanders Aleksei Leonov and Tom Stafford and *inscribed* by Stafford at the top of the sheet: "*Flown on ASTP*."
$700 - 900

357
APOLLO-SOYUZ MEMENTOS.
A group of items, comprising: 3 lapel pins, an unflown Apollo-Soyuz Robbins medallion, a postal cover, a one Ruble bank note, and a color photograph of General Stafford and his family in Red Square, Moscow. Mounted together and framed in shadow box, 15 by 15 inches.

The postal cover and bank note are *signed by all 5 Apollo-Soyuz crew members.*
$600 - 800

358

359

360 (detail)

358
THE STARS AND STRIPS CARRIED ON APOLLO-SOYUZ.
Flown Flag, silk, 6 by 4 inches. Carried on ASTP. Mounted with a 3½-inch Beta cloth mission emblem, surrounded by signatures of the five crew members and a print of Robert McCall's painting illustrating the moment just before docking. Together on 20 by 16 inch white mat board.

Flown flag displayed with all five crew members signatures and the mission emblem. The caption below the flag reads: "*This flag was flown on the first international space mission, Apollo/Soyuz, July 15-24, 1975.*" Signed by Astronauts Tom Stafford, D. K. Slayton, Vance Brand and by Cosmonauts Aleksei Leonov and Valery Kubasov.
$2,500 - 3,500

The following 2 lots were originally in the collection of Astronaut Thomas P. Stafford.

359
EMBLEM CARRIED ON APOLLO SOYUZ TEST PROJECT.
Flown Apollo Soyuz emblem, 3½ inches in diameter, printed on Beta cloth, 5 inches square. Carried on the Apollo Soyuz Test Project flight by Tom Stafford. Features an Apollo CSM docking with a Soyuz vehicle, the American and Russian crew names printed around the outer edge.

Accompanied by a Typed Letter Signed by Tom Stafford on his stationery, which reads in part: *"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."*
The Beta cloth has been signed by all ASTP crew members: Tom Stafford, Vance Brand, D. K. Slayton, Aleksei Leonov, and Valery Kubasov. An inscription along the bottom by Stafford reads: *"Flown on ASTP, July 15-24, 1975, T.P.S."*
$2,500 - 3,500

360
STAFFORD'S CUSTOM FLOWN ASTP EMBLEM.
Flown ASTP "TPS" crew emblem, 5 inches in diameter. Specially made for Apollo Commander Thomas P. Stafford with his initials "TPS" embroidered between the American and Russian crew names. Mounted on a Typed Letter Signed by Thomas P. Stafford on his stationery.

The letter reads: *"This large Apollo-Soyuz cloth patch was carried on the Apollo-Soyuz Test Project (ASTP) mission. It was the first manned flight between the United States and Russia. The Soyuz spacecraft was launched first with Aleksei Leonov and Valery Kubasov on July 15, 1975. Later that same day, the Apollo spacecraft was launched with astronauts Vance Brand, Deke Slayton, and myself aboard for a two day rendezvous sequence bringing us to the Soyuz. On July 17, Apollo docked with Soyuz and remained docked for two days performing mission tasks.*
Soyuz returned to earth on July 21. Apollo remained in orbit for 3 more days then made a splashdown on July 24, 1975, ending the flight history of the Apollo program.
This was a very limited production patch and has my initials of 'TPS' in large gold lettering between the flight crew names. It was carried in my Personal Preference Kit (PPK) during the mission. This patch has been in my private collection since 1975.
$3,000 - 5,000

361
FIRST INTERNATIONAL SPACE DOCKING CERTIFICATES.
2 certificates, each featuring an illustration of the Apollo CSM and Soyuz spacecraft in a docked configuration. Parallel text in English and Russian, printed but with times and dates supplied in manuscript and signed by both Thomas P. Stafford and Alexei Leonov, the commanders of the American and Russian spacecraft. Each 9 by 12 inches.

Informally known as the Space Magna Carta, these two certificates are from the same printing as the certificates carried on the Apollo-Soyuz flight. A very small number of these certificates were printed, and two of each type were carried on the flight, to be completed there. Two certificates were to be kept by the Americans and the other two by the Russians.
The certificate reads: *"This is to certify that at [12] hours [09] minutes Washington time and [19] hours [09] minutes Moscow time, on July [17], 1975, flight crews of the United States and the Soviet Socialist Republic successfully docked their Apollo and Soyuz Spacecraft in earth orbit. They share the hope that this first International Manned Space Flight will stand in the light of history as a significant advance in the ability of their nations to work together in ways that advance the interests of people everywhere."*
During the mid-1970s, space flight supporters hoped that this mission would set the stage for future multinational space exploration. Geo-political events, however, allowed the Cold War to endure for 15 more years.
$1,200 - 1,800

362 °
THE CREWS.
Color photolithograph, 10 by 8 inches, of both the Apollo and Soyuz crews posing in their in-flight coveralls, printed caption on verso.

Signed by Astronauts Tom Stafford, D.K. Slayton, and Vance Brand, and by Cosmonauts Alexei Leonov and Valery Kubasov.
$400 - 600

363 °
THE APOLLO CREW.
Color photograph, 14 by 11 inches mounted to 20 by 16 inch mat, of the Apollo crew in their white space suits.

Signed by D.K. Slayton, Vance Brand, and Tom Stafford, each on their respective space suit.
$300 - 400

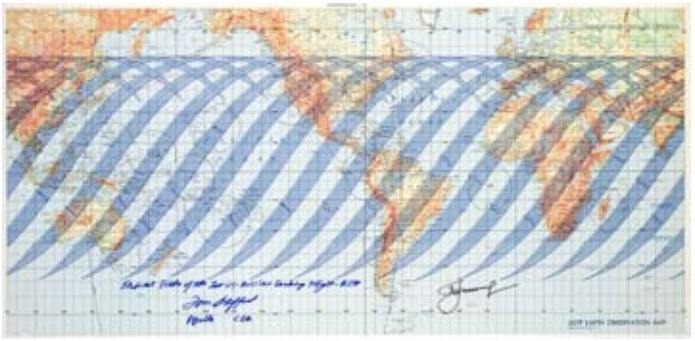
364 °
ASTP PRESS RELEASES.
Three NASA and DoD issued press releases:
1. *Apollo-Soyuz Test Project, Information for Press*. NASA HQ: 1975. 204 pages.
2. *CCCP - C III A*. NASA. 119 pages. ASTP press release printed in Russian.
3. *ASTP for the Press*. DoD. 54 pages. Describes the DoD role with ASTP and the Apollo ocean recovery.
3 items. 8 by 10½ inches. Loose-leaf, punched.

Signed by Alexei Leonov, Tom Stafford, and Valery Kubasov. Leonov and Stafford have signed each front cover and Kubasov has signed two of them.
$250 - 350

365 °
ASTP BLUEPRINTS.
"ASTP CSM Launch," "ASTP DM Launch," "ASTP CSM Return," 3 blueprints, [NASA/JSC-Rockwell], November 12, 1974-March 10, 1975, each 17 by 11 inches.

A set of three small blueprints illustrating the configuration layout of the CSM and DM (Docking Module) during various phases of the Apollo-Soyuz flight. *Each signed by Tom Stafford and Aleksei Leonov,* and showing the spacecraft at various viewing angles as well as listing stowage location for various equipment based on the flight phase.
$400 - 600

361


368

366 °
ASTP—JOINT CREW ACTIVITIES PLAN.
Apollo Soyuz Test Project. Joint Crew Activities Plan. [NASA/JSC]: June 14, 1975. Upwards of 220 pp. 10½ by 8 inches. Loose-leaf, punched.

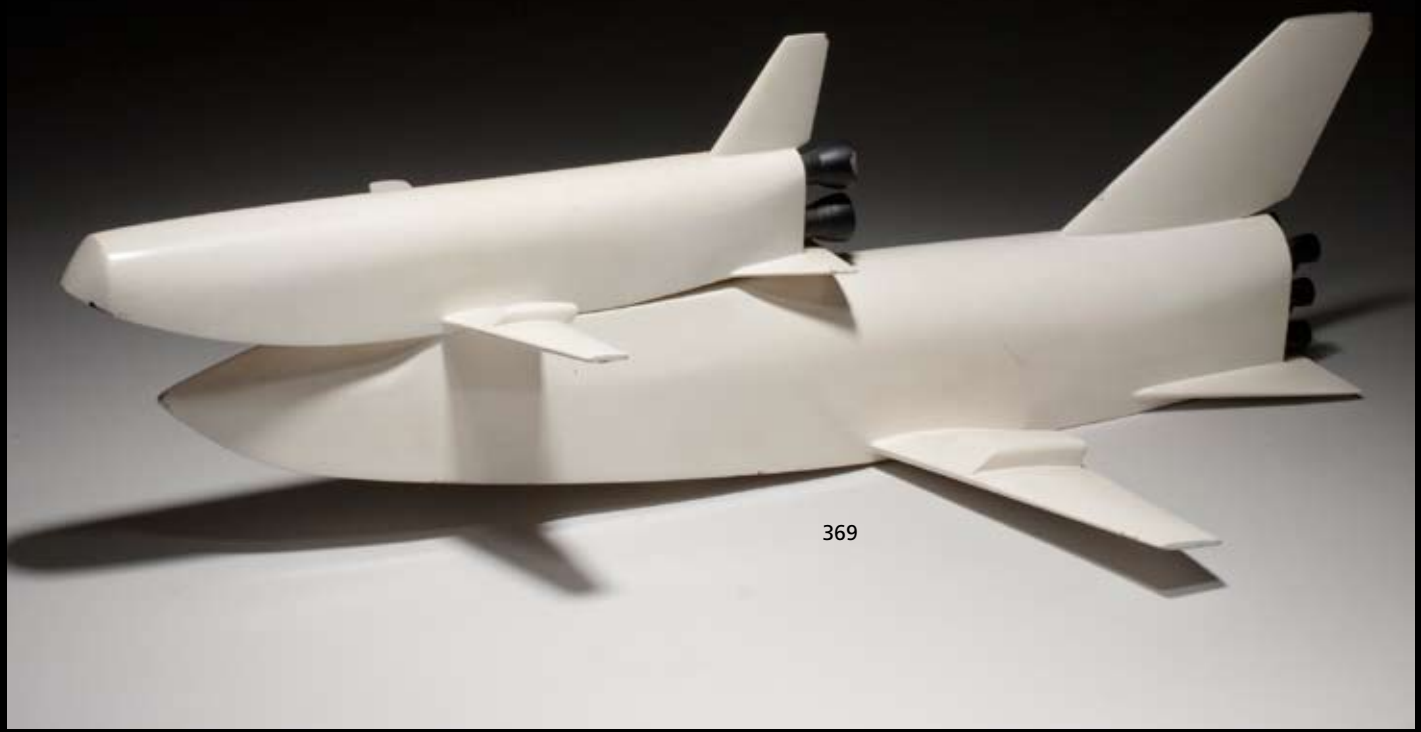
Signed by Aleksei Leonov, Valery Kubasov, and Tom Stafford ("Tom Stafford / Apollo CDR") on the cover. Details the sequence of activities planned to be performed by the US and USSR crews during the joint phase of the mission. Included are activity plans for the second through fifth launch opportunities in the event of the dual launch not occurring on the first opportunity. Preliminary text in Russian and English.
$500 - 700

367 °
ASTP TRANSCRIPTS.
ASTP Technical Air-to-Ground Voice Transcription. Prepared by Test Division Program Operations Office. NASA/JSC: July, 1975. 1,080 pp. 8 by 10½ inches. Card stock covers, punched.

Signed by Aleksei Leonov, Valery Kubasov, and Tom Stafford on the front cover. Stafford has inscribed "*Apollo CDR*" under his signature. Full transcript of communications to and from the Apollo spacecraft and/or Soyuz spacecraft from Capsule Communicator (CAPCOM) at Houston, Texas and the Russian Control Center.
$300 - 400

368
ORBITAL PATHS OF THE 1ST US-RUSSIAN DOCKING FLIGHT.
"ASTP Earth Observation Map," color Earth map, 19¼ by 40 inches.

Signed by the Commanders of both the U.S. and Russian crews, Tom Stafford and Aleksei Leonov. Stafford has additionally inscribed: "*Orbital paths of the 1st US-Russian Docking Flight-ASTP / Tom Stafford / Apollo CDR*."
$700 - 900



369

The following Space Shuttle prototype models are from the estate of Dr. Maxime Faget.

369
EARLY SPACE SHUTTLE MODEL.
Model of a reusable booster and space orbiter, plastic and metal, 25 inches long. The lower booster vehicle has 8 rocket engines at the rear and a hole to allow placement for a display rod (no longer with the model). Two sets of jet engines on each wing were designed to allow this booster to make a runway landing after returning from orbit. The orbiter is mounted "piggy-back" on top of the booster and held in place by three metal pins. Each vehicle has a large vertical and delta-shaped horizontal stabilizers.

This model is associated with the initial design concepts at the Manned Spacecraft Center led by Dr. Faget. It very closely resembles the drawings submitted by Dr. Faget to the US Patent Office titled "Space Shuttle Vehicle and System." He received a patent for his design in November 1972. The model is constructed in the same manner as models used in NASA wind and shock tunnels. Included are a color photograph of a nearly identical orbiter section model during shock tunnel tests, and a copy of Faget's patent.
$7,000 - 9,000

370
SPACE SHUTTLE REUSABLE ENGINES PROTOTYPE.
Prototype model displaying reusable engines for the Space Shuttle, made by Technical Services Division, MSC, Houston, TX, plastic, metal and decals, comprising a 9 inch wide aft end of an orbiter alongside a 5½ inch diameter external tank, mounted onto a 13 by 9 inch wood base. With original 15 by 9 by 10 inch wood carrying case.
There are four modified Apollo J-2 rocket engines attached to the base of the external tank. Hinged arms allow these four engines to be moved and mated to the orbiter section. There is a removable interstage ring attached to the external tank. The inside lid of the carrying case has a series of scale drawings titled: "*Orbiter Configuration 040B and External Tanks. MSC-SDD - Oct. 12, 1971.*" A side view shows how the orbiter and external tank are located above a booster vehicle. Additional side and aft drawings show the translation of the rocket engines from the external tank to the orbiter. The case lid bears a NASA meatball logo.

A new propulsion concept by Maxime Faget. This design allowed for the engines to be reused after removal from the external tank or to be jettisoned reducing weight during an ascent abort. The design was never implemented for a shuttle flight vehicle, but it was patented in December 1975 by Dr. Faget, W. Petynia, and W. Taub. A copy of this patent is included with the model.
$5,000 - 7,000

371

370

371
ROCKWELL-GENERAL DYNAMICS SPACE SHUTTLES MODEL.
A large and impressive model set by Rockwell and General Dynamics, composite material, metal, and wood. Features a pair of shuttle orbiters each designed to use a common booster vehicle. The booster, 15 inches tall, is mounted vertically at the center rear of a wood display stand. It has 12 silver rocket engines at the rear, a large V-tail stabilizer, and detailed paint and decal markings. The straight-wing orbiter, 11 inches long, and the delta-wing orbiter, 10 ½ inches long, each have two rear rocket engines. Both have detailed paint and decal markings. Tthe landing gear of each is permanently mounted to the base, though each can alternatively be lifted from metal pegs on the landing gear and mounted to the booster vehicle. A large metal plaque on base reads: *"Space Shuttle - North American Rockwell Space Division - General Dynamics Convair Division."* Smaller plaques alongside read: *"Limited Cross Range Orbiter," "Maximum Cross Range Orbiter."*

The designs for these vehicles were released by these contractors during November 1970, in response to NASA's Phase B Integral Launch and Re-entry Vehicle competition. Included is a NASA photograph of Dr. Maxime Faget at his JSC office area holding the booster component of the present model. Both orbiters and the large wood base can be seen on a table in the background.
$7,000 - 9,000

373

372
SPACE SHUTTLE CONCEPT.
Model of a concept Space Shuttle, designed by McDonnell Douglas, plastic, metal and decals. Comprises a booster, 10 inches long, and a delta-winged orbiter, 6 inches long. The orbiter is separable from the booster section. The two parts slot onto pins above a wooden base with a plaque reading: *"McDonnell Douglas Space Shuttle, McDonnell Douglas Astronautics Company."*

This particular concept was one of the many industry designs responding to a 1970 NASA Phase B competition for an integrated launch and re-entry vehicle, commonly called a space shuttle. The entire vehicle would be launched vertically with the larger booster section returning to a runway landing for reuse. The orbiter section would continue into earth orbit and perform a gliding re-entry and runway landing once the mission was completed. Presented to Dr. Faget during the early 1970's.
$2,000 - 3,000

373
LOCKHEED SHUTTLE PROTOTYPE.
Lockheed Space Shuttle model designed by the Lockheed Missiles and Space Company, plastic, 10 inches long, being a delta-winged orbiter which slides onto a curved metal bracket to suspend above a triangular wood base. A plaque on the base reads: *"Lockheed Space Shuttle, M. A. Faget."*

This model design is associated with NASA's July 1970 Alternate Space Shuttle Concept (ASSC) initiative to determine the feasibility of a non-fully-reusable shuttle. Plans for this orbiter were for use with either a V-shaped stage-and-a-half (expendable tanks), a reusable booster, or a combination of both.
$2,000 - 3,000

374
GRUMMAN/BOEING SHUTTLE PROTOTYPE.
Model of an Expendable Booster Space Shuttle, designed by Grumman and Boeing, plastic, metal and decals, 19 inches tall. Comprises a lower booster stage with seven engine ports at the base and two fin-type stabilizers. An upper stage serves as an external fuel tank to supply the attached orbiter's four rocket engines. The orbiter itself is of delta-wing design and has two maneuvering engine pods at the aft end of the fuselage, as well as reaction control engine pods near each wing-tip and atop the vertical stabilizer. All three components are detachable and mounted together by metal pins, standing vertically on a wooden base with a plaque reading: *"Grumman/ Boeing Space Shuttle."*

Included with the model is a black and white NASA photograph of Dr. Maxime Faget at his JSC office, holding the present model and demonstrating its flight characteristics.
$3,000 - 4,000

374

372

375
WIND TUNNEL PRESENTATION MODEL.
Model of an early 1970s Space Shuttle Orbiter, stainless steel, 17 inches long. Mounted at an angle to a wooden base. The base bears a plaque reading: "*Presented to Max Faget on the occasion of his retirement, December 1981. From the Personnel of the Engineering and Analysis Division. 'Old Configurations Never Die, They Just Get Mounted.'*"

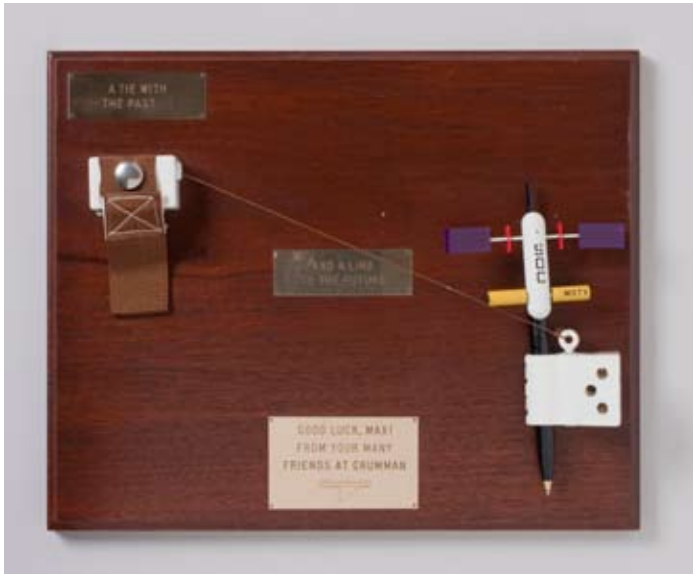
This design is virtually identical to that in Faget's 1971 patent application. The model is mounted at an angle to replicate the high angle of attack planned for re-entry by this vehicle.
$5,000 - 7,000

Lots 376 to 384 are presentation pieces and other items directly from the estate of Dr. Maxime Faget.

376
FAGET'S "YO-YO"—AN APOLLO SPACE SUIT LUNAR SURFACE TETHER.
Apollo space suit lunar surface tether: metal clamp, line, metal housing for line with a brown cloth snap-loop attachment. The clamp holds a removable ink pen with a future prototype space station affixed. Mounted onto a 13 by 11 inch wood presentation display. Three small bronze plaques read: "*A tie with the Past... And a link to the Future. Good Luck, Max! From your many friends at Grumman*."

The tether was commonly referred to as the "yo-yo" because of the retractable action of the line-tied clamp. The metal clamp has part number: *SEB33100292-302* and serial number: *S/N 1013*. The metal housing on the opposite side of the plaque has a brown snap-loop attachment which allowed the entire device to be attached to the Apollo space suit. The clamp held lunar rock gathering tongs or other similar equipment during surface explorations by the Apollo astronauts. This was Grumman's retirement gift to Maxime Faget.
$2,500 - 3,500

375



376

379

377
SPACE SHUTTLE ARCHIVE.
A group of Space Shuttle documents and diagrams, assembled by Maxime Faget, some with his manuscript notes, including:
1. "A Concept of a Manned Satellite Reentry Which is Completed with a Glide Landing." NASA Technical Memorandum X-226. Washington: December 1959. 44 pp. Card stock covers, stapled. One of the earliest NASA technical papers on landing a vehicle returning from space on a runway.
2. "Status of MSC Shuttle Study." Houston, TX: NASA/MSC, May 21, 1969. 67 pp. Card stock covers, stapled. Covers the results of a NASA Shuttle feasibility study and associated mission applications.
3. "NASA Space Shuttle Summary Report." Shuttle Task Group: July 31, 1969. 36 pp. Card stock covers, stapled. An illustrated review of Shuttle activity to mid-1969.
4. "Recommend Changes to Space Shuttle." Undated NASA internal meeting hand-out. 16 pp, stapled. Includes new concepts such as the *"Swing Engines."*
5. Meeting illustrations, 16 photocopied sheets, numbered in pencil by Faget, 4 sheets with quick sketches or notes.
6. "Alternate Shuttle Concept." NASA/MSC: May 26, 1971. 20 pp, photocopies. A meeting hand-out illustrating different vehicle designs.
7. "Study Objective." Internal NASA/MSC meeting handout, c.1971. 40 pp, photocopies, stapled. Focuses on costs, early capability, and growth potential.
8. 18 diagrams of the Shuttle at various scales, sizes 46 by 18 inches or smaller, all period internal NASA distribution copies illustrating various shuttle/booster concepts and dating from around 1971.
All but the diagrams 10½ by 8 inches or similar.
$1,500 - 2,000

378
LARGE US FLAG & CREW PATCH CARRIED ON STS-1.
Flown US Flag, 8 by 12 inches, and Crew Patch, 4 inches tall. Carried aboard the Space Shuttle Columbia (STS-1). Displayed together on blue mat, with a presentation certificate, to 20 by 16 inches.

The certificate reads: "*This flag and patch were flown aboard the Space Shuttle 'Columbia' (STS-1). Presented to Maxime A. Faget from the National Aeronautics and Space Administration.*" The printed signatures of Astronauts John Young and Bob Crippen are on the certificate.
$1,000 - 1,500

379
FLOWN SPACE SHUTTLE THERMAL PROTECTION TILE FRAGMENT.
Blackened tile segment from the Space Shuttle *Columbia*, 4 by 1½ by 1 inches. Mounted inside a 7 inch tall plexiglass cylinder. Images of the STS-1 launch and landing are featured inside the cylinder, which is on an 8 by 6 inch wood base with a 7 inch tall back panel. A metal plaque with Kraft's printed signature reads: *"Presented to Maxime A. Faget. In grateful appreciation of your leadership in the development of our Nation's Space Transportation System. Christopher C. Kraft, Jr., Director, NASA Johnson Space Center. This piece of tile from the Space Shuttle Columbia contributed to the successful reentry of the STS-1 flight, April 12-14, 1981."*

Space Shuttle tile fragment, flown on the first Shuttle mission.
$1,000 - 1,500

380
SHUTTLE-ERA HARD HAT.
Hard hat, high-impact plastic with interior support straps, 11 inches in diameter. With 4-inch triangular Space Shuttle logo color decal at the front above Faget's name tag. An interior imprinted label reads, in part: *"Norton #69, Made in USA"* and includes ANSI specification classes A, C, and B.

This hard hat was worn by Dr. Faget during various tests and observations during the Space Shuttle Programs.
$600 - 800

381
FLIGHT HELMET BAG.
Military-issue green nylon aircraft helmet bag, 20 by 20 inches. With two large front pockets and a 4 by 2 inch black leather name tag reading: "*NASA Max Faget.*" Zipper closure and two carrying handles. The interior is quilted and bears a white label reading: "*Bag, Flyer's, Helmet, Nylon. DLA100-80-C-2524, 8415-00-782-2989, S & S Garment MFG. CO.*"
$1,200 - 1,800

382
ASTRONAUT CANDIDATES.
Composite photograph, 10 by 8 inches, of the 21 Astronaut candidates selected in January, 1980.

Signed by all 21 candidates below their individual portraits. Accompanied by a Typed Letter Signed from those candidates to Dr Faget, January 13, 1981, which reads in part: "*Thank you again for speaking to us on the 'History of Manned Spaceflight.' Your contributions to spacecraft design, from Mercury to space Shuttle, are an inspiration to us all.*" The candidates were James Bagian, John Blaha, Charles Bolden, Roy Bridges, Franklin Chang, Mary Cleave, Bonnie Dunbar, Bill Fisher, Guy Gardner, Ronald Grabe, Dave Hilmers, Dave Leestma, Mike Lounge, Claude Nicollier, Wubbo Ockels, Bryan O'Connor, Richard Richards, Jerry Ross, Mike Smith, Woody Spring, and Bob Springer. Every candidate except Bonnie Dunbar has signed the letter. Mike Smith was lost on STS 51L. Together in original NASA envelope.
$700 - 900

383
ASTRONAUT CLASS OF 1984.
Color photograph, 7 by 9½ inch, of the 1984 Astronauts posing with a Space Shuttle model, captioned on original mat: "*To Max Faget - With our thanks & Best Wishes. The Astronaut Class of 1984*," framed to 12 by 15 inches.

Signed by 14 astronauts.
Even after his retirement from NASA in 1981, Dr. Faget would return to NASA-JSC to talk to each new astronaut class describing his NASA experiences with the Space Shuttle. The lower part of the mat has been signed by: Mark M. Brown, Ken Cameron, John Casper, Sonny Carter*, Sid Gutierrez, Blaine Hammond, Marsha Ivans, David Low*, Mark Lee, William Shepherd, Ellen Shulman, Kathy Thornton, Lacy Veach*, and Jim Wetherbee. Frank Culbertson, Michael McCully, and James Adamson have not signed.
* Deceased.
$1,000 - 1,500

384
SPACE SHUTTLE THERMAL TILE DISPLAY.
Display of four thermal protection items used on the Space Shuttle, comprising:
1. 2 types of silica tile.
2. A sample of tile gap filler.
3. A sample of thermal blanket material which covers areas of the shuttle not subject to the highest temperatures during re-entry. A majority of the Space Shuttle is covered with the black outer-coated silica tiles.
Plaques above and below these samples read: "*To Max Faget. Best wishes on your retirement from your many friends at Ames Research Center, 1981. NASA Ames Developed Materials Adopted For Space Shuttle Orbiter*." All material is labeled with its NASA ID designation and mounted on a 6 by 7inch wood base.

Accompanied by a November 24, 1981 letter from C. A. Syvertson (Ames Director) to Dr. Faget. It reads in part: "*The small remaining group of our more 'senior' staff members remember your technically inspiring visits to Ames in the early days of NASA when you described your concepts for safely bringing persons back from earth orbit. Of course, these concepts later provided the basis for the design of the Mercury, Gemini, and Apollo capsules….*" The letter also acknowledges Dr. Faget's work with the Space Shuttle and states: "*It is indeed rare for one person to leave such an impressive technical imprint on the two largest programs undertaken by NASA.*"
$700 - 900

385
OLD GLORY AND THE EVOLUTION OF FLIGHT.
Flown US Flag, 6 by 4 inches. Carried on Shuttle Mission 61-A. Mounted inside a gilt-printed commemorative folder.

A historic memento from the last successful flight of Space Shuttle Challenger. The caption printed below the flag reads: *"Old Glory, Flown on Space Shuttle 'Challenger' Mission 61-A, October 31-November 6, 1985. To commemorate conveyance of Space Shuttle "Enterprise" from the National Aeronautics and Space Administration to the Smithsonian National Air and Space Museum. 1985 Wright Memorial Dinner."*
$800 - 1,200

End of Sale

381

INDEX

PROVENANCE INDEX

COMMON ACRONYMS

AFB ..... Air Force Base
ALSEP ..... Apollo Lunar Surface Experiments Package
AS ..... Apollo-Saturn
ASTP ..... Apollo-Soyuz Test Project
CM ..... Command Module
CDR ..... Commander
CMP ..... Command Module Pilot
CSM ..... Command Service Modules
EVA ..... Extra-Vehicular Activity
GSFC ..... Goddard Space Flight Center (Greenbelt, MD)
GT ..... Gemini-Titan
IVA ..... Inter-Vehicular Activity
JPL ..... Jet Propulsion Laboratory
JSC ..... Johnson Space Center (Houston, TX)
KSC ..... Kennedy Space Center
LM ..... Lunar Module
LMP ..... Lunar Module Pilot
MA ..... Mercury-Atlas
MFA ..... Manned Flight Awareness
MR ..... Mercury-Redstone
MSC ..... Manned Spacecraft Center (Houston, TX)
MSFC ..... Marshall Space Flight Center (Huntsville, AL)
NAA ..... North American Aviation
NACA ..... National Advisory Committee for Aeronautics
NASA ..... National Aeronautics and Space Administration
SL ..... Skylab
SM ..... Service Module
SP ..... Special Publication (by NASA and the Government Printing Office)
SPS ..... Service Propulsion System
USAF ..... United States Air Force

US Manned Space Flight Chronology

MR 3	Shepard	May 5, 1961
MR 4	Grissom	July 21, 1961
MA 6	Glenn	February 20, 1962
MA 7	Carpenter	May 24, 1962
MA 8	Schirra	October 3, 1962
MA 9	Cooper	May 15 and 16, 1963
GT III	Grissom, Young	March 23, 1965
GT IV	McDivitt, White	June 3 to 7, 1965
GT V	Cooper, Conrad	August 21 to 29, 1965
GT VII	Borman, Lovell	December 4 to 18, 1965
GT VI-A	Schirra, Stafford	December 15 and 16, 1965
GT VIII	Armstrong, Scott	March 16, 1966
GT IX-A	Stafford, Cernan	June 3 to 6, 1966
GT X	Young, Collins	July 18 to 21, 1966
GT XI	Conrad, Gordon	September 12 to 15, 1966
GT XII	Lovell, Aldrin	November 11 to 15, 1966
Apollo 7	Schirra, Eisele, Cunningham	October 11 to 22, 1968
Apollo 8	Borman, Lovell, Anders	December 21 to 27, 1968
Apollo 9	McDivitt, Scott, Schweickart	March 3 to 13, 1969
Apollo 10	Stafford, Young, Cernan	May 18 to 26, 1969
Apollo 11	Armstrong, Collins, Aldrin	July 16 to 24, 1969
Apollo 12	Conrad, Gordon, Bean	November 14 to 24, 1969
Apollo 13	Lovell, Swigert, Haise	April 11 to 17, 1970
Apollo 14	Shepard, Roosa, Mitchell	January 31 to February 9, 1971
Apollo 15	Scott, Worden, Irwin	July 26 to August 7, 1971
Apollo 16	Young, Mattingly, Duke	April 16 to 27, 1972
Apollo 17	Cernan, Evans, Schmitt	December 7 to 19, 1972
SL-2	Conrad, Kerwin, Weitz	May 25 to June 22, 1973
SL-3	Bean, Garriott, Lousma	July 28 to September 25, 1973
SL-4	Carr, Gibson, Pogue	November 16, 1973 to February 8, 1974
ASTP	Stafford, Brand, Slayton	July 15 to 24, 1975
Space Shuttle Program		1981-present

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$200-500	$25 increments
$500-1,000	$50 increments
$1,000-2000	$100 increments
$2,000-5,000	$250 increments
$5,000-10,000	$500 increments
$10,000-20,000	$1,000 increments
$20,000-50,000	$2,500 increments
$50,000-100,000	$5,000 increments
$100,000-500,000	$10,000 increments

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