



26/20/117  
 Alumni Association  
 Alumni  
 John C. Houbolt Papers, 1932-2000

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## BIOGRAPHICAL NOTE

April 10,	1919	Born in Altoona, Iowa
	1940	Received B.S. in Civil Engineering from the University of Illinois
	1942	Received M.S. in Civil Engineering from the University of Illinois
	1942	Langley Research Center (LaRC), Structures Research Division - conducting research on stability and dynamics of aircraft structures
	1945-1963	Teaching at the University of Virginia Graduate Extension Division and Virginia Technical Institute grad extension: Theory of elasticity, Elastic stability, Vibration, Aircraft Flutter, Calculus of variations and Higher mathematics
	1949	Served as an exchange research scientist at the Royal Aircraft Establishment at Farnborough, Hants, England for six months
	1949-1961	Associate chief of the Dynamic Loads Division, LaRC-NASA - pursuing research problems in aeroelasticity in application to aircraft and space vehicles
	1956-1957	Received Ph.D. in Technical Sciences from ETH (Eidgenossische Technische Hochschule, Zurich, Switzerland)
	1961-1963	Chief of the Theoretical Mechanics Division, LaRC-NASA - research on special problems of space flight (space rendezvous, communication satellites, launch vehicle dynamics, etc.)
	1963-1975	Senior Vice President and Senior Consultant, Aeronautical Research Associates of Princeton, Inc. - research consulting in aeronautics and astronautics (specifically in the fields of aeroelasticity, structures, flight mechanics, system analysis, guidance and control)
	1976-1985	Chief Aeronautical Scientist, LaRC-NASA
	1985	Retired from NASA

Box 1:

## BIOGRAPHICAL AND PERSONAL

## J.C. Houbolt's biographical sketch

## Education

## Class notes

## Joliet Junior College

Handwritten notebook

Machine shop (handwritten notebooks)

Physiography notebook, 1932-33

Drawings, 1933

Physics report: exercises, 1937-38

Physics (handwritten notebook), 1938

Physics (handwritten notebook), ca 1938

Some experiments in electricity, 1938

## University of Illinois

Laboratory notes in hydraulics, 1938

T&AM-2: class notes, 1938  
 T&AM-2: class notes, 1938  
 T&AM-2: class notes, 1938  
 T&AM-2: class notes, 1938  
 T&AM-2: class notes, 1938

Class notes, 1939  
 ME-2, CE-3, CE-20,...: class notes, 1939  
 CE-3: class notes, 1939  
 CE-36: class report, 1939

### Box 2:

CE-61: class notes, 1939  
 CE-62 (Shop building design): class notes, 1939  
 CE-62 (Shop building weight list): class report, 1939  
 CE-64 (Warehouse design): class report, 1939  
 T&AM-2: class notes, 1939  
 T&AM-4 (Calibration of Pitot tube): class report, 1939  
 T&AM-64 (Calibration of a circular orifice): class report, 1939  
 T&AM-64 (Efficiency of an impulse water motor): class report, 1939  
 T&AM-64 (Calibration of water meter): class report, 1939  
 T&AM-64 (Determination of the efficiency of a centrifugal pump): class report, 1939

CE-64 (Office building design): class report, 1940  
 CE-65 (Railroad bridge design): class notes, 1940  
 T&AM-47 - Engineering analysis: class notes, 1940-41  
 "Difference equations as applied to a slab varying in thickness in two directions"  
 (paper), ca 1940  
 T&AM-114: class notes, 1941  
 CE-107 (Steel design): class notes, 1942  
 Math and fluid flows, 1943-1947

ETH (Eidgenössische Technische Hochschule) (Zurich)  
 Department of Public Information (Princeton University): Rockefeller Public Service Awards, 1956  
 ETH registration and grade transcript  
 Notes on Aerodynamics, Integral equations, Theory of rockets (in German), 1956  
 Untitled folder: letters to the Rockefeller Public Service Awards; summary of a report, 1957  
 Untitled folder: overheads and the list (in German), 1957

University of Virginia  
 Theory of elastic stability: lecture notes & exams, 1944-45  
 Theory of Vibration: exams, 1947, 1950

### Box 3:

Mechanical and Structural Vibrations I: lecture notes and exams, 1947-54

Aircraft Vibration and Flutter Theory: lecture notes, 1952  
 Aircraft Vibration and Flutter Theory: lecture notes, 1952  
 Aircraft Vibration and Flutter: correspondence, memos, 1952  
 Vibration - Flutter: lecture notes, 1954  
 Aircraft Vibration and Flutter: course outline, exams, Fall 1954  
 [Harmonic functions, vector analysis; vibrating string with masses], 1956  
 Comprehensives, Training, etc., 1957-60  
 Calculus of Variations: lecture notes, Fall 1959  
 Calculus of Variations (Math. 502): lecture notes, 1959  
 Advanced Engineering Mathematics I: exams, grades, 1959  
 Calculus of Variations: grades, 1959-1960  
 Mechanical and Structural Vibration I: exams, quiz, course material, Fall 1960

Box 4:

Advanced Engineering mathematics II: exams, lecture notes, 1960  
 Mechanical and Engineering Vibrations II: lecture notes (ME 28.391), 1961  
 Mechanical and Structural Vibrations II: exams, grades, 1961  
 Calculus of Variations: exams, grades, 1961  
 Calculus of Variations: lecture notes, exams, 1961, 1963  
 Elastic Stability: lecture notes, exams, calculations, 1962  
 Short Course in Acoustics and noise: lecture notes, correspondence, 1968  
 Untitled folder: handwritten notes and course outline

## Other lecture notes

Electrical Measuring Circuits: Training program in structural flight measurements;  
 G.L. Martin Company, 1943-44  
 Survey course in Aeroelasticity: MIT, Department of Aeronautical Engineering (part I), 1952

Box 5:

Survey course in Aeroelasticity: MIT, Department of Aeronautical Engineering (part II), 1952

## Thesis

Thesis for the Degree of Master of Science in Civil Engineering (University of Illinois) 1940  
 Doctoral thesis and a letter from the publisher 1957  
 Copy of the doctoral thesis "A study of several aerothermoelastic problems of aircraft structures in high-speed flight" (handwritten), 1957  
 Correspondence concerning publication of Doctoral thesis and notes, 1958

## Calendars and notebooks

Calendars for 1960-1962  
 Calendars for 1963-1964  
 Calendars for 1965-1968

Box 6:

Calendar for 1969

Calendar for 1970, 1971, 1973  
 Calendars for 1974-1975  
 Pocket planners for 1976-1978  
 Calendars for 1979-1981  
 Calendars for 1982-1986  
 Notebook: 1959-1963  
 Notebook: 1963-1970

Box 7:

Awards, Certificates and Diplomas

US Department of Air Force: Honorary member of 91st Civil Engineering Squadron  
 Member of the Chi Epsilon Fraternity (University of Illinois), April 30, 1939  
 Member of the Tau Beta Pi Chapter, December 17, 1939  
 Member of the Phi Kappa Phi, November 15, 1939  
 Associate of the Society of the Sigma Xi, March 20, 1940  
 American Institute of Aeronautics and Astronautics: certificate of appreciation, 1962  
 NASA: Twenty year service award, Oct. 1962  
 Princeton Jaycees: Distinguished service award, 1969  
 Will County Historical Society: Fredrick Bartleson memorial award, Dec. 18, 1969  
 University of Illinois, CE Alumni Association: Distinguished alumnus award, Oct.4, 1969  
 ETH (Eidgenossische Technische Hochschule, Zurich, Switzerland): Honorary Doctoral Degree, 1975  
 NASA: Twenty five year service award, Sept. 1980  
 University of Illinois, Alumni Association: Achievement award, Oct. 31, 1987  
 Joliet/Will County: Hall of Pride, April 26, 1988  
 National Society of Professional Engineers: Engineer of the year, 1988-1989  
 American Institute of Aeronautics and Astronautics; Atmospheric Environment Technical Committee, Oct. 1989  
 Clarkson University: Doctor of Science, May 20, 1990  
 NASA: Thirty five year service award, Sept. 24, 1990  
 NASA/Langley Research Center: Certificate of appreciation, Dec. 31, 1992  
 University of Illinois; College of Engineering: Alumni award for distinguished service, April 11, 1997  
 Kiwanis International: Certificate of appreciation, May 13, 1998  
 Honorary member of the Third Thursday Lunch Bunch, 1998  
 Joliet Junior College: Commencement speaker, May 14, 1999  
 American Society of Mechanical Engineers: 2000 Spirit of St. Louis Medal, 2000

Box 8: (includes 2 small card-file boxes)

Box I: Popular Aviation Magazine Award: National Model Airplane Championships, Detroit, 1937  
 Popular Aviation Magazine Award: National Model Airplane Championship, Detroit, 1937  
 Exchange Club Award: National Model Plane Championships, Detroit, 1937  
 Burr Patterson and Auld Co. Award: National Model Airplane Championships, Detroit, 1937  
 Junior Birdmen of America: 2nd place  
 NASA: Award for Exceptional Scientific Achievement, Oct.1, 1963

3 (three) unidentified medals

Box II: American Institute of Aeronautics and Astronautics; Board of Directors: J.C. Houbolt  
1969-1970  
University of Illinois; College of Engineering: Alumni award for distinguished  
service, 1997

Box 9:

Personal

Books  
Conundrums  
Filing cabinets  
Medical examination records  
Mementos  
Names and addresses  
Personal financial statements (contains the draft of the will of J. Houbolt (father))  
Rosters and names  
Scraps and sayings from desk  
Some sayings

Professional

J.C. Houbolt's office file contents; appointments; DAG-SAG; clearance forms  
Rates and J.C. Houbolt's work

WORKSHOPS, CONFERENCES AND SEMINARS ATTENDED

Conferences (agendas)  
Lectures attended  
Massachusetts Institute of Technology: Special Summer Program, 1956  
Massachusetts Institute of Technology: Special Summer Program : Aeroelasticity, 1958

Box 10:

Seminar in Procurement Management (Williamsburg, Va), March, 1962  
Cornell University (Ithaca, NY): Summer Seminar in Space Mathematics, 1963  
American Institute of Aeronautics and Astronautics (AIAA) 2nd Manned Space Flight  
Meeting (program, correspondence), 1963  
4th Annual National Conference on Environmental Effects on Aircraft and Propulsion  
Systems (program, list of attendees), 1964  
AIAA 5th Aerospace Sciences Meeting (program), 1967  
Applied Optimal Control Seminar: Lecture notes on Optimization, estimation and control,  
1967-1968  
Applied Optimal Control Seminar: Notebook, 1968  
NASA/National Teachers' Association: Youth Science Congress (program, two pages of the  
"Goddard News", May 27, 1968), 1969  
Surface Effect Vehicle (SEV) Summer Study: notes and correspondence, 1969  
SEV Summer Study: R&D program elements from working groups, 1969  
SEV Summer Study: Objectives, some recommendation and report outlines, 1969  
SEV Summer Study: Memos and announcements, 1969

SEV Summer Study: Bibliography, 1969  
 Advisory Group for Aeronautical Research and Development (AGARD) Symposium on Unsteady Aerodynamics for Aeroelastic Analyses of Interfering Surfaces (correspondence, program), 1970  
 Aerospace Workshop, Sept. 1971  
 Federal Aviation Administration (FAA) Symposium on Turbulence (agenda, attendance list), 1971

Box 11:

5th & 6th Structural Loads Workshop, 1973-1974  
 Von Karman Centennial Symposium (Washington, DC; May, 1981  
 AFOSR Special Study: Low drag, low observable weapons, 1982  
 First National Aerospace Plane Technology Symposium (agenda), May, 1986  
 Warner Robins ALC: Symposium on Multi-site Damage in Aging Aircraft, Feb. 1992

TALKS, LECTURES AND PRESENTATIONS

Meeting of Langley Committee on Propellers: Talk before the subcommittee on propellers of aircraft, 1948  
 Research department meeting talk: on visit to Royal Aircraft Establishment in Farnborough, England, 1949  
 "Institute paper": A recurrence matrix solution for the dynamic response of elastic aircraft (contains overheads), 1950  
 Institute of the Aeronautical Sciences: 18th Annual Meeting and Honors Night Dinner (agenda), Jan. 1950  
 Review of NASA research relating to fatigue and repeated loads: Analytical studies of the relative response of flexible airplanes, May, 1950  
 "Loads-Structures Conference": Some considerations of wing flexibility on airplane response due to gusts, March, 1951  
 "Conference on loads, flutters, structures": Correlation of calculation and flight test studies of the effect of wing flexibility on structural response due to gusts (contains overheads), 1953  
 Institute of the Aeronautical Sciences, 22nd annual meeting: Some applications of generalized harmonic analysis to gust loads on airplanes, Jan. 1954  
 NACA Vibration Panel of Subcommittee on Propellers for Aircraft (comments, talk, minutes), 1954  
 NACA Vibration Panel of the Subcommittee on Propellers for Aircraft (minutes, agenda), 1954  
 ANC-1 Panel on Flight Loading Conditions; Symposium on Structural Aspects of Dynamic Response of Aircraft Gusts, June, 1954  
 Talk for High School Science Club (notes), 1954  
 Institute of the Aeronautical Sciences, 23rd annual meeting: Coupled bending and torsional deformations of twisted rotating blades under arbitrary loading, Jan. 1955  
 School of Aeronautics, Purdue University: Talk on the analysis of aircraft structures subject to random loading, May 1955  
 NACA conference on Aircraft Loads, Flutter and Structures: On spectral analysis of runway roughness and loads developed during taxiing (contains overheads), 1955  
 NACA Vibration Panel of the Subcommittee on Propellers for Aircraft (minutes, summary of progress, notes), March 1956  
 NATO/AGARD (Advisory Group for Aeronautical Research and Development), 3rd meeting

of the Structures and Material Panel (agenda, summary of papers), April 1956  
 Wissenschaftliche Gesellschaft für Luftfahrt (WGL) meeting (Essen, Germany)  
 (correspondence in English and German, agenda), April 1957  
 Paper presented at WGL meeting: On the response of structures having multiple random  
 inputs (contains overheads), 1957  
 Research Department Meeting: Spanwise effects on the structural response of flexible  
 airplanes in random gusts, Dec. 1957  
 26th Shock and Vibration Symposium: On the response of panels subject to a flow field  
 containing random disturbances (contains negatives), May 1958  
 Flight Flutter Testing Symposium: On the prediction of critical flutter conditions from  
 subcritical response data and some related wind-tunnel experience (contains overheads),  
 May 1958

Box 12:

NATO/AGARD (Advisory Group for Aeronautical Research and Development), 8th General  
 Assembly: R.V. Rhode and J.C. Houbolt, The impact of space technology on research  
 and development - structures and materials; J.C. Houbolt, Progress and recommended  
 research activity on the runway roughness problem, Oct. 1958  
 NATO/AGARD (Advisory Group for Aeronautical Research and Development), 8th General  
 Assembly (correspondence and program)  
 "Structural Dynamics - Talk for Congress" (correspondence, agenda, visual material), 1959  
 Conference to Correlate Airfield Pavement Design with Aircraft Design (agenda), May, 1959  
 American Society of Civil Engineers, Annual Convention: Some runway roughness studies  
 in the aeronautical field, 1959  
 USAF Pavement Conference: Runway roughness studies, 1959  
 USAF Symposium on Fatigue of Aircraft Structures: J.C. Houbolt and R. Steiner, Prediction  
 of gust loads in airplane and missile operations, 1959  
 USAF Symposium on Fatigue of Aircraft Structures (correspondence, abstract of the paper  
 presented, notes), 1959  
 Aeroscience Laboratory Colloquium Series (abstract of the lecture delivered,  
 correspondence), 1959  
 Institute of Navigation, 15th annual meeting (agenda, catalogue for Weems System of  
 Navigation), 1959  
 Navigation in Space - sequence of lectures presented to the project Mercury astronauts:  
 Some concepts in space navigation (includes overheads), 1959  
 Institute of Aeronautical Sciences (IAS)/NASA/The RAND Corp.: Manned Space Stations  
 Symposium (program), 1960  
 "Re-entry Vehicle Conference": Some landing studies pertinent to re-entry type (includes  
 overheads), 1960  
 American Rocket Society (ARS), Space flight report to the nation (agenda, notes,  
 correspondence), 1961  
 International Academy of Astronautics, International Symposium on Space Flight and Re-  
 entry Trajectories: Problems and potentialities of space rendezvous, 1961  
 NASA Administrator briefing: Rendezvous in space, 1961  
 NASA/Industry Apollo Technical Conference: Considerations of space rendezvous, 1961  
 G.C. Marshall Space Flight Center: Orbital docking study - Oral presentation, 1961



Box 13:

Society of Automotive Engineers (SAE) National Aeronautic Meeting, 1961  
Institute of the Aerospace Sciences (IAS), Annual meeting, 1961  
IAS, Aerospace Technology Panel for Aeroelasticity (correspondence), 1961  
NASA/G.C. Marshall Space Flight Center, Saturn Program (SA-7) Conference, 1961  
NATO/AGARD 12th General Assembly (program, correspondence, abstracts of papers presented), 1962  
NASA-University Conference On The Science and Technology of Space Exploration (program, memos), 1962  
American Rocket Society, 17th Annual meeting and Space flight exposition (program, discussion of papers presented), 1962  
FY 1963 Budget Talk: Space Vehicle Research and Technology  
New York University, department of Electrical engineering: colloquia (announcement), 1963  
Symposium on Aerolastic and Dynamic Modeling Technology (security reminder with handwritten notes on it), 1963  
American Mathematical Society: Rendezvous problem, 1963  
General Precision, Inc.(GPI): talk on Some concepts in space navigation (report and handwritten notes, correspondence), 1963  
American Institute of Aeronautics and Astronautics (AIAA), Guidance and Control Conference (notes, correspondence, program), 1963  
IAS, 31st Annual Meeting (program, correspondence, abstracts of papers), 1963

Box 14:

Institute of Navigation, National Space Meeting (abstract of paper: Concept of navigation in space), 1964  
AIAA Aerospace Sciences Meeting (program, correspondence), 1964  
AIAA 1st Annual Meeting (correspondence), 1964  
Princeton University: E.G. Baetjer II Colloquia in Aerospace and Mechanical Sciences (announcement), 1965  
General Electric - Aerospace presentation (contains overheads), 1965  
AIAA 3rd Aerospace Sciences Meeting (correspondence, program), 1966  
National Aerospace Electronics Conference (NAECON) (abstract of paper: On low altitude speed flight; correspondence), 1966  
AIAA/ASME Structures and Materials Conference (abstract of paper: On gust response analysis; correspondence), 1966  
Meeting on ground wind load problems in relation to launch vehicles (program), 1966  
Amateur Astronomers Association of Princeton, NJ. (abstract of paper presented at the meeting), 1966  
AGARD Specialists' Meeting on Stability and Control (agenda, correspondence), 1966  
Royal Aeronautical Society's Centenary Congress/International Council of the Aeronautical Sciences (ICAS) 5th Congress (correspondence, abstracts of papers), 1966  
AGARD Flight Mechanics Panel: On aeroelasticity for large aircraft (notes, figures, graphs), 1966  
AIAA 3rd Annual Meeting and Technical Display (program, correspondence), 1966  
International Conference on the Mechanics of Composite Materials: Abstract of the paper by J.S. Humphreys and J.C. Houbolt, Fatigue properties of composites, 1967  
ASEE-NASA Summer Faculty Institute: Lecture on numerical methods in dynamic analysis of structures (handwritten notes, correspondence, program), 1967

Institute of Environmental Sciences (IES) 14th Annual meeting (program, correspondence), 1968  
 International Aeronautical Federation, 19th Congress (program, correspondence), 1968  
 AIAA 6th Aerospace Sciences Meeting: Gust design procedures based on power spectral technique (includes figures, notes), 1968

Box 15:

AIAA/ASME 9th Structures, Structural Dynamics and Material Conference: E.G. Menkes and J.C. Houbolt, Evaluation of aerothermoelasticity problems for unmanned Mars entry vehicle (correspondence, visual material), 1968  
 Commencement address at Sweet Briar (abstract, notes, correspondence), 1970  
 AIAA/ASME 11th Structures, Structural Dynamics and Materials Conference (correspondence, handwritten notes), 1970  
 AAS/AIAA Technology Utilization Program Award Conference (agenda, correspondence), 1970  
 AGARD/NATO 31st Meeting of the Structures and Materials Panel: Abstract of paper On gust frequency response determination (also correspondence, agenda), 1970  
 Symposium on Aircraft Wake Turbulence (correspondence, published abstracts of papers), 1970  
 Talk at Joliet Junior College dedication ceremony (speech, correspondence, pages from various papers and journals), 1972  
 "Peak count (AGARD paper)" (contains calculations and correspondence), 1972  
 Dryden Lecture at AIAA 10th Aerospace Sciences Meeting: Atmospheric Turbulence, 1972  
 AGARD/NATO Symposium on Flight in Turbulence (correspondence, visual material), 1973  
 The Tau Beta Pi Association: talk on Energy sources (visual material), 1973  
 "DGLR talk" (program, notes, overheads), 1973  
 Conference on a Proposed Power Spectral Gust Design Procedure: Short period response and 3-d gusts (overheads and notes), 1974  
 Seminar by J.C. Houbolt on Subcritical Flutter Testing Techniques, 1974  
 AGARD/NATO Meeting of the Structures and Materials Panel (correspondence, handwritten notes), 1974  
 NASA Symposium on Flutter Testing Techniques (agenda, correspondence), 1975  
 "Slides for LRC Talk", 1975  
 NASA/Langley Directorate Symposium (notes, overheads), 1976  
 Transportation Research Board (TRB) Ride Quality workshop (correspondence), 1976

Box 16:

TRB Workshop on Vehicle Ride Quality (correspondence, agenda, final report), 1976  
 OAST Aviation Meteorology R&D Retreat (correspondence, notes, minutes of the workshop), 1976  
 US Energy Research and Development Administration: Wind Characteristics Workshop (correspondence, progress report), 1976  
 NASA/OAST Program "Knowledge of Atmospheric Processes" (agenda), 1977  
 University of Tennessee Space Institute: Annual Workshop on Aviation Meteorological and Environmental Inputs to Aviation Systems: Abstract of paper: Airplane design for gusts (contains overheads), 1977  
 NASA Aviation Meteorology R&D Retreat (agenda, correspondence), 1977  
 NASA/UK Ministry of Defense meeting on joint aeronautical programs (agenda,

correspondence), 1978  
 NASA Aviation Meteorology R&D Retreat (notes, agenda, correspondence), 1978-1979  
 University of Tennessee Space Institute: 2nd Annual Workshop on Meteorological and Environmental Inputs to Aviation Systems. Paper presented: Effects of spanwise gust variations (contains also correspondence, agenda and handwritten notes), 1978  
 Von Karman Institute for Fluid Dynamics: Lecture Series "Aeroelastic Problems in Aircraft Design". abstract of paper: Flutter suppression and structural load alleviation, 1979  
 Meeting of Aerospace Flutter and Dynamics Council (agenda, correspondence, abstracts of papers), 1979  
 University of Tennessee Space Institute: 3rd and 4th Annual Workshops on Meteorological and Environmental Inputs to Aviation Systems (contains overheads), 1979-1980  
 Meeting of Aerospace Flutter and Dynamics Council (correspondence), 1980  
 Presentation: "Active Controls - A Review and Some New Notions" (contains overheads), 1980  
 NASA Symposium on Computational Methods in Non-linear Structural and Solid Mechanics (agenda, correspondence), 1980  
 Air Force/Industry Workshop on Fatigue Load Spectra Development for Aircraft (correspondence), 1980

Box 17:

AIAA 22nd Structures, Structural Dynamics and Materials Conference (correspondence, flyer)  
 AIAA 19th Aerospace Sciences Meeting. abstract of paper: Rolling moment induced by non-uniform spanwise gusts, 1981  
 University of Tennessee Space Institute: 5th Annual Workshop on Meteorological and Environmental Inputs to Aviation Systems, 1981  
 University of Tennessee Space Institute: 5th and 6th Annual Workshop on Meteorological and Environmental Inputs to Aviation Systems. Paper presented: Some gust research problems of the next few years (contains overheads), 1981, 1985  
 "Talks on Space Shuttle" (correspondence, notes, pictures), 1982  
 "DAR Talk" (articles from papers and journals about Soviet space shuttles, chemical weapons, etc. materials for presentation), 1983  
 "The USSR Threat" (overheads and their file prints), 1983  
 "Air power in the 21st Century" (overheads only), 1984  
 NASA-Langley: Wind Shear/Turbulence Inputs to Flight Simulation and Systems Certification Workshop (presentation, some overheads, notes), 1984  
 2nd Naval Space Symposium (program, correspondence, notes), 1985  
 About the "Talk on Twin-fuselage aircraft", 1986  
 Engineers' Club of the Virginia Peninsula: Presentation on The Cousteau Society "Turbo-sail" design ship Alcione (overheads and their file print), 1986  
 "NASP": Visit of NASP Hypersonic Technology Group (presentations on hypersonic scramjets, key problem areas, etc.), 1986  
 "AGARD (John Glaser)": abstracts of papers and a paper by H.N. Murrow, K.G. Pratt, and J.C. Houbolt, NACA/NASA research related to evolution of US gust design criteria (also contains overheads), 1988  
 Talk at the 60th Shock and Vibration Symposium: Recent developments and directions in aeroelasticity and structural dynamics (contains overheads and their file prints), 1989  
 60th Shock and Vibration Symposium (correspondence), 1989  
 AIAA Workshop on Turbulence Forecasting, Measurement and Modeling with Emphasis on

- Fatigue Factors Affecting Commercial Airlines: presentation on problems of fatigue (contains overheads and their file prints), 1989
- "Remarkable new findings for gust response of airplanes" (contains overheads and correspondence), 1989
- "Robins Workshop" (Robins AFB, Ga.): Abstract of paper: Random thoughts on MSD in aging aircraft; presentation on fracture mechanics - MSD (contains overheads), 1991

#### Box 18:

- The Lifelong Learning Society of Christopher Newport University (Va.): "Hampton Roads - The Cradle of Aerospace" (schedule and lecture notes), 1992
- Virginia Air and Space Center: Apollo and Viking Anniversary Panel (contains correspondence and handwritten notes of the talk), 1993
- AGARD 78th Meeting of the Structures and Material Panel. Paper presented: Special effects of gust loads on military aircraft, 1994
- Master copy of the paper for presentation at Gust Specialists Group Meeting (contains overheads), 1999
- Civil Service Retirement: materials for J.C. Houbolt's talk
- Talk on Civil service retirement (overheads)
- Talk on Civil service retirement (file print of overheads)
- "Completed talks" (correspondence)
- Fighter aircraft engine sizing trends (file prints of overheads)
- Fighter aircraft engine sizing trends (overheads)
- "Gust lectures" (handwritten notes)
- "Navy" (overheads and their file print)
- Presentation containing overheads [NASA, space shuttles]
- "Simplified Gust"

#### PUBLICATIONS AND WRITINGS

##### Published reports and papers

##### Bibliography of J.C. Houbolt's reports

- E.Z. Stowell, E.B. Schwartz, J.C. Houbolt, Bending and shear stresses developed by the instantaneous arrest of the root of a moving cantilever beam. NASA Report 828, 1945
- S.B. Batdorf and J.C. Houbolt, Critical combinations of shear and transverse direct stress for an infinitely long plate with edges elastically restrained against rotation. NACA Report 847, 1946
- J.C. Houbolt, R.A. Anderson, Calculation of uncoupled modes and frequencies in bending or torsion of non-uniform beams. NACA-Langley Tech. Note 1522, 1948  
Tables 1-8 for NACA Technical Report 1522
- R.A. Anderson and J.C. Houbolt Effect of shear lag on bending vibration of box beams. NACA-Langley. Tech. Note 1583, 1948
- R.A. Anderson and J.C. Houbolt, Determination of coupled and uncoupled modes and frequencies of natural vibration of swept and unswept wings from uniform cantilever modes. NACA-Langley. Tech. Note 1747, 1948
- E.Z. Stowell, J.C. Houbolt, S.B. Batdorf, An evaluation of some approximate methods of computing landing stresses in aircraft. NACA-Langley. Tech. Note 1584, 1948

#### Box 19:

- E.T. Kruszewski and J.C. Houbolt, The calculation of modes and frequencies of a

- modified structure from those of the unmodified structure. NACA. Tech. Note 2132, 1950
- J.C. Houbolt, A recurrence matrix solution for the dynamic response of aircraft in gusts. NACA-Langley. Tech. Note 2060, 1950
- J.C. Houbolt and E.Z. Stowell, Critical stress of plate columns. NACA-Langley. Tech. Note 2163, 1950
- J.C. Houbolt and E.E. Kordes, Gust-response analysis of an airplane including wing bending flexibility. NACA-Langley. Tech. Note 2763, 1952
- E.E. Kordes and J.C. Houbolt, Evaluation of gust response characteristics of some existing aircraft with wing bending flexibility included. NACA-Langley. Tech. Note 2897, 1953
- J.C. Houbolt, Correlation of calculation and flight studies of the effect of wing flexibility on structural response due to gusts. NACA-Langley. Tech. Note 3006, 1953
- J.H. Walls, J.C. Houbolt and H. Press, Some measurements and power spectra of runway roughness. NACA-Langley. Tech. Note 3305, 1954
- J.C. Houbolt, J.H. Walls and R.F. Smiley, On spectral analysis of runway roughness and loads developed during taxiing. NACA-Langley. Tech. Note 3484, 1955
- G.W. Brooks and J.C. Houbolt, Analytical determination of the natural coupled frequencies and mode shapes and the response to oscillating forcing functions of tandem helicopters. NACA-Langley. Tech. Note 3849, 1956
- J.E. Yeates, Jr., G.W. Brooks and J.C. Houbolt, Flight and analytical methods for determining the coupled vibration response of tandem helicopters. NACA Report 1326, 1957
- J.C. Houbolt and G.W. Brooks, Differential equations of motion for combined flapwise bending, chordwise bending, and torsion of twisted nonuniform robot blades. NACA-Langley. Tech. Note 3905, 1957
- J.C. Houbolt, "Study of Several Aerothermoelastic Problems of Aircraft Structure in High Speed Flight," 1958.
- J.C. Houbolt and S.A. Batterson, Some landing studies pertinent to glider-reentry vehicles. NASA-Langley. Tech. Note D-448 1960
- F.V. Bennet, T.L. Coleman and J.C. Houbolt, Determination of the required number of randomly spaced communication satellites. NASA-Langley. Tech. Note D-619, 1961
- J.C. Houbolt, J.D. Bird and M. Queijo, Guidance and navigation aspects of space rendezvous. In Control, guidance and navigation of spacecraft, 1962
- J.C. Houbolt, R. Steiner and K.G. Pratt, Flight data and considerations of the dynamic response of airplanes to atmospheric turbulence. NASA-Langley, 1962
- J.C. Houbolt, Lunar orbit rendezvous - and manned Lunar landing. NASA-Langley Research Center, 1962
- J.C. Houbolt, Concept of navigation in space. ARAP Report 58, 1964 (folder includes notes, article by I.E. Garrick)
- J.C. Houbolt, R. Steiner and K.G. Pratt, Dynamic response of airplanes to atmospheric turbulence including flight data on input and response. NASA TR R-199, 1964
- J.C. Houbolt, Communication probabilities for orderly spaced satellites. NASA CR-327, 1965
- J.C. Houbolt, Structural response of reentry vehicles to boundary layer noise. ARAP Report 65, 1965
- J.C. Houbolt, On the estimation of pressure fluctuations in boundary layers and wakes. GE, 1966

- J.C. Houbolt, Preliminary development of gust design procedures based on power spectral techniques (v. 1, 2). AFFDL TR-66-58, 1966
- J.C. Houbolt, An assessment of rendezvous accomplishments. ARAP, 1967
- E.G. Menkes and J.C. Houbolt, Evaluation of aerothermoelasticity problems for unmanned Mars entry vehicles. GE, 1968
- J.C. Houbolt, Some new concepts in oscillatory lifting surface theory. FFDL TR-69-2, 1969
- J.C. Houbolt, Combining loads during ascent. NASA, 1970 (folder contains some handwritten notes)
- J.C. Houbolt, Separation of aircraft acceleration signals into gusts and maneuver components. ARAP Report 148, 1970
- J.C. Houbolt, The art of determining gust frequency response functions. ARAP, 1970
- J.C. Houbolt and Asim Sen, Single-degree-of-freedom roll response due to two-dimensional vertical gusts. ARAP, 1971
- J.C. Houbolt, Certain present and future work efforts of the structures division - an appraisal and recommendations. ARAP Working Paper 71-12, 1971
- J.C. Houbolt and Asim Sen, Cross-spectral functions based on Von Karman's spectral equation. NASA CR-2011, 1972
- J.C. Houbolt, On the response of airplanes in a three-dimensional gust field. ARAP, 1972
- J.C. Houbolt, Updated gust design values for use with AFFDL-70-106. Technical Report AFFDL-TR-73-148, 1973
- J.C. Houbolt, Survey on effect of surface winds on aircraft design and operation and recommendations for needed wind research. NASA Report 2360, 1973
- J.C. Houbolt, Subcritical flutter testing and system identification. ARAP, 1974
- G.G. Williamson and B. Gilligan, Program documentation for subcritical flutter analysis software, Appendix to Subcritical flutter testing and system identification by J.C. Houbolt. ARAP, 1974

Box 21:

- J.C. Houbolt, Effect of nonuniform spanwise gusts on aircraft vertical response. ARAP, 1974
- J.C. Houbolt, Recommended procedures for processing acceleration data obtained by aircraft during atmospheric turbulence encounter. AGARD/NATO Report 631, 1975
- J.C. Houbolt, Mathematical modeling and response evaluation for the fluctuating pressures of aircraft buffeting. AGARD/NATO Report 630, 1975
- J.C. Houbolt and G.G. Williamson, Spectral gust response for an airplane with vertical motion and pitch. ARAP, 1975
- J.C. Houbolt and G.G. Williamson, A direct time history study of the response of an airplane to non-stationary turbulence. ARAP AFFDL-TR-74-148, 1975
- J.C. Houbolt, On identifying frequencies and damping in subcritical flutter testing. ARAP Report 257, 1975
- J.C. Houbolt, An algorithm for identifying frequencies and damping in subcritical flight flutter testing. ARAP Report 258, 1975
- J.C. Houbolt, Theory extension and numerical experiments to determine the probability of exceedance of given load levels in specified times. ARAP, 1975
- G.G. Williamson and J.C. Houbolt, Evaluation of gust response parameters for two-degree-of-freedom for seven general aviation aircraft. ARAP Report 282, 1976
- J.C. Houbolt, On fatigue crack growth and a study of some of the stress history parameters affecting fatigue lift. ARAP, 1976

## J.C. Houbolt's Papers (handwritten, typed, printout)

- J.C. Houbolt and J.L. Sanders, Effects of flexibility on the L-P propeller vibration problem, 1949 (several copies of the paper with notes)  
 "British flutter paper conversion"(notes, some of them dated), 1949  
 J.C. Houbolt, Differential equation solution for flutter, 1950  
 J.C. Houbolt, A recurrence method for the dynamic analysis of aircraft in landing, ca.1950  
 National Aviation Facilities Experimental Center (NAFEC) Report (contains handwritten calculations), 1974  
 J.C. Houbolt, The solution of Kepler's equation (printed paper and correspondence regarding its publication), 1983  
 J.C. Houbolt, Suggestions for improving gust design procedures (presented at the 75th Structures and materials panel meeting of AGARD), 1992  
 J.C. Houbolt, Improving gust design procedures (presented at AIAA 32nd Aerospace Sciences Meeting and Exhibit), 1994  
 J.C. Houbolt, Improvements in the analysis of measured acceleration records for gust encounter. FAA/NASA, 1995  
 J.C. Houbolt, On the generation of continuous and discrete gusts and airplane response (Prepared for FAA), 1998  
 J.C. Houbolt, Remarkable findings for gust response of airlines (Prepared for FAA), 1998

Box 22:

Reprints of articles by J.C. Houbolt (includes two undated reprints), 1957 - 1973

## RESEARCH NOTEBOOKS AND MATERIALS

- I and II (calculations)  
 2 degree freedom  
 2 degree freedom  
 2 degree freedom paper (contains 2 copies of J.C. Houbolt's paper Remarkably condensed results for the spectral gust response of an airplane with vertical motion and pitch)  
 2 degree freedom, Kernel Fnc., Slope of lift curve  
 2 degree of freedom (ARAP) (contains results of the longitudinal-lateral gust response, handwritten calculations)  
 5 stager (handwritten calculations, graphs, a drawing)  
 757 Loran C Receiver (calculations, correspondence, manuals)  
 841-A. Circumferentially stiffened cylinders under lateral pressure, 1945-1946

Box 23:

- 841-B, 1946-47  
 A; Early N and P; New N and P (also contains correspondence)  
 Acoustic resonators  
 Acoustic sources and air damping  
 Advanced K kernel function  
 AGARD gust data (also contains correspondence)  
 Aircraft configuration (on fuel conservation possibilities)  
 [Aircraft weight and balance (model A23)]  
 Airships (calculations, also contains correspondence)

## Box 24

Algorithm on FFT (Flight Flutter Testing), 1975  
 Analog exp. (also contains microform copy of R. Buckley, The fast Fourier transform and its use in digital power spectral and correlation analysis, 1972), 1974  
 B-1 / Flight data, 1976  
 B-747  
 Blanket machine, 1961  
 Calculations of  $f_4$   
 Cantilever excitation  
 Centrifugal lifting rotor  
 C.H.A. (spanwise effects) (1)  
 C.H.A. (2)  
 Convection and spacial correlation  
 Conversions,  $\phi$ 's, R's, P's,  $\gamma_c$ , L by mixing length, L by  $\phi$  filtering

Box 25:

Combining loads  
 Copies of P (X. T) study  
 Correction of root reaction, 1955  
 Cross coupling terms  
 Cube  
 Curved beam, 1971  
 Deployable interceptors  
 Derivation for gust paper and other work  
 Design problems (also contains presentation on GE-UDF engines and a memo), 1981  
 Dissapative systems  
 Dynamic analysis of centrifuge, 1963  
 Dynamics I: natural frequencies, structural response, 1946-1947  
 Dynamics II: landing, gusts, hydrodynamics, 1943-1944  
 Dynamics III: methods of analysis, forces and moments, fig and indicial functions, swept wings, 1947, 1955  
 Electra (1)  
 Electra (2)

Box 26:

Electra (3)  
 Electra (4) (contains an article and abstract of J.C. Houbolt and W.H. Reed, III, Propeller-Nacelle whirl flutter, 1961)  
 Electra (5)  
 [Equation of motion]  
 Exact difference equations (contains overheads)  
 Example - old, 1948-1949  
 Exceedance of interaction curves  
 Extensions, winglets, flaps, B-planes  
 ERD evaluation  
 Exact solution for the critical stress of an infinitely low flat plate with elastically restrained edges under combined shear and transverse direct stress



Fatigue (1)  
 Fatigue (2)

Box 27:

Fatigue by crack growth  
 Fatigue machine  
 Filters (on two high-pass numerical filters; paper on digital determination of power spectra, notes)  
 Filters, improved  $\phi$  TR-199 $\phi$ , swept sine (contains two papers by J.C. Houbolt, Tentative improved procedure for the digital determination of power spectra, 1966; Illustrative applications and error determination)  
 Filtering and statistical properties (contains a draft of a report by J.C. Houbolt, High-pass numerical filters)  
 Flat and curved plates  
 Flight flutter testing  
 Flight flutter testing, 1971-1974  
 Flight flutter testing correction  
 [Flutter; energy equation for plates; rapid calculation for influence surfaces], 1956-1957  
 Flutter analysis, ca 1957  
 Flutter and Fourier analyzer

Box 28:

Formulas and derivations used by A. Regier, 1945  
 Fourier analyzer  
 Fourier analyzer  
 Fourier dev. of kernel function  
 Fourier transform of  $\phi$  and K  
 G.E. I  
 G.E. II  
 General exceedance curves

Box 29:

General exceedance curves and various mission analysis  
 Gliding  $h'$   $v'$  wind shear  
 Gravity gradient  
 [Grid performance analysis; gust loads]  
 Gust analysis  
 Gust analysis - original recurrence analysis, modal solution, simple damped mass oscillator, etc.  
 Gust history  
 [Gust loads], 1952-1953  
 Gust response  
 [Gusts]  
 Hang glider  
 [Houbolt's correction function]  
 Kernel cv

Box 30:

Kernel and SK  
 Kernel function and 3-d flutter  
 Lateral gust response  
 Lateral gust response 1-degree freedom  
 Launch vehicle  
 [Loads sources of flight]  
 Low  $\mu$   
 LRCA (contains a copy of J.C. Houbolt's paper Impact of technical advances (sensitivity),  
 1980)  
 Mars entry vehicle  
 Math probing  
 Matrix characteristic equation  
 Method of modeling  
 Mode determination from slope measurements, 1956  
 Model analysis results; flutter flight test data, 1976  
 A more general range equation  
 More on the kernel functions; slope of the lift curve  
 Multiple sensors

Box 31:

N and P graphs  
 NASA - gust program  
 NASP  
 NCAR (contains two articles on turbulence by C.S. Morse and L.R. Cornman)  
 New simplified 2 degree for  $K+N_0+4$  aircraft  
 New thought on gust response  
 Non-stationary turbulence  
 Non-steady  $\mu$  files  
 Non-steady aero  $J$ 's  
 Non-uniform spanwise gusts lift and roll  
 Numerical filtering, 1957

Box 32:

Numerical methods  
 Oper. 1-8 redo; outlines (contains presentation on Analysis of aircraft structures), 1955  
 Orbits (contains memo on interplanetary trajectory program), 1959  
 Optimum filter  
 Optimum pred. filter  
 Optimum staging  
 Optimum staging  
 Optimum staging  
 P(T) study  
 Panel flutter  
 Papers on aeroelasticity

Box 33:

Parameter identification  
 Peaks  
 Probability and game  
 [Program E; atmosphere and constants; airplane engine data; Sf studies; sensitivity studies;  
 coupling of two DC-9's; twin B-1; two JT9D-7; model design; lift on swept wings;  
 stability]  
 PVA 93-30BBN  
 PVA 93-31  
 Range paper, 1969-1970  
 Re-entry vehicle; X-15 landing analysis  
 Re-evaluation of  $\gamma$  and P  
 Rigid body,  $P^2 + Q^2$ , misc. response,  $\beta$  from R and  $\phi$

Box 34:

Rings and shells (notes, calculations)  
 Roll (calculations and graphs)  
 Roll-response (calculations, paper on vehicle roll response, tables and figures)  
 Root behavior and flutter (calculations and graphs)  
 Rotating blades  
 Runway roughness (calculations, correspondence, printed paper by J.C. Houbolt  
Mathematical treatment involved in development of roughness criteria)  
 Rutgers (calculations, memo, correspondence)  
 Rutgers - on jet VTOL engines, V/STOL aircraft  
 [Sensitivity study, error in h; longitude w; longitude E; LHA and longitude; star chart]  
 Shuttle ascent loads  
 Simplified solution for gust problem

Box 35:

Simplified rocket ascent (on vehicle design and various optional staging studies)  
 Some technical graphs and information  
 Some unfinished work on the stability of a short column  
 Sonic boom  
 Sources and sinks (a letter concerning the paper "Some new concepts in oscillatory lifting  
 surface theory" and notes, also three other papers on the same subject)  
 Sources; grids;  $w(x)$ ;  $w(-x)$ ; K; Fourier transforms  
 Space and time variant noise  
 Stability  
 [Steering control problem; Booster capability], 1963  
 Structures (on determinations; stability; properties of metals)

Box 36:

Subcritical flight flutter testing (analog experiments), 1975  
 Subcritical flight flutter testing, 1975  
 Subsonic design  
 Subsonic design (cont.) and lecture figures

Surface winds and gusts (objectives; individuals; trip schedule; findings)  
 Taxiing stresses  
 Tip off (contains photo and negatives)  
 Tip propellers  
 Tip propellers (contains overheads)  
 Thin strip column (fixed ends, energy; pinned ends, energy; free and restrained edges), 1942-1945

Box 37:

Torsion of propellers  
 TR-199; on dynamic gust response (memos, notes), 1962  
 Transient aerodynamics and the isoclinic wing, 1949  
 Turbulence meter  
 Twin fuselage (contains correspondence, articles, overheads)  
 Upwash corrections  
 Various math  
 Various problems (contains B-1 data, memo on flutter problem; aerodynamic circuit)  
 Various spectral matters  
 Vehicle design studies  
 Wake turbulence  
 WF - gust

Box 38:

WF (mission consideration)  
 Wing-tip propellers (research papers of 1969-1984)  
 $A_r$  and  $K_0$  for various aircraft  
 $K$ ,  $k_0$ , downwash  
 $K$  for incompressible flow  
 $K$  for 1011, DC10, 747, 727 (letters and data from P. McGowan, F. Hoblit, N. Crabil)  

$$K = e \frac{\Delta v}{u}, r = \frac{k - 1}{1 - \epsilon k} \quad (\text{Calculations and graphs}), 1979$$
 $K$   $\int$  reduced to sub  $\int$ ; exact  $\int$ ;  $K$  report 4 airplanes  
 l-p (calculations)  
 $\varphi_n(r) = \int_0^\infty P(l) dl$ ,  $N/N_0 = \int$ ;  $\varphi_1 + \varphi_2$   
 $\varphi$  with time variation spanwise gust distributions  
 $F + iG$  functions  
 $h$  by least squares  
 $f_4$  (two-dimensional gust effect)  
 $\alpha^2$ ,  $R_{12}$ ,  $\varphi_{12}$ ,  $R_f$   
 $h$  for gusts  $z$  and  $\varphi$   
 $\alpha/q$   
 $\Delta$ 's low power airships (contains overheads)

Box 39:

$K\ddot{y}$  with filter

$\Delta$  divergence  
 w from z w from  $\phi_w$  (Includes 3.5" floppy disk)  
 $\alpha$  (l) and  $N_0$  (L)  
 $h(\alpha)$  and  $F_n$   
 n m PT  $N_0$  (graphs, data)  
 $K_0$  for swept wing  
 $N_0$  by 2 degree gusts (calculations and two reports on turbulence)  
 $\alpha$ , v, m and weight of wing  
 Unlabeled folder with handwritten calculations, ca 1956-57  
 Unlabeled folder with handwritten calculations  
 Unlabeled folder with handwritten calculations, 1963  
 Unlabeled folder with handwritten calculations  
 Unlabeled folder with handwritten calculations and graphs, 1964  
 Unlabeled folder with handwritten calculations, 1972-1973

Box 40:

Unlabeled folder with handwritten calculations  
 Unlabeled folder with handwritten calculations  
 Unlabeled folder with handwritten calculations  
 Unlabeled folder with handwritten calculations  
 Unlabeled folder with handwritten calculations

RESEARCH AND CONSULTING ACTIVITIES; PROPOSALS

2 degree freedom - 7 aircraft  
 2 stage and 1 stage (reports and studies), 1977-1978  
 747 gust analysis (contains calculations, NTSB special investigation report, technical note and overheads)  
 Air research (Airesearch Manufacturing company), 1969  
 ALLCAT (notes and calculations)  
 ALLCAT (memos), 1966, 1967, 1973  
 Autopilot effects on K and  $N_0$ , 1979-1981

Box 41:

C-5 (ALDCS evaluation meeting), 1974  
 C-5 (C-5/Space shuttle feasibility report), 1974  
 C-5 (report of C-5 ad hoc committee on C-5 structures), 1976  
 C-141 (reports of DAG Committee on C-141A air loads), 1966  
 Communication satellites (paper, memo)  
 Communication satellites (notes, calculations, memos), 1962  
 Cousteau Society - Turbosail: Information kit (contains notes and photos), 1985  
 "ECHO" (on communication satellites)  
 Electra gust analysis, 1960  
 F-15 flutter (review of F-15 flutter program), consulting agreement with McDonnell-Douglas, 1971  
 F-4 (correspondence, memos, report of F-4 Structures Committee), 1973  
 F-4 (correspondence, F-4 Structures Committee meeting and report), 1973-1975  
 F-4 (correspondence, draft of the final report of F-4 Structures Committee), 1974-1975  
 FAA - DC-10-10 Wing pilon test loads spectrum (Douglas Aircraft Company), 1979

Box 42:

FAA - Proposal; 2 degrees of freedom (correspondence, report), 1974-1975  
 Fatigue Proposal, 1972  
 G.E.; MK-12  
 G.E. - Erosion (material on erosion to review), 1968  
 G.E. - Acoustic loads, 1973  
 General Electric - Acoustic prediction and program for boundary layer excitation, 1967  
 General Electric - Current (notes, calculations), 1967-1968  
 General electric - Transition noise, 1972  
 General Electric - Wake data analysis (contains various publications and notes)  
 General Precision, Inc. (Scientific Advisory Group Meetings), 1963-1965  
 Grumann (Grumann Aircraft Engineering Corporation) - LEM; preliminary study on Martian optical probe, 1963  
 Grumann (notes), 1961-1964  
 Grumann (vehicle sizing study), 1970  
 Gust specification and rationalization of design loads  
 Iranian 747 airplane crash (report, photos, overheads), 1977  
 Launch vehicle data

Box 43:

Lockheed Aircraft Corporation (Electra), Pac-Aero and STL (memo, notes), 1960  
 LTA (paper on aerodynamic forces, correspondence), 1983  
 Lunar penetrometer; Circumlunar photography (projects), 1961  
 Manned space station (memos, notes), 1959-1960  
 Manned space station (memos, paper on interplanetary vehicle by P. Kurzhaks), 1959-1960  
 Martin (research done for Martin-Marietta Corporation), 1964  
 Martin (flutter analysis of fin) - report, 1971  
 Martin (Consultation on CLGP design problems), 1971  
 Martin (notes)  
 McDonnell (St. Louis) (on F-4 airplane), 1969-1971  
 MADCAT (correspondence, calculations), 1967-1968  
 Meteorological rocket - Hercules, 1965  
 Missile launch programs (memos, proposal), 1960  
 MSC acoustic lab, 1973  
 NADC (Naval Air Development Center) (notes and memos), 1973-1974  
 NAEC (Naval Air Engineering Center) (notes, calculations)

Box 44:

NAEC (report: Gust and maneuver loads analysis of service aircraft), 1969  
 New technology report: contract # NASI-11672, 1974  
 NRL (Naval Research Laboratory), 1969  
 O-ring; seal design; elastomers (VITON E-60C), 1986  
 Odd problems (calculations), 1958  
 Odd problems: side problems  
 Odd problems: possible future problems  
 Odd problems: sailing  
 Odd problems (J. Tabachnik, "Unified theory of our universe"; a letter from the author)

Program for the study of balance reflex dynamics, 1964  
 Project Fire (memos), 1962  
 Proposal on gust design verification, 1972  
 Proposal to Marshall on input moment spectra  
 PTA-6 engine failure  
 RCA (graphs and design sketches for contract RCA and review of deployment qualification), 1969, 1976  
 RCA - Low altitude satellite, 1966  
 RCA (contains notes and calculations and final report on RCA contract), 1969  
 RCA (contains a list of reports of J.C. Houbolt)  
 RCA proposal review, 1972  
 RCA (calculations and graphs)  
 RCS and IR (mission analysis on aeronautical warfare goals), 1972  
 J.C. Houbolt, A critique of "Hale" design. Report prepared for Naval Air Development Center, 1989  
 Review of proposals, 1981-1985

Box 45:

Satellite program (contains figures for the paper on satellites), 1962  
 Saturn info (memo on projects Centaur and Saturn; paper by J.S. Mixson and J.J. Catherine on Saturn SA-1), 1960, 1961  
 Saturn S-IV (notes, calculations, memos and correspondence), 1960  
 Scout ST-6: pre-flight planning report, 1961  
 Scout ST-6 (contains a handwritten notebook, notes, drawings, memos), 1961  
 Scout ST-7: preliminary flight report, 1961  
 "Scout" work  
 Space station (Orbiting Research Lab), 1962  
 TAV (Trans-Atmospheric Vehicle) System, Materials and structures of TAV (contains correspondence), 1984  
 TRW visit (Mark 12 re-entry vehicle review committee), 1973  
 Various proposal efforts (memos and correspondence), 1964-1972  
 Visit to aircraft industries (memos, comments on landing loads, landing-gear problems), 1951  
 Visit to Douglas missile and Minn. Honeywell (notes; proposed Delta telemetry assignments), 1959  
 Visit to helicopter manufacturers (notes, memo), 1954

Box 46:

Visit to the Northrop Aviation Company (memos, calculations concerning F89D airplane), 1953  
 Visit to STL and Convair (notes)  
 West coast trip (contains a notebook, notes and correspondence), 1950  
 WF gust proposal, 1963-1968  
 WF noise facility (notes, on sonic fatigue facility), 1964  
 Work statement on Saturn Stage S-II, 1961  
 Wright-Patterson Air Force Base: meetings, letters, 1963-1971  
 X-15 Landing. Visit to Edwards and NA, 1959

## SUBJECT FILE

## American Institute of Aeronautics and Astronautics (AIAA)

AIAA 50th Anniversary Celebration, 1981-1982  
 AIAA awards (correspondence), 1975, 1984  
 AIAA elections and honorary fellows, 1976, 1980  
 AIAA Fellows; Grade committee, 1980

Box 47:

AIAA Honorary Fellows  
 AIAA membership (correspondence), 1968  
 AIAA Princeton Section: information on possible speakers; colloquium series of NYU  
 Department of Electrical Engineering  
 AIAA Princeton Section: meetings  
 AIAA scientific publications: J.C. Houbolt, Effect of non-uniform spanwise gust,  
 correspondence concerning its publication, notes, 1975  
 AIAA tape series (on series of recorded lectures)  
 AIAA - treasurer's report, memos and correspondence, 1965-1968  
 AIAA VP and Fellows' letters (also contains three issues of the paper "Booster")  
 Local AIAA business: AIAA Princeton Section  
 American Society of Mechanical Engineers: Honors Assembly (Spirit of St. Louis Medal), 2000  
 Applicants (resumes)  
 Asim Sen, "Derivation of cross-spectra for two-dimensional gust structures" (paper, handwritten  
 tables and graphs)  
 Aeronautical Research Associates of Princeton, Inc. (ARAP)  
 ARAP - about the company: description, general information  
 ARAP: memorandums and notes  
 ARAP: memorandums, expense accounts  
 ARAP: official papers and records  
 "Life with Lois" - a farewell report for Lois (the secretary to J.C. Houbolt?)  
 Office

Box 48:

## California Institute of Technology: on electric analog computers

## Clubs

Astro-flying Club  
 Black Rock Gun Club  
 Cavaliers, 1977, 1986  
 Club 55  
 Club membership  
 Gun Club  
 Gun Club (NASSAU Gun Club)  
 Kiwanis International Club (Certificate of appreciation)  
 Letters; various action items  
 National Exchange Club - Freedom Shrine  
 Shooting  
 Trap analysis  
 Trap and skeet analysis  
 Trap and skeet information



Box 49:

Cosmology (notes on cosmological problem)  
 Defense Science Board (DSB) (correspondence, appointments), 1992  
 The differential analyzer of the University of California, Los Angeles Ca., 1947  
 Department of the Air Force: MIL-A-008861A (USAF) and MIL-A-87221 military specifications  
 Department of Defense (security forms and notes), 1994  
 Dinner at the Century Plaza Hotel (guest list), August 13, 1969  
 Equipments (manuals)  
   Computers (HP calculators; correspondence)  
   Equipment  
   Hewlett-Packard 97 (manual)  
   HP Fourier Analyzer System 5451A (system operating manual)

Box 50:

Texas Instruments: Programmable calculator (manuals)  
 Texas Instruments: SR-52 (Math Library MA 1) (Manual)  
 Texas Instruments: SR-52 (Statistics Library ST 1) (manual)  
 US Department of Commerce: Weather science study kit  
 Federal Aviation Administration (FAA)  
   FAA: technical proposal, reports, correspondence, 1975-1977  
   FAA (drawing), 1985  
 Garrick, I.E.  
   Garrick, I.E. Birds and bees and ESP, in the Torch, 1978  
   Garrick, I.E. (Flight flutter talk; correspondence), 1949-1950  
   Garrick, I.E., Non-steady wing characteristics

Box 51:

Inventions (contains letters and articles from journals)  
 "Kooky" Inventions  
 Joliet Junior College: Dedication and Open House, Oct. 22, 1972  
 Lunar Orbit Rendezvous and Interplanetary Missions (See also Map case drawers)  
   Apollo (clippings from different papers)  
   Apollo Rendezvous study evaluation (notes, correspondence), 1962  
   Apollo 11 (correspondence)  
   Apollo 11 observer certificates (2 copies)  
   Apollo 16 and Apollo 17: Tribute to Apollo Program (invitation), 1972, 1973, 1983  
   Briefing on Rendezvous for Dr. Seamans, Jr., Dec. 14, 1960  
   Compact Disk containing TIFF files of drawings treated by Etherington Conservation Center  
   ( Basic Gemini Flight Plan, Comparative Sizes of Manned Projects, Comparative Sizes of  
   Space Capsules, Comparison of Lander Sizes, Main Approaches to Lunar Landing, Earth  
   to Moon Mission Orbit Plan). See Map Case for Originals  
   Grumman Aerospace Corporation: NASA/Grumman Apollo Lunar Module  
   Handbook of Lunar materials. NASA Reference Publications, 1980  
   J.R. Hansen, The genesis of the Lunar Orbit Rendezvous concept (first chapter of the draft  
   and a letter from the author)  
   History of LOR  
   J.C. Houbolt, Lunar Orbit Rendezvous and manned Lunar landing, 1962 (contains copy of

the article, photos and material for presentation)  
 Interplanetary missions model (drawing), 1963  
 Landing on the moon (5 color photos)  
*Life, Time*, and LOR letters  
 LOR (briefing on the research of LOR; Trajectory consideration, by W.H. Michael, Jr.;  
 handwritten notes and overheads), 1962

Box 52:

LOR (correspondence, Langley Researcher of March, 1983 and a special supplement to the  
 Los Angeles Herald Examiner)  
 LOR and MOR (handwritten calculations)  
 LOR talks (handwritten notes and NASA publication "Apollo 8: man around the moon"),  
 1965, 1969, 1979  
 Lunar Committee, NASA/Langley (notes, memos, minutes), 1960  
 Lunar Rendezvous (charts)  
 Lunar Science Subcommittee (notes), 1961  
 Material for the two volume report on LOR  
 Mercury flights (proceedings of the conference on results of the first US manned suborbital  
 space flight), 1961  
 Minutes of the meeting at Rockwell, Oct. 18, 1978  
 More on LOR: historical interest (notes, correspondence, journals: Aerospace Historian,  
 1971; R.C. Seamans Jr.: Action and reaction (the 1969 Minta Martin Lecture))  
 A. Rand, Apollo 11 (copy of the article)  
 NASA Ames Research Center: Adventure with Apollo  
 NASA Honor Award, 1963-1964  
 NASA Inter-center Rendezvous meeting, Feb. 27-28, 1961  
 NASA Lunar Orbit Rendezvous (handwritten calculations; hearing before the Committee on  
 Science and Astronautics US House of Representatives), 1962  
 NASA: Planetary and Lunar sciences subcommittees (meetings, reports, correspondence,  
 notes), 1961-1962

Box 53:

NASA/Langley Research Center, Manned Lunar landing through use of LOR (v. 1, 2), 1961  
 Rendezvous (references)  
 Reproduction of big charts \_ LOR (contains negatives)  
 Salute to Apollo: National Space Club (an invitation), Jan. 22, 1973  
 Science and Technology (contains printout of articles by J.C. Houbolt, Manned Lunar  
 landing via LOR and Technical aspects of the LOR; correspondence and visual material)  
 Scientific American (correspondence, notes and a copy of the article by J.C. Houbolt,  
Rendezvous in space), 1962-1963  
 Space Exploration Council (presentations), 1961  
 Various historical papers, 1960  
 Various Rendezvous meetings, 1969-1962  
 Viking 1 and Viking 2: sunrise and sunset on Mars  
 National Academy of Engineering (NAE)  
 National Academy of Engineering: 26th Annual meeting (correspondence, new members  
 yearbook), 1990

Box 54:

National Academy of Engineers (correspondence, resumes), 1997-1999

## NASA

NACA-NASA History

NASA: Reunion, (Ashville, N.C.), 1976

NASA: Reunion II (Williamsburg, Va.), 1982

NASA Appointment

NASA: Equipment user's information, 1990

NASA: Honor Awards Program, 1969

NASA: Information

NASA: Organizational charts, 1962

NASA/Langley Research Center: Album on occasion of J.C. Houbolt's retirement, 1985

NASA/LRC, Dynamics Research Lab: memos and progress reports, 1960-1962

NASA/LRC "Non-supervisory performance appraisal" form, 1984-1985

NASA/Langley: Dynamic Loads Division - activity and personnel, up to 1962

NASA/Langley: Landing loads branch - key papers, current jobs, etc.

Box 55:

NASA memorandum: Reliability of complex research devices, 1960

NASA/Langley: monograph (correspondence, notes, space vehicle design criteria program)

NASA: design criteria monographs, 1967

NASA: space sciences (memos, program), 1960

NASA: TIROS III (photos), 1961

National Geographic Society: The Earth's Moon (map)

NATO/AGARD: Von Karman Lecture and other papers by R.C. Seamans, Jr., 1972

On Management (notes)

Odd problems (odd jobs; words; Data Guide's summaries)

The Orient Express of McDonnell Douglas, 1986

## Pilot Exams

Aeronautical charts: NY, Philadelphia, Washington, Norfolk

Airplane (various articles)

AOPA Air Safety Foundations: Instrument written exam course; information manual and flight procedures; notes

Federal Aviation Agency: Instrument pilot examination guide; aircraft inspection handbook; flight test guide

Handwritten notes and graphs

Jeppesen airway manual services and pilot accessories; flight charts

Box 56:

Jeppesen instrument rating course for pilots

Pilot training manual (courses, tests)

REAC computers

Reissner, E. Lectures on topics from non-steady lift theory, 1948

Reports on meteorology

Rotor blades (various publications by different authors and handwritten notes)

Small aircraft - turbulence (various articles and papers by different authors)

## Theoretical mechanics division

## Travel (vouchers)

European trip (correspondence)

Log (travel info; US highway map and air atlas)

Box 57:

Travel vouchers, travel request forms, itineraries, 1983-1987

Travel reservation forms, 1972-1975

Travel reservation forms, 1963-1975

Travel vouchers, 1983-1996

Travel request forms, vouchers, correspondence, 1948-1963

Travel request and authorization forms, itineraries and tickets, 1976-1982

Box 58:

## USAF Scientific Advisory Board (SAB)

Ad Hoc Committee on Air Base Performance (agenda of the meeting, presentation, contains overheads), Dec., 1986

Department of AF: monthly report of the Senior Executive Secretary, SAB, 1985

Members 1994: SAB membership rosters

On Rendezvous program, Sept., Nov., 1960

R.J. Patton and Associates (correspondence), 1994

R.J. Patton (correspondence), 1995-1997

SAB - orders: special orders for SAB trips; members list

Summer study (presentation, correspondence), 1995

Spring Workshop and Summer study, 1995

## University of Illinois

Illinois Achievement Awards, 1980

Illinois Alumni Association: Reunion (includes photo), 1987

Illinois Alumni News: Article Eagle landed on the Moon, 1969

College of Engineering Alumni Award for Distinguished Service (notes, correspondence), 1997

College of Engineering: Structural Research Newsletters and correspondence, 1953-1955

Homecoming (correspondence), 1997

Homecoming (correspondence, itinerary, U of I, CE Home Awards Convocation, Illinois Alumni of July/Aug. 1997 and Jan./Feb. of 1998)

Univ. of Illinois: 1970 Commencement (commencement program, schedule of activities, correspondence)

University of Tennessee Space Institute (Tullahoma, Tennessee): To J.C. Houbolt In recognition of your efforts on behalf of the Space Institute, 1977

Dr. I. Velikovski (articles and correspondence)

"Venture" (notes on the boat "Venture")

Box 59:W. Weeks, Independent determination of atmospheric turbulence scale and severity, 1971 (with acknowledgment to Dr. J.C. Houbolt)

Why space and the Moon (article from papers, notes, correspondence, statement made by J.A.)

Michener before subcommittee on science, technology and space in 1979, the National Geographic reprinted from July 1960)  
 Wright Brothers: "Volume four - The nearness of distance"  
 Write-ups on future research ideas

SLIDES; AUDIO-VISUAL MATERIAL; PHOTOGRAPHS; GRAPHS

Interview with J.C. Houbolt (printout and a cassette), Dec., 1966

Photographs

Photos, ca 1940

Photos (personal and photographs of earth of Goddard space flight center), ca 1963

Photos (personal), ca 1960

Photo of J.C. Houbolt: Under the Rockefeller Public Service Award, 1958

Photos (personal), 1962

Misc. pictures

Slides, overheads, graphs

ATF (overheads only)

AGARD paper (negatives)

AGARD Structures Materials Panel (negatives), 1962

[Aircraft design] (overheads only)

[Aircraft survival] (overheads and their handwritten copy)

AIAA 19th Aerospace Sciences Meeting (negatives), 1981

[Analytic spectra functions] (negatives of charts and graphs)

Archimedean screw

[Cantilever wing; properties of some metals and alloys; damping] (tables and graphs)

Box 60:

[Communications satellites] (overheads)

[Damping: tables and graphs]

Excedences - plots (graphs)

Figures for AGARD Freq. response paper, 1970

Figures for NACA Report 1010 (TN 206)

Figures for paper Certain present and future work efforts of the structures division - appraisal and recommendations (contains handwritten notes), 1971

Figures for report on Estimation of pressure fluctuation in boundary layers and wakes (graphs and notes), 1966

Figures for roll-response paper, 1971

Figures for wake turbulence paper (contains negatives), 1970

Flutter (slides)

[Flutter; noise elimination; damping] (overheads and their file prints)

[Gust] (slides)

[Gust] (tables, negatives), 1981

[Gust] (overheads)

[Gust] (overheads and calculations)

[Gust] (negatives of graphs and charts)

Gust parameter figures (overheads and their file prints)

[Large aircrafts] (overheads)

LOR (negatives)

LOR (Photos and negatives)

No report (figures)  
 NAEC report (graphs)  
 Natural frequencies (overheads)  
 Odd figures for gust paper (contains negatives)  
 Paper on navigation (figures, notes, graphs and negatives)  
 Press-Deiderich-Houbolt (graphs, negatives)  
 Rendezvous in space (overheads), 1961  
 Report 148 (NAEC) (graphs)  
 "Rigid" body stress (graphs)  
 Rolling spectra (slides)  
 Shuttle: ascent dynamic and loads review (overheads only)

Box 61:

Slides  
 Some rough figures for AGARD paper (graphs), 1970  
 [Space shuttle vehicle] (slides)  
 [Spectral input-output] (slides)  
 [Structural dynamics] (graphs), 1959  
 STS (slides)  
 T-33 records (figures)  
 TR-73-148: updated gust design values (figures)  
 [Twin-body design] (negatives, positives, graphs)  
 View graphs for gust design, 106 AFFDL-TR-67-74  
 WF gust - AFFDL-TR-70-106 (figures)  
 WF gust (view graphs for ARAPR 126) Oscillatory A.F.: AFFDL TR-62-2

CORRESPONDENCE

Administrative

Administrative 1950's  
 Administrative 1960-1969  
 Administrative 1970-1973  
 Administrative 1975-1979  
 Administrative 1980-1981  
 Past appointments 1963-1978

Personal

Personal (without date)  
 Personal memos and correspondence 1950's  
 Personal memos and correspondence 1960-1963  
 Personal memos and correspondence 1964-1967

Box 62:

Personal memos and correspondence 1968-1969  
 Personal memos and correspondence 1970-1971  
 Personal memos and correspondence 1972-1974  
 Personal memos and correspondence 1975-1979  
 Personal memos and correspondence 1980-1987  
 ETH 1974-1975

Fan mail  
Fan mail

Box 63:

Garrick (correspondence), 1962-1982  
Garrick's recommendations of J.C. Houbolt  
J.C. Houbolt's Day and thank you notes, 1969  
Letters and postcards on retirement from NASA (contains photos), 1985  
Letters from D.R. Brady Jr., (contains photos), 1990  
Letters of congratulation  
Letters to answer, 1977, 1979  
Letters to the presidents of the USA (J.F. Kennedy, D.D. Eisenhower, R. Reagan)  
Philatelic mementos (from S.M. Kessler), 1974 [18 "covers"]  
Rockefeller Public Service Award, 1956  
Take care of letters  
University of Illinois, 1970-1990

Professional

Professional (without date)  
Professional 1948-1950  
Professional 1951  
Professional 1952-1953  
Professional 1954-1957  
Professional 1958-1959  
Professional 1960  
Professional 1961

Box 64:

Professional 1962  
Professional 1963  
Professional 1964  
Professional 1965  
Professional 1966  
Professional 1967  
Professional 1968  
Professional 1969  
Professional 1970  
Professional 1971  
Professional 1972-1979  
Professional 1980-1984

Box 65:

Professional 1985-1989  
Professional 1990, 1997  
ASME: Spirit of St. Louis Medal, 2000  
Announcements, 1964-1969  
Awards, 1962-1987  
Guido (reference letters for Guido Sandri)

Long range requests to write articles  
 Pacner, Karle (a letter and a book "And one giant leap for mankind" in Czech)  
 Paper review (reviews and correspondence), 1972-1984  
 Request for reports, 1958-1987  
 Rockefeller Public Service Awards, 1955-1975  
 R.C. Seamans, Jr., 1961-1963  
 R. Siemerling (letter and an article), 1970

#### MAGAZINES AND NEWSPAPERS

Langley Researcher, 1962  
 Monitor, April 1963  
 Princeton University Weekly Bulletin (two issues), 1963  
 Metalworking News, Apr. 6, 1964  
 Langley Researcher, Aug. 1977  
 NASA Activities: 20th Anniversary, Oct. 1978  
 Alumni Action (of Joliet Junior College), 1984  
 News Researcher (NASA/Langley), July 1 and 15, 1994  
 News Researcher (NASA/Langley), Oct. 1997

#### Box 66:

Articles from different newspapers (Daily Press, 1989; Virginia Gazette, 1985 and 1990;  
 Miami News, 1969; Princeton Packet, 1969; Illinois Alumni, 1969; Joliet Herald-News,  
 1969; New York times, 1969; New York Times, 1962; Joliet Herald-News, 1962)  
 Articles from different newspapers  
 Clippings  
 Clippings  
 Flying articles  
 Rockefeller Public Service Award (from newspapers: Daily Press, March 5, 1956; City Life,  
 March 6, 1956; Airscoop, March 9, 1956)  
 NASA: "In this decade..."-Mission to the Moon  
 NASA: Code-name SPIDER - flight of Apollo 9  
*Time*, Jan. 3, 1969  
*Time*, Jul. 18, 1969  
*Time*, Jul. 25, 1969  
*Time*, Aug. 8, 1969  
 Centerline, 1994  
 Spectrum, July 1994  
 People magazine, July 12, 1999

#### Box 67: Oversize Box I

#### MAGAZINES AND NEWSPAPERS

LIFE, Sept. 25, 1964  
 LIFE, March 14, 1969  
 LIFE, June 6, 1969  
 LIFE (special issue), Jul. 4, 1969  
 LIFE, Jul. 25, 1969  
 LIFE, Aug. 8, 1969  
 LIFE, Aug. 22, 1969



LIFE, Aug. 29, 1969  
 Sunday Times Advertiser  
 Illinois Alumni News, Apr. 1962  
 Richmond Times Dispatch, Aug. 1, 1962  
 Town Topics (Princeton, NJ), Mar. 1969  
 Today (Florida's Space Age Newspaper), Jul. 16, 1969  
 Evening Times, Jul. 16, 1969  
 New York Times, July 17, 1969  
 Joliet Herald-News, Jul. 19, 1969  
 Evening Times, Jul. 21, 1969

Box 68: Oversize Box II

New York Times, Jul. 21, 1969  
 Joliet Herald-News (Souvenir edition), Jul. 21, 1969  
 Evening Tribune, Jul. 24, 1969  
 San Diego Union, Jul. 24, 1969  
 New York Times (Special supplement), Aug. 3, 1969  
 Chicago Tribune (A special souvenir supplement and poster), Aug. 13, 1969  
 Los Angeles Times, Aug. 14, 1969  
 Joliet Herald-News, Sept. 19, 1969  
 Ohio State Lantern, Dec. 3, 1969  
 Virginia Gazette, May 18, 1983  
 Daily Press, Oct. 23, 1983  
 Herald News, Apr. 24, 1988  
 Daily Break, Jul. 15, 1989  
 Herald News (Joliet, Ill.), Jul. 20, 1989

DIPLOMAS AND CERTIFICATES

New Lenox Methodist Episcopal Sunday School: Certificate of promotion to the Junior Department, 1928  
 New Lenox Grade School: Certificate of promotion to High School, 1932  
 Joliet Township High School: Diploma, 1936  
 Joliet Junior College: Diploma, 1938  
 AIAA: Structures and Materials Award, 1968  
 University of Illinois: Illini Achievement Award, June 1970  
 UIAA: Dryden Research Lecture (certificate), Jan. 1972  
 State of New Jersey, General Assembly: Resolution, May 4, 1970  
 NASA: A joint resolution of the Congress of the USA; A proclamation by R. Reagan (On 25th Anniversary of NASA), 1983  
 Joliet Junior College: 1986 Distinguished Alumnus

Box 69:

**Archivist's note: The contents of Box 69 were processed later than the rest of the Houbolt Papers. Most of the material is part of or relates to a small 3-dimensional model used by Dr. Houbolt to train astronauts and other personnel.**

Drawings – Possibly Related to Model

Houbolt Papers, Dedication of – Agenda, Arrangements, Maher Remarks, Program, 2003

Notes – Teaching Astronauts with Model

Photographs

Small Parts for Moden (stored in small box, should be kept within Box 69)

Bases/Supports for Model

Map case drawer 2-11:

Lunar Orbit Rendezvous and Interplanetary Missions (see also Box 51)

    Apollo-taxi, Lunar Landing Vehicle (drawing), 1961

    Interplanetary Missions Model (drawing), 1963

Basic Gemini Flight Plan (L1632)--encapsulated original and copy

Comparative Sizes of Manned Projects (L-1630)-encapsulated original and copy

Comparative Sizes of Space Capsules (L-1633)-encapsulated original and copy

Comparison of Lander Sizes (L1629)-encapsulated original and copy

Main Approaches to Lunar Landing (L-1631)-encapsulated original and copy

Earth to Moon Mission Orbit Plan, ink on paper drawing by David Afton Wilment, 1962 (L1744-2) 24" x 20, matted original and glossy photographic copy David Afton Wilment, 1962

Note: Photographic prints of the L1629-33 and 1744-2 drawings are stored with the originals in the Map Case drawer. A Compact Disk containing TIFF file scans of the L1629-33 and 1744-2 drawings can be found in Box 51.