



Smithsonian  
*National Air and Space Museum*

Ralph Hazlett Upson Collection

Kate Igoe

1997



National Air and Space Museum Archives  
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<http://airandspace.si.edu/research/resources/archives/>

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## Collection Overview

|                    |  |
|--------------------|--|
| <b>Repository:</b> | National Air and Space Museum Archives   |
| <b>Title:</b>      | Ralph Hazlett Upson Collection   |
| <b>Identifier:</b> | NASM.XXXX.0177   |
| <b>Date:</b>       | 1911-1968<br>(bulk 1940-1960)  |
| <b>Extent:</b>     | 7 Cubic feet (21 boxes )   |
| <b>Creator:</b>    | Upson, Ralph Hazlett, 1888-1968  |
| <b>Language:</b>   | English .  |
| <b>Summary:</b>    | This collection contains Upson's papers and notebooks. The material consists of notebooks, both general (1911-35) and experimental (1928-68) and reference files on a variety of aeronautical subjects. The collection also contains material from Upson's teaching career, as well as miscellaneous personal documents. |

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## Administrative Information

### Acquisition Information

Francis A. Upson, gift, 1974, XXXX-0177

Curtiss-Wright Corporation

### Processing Information

The National Air and Space Museum (NASM) received these materials in 1974. This was a donation from Frances Upson, the wife whom Ralph Upson met aboard ship on his way to the 1913 Gordon Bennett Race. Original order, when identified, has been maintained.

Upson's book *Free and Captive Balloons* will not be found in this collection, but is contained within the holdings of NASM's Library. The researcher may also wish to consult the NASM Archives' Aerospace Vehicle and Engine Drawings Collection (XXXX-0002), which includes 138 drawings of the Aircraft Development Corporation's MC-2.

### Preferred Citation

Ralph Hazlett Upson Collection, Acc. XXXX-0177, National Air and Space Museum, Smithsonian Institution.

### Restrictions

No restrictions on access.

## Conditions Governing Use

[Permissions Requests](#)

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### Biographical Note

Ralph Hazlett Upson (1888-1968) was an aeronautical engineer, inventor and pilot. After graduation from Stevens Institute of Technology (ME 1910) he rocketed to prominence by winning the International Balloon Race (1913) and American National Balloon Race (1913, 1921). He worked as chief engineer of the aeronautical department of Goodyear Tire and Rubber Co. (1914-1920), during which time he flew the first United States Navy coastal patrol airship on a demonstration flight (1917) and served on the Navy Design Mission to Europe (1918-19). He then moved to the Aircraft Development Corp. (Chief Engineer 1922-27) while serving as chairman of the Lighter-Than-Air (LTA) division of the Aeronautical Safety Code Commission, US Bureau of Standards (1922-24). He went to work for Aeromarine-Klemm Corp. and a number of other companies (1928-42), during which time he designed the first successful metal-clad airship, the ZMC-2 (1929). After a brief tenure at H. J. Heinze Co. (Chief of Aeronautical Engineering (1942-44) he moved into academia at New York University (NYU, Research Specialist and Lecturer 1944-46) and the University of Minnesota (Professor of Aeronautical Engineering 1946-56; Professor Emeritus 1956-1968). Upson then worked for Boeing (Research Specialist 1956-64) and remained an active consultant until his death.

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### Scope and Contents

This collection contains Upson's papers and notebooks. The material consists of notebooks, both general (1911-35) and experimental (1928-68) and reference files on a variety of aeronautical subjects. The collection also contains material from Upson's teaching career, as well as miscellaneous personal documents.

There is approximately seven cubic feet of correspondence, reports, manuscripts, notebooks and various other materials.

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### Arrangement

#### Contents:

- Series 1: Personal and Career
  - Subseries 1: Personal
  - Subseries 2: Career
  - Subseries 3: Education
  - Subseries 4: Authorship
  - Subseries 5: Correspondence
- Series 2: Notepads and Notebooks
  - Subseries 1: Notepads and Appointment books
  - Subseries 2: Notebooks
- Series 3: Subject files
- Series 4: Miscellaneous

## General

An artifact from this collection, the Early Bird plaque of Ralph Upson, was transferred to the Aeronautics Division of the National Air and Space Museum.

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## Names and Subject Terms

This collection is indexed in the online catalog of the Smithsonian Institution under the following terms:

### Subjects:

- Aeronautical engineers
- Aeronautics
- Airships
- Periodicals
- ZMC-2

### Types of Materials:

- Correspondence
- Diaries
- Letters
- Notebooks
- Photographs
- Publications

### Names:

- Aeromarine-Klemm Corp
- Aircraft Development Corporation
- American National Balloon Race
- Goodyear Tire and Rubber Company
- International Balloon Race
- United States. National Bureau of Standards. Aeronautical Safety Code Commission
- Upson, Ralph Hazlett, 1888-1968

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## Container Listing

### Series 1: Personal and Career

The career and personal life of Ralph H. Upson were so related as to form a harmonic whole, difficult to compartmentalize. An interest in education expressed itself in both employment by universities and volunteer work with primary school students. A lifetime's accumulation of knowledge was channeled into the writing of a substantial collection of articles and reports. Only materials related *directly* to Upson's career and personal life are included in this series; more general materials concerning projects Upson may have been involved with can be found in Series 3: Subject Files.

#### 1.1: Personal

|                 |   |
|-----------------|---|
| Box 1, Folder 1 | Personal and Biographical information           |
| Box 1, Folder 2 | Photographs of R.H. Upson                       |
| Box 1, Folder 3 | Personal correspondence                         |
| Box 1, Folder 4 | Early Birds                                     |
| Box 1, Folder 5 | Wingfoot Lighter-Than-Air Society , 1958 - 1965 |
| Box 1, Folder 6 | Wingfoot Lighter-Than-Air Society , 1968        |

#### 1.2: Notebooks

|                 |  |
|-----------------|--|
| Box 6, Folder 5 | Notebooks #0 and #1 , 1909 - 1910, 1926-12 - 1927-09         |
| Box 7, Folder 1 | Notebook #2 , 1927-09 - 1928-10, 1930-09                     |
| Box 7, Folder 2 | Notebook #3 , 1928-08 - 1929-04                              |
| Box 7, Folder 3 | Notebook #4 , 1929-03 - 1930-06                              |
| Box 7, Folder 3 | Notebooks #6 and #7 , 1930-10 - 1931-06, 1933-01 - 1933-04   |
| Box 7, Folder 5 | Notebooks #8 and #9 , 1933-04 - 1933-08, 1933-08 - 1934-03   |
| Box 7, Folder 6 | Notebooks #10 and #11 , 1934-03 - 1934-08, 1934-08 - 1935-06 |
| Box 8, Folder 1 | Notebooks #12 and #13 , 1935-06 - 1936-02, 1936-02 - 1936-11 |

Box 8, Folder 2 Notebooks #14, #15 and #16 , 1936-11 - 1937-04, 1937-04 - 1937-11, 1937-11 - 1938-06

Box 8, Folder 3 Notebooks #17 and #18, 1938-06 - 1939-04, 1939-04 - 1939-12

Box 8, Folder 4 Notebook #19 , 1939-12 - 1940-09

Box 8, Folder 5 Notebook #21 , 1941-09 - 1942-05

Box 8, Folder 6 Notebooks #22, #23, #24a and #24 and #25, 1942-05 - 1942-12, 1942-12 - 1943-07, 1943-04 - undated

Box 9, Folder 1 Notebooks #27, #29, #30 and #31 , 1945-01 - 1945-04, 1945-10 - 1946-01, 1946-01 - 1946-05, 1946-05 - 1946-09

Box 9, Folder 2 Notebooks #32, #33, #34 and #35 , 1947-09 - 1948-03, 1947-03 - 1947-09, 1946-09 - 1947-02, 1948-03 - 1948-08

Box 9, Folder 3 Notebooks #36, #37 and #38 , 1950-06 - 1951-03, 1949-03 - 1950-06, 1948-08 - 1949-03

Box 9, Folder 4 Notebooks #39, #40 and #41 , 1952-05 - 1952-10, 1951-10 - 1952-05, 1951-03 - 1951-10

Box 9, Folder 5 Notebooks #42 and #43 , 1954-09 - 1955-10, 1952-10 - 1954-09

Box 9, Folder 6 Notebooks #44, #45, #46 and #47, 1956-12-26 - 1957-03-19, 1956-10-01 - 1956-12-26, 1956-07-16 - 1956-09-28, 1955-10 - undated

Box 9, Folder 7 Notebooks #48, #49, #50 and #51 , 1957-06-11 - 1957-10-29, 1957-10-29 - 1958-01-23, 1957-03-19 - 1957-06-11, 1958-01-23 - 1958-03-15

Box 10, Folder 1 Notebooks #52 and #53 , 1958-06-27 - 1959-06-17, 1958-03-16 - 1958-06-27

Box 10, Folder 2 Notebooks #54 and #55 , 1960-07-08 - 1961-08-04, 1959-06-18 - 1960-06-07

Box 10, Folder 3 Notebooks #56 and #57 , 1962-11-06 - 1963-11-07, 1961-08-14 - 1962-11-06

Box 10, Folder 4 Notebook #58 , 1963-11-07 - 1966-06-20

Box 10, Folder 5 Notebook #59 , 1966-06-28 - 1968-08-01

### 1.3: Career

Box 1, Folder 7 Patents and Patentable Ideas of R.H. Upson

Box 1, Folder 8 The Boeing Company

Box 1, Folder 9 General Mills, Inc.: correspondence

Box 1, Folder 10 General Mills, Inc.: reports

Box 1, Folder 11 General Mills, Inc.: reports

Box 2, Folder 1 Hofgren, Wegner, Allen, Stellman and McCord

Box 2, Folder 2 Honeywell

Box 2, Folder 3 National Center for Atmospheric Research: Consulting

Box 2, Folder 4 University Corporation for Atmospheric Research

#### 1.4: Education

Box 2, Folder 5 Primary School Science

Box 2, Folder 6 Second Grade Science

Box 2, Folder 7 Fifth Grade Science

Box 2, Folder 8 Sixth Grade Science

Box 2, Folder 9 Eighth and Ninth Grade Science

Box 2, Folder 10 Aeronautical Engineering Class Notes

Box 2, Folder 11 Astronautics Casebook: Professor R. Street

Box 2, Folder 12 Geometric Calculation

#### 1.5: Authorship

Box 2, Folder 13; "Principles of Aerodynamic Design" by R.H. Upson , 1951-11  
Box 2, Folder 13

Box 3, Folder 1; "On the Prediction of the Aerodynamic Drag of Missiles" by Marvin L. Luther  
and Ralph H. Upson , 1952-11



|                                     |   |
|-------------------------------------|---|
| Box 3, Folder 1                     |   |
| Box 3, Folder 2;<br>Box 3, Folder 2 | "Simple Approximation of Mis sile Drag" by R.H. Upson , 1959-12           |
| Box 3, Folder 3;<br>Box 3, Folder 3 | Scientific Ballooning Handbook edited by R.H. Upson - materials , 1966-05 |
| Box 3, Folder 4                     | "Handbook of General and Aerodynamic Data" , undated                      |
| Box 3, Folder 5                     | Drafts of textbook materials by R.H. Upson                                |
| Box 3, Folder 6                     | Articles and letters to editors by R.H. Upson                             |
| Box 3, Folder 7                     | Material for articles by R.H. Upson for aviation                          |
| Box 3, Folder 8                     | Drafts of articles by R.H. Upson  |
| Box 3, Folder 9                     | Presentations by R.H. Upson   |
| Box 3, Folder 10                    | Reports by R.H. Upson , 1938  |
| Box 3, Folder 11                    | Reports by R.H. Upson , 1939  |
| Box 3, Folder 12                    | Reports by R.H. Upson , 1944 - 1953                                       |
| Box 4, Folder 1                     | Reports by R.H. Upson , 1955 - 1968                                       |
| Box 4, Folder 2                     | Draft reports by R.H. Upson   |

## 1.6: Correspondence

|                 |                              |
|-----------------|------------------------------|
| Box 4, Folder 3 | Correspondence , 1946 - 1957 |
| Box 4, Folder 4 | Correspondence , 1958        |
| Box 4, Folder 5 | Correspondence , 1959        |
| Box 4, Folder 6 | Correspondence , 1960 - 1961 |
| Box 4, Folder 7 | Correspondence , 1962 - 1963 |
| Box 4, Folder 8 | Correspondence , 1964 - 1965 |

Box 4, Folder 9            Correspondence , 1966

Box 4, Folder 10        Correspondence , 1967 - 1968, undated

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## Series 2: Notepads and Notebooks

As an inventor and engineer, Upson had a great stake in recording and preserving the origins of his ideas and their development. He kept meticulous notes for nearly his entire adult life. The first subseries found here includes notepads and appointment books, which consist mainly of personal notes and reminders. The notebooks, which make up the second subseries below, contain sketches of possible inventions, equations, calculations and notes.

Notebooks # 20, #26, and #28 are missing.

### 2.1: Notepads and Appointment books

|       |  |
|-------|--|
| Box 5 | (#1): Notepad, November 1, 1911 to May 1, 1912       |
| Box 5 | (#2): Notepad, May 2 to July 10, 1912                |
| Box 5 | (#3): Notepad, July 11 to October 1, 1912            |
| Box 5 | (#4): Notepad, October 2, 1912 to May 5, 1913        |
| Box 5 | (#5): Notepad, May 6 to August 31, 1913              |
| Box 5 | (#6): Notepad, September 1 to October 11, 1913       |
| Box 5 | (#7): Notepad, October 12, 1913 to February 10, 1914 |
| Box 5 | (#8): Notepad, February 11 to July 31, 1914          |
| Box 5 | (#9): Notepad, August 1, 1914 to January 31, 1915    |
| Box 5 | (#10): Notepad, January 31 to July 20, 1915          |
| Box 5 | Notepad, Second Half of 1915                         |
| Box 5 | (#11): Notepad, January 1, 1914 to May 9, 1916       |
| Box 5 | (#13): Notepad, June 1916 to January 12, 1917        |
| Box 5 | Notepad, January to September 1917                   |
| Box 5 | Notepad, October or November 1917 to November 1918   |
| Box 5 | Notepad, 1921  |
| Box 5 | G.B. Race , 1921                                     |

|       |   |
|-------|---|
| Box 5 | Detroit, Winter, 1931-1922                    |
| Box 5 | Detroit, Spring, 1922                         |
| Box 5 | Detroit, Summer, 1922                         |
| Box 5 | Detroit, Autumn, 1922                         |
| Box 5 | National Races, 1923                          |
| Box 5 | Notepad, January to November 1923             |
| Box 5 | Notepad, June to August 1924                  |
| Box 5 | Notepad, November 1923 to May 1924            |
| Box 5 | Notepad, May to November 1925                 |
| Box 5 | Notepad, October 1925 to May 1926             |
| Box 5 | Notepad, August 1926 to February 1927         |
| Box 5 | Notepad, February to July 1927                |
| Box 5 | Notepad, July to November 1927                |
| Box 5 | Notepad, November 1927 to July 1928           |
| Box 5 | Notepad, July 1928 to May 1929                |
| Box 5 | Notepad, [?] to December 1, 1930              |
| Box 5 | Notepad, June 20, 1932 to March 4, 1933       |
| Box 5 | Notepad, December 1, 1930 to December 1, 1931 |
| Box 5 | Notepad, December 1, 1931 to June 20, 1932    |
| Box 5 | Notepad, March 4, 1933 to [?]                 |
| Box 5 | Notepad, May 1934 to January 1935             |

|                 |   |
|-----------------|---|
|                 | [noted inside, "previous book lost"]  |
| Box 5           | Notepad, January 1935 to June 1935  |
| Box 5           | Notepad, June 1935 to February 1936   |
| Box 5           | Notepad, March to September 1936  |
| Box 5           | Notepad, September 1936 to April 1937   |
| Box 5           | Notepad, April to November 1937   |
| Box 5           | Notepad, November 1937 to September 1938  |
| Box 5           | Notepad, September 1938 to April 1939   |
| Box 5           | Notepad, May to November 1939   |
| Box 5           | Notepad, December 1939 to April 1941  |
| Box 5           | Notepad, March 1941 to February 1942  |
| Box 5           | Notepad, February to August 1, 1942   |
| Box 5           | Notepad, August 1, 1942 to June 1, 1943   |
| Box 5           | Notepad, June 1, 1943 to March 10, 1944   |
| Box 5           | Notepad, April 17, 1944 to February 1945  |
| Box 6, Folder 1 | Notepads, March 1945 to February 1946, December 1948 to June 1951, June 1951 to January 1955, February 1946 to August 1947, August 1947 to December 1948, undated |
| Box 6, Folder 2 | Oversized Notepads: National Balloon Race[s] 1919, 1920, 1921, Gordon Bennett 1920 and May 1929 to [?]  |
| Box 6, Folder 3 | Appointment Calendar , 1927   |
| Box 6, Folder 4 | Appointment Calendar , 1928   |

## 2.2: Notebooks

Note: Notebooks #20, #26 and #28 are missing.

Note: Because of its slightly greater size, Notebook #5 (June 1930 to December 1931) is to be found in Box 21, Folder 1.

|                 |   |
|-----------------|---|
| Box 6, Folder 5 | Notebooks #0 (1909 to 1910) and #1 (December 1926 to September 1927)  |
| Box 7, Folder 1 | Notebook #2 (September 1927 to October 1928 and September 1930)   |
| Box 7, Folder 2 | Notebook #3 (August 1928 to April 1929)   |
| Box 7, Folder 3 | Notebook #4 (March 1929 to June 1930)   |
| Box 7, Folder 4 | Notebooks #6 (October 1930 to June 1931) and #7 (January to April 1933)   |
| Box 7, Folder 5 | Notebooks #8 (April to August 1933) and #9 (August 1933 to March 1934)  |
| Box 7, Folder 6 | Notebooks #10 (March to August 1934) and #11 (August 1934 to June 1935)   |
| Box 8, Folder 1 | Notebooks #12 (June 1935 to February 1936) and #13 (February to November 1936)  |
| Box 8, Folder 2 | Notebooks #14 (November 1936 to April 1937), #15 (April to November 1937) and #16 (November 1937 to June 1938)                                    |
| Box 8, Folder 3 | Notebooks #17 (June 1938 to April 1939) and #18 (April to December 1939)  |
| Box 8, Folder 4 | Notebook #19 (December 1939 to September 1940)  |
| Box 8, Folder 5 | Notebook #21 (September 1941 to May 1942)   |
| Box 8, Folder 6 | Notebooks #22 (May to December 1942), #23 (December 1942 to July 1943), #24a and #24 (April 1943 to [?]) and #25                                  |
| Box 9, Folder 1 | Notebooks #27 (January to April 1945), #29 (October 1945 to January 1946), #30 (January to May 1946) and #31 (May to September 1946)              |
| Box 9, Folder 2 | Notebooks #32 (September 1946 to February 1947), #33 (March to September 1947), #34 (September 1947 to March 1948) and #35 (March to August 1948) |
| Box 9, Folder 3 | Notebooks #36 (August 1948 to March 1949), #37 (March 1949 to June 1950) and #38 (June 1950 to March 1951)  |
| Box 9, Folder 4 | Notebooks #39 (March to October 1951), #40 (October 1951 to May 1952) and #41 (May to October 1952)   |

- Box 9, Folder 5      Notebooks #42 (October 1952 to September 1954) and #43 (September 1954 to October 1955)
- Box 9, Folder 6      Notebooks #44 (October 1955 to [?]), #45 (July 16 to September 28, 1956), #46 (October 1 to December 26, 1956) and #47 (December 26, 1956 to March 19, 1957)
- Box 9, Folder 7      Notebooks #48 (March 19 to June 11, 1957), #49 (June 11 to October 29, 1957), #50 (October 29, 1957 to January 23, 1958) and #51 (January 23 to March 15, 1958)
- Box 10, Folder 1     Notebooks #52 (March 16 to June 27, 1958) and #53 (June 27, 1958 to June 17, 1959)
- Box 10, Folder 2     Notebooks #54 (June 18, 1959 to July 7, 1960) and #55 (July 8, 1960 to August 4, 1961)
- Box 10, Folder 3     Notebooks #56 (August 14, 1961 to November 6, 1962) and #57 (November 6, 1962 to November 7, 1963)
- Box 10, Folder 4     Notebook #58 (November 7, 1963 to June 20, 1966)
- Box 10, Folder 5     Notebook #59 (June 28, 1966 to August 1, 1968)

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## Series 3: Subject files

This series is composed of files maintained by Upson for his own research and the development of projects pursued by him. The researcher especially interested in the inventions of Ralph Upson may wish to consult the files below on metalclad airships, balloons, flight instrumentation and re-entry and recovery.

Where files were found together and labelled by Upson, their integrity has been preserved.

|                  |  |
|------------------|--|
| Box 10, Folder 6 | Aircraft Design  |
| Box 10, Folder 7 | Aircraft Design: Shell Structures  |
| Box 11, Folder 1 | Aircraft Design: Wing Geometry   |
| Box 11, Folder 2 | Airfoils   |
| Box 11, Folder 3 | Airship Disasters  |
| Box 11, Folder 4 | Airships: Design   |
| Box 11, Folder 5 | Airships, Metalclad: Technical Reports   |
| Box 11, Folder 6 | Airships, Metalclad: Technical Reports   |
| Box 11, Folder 7 | Airships, Metalclad: Technical Reports   |
| Box 11, Folder 8 | Airships, Metalclad: ZMC-2 and Metalclad Rigid Airship Development                 |
| Box 12, Folder 1 | Airships, Metalclad: ZMC-2 and Metalclad Rigid Airship Development: Articles       |
| Box 12, Folder 2 | Airships, Metalclad: ZMC-2 and Metalclad Rigid Airship Development: Correspondence |
| Bin 12, Folder 3 | Airships, Metalclad: ZMC-2 Photographs   |
| Box 12, Folder 4 | Airships: Miscellaneous  |
| Box 12, Folder 5 | Airships: Non-rigid  |
| Box 12, Folder 6 | Alternative Energy Sources   |
| Box 12, Folder 7 | Astronomy  |
| Box 12, Folder 8 | Astronomy: Solar Eclipse June 30, 1954   |



|                   |  |
|-------------------|--|
| Box 12, Folder 9  | Atmosphere   |
| Box 12, Folder 10 | Atmosphere: Reports                                  |
| Box 12, Folder 11 | Aviation Accidents and Flight Safety                 |
| Box 12, Folder 12 | Balloons: Aerodynamics                               |
| Box 12, Folder 13 | Balloons: High Altitude Performance                  |
| Box 13, Folder 1  | Balloon Logging Systems Report 1964                  |
| Box 13, Folder 2  | Balloons: Manuscripts and Publications               |
| Box 13, Folder 3  | Balloons: Miscellaneous                              |
| Bin 13, Folder 4  | Balloons: Neoprene Balloons and Balloon Aerodynamics |
| Box 13, Folder 5  | Balloons: Preliminary Design                         |
| Box 13, Folder 6  | Balloons: Shapes and Stresses                        |
| Box 13, Folder 7  | Balloons: test samples and data materials            |
| Box 13, Folder 8  | Balloons: Wind Response                              |
| Box 13, Folder 9  | Bending of Structural Elements                       |
| Box 13, Folder 10 | Bibliographies                                       |
| Box 14, Folder 1  | Boeing Aircraft                                      |
| Box 14, Folder 2  | Boeing Scientific Research Laboratories: Reports     |
| Box 14, Folder 3  | Boeing Scientific Research Laboratories: Reports     |
| Box 14, Folder 4  | Boeing Scientific Research Laboratories: Reports     |
| Box 14, Folder 5  | Compressibility                                      |
| Box 14, Folder 6  | De-Icing   |
| Box 14, Folder 7  | Flatt, Joseph: Correspondence and Patents            |

|                   |   |
|-------------------|---|
| Box 14, Folder 8  | Flight Control  |
| Box 14, Folder 9  | Flight Control  |
| Box 14, Folder 10 | Flight Control: The Upson Air_zon   |
| Box 15, Folder 1  | Flight Instrumentation, Angle of Attack and Path Control  |
| Box 15, Folder 2  | Flight Instrumentation, Angle of Attack: Articles   |
| Box 15, Folder 3  | Flight Instrumentation, Angle of Attack: Correspondence   |
| Box 15, Folder 4  | Flight Instrumentation, Angle of Attack: Giannini Controls Corporation                                  |
| Box 15, Folder 5  | Flight Instrumentation, Angle of Attack: Graphs and Charts  |
| Box 15, Folder 6  | Flight Instrumentation, Angle of Attack: Jet Aircraft   |
| Box 15, Folder 7  | Flight Instrumentation, Angle of Attack: Miscellaneous  |
| Box 15, Folder 8  | Flight Instrumentation, Angle of Attack: Related Patents  |
| Box 15, Folder 9  | Flight Instrumentation, Angle of Attack: Reports  |
| Box 15, Folder 10 | Flight Instrumentation, Angle of Attack: Safe Flight Instrument Corporation                             |
| Box 15, Folder 11 | Flight Instrumentation, Angle of Attack: Safe Flight Instrument Corporation                             |
| Box 15, Folder 12 | Flight Instrumentation: Reports   |
| Box 16, Folder 1  | Flight Instrumentation: Reports   |
| Box 16, Folder 2  | Flight Instrumentation: Stall Warning Indicator   |
| Box 16, Folder 3  | Flight Instrumentation, Stall Warning Indicator: General Correspondence                                 |
| Box 16, Folder 4  | Flight Instrumentation, Stall Warning Systems: Articles and Miscellaneous                               |
| Box 16, Folder 5  | Flight Instrumentation, Stall Warning Systems: Correspondence   |
| Box 16, Folder 6  | Flight Instrumentation, Stall Warning Systems: Correspondence with the Civil Aeronautics Administration |

|                                       |  |
|---------------------------------------|--|
| Box 16, Folder 7                      | Flight Instrumentation, Stall Warning Systems: Related Patents |
| Box 16, Folder 8                      | Gas and Leakage  |
| Box 16, Folder 9                      | International Air Safety Seminar: Reports                      |
| Box 17, Folder 1                      | Mathematics  |
| Box 17, Folder 2                      | Mathematics  |
| Box 17, Folder 3                      | Meteorology  |
| Box 17, Folder 4                      | Missile Calculations   |
| Box 17, Folder 5                      | Missiles   |
| Box 17, Folder 6;<br>Box 17, Folder 6 | NACA Reports , 1945 - 1958                                     |
| Box 17, Folder 7                      | NASA Reports , 1958 - 1959                                     |
| Box 17, Folder 8                      | NASA Reports , 1960  |
| Box 17, Folder 9                      | Oceanic Research   |
| Box 17, Folder 10                     | Orbits, Circular   |
| Box 18, Folder 1                      | Orbits, Elliptical: Correspondence and Calculations            |
| Box 18, Folder 2                      | Orbits, Elliptical: Raw Data                                   |
| Box 18, Folder 3                      | Orbits, Elliptical: Reports                                    |
| Box 18, Folder 4                      | Parachute, Ballute   |
| Box 18, Folder 5                      | Parachute, Controllable-Glide                                  |
| Box 18, Folder 6                      | Parachutes   |
| Box 18, Folder 7                      | Phugoid Curves   |
| Box 18, Folder 8                      | Propulsion   |

|                   |   |
|-------------------|---|
| Box 18, Folder 9  | Recoverable Launch Vehicles   |
| Box 18, Folder 10 | Re-Entry and Recovery: Analysis and Research                                    |
| Box 19, Folder 1  | Re-Entry and Recovery: Articles   |
| Box 19, Folder 2  | Re-Entry and Recovery: References   |
| Box 19, Folder 3  | Re-Entry and Recovery: Reports , 1959 - 1961-08                                 |
| Box 19, Folder 4  | Re-Entry and Recovery: Reports , 1961-10  |
| Box 19, Folder 5  | Re-Entry and Recovery: Reports , 1961-12 - 1965                                 |
| Box 19, Folder 6  | Regulatory Agencies   |
| Box 19, Folder 7  | G.T. Schjeldahl Company   |
| Box 19, Folder 8  | Space Exploration   |
| Box 19, Folder 9  | Space Exploration: The Moon   |
| Box 19, Folder 10 | Space Survey , 1961   |
| Box 20, Folder 1  | Supersonic Transport  |
| Box 20, Folder 2  | Turbulence  |
| Box 20, Folder 3  | Unmanned Craft  |
| Box 20, Folder 4  | War Production Board: Wind Turbine Project Report Chapters 1 to 7               |
| Box 20, Folder 5  | War Production Board: Wind Turbine Project Report Chapters 8 through Appendices |
| Box 20, Folder 6  | Miscellaneous Articles  |
| Box 20, Folder 7  | Miscellaneous Design Calculations   |
| Box 20, Folder 8  | Miscellaneous Reports   |
| Box 20, Folder 9  | Miscellaneous   |

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## Series 4: Miscellaneous

Box 21, Folder 1          Notebook #5 , 1930-06 - 1931-12

Box 21, Folder 2          Drawing of Class ZMC Airship, General Arrangement (29½ by 72") Flight  
Instrumentation, Angle of Attack: Graph "Report on The Contraction of Satellite  
Orbits Under the Influence of Drag" by King-Hele, Cook and Walker, 1959-11

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