Guide to the
Alvin Seiff Papers, 1955-2000
PP05.22-AS

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NASA Ames Research Center

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Descriptive Summary

Title:
Alvin Seiff Papers, 1955-2000

Collection Number:
PP05.22-AS

Creator:
Seiff, Alvin

Dates:
Inclusive: 1955-2000
Bulk: 1966-1999

Extent:
Volume: 3.15 cubic feet

Repository:
NASA Ames History Office
Moffett Field, California 94035

Abstract:
The Alvin Seiff Papers include instrument descriptions, design reviews, testing reports, progress reports, meeting notes, project proposals, correspondence, publications, photographs, and overheads documenting Seiff's contributions to atmospheric structure experiments in Viking, Cassini-Huygens, Galileo, and other projects during his career as a scientist and research associate at the NASA Ames Research Center.

Administrative Information

Access:
Collection is open for research.

Publication Rights:
Copyright does not apply to United States government records. For non-governmental material, researcher must contact the original creator.

Preferred Citation:
[Identification of item], Alvin Seiff Papers, [Container number]: [Folder number], NASA Ames History Office, NASA Ames Research Center

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Donated by Charles Sobeck on October 24, 2005.

Biographical Note

Alvin Seiff (called "Al" by his colleagues) made important contributions to the space exploration community during his career at NASA's Ames Research Center. He is thought by many to be the chief creator of the idea of employing entry probes to determine a planet's atmospheric structure.

Seiff was born in Kansas City, Missouri. When he was twenty years old, he obtained a Bachelor of Science degree from the University of Missouri in chemical engineering. Soon after, Seiff joined the Manhattan Project and worked on resolving the uranium separation problem. Before joining the Ames Research Center in 1948, Seiff lectured at the University of Tennessee teaching physics.

In his career at Ames Research Center, Seiff undertook many roles and tasks, impressing his colleagues with his knowledge, skills, and leadership ability in each position he held. For his first ten years (1948-1957) at NASA (at that time it was called NACA, the National Advisory Committee for Aeronautics), Seiff was as a research scientist. From 1952 until 1963 Seiff also became the Chief of the Supersonic Free Flight Research Branch at Ames. Subsequently, he became the Chief of the Vehicle Environment Division from 1963 until 1972. During that period, Ames became one of the chief centers for reentry studies. For instance, it was Seiff's team that planned out and conducted the Planetary Atmosphere Experiments Test (PAET) in 1971 that proved reliable data (such as chemical composition and changes in density, temperature, and pressure) could be retrieved from probes entering a planetary atmosphere. The experience and knowledge NASA gained from the PAET Project was used to create the foundation upon which all subsequent entry and descent experiments were based, including the Pioneer Venus Mission, the Viking Mission to Mars, the Galileo Mission to Jupiter, the Cassini-Huygens Atmospheric Entry Probe into Titan, and the Mars Pathfinder. For a majority of these missions (the Pioneer Probe Mission to Venus, the Viking Mission to Mars, the Galileo Probe Mission to Jupiter, and the Mars Pathfinder) Seiff was the Principal Investigator for the Atmospheric Structure Instruments. For the Cassini-Huygens Probe, Seiff, in conjunction with several European Space Agency colleagues, was a Co-Investigator for the Huygens Atmospheric Structure Instrument.

In 1972, Seiff became a Senior Staff Scientist in the Space Science Division until he retired 1986. However, even after retirement, Seiff remained active in space exploration studies at NASA Ames as a research associate. During the Mars Pathfinder Mission development, he was the Chairman of the Atmospheric Science Advisory Team. Once Pathfinder was launched, Seiff joined the team of scientists in charge of the Atmospheric Structure Investigation/Meteorology Package Experiment on the probe. During the Cassini-Huygens Project development, he became very active in coordinating with European Space Agency scientists as a Co-Investigator for the Huygens Probe Atmospheric Structure Instrument. He did not live to see the spacecraft arrive at Titan in 2005. After a three-month struggle with brain cancer, Seiff passed away on December 16, 2000.

Sources Consulted

Magalhães, Julio A. & Young, Richard E. (2001). In Memoriam. Alvin Seiff, 1922-2000. *Icarus, 152*, 1-3.

Scope and Content

The Alvin Seiff Papers (3.15 cubic feet) include technical documents, reports, conference and meeting documentation, publications, overheads, correspondence, and photographs detailing Seiff's contributions to the Viking, Cassini-Huygens, and Galileo projects. Also included are general correspondence (such as future mission announcements and a book review) and brief records of his involvement as an advisor to the Committee on Uses of Shuttle External Tanks.

Viking Project

The first series, the Viking Project, contains Seiff's documentation of various pressure and temperature sensor tests during the development phase of the Viking Project. It contains documents, test reports, mechanical descriptions and plans, and photographs.

The primary objectives of the Viking Project were to photograph the surface of Mars, determine the structure and components of the Martian atmosphere and surface, and look for any signs of life. The mission consisted of two spacecraft, each consisting of an orbiter and a lander. Viking 1 left Earth on August 20, 1975 and arrived at Mars on June 19, 1976. The spacecraft spent four weeks taking images of the surface in order to find appropriate landing sites for both landers. On July 20, 1976 the Viking 1 Lander separated from the orbiter and touched down at Chryse Planitia (a smooth rounded basin, probably an ancient impact site, in the northern equatorial area of Mars). The second spacecraft, Viking 2, was launched on September 9, 1975 and arrived at Mars on August 7, 1976. A month later, the Viking 2 Lander touched down at Utopia Planitia (a part of the vast plains that covers most of the northern Martian hemisphere) on September 3, 1976. After several years of operation (which included conducting soil and atmosphere experiments and sending back a combined total of over 1400 pictures) both landers lost power. First, the Viking 2 Lander ended communications on April 11, 1980, and later the Viking 1 Lander stopped functioning on November 13, 1982.

Seiff was the Principal Investigator on the Atmospheric Structure Instrument. The instrument contained sensors such as accelerometers, radar altimeters, thermometers, and pressure sensors. The results, taken from below an altitude of 132 km, provided Seiff and his colleagues with information detailing pressure, temperature, wind speed, lander acceleration, and other important information from varying altitude levels. From this data, the team was able to determine how the Martian atmosphere is structured.

Cassini-Huygens Project

The second series, the Cassini-Huygens Project, details Seiff's involvement in the joint NASA-ESA (European Space Agency)-ASI (Italian Space Agency) mission to Saturn and Titan (one of Saturn's moons). It contains records of Seiff's correspondence with his ESA

counterparts, tests of instruments, instrument descriptions, meeting reports, studies, proposals, and publications.

The primary objective of the mission was to study the Saturn planetary system and Titan itself. Cassini-Huygens launched on October 17, 1997. Its trajectory took it past Venus (twice), back to Earth, and on to Jupiter where it was able to briefly join the Galileo spacecraft (then still in orbit) on December 30, 2000. On June 11th, 2004, Cassini entered the Saturn system. In December of that year, the Huygens Probe was detached and, after coasting towards the planet for twenty days, entered Titan's atmosphere on January 14, 2005. The probe collected over two and a half hours of data about the atmosphere while descending and approximately one and a half hours of data on the surface. As of April 2007, the Cassini spacecraft itself is still operational and continues to send back readings and photographs from the Saturn system.

Seiff's contributions to the Cassini-Huygens Project dealt primarily with the Huygens Atmospheric Structure Instrument (HASI). The purpose for this instrument was to determine the physical and electrical structure of Titan's atmosphere by using accelerometers, temperature and pressure sensors, and the Permittivity and Electromagnetic Wave Analyzer (which measures the conductivity of the atmosphere). As a Co-Investigator for the HASI, Seiff was able to use his knowledge and years of experience with entry probes to help his ESA counterparts in developing a working ASI for the Huygens Probe.

Galileo Project

The third series, the Galileo Project, contains documentation that covers only a small part of Seiff's involvement with the project including a draft of a Galileo Mission history, a final ASI technical report, and results of the retrieved ASI data.

The primary objective of the project was to determine atmospheric structure of Jupiter and conduct studies of the Jupiter system. On October 18, 1989, the Galileo spacecraft left Earth in the cargo bay of the Atlantis Space Shuttle. Soon after, the shuttle crewmembers sent Galileo on its way. The spacecraft did not have enough power to make it to Jupiter on its own. Instead, NASA planned a trajectory that would slingshot Galileo past Venus and twice past Earth to gain enough momentum to reach Jupiter. On the way there, the spacecraft was able to take our first images of asteroids and even was able to capture the first pictures of the comet Shoemaker-Levy 9 smashing into Jupiter. Before the spacecraft arrived at Jupiter, on July 13, 1995, the probe was detached and sent ahead on a trajectory to enter Jupiter's atmosphere. The probe arrived at Jupiter on December 7, 1995. The spacecraft itself continued on to achieve its two-year mission observing the Jupiter planetary system. Later, due to its success, its mission was extended and lasted until September 21, 2003. At this time, the decision was made to destroy the probe by sending it into Jupiter's atmosphere. In its nine years spent at Jupiter, Galileo had returned over 30 gigabytes of data, including 14,000 pictures.

As before, Seiff was the Principle Investigator for the Atmospheric Structure Instrument on the probe. The probe's purpose was to determine the temperature, pressure, and density of the atmosphere and how they vary as it descended. The probe was able to record information from an attitude of 20 km above the atmosphere to –140 km. The results provided NASA with enough information to keep analysts busy for years to come.

Proposed Space Shuttle External Tank Usage

The fourth series, Proposed Space Shuttle External Tank Usage, contains a few documents Seiff maintained from his time as an advisor to the Committee on Uses of Shuttle External Tanks. The committee's job was to figure out if there was a way to turn the external tanks of the space shuttles into part of a space station as a storage, manufacturing, or other type of unit.

General Correspondence

The fifth series, General Correspondence, contains correspondence from various times during Seiff's career, future mission notifications, and an evaluation of chapter 3 of the book *Atmosphere of Freedom* by Glenn Bugos.

Sources Consulted

National Aeronautics and Space Administration (2003). *Galileo Mission to Jupiter*. Retrieved March 21, 2007 from http://www2.jpl.nasa.gov/galileo

National Aeronautics and Space Administration (2005). *Spacecraft: Huygens Probe Instruments.* Retrieved March 30, 2007 from http://saturn.jpl.nasa.gov/spacecraft/instruments-huygens.cfm

National Aeronautics and Space Administration (2006). *Galileo Probe.* Retrieved March 21, 2007 from http://nssdc.gsfc.nasa.gov/database/MasterCatalog?sc=1989-084E

National Aeronautics and Space Administration (2006). *Viking Mission to Mars.* Retrieved March 21, 2007, from http://www.nasa.gov/mission_pages/viking/index.html

National Aeronautics and Space Administration (2007). *Cassini-Huygens Mission to Saturn.* Retrieved March 23, 2007 from http://www.nasa.gov/mission_pages/cassini/main/index.html

Series Descriptions

Series I: Viking Project, 1966-1976, 31 folders.

This series is arranged into two subseries documenting Seiff's assignment as Principal Investigator for the Atmospheric Structure Instrument onboard the Viking Landers.

The first subseries, Pressure Sensors, contains records regarding the pressure sensors used in the Atmospheric Structure Instrument. These records include potential locations of where the sensor could be attached to the lander, flight acceptance tests, science tests, calibration tests, mechanism descriptions and specifications, and sensor evaluations.

The second subseries, Temperature Sensors, focuses upon the temperature sensors used in the Atmospheric Structure Instrument. Included in the subseries are documents and photographs regarding experiment tests, design reviews, sensor development, and thermal performance analysis, as well as monthly progress reports. On a side note, also included in this subseries are documents from the Planetary Atmosphere Experiments Test (PAET) Project. These particular records Seiff included in his files deal only with the temperature sensor onboard the PAET Probe. As Seiff may have included these PAET records due to their similarity with the Viking temperature sensor documents, it was decided to leave this folder in its original order instead of separating it into a different series.

Series II: Cassini-Huygens Project, 1974-2000, 51 folders.

This series is arranged into five subseries documenting Seiff's involvement as Co-Investigator for the Atmospheric Structure Instrument onboard the Cassini-Huygens Probe.

The first subseries, Probe Scientific Instruments, contains documents referring to the scientific instruments onboard the Huygens Probe, primarily the Atmospheric Structure Instrument, but also includes a few documents on the Surface Science Package and the Descent Imager/Spectral Radiometer Experiments. Included in the subseries are records of sensor deployments, group science meetings, proposals, sensor (including temperature, pressure, and accelerometer) tests, technical inputs, correspondence with Seiff's Co-Investigator's, and instrument descriptions.

The second subseries, Probe Aerodynamics, focuses upon the planned trajectory of the Huygens Probe as it makes its descent into Titan’s atmosphere. Included in the subseries are model atmospheres and trajectories, aerothermodynamics, wind tunnel tests, and target area on Titan.

The third subseries, Probe Impact Studies, contains two folders describing impact studies. The first folder focuses on the Huygens Probe impact dynamics. The second folder discusses various impact experiments conducted featuring different terrain types such as ocean and soil.

The fourth subseries, Orbiter Experiments, focuses upon documents referring to the Cassini orbiter itself. Included in the subseries are descriptions of possible experiments and experiment proposals for the orbiter.

The fifth subseries, Overview, contains documents that focus primarily on the mission as a whole rather than specific experiments. Included in the subseries are records such as possible Titan atmospheres, Cassini-Huygens mission descriptions, and general Huygens Probe aerothermodynamics.

Series III: Galileo Project, 1982-1999, 5 folders.

This series contains records documenting a small portion of Seiff's contributions to the Galileo Mission as Principal Investigator for the Atmospheric Structure Instrument onboard the Galileo Probe. Contained in the series are final technical reports for the project, a draft of chapters two through five of the book *History of Project Galileo* by Theodore C. Clarke, and a paper (including related reviews and publishing notifications) discussing Jupiter's atmospheric flow.

Series IV: Proposed Space Shuttle External Tank Usage, 1982-1983, 3 folders.

This series contains documents describing Seiff's role as an advisor for the Committee on Uses of Shuttle External Tanks. The series focuses upon the general proposed plan for using the Space Shuttles' external tank as a potential part of a space station.

Series V: General Correspondence, 1955-1999, 3 folders.

This series contains general correspondence between Seiff, his colleagues, and others over an extended period of time. Included in the series are correspondences covering many projects, descriptions of future planned missions to Pluto and Neptune, and Seiff's evaluation of chapter 3 of the book *Atmosphere of Freedom* by Glenn Bugos.

Indexing Terms

The following terms may be used to index this collection.

Corporate Name
Ames Research Center
European Space Agency

Geographic Name
Moffett Field (Calif.)

Personal Name
Seiff, Alvin

Subjects
Atmospheric entry
Planetary science: atmospheres
Atmospheric Structure Instrument
Pressure sensors
Temperature sensors
Accelerometers
Mars atmosphere
Viking Mars Program (U.S.)
Viking lander 1
Viking lander 2
Titan atmosphere
Cassini Mission
Huygens probe
Jupiter atmosphere
Galileo project
Galileo probe
Space station modules

Separated Material

One folder has been removed from the collection and placed into the Archives Reference Collection (AFS1070.8A): Aeroassist Flight Experiment Science Review. Monterey, CA, May 16-20, 1988. 1985-1990.

Related Collections

None

Container List

Series I: Viking Project

1. Pressure Sensors

Box	Folder	Folder Title
1	1	Viking Project Pre-Test Report for Investigation to Determine Location of Terminal Descent/Landed Pressure Sensor Orifice, 1971
	2	Conrac and Tavis Base Pressure Sensors, Flight Acceptance Test and Calibration Data, 1973-1975 (Folder 1 of 2)
	3	Conrac and Tavis Base Pressure Sensors, Flight Acceptance Test and Calibration Data, 1973-1975 (Folder 2 of 2)
	4	Tavis 0-25 millibars Sensors Test Data, Science Testing, 1973-1974 (Folder 1 of 2)
	5	Tavis 0-25 millibars Sensors Test Data, Science Testing, 1973-1974 (Folder 2 of 2)
	6	Flight Acceptance Test and Calibration Data. Tavis Pressure Sensors for F.C. A and B and Flight Spare. Tavis' Explanation of Mechanisms. Letters from Specification Sheets, 1974-1976 (Folder 1 of 2)
	7	Flight Acceptance Test and Calibration Data. Tavis Pressure Sensors for F.C. A and B and Flight Spare. Tavis' Explanation of Mechanisms. Letters from Specification Sheets, 1974-1976 (Folder 2 of 2)
	8	Viking Entry Science Team Tests of the Parachute Phase Pressure Sensor 0 to 25 millibars Range, 1974
	9	Engineering Evaluation Test Report for a 0.1 Absolute Pressure per Square Inch Tavis P-4A Pressure Transducer, 1973
	10	Vibrating Diaphragm Pressure Transducer, 1966-1967
2	1	Evaluation Testing of Tavis 25 millibars Pressure Sensors, 1973
	2	Pressure Sensor, Viking Project, 1969-1975 (Folder 1 of 2)
	3	Pressure Sensor, Viking Project, 1969-1975 (Folder 2 of 2)

2. Temperature Sensors

Box	Folder	Folder Title
2	4	Temperature Sensor Report, April 12, 1973
	5	Planetary Atmosphere Experiments Test Temperature Sensor,

		Ames Research Center, January 6, 1971
	6	Temperature Sensor Calibration Data, 1974-1975
	7	Miscellaneous Studies Re Interfaces, Interference, Environment, Response, 1971-1972
	8	Viking Temperature Sensor Critical Design Review, 1966-1973
	9	Action Items on Temperature Sensors from Preliminary Design Review, 1972
3	1	Viking Temperature Sensor Development Phase, 1971-1975 (Folder 1 of 3)
	2	Viking Temperature Sensor Development Phase, 1971-1975 (Folder 2 of 3)
	3	Viking Temperature Sensor Development Phase, 1971-1975 (Folder 3 of 3)
	4	Reports on Viking Temperature Sensors, 1971-1974 (Folder 1 of 2)
	5	Reports on Viking Temperature Sensors, 1971-1974 (Folder 2 of 2)
	6	Thermal Performance Analysis, Viking Temperature Sensors, 1972-1974 (Folder 1 of 2)
	7	Thermal Performance Analysis, Viking Temperature Sensors, 1972-1974 (Folder 2 of 2)
4	1	Critical Design Review Data Package: Drawings, Circuits, Wts, Thermal and Mechanical Analysis, Failure Analysis, Error Budget, 1972-1973 (Folder 1 of 4)
	2	Critical Design Review Data Package: Drawings, Circuits, Wts, Thermal and Mechanical Analysis, Failure Analysis, Error Budget, 1972-1973 (Folder 2 of 4)
	3	Critical Design Review Data Package: Drawings, Circuits, Wts, Thermal and Mechanical Analysis, Failure Analysis, Error Budget, 1972-1973 (Folder 3 of 4)
	4	Critical Design Review Data Package: Drawings, Circuits, Wts, Thermal and Mechanical Analysis, Failure Analysis, Error Budget, 1972-1973 (Folder 4 of 4)
	5	Viking Temperature Sensor Monthly Progress Reports, 1972-1974

Series 2: Cassini-Huygens Project

1. Probe Scientific Instruments

Box	Folder	Folder Title
	6	Huygens Probe Temperature Sensor and Deployment, 1974-1998
5	1	Saturn Orbiter – Titan Probe Mission (Cassini). Cassini Science Group Meeting, McLean, Virginia, November 1987, 1982-1990

		(Folder 1 of 2)
	2	Saturn Orbiter – Titan Probe Mission (Cassini). Cassini Science Group Meeting, McLean, Virginia, November 1987, 1982-1990 (Folder 2 of 2)
	3	Atmospheric Structure Instrument Accelerometers, 1984-1999
	4	Huygens Probe Accelerometer, 1987-1999
	5	Atmospheric Structure Instrument Pressure Sensors, 1988-1993
	6	Marcello Fulchignoni's Huygens Atmospheric Structure Instrument viewgraphs, no date
	7	Presentation to Code S, Atmospheric Structure Experiment Science Objectives, December 21, 1989
	8	Huygens Probe Atmospheric Structure Instrument Proposal, 1989-1991 (Folder 1 of 2)
	9	Huygens Probe Atmospheric Structure Instrument Proposal, 1989-1991 (Folder 2 of 2)
6	1	European Space Agency Interview, May 30, 1990
	2	Huygens Temperature Sensor. Interactions with Alessandra Castelli and Christina Cornaro, 1990-1993
	3	Huygens Atmospheric Structure Instrument Co-Investigator Arrangement and Budget. Interactions with Marcello Fulchignoni and John Zarnecki, 1990-1994
	4	European Space Agency Fax Mail, 1990-1996
	5	Huygens Experiment Papers, 1990-1998 (Folder 1 of 2)
	6	Huygens Experiment Papers, 1990-1998 (Folder 2 of 2)
	7	Technical Inputs to the Huygens Atmospheric Structure Instrument and Surface Science Experiments (See also Temperature Sensor and Accelerometer Folders), 1991-1992
	8	April and July 1991 Cassini-Huygens Meetings in Paris, Cannes, CalTech ESTEC October 5, 1992, 1991-1993
	9	Huygens Probe Drawings. Atmospheric Structure Instrument Conference Drawings, 1991-1995
7	1	Titan Probe Pressure Sensors, 1991-1998
	2	Huygens Atmosphere-Reconstruction Wind Measurement, 1991-1999
	3	Edinburgh, Kent, ESTEC Notes April 1992; Padua and Rome, February 1993, 1992-1993
	4	Accelerometer and Pressure Sensor Evaluation Tests, 1993-1994
	5	Calibrations, Accelerometer and Pressure Sensors, 1993-1994
	6	Huygens Atmospheric Structure Instrument Meeting, Padova, Italy, 1998-1999

8	7	Cruise Checkouts, Balloon Tests, Meetings 2000, 1998-2000
	8	The Descent Imager/Spectral Radiometer (DISR) Experiment on the Huygens Entry Probe of Titan, 1999

2. Probe Aerodynamics

Box	Folder	Folder Title
	9	Titan: Model Atmosphere and Trajectory, 1989-1995
8	1	Huygens Probe Dynamic Stability and Aerodynamics, Entry and Descent, 1993-1997
	2	Probe Mass, Dea. Center of Gravity Wind Tunnel Tests. Target Area on Titan, 1997
	3	Huygens Probe Trajectories, 1999

3. Probe Impact Studies

Box	Folder	Folder Title
8	4	Huygens Probe Impact Dynamics, 1993-1994
	5	Huygens Impact Soil/Ocean Experiments, 1993-1999

4. Orbiter Experiments

Box	Folder	Folder Title
8	6	Cassini, November 1987. McLean, Virginia. Mission Design and Schedule. Meeting notes. Experiment Descriptions (Most Discarded). HAC Proposed to Use PVSP at Saturn and/or Galileo at Titan, 1987-1991
	7	Cassini Mission: Saturn Orbiter Ion and Neutral Mass Spectrometer Facility Instrument Science Team Proposal Information Package. Volume XIII: Physical Models, 1991
	8	Cassini Ion and Neutral Mass Spectrometer Proposal, 1991-1999

5. Overview

Box	Folder	Folder Title
8	9	Titan's Atmosphere – Publications, 1982-1991
	10	Cassini Project Science Group Huygens Probe Science Working Team, 1994
	11	Alenia Booklet: Cassini-Huygens. Scientific Mission to Explore the

		Solar System, 1997
	12	European Space Agency Booklet: The Cassini/Huygens Mission, November 1997
	13	AIAA (American Institute of Aeronautics and Astronautics)-97-2476: Huygens Probe Aerothermodynamics, 1997

Series 3: Galileo Project

Box	Folder	Folder Title
9	1	Final Technical Report, Atmospheric Structure Instrument, Contract Number NAS2-10044, 1982-1983 (Folder 1 of 3)
	2	Final Technical Report, Atmospheric Structure Instrument, Contract Number NAS2-10044, 1982-1983 (Folder 2 of 3)
	3	Final Technical Report, Atmospheric Structure Instrument, Contract Number NAS2-10044, 1982-1983 (Folder 3 of 3)
	4	History of Project Galileo, Drafts of Chapters 2-5, By Theodore C. Clarke, 1997
	5	Atmospheric Flow Within Jupiter's 5-Micron Hot Spots, 1998 - 1999

Series 4: Proposed Space Shuttle External Tank Usage

Box	Folder	Folder Title
9	6	Draft Report on the Utilization of the External Tanks of the Space Transportation System, 1982
	7	Committee on Uses of Shuttle External Tanks, March 1982
	8	The Process of Space Station Development Using External Tanks, 1983

Series 5: General Correspondence

Box	Folder	Folder Title
9	9	Correspondence, 1955-1970
	10	Missions to Neptune, Pluto, 1993
	11	Atmosphere of Freedom, Chapter 3 by Glenn Bugos, 1999