Guide to the
PAET Flight Project Binders, 1970-1971
AFS8000.5-PAET

NASA Ames History Office
NASA Ames Research Center

Contact Information:
NASA Ames Research Center
NASA Ames History Office
Mail-Stop 207-1
Moffett Field, CA 94035-1000
Phone: (650) 604-1032
Email: ARC-DL-history@mail.nasa.gov
URL: http://history.arc.nasa.gov/

Collection processed by:
Jack Doran, September 2012

Table of Contents

Descriptive Summary

Title:
PAET Flight Project Binders, 1970-1971

Collection Number:
AFS8000.5-PAET

Creator:
Ames Research Center

Dates:
Inclusive: 1970-1971

Extent:
Volume: 0.35 cubic feet

Repository:
NASA Ames History Office
Moffett Field, California 94035

Abstract:
This collection consists of two binders of material related to the Planetary Atmosphere Experiments Test (PAET) Project. The first, which was compiled by PAET Project Manager David E. Reese, primarily contains logistical documents for the flight, including pre-flight test data sheets and reliability and quality assurance reports. The second contains photographs detailing the PAET vehicle and payload instruments.

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:
Expanded:
NASA Ames History Office, NASA Ames Research Center. Moffett Field, California. AFS8000.5-PAET, PAET Flight Project Binders, [Container number] : [Folder number]. [Identification of item]. [Date, if available].
Abbreviated:
NASA ARC. AFS8000.5-PAET, [Container number] : [Folder number]. [Identification of item]. [Date, if available].

Acquisition Information:
Transferred by Robert E. Sly on February 19, 2008 (2008-004) and Diane Farrar and Larry Lasher on October 11, 2005 (2005-19).

Administrative History

By 1970, NASA had established a planetary exploration program for future missions to Mars, Venus, Saturn and Jupiter. One of the primary objectives of these interplanetary missions was to gain a better understanding of atmospheric properties on other planets, but the methods and instrumentation necessary to achieve this end had to first be tested. The idea that an entry probe could be used to determine the structure and characteristics of a planet's atmosphere was put forth by Ames planetary scientist Alvin Seiff. The PAET project was the first time Seiff's conception of probe technology was tested.

The aim of the PAET project was to expand on the understanding of atmospheric structure by taking measurements of atmospheric effects on spacecraft specifically during planetary entry. Included in the instrument package were accelerometers, radiometers, pressure sensors and temperature sensors, all of which were collectively employed to determine pressure, temperature, stagnation pressure, density changes with different altitudes, mean molecular weight in the atmosphere and water vapor. A mass spectrometer was employed for the purpose of effectively determining gas species.

Most instruments, as well as the body of the PAET spacecraft were designed, fabricated and tested at Ames. The craft consisted of the entry vehicle and the entry vehicle separation system for a combined weight of 296 pounds. The entry vehicle consisted of a blunt shaped forebody and a honeycomb shaped afterbody. It was 36 inches in diameter and 25.2 inches long. Before launch the aerodynamic shape of the spacecraft was studied with tests in the NASA Ames Hypervelocity Free Flight Tunnel.

Launch took place on June 20, 1971 at Wallops Island, and the craft's flight from liftoff to splashdown totaled just over 13 minutes with a peak altitude of 400 kilometers and entry trajectory commencing at nearly 250 kilometers. Data was collected primarily at the MSFN in Bermuda near impact, but the MSFN Tracking Ship USNS Vanguard and three telemetry ships were also employed to provide stored telemetry data gathered during radio signal blackout.

Participants and analysts involved with PAET determined that the instruments and techniques being tested were largely successful. Measurements taken of atmospheric structure, temperature profile and mole fractions of major gases were all deemed accurate and satisfactory. The one conspicuous problem was an apparent blocking of the hole at the nose of the craft through which the mass spectrometer was to take gas samples. It was concluded that the PAET succeeded in supporting forthcoming missions to Mars, Venus, Jupiter and Saturn with the respective Viking, Pioneer Venus, Galileo and the Cassini-Huygens projects.

The Planetary Atmosphere Experiments Test Project was part of a program directed from the Entry Technology Office of the Office of Advanced Research and Technology (OART) at NASA Headquarters. The PAET Project team at headquarters was led by Warren A. Guild and J. Levine. OART tasked project management to Ames Research Center, with David E. Reese as project manager. The Scout Launch Vehicle was managed by Paul E. Goozh from the Office of Launch Vehicle and Propulsion Programs of the Office of Space Science and Applications, and R. D. English from Langley Research Center. Goddard Space Flight Center managed the test tracking and communications on behalf of NASA's Office of Tracking and Data Acquisition. OART technical associates for the science investigations were J. E. Greene (atmospheric structure and radiometer), and Dr. Robert F. Fellows (mass spectrometer). Principal investigators for the experiment packages were Simon C. Sommer (Ames) and Hasso B. Niemann (Goddard) for atmosphere structure, Ellis E. Whiting (Ames) for radiometric composition experiment, and N. Spencer (Goddard) for the mass spectrometer.

Sources Consulted:

NASA Ames History Office, NASA Ames Research Center. Moffett Field, California. AFS1380.39A, Ames Astrogram. "Ames PAET Launch Set for June 16," p. 1, vol. 13, no. 17, June 10, 1971.

NASA Ames History Office, NASA Ames Research Center. Moffett Field, California. AFS1380.39A, Ames Astrogram. "PAET Staff Enjoys Success," pp.1-2, vol. 13, no.19, July 8, 1971.

"Planetary Atmosphere Experiments Test (PAET) Press Kit" (Document ID 19710021556), NASA, accessed September 2012 from http://ntrs.nasa.gov/

Seiff, Alvin, David E. Reese, Simon C. Sommer, Donn B. Kirk, Ellis E. Whiting & Hasso B. Niemann. "PAET, An Entry Probe Experiment in the Earth's Atmosphere." *Icarus* 18, no. 4 (1972): 525-563.

Scope and Content

The PAET Flight Project Binders consist of two binders. The first binder (folders 1-12) contains documents relating to the pre-flight tests conducted before the PAET vehicle's flight, the data sheets related to its design and trajectory, as well as its communications. The Prelaunch Operations folder provides special instructions for the integration, test and launch activities specific to the PAET, and can be utilized as a supplemental overview of the purpose of the collected data included in this binder. Also included in the first binder is a folder of photographs of the spacecraft and the instruments contained therein.

Binder two (folders 13-15) consists of additional photographs. Folder 13 is made up of shadowgraph images of the re-entry vehicle as well as photos of the engineering model and internal design. Folder 14 contains engineering verification photos of the accelerometer, pressure sensors and other instruments used in the PAET. Folder 15 includes photographs of

the flight model and its separation system, the launch itself and finally a group photo of the PAET staff.

System of Arrangement

Original order was maintained for the entire collection. All contents were removed from their binders and placed in protective housing. Contents are arranged by function, and by format in the case of photographs.

Indexing Terms
The following terms may be used to index this collection.

Corporate Name
Ames Research Center

Geographic Name
Wallops Island (Va.). NASA Wallops Flight Center [LOC]

Personal Name
Reese, David E.

Subjects
Flight Tests [NASA Thes.]
Planetary Atmosphere Experiments Test
Atmospheric Composition [NASA Thes.]
Atmospheric Structure Instrument

Related Collections
PP05.22-AS: Alvin Seiff Papers, 1955-2000
AFS8100.15A: Pioneer Papers, 1952-1996
AFS1070.9: Histories of Ames Research Files
Record Group 255.4.1: NACA Ames Aeronautical Laboratory and
NASA Ames Research Center Records at NARA San Francisco, 1939-1971

Container List

Box	Folder	Folder Title
1	1	PAET Checklist
1	2	Reliability and Quality Assurance Reports, 1970-1971
1	3	Test Program, 1970-1971
1	4	Data Sheets, 1971
1	5	Calibrations, 1971
1	6	Photographs, 1971
1	7	Spin Balance
1	8	Inertia Balance, 1970
1	9	Alignment Measurements
1	10	Assembly Procedure
1	11	Prelaunch Operations
1	12	Flight Readiness Review, 1970-1971
1	13	PAET Photographs (1 of 3), 1970-1971
1	14	PAET Photographs (2 of 3), 1970-1971
1	15	PAET Photographs (3 of 3), 1970-1971