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NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

NASA Meteorological Documentation of Wake Vortex Flight Test

NATIONAL TRANSPORTATION SAFETY BOARD
Office of Research and Engineering
Washington, D.C.

November 8, 1995

NASA Meteorological Documentation of Wake Vortex Flight Test

A. ACCIDENT DCA-94-MA-076

Location	:	Aliquippa, Pennsylvania
Date	:	September 8, 1994
Time	:	1904 Eastern Daylight Time
Aircraft	:	Boeing 737-300, N513AU

B. GROUP IDENTIFICATION

The Aircraft Performance Group met at the Federal Aviation Administration's (FAA) Technical Center facility at the Atlantic City International Airport, New Jersey, from September 25, 1995 through October 1, 1995. An additional flight was conducted on October 2, 1995 with FAA and the National Aeronautics and Space Administration (NASA) airplanes. The following group members participated in the effort:

Chairman	:	Thomas R. Jacky, NTSB
Member	:	Bob McCullough, USAir
Member	:	Keakini Kaulia, ALPA
Member	:	James Kerrigan, Boeing

Additionally, the following persons participated in this phase of the investigation:

Bob Stuever, NASA
Rob Rivers, NASA

C. SUMMARY

On September 8, 1994 at 1904 Eastern Daylight Time, USAir Flight 427, a Boeing 737-3B7, N513AU, crashed while maneuvering to land at Pittsburgh International Airport, Pittsburgh, Pennsylvania. The airplane was being operated on an instrument flight rules (IFR) flight plan under the provisions of Title 14, code of Federal Regulation (CFR), Part 121, on a regularly scheduled flight from Chicago O'Hare International Airport, Chicago, Illinois, to Pittsburgh. The airplane was destroyed by impact forces and fire near Aliquippa, Pennsylvania. All 132 persons on board the airplane were fatally injured.

D. DETAILS OF INVESTIGATION

The attached data represent information from the National Aeronautics and Space Administration (NASA) during the Wake Vortex Flight Tests accomplished in Atlantic City, New Jersey from September 25 through October 2, 1995. The data represent documentation by NASA Langley Research Center (LaRC) personnel who participated in the execution of the tests.

NASA supported the wake vortex flight tests via use of LaRC's OV-10A airplane (Attachment 1). The OV-10A, used by LaRC as a meteorological data collection platform, flew in the area of the wake vortex flight tests during individual flights. In addition, the OV-10A penetrated the smoke-marked wake vortices of the generating B-727 during two flights, with the October 2, 1995 flight executed specifically for OV-10A penetrations.

The OV-10A was flown in support of the flight during the following days:

1) Wednesday, September 27, flight test No. 19-07-2: meteorological data collection;
2) Friday, September 29, flight test No. 19-09-1: meteorological data collection and 727 wake vortex penetration;
3) Monday, October 2, flight test No. n/a: meteorological data collection and 727 wake vortex penetration (note: the 737 did not participate in this flight);

During the wake vortex penetration phase of the flight test, participants followed the test cards included in Attachment 2.

The collected OV-10A data will be entered into the docket at a later date.

[redacted]
Tom Jacky
Aerospace Engineer

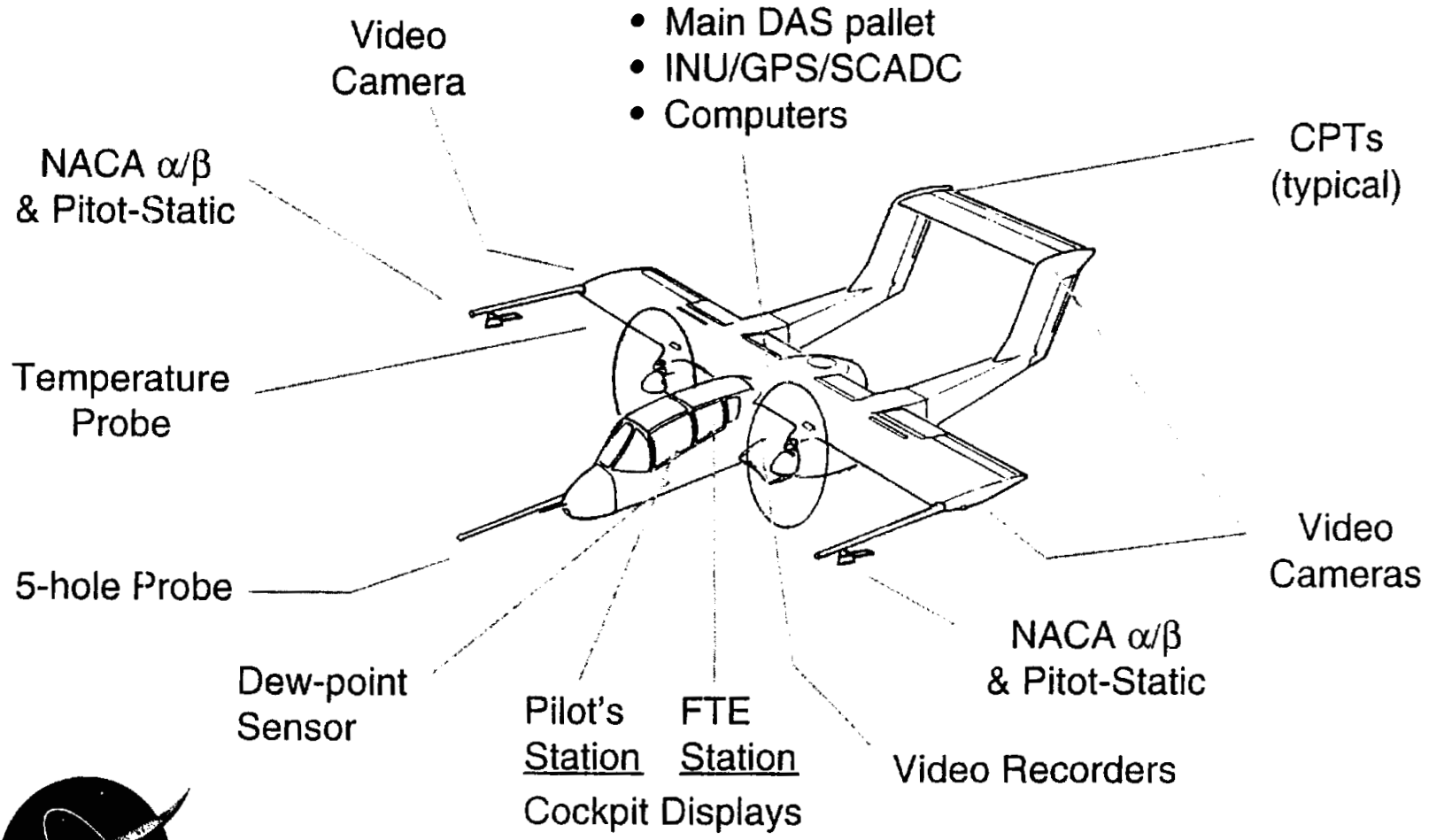
Attachments

1. NASA LaRC's OV-10A Airplane
2. NASA Wake Vortex Test Cards

ATTACHMENT 1

NASA LaRC's OV-10A Airplane

MAJOR INSTRUMENTATION SYSTEMS



OV-10A

ATTACHMENT 2

NASA Wake Vortex Test Cards

PRIMARY TEST CARD (1)

(i) SEQUENCE

A, B, C, D, A, B, D, A, B

(A) TEMPERATURE/DEWPOINT PROFILES:

PASS	MANEUVER
50	Low --> High ψ -1500 --> +1000
OR	
55	High --> Low ψ +1000 --> -1500

(B) TURBULENCE/WINDS (~130 kt)

2 min level passes

PASS	MANEUVER
60	-1000 @ ψ+180
70	+500 @ ψ
80	0 @ ψ+180

(C) VIDEO CALIBRATION SHOT

PASS	MANEUVER
90	~500 ft overhead B-727 for several seconds, nominal speed

PRIMARY TEST CARD (2) (continued)

(D) VORTEX MEASUREMENTS

Ensure on ψ vortex penetrations taken at 2, 3, and 4 nm downstream B-727.

Passes 100/110 and similar taken continuously downstream.

Passes 120 and similar taken constant altitude.

PASS	MANEUVER	V-727	ψ
100	GPS from side	200	ψ
110	Lat penetration	200	ψ
120	Above/video	200	ψ+180
130	GPS from side	250	ψ
140	Lat penetration	250	ψ
150	Above/video	250	ψ+180
160	GPS from side	225	ψ
170	Lat penetration	225	ψ
180	Above/video	225	ψ+180

(CONTINUED)

PRIMARY TEST CARD (3)
(continued)

ADDITIONAL NOTES:

1. OV-10A will work primarily area Dover to Atlantic City.

2. Test frequency 123.15

3. B-727/OV-10A joinup starting B-727 @ 6000' and OV-10A at 5000' until visual acquisition.

4. For OV-10A vortex penetrations:

   B-727 start 1/2 mi behind, increase speed to condition, pass off RHS of OV-10A.

   In turns, B-727 to 180 kt and left-hand turn unless otherwise instructed.