DOCKET NO. SA - 510

EXHIBIT NO. 13X - V

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

NASA LANGLEY FLIGHT TEST REPORT

NASA/LANGLEY

FLIGHT TEST REPORT

1. FLIGHT REQUEST NO.
95-247/49/50

2. AIRCRAFT
OV-10A

3. PROJECT
Wake Vortex Flight Hazards

4. TEST ID: (Title, Flight No., Card No., etc)
R-95-547/8/9

5. FLIGHT DATE:
27,29 SEP/2 OCT

PROJECT ENGINEER
Bob Stuever

5. PILOT(S):
Rob Rivers

REPORT SUBMITTED BY:
Rob Rivers

7. CONFIGURATION
Full systems; Wake Vortex Encounter

8. TIME OFF:
1314/0658/1011

9. TIME ON:
1605/942/1255

10. START UP GR. WT.:
11,000 lbs

11. START UP C.G.:
Nominal

12. START UP FUEL
1850 lbs

13. WEATHER
All Flights: VFR with inversions up to 6500 ft MSL; light winds, intermittent light turbulence; scattered to no clouds.

14. TEST CONDITIONS:
VMC at or above the inversion layer in light to no turbulence. All flights occurred in the vicinity of ACY, generally to the southwest to southeast. The first two flights were flown more or less along V 229 from near Dover to north of ACY. The third flight was conducted along the 131 deg radial from Sea Isle VOR from the coast out to 35 miles over the Atlantic Ocean. This was a dedicated vortex encounter flight was flown above an inversion layer that was extremely hazy.

15. INSTRUMENTATION:
Full OV-10A Wake Vortex Project systems capability: INS/GPS; dew point sensor; temperature sensors; complete CPT package for flight controls and engine parameters; static pressure sensors; two wingtip booms with pitot-static and NACA flow vanes; nose boom with 5-hole Rosemont probe; derived wind and turbulence measurements; three axis rate accelerometers and rate gyros.

16. TESTS PERFORMED
Flight R-547:
Atmospheric measurements to support USAir/Boeing B-737 encounters of FAA B-727 wake vortices.

Due to turbulence at 6K, the test altitude was varied from 6K to 12K along the V-229 flight path. The B-727 flew at 6.3K to allow the vortices to sink to approximately 6K at the time of the encounters. The OV-10 arrived on time in the test area and commenced both vertical dew point profile samplings from test altitude +1000 ft to test altitude -1500 ft and horizontal atmospheric turbulence profiles at test altitude +500 ft, test altitude -1000 ft, and at test altitude. Time and fuel considerations dictated a slight rearrangement of this latter sequence and also required the horizontal profiles to be accomplished along the track rather than in a specific area subset. The long tracks flown by the 727/737 also complicated the atmospheric data sampling since the OV-10 was constrained to sample the atmosphere over a very large area. Also, the frequent change of test altitudes resulted in a thinner data sampling at the appropriate altitudes than we would have liked.

Flight R-548
Atmospheric measurements to support 737 vortex encounters and 2 runs of OV-10 vortex encounters behind the FAA B-727.

The atmospheric measurements were accomplished as in Flight R-547 except that the test altitude remained at 6K. The original plan was to have the OV-10 penetrate the 727 wake about 15 minutes after arrival and upon completion of the atmospheric data collection. Due to the 737 remaining on station longer than anticipated, the OV-10 continued with

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atmospheric data collection in a maximum fuel endurance mode which somewhat limited the data collection. By the time the OV-10 was cleared behind the 727, there was only enough time for one horizontal penetration encounter run and one overhead video system run prior to reaching bingo fuel state. See below for details on these runs.

Flight R-549
Atmospheric measurements and 727 vortex encounters and video imaging.

The mission of this flight was to measure the strength of the 727 wake using both penetration techniques and overhead video imaging techniques. Upon arrival in the test area a series of atmospheric measurements was taken as described above. In order to calibrate the altitude of the generator aircraft, the OV-10 was flown abeam the 727 at the same altitude with data on and a mark. The OV-10 pulled ahead of the 727 on altitude about .25 miles at 180 KIAS. When the OV-10 signaled on condition, the 727 began a rapid acceleration to 200 KIAS passing abeam the OV-10 near condition. The OV-10 drifted aft abeam the smoke entrained vortices at about 130 KIAS at the same altitude measuring vortex sink rate until 2 miles in trail (as determined by the 727 on-board TCAS) at which horizontal wake penetrations commenced. These penetrations continued until the wake smoke had mostly dissipated at about 8 miles in trail. The 727 was then called to commence a 180 degree turn and the OV-10 commenced a rendezvous maneuver at 180-190 KIAS. Once again the OV-10 flew abeam the 727 for the altitude mark and then climbed to about test altitude +200 ft as the 727 accelerated to 200 KIAS. When behind the 727, the OV-10 assumed a position over the wake so that both vortices were more or less centered in the wingtip camera fields-of-view. The OV-10 slowed to about 130-150 KIAS and attempted to maintain an altitude of about 200 ft above the vortices until the smoke dissipated at about 8 miles in trail. This sequence was repeated with the 727 flying at 250 KIAS. Atmospheric measurements were taken in an abbreviated format on the way back to LFI.

Note on Trim Shots

Extensive trim shots were accomplished at the beginning and end of each flight enroute to and from ACY. These trim shots included:
Stable open loop 30 sec runs at ~150 KIAS (stick and throttle free)
Stable closed loop 30 sec runs at 150 KIAS
Elevator, Aileron, and Rudder doublets at 150 KIAS
Level accels from ~1.2 Vstall to 90% level Vmax (~185 KIAS)
Five cycle level (phi = 0) yaw oscillations (slow rudder doublets) to + or - 10 deg beta
Video calibrations over ground marker (SBY airport in every case) at 10-12K or max feasible altitude

Results indicated the level accelerations and yaw oscillations were not effective in providing data to calibrate the inconsistencies in the wingtip NACA vane output and will be deleted in subsequent flights.

17. RESULTS:
Transit time to the test area was about 45 min to the south end and about 55 min to ACY. Based on the transit distance of about 150 NM one way, the OV-10 nominally had about 1 hour of on station time. Trim shots were accomplished during the transits as described above. The transits required about 400 lbs of fuel depending on where in the test area the transit was started or ended. The bingo to LFI was accomplished at 10,500 ft MSL in normal cruise condition (props) at about 89% RPM giving a TAS of about 168 kts. Since we have essentially no range data on NASA 524 and there is no fuel flow indicator in

the cockpit, developing range profiles and fuel requirements will be a secondary objective on every flight.

R-547
As mentioned above, the preplanned atmospheric sampling profiles were modified real time due to the constantly changing profiles flown by the 727/737. Coordination with ATC (Dover Approach, Washington Center, and ACY Approach) was surprisingly smooth, and we flew usually to the east of V-229 to avoid traffic conflicts. Most of the traffic conflicts were from easterly arrivals into PHA Int'l over the Delaware Bay or lower Cape May Peninsula. The vertical profiles and horizontal turbulence sampling legs were flown generally around a fuel conservative airspeed of 120-130 KIAS at constant power settings as much as possible. VHF communications were kept to a minimum due to RFI interference on several data channels. All data runs were over the Delaware Bay parallel to V-229 and over the Cape May Peninsula.

R-548
Most of this flight was spent at max conserve due to the slippage of our time on the B-727. We arrived on time in the test area, but we were not cleared onto the 727 for almost an hour. This necessitated a planned divert to WFF for fuel on the way back to LFI in order to get any test data behind the 727. As it was, only 2 data runs were possible. The atmospheric sampling runs were over land in the vicinity of ACY to support the 737 encounters, but the OV-10 encounters were flown the Delaware Bay for video requirements. Rendezvous was uneventful and according to the plan of test. The runs were made by the 727 at 200 KIAS with the OV-10 flying between 110-130 KIAS. Penetrations commenced at 2 miles in trail and continued up to smoke dissipation at about 7-8 miles in trail. At 2 miles the upsets were on the order of + or - 60 deg in roll with the pilot actively opposing the roll. Vertical acceleration was virtually indiscernible. The perceived relative strength of the vortex remained essentially constant up to the very rapid vortex bursting at 7-8 miles. The degree of the upset is *heavily dependent on the exact trajectory of the encounter. If the encounter differs even slightly from encounter to encounter, the observed vortex strength is quite different.* The vortices were fairly tightly wound averaging only 2-3 feet in diameter until about 4 miles in trail. As they began to increasingly oscillate both vertically and horizontally, penetrating consistently in the center of the core from the pilot's eye point became increasingly problematical. I am not sure what trajectory leads to the strongest upsets, but very slight differences in trajectory are significant. Since the flight path was partially crosswind, the vortices developed vertical separation and almost rolled up on top of each other at times. Also, at times one vortex would have completely burst and show no smoke cohesion at all while the other was tightly coiled. This phenomenon would reverse itself on the same run with the burst vortex being "reborn" at a further downwind distance and the other previously intact vortex having become dissipated. Overall, my impressions were of a very unpredictable, almost capricious phenomenon.

R-549
Encounter and vertical video runs were accomplished at both 200 and 250 KIAS for the generating aircraft. The OV-10 decelled to about 130 KIAS after the initial rendezvous at 190 KIAS to acquire the altitude mark. The plan was for the OV-10 to take the flight lead after the altitude mark and fly about 0.25 mile upwind at 190 KIAS in order to allow the 727 to reach target airspeed as it passed the OV-10. This did not work out just as planned for a variety of reasons, but the lesson learned was that this technique is probably not needed and is difficult for the OV-10 due to the poor rearward visibility in the OV-10

because of the tail boom arrangement. The encounters and video passes were very similar to those reported in R-548. The FAA did not allow the OV-10 to fly over the 727 at +500 ft for video calibration of the vortex separation as had been specified in the plan of test contained in the FTOSR. The NTSB did, however, insert a third plane into the test just prior to the flight for photo coverage which was not ever mentioned in the flight planning meetings. This required the OV-10 flight crew to obtain ASRB clearance on very short notice just prior to the flight. Problems with one of the smokers at the end of the flight precluded any further flights with the 727. Very similar behavior of the vortices to that observed in R-548 occurred on this flight, i.e., unpredictable behavior of the vortices with respect to each other up to about 7-8 miles where Crow linking seemed to rapidly occur resulting in annihilation of the vortices. On both flights the vortices seemed to descend about 300 feet by 4 miles with lesser descent observed afterwards, but this is highly speculative on my part pending actual data analysis. Vertical and horizontal sinusoidal wave motions were observed noticeably after about 4 miles, but the amplitude of the oscillations was limited to about + or - 50 feet.

Operationally speaking, no problems occurred on the rendezvous after each run with lead turn technique being employed to effect an expeditious rendezvous after the 727 had completed its 180 deg turn and was on opposite course from the OV-10. The OV-10 had to frequently specify an airspeed for the 727 to assist in the rendezvous. The slow top speed of the OV-10 adds to the complexity of the task and requires planning on the part of the OV-10 pilot to keep the 2 aircraft from getting too far separated during the flight. Also, the OV-10 in normal flight condition does not decelerate very well at all. The speed instability mentioned in previous FTRs causes problems during rendezvous. If the rendezvous occurs with very much overtake from the OV-10, idle power and fully cross controlling the OV-10 still will not bleed the excess airspeed at a sufficient rate. The pilot is forced to select takeoff and land condition to get prop beta effects to aid in slowing down. This, of course, immediately causes activation of the landing gear warning horn which must quickly be silenced. In summary, the OV-10 does possess some less than optimal formation characteristics of which the pilot must be aware.

Concluding Remarks

The OV-10 was tasked on short notice through the APG for this support. In endeavoring to respond, the OV-10 team scheduled a planning meeting at the FAA Tech Center to coordinate the flights and quickly prepared an ASRB briefing and FTOSR. The meeting covered all of the operational details and all of the appropriate FAA, Boeing, and NTSB personnel were briefed and the appropriate signatures obtained on the FTOSR. Since some of the participants had a more limited knowledge of the recent developments in wake vortex research, several suggestions were introduced by the OV-10 team that, I believe, contributed to the hopeful success of the project. In retrospect the OV-10 team probably should have been included in the planning for this experiment at an earlier date, but the opportunity to participate with Boeing, the NTSB, and the FAA in a three ship operation should lead to the recovery of very valuable data.

18. RECOMMENDATIONS:

1. Continue to record range performance data for the OV-10 in order to update the range performance tables in the Dash 1.
2. Investigate the very strong correlation between very slightly different trajectories through a vortex and the resulting degree of upset.
3. Quickly review the stereoscopic video data to determine if this technique is acceptable and if any modifications to the technique will be necessary.

NASA OV-10
MISSION SUMMARY

FLIGHT #: 95-547
MISSION: NTSB WX

DATE: 09/27/95
TIME 1300L

PASS	START TIME (Z)	SPEED (knots)	ALT (feet)	HDG (deg)		COMMENTS
10	170908	—	—	—		GROUND CAL
17	172953	150	7500			STABLE OPEN-LOOP TRIM
20	173156	150	7500			STABLE CLOSED-LOOP TRIM
25-35	173319	150	7500			TRIM-SHOT DOUBLETS
40	173625	100-190	7500			TRIM THROTTLE STEP
43	174018	100-190	7500			TRIM THROTTLE RAMP
45	174356	150	7500			TRIM YAW OSCILLATIONS
					—	— ENTER TEST AREA —
55	180240	130	7300↓ 4800	058		BEGIN DESCENT / B-727 6300' T/DP
50	180540	130	4800↓ 7300	058		CLIMB - T/DP
70	181140	120	6800	060		LEVEL WX RUN / 2 MIN
75	181622	135	6800	230		LEVEL WX RUN / 2 MIN
80	182120	140	6300	060		LEVEL WX RUN / 2 MIN
85	182428	125	6300	250		LEVEL WX RUN / 2 MIN
—						UNSTABLE VORTICES / B-737 ↑ 10,500'
60	182856	130	5300	050		LEVEL WX RUN / 2 MIN
65	183218	115	5300	250		LEVEL WX RUN / 2 MIN
51	183600	130	5300↓ 11,500	250		CLIMB - T/DP
71	184319	135	11,000	060		LEVEL WX RUN / 2 MIN

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NASA OV-10
MISSION SUMMARY

FLIGHT #: 95-547
MISSION: NTSB WX

DATE: 09/27/95
TIME 1300L

PASS	START TIME (Z)	SPEED (knots)	ALT (feet)	HDG (deg)		COMMENTS
76	184654	135	11,000	250		LEVEL WX RUN / 2 MIN
81	185050	140	10,500	060		LEVEL WX RUN / 2 MIN
86	185415	120	10,500	250		LEVEL WX RUN / 2 MIN
61	185801	145	9,500	060		LEVEL WX RUN / 2 MIN
66	190142	130	9,500	240		LEVEL WX RUN / 2 MIN
—						B737 12,500' ↳ 6000' @ ~3° G.S.
57	190631	150	9000↳ 4500	120		DESCENT – T/DP
53	191105	140	4500↳ 12,500	TURN NE→ 230		CLIMB – T/DP
89	191832	140	12,500	330		LEVEL WX RUN / 2 MIN
						-- DEPART TEST AREA --
305	192814	150	10,500			STABLE OPEN-LOOP TRIM
307	192955	150	10,500			STABLE CLOSED-LOOP TRIM
310-320	193113	150	10,500			TRIM-SHOT DOUBLETS
325	193411	100-180	10,500	210		TRIM THROTTLE STEP
327	193910	100-180	10,500			TRIM THROTTLE RAMP
330	194230	150	10,500			TRIM YAW OSCILLATIONS
340	200930	—	—			GROUND CAL

TAKEOFF: 17:14:20
LANDING: 20:05:50
F.T. TIME: 2:52

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NOMINAL TEST SEQUENCE

PASS	MANEUVER
5	Pre-flight electrical cals
10	Ground cal
15	Takeoff
17	Trim shot -- stable open loop
20	Trim shot -- stable closed loop
25	Trim shot -- elevator doublet
30	Trim shot -- aileron doublet
35	Trim shot -- rudder doublet
40	ΔV: 1.2Vstall step 90% Vmax, level
43	ΔV: 1.2Vstall ramp 90% Vmax, level
45	Yaw oscillation, ΔV okay, phi = 0
50	TEST CARD SELECTIONS
300	"
305	Trim shot -- stable open loop
307	Trim shot -- stable closed loop
310	Trim shot -- elevator doublet
315	Trim shot -- aileron doublet
320	Trim shot -- rudder doublet

NOV 16 '95 03:01PM PROSPERITY MORTGAGE

NOMINAL TEST SEQUENCE

PASS	MANEUVER
325	ΔV: 1.2Vstall step 90% Vmax, level
327	ΔV: 1.2Vstall ramp 90% Vmax, level
330	Yaw oscillation, ΔV okay, phi = 0
335	Landing
340	Ground cal
345	Post-flight electrical cals

NOV 16 '95 03:02PM PROSPERITY MORTGAGE

PRIMARY TESTCARD

PASS	MANEUVER

Temperature/Dewpoint Profiles:

On radial

50-54 Start 1500' below gen alt
End 1000' above gen alt

Reverse direction

55-59 Start 1000' above gen alt
End 1500' below gen alt

Turbulence/Winds (~130 kt)

60-64 1000' below gen alt on radial
hold 2 min level

65-69 1000' below gen alt rev radial
hold 2 min level

70-74 500' above gen alt on radial
hold 2 min level

75-79 500' above gen alt rev radial
hold 2 min level

80-84 At gen alt on radial
hold 2 min level

85-89 At gen alt rev radial
hold 2 min level

NOV 16 '95 03:02PM PROSPERITY MORTGAGE

SECONDARY PASSES

PASS	MANEUVER
Temperature/Dewpoint Profiles:	
90-94	Start 1500' below gen alt Spiral to 1000' above gen alt
Turbulence/Winds (~130 kt)	
95-99	1000' below gen alt upwind hold 2 min level
100-104	1000' below gen alt downwind hold 2 min level
105-109	500' above gen alt upwind hold 2 min level
110-114	500' above gen alt downwind hold 2 min level
115-119	1000' below gen alt perp radial hold 2 min level
120-124	1000' below gen alt rev perp rad hold 2 min level
125-129	500' above gen alt perp radial hold 2 min level
130-134	500' above gen alt rev perp radial hold 2 min level

NOV 16 '95 03:03PM PROSPERITY MORTGAGE P.12

NASA OV-10
MISSION SUMMARY

FLIGHT #: 95-548
MISSION: NTSB WX/WAKE

DATE: 09/29/95
TIME 0630 L

PASS	START TIME (Z)	SPEED (knots)	ALT (feet)	HDG (deg)		COMMENTS
10	105454	—	—	—		GROUND CAL
17	110736	150	7500			STABLE OPEN-LOOP TRIM
20	110935	150	7500			STABLE CLOSED-LOOP TRIM
25-35	111046	150	7500			TRIM-SHOT DOUBLETS
40	111343	95-190	7500			TRIM THROTTLE STEP
45	111835	150	7500			TRIM YAW OSCILLATIONS
47a	113637	150	7500			PROVISIONAL VIDEO GRND CAL
						-- ENTER TEST AREA -- B727/B737 @ 6000' NOMINAL
50	115020	140	4500↑ 7300	070		CLIMB - T/DP
55	115232	145	7300↓ 4500	070		DESCENT - T/DP
60	115620	130	5000	070		LEVEL WX RUN / 2 MIN
65	120200	120	5000	240		LEVEL WX RUN / 2 MIN
70	120603	130	6500	060		LEVEL WX RUN / 2 MIN
75	120928	135	6500	230		LEVEL WX RUN / 2 MIN
80	121422	140	6000	060		LEVEL WX RUN / 2 MIN
85	122114	110	6000	230		LEVEL WX RUN / 2 MIN
86	123125	150	6000	050		LEVEL WX RUNS WHILE WAITING FOR B-737 RELEASE
87	123835	135	6000	040		
95	125314					MARK ABEAM B-727
90	125449					VIDEO MARK OVERHEAD B-727

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NASA OV-10
MISSION SUMMARY

FLIGHT #: 95-548
MISSION: NTSB WX/WAKE

DATE: 09/29/95
TIME 0630L

PASS	START TIME (Z)	SPEED (knots)	ALT (feet)	HDG (deg)	V727	COMMENTS
95/100	125601		6000		200	BEGIN LATERAL PENETRATIONS THROUGH B-727 WAKE STARTING ~ 2 nm
						(T-33 RTB)
105	131021		6500		200	BEGIN OVERHEAD MEAS OF B-727 WAKE W/VIDEO STARTING ~ OVERHEAD B-727 WORK BACK SEVERAL nm.
						-- DEPART TEST AREA --
325	132450	100-185	8500			TRIM THROTTLE STEP
307	132805	150	8500			STABLE CLOSED-LOOP TRIM
47	133149	155	8500			VIDEO CAL OVER GRND MARK
310-320	133312	155	8500			TRIM-SHOT DOUBLETS
305	133524	152	8500			STABLE OPEN-LOOP TRIM
330	133645	152	8500			TRIM YAW OSCILLATIONS
						-- LAND WFF FOR FUEL --
340	134528	—	—			GRND CAL WFF TP-35
						TAKEOFF LFE: 10:58:53 LANDING WFF: 13:42:04 2:44
						TAKEOFF WFF: 14:52 LANDING LFE: 15:22 0:30

TOTAL FLT TIME: 3:14

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NOMINAL TEST SEQUENCE

PASS	MANEUVER
5	Pre-flight electrical cals
10	Ground cal
15	Takeoff
17	Trim shot -- stable open loop
20	Trim shot -- stable closed loop
25	Trim shot -- elevator doublet
30	Trim shot -- aileron doublet
35	Trim shot -- rudder doublet
40	ΔV: 1.2Vstall step 90% Vmax, level
45	Yaw oscillation, ΔV okay, phi = 0
47	Passage over ground marker 10-12K'
50	TEST CARD SELECTIONS
300	"
305	Trim shot -- stable open loop
307	Trim shot -- stable closed loop
310	Trim shot -- elevator doublet
315	Trim shot -- aileron doublet

NOMINAL TEST SEQUENCE

PASS	MANEUVER
320	Trim shot -- rudder doublet
325	ΔV: 1.2Vstall step 90% Vmax, level
330	Yaw oscillation, ΔV okay, phi = 0
335	Landing
340	Ground cal
345	Post-flight electrical cals

NOV 16 '95 03:04PM PROSPERITY MORTGAGE

PRIMARY TEST CARD

(A) TEMPERATURE/DENPOINT PROFILES:

PASS	MANEUVER	
50	Low --> High -1500 --> +1000	ψ
55	High --> Low +1000 --> -1500	ψ+180

(B) TURBULENCE/WINDS (~130 kt)

2 min level passes

PASS	MANEUVER
60	-1000 @ ψ
65	-1000 @ ψ+180
70	+500 @ ψ
75	+500 @ ψ+180
80	0 @ ψ
85	0 @ ψ+180

(CONTINUED)

PRIMARY TEST CARD (continued)

(C) VIDEO CALIBRATION SHOT

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

(D) VORTEX MEASUREMENTS

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

PASS	MANEUVER	V-727	ψ
95	GPS from side	200	ψ
100	Lat penetration	200	ψ
105	Above/video	200	ψ+180
110	GPS from side	250	ψ
115	Lat penetration	250	ψ
120	Above/video	250	ψ+180
125	GPS from side	225	ψ
130	Lat penetration	225	ψ
135	Above/video	225	ψ+180

(CONTINUED)

NOV 16 '95 03:05PM PROSPERITY MORTGAGE P.16

PRIMARY TEST CARD (continued)

(E) TEMPERATURE/DEWPOINT PROFILES

PASS	MANEUVER
150	Low --> High ψ -1500 --> +1000
155	High --> Low ψ+180 +1000 --> -1500

(F) TURBULENCE/WINDS (~130 KT)

2 min level passes

PASS	MANEUVER
160	-1000 @ ψ
165	-1000 @ ψ+180
170	+500 @ ψ
175	+500 @ ψ+180
180	0 @ ψ
185	0 @ ψ+180

(CONTINUED)

PRIMARY TEST CARD (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.

NOV 16 '95 03:05PM PROSPERITY MORTGAGE

SECONDARY PASSES

PASS	MANEUVER
Temperature/Dewpoint Profiles:	
200	Start 1500' below gen alt Spiral to 1000' above gen alt
Turbulence/Winds (~130 kt)	
205	1000' below gen alt upwind hold 2 min level
210	1000' below gen alt downwind hold 2 min level
215	500' above gen alt upwind hold 2 min level
220	500' above gen alt downwind hold 2 min level
225	1000' below gen alt perp radial hold 2 min level
230	1000' below gen alt rev perp rad hold 2 min level
235	500' above gen alt perp radial hold 2 min level
240	500' above gen alt rev perp radial hold 2 min level

NASA OV-10
MISSION SUMMARY

FLIGHT #: 95-549
MISSION: NTSB WX/WAKE

DATE: 10/02/95
TIME 0930L

PASS	START TIME (Z)	SPEED (knots)	ALT (feet)	HDG (deg)	V-727	COMMENTS
10	135248	—	—	—		GROUND CAL
17	142010	150	7500	—		STABLE OPEN-LOOP TRIM
20	142131	150	7500			STABLE CLOSED-LOOP TRIM
25-35	142237	150	7500			TRIM-SHOT DOUBLETS
45	142400	150	7500			TRIM YAW OSCILLATIONS
47	144258	150	7500			VIDEO CAL OVER GRND MARKER -- ENTER TEST AREA --
55	145435	140	8000 ↓ 5500	020		DESCENT — T/DP
60	145719	140	6000	180		LEVEL WX RUN / 2 MIN
50	145945		6000 ↑ 7500	350		CLIMB — T/DP
70	150043	150	7500	350		LEVEL WX RUN / 2 MIN
80	150340	140	7000	180		LEVEL WX RUN / 2 MIN
51	150638	150	5500 ↑ 8000	360		CLIMB — T/DP
100	151337	180	7000			MARK ABEAM B-727
100/110	151509	170	7000	110	200	BEGIN LATGRAL PENETRATIONS THROUGH B-727 WAKE STARTING ~ 2 nm END ~ 8.4 nm
120	153031		7000		200	BEGIN OVERHEAD MEAS OF B-727 WAKE W/VIDEO BACK TO 6.8 nm (SMOKE LOST)

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NASA OV-10
MISSION SUMMARY

FLIGHT #: 95-549
MISSION: NTSB WX/WAKE

DATE: 10/02/95
TIME 0930L

PASS	START TIME (Z)	SPEED (knots)	ALT (feet)	HDG (deg)	V_{727}	COMMENTS
130/140	154031		7000		250	BEGIN LATERAL PENETRATIONS THROUGH B-727 WAKE
81	155441	145	7000			LEVEL WX RUN ATTEMPT WHILE WAITING FOR SHOCKER FIX ON B-727.
71	155825	160	7500			LEVEL WX RUN/2 MIN
						-- DEPART TEST AREA EARLY DUE TO FUEL REQ'M'T --
47/ 305	161946	141	10,500			VIDEO CAL & STABLE OPEN-LOOP TRIM
307	162214	141	10,500			STABLE CLOSED-LOOP TRIM
310-320	162340	141	10,500			TRIM-SHOT DOUBLETS
340	165823	—	—			GROUND CAL
						TAKEOFF: 14:11:37
						LANDING: 16:54:25
						FLT. TIME: 2:44

:MARY TEST CARD (1)

EQUENCE

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

PERATURE/DEWPOINT PROFILES:

:	MANEUVER
	Low --> High ψ
	-1500 --> +1000
	High --> Low ψ
	+1000 --> -1500

ULENCE/WINDS (-130 kt)

.n level passes

:	MANEUVER
	-1000 @ ψ+180
	+500 @ ψ
	0 @ ψ+180

O CALIBRATION SHOT

:	MANEUVER
	~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)

SECONDARY PA

PASS	MANEUVE
Temperature/Dewpoint P	
200	Start 1500' Spiral to 10
Turbulence/Winds (~130	
205	1000' below hold 2 min
210	1000' below hold 2 min

PRI

(i) S

A,

(A) TEM

PASS

50

OR

55

(B) TURI

2 mi

PASS

60

70

80

(C) VIDE

PASS

90