

NOAA Technical Memorandum ERL ARL-199



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**VORTEX WAKE CHARACTERISTICS OF B757-200 AND B767-200  
AIRCRAFT USING THE TOWER FLY-BY TECHNIQUE**

**VOLUME 2. APPENDICES**

Leo J. Garodz  
Kirk L. Clawson

Air Resources Laboratory  
Silver Spring, Maryland  
January 1993

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NATIONAL OCEANIC AND  
ATMOSPHERIC ADMINISTRATION

Environmental Research  
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January 1993**



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## PREFACE

This report was prepared in compliance with Military Interdepartmental Purchase Request (MIPR) DTFA03-89-A-00010, issued by the FAA Technical Center at Atlantic City, NJ. The editing co-author was K. L. Clawson. The meteorological data given herein were first summarized in Wake Vortex Research Data Packages NOAA-1 and NOAA-2, titled *NOAA Meteorological Data Summary* and *NOAA Meteorological Data Summary (Level 2 Data)*, respectively. These reports were prepared by K.L. Clawson and issued in November and December of 1990. Vortex wake characteristics presented in this report were initially summarized in a subcontractor's report to NOAA, written by L.J. Garodz and K.L. Clawson under the title *Investigation of the Vortex Wake Characteristics of Large Twin-Engine Jet Transports using the Tower Fly-by Technique (Boeing B757-200 & B767-200 Aircraft)*. It was initially issued in May 1991 with the final revision issued in May 1992. The vortex data were first presented to the public in October 1991 at the FAA International Conference on Aircraft Wake Vortices. The method of presentation was a panel discussion led by R.D. Page, and included K.L. Clawson, L.J. Garodz, and R.P. Rudis. The data presented at that time were still in draft form, and subject to further revision.

The body of this report is a compilation of the reports and the conference proceedings cited above. It draws most heavily from the report by L.J. Garodz and K.L. Clawson, issued to NOAA in 1992. However, it also contains new evaluation methods, conclusions, and recommendations not previously reported in any form, most of which originated with K.L. Clawson. It is divided into two volumes: the first contains the body of the report, while the second contains the appendices. This document completes the obligation of NOAA to the FAA specified in MIPR DTFA03-89-A-00010.

Note: present color copy technology does not permit double-sided copying. Therefore, all color copies in this report have an intentional blank page on the back side of the copy which is not indicated by the words "This page intentionally left blank."

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**Volume 2  
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## ACRONYMS AND SYMBOLS

A	= hot film calibration coefficient (unitless), or initial vortex velocity coefficient (feet/second)
A/D	= analog-to-digital
AGL	= above ground level
ATC	= Air Traffic Control
b	= aircraft wingspan (feet)
b'	= separation of vortex pair = $\pi \frac{b}{4}$ (feet)
b <sub>g</sub>	= wingspan of leading (generating) aircraft (feet)
b <sub>p</sub>	= wingspan of following (probing) aircraft (feet)
B	= hot film calibration coefficient (unitless), or vortex decay rate coefficient (unitless)
c	= wing mean aerodynamic chord (feet)
C <sub>L</sub>	= airplane lift coefficient = $\frac{L}{\frac{1}{2} \rho V^2 S} = \frac{L}{qS}$ (unitless)
cs	= centisecond
d	= distance between aircraft and tower (feet)
E	= electrical motive force (volts)
FAA	= Federal Aviation Administration
fps	= feet per second
FTD	= Flight Test Director
g	= acceleration due to gravity (feet/second <sup>2</sup> or meters/second <sup>2</sup> )

G/S	=	glide slope of aircraft (degrees)
GW	=	gross weight (pounds)
h	=	aircraft height above ground (feet)
$h_v$	=	height of vortex intercept with the tower (feet)
$h_{vge}$	=	height of onset of vortex ground effect (feet)
I	=	electrical current (amperes)
IAS	=	indicated air speed (knots)
IFR	=	instrument flight rules
INEL	=	Idaho National Engineering Laboratory
INS	=	Inertial Navigation System
KIAS	=	knots indicated air speed
L	=	lift = $nW$ (pounds)
LAN	=	Local Area Network
LLWSAS	=	Low-Level Wind Shear Alert System
MAC	=	Military Airlift Command
MDT	=	Mountain Daylight Time
MM	=	middle marker
MSL	=	mean sea level
MTOGW	=	maximum permissible takeoff gross weight
$n$	=	normal load factor, which equals 1 in level flight (unitless)
NAFEC	=	National Aviation Facilities Experimental Center
NAS	=	National Airspace System

NIST	= National Institute of Standards and Technology
NOAA	= National Oceanic and Atmospheric Administration
NRC	= Nuclear Regulatory Commission
P <sub>a</sub>	= ambient air pressure (pascals)
P <sub>l,m,h</sub>	= pressure of the low-, medium-, and high-velocity calibration ports of the hot film anemometer wind tunnel (pascals)
PAPI	= Precision Approach Path Indicator
PBL	= planetary boundary layer
q	= dynamic pressure = $\frac{1}{2}\rho V^2$ (pounds/feet <sup>2</sup> )
r	= distance from vortex center (feet)
r <sup>2</sup>	= coefficient of determination (unitless)
r <sub>c</sub>	= vortex core radius where V <sub>θ</sub> is a maximum (feet)
R	= electrical resistance (ohms)
Ri	= Richardson Number = $\frac{g \left( \frac{d\theta}{dz} \right)}{\bar{\theta} \left( \frac{du}{dz} \right)^2}$ (unitless)
S	= wing area (feet <sup>2</sup> )
t	= vortex age (seconds)
T	= air temperature (°C, °F, or K, as specified)
T <sub>cal</sub>	= temperature of air in wind tunnel during hot film anemometer calibration (°C)
T <sub>e</sub>	= ambient air temperature influencing hot film anemometer (°C)
T <sub>s</sub>	= hot film anemometer operating temperature (250 °C)
TAS	= true air speed (knots)

$u$	= ambient wind speed (knots or miles/hour or feet/second, as applicable)
UAL	= United Airlines
USAF	= United States Air Force
$V$	= aircraft true air speed (knots or feet/second), or hot film-measured vortex velocity (feet/second)
$V_\theta$	= vortex tangential velocity (feet/second)
$V_{\theta \max}$	= maximum vortex tangential velocity at $r_c$ (feet/second)
VFR	= visual flight rules
VNTSC	= Volpe National Transportation Systems Center
W	= gross weight of aircraft (pounds)
WORM	= write-once/read-many
$z$	= height above ground (feet)
$\dot{z}$	= vortex descent rate (feet/second)
$\alpha$	= aircraft angle-of-attack (degrees), or statistical significance level (unitless)
$\Gamma$	= vortex circulation = $\frac{4}{\pi} \frac{nW}{\rho Vb}$ (feet <sup>2</sup> /second)
$\Gamma'$	= average vortex circulation at distance $r$ (feet <sup>2</sup> /second)
$\Gamma_o$	= initial mid-span vortex circulation = $\frac{1}{2} c C_L V$ (feet <sup>2</sup> /second)
$\Gamma_{(rc)}$	= vortex circulation at vortex core radius where $V_\theta$ is a maximum (feet <sup>2</sup> /second)
$\delta_F$	= flap deflection (percent or degrees)
$\Delta T$	= temperature difference (°C)
$\Delta z$	= height difference (feet)
$\epsilon^{1/3}$	= atmospheric turbulence dissipation rate (centimeters <sup>2</sup> /second <sup>3</sup> )

- $\theta$  = potential temperature ( $^{\circ}\text{C}$ )  
 $\Lambda$  = wing sweep angle (degrees)  
 $\rho$  = air density (slugs/foot $^3$  or grams/meter $^3$ )

# **VORTEX WAKE CHARACTERISTICS OF B757-200 AND B767-200 AIRCRAFT USING THE TOWER FLYBY TECHNIQUE**

**Leo J. Garodz and Kirk L. Clawson**

## **ABSTRACT**

The number of large wing-mounted twin-engine jet transport aircraft in operation in the National Airspace System (NAS) has significantly increased over the past few years. Very little is known about the vortex wake characteristics of these aircraft, particularly in takeoff and landing configurations. Since aircraft classification and Air Traffic Control (ATC) separation criteria in terminal area flight operations are based primarily on the aircraft vortex wake hazard, the FAA undertook a flight test program in the fall of 1990 to investigate the vortex wakes of the Boeing 757-200 and 767-200. The tests were conducted at the NOAA vortex test facility near Idaho Falls, Idaho. This report presents the results of the flight tests using the tower flyby technique. Included are characterizations of vortex wakes as a function of aircraft configuration and performance, and ambient atmospheric conditions. Very high vortex tangential velocities were created by the B757 aircraft, with the most intense vortex measured at 326 feet per second (fps). Vortex velocities generated by the B757 were approximately 50% higher than those of the B767 at similar vortex ages younger than 60 seconds. The oldest vortices generated by the B757 were much younger than those generated by the B767, and were 84 and 135 s, respectively. The most intense vortices were generated under stable or near-neutral atmospheric conditions. Richardson Number, air temperature gradient, and wind speed were good general indicators of the  $V_{\theta\max}$ -vortex age envelope. The 3° glide slope did not produce vortices that were statistically significantly greater in intensity. The Hoffman-Joubert logarithmic model adequately predicted vortex velocity profiles in which  $V_{\theta\max}$  was  $\geq 50$  fps. Further flight testing of the B757 was recommended as a basis upon which to review present ATC separation standards for this aircraft.

**APPENDIX A**

**TEST**  
**AIRCRAFT**  
**SPECIFICATIONS**

## **Boeing 727-100 (also known as FAA 727)**

Wingspan	108 feet, 0 inches
Length	133 feet, 2 inches
Height	34 feet, 0 inches
Wing Area	1,700 square feet
Wing Root Chord	25 feet, 3 inches
Wind Tip Chord	7 feet, 8 inches
Wing Aspect Ratio	7.67 (Span/Average Chord)
Wing Taper Ratio	3.30
Wing Quarter-Chord Sweep Back	32 degrees
Maximum Takeoff Weight	169,000 pounds
Maximum Landing Weight	142,500 pounds
Powerplant	14,000 lb. static thrust, Pratt & Whitney JT8D-1 (3)

## **Boeing 727-200 (also known as UAL 727)**

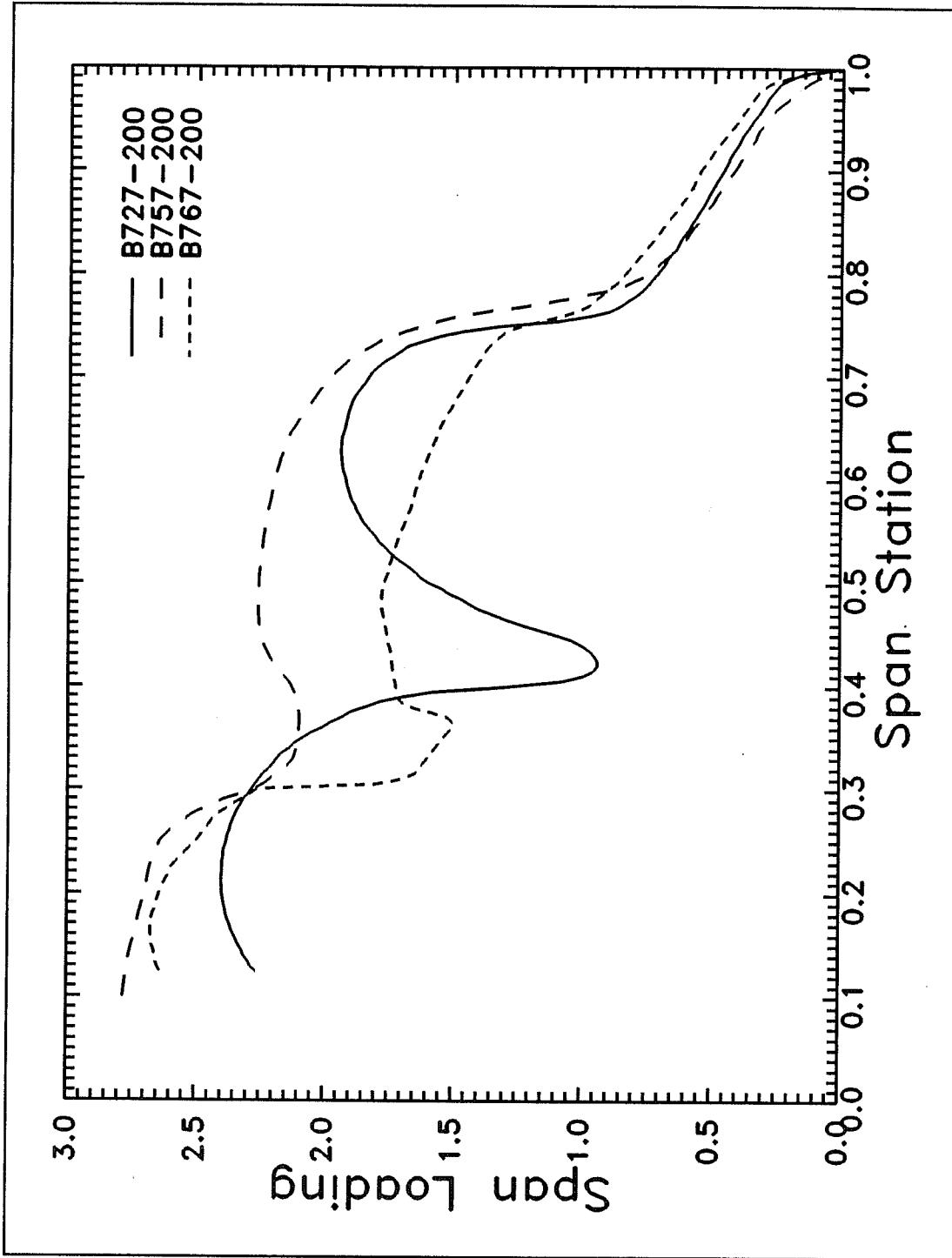
Wingspan	108 feet, 0 inches
Length	153 feet, 2 inches
Height	34 feet, 0 inches
Wing Area	1,700 square feet
Wing Root Chord	25 feet, 3 inches
Wind Tip Chord	7 feet, 8 inches
Wing Aspect Ratio	7.67 (Span/Average Chord)
Wing Taper Ratio	3.30
Wing Quarter-Chord Sweep Back	32 degrees
Maximum Takeoff Weight	172,000 pounds
Maximum Landing Weight	150,000 pounds
Powerplant	14,000 lb. static thrust, Pratt & Whitney JT8D-7 (3)

## **Boeing 757-200 (also known as UAL 757)**

Wingspan	124 feet, 6 inches
Length	155 feet, 3 inches
Height	44 feet, 6 inches
Wing Area	1,951 square feet
Wing Root Chord	NA
Wind Tip Chord	NA
Wing Aspect Ratio	7.94 (Span/Average Chord)
Wing Taper Ratio	NA
Wing Quarter-Chord Sweep Back	25 degrees
Maximum Takeoff Weight	240,000 pounds
Maximum Landing Weight	198,000 pounds
Powerplant	40,000 lb. static thrust, Rolls-Royce RB211-535E4 (2)

## **Boeing 767-200 (also known as UAL 767)**

Wingspan	156 feet, 1 inches
Length	159 feet, 2 inches
Height	52 feet, 0 inches
Wing Area	3,050 square feet
Wing Root Chord	28 feet, 1 inches
Wind Tip Chord	7 feet, 6 inches
Wing Aspect Ratio	7.90 (Span/Average Chord)
Wing Taper Ratio	3.75
Wing Quarter-Chord Sweep Back	31.5 degrees
Maximum Takeoff Weight	310,000 pounds
Maximum Landing Weight	270,000 pounds
Powerplant	47,800 lb. static thrust, Pratt & Whitney JT9D-7R4D (2)



**Figure A-1.** Predicted wing span load distribution in the landing configuration of the B727-200 (identical for the -222), B757-200, and B767-200 (Tom Zierlein, Personal Communication, 1990). Flap settings,  $C_L$ , b, and c for the calculations are: 40, 30, and 30°; 1.61, 1.72, and 1.42; 106.00, 124.52, and 155.00 ft; 15.00, 16.651, and 19.790 ft, respectively.

**APPENDIX B**

**TOWER**  
**METEOROLOGICAL**  
**DATA**

## TOWER METEOROLOGICAL DATA LISTING

The complete listing of the 200-ft meteorological tower data is included in this appendix. Each atmospheric variable is the 3-min average of 1-s scans. The data are defined as follows:

1. Date (DDMMYY YYYY)
2. Calendar day of the year
3. Flyby number, also known as Run number (issued by the FTD)
4. Richardson Number (unitless)
5. Air temperature gradient ( $^{\circ}\text{C}/100\text{ m}$ )
6. Wind Speed at the 6.25-ft level (knots)
7. Wind Speed at the 12.5-ft level (knots)
8. Wind Speed at the 25-ft level (knots)
9. Wind Speed at the 50-ft level (knots)
10. Wind Speed at the 100-ft level (knots)
11. Wind Speed at the 150-ft level (knots)
12. Wind Speed at the 200-ft level (knots)
13. Wind Direction at the 6.25-ft level (deg. true)
14. Wind Direction at the 12.5-ft level (deg. true)
15. Wind Direction at the 25-ft level (deg. true)
16. Wind Direction at the 50-ft level (deg. true)
17. Wind Direction at the 100-ft level (deg. true)
18. Wind Direction at the 150-ft level (deg. true)
19. Wind Direction at the 200-ft level (deg. true)
20. Air Temperature at the 6.25-ft level ( $^{\circ}\text{C}$ )
21. Air Temperature at the 12.5-ft level ( $^{\circ}\text{C}$ )
22. Air Temperature at the 25-ft level ( $^{\circ}\text{C}$ )
23. Air Temperature at the 50-ft level ( $^{\circ}\text{C}$ )
24. Air Temperature at the 100-ft level ( $^{\circ}\text{C}$ )
25. Air Temperature at the 150-ft level ( $^{\circ}\text{C}$ )
26. Air Temperature at the 200-ft level ( $^{\circ}\text{C}$ )

Day of Run	Date Yr. No.	$R_i$	Wind Speed (knots)	Wind Direction (degrees)										Air Temperature (°C)												
				6.25	12.5	25	50	100	150	200	6.2	12	25	50	100	150	200	6.25	12.5	25	50	100	150	200		
20JUN1990 171	1	0.25	0.94	0.1	0.8	1.6	2.5	3.4	3.9	4.3	206	214	229	258	318	317	317	10.8	11.0	11.5	12.4	11.8	11.2	11.2		
20JUN1990 171	2	0.00	0.00	0.9	1.5	2.0	2.6	3.1	3.5	3.7	208	215	230	259	317	15	73	11.3	11.4	11.6	11.6	11.9	11.3	11.3		
20JUN1990 171	3	-1.05	-0.85	1.0	1.3	2.3	2.5	2.8	2.9	3.0	203	211	227	259	322	25	88	12.0	12.1	12.1	12.3	12.6	12.1	11.5		
20JUN1990 171	4	-2.56	-2.26	2.8	3.5	4.1	3.0	1.9	1.2	0.8	243	240	236	227	208	190	172	12.5	12.5	12.6	12.6	12.7	11.9	11.2		
20JUN1990 171	5	-76.88	-3.20	2.0	2.6	3.2	3.0	2.7	2.5	2.4	244	244	244	244	243	243	12.7	12.7	12.7	12.8	12.8	11.8	10.8			
20JUN1990 171	6	-74.46	-3.10	0.9	0.9	1.6	1.5	1.4	1.3	1.3	255	252	245	232	204	177	150	13.2	13.2	13.3	13.3	13.4	12.4	11.4		
20JUN1990 171	7	-2254.9	-3.76	0.4	1.0	1.6	1.6	0.9	0.7	0.5	334	336	334	336	350	9	27	46	13.6	13.6	13.7	13.7	14.0	12.7	11.4	
20JUN1990 171	8	-13.18	-3.76	2.3	2.4	2.7	3.0	3.1	3.3	3.4	32	32	32	32	33	33	34	17.2	17.2	17.2	17.2	17.2	16.1	15.0		
20JUN1990 171	9	-2.48	-3.57	8.3	8.9	9.4	9.8	10.3	10.7	10.9	232	232	232	232	230	230	229	21.7	21.8	21.8	21.8	22.0	20.8	19.6		
20JUN1990 171	10	-0.65	-4.70	9.9	11.0	12.2	13.3	14.4	15.1	15.5	229	229	229	229	230	231	232	22.7	22.7	22.7	22.7	22.6	22.3	21.1		
20JUN1990 171	11	-0.71	-4.52	7.7	8.8	9.8	10.9	12.0	12.6	13.0	211	212	213	215	217	219	22.7	22.7	22.6	22.6	22.6	22.4	21.2			
20JUN1990 171	12	-2.41	-4.52	10.7	11.3	11.8	12.4	12.9	13.3	13.5	232	232	232	232	231	231	22.8	22.8	22.8	22.8	22.7	22.6	20.0			
20JUN1990 171	13	-1.07	-4.23	7.6	8.4	9.2	10.1	10.9	11.4	11.7	246	246	246	246	246	246	246	22.9	22.9	22.9	22.9	22.9	21.6	20.4		
20JUN1990 171	14	-1.44	-5.27	8.5	9.3	10.1	10.9	11.7	12.2	12.5	221	221	222	223	224	226	228	23.6	23.5	23.4	23.3	23.0	21.7	20.4		
20JUN1990 171	15	-2.99	-4.33	7.3	7.8	8.3	8.8	9.3	9.6	9.8	248	247	246	245	242	239	236	23.1	23.1	23.0	22.9	22.9	21.8	20.6		
20JUN1990 171	16	-0.73	-4.99	10.5	11.5	12.7	13.8	14.8	15.5	16.0	239	239	239	239	240	240	241	24.2	24.2	24.2	24.2	24.1	23.8	22.6		
20JUN1990 171	17	-0.56	-4.89	9.7	10.9	12.2	13.5	14.7	15.4	15.4	245	245	245	245	246	246	246	24.1	24.1	24.0	24.0	24.0	23.9	22.4		
20JUN1990 171	18	-1.28	-5.08	8.0	8.9	9.6	10.5	11.3	11.8	12.2	233	233	233	233	232	232	232	24.3	24.3	24.3	24.2	23.9	22.7	21.3		
21JUN1990 172	1	0.27	5.87	2.4	3.7	4.7	6.1	8.1	10.8	12.3	45	54	53	56	60	64	64	10.8	11.5	12.9	13.4	13.6	14.0	14.2		
21JUN1990 172	2	0.21	4.13	3.3	4.5	5.6	7.1	8.9	11.0	12.7	65	69	69	67	67	67	67	11.8	12.4	13.3	13.5	13.8	14.0	14.3		
21JUN1990 172	3	0.18	3.91	3.2	4.2	5.6	7.7	10.7	12.1	13.1	70	75	73	72	72	72	72	12.0	12.4	13.1	13.5	14.1	14.3	14.3		
21JUN1990 172	4	0.08	1.57	7.2	8.3	9.5	10.8	13.1	15.3	16.4	61	67	65	64	63	63	63	13.2	13.4	13.9	14.0	14.1	14.1	14.1		
21JUN1990 172	5	0.11	1.94	7.9	9.0	10.6	12.2	14.9	16.5	16.9	53	58	56	54	54	54	54	14.0	14.1	14.4	14.4	14.9	15.1	15.1		
21JUN1990 172	6	0.02	0.58	7.4	8.7	9.8	11.6	14.2	16.7	18.1	49	53	49	50	46	44	42	14.4	14.5	14.7	14.7	14.5	14.6	14.7		
21JUN1990 172	7	0.03	0.61	8.4	9.8	11.0	12.8	15.1	16.8	17.8	47	51	47	45	43	43	43	14.8	14.9	15.0	14.9	14.9	15.2	15.1		
21JUN1990 172	8	-0.02	-0.30	7.5	8.6	9.5	10.8	12.7	14.4	15.6	38	41	39	44	48	48	48	15.3	15.4	15.4	15.5	15.3	15.1	15.1		
21JUN1990 172	9	-0.35	-0.65	6.4	7.6	8.6	9.2	9.2	9.8	9.2	31	33	32	34	34	34	34	15.5	15.5	15.6	15.6	15.3	15.1	15.2		
21JUN1990 172	10	-0.54	-1.37	6.0	7.0	7.6	7.8	8.4	8.7	9.4	47	52	49	52	52	52	52	15.8	15.8	15.8	15.8	15.5	15.2	15.0		
21JUN1990 172	11	-0.35	-1.79	8.6	9.6	10.7	11.3	12.3	13.3	13.1	51	56	53	54	54	54	54	16.7	16.7	16.6	16.6	16.3	15.9	15.7		
21JUN1990 172	12	-0.25	-1.86	8.3	9.7	10.8	12.1	13.4	13.9	14.1	52	57	53	54	54	54	54	16.8	16.8	16.7	16.7	16.3	16.0	15.8		
21JUN1990 172	13	-0.29	-2.00	8.8	10.0	11.4	12.4	13.3	13.8	14.3	52	56	53	52	51	52	52	17.0	16.9	16.7	16.7	16.4	16.1	15.8		
21JUN1990 172	14	-0.25	-1.94	10.3	11.9	13.6	14.9	15.7	15.8	16.2	48	53	50	51	52	51	52	17.1	17.1	16.9	16.5	16.2	16.0	15.9		
21JUN1990 172	15	-0.44	-2.14	9.4	10.7	11.5	13.0	13.9	13.8	14.0	52	57	55	55	55	56	56	17.3	17.3	17.2	17.2	16.8	16.5	16.2		
21JUN1990 172	16	-0.31	-2.28	11.9	13.8	15.2	16.4	17.6	17.7	17.7	52	57	54	55	55	56	56	17.5	17.4	17.3	17.3	16.8	16.5	16.2		
21SEP1990 264	1	-21.43	-1.74	4.8	5.4	5.5	5.9	5.6	5.4	5.4	55	60	57	56	45	43	40	14.5	14.4	14.4	14.4	14.4	14.4	14.4		
21SEP1990 264	2	-1.30	-1.68	4.3	4.9	4.9	5.1	5.4	6.0	6.7	62	67	61	66	52	42	37	14.7	14.5	14.1	14.1	13.9	14.1	13.7		
21SEP1990 264	3	-11.92	-2.46	5.4	6.0	6.3	6.4	6.4	6.4	54	59	57	58	58	56	56	15.9	15.9	15.4	15.4	15.0	15.0	14.8			
21SEP1990 264	4	-11.62	-1.90	5.1	5.8	6.0	6.1	6.3	6.2	5.9	13	11	10	16	11	12	12	15.5	15.2	14.8	14.7	14.5	14.5	14.4		
21SEP1990 264	5	-2.44	-2.12	5.5	5.9	6.1	6.5	6.7	7.4	7.5	59	63	60	59	51	46	42	39	42	46	42	42	40			
21SEP1990 264	6	-4.86	-2.49	5.5	6.1	6.1	6.3	6.9	7.1	7.0	24	27	23	25	25	25	25	15.9	15.8	15.0	14.9	14.6	14.4	14.4		
21SEP1990 264	7	-17.89	-2.36	4.8	5.5	5.7	6.1	6.5	5.7	5.6	53	57	58	58	51	46	49	16.2	15.9	15.4	15.4	15.0	15.0	14.8		
21SEP1990 264	8	-24.71	-2.62	5.3	5.9	5.9	6.2	6.6	6.0	6.0	56	59	54	56	56	56	56	16.4	16.1	15.7	15.5	15.0	15.0	14.8		
21SEP1990 264	9	-7.14	-2.21	5.2	5.6	5.7	5.8	6.2	6.3	51	54	47	47	47	47	47	14.8	14.7	14.6	14.6	14.5	14.4	14.4			
21SEP1990 264	10	-3.52	-1.86	2.1	2.2	2.0	2.3	3.2	3.4	3.7	353	349	44	53	71	79	78	16.5	16.3	15.9	15.9	15.7	15.5	15.0		
21SEP1990 264	11	-39.85	-2.80	3.0	3.4	3.4	3.7	3.8	4.1	4.1	4.5	4.2	4.1	4.1	16	11	12	15	19	17.1	17.0	16.5	16.1	16.1	16.1	16.7
21SEP1990 264	12	-22.59	-2.13	3.5	4.0	4.0	4.1	4.1	4.1	4.1	4.4	4.4	4.4	4.4	4.7	27	29	28	35	40	46	46	46	46	16.7	
21SEP1990 264	13	-9.00	-2.05	2.9	3.4	3.4	3.6	3.6	3.8	4.0	163	158	158	158	164	167	17.6	17.5	17.5	17.5	17.5	17.5	17.0			
21SEP1990 264	14	-6.60	-1.78	3.6	4.0	4.1	4.1</																			

Day	Run No.	Date Yr.	Ri	Wind Speed (Knots)										Wind Direction (degrees)										Air Temperature (°C)												
				6.25	12.5	25	50	100	150	200	6.2	12.5	25	50	100	150	200	6.25	12.5	25	50	100	150	200	6.25	12.5	25	50	100	150	200					
21SEP1990	264	15	-9.40	-4.61	1.1	1.4	1.7	2.0	2.3	2.5	2.6	3.22	3.21	3.19	3.15	3.07	298	290	18.6	18.4	18.1	17.0	15.9													
21SEP1990	264	16	-2602.7	-4.42	1.1	1.2	1.9	1.7	1.5	1.3	1.2	4.0	40	39	38	36	34	32	18.9	18.9	18.8	18.6	17.5	16.3												
21SEP1990	264	17	-30.92	-5.27	3.5	3.6	3.8	4.0	4.2	4.3	4.3	154	155	156	159	163	168	173	20.1	20.0	19.9	19.7	19.2	18.1	16.9											
21SEP1990	264	18	-677.33	-4.61	3.9	4.0	4.7	4.7	4.3	4.2	4.1	238	238	237	234	230	225	221	19.4	19.3	19.2	18.9	17.8	16.7												
22SEP1990	266	1	0.92	10.55	2.3	3.1	4.4	5.7	6.0	9.1	9.6	288	308	324	337	36	16	20	3.6	4.1	4.7	5.7	6.4	7.0	8.8	9.8										
22SEP1990	266	2	0.88	10.29	1.4	2.0	3.1	5.5	6.0	7.7	8.7	287	296	324	345	358	10	21	3.7	3.9	4.6	5.0	5.6	7.1	8.4	9.7										
22SEP1990	266	3	0.84	8.89	1.8	2.7	3.7	5.6	6.0	8.3	8.8	304	313	323	337	33	12	4.3	4.4	5.0	5.5	7.3	8.6	8.6	9.6											
22SEP1990	266	4	0.94	9.17	1.4	1.9	2.9	4.1	6.6	7.5	8.1	266	295	317	344	36	18	21	4.4	4.6	4.9	6.1	7.5	9.1	9.1	9.8										
22SEP1990	266	5	0.79	8.31	1.3	2.0	2.9	3.9	7.6	7.8	8.3	260	315	329	353	6	22	25	4.8	4.9	5.3	6.0	7.4	8.8	9.8											
22SEP1990	266	6	0.67	7.75	1.2	1.5	1.8	3.7	7.4	8.6	8.5	270	346	351	351	8	9	22	28	5.0	5.0	5.0	5.6	6.7	6.8	7.0	8.7									
22SEP1990	266	7	0.65	7.57	1.5	1.7	2.0	3.4	7.3	8.3	8.9	272	71	42	23	20	30	35	5.1	5.1	5.0	5.5	7.3	9.1	9.5											
22SEP1990	266	8	0.61	5.84	1.0	1.1	1.6	2.0	5.1	7.2	7.6	272	87	58	34	38	5.9	5.7	5.4	5.5	6.7	8.9	9.3													
22SEP1990	266	9	0.51	4.57	1.3	1.4	1.4	1.8	3.4	7.0	7.7	271	72	63	59	37	35	6.3	6.2	6.0	6.0	6.5	8.4	9.0												
22SEP1990	266	10	0.59	3.20	2.3	2.6	2.7	3.8	6.4	7.3	272	91	88	57	48	51	6.8	6.7	6.5	6.5	6.5	6.8	7.9	8.7												
22SEP1990	266	11	0.42	2.43	2.8	3.2	3.2	3.4	4.7	6.8	8.0	70	78	66	55	51	53	7.0	7.0	6.9	7.0	7.1	7.9	8.5												
22SEP1990	266	12	0.27	1.46	3.5	3.9	4.0	4.2	4.5	6.4	8.5	60	66	63	57	50	53	7.6	7.6	7.4	7.4	7.7	7.7	8.5												
22SEP1990	266	13	0.22	0.80	2.9	3.1	3.1	3.3	3.9	5.4	7.0	67	70	66	59	53	49	8.0	7.9	7.8	7.9	7.7	7.9	7.9												
22SEP1990	266	14	0.05	0.21	4.0	4.5	4.6	4.7	5.4	7.0	8.4	56	62	58	59	52	50	46	8.8	8.7	8.5	8.5	8.3	8.4	8.9											
22SEP1990	266	15	0.02	0.08	4.6	5.2	5.3	5.3	5.6	7.1	8.5	48	52	49	51	47	45	41	9.3	9.2	9.0	9.0	8.8	8.8	9.4											
22SEP1990	266	16	-0.32	-0.54	3.6	4.0	4.4	4.5	4.6	5.4	6.4	44	46	39	40	39	34	33	13.0	12.7	12.4	12.4	12.1	11.9	12.0											
22SEP1990	266	17	0.28	2.11	1.88	5.6	6.3	6.5	7.3	8.0	8.3	33	35	33	34	35	35	34	15.6	15.5	15.1	13.1	13.0	12.7	12.5											
22SEP1990	266	18	-0.43	-0.79	3.6	4.1	4.3	4.3	5.0	5.8	6.5	25	30	31	33	31	30	29	11.2	11.0	10.8	10.8	10.6	10.3	10.7											
22SEP1990	266	19	-1.93	-1.23	4.5	5.1	5.3	5.4	5.7	5.8	6.2	38	41	37	34	31	31	33	12.1	11.9	11.7	11.7	11.4	11.4	11.4											
22SEP1990	266	20	-4.15	-1.71	5.2	5.9	6.3	6.2	6.3	6.1	6.5	41	45	41	38	34	34	33	13.0	12.7	12.4	12.4	12.1	11.9	12.0											
22SEP1990	266	21	-1.19	-1.88	5.6	6.3	6.5	7.3	5.2	5.3	5.8	6.7	9.0	9.0	8.3	33	33	34	35	15.6	15.3	14.9	14.9	14.3	14.0	14.2										
22SEP1990	266	22	-1.23	-1.94	6.5	7.2	7.6	7.9	8.1	8.8	9.2	44	48	42	42	39	38	35	13.9	13.7	13.3	13.3	13.4	13.0	12.8											
22SEP1990	266	23	-2.84	-1.80	6.4	7.1	7.4	7.7	7.9	7.9	8.1	35	38	35	36	35	38	37	14.2	14.0	13.6	13.6	13.3	13.3	13.2											
22SEP1990	266	24	-1.79	-2.47	5.8	6.7	7.3	8.2	8.2	8.2	8.3	32	34	30	31	33	35	36	14.8	14.3	14.1	13.7	13.6													
22SEP1990	266	25	-4.31	-2.42	7.5	8.5	8.8	9.1	9.3	9.2	9.1	35	38	35	36	37	42	42	15.3	15.0	14.5	14.4	14.1	13.9												
22SEP1990	266	26	-5.17	-2.38	7.1	8.0	8.4	8.8	9.0	8.6	8.5	50	53	50	51	48	44	42	15.6	15.3	14.9	14.9	14.3	14.0	14.2											
22SEP1990	266	27	-616.28	-4.23	5.3	5.3	5.2	5.2	5.1	5.1	5.1	68	66	63	63	56	50	43	22.1	22.1	22.1	22.0	22.0	21.8	20.7											
22SEP1990	266	28	-150.57	-4.14	2.0	2.1	2.2	2.2	2.3	2.3	2.3	76	75	73	69	61	53	45	22.2	22.2	22.1	22.0	22.0	21.8	21.7											
22SEP1990	266	29	-6.36	-3.95	2.7	3.0	3.3	3.6	4.0	4.2	4.3	68	67	66	65	62	59	56	22.6	22.5	22.4	22.4	22.2	21.2	20.2											
22SEP1990	266	30	-2.28	-3.76	0.4	0.4	0.6	1.5	2.3	2.8	3.1	77	77	77	77	78	78	78	22.5	22.5	22.4	22.4	22.3	21.3	20.3											
22SEP1990	266	31	-170.66	-4.70	1.8	2.0	2.7	2.5	2.3	2.3	2.2	225	226	227	230	234	239	244	23.1	23.0	23.0	22.9	22.8	22.4	20.4											
22SEP1990	266	32	-163.83	-4.52	0.5	0.6	0.7	1.3	1.1	1.0	0.9	296	299	303	314	335	356	17	23.1	23.0	22.9	22.9	22.8	22.4	20.4											
22SEP1990	266	33	-720.33	-4.99	2.3	2.3	2.3	2.2	2.1	2.0	1.9	130	129	127	123	116	108	100	24.3	24.2	24.1	23.9	23.6	22.4	21.3											
22SEP1990	266	34	-653.59	-4.52	3.0	3.0	3.3	3.2	3.1	3.1	3.1	171	169	166	160	153	147	138	23.8	23.7	23.6	23.6	23.3	22.2	21.2											
22SEP1990	266	35	-25.58	-4.42	1.1	1.3	1.5	1.7	1.8	1.9	2.0	161	161	160	158	150	146	24.0	23.9	23.9	23.9	23.7	22.6	21.4												
22SEP1990	266	36	-12.83	-4.99	2.3	2.6	2.9	3.1	3.4	3.6	3.6	228	227	226	225	223	221	23.9	23.8	23.8	23.6	23.3	22.1	20.9												
22SEP1990	267	37	1.45	8.07	3.5	4.5	5.7	6.4	8.7	8.5	8.5																									



Day	Run	Date	Yr.	Ri No.	Wind Speed (knots)					Wind Direction (degrees)					Air Temperature (°C)											
					6.25	12.5	25	50	100	150	200	6.25	12.5	25	50	100	150	200	6.25	12.5	25	50	100	150	200	
25SEP1990	268	33	-1.30	-2.86	6.2	6.9	7.5	7.9	8.8	8.9	9.3	235	233	228	227	229	234	234	22.9	22.7	22.1	21.9	21.6	21.5	21.2	
25SEP1990	268	34	-59.10	-2.56	3.1	3.4	3.2	3.5	3.0	3.6	3.5	166	165	163	160	168	179	179	20.7	20.4	19.9	19.6	19.8	19.5	19.2	
25SEP1990	268	35	-3.10	-2.92	7.9	8.6	8.9	9.3	9.6	10.0	10.0	220	221	223	224	223	23.7	23.6	22.9	22.7	22.3	22.1	22.1	22.0	22.0	
25SEP1990	268	36	-1.73	-1.81	4.0	4.4	4.9	5.0	4.8	5.6	6.1	262	261	257	253	268	246	241	22.5	22.4	22.0	21.9	21.6	21.5	21.4	
25SEP1990	268	37	-0.74	-2.60	5.8	6.4	6.7	7.8	9.1	10.4	11.5	231	232	232	227	225	23.5	23.3	22.8	22.5	22.3	22.1	22.2	22.0		
25SEP1990	268	38	-0.94	-3.13	7.7	8.3	9.0	9.7	10.2	11.1	11.5	244	247	246	244	242	23.9	23.7	23.2	22.8	22.5	22.3	22.1	22.1		
25SEP1990	268	39	-0.91	-3.00	9.1	10.0	11.0	12.2	12.6	13.2	12.9	251	251	249	247	244	243	23.7	23.5	23.0	22.6	22.4	22.2	22.0	22.0	
25SEP1990	268	40	-0.98	-2.50	7.1	8.0	8.5	9.0	9.8	10.0	10.4	258	261	262	258	252	248	243	23.4	23.3	22.8	22.6	22.3	22.1	21.9	
25SEP1990	268	41	-1.41	-2.12	3.8	4.0	3.9	4.6	5.2	6.4	6.4	203	207	218	231	225	220	23.2	23.0	22.6	22.5	22.2	22.1	21.9		
26SEP1990	269	42	4.96	6.09	1.8	1.8	1.3	2.7	3.2	3.9	4.1	209	238	23	11	31	32	45	7.6	8.3	9.7	10.7	11.1	11.1	11.2	
26SEP1990	269	43	0.60	2.68	1.5	2.1	3.1	3.3	4.3	5.5	6.0	42	51	45	56	63	69	66	9.7	9.9	10.6	11.1	11.1	11.1	11.3	
26SEP1990	269	44	3.46	6.28	4.9	5.8	6.4	4.6	3.1	1.8	2.0	247	244	243	23.7	23.5	23.0	22.6	22.4	22.2	22.0	22.0	22.0	22.0		
26SEP1990	269	45	2.38	7.92	1.6	2.2	1.9	2.5	4.1	5.2	5.5	39	78	101	108	102	90	74	6.5	6.9	9.0	10.0	10.6	10.7	10.7	
26SEP1990	269	46	0.65	1.86	1.7	2.2	2.6	3.1	3.7	4.8	5.3	87	92	99	95	89	83	73	9.6	10.0	10.4	10.5	10.4	10.6	10.7	
26SEP1990	269	47	0.55	1.43	2.2	2.5	2.5	2.7	3.7	5.6	5.7	164	153	128	121	106	91	72	9.8	10.0	10.4	10.3	10.4	10.5	10.7	
26SEP1990	269	48	0.47	1.87	1.0	1.3	1.6	2.3	3.8	5.2	5.2	157	152	134	100	98	92	70	9.5	9.6	10.0	10.2	10.4	10.4	10.6	
26SEP1990	269	49	0.14	0.24	2.0	2.2	2.4	2.4	3.0	4.6	4.8	167	176	152	123	102	86	10.5	10.3	10.2	10.1	10.2	10.4	10.6		
26SEP1990	269	50	-2.43	-0.48	3.2	3.7	3.7	3.8	3.3	3.8	4.2	164	166	161	157	140	117	103	11.0	10.9	10.7	10.4	10.5	10.5	10.7	
26SEP1990	269	51	-3.08	-0.58	3.7	4.0	4.1	4.2	3.5	2.7	2.7	202	203	200	194	177	141	109	11.4	11.4	11.0	11.0	11.0	11.1	11.1	
26SEP1990	269	52	-1.05	-1.04	3.0	3.4	3.4	3.6	3.6	4.1	5.1	65	65	65	68	63	63	62	11.9	11.9	11.7	11.7	11.4	11.3	11.3	
26SEP1990	269	53	-0.81	-0.68	3.1	3.5	3.7	3.8	4.0	4.6	5.1	61	69	68	72	73	74	69	12.1	12.1	11.9	11.7	11.7	11.6	11.7	
26SEP1990	269	54	-6.78	-1.32	2.3	2.6	2.7	2.7	3.1	2.9	3.3	68	82	76	85	86	82	73	12.7	12.4	12.5	12.2	11.9	11.9	11.9	
26SEP1990	269	55	-9.33	-1.88	2.9	3.3	3.2	3.4	3.5	3.6	3.9	90	98	87	80	83	68	56	13.5	13.4	13.2	12.9	12.5	12.4	12.4	
26SEP1990	269	56	-23.41	-1.79	3.8	4.2	4.4	4.5	4.2	4.5	4.4	207	202	203	200	194	177	141	109	11.4	11.4	11.0	11.0	11.0	11.1	11.1
26SEP1990	269	57	-3.92	-1.56	4.6	5.1	5.2	5.4	5.7	5.8	6.0	38	41	37	38	37	36	31	13.7	13.7	13.8	13.7	13.4	13.4	12.9	
26SEP1990	269	58	-2.45	-1.67	4.7	5.3	5.6	6.0	6.2	6.2	6.4	39	44	43	44	42	42	42	14.1	14.0	13.7	13.6	13.4	13.2	13.1	
26SEP1990	269	59	-4.26	-1.84	4.0	4.4	4.6	4.6	5.0	5.1	5.2	46	49	47	50	52	51	52	14.3	14.0	13.8	13.5	13.3	13.2	13.2	
26SEP1990	269	60	-1.53	4.0	4.7	4.9	5.2	5.5	6.0	5.2	5.4	51	54	55	55	54	54	55	14.2	14.1	15.0	15.0	13.9	13.6	13.3	
26SEP1990	269	61	-3.07	-2.23	4.7	5.3	5.4	5.5	5.7	5.8	6.0	22	15	11	8	9	2	9	20.3	20.2	19.8	19.7	19.2	19.1	18.9	
26SEP1990	269	62	-4.91	-2.05	3.0	3.6	3.7	3.9	4.3	4.3	4.4	296	303	313	316	326	331	341	20.1	20.1	20.1	20.1	19.6	19.2	19.1	
26SEP1990	269	63	-1.21	-1.81	3.4	4.0	4.4	4.8	5.1	5.4	6.0	40	34	28	25	23	18	20.3	20.3	20.0	19.8	19.5	19.4	19.2		
26SEP1990	269	64	-9.45	-2.55	4.7	5.8	6.2	6.0	5.9	6.1	5.8	352	345	343	340	340	345	355	20.5	20.3	19.9	19.8	19.3	19.1	19.0	
26SEP1990	269	65	-4.21	-1.69	2.5	2.9	3.5	3.8	3.7	3.9	3.5	26	39	357	336	345	341	335	339	20.1	20.1	19.8	19.7	19.4	19.3	19.1
26SEP1990	269	66	-3.80	-2.32	2.6	3.1	3.4	3.9	4.3	4.2	4.2	286	299	310	321	327	320	320	20.7	20.7	20.2	20.0	19.7	19.8	19.3	
26SEP1990	269	67	-6.23	-1.82	4.1	4.6	4.8	5.1	5.5	5.3	5.2	42	44	40	39	31	26	23	20.6	20.5	20.2	20.2	19.8	19.6	19.5	
26SEP1990	269	68	-3.74	-2.71	3.9	4.5	4.7	5.1	5.3	5.8	5.7	356	343	349	346	352	345	359	21.2	21.1	20.5	20.3	19.9	19.7	19.6	
26SEP1990	269	69	-109.64	-1.52	3.3	3.6	3.8	4.0	3.8	3.9	3.5	26	39	357	336	345	341	335	339	20.1	20.1	19.8	20.0	20.1	20.0	19.9
26SEP1990	270	70	-18.91	-2.19	2.7	2.8	2.6	2.7	2.2	2.2	2.0	42	39	357	336	345	341	335	339	21.2	21.1	20.7	20.1	20.0	19.9	19.1
29SEP1990	272	1	-2.64	10.85	2.8	3.4	3.2	4.8	5.2	6.2	7.2	277	292	331	350	5	6	14	2.3	3.3	6.0	7.4	8.3	8.5	8.7	
29SEP1990	272	2	0.95	6.97	1.5	2.6	3.5	5.1	4.9	5.9	7.3	277	330	347	9	15	17	4.5	5.2	6.4	7.8	8.2	8.4	8.7		
29SEP1990	272	3	0.59	7.89	1.7	2.7	3.5	5.2	6.9	8.1	9.5	278	329	352	7	6	12	16	4.2	4.9	6.1	7.0	8.0	8.3	8.9	
29SEP1990	272	4	0.47	9.98	1.1	2.2	3.2	5.3	6.4	8.9	11.0	280	340	349	351	8	17	25	3.6	4.3	5.2	6.4	7.9	8.4	9.5	
29SEP1990	272	5	0.70	11.49	1.4	2.6	5.7	7.0	8.7	10.1	281	276	339	358	4	7	11	2.0	2.8	4.2	5.8	7.7	8.0	8.8		
29SEP1990	272	6	0.76	11.72	1.2	4.9	1.8	4.8	6.7	8.2	9.7	280	119	4	14	6	8	10	2.3	3.3	6.0	7.4	8.1	8.0	8.4	
29SEP1990	272	7	0.89	9.37	1.1	1.9	1.6	2.7	4.7	7.0	8.1	280	152	60	32	10	8	14	2.3	3.6	4.6	5.8	7.7	8.0	8.4	
29SEP1990	272	8	0.93	6.74	0.7	1.9	1.6	2.3	3.4	6.0	6.5	234	303	354	354	10	17	3.3	4.2	5.0	5.6	6.1	7.1	7.3		
29SEP1990	272	9	0.78	5.68	1.0	1.7	1.4	3.4	2.9	5.4	6.8	207	139	137	7	39	46	50	4.3	4.7	5.7	6.1	6.4	7.3	7.6	
29SEP1990	272	10																								

Day of Run	Date	Temp. Grad.	Wind Speed (knots)										Wind Direction (degrees)										Air Temperature (°C)							
			6.25	12.5	25	50	100	150	200	6.2	12.5	25	50	100	150	200	6.25	12.5	25	50	100	150	200	6.25	12.5	25	50			
29SEP1990	272	0.46	3.88	1.9	2.1	1.2	1.4	2.7	5.6	8.1	6.3	12	22	332	51	44	5.4	5.5	6.0	6.5	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	
29SEP1990	272	12	0.38	3.09	1.7	1.8	2.0	3.2	5.3	6.1	4.2	6.1	7.8	168	79	49	70	54	52	46	46	46	46	46	46	46	46	46	46	46
29SEP1990	272	13	0.41	1.73	1.2	1.4	1.8	2.1	4.2	4.9	5.6	13	357	344	357	14	22	30	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	
29SEP1990	272	14	-0.38	-0.23	2.0	2.2	2.3	2.4	2.6	3.1	3.6	10	31	24	20	14	18	13	7.6	7.6	7.4	7.5	7.5	7.4	7.4	7.4	7.4	7.4	7.4	
29SEP1990	272	15	-1.05	-0.90	1.5	2.0	2.3	2.7	3.0	3.7	3.5	337	324	330	341	352	10	7	8.0	7.9	7.8	7.7	7.6	7.5	7.4	7.4	7.4	7.4	7.4	
29SEP1990	272	16	-1.44	-1.14	3.1	3.6	3.9	4.1	4.0	4.6	5.0	3	355	357	356	359	12	14	8.3	8.2	8.3	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	
29SEP1990	272	17	-1.73	-1.40	3.7	4.6	5.0	4.9	5.1	5.4	5.6	354	340	343	349	356	2	12	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	
29SEP1990	272	18	-1.65	-1.09	3.9	4.4	4.6	4.6	5.0	5.4	5.7	9	34	6	3	5	10	8.7	8.7	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	8.4	
29SEP1990	272	19	-0.30	-0.66	5.0	5.7	6.0	6.2	7.5	8.2	8	7	17	12	11	15	23	9.2	9.1	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	
29SEP1990	272	20	-0.55	-0.92	5.7	6.3	6.4	6.6	7.3	7.8	8.5	17	19	15	18	17	23	25	9.8	9.7	9.4	9.3	9.1	9.1	9.2	9.2	9.2	9.2	9.2	
29SEP1990	272	21	-1.98	-1.65	4.7	5.4	5.6	5.8	5.9	6.2	6.7	12	12	19	19	16	23	26	10.2	10.1	9.8	9.7	9.4	9.0	9.0	9.0	9.0	9.0	9.0	
29SEP1990	272	22	17.82	4.72	1.8	2.2	2.5	2.5	2.3	2.7	2.9	259	304	311	329	49	59	44	5.6	5.7	5.5	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	
29SEP1990	273	23	5.74	2.27	2.1	2.5	2.5	2.6	2.8	3.0	3.5	21	31	28	31	67	68	64	6.7	6.7	6.7	7.3	8.1	8.1	8.1	8.1	8.1	8.1	8.1	
29SEP1990	273	24	2.82	1.20	2.0	2.2	2.2	2.2	2.4	2.6	3.4	36	33	55	75	81	73	60	7.4	7.4	7.4	7.7	8.0	8.0	8.0	8.0	8.0	8.0	8.0	
29SEP1990	273	25	9.37	1.66	2.2	2.2	2.4	2.4	2.5	2.7	3.1	25	34	48	57	39	35	7.8	7.8	7.8	7.7	8.0	8.0	8.0	8.0	8.0	8.0	8.0		
30SEP1990	273	26	1.71	2.60	1.7	1.9	1.9	2.1	2.3	3.6	4.3	32	31	35	42	48	23	13	8.0	8.1	8.0	8.1	8.3	8.3	8.3	8.3	8.3	8.3	8.3	
30SEP1990	273	27	0.67	2.00	1.1	2.2	1.6	1.7	1.8	3.3	4.8	42	22	5	357	341	7	5	8.8	8.7	8.5	8.5	8.4	8.4	8.4	8.4	8.4	8.4	8.4	
30SEP1990	273	28	0.81	0.64	1.7	1.8	1.9	2.0	2.4	3.2	3.6	247	268	274	312	320	347	2	9.7	9.7	9.6	9.6	9.9	9.9	9.9	9.9	9.9	9.9	9.9	
30SEP1990	273	29	-0.35	-0.38	2.4	2.9	3.1	3.0	3.1	4.3	4.6	4	342	335	335	358	5	11	10.7	10.7	10.4	10.4	10.3	10.5	10.5	10.5	10.5	10.5	10.5	
30SEP1990	273	30	-1.34	-0.55	2.8	3.0	3.0	3.0	3.0	3.6	4.1	19	19	12	12	359	20	13	10.7	10.6	10.6	10.5	10.5	10.5	10.5	10.5	10.5	10.5		
30SEP1990	273	31	-6.71	-1.00	3.1	3.6	3.6	3.6	3.7	3.6	3.9	12	11	16	20	15	16	18	11.2	11.2	11.1	11.1	10.8	10.7	10.7	10.7	10.7	10.7	10.7	
30SEP1990	273	32	-151.36	-1.02	3.8	4.3	4.4	4.4	4.4	4.7	5.0	33	35	29	27	23	20	16	11.5	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	11.4	
30SEP1990	273	33	-3.36	-1.39	3.6	4.1	4.5	4.7	4.8	5.0	5.0	23	24	20	20	18	15	14	12.0	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	
30SEP1990	273	34	-7.72	-1.68	4.3	4.9	5.1	5.2	5.3	5.3	5.3	15	16	22	16	15	18	12.3	12.2	12.2	12.2	11.8	11.7	11.7	11.7	11.7	11.7	11.7		
30SEP1990	273	35	-22.50	-1.64	5.0	5.4	5.6	5.7	5.5	5.9	5.6	13	10	15	19	11	14	15	12.3	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	12.2	
30SEP1990	273	36	-23.03	-1.83	4.5	4.9	5.1	5.2	5.3	5.2	5.1	27	27	23	23	19	24	26	12.7	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	
30SEP1990	273	37	-8.06	-1.55	4.3	4.8	4.9	4.8	4.7	5.3	5.2	30	31	28	30	31	34	34	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	
30SEP1990	273	38	-8.17	-1.60	5.6	6.0	6.2	6.5	6.5	6.7	6.5	48	51	48	48	47	49	47	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0	
30SEP1990	273	39	-11.84	-1.70	4.9	5.3	5.5	5.5	5.4	5.5	5.7	56	60	52	54	54	55	48	13.4	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	13.3	
30SEP1990	273	40	-11.46	-2.18	4.9	5.3	5.5	5.5	5.8	6.0	5.8	56	60	56	56	57	58	52	13.8	13.7	13.7	13.7	13.7	13.7	13.7	13.7	13.7	13.7	13.7	
30SEP1990	273	41	-157.69	-2.10	4.5	5.0	5.1	5.3	5.3	4.9	4.7	43	45	42	44	48	45	42	14.0	14.0	14.0	13.6	13.5	13.5	13.5	13.5	13.5	13.5		
30SEP1990	273	42	-4.12	-2.60	2.2	2.5	2.5	2.7	2.8	2.9	3.1	173	160	175	175	176	176	176	176	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3	19.3
30SEP1990	273	43	-35.81	-2.70	3.5	4.2	4.6	4.6	4.6	4.1	4.1	149	151	154	156	163	163	163	163	20.4	20.4	20.4	19.9	19.9	19.9	19.9	19.9	19.9	19.9	
30SEP1990	273	44	-3.32	-2.74	2.0	2.7	2.8	2.9	3.1	3.5	3.7	3.9	129	120	126	134	151	159	21.0	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	
30SEP1990	273	45	-2.56	-2.57	3.3	3.8	3.8	3.9	4.3	5.1	5.7	5.4	164	165	160	160	169	173	173	173	173	173	173	173	173	173	173	173		
30SEP1990	273	46	-7.39	-2.23	4.6	5.0	5.0	5.2	5.8	6.0	5.8	201	201	197	200	193	191	187	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	21.3	
30SEP1990	273	47	-20.09	-2.15	5.0	5.4	5.4	5.7	6.1	5.8	5.7	214	214	207	201	195	195	189	21.2	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	
30SEP1990	273	48	-3.68	-2.69	4.4	4.8	4.9	5.7	6.2	6.5	6.2	174	180	187	191	180	183	184	22.1	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	
30SEP1990	273	49	-1.49	-2.81	4.8	5.8	6.5	6.9	6.8	7.4	7.6	151	155	156	160	158	162	164	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	21.7	
30SEP1990	273	50	-3.21	-2.61	5.5	5.8	5.8	6.5	6.5	7.1	7.2	198	198	192	192	185	190	184	21.9	21.8	21.8	21.8	21.8	21.8	21.8	21.8	21.8	21.8	21.8	
30SEP1990	273	51	-8.18	-2.85	4.8	5.2	5.5	6.2	6.1	6.7	6.0	195	195	190	190	189	182	180	185	21.3	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8
30SEP1990	273	52	-1.66	-3.26	6.1	7.0	7.6	7.9	8.4	8.7	9.1	173	168	171	171	166	172	173	22.5	22.2	22.2	22.2	22.2	22.2	22.2	22.2	22.2	22.2	22.2	
30SEP1990	273	53	-1.89	-3.16	5.2	5.6	6.0	6.5	7.3	7.9	7.9	191	195	195	198	203	200	200	22.8	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	
30SEP1990	273	54	-5.52	-3.37	7.0	7.7	8.4	9.3	10.2	9.7	8.6	183	180	180	178	177	176	176	22.3	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	
30SEP1990	273	55	-5.64	-2.64	2.7	3.6	3.4	3.9	3.7	4.0	4.1	123	135	133	133	138	138	138	22.4	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	21.9	
30SEP1990	273	56	-1.97	-2.69	6.2	6.7	6.7	7.0	7.0	7.5</																				

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## **APPENDIX C**

### **TOWER METEOROLOGICAL DATA GRAPHS**

# TOWER METEOROLOGICAL DATA GRAPHS

This appendix contains graphs of the profiles of wind speed, wind direction, and air temperature for every flyby (run).

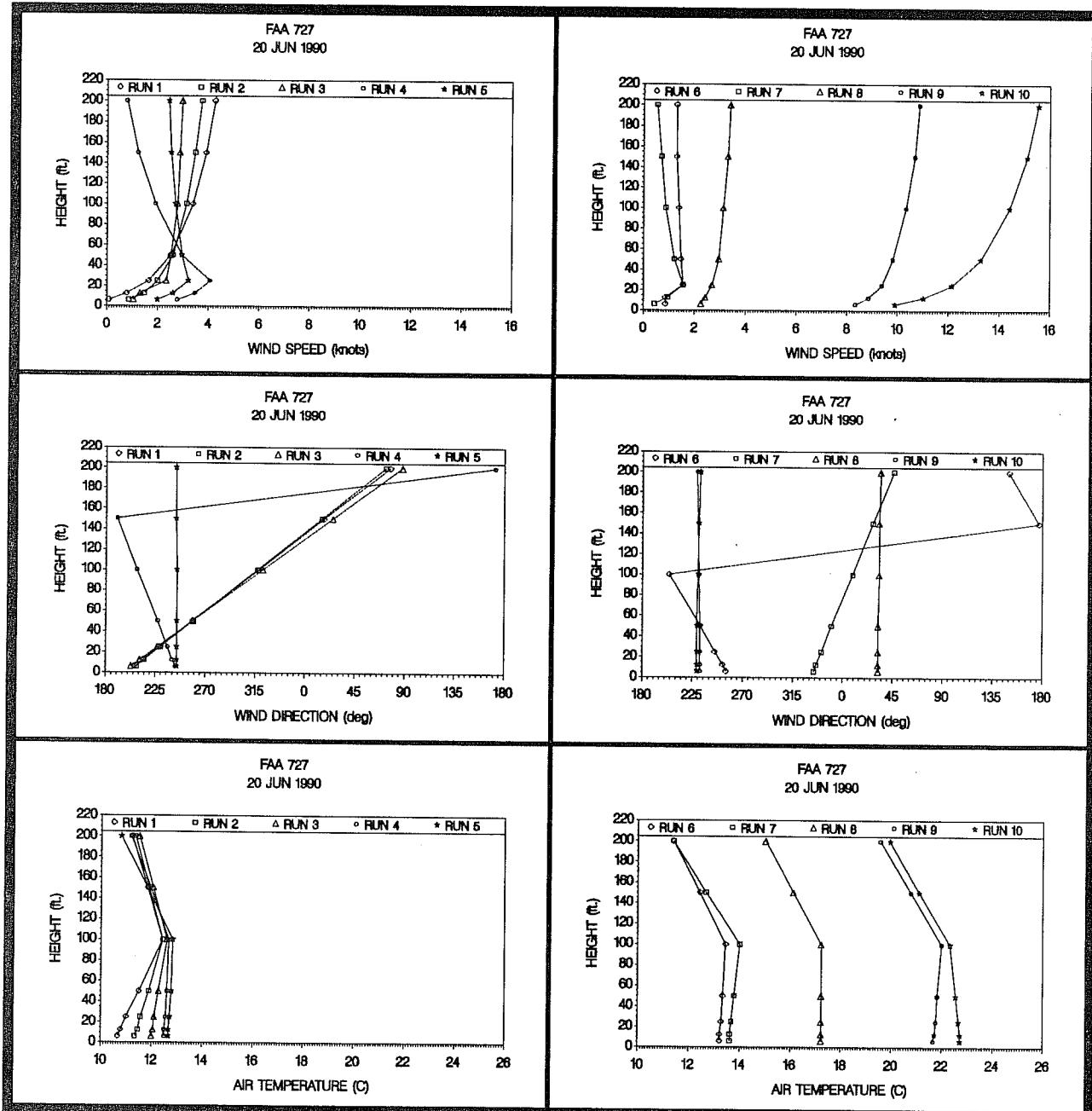


Figure C-1. Wind speed, wind direction, and air temperature profiles from 6.25 to 200 ft AGL for runs 1-5 (left) and 6-10 (right) of the B727-100 on 20 Jun 1990.

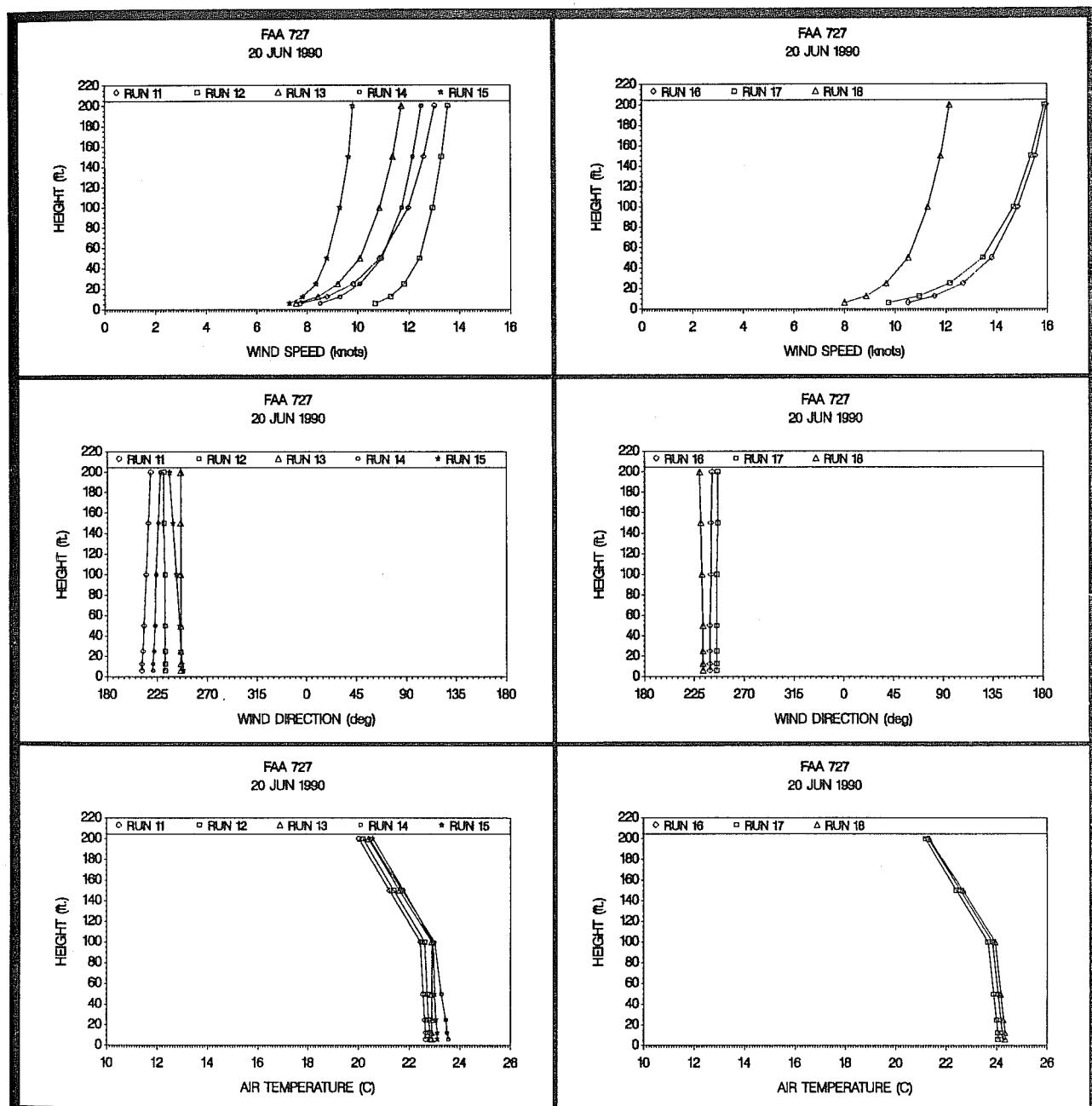


Figure C-2. Wind speed, wind direction, and air temperature profiles from 6.25 to 200 ft AGL for runs 11-15 (left) and 16-18 (right) of the B727-100 on 20 Jun 1990.

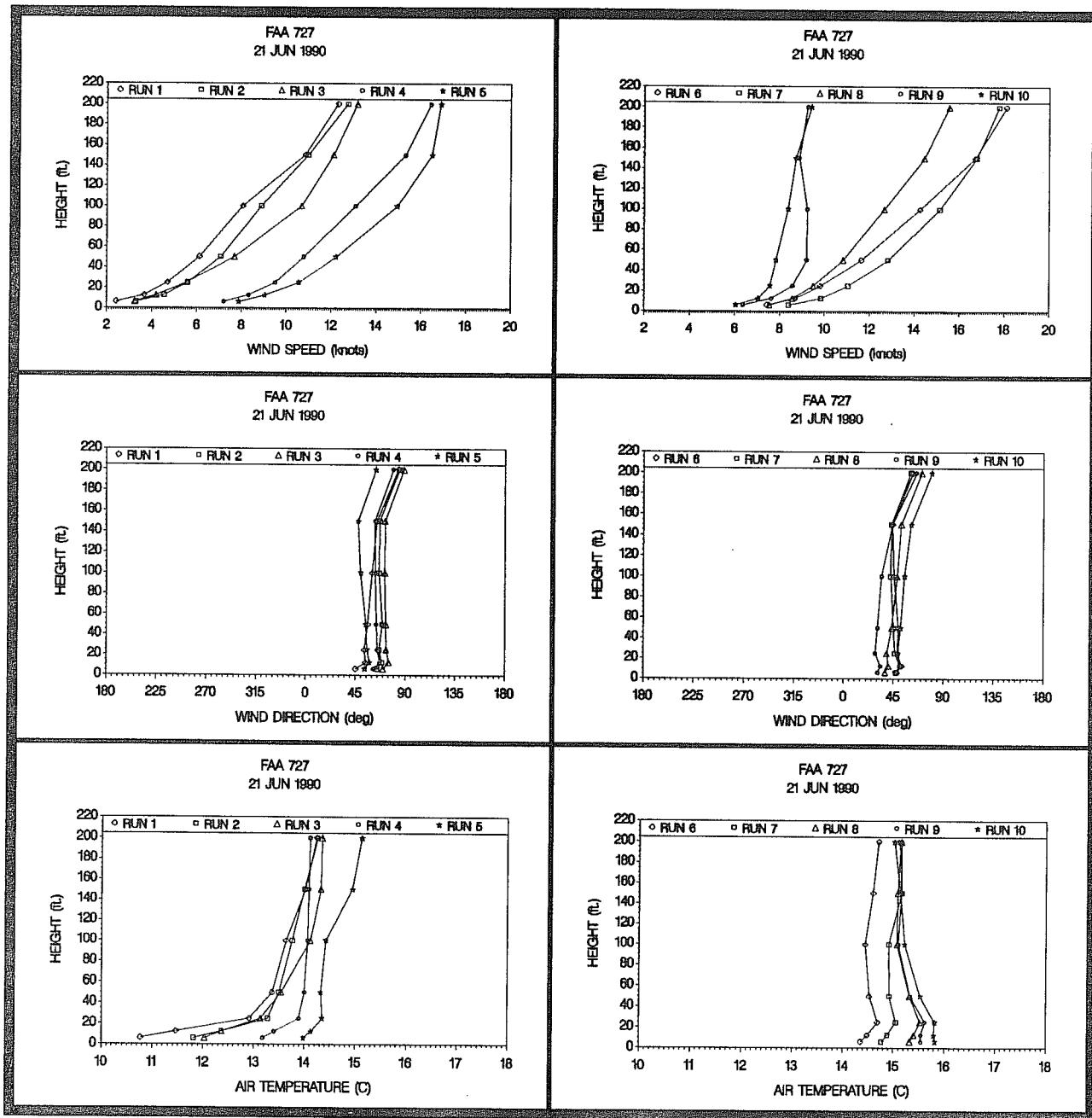
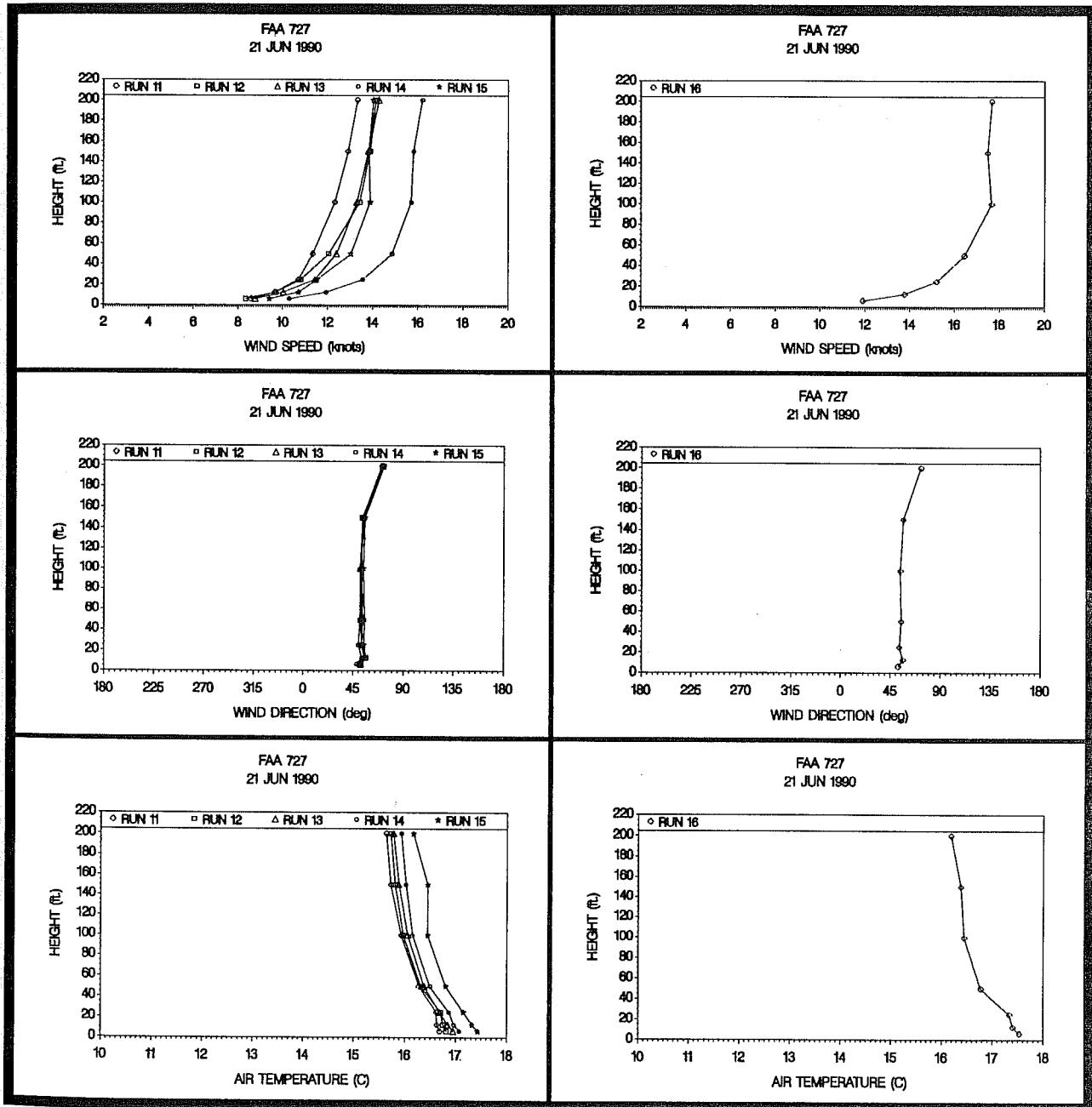


Figure C-3. Wind speed, wind direction, and air temperature profiles from 6.25 to 200 ft AGL for runs 1-5 (left) and 6-10 (right) of the B727-100 on 21 Jun 1990.



**Figure C-4.** Wind speed, wind direction, and air temperature profiles from 6.25 to 200 ft AGL for runs 11-15 (left) and 16 (right) of the B727-100 on 21 Jun 1990.

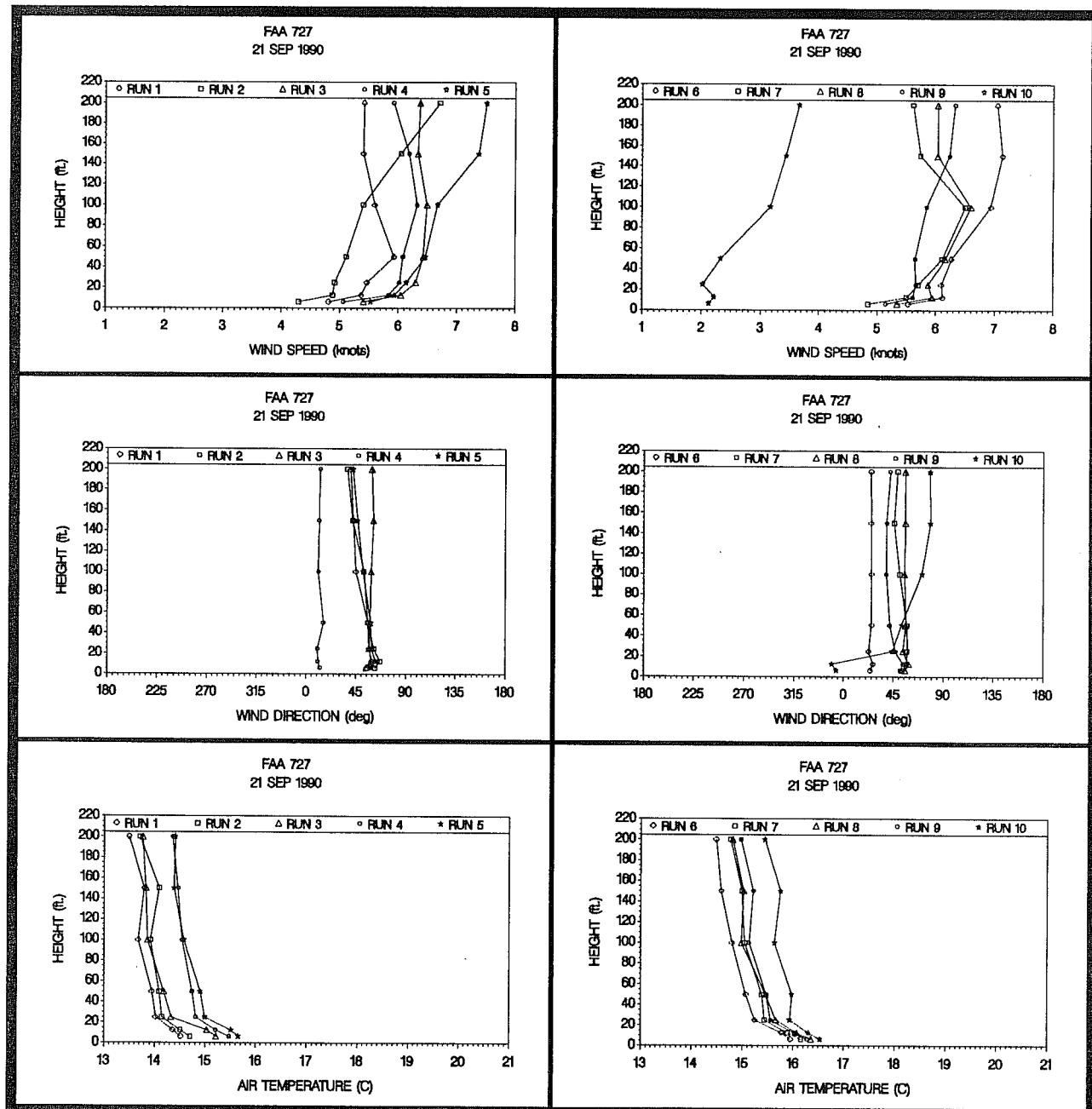


Figure C-5. Wind speed, wind direction, and air temperature profiles from 6.25 to 200 ft AGL for runs 1-5 (left) and 6-10 (right) of the B727-100 on 21 Sep 1990.

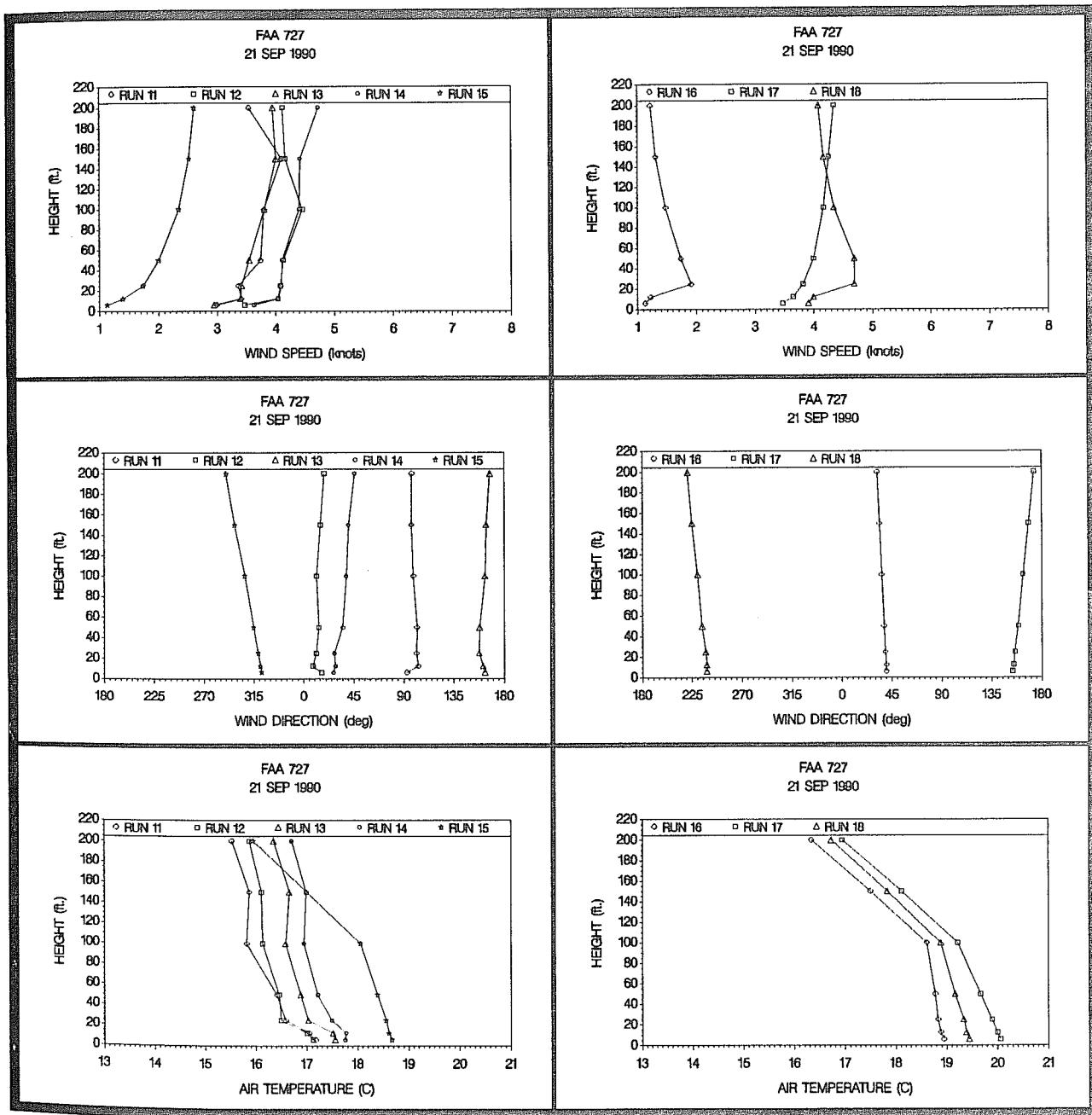


Figure C-6. Wind speed, wind direction, and air temperature profiles from 6.25 to 200 ft AGL for runs 11-15 (left) and 16-18 (right) of the B727-100 on 21 Sep 1990.

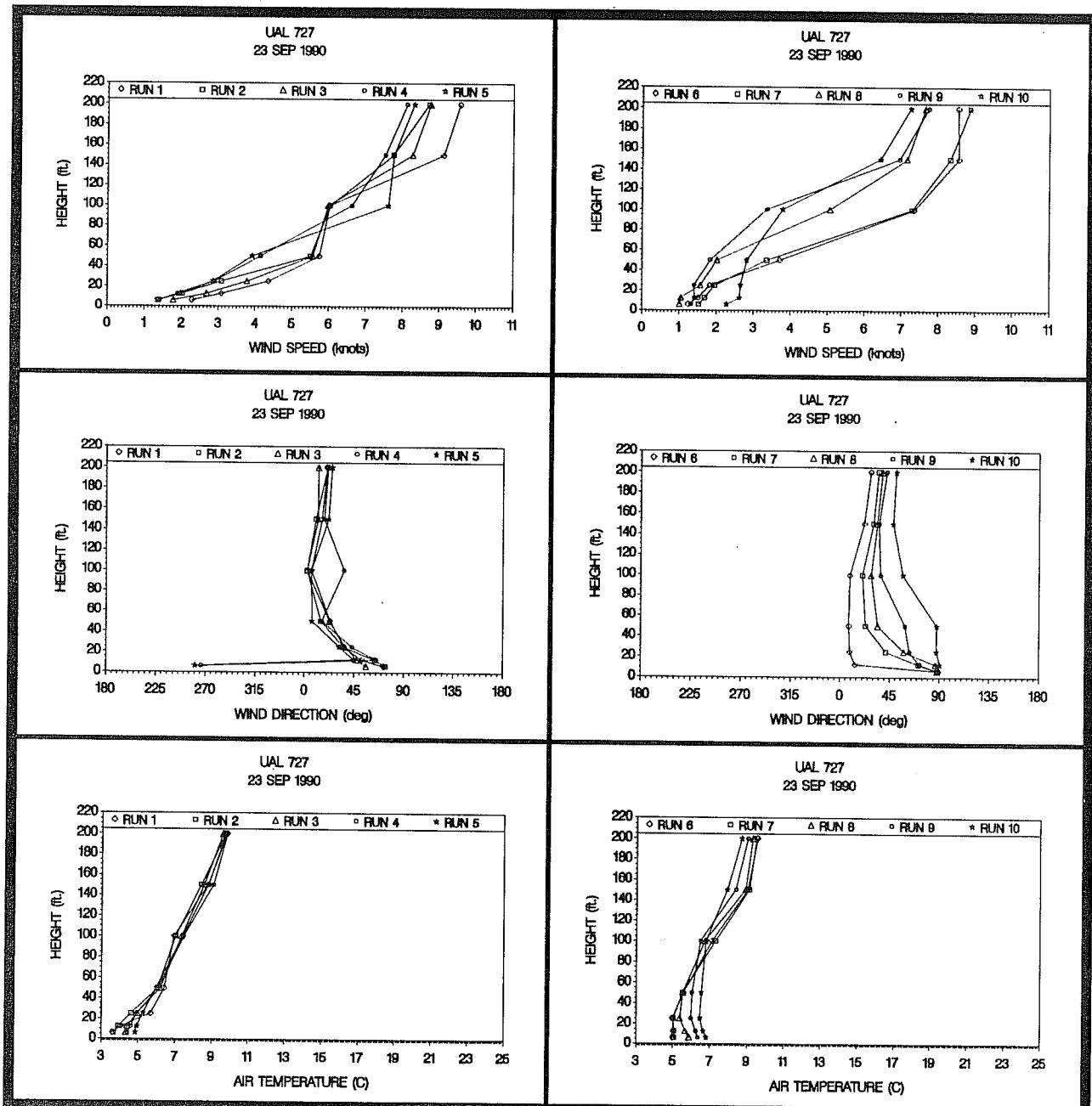


Figure C-7. Wind speed, wind direction, and air temperature profiles from 6.25 to 200 ft AGL for runs 1-5 (left) and 6-10 (right) of the B727-222 on 23 Sep 1990.

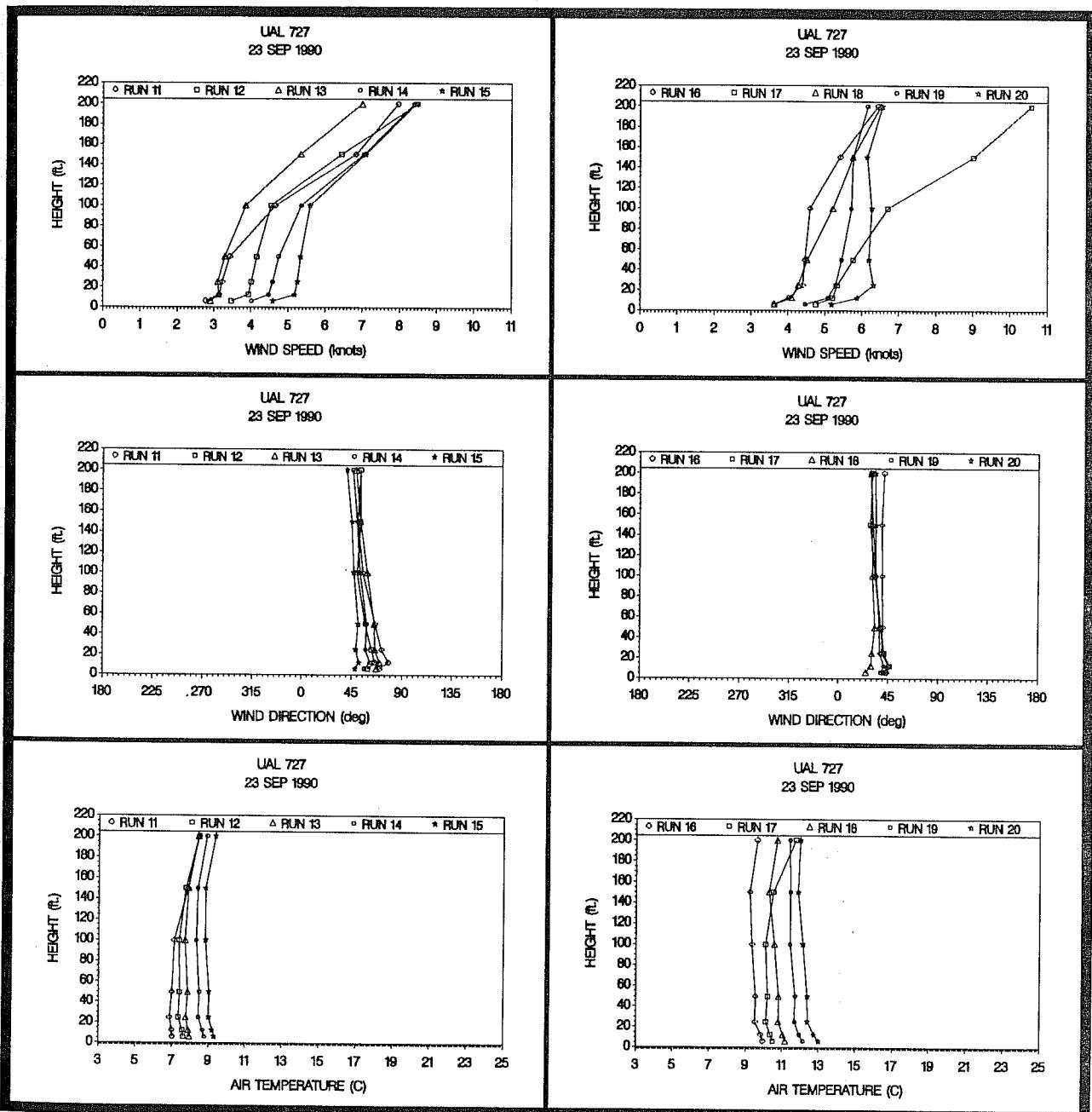


Figure C-8. Wind speed, wind direction, and air temperature profiles from 6.25 to 200 ft AGL for runs 11-15 (left) and 16-20 (right) of the B727-222 on 23 Sep 1990.

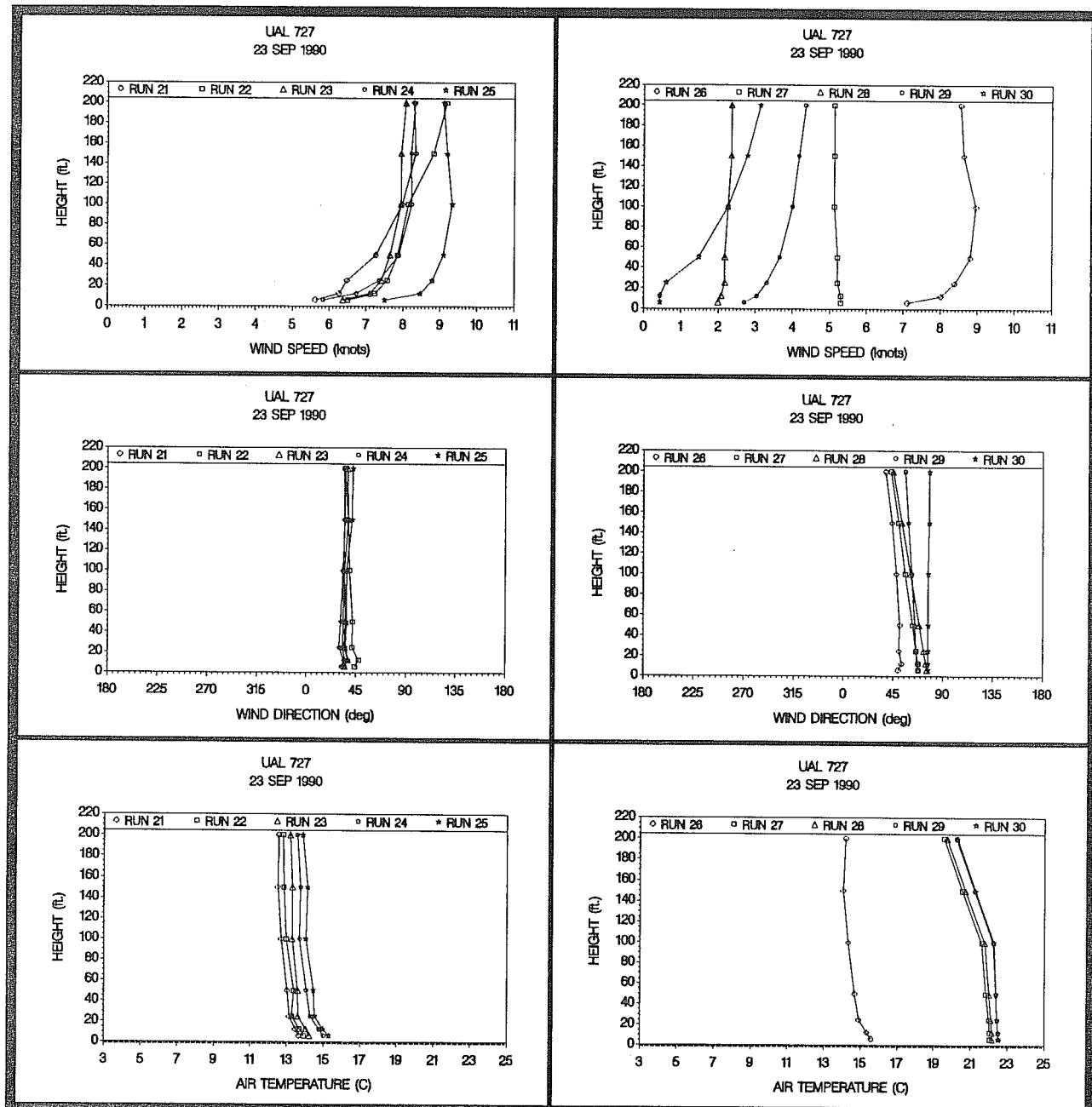
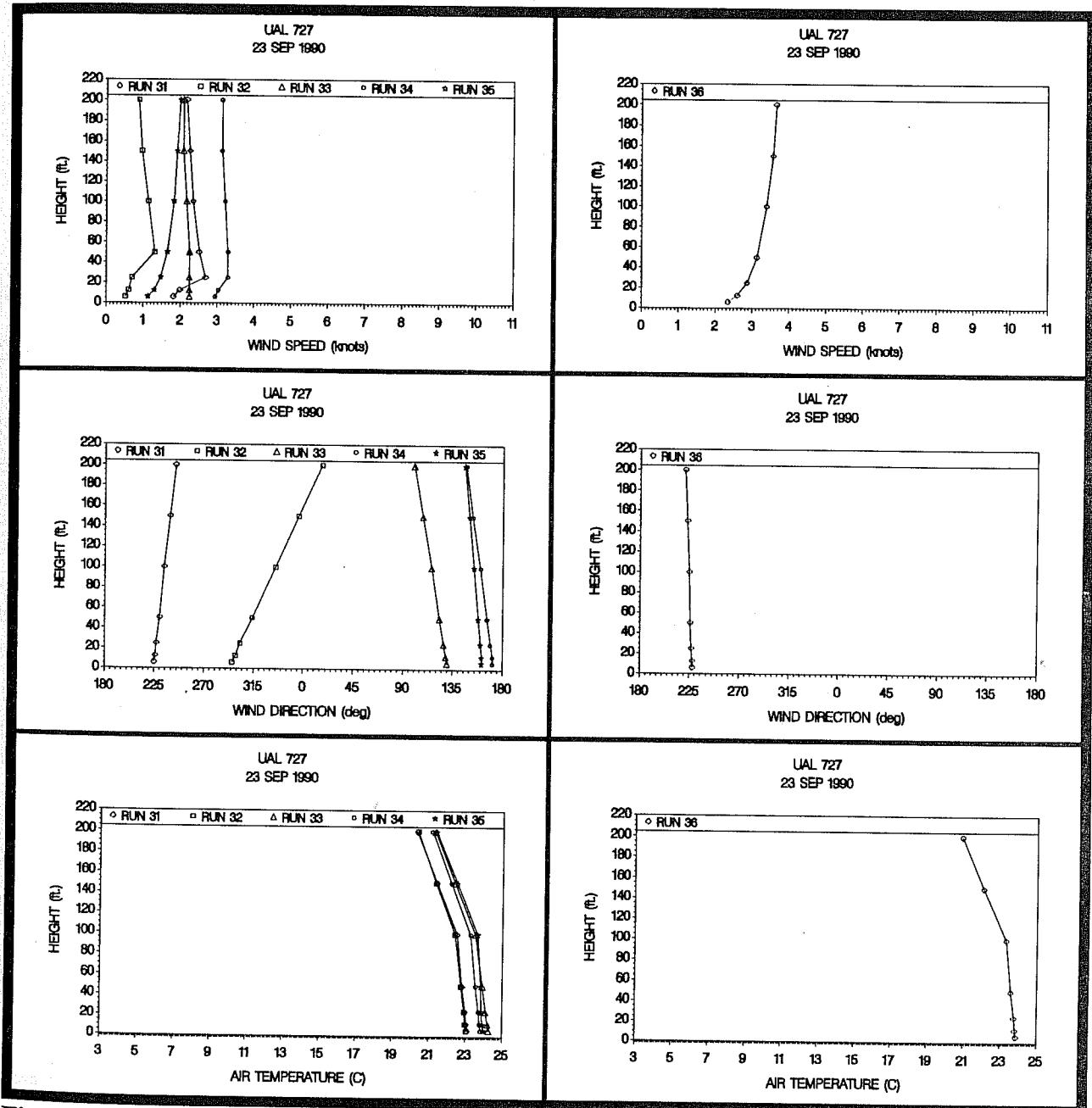


Figure C-9. Wind speed, wind direction, and air temperature profiles from 6.25 to 200 ft AGL for runs 21-25 (left) and 26-30 (right) of the B727-222 on 23 Sep 1990.



**Figure C-10.** Wind speed, wind direction, and air temperature profiles from 6.25 to 200 ft AGL for runs 31-35 (left) and 36 (right) of the B727-222 on 23 Sep 1990.

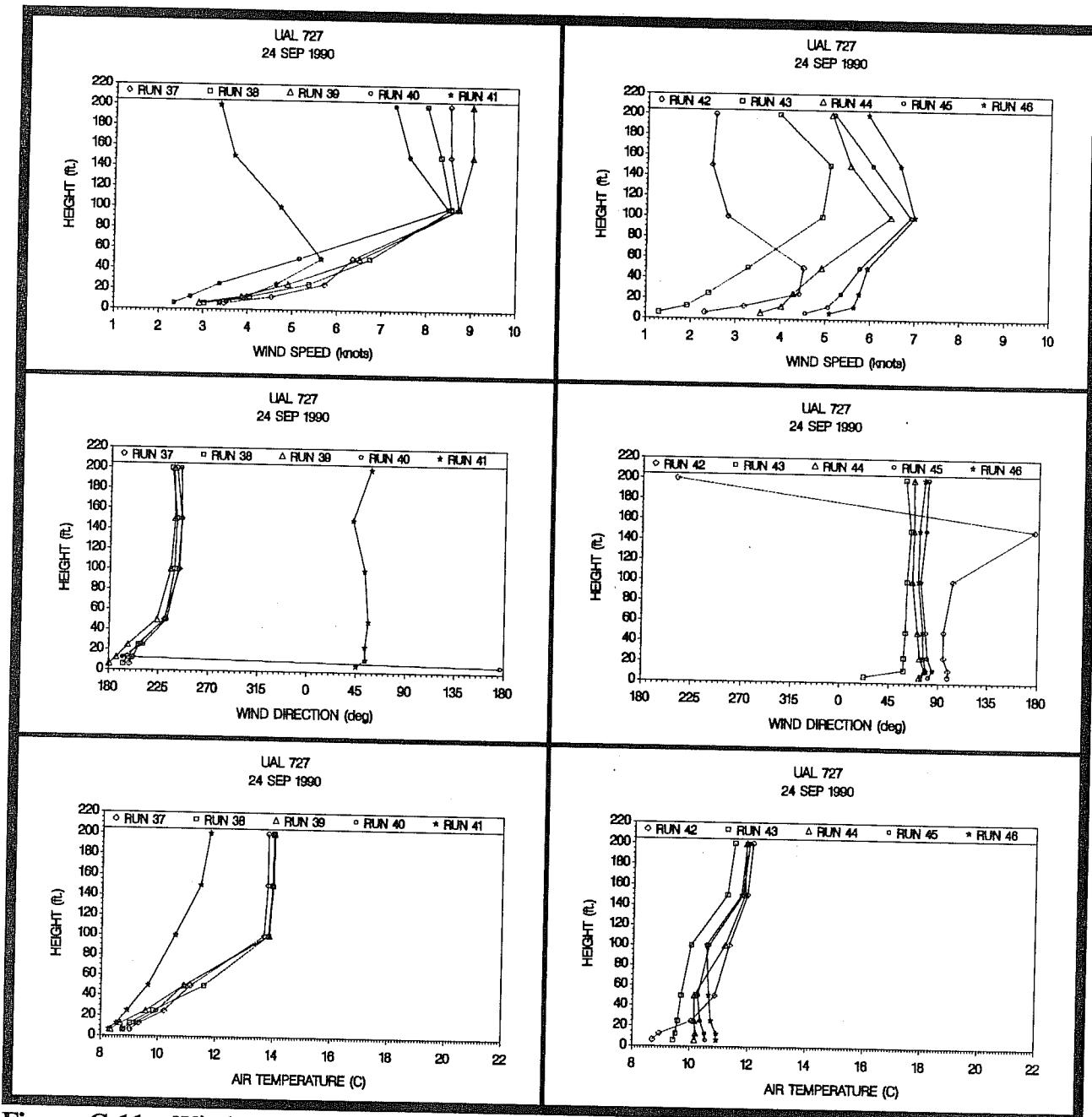
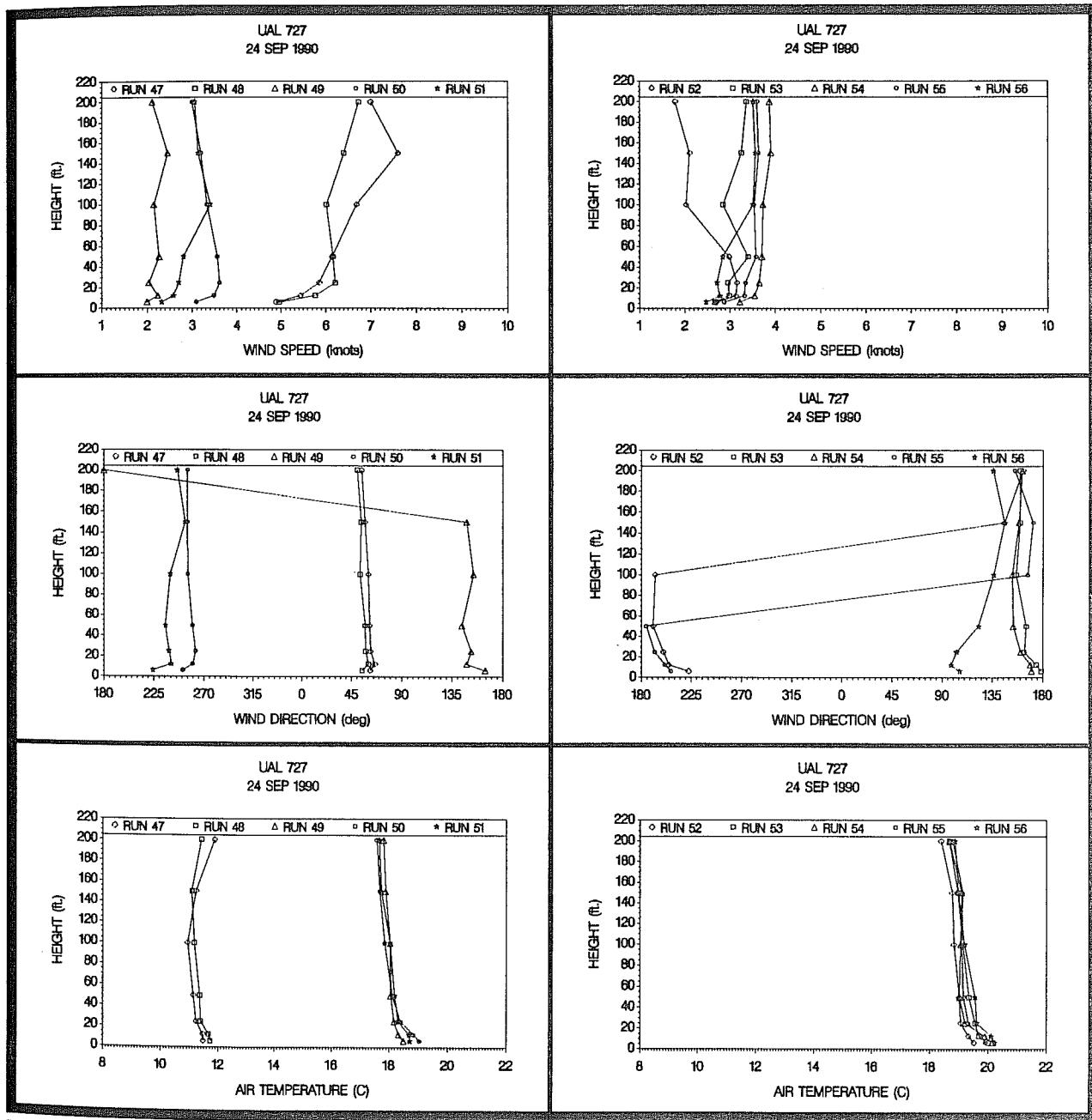


Figure C-11. Wind speed, wind direction, and air temperature profiles from 6.25 to 200 ft AGL for runs 37-41 (left) and 42-46 (right) of the B727-222 on 24 Sep 1990.



**Figure C-12.** Wind speed, wind direction, and air temperature profiles from 6.25 to 200 ft AGL for runs 47-51 (left) and 52-56 (right) of the B727-222 on 24 Sep 1990.

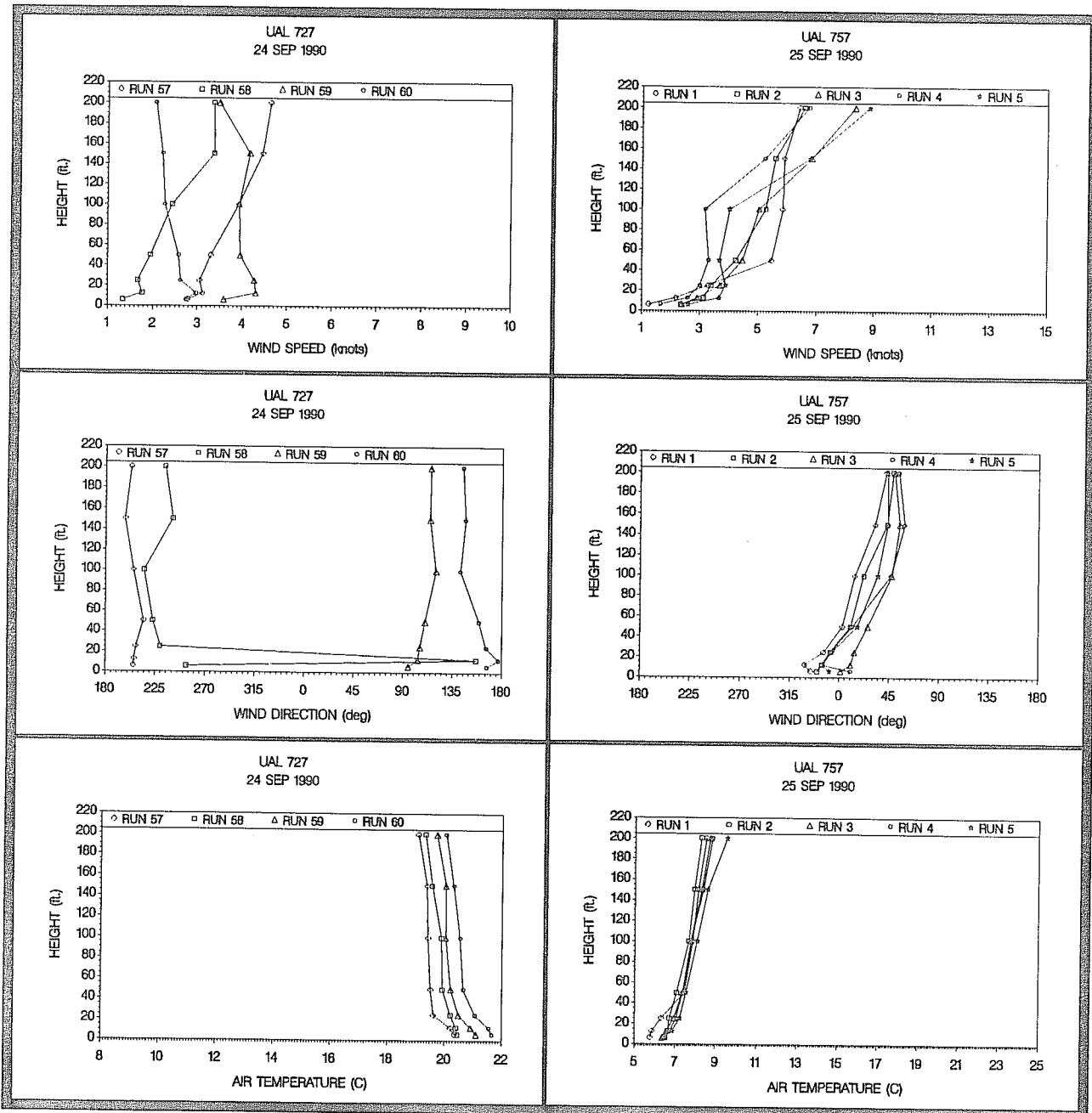
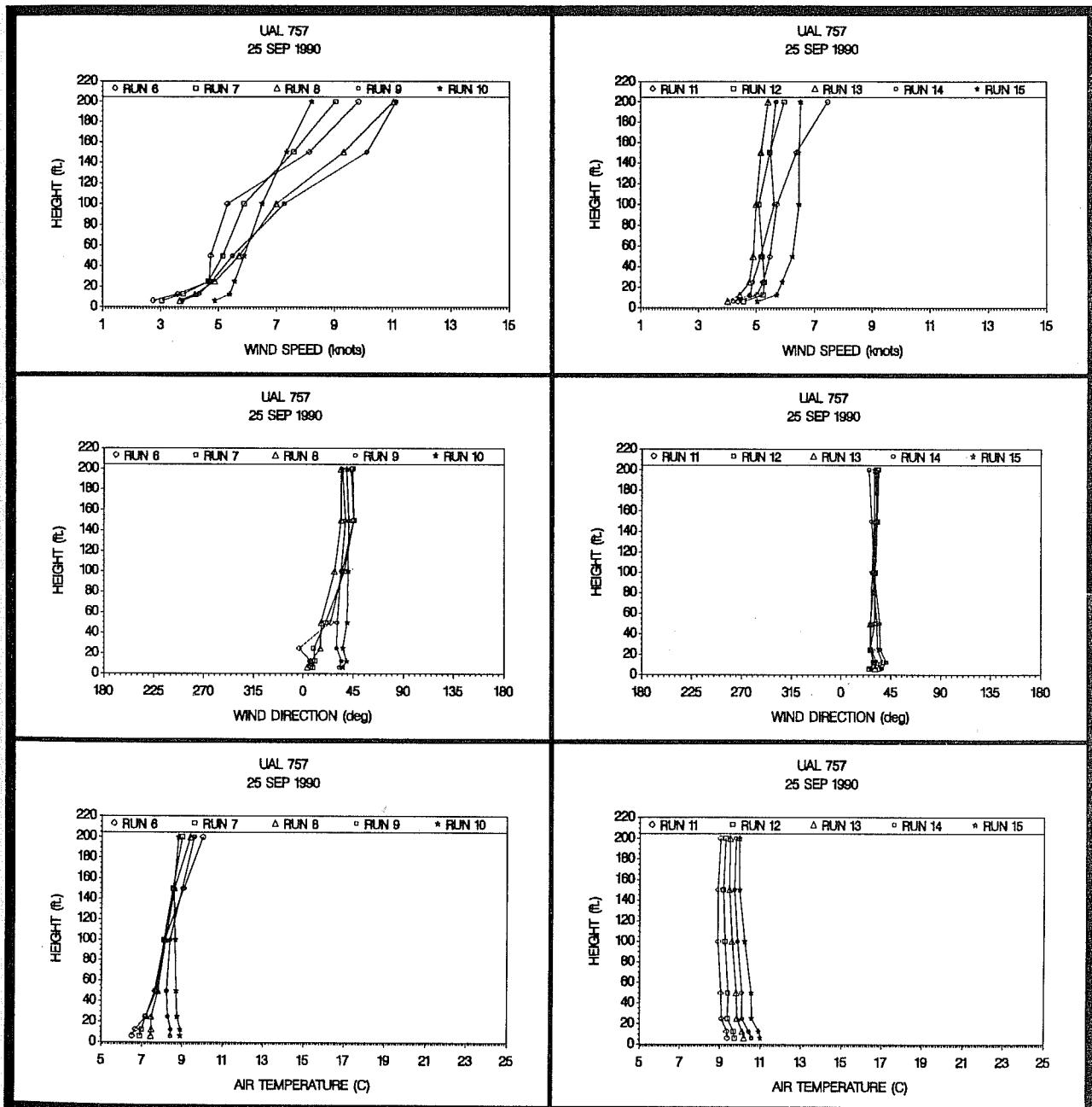


Figure C-13. Wind speed, wind direction, and air temperature profiles from 6.25 to 200 ft AGL for runs 57-60 of the B727-222 on 24 Sep 1990 (left) and runs 1-5 of the B757-200 on 25 Sep 1990.



**Figure C-14.** Wind speed, wind direction, and air temperature profiles from 6.25 to 200 ft AGL for runs 6-10 (left) and 11-15 (right) of the B757-200 on 25 Sep 1990.

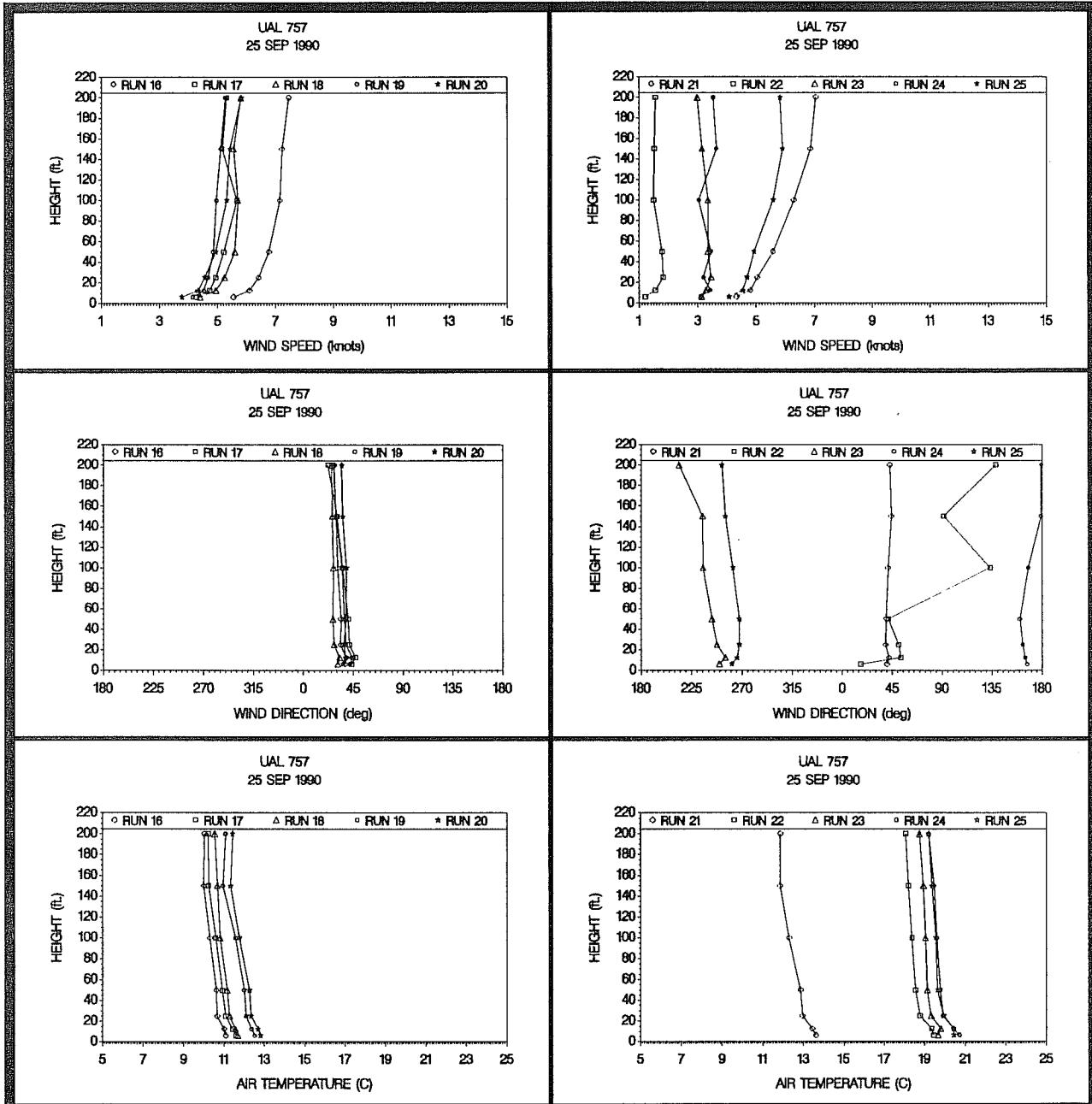
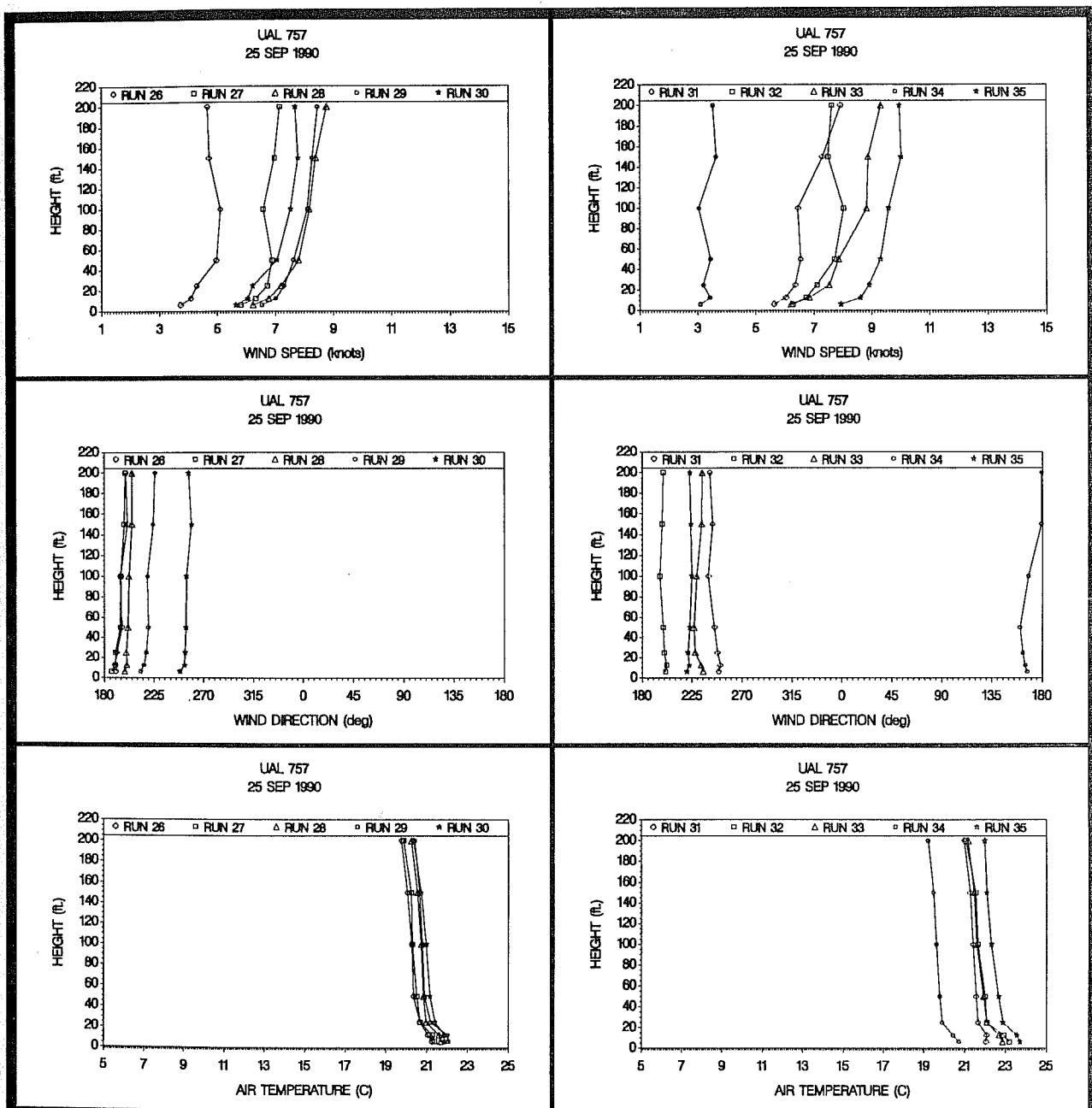


Figure C-15. Wind speed, wind direction, and air temperature profiles from 6.25 to 200 ft AGL for runs 16-20 (left) and 21-25 (right) of the B757-200 on 25 Sep 1990.



**Figure C-16.** Wind speed, wind direction, and air temperature profiles from 6.25 to 200 ft AGL for runs 26-30 (left) and 31-35 (right) of the B757-200 on 25 Sep 1990.

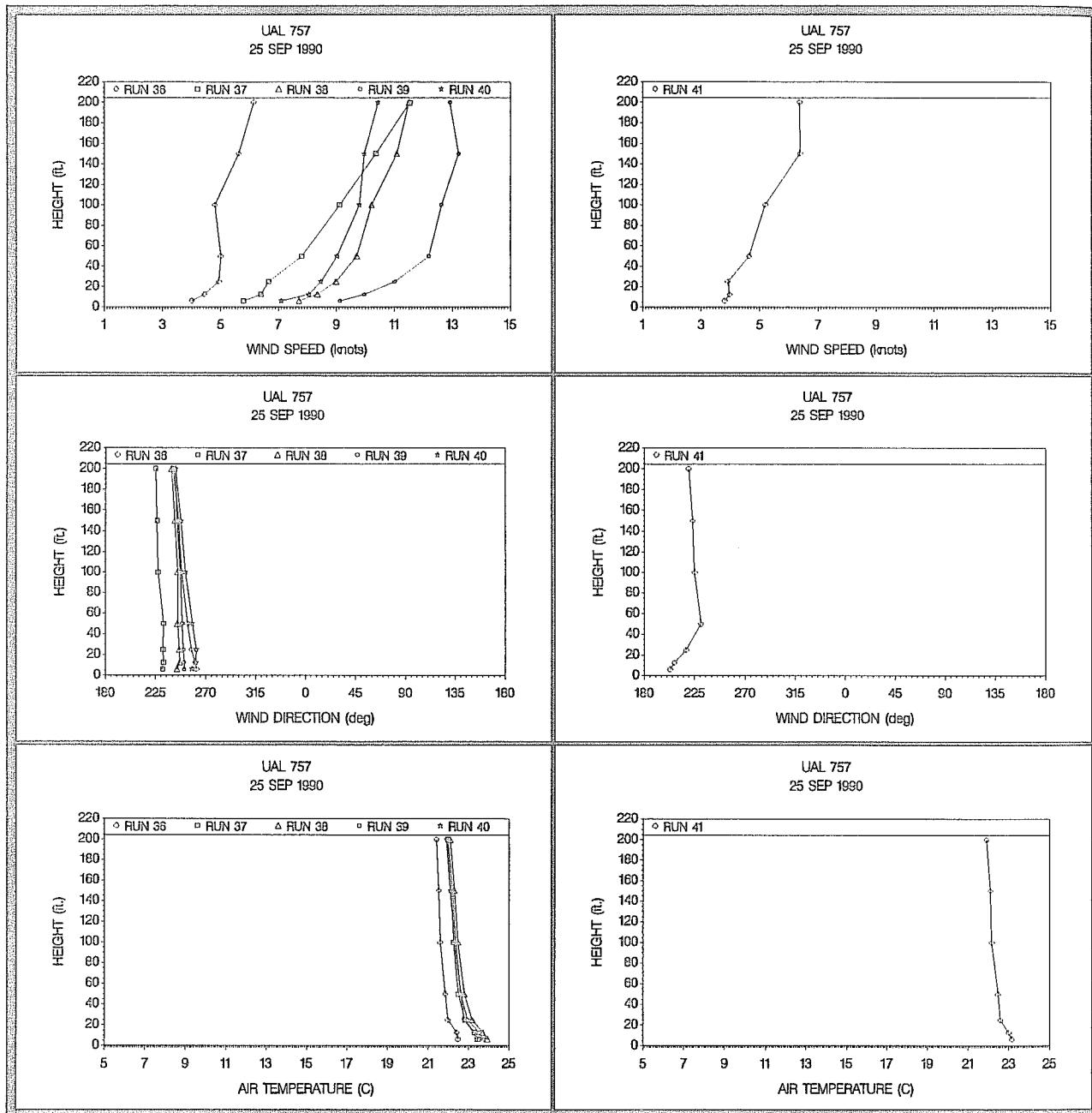
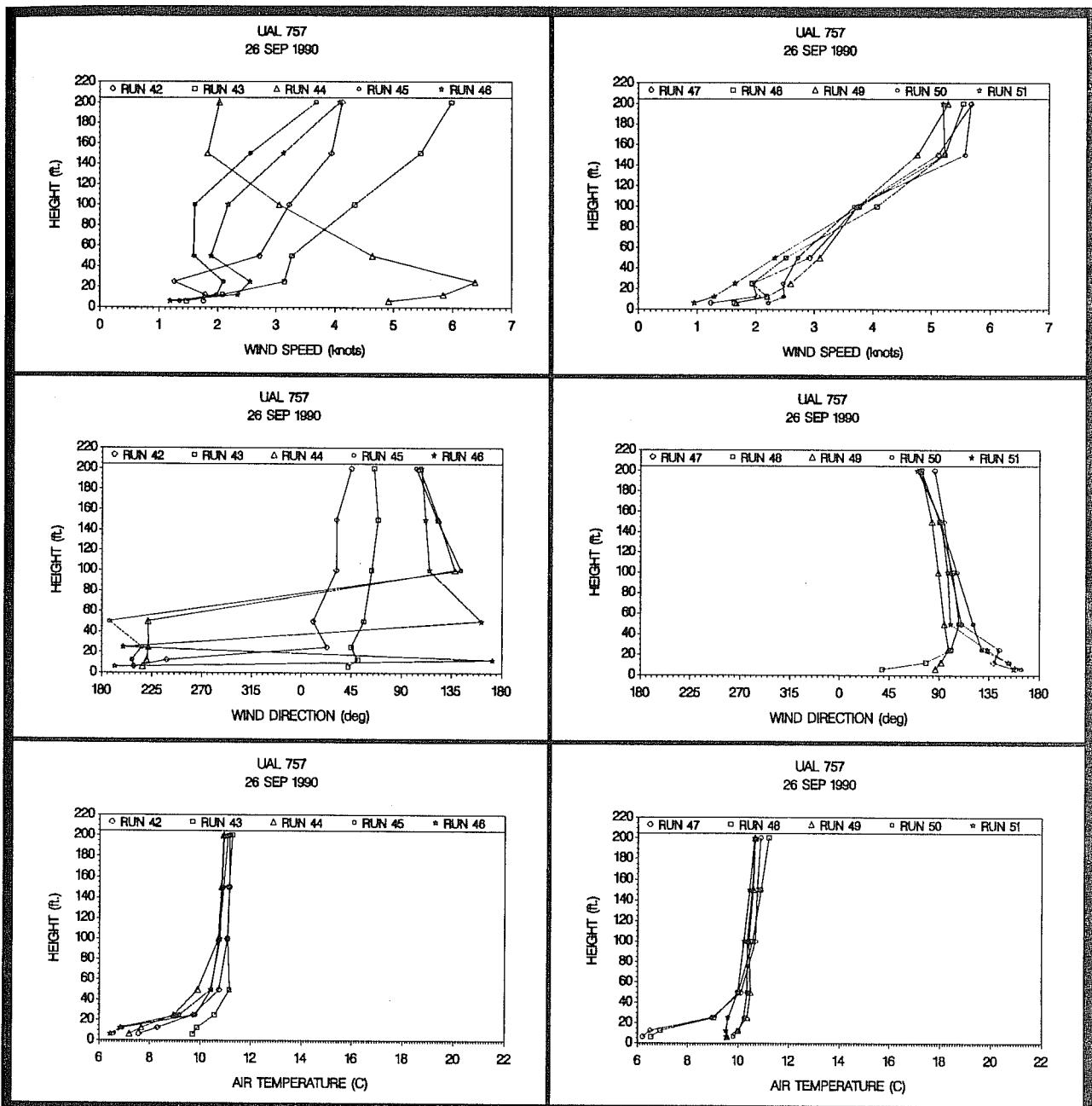


Figure C-17. Wind speed, wind direction, and air temperature profiles from 6.25 to 200 ft AGL for runs 35-40 (left) and 41 (right) of the B757-200 on 25 Sep 1990.



**Figure C-18.** Wind speed, wind direction, and air temperature profiles from 6.25 to 200 ft AGL for runs 42-46 (left) and 47-51 (right) of the B757-200 on 26 Sep 1990.

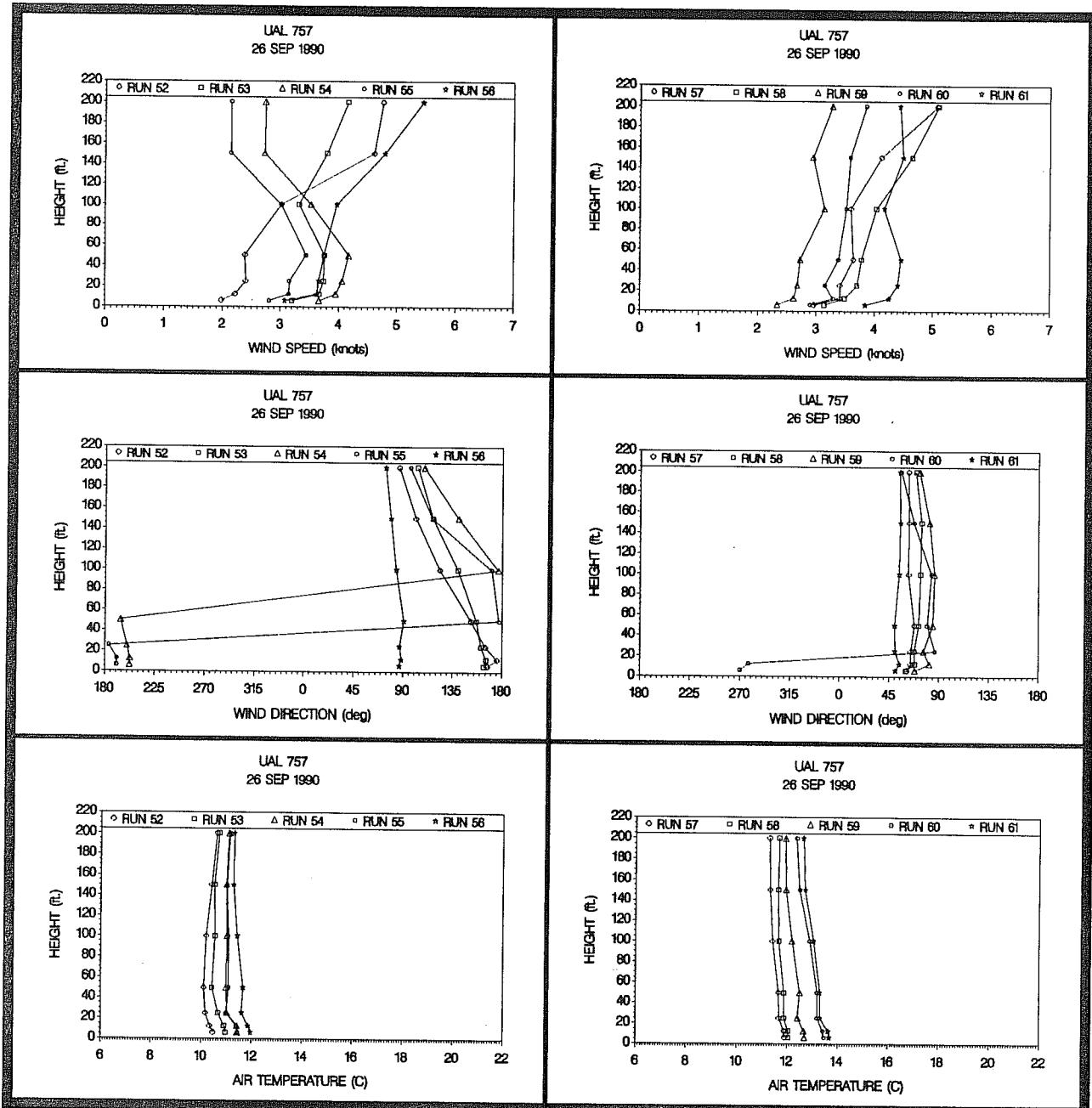
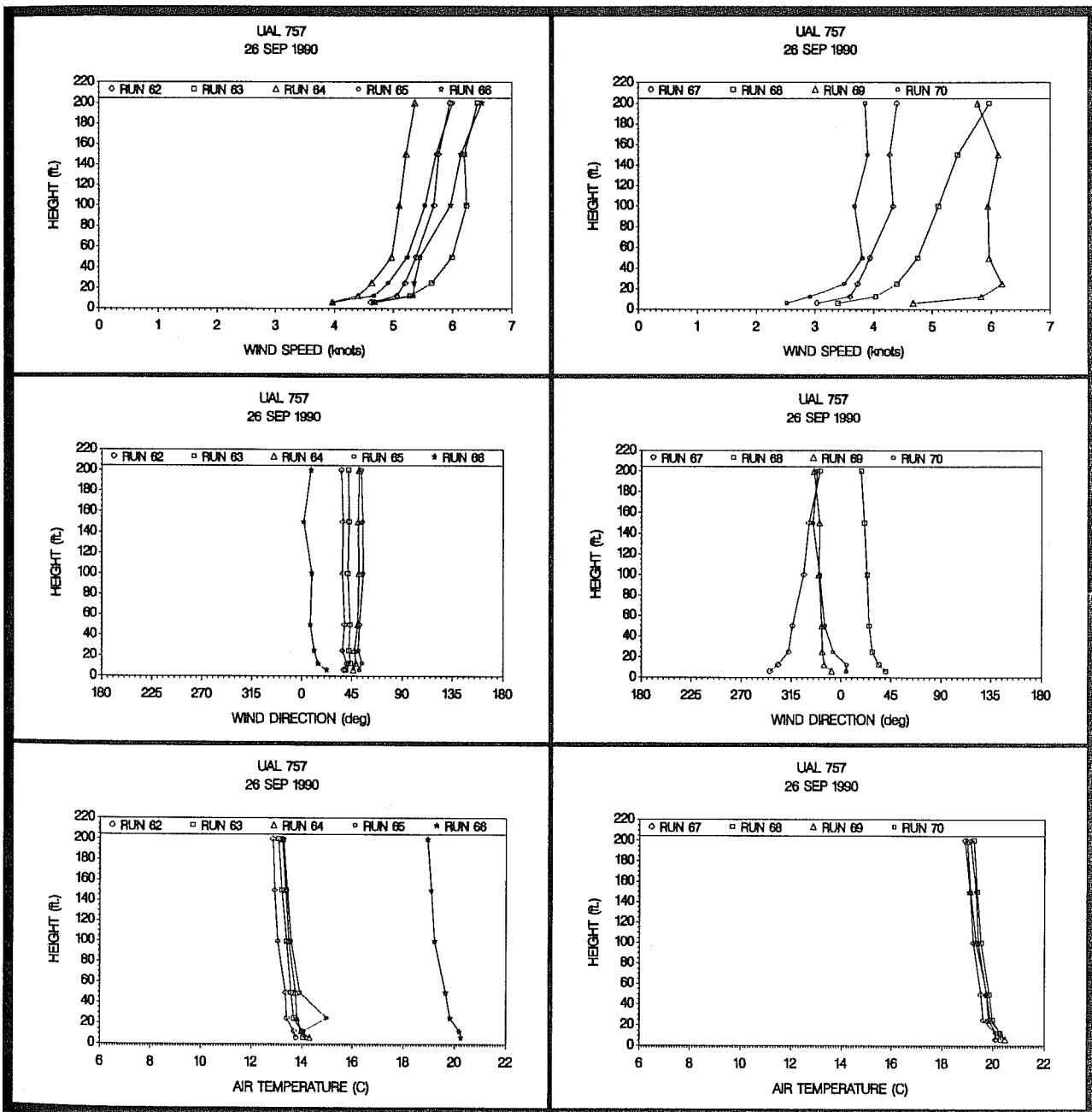


Figure C-19. Wind speed, wind direction, and air temperature profiles from 6.25 to 200 ft AGL for runs 52-56 (left) and 57-61 (right) of the B757-200 on 26 Sep 1990.



**Figure C-20.** Wind speed, wind direction, and air temperature profiles from 6.25 to 200 ft AGL for runs 62-66 (left) and 67-70 (right) of the B757-200 on 26 Sep 1990.

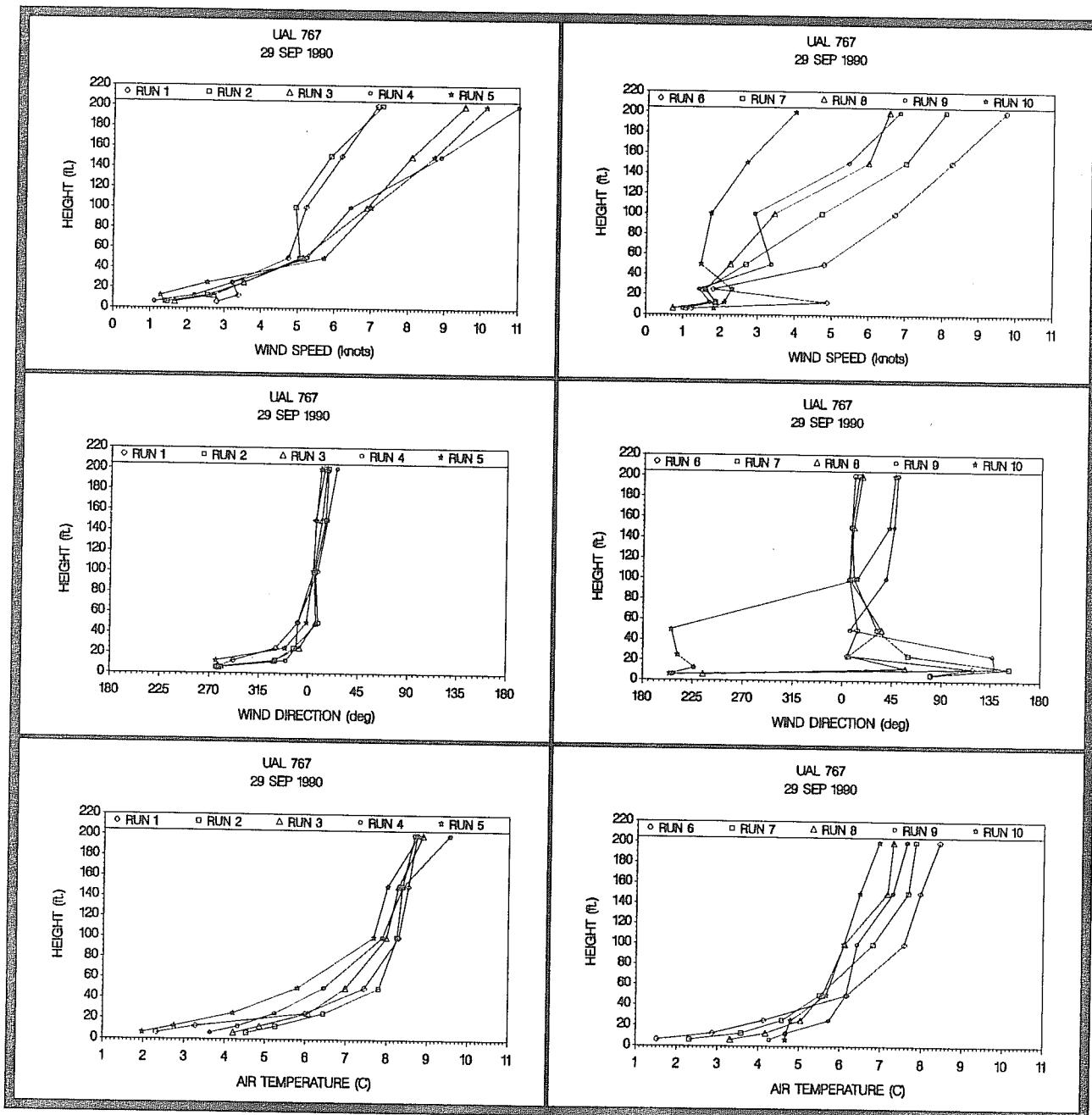
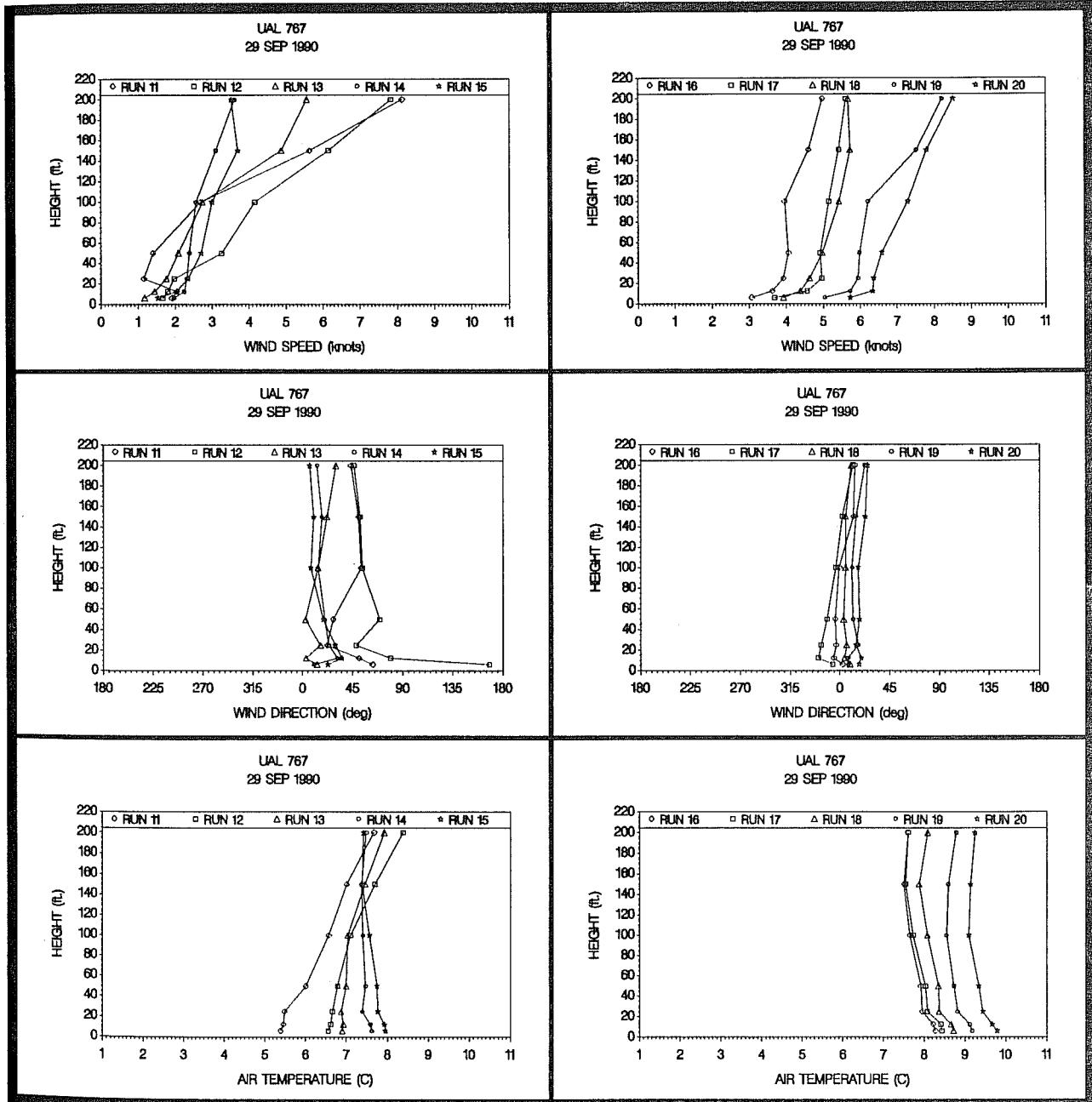


Figure C-21. Wind speed, wind direction, and air temperature profiles from 6.25 to 200 ft AGL for runs 1-5 (left) and 6-10 (right) of the B767-200 on 29 Sep 1990.



**Figure C-22.** Wind speed, wind direction, and air temperature profiles from 6.25 to 200 ft AGL for runs 11-15 (left) and 16-20 (right) of the B767-200 on 29 Sep 1990.

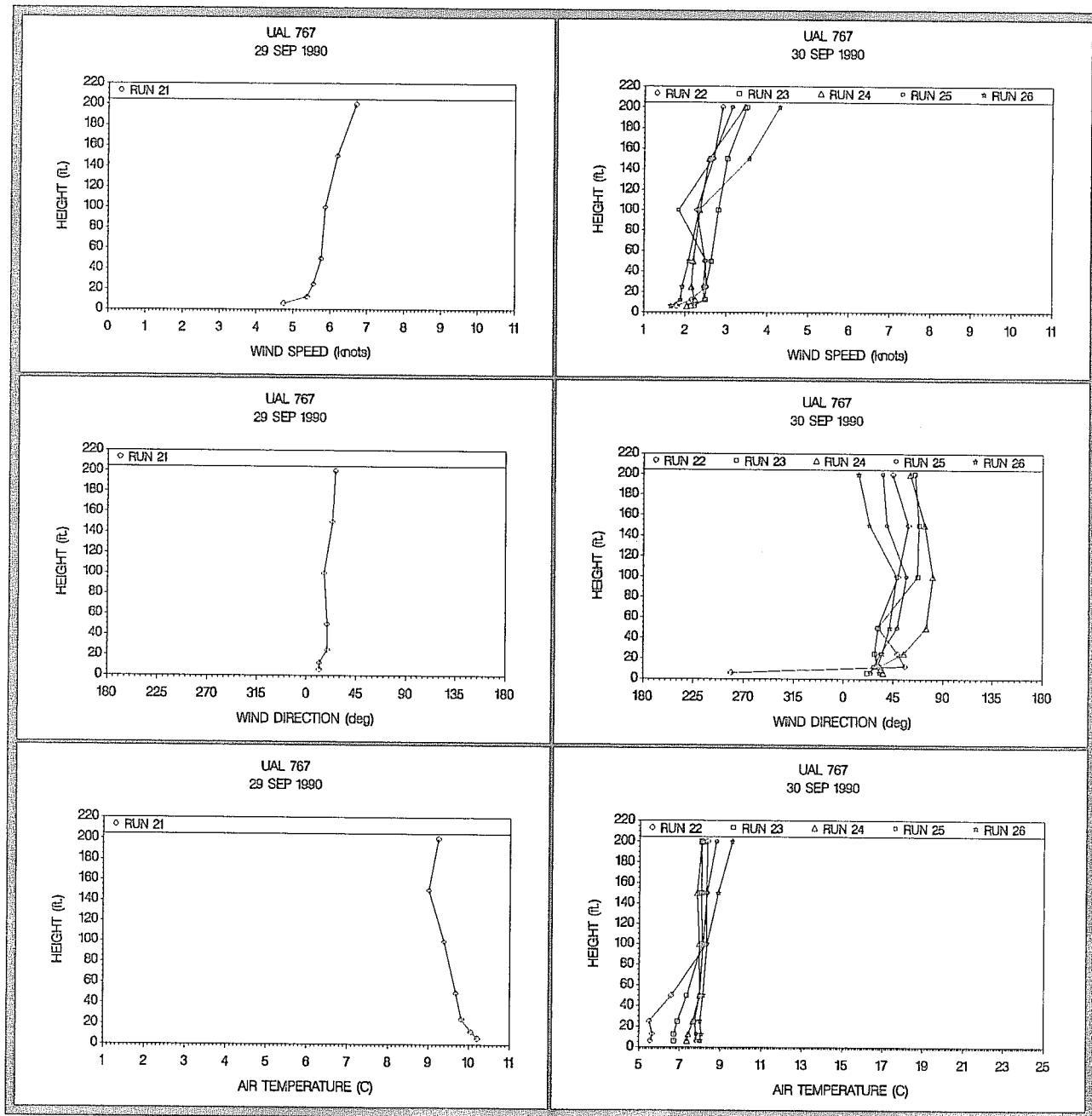


Figure C-23. Wind speed, wind direction, and air temperature profiles from 6.25 to 200 ft AGL for run 21 of the B767-200 on 29 Sep 1990 (left) and runs 22-26 of the B767-200 on 30 Sep 1990 (right).

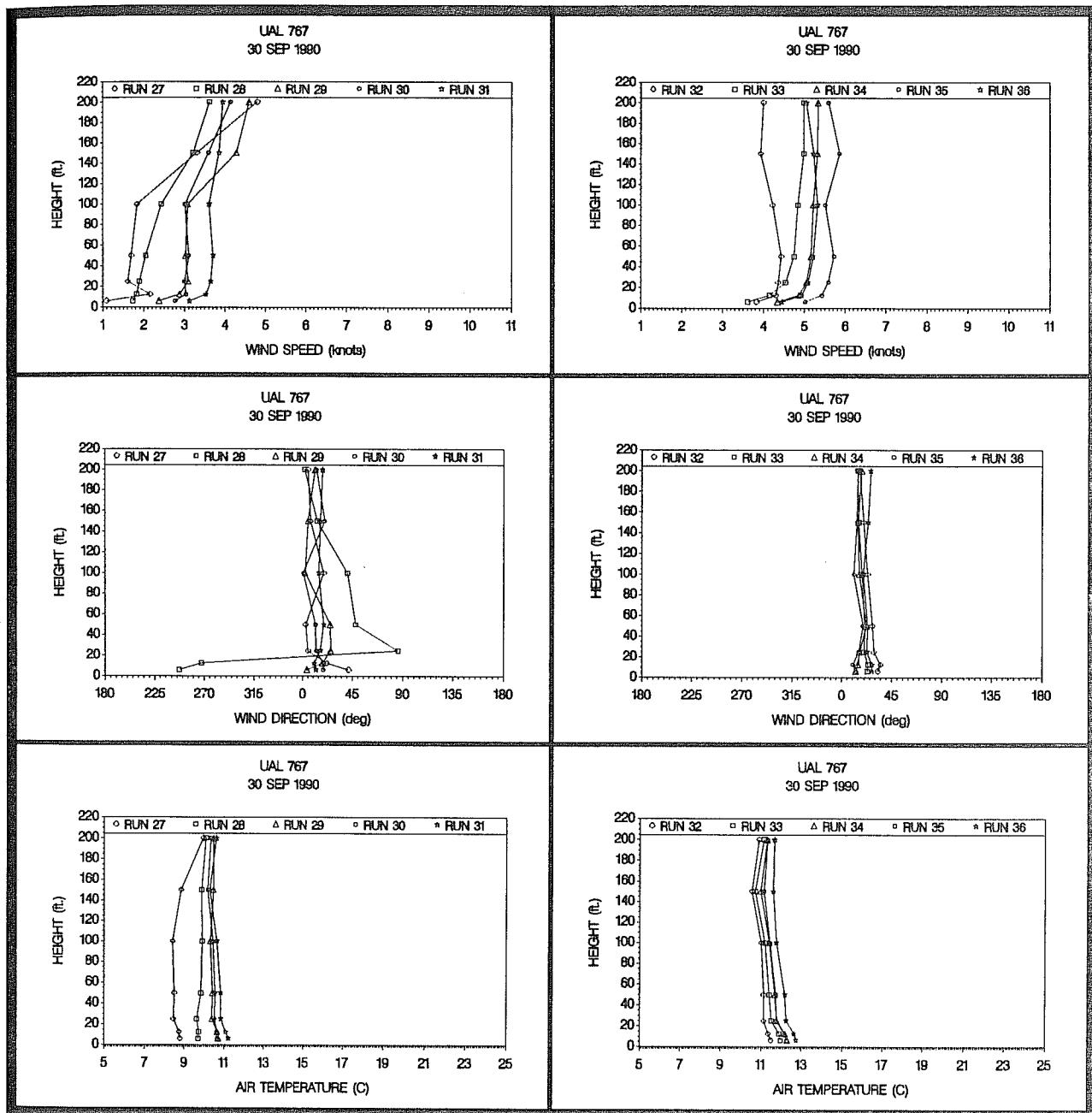


Figure C-24. Wind speed, wind direction, and air temperature profiles from 6.25 to 200 ft AGL for runs 27-31 (left) and 32-36 (right) of the B767-200 on 30 Sep 1990.

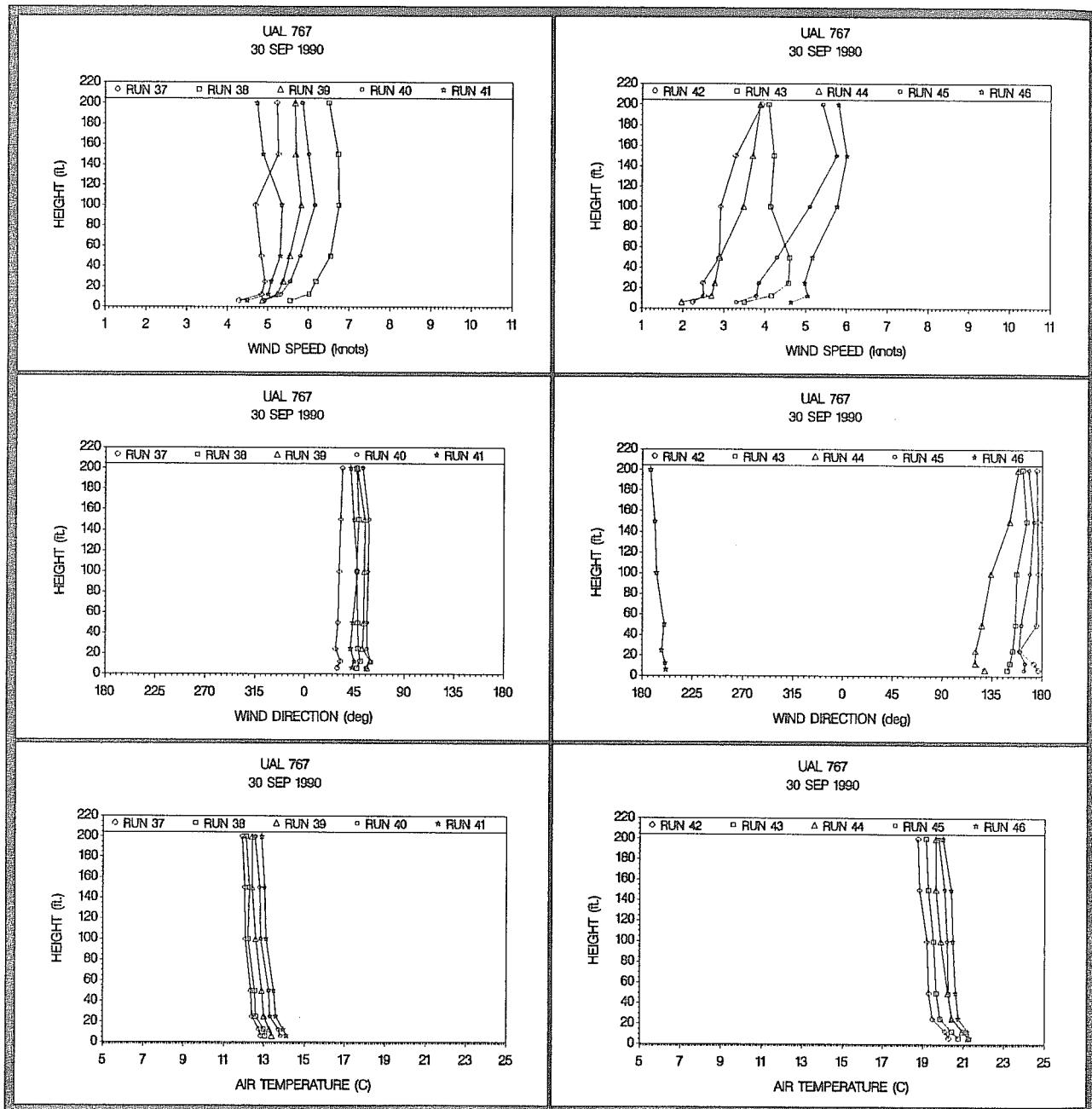
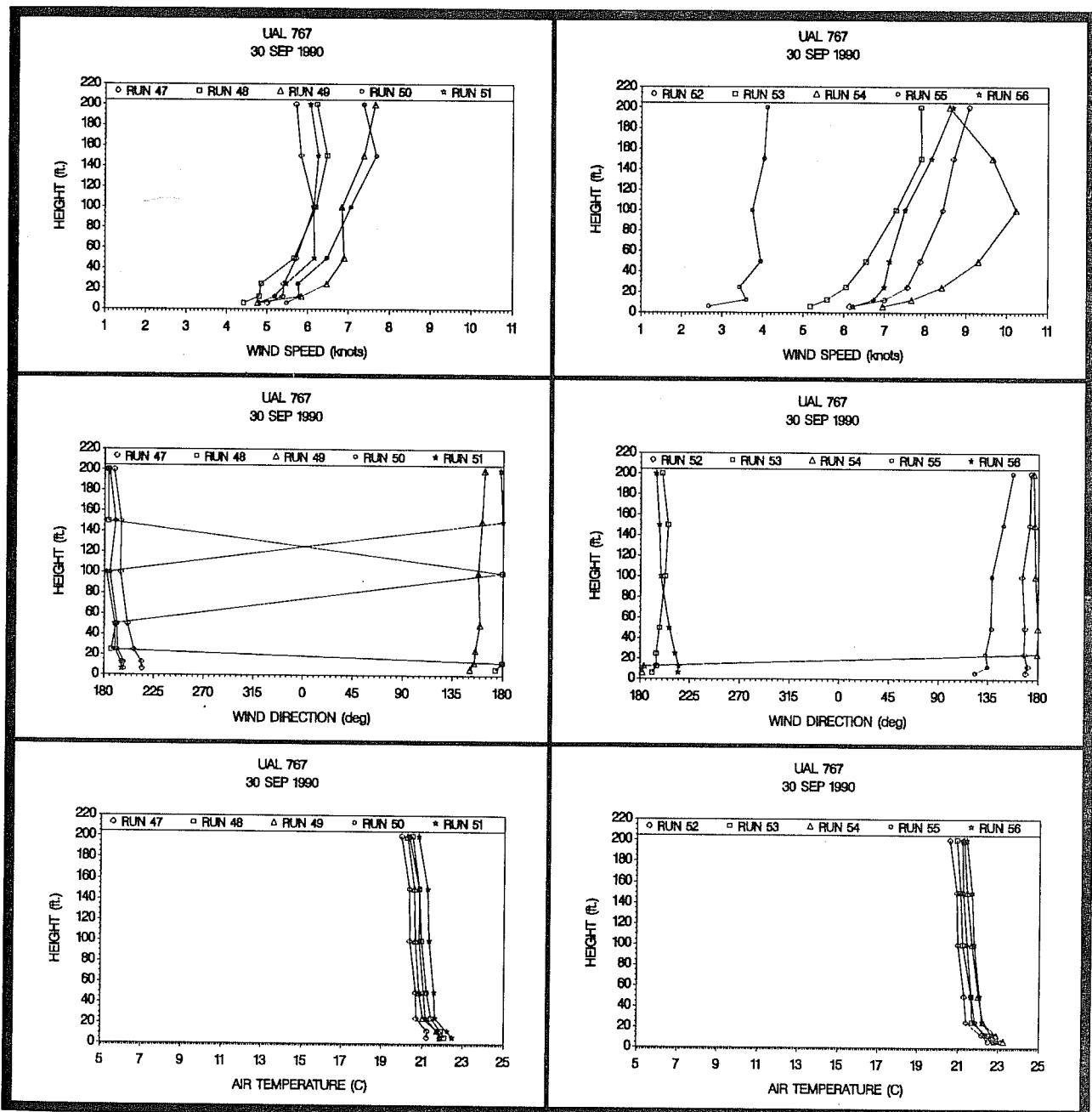


Figure C-25. Wind speed, wind direction, and air temperature profiles from 6.25 to 200 ft AGL for runs 37-41 (left) and 42-46 (right) of the B767-200 on 30 Sep 1990.



**Figure C-26.** Wind speed, wind direction, and air temperature profiles from 6.25 to 200 ft AGL for runs 47-51 (left) and 52-56 (right) of the B767-200 on 30 Sep 1990.

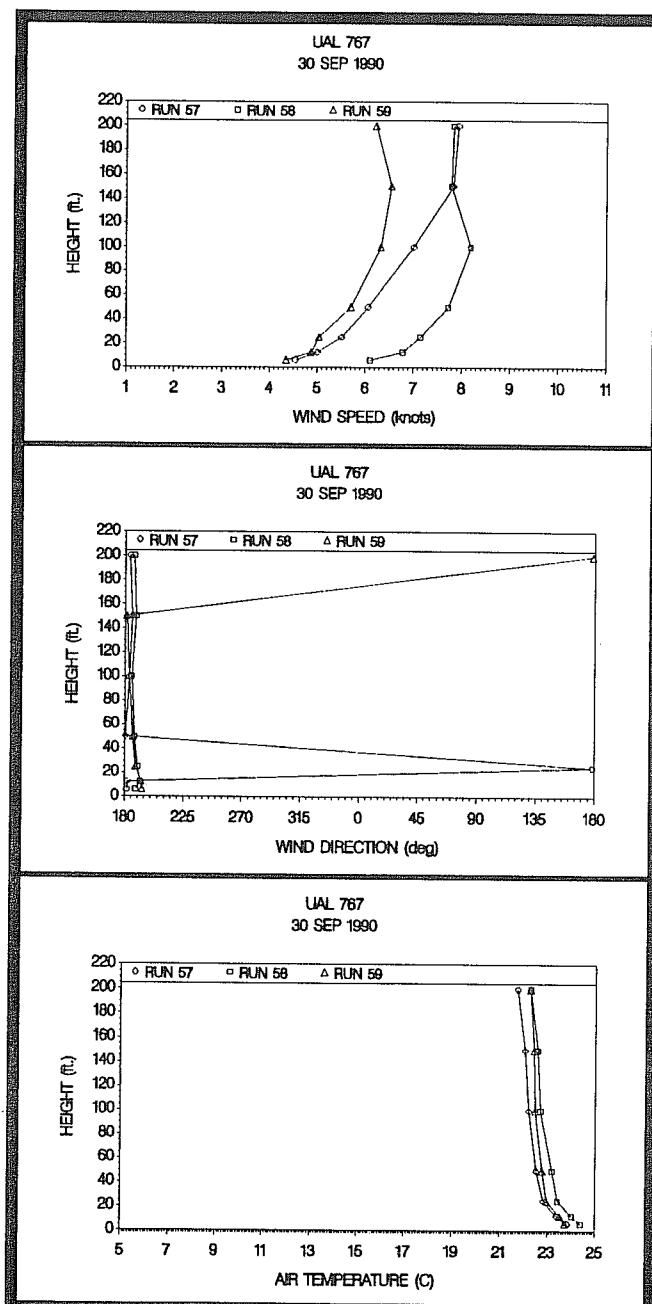


Figure C-27. Wind speed, wind direction, and air temperature profiles from 6.25 to 200 ft AGL for runs 57-59 of the B767-200 on 30 Sep 1990.

## **APPENDIX D**

### **TETHERSONDE METEOROLOGICAL DATA**

## TETHERSONDE METEOROLOGICAL DATA LISTING

The complete listing of the tethersonde meteorological data is included in this appendix.  
The data are defined as follows:

1. Date (DDMMYY YYYY)
2. Calendar day of the year
3. Time of day (HHMMSS)
4. Sounding number (numbered sequentially each day; not to be confused with run number)
5. Height of the sonde above ground level (ft)
6. Wind speed (knots)
7. Wind direction (deg. true)
8. Air temperature ( $^{\circ}$ C)
9. Wet bulb temperature ( $^{\circ}$ C)
10. Dew point temperature ( $^{\circ}$ C)
11. Relative humidity (%)

Date	Day of Yr.	Time of Day	Sound. No.	Height (ft)	Wind Speed (kt)	Wind Dir. (Deg)	Air Temp. (C)	Wet Bulb (C)	Dew Point (C)	Rel. Hum. (%)
21SEP1990	264	103241	1	769	5.2	12	10.1	5.1	-0.1	49.2
21SEP1990	264	103530	1	639	6.4	17	10.6	5.5	0.3	48.8
21SEP1990	264	103729	1	608	7.0	22	10.4	5.4	0.3	49.4
21SEP1990	264	103908	1	536	6.8	9	10.9	5.7	0.4	48.2
21SEP1990	264	104028	1	437	7.0	18	11.2	5.8	0.3	46.9
21SEP1990	264	104157	1	341	7.2	14	11.4	5.9	0.3	46.4
21SEP1990	264	104327	1	269	6.2	20	11.8	6.2	0.5	45.6
21SEP1990	264	104446	1	173	4.3	16	11.7	6.2	0.6	46.5
21SEP1990	264	104606	1	92	3.3	30	12.5	6.5	0.5	43.7
21SEP1990	264	115023	2	674	2.7	27	14.4	7.5	0.8	39.4
21SEP1990	264	115233	2	631	3.7	3	14.2	7.4	0.9	40.1
21SEP1990	264	115442	2	558	0.2	22	13.9	7.3	1.1	41.6
21SEP1990	264	115800	2	412	3.9	63	14.5	7.5	0.9	39.5
21SEP1990	264	115940	2	363	2.3	50	14.8	7.7	1.1	39.2
21SEP1990	264	120457	2	265	2.9	11	15.6	8.3	1.5	38.4
21SEP1990	264	121324	2	175	2.7	69	16.0	8.5	1.7	38.0
21SEP1990	264	121742	2	92	4.1	39	15.9	8.5	1.7	38.2
23SEP1990	266	92455	1	99	7.2	17	11.5	5.0	-2.6	37.2
23SEP1990	266	92607	1	198	9.9	26	11.6	5.0	-2.6	37.1
23SEP1990	266	92718	1	286	10.1	17	11.7	5.1	-2.3	37.5
23SEP1990	266	92829	1	362	15.0	22	12.6	5.6	-2.3	35.4
23SEP1990	266	92930	1	430	15.6	24	13.1	6.1	-1.3	36.9
23SEP1990	266	93032	1	504	15.7	23	13.1	6.4	-0.5	39.1
23SEP1990	266	93254	2	541	13.2	31	13.2	6.8	0.5	41.6
23SEP1990	266	93356	2	464	13.2	17	12.8	6.2	-0.8	39.1
23SEP1990	266	93507	2	367	10.1	21	12.1	5.5	-1.7	38.1
23SEP1990	266	93558	2	297	10.5	19	12.6	5.8	-1.7	37.1
23SEP1990	266	93730	2	190	7.6	28	12.4	5.5	-2.3	35.9
23SEP1990	266	93831	2	95	7.6	15	13.1	5.9	-2.2	34.4
23SEP1990	266	93901	3	99	5.8	28	13.1	5.8	-2.5	33.9
23SEP1990	266	93952	3	189	9.1	9	12.8	5.8	-2.1	35.5
23SEP1990	266	94104	3	276	11.5	17	12.2	5.4	-2.2	36.5
23SEP1990	266	94215	3	361	8.2	18	12.2	5.4	-2.1	36.9
23SEP1990	266	94347	3	442	13.8	18	12.8	5.9	-1.6	36.9
23SEP1990	266	94458	3	515	16.1	30	13.3	6.2	-1.2	36.6
23SEP1990	266	94610	3	575	16.1	27	13.0	5.9	-1.9	35.6
23SEP1990	266	94640	4	486	16.9	24	12.8	5.9	-1.6	36.7
23SEP1990	266	94752	4	423	15.9	37	12.9	6.3	-0.6	39.4
23SEP1990	266	94843	4	352	13.8	23	13.3	6.5	-0.6	38.5
23SEP1990	266	94934	4	276	11.9	18	12.7	5.9	-1.4	37.5
23SEP1990	266	95014	4	238	11.7	20	12.7	5.7	-2.0	36.0
23SEP1990	266	95116	4	156	10.5	30	12.9	5.9	-1.6	36.6
23SEP1990	266	121349	5	118	7.0	36	20.7	10.5	1.8	28.5
23SEP1990	266	121500	5	236	8.9	11	21.2	10.8	2.1	28.3
23SEP1990	266	121632	5	333	10.1	3	20.8	10.8	2.6	30.0
23SEP1990	266	121755	5	369	8.9	8	19.9	10.2	1.9	30.2

Date	Day of Yr.	Time of Sound.	No.	Height (ft)	Wind Speed (kt)	Wind Dir. (Deg)	Air Temp. (C)	Wet Bulb (C)	Dew Point (C)	Rel. Hum. (%)
23SEP1990	266	121936	5	492	11.1	24	19.7	10.2	2.2	31.3
23SEP1990	266	122229	5	640	12.8	27	19.8	10.0	1.6	29.6
23SEP1990	266	122937	6	541	8.6	21	19.7	10.0	1.6	29.9
23SEP1990	266	123230	6	381	8.9	359	20.0	10.3	2.1	30.4
23SEP1990	266	123342	6	314	7.6	9	20.4	10.4	1.8	29.0
23SEP1990	266	123443	6	243	7.0	5	20.6	10.5	1.8	28.7
23SEP1990	266	123554	6	164	8.2	3	21.1	10.9	2.5	29.2
23SEP1990	266	123715	6	82	7.6	355	21.1	10.8	2.1	28.6
23SEP1990	266	123827	7	115	7.8	351	22.1	11.1	2.0	26.5
23SEP1990	266	124150	7	346	7.2	23	21.3	10.9	2.4	28.6
23SEP1990	266	124312	7	413	8.0	35	21.4	10.9	2.2	28.0
23SEP1990	266	124433	7	471	8.7	44	20.8	10.5	1.9	28.6
23SEP1990	266	124534	7	607	12.6	43	20.9	10.7	2.4	29.2
23SEP1990	266	124656	7	678	6.0	352	21.1	10.8	2.4	28.9
23SEP1990	266	124706	8	709	10.5	349	20.6	10.8	2.9	31.0
23SEP1990	266	124817	8	624	2.1	3	20.3	10.5	2.3	30.4
23SEP1990	266	124929	8	536	6.0	11	20.6	10.6	2.2	29.6
23SEP1990	266	125040	8	443	7.4	16	21.3	10.8	2.0	27.9
23SEP1990	266	125151	8	331	7.4	37	21.5	10.9	1.9	27.3
23SEP1990	266	125414	8	156	10.5	4	22.0	11.3	2.5	27.7
23SEP1990	266	125434	9	110	7.8	16	22.0	11.2	2.2	27.1
23SEP1990	266	125545	9	220	7.0	72	23.3	11.7	2.2	25.1
23SEP1990	266	125717	9	302	8.0	32	21.9	11.1	2.1	27.1
23SEP1990	266	125859	9	386	4.7	53	20.9	10.9	2.8	30.4
23SEP1990	266	130020	9	484	9.9	10	21.5	11.0	2.3	28.2
23SEP1990	266	130152	9	527	6.4	31	20.9	10.7	2.3	29.2
23SEP1990	266	130344	9	701	4.5	27	21.1	10.8	2.4	28.9
23SEP1990	266	131142	10	628	7.4	9	20.5	10.5	2.2	29.7
23SEP1990	266	131314	10	439	5.8	23	21.1	10.9	2.5	29.2
23SEP1990	266	131435	10	365	4.7	17	21.2	11.0	2.7	29.5
23SEP1990	266	131516	10	262	3.3	5	21.4	11.1	2.5	28.8
23SEP1990	266	131708	10	208	2.9	284	22.3	11.5	2.8	27.8
23SEP1990	266	131850	10	104	1.9	323	22.5	11.7	3.2	28.2
23SEP1990	266	131910	11	85	0.8	48	22.6	11.8	3.2	28.1
23SEP1990	266	132032	11	170	5.8	24	22.7	11.6	2.8	27.0
23SEP1990	266	132143	11	259	7.4	41	22.8	11.5	2.4	26.2
23SEP1990	266	132304	11	374	2.7	60	22.3	11.5	3.0	28.1
23SEP1990	266	132456	11	473	3.7	53	21.5	11.1	2.6	28.7
23SEP1990	266	132648	11	566	3.7	50	21.4	11.1	2.8	29.4
23SEP1990	266	132901	11	703	6.4	27	22.3	11.3	2.4	27.0
23SEP1990	266	133255	12	698	4.5	16	22.5	11.7	3.3	28.4
23SEP1990	266	133356	12	585	3.7	79	22.8	11.5	2.4	26.1
23SEP1990	266	133457	12	463	4.9	98	22.2	11.4	2.7	27.7
23SEP1990	266	133558	12	377	2.5	95	22.3	11.4	2.6	27.5
23SEP1990	266	133659	12	293	2.9	355	22.3	11.4	2.7	27.7
23SEP1990	266	133831	12	204	2.9	330	22.6	11.5	2.5	26.7
23SEP1990	266	133942	12	102	4.3	338	22.7	11.6	2.6	26.7
24SEP1990	267	70359	1	584	13.2	210	13.8	10.0	7.2	64.4

Date	Day of Yr.	Time of Day	Sound. No.	Height (ft)	Wind Speed (kt)	Wind Dir. (Deg)	Air Temp. (C)	Wet Bulb (C)	Dew Point (C)	Rel. Hum. (%)
24SEP1990	267	70551	1	524	10.5	208	13.8	10.1	7.4	65.0
24SEP1990	267	70713	1	428	10.3	208	13.9	10.2	7.4	64.9
24SEP1990	267	70834	1	333	9.1	205	13.4	10.0	7.4	67.0
24SEP1990	267	70936	1	261	8.0	211	13.3	9.8	7.2	66.6
24SEP1990	267	71057	1	158	8.7	221	13.5	9.9	7.2	65.7
24SEP1990	267	71633	2	90	8.2	227	13.4	9.9	7.3	66.5
24SEP1990	267	71836	2	180	8.6	218	13.7	10.1	7.3	65.4
24SEP1990	267	71937	2	263	9.3	207	14.0	10.2	7.3	64.3
24SEP1990	267	72048	2	346	10.5	206	14.0	10.2	7.4	64.4
24SEP1990	267	72210	2	432	10.5	210	13.8	10.1	7.4	65.5
24SEP1990	267	72331	2	521	12.1	201	13.7	10.1	7.5	66.0
24SEP1990	267	72534	2	596	12.8	205	13.6	10.0	7.4	66.4
24SEP1990	267	72736	3	599	12.6	202	13.5	10.0	7.4	66.5
24SEP1990	267	72918	3	521	11.3	202	13.6	10.1	7.5	66.5
24SEP1990	267	73019	3	455	9.1	204	13.6	10.1	7.6	66.9
24SEP1990	267	73130	3	365	8.6	205	13.5	10.1	7.6	67.3
24SEP1990	267	73221	3	300	9.5	218	13.5	10.0	7.4	66.5
24SEP1990	267	73343	3	176	6.0	222	13.8	10.2	7.6	65.9
24SEP1990	267	73454	3	88	7.8	223	13.8	10.2	7.6	66.4
24SEP1990	267	73727	4	82	4.1	211	12.1	9.3	7.2	71.9
24SEP1990	267	73919	4	164	6.4	215	12.7	9.6	7.3	69.3
24SEP1990	267	74000	4	228	5.4	218	13.3	9.6	6.7	64.3
24SEP1990	267	74121	4	355	4.7	225	13.4	9.9	7.2	66.1
24SEP1990	267	74243	4	450	6.2	226	13.3	9.8	7.3	67.1
24SEP1990	267	74344	4	528	7.0	234	13.2	9.8	7.3	67.5
24SEP1990	267	74536	4	608	7.0	220	12.9	9.7	7.3	68.6
24SEP1990	267	74718	5	638	6.8	220	12.8	9.6	7.2	68.4
24SEP1990	267	74819	5	578	4.9	224	13.0	9.7	7.3	68.1
24SEP1990	267	74931	5	480	3.5	241	13.1	9.8	7.3	67.9
24SEP1990	267	75102	5	393	6.8	202	13.0	9.7	7.2	68.1
24SEP1990	267	75608	5	304	3.1	40	11.5	8.4	5.8	68.0
24SEP1990	267	75740	5	202	4.5	37	11.9	8.5	5.7	66.2
24SEP1990	267	75942	5	101	7.4	36	11.0	7.2	3.9	61.4
24SEP1990	267	80225	6	178	4.5	46	12.0	8.2	5.1	62.6
24SEP1990	267	80508	6	267	4.9	26	12.0	8.4	5.5	64.6
24SEP1990	267	80650	6	387	1.7	11	11.6	8.5	6.0	68.4
24SEP1990	267	80812	6	482	1.7	250	11.9	9.1	7.0	71.6
24SEP1990	267	81004	6	553	4.5	241	12.6	9.5	7.2	69.7
24SEP1990	267	81227	6	636	5.2	238	12.6	9.5	7.2	69.5
24SEP1990	267	82056	7	640	6.2	234	12.8	9.7	7.3	69.1
24SEP1990	267	82218	7	576	3.5	228	12.7	9.6	7.4	70.3
24SEP1990	267	82329	7	490	3.1	224	12.1	9.1	6.7	69.5
24SEP1990	267	82410	7	418	1.4	202	12.1	9.0	6.5	69.0
24SEP1990	267	82521	7	288	5.2	66	12.3	8.7	5.7	64.2
24SEP1990	267	82632	7	180	7.2	46	12.2	8.4	5.3	62.6
24SEP1990	267	82824	7	90	8.0	40	11.4	7.3	3.7	59.3
24SEP1990	267	83548	8	96	3.3	141	12.4	8.0	4.2	57.1
24SEP1990	267	83841	8	192	6.0	20	11.5	7.4	3.7	58.5

Date	Day of Yr.	Day of Sound.	Height (ft)	Wind Speed (kt)	Wind Dir. (Deg)	Air Temp. (C)	Wet Bulb (C)	Dew Point (C)	Rel. Hum. (%)	
24SEP1990	267	83932	8	283	7.6	39	11.7	7.7	4.2	59.8
24SEP1990	267	84802	8	375	6.0	38	12.5	8.5	5.2	61.3
24SEP1990	267	84913	8	484	3.1	33	12.1	8.6	5.9	65.8
24SEP1990	267	85025	8	600	2.5	36	11.9	8.5	5.8	66.3
24SEP1990	267	85146	8	681	2.3	27	11.8	8.6	6.0	67.3
24SEP1990	267	85359	9	665	2.9	14	11.9	8.6	5.9	67.0
24SEP1990	267	85520	9	558	4.9	22	12.1	8.5	5.7	64.6
24SEP1990	267	85642	9	494	3.7	37	12.2	8.5	5.5	63.7
24SEP1990	267	85753	9	376	4.7	33	12.1	8.3	5.1	62.4
24SEP1990	267	85844	9	279	5.8	35	11.8	7.7	4.1	59.3
24SEP1990	267	85935	9	170	4.1	18	12.5	7.9	4.0	56.3
24SEP1990	267	90036	9	85	5.6	42	12.4	8.0	4.2	57.5
24SEP1990	267	90350	10	100	6.0	30	12.6	8.1	4.2	56.6
24SEP1990	267	90511	10	200	6.0	23	12.6	8.1	4.1	56.2
24SEP1990	267	90653	10	296	6.8	23	12.3	8.0	4.3	58.0
24SEP1990	267	90804	10	388	5.4	21	12.1	7.9	4.4	59.5
24SEP1990	267	90855	10	485	4.5	17	12.1	8.0	4.5	59.9
24SEP1990	267	90946	10	589	3.7	22	12.3	8.6	5.5	63.4
24SEP1990	267	91037	10	664	3.5	7	12.2	8.6	5.8	65.1
24SEP1990	267	92817	11	603	4.1	9	11.9	7.9	4.5	60.7
24SEP1990	267	92938	11	534	8.0	22	12.5	8.0	4.1	56.7
24SEP1990	267	93050	11	412	5.6	18	12.6	8.2	4.5	57.6
24SEP1990	267	93151	11	323	6.2	27	12.9	8.2	4.3	55.6
24SEP1990	267	93242	11	243	7.6	10	13.7	8.6	4.3	52.9
24SEP1990	267	93333	11	110	9.1	7	13.8	9.0	5.0	55.3
24SEP1990	267	94637	12	88	4.3	30	13.8	9.3	5.6	57.6
24SEP1990	267	94900	12	176	3.1	23	14.5	9.4	5.3	54.0
24SEP1990	267	95123	12	284	3.9	27	14.2	9.3	5.4	55.5
24SEP1990	267	95254	12	362	5.1	28	13.6	9.2	5.7	59.0
24SEP1990	267	95345	12	463	4.5	5	13.3	9.1	5.8	60.4
24SEP1990	267	95457	12	535	8.6	4	13.4	9.0	5.5	58.9
24SEP1990	267	95537	12	616	5.8	19	13.0	8.9	5.7	61.2
24SEP1990	267	95709	12	748	2.5	28	13.3	9.0	5.7	60.1
24SEP1990	267	95841	12	785	3.3	5	12.6	8.8	5.9	63.6
24SEP1990	267	100134	12	848	2.7	326	12.5	8.9	6.2	65.2
24SEP1990	267	100609	13	917	1.7	37	12.4	8.6	5.6	63.1
24SEP1990	267	101054	13	789	4.3	10	13.0	8.9	5.7	61.3
24SEP1990	267	101206	13	697	3.7	8	13.0	9.1	6.0	62.3
24SEP1990	267	101327	13	640	2.9	39	13.5	9.5	6.5	62.4
24SEP1990	267	101439	13	564	3.3	38	13.7	9.6	6.5	61.4
24SEP1990	267	101600	13	447	3.3	46	15.0	9.7	5.5	53.3
24SEP1990	267	101711	13	339	3.7	46	14.9	9.8	6.0	55.2
24SEP1990	267	101833	13	264	1.9	49	15.5	10.2	6.2	53.8
24SEP1990	267	101944	13	154	3.7	27	15.1	10.1	6.3	55.7
24SEP1990	267	102824	14	80	4.1	22	15.5	10.5	6.8	56.3
24SEP1990	267	102854	14	160	1.2	356	15.4	10.5	6.7	56.1
24SEP1990	267	103006	14	255	1.7	332	15.1	10.3	6.8	57.7
24SEP1990	267	103056	14	368	0.8	61	14.9	10.3	6.8	58.5

Date	Day of Yr.	Time of Day	Sound. No.	Height (ft)	Wind Speed (kt)	Wind Dir. (Deg)	Air Temp. (C)	Wet Bulb (C)	Dew Point (C)	Rel. Hum. (%)
24SEP1990	267	103147	14	467	1.7	81	14.9	10.2	6.8	58.5
24SEP1990	267	103248	14	567	0.2	70	15.0	10.2	6.7	57.9
24SEP1990	267	103400	14	676	1.4	25	14.3	9.9	6.6	59.8
24SEP1990	267	103643	14	765	0.8	310	13.9	9.7	6.5	60.7
24SEP1990	267	103814	14	856	0.8	5	13.8	9.6	6.4	60.7
24SEP1990	267	104239	14	908	2.7	359	14.1	9.7	6.3	59.4
24SEP1990	267	104937	15	950	2.7	351	13.9	9.7	6.6	61.5
24SEP1990	267	105028	15	860	2.3	352	14.3	9.7	6.3	58.9
24SEP1990	267	105129	15	757	2.3	331	14.5	10.0	6.6	59.2
24SEP1990	267	105210	15	660	3.5	331	14.5	10.0	6.6	59.2
24SEP1990	267	105311	15	581	3.1	356	15.1	10.2	6.7	57.1
24SEP1990	267	105402	15	490	3.7	319	15.4	10.3	6.6	55.8
24SEP1990	267	105453	15	406	0.4	336	15.7	10.5	6.6	54.4
24SEP1990	267	105533	15	301	1.6	86	16.8	10.9	6.6	50.9
24SEP1990	267	105614	15	231	3.1	132	17.0	11.0	6.7	50.8
24SEP1990	267	105715	15	100	4.3	98	17.1	11.2	6.8	51.0
24SEP1990	267	110856	16	94	2.5	109	17.2	11.4	7.4	52.5
24SEP1990	267	110916	16	188	1.9	129	17.2	11.4	7.3	52.2
24SEP1990	267	111129	16	294	2.1	64	16.7	11.1	7.2	53.4
24SEP1990	267	111240	16	400	1.6	90	16.5	11.1	7.2	54.1
24SEP1990	267	111339	16	500	1.4	103	16.3	11.0	7.2	54.9
24SEP1990	267	111430	16	603	1.0	248	16.2	10.9	7.1	54.7
24SEP1990	267	111531	16	704	1.4	132	15.5	10.6	7.0	56.7
24SEP1990	267	112249	17	728	3.1	196	16.0	10.8	7.0	55.2
24SEP1990	267	112340	17	672	1.6	246	16.4	10.8	6.8	52.9
24SEP1990	267	112441	17	513	2.3	16	17.3	11.3	6.9	50.5
24SEP1990	267	112542	17	431	3.1	343	16.9	11.1	7.0	52.3
24SEP1990	267	112623	17	341	1.6	87	17.3	11.3	7.0	50.9
24SEP1990	267	112703	17	242	1.4	135	18.0	11.6	7.0	48.6
24SEP1990	267	112835	17	121	4.7	119	18.8	11.9	7.0	46.2
24SEP1990	267	113846	18	90	3.9	91	18.1	11.9	7.5	49.9
24SEP1990	267	113947	18	180	4.7	150	18.2	11.9	7.5	49.3
24SEP1990	267	114018	18	261	3.3	94	18.3	11.9	7.5	49.6
24SEP1990	267	114109	18	386	3.1	165	18.1	11.7	7.3	49.2
24SEP1990	267	114149	18	498	1.6	149	17.3	11.5	7.4	52.3
24SEP1990	267	114230	18	609	1.7	125	18.0	11.6	7.0	48.6
24SEP1990	267	114321	18	691	2.3	95	18.4	11.7	7.0	47.4
24SEP1990	267	115332	19	623	3.1	135	17.2	11.2	6.9	50.7
24SEP1990	267	115423	19	556	4.3	148	17.6	11.2	6.5	48.0
24SEP1990	267	115504	19	455	6.2	144	18.0	11.3	6.4	46.7
24SEP1990	267	115544	19	388	4.9	158	18.1	11.4	6.6	47.0
24SEP1990	267	115625	19	285	5.1	144	18.6	11.6	6.7	45.7
24SEP1990	267	115706	19	188	3.1	290	19.0	11.9	6.8	45.1
24SEP1990	267	115858	19	94	1.2	190	19.3	12.2	7.3	45.6
24SEP1990	267	122218	20	140	8.4	172	20.2	12.5	7.1	42.7
24SEP1990	267	122248	20	212	3.5	129	19.5	12.3	7.4	45.3
24SEP1990	267	122339	20	323	3.3	147	19.3	12.2	7.3	45.8
24SEP1990	267	122420	20	417	3.7	183	18.5	12.0	7.5	48.7

Date	Day of Yr.	Time of Day	Sound. No.	Height (ft)	Wind Speed (kt)	Wind Dir. (Deg)	Air Temp. (C)	Wet Bulb (C)	Dew Point (C)	Rel. Hum. (%)
24SEP1990	267	122501	20	457	4.9	132	18.6	11.9	7.3	47.7
24SEP1990	267	122552	20	541	4.1	139	18.4	11.8	7.1	47.6
24SEP1990	267	123047	21	573	3.9	145	18.7	11.8	6.9	46.2
24SEP1990	267	123158	21	506	5.1	129	18.9	11.9	7.0	46.1
24SEP1990	267	123259	21	427	5.4	166	19.0	12.0	7.2	46.1
24SEP1990	267	123330	21	348	1.9	204	19.1	12.2	7.4	46.5
24SEP1990	267	123411	21	242	2.1	189	19.3	12.4	7.6	46.8
24SEP1990	267	123451	21	121	1.4	187	19.6	12.6	7.7	46.1
25SEP1990	268	64410	1	86	11.7	21	10.0	7.2	4.7	69.3
25SEP1990	268	64542	1	172	8.7	20	11.3	7.7	4.7	64.1
25SEP1990	268	64623	1	259	8.9	11	11.5	8.0	5.0	64.4
25SEP1990	268	64734	1	397	6.2	20	11.6	8.0	4.9	63.3
25SEP1990	268	64926	1	476	3.9	12	12.2	8.2	4.8	60.7
25SEP1990	268	65242	1	565	3.3	9	12.3	8.2	4.9	60.3
25SEP1990	268	74423	2	595	2.9	46	12.2	8.5	5.6	64.3
25SEP1990	268	74535	2	539	4.9	41	12.2	8.5	5.4	62.9
25SEP1990	268	74656	2	433	5.8	28	12.3	8.4	5.3	62.3
25SEP1990	268	74818	2	326	13.2	29	12.2	8.5	5.4	63.4
25SEP1990	268	74909	2	273	11.5	22	11.2	8.3	6.0	70.4
25SEP1990	268	75010	2	174	9.9	36	10.1	7.8	6.0	75.6
25SEP1990	268	75121	2	87	3.9	18	8.3	6.3	4.5	77.4
25SEP1990	268	75121	3	90	3.9	18	8.3	6.3	4.5	77.4
25SEP1990	268	75202	3	180	8.7	30	8.6	6.3	4.3	74.0
25SEP1990	268	75243	3	252	10.3	27	9.4	6.9	4.7	72.5
25SEP1990	268	75314	3	288	10.3	29	10.1	7.3	5.0	70.4
25SEP1990	268	75354	3	381	11.9	23	11.0	7.9	5.4	68.4
25SEP1990	268	75435	3	470	9.3	27	12.0	8.3	5.3	63.6
25SEP1990	268	75557	3	565	8.2	34	12.0	8.2	5.2	62.9
25SEP1990	268	80234	4	513	7.2	28	12.4	8.4	5.1	61.0
25SEP1990	268	80325	4	473	8.9	25	12.5	8.5	5.2	60.8
25SEP1990	268	80416	4	410	10.3	25	12.7	8.6	5.2	60.0
25SEP1990	268	80507	4	330	12.2	27	12.8	8.8	5.6	61.6
25SEP1990	268	80639	4	212	15.6	24	11.4	8.5	6.1	69.6
25SEP1990	268	80730	4	134	12.6	9	10.6	8.1	6.0	73.3
25SEP1990	268	81631	5	112	6.0	11	8.3	6.0	4.0	74.5
25SEP1990	268	81712	5	224	12.6	20	8.8	6.2	3.8	71.0
25SEP1990	268	81743	5	294	11.3	17	9.5	6.8	4.4	70.5
25SEP1990	268	81854	5	405	15.4	11	11.6	8.3	5.6	66.5
25SEP1990	268	81955	5	446	11.5	12	11.9	8.3	5.5	64.9
25SEP1990	268	82026	5	535	10.1	10	12.4	8.6	5.4	62.2
25SEP1990	268	82056	5	621	12.2	19	12.6	8.5	5.1	60.3
25SEP1990	268	82714	6	613	11.5	20	12.7	8.5	5.1	60.0
25SEP1990	268	82805	6	547	13.2	22	13.1	8.8	5.4	59.6
25SEP1990	268	82906	6	440	15.0	16	12.3	8.8	6.1	65.8
25SEP1990	268	83007	6	363	14.2	8	11.6	8.7	6.3	69.8
25SEP1990	268	83139	6	242	9.7	13	10.4	7.9	5.9	73.5
25SEP1990	268	83209	6	190	8.2	10	10.0	7.7	5.7	74.8
25SEP1990	268	83250	6	95	6.6	16	9.2	6.7	4.5	72.4

Date	Day of Yr.	Time of Day	Sound. No.	Height (ft)	Wind Speed (kt)	Wind Dir. (Deg)	Air Temp. (C)	Wet Bulb (C)	Dew Point (C)	Rel. Hum. (%)
25SEP1990	268	83533	7	103	5.2	9	9.0	6.4	4.1	71.5
25SEP1990	268	83604	7	206	6.0	3	8.9	6.5	4.3	72.9
25SEP1990	268	83624	7	244	7.0	28	9.2	6.8	4.7	73.1
25SEP1990	268	83644	7	317	7.6	18	10.3	7.4	4.9	69.2
25SEP1990	268	83746	7	452	14.4	14	12.1	8.5	5.6	64.5
25SEP1990	268	83806	7	493	7.4	9	12.1	8.6	5.7	64.8
25SEP1990	268	83857	7	627	11.7	18	12.7	8.6	5.2	60.2
25SEP1990	268	84818	8	567	10.7	20	13.0	8.7	5.3	59.7
25SEP1990	268	84929	8	474	12.4	16	13.3	9.1	5.7	60.2
25SEP1990	268	85020	8	388	15.4	19	13.2	9.2	6.1	62.5
25SEP1990	268	85111	8	316	12.2	15	12.1	8.7	6.0	66.3
25SEP1990	268	85202	8	240	8.7	4	10.7	8.1	5.9	72.4
25SEP1990	268	85243	8	132	5.8	19	10.1	7.3	5.0	70.9
25SEP1990	268	85627	9	87	5.6	21	10.3	7.2	4.5	67.1
25SEP1990	268	85749	9	174	6.6	12	10.1	7.2	4.6	68.9
25SEP1990	268	85840	9	276	8.0	14	10.4	7.2	4.5	66.8
25SEP1990	268	85900	9	357	6.4	11	9.9	7.2	4.9	71.1
25SEP1990	268	85931	9	423	13.2	18	12.2	8.2	4.8	60.5
25SEP1990	268	90011	9	571	12.6	24	12.8	8.6	5.2	60.1
25SEP1990	268	90356	10	619	8.4	31	13.0	8.8	5.4	60.0
25SEP1990	268	90436	10	576	10.5	21	13.6	9.0	5.4	57.8
25SEP1990	268	90517	10	484	12.8	27	13.9	9.4	5.8	58.0
25SEP1990	268	90608	10	382	14.2	17	12.9	9.3	6.5	64.8
25SEP1990	268	90649	10	288	4.7	26	10.9	7.9	5.5	69.5
25SEP1990	268	90719	10	232	7.6	20	10.8	7.6	4.8	66.2
25SEP1990	268	90810	10	96	5.8	4	10.8	7.6	4.8	66.2
25SEP1990	268	92101	11	146	5.6	13	11.2	7.9	5.1	65.7
25SEP1990	268	92142	11	259	5.6	8	10.9	7.6	4.9	66.4
25SEP1990	268	92203	11	321	6.0	16	10.9	7.7	4.9	66.6
25SEP1990	268	92304	11	498	9.1	30	12.3	8.1	4.6	59.5
25SEP1990	268	92355	11	593	8.4	36	13.1	8.6	5.0	58.2
25SEP1990	268	93234	12	641	7.0	34	13.4	8.8	5.1	56.9
25SEP1990	268	93315	12	575	10.5	36	13.6	9.0	5.3	57.2
25SEP1990	268	93346	12	515	9.7	27	12.7	8.5	5.1	59.9
25SEP1990	268	93416	12	423	7.4	14	12.2	8.3	5.0	61.5
25SEP1990	268	93457	12	299	3.9	5	12.7	8.4	4.7	58.0
25SEP1990	268	93528	12	220	6.4	24	12.5	8.4	4.8	59.4
25SEP1990	268	93629	12	100	4.5	26	13.3	8.6	4.7	56.1
25SEP1990	268	94306	13	158	7.0	18	13.1	8.8	5.3	59.3
25SEP1990	268	94357	13	281	7.6	3	12.9	8.6	5.1	59.0
25SEP1990	268	94448	13	352	6.6	16	12.6	8.4	5.0	59.9
25SEP1990	268	94539	13	453	6.2	28	12.5	8.4	5.0	60.1
25SEP1990	268	94620	13	530	7.0	25	12.8	8.5	5.0	59.1
25SEP1990	268	94701	13	602	7.8	25	13.2	8.8	5.2	58.4
25SEP1990	268	94802	14	586	7.6	29	13.1	8.7	5.2	58.5
25SEP1990	268	94903	14	520	6.6	30	12.8	8.7	5.3	60.4
25SEP1990	268	95004	14	424	7.4	26	12.7	8.6	5.4	61.0
25SEP1990	268	95105	14	329	6.6	5	12.6	8.5	5.1	60.3

Date	Yr.	Day of Day	Time of Sound.	Height AGL (ft)	Wind Speed (kt)	Wind Dir. (Deg)	Air Temp. (C)	Wet Bulb (C)	Dew Point (C)	Rel. Hum. (%)
25SEP1990	268	95146	14	252	5.4	30	12.9	8.7	5.3	59.8
25SEP1990	268	95227	14	134	5.2	29	13.4	8.9	5.3	58.1
25SEP1990	268	114428	15	132	1.6	158	17.8	11.0	5.9	45.7
25SEP1990	268	114529	15	264	0.8	68	17.5	10.9	5.9	46.2
25SEP1990	268	114609	15	364	3.5	74	17.3	10.7	5.7	46.6
25SEP1990	268	114700	15	468	2.9	128	17.0	10.6	5.8	47.7
25SEP1990	268	114731	15	563	2.5	159	16.6	10.5	5.8	48.7
25SEP1990	268	114801	15	667	2.9	168	16.6	10.4	5.8	48.9
25SEP1990	268	120743	16	604	5.1	118	17.5	10.7	5.5	45.4
25SEP1990	268	120914	16	454	5.1	153	18.1	10.8	5.3	43.0
25SEP1990	268	121016	16	387	7.2	193	18.9	11.1	5.2	40.5
25SEP1990	268	121117	16	284	3.1	225	19.2	11.5	5.9	41.7
25SEP1990	268	121208	16	180	7.0	154	18.9	11.2	5.4	41.1
25SEP1990	268	121339	16	90	4.3	191	20.4	11.8	5.4	37.4
25SEP1990	268	123502	17	110	6.0	158	20.1	11.5	4.9	36.9
25SEP1990	268	123613	17	220	0.4	153	19.9	11.6	5.4	38.7
25SEP1990	268	123654	17	331	2.5	212	20.7	11.6	4.8	35.1
25SEP1990	268	123735	17	411	10.5	194	21.0	11.9	5.2	35.8
25SEP1990	268	124139	17	467	8.7	192	19.2	11.2	5.2	39.6
25SEP1990	268	124210	17	507	7.6	191	18.9	11.1	5.3	40.8
25SEP1990	268	124614	18	635	9.3	198	19.9	11.2	4.7	36.8
25SEP1990	268	124715	18	518	8.7	185	20.0	11.1	4.2	35.3
25SEP1990	268	124756	18	429	7.8	220	20.0	11.1	4.2	35.2
25SEP1990	268	124827	18	379	8.6	206	20.1	11.2	4.3	35.2
25SEP1990	268	124917	18	279	5.4	164	20.7	11.5	4.6	34.8
25SEP1990	268	124958	18	202	10.3	144	21.0	11.8	4.8	34.7
25SEP1990	268	125120	18	101	8.6	240	21.6	12.2	5.3	34.5
25SEP1990	268	125413	19	82	7.6	188	21.5	12.0	4.8	33.7
25SEP1990	268	125514	19	136	9.1	228	20.8	11.8	5.0	35.7
25SEP1990	268	125605	19	252	10.3	219	20.7	11.5	4.6	34.7
25SEP1990	268	125656	19	295	7.6	220	20.2	11.3	4.4	35.3
25SEP1990	268	125757	19	442	7.6	235	20.5	11.2	3.9	33.5
25SEP1990	268	125827	19	510	8.2	239	20.4	11.2	4.1	34.1
25SEP1990	268	125949	19	627	6.6	226	20.1	11.4	4.9	36.8
25SEP1990	268	130525	20	709	0.2	326	20.0	11.3	4.7	36.5
25SEP1990	268	130636	20	569	0.2	298	19.8	10.9	4.0	35.3
25SEP1990	268	130747	20	422	0.2	353	20.2	11.1	4.0	34.4
25SEP1990	268	130919	20	355	2.5	196	21.3	11.6	4.2	32.5
25SEP1990	268	131020	20	276	7.2	262	20.9	11.5	4.1	33.2
25SEP1990	268	131111	20	212	5.8	261	21.3	11.5	4.0	32.1
25SEP1990	268	131202	20	106	7.8	229	21.9	12.0	4.4	31.9
25SEP1990	268	132314	21	150	8.2	292	22.6	12.1	4.1	29.9
25SEP1990	268	132404	21	271	7.4	206	21.8	11.9	4.4	32.1
25SEP1990	268	132505	21	378	2.9	249	22.6	12.2	4.4	30.5
25SEP1990	268	132556	21	465	2.7	193	21.7	12.1	5.0	33.5
25SEP1990	268	132647	21	533	11.5	235	21.6	11.6	3.9	31.3
25SEP1990	268	132718	21	593	9.7	181	21.0	11.4	4.0	32.6
25SEP1990	268	133638	22	551	9.1	232	20.3	11.2	4.2	34.6

Date	Day of Yr.	Time of Sound.	Height AGL (ft)	Wind Speed (kt)	Wind Dir. (Deg)	Air Temp. (C)	Wet Bulb (C)	Dew Point (C)	Rel. Hum. (%)	
25SEP1990	268	133749	22	488	7.0	218	20.2	11.2	4.2	34.9
25SEP1990	268	133840	22	359	8.0	233	20.5	11.2	3.9	33.7
25SEP1990	268	134001	22	245	8.0	188	21.1	11.5	4.1	32.9
25SEP1990	268	134042	22	190	8.6	218	22.5	12.1	4.2	30.2
25SEP1990	268	134122	22	95	7.8	221	23.3	12.5	4.5	29.6
26SEP1990	269	70619	1	134	1.9	25	10.8	6.1	1.4	52.2
26SEP1990	269	70740	1	251	5.8	33	11.1	6.2	1.5	51.8
26SEP1990	269	70821	1	283	6.4	32	11.2	6.4	1.8	52.3
26SEP1990	269	71519	1	366	11.3	13	12.3	6.9	1.7	48.4
26SEP1990	269	71944	1	466	7.0	4	11.5	6.3	1.3	49.7
26SEP1990	269	72430	1	533	12.2	356	13.3	6.7	0.1	40.4
26SEP1990	269	72702	1	622	12.2	4	13.6	7.0	0.5	40.7
26SEP1990	269	73441	2	584	13.2	11	13.8	7.0	0.4	40.0
26SEP1990	269	73654	2	443	11.9	341	12.6	6.5	0.4	43.1
26SEP1990	269	73825	2	398	8.9	13	12.5	6.5	0.4	43.3
26SEP1990	269	73927	2	345	7.8	355	12.1	6.3	0.4	44.7
26SEP1990	269	74028	2	303	8.0	14	11.9	7.1	2.7	53.6
26SEP1990	269	74129	2	239	6.0	19	11.3	6.2	1.1	49.5
26SEP1990	269	74220	2	146	5.6	57	10.9	6.2	1.5	52.1
26SEP1990	269	75749	3	122	5.1	53	10.5	5.8	1.1	52.1
26SEP1990	269	75850	3	247	6.2	16	11.1	5.7	0.2	47.1
26SEP1990	269	75920	3	342	7.8	13	11.3	5.8	0.1	45.9
26SEP1990	269	80032	3	409	13.8	21	12.8	6.5	0.2	42.1
26SEP1990	269	80123	3	459	13.8	18	12.8	6.7	0.8	44.0
26SEP1990	269	80214	3	558	13.8	16	12.7	6.7	0.8	44.0
26SEP1990	269	80509	3	641	14.0	7	14.1	7.2	0.4	39.2
26SEP1990	269	81106	4	710	12.4	13	14.1	7.3	0.8	40.0
26SEP1990	269	81227	4	624	8.9	14	13.2	7.2	1.6	45.0
26SEP1990	269	81339	4	526	8.9	16	12.9	6.8	0.9	43.8
26SEP1990	269	81510	4	453	7.6	25	12.9	7.0	1.2	44.8
26SEP1990	269	81612	4	370	7.4	34	12.5	6.7	1.2	46.0
26SEP1990	269	81703	4	273	6.4	40	12.0	6.4	0.9	46.4
26SEP1990	269	81753	4	176	3.9	46	11.4	5.9	0.4	46.7
26SEP1990	269	81905	4	88	2.1	123	10.5	5.7	0.9	51.2
26SEP1990	269	82836	5	120	2.3	124	11.0	5.9	0.8	49.5
26SEP1990	269	82937	5	240	3.1	52	11.0	6.2	1.5	51.8
26SEP1990	269	83017	5	342	5.2	55	11.4	6.2	1.2	49.5
26SEP1990	269	83058	5	396	9.5	38	11.9	6.5	1.1	47.6
26SEP1990	269	83300	5	458	8.4	29	12.8	6.8	0.8	43.8
26SEP1990	269	83351	5	548	13.8	23	13.0	7.1	1.5	45.7
26SEP1990	269	83432	5	616	13.2	26	12.9	7.2	1.9	47.1
26SEP1990	269	83533	5	687	13.8	19	13.5	7.2	1.2	43.0
26SEP1990	269	84403	6	602	13.4	8	13.4	7.1	1.1	42.9
26SEP1990	269	84504	6	532	13.4	7	13.5	7.2	1.3	43.2
26SEP1990	269	84605	6	492	10.7	10	13.6	7.3	1.4	43.4
26SEP1990	269	84706	6	373	10.3	15	13.3	7.7	2.8	48.9
26SEP1990	269	84807	6	293	8.0	20	12.8	7.4	2.6	50.0
26SEP1990	269	84909	6	201	6.8	33	12.1	6.8	1.8	49.1

Date	Day of Yr.	Time of Day	Sound. No.	Height (ft)	Wind Speed (kt)	Wind Dir. (Deg)	Air Temp. (C)	Wet Bulb (C)	Dew Point (C)	Rel. Hum. (%)
26SEP1990	269	85000	6	110	3.3	37	11.9	6.7	1.6	49.4
26SEP1990	269	90007	7	91	2.9	43	13.5	7.7	2.3	46.8
26SEP1990	269	90048	7	182	3.1	36	12.5	7.2	2.1	49.2
26SEP1990	269	90139	7	297	3.7	39	12.2	6.8	1.6	48.4
26SEP1990	269	90220	7	382	5.4	17	12.4	6.9	1.6	47.8
26SEP1990	269	90311	7	433	5.2	39	12.2	6.8	1.6	48.3
26SEP1990	269	90341	7	531	10.3	22	12.9	6.7	0.5	42.4
26SEP1990	269	90422	7	609	7.8	8	12.8	6.6	0.4	42.5
26SEP1990	269	90523	7	697	11.7	12	13.7	7.2	0.9	41.4
26SEP1990	269	91352	8	704	12.2	13	13.4	7.2	1.4	44.0
26SEP1990	269	91514	8	635	12.6	19	13.5	7.3	1.6	44.4
26SEP1990	269	91615	8	548	10.7	24	13.4	7.3	1.5	44.1
26SEP1990	269	91706	8	472	7.2	35	13.1	7.1	1.4	44.9
26SEP1990	269	91817	8	384	5.6	33	12.8	7.0	1.5	46.1
26SEP1990	269	91908	8	287	4.7	28	12.9	7.1	1.6	46.2
26SEP1990	269	91949	8	198	5.4	20	13.0	7.2	1.8	46.4
26SEP1990	269	92445	8	99	6.4	32	13.5	7.5	1.8	45.0
26SEP1990	269	93722	9	94	6.8	34	13.7	7.6	2.0	45.0
26SEP1990	269	93824	9	188	7.2	32	13.5	7.6	2.2	46.1
26SEP1990	269	93914	9	273	8.7	30	13.2	7.4	2.0	46.5
26SEP1990	269	94005	9	356	8.6	42	13.0	7.3	2.0	47.3
26SEP1990	269	94107	9	473	7.6	44	12.7	7.2	2.1	48.3
26SEP1990	269	94147	9	519	9.7	30	12.5	7.1	2.1	49.0
26SEP1990	269	94218	9	571	10.5	31	12.4	7.0	2.1	49.4
26SEP1990	269	94259	9	675	11.5	11	12.6	7.0	1.9	48.0
26SEP1990	269	94521	10	721	11.9	21	12.7	7.2	2.2	48.8
26SEP1990	269	94623	10	619	9.9	20	12.6	7.3	2.3	49.5
26SEP1990	269	94724	10	538	8.2	19	12.6	7.3	2.4	49.9
26SEP1990	269	94825	10	451	8.6	35	12.8	7.4	2.5	49.3
26SEP1990	269	94957	10	360	9.5	36	13.0	7.5	2.5	48.9
26SEP1990	269	95058	10	283	7.6	37	12.9	7.4	2.3	48.4
26SEP1990	269	95159	10	212	8.9	56	13.0	7.5	2.4	48.5
26SEP1990	269	95310	10	106	5.8	68	13.5	7.7	2.5	47.5
26SEP1990	269	134702	11	111	7.4	4	18.5	9.6	1.7	32.4
26SEP1990	269	134803	11	222	4.1	319	18.3	9.5	1.9	33.5
26SEP1990	269	134833	11	295	0.8	332	18.1	9.4	1.7	33.2
26SEP1990	269	134904	11	409	1.6	312	17.8	9.3	1.9	34.2
26SEP1990	269	134935	11	477	2.7	239	17.8	9.2	1.5	33.6
26SEP1990	269	135005	11	596	0.6	347	17.4	9.0	1.5	34.2
26SEP1990	269	135025	11	691	2.1	314	17.2	8.8	1.3	34.2
26SEP1990	269	135116	11	833	1.4	297	16.9	8.5	0.9	33.9
26SEP1990	269	135521	12	822	0.8	239	17.0	8.4	0.5	32.7
26SEP1990	269	135622	12	698	1.2	282	18.1	8.9	0.5	30.4
26SEP1990	269	135733	12	617	7.6	199	18.5	9.5	1.6	32.4
26SEP1990	269	135824	12	544	2.7	16	17.8	9.3	1.8	34.1
26SEP1990	269	135905	12	452	6.4	358	18.3	9.6	2.0	33.5
26SEP1990	269	135956	12	324	12.8	37	19.0	9.9	1.9	31.8
26SEP1990	269	140036	12	246	5.8	18	18.8	9.7	1.8	32.0

Date	Yr.	Day of Day	Time Sound.	Height AGL (ft)	Wind Speed (kt)	Wind Dir. (Deg)	Air Temp. (C)	Wet Bulb (C)	Dew Point (C)	Rel. Hum. (%)
26SEP1990	269	140127	12	123	5.1	16	18.7	9.7	1.8	32.2
26SEP1990	269	141351	13	138	5.4	342	19.0	9.9	1.9	31.9
26SEP1990	269	141431	13	269	4.5	330	18.6	9.8	2.2	33.4
26SEP1990	269	141623	13	387	6.4	333	18.4	9.5	1.8	32.8
26SEP1990	269	141745	13	471	6.0	321	17.8	9.1	1.3	33.0
26SEP1990	269	142028	13	563	6.6	322	17.9	9.3	1.7	33.7
26SEP1990	269	142058	13	621	3.3	337	17.8	9.3	1.9	34.5
26SEP1990	269	142847	14	658	7.4	354	17.8	9.3	1.9	34.5
26SEP1990	269	143028	14	493	5.8	331	17.9	9.4	1.9	34.1
26SEP1990	269	143129	14	428	7.0	329	18.3	9.5	1.9	33.3
26SEP1990	269	143231	14	383	5.1	307	18.4	9.5	1.8	32.8
26SEP1990	269	143332	14	298	4.1	292	18.8	9.7	1.8	32.0
26SEP1990	269	143423	14	210	3.9	296	19.0	9.8	1.7	31.6
26SEP1990	269	143544	14	105	8.0	326	19.9	10.2	1.9	30.2
26SEP1990	269	143908	15	142	4.3	330	19.8	10.3	2.1	30.7
26SEP1990	269	144120	15	248	5.1	346	19.8	10.5	2.7	32.0
26SEP1990	269	144302	15	394	4.9	344	18.7	9.8	2.2	33.0
26SEP1990	269	144514	15	508	5.1	331	18.4	9.7	2.3	34.1
26SEP1990	269	144555	15	597	4.7	9	18.3	9.4	1.7	33.0
26SEP1990	269	144646	15	694	4.9	20	18.1	9.3	1.6	33.0
26SEP1990	269	144757	15	740	3.9	7	17.9	9.2	1.6	33.5
26SEP1990	269	145455	16	780	2.5	332	18.5	9.6	2.1	33.4
26SEP1990	269	145828	16	592	6.4	293	18.8	9.7	1.8	32.0
26SEP1990	269	145919	16	530	5.8	294	19.1	9.7	1.7	31.3
26SEP1990	269	150020	16	468	9.1	321	19.4	9.7	1.2	29.7
26SEP1990	269	150142	16	360	5.6	320	19.2	9.8	1.7	31.1
26SEP1990	269	150303	16	314	3.1	327	19.5	10.0	1.9	30.8
26SEP1990	269	150425	16	210	4.1	72	19.7	10.2	2.0	30.8
26SEP1990	269	150556	16	105	8.0	33	19.9	10.2	1.9	30.3
29SEP1990	272	65056	1	85	4.3	15	8.0	3.3	-2.5	47.6
29SEP1990	272	65228	1	170	8.9	12	8.3	4.2	-0.4	54.3
29SEP1990	272	71434	1	242	10.1	6	8.6	4.2	-0.6	52.5
29SEP1990	272	71808	1	316	13.4	17	9.6	4.7	-0.7	48.6
29SEP1990	272	72203	1	391	13.6	14	9.9	5.0	-0.1	49.6
29SEP1990	272	72324	1	428	13.2	12	10.1	5.1	-0.2	49.0
29SEP1990	272	73103	1	540	16.7	26	10.7	5.1	-1.0	44.3
29SEP1990	272	73215	1	592	19.4	34	11.3	5.3	-1.3	41.5
29SEP1990	272	73559	2	645	18.5	29	11.9	5.6	-1.1	40.5
29SEP1990	272	73731	2	576	16.9	22	11.5	5.6	-0.7	42.9
29SEP1990	272	73852	2	506	15.0	26	10.4	5.5	0.3	49.4
29SEP1990	272	73954	2	439	14.6	17	10.1	5.2	0.1	50.1
29SEP1990	272	74115	2	340	14.4	11	9.9	5.2	0.3	51.2
29SEP1990	272	74237	2	256	12.8	5	8.9	4.7	0.1	53.7
29SEP1990	272	74338	2	188	10.7	348	8.1	4.2	-0.2	56.0
29SEP1990	272	74439	2	94	7.0	345	7.0	3.3	-1.0	57.0
29SEP1990	272	80948	3	140	5.6	31	6.5	2.6	-2.4	52.7
29SEP1990	272	81343	3	227	13.4	28	9.5	4.6	-0.9	48.0
29SEP1990	272	81818	3	320	12.6	26	9.6	4.8	-0.6	49.0

<u>Date</u>	<u>Day of Yr.</u>	<u>Time of Day</u>	<u>Sound. No.</u>	<u>Height (ft)</u>	<u>Wind Speed (kt)</u>	<u>Wind Dir. (Deg)</u>	<u>Air Temp. (C)</u>	<u>Wet Bulb (C)</u>	<u>Dew Point (C)</u>	<u>Rel. Hum. (%)</u>
29SEP1990	272	82345	3	380	13.8	30	9.9	4.8	-0.7	47.7
29SEP1990	272	82810	3	478	13.4	33	10.9	5.4	-0.6	44.9
29SEP1990	272	83346	3	559	16.3	30	11.2	5.3	-1.1	42.2
29SEP1990	272	84115	3	632	19.8	25	11.4	5.3	-1.4	40.8
29SEP1990	272	85248	4	739	19.6	14	11.8	5.4	-1.7	39.0
29SEP1990	272	85430	4	657	15.4	30	11.5	5.5	-0.9	42.1
29SEP1990	272	85531	4	597	16.3	30	11.5	5.6	-0.5	43.4
29SEP1990	272	85632	4	523	15.2	33	11.5	5.8	-0.1	44.6
29SEP1990	272	85733	4	424	13.0	30	10.7	5.6	0.2	48.2
29SEP1990	272	85824	4	349	8.9	356	9.1	4.9	0.6	55.3
29SEP1990	272	85915	4	260	5.1	352	7.5	3.6	-0.9	55.1
29SEP1990	272	90017	4	130	4.7	316	7.7	3.5	-1.3	52.9
29SEP1990	272	90922	5	97	5.2	338	8.5	4.0	-1.0	51.1
29SEP1990	272	91028	5	194	4.9	343	8.2	3.9	-1.1	51.8
29SEP1990	272	91109	5	278	9.1	18	8.7	4.0	-1.5	48.6
29SEP1990	272	91139	5	362	13.8	8	9.2	4.3	-1.2	48.0
29SEP1990	272	91240	5	450	11.7	22	10.8	5.2	-0.8	44.3
29SEP1990	272	91301	5	508	17.5	36	11.0	5.2	-1.1	43.0
29SEP1990	272	91453	5	667	19.8	34	11.6	5.1	-2.3	37.7
30SEP1990	273	71338	1	621	11.3	13	10.6	3.7	-5.1	32.6
30SEP1990	273	71429	1	592	10.5	14	10.1	3.9	-3.6	37.9
30SEP1990	273	71459	1	524	8.4	12	9.3	3.5	-3.6	39.8
30SEP1990	273	71530	1	448	7.0	358	9.1	3.3	-3.9	39.5
30SEP1990	273	71621	1	288	4.5	345	9.3	3.3	-4.2	38.1
30SEP1990	273	71702	1	236	3.7	334	9.2	3.3	-4.1	38.6
30SEP1990	273	71743	1	144	3.3	329	8.9	3.2	-4.2	39.0
30SEP1990	273	73341	2	223	1.0	219	8.6	2.6	-5.4	36.6
30SEP1990	273	73512	2	337	4.7	358	9.1	3.1	-4.7	37.3
30SEP1990	273	73543	2	400	7.8	11	9.1	3.2	-4.5	37.9
30SEP1990	273	73634	2	455	3.7	9	9.1	3.2	-4.5	37.6
30SEP1990	273	73704	2	539	8.7	3	9.1	3.2	-4.5	38.0
30SEP1990	273	73745	2	618	11.1	3	9.1	3.1	-4.7	37.1
30SEP1990	273	73857	2	703	12.4	356	10.1	3.6	-4.5	35.4
30SEP1990	273	75818	3	651	10.5	3	10.7	3.9	-4.5	33.8
30SEP1990	273	75909	3	586	11.9	3	10.6	4.0	-4.2	35.2
30SEP1990	273	80000	3	522	11.7	14	9.8	3.7	-3.8	38.0
30SEP1990	273	80051	3	437	8.6	17	9.4	3.4	-4.0	38.5
30SEP1990	273	80132	3	376	8.2	24	9.1	3.2	-4.3	38.5
30SEP1990	273	80213	3	275	6.0	25	9.0	3.1	-4.7	37.7
30SEP1990	273	80304	3	194	4.3	55	8.7	2.9	-4.8	38.1
30SEP1990	273	80405	3	97	1.9	74	8.5	2.8	-4.6	39.2
30SEP1990	273	82515	4	112	6.0	334	5.3	0.2	-7.9	37.8
30SEP1990	273	82535	4	262	3.1	67	7.6	1.4	-8.3	31.4
30SEP1990	273	82556	4	337	6.4	58	8.6	2.2	-7.2	31.8
30SEP1990	273	82647	4	421	9.7	32	10.5	3.6	-5.5	32.1
30SEP1990	273	82707	4	465	7.8	41	10.5	3.7	-5.0	33.2
30SEP1990	273	82728	4	572	7.8	49	10.8	3.8	-5.1	32.4
30SEP1990	273	82748	4	643	6.8	37	10.9	3.9	-5.1	32.2

Date	Day of Yr.	Time of Day	Sound. No.	Height (ft)	Wind Speed (kt)	Wind Dir. (Deg)	Air Temp. (C)	Wet Bulb (C)	Dew Point (C)	Rel. Hum. (%)
30SEP1990	273	82920	4	756	9.1	14	11.1	4.1	-4.6	32.8
30SEP1990	273	84204	5	710	10.9	28	11.4	4.2	-4.7	32.1
30SEP1990	273	84315	5	651	11.5	25	11.5	4.5	-4.0	33.5
30SEP1990	273	84356	5	591	14.4	39	10.9	4.3	-3.6	35.9
30SEP1990	273	84457	5	491	9.7	33	10.0	4.1	-2.9	40.1
30SEP1990	273	84548	5	390	7.6	32	9.9	3.9	-3.5	38.7
30SEP1990	273	84629	5	325	8.2	23	10.0	3.8	-3.8	37.5
30SEP1990	273	84710	5	250	5.6	30	9.6	3.6	-3.8	38.8
30SEP1990	273	84811	5	125	1.6	72	7.5	2.2	-5.1	40.4
30SEP1990	273	85903	6	128	1.4	289	8.3	2.5	-5.5	37.0
30SEP1990	273	90226	6	299	5.4	330	10.0	3.8	-4.1	36.8
30SEP1990	273	90247	6	401	3.9	357	10.7	4.0	-4.3	34.7
30SEP1990	273	90307	6	462	4.1	357	11.3	4.2	-4.6	32.4
30SEP1990	273	90348	6	576	8.4	3	11.2	4.5	-3.5	35.5
30SEP1990	273	90419	6	647	9.5	6	11.2	4.6	-3.1	36.5
30SEP1990	273	90449	6	715	9.9	7	11.2	4.7	-3.0	36.8
30SEP1990	273	91440	7	698	11.3	8	12.0	5.4	-1.9	37.9
30SEP1990	273	91601	7	645	9.9	10	11.9	5.2	-2.4	36.9
30SEP1990	273	91652	7	562	8.4	8	11.7	5.1	-2.4	37.1
30SEP1990	273	91743	7	473	7.8	4	11.2	4.7	-3.0	37.0
30SEP1990	273	91834	7	400	8.0	4	10.6	4.2	-3.5	36.8
30SEP1990	273	91915	7	319	6.4	3	9.8	3.8	-3.4	39.2
30SEP1990	273	91956	7	238	4.5	11	9.8	3.7	-4.2	36.9
30SEP1990	273	92117	7	119	4.1	9	10.2	3.8	-4.3	35.6
30SEP1990	273	92259	8	94	4.3	4	10.2	3.9	-4.1	36.2
30SEP1990	273	92340	8	126	3.9	17	10.3	3.9	-4.3	35.5
30SEP1990	273	92501	8	369	5.8	8	10.2	3.8	-4.2	35.8
30SEP1990	273	92532	8	454	6.6	4	10.7	4.0	-4.3	34.5
30SEP1990	273	92602	8	519	9.3	358	10.8	4.1	-4.1	34.9
30SEP1990	273	92633	8	598	11.1	7	11.0	4.3	-3.9	34.9
30SEP1990	273	92754	8	669	13.0	5	11.4	4.8	-2.9	36.7
30SEP1990	273	93341	9	684	12.8	8	12.3	5.3	-2.7	35.0
30SEP1990	273	93452	9	625	12.4	4	12.0	5.4	-1.8	38.2
30SEP1990	273	93553	9	559	10.3	357	11.4	4.9	-2.4	38.0
30SEP1990	273	93654	9	465	8.0	4	10.9	4.7	-2.6	38.6
30SEP1990	273	93735	9	389	7.4	3	10.5	4.3	-3.1	38.3
30SEP1990	273	93826	9	296	3.7	14	10.3	4.0	-3.8	36.9
30SEP1990	273	93906	9	206	6.0	10	10.6	4.1	-3.9	35.8
30SEP1990	273	94008	9	103	5.1	9	10.8	4.2	-4.0	35.0
30SEP1990	273	95254	10	99	5.8	5	11.6	4.7	-3.5	34.6
30SEP1990	273	95415	10	200	5.2	22	11.5	4.6	-3.7	34.2
30SEP1990	273	95506	10	290	4.5	16	11.1	4.5	-3.4	35.9
30SEP1990	273	95537	10	387	4.5	16	11.0	4.4	-3.6	35.6
30SEP1990	273	95617	10	486	4.3	13	10.9	4.3	-3.8	35.5
30SEP1990	273	95658	10	557	10.3	23	11.2	4.4	-4.0	34.1
30SEP1990	273	95729	10	619	14.0	15	12.0	4.7	-4.0	32.4
30SEP1990	273	95830	10	714	12.4	9	12.4	5.0	-3.5	32.9
30SEP1990	273	100719	11	745	12.4	356	11.8	4.9	-3.1	35.1

Date	Day of Yr.	Time of Day	Sound. No.	Height (ft)	Wind Speed (kt)	Wind Dir. (Deg)	Air Temp. (C)	Wet Bulb (C)	Dew Point (C)	Rel. Hum. (%)
30SEP1990	273	100831	11	691	9.3	16	11.5	4.7	-3.1	35.9
30SEP1990	273	100922	11	635	4.7	6	11.0	4.5	-3.1	37.1
30SEP1990	273	101002	11	541	5.1	20	11.1	4.3	-3.9	34.7
30SEP1990	273	101043	11	447	6.4	16	11.7	4.6	-4.0	33.1
30SEP1990	273	101124	11	360	4.1	7	11.8	4.8	-3.6	33.9
30SEP1990	273	101225	11	296	7.4	33	12.4	5.0	-4.0	31.6
30SEP1990	273	101407	11	148	6.2	37	12.4	5.1	-3.8	32.0
30SEP1990	273	101619	12	102	7.0	37	13.2	5.4	-4.0	30.1
30SEP1990	273	101650	12	204	5.1	28	12.7	5.3	-3.2	32.9
30SEP1990	273	101720	12	308	4.3	28	12.2	5.1	-3.2	34.0
30SEP1990	273	101751	12	399	5.8	15	12.0	5.0	-3.3	34.0
30SEP1990	273	101842	12	452	7.6	15	11.9	4.7	-3.9	33.0
30SEP1990	273	101912	12	546	8.0	3	11.7	4.7	-3.7	33.9
30SEP1990	273	101943	12	611	9.3	356	11.9	4.7	-3.9	32.8
30SEP1990	273	102024	12	694	11.7	354	11.9	4.7	-3.8	33.1
30SEP1990	273	102459	13	755	9.9	4	12.2	5.0	-3.4	33.4
30SEP1990	273	102600	13	692	6.8	5	11.7	4.7	-3.5	34.4
30SEP1990	273	102651	13	629	5.2	19	11.6	4.6	-4.0	33.3
30SEP1990	273	102731	13	536	4.9	17	11.8	4.7	-3.9	33.1
30SEP1990	273	102812	13	456	5.2	8	12.1	4.9	-3.7	32.9
30SEP1990	273	102853	13	353	7.2	10	12.4	5.0	-4.0	31.5
30SEP1990	273	102923	13	298	7.8	45	12.7	5.1	-4.0	30.9
30SEP1990	273	103227	13	149	6.0	20	13.6	5.6	-3.8	29.5
30SEP1990	273	114835	14	113	2.9	216	18.6	8.0	-3.3	22.4
30SEP1990	273	114855	14	226	2.5	179	18.1	7.9	-3.0	23.6
30SEP1990	273	114926	14	332	1.9	176	17.6	7.6	-3.1	24.1
30SEP1990	273	115006	14	431	1.0	279	17.2	7.5	-2.9	25.2
30SEP1990	273	115037	14	522	0.2	140	16.9	7.2	-3.2	25.0
30SEP1990	273	115107	14	625	0.4	211	16.8	7.1	-3.5	24.7
30SEP1990	273	115138	14	723	1.2	347	16.2	6.8	-3.6	25.5
30SEP1990	273	115208	14	823	1.2	219	16.0	6.6	-4.0	25.1
30SEP1990	273	115330	15	805	1.7	224	16.1	6.7	-3.8	25.2
30SEP1990	273	115421	15	707	2.3	197	16.3	6.8	-3.8	24.9
30SEP1990	273	115511	15	606	2.5	167	16.7	7.0	-3.6	24.7
30SEP1990	273	115602	15	506	3.3	155	17.0	7.2	-3.5	24.3
30SEP1990	273	115653	15	409	2.3	170	17.6	7.5	-3.4	23.6
30SEP1990	273	115744	15	313	2.5	194	18.4	7.8	-3.7	22.0
30SEP1990	273	115835	15	214	2.7	198	18.5	7.9	-3.4	22.4
30SEP1990	273	115926	15	107	3.9	156	18.5	7.9	-3.7	21.9
30SEP1990	273	121552	16	101	5.4	185	19.9	8.4	-4.2	19.3
30SEP1990	273	121815	16	211	2.5	199	19.0	8.1	-3.6	21.3
30SEP1990	273	121845	16	304	3.3	206	18.4	7.9	-3.4	22.4
30SEP1990	273	121956	16	392	5.1	148	19.1	7.8	-4.7	19.6
30SEP1990	273	122057	16	558	2.7	183	18.4	7.8	-3.7	22.0
30SEP1990	273	122128	16	666	3.1	244	18.3	7.6	-4.1	21.4
30SEP1990	273	122340	17	773	2.5	214	17.5	7.3	-3.9	22.8
30SEP1990	273	122441	17	703	2.9	215	18.0	7.4	-4.3	21.5
30SEP1990	273	122542	17	610	0.8	196	17.9	7.5	-4.0	22.2

Date	Day of Yr.	Time of Day	Sound. No.	Height (ft)	Wind Speed (kt)	Wind Dir. (Deg)	Air Temp. (C)	Wet Bulb (C)	Dew Point (C)	Rel. Hum. (%)
30SEP1990	273	122623	17	507	3.3	170	18.5	7.6	-4.5	20.6
30SEP1990	273	122714	17	394	4.9	137	19.1	7.9	-4.4	19.8
30SEP1990	273	122804	17	313	3.7	180	19.5	8.4	-3.3	21.1
30SEP1990	273	122905	17	228	2.5	146	19.2	8.3	-3.3	21.4
30SEP1990	273	123006	17	114	5.8	118	20.4	8.6	-4.0	19.0
30SEP1990	273	123431	18	87	4.3	137	20.1	8.6	-3.4	20.2
30SEP1990	273	123532	18	174	5.1	161	20.9	8.9	-3.8	18.7
30SEP1990	273	123602	18	283	4.9	178	19.4	8.4	-3.0	21.9
30SEP1990	273	123633	18	406	5.1	171	19.2	8.2	-3.6	21.0
30SEP1990	273	123703	18	443	1.9	191	19.6	8.2	-4.2	19.7
30SEP1990	273	123734	18	523	4.3	214	18.7	7.9	-3.6	21.8
30SEP1990	273	123804	18	629	3.9	201	18.4	7.8	-3.5	22.3
30SEP1990	273	124037	18	691	4.9	157	18.3	7.7	-3.7	22.1
30SEP1990	273	124107	19	694	5.2	156	18.4	7.6	-4.0	21.4
30SEP1990	273	124158	19	667	3.9	137	19.0	8.1	-3.3	21.8
30SEP1990	273	124249	19	532	7.8	178	19.6	8.0	-4.9	18.6
30SEP1990	273	124330	19	465	2.5	185	19.2	8.1	-4.0	20.5
30SEP1990	273	124421	19	337	5.8	159	19.2	8.1	-3.8	20.7
30SEP1990	273	124512	19	279	6.0	130	19.8	8.4	-3.8	20.0
30SEP1990	273	124613	19	192	5.1	119	20.0	8.5	-3.7	19.9
30SEP1990	273	124724	19	96	7.2	137	21.2	8.9	-4.5	17.4
30SEP1990	273	130320	20	625	11.1	251	20.1	8.5	-3.7	19.7
30SEP1990	273	130411	20	522	6.0	150	18.9	8.0	-3.6	21.5
30SEP1990	273	130502	20	441	7.6	160	19.6	8.3	-3.6	20.5
30SEP1990	273	130552	20	395	10.5	160	20.3	8.8	-3.2	20.2
30SEP1990	273	130653	20	319	10.1	157	20.6	9.1	-2.5	20.9
30SEP1990	273	130744	20	246	8.6	154	20.9	9.2	-2.7	20.3
30SEP1990	273	130835	20	176	9.5	167	21.7	9.4	-3.0	18.9
30SEP1990	273	131138	20	88	12.1	292	21.5	9.4	-3.0	19.2
30SEP1990	273	132031	21	97	8.9	199	22.1	9.5	-3.2	18.2
30SEP1990	273	132132	21	194	6.2	202	21.9	9.7	-2.5	19.4
30SEP1990	273	132202	21	271	8.2	218	21.3	9.2	-3.1	19.2
30SEP1990	273	132243	21	365	6.0	205	20.6	9.1	-2.6	20.7
30SEP1990	273	132314	21	454	6.2	208	20.6	8.9	-3.0	20.3
30SEP1990	273	132354	21	552	5.2	172	20.8	9.0	-2.9	20.1
30SEP1990	273	132425	21	627	14.4	134	20.5	9.0	-2.5	21.2

Date	Day of Yr.	Time of Day	Sound. No.	Height (ft)	Wind Speed (kt)	Wind Dir. (Deg)	Air Temp. (C)	Wet Bulb (C)	Dew Point (C)	Rel. Hum. (%)
30SEP1990	273	122623	17	507	3.3	170	18.5	7.6	-4.5	20.6
30SEP1990	273	122714	17	394	4.9	137	19.1	7.9	-4.4	19.8
30SEP1990	273	122804	17	313	3.7	180	19.5	8.4	-3.3	21.1
30SEP1990	273	122905	17	228	2.5	146	19.2	8.3	-3.3	21.4
30SEP1990	273	123006	17	114	5.8	118	20.4	8.6	-4.0	19.0
30SEP1990	273	123431	18	87	4.3	137	20.1	8.6	-3.4	20.2
30SEP1990	273	123532	18	174	5.1	161	20.9	8.9	-3.8	18.7
30SEP1990	273	123602	18	283	4.9	178	19.4	8.4	-3.0	21.9
30SEP1990	273	123633	18	406	5.1	171	19.2	8.2	-3.6	21.0
30SEP1990	273	123703	18	443	1.9	191	19.6	8.2	-4.2	19.7
30SEP1990	273	123734	18	523	4.3	214	18.7	7.9	-3.6	21.8
30SEP1990	273	123804	18	629	3.9	201	18.4	7.8	-3.5	22.3
30SEP1990	273	124037	18	691	4.9	157	18.3	7.7	-3.7	22.1
30SEP1990	273	124107	19	694	5.2	156	18.4	7.6	-4.0	21.4
30SEP1990	273	124158	19	667	3.9	137	19.0	8.1	-3.3	21.8
30SEP1990	273	124249	19	532	7.8	178	19.6	8.0	-4.9	18.6
30SEP1990	273	124330	19	465	2.5	185	19.2	8.1	-4.0	20.5
30SEP1990	273	124421	19	337	5.8	159	19.2	8.1	-3.8	20.7
30SEP1990	273	124512	19	279	6.0	130	19.8	8.4	-3.8	20.0
30SEP1990	273	124613	19	192	5.1	119	20.0	8.5	-3.7	19.9
30SEP1990	273	124724	19	96	7.2	137	21.2	8.9	-4.5	17.4
30SEP1990	273	130320	20	625	11.1	251	20.1	8.5	-3.7	19.7
30SEP1990	273	130411	20	522	6.0	150	18.9	8.0	-3.6	21.5
30SEP1990	273	130502	20	441	7.6	160	19.6	8.3	-3.6	20.5
30SEP1990	273	130552	20	395	10.5	160	20.3	8.8	-3.2	20.2
30SEP1990	273	130653	20	319	10.1	157	20.6	9.1	-2.5	20.9
30SEP1990	273	130744	20	246	8.6	154	20.9	9.2	-2.7	20.3
30SEP1990	273	130835	20	176	9.5	167	21.7	9.4	-3.0	18.9
30SEP1990	273	131138	20	88	12.1	292	21.5	9.4	-3.0	19.2
30SEP1990	273	132031	21	97	8.9	199	22.1	9.5	-3.2	18.2
30SEP1990	273	132132	21	194	6.2	202	21.9	9.7	-2.5	19.4
30SEP1990	273	132202	21	271	8.2	218	21.3	9.2	-3.1	19.2
30SEP1990	273	132243	21	365	6.0	205	20.6	9.1	-2.6	20.7
30SEP1990	273	132314	21	454	6.2	208	20.6	8.9	-3.0	20.3
30SEP1990	273	132354	21	552	5.2	172	20.8	9.0	-2.9	20.1
30SEP1990	273	132425	21	627	14.4	134	20.5	9.0	-2.5	21.2

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**APPENDIX E**

**TETHERSONDE**  
**METEOROLOGICAL**  
**DATA**  
**GRAPHS**

# TETHERSONDE METEOROLOGICAL DATA GRAPHS

This appendix contains graphs of the profiles of wind speed, wind direction, and air temperature for every atmospheric sounding.

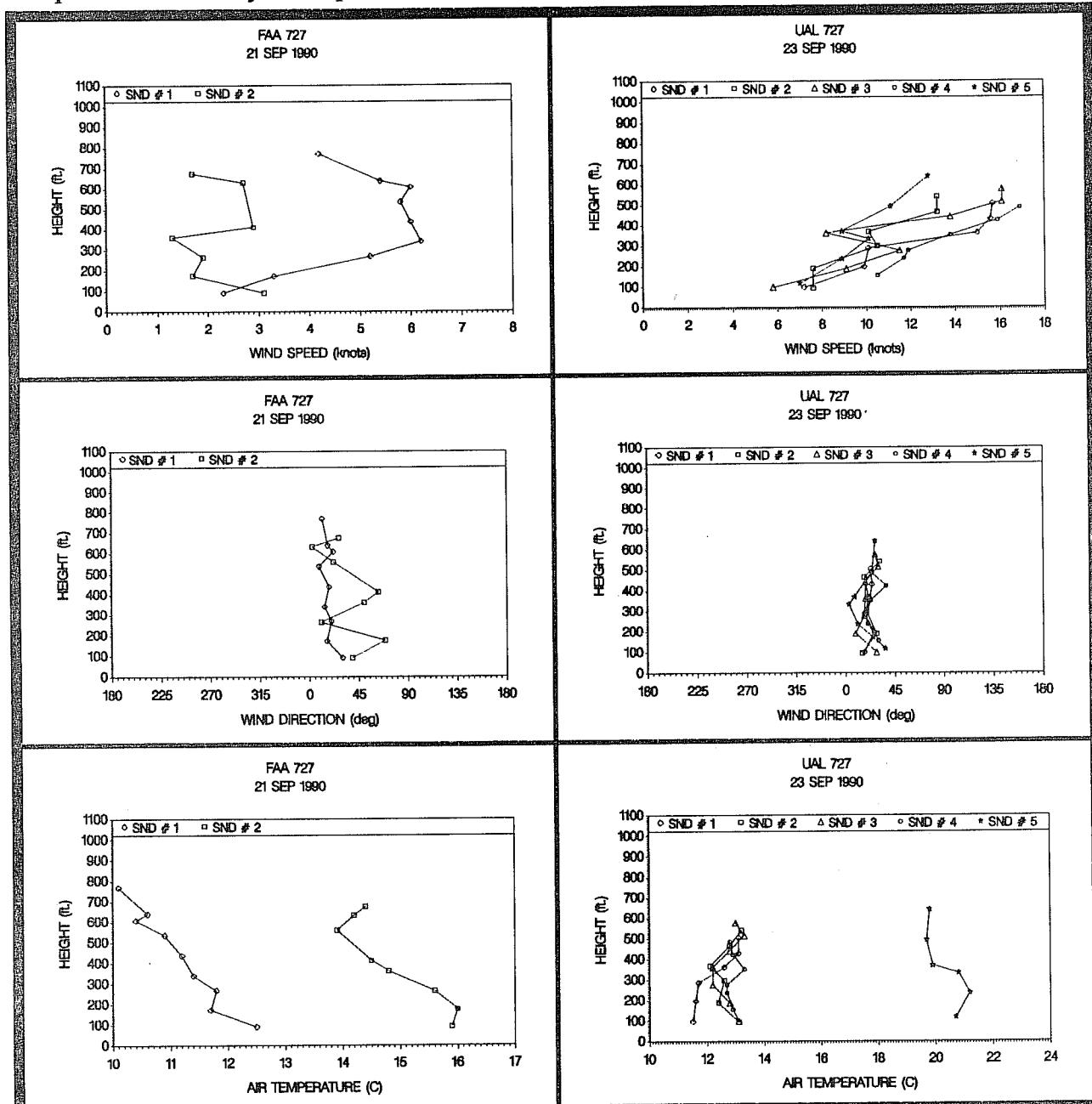


Figure E-1. Wind speed, wind direction, and air temperature profiles from tethersonde sounding numbers 1-2 for the B727-100 on 21 Sep 1990 (left) and sounding numbers 1-5 for the B727-222 on 23 Sep 1990 (right).

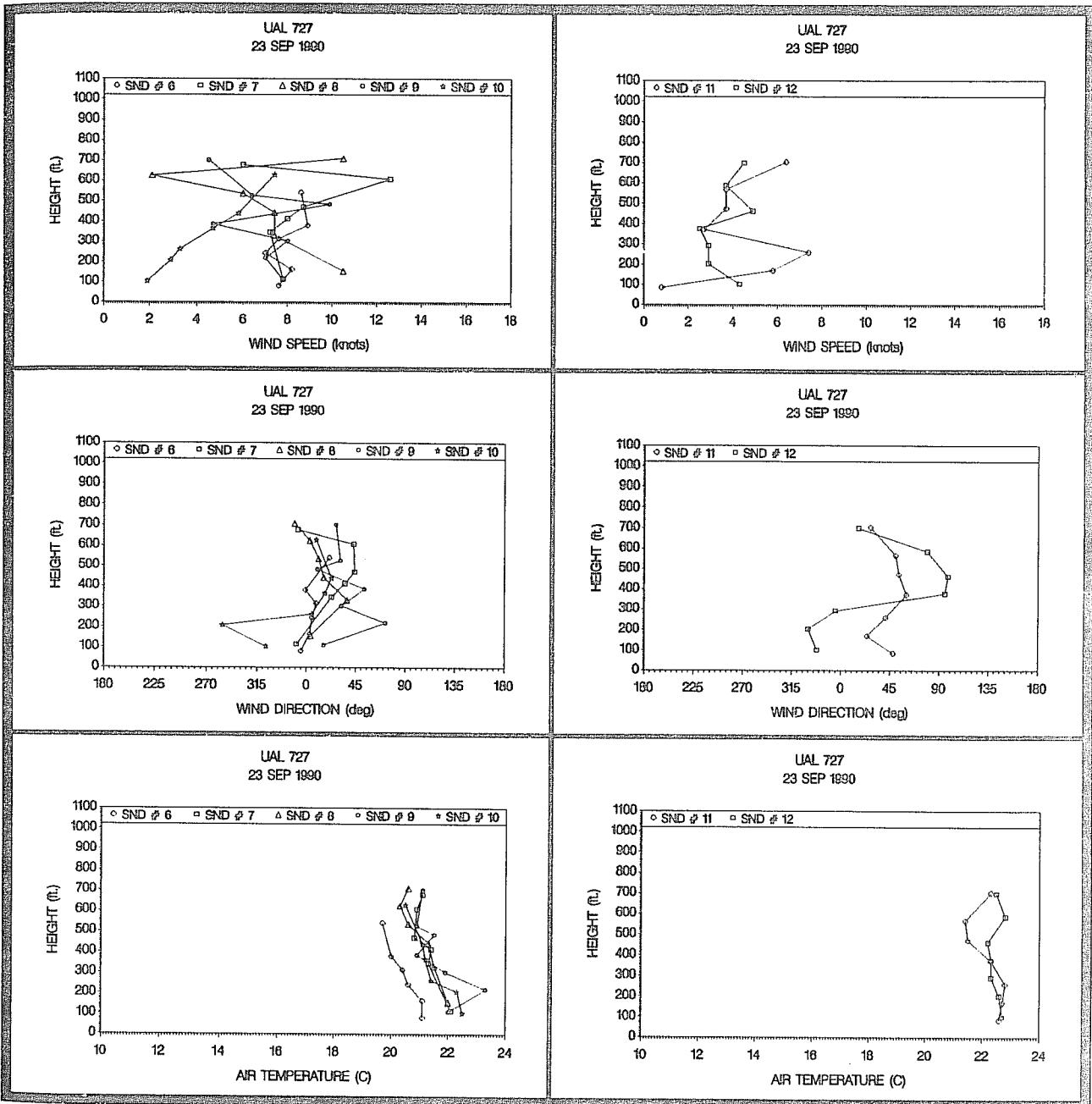


Figure E-2. Wind speed, wind direction, and air temperature profiles from tethersonde sounding numbers 6-10 (left) and 11-13 (right) for the B727-222 on 23 Sep 1990.

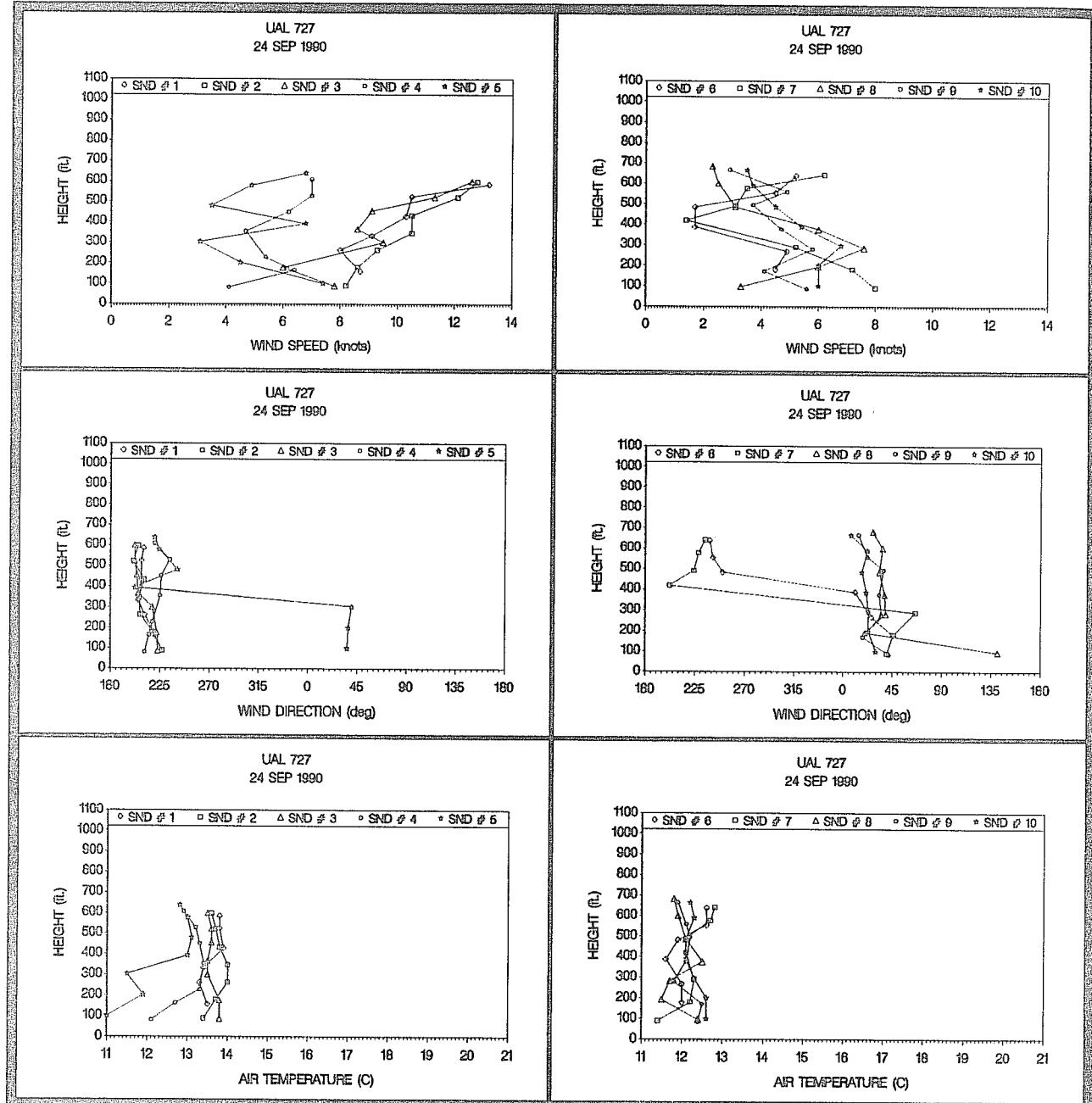


Figure E-3. Wind speed, wind direction, and air temperature profiles from tethersonde sounding numbers 1-5 (left) and 6-10 (right) for the B727-222 on 24 Sep 1990.

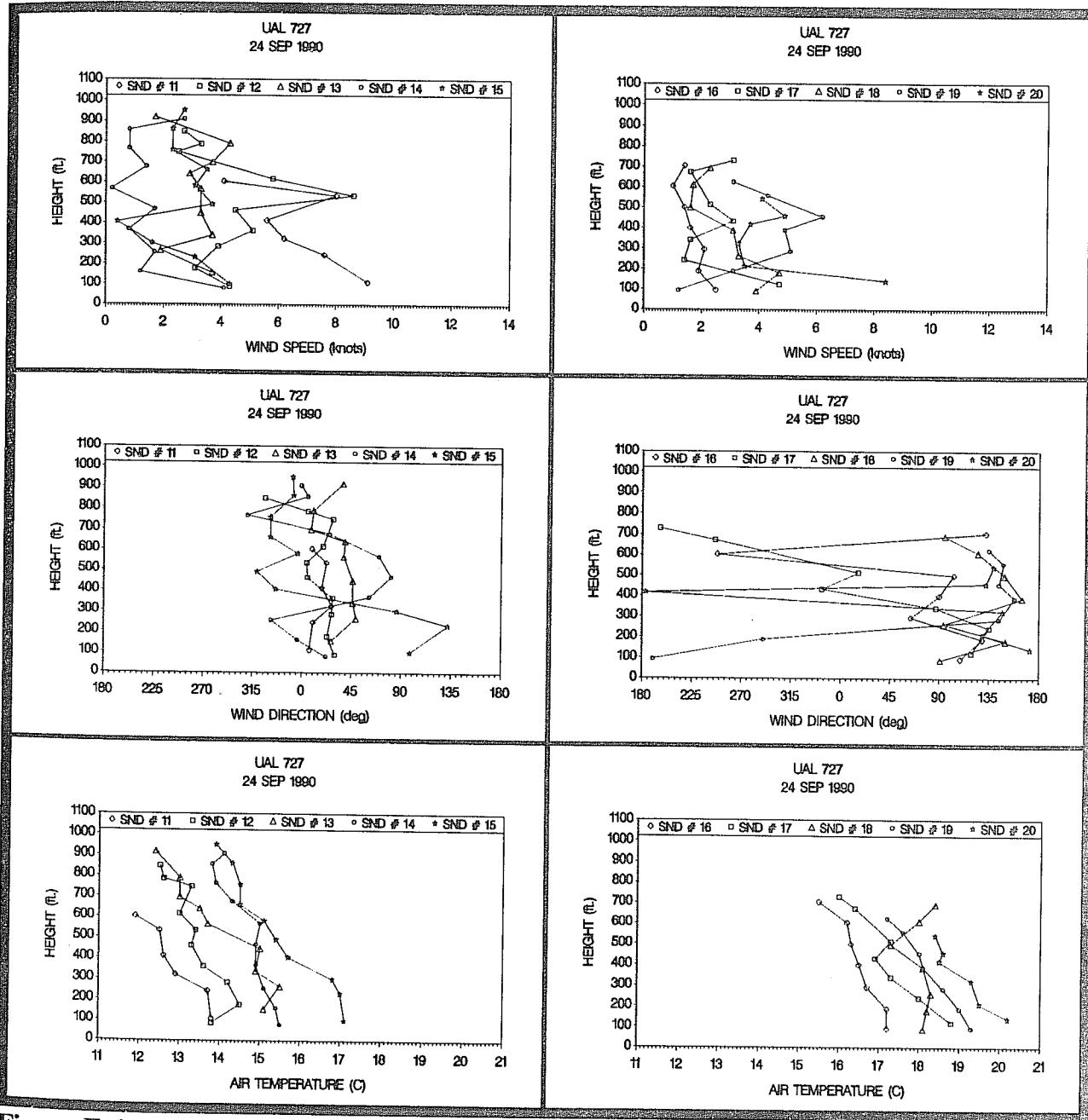


Figure E-4. Wind speed, wind direction, and air temperature profiles from tethersonde sounding numbers 11-15 (left) and 16-20 (right) for the B727-222 on 24 Sep 1990.

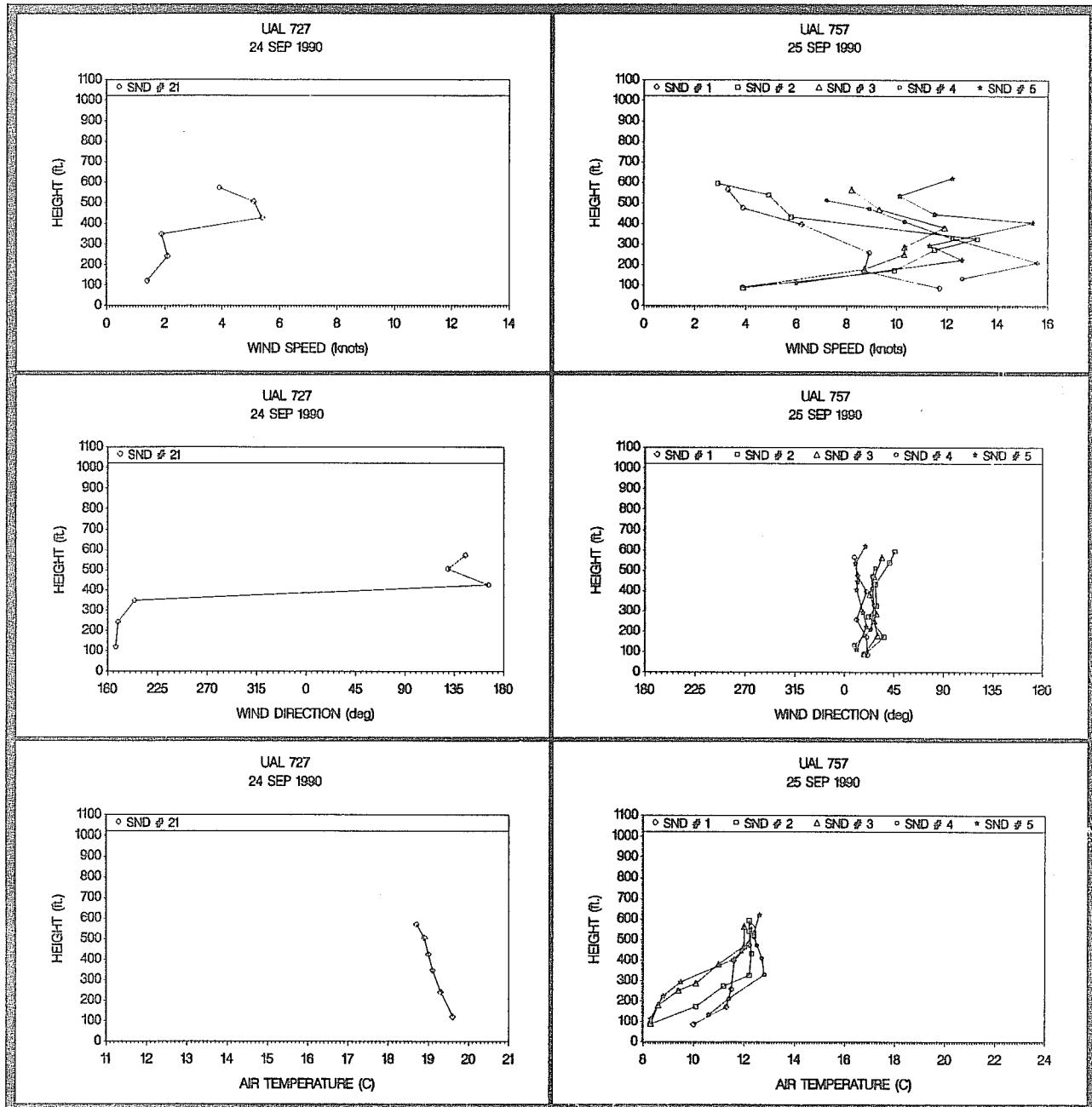


Figure E-5. Wind speed, wind direction, and air temperature profiles from tethersonde sounding number 21 for the B727-222 on 24 Sep 1990 (left) and sounding numbers 1-5 for the B757-200 on 25 Sep 1990 (right).

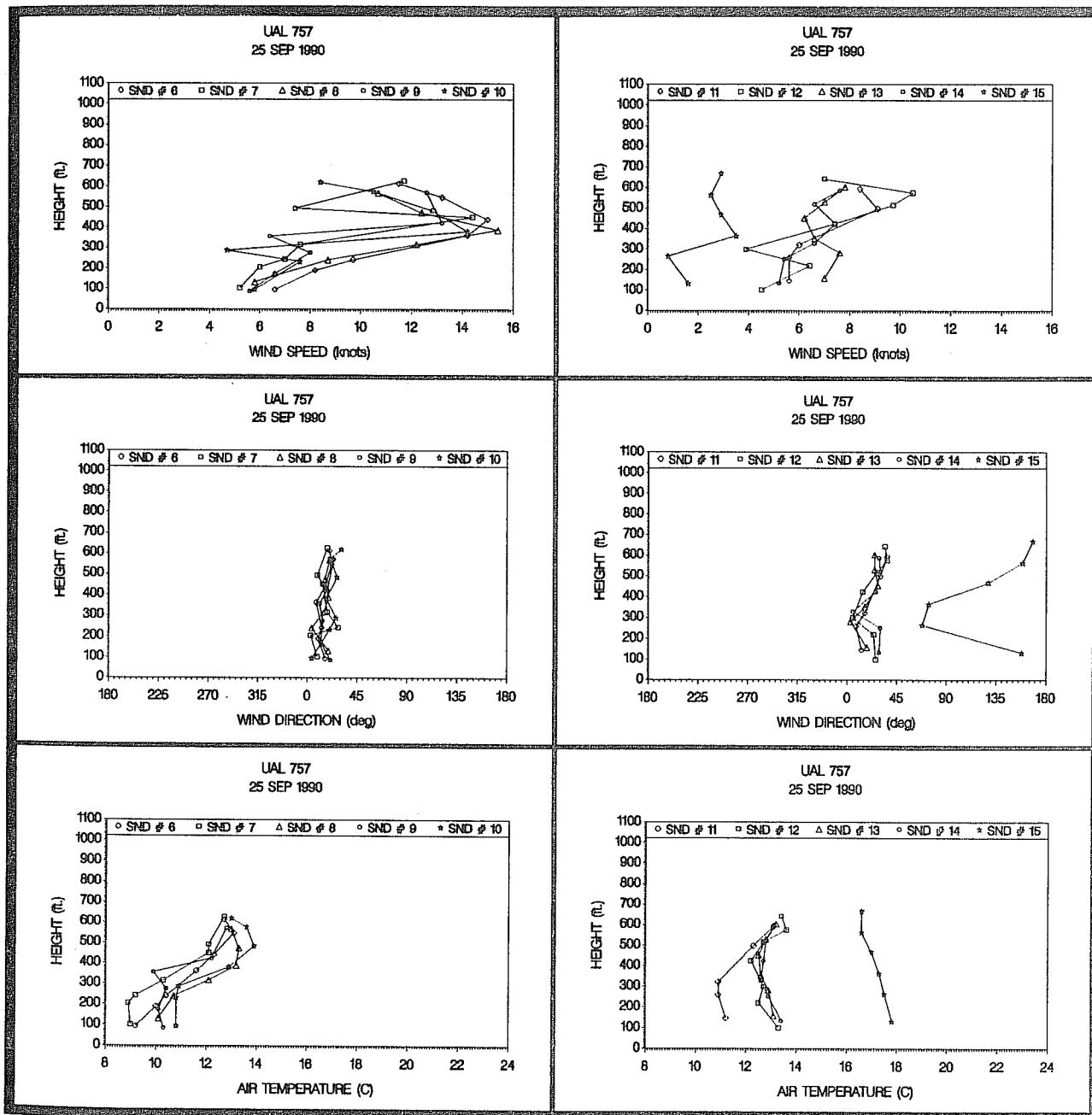


Figure E-6. Wind speed, wind direction, and air temperature profiles from tethersonde sounding numbers 6-10 (left) and 11-15 (right) for the B757-200 on 25 Sep 1990.

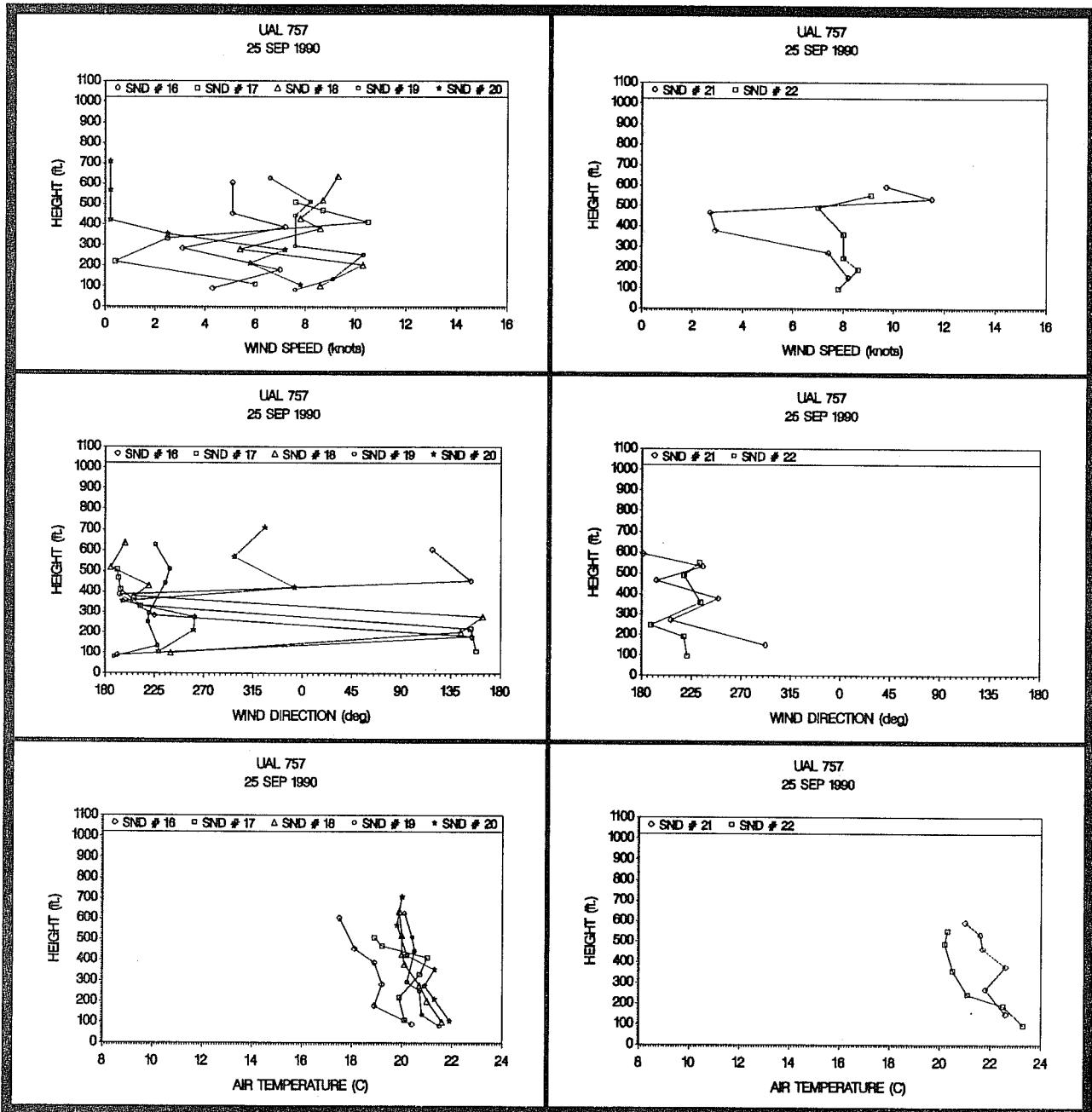


Figure E-7. Wind speed, wind direction, and air temperature profiles from tethersonde sounding numbers 16-20 (left) and 21-22 (right) for the B757-200 on 25 Sep 1990.

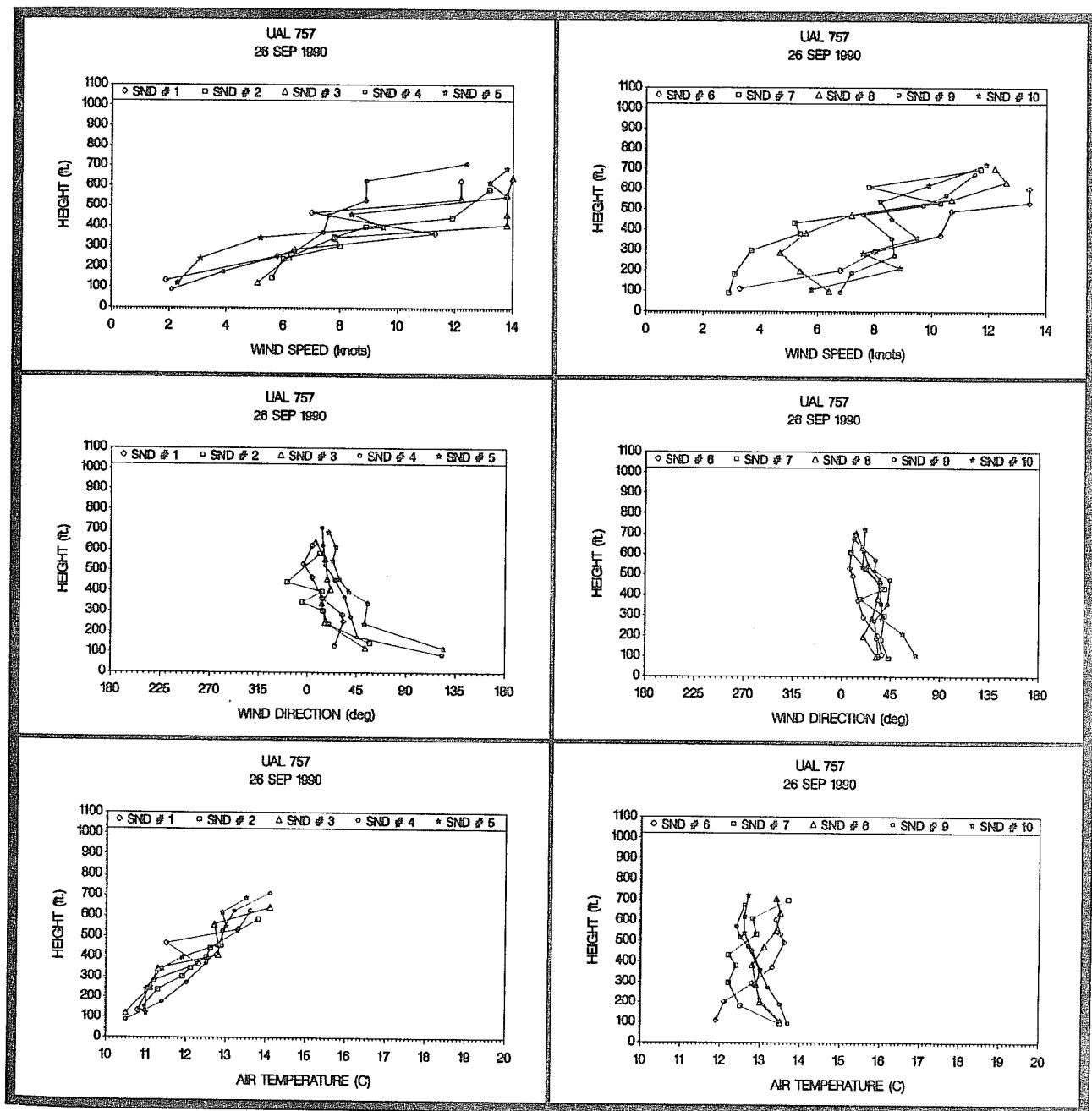


Figure E-8. Wind speed, wind direction, and air temperature profiles from tethersonde sounding numbers 1-5 (left) and 6-10 (right) for the B757-200 on 26 Sep 1990.

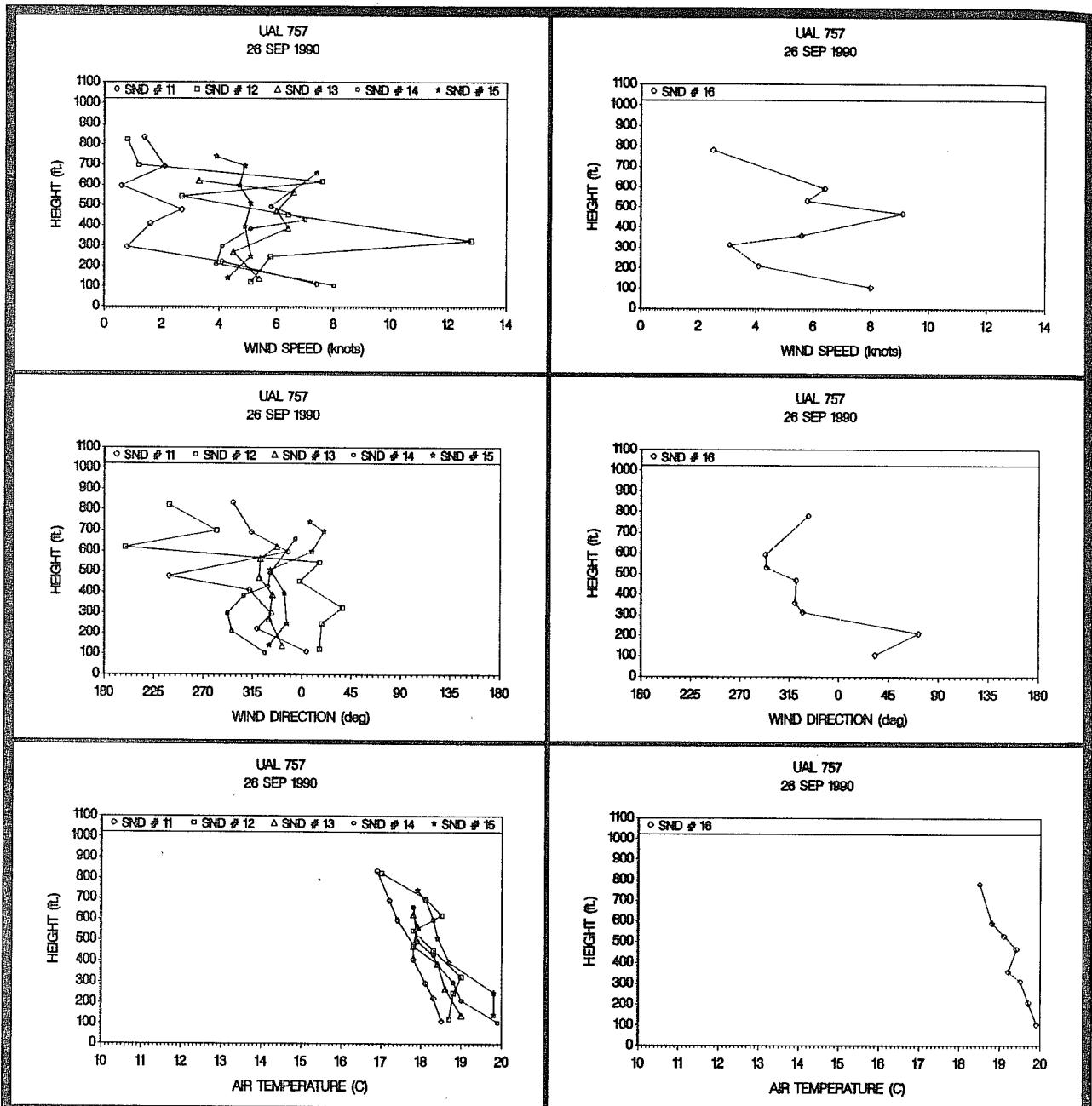
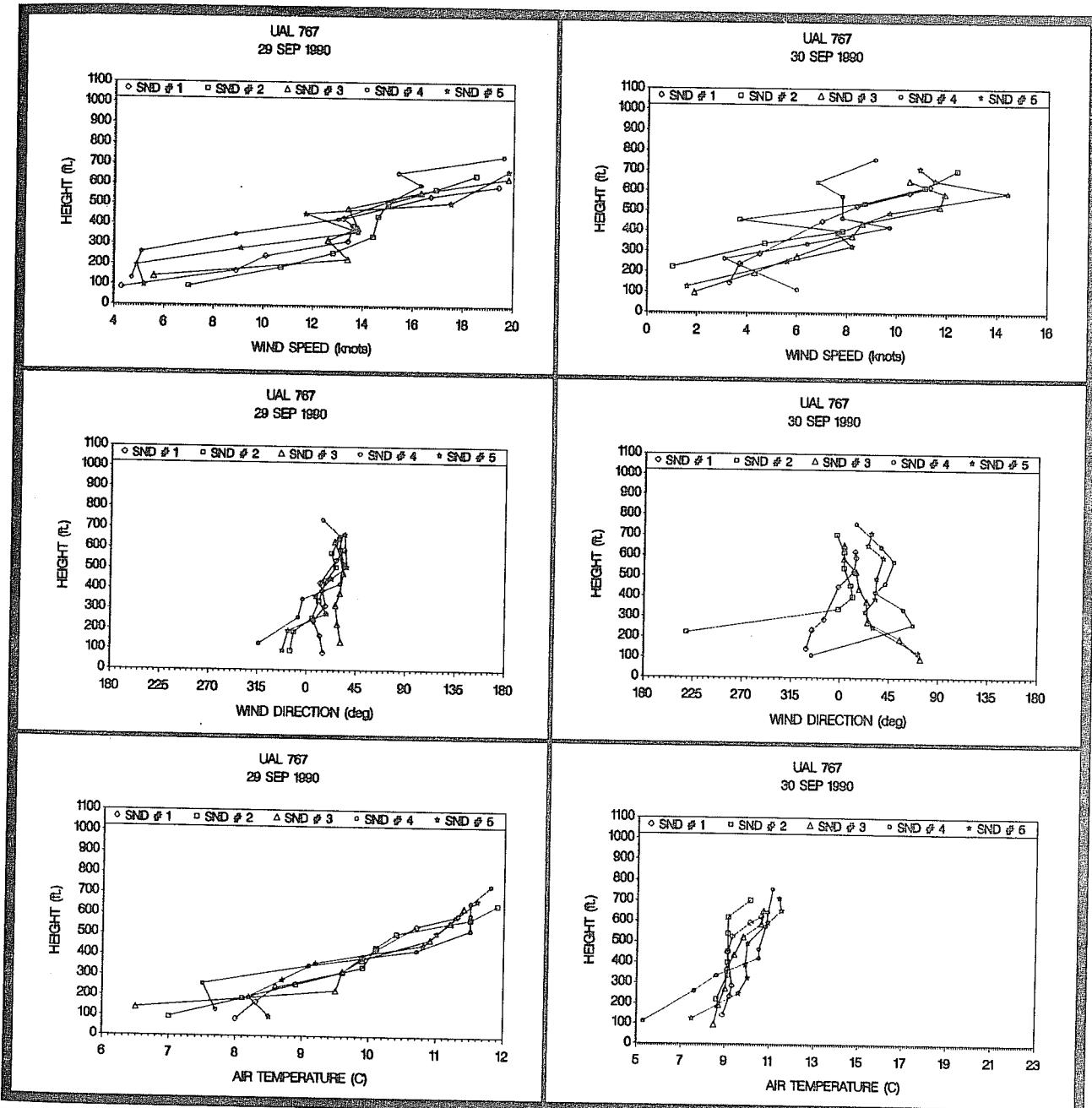


Figure E-9. Wind speed, wind direction, and air temperature profiles from tethersonde sounding numbers 11-15 (left) and 16 (right) for the B757-200 on 26 Sep 1990.



**Figure E-10.** Wind speed, wind direction, and air temperature profiles from tethersonde sounding numbers 1-5 for the B767-200 on 29 Sep 1990 (left) and sounding numbers 1-5 for the B767-200 on 30 Sep 1990 (right).

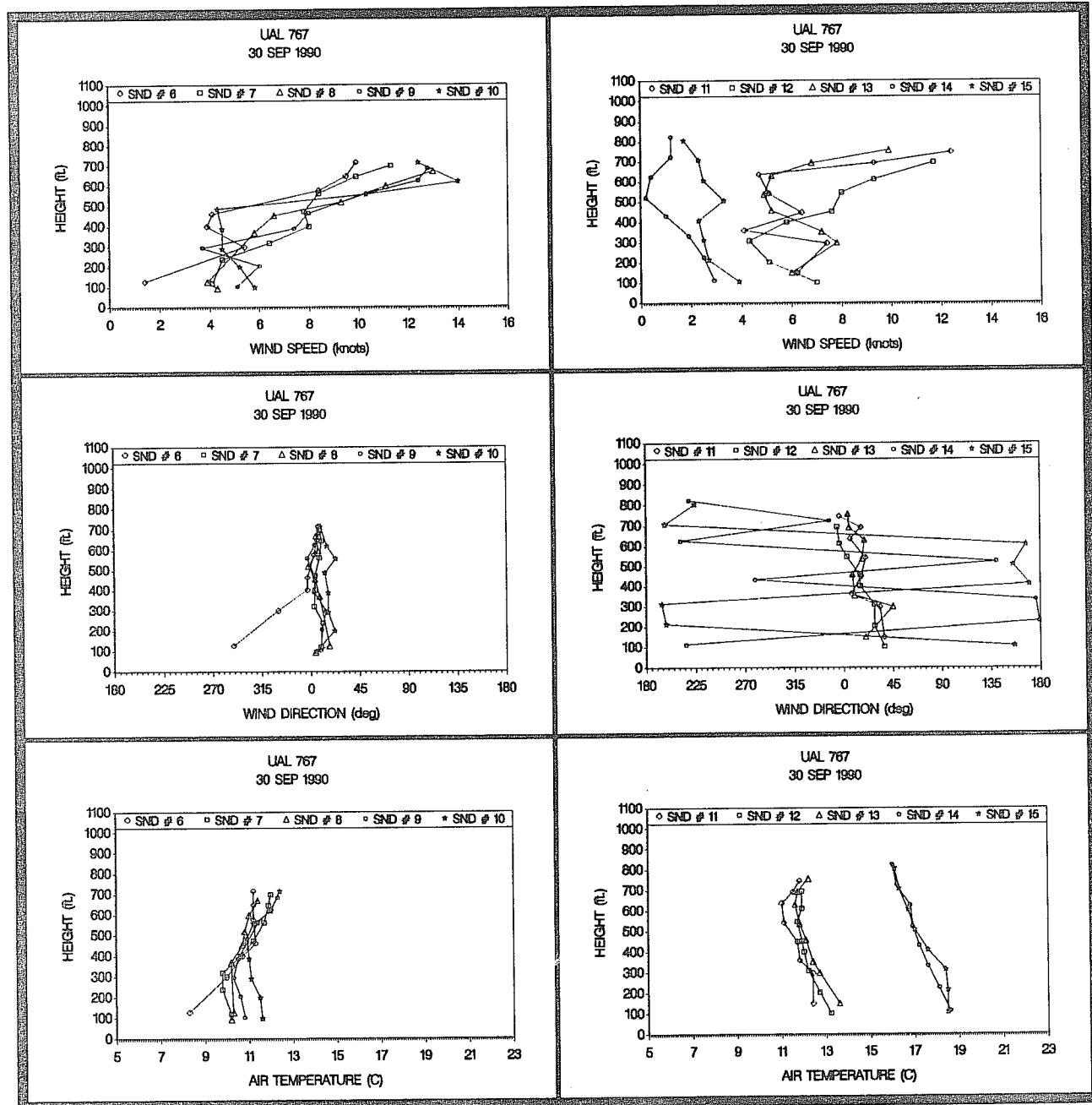
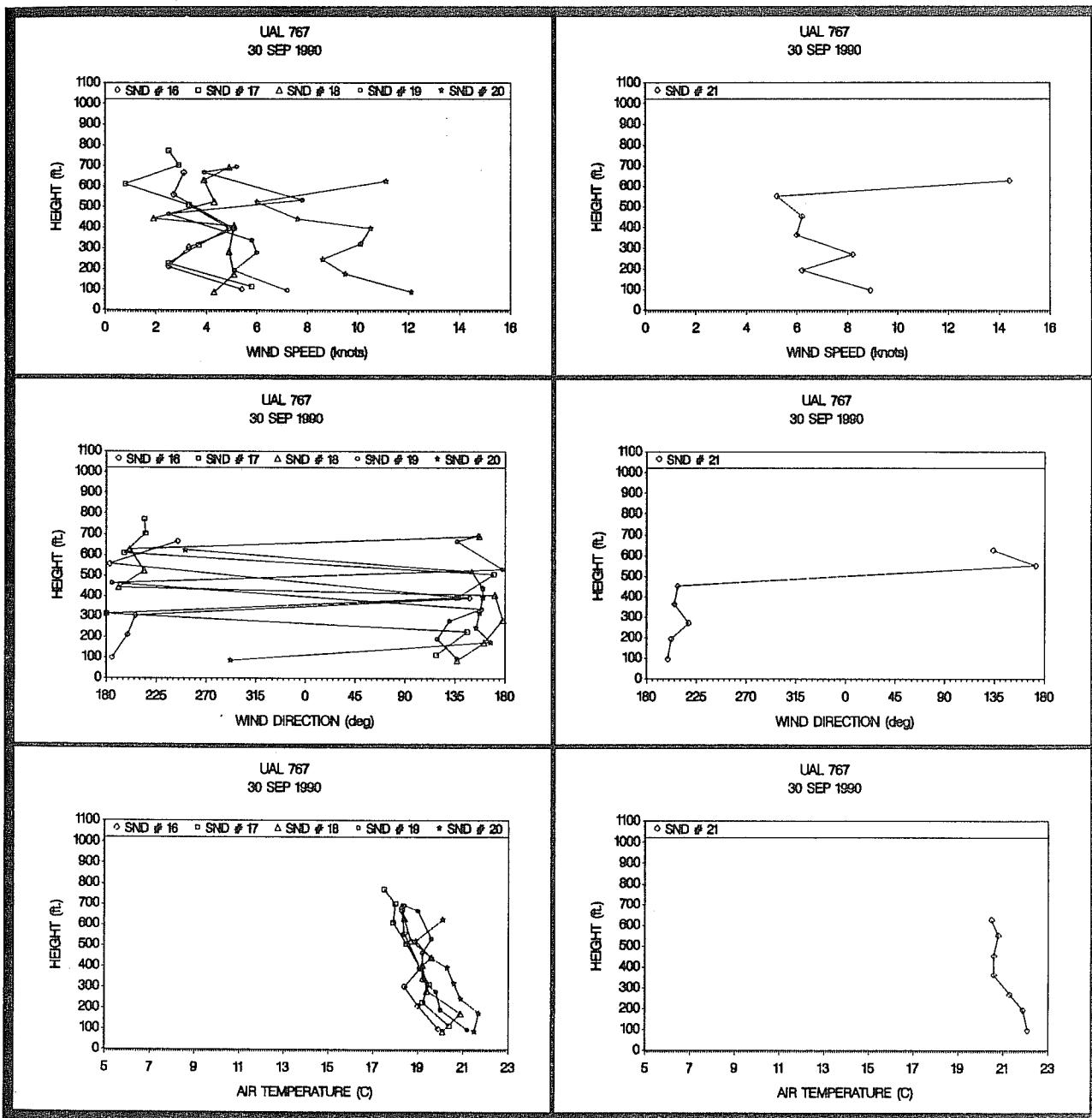


Figure E-11. Wind speed, wind direction, and air temperature profiles from tethersonde sounding numbers 5-10 (left) and 11-15 (right) for the B767-200 on 30 Sep 1990.



**Figure E-12.** Wind speed, wind direction, and air temperature profiles from tethersonde sounding numbers 16-20 (left) and 21-22 (right) for the B767-200 on 30 Sep 1990.

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**APPENDIX F**

**VORTEX  
TANGENTIAL  
VELOCITY  
DISTRIBUTION  
DATA**

# VORTEX TANGENTIAL VELOCITY DISTRIBUTION DATA LISTING

The complete listing of the velocity distribution of each wake vortex is included in this appendix. The data are defined as follows:

## Main Header:

1. Aircraft Type: FAA B727-100, UAL B727-222, UAL B757-200, or UAL B767-200.
2. Run (Flyby) Number: Unique identification for each flyby.
3. Date: Date of Test (DDMMYY YYYY).
4. Day of Year: Number representing Day of the Year from January 1.
5. Abeam Time: Actual aircraft time (hours, minutes and seconds MDT).

## Aircraft Data Header:

1. Configuration: Aircraft flight configuration (landing, takeoff, clean, or holding)
2. Flaps: Aircraft flap setting (degrees)
3. Gross Weight: Aircraft gross weight (thousands of pounds)
4. Glide Slope: Aircraft glide slope ( $0^\circ$  or  $3^\circ$ )
5. Indicated Air Speed: Aircraft indicated air speed (knots)
6. Altitude: Aircraft altitude above ground level (feet)

## Meteorological Data Header:

1. Wind Speed: Average wind speed at 200-ft level (knots)
2. Wind Direction: Average wind direction at 200-ft level (degrees)
3. Air Temperature: Average air temperature at 200-ft level ( $^\circ$ C)
4. Atmospheric Stability Class: Average stability class from 6-200 ft  $\Delta T/\Delta z$  measurements

## Downwind Vortex Characteristics Header (First Measured Vortex):

1. Maximum Velocity: Maximum vortex tangential velocity exclusive of ambient wind effects (feet per second)
2. Age: Vortex age (seconds)
3. Estimated Core Radius: Size of the vortex core determined by iteration of the Hoffman-Joubert Model (feet)
4. Descent Rate: Rate of vortex descent from the aircraft to the tower (feet per second)
5. Advection Rate: Rate of lateral vortex advection from the aircraft to the tower (feet per second)
6. Tower Penetration Height: Height of hot film anemometer that measured the maximum velocity (feet)

## Upwind Vortex Characteristics Header (Second Measured Vortex):

Explanation is identical to the Downwind Vortex Characteristics Header.

Downwind Vortex Tangential Velocities Header:

1. Sensor Height: Height of the hot film anemometer on the tower (feet)
2. Relative Height: Height of the hot film anemometer relative to the height of the hot film anemometer at which the maximum tangential velocity was recorded (feet)
3.  $V_\theta$ : Vortex tangential velocity adjusted for ambient wind (feet per second). Data were flagged, when necessary, as follows:
  - \* = estimated value
  - (D) = vortex dissipated upwind of the tower, as determined primarily by video coverage of entrained smoke in each vortex, and was not measured by the hot film anemometers
  - (M) = data is missing due primarily to operator error
  - (O) = flyby was flown for measurement by remote sensing equipment operated by other participating agencies
  - (P) = vortex core passed over the top of the tower and was not completely measured by the hot film anemometers

Upwind Vortex Tangential Velocities Header (Second Measured Vortex):

Explanation is identical to the Downwind Vortex Tangential Velocities Header.

Flyby (Run) Number: 1		FAA B77-100		Date: 20 JUN 1990 (Day of Year: 171)		Absent Time: 6:07:09 (MDT)	
Configuration: Clean		AIRCRAFT DATA		Flaps: 0 deg.		Gross Weight: 138,000 lbs.	
Glide Slope: 0 deg.		Indicated Air Speed: 210 kts		Altitude: 225 ft AGL		Atmospheric Stability: Stable	
Wind Speed: 4.3 kts		Wind Direction: 77 deg.		Air Temperature: 11.2 °C		Atmospheric Stability: Stable	
Maximum Velocity: (M) fps		Downwind Vortex Characteristics		Estimated Core Radius: (M) ft		Tower Penetration Height: (M) ft AGL	
Descent Rate: (M) fps		Age: (M) s		Tower Penetration Height: (M) ft AGL		Estimated Core Radius: (M) ft	
Maximum Velocity: (M) fps		Upwind Vortex Characteristics		Tower Penetration Height: (M) ft AGL		Tower Penetration Height: (M) ft AGL	
Descent Rate: (M) fps		Age: (M) s		Sensor Height: (M) ft		Sensor Height: (M) ft	
Maximum Velocity: (M) fps		Advection Rate: (M) fps		Relative Height (ft)		Relative Height (ft)	
Descent Rate: (M) fps		Advection Rate: (M) fps		Sensor Height (ft)		Sensor Height (ft)	
Maximum Velocity: (M) fps		Downwind Vortex Tangential Velocities		Upwind Vortex Tangential Velocities		Upwind Vortex Tangential Velocities	
Descent Rate: (M) fps		Sensor Height (ft)		Sensor Height (ft)		Sensor Height (ft)	
Sensor Height (ft)		Relative Height (ft)		Relative Height (ft)		Relative Height (ft)	
Relative Height (ft)		V <sub>θ</sub> (fps)		V <sub>θ</sub> (fps)		V <sub>θ</sub> (fps)	
Sensor Height (ft)		Sensor Height (ft)		Sensor Height (ft)		Sensor Height (ft)	
198	(M)	102	(M)	198	(M)	102	(M)
196	(M)	100	(M)	196	(M)	100	(M)
194	(M)	98	(M)	194	(M)	98	(M)
192	(M)	96	(M)	192	(M)	96	(M)
190	(M)	94	(M)	190	(M)	94	(M)
188	(M)	92	(M)	188	(M)	92	(M)
186	(M)	90	(M)	186	(M)	90	(M)
184	(M)	88	(M)	184	(M)	88	(M)
182	(M)	86	(M)	182	(M)	86	(M)
180	(M)	84	(M)	180	(M)	84	(M)
178	(M)	82	(M)	178	(M)	82	(M)
176	(M)	80	(M)	176	(M)	80	(M)
174	(M)	78	(M)	174	(M)	78	(M)
172	(M)	76	(M)	172	(M)	76	(M)
170	(M)	74	(M)	170	(M)	74	(M)
168	(M)	72	(M)	168	(M)	72	(M)
166	(M)	70	(M)	166	(M)	70	(M)
164	(M)	68	(M)	164	(M)	68	(M)
162	(M)	66	(M)	162	(M)	66	(M)
160	(M)	64	(M)	160	(M)	64	(M)
158	(M)	62	(M)	158	(M)	62	(M)
156	(M)	60	(M)	156	(M)	60	(M)
154	(M)	58	(M)	154	(M)	58	(M)
152	(M)	56	(M)	152	(M)	56	(M)
150	(M)	54	(M)	150	(M)	54	(M)
148	(M)	52	(M)	148	(M)	52	(M)
146	(M)	50	(M)	146	(M)	50	(M)
144	(M)	48	(M)	144	(M)	48	(M)
142	(M)	46	(M)	142	(M)	46	(M)
140	(M)	44	(M)	140	(M)	44	(M)
138	(M)	42	(M)	138	(M)	42	(M)
136	(M)	40	(M)	136	(M)	40	(M)
134	(M)	38	(M)	134	(M)	38	(M)
132	(M)	36	(M)	132	(M)	36	(M)
130	(M)	34	(M)	130	(M)	34	(M)
128	(M)	32	(M)	128	(M)	32	(M)
126	(M)	30	(M)	126	(M)	30	(M)
124	(M)	28	(M)	124	(M)	28	(M)
122	(M)	26	(M)	122	(M)	26	(M)
120	(M)	24	(M)	120	(M)	24	(M)
118	(M)	22	(M)	118	(M)	22	(M)
116	(M)	20	(M)	116	(M)	20	(M)
114	(M)	18	(M)	114	(M)	18	(M)
112	(M)	16	(M)	112	(M)	16	(M)
110	(M)	14	(M)	110	(M)	14	(M)
108	(M)	12	(M)	108	(M)	12	(M)
106	(M)	10	(M)	106	(M)	10	(M)
104	(M)			104	(M)		

\* = Estimated (D) = No vortex (O) = Missing (P) = Flyby passed over top of tower (N) = No vortex flown for remote sensing systems

Flyby (Run) Number: 2	FAA B727-100	Date: 20 JUN 1980 (Day of Year: 171)	Abeam Time: 6:12:58 (MDT)
Configuration: Clean	AIRCRAFT DATA		
Glide Slope: 0 deg.	Flaps: 0 deg.	Gross Weight: 136,500 lbs.	
	Indicated Air Speed: 255 kts	Altitude: 210 ft AGL	
Wind Speed: 3.7 kts	METEOROLOGICAL DATA (200 ft Sensor Level)	Air Temperature: 11.3 °C	Atmospheric Stability: Stable
Wind Direction: 73 deg.	DOWNDOWN VORTEX CHARACTERISTICS	Age: (P)s	Estimated Core Radius: (P) ft
	Advection Rate: (P) fpm		Tower Penetration Height: (P) ft AGL
Maximum Velocity: 110.4 fpm	UPWIND VORTEX CHARACTERISTICS	Age: 32 s	Estimated Core Radius: 0.3 ft
Descent Rate: 1.3 fpm	Advection Rate: 12.1 fpm		Tower Penetration Height: 168 ft AGL
Maximum Velocity: 110.4 fpm	DOWNDOWN VORTEX TANGENTIAL Velocities	Upwind Vortex Tangential Velocities	
Descent Rate: 1.3 fpm	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)
	Sensor Height (ft)	Sensor Height (ft)	Relative Height (ft)
	(P)	(P)	(P)
198	198	102	198
194	194	98	194
192	192	96	192
190	190	94	190
188	188	92	188
186	186	90	186
184	184	88	184
182	182	86	182
180	180	84	180
178	178	82	178
176	176	80	176
174	174	78	174
172	172	76	172
170	170	74	170
168	168	72	168
166	166	70	166
164	164	68	164
162	162	66	162
160	160	64	160
158	158	62	158
156	156	60	156
154	154	58	154
152	152	56	152
150	150	54	150
148	148	52	148
146	146	50	146
144	144	48	144
142	142	46	142
140	140	44	140
138	138	42	138
136	136	40	136
134	134	38	134
132	132	36	132
130	130	34	130
128	128	32	128
126	126	30	126
124	124	28	124
122	122	26	122
120	120	24	120
118	118	22	118
116	116	20	116
114	114	18	114
112	112	16	112
110	110	14	110
108	108	12	108
106	106	10	106
104	104	8	104

= Estimated      (D) = Vortex dissipated upwind of tower      (M) = Missing      (O) = No vortex (Flyby flown for remote sensing systems)      (P) = Vortex passed over top of tower

Flyby Run Number: 3	Date: 20 JUN 1990 (Day of Year: 171)	Abeam Time: 6:18:28 (MDT)					
Configuration: Clean	AIRCRAFT DATA						
Glide Slope: 0 deg.	Flaps: 0 deg.	Gross Weight: 135,000 lbs.					
Glide Slope: 0 deg.	Indicated Air Speed: 300 kts	Altitude: 200 ft AGL					
Wind Speed: 30 kts	Wind Direction: 38 deg.	Air Temperature: 11.5 °C					
Maximum Velocity: (P) fps	Downwind Vortex Characteristics	Atmospheric Stability: Neutral					
Descent Rate: (M) fps	Age: (P) s Advection Rate: (P) fps	Estimated Core Radius: (P) ft Tower Penetration Height: (P) ft AGL					
Maximum Velocity: (M) fps	Upwind Vortex Characteristics	Estimated Core Radius: (M) ft Tower Penetration Height: (M) ft AGL					
Descent Rate: (M) fps	Age: (M) s Advection Rate: (M) fps						
Maximum Velocity: (M) fps	Downwind Vortex Tangential Velocities						
Descent Rate: (M) fps	Sensor Height [ft]	Relative Height [ft]	Sensor Height [ft]	Relative Height [ft]	Sensor Height [ft]	Relative Height [ft]	$V_{\theta}$ (fps)
	Relative Height (ft)		Relative Height (ft)		Relative Height (ft)		
198	(P)	(P)	(P)	(P)	(P)	(P)	198
196	(P)	(P)	(P)	(P)	(P)	(P)	196
194	(P)	(P)	(P)	(P)	(P)	(P)	194
192	(P)	(P)	(P)	(P)	(P)	(P)	192
190	(P)	(P)	(P)	(P)	(P)	(P)	190
188	(P)	(P)	(P)	(P)	(P)	(P)	188
186	(P)	(P)	(P)	(P)	(P)	(P)	186
184	(P)	(P)	(P)	(P)	(P)	(P)	184
182	(P)	(P)	(P)	(P)	(P)	(P)	182
180	(P)	(P)	(P)	(P)	(P)	(P)	180
178	(P)	(P)	(P)	(P)	(P)	(P)	178
176	(P)	(P)	(P)	(P)	(P)	(P)	176
174	(P)	(P)	(P)	(P)	(P)	(P)	174
172	(P)	(P)	(P)	(P)	(P)	(P)	172
170	(P)	(P)	(P)	(P)	(P)	(P)	170
168	(P)	(P)	(P)	(P)	(P)	(P)	168
166	(P)	(P)	(P)	(P)	(P)	(P)	166
164	(P)	(P)	(P)	(P)	(P)	(P)	164
162	(P)	(P)	(P)	(P)	(P)	(P)	162
160	(P)	(P)	(P)	(P)	(P)	(P)	160
158	(P)	(P)	(P)	(P)	(P)	(P)	158
156	(P)	(P)	(P)	(P)	(P)	(P)	156
154	(P)	(P)	(P)	(P)	(P)	(P)	154
152	(P)	(P)	(P)	(P)	(P)	(P)	152
150	(P)	(P)	(P)	(P)	(P)	(P)	150
148	(P)	(P)	(P)	(P)	(P)	(P)	148
146	(P)	(P)	(P)	(P)	(P)	(P)	146
144	(P)	(P)	(P)	(P)	(P)	(P)	144
142	(P)	(P)	(P)	(P)	(P)	(P)	142
140	(P)	(P)	(P)	(P)	(P)	(P)	140
138	(P)	(P)	(P)	(P)	(P)	(P)	142
136	(P)	(P)	(P)	(P)	(P)	(P)	138
134	(P)	(P)	(P)	(P)	(P)	(P)	134
132	(P)	(P)	(P)	(P)	(P)	(P)	132
130	(P)	(P)	(P)	(P)	(P)	(P)	130
128	(P)	(P)	(P)	(P)	(P)	(P)	128
126	(P)	(P)	(P)	(P)	(P)	(P)	126
124	(P)	(P)	(P)	(P)	(P)	(P)	124
122	(P)	(P)	(P)	(P)	(P)	(P)	122
120	(P)	(P)	(P)	(P)	(P)	(P)	120
118	(P)	(P)	(P)	(P)	(P)	(P)	118
116	(P)	(P)	(P)	(P)	(P)	(P)	116
114	(P)	(P)	(P)	(P)	(P)	(P)	114
112	(P)	(P)	(P)	(P)	(P)	(P)	112
110	(P)	(P)	(P)	(P)	(P)	(P)	110
108	(P)	(P)	(P)	(P)	(P)	(P)	108
106	(P)	(P)	(P)	(P)	(P)	(P)	106
104	(P)	(P)	(P)	(P)	(P)	(P)	104

\* = Estimated (D) = Vortex dissipated upwind of tower

(M) = Missing (O) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

Flyby (Run) Number: 4	Date: 20 JUN 1990 (Day of Year: 171)	Abeam Time: 6:23:14 (MDT)						
Configuration: Clean	AIRCRAFT DATA							
Glide Slope: 0 deg.	Flaps: 0 deg.	Gross Weight: 134,000 lbs.						
	Indicated Air Speed: 210 kts	Altitude: 180 ft AGL						
Wind Speed: 0.8 kts	METEOROLOGICAL DATA (200 ft Sensor Level)							
Maximum Velocity: 30.3 ips	Wind Direction: 172 deg.	Atmospheric Stability: Unstable						
Descent Rate: 0.1 ips	Age: 28 <sup>s</sup>	Estimated Core Radius: 1.0 ft						
Maximum Velocity: 193.5 ips	Advection Rate: 11.5 ips	Tower Penetration Height: 176 ft AGL						
Descent Rate: 1.7 ips	Age: 41 <sup>s</sup>	Estimated Core Radius: 0.2 ft						
	Advection Rate: 9.4 ips	Tower Penetration Height: 110 ft AGL						
	DOWNWIND VORTEX CHARACTERISTICS							
	Downwind Vortex Tangential Velocities	Upwind Vortex Tangential Velocities						
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	
		V <sub>θ</sub> (fps)		V <sub>θ</sub> (fps)		V <sub>θ</sub> (fps)		
198	22	26.5	102	-74	-0.7	198	88	
196	20	23.2*	100	-76	-0.5	196	86	
194	18	19.9	98	-78	-2.3	194	84	
192	16	21.6*	96	-80	-2.1	192	82	
190	14	23.3*	94	-82	-1.5	190	80	
188	12	25.0*	92	-84	-1.7	188	78	
186	10	26.6*	90	-86	-1.6	186	76	
184	8	24.0*	88	-88	-0.3	184	74	
182	6	21.4*	86	-90	-0.6	182	72	
180	4	18.8	84	-92	-0.8	180	70	
178	2	29.6	82	-94	-2.6	178	68	
176	0	-30.3	80	-96	-2.6	176	66	
174	-2	-27.5	78	-98	-0.5	174	64	
172	-4	-19.2	76	-100	-1.4	172	62	
170	-6	-11.7	74	-102	-0.3	170	60	
168	-8	-7.0	72	-104	0.4	168	58	
166	-10	-6.0	70	-106	-1.3	166	56	
164	-12	-3.7	68	-108	0.7	164	54	
162	-14	-6.6	66	-110	0.9	162	52	
160	-16	-4.7	64	-112	0.6	160	50	
158	-18	-4.2	62	-114	1.3	158	48	
156	-20	-5.6	60	-116	0.8	156	46	
154	-22	-5.5	58	-118	0.7	154	44	
152	-24	-6.0	56	-120	0.9	152	42	
150	-26	-7.2	54	-122	-1.1	150	40	
148	-28	-6.4	52	-124	-0.1	148	38	
146	-30	-6.2	50	-126	-0.5	146	36	
144	-32	-5.6	48	-128	-1.0	144	34	
142	-34	-4.2	46	-130	-1.0	142	32	
140	-36	-5.5	44	-132	2.1	140	30	
138	-38	-4.8	42	-134	1.8	138	28	
136	-40	-6.0	40	-136	1.6	136	26	
134	-42	-5.3	38	-138	1.3	134	24	
132	-44	-3.3	36	-140	2.0	132	22	
130	-46	-4.1	34	-142	1.8	130	20	
128	-48	-3.4	32	-144	2.5	128	18	
126	-50	-3.6	30	-146	3.7	126	16	
124	-52	-2.1	28	-148	3.6*	124	14	
122	-54	-2.0	26	-150	3.6	122	12	
120	-56	-2.1	24	-152	3.1	120	10	
118	-58	-1.8	22	-154	2.9	118	8	
116	-60	-2.1	20	-156	2.8	116	6	
114	-62	-4.7	18	-158	2.3	114	4	
112	-64	-4.3	16	-160	2.9	112	2	
110	-66	-3.3	14	-162	1.6*	110	0	
108	-68	-3.4	12	-164	0.2	108	-2	
106	-70	-3.4	10	-166	0.2	106	-4	
104	-72	-3.9	8		104	-6	104	-6

= Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(N) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

FAA B727-100					
AIRCRAFT DATA			METEOROLOGICAL DATA		
Configuration: Clean Glide Slope: 0 deg.			Flaps: 0 deg. Indicated Air Speed: 250 kts (200 ft Sensor Level)		
Wind Speed: 2.4 kts			Wind Direction: 243 deg. Air Temperature: 10.8 °C		
DOWNDOWN VORTEX CHARACTERISTICS					
Maximum Velocity: (M) fps			Age: (M) s		
Descent Rate: (M) f/s			Advection Rate: (M) f/s		
UPWIND VORTEX CHARACTERISTICS					
Maximum Velocity: (M) fps			Age: (M) s		
Descent Rate: (M) f/s			Advection Rate: (M) f/s		
Downwind Vortex Tangential Velocities					
Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)
198	(M)	(M)	102	(M)	(M)
196	(M)	(M)	100	(M)	(M)
194	(M)	(M)	98	(M)	(M)
192	(M)	(M)	96	(M)	(M)
190	(M)	(M)	94	(M)	(M)
188	(M)	(M)	92	(M)	(M)
186	(M)	(M)	90	(M)	(M)
184	(M)	(M)	88	(M)	(M)
182	(M)	(M)	86	(M)	(M)
180	(M)	(M)	84	(M)	(M)
178	(M)	(M)	82	(M)	(M)
176	(M)	(M)	80	(M)	(M)
174	(M)	(M)	78	(M)	(M)
172	(M)	(M)	76	(M)	(M)
170	(M)	(M)	74	(M)	(M)
168	(M)	(M)	72	(M)	(M)
166	(M)	(M)	70	(M)	(M)
164	(M)	(M)	68	(M)	(M)
162	(M)	(M)	66	(M)	(M)
160	(M)	(M)	64	(M)	(M)
158	(M)	(M)	62	(M)	(M)
156	(M)	(M)	60	(M)	(M)
154	(M)	(M)	58	(M)	(M)
152	(M)	(M)	56	(M)	(M)
150	(M)	(M)	54	(M)	(M)
148	(M)	(M)	52	(M)	(M)
146	(M)	(M)	50	(M)	(M)
144	(M)	(M)	48	(M)	(M)
142	(M)	(M)	46	(M)	(M)
140	(M)	(M)	44	(M)	(M)
138	(M)	(M)	42	(M)	(M)
136	(M)	(M)	40	(M)	(M)
134	(M)	(M)	38	(M)	(M)
132	(M)	(M)	36	(M)	(M)
130	(M)	(M)	34	(M)	(M)
128	(M)	(M)	32	(M)	(M)
126	(M)	(M)	30	(M)	(M)
124	(M)	(M)	28	(M)	(M)
122	(M)	(M)	26	(M)	(M)
120	(M)	(M)	24	(M)	(M)
118	(M)	(M)	22	(M)	(M)
116	(M)	(M)	20	(M)	(M)
114	(M)	(M)	18	(M)	(M)
112	(M)	(M)	16	(M)	(M)
110	(M)	(M)	14	(M)	(M)
108	(M)	(M)	12	(M)	(M)
106	(M)	(M)	10	(M)	(M)
104	(M)	(M)	8	(M)	(M)

(P) = Vortex passed over top of tower

(M) = Missing

(D) = Vortex dissipated upwind of tower

(O) = No vortex (Flyby) down for remote sensing systems

FAA B727-100		Date: 20 JUN 1990 (Day of Year: 171)		Abeam Time: 6:34:26 (MDT)	
Configuration: Clean		Wind Speed: 1.3 kts		Maximum Velocity: 51.7 fpm	
Glide Slope: 0 deg.		Descent Rate: 1.3 fpm		Descent Rate: (D) fpm	
AIRCRAFT DATA	METEOROLOGICAL DATA (200 ft Sensor Level)	DOWNDOWN VORTEX CHARACTERISTICS	UPWIND VORTEX CHARACTERISTICS	Upwind Vortex Tangential Velocities	Upwind Vortex Tangential Velocities
Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)
198	76	23.3	102	0.0	198
196	74	21.6*	100	-0.2	196
194	72	19.9	98	-0.4	194
192	70	22.4*	96	-0.6	192
190	68	24.9*	94	-0.8	190
188	66	27.4*	92	-1.0	188
186	64	29.8	90	-1.3	186
184	62	22.2*	88	-3.4	184
182	60	22.6*	86	-3.6	182
180	58	18.9	84	-0.8	180
178	56	20.1*	82	-0.3	178
176	54	22.5*	80	-0.1	176
174	52	22.5	78	-4.4	174
172	50	24.7	76	-1.1	172
170	48	25.4	74	-4.6	170
168	46	24.8	72	-5.0	168
166	44	24.3	70	-5.2	166
164	42	24.0	68	-5.4	164
162	40	23.8	66	-5.6	162
160	38	23.8	64	-5.8	160
158	36	23.2	62	-6.0	158
156	34	23.3	60	-1.5	156
154	32	23.0	58	-6.4	154
152	30	22.4	56	-6.6	152
150	28	22.7	54	-6.8	150
148	26	21.6	52	-7.0	148
146	24	25.0	50	-7.2	146
144	22	23.4	48	-7.4	144
142	20	23.2	46	-7.6	142
140	18	21.6	44	-7.8	140
138	16	18.7	42	-8.0	138
136	14	22.6	40	-8.2	136
134	12	20.8	38	-8.4	134
132	10	24.5	36	-8.6	132
130	8	25.2	34	-8.8	130
128	6	24.4	32	-9.0	128
126	4	17.4	30	-9.2	126
124	2	33.3	28	-9.4	124
122	0	51.7	26	-9.6	122
120	-2	24	-16.6	-10.6	120
118	-4	22	-1.2	-1.5	118
116	-6	1.4	20	-10.0	22
114	-8	5.0	18	-10.4	18
112	-10	3.4	16	-10.3	16
110	-12	3.4	14	-10.8	14
108	-14	3.5	12	-11.0	10
106	-16	3.5	10	-11.2	10
104	-18	0.4	-0.4	-10.4	104

Estimated

) = Vortex dissipated by wind of tower ( $M$ ) = Missing

= Vortex dissipated by wind of tower

(P) = Vertex passed over too often

Flyby (Run) Number: 7		Date: 20 JUN 1990 (Day of Year: 171)		Abeam Time: 6:39:56 (MDT)	
Configuration: Clean		AIRCRAFT DATA			
Glide Slope: 0 deg.		Flaps: 0 deg.		Gross Weight: 132,000lbs.	
Descent Rate: [P] fpm		Indicated Air Speed: 205 knts		Altitude: 190 ft AGL	
Wind Speed: 0.5 knts		METEOROLOGICAL DATA		Atmospheric Stability: Unstable	
Maximum Velocity: [P] fpm		Wind Direction: 46 deg.		Air Temperature: 11.4 °C	
Descent Rate: [P] fpm		Age: [P] s		Estimated Core Radius: [P] ft	
Maximum Velocity: [P] fpm		Advection Rate: [P] fpm		Tower Penetration Height: [P] ft AGL	
Descent Rate: [P] fpm		METEOROLOGICAL DATA		Estimated Core Radius: [P] ft	
Wind Speed: 0.5 knts		DOWNWIND VORTEX CHARACTERISTICS		Tower Penetration Height: [P] ft AGL	
Maximum Velocity: [P] fpm		Age: [P] s		Estimated Core Radius: [P] ft	
Descent Rate: [P] fpm		Advection Rate: [P] fpm		Tower Penetration Height: [P] ft AGL	
Sensor Height (ft)		Downwind Vortex Tangential Velocities		Upwind Vortex Tangential Velocities	
Sensor Height (ft)	Relative Height (ft)	$v_{\theta}$ (fps)	Sensor Height (ft)	Relative Height (ft)	$v_{\theta}$ (fps)
198	[P]	[P]	102	[P]	[P]
196	[P]	[P]	100	[P]	[P]
194	[P]	[P]	98	[P]	[P]
192	[P]	[P]	96	[P]	[P]
190	[P]	[P]	94	[P]	[P]
188	[P]	[P]	92	[P]	[P]
186	[P]	[P]	90	[P]	[P]
184	[P]	[P]	88	[P]	[P]
182	[P]	[P]	86	[P]	[P]
180	[P]	[P]	84	[P]	[P]
178	[P]	[P]	82	[P]	[P]
176	[P]	[P]	80	[P]	[P]
174	[P]	[P]	78	[P]	[P]
172	[P]	[P]	76	[P]	[P]
170	[P]	[P]	74	[P]	[P]
168	[P]	[P]	72	[P]	[P]
166	[P]	[P]	70	[P]	[P]
164	[P]	[P]	68	[P]	[P]
162	[P]	[P]	66	[P]	[P]
160	[P]	[P]	64	[P]	[P]
158	[P]	[P]	62	[P]	[P]
156	[P]	[P]	60	[P]	[P]
154	[P]	[P]	58	[P]	[P]
152	[P]	[P]	56	[P]	[P]
150	[P]	[P]	54	[P]	[P]
148	[P]	[P]	52	[P]	[P]
146	[P]	[P]	50	[P]	[P]
144	[P]	[P]	48	[P]	[P]
142	[P]	[P]	46	[P]	[P]
140	[P]	[P]	44	[P]	[P]
138	[P]	[P]	42	[P]	[P]
136	[P]	[P]	40	[P]	[P]
134	[P]	[P]	38	[P]	[P]
132	[P]	[P]	36	[P]	[P]
130	[P]	[P]	34	[P]	[P]
128	[P]	[P]	32	[P]	[P]
126	[P]	[P]	30	[P]	[P]
124	[P]	[P]	28	[P]	[P]
122	[P]	[P]	26	[P]	[P]
120	[P]	[P]	24	[P]	[P]
118	[P]	[P]	22	[P]	[P]
116	[P]	[P]	20	[P]	[P]
114	[P]	[P]	18	[P]	[P]
112	[P]	[P]	16	[P]	[P]
110	[P]	[P]	14	[P]	[P]
108	[P]	[P]	12	[P]	[P]
106	[P]	[P]	10	[P]	[P]
104	[P]	[P]	8	[P]	[P]

(D) = Vortex dissipated upwind of tower (O) = Missing (F) = Flyby flown for remote sensing systems

(I) = Estimated (N) = No vortex (P) = Vortex passed over top of tower (P) = Vortex passed over remote sensing systems

Flyby [Run] Number: 8	FAA B727-100	Date: 20 JUN 1990 (Day of Year: 171)	Abeam Time: 8:10:37 (MDT)
Configuration: Landing	AIRCRAFT DATA		
Glide Slope: 0 deg.	Flaps: 30 deg.		
	Indicated Air Speed: 132 kts		
Wind Speed: 3.4 kts	Wind Direction: 34 deg.	Air Temperature: 15.0 °C	Atmospheric Stability: Unstable
Maximum Velocity: (D) fps	Age: (D) s	Estimated Core Radius: (D) ft	
Descent Rate: (D) fpm	Advection Rate: (D) fps	Tower Penetration Height: (D) ft AGL	
Maximum Velocity: (D) fps	Age: (D) s	Estimated Core Radius: (D) ft	
Descent Rate: (D) fpm	Advection Rate: (D) fps	Tower Penetration Height: (D) ft AGL	
<b>METEOROLOGICAL DATA</b>			
(200 ft Sensor Level)			
Downwind Vortex Characteristics			
Upwind Vortex Characteristics			
Sensor Height (ft)	Relative Height (ft)	Downwind Vortex Tangential Velocities	Upwind Vortex Tangential Velocities
		Sensor Height (ft)	Sensor Height (ft)
		Relative Height (ft)	Relative Height (ft)
		V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)
198	198	(D)	(D)
196	194	102	198
192	190	100	196
188	186	98	194
184	182	96	192
180	178	94	190
176	174	92	188
172	170	90	186
168	166	88	184
164	162	86	182
160	158	84	180
156	154	82	178
152	150	80	176
148	146	78	174
144	142	76	172
140	138	74	170
136	134	72	168
132	130	70	166
128	126	68	164
124	122	66	162
120	118	64	160
116	114	62	158
112	110	60	156
108	106	58	154
104	102	56	152
= Estimated			
(D) = Vortex dissipated upwind of tower			
(M) = Missing			
(O) = No vortex (Flyby flown for remote sensing systems)			
(P) = Vortex passed over top of tower			

Flyby (Run) Number: 9	Date: 20 JUN 1990 (Day of Year: 171)	AIRCRAFT DATA	Gross Weight: 138,000 lbs.
Configuration: Landing	Flaps: 30 deg.	Altitude: 210 ft AGL	
Glide Slope: 0 deg.	Indicated Air Speed: 150 kts		
Wind Speed: 10.9 kts	Wind Direction: 229 deg.	Air Temperature: 19.6 °C	Atmospheric Stability: Unstable
Maximum Velocity: (M) fps	Age: (M) s	Downwind Vortex Characteristics	Estimated Core Radius: (M) ft
Decent Rate: (M) fps	Advection Rate: (M) fps	Tower Penetration Height: (M) ft AGL	
Maximum Velocity: (M) fps	Age: (M) s	Upwind Vortex Characteristics	Estimated Core Radius: (M) ft
Decent Rate: (M) fps	Advection Rate: (M) fps	Tower Penetration Height: (M) ft AGL	
Downwind Vortex Tangential Velocities			
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
		$V_{\theta}$ (fps)	$V_{\theta}$ (fps)
198	(M)	102	(M)
196	(M)	100	(M)
194	(M)	98	(M)
192	(M)	96	(M)
190	(M)	94	(M)
188	(M)	92	(M)
186	(M)	90	(M)
184	(M)	88	(M)
182	(M)	86	(M)
180	(M)	84	(M)
178	(M)	82	(M)
176	(M)	80	(M)
174	(M)	78	(M)
172	(M)	76	(M)
170	(M)	74	(M)
168	(M)	72	(M)
166	(M)	70	(M)
164	(M)	68	(M)
162	(M)	66	(M)
160	(M)	64	(M)
158	(M)	62	(M)
156	(M)	60	(M)
154	(M)	58	(M)
152	(M)	56	(M)
150	(M)	54	(M)
148	(M)	52	(M)
146	(M)	50	(M)
144	(M)	48	(M)
142	(M)	46	(M)
140	(M)	44	(M)
138	(M)	42	(M)
136	(M)	40	(M)
134	(M)	38	(M)
132	(M)	36	(M)
130	(M)	34	(M)
128	(M)	32	(M)
126	(M)	30	(M)
124	(M)	28	(M)
122	(M)	26	(M)
120	(M)	24	(M)
118	(M)	22	(M)
116	(M)	20	(M)
114	(M)	18	(M)
112	(M)	16	(M)
110	(M)	14	(M)
108	(M)	12	(M)
106	(M)	10	(M)
104	(M)		(M)

(P) = Vortex passed over top of tower

(O) = Missing

(D) = Vortex dissipated upwind of tower

(M) = Estimated

(O) = No vortex (Flyby flown for remote sensing systems)

Flyby (Run) Number: 10	Date: 20 JUN 1990 (Day of Year: 171)	Abeam Time: 11:31:26 (MDT)
Configuration: Landing Glide Slope: -3 deg.	AIRCRAFT DATA Flaps: 30 deg. Indicated Air Speed: 145 kts	Gross Weight: 136,500 lbs. Altitude: 225 ft AGL
Wind Speed: 15.5 kts	METEOROLOGICAL DATA (200 ft Sensor Level) Wind Direction: 232 deg. Air Temperature: 19.9 °C	Atmospheric Stability: Unstable
Maximum Velocity: (P) fpm Descent Rate: (P) fpm	DOWNWIND VORTEX CHARACTERISTICS Age: (P) s Advection Rate: (P) fpm	Estimated Core Radius: (P) ft Tower Penetration Height: (P) ft AGL
Maximum Velocity: (P) fpm Descent Rate: (P) fpm	UPWIND VORTEX CHARACTERISTICS Age: (P) s Advection Rate: (P) fpm	Estimated Core Radius: (P) ft Tower Penetration Height: (P) ft AGL
Sensor Height (ft)	Downwind Vortex Tangential Velocities Relative Height (ft)	Upwind Vortex Tangential Velocities Sensor Height (ft)
		Relative Height (ft)
198	(P) 196	(P) 198
194	(P) 192	(P) 196
190	(P) 188	(P) 192
188	(P) 186	(P) 190
186	(P) 184	(P) 188
184	(P) 182	(P) 186
182	(P) 180	(P) 184
180	(P) 178	(P) 182
178	(P) 176	(P) 178
176	(P) 174	(P) 176
174	(P) 172	(P) 174
172	(P) 170	(P) 172
170	(P) 168	(P) 170
168	(P) 166	(P) 168
166	(P) 164	(P) 166
164	(P) 162	(P) 164
162	(P) 160	(P) 162
160	(P) 158	(P) 160
158	(P) 156	(P) 158
156	(P) 154	(P) 156
154	(P) 152	(P) 154
152	(P) 150	(P) 152
150	(P) 148	(P) 150
148	(P) 146	(P) 148
146	(P) 144	(P) 146
144	(P) 142	(P) 144
142	(P) 140	(P) 142
140	(P) 138	(P) 140
138	(P) 136	(P) 138
136	(P) 134	(P) 136
134	(P) 132	(P) 134
132	(P) 130	(P) 132
130	(P) 128	(P) 130
128	(P) 126	(P) 128
126	(P) 124	(P) 126
124	(P) 122	(P) 124
122	(P) 120	(P) 122
120	(P) 118	(P) 120
118	(P) 116	(P) 118
116	(P) 114	(P) 116
114	(P) 112	(P) 114
112	(P) 110	(P) 112
110	(P) 108	(P) 110
108	(P) 106	(P) 108
106	(P) 104	(P) 106
104	(P) 102	(P) 104

\* = Estimated (D) = Vortex dissipated upwind of tower (M) = Missing

(O) = No vortex (P) = Vortex passed over top of tower (O) = Missing (P) = Vortex flown for remote sensing systems

Flyby (Run) Number: 11	FAA E727-100	Date: 20 JUN 1990 (Day of Year: 171)	Abeam Time: 11:37:58 (MDT)
Configuration: Landing Glide Slope: 0 deg.	AIRCRAFT DATA		
Wind Speed: 13.0 kts	Flaps: 30 deg. Indicated Air Speed: 130 kts		
Maximum Velocity: (M) fps			Gross Weight: 135,000 lbs. Altitude: 200 ft AGL
Decent Rate: (M) fps			
Maximum Velocity: (D) fps			
Decent Rate: (D) fps			
METEOROLOGICAL DATA (200 ft Sensor Level)			
Wind Direction: 219 deg.	Air Temperature: 20.0 °C		Atmospheric Stability: Unstable
DOWNWIND VORTEX CHARACTERISTICS			
Ag: (M) s	Advection Rate: (M) fps		Estimated Core Radius: (M) ft
Advection Rate: (D) fps			Tower Penetration Height: (M) ft AGL
UPWIND VORTEX CHARACTERISTICS			
Ag: (D) s	Advection Rate: (D) fps		Estimated Core Radius: (D) ft
Advection Rate: (D) fps			Tower Penetration Height: (D) ft AGL
Downwind Vortex Tangential Velocities			
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
(M)	(M)	(M)	(M)
198	198	102	198
196	196	100	196
194	194	98	194
192	192	96	192
190	190	94	190
188	188	92	188
186	186	90	186
184	184	88	184
182	182	86	182
180	180	84	180
178	178	82	178
176	176	80	176
174	174	78	174
172	172	76	172
170	170	74	170
168	168	72	168
166	166	70	166
164	164	68	164
162	162	66	162
160	160	64	160
158	158	62	158
156	156	60	156
154	154	58	154
152	152	56	152
150	150	54	150
148	148	52	148
146	146	50	146
144	144	48	144
142	142	46	142
140	140	44	140
138	138	42	138
136	136	40	136
134	134	38	134
132	132	36	132
130	130	34	130
128	128	32	128
126	126	30	126
124	124	28	124
122	122	26	122
120	120	24	120
118	118	22	118
116	116	20	116
114	114	18	114
112	112	16	112
110	110	14	110
108	108	12	108
106	106	10	106
104	104	10	104

(D) = Estimated (M) = Missing (N) = No vortex (F/Voy flown for remote sensing systems)

(P) = Vortex passed over top of tower (R) = Vortex dissipated upwind of tower

Flyby (Run) Number: 12	Date: 20 JUN 1990 (Day of Year: 171)	Abeam Time: 11:45:01 (MDT)				
Configuration: Landing	AIRCRAFT DATA					
Glide Slope: -3 deg.	Flaps: 30 deg.	Gross Weight: 134,000 lbs.				
Descent Rate: (M) fpm	Indicated Air Speed: 128 kts	Altitude: 250 ft AGL				
Wind Speed: 13.5 kts	METEOROLOGICAL DATA (200 ft Sensor Level)					
Maximum Velocity: (D) fpm	Wind Direction: 231 deg.	Air Temperature: 20.2 °C				
Descent Rate: (M) fpm	Age: (M) s	Atmospheric Stability: Unstable				
Maximum Velocity: (D) fpm	Advection Rate: (M) fps	Estimated Core Radius: (M) ft				
Descent Rate: (D) fpm	Age: (D) s	Tower Penetration Height: (M) ft AGL				
	Advection Rate: (D) fps	Estimated Core Radius: (D) ft				
		Tower Penetration Height: (D) ft AGL				
DOWNWIND VORTEX CHARACTERISTICS						
Downwind Vortex Tangential Velocities	Upwind Vortex Tangential Velocities					
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)
198	(M)	(M)	102	(M)	198	(D)
196	(M)	(M)	100	(M)	196	(D)
194	(M)	(M)	98	(M)	194	(D)
192	(M)	(M)	96	(M)	192	(D)
190	(M)	(M)	94	(M)	190	(D)
188	(M)	(M)	92	(M)	188	(D)
186	(M)	(M)	90	(M)	186	(D)
184	(M)	(M)	88	(M)	184	(D)
182	(M)	(M)	86	(M)	182	(D)
180	(M)	(M)	84	(M)	180	(D)
178	(M)	(M)	82	(M)	178	(D)
176	(M)	(M)	80	(M)	176	(D)
174	(M)	(M)	78	(M)	174	(D)
172	(M)	(M)	76	(M)	172	(D)
170	(M)	(M)	74	(M)	170	(D)
168	(M)	(M)	72	(M)	168	(D)
166	(M)	(M)	70	(M)	166	(D)
164	(M)	(M)	68	(M)	164	(D)
162	(M)	(M)	66	(M)	162	(D)
160	(M)	(M)	64	(M)	160	(D)
158	(M)	(M)	62	(M)	158	(D)
156	(M)	(M)	60	(M)	156	(D)
154	(M)	(M)	58	(M)	154	(D)
152	(M)	(M)	56	(M)	152	(D)
150	(M)	(M)	54	(M)	150	(D)
148	(M)	(M)	52	(M)	148	(D)
146	(M)	(M)	50	(M)	146	(D)
144	(M)	(M)	48	(M)	144	(D)
142	(M)	(M)	46	(M)	142	(D)
140	(M)	(M)	44	(M)	140	(D)
138	(M)	(M)	42	(M)	138	(D)
136	(M)	(M)	40	(M)	136	(D)
134	(M)	(M)	38	(M)	134	(D)
132	(M)	(M)	36	(M)	132	(D)
130	(M)	(M)	34	(M)	130	(D)
128	(M)	(M)	32	(M)	128	(D)
126	(M)	(M)	30	(M)	126	(D)
124	(M)	(M)	28	(M)	124	(D)
122	(M)	(M)	26	(M)	122	(D)
120	(M)	(M)	24	(M)	120	(D)
118	(M)	(M)	22	(M)	118	(D)
116	(M)	(M)	20	(M)	116	(D)
114	(M)	(M)	18	(M)	114	(D)
112	(M)	(M)	16	(M)	112	(D)
110	(M)	(M)	14	(M)	110	(D)
108	(M)	(M)	12	(M)	108	(D)
106	(M)	(M)	10	(M)	106	(D)
104	(M)	(M)		(M)	104	(D)

(P) = Vortex passed over top of tower

(O) = No vortex (Flyby dissipated upwind of tower)

(M) = Missing

\* = Estimated

FAA B727-100																
Flyby (Run) Number: 13		Date: 20 JUN 1990 (Day of Year: 171)		Abeam Time: 11:53:06 (MDT)												
AIRCRAFT DATA				Gross Weight: 132,000 lbs.												
Configuration: Landing					Altitude: 190 ft AGL											
Glide Slope: 0 deg.		Flaps: 30 deg.	Indicated Air Speed: 128 kts													
Wind Speed: 11.7 kts		Wind Direction: 246 deg.		Air Temperature: 20.4 °C	Atmospheric Stability: Unstable											
Maximum Velocity: (M) fps		Age: (M) s			Estimated Core Radius: (M) ft											
Descent Rate: (M) fpm		Advection Rate: (M) fpm			Tower Penetration Height: (M) ft AGL											
Maximum Velocity: (M) fps		Age: (M) s			Estimated Core Radius: (M) ft											
Descent Rate: (M) fpm		Advection Rate: (M) fpm			Tower Penetration Height: (M) ft AGL											
METEOROLOGICAL DATA (200 ft Sensor Level)																
Wind Speed: 11.7 kts																
Wind Direction: 246 deg.																
Downwind Vortex Characteristics																
Upwind Vortex Characteristics																
Sensor Height (ft)	Relative Height (ft)	Downwind Vortex Tangential Velocities	Sensor Height (ft)	Relative Height (ft)	Upwind Vortex Tangential Velocities	Sensor Height (ft)	Relative Height (ft)	Upwind Vortex Tangential Velocities	Sensor Height (ft)							
		V <sub>θ</sub> (fps)		V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)			V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)							
198	(M)	(M)	102	(M)	(M)	198	(M)	(M)	102	(M)						
196	(M)	(M)	100	(M)	(M)	196	(M)	(M)	100	(M)						
194	(M)	(M)	98	(M)	(M)	194	(M)	(M)	98	(M)						
192	(M)	(M)	96	(M)	(M)	192	(M)	(M)	96	(M)						
190	(M)	(M)	94	(M)	(M)	190	(M)	(M)	94	(M)						
188	(M)	(M)	92	(M)	(M)	188	(M)	(M)	92	(M)						
186	(M)	(M)	90	(M)	(M)	186	(M)	(M)	90	(M)						
184	(M)	(M)	88	(M)	(M)	184	(M)	(M)	88	(M)						
182	(M)	(M)	86	(M)	(M)	182	(M)	(M)	86	(M)						
180	(M)	(M)	84	(M)	(M)	180	(M)	(M)	84	(M)						
178	(M)	(M)	82	(M)	(M)	178	(M)	(M)	82	(M)						
176	(M)	(M)	80	(M)	(M)	176	(M)	(M)	80	(M)						
174	(M)	(M)	78	(M)	(M)	174	(M)	(M)	78	(M)						
172	(M)	(M)	76	(M)	(M)	172	(M)	(M)	76	(M)						
170	(M)	(M)	74	(M)	(M)	170	(M)	(M)	74	(M)						
168	(M)	(M)	72	(M)	(M)	168	(M)	(M)	72	(M)						
166	(M)	(M)	70	(M)	(M)	166	(M)	(M)	70	(M)						
164	(M)	(M)	68	(M)	(M)	164	(M)	(M)	68	(M)						
162	(M)	(M)	66	(M)	(M)	162	(M)	(M)	66	(M)						
160	(M)	(M)	64	(M)	(M)	160	(M)	(M)	64	(M)						
158	(M)	(M)	62	(M)	(M)	158	(M)	(M)	62	(M)						
156	(M)	(M)	60	(M)	(M)	156	(M)	(M)	60	(M)						
154	(M)	(M)	58	(M)	(M)	154	(M)	(M)	58	(M)						
152	(M)	(M)	56	(M)	(M)	152	(M)	(M)	56	(M)						
150	(M)	(M)	54	(M)	(M)	150	(M)	(M)	54	(M)						
148	(M)	(M)	52	(M)	(M)	148	(M)	(M)	52	(M)						
146	(M)	(M)	50	(M)	(M)	146	(M)	(M)	50	(M)						
144	(M)	(M)	48	(M)	(M)	144	(M)	(M)	48	(M)						
142	(M)	(M)	46	(M)	(M)	142	(M)	(M)	46	(M)						
140	(M)	(M)	44	(M)	(M)	140	(M)	(M)	44	(M)						
138	(M)	(M)	42	(M)	(M)	138	(M)	(M)	42	(M)						
136	(M)	(M)	40	(M)	(M)	136	(M)	(M)	40	(M)						
134	(M)	(M)	38	(M)	(M)	134	(M)	(M)	38	(M)						
132	(M)	(M)	36	(M)	(M)	132	(M)	(M)	36	(M)						
130	(M)	(M)	34	(M)	(M)	130	(M)	(M)	34	(M)						
128	(M)	(M)	32	(M)	(M)	128	(M)	(M)	32	(M)						
126	(M)	(M)	30	(M)	(M)	126	(M)	(M)	30	(M)						
124	(M)	(M)	28	(M)	(M)	124	(M)	(M)	28	(M)						
122	(M)	(M)	26	(M)	(M)	122	(M)	(M)	26	(M)						
120	(M)	(M)	24	(M)	(M)	120	(M)	(M)	24	(M)						
118	(M)	(M)	22	(M)	(M)	118	(M)	(M)	22	(M)						
116	(M)	(M)	20	(M)	(M)	116	(M)	(M)	20	(M)						
114	(M)	(M)	18	(M)	(M)	114	(M)	(M)	18	(M)						
112	(M)	(M)	16	(M)	(M)	112	(M)	(M)	16	(M)						
110	(M)	(M)	14	(M)	(M)	110	(M)	(M)	14	(M)						
108	(M)	(M)	12	(M)	(M)	108	(M)	(M)	12	(M)						
106	(M)	(M)	10	(M)	(M)	106	(M)	(M)	10	(M)						
104	(M)	(M)	8	(M)	(M)	104	(M)	(M)	8	(M)						

= Estimated (D) = Vortex dissipated upwind of tower (M) = Missing (O) = No vortex (I) = Vortex flown for remote sensing systems (P) = Vortex passed over top of tower

Flyby /Run) Number: 14	FAA B727-100	Date: 20 JUN 1990 (Day of Year: 171)	Abeam Time: 12:00:06 (MDT)
Configuration: Landing Glide Slope: -3 deg.			Gross Weight: 130,000lbs. Altitude: 260 ft AGL
Wind Speed: 12.5 kts	AIRCRAFT DATA Flaps: 30 deg. Indicated Air Speed: 128 kts	METEOROLOGICAL DATA Wind Direction: 228 deg. (200 ft Sensor Level)	Atmospheric Stability: Unstable
Maximum Velocity: (M) fps Descent Rate: (M) fpm	DOWNDOWN VORTEX CHARACTERISTICS Age: (M) s Advection Rate: (M) fpm	UPWIND VORTEX CHARACTERISTICS Age: (D) s Advection Rate: (D) fpm	Estimated Core Radius: (M) ft Tower Penetration Height: (M) ft AGL
Wind Speed: 12.5 kts	Maximum Velocity: (D) fps Descent Rate: (D) fpm	Downwind Vortex Tangential Velocities Sensor Height (ft) Relative Height (ft)	Upwind Vortex Tangential Velocities Sensor Height (ft) Relative Height (ft)
		Sensor Height (ft)	Sensor Height (ft)
		Relative Height (ft)	Relative Height (ft)
		V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)
198	[N]	102	198
196	[W]	100	196
194	[W]	98	194
192	[W]	96	192
190	[W]	94	190
188	[W]	92	188
186	[W]	90	186
184	[W]	88	184
182	[W]	86	182
180	[W]	84	180
178	[W]	82	178
176	[W]	80	176
174	[W]	78	174
172	[W]	76	172
170	[W]	74	170
168	[W]	72	168
166	[W]	70	166
164	[W]	68	164
162	[W]	66	162
160	[W]	64	160
158	[W]	62	158
156	[W]	60	156
154	[W]	58	154
152	[W]	56	152
150	[W]	54	150
148	[W]	52	148
146	[W]	50	146
144	[W]	48	144
142	[W]	46	142
140	[W]	44	140
138	[W]	42	138
136	[W]	40	136
134	[W]	38	134
132	[W]	36	132
130	[W]	34	130
128	[W]	32	128
126	[W]	30	126
124	[W]	28	124
122	[W]	26	122
120	[W]	24	120
118	[W]	22	118
116	[W]	20	116
114	[W]	18	114
112	[W]	16	112
110	[W]	14	110
108	[W]	12	108
106	[W]	10	106
104	[W]		104

Estimated

Missing

(F) = Vortex passed over top of tower

Flyby (Run) Number: 15	Date: 20 JUN 1990 (Day of Year: 171)	Abeam Time: 12:07:47 (MDT)
Configuration: Landing Glide Slope: 0 deg.	AIRCRAFT DATA Flaps: 30 deg. Indicated Air Speed: 126 kts	Gross Weight: 129,500 lbs. Altitude: 200 ft AGL
Wind Speed: 9.8 kts	Wind Direction: 236 deg.	Air Temperature: 20.6 °C
Maximum Velocity: (M) fps Descent Rate: (ft) fpm	Age: (M) s Advection Rate: (D) fpm	Atmospheric Stability: Unstable
Maximum Velocity: (D) fps Descent Rate: (D) fpm	Age: (D) s Advection Rate: (D) fpm	Estimated Core Radius: (D) ft Tower Penetration Height: (M) ft AGL
METEOROLOGICAL DATA (200 ft Sensor Level)		
DOWNWIND VORTEX CHARACTERISTICS		
Sensor Height (ft)	Relative Height (ft)	Downwind Vortex Tangential Velocities
		Sensor Height (ft)
198	(M)	(M)
196	(M)	(M)
194	(M)	(M)
192	(M)	(M)
190	(M)	(M)
188	(M)	(M)
186	(M)	(M)
184	(M)	(M)
182	(M)	(M)
180	(M)	(M)
178	(M)	(M)
176	(M)	(M)
174	(M)	(M)
172	(M)	(M)
170	(M)	(M)
168	(M)	(M)
166	(M)	(M)
164	(M)	(M)
162	(M)	(M)
160	(M)	(M)
158	(M)	(M)
156	(M)	(M)
154	(M)	(M)
152	(M)	(M)
150	(M)	(M)
148	(M)	(M)
146	(M)	(M)
144	(M)	(M)
142	(M)	(M)
140	(M)	(M)
138	(M)	(M)
136	(M)	(M)
134	(M)	(M)
132	(M)	(M)
130	(M)	(M)
128	(M)	(M)
126	(M)	(M)
124	(M)	(M)
122	(M)	(M)
120	(M)	(M)
118	(M)	(M)
116	(M)	(M)
114	(M)	(M)
112	(M)	(M)
110	(M)	(M)
108	(M)	(M)
106	(M)	(M)
104	(M)	(M)

\* = Estimated  
(D) = Vortex dissipated upwind of tower  
(M) = Missing

(O) = No vortex (Flyby flown for remote sensing systems)  
(P) = Vortex passed over top of tower

Flyby (Run) Number: 16		Date: 20 JUN 1990 (Day of Year: 171)	Abeam Time: 12:15:49 (MDT)
<b>AIRCRAFT DATA</b>			
Flaps: 15 deg.		Gross Weight: 129 000 lbs.	
Indicated Air Speed: 140 kts		Altitude: 200 ft AGL	
<b>METEOROLOGICAL DATA</b>			
(200 ft Sensor Level)			
Wind Speed: 16.0 kts	Wind Direction: 241 deg.	Air Temperature: 21.3 °C	Atmospheric Stability: Unstable
<b>DOWNWIND VORTEX CHARACTERISTICS</b>			
Age: [M] s		Estimated Core Radius: [M] ft	
Advection Rate: [M] fps		Tower Penetration Height: [M] ft AGL	
<b>UPWIND VORTEX CHARACTERISTICS</b>			
Age: [M] s		Estimated Core Radius: [M] ft	
Advection Rate: [M] fps		Tower Penetration Height: [M] ft AGL	
<b>Downwind Vortex Tangential Velocities</b>			
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
		[M]	[M]
198	198	102	198
196	196	100	196
194	194	98	194
190	190	96	192
188	188	94	190
186	186	92	188
184	184	90	186
182	182	88	184
180	180	86	182
178	178	84	180
176	176	82	178
174	174	80	176
172	172	78	174
170	170	76	172
168	168	74	170
166	166	72	168
164	164	70	166
162	162	68	164
160	160	66	162
158	158	64	160
156	156	62	158
154	154	60	156
152	152	58	154
150	150	56	152
148	148	54	150
146	146	52	148
144	144	50	146
142	142	48	144
140	140	46	142
138	138	44	140
136	136	42	138
134	134	40	136
132	132	38	134
130	130	36	132
128	128	34	130
126	126	32	128
124	124	30	126
122	122	28	124
120	120	26	122
118	118	24	120
116	116	22	118
114	114	20	116
112	112	18	114
110	110	16	112
108	108	14	110
106	106	12	108
104	104	10	106
			104

= Estimated (D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

FAA B727-100		Date: 20 JUN 1980 (Day of Year: 171)		Abeam Time: 12:26:59 (MDT)	
Configuration: Takeoff Glide Slope: 0 deg.		Wind Speed: 15.9 kts Descent Rate: (M) fpm		Aircraft Data Flaps: 15 deg. Indicated Air Speed: 146 kts	
		METEOROLOGICAL DATA (200 ft Sensor Level) Wind Direction: 246 deg. Air Temperature: 21.2 °C			
		DOWNDOWN VORTEX CHARACTERISTICS Advection Rate: (M) fpm		UPWIND VORTEX CHARACTERISTICS Advection Rate: (M) fpm	
Sensor Height (ft)	Relative Height (ft)	Downwind Vortex Tangential Velocities $V_\theta$ (fps)	Sensor Height (ft)	Upwind Vortex Tangential Velocities $V_\theta$ (fps)	Tower Penetration Height: (M) ft AGL
198	196	102	198	196	Gross Weight: 128,000lbs. Altitude: 235 ft AGL
194	192	98	194	192	Estimated Core Radius: (M) ft
190	188	94	190	190	Tower Penetration Height: (M) ft AGL
186	184	90	188	186	Atmospheric Stability: Unstable
182	180	88	184	182	
178	176	84	180	180	
174	172	82	178	178	
170	168	80	176	176	
166	164	78	172	172	
162	160	76	170	170	
158	156	74	168	168	
154	152	72	166	166	
150	148	68	164	164	
146	144	66	162	162	
142	140	64	160	160	
138	136	62	158	158	
134	132	60	156	156	
130	128	58	154	154	
126	124	56	152	152	
122	120	54	150	150	
118	116	52	148	148	
114	112	48	144	144	
110	108	46	142	142	
106	104	44	140	140	
104	102	42	138	138	
100	98	40	136	136	
96	94	38	134	134	
92	90	36	132	132	
88	86	34	130	130	
84	82	32	128	128	
80	78	30	126	126	
76	74	28	124	124	
72	70	26	122	122	
68	66	24	120	120	
64	62	22	118	118	
60	58	20	116	116	
56	54	18	114	114	
52	50	16	112	112	
48	46	14	110	110	
44	42	12	108	108	
40	38	10	104	104	

### **Estimated**

8  
n

{(P)} = Vortex passed over top of tower

Flyby (Run) Number: 18	Date: 20 JUN 1990 (Day of Year: 171)	Abeam Time: 12:30:04 (MDT)									
Configuration: Takeoff Glide Slope: 0 deg.	AIRCRAFT DATA Flaps: 15 deg. Indicated Air Speed: 143 kts	Gross Weight: 127,500 lbs. Altitude: 210 ft AGL									
Wind Speed: 12.2 kts	Wind Direction: 230 deg.	Atmospheric Stability: Unstable									
Maximum Velocity: (M) fps Descent Rate: (M) f/s	Age: (M) s (200 ft Sensor Level)	Estimated Core Radius: (M) ft Tower Penetration Height: (M) ft AGL									
Maximum Velocity: (M) fps Descent Rate: (M) f/s	Age: (M) s (200 ft Sensor Level)	Estimated Core Radius: (M) ft Tower Penetration Height: (M) ft AGL									
METEOROLOGICAL DATA											
DOWNWIND VORTEX CHARACTERISTICS											
Wind Direction: 230 deg.											
Air Temperature: 21.3 °C											
UPWIND VORTEX CHARACTERISTICS											
Wind Direction: 230 deg.											
Air Temperature: 21.3 °C											
Downwind Vortex Tangential Velocities											
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)
198	(M)	(M)	102	(M)	(M)	198	(M)	(M)	(M)	(M)	(M)
196	(M)	(M)	100	(M)	(M)	196	(M)	(M)	(M)	(M)	(M)
192	(M)	(M)	98	(M)	(M)	194	(M)	(M)	(M)	(M)	(M)
190	(M)	(M)	96	(M)	(M)	192	(M)	(M)	(M)	(M)	(M)
188	(M)	(M)	94	(M)	(M)	190	(M)	(M)	(M)	(M)	(M)
186	(M)	(M)	92	(M)	(M)	188	(M)	(M)	(M)	(M)	(M)
184	(M)	(M)	90	(M)	(M)	186	(M)	(M)	(M)	(M)	(M)
182	(M)	(M)	88	(M)	(M)	184	(M)	(M)	(M)	(M)	(M)
180	(M)	(M)	86	(M)	(M)	182	(M)	(M)	(M)	(M)	(M)
178	(M)	(M)	84	(M)	(M)	180	(M)	(M)	(M)	(M)	(M)
176	(M)	(M)	82	(M)	(M)	178	(M)	(M)	(M)	(M)	(M)
174	(M)	(M)	80	(M)	(M)	176	(M)	(M)	(M)	(M)	(M)
172	(M)	(M)	78	(M)	(M)	174	(M)	(M)	(M)	(M)	(M)
170	(M)	(M)	76	(M)	(M)	172	(M)	(M)	(M)	(M)	(M)
168	(M)	(M)	74	(M)	(M)	170	(M)	(M)	(M)	(M)	(M)
166	(M)	(M)	72	(M)	(M)	168	(M)	(M)	(M)	(M)	(M)
164	(M)	(M)	70	(M)	(M)	166	(M)	(M)	(M)	(M)	(M)
162	(M)	(M)	68	(M)	(M)	164	(M)	(M)	(M)	(M)	(M)
160	(M)	(M)	66	(M)	(M)	162	(M)	(M)	(M)	(M)	(M)
158	(M)	(M)	64	(M)	(M)	160	(M)	(M)	(M)	(M)	(M)
156	(M)	(M)	62	(M)	(M)	158	(M)	(M)	(M)	(M)	(M)
154	(M)	(M)	60	(M)	(M)	156	(M)	(M)	(M)	(M)	(M)
152	(M)	(M)	58	(M)	(M)	154	(M)	(M)	(M)	(M)	(M)
150	(M)	(M)	56	(M)	(M)	152	(M)	(M)	(M)	(M)	(M)
148	(M)	(M)	54	(M)	(M)	150	(M)	(M)	(M)	(M)	(M)
146	(M)	(M)	52	(M)	(M)	148	(M)	(M)	(M)	(M)	(M)
144	(M)	(M)	50	(M)	(M)	146	(M)	(M)	(M)	(M)	(M)
142	(M)	(M)	48	(M)	(M)	144	(M)	(M)	(M)	(M)	(M)
140	(M)	(M)	46	(M)	(M)	142	(M)	(M)	(M)	(M)	(M)
138	(M)	(M)	44	(M)	(M)	140	(M)	(M)	(M)	(M)	(M)
136	(M)	(M)	42	(M)	(M)	138	(M)	(M)	(M)	(M)	(M)
134	(M)	(M)	40	(M)	(M)	136	(M)	(M)	(M)	(M)	(M)
132	(M)	(M)	38	(M)	(M)	134	(M)	(M)	(M)	(M)	(M)
130	(M)	(M)	36	(M)	(M)	132	(M)	(M)	(M)	(M)	(M)
128	(M)	(M)	34	(M)	(M)	130	(M)	(M)	(M)	(M)	(M)
126	(M)	(M)	32	(M)	(M)	128	(M)	(M)	(M)	(M)	(M)
124	(M)	(M)	30	(M)	(M)	126	(M)	(M)	(M)	(M)	(M)
122	(M)	(M)	28	(M)	(M)	124	(M)	(M)	(M)	(M)	(M)
120	(M)	(M)	26	(M)	(M)	122	(M)	(M)	(M)	(M)	(M)
118	(M)	(M)	24	(M)	(M)	120	(M)	(M)	(M)	(M)	(M)
116	(M)	(M)	22	(M)	(M)	118	(M)	(M)	(M)	(M)	(M)
114	(M)	(M)	20	(M)	(M)	116	(M)	(M)	(M)	(M)	(M)
112	(M)	(M)	18	(M)	(M)	114	(M)	(M)	(M)	(M)	(M)
110	(M)	(M)	16	(M)	(M)	112	(M)	(M)	(M)	(M)	(M)
108	(M)	(M)	14	(M)	(M)	110	(M)	(M)	(M)	(M)	(M)
106	(M)	(M)	12	(M)	(M)	108	(M)	(M)	(M)	(M)	(M)
104	(M)	(M)	10	(M)	(M)	104	(M)	(M)	(M)	(M)	(M)

= Estimated (D) = Vortex dissipated upwind of tower (M) = Missing (O) = No vortex (F) = Flyby flown for remote sensing systems

(P) = Vortex passed over top of tower (O) = No vortex (F) = Flyby flown for remote sensing systems

Flyby (Run) Number: 1				Date: 21 JUN 1990 (Day of Year: 172)	Abeam Time: 6:14:10 (MDT)
AIRCRAFT DATA				Gross Weight: 137,000lbs.	
Configuration: Takeoff				Altitude: 230 ft AGL	
Glide Slope: 0 deg.					
Wind Speed: 12.3 kts				Air Temperature: 14.2 °C	Atmospheric Stability: Stable
Maximum Velocity: (M) fps				Estimated Core Radius: (M) ft	
Descent Rate: (ft/s) fps				Tower Penetration Height: (M) ft AGL	
Wind Direction: 84 deg.					
METEOROLOGICAL DATA (200 ft Sensor Level)					
Maximum Velocity: (M) fps					
Descent Rate: (ft/s) fps					
Downwind Vortex Characteristics					
Age: (M) s					
Advection Rate: (M) fps					
Upwind Vortex Characteristics					
Age: (M) s					
Advection Rate: (M) fps					
Downwind Vortex Tangential Velocities					
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)
198	(M)	(M)	102	(M)	(M)
196	(M)	(M)	100	(M)	(M)
194	(M)	(M)	98	(M)	(M)
192	(M)	(M)	96	(M)	(M)
190	(M)	(M)	94	(M)	(M)
188	(M)	(M)	92	(M)	(M)
186	(M)	(M)	90	(M)	(M)
184	(M)	(M)	88	(M)	(M)
182	(M)	(M)	86	(M)	(M)
180	(M)	(M)	84	(M)	(M)
178	(M)	(M)	82	(M)	(M)
176	(M)	(M)	80	(M)	(M)
174	(M)	(M)	78	(M)	(M)
172	(M)	(M)	76	(M)	(M)
170	(M)	(M)	74	(M)	(M)
168	(M)	(M)	72	(M)	(M)
166	(M)	(M)	70	(M)	(M)
164	(M)	(M)	68	(M)	(M)
162	(M)	(M)	66	(M)	(M)
160	(M)	(M)	64	(M)	(M)
158	(M)	(M)	62	(M)	(M)
156	(M)	(M)	60	(M)	(M)
154	(M)	(M)	58	(M)	(M)
152	(M)	(M)	56	(M)	(M)
150	(M)	(M)	54	(M)	(M)
148	(M)	(M)	52	(M)	(M)
146	(M)	(M)	50	(M)	(M)
144	(M)	(M)	48	(M)	(M)
142	(M)	(M)	46	(M)	(M)
140	(M)	(M)	44	(M)	(M)
138	(M)	(M)	42	(M)	(M)
136	(M)	(M)	40	(M)	(M)
134	(M)	(M)	38	(M)	(M)
132	(M)	(M)	36	(M)	(M)
130	(M)	(M)	34	(M)	(M)
128	(M)	(M)	32	(M)	(M)
126	(M)	(M)	30	(M)	(M)
124	(M)	(M)	28	(M)	(M)
122	(M)	(M)	26	(M)	(M)
120	(M)	(M)	24	(M)	(M)
118	(M)	(M)	22	(M)	(M)
116	(M)	(M)	20	(M)	(M)
114	(M)	(M)	18	(M)	(M)
112	(M)	(M)	16	(M)	(M)
110	(M)	(M)	14	(M)	(M)
108	(M)	(M)	12	(M)	(M)
106	(M)	(M)	10	(M)	(M)
104	(M)	(M)	104	(M)	(M)

\* = Estimated (D) = Vortex dissipated upwind of tower (M) = Missing

(O) = No vortex (Flyby flown for remote sensing systems) (P) = Vortex passed over top of tower (N) = No sensor

Flyby (Run) Number: 2		FAA B727-100		Date: 21 JUN 1990 (Day of Year: 172)		Abeam Time: 6:20:36 (MDT)	
Configuration: Takeoff Glide Slope: 0 deg.		AIRCRAFT DATA		Flaps: 15 deg., 4.3 kts (200 ft Sensor Level)		Gross Weight: 136,000 lbs. Altitude: 270 ft AGL	
Wind Speed: 12.7 kts		Wind Direction: 85 deg.		Age: 21 s Advection Rate: 12.6 fps		Air Temperature: 14.3 °C Tower Penetration Height: 160 ft AGL	
Maximum Velocity: 93.4 fps		DOWNTWIND VORTEX CHARACTERISTICS		Estimated Core Radius: 0.9 ft		Atmospheric Stability: Stable	
Descent Rate: 5.2 fps		UPWIND VORTEX CHARACTERISTICS		Tower Penetration Height: 160 ft AGL		Estimated Core Radius: 1.1 ft	
Maximum Velocity: 79.1 fps		Age: 27 s Advection Rate: 12.1 fps		Tower Radius: 112 ft AGL		Tower Penetration Height: 112 ft AGL	
Descent Rate: 5.9 fps		Downwind Vortex Tangential Velocities		Upwind Vortex Tangential Velocities		Upwind Vortex Sensor Velocities	
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)
198	38	26.3	102	-5.8	-6.7	198	84
196	34	27.5	100	-6.0	-5.4	196	82
194	32	28.8*	98	-6.2	-5.6	194	80
192	30	30.0*	96	-6.4	-4.3	192	78
190	30	31.3*	94	-6.6	-4.1	190	76
188	28	32.5*	92	-6.8	-3.8	188	74
186	26	33.8*	90	-7.0	-4.1	186	72
184	24	32.8*	88	-7.2	-5.0	184	70
182	22	22.2*	86	-7.4	-3.5	182	68
180	20	16.5*	84	-7.6	-4.1	180	66
178	18	18.9*	82	-7.8	-4.7	178	64
176	16	21.3*	80	-8.0	-3.6	176	62
174	14	23.7	78	-8.2	-3.6	174	60
172	12	23.7	76	-8.4	-2.7	172	58
170	10	30.6*	74	-8.6	-2.8	170	56
168	8	37.5	72	-8.8	-2.3	168	54
166	6	44.5	70	-9.0	-1.7	166	52
164	4	37.3	68	-9.2	-2.1	164	50
162	2	65.0	66	-9.4	-2.5	162	48
160	0	-93.4	64	-9.6	-2.9	160	46
158	-2	-60.6	62	-9.8	-2.6	158	44
156	-4	-46.8	60	-10.0	-2.6	156	42
154	-6	-38.6	58	-10.2	-2.6	154	40
152	-8	-33.1	56	-10.4	-2.6	152	38
150	-10	-26.6	54	-10.6	-2.6	150	36
148	-12	-24.0	52	-10.8	-2.1	148	34
146	-14	-21.5	50	-11.0	-2.0	146	32
144	-16	-12.3	48	-11.2	-2.4	144	30
142	-18	-13.1	46	-11.4	-1.8	142	28
140	-20	-12.2	44	-11.6	-1.9	140	26
138	-22	-11.8	42	-11.8	-2.6	138	24
136	-24	-11.5	40	-12.0	-2.7	136	22
134	-26	-14.2*	38	-12.2	-2.1	134	20
132	-28	-16.9	36	-12.4	-1.7	132	18
130	-30	-13.2	34	-12.6	-1.8	130	16
128	-32	-9.8	32	-12.8	-1.8	128	14
126	-34	-6.6	30	-13.0	-1.7	126	12
124	-36	-9.4	28	-13.2	-1.9*	124	10
122	-38	-9.6	26	-13.4	-2.0	122	8
120	-40	-9.2	24	-13.6	-1.8	120	6
118	-42	-9.0	22	-13.8	-1.4	118	4
116	-44	-10.2	20	-14.0	-0.9	116	2
114	-46	-9.7	18	-14.2	-1.5	114	0
112	-48	-10.2	16	-14.4	-1.6*	112	-2
110	-50	-9.4	14	-14.6	-1.6	110	-4
108	-52	-7.5	12	-14.8	-1.6	108	-6
106	-54	-6.1	10	-15.0	-1.5	106	-8
104	-56	-6.1					-34.2

Estimated

of tower ( $M$ ) = Missing

(P) = Vortex passed over top of tower

FAA B727-100		Date: 21 JUN 1990 (Day of Year: 172)		Abeam Time: 06:26:56 (MDT)	
Configuration: Takeoff Glide Slope: 0 deg.		Wind Speed: 13.1 kts Maximum Velocity: 50.3 fps Descent Rate: 4.3 fps		Wind Direction: 89 deg. Wind Velocity: 13.1 kts Wind Temperature: 14.3 °C	
AIRCRAFT DATA Flaps: 15 deg Indicated Air Speed: 147 kts		METEOROLOGICAL DATA (200 ft Sensor Level) Airspeed: 29 s Advection Rate: 11.1 fps		Atmospheric Stability: Stable Estimated Core Radius: 0.7 ft Tower Penetration Height: 134 ft AGL	
Wind Speed: 13.1 kts Maximum Velocity: 50.3 fps Descent Rate: 4.3 fps	Wind Direction: 89 deg. Wind Velocity: 13.1 kts Wind Temperature: 14.3 °C	Downwind Vortex Characteristics Age: 29 s Advection Rate: 11.1 fps	Upwind Vortex Characteristics Age: 34 s Advection Rate: 11.4 fps	Upwind Vortex Tangential Velocities Age: 34 s Advection Rate: 11.4 fps	Tower Penetration Height: 86 ft AGL Estimated Core Radius: 0.6 ft Tower Penetration Height: 134 ft AGL
198	64	29.4	102	-3.2	-7.8
196	62	27.3*	100	-3.4	-5.2
194	60	25.1*	98	-3.6	-5.6
192	58	23.0*	96	-3.8	-4.4
190	56	20.8*	94	-4.0	-4.4
188	54	18.7*	92	-4.2	-2.7
186	52	16.5*	90	-4.4	-2.0
184	50	21.0*	88	-4.6	-1.5
182	48	25.5*	86	-4.8	-0.8
180	46	30.0*	84	-5.0	-1.0
178	44	26.6*	82	-5.2	-2.5
176	42	23.1	80	-5.4	-3.5
174	40	29.0	78	-5.6	-3.1
172	38	30.0	76	-5.8	-3.0
170	36	26.8	74	-6.0	-1.3
168	34	26.3	72	-6.2	-1.5
166	32	25.8	70	-6.4	-2.6
164	30	27.1	68	-6.6	-1.8
162	28	25.9	66	-6.8	-0.8
160	26	25.4	64	-7.0	-1.1
158	24	25.2	62	-7.2	-1.3
156	22	21.6	60	-7.4	-0.2
154	20	19.7	58	-7.6	-1.1
152	18	22.7	56	-7.8	-1.7
150	16	20.7	54	-8.0	-2.3
148	14	20.2	52	-8.2	-1.4
146	12	26.3	50	-8.4	-0.6
144	10	23.8	48	-8.6	-0.1
142	8	25.3	46	-8.8	-0.6
140	6	32.9	44	-9.0	-0.2
138	4	34.5	42	-9.2	-0.5
136	2	52.2	40	-9.4	-1.0
134	0	50.3	38	-9.6	-0.2
132	-2	-32.3	36	-9.8	-0.5
130	-4	-29.2	34	-100	0.0
128	-6	-12.8	32	-102	0.4
126	-8	-13.5*	30	-104	0.4
124	-10	-14.1	28	-106	0.5
122	-12	-9.0	26	-108	0.7
120	-14	-7.5	24	-110	1.0
118	-16	-4.2	22	-112	1.1
116	-18	-6.9	20	-114	1.3
114	-20	-6.6	18	-116	1.6
112	-22	-8.0	16	-118	1.8
110	-24	-6.9	14	-120	2.0
108	-26	-7.6	12	-122	2.2
106	-28	-0.4	10	-108	2.4
104	-30	-8.7	8	-104	2.7

\* - Estimated

109

(M) = Miesina (O) = Novarrese (I) = Valtellina floras for remote sensing systems. (P) = Vortex massed over ton of toner

### **= Estimated**

(M) = Missing

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Flyby (Run) Number: 5		Date: 21 JUN 1990 Day of Year: 172)	Abeam Time: 6:40:23 (MDT)					
Configuration: Takeoff	AIRCRAFT DATA							
Glide Slope: 0 deg.	Flaps: 15 deg.	Gross Weight: 133,000 lbs.						
Descent Rate: 4.7 ips	Indicated Air Speed: 146 kts	Altitude: 250 ft AGL						
Wind Speed: 16.9 kts	METEOROLOGICAL DATA (200 ft Sensor Level)	Atmospheric Stability: Stable						
Maximum Velocity: 71.5 ips	Wind Direction: 63 deg.	Estimated Core Radius: 1.7 ft						
Descent Rate: 4.6 ips	Advection Rate: 17.0 ips	Tower Penetration Height: 160 ft AGL						
Maximum Velocity: 71.5 ips	Age: 19 s	Estimated Core Radius: 1.0 ft						
Descent Rate: 4.6 ips	Age: 22 s	Tower Penetration Height: 148 ft AGL						
DOWNWIND VORTEX CHARACTERISTICS								
Wind Temperature: 15.1 °C		Atmospheric Stability: Stable						
UPWIND VORTEX CHARACTERISTICS								
Age: 19 s		Estimated Core Radius: 1.7 ft						
Advection Rate: 17.0 ips		Tower Penetration Height: 160 ft AGL						
Downwind Vortex Tangential Velocities								
Sensor Height [ft]	Relative Height [ft]	$V_\theta$ (fps)	Sensor Height [ft]	Relative Height [ft]	$V_\theta$ (fps)	Sensor Height [ft]	Relative Height [ft]	$V_\theta$ (fps)
198	38	34.6	102	-58	-8.6	198	50	-5.7
196	36	34.2°	100	-60	-5.5	196	48	-5.8°
194	34	33.8°	98	-62	-5.3	194	46	-5.9°
192	32	33.4°	96	-64	-3.8	192	44	-6.0°
190	30	33.0°	94	-66	-3.9	190	42	-6.1°
188	28	32.6°	92	-68	-4.2	188	40	-6.2°
186	26	32.2°	90	-70	-4.6	186	38	-6.3°
184	24	31.8°	88	-72	-4.8	184	36	-6.4°
182	22	31.3°	86	-74	-5.1	182	34	-6.4°
180	20	30.8°	84	-76	-5.5	180	32	-6.5°
178	18	30.6°	82	-78	-5.9	178	30	-6.6°
176	16	30.4°	80	-80	-6.3	176	28	-6.8°
174	14	30.2°	78	-82	-6.9	174	26	-7.0°
172	12	24.6	76	-84	-3.6	172	24	-12.4
170	10	31.3	74	-86	-3.0	170	22	-11.8
168	8	47.4	72	-88	-1.3	168	20	-21.3
166	6	63.4	70	-90	-1.5	166	18	-72
164	4	64.7	68	-92	-1.7	164	16	-78
162	2	64.1°	66	-94	-2.0	162	14	-80
160	0	-63.5	64	-96	-2.4	160	12	-82
158	-2	-47.2	62	-98	-0.1	158	10	-84
156	-4	-41.8	60	-100	-0.5	156	8	-86
154	-6	-36.2	58	-102	-0.6	154	6	-88
152	-8	-30.4	56	-104	-0.5	152	4	-90
150	-10	-27.0	54	-106	-1.3	150	2	-92
148	-12	-25.1	52	-108	-1.1	148	0	-94
146	-14	-26.9	50	-110	-0.9	146	-2	-96
144	-16	-22.2	48	-112	-0.7	144	-4	-98
142	-18	-27.4	46	-114	-0.4	142	-4	-100
140	-20	-22.4	44	-116	-2.2	140	-6	-102
138	-22	-8.0	42	-118	-1.0	138	-8	-104
136	-24	-13.2	40	-120	-1.7	136	-10	-106
134	-26	-13.8	38	-122	-2.1	134	-12	-108
132	-28	-11.2	36	-124	-1.3	132	-14	-110
130	-30	-12.9	34	-126	-4.0	130	-16	-112
128	-32	-8.7	32	-128	-6.4	128	-18	-114
126	-34	-5.8	30	-130	-6.9	126	-20	-116
124	-36	-6.4	28	-132	-4.6	124	-22	-118
122	-38	-5.4	26	-134	-2.8°	122	-24	-120
120	-40	-7.8	24	-136	-1.1	120	-26	-122
118	-42	-7.1	22	-138	-0.3	118	-28	-124
116	-44	-6.4	20	-140	-0.6	116	-30	-126
114	-46	-8.3	18	-142	-1.0	114	-32	-128
112	-48	-7.9	16	-144	-0.7	112	-34	-130
110	-50	-11.7	14	-146	-0.1	110	-36	-132
108	-52	-10.1	12	-148	-1.6	108	-38	-134
106	-54	-7.5	10	-150	-0.4	106	-40	-136
104	-56	-4.9				104	-44	-138

= Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex (Flyby down for remote sensing systems)

(P) = Vortex passed over top of tower

Flyby (Run) Number: 6	FAA B727-100	Date: 21 JUN 1990 (Day of Year: 172)	Above Time: 6:47:57 (MDT)
Configuration: Takeoff	AIRCRAFT DATA		
Glide Slope: 0 deg.	Flaps: 15 deg.	Gross Weight: 132,000 lbs.	
	Indicated Air Speed: 147 kts	Altitude: 260 ft AGL	
Wind Speed: 18.1 kts	METEOROLOGICAL DATA (200 ft Sensor Level)	Air Temperature: 14.7 °C	Atmospheric Stability: Stable
Maximum Velocity: (P) fps	Age: (P) s	Advection Rate: (P) fpm	Estimated Core Radius: (P) ft
Descent Rate: (P) fpm	Advection Rate: (P) s	Advection Rate: (P) fpm	Tower Penetration Height: (P) ft AGL
Wind Direction: 62 deg.	Wind Direction: 62 deg.	Wind Direction: 62 deg.	Wind Direction: 62 deg.
DOWNTWIND VORTEX CHARACTERISTICS			
Maximum Velocity: (P) fps	Age: (P) s	Advection Rate: (P) fpm	Estimated Core Radius: (P) ft
Descent Rate: (P) fpm	Advection Rate: (P) s	Advection Rate: (P) fpm	Tower Penetration Height: (P) ft AGL
UPWIND VORTEX CHARACTERISTICS			
Maximum Velocity: (P) fps	Age: (P) s	Advection Rate: (P) fpm	Estimated Core Radius: (P) ft
Descent Rate: (P) fpm	Advection Rate: (P) s	Advection Rate: (P) fpm	Tower Penetration Height: (P) ft AGL
DOWNWIND VORTEX TANGENTIAL VELOCITIES			
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
		V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)
198	(P)	(P)	(P)
196	(P)	(P)	102
194	(P)	(P)	98
192	(P)	(P)	94
190	(P)	(P)	92
188	(P)	(P)	90
186	(P)	(P)	88
184	(P)	(P)	86
182	(P)	(P)	84
180	(P)	(P)	82
178	(P)	(P)	80
176	(P)	(P)	78
174	(P)	(P)	76
172	(P)	(P)	74
170	(P)	(P)	72
168	(P)	(P)	70
166	(P)	(P)	68
164	(P)	(P)	66
162	(P)	(P)	64
160	(P)	(P)	62
158	(P)	(P)	60
156	(P)	(P)	58
154	(P)	(P)	56
152	(P)	(P)	54
150	(P)	(P)	52
148	(P)	(P)	50
146	(P)	(P)	48
144	(P)	(P)	46
142	(P)	(P)	44
140	(P)	(P)	42
138	(P)	(P)	40
136	(P)	(P)	38
134	(P)	(P)	36
132	(P)	(P)	34
130	(P)	(P)	32
128	(P)	(P)	30
126	(P)	(P)	28
124	(P)	(P)	26
122	(P)	(P)	24
120	(P)	(P)	22
118	(P)	(P)	20
116	(P)	(P)	18
114	(P)	(P)	16
112	(P)	(P)	14
110	(P)	(P)	12
108	(P)	(P)	10
106	(P)	(P)	08
104	(P)	(P)	04

\* = Estimated (D) = Vortex dissipated upwind of tower (P) = Vortex passed over top of tower

(M) = Missing (O) = No vortex (F) = flyby flown for remote sensing systems

Flyby (Run) Number: 7		FAA B727-100		Date: 21 JUN 1990 (Day of Year: 172)		Absam Time: 6:55:42 (MDT)	
Configuration: Landing		AIRCRAFT DATA		Flaps: 30 deg.		Gross Weight: 130,500 lbs.	
Glide Slope: 0 deg.		Indicated Air Speed: 130 kts		Altitude: 260 ft AGL		Atmospheric Stability: Stable	
Wind Speed: 17.8 kts		METEOROLOGICAL DATA		(200 ft Sensor Level)		Wind Direction: 61 deg.	
Maximum Velocity: 145.1 fps		Air Temperature: 15.1 °C		Age: 19.5 s		Advection Rate: 18.6 fps	
Descent Rate: 6.9 fps		DOWNWIND VORTEX CHARACTERISTICS		Age: 22.5 s		Advection Rate: 18.9 fps	
Maximum Velocity: 161.7 fps		UPWIND VORTEX CHARACTERISTICS		Wind Direction: 61 deg.		Advection Rate: 18.9 fps	
Descent Rate: 7.0 fps		Downwind Vortex Tangential Velocities		Age: 19.5 s		Advection Rate: 18.6 fps	
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)
198	70	40.2	102	-26	-14.5	198	92
196	68	40.2*	100	-28	-18.1	196	90
194	66	40.2*	98	-30	-14.0*	194	88
192	64	40.2*	96	-32	-9.9	192	86
190	62	40.2*	94	-34	-7.5	190	84
188	60	40.3*	92	-36	-8.3	188	82
186	58	40.3*	90	-38	-8.9	186	80
184	56	40.3*	88	-40	-10.8	184	78
182	54	40.3*	86	-42	-11.7	182	76
180	52	40.3*	84	-44	-8.5*	180	74
178	50	39.9*	82	-46	-5.2	178	72
176	48	39.9*	80	-48	-2.0	176	70
174	46	39.1	78	-50	-1.9	174	68
172	44	40.4	76	-52	-3.0	172	66
170	42	38.6*	74	-54	-3.8	170	64
168	40	36.8	72	-56	-3.5	168	62
166	38	35.1	70	-58	-3.0	166	60
164	36	35.3	68	-60	-3.0	164	58
162	34	38.8	66	-62	-3.3	162	56
160	32	39.2	64	-64	-3.0	160	54
158	30	27.3	62	-66	-3.8	158	52
156	28	22.1	60	-68	-3.6	156	50
154	26	26.0	58	-70	-3.9	154	48
152	24	34.3	56	-72	-4.1	152	46
150	22	54	54	-74	-6.8	150	44
148	20	52	52	-76	-5.2	148	42
146	18	31.7	50	-78	-5.3	146	40
144	16	28.5	48	-80	-4.9	144	38
142	14	27.3	46	-82	-4.7	142	36
140	12	25.5	44	-84	-4.2	140	34
138	10	24.7	42	-86	-5.2	138	32
136	8	23.1	40	-88	-4.8	136	30
134	6	38.8	38	-90	-3.5	134	28
132	4	45.2	36	-92	-3.4	132	26
130	2	96.1	34	-94	-3.7	130	24
128	0	145.1	32	-96	-3.7	128	22
126	-2	-49.8	30	-98	-3.9*	126	20
124	-4	-56.6	28	-100	-3.9	124	18
122	-6	-42.5	26	-102	-3.5	122	16
120	-8	-40.3	24	-104	-3.7	120	14
118	-10	-29.3	22	-106	-3.4	118	12
116	-12	-26.8	20	-108	-3.8	116	10
114	-14	-26.1	18	-110	-3.9	114	8
112	-16	-18.4	16	-112	-3.4*	112	6
110	-18	-18.8	14	-114	-3.9	110	4
108	-20	-18.3*	12	-116	-3.9	108	2
106	-22	-17.5*	10	-118	-2.9	106	0
104	-24	-17.3	8	-120	-2.9	104	-2

(M) = Missing (O) = No vortex (Flyby flown for remote sensing systems) (P) = Vortex passed over top of tower

(D) = Vortex dissipated upwind of tower (I) = Missing (E) = Estimated

Flyby (Run) Number: 8		FAA B727-100	
Date: 21 JUN 1990 (Day of Year: 172)	Abeam Time: 7:03:21 (MDT)		
AIRCRAFT DATA		Gross Weight: 129,000 lbs.	
Flaps: 30 deg.	Indicated Air Speed: 141 kts	Altitude: 275 ft AGL	
Configuration: Landing			
Glide Slope: -3 deg.			
METEOROLOGICAL DATA		Atmospheric Stability: Stable	
Wind Speed: 15.6 kts	Wind Direction: 70 deg.	Air Temperature: 15.1 °C	
Maximum Velocity: (P) fps	Age: (P) s	Advective Rate: (P) fps	Estimated Core Radius: (P) ft
Descent Rate: (P) fpm	Advective Rate: (P) s	Advective Rate: (P) fpm	Tower Penetration Height: (P) ft AGL
DOWNDOWN VORTEX CHARACTERISTICS		Tower Penetration Height: (P) ft AGL	
UPWIND VORTEX CHARACTERISTICS		Estimated Core Radius: (P) ft	
Wind Speed: 15.6 kts	Wind Direction: 70 deg.	Age: (P) s	Tower Penetration Height: (P) ft AGL
Maximum Velocity: (P) fps	Age: (P) s	Advective Rate: (P) fpm	
Descent Rate: (P) fpm	Advective Rate: (P) s	Advective Rate: (P) fpm	
DOWNDOWN VORTEX TANGENTIAL VELOCITIES		Upwind Vortex Tangential Velocities	
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
198	(P)	102	(P)
196	(P)	100	(P)
194	(P)	98	(P)
192	(P)	96	(P)
190	(P)	94	(P)
188	(P)	92	(P)
186	(P)	90	(P)
184	(P)	88	(P)
182	(P)	86	(P)
180	(P)	84	(P)
178	(P)	82	(P)
176	(P)	80	(P)
174	(P)	78	(P)
172	(P)	76	(P)
170	(P)	74	(P)
168	(P)	72	(P)
166	(P)	70	(P)
164	(P)	68	(P)
162	(P)	66	(P)
160	(P)	64	(P)
158	(P)	62	(P)
156	(P)	60	(P)
154	(P)	58	(P)
152	(P)	56	(P)
150	(P)	54	(P)
148	(P)	52	(P)
146	(P)	50	(P)
144	(P)	48	(P)
142	(P)	46	(P)
140	(P)	44	(P)
138	(P)	42	(P)
136	(P)	40	(P)
134	(P)	38	(P)
132	(P)	36	(P)
130	(P)	34	(P)
128	(P)	32	(P)
126	(P)	30	(P)
124	(P)	28	(P)
122	(P)	26	(P)
120	(P)	24	(P)
118	(P)	22	(P)
116	(P)	20	(P)
114	(P)	18	(P)
112	(P)	16	(P)
110	(P)	14	(P)
108	(P)	12	(P)
106	(P)	10	(P)
104	(P)	8	(P)

(M) = Missing

(D) = Vortex dissipated upwind of tower

= Estimated

(P) = Vortex passed over top of tower

(O) = No vortex (Flyby flown for remote sensing systems)

Flyby (Run) Number: 9		Date: 21 JUN 1990 (Day of Year: 172)	Abeam Time: 7:18:14 (MDT)								
Configuration: Landing	AIRCRAFT DATA										
Glide Slope: 0 deg.	Flaps: 30 deg.	Indicated Air Speed: 132 kts									
			Gross Weight: 127,000lbs.								
			Altitude: 250 ft AGL								
METEOROLOGICAL DATA (200 ft Sensor Level)											
Wind Speed: 9.2 kts	Wind Direction: 66 deg.	Air Temperature: 15.2 °C	Atmospheric Stability: Neutral								
Maximum Velocity: 91.2 fps	DOWNWIND VORTEX CHARACTERISTICS										
Descent Rate: 3.5 fpm	Age: 34 s	Advection Rate: 10.4 fpm	Estimated Core Radius: 0.4 ft								
			Tower Penetration Height: 132 ft AGL								
Maximum Velocity: 34.5 fps	UPWIND VORTEX CHARACTERISTICS										
Descent Rate: 2.7 fpm	Age: 40 s	Advection Rate: 10.4 fpm	Estimated Core Radius: 1.8 ft								
			Tower Penetration Height: 142 ft AGL								
Downwind Vortex Tangential Velocities											
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)								
			Relative Height (ft)								
			V <sub>θ</sub> (fps)								
198	66	19.1	102	-30	-6.4	198	-2.8	102	-40	15.3*	
196	64	19.1*	100	-32	-6.0	196	-3.1*	100	-42	13.5	
194	62	19.2*	98	-34	-5.5	194	-3.4*	98	-44	15.3	
192	60	19.3*	96	-36	-3.4	192	-3.8*	96	-46	19.3	
190	58	19.4*	94	-38	-2.4	190	-4.1*	94	-48	16.9	
188	56	19.4*	92	-40	-1.7	188	-4.4*	92	-50	18.7	
186	54	19.5*	90	-42	-2.5	186	-4.8*	90	-52	20.6	
184	52	19.5*	88	-44	-2.6	184	-5.1*	88	-54	21.2	
182	50	19.7*	86	-46	-1.3	182	-5.4*	86	-56	20.3	
180	48	19.7	84	-48	-0.7	80	-5.8	84	-58	19.9	
178	46	19.5*	82	-50	-1.7	78	-6.6*	82	-60	20.5	
176	44	19.2*	80	-52	-1.0	76	-7.0	80	-62	20.5	
174	42	18.8	78	-54	-1.0	74	-7.4	78	-64	20.0	
172	40	19.1	76	-56	-1.4	72	-7.9	76	-66	19.5	
170	38	20.2	74	-58	-0.6	70	-8.9	74	-68	19.5	
168	36	19.7	72	-60	-2.2	68	-28	72	-70	20.5	
166	34	19.1	70	-62	-0.1	66	-24	70	-72	20.5	
164	32	18.5	68	-64	-0.3	64	-22	71	-74	21.6	
162	30	19.1	66	-66	-1.7	62	-20	75	-76	18.6	
160	28	16.0	64	-68	-2.5	60	-18	11.0	64	78	21.6
158	26	14.3	62	-70	-0.8	58	-16	-9.5	62	-80	19.3
156	24	15.2	60	-72	-1.8	56	-14	-9.5	60	-82	20.3
154	22	15.4	58	-74	-1.2	54	-12	-12.8	58	-84	21.2
152	20	13.4	56	-76	-0.3	52	-10	-18.3	56	-86	23.2
150	18	12.0	54	-78	-0.1	50	-8	-17.8	54	-88	24.0
148	16	13.7	52	-80	-0.5	48	-6	-18.4	52	-90	22.2
146	14	14.6	50	-82	-0.4	46	-4	-27.9	50	-92	21.4
144	12	21.3	48	-84	-0.1	44	-2	-28.7	48	-94	20.8
142	10	29.5	46	-86	-0.9	42	0	-34.5	46	-96	19.5
140	8	27.3	44	-88	-2.9	40	-2	-40.4	44	-98	18.1
138	6	32.6	42	-90	-0.4	38	-4	-29.9	42	-100	17.1
136	4	36.6	40	-92	-0.9	36	-8	-23.2	40	-102	18.4
134	2	60.2	38	-94	-1.4	34	-20	-17.8	38	-104	21.7
132	0	91.2	36	-96	-0.2	32	-10	-17.3	22	-106	19.5
130	-2	-51.3	34	-98	0.0	30	-12	-15.2	34	-108	18.6
128	-4	-23.7	32	-100	1.2	28	-14	-15.0	32	-110	17.6
126	-6	-12.6	30	-102	0.8	26	-16	-15.1*	30	-112	17.5
124	-8	-15.7	28	-104	0.0	24	-18	-15.1	28	-114	17.0
122	-10	-15.6	26	-106	2.3	22	-20	-17.3	26	-116	16.6
120	-12	-16.0	24	-108	0.0	20	-22	-16.5	24	-118	15.5
118	-14	-11.2	22	-110	1.7	18	-24	-17.3	22	-120	13.5
116	-16	-11.6	20	-112	0.3	16	-26	-21.8	20	-122	15.2
114	-18	-9.5	18	-114	0.8	14	-28	-20.4	18	-124	16.6
112	-20	-10.2	16	-116	-1.6	12	-30	-19.4	16	-126	13.4
110	-22	-10.6	14	-118	-1.4	10	-32	-20.5	14	-128	13.7*
108	-24	-10.2	12	-120	-2.2	8	-34	-22.8	12	-130	14.0
106	-26	-7.4	10	-122	-0.6	6	-36	-22.7	10	-132	13.1
104	-28	-8.8		-124	-0.4	4	-38	-17.0			

(P) = Vortex passed over top of tower

(D) = Vortex dissipated upwind of tower

(O) = No vortex

(M) = Missing

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Flurry (Run) Number: 10	FAA B727-100	Date: 21 JUN 1990 (Day of Year: 172)	Abeam Time: 7:26:42 (MDT)			
Configuration: Landing	AIRCRAFT DATA					
Glide Slope: -3 deg.	Flops: 30 deg; 126 kts	Gross Weight: 126,500 lbs.				
	Indicated Air Speed: 126 kts	Altitude: 290 ft AGL				
Wind Speed: 9.4 kts	Wind Direction: 80 deg.	Air Temperature: 15.0 °C	Atmospheric Stability: Neutral			
Maximum Velocity: (M) fps	Age: (M) s					
Descent Rate: (M) fps	Advection Rate: (M) fps					
Maximum Velocity: (M) fps	Age: (M) s	Estimated Core Radius: (M) ft				
Descent Rate: (M) fps	Advection Rate: (M) fps	Tower Penetration Height: (M) ft AGL				
METEOROLOGICAL DATA	UPWIND VORTEX CHARACTERISTICS	DOWNWIND VORTEX CHARACTERISTICS				
(200 ft Sensor Level)	(200 ft Sensor Level)	(200 ft Sensor Level)				
Wind Speed: 9.4 kts	Wind Direction: 80 deg.	Age: (M) s				
Maximum Velocity: (M) fps	Age: (M) s	Upwind Vortex Tangential Velocities				
Descent Rate: (M) fps	Advection Rate: (M) fps	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)
Downwind Vortex Tangential Velocities						
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	
198	(M)	(M)	198	(M)	(M)	
196	(M)	(M)	196	(M)	(M)	
194	(M)	(M)	194	(M)	(M)	
192	(M)	(M)	192	(M)	(M)	
190	(M)	(M)	190	(M)	(M)	
188	(M)	(M)	188	(M)	(M)	
186	(M)	(M)	186	(M)	(M)	
184	(M)	(M)	184	(M)	(M)	
182	(M)	(M)	182	(M)	(M)	
180	(M)	(M)	180	(M)	(M)	
178	(M)	(M)	178	(M)	(M)	
176	(M)	(M)	176	(M)	(M)	
174	(M)	(M)	174	(M)	(M)	
172	(M)	(M)	172	(M)	(M)	
170	(M)	(M)	170	(M)	(M)	
168	(M)	(M)	168	(M)	(M)	
166	(M)	(M)	166	(M)	(M)	
164	(M)	(M)	164	(M)	(M)	
162	(M)	(M)	162	(M)	(M)	
160	(M)	(M)	160	(M)	(M)	
158	(M)	(M)	158	(M)	(M)	
156	(M)	(M)	156	(M)	(M)	
154	(M)	(M)	154	(M)	(M)	
152	(M)	(M)	152	(M)	(M)	
150	(M)	(M)	150	(M)	(M)	
148	(M)	(M)	148	(M)	(M)	
146	(M)	(M)	146	(M)	(M)	
144	(M)	(M)	144	(M)	(M)	
142	(M)	(M)	142	(M)	(M)	
140	(M)	(M)	140	(M)	(M)	
138	(M)	(M)	138	(M)	(M)	
136	(M)	(M)	136	(M)	(M)	
134	(M)	(M)	134	(M)	(M)	
132	(M)	(M)	132	(M)	(M)	
130	(M)	(M)	130	(M)	(M)	
128	(M)	(M)	128	(M)	(M)	
126	(M)	(M)	126	(M)	(M)	
124	(M)	(M)	124	(M)	(M)	
122	(M)	(M)	122	(M)	(M)	
120	(M)	(M)	120	(M)	(M)	
118	(M)	(M)	118	(M)	(M)	
116	(M)	(M)	116	(M)	(M)	
114	(M)	(M)	114	(M)	(M)	
112	(M)	(M)	112	(M)	(M)	
110	(M)	(M)	110	(M)	(M)	
108	(M)	(M)	108	(M)	(M)	
106	(M)	(M)	106	(M)	(M)	
104	(M)	(M)	104	(M)	(M)	

= Estimated (D) = Vortex dissipated upwind of tower (M) = Missing (O) = No vortex (F) by flown for remote sensing systems

(P) = Vortex passed over top of tower

Flyby (Run) Number: 11	Date: 21 JUN 1990 (Day of Year: 172)	Abeam Time: 7:35:17 (MDT)
Configuration: Landing Glide Slope: 0 deg.	AIRCRAFT DATA Flaps: 30 deg. Indicated Air Speed: 128 kts	Gross Weight: 124,000 lbs. Altitude: 294 ft AGL
Wind Speed: 13.3 kts	Wind Direction: 71 deg.	Atmospheric Stability: Unstable
Maximum Velocity: 91.6 fps	Age: 27 s	Estimated Core Radius: 0.7 ft
Descent Rate: 8.1 fps	Advection Rate: 13.6 ips	Tower Penetration Height: 76 ft AGL
Maximum Velocity: 79.6 fps	Age: 29 s	Estimated Core Radius: 0.4 ft
Descent Rate: 6.4 ips	Advection Rate: 14.9 ips	Tower Penetration Height: 108 ft AGL
METEOROLOGICAL DATA (200 ft Sensor Level)		
DOWNMWIND VORTEX CHARACTERISTICS		
Age: 27 s		
Advection Rate: 13.6 ips		
UPWMWIND VORTEX CHARACTERISTICS		
Age: 29 s		
Advection Rate: 14.9 ips		
Downwind Vortex Tangential Velocities		
Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)
198	122	40.9
196	120	40.6*
194	118	40.3*
192	116	40.0*
190	114	39.7*
188	112	39.4*
186	110	39.1*
184	108	38.8*
182	106	38.5*
180	104	38.3*
178	102	37.5*
176	100	36.7*
174	98	35.9
172	96	34.8
170	94	34.6
168	92	34.2
166	90	34.0
164	88	33.8
162	86	33.6
160	84	33.4
158	82	33.2
156	80	33.0
154	78	32.8
152	76	32.6
150	74	32.4
148	72	32.2
146	70	31.9
144	68	31.6
142	66	31.3
140	64	31.0
138	62	30.7
136	60	30.4
134	58	30.1
132	56	29.8
130	54	29.5
128	52	29.2
126	50	28.9
124	48	28.6
122	46	28.3
120	44	28.0
118	42	27.7
116	40	27.4
114	38	27.1
112	36	26.8
110	34	26.5
108	32	26.2
106	30	25.9
104	28	25.6
Upwind Vortex Tangential Velocities		
Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)
198	102	27.1*
196	100	24.8
194	98	23.2
192	96	20
190	94	18
188	92	16
186	90	14
184	88	12
182	86	10
180	84	8
178	82	6
176	80	4
174	78	2
172	76	0
170	74	-2
168	72	-4
166	70	-6
164	68	-8
162	66	-10
160	64	-12
158	62	-14
156	60	-16
154	58	-18
152	56	-20
150	54	-22
148	52	-24
146	50	-26
144	48	-28
142	46	-30
140	44	-32
138	42	-34
136	40	-36
134	38	-38
132	36	-40
130	34	-42
128	32	-44
126	30	-46
124	28	-48
122	26	-50
120	24	-52
118	22	-54
116	20	-56
114	18	-58
112	16	-60
110	14	-62
108	12	-64
106	10	-66
104	8	-68
102	6	-70
100	4	-72
98	2	-74
96	0	-76
94	-2	-78
92	-4	-80
90	-6	-82
88	-8	-84
86	-10	-86
84	-12	-88
82	-14	-90
80	-16	-92
78	-18	-94
76	-20	-96
74	-22	-98
72	-24	-26.9
70	-26	-24.7
68	-28	-21.9
66	-30	-26.4
64	-32	-25.8
62	-34	-27.6
60	-36	-25.5
58	-38	-23.3
56	-40	-21.9
54	-42	-26.9
52	-44	-25.0
50	-46	-25.2
48	-48	-27.3
46	-50	-25.3
44	-52	-25.3
42	-54	-25.3
40	-56	-25.3
38	-58	-25.3
36	-60	-27.4
34	-62	-26.9
32	-64	-25.0
30	-66	-28.8
28	-68	-28.6
26	-70	-23.1
24	-72	-24.3
22	-74	-24.5
20	-76	-26.5
18	-78	-30.3
16	-80	-27.9
14	-82	-28.4
12	-84	-29.4
10	-86	-26.9
8	-88	-24.5
6	-90	-20.0
4	-92	-18.8
2	-94	-17.0
0	-96	-15.2
-2	-98	-13.4

\*(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex (Flyby passed over top of tower)

(P) = Vortex passed over top of tower

FAA B727-100									
Date: 21 JUN 1980 (Day of Year: 172)									Abeam Time: 7:43:13 (MDT)
AIRCRAFT DATA									
Flaps: 30 deg., Indicated Air Speed: 132 kts									Gross Weight: 123,000 lbs.
Altitude: 3000 ft AGL									Altitude: 3000 ft AGL
METEOROLOGICAL DATA									
Wind Speed: 14.1 kts									Air Temperature: 15.7 °C
Wind Direction: 72 deg.									Atmospheric Stability: Unstable
DOWNDOWN VORTEX CHARACTERISTICS									
Age: (P) s									Estimated Core Radius: (P) ft
Advection Rate: (P) fps									Tower Penetration Height: (P) ft AGL
UPWIND VORTEX CHARACTERISTICS									
Age: 25 s									Estimated Core Radius: 0.3 ft
Advection Rate: 15.5 fps									Tower Penetration Height: 168 ft AGL
Downwind Vortex Tangential Velocities									
Maximum Velocity: 184.9 fps									Upwind Vortex Tangential Velocities
Descent Rate: 5.3 fps									Sensor Height (ft)
Descent Rate: 5.3 fps									Relative Height (ft)
Sensor Height (ft)									Relative Height (ft)
Sensor Height (ft)									V <sub>θ</sub> (fps)
Sensor Height (ft)									V <sub>θ</sub> (fps)
(P) = Missing									(O) = No vortex (Flyby passed over top of tower)
(D) = Vortex dissipated upwind of tower									(P) = Vortex flown for remote sensing systems

(P) = Vortex passed over top of tower

(O) = No vortex (Flyby passed over top of tower)

(D) = Vortex dissipated upwind of tower

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FAA B-27-100		Data: 21 JUN 1990 (Day of Year: 172)		Abeam Time: 7:51:04 (MDT)	
Flyby (Run) Number: 13		AIRCRAFT DATA			
Configuration: Holding	Flaps: 0 deg.	Indicated Air Speed: 197 kts		Gross Weight: 122,000 lbs.	
Glide Slope: 0 deg.				Altitude: 270 ft AGL	
Wind Speed: 14.3 kts	Wind Direction: 72 deg.	AIR TEMPERATURE	15.8 °C	Atmospheric Stability: Unstable	
Maximum Velocity: (D) f/s	Advection Rate: (D) f/s	METEOROLOGICAL DATA (200 ft Sensor Level)		Estimated Core Radius: (D) ft	
Descent Rate: (D) f/s	Age: (D) s	Tower Penetration Height: (D) ft		Tower Penetration Height: (D) ft	
Maximum Velocity: (D) f/s	Advection Rate: (D) f/s	DOWNWIND VORTEX CHARACTERISTICS		Estimated Core Radius: (D) ft	
Descent Rate: (D) f/s	Age: (D) s	UPWIND VORTEX CHARACTERISTICS		Tower Penetration Height: (D) ft	
Wind Speed: 14.3 kts	Wind Direction: 72 deg.	ADVECTION RATE: (D) f/s		Estimated Core Radius: (D) ft	
Maximum Velocity: (D) f/s	Relative Height (ft)	Downwind Vortex Tangential Velocities		Upwind Vortex Tangential Velocities	
Descent Rate: (D) f/s	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)
	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)
198	102	100	198	196	102
196	100	98	196	194	100
194	98	96	192	190	98
192	96	94	190	188	96
190	94	92	188	186	94
188	92	90	186	184	92
186	90	88	184	182	90
184	88	86	182	180	88
182	86	84	180	178	86
180	84	82	178	176	84
178	82	80	176	174	82
176	80	78	174	172	80
174	78	76	172	170	78
172	76	74	170	168	76
170	74	72	168	166	74
168	72	70	166	164	72
166	70	68	164	162	70
164	68	66	162	160	68
162	66	64	160	158	66
160	64	62	158	156	64
158	62	60	156	154	62
156	60	58	154	152	60
154	58	56	152	150	58
152	56	54	150	148	56
150	54	52	148	146	54
148	52	50	146	144	52
146	50	48	144	142	50
144	48	46	142	140	48
142	46	44	140	138	46
140	44	42	138	136	44
138	42	40	136	134	42
136	40	38	134	132	40
134	38	36	132	130	38
132	36	34	130	128	36
130	34	32	128	126	34
128	32	30	126	124	32
126	30	28	124	122	30
124	28	26	122	120	28
122	26	24	120	118	26
120	24	22	118	116	24
118	22	20	116	114	22
116	20	18	114	112	20
114	18	16	112	110	18
112	16	14	110	108	16
110	14	12	108	106	14
108	12	10	106	104	12
106	10		104		10

FAA B727-100		Date: 21 JUN 1990 (Day of Year: 172)	Abeam Time: 7:58:22 (MDT)
<b>AIRCRAFT DATA</b>		Gross Weight: 121,000 lbs.	
Flaps: 0 deg.		Altitude: 220 ft AGL	
Indicated Air Speed: 197 kts			
<b>METEOROLOGICAL DATA</b>			
(200 ft Sensor Level)		Air Temperature: 15.9 °C	Atmospheric Stability: Unstable
Wind Speed: 16.2 kts	Wind Direction: 73 deg.		
<b>DOWNWIND VORTEX CHARACTERISTICS</b>			
Maximum Velocity: 115.3 fps		Age: 22 s	Advection Rate: 14.0 fps
Descent Rate: 4.7 fps		Age: 24 s	Advection Rate: 15.5 fps
<b>UPWIND VORTEX CHARACTERISTICS</b>			
Maximum Velocity: 95.8 fps		Age: 22 s	Advection Rate: 14.0 fps
Descent Rate: 4.7 fps		Age: 24 s	Advection Rate: 15.5 fps
<b>Downwind Vortex Tangential Velocities</b>			
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
		$V_\theta$ (fps)	$V_\theta$ (fps)
198	70	38.0	10.2
196	68	38.8*	10.0
194	66	38.8*	9.8
192	64	39.2*	9.6
190	62	39.6	9.4
188	60	40.0	9.2
186	58	40.3*	9.0
184	56	40.6*	8.8
182	54	40.9*	8.6
180	52	41.2	8.4
178	50	41.5	8.2
176	48	41.8	8.0
174	46	40.8*	7.8
172	44	40.4	7.6
170	42	41.1	7.4
168	40	39.1	7.2
166	38	37.2	7.0
164	36	38.5	6.8
162	34	36.8	6.6
160	32	36.1	6.4
158	30	35.7	6.2
156	28	34.6	6.0
154	26	34.6	5.8
152	24	32.6	5.6
150	22	34.2	5.4
148	20	32.2	5.2
146	18	33.3*	5.0
144	16	34.3	4.8
142	14	33.1	4.6
140	12	30.6	4.4
138	10	25.1	4.2
136	8	28.1	4.0
134	6	27.5	3.8
132	4	34.9	3.6
130	2	78.7	3.4
128	0	-115.8	3.2
126	-2	-124.5	3.0
124	-4	-22.0	2.8
122	-6	-20.3	2.6
120	-8	-16.2	2.4
118	-10	-11.7	2.2
116	-12	-9.5	2.0
114	-14	-7.9	1.8
112	-16	-6.3	1.6
110	-18	-5.3	1.4
108	-20	-3.3	1.2
106	-22	-1.8	1.0
104	-24	-1.7	1.0

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex

(P) = Vortex passed over top of tower

\* = Estimated

Flyby (Run) Number: 15	Date: 21 JUN 1990 (Day of Year: 172)	AIRCRAFT DATA	
Configuration: Holding		Flags: 5 dog.	Abeam Time: 8:05:42 (MDT)
Glide Slope: 0 deg.		Indicated Air Speed: 165 kts	Gross Weight: 120,000 lbs.
			Altitude: 225 ft AGL
Wind Speed: 14.0 kts	Wind Direction: 73 deg.	Air Temperature: 16.2 °C	Atmospheric Stability: Unstable
Maximum Velocity: 70.5 fps	Age: 22 s	Estimated Core Radius: 1.0 ft	
Descent Rate: 6.0 fps	Advection Rate: 14.7 fps	Tower Penetration Height: 92 ft AGL	
Maximum Velocity: 61.7 fps	Age: 25 s	Estimated Core Radius: 1.4 ft	
Descent Rate: 6.4 ips	Advection Rate: 15.5 fps	Tower Penetration Height: 64 ft AGL	
METEOROLOGICAL DATA (200 ft Sensor Level)			
DOWNWIND VORTEX CHARACTERISTICS			
Sensor Height [ft]	Relative Height [ft]	V <sub>θ</sub> (fps)	
198	106	41.3	102
196	104	41.3*	100
194	102	41.2	98
192	100	41.1*	96
190	98	41.0*	94
188	96	40.9*	92
186	94	40.8*	90
184	92	40.7*	88
182	90	40.6*	86
180	88	40.6	84
178	86	40.9*	82
176	84	41.2*	80
174	82	41.5	78
172	80	43.0	76
170	78	42.2	74
168	76	41.8	72
166	74	41.4	70
164	72	41.5	68
162	70	40.3	66
160	68	42.6	64
158	66	40.0	62
156	64	39.7	60
154	62	40.6	58
152	60	42.1	56
150	58	42.3	54
148	56	38.4	52
146	54	39.1*	50
144	52	39.9	48
142	50	39.4	46
140	48	39.4	44
138	46	37.8*	42
136	44	37.3	40
134	42	34.6	38
132	40	39.3	36
130	38	42.7	34
128	36	39.2	32
126	34	39.5*	30
124	32	33.7	28
122	30	38.5	26
120	28	39.2	24
118	26	38.5	22
116	24	39.2	20
114	22	39.5	18
112	20	36.0	16
110	18	38.2	14
108	16	32.5	12
106	14	35.1	10
104	12	34.3	10

\* = Estimated

(D) =

Vortex dissipated upwind of tower

(M) = Missing

(O) = No

Vortex

(P) =

Vortex passed over top of tower

Flyby (Run) Number: 16		Date: 21 JUN 1990 (Day of Year: 172)		Aircraft Time: 8:13:27 (MDT)					
Configuration: Holding		Flaps: 5 deg.		Gross Weight: 119,000 lbs.					
Glide Slope: 0 deg.		Indicated Air Speed: 166 kts		Altitude: 220 ft AGL					
Wind Speed: 17.7 kts		Air Temperature: 16.2 °C		Atmospheric Stability: Unstable					
Maximum Velocity: 60.3 fps		Age: 22 s		Estimated Core Radius: 1.4 ft					
Descent Rate: 5.2 fps		Advection Rate: 14.7 fps		Tower Penetration Height: 114 ft AGL					
Wind Direction: 73 deg.		Age: 24 s		Estimated Core Radius: 0.5 ft					
(200 ft Sensor Level)		Advection Rate: 16.1 fps		Tower Penetration Height: 96 ft AGL					
<b>AIRCRAFT DATA</b>									
METEOROLOGICAL DATA									
UPWIND VORTEX CHARACTERISTICS									
DOWNWIND VORTEX CHARACTERISTICS									
Maximum Velocity: 49.6 fps									
Descent Rate: 5.2 fps									
Wind Speed: 17.7 kts									
Configuration: Holding									
Glide Slope: 0 deg.									
Flaps: 5 deg.									
Indicated Air Speed: 166 kts									
Sensor Height (ft)									
Relative Height (ft)									
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Relative Height (ft)									

FAA B727-100		Abeam Time: 10:56:05 (MDT)	
Flyby (Run) Number: 1		Date: 21 SEP 1980 (Day of Year: 264)	
AIRCRAFT DATA		Gross Weight: 135,000lbs.	
Configuration: Landing	Glide Slope: 0 deg.	Altitude: 600 ft AGL	
Flaps: 30 deg,	Indicated Air Speed: 150 kts		
METEOROLOGICAL DATA		Atmospheric Stability: Unstable	
Wind Speed: 5.4 kts	Wind Direction: 40 deg.	Air Temperature: 13.5 °C	
DOWNDOWN VORTEX CHARACTERISTICS		Estimated Core Radius: (O) ft	
Maximum Velocity: (O) fps	Age: (O) s	Tower Penetration Height: (O) ft AGL	
Descent Rate: (O) f/s	Advection Rate: (O) f/s		
UPWIND VORTEX CHARACTERISTICS		Estimated Core Radius: (O) ft	
Maximum Velocity: (O) f/s	Age: (O) s	Tower Penetration Height: (O) ft AGL	
Descent Rate: (O) f/s	Advection Rate: (O) f/s		
Downwind Vortex Tangential Velocities		Upwind Vortex Tangential Velocities	
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
198	196	102	198
194	192	100	196
190	188	98	194
186	184	96	192
182	180	94	190
178	176	92	188
174	172	90	186
170	168	88	184
166	164	86	182
162	160	84	180
158	156	82	178
154	152	80	176
150	148	78	174
146	144	76	172
142	140	74	170
138	136	72	168
134	132	70	166
130	128	68	164
126	124	66	162
122	120	64	160
118	116	62	158
114	112	60	156
110	108	58	154
106	104	56	152
		54	150
		52	148
		50	146
		48	144
		46	142
		44	140
		42	138
		40	136
		38	134
		36	132
		34	130
		32	128
		30	126
		28	124
		26	122
		24	120
		22	118
		20	116
		18	114
		16	112
		14	110
		12	108
		10	106
			104

= Estimated (D) = Vortex dissipated upwind of tower (M) = Missing (O) = No vortex (Flyby down for remote sensing systems) (P) = Vortex passed over top of tower

Flight Number: 2		Date: 21 SEP 1990 (Day of Year: 264)		Abeam Time: 11:00:51 (MDT)	
Configuration: Landing		AIRCRAFT DATA		Gross Weight: 134,000lbs Altitude: 250 ft AGL	
Glide Slope: 0 deg.		Flaps: 30 deg Indicated Air Speed: 140 kts			
Wind Speed: 6.7 kts	Wind Direction: 37 deg.	Age: (D) s	Advection Rate: (D) fps	Estimated Core Radius: (D) ft	Atmospheric Stability: Unstable
Maximum Velocity: (D) fps	METEOROLOGICAL DATA (200 ft Sensor Level)	Age: (D) s	Advection Rate: (D) fps	To Vortex Penetration Height: (D) ft AGL	
Descent Rate: (D) fps	DOWNWIND VORTEX CHARACTERISTICS	Age: (D) s	Advection Rate: (D) fps	Estimated Core Radius: (D) ft	
Maximum Velocity: (D) fps	UPWIND VORTEX CHARACTERISTICS	Age: (D) s	Advection Rate: (D) fps	To Vortex Penetration Height: (D) ft AGL	
Descent Rate: (D) fps	Downwind Vortex Tangential Velocities	Sensor Height (ft)	Relative Height (ft)	Relative Height (ft)	Estimated Core Radius: (D) ft
		Relative Height (ft)	Sensor Height (ft)	Sensor Height (ft)	To Vortex Penetration Height: (D) ft AGL
		V <sub>e</sub> (fps)	V <sub>e</sub> (fps)	V <sub>e</sub> (fps)	
198	196	194	192	190	188
186	184	182	180	178	176
174	172	170	168	166	164
162	160	158	156	154	152
150	148	146	144	142	140
146	144	142	140	138	136
142	140	138	136	134	132
138	136	134	132	130	128
134	132	130	128	126	124
130	128	126	124	122	120
126	124	122	120	118	116
122	120	118	116	114	112
120	118	116	114	112	110
118	116	114	112	110	108
116	114	112	110	108	106
114	112	110	108	106	104

(P) = Vortex passed over top of tower

10 - Novastar/Elyby flaws for remote sensing systems

W. Messing

[Volume 1]

Flyby (Run) Number: 3		Date: 21 SEP 1980 (Day of Year: 264)		AIRCRAFT DATA		Gross Weight: 133,000 lbs.							
Configuration: Landing		Flaps: 30 deg.		Altitude: 300 ft AGL		Indicated Air Speed: 144 kts							
Glides Slope: -3 deg.		Estimated Core Radius: 0.5 ft		Atmospheric Stability: Unstable		Estimated Penetration Height: 30 ft AGL							
Wind Speed: 6.4 kts		Wind Direction: 59 deg.		Air Temperature: 13.8 °C		Tower Penetration Height: 142 ft AGL							
Maximum Velocity: 107.4 fps		Ags: 25 s		Estimated Core Radius: 0.8 ft		Tower Penetration Height: 30 ft AGL							
Decent Rate: 6.3 ips		Advection Rate: 4.6 fps		Estimated Penetration Height: 30 ft AGL		Tower Penetration Height: 142 ft AGL							
Maximum Velocity: 30.5 ips		Ags: 42 s		Estimated Core Radius: 0.8 ft		Tower Penetration Height: 30 ft AGL							
Decent Rate: 6.4 ips		Advection Rate: 4.3 fps		Estimated Penetration Height: 30 ft AGL		Tower Penetration Height: 142 ft AGL							
<b>METEOROLOGICAL DATA</b>													
(200 ft Sensor Level)													
Wind Speed: 6.4 kts		Wind Direction: 59 deg.		Air Temperature: 13.8 °C		Atmospheric Stability: Unstable							
Maximum Velocity: 107.4 fps		Ags: 25 s		Estimated Core Radius: 0.5 ft		Estimated Penetration Height: 30 ft AGL							
Decent Rate: 6.3 ips		Advection Rate: 4.6 fps		Estimated Core Radius: 0.8 ft		Estimated Penetration Height: 30 ft AGL							
Maximum Velocity: 30.5 ips		Ags: 42 s		Estimated Core Radius: 0.8 ft		Estimated Penetration Height: 30 ft AGL							
Decent Rate: 6.4 ips		Advection Rate: 4.3 fps		Estimated Core Radius: 0.8 ft		Estimated Penetration Height: 30 ft AGL							
<b>DOWNWIND VORTEX CHARACTERISTICS</b>													
(200 ft Sensor Level)													
Wind Speed: 6.4 kts		Wind Direction: 59 deg.		Air Temperature: 13.8 °C		Atmospheric Stability: Unstable							
Maximum Velocity: 107.4 fps		Ags: 25 s		Estimated Core Radius: 0.5 ft		Estimated Penetration Height: 30 ft AGL							
Decent Rate: 6.3 ips		Advection Rate: 4.6 fps		Estimated Core Radius: 0.8 ft		Estimated Penetration Height: 30 ft AGL							
Maximum Velocity: 30.5 ips		Ags: 42 s		Estimated Core Radius: 0.8 ft		Estimated Penetration Height: 30 ft AGL							
<b>UPWIND VORTEX CHARACTERISTICS</b>													
(200 ft Sensor Level)													
Wind Speed: 6.4 kts		Wind Direction: 59 deg.		Air Temperature: 13.8 °C		Atmospheric Stability: Unstable							
Maximum Velocity: 107.4 fps		Ags: 25 s		Estimated Core Radius: 0.5 ft		Estimated Penetration Height: 30 ft AGL							
Decent Rate: 6.3 ips		Advection Rate: 4.6 fps		Estimated Core Radius: 0.8 ft		Estimated Penetration Height: 30 ft AGL							
<b>UPWIND VORTEX TANGENTIAL Velocities</b>													
(200 ft Sensor Level)													
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)						
198	5.6	10.6	102	-4.0	-9.6	198	1.9						
196	5.4	13.3	100	-4.2	-7.6*	196	0.9						
194	5.2	13.5	98	-4.4	-5.3	194	0.9						
192	5.0	12.2	96	-4.6	-4.7	192	0.9						
190	4.8	11.8	94	-4.8	-5.9	190	1.4						
188	4.6	12.4	92	-5.0	-8.0	188	0.1						
186	4.4	14.8	90	-5.2	-6.6	186	-2.3						
184	4.2	13.8	88	-5.4	-2.0	184	-0.3						
182	4.0	13.7	86	-5.6	-1.8	182	-0.3						
180	3.8	15.1°	84	-5.8	-3.3	180	-3.2						
178	3.6	16.5	82	-6.0	-3.4	178	-5.2						
176	3.4	13.7	80	-6.2	-3.3	176	-2.2						
174	3.2	13.7	78	-6.4	-3.2	174	-2.6						
172	3.0	12.1	76	-6.6	-3.7	172	-1.8						
170	2.8	13.0°	74	-6.8	-3.4	170	-3.5						
168	2.6	13.9	72	-7.0	-3.2	168	-3.7						
166	2.4	14.8	70	-7.2	-3.3	166	-3.7						
164	2.2	15.1	68	-7.4	-3.4	164	-3.9						
162	2.0	11.7	66	-7.6	-3.4	162	-3.9						
160	1.8	10.4	64	-7.8	-2.9	160	3.4						
158	1.6	11.6	62	-8.0	-3.0	158	3.2						
156	1.4	14.8	60	-8.2	-2.2	156	4.8						
154	1.2	15.0	58	-84	-1.2	154	5.8						
152	1.0	16.5	56	-86	-0.9	152	26						
150	0.8	16.7	54	-88	-0.6	150	24						
148	0.6	19.3	52	-90	-0.5	148	22						
146	0.4	22.0	50	-92	-0.7	146	20						
144	0.2	27.3	48	-94	-1.1	144	18						
142	0.0	4.0	46	-96	-1.1	142	9.9						
140	-2.4	-59.1	44	-98	-0.9	140	-13.3						
138	-4.6	-31.8	42	-100	-1.0	138	-18.7						
136	-6.0	-30.2	40	-102	-1.8	136	-30.5						
134	-8.0	-24.6	38	-104	-0.8	134	-32.5						
132	-10.0	-22.2	36	-106	-0.2	132	-38.1						
130	-12.0	-34.0	34	-108	0.4	130	-17.3						
128	-14.0	-32.0	32	-110	0.4	128	-5.8						
126	-16.0	-9.6	30	-112	0.1	126	-1.6						
124	-18.0	-12.0	28	-114	0.2	124	-1.6						
122	-20.0	-12.0	26	-116	1.3	122	-2.4						
120	-22.0	-11.3	24	-118	1.3	120	-2.4						
118	-24.0	-12.0	22	-120	-1.0	118	-8.0						
116	-26.0	-8.2	20	-122	-1.5	116	-22.0						
114	-28.0	-10.8	18	-124	-1.1	114	-1.0						
112	-30.0	-10.5	16	-126	-0.2	112	-1.4						
110	-32.0	-11.7	14	-128	-0.7	110	-1.2						
108	-34.0	-8.7	12	-130	-0.2	108	-1.6						
106	-36.0	-7.7	10	-132	2.0	106	-18						
104	-38.0	-8.0	74	-132	1.04	104	-20						

\* = Estimated (D) = Vortex dissipated upwind of tower

(M) = Missing

(P) = Vortex passed over top of tower

Flipy (Run) Number: 4	Date: 21 SEP 1990 (Day of Year: 264)	Abeam Time: 11:11:55 (MDT)								
Configuration: Landing Glide Slope: -3 deg.	AIRCRAFT DATA Flaps: 30 deg. Indicated Air Speed: 146 kts	Gross Weight: 132,000 lbs. Altitude: 250 ft AGL								
Wind Speed: 5.9 knts	METEOROLOGICAL DATA (200 ft Sensor Level)	Estimated Core Radius: 0.4 ft Tower Penetration Height: 132 ft AGL								
Maximum Velocity: 93.1 fps Descent Rate: 7.4 fps	Wind Direction: 12 deg. Age: 16 s Advection Rate: 5.8 fps	Atmospheric Stability: Unstable Air Temperature: 14.4 °C Tower Penetration Height: 82 ft AGL								
Maximum Velocity: 105.5 fps Descent Rate: 6.0 fps	DOWNWIND VORTEX CHARACTERISTICS Age: 28 s Advection Rate: 5.6 fps	Estimated Core Radius: 0.4 ft Tower Penetration Height: 132 ft AGL								
Sensor Height (ft)	Relative Height (ft)	Downwind Vortex Tangential Velocities								
		Sensor Height (ft)	Relative Height (ft)	$V_{\theta}$ (fps)	Upwind Vortex Tangential Velocities					
198	66	14.3	102	-30	Sensor Height (ft)	Relative Height (ft)	$V_{\theta}$ (fps)	Upwind Vortex Tangential Velocities		
196	64	14.1	100	-32						
194	62	14.7	98	-34	198	116	-2.0	Sensor Height (ft)	Relative Height (ft)	$V_{\theta}$ (fps)
192	60	17.1	96	-1.3	196	114	-1.4			
190	58	16.1	94	-1.7	194	112	-1.9	102	100	20
188	56	13.9	92	-2.9	192	110	-2.2	98	98	18
186	54	17.5	90	-4.0	190	108	-2.0	96	96	16
184	52	14.8	88	-1.5	188	106	-2.4	94	94	14
182	50	14.9	86	-4.4	186	104	-1.4	92	92	12
180	48	13.9	84	-4.6	184	102	-0.4	90	90	10
178	46	13.1	82	-4.8	182	100	-0.4	88	88	8
176	44	17.1	80	-5.2	180	98	-3.5	86	86	6
174	42	15.5	78	-5.4	178	96	-5.3	84	84	4
172	40	15.0	76	-5.6	176	94	-2.7	82	82	2
170	38	15.2	74	-5.8	174	92	-3.0	80	80	0
168	36	15.4	72	-6.0	172	90	-2.8	78	78	-2.8
166	34	15.6	70	-6.2	170	88	-2.5	76	76	-4
164	32	16.4	68	-6.4	168	86	-2.5	74	74	-30.9
162	30	19.3	66	-6.6	166	84	-3.5	72	72	-10.5
160	28	17.5	64	-6.8	164	82	-6.2	70	70	-10.5
158	26	20.4	62	-7.0	162	80	-3.8	68	68	-14
156	24	19.5	60	-7.2	160	78	-7.0	66	66	-16
154	22	15.6	58	-7.4	158	76	-7.0	64	64	-18
152	20	22.7	56	-7.6	156	74	-6.0	62	62	-18.4
150	18	33.1	54	-7.8	154	72	-3.4	60	60	-20
148	16	29.3	52	-8.0	152	70	-2.2	58	58	-25.2
146	14	35.7	50	-8.2	150	68	-4.1	56	56	-12
144	12	32.6	48	-8.4	148	66	-3.5	54	54	-26.5
142	10	24.2	46	-8.6	146	64	-2.8	52	52	-14
140	8	18.1	44	-8.8	144	62	-4.3	50	50	-32
138	6	31.1	42	-9.0	142	60	-3.7	48	48	-12.7
136	4	44.1	40	-9.2	140	58	-5.0	46	46	-34
134	2	68.6	38	-9.4	138	56	-4.6	44	44	-13.2
132	0	93.1	36	-9.6	136	54	-4.5	42	42	-11.4
130	-2	36.5	34	-9.8	134	52	-4.2	38	38	-10.3
128	-4	32	-100	-1.2	132	50	-4.2	36	36	-40
126	-6	-102	-102	-1.2	130	48	-2.6	34	34	-44
124	-8	-104	-104	-0.9	128	46	-2.6	32	32	-56
122	-10	-106	-106	-1.5	126	44	-3.9	30	30	-52
120	-12	-108	-108	-0.8	124	42	-4.5	28	28	-54
118	-14	-110	-110	-1.2	122	40	-4.3	26	26	-56
116	-16	-112	-112	-1.7	120	38	-7.6	24	24	-58
114	-18	-114	-114	-1.9	118	36	-7.0	22	22	-62
112	-20	-116	-116	-1.9	116	34	-6.4	20	20	-62
110	-22	-118	-118	-2.0	114	32	-8.1	18	18	-64
108	-24	-120	-120	-2.0	112	30	-8.1	16	16	-66
106	-26	-120	-120	-2.0	110	28	-8.5	14	14	-68
104	-28	-122	-122	-2.4	108	26	-8.5	12	12	-70
					106	24	-8.3	10	10	-72
					104	22	-12.2			

= Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex [Flyby flown over top of tower]

(P) = Vortex passed over top of tower

Flyby (Run) Number: 5		FAA B727-100		Date: 21 SEP 1980 (Day of Year: 264)	Abeam Time: 11:18:30 (MDT)
Configuration: Holding		AIRCRAFT DATA		Gross Weight: 131,000 lbs.	
Glide Slope: 0 deg.		Indicated Air Speed: 200 kts		Altitude: 600 ft AGL	
Wind Speed: 7.5 kts		METEOROLOGICAL DATA (200 ft Sensor Level)		Atmospheric Stability: Unstable	
Wind Direction: 42 deg.		Air Temperature: 14.4 °C		Atmospheric Stability: Unstable	
DOWNWIND VORTEX CHARACTERISTICS					
Maximum Velocity: (O) fps		Age: (O) s		Estimated Core Radius: (O) ft	
Descent Rate: (O) ips		Advection Rate: (O) ips		Tower Penetration Height: (O) ft AGL	
UP/WIND VORTEX CHARACTERISTICS					
Maximum Velocity: (O) fps		Age: (O) s		Estimated Core Radius: (O) ft	
Descent Rate: (O) ips		Advection Rate: (O) ips		Tower Penetration Height: (O) ft AGL	
Downwind Vortex Tangential Velocities					
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)
198	196	(O)	102	(O)	(O)
194	192	(O)	100	(O)	(O)
190	188	(O)	98	196	194
186	184	(O)	96	192	190
182	180	(O)	94	188	186
178	176	(O)	92	184	182
174	172	(O)	90	180	178
170	168	(O)	88	176	174
166	164	(O)	86	172	170
162	160	(O)	84	168	166
158	156	(O)	82	164	162
154	152	(O)	80	160	158
150	148	(O)	78	156	154
146	144	(O)	76	152	150
142	140	(O)	74	148	146
138	136	(O)	72	144	142
134	132	(O)	70	140	138
130	128	(O)	68	136	134
126	124	(O)	66	132	130
122	120	(O)	64	128	126
118	116	(O)	62	124	122
114	112	(O)	60	120	118
110	108	(O)	58	116	114
106	104	(O)	56	112	110
		(D)		108	106
		(D)		104	104

= Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex [Flyby flown for remote sensing systems]

(P) = Vortex passed over top of tower

Flyby (Run) Number: 6	Date: 21 SEP 1990 (Day of Year: 264)	Absent Time: 11:23:35 (MDT)					
<b>AIRCRAFT DATA</b>							
Configuration: Holding	Flaps: 0 deg.	Gross Weight: 130,000 lbs.					
Glide Slope: 0 deg.	Indicated Air Speed: 206 kts	Altitude: 250 ft AGL					
Wind Speed: 7.0 kts	Wind Direction: 25 deg.	Air Temperature: 14.5 °C					
Maximum Velocity: (D) fpm	Age: (D) s	Atmospheric Stability: Unstable					
Descent Rate: (D) fpm	Advection Rate: (D) fpm	Tower Penetration Height: (D) ft AGL					
Maximum Velocity: (D) fpm	Age: (D) s	Estimated Core Radius: (D) ft					
Descent Rate: (D) fpm	Advection Rate: (D) fpm	Tower Penetration Height: (D) ft AGL					
<b>METEOROLOGICAL DATA</b> [200 ft Sensor Level]							
Downwind Vortex Characteristics	Upwind Vortex Characteristics	Upwind Vortex Tangential Velocities					
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
198	196	194	192	190	188	186	184
198	196	194	192	190	188	186	184
192	190	188	186	184	182	180	178
188	186	184	182	180	178	176	174
184	182	180	178	176	174	172	170
182	180	178	176	174	172	170	168
180	178	176	174	172	170	168	166
178	176	174	172	170	168	166	164
176	174	172	170	168	166	164	162
174	172	170	168	166	164	162	160
172	170	168	166	164	162	160	158
170	168	166	164	162	160	158	156
168	166	164	162	160	158	156	154
166	164	162	160	158	156	154	152
164	162	160	158	156	154	152	150
162	160	158	156	154	152	150	148
160	158	156	154	152	150	148	146
158	156	154	152	150	148	146	144
156	154	152	150	148	146	144	142
154	152	150	148	146	144	142	140
152	150	148	146	144	142	140	138
148	146	144	142	140	138	136	134
146	144	142	140	138	136	134	132
144	142	140	138	136	134	132	130
142	140	138	136	134	132	130	128
140	138	136	134	132	130	128	126
138	136	134	132	130	128	126	124
136	134	132	130	128	126	124	122
134	132	130	128	126	124	122	120
132	130	128	126	124	122	120	118
130	128	126	124	122	120	118	116
128	126	124	122	120	118	116	114
126	124	122	120	118	116	114	112
124	122	120	118	116	114	112	110
122	120	118	116	114	112	110	108
120	118	116	114	112	110	108	106
118	116	114	112	110	108	106	104

\* = Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(P) = No vortex (Flyby flown over top of tower)

(O) = No vortex (Flyby flown for remote sensing systems)

Flyby (Run) Number: 7	Date: 21 SEP 1980 (Day of Year: 264)	Abeam Time: 11:29:36 (MDT)										
<b>AIRCRAFT DATA</b>												
Configuration: Landing	Flaps: 30 deg.	Gross Weight: 129,000 lbs.										
Glide Slope: -3 deg.	Indicated Air Speed: 132 kts	Altitude: 280 ft AGL										
Wind Speed: 5.6 kts	METEOROLOGICAL DATA (200 ft Sensor Level)	Atmospheric Stability: Unstable										
Maximum Velocity: 151.0 fps	Wind Direction: 49 deg.	Air Temperature: 14.8 °C										
Descent Rate: 4.1 fps	Age: 26 s	Estimated Core Radius: 0.3 ft										
Maximum Velocity: 80.7 fps	Advection Rate: 4.9 fps	Tower Penetration Height: 184 ft AGL										
Descent Rate: 5.5 fps	Age: 30 s	Estimated Core Radius: 0.6 ft										
<b>DOWNWIND VORTEX CHARACTERISTICS</b>												
Wind Speed: 5.6 kts	Wind Direction: 49 deg.	Estimated Penetration Height: 124 ft AGL										
Maximum Velocity: 151.0 fps	Age: 6.4 ips	Tower Penetration Velocities										
Descent Rate: 4.1 fps	Advection Rate: 6.4 ips											
<b>UPWIND VORTEX CHARACTERISTICS</b>												
Wind Speed: 5.6 kts	Wind Direction: 49 deg.											
Maximum Velocity: 80.7 fps	Age: 6.4 ips											
Descent Rate: 5.5 fps	Advection Rate: 6.4 ips											
<b>Downwind Vortex Tangential Velocities</b>												
Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	
198	14	28.0	102	-8.2	-3.9	198	72	-2.5	102	-2.2	-2.4	13.1
196	12	30.0	100	-8.4	-5.1*	194	70	-2.6	100	-2.4	-2.6	16.8
194	10	26.1	98	-1.6	-8.6	192	68	-2.3	98	-2.6	-2.8	15.3
192	8	22.6	96	-2.6	-8.8	190	66	-3.5	94	-3.0	-3.0	10.4
190	6	24.0	94	-0.9	-9.0	188	64	-4.3	92	-3.2	-3.2	9.6
188	4	34.6	92	-1.1	-9.1	186	62	-4.3	90	-3.4	-3.4	11.9
186	2	94.1	90	-0.9	-9.4	184	60	-1.8	88	-3.6	-3.6	12.6
184	0	-151.0	88	-3.6	-1.2	182	58	-1.7	86	-3.8	-3.8	14.9
182	-2	-69.6	86	-9.8	-1.6	180	56	-4.5	84	-4.0	-4.2	14.2
180	-4	-32.8	84	-100	-1.7	178	54	-3.6	82	-4.2	-4.2	13.1
178	-6	-26.5	82	-102	-1.2	176	52	-6.6	80	-4.4	-4.4	13.1
176	-8	-24.5	80	-104	-1.5	174	50	-3.7	78	-4.6	-4.6	15.7
174	-10	-17.1	78	-106	-1.3	172	48	-5.7	76	-4.8	-4.8	12.0
172	-12	-21.4	76	-108	-1.5	170	46	-4.2	74	-5.0	-5.0	14.7
170	-14	-18.0*	74	-110	-2.1	168	44	-5.5	72	-5.2	-5.2	15.2
168	-16	-14.6	72	-112	-1.9	166	42	-7.2	70	-5.4	-5.4	16.1
166	-18	-11.2	70	-114	-2.0	164	40	-6.1	68	-5.6	-5.6	14.9
164	-20	-10.7	68	-116	-1.8	162	38	-6.1	66	-5.8	-5.8	14.9
162	-22	-10.2	66	-118	-1.7	160	36	-3.7	64	-6.0	-6.0	13.8
160	-24	-10.7	64	-120	-1.3	158	34	-3.7	62	-6.2	-6.2	13.8
158	-26	-8.0	62	-122	-1.2	156	32	-6.2	60	-6.4	-6.4	13.0
156	-28	-9.4	60	-124	-1.4	154	30	-6.3	58	-6.4	-6.4	16.4
154	-30	-9.0	58	-126	-2.6	152	28	-9.3	56	-6.8	-6.8	15.6
152	-32	-7.9*	56	-128	-2.5	150	26	-8.0	54	-7.0	-7.0	17.7
150	-34	-6.8	54	-130	-2.0	148	24	-9.8	52	-7.2	-7.2	16.1
148	-36	-5.8	52	-132	-2.0	146	22	-1.2	50	-7.4	-7.4	16.1
146	-38	-5.3	50	-134	-1.5	144	20	-16.4	48	-7.6	-7.6	17.9
144	-40	-6.3	48	-136	-2.3	142	18	-16.8	46	-7.8	-7.8	16.9
142	-42	-8.5	46	-138	-0.9	140	16	-18.4	44	-8.0	-8.0	16.0
140	-44	-7.4	44	-140	-1.4	138	14	-16.8	42	-8.2	-8.2	17.9
138	-46	-4.2	42	-142	-1.7	136	12	-19.5	40	-8.4	-8.4	16.6
136	-48	-4.1	40	-144	-2.1	134	10	-18.6	38	-8.6	-8.6	18.9
134	-50	-4.5	38	-146	-2.1	132	8	-21.7	36	-8.8	-8.8	16.7
132	-52	-5.2	36	-148	-2.9	130	6	-20.8	34	-9.0	-9.0	16.1
130	-54	-4.6	34	-150	-2.3	128	4	-26.2	32	-9.2	-9.2	15.6
128	-56	-4.6	32	-152	-1.3	126	2	-34.2	30	-9.4	-9.4	15.3
126	-58	-3.4	30	-154	-2.2	124	0	-80.7	28	-9.6	-9.6	17.9
124	-60	-6.2	28	-156	-2.0	122	-2	-57.8	26	-9.8	-9.8	15.5
122	-62	-3.8	26	-158	-1.9	120	-2.4	-2.4	24	-100	-100	12.4
120	-64	-5.7	24	-160	-2.3	118	-2.4	-2.4	22	-102	-102	14.0
118	-66	-4.1	22	-162	-2.7	116	-2.4	-2.4	20	-104	-104	15.8
116	-68	-4.9	20	-164	-2.6	114	-1.4	-1.4	18	-106	-106	16.2
114	-70	-4.1	18	-166	-1.4	112	-0.6	-0.6	16	-108	-108	15.3
112	-72	-4.4	16	-168	-0.8	110	-1.4	-1.4	14	-110	-110	13.8
110	-74	-3.2	14	-170	-1.3	108	-1.6	-1.6	12	-112	-112	14.4
108	-76	-4.7	12	-172	-1.7	106	-0.9	-0.9	10	-114	-114	14.4
106	-78	-7.5	10	-174	-0.9	104	-2.0	-2.0	10	-114	-114	14.2
104	-80	-7.0										

\*= Estimated

(D) = Vortex dissipated upwind of tower

(O) = Missing

(P) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

Flyby (Run) Number: 8		FAA B727-100		Date: 21 SEP 1990 (Day of Year: 264)		Absent Time: 11:36:34 (MDT)	
Configuration: Landing		AIRCRAFT DATA		Air Temperature: 14.8 °C		Atmospheric Stability: Unstable	
Glide Slope: -3 deg.		Flaps: 30 deg.		Gross Weight: 128,000lbs.		Estimated Core Radius: 0.4 ft	
Descent Rate: 4.3 fps		Indicated Air Speed: 132 kts		Altitude: 250 ft AGL		Tower Penetration Height: 84 ft AGL	
Wind Speed: 6.0 kts		Wind Direction: 56 deg.		Age: 39 s		Tower Penetration Height: 96 ft AGL	
Maximum Velocity: 108.8 fps		Age: 62 s		Upwind Vortex Characteristics		Estimated Core Radius: 0.3 ft	
Descent Rate: 2.5 fps		Advection Rate: 3.1 fps		Upwind Vortex Characteristics		Tower Penetration Height: 96 ft AGL	
Maximum Velocity: 46.3 fps		Age: 62 s		Upwind Vortex Tangential Velocities		Estimated Core Radius: 0.3 ft	
Descent Rate: 2.5 fps		Advection Rate: 3.0 fps		Upwind Vortex Tangential Velocities		Tower Penetration Height: 96 ft AGL	
Downwind Vortex Tangential Velocities		Sensor Height (ft)		Sensor Height (ft)		Sensor Height (ft)	
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Relative Height (ft)	V <sub>θ</sub> (fps)
198	114	12.9	102	18	21.2	102	2.8
196	112	13.9	100	14	19.1*	100	3.2
194	110	16.0	98	12	17.0	98	4.6
192	108	15.3	96	10	16.5	96	4.9
190	106	15.0	94	10	15.1	94	2.0
188	104	12.2	92	8	12.8	92	1.0
186	102	16.4	90	6	17.2	88	1.4
184	100	14.9	88	4	35.1	88	0.4
182	98	14.8	86	2	57.3	86	0.4
180	96	11.4	84	0	108.9	84	-10
178	94	15.3	82	-2	46.6	82	8.1
176	92	15.6	80	-4	32.6	82	-13.4
174	90	15.4	78	-6	27.4	80	-18.7
172	88	7.6	76	-8	25.1	78	-24.6
170	86	13.6*	74	-10	19.8	76	-34.3
168	84	13.4	72	-12	15.8	74	-42.6
166	82	13.4	70	-14	11.3	72	-50.9
164	80	11.8	68	-16	13.6	68	-59.2
162	78	12.9	66	-18	10.5	66	-67.5
160	76	14.9	64	-20	10.0	64	-75.8
158	74	15.9	62	-22	9.2	62	-84.1
156	72	15.4	60	-24	1.4	60	-92.4
154	70	16.1	58	-26	9.4	58	-100.7
152	68	18.9	56	-28	9.3	56	-109.0
150	66	14.8	54	-30	1.1	54	-117.3
148	64	13.9	52	-32	10.1	52	-125.6
146	62	16.2	50	-34	9.0	50	-134.9
144	60	15.7	48	-36	1.9	48	-143.2
142	58	17.1	46	-38	8.3	46	-152.5
140	56	13.3	44	-40	9.1	44	-161.8
138	54	11.5	42	-42	7.3	42	-171.1
136	52	15.3	40	-44	7.9	38	-180.4
134	50	13.4	38	-46	8.5	38	-189.7
132	48	14.1	36	-48	8.9	36	-199.0
130	46	11.2	34	-50	4.9	34	-208.3
128	44	13.9*	32	-52	7.5	32	-217.6
126	42	13.3*	30	-54	7.4	30	-226.9
124	40	12.7	28	-56	7.4	28	-236.2
122	38	16.5	58	-58	6.4	26	-245.5
120	36	15.5	24	-60	5.3	24	-254.8
118	34	15.0	22	-62	5.1	22	-264.1
116	32	16.8	20	-64	4.2	20	-273.4
114	30	16.8	18	-66	5.6	18	-282.7
112	28	20.1	16	-68	5.2	16	-292.0
110	26	20.8	14	-70	4.2	14	-301.3
108	24	18.9	12	-72	6.7	12	-310.6
106	22	18.8	10	-74	6.7	10	-319.9
104	20	19.6	8	-	-	8	-329.2

= Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

Flyby (Run) Number: 9	FAA B727-100	Date: 21 SEP 1990 (Day of Year: 264)	Abeam Time: 11:43:11 (MDT)
Configuration: Landing Glide Slope: 0 deg.	AIRCRAFT DATA Flaps: 30 deg Indicated Air Speed: 140 kts	Gross Weight: 126,000lbs. Altitude: 600 ft AGL	
Wind Speed: 6.3 kts	METEOROLOGICAL DATA (200 ft Sensor Level)	Air Temperature: 15.0 °C	Atmospheric Stability: Unstable
Maximum Velocity: (O) fps Descent Rate: (O) fpm	DOWNDOWN VORTEX CHARACTERISTICS Age: (O) s Advection Rate: (O) fpm	Estimated Core Radius: (O) ft Tower Penetration Height: (O) ft AGL	
Maximum Velocity: (O) fps Descent Rate: (O) fpm	UPWIND VORTEX CHARACTERISTICS Age: (O) s Advection Rate: (O) fpm	Estimated Core Radius: (O) ft Tower Penetration Height: (O) ft AGL	
	Downdown Vortex Tangential Velocities	Upwind Vortex Tangential Velocities	
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
198	102	198	196
196	100	196	194
194	98	194	192
192	96	192	190
190	94	190	188
188	92	188	186
186	90	186	184
184	88	184	182
182	86	182	180
180	84	180	178
178	82	178	176
176	80	176	174
174	78	174	172
172	76	172	170
170	74	170	168
168	72	168	166
166	70	166	164
164	68	164	162
162	66	162	160
160	64	160	158
158	62	158	156
156	60	156	154
154	58	154	152
152	56	152	150
150	54	150	148
148	52	148	146
146	50	146	144
144	48	144	142
142	46	142	140
140	44	140	138
138	42	138	136
136	40	136	134
134	38	134	132
132	36	132	130
130	34	130	128
128	32	128	126
126	30	126	124
124	28	124	122
122	26	122	120
120	24	120	118
118	22	118	116
116	20	116	114
114	18	114	112
112	16	112	110
110	14	110	108
108	12	108	106
106	10	106	104

= Estimated (D) = Vortex dissipated upwind of tower (M) = Missing (P) = No vortex (Flyby flown for remote sensing systems) (I) = Vortex passed over top of tower

Flyby (Run) Number: 10	FAA B727-100	Date: 21 SEP 1990 (Day of Year: 264)	Absent Time: 11:49:25 (MDT)				
Configuration: Landing	AIRCRAFT DATA						
Glide Slope: 0 deg.	Flaps: 30 deg	Indicated Air Speed: 134 kts	Gross Weight: 125,000 lbs.				
Wind Speed: 3.7 kts	METEOROLOGICAL DATA (200 ft Sensor Level)	Tower Penetration Height: 20 ft AGL	Altitude: 250 ft AGL				
Maximum Velocity: 30.6 fps	Wind Direction: 78 deg.	Air Temperature: 15.4 °C	Atmospheric Stability: Unstable				
Descent Rate: 4.9 ips	Age: 47 s	Advection Rate: 4.7 ips	Estimated Core Radius: 0.6 ft				
Maximum Velocity: (D) ips	UPWIND VORTEX CHARACTERISTICS	Age: (D) s	Tower Penetration Height: 20 ft AGL				
Descent Rate: (D) ips	Downwind Vortex Characteristics	Advection Rate: (D) ips	Estimated Core Radius: (D) ft				
Maximum Velocity: 30.6 fps	Downwind Vortex Tangential Velocities	Upwind Vortex: Tangential Velocities	Tower Penetration Height: (D) ft AGL				
Descent Rate: 4.9 ips	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)				
Wind Speed: 3.7 kts	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)				
Maximum Velocity: (D) ips	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)				
Descent Rate: (D) ips							
198	178	13.2	102	82	10.5	198	102
196	176	13.7	100	80	11.1*	196	100
194	174	13.9	98	78	11.7	194	98
192	172	14.4	96	76	11.6	192	96
190	170	12.0	94	74	12.6	190	94
188	168	11.1	92	72	12.4	188	92
186	166	14.6	90	70	11.8	186	90
184	164	12.8	88	68	10.5	184	88
182	162	12.5	86	66	9.4	182	86
180	160	10.7	84	64	9.4	180	84
178	158	12.4	82	62	9.6	178	82
176	156	13.7	80	60	8.2	176	80
174	154	13.0	78	58	7.8	174	78
172	152	13.4	76	56	9.5	172	76
170	150	13.4	74	54	11.4	170	74
168	148	13.4	72	52	12.0	168	72
166	146	13.4	70	50	13.2	166	70
164	144	13.1	68	48	11.8	164	68
162	142	13.6	66	46	11.5	162	66
160	140	13.6	64	44	11.3	160	64
158	138	11.6	62	42	14.4	158	62
156	136	12.7	60	40	11.5	156	60
154	134	11.5	58	38	13.2	154	58
152	132	13.4	56	36	14.2	152	56
150	130	11.4	54	34	14.2	150	54
148	128	12.0	52	32	16.2	148	52
146	126	14.3	50	30	13.8	146	50
144	124	12.9	48	28	14.9	144	48
142	122	12.6	46	26	15.9	142	46
140	120	12.6	44	24	16.3	140	44
138	118	10.2	42	22	13.0	138	42
136	116	12.6	40	20	14.7	136	40
134	114	10.0	38	18	17.9	134	38
132	112	11.9	36	16	19.7	132	36
130	110	8.6	34	14	14.7	130	34
128	108	12.4	32	12	17.9	128	32
126	106	11.3	30	10	15.6	126	30
124	104	10.1	28	8	18.8	124	28
122	102	12.0	26	6	14.1	122	26
120	100	11.7	24	4	13.7	120	24
118	98	10.6	22	2	30.7	118	22
116	96	12.1	20	0	-30.6	116	20
114	94	12.6	18	-2	-9.6	114	18
112	92	12.6	16	-4	-12.4	112	16
110	90	12.0	14	-6	-12.3	110	14
108	88	11.1	12	-8	-8.0	108	12
106	86	12.8	10	-10	-13.7	106	10
104	84	11.8				104	

\* = Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex

(F) = Flyby flown for remote sensing systems

(P) = Vortex passed over top of tower

Flyby (Run) Number: 11		FAA B727-100		Date: 21 SEP 1990 (Day of Year: 264)	Abeam Time: 11:56:12(MDT)
Configuration: Landing Glide Slope: -3 deg.		AIRCRAFT DATA		Gross Weight: 125,000lbs. Altitude: 260 ft AGL	
Wind Speed: 3.6 kts		Flaps: 30 deg.	Indicated Air Speed: 130 kts		
Maximum Velocity: (D) f/s Descent Rate: (D) f/s		METEOROLOGICAL DATA (200 ft Sensor Level)		Air Temperature: 15.5 °C	Atmospheric Stability: Unstable
Wind Direction: 97 deg.		DOWNWIND VORTEX CHARACTERISTICS		Estimated Core Radius: (D) ft Tower Penetration Height: (D) ft AGL	
Maximum Velocity: (D) f/s Descent Rate: (D) f/s		Age: (D) s Advection Rate: (D) f/s	Age: (D) s Advection Rate: (D) f/s	Tower Penetration Height: (D) ft AGL	
Downwind Vortex Tangential Velocities		UPWIND VORTEX CHARACTERISTICS		Upwind Vortex Tangential Velocities	
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)
198	(D)	(D)	102	(D)	(D)
196	(D)	(D)	100	(D)	(D)
194	(D)	(D)	98	196	196
192	(D)	(D)	96	194	192
190	(D)	(D)	94	190	190
188	(D)	(D)	92	188	188
186	(D)	(D)	90	186	186
184	(D)	(D)	88	184	184
182	(D)	(D)	86	182	182
180	(D)	(D)	84	180	180
178	(D)	(D)	82	178	178
176	(D)	(D)	80	176	176
174	(D)	(D)	78	174	174
172	(D)	(D)	76	172	172
170	(D)	(D)	74	170	170
168	(D)	(D)	72	168	168
166	(D)	(D)	70	166	166
164	(D)	(D)	68	164	164
162	(D)	(D)	66	162	162
160	(D)	(D)	64	160	160
158	(D)	(D)	62	158	158
156	(D)	(D)	60	156	156
154	(D)	(D)	58	154	154
152	(D)	(D)	56	152	152
150	(D)	(D)	54	150	150
148	(D)	(D)	52	148	148
146	(D)	(D)	50	146	146
144	(D)	(D)	48	144	144
142	(D)	(D)	46	142	142
140	(D)	(D)	44	140	140
138	(D)	(D)	42	138	138
136	(D)	(D)	40	136	136
134	(D)	(D)	38	134	134
132	(D)	(D)	36	132	132
130	(D)	(D)	34	130	130
128	(D)	(D)	32	128	128
126	(D)	(D)	30	126	126
124	(D)	(D)	28	124	124
122	(D)	(D)	26	122	122
120	(D)	(D)	24	120	120
118	(D)	(D)	22	118	118
116	(D)	(D)	20	116	116
114	(D)	(D)	18	114	114
112	(D)	(D)	16	112	112
110	(D)	(D)	14	110	110
108	(D)	(D)	12	108	108
106	(D)	(D)	10	106	106
104	(D)	(D)	8	104	104

= Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(P) = No vortex (Flyby flown for remote sensing systems)

Flyby [Run] Number: 12

FAA B727-100  
Date: 21 SEP 1990 (Day of Year: 264)

Abeam Time: 12:03:37 (MDT)

Configuration: Landing  
Glide Slope: -3 deg.

AIRCRAFT DATA  
Flaps: 30 deg, 134 kts  
Indicated Air Speed:

Gross Weight: 124,000 lbs.  
Altitude: 300 ft AGL

Wind Speed: 4.1 kts

Maximum Velocity: 24.3 fps  
Descent Rate: 3.6 ips

UPWIND VORTEX CHARACTERISTICS  
Age: 50 s  
Advection Rate: 3.2 fps

Downwind Vortex Tangential Velocities

METEOROLOGICAL DATA  
(200 ft Sensor Level)  
Age: (D) s  
Advection Rate: (D) fps

Upwind Vortex Characteristics  
Estimated Core Radius: 2.1 ft  
Tower Penetration Height: 120 ft AGL

Atmospheric Stability: Unstable

Wind Direction: 19 deg.

Air Temperature: 15.9 °C

DOWNWIND VORTEX CHARACTERISTICS  
Age: 50 s  
Advection Rate: (D) fps

Upwind Vortex Tangential Velocities  
Estimated Core Radius: (D) ft  
Tower Penetration Height: (D) ft AGL

Atmospheric Stability: Unstable

= Estimated

(M) = Missing

(P) = Vortex passed over top of tower

(O) = No vortex [Flyby flown for remote sensing systems]

Flyby (Run) Number: 13		FAA B727-100		Date: 21 SEP 1980 (Day of Year: 264)		Abeam Time: 12:09:13 (MDT)	
Configuration: Landing Glide Slope: 0 deg.		AIRCRAFT DATA Flaps: 30 deg. Indicated Air Speed: 130 kts		METEOROLOGICAL DATA (200 ft Sensor Level) Wind Speed: 4.0 kts Wind Direction: 167 deg.		Gross Weight: 123,000 lbs. Altitude: 600 ft AGL	
Maximum Velocity: (0) fps Descent Rate: (0) fpm		DOWNWIND VORTEX CHARACTERISTICS Age: (0) s Advection Rate: (0) fpm		Atmospheric Stability: Unstable Estimated Core Radius: (0) ft Tower Penetration Height: (0) ft AGL			
Maximum Velocity: (0) fps Descent Rate: (0) fpm		UPWIND VORTEX CHARACTERISTICS Age: (0) s Advection Rate: (0) fpm		Upwind Vortex Tangential Velocities Sensor Height (ft)		Upwind Vortex Tangential Velocities Sensor Height (ft)	
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
198	196	102	100	198	196	102	100
194	192	98	96	194	192	98	96
190	188	94	92	190	188	94	92
186	184	90	88	186	184	90	88
182	180	86	84	182	180	86	84
178	176	82	80	178	176	82	80
174	172	78	76	174	172	78	76
170	168	74	72	170	168	74	72
166	164	70	68	166	164	70	68
162	158	66	64	162	160	66	64
158	156	62	60	158	156	62	60
154	152	58	56	154	152	58	56
150	148	54	52	150	148	54	52
146	144	50	48	146	144	50	48
142	140	46	44	142	140	46	44
138	136	42	40	138	136	42	40
134	132	38	36	134	132	38	36
130	128	34	32	130	128	34	32
126	124	30	28	126	124	30	28
122	120	26	24	122	120	26	24
118	116	22	20	118	116	22	20
114	112	18	16	114	112	18	16
110	108	14	12	110	108	14	12
106	104	10	10	106	104	10	10

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Flyby (Run) Number: 14		FAA B727-100		Absent Time: 12:16:03 (MDT)	
AIRCRAFT DATA		METEOROLOGICAL DATA		Atmospheric Stability: Unstable	
Configuration: Landing		Flaps: 30 deg.		Gross Weight: 122,000 lbs.	
Glide Slope: 0 deg.		Indicated Air Speed: 130 kts		Altitude: 250 ft AGL	
Wind Speed: 4.7 kts		Wind Direction: 46 deg.		Air Temperature: 16.7 °C	
Maximum Velocity: (D) fps		Age: (D) s		Estimated Core Radius: (D) ft	
Descent Rate: (D) fpm		Advection Rate: (D) fpm		Tower Penetration Height: (D) ft AGL	
Descent Rate: (D) fpm		Age: (D) s		Estimated Core Radius: (D) ft	
Descent Rate: (D) fpm		Advection Rate: (D) fpm		Tower Penetration Height: (D) ft AGL	
DOWNWIND VORTEX CHARACTERISTICS					
Wind Speed: 4.7 kts		Age: (D) s		Upwind Vortex Tangential Velocities	
Maximum Velocity: (D) fpm		Advection Rate: (D) fpm		Sensor Height (ft)	
Descent Rate: (D) fpm		Age: (D) s		Relative Height (ft)	
Descent Rate: (D) fpm		Advection Rate: (D) fpm		V <sub>θ</sub> (fps)	
UPWIND VORTEX CHARACTERISTICS					
Wind Speed: 4.7 kts		Age: (D) s		Sensor Height (ft)	
Maximum Velocity: (D) fpm		Advection Rate: (D) fpm		Relative Height (ft)	
Descent Rate: (D) fpm		Age: (D) s		V <sub>θ</sub> (fps)	
Descent Rate: (D) fpm		Advection Rate: (D) fpm		Sensor Height (ft)	
Descent Rate: (D) fpm		Age: (D) s		Relative Height (ft)	
Descent Rate: (D) fpm		Advection Rate: (D) fpm		V <sub>θ</sub> (fps)	
Downwind Vortex Tangential Velocities					
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
198	(D)	102	(D)	198	(D)
196	(D)	100	(D)	196	(D)
194	(D)	98	(D)	194	(D)
192	(D)	96	(D)	192	(D)
190	(D)	94	(D)	190	(D)
188	(D)	92	(D)	188	(D)
186	(D)	90	(D)	186	(D)
184	(D)	88	(D)	184	(D)
182	(D)	86	(D)	182	(D)
180	(D)	84	(D)	180	(D)
178	(D)	82	(D)	178	(D)
176	(D)	80	(D)	176	(D)
174	(D)	78	(D)	174	(D)
172	(D)	76	(D)	172	(D)
170	(D)	74	(D)	170	(D)
168	(D)	72	(D)	168	(D)
166	(D)	70	(D)	166	(D)
164	(D)	68	(D)	164	(D)
162	(D)	66	(D)	162	(D)
160	(D)	64	(D)	160	(D)
158	(D)	62	(D)	158	(D)
156	(D)	60	(D)	156	(D)
154	(D)	58	(D)	154	(D)
152	(D)	56	(D)	152	(D)
150	(D)	54	(D)	150	(D)
148	(D)	52	(D)	148	(D)
146	(D)	50	(D)	146	(D)
144	(D)	48	(D)	144	(D)
142	(D)	46	(D)	142	(D)
140	(D)	44	(D)	140	(D)
138	(D)	42	(D)	138	(D)
136	(D)	40	(D)	136	(D)
134	(D)	38	(D)	134	(D)
132	(D)	36	(D)	132	(D)
130	(D)	34	(D)	130	(D)
128	(D)	32	(D)	128	(D)
126	(D)	30	(D)	126	(D)
124	(D)	28	(D)	124	(D)
122	(D)	26	(D)	122	(D)
120	(D)	24	(D)	120	(D)
118	(D)	22	(D)	118	(D)
116	(D)	20	(D)	116	(D)
114	(D)	18	(D)	114	(D)
112	(D)	16	(D)	112	(D)
110	(D)	14	(D)	110	(D)
108	(D)	12	(D)	108	(D)
106	(D)	10	(D)	106	(D)
104	(D)	8	(D)	104	(D)

\* = Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(I) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

Flyby (Run) Number: 15		FAA B727-100		Date: 21 SEP 1990 (Day of Year: 264)	Abeam Time: 12:59:00 (MDT)
Configuration: Landing		AIRCRAFT DATA		Gross Weight: 117,000 lbs.	
Glide Slope: -3 deg.		Indicated Air Speed: 130 kts		Altitude: 250 ft AGL	
METEOROLOGICAL DATA		(200 ft Sensor Level)		Air Temperature: 15.9 °C	Atmospheric Stability: Unstable
Wind Speed: 2.6 kts		Wind Direction: 290 deg.			
Maximum Velocity: (D) fps		Age: (D) s		Estimated Core Radius: (D) ft	
Descent Rate: (D) fps		Advection Rate: (D) fps		Tower Penetration Height: (D) ft AGL	
Maximum Velocity: (D) fps		UPWIND VORTEX CHARACTERISTICS		Estimated Core Radius: (D) ft	
Descent Rate: (D) fps		Age: (D) s		Tower Penetration Height: (D) ft AGL	
		Advection Rate: (D) fps			
		Downwind Vortex Tangential Velocities		Upwind Vortex Tangential Velocities	
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	V <sub>θ</sub> (fps)	Relative Height (ft)
198	198	(D)	102	(D)	198
196	194	(D)	100	(D)	196
192	190	(D)	98	(D)	194
188	186	(D)	96	(D)	192
186	184	(D)	94	(D)	190
184	182	(D)	92	(D)	188
182	180	(D)	90	(D)	186
180	178	(D)	88	(D)	184
178	176	(D)	86	(D)	182
176	174	(D)	84	(D)	180
174	172	(D)	82	(D)	178
172	170	(D)	80	(D)	176
170	168	(D)	78	(D)	174
168	166	(D)	76	(D)	172
166	164	(D)	74	(D)	170
164	162	(D)	72	(D)	168
162	160	(D)	70	(D)	166
160	158	(D)	68	(D)	164
158	156	(D)	66	(D)	162
156	154	(D)	64	(D)	160
154	152	(D)	62	(D)	158
152	150	(D)	60	(D)	156
150	148	(D)	58	(D)	154
148	146	(D)	56	(D)	152
146	144	(D)	54	(D)	150
144	142	(D)	52	(D)	148
142	140	(D)	50	(D)	146
140	138	(D)	48	(D)	144
138	136	(D)	46	(D)	142
136	134	(D)	44	(D)	140
134	132	(D)	42	(D)	138
132	130	(D)	40	(D)	136
130	128	(D)	38	(D)	134
128	126	(D)	36	(D)	132
126	124	(D)	34	(D)	130
124	122	(D)	32	(D)	128
122	120	(D)	30	(D)	126
120	118	(D)	28	(D)	124
118	116	(D)	26	(D)	122
116	114	(D)	24	(D)	120
114	112	(D)	22	(D)	118
112	110	(D)	20	(D)	116
110	108	(D)	18	(D)	114
108	106	(D)	16	(D)	112
106	104	(D)	14	(D)	110
104		(D)	12	(D)	108

\* = Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

Flyby (Run) Number: 16	Date: 21 SEP 1990 [Day of Year: 264]	Absent Time: 13:06:00 (MDT)					
Configuration: Landing	AIRCRAFT DATA						
Glide Slope: -3 deg.	Flaps: 30 deg.	Gross Weight: 115,000 lbs.					
	Indicated Air Speed: 126 kts	Altitude: 250 ft AGL					
Wind Speed: 1.2 kts	Wind Direction: 32 deg.	Air Temperature: 16.3 °C					
Maximum Velocity: (D) fps	Age: (D) s	Atmospheric Stability: Unstable					
Descent Rate: (D) fps	Advection Rate: (D) fps	Estimated Core Radius: (D) ft					
Maximum Velocity: (D) fps	Age: (D) s	Tower Penetration Height: (D) ft AGL					
Descent Rate: (D) fps	Advection Rate: (D) fps	Upwind Vortex Characteristics					
Downwind Vortex Tangential Velocities	Upwind Vortex Tangential Velocities						
Sensor Height [ft]	Relative Height [ft]	Sensor Height [ft]	Relative Height [ft]	Sensor Height [ft]	Relative Height [ft]	Sensor Height [ft]	Relative Height [ft]
198	(D)	102	(D)	198	(D)	102	(D)
196	194	98	196	194	98	100	100
192	190	94	192	190	94	96	96
188	186	92	188	186	92	90	90
184	182	88	184	182	88	86	84
180	178	84	180	178	82	80	80
176	174	82	176	174	78	76	76
172	170	78	172	170	74	72	72
168	166	74	168	166	70	68	68
164	162	72	164	162	66	64	64
160	158	70	160	158	62	60	60
156	154	68	156	154	58	56	56
152	150	66	152	150	54	52	52
148	146	64	148	146	50	48	48
144	142	62	144	142	46	44	44
140	138	60	140	138	42	40	42
136	134	58	136	134	38	36	38
132	130	56	132	130	34	32	34
128	126	54	128	126	30	28	30
124	122	52	124	122	26	24	26
120	118	50	120	118	22	20	22
116	114	48	116	114	18	16	18
112	110	46	112	110	14	12	14
108	106	44	108	106	10	12	10
104	102	42	104	102	10	10	10

\* = Estimated (O) = No vortex Flyby passed over top of tower

(M) = Missing (P) = Vortex passed over remote sensing systems

FAA B727-100										
AIRCRAFT DATA			Date: 21 SEP 1990 (Day of Year: 264)							
Configuration: Takeoff Glide Slope: 0 deg.		Abeam Time: 13:12:46 (MDT)								
Flaps: 15 deg. Indicated Air Speed: 130 kts		Gross Weight: 114,000 lbs. Altitude: 500 ft AGL								
METEOROLOGICAL DATA	(200 ft Sensor Level)	Wind Speed: 4.3 kts	Wind Direction: 173 deg	Air Temperature: 16.9 °C	Atmospheric Stability: Unstable					
DOWNWIND VORTEX CHARACTERISTICS										
Maximum Velocity: (O) ips		Age: (O) s		Estimated Core Radius: (O) ft						
Descent Rate: (O) fpm		Advection Rate: (O) fpm		Tower Penetration Height: (O) ft AGL						
UPWIND VORTEX CHARACTERISTICS										
Maximum Velocity: (O) ips		Age: (O) s		Estimated Core Radius: (O) ft						
Descent Rate: (O) fpm		Advection Rate: (O) fpm		Tower Penetration Height: (O) ft AGL						
Downwind Vortex Tangential Velocities										
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)				
198	0	0	102	0	0	198				
196	0	0	100	0	0	196				
194	0	0	98	0	0	194				
192	0	0	96	0	0	192				
190	0	0	94	0	0	190				
188	0	0	92	0	0	188				
186	0	0	88	0	0	186				
184	0	0	86	0	0	184				
182	0	0	84	0	0	182				
180	0	0	82	0	0	180				
178	0	0	80	0	0	178				
176	0	0	78	0	0	176				
174	0	0	76	0	0	174				
172	0	0	74	0	0	172				
170	0	0	72	0	0	170				
168	0	0	70	0	0	168				
166	0	0	68	0	0	166				
164	0	0	66	0	0	164				
162	0	0	64	0	0	162				
160	0	0	62	0	0	160				
158	0	0	60	0	0	158				
156	0	0	58	0	0	156				
154	0	0	56	0	0	154				
152	0	0	54	0	0	152				
150	0	0	52	0	0	150				
148	0	0	50	0	0	148				
146	0	0	48	0	0	146				
144	0	0	46	0	0	144				
142	0	0	44	0	0	142				
140	0	0	42	0	0	140				
138	0	0	40	0	0	138				
136	0	0	38	0	0	136				
134	0	0	36	0	0	134				
132	0	0	34	0	0	132				
130	0	0	32	0	0	130				
128	0	0	30	0	0	128				
126	0	0	28	0	0	126				
124	0	0	26	0	0	124				
122	0	0	24	0	0	122				
120	0	0	22	0	0	120				
118	0	0	20	0	0	118				
116	0	0	18	0	0	116				
114	0	0	16	0	0	114				
112	0	0	14	0	0	112				
110	0	0	12	0	0	110				
108	0	0	10	0	0	108				
106	0	0	0	0	0	106				
104	0	0	0	0	0	104				

= Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(P) = No vortex (flyby flown over top of tower)

(R) = Vortex passed over remote sensing systems

FAA B727-100		Date: 21 SEP 1990 (Day of Year: 264)		Absent Time: 13:18:16 (MDT)	
Configuration: Takeoff		AIRCRAFT DATA			
Glide Slope: 0 deg.		Flops: 15 deg.	Indicated Air Speed: 129 kts		
Wind Speed: 4.1 kts		METEOROLOGICAL DATA (200 ft Sensor Level)		Gross Weight: 113,000lbs.	Altitude: 250 ft AGL
Maximum Velocity: (D) fps	Descent Rate: (D) fpm	Wind Direction: 221 deg.	Air Temperature: 16.7 °C	Atmospheric Stability: Unstable	
DOWNWIND VORTEX CHARACTERISTICS		Estimated Core Radius: (D) ft		Tower Penetration Height: (D) ft AGL	
UPWIND VORTEX CHARACTERISTICS		Age: (D) s		Estimated Core Radius: (D) ft	
Advection Rate: (D) fpm		Age: (D) s		Tower Penetration Height: (D) ft AGL	
Downwind Vortex Velocities		Upwind Vortex Velocities		Estimated Core Radius: (D) ft	
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Tangential Velocity ( $V_g$ fpm)	Sensor Height (ft)	Relative Height (ft)
D	D	D	D	D	D
198	196	102	198	198	102
194	192	98	194	198	98
190	188	94	192	196	96
186	184	92	190	194	94
182	180	90	188	192	92
178	176	88	184	188	90
174	172	86	182	186	88
170	168	84	180	182	86
166	164	82	178	180	84
162	160	80	176	178	82
158	156	78	174	176	80
154	152	76	172	174	78
150	148	74	170	172	76
146	144	72	168	170	74
142	140	70	166	168	72
138	136	68	164	166	70
134	132	66	162	164	68
130	128	64	160	162	66
126	124	62	158	160	64
122	120	60	156	158	62
118	116	58	154	156	60
114	112	56	152	154	58
110	108	54	148	152	56
106	104	52	144	148	54
102	100	50	140	144	52
98	96	48	138	142	50
94	92	46	136	138	48
90	88	44	134	136	46
86	84	42	132	134	44
82	80	40	130	132	42
78	76	38	128	130	40
74	72	36	126	128	38
70	68	34	124	126	36
68	66	32	122	124	34
66	64	30	120	122	32
64	62	28	118	120	30
62	60	26	116	118	28
60	58	24	114	116	26
58	56	22	112	114	24
56	54	20	110	112	22
54	52	18	108	110	20
52	50	16	106	108	18
50	48	14	104	106	16
48	46	12	102	104	14
46	44	10	100	102	12
44	42	8	98	100	10
42	40	6	96	98	8
40	38	4	94	96	6
38	36	2	92	94	4
36	34	0	90	92	2

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Flyby (Run) Number: 1		Date: 23 SEP 1990 (Day of Year: 266)	Abeam Time: 7:16:49 (MDT)
<b>AIRCRAFT DATA</b>		Gross Weight: 142,500lbs.	
Configuration: Landing		Altitude: 600 ft AGL	
Glide Slope: 0 deg.			
Indicated Air Speed: 130 kts			
<b>METEOROLOGICAL DATA</b>			
Wind Speed: 9.6 kts		Wind Direction: 20 deg.	Air Temperature: 9.8 °C
Maximum Velocity: (O) fps			
Descent Rate: (O) fps			
Maximum Velocity: (O) fps			
Descent Rate: (O) fps			
<b>DOWNWIND VORTEX CHARACTERISTICS</b>			
Age: (O) s			
Advection Rate: (O) fps			
<b>UPWIND VORTEX CHARACTERISTICS</b>			
Age: (O) s			
Advection Rate: (O) fps			
<b>Downwind Vortex Tangential Velocities</b>			
Sensor Height [ft]	Relative Height [ft]	Sensor Height [ft]	Relative Height [ft]
198	196	102	198
194	192	100	196
190	188	98	194
186	184	94	192
182	180	92	190
178	176	88	188
174	172	86	186
170	168	84	184
166	164	82	182
162	160	80	180
158	156	78	178
154	152	76	176
150	148	74	174
146	144	72	172
142	140	70	170
138	136	68	168
134	132	66	166
130	128	64	164
126	124	62	162
122	120	60	160
118	116	58	158
114	112	56	156
110	108	54	154
106	104	52	152
		50	150
		48	148
		46	146
		44	144
		42	142
		40	140
		38	138
		36	136
		34	134
		32	132
		30	130
		28	128
		26	126
		24	124
		22	122
		20	120
		18	118
		16	116
		14	114
		12	112
		10	110
			108
			106
			104

(P) = Vortex passed over top of tower

(O) = No vortex (Flyby passed over remote sensing systems)

(M) = Missing (I) = Estimated

Flyby (Run) Number: 2		Date: 23 SEP 1990 [Day of Year: 266]		Aircraft Data						
Configuration: Landing		Flaps: 30 deg.		Indicated Air Speed: 134 kts						
Glide Slope: 0 deg.		Gross Weight: 141,000 lbs.		Atmospheric Stability: Stable						
Wind Speed: 8.7 kts		Wind Direction: 21 deg		Age: 26 s						
Maximum Velocity: 90.6 fps		Air Temperature: 9.7 °C		Estimated Core Radius: 0.9 ft						
Descent Rate: 4.2 fps		(200 ft Sensor Level)		Tower Penetration Height: 140 ft AGL						
Descent Rate: 3.8 fps		Atmospheric Stability: Indicated		Estimated Core Radius: 0.5 ft						
Wind Speed: 8.7 kts		Atmospheric Stability: Stable		Tower Penetration Height: 112 ft AGL						
<b>METEOROLOGICAL DATA</b>										
<b>DOWNWIND VORTEX CHARACTERISTICS</b>										
Wind Direction: 21 deg		Age: 26 s		Estimated Core Radius: 0.9 ft						
Maximum Velocity: 136.3 fps		Advection Rate: 7.9 fps		Estimated Core Radius: 0.5 ft						
Descent Rate: 4.2 fps		Atmosvection Rate: 7.5 fps		Estimated Core Radius: 0.5 ft						
<b>UPWIND VORTEX CHARACTERISTICS</b>										
<b>Downwind Vortex Tangential Velocities</b>										
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	Upwind Vortex Tangential Velocities					
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)					
198	58	17.0	102	-8.6	198	86	0.1	102	-1.0	32.6
196	56	18.5*	100	-9.5*	196	84	-3.9	100	-1.2	27.5*
194	54	20.0	98	-10.5	194	82	-3.2	98	-1.4	22.3*
192	52	18.6	96	-9.1	192	80	-4.0	96	-1.6	22.1
190	50	17.1	94	-4.4	190	78	-5.3	94	-1.8	19.2
188	48	19.2*	92	-11.0	188	76	-4.5	90	-2.0	17.8
186	46	21.3	90	-4.8	186	74	-3.9	88	-2.4	13.7
184	44	21.4	88	-5.0	184	72	-3.1	86	-2.6	15.0
182	42	20.9	86	-5.4	182	70	-3.1	84	-2.8	12.5
180	40	20.4	84	-5.6	180	68	-1.7	82	-3.0	9.1
178	38	20.0	82	-5.8	178	66	-0.8	80	-3.2	6.8
176	36	18.6	80	-6.0	176	64	-2.0	78	-3.4	6.3
174	34	12.2	78	-6.2	174	62	-3.2	76	-3.6	5.2
172	32	14.0	76	-6.4	172	60	-3.5	74	-3.8	6.3
170	30	14.5*	74	-6.6	170	58	-4.2*	72	-4.0	6.5
168	28	15.0	72	-6.8	168	56	-4.9	70	-4.2	9.1
166	26	15.4	70	-7.0	166	54	-5.5	68	-4.4	10.4
164	24	16.7	68	-7.2	164	52	-5.5	66	-4.6	10.0
162	22	20.5	66	-7.4	162	50	-6.3	64	-4.8	7.6
160	20	23.0	64	-7.6	160	48	-5.5	62	-5.0	7.2
158	18	25.9	62	-7.8	158	46	-7.3	60	-5.2	7.8
156	16	26.9	60	-8.0	156	44	-7.7	58	-5.6	6.0
154	14	29.9	58	-8.2	154	42	-6.8	56	-5.8	6.2
152	12	35.3	56	-8.4	152	40	-6.8	54	-5.2	6.6
150	10	31.5	54	-8.6	150	38	-5.0	52	-6.0	6.8
148	8	35.0	52	-8.8	148	36	-4.6	50	-6.2	8.4
146	6	45.1	50	-9.0	146	34	-6.8	48	-6.4	8.4
144	4	45.9	48	-9.2	144	32	-6.7	46	-6.6	8.2
142	2	60.9	46	-9.4	142	30	-7.6	44	-6.8	6.7
140	0	90.6	44	-9.6	140	28	-8.5	42	-7.0	7.7
138	-2	90.6	42	-9.8	138	26	-7.8	40	-7.2	6.9
136	-4	95.2	40	-10.0	136	24	-10.6	38	-7.4	6.4
134	-6	34.0	38	-10.2	134	22	-14.6	36	-7.6	5.2
132	-8	34.0	36	-10.4	132	20	-13.1	34	-7.8	6.0
130	-10	19.2	34	-10.6	130	18	-14.6	32	-8.0	6.3
128	-12	22.6	32	-10.8	128	16	-11.0	30	-8.2	4.4
126	-14	25.6	30	-11.0	126	14	-12.4	28	-8.4	4.2
124	-16	14.9	28	-11.2	124	12	-17.8	26	-8.6	3.9
122	-18	15.8	26	-11.4	122	10	-33.7	24	-8.8	3.4
120	-20	12.7	24	-11.6	120	8	-49.9	22	-9.0	4.2
118	-22	12.7	22	-11.8	118	6	-50.5	20	-9.2	3.9
116	-24	12.3	20	-12.0	116	4	-78.5	18	-9.4	3.6
114	-26	12.3	18	-12.2	114	2	-136.9	16	-9.6	3.7
112	-28	8.8	16	-12.4	112	0	-47.9	14	-9.8	3.4
110	-30	11.1	14	-12.6	110	-2	-40.0	12	-100	3.5
108	-32	10.2	12	-12.8	108	-4	-34.5	10	-102	2.7
106	-34	11.0	10	-13.0	106	-6	-104	-8	-31.1	
104	-36	12.0	10	-12.0	104	-8				

\* = Estimated      (D) = Vortex dissipated upwind of tower      (M) = Missing      (O) = No vortex (Flyby flown for remote sensing systems)      (P) = Vortex passed over top of tower

Flyby (Run) Number: 3	Date: 23 SEP 1990 (Day of Year: 266)	Abeam Time: 7:27:53 (MDT)
Configuration: Takeoff	AIRCRAFT DATA	
Glide Slope: 0 deg.	Flaps: 5 deg.	Gross Weight: 140,000 lbs.
	Indicated Air Speed: 147 kts	Altitude: 600 ft AGL
Wind Speed: 8.8 kts	Wind Direction: 12 deg.	Atmospheric Stability: Stable
Maximum Velocity: (O) fps	METEOROLOGICAL DATA (200 ft Sensor Level)	Estimated Core Radius: (O) ft
Descent Rate: (O) fpm	Age: (O) s	Tower Penetration Height: (O) ft AGL
Maximum Velocity: (O) fps	Advection Rate: (O) fpm	Estimated Core Radius: (O) ft
Descent Rate: (O) fpm	Age: (O) s	Tower Penetration Height: (O) ft AGL
DOWNTWIND VORTEX CHARACTERISTICS		
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)
198	(O)	102
196	(O)	100
194	(O)	98
192	(O)	96
190	(O)	94
188	(O)	92
186	(O)	90
184	(O)	88
182	(O)	86
180	(O)	84
178	(O)	82
176	(O)	80
174	(O)	78
172	(O)	76
170	(O)	74
168	(O)	72
166	(O)	70
164	(O)	68
162	(O)	66
160	(O)	64
158	(O)	62
156	(O)	60
154	(O)	58
152	(O)	56
150	(O)	54
148	(O)	52
146	(O)	50
144	(O)	48
142	(O)	46
140	(O)	44
138	(O)	42
136	(O)	40
134	(O)	38
132	(O)	36
130	(O)	34
128	(O)	32
126	(O)	30
124	(O)	28
122	(O)	26
120	(O)	24
118	(O)	22
116	(O)	20
114	(O)	18
112	(O)	16
110	(O)	14
108	(O)	12
106	(O)	10
104	(O)	8

\* = Estimated      (D) = Vortex dissipated upwind of tower      (M) = Missing      (O) = No vortex (Flyby town for remote sensing systems)      (P) = Vortex passed over top of tower

(P) = Vortex passed over top of tower

UAL B727-222									
Date: 23 SEP 1980 (Day of Year: 266)									Absent Time: 7:37:48 (MDT)
AIRCRAFT DATA									
Configuration: Takeoff									Gross Weight: 138,000 lbs.
Glide Slope: 0 deg.									Altitude: 250 ft AGL
METEOROLOGICAL DATA									
Wind Speed: 8.1 kts									Atmospheric Stability: Stable
Maximum Velocity: 187.2 fps									Estimated Core Radius: 0.3 ft
Descent Rate: 5.1 fpm									Tower Penetration Height: 132 ft AGL
Indicated Air Speed: 154 kts									Estimated Core Radius: 0.5 ft
Wind Direction: 21 deg.									Tower Penetration Height: 98 ft AGL
DOWNWIND VORTEX CHARACTERISTICS									
(200 ft Sensor Level)									Age: 23 s
Wind Direction: 21 deg.									Advection Rate: 7.6 fps
Age: 31 s									Upwind Vortex Characteristics
(200 ft Sensor Level)									Age: 7.7 fps
Downwind Vortex Tangential Velocities									
Sensor Height [ft]	Relative Height [ft]	V <sub>θ</sub> (fps)	Sensor Height [ft]	Relative Height [ft]	V <sub>θ</sub> (fps)	Sensor Height [ft]	Relative Height [ft]	Sensor Height [ft]	Relative Height [ft]
198	66	17.5	102	-30	-8.6	198	100	0.9	102
196	64	17.1	100	-32	-8.3*	196	98	-2.0	100
192	62	16.5	98	-34	-7.9	192	96	-1.3	98
190	60	16.9	96	-36	-8.7	90	92	0.9	94
188	58	15.2	94	-40	-8.4	88	86	1.0	92
186	56	16.8	92	-42	-9.5	84	86	-0.1	88
184	54	17.0*	88	-44	-9.4	82	84	0.1	86
182	52	14.7	86	-46	-8.7	82	84	-1.3	84
180	50	15.2	84	-48	-9.5	80	82	-0.3	82
178	48	18.6	82	-50	-9.2	78	80	0.6	80
176	44	19.8	80	-52	-9.6	76	78	-1.2	78
174	42	18.2	78	-54	-9.9	74	76	-1.8	76
172	40	11.8	76	-56	-8.1	72	74	-1.8	74
170	38	11.9*	74	-58	-8.9	70	72	-3.2	72
168	36	11.9	72	-60	-8.1	68	70	-2.8	70
166	34	12.0	70	-62	-10.9	66	68	-2.8	68
164	32	12.0	68	-64	-6.7	64	66	-3.2	66
162	30	13.4	66	-66	-7.0	62	64	-3.4	64
160	28	10.9	64	-68	-4.7	60	62	-3.9	62
158	26	11.4	62	-70	-4.6	58	60	-3.9	60
156	24	14.0	60	-72	-4.0	56	58	-4.9	58
154	22	16.9	58	-74	-3.7	54	56	-4.8	56
152	20	20.4	56	-76	-3.5	52	54	-5.6	54
150	18	18.9	54	-78	-3.9	50	52	-4.8	52
148	16	19.8	52	-80	-3.9	48	50	-4.9	50
146	14	31.9	50	-82	-3.1	46	48	-5.5	48
144	12	30.5*	48	-84	-2.9	44	46	-6.5	46
142	10	29.1	46	-86	-2.6	42	44	-5.7	46
140	8	34.5	44	-88	-2.5	40	42	-8.5	44
138	6	39.1	42	-90	-1.5	38	40	-6.9	42
136	4	48.6	40	-92	-1.5	36	38	-6.9	40
134	2	58.2	38	-94	-1.4	34	36	-8.7	38
132	0	-187.2	34	-96	-1.3	32	34	-8.7	36
130	-2	-67.1	32	-98	-1.5	30	32	-8.5	34
128	-4	-65.4	30	-100	-1.2	28	30	-6.9	32
126	-6	-18.0	28	-102	-1.3	26	28	-6.5	28
124	-8	-19.4	26	-104	-0.5	24	26	-9.3	26
122	-10	-20.5	24	-106	-0.7	22	24	-8.1	24
120	-12	-19.5	22	-108	-0.6	20	22	-9.9	22
118	-14	-14.5	20	-110	-0.9	18	20	-11.5	20
116	-16	-12.6	18	-112	-1.0	16	18	-10.3	18
114	-18	-10.7	16	-114	-0.8	14	16	-12.1	14
112	-20	-12.4	14	-116	-1.6	12	12	-13.9	14
110	-22	-1.1	12	-118	-1.4	10	10	-14.9	12
108	-24	-8.2	10	-120	-1.0	8	10	-14.9	10
106	-26	-8.7	10	-122	-0.9	6	8	-21.1	8
104	-28	-8.6				104	6	-34.3	

\* = Estimated (D) = Vortex dissipated upwind of tower (M) = Missing

(O) = No vortex (F) = Flyby flown over remote sensing systems

(P) = Vortex passed over top of tower

Flyby (Run) Number: 5		UAL B727-222		Abeam Time: 7:42:49 (MDT)	
Date: 23 SEP 1990 (Day of Year: 266)		Gross Weight: 137,500lbs.		Altitude: 600 ft AGL	
Configuration: Landing		Flaps: 30 deg.		Atmospheric Stability: Stable	
Glide Slope: 0 deg.		Indicated Air Speed: 129 kts		Estimated Core Radius: (O) ft	
Wind Speed: 8.3 kts		(200 ft Sensor Level)		Tower Penetration Height: (O) ft AGL	
Wind Direction: 25 deg.		Air Temperature: 9.8 °C		Estimated Core Radius: (O) ft	
Maximum Velocity: (O) fps		Advection Rate: (O) s		Tower Penetration Height: (O) ft AGL	
Descent Rate: (O) fpm		Age: (O) s		Estimated Core Radius: (O) ft	
Maximum Velocity: (O) fps		Advection Rate: (O) fpm		Tower Penetration Height: (O) ft AGL	
Descent Rate: (O) fpm		Age: (O) s		Estimated Core Radius: (O) ft	
Downwind Vortex Characteristics		Upwind Vortex Characteristics		Tower Penetration Height: (O) ft AGL	
Wind Direction: 25 deg.		Advection Rate: (O) fpm		Estimated Core Radius: (O) ft	
Maximum Velocity: (O) fps		Age: (O) s		Tower Penetration Height: (O) ft AGL	
Descent Rate: (O) fpm		Advection Rate: (O) fpm		Estimated Core Radius: (O) ft	
Sensor Height (ft)		Downwind Vortex Tangential Velocities		Tower Penetration Height: (O) ft AGL	
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)
198	(O)	(O)	102	(O)	(O)
196	(O)	(O)	100	(O)	(O)
194	(O)	(O)	98	(O)	(O)
192	(O)	(O)	96	(O)	(O)
190	(O)	(O)	94	(O)	(O)
188	(O)	(O)	92	(O)	(O)
186	(O)	(O)	90	(O)	(O)
184	(O)	(O)	88	(O)	(O)
182	(O)	(O)	86	(O)	(O)
180	(O)	(O)	84	(O)	(O)
178	(O)	(O)	82	(O)	(O)
176	(O)	(O)	80	(O)	(O)
174	(O)	(O)	78	(O)	(O)
172	(O)	(O)	76	(O)	(O)
170	(O)	(O)	74	(O)	(O)
168	(O)	(O)	72	(O)	(O)
166	(O)	(O)	70	(O)	(O)
164	(O)	(O)	68	(O)	(O)
162	(O)	(O)	66	(O)	(O)
160	(O)	(O)	64	(O)	(O)
158	(O)	(O)	62	(O)	(O)
156	(O)	(O)	60	(O)	(O)
154	(O)	(O)	58	(O)	(O)
152	(O)	(O)	56	(O)	(O)
150	(O)	(O)	54	(O)	(O)
148	(O)	(O)	52	(O)	(O)
146	(O)	(O)	50	(O)	(O)
144	(O)	(O)	48	(O)	(O)
142	(O)	(O)	46	(O)	(O)
140	(O)	(O)	44	(O)	(O)
138	(O)	(O)	42	(O)	(O)
136	(O)	(O)	40	(O)	(O)
134	(O)	(O)	38	(O)	(O)
132	(O)	(O)	36	(O)	(O)
130	(O)	(O)	34	(O)	(O)
128	(O)	(O)	32	(O)	(O)
126	(O)	(O)	30	(O)	(O)
124	(O)	(O)	28	(O)	(O)
122	(O)	(O)	26	(O)	(O)
120	(O)	(O)	24	(O)	(O)
118	(O)	(O)	22	(O)	(O)
116	(O)	(O)	20	(O)	(O)
114	(O)	(O)	18	(O)	(O)
112	(O)	(O)	16	(O)	(O)
110	(O)	(O)	14	(O)	(O)
108	(O)	(O)	12	(O)	(O)
106	(O)	(O)	10	(O)	(O)
104	(O)	(O)	8	(O)	(O)

(M) = Missing (D) = Vortex dissipated upwind of tower

(P) = Vortex passed over top of tower (O) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower (O) = Missing

UAL B727-222									
Flyby (Run) Number: 6		Date: 23 SEP 1990 (Day of Year: 266)							
Configuration: Landing		AIRCRAFT DATA							
Glide Slope: 0 deg.		Flaps: 30 deg. Indicated Air Speed: 128 kts							
Wind Speed: 8.5 kts		Gross Weight: 136,500 lbs. Altitude: 260 ft AGL							
Maximum Velocity: 125.1 fps		Atmospheric Stability: Stable							
Descent Rate: 4.1 fps		Estimated Core Radius: 0.6 ft							
Maximum Velocity: 170.0 fps		Tower Penetration Height: 158 ft AGL							
Descent Rate: 3.5 fps		Estimated Core Radius: 0.4 ft							
Wind Direction: 28 deg.		Tower Penetration Height: 148 ft AGL							
Air Temperature: 9.6 °C		Atmospheric Stability: Stable							
Maximum Velocity: 125.1 fps		Estimated Core Radius: 0.6 ft							
Descent Rate: 4.1 fps		Tower Penetration Height: 158 ft AGL							
Maximum Velocity: 170.0 fps		Estimated Core Radius: 0.4 ft							
Descent Rate: 3.5 fps		Tower Penetration Height: 148 ft AGL							
DOWNWIND VORTEX CHARACTERISTICS									
Wind Direction: 28 deg.		Age: 25 s							
Air Temperature: 9.6 °C		Advection Rate: 6.8 fps							
Maximum Velocity: 125.1 fps		Age: 32 s							
Descent Rate: 4.1 fps		Advection Rate: 7.3 fps							
UPWIND VORTEX CHARACTERISTICS									
Wind Direction: 28 deg.		Age: 25 s							
Air Temperature: 9.6 °C		Advection Rate: 6.8 fps							
Maximum Velocity: 170.0 fps		Age: 32 s							
Descent Rate: 3.5 fps		Advection Rate: 7.3 fps							
Downwind Vortex Tangential Velocities									
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)
198	40	15.5	102	-5.6	-4.8	198	-6.6	-102	100
198	38	19.1	98	-60	-9.3	194	-7.8	102	-48
194	34	21.2	96	-62	-9.7	192	-4.6	98	98
192	32	23.3	94	-64	-3.7	190	-4.4	-5.2	-52
190	30	21.5	92	-66	-5.3	188	-4.2	-9.8	94
188	28	23.0	90	-68	-4.4	186	-3.8	-11.4	-54
186	26	21.2	88	-70	-3.7	184	-3.6	-10.9	-90
184	24	22.1	86	-72	-5.0	182	-3.4	-10.2	-58
182	22	22.0	84	-74	-4.7	180	-3.2	-10.5	-60
180	20	23.3	82	-76	-4.7	178	-3.0	-10.5	-64
178	18	33.0	80	-78	-3.4	176	-2.8	-12.8	-68
176	16	31.9	78	-80	-3.4	174	-2.6	-11.2	-70
174	14	36.3	76	-82	-2.2	172	-2.4	-13.0	-72
172	12	39.1	74	-84	-2.9	170	-2.2	-12.9	-74
170	10	41.9	72	-86	-2.5	168	-2.0	-12.9	-76
168	8	44.8	70	-88	-2.9	166	-1.8	-12.8	-78
166	6	49.7	68	-90	-2.3	164	-1.6	-12.8	-80
164	4	52.0	66	-92	-2.2	162	-1.4	-14.8	-81
162	2	103.3	64	-94	-1.8	160	-1.2	-18.5	-82
160	0	126.1	62	-96	-1.7	158	-1.0	-22.5	-84
158	-2	156	-2	-98	-1.7	156	-0.8	-31.6	-86
156	-4	-56.4	58	-100	-2.2	154	-0.6	-60	-88
154	-6	-35.7	56	-102	-2.5	152	-0.4	-59.0	-90
152	-8	-30.7	54	-104	-2.1	150	-0.2	-61.7	-92
150	-10	-25.5	52	-106	-2.0	148	0	-92.2	-94
148	-12	-24.6	50	-108	-1.5	146	-2	-170.0	-96
146	-14	-19.7	48	-110	-2.1	144	-4	-99.8	-98
144	-16	-23.6	46	-112	-1.8	142	-6	-43.0	-98
142	-18	-20.1	44	-114	-1.4	140	-8	-49.2	-100
138	-20	-19.2	42	-116	-1.9	138	-10	-35.4	-102
136	-22	-14.6	40	-118	-2.6	136	-12	-35.6	-104
134	-24	-14.6	38	-120	-1.5	134	-14	-32.5	-108
132	-26	-17.6	36	-122	-2.1	132	-16	-38.5	-110
130	-28	-12.9	34	-124	-2.2	130	-18	-38.5	-112
128	-30	-8.1	32	-126	-2.2	128	-20	-17.4	-114
126	-32	-5.2	30	-128	-1.8	126	-22	-15.6	-116
124	-34	-7.5	28	-130	-1.2	124	-24	-13.8	-118
122	-36	-6.0	26	-132	-1.1	122	-26	-15.9	-120
120	-38	-4.7	24	-134	-0.8	120	-28	-13.3	-122
118	-40	-3.8	22	-136	-1.0	118	-30	-12.9	-124
116	-42	-3.8	20	-138	-0.8	116	-32	-12.4	-126
114	-44	-3.2	18	-140	-0.8	114	-34	-13.0	-128
112	-46	-4.5	16	-142	-0.8	112	-36	-11.1	-130
110	-48	-5.1	14	-144	-1.2	110	-38	-11.5	-134
108	-50	-5.7	12	-146	-1.6	108	-40	-11.7	-136
106	-52	-3.9	10	-148	-1.3	106	-42	-13.2	-138
104	-54	-4.5				104	-44	-12.5	

(\* = Estimated) (D) = Vortex dissipated upwind of tower

(M) = Missing (O) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

Flyby (Run) Number: 7		Date: 23 SEP 1990 (Day of Year: 266)		Abeam Time: 7:59:33 (MDT)	
AIRCRAFT DATA		METEOROLOGICAL DATA		Atmospheric Stability: Stable	
Configuration: Holding		Flaps: 0 deg.		Gross Weight: 135,500 lbs.	
Glide Slope: 0 deg.		Indicated Air Speed: 215 kts		Altitude: 230 ft AGL	
Wind Speed: 8.9 kts		Wind Direction: 35 deg.		Air Temperature: 9.5 °C	
Maximum Velocity: (O) fps		Age: (O) s		Estimated Core Radius: (O) ft	
Descent Rate: (O) fpm		Advection Rate: (O) fpm		Tower Penetration Height: (O) ft AGL	
Maximum Velocity: (O) fps		Age: (O) s		Atmospheric Stability: Stable	
Descent Rate: (O) fpm		Advection Rate: (O) fpm		(P) = Vortex passed over top of tower	
DOWNWIND VORTEX CHARACTERISTICS					
Wind Speed: 8.9 kts		Age: (O) s		(P) = No vortex (Flyby flown for remote sensing systems)	
Descent Rate: (O) fpm		Advection Rate: (O) fpm		(M) = Missing	
UPWIND VORTEX CHARACTERISTICS					
Wind Speed: 8.9 kts		Age: (O) s		(D) = Vortex dissipated upwind of tower	
Descent Rate: (O) fpm		Advection Rate: (O) fpm		(I) = Estimated	
Downwind Vortex Tangential Velocities					
Sensor Height (ft)	Relative Height (ft)	$V_{\theta}$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_{\theta}$ (fps)
198	102	100	198	196	100
196	98	96	194	194	98
194	94	92	192	192	96
192	90	88	190	190	94
190	86	84	188	188	92
188	82	80	186	186	90
186	78	76	184	184	88
184	74	72	182	182	86
182	70	68	180	180	84
180	66	64	178	178	82
178	62	60	176	176	80
176	58	56	174	174	78
174	54	52	172	172	76
172	50	48	170	170	74
170	46	44	168	168	72
168	42	40	166	166	70
166	38	36	164	164	68
164	34	32	162	162	66
162	30	28	160	160	64
160	26	24	158	158	62
158	22	20	156	156	60
156	18	16	154	154	58
154	14	12	152	152	56
152	10	8	150	150	54
150	6	4	148	148	52
148	2	-2	146	146	50
146	-4	-6	144	144	48
144	-8	-10	142	142	46
142	-12	-14	140	140	44
140	-16	-18	138	138	42
138	-20	-22	136	136	40
136	-24	-26	134	134	38
134	-28	-30	132	132	36
132	-32	-34	130	130	34
130	-36	-38	128	128	32
128	-40	-42	126	126	30
126	-44	-46	124	124	28
124	-48	-50	122	122	26
122	-52	-54	120	120	24
120	-56	-58	118	118	22
118	-60	-62	116	116	20
116	-64	-66	114	114	18
114	-68	-70	112	112	16
112	-72	-74	110	110	14
110	-76	-78	108	108	12
108	-80	-82	106	106	10
106	-84	-86	104	104	10

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$\langle B \rangle = \text{Vortex passed over top of tower}$

Flyby (Run) Number: 8		Date: 23 SEP 1990 (Day of Year: 266)		Abeam Time: 8:06:40 (MDT)					
Configuration: Holding		AIRCRAFT DATA		Gross Weight: 134,500 lbs.					
Glide Slope: 0 deg.		Flaps: 0 deg.		Altitude: 250 ft AGL					
Indicated Air Speed: 215 kts		METEOROLOGICAL DATA		Atmospheric Stability: Stable					
(200 ft Sensor Level)		Wind Direction: 38 deg.		Air Temperature: 9.3 °C					
Wind Speed: 7.6 kts		Wind Direction: 38 deg.		Estimated Core Radius: (P) ft					
Maximum Velocity: (P) fps		Age: (P) s		Tower Penetration Height: (P) ft AGL					
Descent Rate: 2.4 fps		Advection Rate: (P) fps		Atmospheric Stability: Stable					
Maximum Velocity: 191.8 fps		Age: 27 s		Estimated Core Radius: 0.2 ft					
Descent Rate: 2.4 fps		Advection Rate: 8.4 fps		Tower Penetration Height: 184 ft AGL					
<b>DOWNWIND VORTEX CHARACTERISTICS</b>									
Age: (P) s									
Advection Rate: (P) fps									
<b>UPWIND VORTEX CHARACTERISTICS</b>									
Age: 27 s									
Advection Rate: 8.4 fps									
<b>Downwind Vortex Tangential Velocities</b>									
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)				
198	(P)	(P)	102	(P)	(P)				
196	(P)	(P)	100	(P)	(P)				
194	(P)	(P)	98	(P)	(P)				
192	(P)	(P)	96	(P)	(P)				
190	(P)	(P)	94	(P)	(P)				
188	(P)	(P)	92	(P)	(P)				
186	(P)	(P)	90	(P)	(P)				
184	(P)	(P)	88	(P)	(P)				
182	(P)	(P)	86	(P)	(P)				
180	(P)	(P)	84	(P)	(P)				
178	(P)	(P)	82	(P)	(P)				
176	(P)	(P)	80	(P)	(P)				
174	(P)	(P)	78	(P)	(P)				
172	(P)	(P)	76	(P)	(P)				
170	(P)	(P)	74	(P)	(P)				
168	(P)	(P)	72	(P)	(P)				
166	(P)	(P)	70	(P)	(P)				
164	(P)	(P)	68	(P)	(P)				
162	(P)	(P)	66	(P)	(P)				
160	(P)	(P)	64	(P)	(P)				
158	(P)	(P)	62	(P)	(P)				
156	(P)	(P)	60	(P)	(P)				
154	(P)	(P)	58	(P)	(P)				
152	(P)	(P)	56	(P)	(P)				
150	(P)	(P)	54	(P)	(P)				
148	(P)	(P)	52	(P)	(P)				
146	(P)	(P)	50	(P)	(P)				
144	(P)	(P)	48	(P)	(P)				
142	(P)	(P)	46	(P)	(P)				
140	(P)	(P)	44	(P)	(P)				
138	(P)	(P)	42	(P)	(P)				
136	(P)	(P)	40	(P)	(P)				
134	(P)	(P)	38	(P)	(P)				
132	(P)	(P)	36	(P)	(P)				
130	(P)	(P)	34	(P)	(P)				
128	(P)	(P)	32	(P)	(P)				
126	(P)	(P)	30	(P)	(P)				
124	(P)	(P)	28	(P)	(P)				
122	(P)	(P)	26	(P)	(P)				
120	(P)	(P)	24	(P)	(P)				
118	(P)	(P)	22	(P)	(P)				
116	(P)	(P)	20	(P)	(P)				
114	(P)	(P)	18	(P)	(P)				
112	(P)	(P)	16	(P)	(P)				
110	(P)	(P)	14	(P)	(P)				
108	(P)	(P)	12	(P)	(P)				
106	(P)	(P)	10	(P)	(P)				
104	(P)	(P)	8	(P)	(P)				
					104				

\* = Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex (Flyby) flown for remote sensing systems

(P) = Vortex passed over top of tower

FLYBY (Run) Number: 9		Date: 23 SEP 1990 (Day of Year: 266)		Abeam Time: 8:14:20 (MDT)	
AIRCRAFT DATA		METEOROLOGICAL DATA		Atmospheric Stability: Stable	
Configuration: Landing		Flaps: 30 deg		Gross Weight: 134,000 lbs.	
Landing Glide Slope: 0 deg.		Indicated Air Speed: 155 kts		Altitude: 600 ft AGL	
Wind Speed: 7.7 kts		Wind Direction: 42 deg.		Estimated Core Radius: (0) ft	
Maximum Velocity: (0) fpm		Age: (0) s		Tower Penetration Height: (0) ft AGL	
Descent Rate: (0) fpm		Advection Rate: (0) fpm		Estimated Core Radius: (0) ft	
Wind Speed: 7.7 kts		Air Temperature: 9.0 °C		Tower Penetration Height: (0) ft AGL	
DOWNWIND VORTEX CHARACTERISTICS		UPWIND VORTEX CHARACTERISTICS		Upwind Vortex Tangential Velocities	
Wind Direction: 42 deg.		Age: (0) s		Sensor Height (ft)	
Maximum Velocity: (0) fpm		Advection Rate: (0) fpm		Relative Height (ft)	
Descent Rate: (0) fpm		Age: (0) s		V <sub>θ</sub> (fps)	
Downwind Vortex Tangential Velocities		Upwind Vortex Tangential Velocities		Sensor Height (ft)	
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
198	198	102	198	102	102
196	196	100	196	100	98
192	192	98	192	96	96
190	190	96	190	94	94
188	188	94	188	92	92
186	186	92	186	90	90
184	184	90	184	88	88
182	182	88	182	86	86
180	180	86	180	84	84
178	178	84	178	82	82
176	176	82	176	80	80
174	174	80	174	78	78
172	172	78	172	76	76
170	170	76	170	74	74
168	168	74	168	72	72
166	166	72	166	70	70
164	164	68	164	68	68
162	162	66	162	66	66
160	160	64	160	64	64
158	158	62	158	62	62
156	156	60	156	60	60
154	154	58	154	58	58
152	152	56	152	56	56
150	150	54	150	54	54
148	148	52	148	52	52
146	146	50	146	50	50
144	144	48	144	48	48
142	142	46	142	46	46
140	140	44	140	44	44
138	138	42	138	42	42
136	136	40	136	40	40
134	134	38	134	38	38
132	132	36	132	36	36
130	130	34	130	34	34
128	128	32	128	32	32
126	126	30	126	30	30
124	124	28	124	28	28
122	122	26	122	26	26
120	120	24	120	24	24
118	118	22	118	22	22
116	116	20	116	20	20
114	114	18	114	18	18
112	112	16	112	16	16
110	110	14	110	14	14
108	108	12	108	12	12
106	106	10	106	10	10
104	104		104		

Flyby (Run) Number: 10	Date: 23 SEP 1990 (Day of Year: 266)	Abeam Time: 8:21:23 (MDT)					
<b>AIRCRAFT DATA</b>							
Configuration: Landing	Flaps: 30 deg.	Gross Weight: 132,000 lbs.					
Glide Slope: 0 deg.	Indicated Air Speed: 25 kts	Altitude: 260 ft AGL					
Wind Speed: 7.3 kts	Wind Direction: 51 deg.	Air Temperature: 8.7 °C					
Maximum Velocity: 148.1 fps	Age: 29 s	Atmospheric Stability: Stable					
Descent Rate: 3.8 fps	Advection Rate: 6.5 fps	Estimated Core Radius: 0.4 ft					
<b>METEOROLOGICAL DATA</b>							
(200 ft Sensor Level)							
Wind Speed: 7.3 kts	Wind Direction: 51 deg.	Tower Penetration Height: 90 ft AGL					
Maximum Velocity: 135.5 fps	Age: 47 s	Estimated Core Radius: 0.3 ft					
Descent Rate: 3.8 fps	Advection Rate: 5.3 fps	Tower Penetration Height: 82 ft AGL					
<b>DOWNWIND VORTEX CHARACTERISTICS</b>							
Age: 29 s							
Downwind Vortex Tangential Velocities							
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
		V <sub>θ</sub> (fps)		V <sub>θ</sub> (fps)		V <sub>θ</sub> (fps)	
198	108	23.5	102	12	15.1	198	116
196	106	23.6	100	10	18.1*	196	114
194	104	24.6	98	8	21.1*	194	112
192	102	24.1	96	6	24.0	192	110
190	100	22.8	94	4	22.4	190	108
188	98	20.6	92	2	18.8	188	106
186	96	24.0	90	0	-13.5	186	104
184	94	20.5	88	-2	-60.4	184	102
182	92	21.9	86	-4	-36.3	182	100
180	90	19.9	84	-6	-27.6	180	98
178	88	22.0	82	-8	-22.7	178	96
176	86	24.4	80	-10	-24.6	176	94
174	84	22.3	78	-12	-17.8	174	92
172	82	22.2	76	-14	-20.2	172	90
170	80	21.4*	74	-16	-21.2	170	88
168	78	21.6	72	-18	-14.6	168	86
166	76	19.8	70	-20	-16.8	166	84
164	74	21.5	68	-22	-13.3	164	82
162	72	22.5	66	-24	-10.7	162	80
160	70	20.4	64	-26	-9.3	160	78
158	68	20.4	62	-28	-10.2	158	76
156	66	20.1	60	-30	-9.4	156	74
154	64	19.7	58	-32	-7.8	154	72
152	62	18.9*	56	-34	-9.3	152	70
150	60	18.2	54	-36	-10.1	150	68
148	58	15.7	52	-38	-9.7	148	66
146	56	18.9	50	-40	-8.1	146	64
144	54	15.1	48	-42	-5.2	144	62
142	52	13.9	46	-44	-7.6	142	60
140	50	10.7	44	-46	-6.4	140	58
138	48	42	42	-48	-4.1	138	56
136	46	12.8	40	-50	-3.8	136	54
134	44	12.5	38	-52	-3.9	134	52
132	42	9.2*	36	-54	-3.8	132	50
130	40	5.9	34	-56	-3.6	130	48
128	38	8.4	32	-58	-3.7	128	46
126	36	6.8	30	-60	-2.0	126	44
124	34	6.7	28	-62	-2.9	124	42
122	32	26	26	-64	-1.7	122	40
120	30	9.0	24	-66	-1.3	120	38
118	28	19.3	22	-68	-1.5	118	36
116	26	12.7	20	-70	-2.1	116	34
114	24	19.0	18	-72	-1.1	114	32
112	22	13.8	16	-74	-1.2	112	30
110	20	9.4	14	-76	-1.3	110	28
108	18	12.5	12	-78	-1.7	108	26
106	16	14.9	10	-80	-1.6	106	24
104	14	18.3				104	22

\* = Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

Flyby (Run) Number: 11		Date: 23 SEP 1990 (Day of Year: 266)		Abeam Time: 8:29:07 (MDT)	
AIRCRAFT DATA					
Configuration: Landing	Glide Slope: 0 deg.	Flaps: 40 deg.	Air Temperature: 8.5 °C	Gross Weight: 131,000 lbs.	
		Indicated Air Speed: 120 kts		Altitude: 600 ft AGL	
METEOROLOGICAL DATA		Atmospheric Stability: Stable			
Wind Speed: 8.0 knts	Wind Direction: 53 deg.	(200 ft Sensor Level)			
DOWNWIND VORTEX CHARACTERISTICS		Estimated Core Radius: (O) ft			
Maximum Velocity: (O) fpm	Age: (O) s	Advection Rate: (O) fpm	Tower Penetration Height: (O) ft AGL		
Descent Rate: (O) fpm					
UPWIND VORTEX CHARACTERISTICS		Estimated Core Radius: (O) ft			
Maximum Velocity: (O) fpm	Age: (O) s	Advection Rate: (O) fpm	Tower Penetration Height: (O) ft AGL		
Descent Rate: (O) fpm					
Downwind Vortex Tangential Velocities					
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	Upwind Vortex Tangential Velocities
198	196	(O)	102	0	
194	192	(O)	100	0	
190	188	(O)	98	198	
186	184	(O)	94	196	
182	180	(O)	92	194	
178	176	(O)	88	192	
174	172	(O)	86	188	
170	168	(O)	84	186	
166	164	(O)	82	184	
162	160	(O)	80	182	
158	156	(O)	78	178	
154	152	(O)	76	176	
150	148	(O)	74	174	
146	144	(O)	72	172	
142	140	(O)	70	170	
138	136	(O)	68	168	
134	132	(O)	66	166	
130	128	(O)	64	164	
126	124	(O)	62	162	
122	120	(O)	60	160	
118	116	(O)	58	158	
114	112	(O)	56	156	
110	108	(O)	54	154	
106	104	(O)	52	152	
		(M) = Missing	(D) = Vortex dissipated upwind of tower	(O) = No vortex (Flyby flown for remote sensing systems)	(P) = Vortex passed over top of tower



Flyby (Run) Number: 13	Date: 23 SEP 1990 (Day of Year: 266)	Abeam Time: 8:43:01 (MDT)
Configuration: Takeoff Glide Slope: 0 deg.	AIRCRAFT DATA Flaps: 15 deg. Indicated Air Speed: 142 kts	Gross Weight: 128,500 lbs. Altitude: 600 ft AGL
Wind Speed: 7.0 knts	Wind Direction: 49 deg.	Air Temperature: 8.4 °C
Maximum Velocity: (O) fpm Descent Rate: (O) fpm	Agc: (O) s Advection Rate: (O) fpm	Atmospheric Stability: Stable
Maximum Velocity: (O) fpm Descent Rate: (O) fpm	Agc: (O) s Advection Rate: (O) fpm	Estimated Core Radius: (O) ft Tower Penetration Height: (O) ft AGL
Downwind Vortex Tangential Velocities	Upwind Vortex Characteristics	Tower Penetration Height: (O) ft AGL
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)
198	102	198
196	100	196
194	98	194
192	96	192
188	92	190
186	90	188
184	88	186
182	86	184
180	84	182
178	82	180
176	80	178
174	78	176
172	76	174
170	74	172
168	72	170
166	70	168
164	68	166
162	66	164
160	64	162
158	62	160
156	60	158
154	58	156
152	56	154
150	54	152
148	52	150
146	50	148
144	48	146
142	46	144
140	44	142
138	42	140
136	40	138
134	38	136
132	36	134
130	34	132
128	32	130
126	30	128
124	28	126
122	26	124
120	24	122
118	22	120
116	20	118
114	18	116
112	16	114
110	14	112
108	12	108
106	10	106
104	04	104

(\*P) = Vortex passed over top of tower

(M) = Missing

(D) = Vortex dissipated upwind of tower

\* = Estimated

(P) = Vortex passed over top of tower

(M) = Missing

(D) = Vortex dissipated upwind of tower

\* = Estimated

Flyby (Run) Number: 14	UAL B727-222	Absent Time: 8:49:27 (MDT)				
Configuration: Takeoff Glide Slope: 0 deg.	Flaps: 15 deg. Indicated Air Speed: 142 kts	Gross Weight: 127,500 lbs. Altitude: 260 ft AGL				
Wind Speed: 8.4 kts	Wind Direction: 46 deg.	Atmospheric Stability: Stable				
Maximum Velocity: (M) fps Descent Rate: (M) ips	Age: (M) s Advection Rate: (M) ips	Estimated Core Radius: (M) ft Tower Penetration Height: (M) ft AGL				
Downwind Vortex Velocities	Upwind Vortex Characteristics	Tower Penetration Height: (M) ft AGL				
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)
198	(M)	102	(M)	198	(M)	(M)
196	(M)	100	(M)	196	(M)	(M)
194	(M)	98	(M)	194	(M)	(M)
192	(M)	96	(M)	192	(M)	(M)
190	(M)	94	(M)	190	(M)	(M)
188	(M)	92	(M)	188	(M)	(M)
186	(M)	90	(M)	186	(M)	(M)
184	(M)	88	(M)	184	(M)	(M)
182	(M)	86	(M)	182	(M)	(M)
180	(M)	84	(M)	180	(M)	(M)
178	(M)	82	(M)	178	(M)	(M)
176	(M)	80	(M)	176	(M)	(M)
174	(M)	78	(M)	174	(M)	(M)
172	(M)	76	(M)	172	(M)	(M)
170	(M)	74	(M)	170	(M)	(M)
168	(M)	72	(M)	168	(M)	(M)
166	(M)	70	(M)	166	(M)	(M)
164	(M)	68	(M)	164	(M)	(M)
162	(M)	66	(M)	162	(M)	(M)
160	(M)	64	(M)	160	(M)	(M)
158	(M)	62	(M)	158	(M)	(M)
156	(M)	60	(M)	156	(M)	(M)
154	(M)	58	(M)	154	(M)	(M)
152	(M)	56	(M)	152	(M)	(M)
150	(M)	54	(M)	150	(M)	(M)
148	(M)	52	(M)	148	(M)	(M)
146	(M)	50	(M)	146	(M)	(M)
144	(M)	48	(M)	144	(M)	(M)
142	(M)	46	(M)	142	(M)	(M)
140	(M)	44	(M)	140	(M)	(M)
138	(M)	42	(M)	138	(M)	(M)
136	(M)	40	(M)	136	(M)	(M)
134	(M)	38	(M)	134	(M)	(M)
132	(M)	36	(M)	132	(M)	(M)
130	(M)	34	(M)	130	(M)	(M)
128	(M)	32	(M)	128	(M)	(M)
126	(M)	30	(M)	126	(M)	(M)
124	(M)	28	(M)	124	(M)	(M)
122	(M)	26	(M)	122	(M)	(M)
120	(M)	24	(M)	120	(M)	(M)
118	(M)	22	(M)	118	(M)	(M)
116	(M)	20	(M)	116	(M)	(M)
114	(M)	18	(M)	114	(M)	(M)
112	(M)	16	(M)	112	(M)	(M)
110	(M)	14	(M)	110	(M)	(M)
108	(M)	12	(M)	108	(M)	(M)
106	(M)	10	(M)	106	(M)	(M)
104	(M)	8	(M)	104	(M)	(M)

(P) = Vortex passed over top of tower

(O) = No vortex (Flyby) flown for remote sensing systems

= Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

Flyby/Run Number: 15	Date: 23 SEP 1990 (Day of Year: 266)	Abeam Time: 8:55:33 (MDT)																																													
Configuration: Landing Glide Slope: 0 deg.	AIRCRAFT DATA Flaps: 40 deg. Indicated Air Speed: 121 kts	Gross Weight: 126,500lbs. Altitude: 600 ft AGL																																													
Wind Speed: 8.5 kts	Wind Direction: 41 deg. (200 ft Sensor Level)	Air Temperature: 9.4 °C Atmospheric Stability: Stable																																													
Maximum Velocity: (O) fps Descent Rate: (O) fpm	DOWNTWIND VORTEX CHARACTERISTICS Agv.: (O) s Advection Rate: (O) fps	METEOROLOGICAL DATA Estimated Core Radius: (O) ft Tower Penetration Height: (O) ft AGL																																													
Maximum Velocity: (O) fps Descent Rate: (O) fpm	UPWIND VORTEX CHARACTERISTICS Agv.: (O) s Advection Rate: (O) fps	Tower Penetration Height: (O) ft AGL																																													
Downwind Vortex Tangential Velocities	Upwind Vortex Tangential Velocities	Upwind Vortex Tangential Velocities																																													
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)																																							
198	196	194	192	190	188	186	184	182	180	178	176	174	172	170	168	166	164	162	160	158	156	154	152	150	148	146	144	142	140	138	136	134	132	130	128	126	124	122	120	118	116	114	112	110	108	106	104
196	194	192	190	188	186	184	182	180	178	176	174	172	170	168	166	164	162	160	158	156	154	152	150	148	146	144	142	140	138	136	134	132	130	128	126	124	122	120	118	116	114	112	110	108	106	104	
194	192	190	188	186	184	182	180	178	176	174	172	170	168	166	164	162	160	158	156	154	152	150	148	146	144	142	140	138	136	134	132	130	128	126	124	122	120	118	116	114	112	110	108	106	104		
192	190	188	186	184	182	180	178	176	174	172	170	168	166	164	162	160	158	156	154	152	150	148	146	144	142	140	138	136	134	132	130	128	126	124	122	120	118	116	114	112	110	108	106	104			
190	188	186	184	182	180	178	176	174	172	170	168	166	164	162	160	158	156	154	152	150	148	146	144	142	140	138	136	134	132	130	128	126	124	122	120	118	116	114	112	110	108	106	104				
188	186	184	182	180	178	176	174	172	170	168	166	164	162	160	158	156	154	152	150	148	146	144	142	140	138	136	134	132	130	128	126	124	122	120	118	116	114	112	110	108	106	104					
186	184	182	180	178	176	174	172	170	168	166	164	162	160	158	156	154	152	150	148	146	144	142	140	138	136	134	132	130	128	126	124	122	120	118	116	114	112	110	108	106	104						
184	182	180	178	176	174	172	170	168	166	164	162	160	158	156	154	152	150	148	146	144	142	140	138	136	134	132	130	128	126	124	122	120	118	116	114	112	110	108	106	104							
182	180	178	176	174	172	170	168	166	164	162	160	158	156	154	152	150	148	146	144	142	140	138	136	134	132	130	128	126	124	122	120	118	116	114	112	110	108	106	104								
180	178	176	174	172	170	168	166	164	162	160	158	156	154	152	150	148	146	144	142	140	138	136	134	132	130	128	126	124	122	120	118	116	114	112	110	108	106	104									
178	176	174	172	170	168	166	164	162	160	158	156	154	152	150	148	146	144	142	140	138	136	134	132	130	128	126	124	122	120	118	116	114	112	110	108	106	104										
176	174	172	170	168	166	164	162	160	158	156	154	152	150	148	146	144	142	140	138	136	134	132	130	128	126	124	122	120	118	116	114	112	110	108	106	104											
174	172	170	168	166	164	162	160	158	156	154	152	150	148	146	144	142	140	138	136	134	132	130	128	126	124	122	120	118	116	114	112	110	108	106	104												
172	170	168	166	164	162	160	158	156	154	152	150	148	146	144	142	140	138	136	134	132	130	128	126	124	122	120	118	116	114	112	110	108	106	104													
170	168	166	164	162	160	158	156	154	152	150	148	146	144	142	140	138	136	134	132	130	128	126	124	122	120	118	116	114	112	110	108	106	104														
168	166	164	162	160	158	156	154	152	150	148	146	144	142	140	138	136	134	132	130	128	126	124	122	120	118	116	114	112	110	108	106	104															
166	164	162	160	158	156	154	152	150	148	146	144	142	140	138	136	134	132	130	128	126	124	122	120	118	116	114	112	110	108	106	104																
164	162	160	158	156	154	152	150	148	146	144	142	140	138	136	134	132	130	128	126	124	122	120	118	116	114	112	110	108	106	104																	
162	160	158	156	154	152	150	148	146	144	142	140	138	136	134	132	130	128	126	124	122	120	118	116	114	112	110	108	106	104																		
160	158	156	154	152	150	148	146	144	142	140	138	136	134	132	130	128	126	124	122	120	118	116	114	112	110	108	106	104																			
158	156	154	152	150	148	146	144	142	140	138	136	134	132	130	128	126	124	122	120	118	116	114	112	110	108	106	104																				
156	154	152	150	148	146	144	142	140	138	136	134	132	130	128	126	124	122	120	118	116	114	112	110	108	106	104																					
154	152	150	148	146	144	142	140	138	136	134	132	130	128	126	124	122	120	118	116	114	112	110	108	106	104																						
152	150	148	146	144	142	140	138	136	134	132	130	128	126	124	122	120	118	116	114	112	110	108	106	104																							
150	148	146	144	142	140	138	136	134	132	130	128	126	124	122	120	118	116	114	112	110	108	106	104																								
148	146	144	142	140	138	136	134	132	130	128	126	124	122	120	118	116	114	112	110	108	106	104																									
146	144	142	140	138	136	134	132	130	128	126	124	122	120	118	116	114	112	110	108	106	104																										
144	142	140	138	136	134	132	130	128	126	124	122	120	118	116	114	112	110	108	106	104																											
142	140	138	136	134	132	130	128	126	124	122	120	118	116	114	112	110	108	106	104																												
140	138	136	134	132	130	128	126	124	122	120	118	116	114	112	110	108	106	104																													
138	136	134	132	130	128	126	124	122	120	118	116	114	112	110	108	106	104																														
136	134	132	130	128	126	124	122	120	118	116	114	112	110	108	106	104																															
134	132	130	128	126	124	122	120	118	116	114	112	110	108	106	104																																
132	130	128	126	124	122	120	118	116	114	112	110	108	106	104																																	
130	128	126	124	122	120	118	116	114	112	110	108	106	104																																		
128	126	124	122	120	118	116	114	112	110	108	106	104																																			
126	124	122	120	118	116	114	112	110	108	106	104																																				
124	122	120	118	116	114	112	110	108	106	104																																					
122	120	118	116	114	112	110	108	106	104																																						
120	118	116	114	112	110	108	106	104																																							
118	116	114	112	110	108	106	104																																								
116	114	112	110	108	106	104																																									
114	112	110	108	106	104																																										
112	110	108	106	104																																											
110	108	106	104																																												
108	106	104																																													
106	104																																														
104																																															

\* = Estimated      (D) = Vortex dissipated upwind of tower      (M) = Missing      (P) = No vortex [Flyby down for remote sensing systems]      (O) = Missing

UAL B727-222												
Flyby (Run) Number: 16			Date: 23 SEP 1990 [Day of Year: 266]									
AIRCRAFT DATA			Abeam Time: 9:01:08 (MDT)									
Configuration: Landing			Flaps: 40 deg.									
Glide Slope: 0 deg.	Indicated Air Speed: 120 kts		Gross Weight: 125,500 lbs.	Tower Penetration Height: 142 ft AGL								
Wind Speed: 6.4 kts	Wind Direction: 41 deg.		Altitude: 250 ft AGL	Atmospheric Stability: Neutral								
Maximum Velocity: 65.3 fps	Age: 19 s		Estimated Core Radius: 0.9 ft									
Descent Rate: 5.7 fps	Advection Rate: 8.3 fps		Tower Penetration Height: 126 ft AGL									
Maximum Velocity: 123.1 fps	Age: 26 s		Estimated Core Radius: 0.6 ft									
Descent Rate: 4.8 fps	Advection Rate: 8.5 fps		Tower Penetration Height: 126 ft AGL									
METEOROLOGICAL DATA (200 ft Sensor Level)												
DOWNWIND VORTEX CHARACTERISTICS												
Wind Speed: 6.4 kts	Age: 19 s		Estimated Core Radius: 0.9 ft									
Descent Rate: 5.7 fps	Advection Rate: 8.3 fps		Tower Penetration Height: 142 ft AGL									
Maximum Velocity: 123.1 fps	Age: 26 s		Estimated Core Radius: 0.6 ft									
Descent Rate: 4.8 fps	Advection Rate: 8.5 fps		Tower Penetration Height: 126 ft AGL									
UPWIND VORTEX CHARACTERISTICS												
Wind Speed: 6.4 kts	Age: 41 s		Estimated Core Radius: 0.9 ft									
Descent Rate: 5.7 fps	Advection Rate: 8.3 fps		Tower Penetration Height: 142 ft AGL									
Maximum Velocity: 123.1 fps	Age: 41 s		Estimated Core Radius: 0.6 ft									
Descent Rate: 4.8 fps	Advection Rate: 8.5 fps		Tower Penetration Height: 126 ft AGL									
TANGENTIAL VELOCITIES												
Sensor Height (ft)	Downwind Vortex	Upwind Vortex	Sensor Height (ft)	Upwind Vortex	Upwind Vortex Tangential Velocities							
Relative Height (ft)	Relative Height (ft)	Relative Height (ft)	Relative Height (ft)	Relative Height (ft)	Relative Height (ft)							
198	56	16.2	10.2	-10.2	-3.9							
196	52	17.2	10.0	-4.2	7.2							
194	50	19.5*	-9.6*	-9.1	-5.0							
192	48	9.4	4.6	-8.9	-7.7*							
190	46	17.1*	-7.1	-1.6	-6.6							
188	44	9.2	5.0	-3.2	-6.8							
186	42	14.4	-9.0	-7.8	-7.4							
184	40	14.3	8.8	-5.4	-8.5							
182	38	17.6	-8.6	-9.0	-9.0							
180	36	13.1	-8.4	-8.3	-8.8							
178	34	12.4	-8.2	-6.2	-8.0							
176	32	14.7*	-8.0	-6.8	-8.3							
174	30	17.0	7.8	-6.4	-7.4							
172	29	22.6*	7.6	-8.8	-8.8							
170	28	22.0*	7.4	-6.7	-7.2							
168	26	21.4	7.2	-8.4	-7.4							
166	24	20.8	7.0	-7.0	-7.4							
164	22	22.7*	6.8	-7.4	-7.4							
162	20	24.7	6.6	-6.2	-7.4							
160	18	28.5	6.4	-4.6	-7.4							
158	16	29.0*	6.2	-4.9	-7.4							
156	14	29.4	6.0	-3.3	-7.4							
154	12	30.3*	5.8	-3.3	-7.4							
152	10	31.2	5.6	-3.4	-7.4							
150	8	33.1	5.4	-3.6	-7.4							
148	6	33.7	5.2	-3.5	-7.4							
146	4	28.1	5.0	-3.6	-7.4							
144	2	36.9	4.8	-3.8	-7.4							
142	0	26.3	3.4	-3.8	-7.4							
140	-2	20.2	3.2	-1.0	-7.4							
138	-4	34.6	4.4	-3.6	-7.4							
136	-6	14.9	4.2	-3.6	-7.4							
134	-8	26.2	4.0	-3.4	-7.4							
132	-10	31.3	3.8	-3.5	-7.4							
130	-12	36.9	4.6	-3.6	-7.4							
128	-14	20.2	3.2	-1.0	-7.4							
126	-16	18.6*	3.0	-1.2	-7.4							
124	-18	17.1	2.8	-1.4	-7.4							
122	-20	18.0	2.6	-1.6	-7.4							
120	-22	14.5	2.4	-1.8	-7.4							
118	-24	12.1	2.2	-2.0	-7.4							
116	-26	1.2	2.0	-2.2	-7.4							
114	-28	14.4	1.8	-2.4	-7.4							
112	-30	11.2	1.6	-2.6	-7.4							
110	-32	9.0	1.4	-2.8	-7.4							
108	-34	10.4	1.2	-3.2	-7.4							
106	-36	10.7	1.0	-3.2	-7.4							
104	-38	9.9	1.0	-2.6	-7.4							

(P) = Vortex passed over top of tower

(O) = No vortex (Flyby flown for remote sensing systems)

(M) = Missing

= Estimated

Flyby/Run Number: 17	Date: 23 SEP 1990 (Day of Year: 266)	Abeam Time: 9:08:01 (MDT)
Configuration: Holding Glide Slope: 0 deg.	AIRCRAFT DATA Flaps: 0 deg. Indicated Air Speed: 205 kts	Gross Weight: 124,000 lbs. Altitude: 250 ft AGL
Wind Speed: 10.6 kts	Wind Direction: 30 deg.	Air Temperature: 11.7 °C
Maximum Velocity: (O) fpm Descent Rate: (O) fpm	Downwind Vortex Characteristics Age: (O) s Advection Rate: (O) fpm	Atmospheric Stability: Stable
Maximum Velocity: (O) fpm Descent Rate: (O) fpm	Upwind Vortex Characteristics Age: (O) s Advection Rate: (O) fpm	Estimated Core Radius: (O) ft Tower Penetration Height: (O) ft AGL
Sensor Height (ft)	Relative Height (ft)	Relative Height (ft)
198	196	198
194	192	194
190	188	192
186	184	190
182	180	188
178	176	186
174	172	178
170	168	176
166	164	174
162	160	172
158	156	170
154	152	168
150	148	166
146	144	164
142	140	162
138	136	160
134	132	158
130	128	156
126	124	154
122	120	152
118	116	148
114	112	146
110	108	144
106	104	142
104		140

\* = Estimated (D) = Vortex dissipated upwind of tower (M) = Missing (O) = No vortex (P) = Flyby flown for remote sensing systems

(P) = Vortex passed over top of tower (I) = Atmospheric stability index

UAL B727-2222		Date: 23 SEP 1990 (Day of Year: 266)	Abeam Time: 9:43:30 (MDT)
<b>AIRCRAFT DATA</b>		Gross Weight: 123,000 lbs.	
Configuration: Holding	Glide Slope: 0 deg.	Altitude: 250 ft AGL	
Flaps: 0 deg.	Indicated Air Speed: 205 kts		
Wind Speed: 6.5 kts	Wind Direction: 29 deg.	Air Temperature: 10.7 °C	Atmospheric Stability: Neutral
Maximum Velocity: 105.8 fps	Age: 26 s	Downwind Vortex Characteristics	Estimated Core Radius: 0.1 ft
Descent Rate: 3.4 ips	Advection Rate: 7.0 ips	Upwind Vortex Characteristics	Tower Penetration Height: 162 ft AGL
Maximum Velocity: 201.4 fps	Age: 32 s	Downwind Vortex Tangential Velocities	Estimated Core Radius: 0.1 ft
Descent Rate: 2.9 ips	Advection Rate: 7.7 ips	Upwind Vortex Tangential Velocities	Tower Penetration Height: 158 ft AGL
Downwind Vortex Tangential Velocities		Sensor Height (ft)	Relative Height (ft)
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
198	36	18.6	102
196	34	18.0	100
194	32	16.4	98
192	30	15.7	94
190	28	14.1	88
188	26	13.3	92
186	24	16.2	90
184	22	16.3	88
182	20	14.5	86
180	18	13.7	84
178	16	16.6	82
176	14	18.9	80
174	12	20.6	78
172	10	19.5	76
170	8	21.9	74
168	6	24.3	72
166	4	26.7	70
164	2	59.2	68
162	0	-105.8	66
160	-2	-32.4	64
158	-4	-18.9	62
156	-6	-14.3	60
154	-8	-9.4	58
152	-10	-12.6	56
150	-12	-9.5	54
148	-14	-6.4	52
146	-16	-6.9	50
144	-18	-6.9	48
142	-20	-3.3	46
140	-22	-2.8	44
138	-24	-3.3	42
136	-26	-4.2	40
134	-28	-2.0	38
132	-30	-3.6	36
130	-32	-4.6	34
128	-34	-0.1	32
126	-36	0.6	30
124	-38	1.0	28
122	-40	0.5	26
120	-42	-0.4	24
118	-44	-2.3	22
116	-46	-0.7	20
114	-48	-1.5	18
112	-50	-1.8	16
110	-52	-1.9	14
108	-54	-2.1	12
106	-56	-2.0	10
104	-58	0.4	104

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

\* = Estimated

Flyby [Run] Number: 19	Date: 23 SEP 1990 [Day of Year: 266]	AIRCRAFT DATA	Gross Weight: 122,500lbs. Altitude: 250 ft AGL
Configuration: Landing Glide Slope: 0 deg.	Flaps: 40 deg. Indicated Air Speed: 114 kts		
Wind Speed: 6.2 kts	Wind Direction: 29 deg.	AIR TEMPERATURE	Atmospheric Stability: Neutral
Maximum Velocity: (O) fpm Descent Rate: (O) fpm	(200 ft Sensor Level)	AIR TEMPERATURE	11.4 °C
Maximum Velocity: (O) fpm Descent Rate: (O) fpm		ADDITIONAL METEOROLOGICAL DATA	
Downwind Vortex Tangential Velocities	Age: (O) s Advection Rate: (O) fpm	Upwind Vortex Characteristics	Estimated Core Radius: (O) ft Tower Penetration Height: (O) ft AGL
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Estimated Core Radius: (O) ft Tower Penetration Height: (O) ft AGL
198	194	102	198
192	190	98	196
188	186	94	194
184	182	92	192
180	178	90	190
176	174	88	188
172	170	86	186
168	166	84	184
164	162	82	182
160	158	80	180
156	154	78	178
152	150	76	176
148	146	74	174
144	142	72	172
140	138	70	170
136	134	68	168
132	130	66	166
128	126	64	164
124	122	62	162
120	118	60	160
116	114	58	158
112	110	56	156
108	106	54	154
104		52	152
		50	150
		48	148
		46	146
		44	144
		42	142
		40	140
		38	138
		36	136
		34	134
		32	132
		30	130
		28	128
		26	126
		24	124
		22	122
		20	120
		18	118
		16	116
		14	114
		12	112
		10	110
			108
			106
			104

= Estimated (D) = Vortex dissipated upwind of tower (M) = Missing (O) = No vortex (Flyby flown for remote sensing systems) (P) = Vortex passed over top of tower

UAL B727-222						
Date: 23 SEP 1990 (Day of Year: 266)						Absent Time: 9:29:13 (MDT)
<b>AIRCRAFT DATA</b>						
Flaps: 40 deg, 114 kts						Gross Weight: 121,000 lbs.
Indicated Air Speed: 114 kts						Altitude: 250 ft AGL
<b>METEOROLOGICAL DATA</b>						
(200 ft Sensor Level)						Tower Penetration Height: 98 ft AGL
Wind Speed: 6.5 kts						
Wind Direction: 33 deg.						Atmospheric Stability: Unstable
Maximum Velocity: 120.2 fps						
Descent Rate: 3.5 fps						Estimated Core Radius: 1.1 ft
Wind Speed: 6.5 kts						
Wind Direction: 33 deg.						Tower Penetration Height: 98 ft AGL
Maximum Velocity: 68.7 fps						
Descent Rate: 5.4 fps						Atmospheric Stability: 12.0 °C
Wind Speed: 6.5 kts						
Wind Direction: 33 deg.						Estimated Core Radius: 0.2 ft
Maximum Velocity: 120.2 fps						
Descent Rate: 3.5 fps						Tower Penetration Height: 114 ft AGL
<b>DOWNWIND VORTEX CHARACTERISTICS</b>						
Age: 28 s						Estimated Core Radius: 1.1 ft
Advection Rate: 7.0 ips						Tower Penetration Height: 98 ft AGL
<b>UPWIND VORTEX CHARACTERISTICS</b>						
Age: 39 s						Atmospheric Stability: 12.0 °C
Advection Rate: 6.7 ips						Estimated Core Radius: 0.2 ft
<b>Downwind Vortex Tangential Velocities</b>						
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)
198	100	13.6	102	4	39.9	198
196	98	12.3	100	2	40.6*	196
194	96	12.5	98	0	-68.7	194
192	94	15.4	96	-2	-48.0	192
190	92	14.4	94	-4	-36.0	190
188	90	12.8	92	-6	-30.9	188
186	88	16.3	90	-8	-24.9	186
184	86	12.9	88	-10	-20.9	184
182	84	13.8	86	-12	-18.7	182
180	82	12.2	84	-14	-18.9	180
178	80	12.7	82	-16	-15.7	178
176	78	11.3	80	-18	-15.6	176
174	76	12.6	78	-20	-16.0	174
172	74	12.0	76	-22	-13.8	172
170	72	11.8*	74	-24	-12.2	170
168	70	11.6	72	-26	-12.6	168
166	68	11.4	70	-28	-11.3	166
164	66	12.3	68	-30	-12.0	164
162	64	12.3	66	-32	-12.6	162
160	62	12.0	64	-34	-9.5	160
158	60	12.2	62	-36	-15.6	158
156	58	13.1	60	-38	-6.6	156
154	56	12.5	58	-40	-6.6	154
152	54	13.5	56	-42	-8.1	152
150	52	13.6	54	-44	-9.0	150
148	50	15.8	52	-46	-7.4	148
146	48	20.0	50	-48	-5.2	146
144	46	16.0	48	-50	-6.0	144
142	44	15.3	46	-52	-6.8	142
140	42	13.9	44	-54	-4.9	140
138	40	14.4	42	-56	-4.0	138
136	38	17.3	40	-58	-3.3	136
134	36	15.4*	38	-60	-3.8	134
132	34	13.5	36	-62	-3.4	132
130	32	10.9	34	-64	-3.4	130
128	30	9.1	32	-66	-3.4	128
126	28	4.9	30	-68	-3.7	126
124	26	9.8	28	-70	-3.9	124
122	24	2.6	26	-72	-4.3	122
120	22	1.8	24	-74	-3.0	120
118	20	1.35	22	-76	-3.9	118
116	18	1.17	20	-78	-4.5	116
114	16	1.51	18	-80	-5.0	114
112	14	2.12	16	-82	-4.9	112
110	12	2.11*	14	-84	-4.7	110
108	10	1.08	12	-86	-4.9	108
106	8	2.05	10	-88	-4.6	106
104	6	3.9	6	-104	-104	104
		39.9		-10	-33.9	

\* = Estimated      (D) = Vortex dissipated upwind of tower      (M) = Missing

(O) = No vortex (Flyby flown for remote sensing systems)      (P) = Vortex passed over top of tower

Flyby (Run) Number: 21	Date: 23 SEP 1990 (Day of Year: 266)	Abeam Time: 9:36:03 (MDT)				
Configuration: Landing Glide Slope: 0 deg.	AIRCRAFT DATA Flaps: 30 deg. Indicated Air Speed: 119 kts	Gross Weight: 119,000 lbs. Altitude: 250 ft AGL				
Wind Speed: 8.3 kts	Wind Direction: 35 deg.	Air Temperature: 12.5 °C Atmospheric Stability: Unstable				
Maximum Velocity: (O) fps Descent Rate: (O) fpm	Age: (O) s Advection Rate: (O) fpm	Estimated Core Radius: (O) ft Tower Penetration Height: (O) ft AGL				
Maximum Velocity: (O) fps Descent Rate: (O) fpm	Age: (O) s Advection Rate: (O) fpm	Estimated Core Radius: (O) ft Tower Penetration Height: (O) ft AGL				
Maximum Velocity: (O) fps Descent Rate: (O) fpm	Age: (O) s Advection Rate: (O) fpm	Upwind Vortex Tangential Velocities				
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)
198	0	102	0	198	0	102
194	100	98	96	196	194	100
192	94	92	90	192	190	96
188	90	88	86	188	186	92
186	86	84	82	184	182	88
184	82	80	78	182	180	84
182	78	76	74	180	178	82
180	74	72	70	178	176	80
178	70	68	66	176	174	78
176	66	64	62	174	172	76
174	62	60	58	172	170	74
172	58	56	54	170	168	72
170	54	52	50	168	166	70
168	50	48	46	166	164	68
166	46	44	42	164	162	66
164	42	40	38	162	160	64
162	38	36	34	160	158	62
160	34	32	30	158	156	60
158	30	28	26	156	154	58
156	26	24	22	154	152	56
154	22	20	18	152	150	54
152	18	16	14	150	148	52
150	14	12	10	148	146	50
148	10	8	6	146	144	48
146	6	4	2	144	142	46
144	4	2	0	142	140	44
142	0	0	0	140	138	42
140	0	0	0	138	136	40
138	0	0	0	136	134	38
136	0	0	0	134	132	36
134	0	0	0	132	130	34
132	0	0	0	130	128	32
130	0	0	0	128	126	30
128	0	0	0	126	124	28
126	0	0	0	124	122	26
124	0	0	0	122	120	24
122	0	0	0	120	118	22
120	0	0	0	118	116	20
118	0	0	0	116	114	18
116	0	0	0	114	112	16
114	0	0	0	112	110	14
112	0	0	0	110	108	12
110	0	0	0	108	106	10
108	0	0	0	106	104	0
106	0	0	0	104	0	0
104	0	0	0	0	0	0

\* = Estimated      (D) = Vortex dissipated upwind of tower

(M) = Missing      (O) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

Flyby (Run) Number: 22		Date: 23 SEP 1990 (Day of Year: 266)	Abeam Time: 9:43:03 (MDT)
Configuration: Landing	AIRCRAFT DATA		
Glide Slope: 0 deg.	Flaps: 30 deg.	Gross Weight: 118 500 lbs.	
Descent Rate: 7.2 fpm	Indicated Air Speed: 118 kts	Altitude: 250 ft AGL	
Wind Speed: 9.2 kts	METEOROLOGICAL DATA (200 ft Sensor Level)	Air Temperature: 12.8 °C	Atmospheric Stability: Unstable
Maximum Velocity: 143.6 fpm	Wind Direction: 35 deg.	Age: 16 s	Estimated Core Radius: 0.5 ft
Descent Rate: 6.2 fpm	Age: 24 s	Advection Rate: 9.1 fpm	Tower Penetration Height: 134 ft AGL
Maximum Velocity: 146.7 fpm	Age: 24 s	Advection Rate: 8.7 fpm	Estimated Core Radius: 0.4 ft
Descent Rate: 7.2 fpm	DOWNWIND VORTEX CHARACTERISTICS		Tower Penetration Height: 102 ft AGL
Wind Speed: 9.2 kts	Downwind Vortex Tangential Velocities		
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
		V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)
198	64	24.2	102
196	62	23.2	100
194	60	23.5	98
192	58	24.7	96
190	56	24.8	94
188	54	25.0	92
186	52	22.6*	42
184	50	20.3	88
182	48	22.2	86
180	46	22.4	84
178	44	24.4	82
176	42	27.1	80
174	40	25.1	78
172	38	23.3	76
170	36	22.3	74
168	34	21.3	72
166	32	20.4	70
164	30	20.1	68
162	28	20.1	66
160	26	19.8	64
158	24	19.8	62
156	22	17.1	60
154	20	22.5	58
152	18	23.2	56
150	16	24.0	54
148	14	19.4	52
146	12	21.7	50
144	10	20.2	48
142	8	32.2	46
140	6	29.6	44
138	4	39.6	42
136	2	91.8	40
134	0	143.6	0
132	-2	75.5	36
130	-4	39.1	34
128	-6	-39.1	32
126	-8	-37.0	30
124	-10	-21.7	0
122	-12	-28.2	-28
120	-14	-29.2	-26
118	-16	-22.8	-24
116	-18	-20.0	-22
114	-20	-16.6	-20
112	-22	-16.0	-18
110	-24	-13.9	-14
108	-26	-14.6	-12
106	-28	-15.0	-10
104	-30	-14.9	-8

= Estimated (D) = Vortex dissipated upwind of tower (M) = Missing (O) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower (I) = Remote sensing system passed over top of tower

= Estimated

Business

$\langle \delta \rangle =$  No vortex [fly by flow] or remote sensing systems;

Flyby   Run Number: 24	Date: 23 SEP 1990 (Day of Year: 266)	Abeam Time: 9:55:45 (MDT)	
Configuration: Landing Glide Slope: 0 deg.	AIRCRAFT DATA Flaps: 30 deg. Indicated Air Speed: 119 kts	Gross Weight: 116,000 lbs. Altitude: 250 ft AGL	
Maximum Velocity: 100.4 fps Descent Rate: 4.1 fps	METEOROLOGICAL DATA (200 ft Sensor Level) Wind Direction: 36 deg. Age: 18 s Advection Rate: 7.4 fps	Atmospheric Stability: Unstable Estimated Core Radius: 1.1 ft Tower Penetration Height: 172 ft AGL	
Maximum Velocity: 90.4 fps Descent Rate: 5.0 fps	DOWNWIND VORTEX CHARACTERISTICS Wind Direction: 36 deg. Age: 22 s Advection Rate: 9.3 fps	Estimated Core Radius: 0.9 ft Tower Penetration Height: 140 ft AGL	
UPWIND VORTEX CHARACTERISTICS			
Downwind Vortex Tangential Velocities			
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
198	26	27.0	-7.0
194	22	24.9	-7.2
192	20	28.8	-2.0*
190	18	24.0	-3.0
188	16	25.1	-3.6
186	14	22.5	-8.0
184	12	16.7	-8.4
182	10	21.1	-8.6
180	8	16.5	-8.8
178	6	38.4	-8.2
176	4	50.4	-9.0
174	2	58.2	-9.4
172	0	72.0	-9.6
170	-2	76.0	-9.8
168	-4	74.0	-2.6
166	-6	40.0	-100.4
164	-8	43.4	-104
162	-10	25.7	-106
160	-12	24.2	-108
158	-14	19.0	-110
156	-16	19.8	-112
154	-18	19.7	-114
152	-20	19.6	-116
150	-22	16.3	-118
148	-24	15.7	-54
146	-26	17.4	-52
144	-28	17.6	-48
142	-30	8.2	-46
140	-32	8.5	-44
138	-34	8.5	-42
136	-36	8.1	-40
134	-38	6.3	-38
132	-40	5.2	-36
130	-42	4.0	-34
128	-44	4.2	-32
126	-46	4.5	-30
124	-48	7.3	-28
122	-50	8.8	-26
120	-52	8.1	-24
118	-54	5.2	-22
116	-56	4.1	-20
114	-58	4.5	-18
112	-60	2.9	-16
110	-62	3.2	-14
108	-64	2.4	-12
106	-66	2.8	-10
104	-68	3.2	-8

\* = Estimated      (D) = Vortex dissipated upwind of tower      (M) = Missing

(O) = No vortex (Flyby flown for remote sensing systems)      (P) = Vortex passed over top of tower

UAL B727-222									
Date: 23 SEP 1990 (Day of Year: 266)									Abeam Time: 10:03:25 (MDT)
AIRCRAFT DATA									
Configuration: Landing									Gross Weight: 114,500 lbs.
Glide Slope: -3 deg.									Altitude: 260 ft AGL
METEOROLOGICAL DATA									
Wind Speed: 9.1 kts									Atmospheric Stability: Unstable
Maximum Velocity: 235.8 fps									
Descent Rate: 6.0 fps									
Maximum Velocity: 179.6 fps									
Descent Rate: 5.1 fps									
DOWNDOWN VORTEX CHARACTERISTICS									
Age: 12 s									Estimated Core Radius: 0.3 ft
Advection Rate: 10.4 fps									Tower Penetration Height: 188 ft AGL
UPWIND VORTEX CHARACTERISTICS									
Age: 18 s									Estimated Core Radius: 0.2 ft
Advection Rate: 10.5 fps									Tower Penetration Height: 168 ft AGL
Downwind Vortex Tangential Velocities									
Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)
198	10	41.1	102	-86	0.3	198	-12.1	102	-66
196	8	50.3	100	-88	0.2	196	-11.9	100	-68
194	6	49.9	98	-90	0.1	194	-2.3*	98	-70
192	4	56.9	96	-92	0.1	192	24	12.3*	18.6
190	2	67.8	94	-94	0.1	190	22	13.0	20.9
188	0	-235.8	92	-96	-0.3	188	20	13.2	21.1
186	-2	-86.4	90	-98	-1.0	186	18	14.8	22.2
184	-4	-56.9	88	-100	-0.1	184	16	16.1*	22.9
182	-6	-59.9	86	-102	-0.8	182	14	17.4	22.9
180	-8	-38.9	84	-104	-0.4	180	12	18.8	22.5
178	-10	-35.2	82	-106	-0.1	178	10	22.7	22.4
176	-12	-26.6	80	-108	-1.3	176	8	25.8	22.1
174	-14	-24.6*	78	-110	0.6	174	6	26.7	22.7
172	-16	-22.6	76	-112	1.0	172	4	40.1	20.7
170	-18	-19.4*	74	-114	1.4	170	2	44.7	22.0
168	-20	-16.2	72	-116	1.9	168	0	17.9	21.9
166	-22	-13.0	70	-118	2.3	166	-2	15.4	21.9
164	-24	-13.1	68	-120	2.1	164	-4	69.1	22.6
162	-26	-12.3	66	-122	2.1	162	-6	43.8	22.1
160	-28	-12.3	64	-124	1.3	160	-8	45.1	21.9
158	-30	-14.6	62	-126	1.1	158	-10	41.0	21.9
156	-32	-10.9	60	-128	1.6	156	-12	31.7	22.3
154	-34	-7.6	58	-130	2.3	154	-14	28.3*	22.3
152	-36	-8.7	56	-132	1.6	152	-16	24.9	22.9
150	-38	-4.9	54	-134	1.6	150	-18	23.5	23.6
148	-40	-6.8	52	-136	1.5	148	-20	20.0	22.7
146	-42	-4.1	50	-138	1.5	146	-22	17.3*	21.1
144	-44	-2.3	48	-140	-0.4	144	-24	14.5	21.1
142	-46	-2.6	46	-142	-0.3	142	-26	6.8	22.4
140	-48	-2.2	44	-144	-0.2	140	-28	16.6	22.0
138	-50	-2.2	42	-146	0.9	138	-30	18.4*	22.0
136	-52	-4.4	40	-148	1.2	136	-32	20.2	22.8
134	-54	-6.5	38	-150	0.4	134	-34	15.7	24.3
132	-56	-6.6	36	-152	0.2	132	-36	19.3	21.8
130	-58	-4.9	34	-154	-0.1	130	-38	13.8	20.4
128	-60	-3.0	32	-156	-0.7	128	-40	17.1	22.1
126	-62	-2.5	30	-158	1.7	126	-42	16.4*	22.1
124	-64	-2.8	28	-160	1.0	124	-44	15.7	22.0
122	-66	-3.9	26	-162	1.4	122	-46	19.8	22.7
120	-68	-2.1	24	-164	0.9	120	-48	20.7	24
118	-70	-2.1	22	-166	1.2	118	-50	18.9	22
116	-72	-2.0	20	-168	0.9	116	-52	21.0	20
114	-74	-2.7	18	-170	3.1	114	-54	20.5	18
112	-76	-2.0	16	-172	3.7	112	-56	20.1	16
110	-78	0.6	14	-174	2.4	110	-58	23.3	14
108	-80	-0.6	12	-176	2.3	108	-60	23.0	12
106	-82	-0.6	10	-178	2.1	106	-62	23.1	10
104	-84	-0.5				104	-64	23.1	

(P) = Vortex passed over top of tower

(O) = No vortex (Flyby flown for remote sensing systems)

(M) = Missing

\* = Estimated

UAL B727-2222										Abeam Time: 10:10:35 (MDT)	
Date: 23 SEP 1990 (Day of Year: 266)											
<b>AIRCRAFT DATA</b>											
Flaps: 30 deg., 120 kts Indicated Air Speed: 120 kts										Gross Weight: 113,000 lbs. Altitude: 240 ft AGL	
<b>METEOROLOGICAL DATA</b>										Atmospheric Stability: Unstable	
(200 ft Sensor Level)										Estimated Core Radius: 0.4 ft Tower Penetration Height: 156 ft AGL	
										Estimated Core Radius: 0.3 ft Tower Penetration Height: 154 ft AGL	
Wind Speed: 8.5 kts										Wind Direction: 38 deg.	
Maximum Velocity: 202.8 fps										Air Temperature: 14.2 °C	
Descent Rate: 6.5 fps										Age: 13 s Advection Rate: 10.1 fps	
Maximum Velocity: 167.9 fps										Age: 18 s Advection Rate: 10.8 fps	
Descent Rate: 4.8 fps										Upwind Vortex Tangential Velocities	
Downwind Vortex Tangential Velocities										Upwind Vortex Tangential Velocities	
Sensor Height (ft)	Relative Height [ft]	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)
198	42	17.4	102	-54	-1.9	198	44	-6.7	102	-52	-20.6
196	40	18.2	100	-56	-2.6*	196	42	-8.8	100	-54	-20.0
194	38	20.1	98	-58	-3.3	194	40	-8.1	98	-56	-19.4
192	36	20.8*	96	-60	-3.6	192	38	-8.2	96	-58	-20.8
190	34	21.4	94	-62	-3.0	190	36	-8.9	94	-60	-22.5
188	32	20.7	92	-64	-2.8	188	34	-9.0	92	-62	-22.1
186	30	18.8	90	-66	-2.9	186	32	-13.4	90	-64	-22.5
184	28	16.9	88	-68	-3.0	184	30	-14.0	88	-66	-22.9
182	26	20.9	86	-70	-4.2	182	28	-17.9	86	-70	-23.6
180	24	23.5	84	-72	-4.5	180	26	-16.0	84	-72	-23.0
178	22	82	74	-74	-3.1	178	24	-15.6*	82	-74	-23.7
176	20	21.6	80	-76	-4.2	176	22	-15.1	80	-74	-21.2
174	18	18.3	78	-78	-4.2	174	20	-13.4	78	-76	-22.2
172	16	23.4	76	-80	-3.5	172	18	-7.0	76	-78	-22.5
170	14	27.2	74	-82	-3.7	170	16	-17.0*	74	-80	-23.0
168	12	31.0	72	-84	-4.4	168	14	-18.4	72	-82	-23.3
166	10	34.7	70	-86	-3.4	166	12	-19.0*	70	-84	-23.4
164	8	40.2	68	-88	-4.7	164	10	-19.7*	68	-86	-22.8
162	6	63.4	66	-90	-4.0	162	8	-20.4	66	-88	-23.4
160	4	62.9	64	-92	-3.4	160	6	-24.4	64	-90	-20.5
158	2	84.1	62	-94	-3.9	158	4	-43.5	62	-94	-24.0
156	0	-202.8	60	-96	-3.8	156	2	-63.9	60	-94	-21.8
154	-2	-97.2	58	-98	-3.3	154	0	-167.9	58	-96	-22.3
152	-4	-66.4	56	-100	-3.2	152	-2	-129.0	56	-98	-22.5
150	-6	-33.4	54	-102	-3.2	150	-4	-42.6	54	-100	-22.4
148	-8	-35.0	52	-104	-4.1	148	-6	-40.9*	52	-104	-21.4
146	-10	-30.2	50	-106	-4.1	146	-8	-39.7*	50	-106	-20.9
144	-12	-26.3	48	-108	-4.1	144	-10	-38.4	48	-106	-22.0
142	-14	-24.4	46	-110	-4.0	142	-12	-38.3	46	-106	-21.0
140	-16	-15.8	44	-112	-4.4	140	-14	-24.6	44	-110	-21.8
138	-18	-14.4	42	-114	-4.7	138	-16	-18.1	40	-114	-21.7
136	-20	-16.3	40	-116	-4.7	136	-18	-16.4	40	-116	-21.4
134	-22	-12.3	38	-118	-4.9	134	-20	-13.7	38	-118	-23.6
132	-24	-15.8	36	-120	-3.6	132	-22	-15.3	36	-120	-21.4
130	-26	-13.4	34	-122	-3.9	130	-24	-11.9	34	-120	-21.1
128	-28	-8.4	32	-124	-4.2	128	-26	-16.4*	32	-124	-20.2
126	-30	-7.5	30	-126	-4.8	126	-28	-16.4*	30	-126	-19.8
124	-32	-8.1	28	-128	-6.1	124	-30	-16.4	28	-128	-19.7
122	-34	-11.6	26	-130	-3.7	122	-32	-16.7*	26	-130	-15.7
120	-36	-11.2	24	-132	-2.6	120	-34	-17.0*	24	-132	-18.4
118	-38	-9.0	22	-134	-2.7	118	-36	-17.2	22	-134	-18.9
116	-40	-8.5	20	-136	-4.1	116	-38	-17.4	20	-136	-20.0
114	-42	-5.1*	18	-138	-3.5	114	-40	-19.4	18	-138	-18.8
112	-44	-1.6	16	-140	-4.4	112	-42	-18.1	16	-140	-18.0
110	-46	-3.3	14	-142	-2.1	110	-44	-18.7	14	-142	-18.1
108	-48	-3.4	12	-144	-5.6	108	-46	-18.4	12	-144	-17.9
106	-50	-5.4	10	-4.9	-0.9	106	-48	-21.2	10	-50	-22.9
104	-52	-5.4				104					

= Estimated    (D) = Vortex dissipated upwind of tower    (M) = Missing    (O) = No vortex [Flyby flown for remote sensing systems]    (P) = Vortex passed over top of tower

Flyby (Run) Number: 27	Date: 23 SEP 1990 (Day of Year: 266)	Abeam Time: 12:31:15 (MDT)												
Configuration: Landing Glide Slope: 0 deg.	AIRCRAFT DATA Flaps: 30 deg. Indicated Air Speed: 130 kts	Gross Weight: 143,500 lbs. Altitude: 230 ft AGL												
Wind Speed: 5.1 kts	Wind Direction: 43 deg.	Atmospheric Stability: Unstable												
Maximum Velocity: 130.8 fps Descent Rate: 9.2 fps	Age: 10 s Advection Rate: 8.1 fps	Estimated Core Radius: 0.7 ft Tower Penetration Height: 138 ft AGL												
Maximum Velocity: 182.6 fps Descent Rate: 8.1 fps	Age: 18 s Advection Rate: 8.0 fps	Estimated Core Radius: 0.2 ft Tower Penetration Height: 84 ft AGL												
DOWNDOWN VORTEX CHARACTERISTICS														
Sensor Height (ft)	Relative Height (ft)	Upwind Vortex Tangential Velocities												
		Sensor Height (ft)      Relative Height (ft)      Sensor Height (ft)      Relative Height (ft)      Sensor Height (ft)      Relative Height (ft)      Sensor Height (ft)      Relative Height (ft)												
198	60	15.5	102	-3.6	-4.0	198	114	2.2	-3.1*	-2.9	102	100	18	-11.6
196	58	16.3	100	-3.8	-3.5*	196	112	-8.4	-8.0	-3.0	98	98	16	-9.4*
194	56	21.3	98	-4.0	-2.9	194	110	-8.4	-8.0	-2.9	96	96	14	-12.9
192	54	20.6*	96	-4.2	-3.0	192	108	-7.6	-7.6	-3.0	94	94	12	-15.0
190	52	19.9	94	-4.4	-2.8	190	106	-7.6	-7.6	-2.8	92	92	10	-19.9
188	50	15.8	92	-4.6	-3.0	188	104	-5.9*	-5.9*	-3.0	90	90	8	-24.2
186	48	19.0	90	-4.8	-2.8	186	102	-4.3	-4.3	-2.8	88	88	4	-29.1
184	46	16.6	88	-5.0	-1.7	184	100	-4.3	-4.3	-1.7	86	86	4	-39.1
182	44	16.7	86	-5.2	-1.9	182	98	-4.7	-4.7	-1.9	84	84	2	-60.4
180	42	18.6	84	-5.4	-1.2	180	96	-7.3	-7.3	-1.2	82	82	0	-182.6
178	40	18.0	82	-5.6	-1.6	178	94	-5.1	-5.1	-1.6	80	80	-4	-68.5
176	38	24.3	80	-5.8	-0.2	176	92	-4.6	-4.6	-0.2	78	78	-6	-33.6
174	36	22.8	78	-6.0	-0.7	174	90	-6.1	-6.1	-0.7	76	76	-8	-34.8
172	34	24.9	76	-6.2	-0.4	172	88	-6.1	-6.1	-0.4	74	74	-10	-37.7
170	32	23.0*	74	-6.4	-1.4	170	86	-3.5	-3.5	-1.4	72	72	-12	-37.7
168	30	21.1	72	-6.6	-0.2	168	84	-0.7	-0.7	-0.2	70	70	-14	-30.9
166	28	20.2	70	-6.8	0.8	166	82	-0.6	-0.6	0.8	68	68	-4	-29.6
164	26	19.2	68	-7.0	0.1	164	80	-3.8	-3.8	0.1	66	66	-6	-29.7
162	24	16.8	66	-7.2	1.0	162	78	0.5	0.5	1.0	64	64	-20	-20.6
160	22	25.3	64	-7.4	0.4	160	76	-2.9	-2.9	0.4	62	62	-22	-18.7
158	20	27.8	62	-7.6	-0.8	158	74	-4.1	-4.1	-0.8	60	60	-24	-16.1
156	18	32.9	60	-7.8	0.5	156	72	-3.8	-3.8	0.5	58	58	-26	-13.2
154	16	36.9*	58	-8.0	0.9	154	70	-3.7	-3.7	0.9	56	56	-30	-15.6
152	14	40.8	56	-8.2	1.4	152	68	-4.9	-4.9	1.4	54	54	-30	-14.3
150	12	38.3	54	-8.4	-0.2	150	66	-4.0	-4.0	-0.2	52	52	-32	-11.0
148	10	41.7	52	-8.6	1.8	148	64	-4.0	-4.0	1.8	50	50	-34	-13.1
146	8	42.6*	50	-8.8	3.8	146	62	-4.1	-4.1	3.8	48	48	-36	-14.1
144	6	43.5	48	-9.0	1.6	144	60	-4.6	-4.6	1.6	46	46	-38	-12.6
142	4	44.0	46	-9.2	0.1	142	58	-4.1	-4.1	0.1	44	44	-40	-13.4
140	2	68.7	44	-9.4	-0.1	140	56	-4.3	-4.3	-0.1	42	42	-44	-10.5
138	0	130.8	42	-9.6	-0.2	138	54	-5.4	-5.4	-0.2	40	40	-44	-12.9
136	-2	-82.5	40	-9.8	0.5	136	52	-5.3	-5.3	0.5	38	38	-46	-14.4
134	-4	69.0	38	-10.0	-1.0	134	50	-3.3	-3.3	-1.0	36	36	-50	-12.6
132	-6	57.4	36	-102	-0.3	132	48	-2.1	-2.1	-0.3	34	34	-50	-13.7
130	-8	-34.1	34	-104	-0.9	130	46	-1.9	-1.9	-0.9	32	32	-54	-5.2
128	-10	-30.0	32	-106	-1.0	128	44	-2.4	-2.4	-1.0	30	30	-56	-13.8
126	-12	-18.9	30	-108	-1.0	126	42	-4.9	-4.9	-1.0	28	28	-58	-13.0
124	-14	-19.3	28	-110	-1.2	124	40	-4.9	-4.9	-1.2	26	26	-60	-12.4
122	-16	-2.2	26	-112	-1.8	122	38	-5.3	-5.3	-1.8	24	24	-62	-9.1
120	-18	-2.9	24	-114	-1.0	120	36	-4.9	-4.9	-1.0	22	22	-64	-11.8
118	-20	-9.4	22	-116	-1.5	118	34	-6.1	-6.1	-1.5	20	20	-66	-11.6
116	-22	-3.2	20	-118	-1.9	116	32	-5.8	-5.8	-1.9	18	18	-68	-11.4
114	-24	-2.4	18	-120	-2.8	114	30	-7.2	-7.2	-2.8	16	16	-70	-9.5
112	-26	-10.8	16	-122	-0.9	112	28	-9.2	-9.2	-0.9	14	14	-72	-10.1
110	-28	-11.2	14	-124	-1.7	110	26	-9.5	-9.5	-1.7	12	12	-74	-12.1
108	-30	-10.3	12	-126	-0.1	108	24	-7.4	-7.4	-0.1	10	10	-74	-12.1
106	-32	-2.1	10	-128	-1.7	106	22	-8.8	-8.8	-1.7	20	20	-8.8	-12.1
104	-34	-3.7												

(P) = Vortex passed over top of tower  
(O) = No vortex (Flyby) flown for remote sensing systems

\* = Estimated (D) = Vortex dissipated upwind of tower (M) = Missing

Flyby (Run) Number: 28		Date: 23 SEP 1990 (Day of Year: 266)		Abeam Time: 12:38:13 (MDT)					
<b>AIRCRAFT DATA</b>		Gross Weight: 142,000 lbs.		Altitude: 260 ft AGL					
Configuration: Landing		Flaps: 30 deg.		Indicated Air Speed: 132 kts					
Glide Slope: -3 deg.		Advection Rate: 6.6 fps		Atmospheric Stability: Unstable					
Wind Speed: 2.3 kts		Wind Direction: 45 deg.		Air Temperature: 19.7 °C					
Maximum Velocity: (D) 31.9 fps		Age: (D) 38 s		Estimated Core Radius: 0.8 ft					
Descent Rate: 2.4 fps		Advection Rate: (D) 6.6 fps		Tower Penetration Height: 168 ft AGL					
Maximum Velocity: (D) fps		Age: (D) s		Estimated Core Radius: (D) ft					
Descent Rate: (D) fps		Advection Rate: (D) fps		Tower Penetration Height: (D) ft AGL					
<b>METEOROLOGICAL DATA</b> [200 ft Sensor Level]									
<b>DOWNWIND VORTEX CHARACTERISTICS</b>									
Wind Direction: 45 deg.									
Air Temperature: 19.7 °C									
<b>UPWIND VORTEX CHARACTERISTICS</b>									
Wind Direction: 45 deg.									
Air Temperature: 19.7 °C									
<b>Downwind Vortex Tangential Velocities</b>									
Sensor Height (ft)	Relative Height (ft)	$V_{\theta}$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_{\theta}$ (fps)				
198	30	11.3	102	-6.6	-1.5				
196	28	11.6	100	-6.8*	-0.8*				
194	26	18.0	98	-7.0	-3.9				
192	24	17.3	96	-7.2	-2.4				
190	22	16.6	94	-7.4	-2.3				
188	20	14.0	92	-7.6	-1.1				
186	18	13.7	90	-7.8	-0.7				
184	16	13.3	88	-8.0	-2.4				
182	14	14.8	86	-8.2	-1.6				
180	12	12.9	84	-8.4	-1.5				
178	10	13.7	82	-8.6	-0.6				
176	8	14.3	80	-8.8	-0.1				
174	6	10.3	78	-9.0	-0.1*				
172	4	7.6	76	-9.2	0.1*				
170	2	8.6	74	-9.4	0.1*				
168	0	-31.9	72	-9.6	0.1*				
166	-2	-17.6	70	-9.8	1.1*				
164	-4	-14.8	68	-10.0	1.1*				
162	-6	-11.2	66	-10.2	1.1*				
160	-8	-6.6	64	-10.4	0.2*				
158	-10	-9.6	62	-10.6	0.2*				
156	-12	-6.9	60	-10.8	0.2*				
154	-14	-4.5	58	-11.0	0.2*				
152	-16	-6.4	56	-11.2	2.9*				
150	-18	-9.3	54	-11.4	2.9*				
148	-20	-8.0	52	-11.6	2.9*				
146	-22	-8.5	50	-11.8	2.9*				
144	-24	-7.3	48	-12.0	4.4*				
142	-26	-7.9	46	-12.2	4.4*				
140	-28	-5.9	44	-12.4	4.4*				
138	-30	-7.8	42	-12.6	4.4*				
136	-32	-4.6	40	-12.8	3.8				
134	-34	-6.3	38	-13.0	0.6*				
132	-36	-8.4	36	-13.2	0.6*				
130	-38	-5.3	34	-13.4	0.6*				
128	-40	-7.9	32	-13.6	0.1*				
126	-42	-6.4	30	-13.8	0.1*				
124	-44	-6.9	28	-14.0	0.1*				
122	-46	-6.3	26	-14.2	0.1*				
120	-48	-7.6	24	-14.4	0.3*				
118	-50	-7.0	22	-14.6	0.3*				
116	-52	-3.1	20	-14.8	0.3*				
114	-54	-9.2	18	-15.0	0.3*				
112	-56	-8.2	16	-15.2	0.3*				
110	-58	-10.5	14	-15.4	0.3*				
108	-60	-3.8	12	-15.6	0.3*				
106	-62	-5.3	10	-15.8	0.3*				
104	-64	-4.6	8	-16.0	1.04				

\* = Estimated      (D) = Vortex dissipated upwind of tower      (M) = Missing      (O) = No vortex [Flyby flown for remote sensing systems]      (P) = Vortex passed over top of tower

Flyby (Run) Number: 29

UAL B727-222

Date: 23 SEP 1990 (Day of Year: 266)

Abeam Time: 12:45:05 (MDT)

Configuration: Landing  
Glide Slope: -3 deg.

AIRCRAFT DATA

Flaps: 30 deg.

Indicated Air Speed: 132 kts

Gross Weight: 141,000 lbs.  
Altitude: 300 ft AGL

Wind Speed: 4.3 kts

Air Temperature: 20.2 °C

Wind Direction: 56 deg.

Atmospheric Stability: Unstable

Maximum Velocity: (D) f/s

Descent Rate: (P) f/s

Age: (P) s

Advection Rate: (P) f/s

Downwind Vortex Characteristics

Estimated Core Radius: (P) ft

Tower Penetration Height: (P) ft AGL

Descent Rate: (D) f/s

Age: (D) s

Advection Rate: (D) f/s

Upwind Vortex Characteristics

Estimated Core Radius: (D) ft

Tower Penetration Height: (D) ft AGL

Maximum Velocity: (D) f/s

Descent Rate: (D) f/s

Age: (D) s

Advection Rate: (D) f/s

Downwind Vortex Tangential Velocities

Estimated Core Radius: (D) ft

Tower Penetration Height: (D) ft AGL

Sensor Height (ft)

Relative Height (ft)

$V_\theta$  (f/s)

Downwind Vortex Tangential Velocities

Estimated Core Radius: (D) ft

Tower Penetration Height: (D) ft AGL

Sensor Height (ft)

Relative Height (ft)

$V_\theta$  (f/s)

Upwind Vortex Tangential Velocities

Estimated Core Radius: (D) ft

Tower Penetration Height: (D) ft AGL

Sensor Height (ft)

Relative Height (ft)

$V_\theta$  (f/s)

Upwind Vortex Tangential Velocities

Estimated Core Radius: (D) ft

Tower Penetration Height: (D) ft AGL

Sensor Height (ft)

Relative Height (ft)

$V_\theta$  (f/s)

Upwind Vortex Tangential Velocities

Estimated Core Radius: (D) ft

Tower Penetration Height: (D) ft AGL

Sensor Height (ft)

Relative Height (ft)

$V_\theta$  (f/s)

Upwind Vortex Tangential Velocities

Estimated Core Radius: (D) ft

Tower Penetration Height: (D) ft AGL

Sensor Height (ft)

Relative Height (ft)

$V_\theta$  (f/s)

Upwind Vortex Tangential Velocities

Estimated Core Radius: (D) ft

Tower Penetration Height: (D) ft AGL

Sensor Height (ft)

Relative Height (ft)

$V_\theta$  (f/s)

Upwind Vortex Tangential Velocities

Estimated Core Radius: (D) ft

Tower Penetration Height: (D) ft AGL

Sensor Height (ft)

Relative Height (ft)

$V_\theta$  (f/s)

Upwind Vortex Tangential Velocities

Estimated Core Radius: (D) ft

Tower Penetration Height: (D) ft AGL

Sensor Height (ft)

Relative Height (ft)

$V_\theta$  (f/s)

Upwind Vortex Tangential Velocities

Estimated Core Radius: (D) ft

Tower Penetration Height: (D) ft AGL

Sensor Height (ft)

Relative Height (ft)

$V_\theta$  (f/s)

Upwind Vortex Tangential Velocities

Estimated Core Radius: (D) ft

Tower Penetration Height: (D) ft AGL

Sensor Height (ft)

Relative Height (ft)

$V_\theta$  (f/s)

Upwind Vortex Tangential Velocities

Estimated Core Radius: (D) ft

Tower Penetration Height: (D) ft AGL

Sensor Height (ft)

Relative Height (ft)

$V_\theta$  (f/s)

Upwind Vortex Tangential Velocities

Estimated Core Radius: (D) ft

Tower Penetration Height: (D) ft AGL

Sensor Height (ft)

Relative Height (ft)

$V_\theta$  (f/s)

Upwind Vortex Tangential Velocities

Estimated Core Radius: (D) ft

Tower Penetration Height: (D) ft AGL

Sensor Height (ft)

Relative Height (ft)

$V_\theta$  (f/s)

Upwind Vortex Tangential Velocities

Estimated Core Radius: (D) ft

Tower Penetration Height: (D) ft AGL

Sensor Height (ft)

Relative Height (ft)

$V_\theta$  (f/s)

Upwind Vortex Tangential Velocities

Estimated Core Radius: (D) ft

Tower Penetration Height: (D) ft AGL

Sensor Height (ft)

Relative Height (ft)

$V_\theta$  (f/s)

Upwind Vortex Tangential Velocities

Estimated Core Radius: (D) ft

Tower Penetration Height: (D) ft AGL

Sensor Height (ft)

Relative Height (ft)

$V_\theta$  (f/s)

Upwind Vortex Tangential Velocities

Estimated Core Radius: (D) ft

Tower Penetration Height: (D) ft AGL

Sensor Height (ft)

Relative Height (ft)

$V_\theta$  (f/s)

Upwind Vortex Tangential Velocities

Estimated Core Radius: (D) ft

Tower Penetration Height: (D) ft AGL

Sensor Height (ft)

Relative Height (ft)

$V_\theta$  (f/s)

Upwind Vortex Tangential Velocities

Estimated Core Radius: (D) ft

Tower Penetration Height: (D) ft AGL

Sensor Height (ft)

Relative Height (ft)

$V_\theta$  (f/s)

Upwind Vortex Tangential Velocities

Estimated Core Radius: (D) ft

Tower Penetration Height: (D) ft AGL

Sensor Height (ft)

Relative Height (ft)

$V_\theta$  (f/s)

Upwind Vortex Tangential Velocities

Estimated Core Radius: (D) ft

Tower Penetration Height: (D) ft AGL

Sensor Height (ft)

Relative Height (ft)

$V_\theta$  (f/s)

Upwind Vortex Tangential Velocities

Estimated Core Radius: (D) ft

Tower Penetration Height: (D) ft AGL

\* = Estimated      (D) = Vortex dissipated upwind of tower      (M) = Missing      (I) = No vortex (Flyby flown for remote sensing systems)      (P) = Vortex passed over top of tower      (O) = Missing

UAL B727-222		Abeam Time: 12:51:53 (MDT)	
Date: 23 SEP 1990 (Day of Year: 266)			
Configuration: Landing Glide Slope: 0 deg.	AIRCRAFT DATA Flaps: 30 deg. Indicated Air Speed: 128 kts	Gross Weight: 140,000 lbs. Altitude: 240 ft AGL	
Wind Speed: 3.1 kts	Wind Direction: 78 deg.	Air Temperature: 20.3 °C	Atmospheric Stability: Unstable
Flyby (Run) Number: 30	METEOROLOGICAL DATA [200 ft Sensor Level]		
Maximum Velocity: [P] fpm	Age: [P] s	DOWNWIND VORTEX CHARACTERISTICS	
Descent Rate: [P] fpm	Advection Rate: [P] fpm		
Sensor Height (ft)	Relative Height (ft)	Upwind Vortex Characteristics	
V <sub>θ</sub> [fps]	Sensor Height (ft)		
[P]	102		
P	100		
P	98		
P	96		
P	94		
P	92		
P	90		
P	88		
P	86		
P	84		
P	82		
P	80		
P	78		
P	76		
P	74		
P	72		
P	70		
P	68		
P	66		
P	64		
P	62		
P	60		
P	58		
P	56		
P	54		
P	52		
P	50		
P	48		
P	46		
P	44		
P	42		
P	40		
P	38		
P	36		
P	34		
P	32		
P	30		
P	28		
P	26		
P	24		
P	22		
P	20		
P	18		
P	16		
P	14		
P	12		
P	10		
P	8		
P	6		
P	4		
P	2		
P	0		

= Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex

(F) = Flyby (down for remote sensing systems)

(P) = Vortex passed over top of tower

Flyby (Run) Number: 31	UAL B727-222	Date: 23 SEP 1990 (Day of Year: 266)	Abeam Time: 12:58:18 (MDT)
Configuration: Landing	AIRCRAFT DATA		
Glide Slope: -3 deg.	Flaps: 30 deg.	Gross Weight: 139,000 lbs.	
	Indicated Air Speed: 130 kts	Altitude: 250 ft AGL	
Wind Speed: 2.2 kts	Wind Direction: 244 deg.	Air Temperature: 20.3 °C	Atmospheric Stability: Unstable
Maximum Velocity: (D) fpm	Age: (D) s	Estimated Core Radius: (D) ft	
Descent Rate: (D) fpm	Advection Rate: (D) fpm	Tower Penetration Height: (D) ft AGL	
Maximum Velocity: (D) fpm	Age: (D) s	Estimated Core Radius: (D) ft	
Descent Rate: (D) fpm	Advection Rate: (D) fpm	Tower Penetration Height: (D) ft AGL	
METEOROLOGICAL DATA (200 ft Sensor Level)			
DOWNTWIND VORTEX CHARACTERISTICS			
Sensor Height (ft)	Relative Height (ft)	Downwind Vortex Tangential Velocities	Upwind Vortex Tangential Velocities
198	196	102	198
194	192	100	196
190	96	98	194
188	92	94	192
186	90	92	190
184	88	88	188
182	86	86	186
180	84	84	184
178	82	82	182
176	78	78	178
174	76	76	174
172	74	74	172
170	72	72	170
168	70	70	168
166	68	68	166
164	66	66	164
162	64	64	162
160	62	62	160
158	60	60	158
156	58	58	156
154	56	56	154
152	54	54	152
150	52	52	150
148	50	50	148
146	48	48	146
144	46	46	144
142	44	44	142
140	42	42	140
138	40	40	138
136	38	38	136
134	36	36	134
132	34	34	132
130	32	32	130
128	30	30	128
126	28	28	126
124	26	26	124
122	24	24	122
120	22	22	120
118	20	20	118
116	18	18	116
114	16	16	114
112	14	14	112
110	12	12	110
108	10	10	108
106	8	8	106
104	6	6	104

= Estimated (D) = Vortex dissipated upwind of tower (M) = Missing (O) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

Flyby (Run) Number: 32	UAL B727-222	Date: 23 SEP 1990 [Day of Year: 266]	Abeam Time: 13:04:58 (MDT)
Configuration: Landing Glide Slope: -3 deg.	AIRCRAFT DATA		
	Flaps: 30 deg.	Indicated Air Speed: 130 kts	Gross Weight: 137,500 lbs. Altitude: 380 ft AGL
Wind Speed: 0.9 kts	METEOROLOGICAL DATA (200 ft Sensor Level)	Wind Direction: 17 deg.	Atmospheric Stability: Unstable
Maximum Velocity: (D) fps	Age: (D) s	Air Temperature: 20.4 °C	Estimated Core Radius: (D) ft Tower Penetration Height: (D) ft AGL
Descent Rate: (D) fps	Advection Rate: (D) fps		Estimated Core Radius: (D) ft Tower Penetration Height: (D) ft AGL
Maximum Velocity: (D) fps	Age: (D) s	Upwind Vortex Characteristics	Estimated Core Radius: (D) ft Tower Penetration Height: (D) ft AGL
Descent Rate: (D) fps	Advection Rate: (D) fps		Upwind Vortex Tangential Velocities
Downwind Vortex Tangential Velocities			
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
		V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)
198	198	102	198
196	196	100	196
194	194	98	194
192	192	96	192
190	190	94	190
188	188	92	188
186	186	90	186
184	184	88	184
182	182	86	182
180	180	84	180
178	178	82	178
176	176	80	176
174	174	78	174
172	172	76	172
170	170	74	170
168	168	72	168
166	166	70	166
164	164	68	164
162	162	66	162
160	160	64	160
158	158	62	158
156	156	60	156
154	154	58	154
152	152	56	152
150	150	54	150
148	148	52	148
146	146	50	146
144	144	48	144
142	142	46	142
140	140	44	140
138	138	42	138
136	136	40	136
134	134	38	134
132	132	36	132
130	130	34	130
128	128	32	128
126	126	30	126
124	124	28	124
122	122	26	122
120	120	24	120
118	118	22	118
116	116	20	116
114	114	18	114
112	112	16	112
110	110	14	110
108	108	12	108
106	106	10	106
104	104	(D)	(D)

= Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

UAL B727-222		Date: 23 SEP 1990 (Day of Year: 266)	Abeam Time: 13:11:26(MDT)
<b>AIRCRAFT DATA</b>			
Configuration: Landing	Flaps: 40 deg.	Gross Weight: 136,000lbs.	
Glide Slope: 0 deg.	Indicated Air Speed: 126 kts	Altitude: 230 ft AGL	
Wind Speed: 2.1 kts	Wind Direction: 100 deg.	Air Temperature: 21.3 °C	Atmospheric Stability: Unstable
Maximum Velocity: 60.2 fps	<b>METEOROLOGICAL DATA</b>		
Descent Rate: 1.9 fps	(200 ft Sensor Level)		
Maximum Velocity: 23.4 fps	Age: 36 s		Estimated Core Radius: 0.6 ft
Descent Rate: 3.4 fps	Advection Rate: 7.0 fps		Tower Penetration Height: 162 ft AGL
Wind Speed: 2.1 kts	<b>DOWNDOWN VORTEX CHARACTERISTICS</b>		Estimated Core Radius: 1.3 ft
Maximum Velocity: 60.2 fps	(200 ft Sensor Level)		Tower Penetration Height: 64 ft AGL
Descent Rate: 1.9 fps	Age: 49 s		
Wind Speed: 2.1 kts	Advection Rate: 6.5 fps		
Maximum Velocity: 23.4 fps	<b>UPWIND VORTEX CHARACTERISTICS</b>		
Descent Rate: 3.4 fps	Age: 49 s		
Wind Speed: 2.1 kts	Advection Rate: 6.5 fps		
<b>Downwind Vortex Tangential Velocities</b>			
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
		$V_\theta$ (fps)	$V_\theta$ (fps)
198	36	9.4	-2.7
196	34	8.9	-6.0
194	32	6.9*	-6.4
192	30	11.2*	-5.7*
190	28	9.6	-6.8
188	26	6.8	-5.6
186	24	8.7	-7.0
184	22	12.2	-7.2
182	20	10.3	-7.4
180	18	16.7	-7.6
178	16	13.0	-7.8
176	14	10.9	-8.0
174	12	12.9	-8.2
172	10	10.6	-8.4
170	8	13.8*	-3.8
168	6	17.4	-2.0
166	4	21.0	-7.2
164	2	24.6	-7.0
162	0	26.8	-9.2
160	-2	6.6	-9.4
158	-4	-29.2	-9.8
156	-6	64	-0.8
154	-8	-22.0	-10.0
152	-10	-15.8	-102
150	-12	-19.0	-104
148	-14	-13.4	-106
146	-16	-12.5	-108
144	-18	-10.5	-110
142	-20	-7.7	-112
140	-22	-8.8	-113
138	-24	-5.9	-118
136	-26	-9.0	-120
134	-28	-9.8	-122
132	-30	-9.4	-124
130	-32	-4.8	-126
128	-34	-8.3	-128
126	-36	-8.3	-130
124	-38	-5.8*	-132
122	-40	-3.3	-134
120	-42	-3.8	-136
118	-44	-5.9	-138
116	-46	-2.8	-128
114	-48	-4.6	-130
112	-50	-1.8	-144
110	-52	-5.4	-146
108	-54	-5.3	-148
106	-56	-6.9	-150
104	-58	-6.9	-152

(\*P) = Vortex passed over top of tower

(M) = Missing

\* = Estimated

(D) = Vortex dissipated upwind of tower

(O) = No vortex (Flyby flown for remote sensing systems)

Flyby (Run) Number: 34	Date: 23 SEP 1990 (Day of Year: 266)	Absent Time: 13:17:46 (MDT)						
Configuration: Landing	AIRCRAFT DATA							
Glide Slope: 3 deg.	Flaps: 40 deg.	Gross Weight: 135,000 lbs.						
	Indicated Air Speed: 124 kts	Altitude: 270 ft ASL						
Wind Speed: 3.1 kts	METEOROLOGICAL DATA (200 ft Sensor Level)	Atmospheric Stability: Unstable						
	Wind Direction: 147 deg.	Air Temperature: 21.2 °C						
	DOWNWIND VORTEX CHARACTERISTICS							
Maximum Velocity: (D) fps	Age: (D) s	Estimated Core Radius: (D) ft						
Descent Rate: (D) fps	Advection Rate: (D) fps	Tower Penetration Height: (D) ft AGL						
Maximum Velocity: (D) fps	Age: (D) s	Estimated Core Radius: (D) ft						
Descent Rate: (D) fps	Advection Rate: (D) fps	Tower Penetration Height: (D) ft AGL						
Downwind Vortex Tangential Velocities	Upwind Vortex Characteristics	Upwind Vortex Tangential Velocities						
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)
198	196	(D)	102	100	(D)	198	196	(D)
194	192	(D)	98	96	(D)	194	192	(D)
190	188	(D)	94	92	(D)	190	188	(D)
186	184	(D)	90	88	(D)	186	184	(D)
182	180	(D)	88	86	(D)	182	180	(D)
178	176	(D)	84	82	(D)	178	176	(D)
174	172	(D)	80	78	(D)	174	172	(D)
170	168	(D)	76	74	(D)	170	168	(D)
166	164	(D)	72	70	(D)	166	164	(D)
162	160	(D)	68	66	(D)	162	160	(D)
158	156	(D)	64	62	(D)	158	156	(D)
154	152	(D)	60	58	(D)	154	152	(D)
150	148	(D)	56	54	(D)	150	148	(D)
146	144	(D)	52	50	(D)	146	144	(D)
142	140	(D)	48	46	(D)	142	140	(D)
138	136	(D)	44	42	(D)	138	136	(D)
134	132	(D)	40	38	(D)	134	132	(D)
130	128	(D)	36	34	(D)	130	128	(D)
126	124	(D)	32	30	(D)	126	124	(D)
122	120	(D)	28	26	(D)	122	120	(D)
118	116	(D)	24	22	(D)	118	116	(D)
114	112	(D)	20	18	(D)	114	112	(D)
110	108	(D)	16	14	(D)	110	108	(D)
106	104	(D)	12	10	(D)	106	104	(D)

\* = Estimated

(D) = Vortex dissipated upwind of tower (M) = Missing

(P) = Vortex passed over top of tower (O) = No vortex (Flyby flown for remote sensing systems)

UAL B727-222									
Date: 23 SEP 1990 (Day of Year: 266)									Abeam Time: 13:24:32 (MDT)
<b>AIRCRAFT DATA</b>									
Configuration: Takeoff									Gross Weight: 134,000lbs.
Glide Slope: 0 deg.									Altitude: 240 ft AGL
<b>METEOROLOGICAL DATA</b>									
(200 ft Sensor Level)									Aerospheric Stability: Unstable
Wind Speed: 2.0 kts									
Wind Direction: 146 deg.									Air Temperature: 21.4 °C
<b>DOWNTWIND VORTEX CHARACTERISTICS</b>									
Age: 38 s									Estimated Core Radius: 0.2 ft
Advection Rate: 3.8 fps									Tower Penetration Height: 70 ft AGL
<b>UPWIND VORTEX CHARACTERISTICS</b>									
Age: (D) s									Estimated Core Radius: (D) ft
Advection Rate: (D) fps									Tower Penetration Height: (D) ft AGL
<b>Downwind Vortex Velocities</b>									
Maximum Velocity: (D) fps									Tower Penetration Height: (D) ft AGL
Descent Rate: (D) fps									
<b>Upwind Vortex Velocities</b>									
Maximum Velocity: (D) fps									
Descent Rate: (D) fps									
Sensor Height [ft]	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height [ft]	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height [ft]	Relative Height (ft)	$V_\theta$ (fps)	Relative Height [ft]
198	128	7.6	102	32	18.6*	198	0	0	102
196	126	7.5	100	30	15.4*	196	0	0	98
194	124	9.3	98	26	12.1	192	0	0	96
192	122	8.7*	96	24	11.8	190	0	0	94
190	120	8.1	94	22	7.8*	188	0	0	92
188	118	6.8	92	20	3.7	186	0	0	88
186	116	10.5	90	18	7.6	184	0	0	86
184	114	8.5	88	16	7.3*	182	0	0	84
182	112	8.0	86	14	7.0	180	0	0	82
180	110	7.5	84	12	6.0	178	0	0	80
178	108	8.2	82	10	13.1	176	0	0	78
176	106	9.5	80	8	12.5	174	0	0	76
174	104	9.9	78	6	11.0	172	0	0	74
172	102	9.1	76	4	14.5	170	0	0	72
170	100	9.2*	74	2	21.0	168	0	0	70
168	98	9.3	72	0	-36.9	166	0	0	68
166	96	9.4	70	-2	-4.8	164	0	0	66
164	94	9.8	68	-4	-8.1	162	0	0	64
162	92	10.7	66	-6	-9.1	160	0	0	62
160	90	10.4	64	-8	-12.1	158	0	0	60
158	88	5.0	62	-10	-3.0	156	0	0	58
156	86	5.6	60	-12	-1.2	154	0	0	56
154	84	10.7	58	-14	-0.1	152	0	0	54
152	82	17.6	56	-16	0.3	150	0	0	52
150	80	10.4	54	-18	-0.3	148	0	0	50
148	78	13.3	52	-20	-0.9	146	0	0	48
146	76	13.9*	50	-22	-0.4	144	0	0	46
144	74	14.5	48	-24	-2.3	142	0	0	44
142	72	12.4	46	-26	-0.6	140	0	0	42
140	70	7.8	44	-28	-1.4	138	0	0	40
138	68	6.4	42	-30	-3.2	136	0	0	38
136	66	9.7	40	-32	-5.0	134	0	0	36
134	64	10.8*	38	-34	-4.3	132	0	0	34
132	62	11.9	36	-36	-7.2	130	0	0	32
130	60	11.2*	34	-38	-4.0	128	0	0	30
128	58	10.5	32	-40	-2.4	126	0	0	28
126	56	10.3	30	-42	-4.9	124	0	0	26
124	54	6.8	28	-44	-2.2	122	0	0	24
122	52	9.2*	26	-46	-1.4	120	0	0	22
120	50	11.5	24	-48	-0.7	118	0	0	20
118	48	13.4	22	-50	-0.5	116	0	0	18
116	46	11.8	20	-52	-2.5	114	0	0	16
114	44	12.2*	18	-54	-4.3	112	0	0	14
112	42	12.5	16	-56	-6.1	110	0	0	12
110	40	14.4	14	-58	-6.0	108	0	0	10
108	38	17.1*	12	-60	-6.0	106	0	0	10
106	36	19.7	10	-62	-6.0	104	0	0	10
104	34	14.3	0	-64	-6.0	102	0	0	10

(P) = Vortex passed over top of tower  
(O) = No vortex (F) = Vortex flown for remote sensing systems

\* = Estimated

Flyby (Run) Number: 36	UAL B727-222	Date: 23 SEP 1990 (Day of Year: 266)	Abeam Time: 13:30:21 (MDT)					
Configuration: Clean	AIRCRAFT DATA							
Glide Slope: 0 deg.	Flags: 0	Gross Weight: 132,000 lbs.						
Descent Rate: 4.1 fps	Indicated Air Speed: 250 kts	Altitude: 250 ft AGL						
Wind Speed: 3.6 kts	METEOROLOGICAL DATA	(200 ft Sensor Level)						
Maximum Velocity: 39.2 fps	Wind Direction: 221 deg.	Air Temperature: 20.9 °C	Atmospheric Stability: Unstable					
Descent Rate: (D) fps	Age: 45 s	Advection Rate: 3.2 fps	Estimated Core Radius: (D) ft					
Downwind Vortex Velocities	Upwind Vortex Characteristics	Advection Rate: (D) s	Tower Penetration Height: 66 ft AGL					
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)					
V <sub>θ</sub> (fps)	V <sub>θ</sub> (ft)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (ft)					
198	132	5.9	102	36	5.9	198	102	D
196	130	7.1	100	34	6.1°	196	100	D
194	128	8.3°	98	32	6.2	194	98	D
192	126	8.9	96	30	8.1	192	96	D
190	124	6.9	94	28	7.1	190	94	D
188	122	10.5	92	26	6.0	188	92	D
186	120	8.4	90	24	6.5	186	90	D
184	118	8.4	88	22	6.5	184	88	D
182	116	8.7	86	20	6.5	182	86	D
180	114	6.7	84	18	7.3	180	84	D
178	112	6.5	82	16	5.9	178	82	D
176	110	7.4	80	14	7.0	176	80	D
174	108	8.8	78	12	8.5	174	78	D
172	106	7.3	76	10	12.5	172	76	D
170	104	7.1°	74	8	16.4	170	74	D
168	102	6.9	72	6	19.0	168	72	D
166	100	6.7	70	4	24.3	166	70	D
164	98	7.4	68	2	30.4	164	68	D
162	96	9.7	66	0	-39.4	162	66	D
160	94	9.3	64	-2	-20.8	160	64	D
158	92	7.2	62	-4	-21.3	158	62	D
156	90	7.7	60	-6	-16.8	156	60	D
154	88	7.2	58	-8	-14.2	154	58	D
152	86	8.8	56	-10	-1.8	152	56	D
150	84	6.4	54	-12	-0.2	150	54	D
148	82	7.3	52	-14	-7.8	148	52	D
146	80	7.6	50	-16	-6.7	146	50	D
144	78	5.6	48	-18	-8.7	144	48	D
142	76	6.4	46	-20	-8.3	142	46	D
140	74	6.0	44	-22	-7.5	140	44	D
138	72	6.6	42	-24	-6.8	138	42	D
136	70	6.6	40	-26	-6.0	136	40	D
134	68	4.9	38	-28	-6.4	134	38	D
132	66	5.2	36	-30	-5.8	132	36	D
130	64	3.7	34	-32	-4.9	130	34	D
128	62	4.2	32	-34	-3.6	128	32	D
126	60	2.0	30	-36	-4.1	126	30	D
124	58	4.8	28	-38	-4.1	124	28	D
122	56	4.8	26	-40	-2.7	122	26	D
120	54	5.9	24	-42	-2.2	120	24	D
118	52	5.1	22	-44	0.1	118	22	D
116	50	6.4	20	-46	0.4	116	20	D
114	48	7.8	18	-50	-2.2	114	18	D
112	46	5.6	16	-52	-3.0	112	16	D
110	44	6.8	14	-52	-2.0	110	14	D
108	42	7.5	12	-54	-2.3	108	12	D
106	40	7.0	10	-56	-2.3	106	10	D
104	38	7.1	7	-56	-1.1	104	10	D

= Estimated (D) = Vortex dissipated upwind of tower (M) = Missing (O) = No vortex (P) = Flyby flown for remote sensing systems (P) = Vortex passed over top of tower

Flyby (Run) Number: 37		Date: 24 SEP 1990 (Day of Year: 267)		Abeam Time: 7:13:48 (MDT)					
AIRCRAFT DATA		Gross Weight: 142,500 lbs.		Altitude: 250 ft AGL					
Configuration: Landing		Flaps: 30 deg.		Atmospheric Stability: Stable					
Glide Slope: 0 deg.		Indicated Air Speed: 130 kts		Tower Penetration Height: 124 ft AGL					
Wind Speed: 8.5 kts		Wind Direction: 240 deg.		Air Temperature: 13.8 °C					
Maximum Velocity: 140.9 ips		Age: 21 s		Estimated Core Radius: 0.3 ft					
Descent Rate: 6.0 ips		Advection Rate: 8.1 ips		Tower Penetration Height: 116 ft AGL					
Maximum Velocity: 116.2 ips		Age: 30 s		Estimated Core Radius: 0.2 ft					
Descent Rate: 4.5 ips		Advection Rate: 7.8 ips		Tower Penetration Height: 116 ft AGL					
<b>METEOROLOGICAL DATA</b>									
(200 ft Sensor Level)									
<b>UPWIND VORTEX CHARACTERISTICS</b>		<b>DOWNTWIND VORTEX CHARACTERISTICS</b>		<b>Upwind Vortex Tangential Velocities</b>					
Wind Direction: 240 deg.		Age: 21 s		Sensor Height (ft)					
Advection Rate: 8.1 ips		Advection Rate: 7.8 ips		Relative Height (ft)					
Maximum Velocity: 116.2 ips		Age: 30 s		Sensor Height (ft)					
Descent Rate: 4.5 ips		Advection Rate: 7.8 ips		Relative Height (ft)					
<b>Downwind Vortex Tangential Velocities</b>									
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)				
198	74	102	-22	198	82				
196	72	100	-24	196	80				
194	70	98	-26	194	78				
192	68	96	-28	192	76				
190	66	94	-30	190	74				
188	64	92	-32	188	72				
186	62	90	-34	186	70				
184	60	88	-36	184	68				
182	58	86	-38	182	66				
180	56	84	-40	180	64				
178	54	82	-42	178	62				
176	52	80	-44	176	60				
174	50	78	-46	174	58				
172	48	76	-48	172	56				
170	46	74	-50	170	54				
168	44	72	-52	168	52				
166	42	70	-54	166	50				
164	40	68	-56	164	48				
162	38	66	-58	162	46				
160	36	64	-60	160	44				
158	34	62	-62	158	42				
156	32	60	-64	156	40				
154	30	58	-66	154	38				
152	28	56	-68	152	36				
150	26	54	-70	150	34				
148	24	52	-72	148	32				
146	22	50	-74	146	30				
144	20	48	-76	144	28				
142	18	46	-78	142	26				
140	16	44	-80	140	24				
138	14	42	-82	138	22				
136	12	40	-84	136	20				
134	10	38	-86	134	18				
132	8	36	-88	132	16				
130	6	43.9	-90	130	14				
128	4	34	-92	128	12				
126	2	32	-94	126	10				
124	0	30	-96	124	8				
122	-2	28	-98	122	6				
120	-4	26	-100	120	4				
118	-6	24	-102	118	2				
116	-8	22	-104	116	0				
114	-10	20	-106	114	-2				
112	-12	18	-108	112	-4				
110	-14	16	-110	110	-6				
108	-16	14	-112	108	-8				
106	-18	12	-114	106	-10				
104	-20	10	-116	104	-12				
= Estimated (D) = Vortex dissipated upwind of tower (M) = Missing (O) = No vortex (P) = Vortex flown for remote sensing systems (R) = Vortex passed over top of tower									

Flyby (Run) Number: 38

UAL B727-222

Date: 24 SEP 1990 (Day of Year: 267)

Abeam Time: 7:21:36 (MDT)

Configuration: Landing  
Glide Slope: -3 deg.

AIRCRAFT DATA

Flaps: 30 deg.  
Indicated Air Speed: 130 kts

Gross Weight: 141,500 lbs.  
Altitude: 230 ft AGL

Wind Speed: 8.0 kts

Wind Direction: 236 deg.

Air Temperature: 14.0 °C

Maximum Velocity: 152.9 fpm  
Descent Rate: 5.6 fpm

Maximum Velocity: 89.2 fpm  
Descent Rate: 4.4 fpm

Maximum Velocity: 89.2 fpm

Estimated Core Radius: 0.6 ft  
Tower Penetration Height: 118 ft AGL

Atmospheric Stability: Stable

METEOROLOGICAL DATA

[200 ft Sensor Level]

Estimated Core Radius: 0.5 ft  
Tower Penetration Height: 102 ft AGL

DOWNTWIND VORTEX CHARACTERISTICS

Age: 20 s  
Advection Rate: 8.8 fpm

UPWIND VORTEX CHARACTERISTICS

Age: 29 s  
Advection Rate: 8.2 fpm

Estimated Core Radius: 0.6 ft  
Tower Penetration Height: 118 ft AGL

Atmospheric Stability: Stable

Downwind Vortex Tangential Velocities

Upwind Vortex Tangential Velocities

Estimated Core Radius: 0.5 ft  
Tower Penetration Height: 102 ft AGL

Atmospheric Stability: Stable

Estimated Core Radius: 0.6 ft  
Tower Penetration Height: 118 ft AGL

Atmospheric Stability: Stable

Estimated Core Radius: 0.5 ft  
Tower Penetration Height: 102 ft AGL

Atmospheric Stability: Stable

Estimated Core Radius: 0.6 ft  
Tower Penetration Height: 118 ft AGL

Atmospheric Stability: Stable

Estimated Core Radius: 0.5 ft  
Tower Penetration Height: 102 ft AGL

Atmospheric Stability: Stable

Estimated Core Radius: 0.6 ft  
Tower Penetration Height: 118 ft AGL

Atmospheric Stability: Stable

Estimated Core Radius: 0.5 ft  
Tower Penetration Height: 102 ft AGL

Atmospheric Stability: Stable

Estimated Core Radius: 0.6 ft  
Tower Penetration Height: 118 ft AGL

Atmospheric Stability: Stable

Estimated Core Radius: 0.5 ft  
Tower Penetration Height: 102 ft AGL

Atmospheric Stability: Stable

Estimated Core Radius: 0.6 ft  
Tower Penetration Height: 118 ft AGL

Atmospheric Stability: Stable

Estimated Core Radius: 0.5 ft  
Tower Penetration Height: 102 ft AGL

Atmospheric Stability: Stable

Estimated Core Radius: 0.6 ft  
Tower Penetration Height: 118 ft AGL

Atmospheric Stability: Stable

Estimated Core Radius: 0.5 ft  
Tower Penetration Height: 102 ft AGL

Atmospheric Stability: Stable

Estimated Core Radius: 0.6 ft  
Tower Penetration Height: 118 ft AGL

Atmospheric Stability: Stable

Estimated Core Radius: 0.5 ft  
Tower Penetration Height: 102 ft AGL

Atmospheric Stability: Stable

Estimated Core Radius: 0.6 ft  
Tower Penetration Height: 118 ft AGL

Atmospheric Stability: Stable

Estimated Core Radius: 0.5 ft  
Tower Penetration Height: 102 ft AGL

Atmospheric Stability: Stable

Estimated Core Radius: 0.6 ft  
Tower Penetration Height: 118 ft AGL

Atmospheric Stability: Stable

Estimated Core Radius: 0.5 ft  
Tower Penetration Height: 102 ft AGL

Atmospheric Stability: Stable

Estimated Core Radius: 0.6 ft  
Tower Penetration Height: 118 ft AGL

Atmospheric Stability: Stable

Estimated Core Radius: 0.5 ft  
Tower Penetration Height: 102 ft AGL

Atmospheric Stability: Stable

Estimated Core Radius: 0.6 ft  
Tower Penetration Height: 118 ft AGL

Atmospheric Stability: Stable

Estimated Core Radius: 0.5 ft  
Tower Penetration Height: 102 ft AGL

Atmospheric Stability: Stable

Estimated Core Radius: 0.6 ft  
Tower Penetration Height: 118 ft AGL

Atmospheric Stability: Stable

Estimated Core Radius: 0.5 ft  
Tower Penetration Height: 102 ft AGL

Atmospheric Stability: Stable

Estimated Core Radius: 0.6 ft  
Tower Penetration Height: 118 ft AGL

Atmospheric Stability: Stable

Estimated Core Radius: 0.5 ft  
Tower Penetration Height: 102 ft AGL

Atmospheric Stability: Stable

Estimated Core Radius: 0.6 ft  
Tower Penetration Height: 118 ft AGL

Atmospheric Stability: Stable

Estimated Core Radius: 0.5 ft  
Tower Penetration Height: 102 ft AGL

Atmospheric Stability: Stable

Estimated Core Radius: 0.6 ft  
Tower Penetration Height: 118 ft AGL

Atmospheric Stability: Stable

\* = Estimated (D) = Vortex dissipated upwind of tower (M) = Missing (P) = No vortex (Flyby flown over top of tower)

(O) = No vortex (Flyby passed over remote sensing systems) (P) = Vortex passed over top of tower

Flyby (Run) Number: 39	UAL B727-222	Date: 24 SEP 1990 (Day of Year: 267)	Above Time: 7:28:06 (MDT)
Configuration: Landing Glide Slope: 0 deg.	AIRCRAFT DATA Flaps: 30 deg. Indicated Air Speed: 129 kts	Gross Weight: 140,000 lbs. Altitude: 400 ft AGL	
Wind Speed: 9.0 kts	Wind Direction: 237 deg.	Air Temperature: 14.0 °C	Atmospheric Stability: Stable
Maximum Velocity: (O) fps Descent Rate: (O) fps	Age: (O) s Advection Rate: (O) fps	Estimated Core Radius: (O) ft Tower Penetration Height: (O) ft AGL	
Maximum Velocity: (O) fps Descent Rate: (O) fps	Age: (O) s Advection Rate: (O) fps	Estimated Core Radius: (O) ft Tower Penetration Height: (O) ft AGL	
DOWNWIND VORTEX CHARACTERISTICS (200 ft Sensor Level)			
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)
198	196	194	198
194	192	190	194
190	188	186	192
188	186	184	190
186	184	182	186
184	182	180	184
182	180	178	180
178	176	174	178
176	174	172	176
174	172	170	174
172	170	168	172
170	168	166	168
168	166	164	166
166	164	162	164
164	162	160	162
162	158	156	160
158	156	154	156
156	154	152	154
154	152	150	152
152	148	146	148
148	146	144	146
146	144	142	144
144	142	140	142
142	138	136	140
138	136	134	138
136	134	132	136
134	132	130	134
132	130	128	130
130	128	126	128
128	126	124	126
126	124	122	124
124	122	120	122
122	118	116	118
118	116	114	116
116	114	112	114
114	112	108	112
112	110	106	108
110	108	106	106
108	106	104	104

(P) = Vortex passed over top of tower

(M) = Missing

(O) = No vortex

(I) = Flyby down for remote sensing systems

\* = Estimated

Flyby (Run) Number: 40		Date: 24 SEP 1990 (Day of Year: 267)	Abeam Time: 7:36:21 (MDT)
<b>AIRCRAFT DATA</b>		Gross Weight: 139,000 lbs.	
Configuration: Landing	Flaps: 30 deg.	Altitude: 345 ft AGL	
Glide Slope: 0 deg.	Indicated Air Speed: 128 kts		
Wind Speed: 7.3 kts	Wind Direction: 244 deg.	Air Temperature: 14.0 °C	Atmospheric Stability: Stable
Maximum Velocity: (O) 136.7 fps	Age: (O) 9 s	Estimated Core Radius: (O) ft	
Descent Rate: 5.5 fps	Advection Rate: (O) 1 fps	Tower Penetration Height: (O) ft AGL	
Maximum Velocity: 136.7 fps	Age: 28 s	Estimated Core Radius: 0.3 ft	
Descent Rate: 5.5 fps	Advection Rate: 8.3 fps	Tower Penetration Height: 192 ft AGL	
<b>DOWNWIND VORTEX CHARACTERISTICS</b>			
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
198	(O) 102	198	8
196	(O) 100	196	4
194	(O) 98	194	2
192	(O) 96	192	0
190	(O) 94	190	-2
188	(O) 92	188	-4
186	(O) 90	186	-6
184	(O) 88	184	-8
182	(O) 86	182	-10
180	(O) 84	180	-12
178	(O) 82	178	-14
176	(O) 80	176	-16
174	(O) 78	174	-18
172	(O) 76	172	-20
170	(O) 74	170	-22
168	(O) 72	168	-24
166	(O) 70	166	-26
164	(O) 68	164	-28
162	(O) 66	162	-30
160	(O) 64	160	-32
158	(O) 62	158	-34
156	(O) 60	156	-36
154	(O) 58	154	-38
152	(O) 56	152	-40
150	(O) 54	150	-42
148	(O) 52	148	-44
146	(O) 50	146	-46
144	(O) 48	144	-48
142	(O) 46	142	-50
140	(O) 44	140	-52
138	(O) 42	138	-54
136	(O) 40	136	-56
134	(O) 38	134	-58
132	(O) 36	132	-60
130	(O) 34	130	-62
128	(O) 32	128	-64
126	(O) 30	126	-66
124	(O) 28	124	-68
122	(O) 26	122	-70
120	(O) 24	120	-72
118	(O) 22	118	-74
116	(O) 20	116	-76
114	(O) 18	114	-78
112	(O) 16	112	-80
110	(O) 14	110	-82
108	(O) 12	108	-84
106	(O) 10	106	-86
104	(O) 8	104	-88

(P) = Vortex passed over top of tower

(O) = No vortex (F) flyby flown for remote sensing systems

(M) = Missing

(D) = Vortex dissipated upwind of tower

(\*) = Estimated

Flyby (Run) Number: 41	Date: 24 SEP 1980 (Day of Year: 267)	Abeam Time: 7:44:34 (MDT)			
Configuration: Landing Glide Slope: 0 deg.	AIRCRAFT DATA Flaps: 30 deg. Indicated Air Speed: 129 kts	Gross Weight: 138,000lbs. Altitude: 250 ft AGL			
Wind Speed: 3.3 knts	Wind Direction: 303 deg.	Air Temperature: 11.8 °C			
Maximum Velocity: (D) f/s Descent Rate: (D) f/s	AGL: (D) s Advection Rate: (D) f/s	Atmospheric Stability: Stable			
Maximum Velocity: (D) f/s Descent Rate: (D) f/s	AGL: (D) s Advection Rate: (D) f/s	Estimated Core Radius: (D) ft Tower Penetration Height: (D) ft AGL			
Downwind Vortex Tangential Velocities	Downwind Vortex Characteristics	Upwind Vortex Tangential Velocities			
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
198	(D)	100	(D)	198	(D)
194	(D)	98	(D)	196	(D)
190	(D)	96	(D)	194	(D)
186	(D)	94	(D)	192	(D)
182	(D)	92	(D)	190	(D)
184	(D)	90	(D)	188	(D)
180	(D)	88	(D)	186	(D)
178	(D)	86	(D)	184	(D)
176	(D)	84	(D)	182	(D)
174	(D)	82	(D)	178	(D)
172	(D)	80	(D)	176	(D)
170	(D)	78	(D)	174	(D)
168	(D)	76	(D)	172	(D)
166	(D)	74	(D)	170	(D)
164	(D)	72	(D)	168	(D)
162	(D)	70	(D)	166	(D)
160	(D)	68	(D)	164	(D)
158	(D)	66	(D)	162	(D)
156	(D)	64	(D)	160	(D)
154	(D)	62	(D)	158	(D)
152	(D)	60	(D)	156	(D)
150	(D)	58	(D)	154	(D)
148	(D)	56	(D)	152	(D)
146	(D)	54	(D)	150	(D)
144	(D)	52	(D)	148	(D)
142	(D)	48	(D)	146	(D)
140	(D)	46	(D)	144	(D)
138	(D)	44	(D)	142	(D)
136	(D)	42	(D)	140	(D)
134	(D)	40	(D)	138	(D)
132	(D)	38	(D)	136	(D)
130	(D)	36	(D)	134	(D)
128	(D)	34	(D)	132	(D)
126	(D)	32	(D)	130	(D)
124	(D)	30	(D)	128	(D)
122	(D)	28	(D)	126	(D)
120	(D)	26	(D)	124	(D)
118	(D)	24	(D)	122	(D)
116	(D)	22	(D)	120	(D)
114	(D)	20	(D)	118	(D)
112	(D)	18	(D)	116	(D)
110	(D)	16	(D)	114	(D)
108	(D)	14	(D)	110	(D)
106	(D)	12	(D)	108	(D)
104	(D)	10	(D)	106	(D)
					104

= Estimated

(D) = Vortex dissipated upwind of tower (M) = Missing

(P) = No vortex (F) = Vortex passed over top of tower (S) = Vortex passed over remote sensing systems

Flyby (Run) Number: 42	Date: 24 SEP 1990 (Day of Year: 267)	Abeam Time: 7:53:29 (MDT)
Configuration: Landing Glide Slope: -3 deg.	AIRCRAFT DATA Flaps: 30 deg. Indicated Air Speed: 130 kts	Gross Weight: 137,500 lbs. Altitude: 240 ft AGL
Wind Speed: 2.5 kts	Wind Direction: 211 deg.	Atmospheric Stability: Stable
Maximum Velocity: (D) fpm Descent Rate: (D) fpm	METEOROLOGICAL DATA (200 ft Sensor Level)	Estimated Core Radius: (D) ft Tower Penetration Height: (D) ft AGL
Maximum Velocity: (D) fpm Descent Rate: (D) fpm	DOWNDOWN VORTEX CHARACTERISTICS Age: (D) s Advection Rate: (D) fpm	Tower Penetration Height: (D) ft AGL
Sensor Height (ft)	Relative Height (ft)	Relative Height (ft)
198	102	198
196	100	196
194	98	194
192	96	192
190	94	190
188	92	188
186	90	186
184	88	184
182	86	182
180	84	180
178	82	178
176	80	176
174	78	174
172	76	172
170	74	170
168	72	168
166	70	166
164	68	164
162	66	162
160	64	160
158	62	158
156	60	156
154	58	154
152	56	152
150	54	150
148	52	148
146	50	146
144	48	144
142	46	142
140	44	140
138	42	138
136	40	136
134	38	134
132	36	132
130	34	130
128	32	128
126	30	126
124	28	124
122	26	122
120	24	120
118	22	118
116	20	116
114	18	114
112	16	112
110	14	110
108	12	108
106	10	106
104		104

### **Estimated**

D) = Vortex dissipated upwind of tower

Missing 10

(Q) = No vortex (E) = Vortex flown for remote sensing systems (R) = Vortex passed over ton of tower

Flyby (Run) Number: 43	Date: 24 SEP 1990 [Day of Year: 267]	Abeam Time: 8:02:09 (MDT)
<b>AIRCRAFT DATA</b>		
Configuration: Landing	Flaps: 40 deg.	Gross Weight: 136,000 lbs.
Glide Slope: 0 deg.	Indicated Air Speed: 121 kts	Altitude: 400 ft AGL
Wind Speed: 3.9 kts	Wind Direction: 59 deg.	Air Temperature: 11.5 °C
Maximum Velocity: (O) fpm	Age: (O) s	
Descent Rate: (O) fpm	Advection Rate: (O) fpm	Estimated Core Radius: (O) ft
Maximum Velocity: (O) fpm	Age: (O) s	
Descent Rate: (O) fpm	Advection Rate: (O) fpm	Tower Penetration Height: (O) ft AGL
<b>METEOROLOGICAL DATA</b> (200 ft Sensor Level)		
Wind Speed: 3.9 kts	Wind Direction: 59 deg.	Air Temperature: 11.5 °C
<b>DOWNWIND VORTEX CHARACTERISTICS</b>		
Downwind Vortex Tangential Velocities	Age: (O) s	Estimated Core Radius: (O) ft
Sensor Height (ft)	V <sub>θ</sub> (fps)	Relative Height (ft)
198	0	0
196	102	198
194	100	196
192	98	194
190	96	192
188	92	190
186	90	188
184	88	186
182	86	184
180	84	182
178	82	180
176	80	178
174	78	176
172	76	174
170	74	172
168	72	170
166	70	168
164	68	166
162	66	164
160	64	162
158	62	160
156	60	158
154	58	156
152	56	154
150	54	152
148	52	150
146	50	148
144	48	146
142	46	144
140	44	142
138	42	140
136	40	138
134	38	136
132	36	134
130	34	132
128	32	130
126	30	128
124	28	126
122	26	124
120	24	122
118	22	120
116	20	118
114	18	116
112	16	114
110	14	112
108	12	110
106	10	108
104	0	106

\* = Estimated  
(D) = Vortex dissipated upwind of tower

(M) = Missing

(P) = Vortex passed over top of tower

(O) = No vortex (Flyby flown for remote sensing systems)

Flyby (Run) Number: 44	Date: 24 SEP 1990 (Day of Year: 267)	Abeam Time: 8:10:59 (MDT)
Configuration: Landing	AIRCRAFT DATA	
Glide Slope: 0 deg.	Flaps: 40 deg.	Gross Weight: 134,000 lbs.
	Indicated Air Speed: 121 kts	Altitude: 350 ft AGL
Wind Speed: 5.1 kts	Wind Direction: 66 deg.	Air Temperature: 11.9 °C
Maximum Velocity: (O) fps	Age: (O) s	Atmospheric Stability: Stable
Descent Rate: (O) fpm	Advection Rate: (O) fpm	Estimated Core Radius: (O) ft
		Tower Penetration Height: (O) ft AGL
Maximum Velocity: (O) fps	Age: (O) s	Estimated Core Radius: (O) ft
Descent Rate: (O) fpm	Advection Rate: (O) fpm	Tower Penetration Height: (O) ft AGL
METEOROLOGICAL DATA [200 ft Sensor Level]		
DOWNDOWN VORTEX CHARACTERISTICS		
Wind Speed: 5.1 kts	Wind Direction: 66 deg.	
Maximum Velocity: (O) fps	Age: (O) s	
Descent Rate: (O) fpm	Advection Rate: (O) fpm	
UPWIND VORTEX CHARACTERISTICS		
Wind Speed: 5.1 kts	Wind Direction: 66 deg.	
Maximum Velocity: (O) fps	Age: (O) s	
Descent Rate: (O) fpm	Advection Rate: (O) fpm	
DOWNDOWN VORTEX TANGENTIAL VELOCITIES		
Sensor Height (ft)	Relative Height (ft)	Relative Height (ft)
198	(O)	(O)
196	(O)	(O)
194	100	102
192	96	98
190	94	96
188	92	94
186	90	92
184	88	86
182	86	84
180	84	82
178	82	80
176	80	78
174	78	76
172	76	74
170	74	72
168	72	70
166	70	68
164	68	66
162	66	64
160	64	62
158	62	60
156	60	58
154	58	56
152	56	54
150	54	52
148	52	50
146	50	48
144	48	46
142	46	44
140	44	42
138	42	40
136	40	38
134	38	36
132	36	34
130	34	32
128	32	30
126	30	28
124	28	26
122	26	24
120	24	22
118	22	20
116	20	18
114	18	16
112	16	14
110	14	12
108	12	10
106	10	10
104	10	10

\* = Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(P) = No vortex (Flyby flown for remote sensing systems)

Flyby (Run) Number: 45	Date: 24 SEP 1990 (Day of Year: 267)	Abeam Time: 8:18:45 (MDT)
Configuration: Landing Glide Slope: 0 deg.	AIRCRAFT DATA Flaps: 40 deg. Indicated Air Speed: 120 kts	Gross Weight: 132,000lbs. Altitude: 250 ft AGL
Wind Speed: 5.2 kts	Wind Direction: 79 deg. [200 ft Sensor Level]	Atmospheric Stability: Stable
Maximum Velocity: (O) fps Descent Rate: (O) fpm	DOWNWIND VORTEX CHARACTERISTICS Age: (O) s Advection Rate: (O) fps	Estimated Core Radius: (O) ft Tower Penetration Height: (O) ft AGL
Maximum Velocity: (O) fps Descent Rate: (O) fpm	UPWIND VORTEX CHARACTERISTICS Age: (O) s Advection Rate: (O) fps	Estimated Core Radius: (O) ft Tower Penetration Height: (O) ft AGL
METEOROLOGICAL DATA		
Sensor Height (ft)	Relative Height (ft)	Relative Height (ft)
198	(O)	102
196	(O)	100
194	(O)	98
192	(O)	96
190	(O)	94
188	(O)	92
186	(O)	90
184	(O)	88
182	(O)	86
180	(O)	84
178	(O)	82
176	(O)	80
174	(O)	78
172	(O)	76
170	(O)	74
168	(O)	72
166	(O)	70
164	(O)	68
162	(O)	66
160	(O)	64
158	(O)	62
156	(O)	60
154	(O)	58
152	(O)	56
150	(O)	54
148	(O)	52
146	(O)	50
144	(O)	48
142	(O)	46
140	(O)	44
138	(O)	42
136	(O)	40
134	(O)	38
132	(O)	36
130	(O)	34
128	(O)	32
126	(O)	30
124	(O)	28
122	(O)	26
120	(O)	24
118	(O)	22
116	(O)	20
114	(O)	18
112	(O)	16
110	(O)	14
108	(O)	12
106	(O)	10
104	(O)	04

(P) = Vortex passed over top of tower

(M) = Missing

(D) = Vortex dissipated upwind of tower

= Estimated

Flyby (Run) Number: 46		UAL B727-222		Date: 24 SEP 1990 (Day of Year: 267)	Abeam Time: 8:26:01 (MDT)		
AIRCRAFT DATA		METEOROLOGICAL DATA		Gross Weight: 130,000 lbs.			
Flaps: 40 deg. Indicated Air Speed: 119 kts		(200 ft Sensor Level)		Altitude: 225 ft AGL			
Wind Speed: 5.9 kts		Wind Direction: 76 deg.		Air Temperature: 11.9 °C	Atmospheric Stability: Stable		
Maximum Velocity: (0) fps		Age: (0) s		Estimated Core Radius: (0) ft			
Descent Rate: (0) fps		Advection Rate: (0) fps		Tower Penetration Height: (0) ft AGL			
Maximum Velocity: (0) fps		Age: (0) s		Estimated Core Radius: (0) ft			
Descent Rate: (0) fps		Advection Rate: (0) fps		Tower Penetration Height: (0) ft AGL			
<b>DOWNWIND VORTEX CHARACTERISTICS</b>							
Downwind Vortex Tangential Velocities							
Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)		
198	(0)	(0)	102	(0)	(0)		
196	(0)	(0)	100	196	(0)		
194	(0)	(0)	98	194	(0)		
192	(0)	(0)	96	192	(0)		
190	(0)	(0)	94	190	(0)		
188	(0)	(0)	92	188	(0)		
186	(0)	(0)	90	186	(0)		
184	(0)	(0)	88	184	(0)		
182	(0)	(0)	86	182	(0)		
180	(0)	(0)	84	180	(0)		
178	(0)	(0)	82	178	(0)		
176	(0)	(0)	80	176	(0)		
174	(0)	(0)	78	174	(0)		
172	(0)	(0)	76	172	(0)		
170	(0)	(0)	74	170	(0)		
168	(0)	(0)	72	168	(0)		
166	(0)	(0)	70	166	(0)		
164	(0)	(0)	68	164	(0)		
162	(0)	(0)	66	162	(0)		
160	(0)	(0)	64	160	(0)		
158	(0)	(0)	62	158	(0)		
156	(0)	(0)	60	156	(0)		
154	(0)	(0)	58	154	(0)		
152	(0)	(0)	56	152	(0)		
150	(0)	(0)	54	150	(0)		
148	(0)	(0)	52	148	(0)		
146	(0)	(0)	50	146	(0)		
144	(0)	(0)	48	144	(0)		
142	(0)	(0)	46	142	(0)		
140	(0)	(0)	44	140	(0)		
138	(0)	(0)	42	138	(0)		
136	(0)	(0)	40	136	(0)		
134	(0)	(0)	38	134	(0)		
132	(0)	(0)	36	132	(0)		
130	(0)	(0)	34	130	(0)		
128	(0)	(0)	32	128	(0)		
126	(0)	(0)	30	126	(0)		
124	(0)	(0)	28	124	(0)		
122	(0)	(0)	26	122	(0)		
120	(0)	(0)	24	120	(0)		
118	(0)	(0)	22	118	(0)		
116	(0)	(0)	20	116	(0)		
114	(0)	(0)	18	114	(0)		
112	(0)	(0)	16	112	(0)		
110	(0)	(0)	14	110	(0)		
108	(0)	(0)	12	108	(0)		
106	(0)	(0)	10	106	(0)		
104	(0)	(0)	104	104	(0)		

= Estimated (D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex (Flyby flown for remote sensing systems) (P) = Vortex passed over top of tower

Flyby (Run) Number: 47		Date: 24 SEP 1990 (Day of Year: 267)	Abeam Time: 8:33:25 (MDT)
Configuration: Landing	Glide Slope: 0 deg.	Indicated Air Speed: 120 kts	Gross Weight: 128,500 lbs. Altitude: 400 ft AGL
Wind Speed: 7.0 kts	Wind Direction: 55 deg.	Air Temperature: 11.9 °C	Atmospheric Stability: Stable
Maximum Velocity: (O) fps	Age: (O) s	DOWNWIND VORTEX CHARACTERISTICS	
Descent Rate: (O) fps	Advection Rate: (O) fps	Estimated Core Radius: (O) ft	Tower Penetration Height: (O) ft AGL
Maximum Velocity: (O) fps	Age: (O) s	UPWIND VORTEX CHARACTERISTICS	
Descent Rate: (O) fps	Advection Rate: (O) fps	Estimated Core Radius: (O) ft	Tower Penetration Height: (O) ft AGL
Downwind Vortex Tangential Velocities			
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
		V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)
198	196	(O)	102
194	192	(O)	100
190	188	(O)	98
186	184	(O)	94
182	180	(O)	92
178	176	(O)	88
174	172	(O)	84
170	168	(O)	82
166	164	(O)	80
162	160	(O)	78
158	156	(O)	76
154	152	(O)	74
150	148	(O)	72
146	144	(O)	70
142	140	(O)	68
138	136	(O)	66
134	132	(O)	64
130	128	(O)	62
126	124	(O)	60
122	120	(O)	58
118	116	(O)	56
114	112	(O)	54
110	108	(O)	52
106	104	(O)	50
		(P)	52
		(O)	48
		(O)	46
		(O)	44
		(O)	42
		(O)	40
		(O)	38
		(O)	36
		(O)	34
		(O)	32
		(O)	30
		(O)	28
		(O)	26
		(O)	24
		(O)	22
		(O)	20
		(O)	18
		(O)	16
		(O)	14
		(O)	12
		(O)	10
		(O)	8
		(O)	6
		(O)	4
		(O)	2
		(O)	0

= Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(P) = No vortex [Flyby flown over top of tower]

(O) = Vortex passed over top of tower

Flyby [Run] Number: 48	UAL B727-222	Date: 24 SEP 1990 (Day of Year: 267)	Abeam Time: 8:40:20 (MDT)
Configuration: Landing	AIRCRAFT DATA		
Glide Slope: 0 deg.	Flaps: 40 deg. 118 kts		
	Indicated Air Speed: 118 kts		
Wind Speed: 6.7 kts	Wind Direction: 50 deg.	Air Temperature: 11.4 °C	Atmospheric Stability: Neutral
Maximum Velocity: (O) fps	Age: (O) s		
Descent Rate: (O) f/s	Advection Rate: (O) f/s		
Maximum Velocity: (O) f/s	Age: (O) s		
Descent Rate: (O) f/s	Advection Rate: (O) f/s		
METEOROLOGICAL DATA (200 ft Sensor Level)			
DOWNDOWN VORTEX CHARACTERISTICS			
Wind Speed: 6.7 kts	Wind Direction: 50 deg.	Air Temperature: 11.4 °C	Atmospheric Stability: Neutral
Maximum Velocity: (O) f/s	Age: (O) s		
Descent Rate: (O) f/s	Advection Rate: (O) f/s		
UPWIND VORTEX CHARACTERISTICS			
Wind Speed: 6.7 kts	Wind Direction: 50 deg.	Air Temperature: 11.4 °C	Atmospheric Stability: Neutral
Maximum Velocity: (O) f/s	Age: (O) s		
Descent Rate: (O) f/s	Advection Rate: (O) f/s		
Downwind Vortex Tangential Velocities			
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)
198	(O)	(O)	198
196	(O)	(O)	196
194	(O)	(O)	194
192	(O)	(O)	192
190	(O)	(O)	190
188	(O)	(O)	188
186	(O)	(O)	186
184	(O)	(O)	184
182	(O)	(O)	182
180	(O)	(O)	180
178	(O)	(O)	178
176	(O)	(O)	176
174	(O)	(O)	174
172	(O)	(O)	172
170	(O)	(O)	170
168	(O)	(O)	168
166	(O)	(O)	166
164	(O)	(O)	164
162	(O)	(O)	162
160	(O)	(O)	160
158	(O)	(O)	158
156	(O)	(O)	156
154	(O)	(O)	154
152	(O)	(O)	152
150	(O)	(O)	150
148	(O)	(O)	148
146	(O)	(O)	146
144	(O)	(O)	144
142	(O)	(O)	142
140	(O)	(O)	140
138	(O)	(O)	138
136	(O)	(O)	136
134	(O)	(O)	134
132	(O)	(O)	132
130	(O)	(O)	130
128	(O)	(O)	128
126	(O)	(O)	126
124	(O)	(O)	124
122	(O)	(O)	122
120	(O)	(O)	120
118	(O)	(O)	118
116	(O)	(O)	116
114	(O)	(O)	114
112	(O)	(O)	112
110	(O)	(O)	110
108	(O)	(O)	108
106	(O)	(O)	106
104	(O)	(O)	104

(P) = Vortex passed over top of tower

(M) = Missing

(D) = Vortex dissipated upwind of tower

\* = Estimated

Flyby (Run) Number: 49	Date: 24 SEP 1990 (Day of Year: 267)	AIRCRAFT DATA	Gross Weight: 143,500 lbs.
Configuration: Landing	Flaps: 30 deg.	Indicated Air Speed: 131 kts	Altitude: 250 ft AGL
Glide Slope: 0 deg.			
Wind Speed: 2.1 knts	Wind Direction: 180 deg.	Air Temperature: 17.8 °C	Atmospheric Stability: Neutral
Maximum Velocity: (D) f/s	METEOROLOGICAL DATA		
Descent Rate: (D) f/s	[200 ft Sensor Level]		
Maximum Velocity: (D) f/s	Age: (D) s	Advection Rate: (D) f/s	Estimated Core Radius: (D) ft
Descent Rate: (D) f/s	Wind Penetration Height: (D) ft AGL		Tower Penetration Height: (D) ft AGL
Downwind Vortex Tangential Velocities	DOWNWIND VORTEX CHARACTERISTICS		
Sensor Height (ft)	V <sub>θ</sub> (f/s)	Age: (D) s	Upwind Vortex Tangential Velocities
Relative Height (ft)		Advection Rate: (D) f/s	Sensor Height (ft)
198	(D)		V <sub>θ</sub> (f/s)
196	(D)		Relative Height (ft)
194	(D)		198
192	(D)		196
190	(D)		194
188	(D)		192
186	(D)		190
184	(D)		188
182	(D)		186
180	(D)		184
178	(D)		182
176	(D)		180
174	(D)		178
172	(D)		176
170	(D)		174
168	(D)		172
166	(D)		170
164	(D)		168
162	(D)		166
160	(D)		164
158	(D)		162
156	(D)		160
154	(D)		158
152	(D)		156
150	(D)		154
148	(D)		152
146	(D)		150
144	(D)		148
142	(D)		146
140	(D)		144
138	(D)		142
136	(D)		140
134	(D)		138
132	(D)		136
130	(D)		134
128	(D)		132
126	(D)		130
124	(D)		128
122	(D)		126
120	(D)		124
118	(D)		122
116	(D)		120
114	(D)		118
112	(D)		116
110	(D)		114
108	(D)		112
106	(D)		110
104	(D)		108

(P) = Vortex passed over top of tower

(O) = No vortex (Flyby flown for remote sensing systems)

(M) = Missing

(D) = Vortex dissipated upwind of tower

\* = Estimated

Flyby (Run) Number: 50	Date: 24 SEP 1990 (Day of Year: 267)	Abeam Time: 11:25:07 (MDT)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
Configuration: Landing Glide Slope: -3 deg.	AIRCRAFT DATA Flaps: 30 deg. Indicated Air Speed: 130 kts Altitude: 250 ft AGL	Gross Weight: 142,800 lbs. Estimated Core Radius: 0.9 ft Tower Penetration Height: 66 ft AGL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
Wind Speed: 3.0 kts	Wind Direction: 255 deg. Age: 43 s Advection Rate: 3.0 fps	Atmospheric Stability: Unstable Estimated Core Radius: (D) ft Tower Penetration Height: (D) ft AGL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
Maximum Velocity: (D) 1fps Descent Rate: 4.3 fps	DOWNWIND VORTEX CHARACTERISTICS (200 ft Sensor Level) Age: (D) s Advection Rate: (D) fps	UPWIND VORTEX CHARACTERISTICS Age: (D) s Advection Rate: (D) fps																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
198	132	-5.5	102	34	-6.1	198	196	-6.3*	194	192	-6.4	190	188	-7.7	184	-8.3	180	-9.4	178	-9.6	174	-10.4	170	-11.2	166	-11.7	162	-12.1	158	-12.7	154	-13.2	150	-13.7	146	-14.0	142	-14.7	138	-15.2	134	-15.7	130	-16.1	126	-16.6	122	-17.0	118	-17.4	114	-17.8	110	-18.2	106	-18.6	102	-19.0	98	-19.4	94	-19.7	90	-19.9	86	-20.2	82	-20.4	78	-20.8	74	-21.1	70	-21.4	66	-21.7	62	-22.0	58	-22.3	54	-22.6	50	-22.9	46	-23.2	42	-23.5	38	-23.8	34	-24.1	30	-24.4	26	-24.7	22	-25.0	18	-25.3	14	-25.7	10	-26.1	104	-26.6	100	-27.1	96	-27.6	92	-28.1	88	-28.6	84	-29.1	80	-29.6	76	-30.1	72	-30.6	68	-31.1	64	-31.6	60	-32.1	56	-32.6	52	-33.1	48	-33.6	44	-34.1	40	-34.6	36	-35.1	32	-35.6	28	-36.1	24	-36.6	20	-37.1	16	-37.6	12	-38.1	8	-38.6	4	-39.1	0	-39.6	-4	-39.9	-8	-40.4	-12	-40.8	-16	-41.2	-20	-41.6	-24	-42.0	-28	-42.4	-32	-42.8	-36	-43.2	-40	-43.6	-44	-44.0	-48	-44.4	-52	-44.8	-56	-45.2	-60	-45.6	-64	-46.0	-68	-46.4	-72	-46.8	-76	-47.2	-80	-47.6	-84	-48.0	-88	-48.4	-92	-48.8	-96	-49.2	-100	-49.6	-102	-49.9	-104	-50.2	-106	-50.5	-108	-50.8	-110	-51.1	-112	-51.4	-114	-51.7	-116	-52.0	-118	-52.3	-120	-52.6	-122	-52.9	-124	-53.2	-126	-53.5	-128	-53.8	-130	-54.1	-132	-54.4	-134	-54.7	-136	-55.0	-138	-55.3	-140	-55.6	-142	-55.9	-144	-56.2	-146	-56.5	-148	-56.8	-150	-57.1	-152	-57.4	-154	-57.7	-156	-58.0	-158	-58.3	-160	-58.6	-162	-58.9	-164	-59.2	-166	-59.5	-168	-59.8	-170	-60.1	-172	-60.4	-174	-60.7	-176	-61.0	-178	-61.3	-180	-61.6	-182	-61.9	-184	-62.2	-186	-62.5	-188	-62.8	-190	-63.1	-192	-63.4	-194	-63.7	-196	-64.0	-198	-64.3	-200	-64.6	-202	-64.9	-204	-65.2	-206	-65.5	-208	-65.8	-210	-66.1	-212	-66.4	-214	-66.7	-216	-67.0	-218	-67.3	-220	-67.6	-222	-67.9	-224	-68.2	-226	-68.5	-228	-68.8	-230	-69.1	-232	-69.4	-234	-69.7	-236	-70.0	-238	-70.3	-240	-70.6	-242	-70.9	-244	-71.2	-246	-71.5	-248	-71.8	-250	-72.1	-252	-72.4	-254	-72.7	-256	-73.0	-258	-73.3	-260	-73.6	-262	-73.9	-264	-74.2	-266	-74.5	-268	-74.8	-270	-75.1	-272	-75.4	-274	-75.7	-276	-76.0	-278	-76.3	-280	-76.6	-282	-76.9	-284	-77.2	-286	-77.5	-288	-77.8	-290	-78.1	-292	-78.4	-294	-78.7	-296	-79.0	-298	-79.3	-300	-79.6	-302	-79.9	-304	-80.2	-306	-80.5	-308	-80.8	-310	-81.1	-312	-81.4	-314	-81.7	-316	-82.0	-318	-82.3	-320	-82.6	-322	-82.9	-324	-83.2	-326	-83.5	-328	-83.8	-330	-84.1	-332	-84.4	-334	-84.7	-336	-85.0	-338	-85.3	-340	-85.6	-342	-85.9	-344	-86.2	-346	-86.5	-348	-86.8	-350	-87.1	-352	-87.4	-354	-87.7	-356	-88.0	-358	-88.3	-360	-88.6	-362	-88.9	-364	-89.2	-366	-89.5	-368	-89.8	-370	-90.1	-372	-90.4	-374	-90.7	-376	-91.0	-378	-91.3	-380	-91.6	-382	-91.9	-384	-92.2	-386	-92.5	-388	-92.8	-390	-93.1	-392	-93.4	-394	-93.7	-396	-94.0	-398	-94.3	-400	-94.6	-402	-94.9	-404	-95.2	-406	-95.5	-408	-95.8	-410	-96.1	-412	-96.4	-414	-96.7	-416	-97.0	-418	-97.3	-420	-97.6	-422	-97.9	-424	-98.2	-426	-98.5	-428	-98.8	-430	-99.1	-432	-99.4	-434	-99.7	-436	-100.0	-438	-100.3	-440	-100.6	-442	-100.9	-444	-101.2	-446	-101.5	-448	-101.8	-450	-102.1	-452	-102.4	-454	-102.7	-456	-103.0	-458	-103.3	-460	-103.6	-462	-103.9	-464	-104.2	-466	-104.5	-468	-104.8	-470	-105.1	-472	-105.4	-474	-105.7	-476	-106.0	-478	-106.3	-480	-106.6	-482	-106.9	-484	-107.2	-486	-107.5	-488	-107.8	-490	-108.1	-492	-108.4	-494	-108.7	-496	-109.0	-498	-109.3	-500	-109.6	-502	-109.9	-504	-110.2	-506	-110.5	-508	-110.8	-510	-111.1	-512	-111.4	-514	-111.7	-516	-112.0	-518	-112.3	-520	-112.6	-522	-112.9	-524	-113.2	-526	-113.5	-528	-113.8	-530	-114.1	-532	-114.4	-534	-114.7	-536	-115.0	-538	-115.3	-540	-115.6	-542	-115.9	-544	-116.2	-546	-116.5	-548	-116.8	-550	-117.1	-552	-117.4	-554	-117.7	-556	-118.0	-558	-118.3	-560	-118.6	-562	-118.9	-564	-119.2	-566	-119.5	-568	-119.8	-570	-120.1	-572	-120.4	-574	-120.7	-576	-121.0	-578	-121.3	-580	-121.6	-582	-121.9	-584	-122.2	-586	-122.5	-588	-122.8	-590	-123.1	-592	-123.4	-594	-123.7	-596	-124.0	-598	-124.3	-600	-124.6	-602	-124.9	-604	-125.2	-606	-125.5	-608	-125.8	-610	-126.1	-612	-126.4	-614	-126.7	-616	-127.0	-618	-127.3	-620	-127.6	-622	-127.9	-624	-128.2	-626	-128.5	-628	-128.8	-630	-129.1	-632	-129.4	-634	-129.7	-636	-130.0	-638	-130.3	-640	-130.6	-642	-130.9	-644	-131.2	-646	-131.5	-648	-131.8	-650	-132.1	-652	-132.4	-654	-132.7	-656	-133.0	-658	-133.3	-660	-133.6	-662	-133.9	-664	-134.2	-666	-134.5	-668	-134.8	-670	-135.1	-672	-135.4	-674	-135.7	-676	-136.0	-678	-136.3	-680	-136.6	-682	-136.9	-684	-137.2	-686	-137.5	-688	-137.8	-690	-138.1	-692	-138.4	-694	-138.7	-696	-139.0	-698	-139.3	-700	-139.6	-702	-139.9	-704	-140.2	-706	-140.5	-708	-140.8	-710	-141.1	-712	-141.4	-714	-141.7	-716	-142.0	-718	-142.3	-720	-142.6	-722	-142.9	-724	-143.2	-726	-143.5	-728	-143.8	-730	-144.1	-732	-144.4	-734	-144.7	-736	-145.0	-738	-145.3	-740	-145.6	-742	-145.9	-744	-146.2	-746	-146.5	-748	-146.8	-750	-147.1	-752	-147.4	-754	-147.7	-756	-148.0	-758	-148.3	-760	-148.6	-762	-148.9	-764	-149.2	-766	-149.5	-768	-149.8	-770	-150.1	-772	-150.4	-774	-150.7	-776	-151.0	-778	-151.3	-780	-151.6	-782	-151.9	-784	-152.2	-786	-152.5	-788	-152.8	-790	-153.1	-792	-153.4	-794	-153.7	-796	-154.0	-798	-154.3	-800	-154.6	-802	-154.9	-804	-155.2	-806	-155.5	-808	-155.8	-810	-156.1	-812	-156.4	-814	-156.7	-816	-157.0	-818	-157.3	-820	-157.6	-822	-157.9	-824	-158.2	-826	-158.5	-828	-158.8	-830	-159.1	-832	-159.4	-834	-159.7	-836	-160.0	-838	-160.3	-840	-160.6	-842	-160.9	-844	-161.2	-846	-161.5	-848	-161.8	-850	-162.1	-852	-162.4	-854	-162.7	-856	-163.0	-858	-163.3	-860	-163.6	-862	-163.9	-864	-164.2	-866	-164.5	-868	-164.8	-870	-165.1	-872	-165.4	-874	-165.7	-876	-166.0	-878	-166.3	-880	-166.6	-882	-166.9	-884	-167.2	-886	-167.5	-888	-167.8	-890	-168.1	-892	-168.4	-894	-168.7	-896	-169.0	-898	-169.3	-900	-169.6	-902	-169.9	-904	-170.2	-906	-170.5	-908	-170.8	-910	-171.1	-912	-171.4	-914	-171.7	-916	-171.9	-918	-172.2	-920	-172.4	-922	-172.6	-924	-172.8	-926	-173.0	-928	-173.2	-930	-173.4	-932	-173.6	-934	-173.8	-936	-174.0	-938	-174.2	-940	-174.4	-942	-174.6	-944	-174.8	-946	-175.0	-948	-175.2	-950	-175.4	-952	-175.6	-954	-175.8	-956	-176.0	-958	-176.2	-960	-176.4	-962	-176.6	-964	-176.8	-966	-177.0	-968	-177.2	-970	-177.4	-972	-177.6	-974	-177.8	-976	-178.0	-978	-178.2	-980	-178.4	-982	-178.6	-984	-178.8	-986	-179.0	-988	-179.2	-990	-179.4	-992	-179.6	-994	-179.8	-996	-180.0	-998	-180.2	-1000

\* = Estimated      (D) = Vortex dissipated upwind of tower      (O) = Missing      (P) = Vortex flown for remote sensing systems

Flyby (Run) Number: 51		Date: 24 SEP 1990 (Day of Year: 267)	Abeam Time: 11:32:12 (MDT)
Configuration: Landing	AIRCRAFT DATA	Gross Weight: 141,500 lbs.	
Glide Slope: 0 deg.	Flaps: 30 deg.	Altitude: 390 ft AGL	
	Indicated Air Speed: 129 kts		
Wind Speed: 3.1 kts	Wind Direction: 246 deg.	Air Temperature: 17.7 °C	Atmospheric Stability: Unstable
Maximum Velocity: (O) fps	Age: (O) s	Estimated Core Radius: (O) ft	
Descent Rate: (O) fps	Advection Rate: (O) fpm	Tower Penetration Height: (O) ft AGL	
Maximum Velocity: (O) fps	Age: (O) s	Estimated Core Radius: (O) ft	
Descent Rate: (O) fps	Advection Rate: (O) fpm	Tower Penetration Height: (O) ft AGL	
<b>METEOROLOGICAL DATA</b>			
(200 ft Sensor Level)			
<b>DOWNTWIND VORTEX CHARACTERISTICS</b>			
Wind Speed: 3.1 kts	Wind Direction: 246 deg.	Air Temperature: 17.7 °C	Atmospheric Stability: Unstable
<b>UPWIND VORTEX CHARACTERISTICS</b>			
Maximum Velocity: (O) fps	Age: (O) s	Estimated Core Radius: (O) ft	
Descent Rate: (O) fps	Advection Rate: (O) fpm	Tower Penetration Height: (O) ft AGL	
<b>DOWNTWIND VORTEX TANGENTIAL VELOCITIES</b>			
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
198	196	102	100
192	190	98	96
188	186	94	92
184	182	90	88
180	178	86	84
176	174	82	80
172	170	78	76
168	166	74	72
164	162	70	70
160	158	66	66
156	154	62	62
152	150	58	58
148	146	54	54
144	142	50	50
140	138	46	46
136	134	44	44
132	130	42	42
128	126	38	38
124	122	34	34
120	118	32	32
116	114	30	30
112	110	28	28
108	106	26	26
104	102	24	24
		22	22
		20	20
		18	18
		16	16
		14	14
		12	12
		10	10
		0	0

\* = Estimated    (D) = Vortex dissipated upwind of tower    (M) = Missing    (O) = No vortex (Flyby flown for remote sensing systems)    (P) = Vortex passed over top of tower

Flyby (Run) Number: 52		Date: 24 SEP 1990 (Day of Year: 267)		Abeam Time: 11:39:13 (MDT)	
<b>AIRCRAFT DATA</b>		<b>METEOROLOGICAL DATA</b>		<b>UPWIND VORTEX CHARACTERISTICS</b>	
Configuration: Landing		Wind Direction: 162 deg.		Age: (O) s	
Glide Slope: -3 deg.		Air Temperature: 18.4 °C		Advection Rate: (O) fps	
Flaps: 30 deg.		Atmospheric Stability: Unstable		Estimated Core Radius: (O) ft	
Indicated Air Speed: 1.28 kts		Tower Penetration Height: (O) ft AGL		Estimated Core Radius: (O) ft	
Meteo Level: (200 ft Sensor Level)		Tower Penetration Height: (O) ft AGL		Estimated Core Radius: (O) ft	
Wind Speed: 1.8 kts		Wind Direction: 162 deg.		Estimated Core Radius: (O) ft	
Maximum Velocity: (O) fps		Age: (O) s		Estimated Core Radius: (O) ft	
Descent Rate: (O) fps		Advection Rate: (O) fps		Estimated Core Radius: (O) ft	
Descent Rate: (O) fps		Upwind Vortex Tangential Velocities		Estimated Core Radius: (O) ft	
Downwind Vortex Tangential Velocities		Sensor Height (ft)		Sensor Height (ft)	
Sensor Height (ft)		Relative Height (ft)		Relative Height (ft)	
Relative Height (ft)		V <sub>θ</sub> (fps)		V <sub>θ</sub> (fps)	
198		(O)		(O)	
196		(O)		(O)	
194		(O)		(O)	
192		(O)		(O)	
190		(O)		(O)	
188		(O)		(O)	
186		(O)		(O)	
184		(O)		(O)	
182		(O)		(O)	
180		(O)		(O)	
178		(O)		(O)	
176		(O)		(O)	
174		(O)		(O)	
172		(O)		(O)	
170		(O)		(O)	
168		(O)		(O)	
166		(O)		(O)	
164		(O)		(O)	
162		(O)		(O)	
160		(O)		(O)	
158		(O)		(O)	
156		(O)		(O)	
154		(O)		(O)	
152		(O)		(O)	
150		(O)		(O)	
148		(O)		(O)	
146		(O)		(O)	
144		(O)		(O)	
142		(O)		(O)	
140		(O)		(O)	
138		(O)		(O)	
136		(O)		(O)	
134		(O)		(O)	
132		(O)		(O)	
130		(O)		(O)	
128		(O)		(O)	
126		(O)		(O)	
124		(O)		(O)	
122		(O)		(O)	
120		(O)		(O)	
118		(O)		(O)	
116		(O)		(O)	
114		(O)		(O)	
112		(O)		(O)	
110		(O)		(O)	
108		(O)		(O)	
106		(O)		(O)	
104		(O)		(O)	

\* = Estimated

(D) = Vortex dissipated upwind of tower

(N) = No vortex

(I) = Flyby flown for remote sensing systems

(P) = Vortex passed over top of tower

Flyby (Run) Number: 53		Date: 24 SEP 1990 (Day of Year: 267)		Abeam Time: 11:46:24 (MDT)	
Configuration: Landing Glide Slope: 0 deg.		AIRCRAFT DATA Flaps: 30 deg. Indicated Air Speed: 127 kts		Gross Weight: 139,000lbs. Altitude: 250 ft AGL	
Wind Speed: 3.4 kts		METEOROLOGICAL DATA (200 ft Sensor Level) Wind Direction: 160 deg.		Estimated Core Radius: (P) ft Tower Penetration Height: (P) ft AGL	
Maximum Velocity: (D) fpm Descent Rate: (D) fpm	Wind Speed: 3.4 kts	Age: (P) s Advection Rate: (P) fpm	Downwind Vortex Characteristics Wind Direction: 160 deg.	Estimated Core Radius: (D) ft Tower Penetration Height: (D) ft AGL	Atmospheric Stability: Unstable
Maximum Velocity: (D) fpm Descent Rate: (D) fpm	Wind Speed: 3.4 kts	Age: (D) s Advection Rate: (D) fpm	Upwind Vortex Characteristics Wind Direction: 160 deg.	Upwind Vortex Tangential Velocities	Tower Penetration Height: (D) ft AGL
				Sensor Height (ft)	Relative Height (ft)
				$V_\theta$ (fps)	Sensor Height (ft)
				(P)	(P)
198	196	(P)	102	(P)	198
194	192	(P)	100	(P)	196
190	188	(P)	98	(P)	194
186	184	(P)	96	(P)	192
182	180	(P)	94	(P)	190
178	176	(P)	92	(P)	188
174	172	(P)	90	(P)	186
170	168	(P)	88	(P)	184
166	164	(P)	86	(P)	182
162	160	(P)	84	(P)	180
158	156	(P)	82	(P)	178
154	152	(P)	80	(P)	176
150	148	(P)	78	(P)	174
146	144	(P)	76	(P)	172
142	140	(P)	74	(P)	170
138	136	(P)	72	(P)	168
134	132	(P)	70	(P)	166
130	128	(P)	68	(P)	164
126	124	(P)	66	(P)	162
122	120	(P)	64	(P)	160
118	116	(P)	62	(P)	158
114	112	(P)	60	(P)	156
110	108	(P)	58	(P)	154
106	104	(P)	56	(P)	152
					150
					148
					146
					144
					142
					140
					138
					136
					134
					132
					130
					128
					126
					124
					122
					120
					118
					116
					114
					112
					110
					108
					104

= Estimated

161

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SCHOLASTIC TESTS OF HYPOTHESES

Flyby (Run) Number: 54

UAL B727-222

Date: 24 SEP 1990 (Day of Year: 267)

Absent Time: 11:52:59 (MDT)

Configuration: Landing  
Glide Slope: -3 deg.

AIRCRAFT DATA

Flops: 30 deg.  
Indicated Air Speed: 127 kts  
Gross Weight: 138,000 lbs  
Altitude: 250 ft AGL

Wind Speed: 3.9 kts  
Descent Rate: 3.5 fpm

METEOROLOGICAL DATA

(200 ft Sensor Level)  
Wind Direction: 162 deg.  
Advection Rate: 4.0 fpm  
Air Temperature: 18.7 °C  
Atmospheric Stability: Unstable

Maximum Velocity: 111.1 fpm  
Descent Rate: (D) fpm

DOWNDOWN VORTEX CHARACTERISTICS

Age: 33 s  
Advection Rate: (D) fpm  
Tower Penetration Height: 136 ft AGL

Maximum Velocity: (D) fpm  
Descent Rate: (D) fpm

UPWIND VORTEX CHARACTERISTICS

Age: (D) s  
Advection Rate: (D) fpm  
Estimated Core Radius: (D) ft AGL

Downwind Vortex Tangential Velocities

Upwind Vortex Tangential Velocities

Estimated Core Penetration Height: (D) ft AGL

Tower Penetration Height: (D) ft AGL

Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fpm)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fpm)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fpm)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fpm)
198	62	-9.7	102	.34	11.0	198	.19	102	100	.98	0
196	60	-8.6	100	.36	12.4	196	.19	100	98	0	0
194	58	-8.0	98	.38	13.7	194	.19	98	96	0	0
192	56	-8.7	96	.40	11.8	192	.19	96	94	0	0
190	54	-7.0	94	.42	16.6	190	.19	94	92	0	0
188	52	-6.3	92	.44	11.6	188	.19	92	90	0	0
186	50	-5.4	90	.46	13.0	186	.19	90	88	0	0
184	48	-6.7	88	.48	11.0	184	.19	88	86	0	0
182	46	-7.3	86	.50	12.5	182	.19	86	84	0	0
180	44	-9.1	84	.52	13.3	180	.19	84	82	0	0
178	42	-11.7	82	.54	11.1	178	.19	82	80	0	0
176	40	-9.9	80	.56	6.2	176	.19	80	78	0	0
174	38	-10.5	78	.58	6.3	174	.19	78	76	0	0
172	36	-13.0	76	.60	4.6*	172	.19	76	74	0	0
170	34	-12.1	74	.62	2.9	170	.19	74	70	0	0
168	32	-14.1	72	.64	0.4	168	.19	70	68	0	0
166	30	-12.3	70	.66	0.4	166	.19	68	66	0	0
164	28	-11.4	68	.68	1.3	164	.19	66	64	0	0
162	26	-10.0	66	.70	2.8	162	.19	64	62	0	0
160	24	-9.8	64	.72	0.4	160	.19	62	60	0	0
158	22	-8.5	62	.74	0.7	158	.19	60	58	0	0
156	20	-8.6	60	.76	0.7	156	.19	58	56	0	0
154	18	-11.2	58	.78	2.1	154	.19	56	54	0	0
152	16	-11.7	56	.80	0.8	152	.19	54	52	0	0
150	14	-17.5	54	.82	0.1	150	.19	52	50	0	0
148	12	-18.4	52	.84	1.9	148	.19	50	48	0	0
146	10	-20.5	50	.86	0.1	146	.19	48	46	0	0
144	8	-28.2	48	.88	0.3	144	.19	46	44	0	0
142	6	-36.5	46	.90	0.3	142	.19	44	42	0	0
140	4	-26.5	44	.92	3.0	140	.19	42	40	0	0
138	2	-48.9	42	.94	1.7	138	.19	40	38	0	0
136	0	-11.1	40	.96	1.9	136	.19	38	36	0	0
134	-2	-73.3	38	.98	0.6	134	.19	36	34	0	0
132	-4	25.8	36	1.00	0.5	132	.19	34	32	0	0
130	-6	20.6	34	1.02	1.7	130	.19	32	30	0	0
128	-8	19.5	32	1.04	0.8	128	.19	30	28	0	0
126	-10	28.1	30	1.06	0.2	126	.19	28	26	0	0
124	-12	23.8	28	1.08	0.7	124	.19	26	24	0	0
122	-14	19.8	26	1.10	2.5	122	.19	24	22	0	0
120	-16	18.5	24	1.12	0.7	120	.19	22	20	0	0
118	-18	14.0	22	1.14	1.9	118	.19	20	18	0	0
116	-20	14.9	20	1.16	0.3	116	.19	18	16	0	0
114	-22	12.8	18	1.18	0.7	114	.19	16	14	0	0
112	-24	11.3	16	1.20	1.20	112	.19	14	12	0	0
110	-26	12.1	14	1.22	0.8	110	.19	12	10	0	0
108	-28	12.9*	12	1.24	0.2	108	.19	10	12	0	0
106	-30	13.6	10	1.26	-0.7	106	.19	10	10	0	0
104	-32	10.7	0	1.28	1.04	104	.19	10	10	0	0

= Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

UAL B727-222		Date: 24 SEP 1990 (Day of Year: 267)	Abeam Time: 12:00:18 (MDT)
<b>AIRCRAFT DATA</b>			
Configuration: Landing	Flaps: 30 deg.	Gross Weight: 136,500 lbs.	
Glide Slope: 0 deg.	Indicated Air Speed: 126 kts	Altitude: 380 ft AGL	
Wind Speed: 3.6 kts	Wind Direction: 155 deg.	Air Temperature: 18.8 °C	Atmospheric Stability: Unstable
<b>METEOROLOGICAL DATA</b> [200 ft Sensor Level]			
Maximum Velocity: (O) fps	Age: (O) s	Estimated Core Radius: (O) ft	
Descent Rate: (O) fpm	Advection Rate: (O) fpm	Tower Penetration Height: (O) ft AGL	
Maximum Velocity: 24.8 fps	Age: 54 s	Estimated Core Radius: 0.2 ft	
Descent Rate: 6.1 fpm	Advection Rate: 4.2 fpm	Tower Penetration Height: 52 ft AGL	
<b>DOWNWIND VORTEX CHARACTERISTICS</b>			
Sensor Height (ft)	Relative Height (ft)	Downwind Vortex Tangential Velocities	Upwind Vortex Tangential Velocities
		Sensor Height (ft)	Sensor Height (ft)
		Relative Height (ft)	Relative Height (ft)
		V <sub>e</sub> (fps)	V <sub>e</sub> (fps)
198	0	0	0
196	102	100	198
194	96	98	196
192	94	92	194
188	90	88	192
186	88	86	189
184	86	84	187
182	84	82	185
180	82	80	183
178	78	76	181
176	76	74	179
174	74	72	177
172	72	70	175
170	70	68	173
168	68	66	171
166	66	64	169
164	64	62	167
162	62	60	165
160	60	58	163
158	58	56	155
156	56	54	153
154	54	52	151
152	52	50	149
148	48	46	147
146	46	44	145
144	44	42	143
142	42	40	141
140	40	38	139
138	38	36	137
136	36	34	135
134	34	32	133
132	32	30	131
130	30	28	129
128	28	26	127
126	26	24	125
124	24	22	123
122	22	20	121
120	20	18	119
118	18	16	117
116	16	14	115
114	14	12	113
112	12	10	111
110	10	8	109
108	8	6	107
106	6	4	105
104	4	2	103

= Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex (F)by flown for remote sensing systems (P) = Vortex passed over top of tower

Flyby (Run) Number: 56	Date: 24 SEP 1990 (Day of Year: 267)	Absent Time: 12:07:40 (MDT)
Configuration: Landing Glide Slope: -3 deg.		
Wind Speed: 3.5 kts	Wind Direction: 136 deg.	
Maximum Velocity: (O) fps Descent Rate: (O) fpm	Age: (O) s Advection Rate: (O) fpm	Age: 40 s Advection Rate: 4.5 fpm
Maximum Velocity: 37.7 fps Descent Rate: 6.0 fpm	Age: (O) s Advection Rate: (O) fpm	Age: 40 s Advection Rate: 4.5 fpm
	DOWNWIND VORTEX CHARACTERISTICS [200 ft Sensor Level]	UPWIND VORTEX CHARACTERISTICS
	Estimated Core Radius: (O) ft Tower Penetration Height: (O) ft AGL	Estimated Core Radius: 0.9 ft Tower Penetration Height: 158 ft AGL
	Gross Weight: 135,000 lbs. Altitude: 400 ft AGL	Atmospheric Stability: Unstable
	AIRCRAFT DATA	
	Flaps: 30 deg.	
	Indicated Air Speed: 126 kts	
	METEOROLOGICAL DATA	
	Air Temperature: 18.9 °C	

Estimated

(M) = Missing

(P) = Vortex passed over top of tower

Flyby (Run) Number: 57		UAL 8727-222		Abeam Time: 12:14:59 (MDT)	
Date: 24 SEP 1980 (Day of Year: 267)		AIRCRAFT DATA		Gross Weight: 133,500 lbs.	
Configuration: Landing		Flaps: 30 deg.		Altitude: 250 ft AGL	
Glide Slope: 0 deg.		Indicated Air Speed: 125 kts		Atmospheric Stability: Unstable	
Wind Speed: 4.6 kts		Wind Direction: 203 deg.		Air Temperature: 19.1 °C	
Maximum Velocity: (D) fpm		Age: 38 s		Estimated Core Radius: 0.7 ft	
Descent Rate: 5.7 fpm		Advection Rate: 3.6 fpm		Tower Penetration Height: 38 ft AGL	
Sensor Height (ft)		METEOROLOGICAL DATA		Estimated Penetration Height: (D) ft AGL	
(200 ft Sensor Level)		(200 ft Sensor Level)		Tower	
Downwind Vortex Tangential Velocities		UPWIND VORTEX CHARACTERISTICS		Core Radius: (D) ft	
Wind Direction: 203 deg.		Age: (D) s		Penetration Height: (D) ft AGL	
Maximum Velocity: 78.3 fpm		Advection Rate: (D) fpm		Tangential Velocities	
Descent Rate: (D) fpm		Upwind Vortex Tangential Velocities		Relative Height (ft)	
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)
198	160	-9.6	102	64	-6.2
196	158	-11.6	100	62	-6.4*
194	154	-9.0	98	60	-6.7
192	152	-9.9	96	58	-5.4
190	150	-9.4	94	56	-5.8
188	148	-9.1	92	54	-8.5
186	146	-12.5	90	52	-8.7
184	144	-12.2	88	50	-4.8
182	142	-13.0	86	48	-6.5
180	140	-11.5	84	46	-6.3
178	138	-13.0	82	44	-8.2
176	136	-11.1	80	42	-5.3
174	134	-11.1	78	40	-5.6
172	132	-12.6	76	38	-6.0
170	130	-10.8	74	36	-8.3
168	128	-10.4	72	34	-7.1
166	126	-9.9	70	32	-7.3
164	124	-10.7	68	30	-11.9
162	122	-10.0	66	28	-10.9
160	120	-10.1	64	26	-8.3
158	118	-10.9	62	24	-10.4
156	116	-6.4	60	22	-13.4
154	114	-9.6	58	20	-15.5
152	112	-8.2	56	18	-11.0
150	110	-7.9	54	16	-11.3
148	108	-1.1	52	14	-24.6
146	106	-5.9	50	12	-19.4
144	104	-8.0	48	10	-23.1
142	102	-7.1	46	8	-22.1
140	100	-7.0	44	6	-24.7
138	98	-6.1	42	4	-40.4
136	96	-8.2	38	2	-75.5
134	94	-4.1	36	0	-78.3
132	92	-6.5	34	-4	33.7
130	90	-10.2	32	-22.4	32
128	88	-10.4	30	-6	19.9
126	86	-6.6	28	-8	17.4
124	84	-5.6	26	-4	-39.9
122	82	-5.8	24	-12	13.6
120	80	-5.8	22	-14	12.2
118	78	-5.5	20	-16	11.7
116	76	-9.9	18	-18	20.9
114	74	-6.5	16	-20	11.6
112	72	-5.6	14	-22	26.7
110	70	-6.4	12	-24	21.5
108	68	-6.1	10	-26	23.4
106	66	-7.7	-28	-28	10.6
104	66	-	-	-	10.4

(P) = Vortex passed over top of tower

(M) = Missing

(I) = No vortex (Flyby flown for remote sensing systems)

\* = Estimated

Flyby (Run) Number: 58	UAL B727-222	Date: 24 SEP 1990 (Day of Year: 267)	Abeam Time: 12:22:17 (MDT)
<b>AIRCRAFT DATA</b>			
Configuration: Landing	Flaps: 30 deg.	Gross Weight: 132,000lbs.	
Glide Slope: -3 deg.	Indicated Air Speed: 124 kts	Altitude: 260 ft AGL	
Wind Speed: 3.4 kts	Wind Direction: 234 deg.	Air Temperature: 19.3 °C	Atmospheric Stability: Unstable
Maximum Velocity: (D) fps	Age: (D) s	Advection Rate: (D) fps	Estimated Core Radius: (D) ft
Descent Rate: (D) fps	(200 ft Sensor Level)	Tower Penetration Height: (D) ft AGL	
Maximum Velocity: (D) fps	Age: (D) s	Advection Rate: (D) fps	Tower Penetration Height: (D) ft AGL
Descent Rate: (D) fps			
Maximum Velocity: (D) fps	Age: (D) s	Advection Rate: (D) fps	Upwind Vortex Tangential Velocities
Descent Rate: (D) fps			
Downwind Vortex Characteristics			
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
198	(D)	102	(D)
196	194	100	198
192	190	98	196
188	186	96	194
184	182	94	192
180	178	92	190
176	174	90	188
172	170	88	186
168	166	86	184
164	162	84	182
160	158	82	180
156	154	80	178
152	150	78	176
148	146	76	174
144	142	74	172
140	138	72	170
136	134	70	168
132	130	68	166
128	126	66	164
124	122	64	162
120	118	62	160
116	114	60	158
112	110	58	156
108	106	56	154
104	102	54	152
		52	150
		50	148
		48	146
		46	144
		44	142
		42	140
		40	138
		38	136
		36	134
		34	132
		32	130
		30	128
		28	126
		26	124
		24	122
		22	120
		20	118
		18	116
		16	114
		14	112
		12	110
		10	108
		8	106
		6	104
		4	102
		2	100
		0	98

\* = Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex [Flyby flown for remote sensing systems]

(P) = Vortex passed over top of tower

Flyby (Run) Number: 59	Date: 24 SEP 1990 (Day of Year: 267)	Abeam Time: 12:29:44 (MDT)					
Configuration: Takeoff Glide Slope: 0 deg.	AIRCRAFT DATA  Flaps: 15 deg. Indicated Air Speed: 142 kts	Gross Weight: 131,000 lbs. Altitude: 225 ft AGL					
Wind Speed: 3.5 kts	Wind Direction: 115 deg.	Atmospheric Stability: Unstable					
Maximum Velocity: (D) fps Descent Rate: (D) f/s	METEOROLOGICAL DATA (200 ft Sensor Level)  Age: (D) s Advection Rate: (D) f/s	Estimated Core Radius: (D) ft Tower Penetration Height: (D) ft AGL					
Maximum Velocity: (D) fps Descent Rate: (D) f/s	UPWIND VORTEX CHARACTERISTICS  Age: (D) s Advection Rate: (D) f/s	Estimated Core Radius: (D) ft Tower Penetration Height: (D) ft AGL					
Downwind Vortex Tangential Velocities							
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
198	(D)	100	(D)	198	(D)	102	(D)
196	194	98	96	194	192	98	96
192	190	94	92	190	188	94	92
188	186	90	88	186	184	88	86
184	182	86	84	182	180	84	82
180	178	82	80	178	176	80	78
176	174	78	76	174	172	76	74
172	170	74	72	170	168	72	70
168	166	70	68	166	164	68	66
164	162	66	64	162	160	64	62
160	158	62	60	158	156	60	58
158	156	60	58	156	154	56	54
154	152	56	54	152	150	52	50
150	148	52	50	150	148	50	48
148	146	48	46	146	144	46	44
146	144	44	42	144	142	42	42
142	140	40	38	142	138	40	40
138	136	38	36	138	136	38	36
136	134	36	34	136	134	36	34
134	132	34	32	134	132	32	32
132	130	32	30	132	128	30	30
128	126	28	26	128	126	28	26
126	124	26	24	126	124	26	24
124	122	24	22	124	122	24	22
122	120	22	20	122	118	20	20
120	118	18	16	120	116	18	18
118	116	16	14	116	114	16	16
116	114	14	12	114	112	14	12
114	112	12	10	112	110	12	10
112	110	10	10	110	108	10	10
110	108	10	10	108	106	10	10
108	106	10	10	106	104	10	10

\* = Estimated      (D) = Vortex dissipated upwind of tower      (M) = Missing      (P) = Vortex passed over top of tower

Flyby (Run) Number: 60		Date: 24 SEP 1990 [Day of Year: 267]		Abeam Time: 12:39:38 (MDT)	
<b>AIRCRAFT DATA</b>					
Configuration: Clean		Flaps: 0 deg.		Gross Weight: 130,000 lbs.	
Glide Slope: 0 deg.		Indicated Air Speed: 250 kts		Altitude: 250 ft AGL	
<b>METEOROLOGICAL DATA</b> (200ft Sensor Level)					
Wind Speed: 2.1 kts		Wind Direction: 144 deg.		Air Temperature: 20.0 °C	
Maximum Velocity: (D) f/s		Age: (D) s		Estimated Core Radius: (D) ft	
Descent Rate: (D) f/s		Advection Rate: (D) f/s		Tower Penetration Height: (D) ft AGL	
<b>DOWNWIND VORTEX CHARACTERISTICS</b>					
Wind Speed: 2.1 kts		Age: (D) s		Atmospheric Stability: Unstable	
<b>UPWIND VORTEX CHARACTERISTICS</b>					
Wind Speed: 2.1 kts		Age: (D) s		Estimated Core Radius: (D) ft	
Maximum Velocity: (D) f/s		Advection Rate: (D) f/s		Tower Penetration Height: (D) ft AGL	
Descent Rate: (D) f/s					
<b>Downwind Vortex Tangential Velocities</b>					
Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)
198	(D)	(D)	102	(D)	(D)
196	(D)	(D)	98	(D)	(D)
194	(D)	(D)	94	(D)	(D)
192	(D)	(D)	92	(D)	(D)
190	(D)	(D)	90	(D)	(D)
188	(D)	(D)	88	(D)	(D)
186	(D)	(D)	86	(D)	(D)
184	(D)	(D)	84	(D)	(D)
182	(D)	(D)	82	(D)	(D)
180	(D)	(D)	80	(D)	(D)
178	(D)	(D)	78	(D)	(D)
176	(D)	(D)	76	(D)	(D)
174	(D)	(D)	74	(D)	(D)
172	(D)	(D)	72	(D)	(D)
170	(D)	(D)	70	(D)	(D)
168	(D)	(D)	68	(D)	(D)
166	(D)	(D)	66	(D)	(D)
164	(D)	(D)	64	(D)	(D)
162	(D)	(D)	62	(D)	(D)
160	(D)	(D)	60	(D)	(D)
158	(D)	(D)	58	(D)	(D)
156	(D)	(D)	56	(D)	(D)
154	(D)	(D)	54	(D)	(D)
152	(D)	(D)	52	(D)	(D)
150	(D)	(D)	50	(D)	(D)
148	(D)	(D)	48	(D)	(D)
146	(D)	(D)	46	(D)	(D)
144	(D)	(D)	44	(D)	(D)
142	(D)	(D)	42	(D)	(D)
140	(D)	(D)	40	(D)	(D)
138	(D)	(D)	38	(D)	(D)
136	(D)	(D)	36	(D)	(D)
134	(D)	(D)	34	(D)	(D)
132	(D)	(D)	32	(D)	(D)
130	(D)	(D)	30	(D)	(D)
128	(D)	(D)	28	(D)	(D)
126	(D)	(D)	26	(D)	(D)
124	(D)	(D)	24	(D)	(D)
122	(D)	(D)	22	(D)	(D)
120	(D)	(D)	20	(D)	(D)
118	(D)	(D)	18	(D)	(D)
116	(D)	(D)	16	(D)	(D)
114	(D)	(D)	14	(D)	(D)
112	(D)	(D)	12	(D)	(D)
110	(D)	(D)	10	(D)	(D)
108	(D)	(D)	8	(D)	(D)
106	(D)	(D)	6	(D)	(D)
104	(D)	(D)	4	(D)	(D)
102	(D)	(D)	2	(D)	(D)
100	(D)	(D)	0	(D)	(D)

= Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex (Flyby flown over top of tower)

(P) = Vortex passed over top of tower

Flyby (Run) Number: 1		Date: 25 SEP 1990 (Day of Year: 268)		Abeam Time: 7:20:50 (MDT)	
Configuration: Takeoff		AIRCRAFT DATA		Gross Weight: 200,000lbs.	
Glide Slope: 0 deg.		Flaps: 20 deg.		Altitude: 270 ft AGL	
Indicated Air Speed: 143 kts		METEOROLOGICAL DATA		Atmospheric Stability: Stable	
Wind Speed: 6.4 kts		Wind Direction: 42 deg.		Air Temperature: 8.5 °C	
Maximum Velocity: (P) fps		Age: (P) s		Estimated Core Radius: (P) ft	
Descent Rate: (P) fps		Advection Rate: (P) fps		Tower Penetration Height: (P) ft AGL	
Maximum Velocity: 119.7 fps		UPWIND VORTEX CHARACTERISTICS		Estimated Core Radius: 0.8 ft	
Descent Rate: 4.5 fps		Age: 20 s		Estimated Penetration Height: 180 ft AGL	
Downwind Vortex Tangential Velocities		Upwind Vortex Tangential Velocities			
Sensor Height [ft]	Relative Height [ft]	V <sub>θ</sub> (fps)	Sensor Height [ft]	Relative Height [ft]	V <sub>θ</sub> (fps)
198	(P)	102	(P)	198	-19.8
196	(P)	100	(P)	196	-23.9
194	(P)	98	(P)	194	-23.3
192	(P)	96	(P)	192	-24.6*
190	(P)	94	(P)	190	-25.8
188	(P)	92	(P)	188	-24.7
186	(P)	90	(P)	186	-37.0
184	(P)	88	(P)	184	-56.2
182	(P)	86	(P)	182	-93.1
180	(P)	84	(P)	180	-9.2
178	(P)	82	(P)	178	-19.7
176	(P)	80	(P)	176	-2
174	(P)	78	(P)	174	-4
172	(P)	76	(P)	172	-6
170	(P)	74	(P)	170	-8
168	(P)	72	(P)	168	-10
166	(P)	70	(P)	166	-12
164	(P)	68	(P)	164	-14
162	(P)	66	(P)	162	-16
160	(P)	64	(P)	160	-18
158	(P)	62	(P)	158	-20
156	(P)	60	(P)	156	-22
154	(P)	58	(P)	154	-24
152	(P)	56	(P)	152	-26
150	(P)	54	(P)	150	-28
148	(P)	52	(P)	148	-30
146	(P)	50	(P)	146	-32
144	(P)	48	(P)	144	-34
142	(P)	46	(P)	142	-36
140	(P)	44	(P)	140	-38
138	(P)	42	(P)	138	-40
136	(P)	40	(P)	136	-42
134	(P)	38	(P)	134	-44
132	(P)	36	(P)	132	-46
130	(P)	34	(P)	130	-48
128	(P)	32	(P)	128	-50
126	(P)	30	(P)	126	-52
124	(P)	28	(P)	124	-54
122	(P)	26	(P)	122	-56
120	(P)	24	(P)	120	-58
118	(P)	22	(P)	118	-60
116	(P)	20	(P)	116	-62
114	(P)	18	(P)	114	-64
112	(P)	16	(P)	112	-66
110	(P)	14	(P)	110	-68
108	(P)	12	(P)	108	-70
106	(P)	10	(P)	106	-72
104	(P)	8	(P)	104	-74
					-76

\* = Estimated      (D) = Vortex dissipated upwind of tower      (M) = Missing      (O) = No vortex (Flyby flown for remote sensing systems)      (P) = Vortex passed over top of tower

UAL B757-200		Date: 25 SEP 1990 (Day of Year: 268)	Abeam Time: 7:27:59 (MDT)			
<b>AIRCRAFT DATA</b>						
Configuration: Takeoff	Flaps: 15 deg.	Air Speed: 150 kts	Gross Weight: 199,000 lbs.			
Glide Slope: 0 deg.	Indicated Air Speed:		Altitude: 250 ft AGL			
<b>METEOROLOGICAL DATA</b> (200 ft Sensor Level)						
Wind Speed: 6.6 kts	Wind Direction: 49 deg.	Air Temperature: 8.3 °C	Atmospheric Stability: Stable			
Maximum Velocity: 64.4 fps	Age: 23 s	Upwind Vortex Characteristics	Estimated Core Radius: 1.3 ft			
Descent Rate: 3.8 fps	Advection Rate: 7.0 fps		Tower Penetration Height: 142 ft AGL			
Maximum Velocity: 69.1 fps	Age: 35 s	Upwind Vortex Characteristics	Estimated Core Radius: 1.1 ft			
Descent Rate: 4.7 fps	Advection Rate: 6.7 fps		Tower Penetration Height: 118 ft AGL			
<b>DOWNDOWN VORTEX CHARACTERISTICS</b>						
Wind Speed: 6.6 kts	Wind Direction: 49 deg.	Upwind Vortex Tangential Velocities	Tower Penetration Velocities			
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	V <sub>θ</sub> (fps)
198	56	16.7	102	-9.9	80	-1.0
196	54	13.4	100	-4.2	78	0.3
194	52	13.6*	98	-4.4	94	-0.7*
192	50	15.6*	96	-10.1	74	-0.7*
190	48	17.5	94	-10.6	72	-4.5
188	46	16.7*	92	-4.8	70	-4.5
186	44	16.1*	90	-5.0	68	-4.5
184	42	14.9	88	-5.2	66	-4.5
182	40	17.6	86	-5.4	84	-11.0
180	38	16.1*	84	-5.6	64	-7.7*
178	36	14.7	82	-5.8	62	-4.4
176	34	12.0	80	-6.0	60	-5.6
174	32	15.5	78	-6.4	58	-6.2
172	30	12.5	76	-6.6	56	-5.0
170	28	17.2	74	-6.8	54	-5.8
168	26	18.2*	72	-5.9	52	-6.6*
166	24	19.2	70	-5.4	70	-6.7
164	22	20.2	68	-7.2	50	-7.3
162	20	23.2	66	-7.4	72	-12.9
160	18	21.9	64	-7.6	70	-4.8
158	16	27.5	62	-7.8	68	-5.2
156	14	25.6	60	-8.0	66	-5.4
154	12	31.5	58	-8.2	64	-5.6
152	10	32.6	56	-8.4	62	-5.7
150	8	38.2	54	-8.6	58	-5.8
148	6	36.6	52	-8.8	60	-6.0
146	4	42.6	50	-9.0	58	-6.2
144	2	42.6	48	-9.2	56	-6.3
142	0	69.1	46	-9.4	54	-6.3
140	-2	59.6	44	-9.6	52	-6.5
138	-4	55.7	42	-9.8	50	-6.7
136	-6	38.0	40	-10.0	48	-6.8
134	-8	32.1	38	-10.2	46	-6.9
132	-10	25.9	36	-10.4	44	-7.0
130	-12	29.6	36	-10.6	42	-7.1
128	-14	18.4	34	-10.8	40	-7.2
126	-16	20.4	32	-11.0	38	-7.3
124	-18	18.6	30	-11.2	36	-7.4
122	-20	16.5	28	-11.4	34	-7.5
120	-22	20.3	26	-11.6	32	-7.6
118	-24	16.9	24	-11.8	30	-7.7
116	-26	13.9	22	-12.0	28	-7.8
114	-28	10.6	20	-12.2	26	-7.9
112	-30	14.7	18	-12.4	24	-8.0
110	-32	15.3	16	-12.6	22	-8.1
108	-34	15.1	14	-12.8	20	-8.2
106	-36	13.0	12	-13.0	18	-8.3
104	-38	15.9	10	-13.2	16	-8.4
				-15.0	14	-8.5
				104	12	-8.6
				-14	10	-8.7

= Estimated (D) = Vortex dissipated upwind of tower (I) = Missing (N) = No vortex (F) = Vortex flown for remote sensing systems (P) = Vortex passed over top of tower (R) = Remote sensing system passed over top of tower

Flyby (Run) Number: 3		Date: 25 SEP 1990 (Day of Year: 268)		Abeam Time: 7:33:49 (MDT)					
AIRCRAFT DATA		METEOROLOGICAL DATA		Atmospheric Stability: Stable					
Configuration: Takeoff Glide Slope: 0 deg.		(200 ft Sensor Level)		Gross Weight: 198,000 lbs. Altitude: 240 ft AGL					
Wind Speed: 8.3 kts		Wind Direction: 50 deg.		Estimated Core Radius: 0.3 ft Tower Penetration Height: 168 ft AGL					
Maximum Velocity: 152.2 fps Descent Rate: 4.0 f/s		Age: 18.5 s Advection Rate: 7.8 f/s		Estimated Core Radius: 0.6 ft Tower Penetration Height: 108 ft AGL					
Maximum Velocity: 130.0 fps Descent Rate: 4.7 f/s		Age: 28 s Advection Rate: 7.7 f/s		Estimated Core Radius: 0.6 ft Tower Penetration Height: 108 ft AGL					
<b>DOWNWIND VORTEX CHARACTERISTICS</b>									
Age: 18.5 s Advection Rate: 7.8 f/s									
<b>UPWIND VORTEX CHARACTERISTICS</b>									
Age: 28 s Advection Rate: 7.7 f/s									
Sensor Height (ft)	Relative Height (ft)	Downwind Vortex Tangential Velocities	Sensor Height (ft)	Upwind Vortex Tangential Velocities	Sensor Height (ft)				
		$V_\theta$ (fps)		$V_\theta$ (fps)					
198	30	18.3	102	-6.6	90				
196	28	19.0	100	-6.8	98				
194	26	16.1*	98	-6.3	94				
192	24	19.8*	70	-10.0	84				
190	22	23.5	96	-8.1	82				
188	20	27.1*	94	-7.6	80				
186	18	30.3	92	-6.1	78				
184	16	35.9	90	-6.3	76				
182	14	42.2	88	-6.2	74				
180	12	36.9	84	-6.4	72				
178	10	48.9	82	-6.2	70				
176	8	58.2*	80	-8.8	68				
174	6	46.2	78	-9.0	66				
172	4	43.7	76	-9.2	64				
170	2	42.6	74	-9.4	62				
168	0	152.2	72	-9.6	60				
166	-2	-67.5	70	-3.8	58				
164	-4	-36.1	68	-10.0	56				
162	-6	-16.5	66	-3.4	54				
160	-8	-16.5	64	-10.4	52				
158	-10	-13.1	62	-10.6	50				
156	-12	-17.4	60	-10.8	48				
154	-14	-14.1	58	-11.0	46				
152	-16	-14.8	56	-11.2	44				
150	-18	-14.8	54	-11.4	42				
148	-20	-15.0	52	-11.6	40				
146	-22	-13.6	50	-11.8	38				
144	-24	-11.0	48	-2.0	36				
142	-26	-13.0	46	-1.2	34				
140	-28	-14.2	44	-2.7	32				
138	-30	-9.3	42	-2.9	30				
136	-32	-3.7	40	-1.7	28				
134	-34	-5.3	38	-3.6	26				
132	-36	-8.0*	36	-2.3	24				
130	-38	-10.7	34	-2.5	22				
128	-40	-12.0	32	-1.8	20				
126	-42	-9.3	30	-2.2	18				
124	-44	-8.4	28	-1.7	16				
122	-46	-10.0	26	-1.4	14				
120	-48	-10.1	24	-1.4	12				
118	-50	-6.1	22	-1.8	10				
116	-52	-8.0	20	-1.6	8				
114	-54	-8.4	18	-1.9	6				
112	-56	-6.5	16	-1.50	5.2				
110	-58	-9.4	14	-1.9	4				
108	-60	-6.4	12	-2.0	2.7				
106	-62	-7.2	10	-1.56	1.4				
104	-64	-5.0	104	-2.1	1.2				
				-1.58	1.0				
				-1.6	1.1				
				-1.4	1.4				
				-1.4	1.2				
				-1.4	1.0				
				-1.4	0.8				
				-1.4	0.6				
				-1.4	0.4				
				-1.4	0.2				
				-1.4	0.0				
				-1.4	-0.2				
				-1.4	-0.4				
				-1.4	-0.6				
				-1.4	-0.8				
				-1.4	-1.0				
				-1.4	-1.2				
				-1.4	-1.4				
				-1.4	-1.6				
				-1.4	-1.8				
				-1.4	-2.0				
				-1.4	-2.2				
				-1.4	-2.4				
				-1.4	-2.6				
				-1.4	-2.8				
				-1.4	-3.0				
				-1.4	-3.2				
				-1.4	-3.4				
				-1.4	-3.6				
				-1.4	-3.8				
				-1.4	-4.0				
				-1.4	-4.2				

\* = Estimated (D) = Vortex dissipated upwind of tower (M) = Missing (O) = No vortex (P) = Vortex flown for remote sensing systems (P) = Vortex passed over top of tower

Flyby (Run) Number: 4	Date: 25 SEP 1990 (Day of Year: 268)	Abeam Time: 7:40:12 (MDT)						
Configuration: Landing	AIRCRAFT DATA							
Glide Slope: 0 deg.	Flaps: 30 deg.	Gross Weight: 197,000 lbs.						
Descent Rate: 4.4 f/s	Indicated Air Speed: 137 kts	Altitude: 250 ft AGL						
Wind Speed: 6.7 kts	Wind Direction: 53 deg.	Atmospheric Stability: Stable						
Maximum Velocity: 245.3 f/s	Age: 21 s	Estimated Core Radius: 0.4 ft						
Descent Rate: 4.4 f/s	Advection Rate: 7.4 f/s	Tower Penetration Height: 158 ft AGL						
Maximum Velocity: 217.0 f/s	Age: 33 s	Estimated Core Radius: 0.4 ft						
Descent Rate: 4.4 f/s	Advection Rate: 6.9 f/s	Tower Penetration Height: 104 ft AGL						
DOWNWIND VORTEX CHARACTERISTICS								
UPWIND VORTEX CHARACTERISTICS								
Downwind Vortex Tangential Velocities	Upwind Vortex Tangential Velocities							
Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)
198	40	13.3	102	56	-10.2*	198	94	-2.3
196	38	17.6	100	58	-10.8*	196	92	-1.8
194	36	14.9	98	60	-1.4	194	90	-3.1
192	34	15.3*	96	62	-1.7	192	88	-3.3
190	32	15.7	94	64	-1.7	190	86	-5.9
188	30	16.8	92	66	-1.25	188	84	-3.7
186	28	17.9	90	68	-1.31	186	82	-2.3
184	26	18.2	88	70	-1.21	184	80	-4.3
182	24	18.4	86	72	-9.4	182	78	-5.2
180	22	16.7	84	74	-10.0	180	76	-3.8
178	20	22.0	82	76	-6.8	178	74	-4.8
176	18	26.2	80	78	-7.1	176	72	-3.8
174	16	34.3	78	80	-5.6	174	70	-3.8
172	14	35.9	76	82	-4.9	172	68	-6.4
170	12	33.8	74	84	-5.0	170	66	-7.5*
168	10	31.8	72	86	-4.5	168	64	-8.7
166	8	37.9	70	88	-3.9	166	62	-8.3
164	6	45.2	68	90	-3.7	164	60	-6.9
162	4	52.3	66	92	-3.5	162	58	-6.9
160	2	83.3	64	94	-3.2	160	56	-9.1
158	0	245.3	62	96	-2.6	158	54	-7.6
156	-2	-114.0	60	98	-3.0	156	52	-8.7
154	-4	-72.0	58	100	-2.5	154	50	-8.1
152	-6	-53.6*	56	102	-3.1	152	48	-10.4
150	-8	-34.2	54	104	-3.1	150	46	-8.9
148	-10	-34.3	52	106	-3.1	148	44	-11.7
146	-12	-27.5	50	108	-2.2	146	42	-9.6
144	-14	-30.3	48	110	-2.6	144	40	-8.6
142	-16	-25.8	46	112	-2.3	142	38	-9.4
140	-18	-25.1	44	114	-2.1	140	36	-10.6
138	-20	-20.5	42	116	-1.6	138	34	-9.1
136	-22	-22.0	40	118	-2.0	136	32	-11.7
134	-24	-1.3	38	120	-2.1	134	30	-11.6
132	-26	-16.8	36	122	-1.7	132	28	-14.6
130	-28	-9.1	34	124	-1.2	130	26	-11.9
128	-30	-3.0	32	126	-1.6	128	24	-14.2
126	-32	-7.1	30	128	-1.4	126	22	-10.5
124	-34	-8.5	28	130	-0.9	124	20	-16.3
122	-36	-10.8	26	132	-1.3	122	18	-20.3
120	-38	-11.3	24	134	-1.2	120	16	-23.6
118	-40	-11.1	22	136	-0.9	118	14	-23.6
116	-42	-10.2	20	138	-1.8	116	12	-29.5
114	-44	-9.0	18	140	-0.9	114	10	-27.6
112	-46	-7.7	16	142	-1.0	112	8	-32.6
110	-48	-7.0	14	144	-1.1	110	6	-45.8
108	-50	-6.6	12	146	-1.0	108	4	-76.0
106	-52	-8.4	10	148	-0.8	106	2	-118.8
104	-54	-10.2				104	0	-217.0

\* = Estimated (P) = No vortex

(O) = Missing (I) = Flyby

= Dissipated upwind of tower

= Vortex passed over top of tower

.

(F) = Flyby flown for remote sensing systems

(A) = Atmospheric stability

(D) = Downwind vortex dissipation

.

Flyby (Run) Number: 5		Date: 25 SEP 1990 (Day of Year: 268)		Abeam Time: 7:47:08 (MDT)	
AIRCRAFT DATA		Gross Weight: 196,000 lbs.		Altitude: 260 ft AGL	
Configuration: Holding		Indicated Air Speed: 211 kts			
Glide Slope: 0 deg.					
Wind Speed: 8.8 kts		Wind Direction: 43 deg.		Air Temperature: 9.5 °C	
Maximum Velocity: (P) fps		Age: (P) s		Estimated Core Radius: (P) ft	
Descent Rate: (P) fpm		Advection Rate: (P) fpm		Tower Penetration Height: (P) ft AGL	
METEOROLOGICAL DATA		Atmospheric Stability: Stable			
(200 ft Sensor Level)					
UPWIND VORTEX CHARACTERISTICS					
Wind Speed: 8.8 kts		Age: 26.5		Upwind Vortex Tangential Velocities	
Maximum Velocity: 180.2 fpm		Advection Rate: 9.5 fpm		Upwind Vortex Tangential Velocities	
Descent Rate: 3.6 fpm					
Downwind Vortex Tangential Velocities					
Sensor Height [ft]	Relative Height [ft]	V <sub>θ</sub> [fps]	Sensor Height [ft]	Relative Height [ft]	V <sub>θ</sub> [fps]
198	(P)	102	(P)	198	-7.1
196	(P)	100	(P)	196	-13.2
194	(P)	98	(P)	194	-10.9
192	(P)	96	(P)	192	2.8
190	(P)	94	(P)	190	-7.9
188	(P)	92	(P)	188	2.4
186	(P)	90	(P)	186	-9.0
184	(P)	88	(P)	184	2.2
182	(P)	86	(P)	182	-1.2
180	(P)	84	(P)	180	-1.2
178	(P)	82	(P)	178	1.8
176	(P)	80	(P)	176	-1.8
174	(P)	78	(P)	174	1.2
172	(P)	76	(P)	172	-1.2
170	(P)	74	(P)	170	0
168	(P)	72	(P)	168	-1.6
166	(P)	70	(P)	166	4
164	(P)	68	(P)	164	-10.8
162	(P)	66	(P)	162	0
160	(P)	64	(P)	160	-2
158	(P)	62	(P)	158	4
156	(P)	60	(P)	156	-6
154	(P)	58	(P)	154	8
152	(P)	56	(P)	152	-10
150	(P)	54	(P)	150	12
148	(P)	52	(P)	148	-14
146	(P)	50	(P)	146	16
144	(P)	48	(P)	144	-16
142	(P)	46	(P)	142	20
140	(P)	44	(P)	140	-22
138	(P)	42	(P)	138	24
136	(P)	40	(P)	136	-26
134	(P)	38	(P)	134	28
132	(P)	36	(P)	132	-30
130	(P)	34	(P)	130	32
128	(P)	32	(P)	128	-34
126	(P)	30	(P)	126	36
124	(P)	28	(P)	124	-38
122	(P)	26	(P)	122	40
120	(P)	24	(P)	120	-42
118	(P)	22	(P)	118	44
116	(P)	20	(P)	116	-46
114	(P)	18	(P)	114	48
112	(P)	16	(P)	112	-50
110	(P)	14	(P)	110	52
108	(P)	12	(P)	108	-56
106	(P)	10	(P)	106	58
104	(P)	8	(P)	104	-60

(P) = Vortex passed over top of tower

(O) = Missing

(D) = Vortex dissipated upwind of tower

\* = Estimated

(P) = Vortex passed over top of tower

(O) = No vortex (Flyby flown for remote sensing systems)

Flyby (Run) Number: 6	UAL B757-200	Date: 25 SEP 1990 [Day of Year: 268]	Abeam Time: 7:53:45 (MDT)
Configuration: Holding	AIRCRAFT DATA		
Glide Slope: 0 deg.	Flaps: 0 deg.		
	Indicated Air Speed: 210 kts		
Wind Speed: 9.8 kts	METEOROLOGICAL DATA [200 ft Sensor Level]		
Maximum Velocity: 117.0 fps	Wind Direction: 43 deg.	Air Temperature: 10.0 °C	Atmospheric Stability: Stable
Descent Rate: (P) fps	Advection Rate: (P) fps	Age: (P) s	Estimated Core Radius: (P) ft
Maximum Velocity: 117.0 fps	Advection Rate: 10.1 fps	Age: 21 s	Tower Penetration Height: (P) ft AGL
Descent Rate: 3.5 fps	Downwind vortex characteristics	Upwind vortex characteristics	Estimated Core Radius: 0.4 ft
Maximum Velocity: 117.0 fps	Age: 21 s	Age: 21 s	Tower Penetration Height: 166 ft AGL
Descent Rate: (P) fps	Downwind vortex tangential velocities	Upwind vortex tangential velocities	
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
(P)	(P)	(P)	(P)
198	198	198	198
196	196	196	30
194	194	194	28
192	192	192	26
190	190	190	24
188	188	188	22
186	186	186	20
184	184	184	18
182	182	182	16
180	180	180	14
178	178	178	12
176	176	176	10
174	174	174	8
172	172	172	6
170	170	170	4
168	168	168	2
166	166	166	0
164	164	164	-2
162	162	162	-4
160	160	160	-6
158	158	158	-8
156	156	156	-10
154	154	154	-12
152	152	152	-14
150	150	150	-16
148	148	148	-18
146	146	146	-20
144	144	144	-22
142	142	142	-24
140	140	140	-26
138	138	138	-28
136	136	136	-30
134	134	134	-32
132	132	132	-34
130	130	130	-36
128	128	128	-38
126	126	126	-40
124	124	124	-42
122	122	122	-44
120	120	120	-46
118	118	118	-48
116	116	116	-50
114	114	114	-52
112	112	112	-54
110	110	110	-56
108	108	108	-58
106	106	106	-60
104	104	104	-62

= Estimated (D) = Vortex dissipated upwind of tower (M) = Missing (O) = No vortex (Flyby flown for remote sensing systems) (P) = Vortex passed over top of tower

AIRCRAFT DATA		METEOROLOGICAL DATA		Atmospheric Stability: Stable	
Configuration: Clean	Flaps: 0 deg	Indicated Air Speed: 250 kts	Gross Weight: 194,000 lbs.	Estimated Core Radius: 0.3 ft	Tower Penetration Height: 188 ft AGL
Wind Speed: 9.0 kts	Wind Direction: 45 deg.	Airs: 25 s	Air Temperature: 9.0 °C		
Maximum Velocity: 89.5 fpm		Advection Rate: 9.4 fpm			
Descent Rate: 3.3 fpm					
DOWNWIND VORTEX CHARACTERISTICS		UPWIND VORTEX CHARACTERISTICS		TOWER PENETRATION HEIGHT: 136 FT AGL	
Wind Speed: 9.0 kts	Wind Direction: 45 deg.	Airs: 25 s	Advection Rate: 9.7 fpm	Estimated Core Radius: 0.2 ft	
Maximum Velocity: 138.3 fpm		Advection Rate: 9.7 fpm		Tower Penetration Height: 136 ft AGL	
Descent Rate: 3.6 fpm					
Downwind Vortex Tangential Velocities					
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fpm)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)
198	30	18.7	102	-6.6	198
196	28	16.9	100	-6.8	196
194	26	20.4	98	-2.5	194
192	24	19.1*	96	-3.3	192
190	22	19.7	94	-7.4	190
188	20	20.6*	92	-7.6	188
186	18	21.6	90	-7.8	186
184	16	17.1	88	-8.0	184
182	14	17.9	86	-8.2	182
180	12	17.6	84	-8.4	180
178	10	17.8	82	-8.6	178
176	8	20.5	80	-8.8	176
174	6	28.3	78	-9.0	174
172	4	49.0	76	-9.2	172
170	2	69.3*	74	-9.4	170
168	0	72	72	-9.6	168
166	-2	89.5	70	-1.1	166
164	-4	-25.9	68	-0.7	164
162	-6	-21.9	68	-0.8	162
160	-8	-14.1	68	-0.9	160
158	-10	-13.0	62	-0.7	158
156	-12	-12.0	60	-0.3	156
154	-14	-12.0	58	-0.4	154
152	-16	-12.0	56	-0.5	152
150	-18	-10.9	54	-0.4	150
148	-20	-7.3	52	-0.7	148
146	-22	-9.2	50	-0.9	146
144	-24	-6.7	48	-1.1	144
142	-26	-4.7	46	-1.4	142
140	-28	-2.8	44	-1.4	140
138	-30	-3.1	42	-1.2	138
136	-32	-4.7	40	-1.2	136
134	-34	-5.4	38	-1.0	134
132	-36	-5.3	36	-1.3	132
130	-38	-4.7	34	-1.9	130
128	-40	-4.0	32	-2.0	128
126	-42	-3.4	30	-1.9	126
124	-44	-5.0	28	-1.2	124
122	-46	-7.0	26	-1.2	122
120	-48	-5.3	24	-1.1	120
118	-50	-5.9	22	-1.5	118
116	-52	-5.0	20	-1.4	116
114	-54	-4.7	18	-1.5	114
112	-56	-6.6	16	-1.3	112
110	-58	-5.1	14	-1.3	110
108	-60	-0.8	12	-0.8	108
106	-62	-4.2	10	-0.2	106
	-64	-104	-64	-3.6	104

\* = Estimated

(ID) = Vertex dissipated upwind of tower

(O) = No vortex (F) = flyby flown for remote sensing system

(P) = Vortex passed over top of tower

Flyby (Run) Number: 8	UAL B757-200	Date: 25 SEP 1990 [Day of Year: 268]	Abeam Time: 8:06:59 (MDT)
Configuration: Landing	AIRCRAFT DATA		
Glide Slope: 0 deg.	Indicated Air Speed: 137 kts		
Wind Speed: 11.0 kts	METEOROLOGICAL DATA (200 ft Sensor Level)		
Maximum Velocity: (P) fps	Wind Direction: 34 deg.	Air Temperature: 9.4 °C	Atmospheric Stability: Stable
Descent Rate: (P) fpm	Age: (P) s	Advection Rate: (P) fpm	Estimated Core Radius: (P) ft AGL
Maximum Velocity: 130.8 fps	Age: 19 s	Advection Rate: 11.6 fpm	Tower Penetration Height: (P) ft AGL
Descent Rate: 4.3 fpm	Upwind Vortex Characteristics	Upwind Vortex Characteristics	Estimated Core Radius: 0.7 ft Tower Penetration Height: 168 ft AGL
	Downwind Vortex Characteristics	Upwind Vortex Tangential Velocities	
Sensor Height (ft)	Relative Height (ft)	Downwind Vortex Tangential Velocities	
		Sensor Height (ft)	Relative Height (ft)
		V <sub>θ</sub> (fps)	
198	(P)	102	(P)
196	(P)	100	(P)
194	(P)	98	(P)
192	(P)	96	(P)
190	(P)	94	(P)
188	(P)	92	(P)
186	(P)	90	(P)
184	(P)	88	(P)
182	(P)	86	(P)
180	(P)	84	(P)
178	(P)	82	(P)
176	(P)	80	(P)
174	(P)	78	(P)
172	(P)	76	(P)
170	(P)	74	(P)
168	(P)	72	(P)
166	(P)	70	(P)
164	(P)	68	(P)
162	(P)	66	(P)
160	(P)	64	(P)
158	(P)	62	(P)
156	(P)	60	(P)
154	(P)	58	(P)
152	(P)	56	(P)
150	(P)	54	(P)
148	(P)	52	(P)
146	(P)	50	(P)
144	(P)	48	(P)
142	(P)	46	(P)
140	(P)	44	(P)
138	(P)	42	(P)
136	(P)	40	(P)
134	(P)	38	(P)
132	(P)	36	(P)
130	(P)	34	(P)
128	(P)	32	(P)
126	(P)	30	(P)
124	(P)	28	(P)
122	(P)	26	(P)
120	(P)	24	(P)
118	(P)	22	(P)
116	(P)	20	(P)
114	(P)	18	(P)
112	(P)	16	(P)
110	(P)	14	(P)
108	(P)	12	(P)
106	(P)	10	(P)
104	(P)	8	(P)

= Estimated (D) = Vortex dissipated upwind of tower (M) = Missing

(I) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

Flyby (Run) Number: 9	UAL B757-200	Date: 25 SEP 1990 (Day of Year: 268)	Abeam Time: 8:18:19 MDT
Configuration: Landing Gills Slope: 0 deg.	Flaps: 30 deg.	Indicated Air Speed: 135 kts	Gross Weight: 192,000 lbs. Altitude: 230 ft AGL
Wind Speed: 11.1 kts	Wind Direction: 35 deg.	Air Temperature: 9.6 °C	Atmospheric Stability: Stable
Maximum Velocity: 217.2 fpm	Age: 14 s	Downwind Vortex Characteristics	Estimated Core Radius: 0.3 ft
Descent Rate: 4.9 fpm	Advection Rate: 11.7 fpm		Tower Penetration Height: 162 ft AGL
Maximum Velocity: 156.3 fpm	Age: 22.5 s	Upwind Vortex Characteristics	Estimated Core Radius: 0.3 ft
Descent Rate: 4.6 fpm	Advection Rate: 10.8 fpm		Tower Penetration Height: 128 ft AGL
AIRCRAFT DATA			
METEOROLOGICAL DATA (200 ft Sensor Level)			
Downwind Vortex Tangential Velocities			
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fpm)	Sensor Height (ft)
198	34	19.5	102
196	32	18.8	100
194	30	18.0	62
192	28	19.5*	64
190	26	22.0	66
188	24	24.7*	68
186	22	28.5	92
184	20	22.4	70
182	18	27.4	72
180	16	21.2	74
178	14	27.2	84
176	12	33.2	82
174	10	40.6	80
172	8	51.0	82
170	6	60.8*	78
168	4	70.7	74
166	2	80.5	72
164	0	169.1	68
162	-2	217.2	66
160	-4	101.5	64
158	-6	57.4	62
156	-8	49.0	60
154	-10	36.2	102
152	-12	36.2	58
150	-14	24.7	54
148	-16	25.8	52
146	-18	21.9	50
144	-20	18.4	48
142	-22	15.8	46
140	-24	16.1*	44
138	-26	16.4	42
136	-28	12.2*	40
134	-30	8.4	38
132	-32	-8.7	36
130	-34	-6.1	34
128	-36	-6.7	32
126	-38	-4.2	30
124	-40	-5.5	28
122	-42	-4.3	26
120	-44	-4.2	24
118	-46	-2.8	22
116	-48	-2.7	20
114	-50	-3.5	18
112	-52	-3.8	16
110	-54	-3.2	14
108	-56	-3.5*	12
106	-58	-3.2	10
104	-58	-3.3*	

\* = Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(C) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

Flyby (Run) Number: 10		Date: 25 SEP 1990 (Day of Year: 268)	Abeam Time: 8:26:05 (MDT)
<b>AIRCRAFT DATA</b>		Gross Weight: 191,000 lbs.	
Flaps: 30 deg. Indicated Air Speed: 134 kts		Altitude: 240 ft AGL	
<b>METEOROLOGICAL DATA</b> (200 ft Sensor Level)		Estimated Core Radius: 0.2 ft	
Wind Speed: 8.2 kts		Atmospheric Stability: Stable	
Maximum Velocity: 325.8 fps		Wind Direction: 39 deg.	
Descent Rate: 4.5 fps		Age: 16.5 s	
Maximum Velocity: 281.7 fps		Advection Rate: 8.8 fps	
Descent Rate: 4.3 fps		Air Temperature: 8.8 °C	
<b>DOWNWIND VORTEX CHARACTERISTICS</b>		Tower Penetration Height: 68 ft AGL	
Sensor Height (ft)		Estimated Core Radius: 0.3 ft	
Relative Height (ft)		Tower Penetration Height: 132 ft AGL	
<b>UPWIND VORTEX CHARACTERISTICS</b>			
Sensor Height (ft)			
Relative Height (ft)			
<b>Downwind Vortex Tangential Velocities</b>			
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
198	30	22.3	102
196	28	22.4	100
194	26	22.4	98
192	24	22.2	96
190	22	22.0	94
188	20	26.0*	92
186	18	30.0	78
184	16	31.2	80
182	14	28.0	86
180	12	30.3	84
178	10	44.3	82
176	8	58.0	80
174	6	67.5	78
172	4	85.3*	76
170	2	103.1	74
168	0	-29.7	72
166	-2	-15.9	70
164	-4	-72.3	68
162	-6	-60.4	66
160	-8	-41.9	64
158	-10	-35.8	62
156	-12	-29.7	60
154	-14	-24.7	58
152	-16	-19.5*	56
150	-18	-14.2	54
148	-20	-14.9	52
146	-22	-13.9*	50
144	-24	-12.9	48
142	-26	-15.8	46
140	-28	-13.2	44
138	-30	-9.0	42
136	-32	-12.3	40
134	-34	-10.4	38
132	-36	-10.0	36
130	-38	-1.3	34
128	-40	-8.8	32
126	-42	-7.5	30
124	-44	-5.2	28
122	-46	-6.2	26
120	-48	-6.2	24
118	-50	-3.9	22
116	-52	-3.1	20
114	-54	-3.7	18
112	-56	-2.3	16
110	-58	-3.5	14
108	-60	-1.6	12
106	-62	-6.9	10
104	-64	-3.8*	

= Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(P) = Vortex passed over top of tower

(O) = No vortex (Flyby flown for remote sensing systems)

Flyby (Run) Number: 11	Date: 25 SEP 1990 (Day of Year: 268)	Abeam Time: 8:33:49 (MDT)					
Configuration: Landing Glide Slope: -3 deg.	AIRCRAFT DATA Flaps: 30 deg. Indicated Air Speed: 134 kts	Gross Weight: 190,000lbs. Altitude: 240 ft AGL					
Wind Speed: 7.5 kts	Air Temperature: 9.0 °C	Atmospheric Stability: Neutral					
Maximum Velocity: 249.0 fps	Wind Direction: 33 deg.						
Maximum Velocity: 261.0 fps	Age: 28 s	Estimated Core Radius: 0.3 ft					
Descent Rate: 4.7 fps	Advection Rate: 5.8 fps	Tower Penetration Height: 74 ft AGL					
Maximum Velocity: 261.0 fps	Age: 40 s	Estimated Core Radius: 0.2 ft					
Descent Rate: 4.7 fps	Advection Rate: 5.9 fps	Tower Penetration Height: 54 ft AGL					
Downwind Vortex Tangential Velocities	DOWNTWIND VORTEX CHARACTERISTICS	Upwind Vortex Tangential Velocities					
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)
198	124	17.6	102	28	19.8	14.4	-2.4
196	122	19.3	100	26	22.1*	-2.1	102
194	120	17.3	98	24	19.9	14.2	46
192	118	18.3*	96	22	22.5	19.6	44
190	116	19.2	94	20	19.0	13.8	98
188	114	21.7*	92	18	34.0	18.8	94
186	112	22.3	90	16	37.2	18.6	92
184	110	20.6	88	14	32.5	18.4	38
182	108	19.4	86	12	35.1	18.2	30
180	106	16.8	84	10	45.9	19.0	34
178	104	19.0	82	8	57.6	17.8	32
176	102	17.3	80	6	56.8	17.6	84
174	100	19.6	78	4	63.5	17.4	82
172	98	19.9	76	2	77.9	17.2	80
170	96	24.7*	74	0	-249.0	17.0	78
168	94	29.8	72	-2	-99.2	16.8	24
166	92	20.1	70	-4	-75.5	16.6	22
164	90	18.2	68	-6	-55.5	16.4	20
162	88	14.0	66	-8	-41.0	16.2	18
160	86	13.8	64	-10	-28.8	16.0	16
158	84	14.1	62	-12	-32.5	15.8	14
156	82	13.2	60	-14	-34.4	15.6	12
154	80	14.2	58	-16	-22.7	15.4	10
152	78	12.7*	56	-18	-27.0	15.2	8
150	76	11.3	54	-20	-19.6	15.0	6
148	74	12.5	52	-22	-18.0	14.8	4
146	72	13.8	50	-24	-18.3	14.6	2
144	70	12.9	48	-26	-16.6	14.4	*
142	68	14.7	46	-28	-14.1	14.2	0
140	66	12.9	44	-30	-1.1	14.0	-2
138	64	12.1	42	-32	-10.0	13.8	-4
136	62	15.5	40	-34	-4.1	13.6	-6
134	60	15.3	38	-36	-8.1	13.4	-8
132	58	14.2*	36	-38	-5.0	13.2	-10
130	56	13.1	34	-40	-7.6	7.6	-12
128	54	15.0	32	-42	-5.2	12.8	-14
126	52	10.7	30	-44	-5.7	12.6	-16
124	50	15.0	28	-46	-7.3	12.4	-18
122	48	20.1	26	-48	-10.3	12.2	-20
120	46	21.3	24	-50	-4.9	12.0	-22
118	44	19.2	22	-52	-4.2	11.8	-24
116	42	19.9	20	-54	-3.3	11.6	-26
114	40	20.4	18	-56	-4.6	11.4	-28
112	38	19.0	16	-58	-1.2	11.2	-30
110	36	18.3	14	-60	-1.5	11.0	-32
108	34	20.2	12	-62	-3.1	10.8	-34
106	32	21.7	10	-64	-2.5	10.6	-36
104	30	22.7*				5.2	-38

\* = Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex (Flyby passed over top of tower)

(P) = Vortex passed over top of tower

Flyby (Run) Number: 12		UAL B757-200		Date: 25 SEP 1990 (Day of Year: 268)	Abeam Time: 8:40:42 (MDT)
Configuration: Landing		AIRCRAFT DATA		Gross Weight: 189,000 lbs.	
Glide Slope: -3 deg.		Flaps: 30 deg.		Altitude: 270 ft AGL	
Wind Speed: 6.0 kts		Indicated Air Speed: 133 kts			
Maximum Velocity: 260.6 fpm		METEOROLOGICAL DATA (200 ft Sensor Level)			
Descent Rate: 6.8 fpm		Wind Direction: 34 deg.		Estimated Core Radius: 0.2 ft	
Maximum Velocity: 223.1 fpm		Age: 23 s		Tower Penetration Height: 120 ft AGL	
Descent Rate: 5.0 fpm		Advection Rate: 6.8 fpm		Atmospheric Stability: Neutral	
Downwind vortex characteristics		Upwind vortex characteristics		Estimated Core Radius: 0.4 ft	
Wind Direction: 34 deg.		Age: 35 s		Tower Penetration Height: 94 ft AGL	
Maximum Velocity: 223.1 fpm		Advection Rate: 6.6 fpm			
Downwind Vortex Tangential Velocities					
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fpm)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fpm)
198	78	9.7	102	-18	-16.9
196	76	10.7	100	-13.9*	196
194	74	11.6	98	-10.9	194
192	72	6.7	96	-12.2	192
190	70	7.2	94	-9.7	190
188	68	7.6	92	-2.8	188
186	66	15.6	90	-9.0	186
184	64	13.1	88	-3.2	184
182	62	14.7	86	-3.4	182
180	60	13.7	84	-8.6	180
178	58	12.7	82	-9.1	178
176	56	12.7	80	-3.8	176
174	54	12.1	78	-4.0	174
172	52	10.8	76	-4.2	172
170	50	8.9	74	-4.4	170
168	48	15.7	72	-4.6	168
166	46	11.8	70	-4.8	166
164	44	11.3	68	-5.2	164
162	42	11.6	66	-5.4	162
160	40	13.2	64	-5.6	160
158	38	12.8	62	-5.8	158
156	36	12.2	60	-6.0	156
154	34	13.3	58	-6.2	154
152	32	12.2	56	-6.4	152
150	30	14.7	54	-6.6	150
148	28	23.1	52	-6.6	148
146	26	23.3	50	-6.8	146
144	24	20.7	48	-7.0	144
142	22	21.3	46	-7.2	142
140	20	21.0	44	-7.4	140
138	18	20.7	42	-7.6	138
136	16	36.4	40	-7.8	136
134	14	35.3	38	-8.0	134
132	12	35.9*	36	-8.2	132
130	10	36.5	34	-8.4	130
128	8	47.8	32	-8.6	128
126	6	37.0	30	-8.8	126
124	4	46.0	28	-9.0	124
122	2	116.5	26	-9.2	122
120	0	-260.6	24	-9.4	120
118	-2	-67.0	22	-9.6	118
116	-4	-55.0	20	-9.8	116
114	-6	-40.2	18	-10.0	114
112	-8	-29.7	16	-10.2	112
110	-10	-2.1	14	-10.4	110
108	-12	-20.9	12	-10.6	108
106	-14	-2.6	10	-10.8	106
104	-16	-19.7	10	-11.0	104

\* = Estimated (D) = Vortex dissipated upwind of tower (M) = Missing (O) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

Flyby (Run) Number: 13	UAL B757-200	Dates: 25 SEP 1990 (Day of Year: 268)	Abeam Time: 8:47:03 (MDT)
Configuration: Landing Glide Slope: 3 deg.	AIRCRAFT DATA Flaps: 30 deg. Indicated Air Speed: 133 kts	Gross Weight: 188,000 lbs. Altitude: 280 ft AGL	
Wind Speed: 5.4 kts	Wind Direction: 32 deg. Wind Temperature: 9.5 °C	Atmospheric Stability: Neutral	
Maximum Velocity: 177.3 fps	DOWNDOWN VORTEX CHARACTERISTICS Age: 34 s Advection Rate: 5.5 fps	Estimated Core Radius: 0.5 ft Tower Penetration Height: 90 ft AGL	
Descent Rate: 5.6 fps	UPWIND VORTEX CHARACTERISTICS Age: 46 s Advection Rate: 5.7 fps	Estimated Core Radius: 0.7 ft Tower Penetration Height: 124 ft AGL	
Maximum Velocity: 142.0 fps			
Descent Rate: 3.4 fps			
Downwind Vortex Tangential Velocities			
Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)
198	108	21.1	102
194	104	21.5	100
192	102	22.0*	98
	100	22.4*	96
188	98	24.0*	92
186	96	25.2	90
184	94	21.2	88
182	92	22.7	86
180	90	17.6	84
178	88	18.6	82
176	86	20.9	80
174	84	21.9	78
172	82	21.9	76
170	80	21.3*	74
168	78	20.7	72
166	76	20.1	70
164	74	19.9	68
162	72	21.3	66
160	70	20.2	64
158	68	20.6	62
156	66	21.2	60
154	64	21.9	58
152	62	23.0	56
150	60	17.7	54
148	58	19.7	52
146	56	21.1	50
144	54	19.6	48
142	52	20.7	46
140	50	20.6	44
138	48	16.6	42
136	46	21.0	40
134	44	18.1	38
132	42	16.8*	36
130	40	15.5	34
128	38	16.2	32
126	36	10.0	30
124	34	14.2	28
122	32	19.6	26
120	30	20.0	24
118	28	22.0	22
116	26	23.9	20
114	24	22.7	18
112	22	27.5	16
110	20	28.4	14
108	18	26.1	12
106	16	29.5*	10
104	14	29.5*	14

\* = Estimated      (D) = Vortex dissipated upwind of tower      (M) = Missing

(O) = No vortex (Flyby down for remote sensing systems)      (P) = Vortex passed over top of tower

Upwind Vortex Tangential Velocities			
Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)
198	108	31.3	198
194	104	32.6*	196
192	102	33.8	194
	100	36.9	192
188	98	51.8	190
186	96	66.0	188
184	94	66.0	186
182	92	-177.3	184
180	90	-128.3	182
178	88	-65.9	180
176	86	-43.4	178
174	84	-30.7	176
172	82	-15.7	174
170	80	-13.5	172
168	78	-10.6	170
166	76	-8.1	168
164	74	-1.6	166
162	72	-10.4	164
160	70	-2.2	162
158	68	-9.8	160
156	66	-2.4	158
154	64	-7.4	156
152	62	-7.2	154
150	60	-3.0	152
148	58	-3.2	150
146	56	-3.4	148
144	54	-3.6	146
142	52	-4.4	144
140	50	-2.4	142
138	48	-4.6	140
136	46	-5.0	138
134	44	-5.6	136
132	42	-4.2	134
130	40	-5.2	132
128	38	-5.4	130
126	36	-5.6	128
124	34	-6.0	126
122	32	-6.2	124
120	30	-6.4	122
118	28	-6.6	120
116	26	-7.0	118
114	24	-7.2	116
112	22	-7.4	114
110	20	-7.6	112
108	18	-7.8	110
106	16	-8.0	108
104	14	-8.2	106

Flyby (Run) Number: 14		UAL B757-200		Date: 25 SEP 1990 (Day of Year: 268)	Abeam Time: 8:54:47 (MDT)
Configuration: Landing		AIRCRAFT DATA		Gross Weight: 187,000lbs.	
Glide Slope: 0 deg.		Indicated Air Speed: 133 kts		Altitude: 250 ft AGL	
Wind Speed: 5.7 kts		METEOROLOGICAL DATA [200 ft Sensor Level]		Estimated Core Radius: 0.2 ft	
Maximum Velocity: 166.4 fps		Wind Direction: 26 deg.		Tower Penetration Height: 5.2 ft AGL	Atmospheric Stability: Neutral
Descent Rate: 4.8 fps		Age: 41 s		Estimated Core Radius: 0.4 ft	
Maximum Velocity: 165.2 fps		Advection Rate: 5.0 fps		Tower Penetration Height: 9.8 ft AGL	
Descent Rate: 2.8 fps		Age: 54 s		Estimated Core Radius: 0.4 ft	
Downwind Vortex Characteristics		Upwind Vortex Characteristics		Tower Penetration Height: 9.8 ft AGL	
Sensor Height (ft)	Relative Height (ft)	Downwind Vortex Tangential Velocities	Upwind Vortex Tangential Velocities		
		Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Relative Height (ft)
		V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)
198	146	13.0	102	50	100
196	144	18.8	100	20.8	4.2
194	142	18.9	98	48	4.6
192	140	19.5	96	16.8	4.4
190	138	20.1	94	44	9.6
188	136	20.3	92	19.3	19.5
186	134	20.4	90	42	19.7
184	132	17.9	88	38	19.7
182	130	17.9	86	36	22.0
180	128	18.2	84	34	21.6
178	126	16.3	82	32	18.9
176	124	17.6	80	30	14.7
174	122	17.6	78	28	14.8
172	120	18.4	76	26	16.7
170	118	24.0	74	24	16.7
168	116	21.5	72	22	17.5
166	114	18.9	70	18	17.9
164	112	19.9	68	16	25.7
162	110	20.4	66	14	22.7
160	108	19.0	64	12	24.3
158	106	19.1	62	10	26.6
156	104	20.1	60	8	30.7
154	102	19.6	58	6	35.8
152	100	23.5	56	4	45.1
150	98	19.2	54	2	63.3
148	96	20.0	52	0	152.3
146	94	23.1	50	-2	-66.4
144	92	20.8	48	-2	-57.7
142	90	21.5	46	-4	-38.0
140	88	20.7	44	-6	-24.1
138	86	18.1	42	-8	-23.2
136	84	22.4	40	-10	-22.8
134	82	19.9	38	-12	-18.7
132	80	22.0	36	-14	-15.5
130	78	16.7	34	-16	-14.4
128	76	19.1	32	-18	-15.4
126	74	10.9	30	-20	-12.8
124	72	16.0	28	-22	-12.5
122	70	20.2	26	-24	-9.5
120	68	22.1	24	-26	-9.2
118	66	20.3	22	-30	-9.5
116	64	20.5	20	-32	-7.3
114	62	22.0	18	-34	-8.6
112	60	19.6	16	-36	-7.3
110	58	19.3	14	-38	-8.4
108	56	21.7	12	-40	-8.8
106	54	21.7	10	-42	-7.9
104	52	21.3	8	-42	-23.5
					6

(D) = Vortex dissipated upwind of tower (M) = Missing (O) = No vortex (Flyby flown for remote sensing systems)

= Estimated (P) = Vortex passed over top of tower

(P) = Vortex passed over top of tower

Flyby (Run) Number: 15	Date: 25 SEP 1990 (Day of Year: 268)	Abeam Time: 9:00:28 (MDT)						
Configuration: Clean								
Glide Slope: 0 deg.								
Wind Speed: 6.5 kts	Flaps: 0 deg. Indicated Air Speed: 250 kts	Gross Weight: 186,000 lbs. Altitude: 230 ft AGL						
Maximum Velocity: 141.7 fps	METEOROLOGICAL DATA [200 ft Sensor Level]	Estimated Core Radius: 0.3 ft Tower Penetration Height: 122 ft AGL						
Decent Rate: 3.2 fps	Wind Direction: 30 deg. Air Temperature: 9.9 °C	Atmospheric Stability: Unstable						
Maximum Velocity: 99.6 fps	DOWNTWIND VORTEX CHARACTERISTICS Age: 34 s Advection Rate: 5.9 fps							
Decent Rate: 2.6 fps	UPWIND VORTEX CHARACTERISTICS Age: 47 s Advection Rate: 5.8 fps							
	Downdownwind Vortex Tangential Velocities	Upwind Vortex Tangential Velocities						
Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)
198	76	12.0	102	-22	-6.6	198	-0.8	102
196	74	13.9	100	-24	-6.1*	88	-0.5	100
194	72	15.2	98	-25	-5.6	194	-1.1	98
192	70	15.3*	96	-26	-5.8	192	0.2	100
190	68	15.5	94	-28	-6.0	190	-0.1	94
188	66	16.4*	92	-30	-6.9	188	-0.8	92
186	64	17.4	90	-32	-6.2	186	-0.8	90
184	62	15.0	88	-34	-5.9	184	-0.2	88
182	60	13.8	86	-36	-6.0	182	-0.7	86
180	58	12.7	84	-38	-5.7	180	-0.8	84
178	56	14.2	82	-40	-5.0	178	-0.7	82
176	54	14.3	80	-42	-6.3	176	-1.2	80
174	52	15.4	78	-44	-5.4	174	-0.9	78
172	50	14.7	76	-46	-4.1	172	-1.2	76
170	48	20.3*	74	-48	-4.6	170	-1.6	74
168	46	17.1	72	-50	-4.6	168	-0.7	72
166	44	13.9	70	-52	-5.0	166	-0.9	70
164	42	14.8	68	-54	-4.5	164	-1.3	68
162	40	14.0	66	-56	-5.2	162	-0.7	66
160	38	13.3	64	-58	-2.3	160	-0.9	64
158	36	12.4	62	-60	-3.0	158	-0.8	64
156	34	12.9	60	-62	-2.7	156	-0.7	62
154	32	13.9	58	-64	-3.1	154	-1.9	60
152	30	15.0	56	-66	-4.2	152	-2.0	58
150	28	9.9	54	-68	-3.6	150	-2.1	56
148	26	11.1	52	-70	-2.4	148	-1.6	54
146	24	13.4	50	-72	-2.0	146	-1.6	52
144	22	12.6	48	-74	-2.8	144	-2.5	50
142	20	11.0	46	-76	-2.7	142	-3.7	48
140	18	13.0	44	-78	-2.4	140	-4.0	46
138	16	11.2	42	-80	-1.5	138	-3.2	44
136	14	13.0	40	-82	-2.2	136	-3.0	42
134	12	14.9	38	-84	-2.1	134	-3.3	40
132	10	23.1	36	-86	-2.0	132	-4.7	38
130	8	20.0*	34	-88	-1.3	130	-5.1	36
128	6	26.6	32	-90	-1.9	128	-5.4	34
126	4	43.8*	30	-92	-1.7	126	-5.4	32
124	2	61.0	28	-94	-1.5	124	-4.8	30
122	0	-141.7	26	-96	-1.3	122	-3.0	28
120	-2	-34.3	24	-98	-1.3	120	-7.3	26
118	-4	-27.2	22	-100	-2.4	118	-7.4	24
116	-6	-18.1	20	-102	-1.9	116	-1.2	22
114	-8	-12.7	18	-104	-2.5	114	-6	20
112	-10	-11.8	16	-106	-2.2	112	-1.2	18
110	-12	-11.4	14	-108	-1.8	110	-4	16
108	-14	-8.9	12	-110	-2.3	108	-1.4	14
106	-16	-10.6	10	-112	-2.1	106	-0.9	12
104	-18	-6.6*	104	-112	-4	104	-0.0	10

\* = Estimated (D) = Vortex dissipated upwind of tower (M) = Missing

(O) = No vortex (Flyby passed over top of tower) (P) = Vortex passed over top of tower

UAL B757-200														
Flyby (Run) Number: 16					Abeam Time: 9:06:41 (MDT)									
Date: 25 SEP 1990 (Day of Year: 268)														
AIRCRAFT DATA					Gross Weight: 185,000lbs. Altitude: 280 ft AGL									
Configuration: Landing Glide Slope: -3 deg.														
FLAPS: 30 deg. Indicated Air Speed: 132 kts					Estimated Core Radius: 0.7 ft Tower Penetration Height: 126 ft AGL									
METEOROLOGICAL DATA (200 ft Sensor Level)														
Wind Speed: 7.5 kts Wind Direction: 28 deg. Maximum Velocity: 127.2 ips Descent Rate: 6.3 ips					Atmospheric Stability: Unstable Air Temperature: 10.0 °C Advection Rate: 7.1 ips Age: 26 s									
UPWIND VORTEX CHARACTERISTICS Wind Direction: 28 deg. Maximum Velocity: 199.2 ips Descent Rate: 4.4 ips					Estimated Core Radius: 0.5 ft Tower Penetration Height: 136 ft AGL Advection Rate: 7.4 ips Age: 35 s									
DOWNWIND VORTEX CHARACTERISTICS														
Downwind Vortex Tangential Velocities														
Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (ips)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (ips)					
198	72	18.5	102	-2.4	198	62	-2.4	102	-3.4					
196	68	20.8	100	-2.6	196	60	-7.8	100	-3.6					
192	66	20.3*	98	-2.8	194	58	-3.8	98	-3.8					
190	64	19.8	96	-3.0	192	56	-3.4	96	-4.0					
188	62	20.6	94	-3.2	190	54	-6.3	94	-4.2					
186	60	21.3	92	-3.4	188	52	-5.4	92	-4.4					
184	58	18.5	88	-3.6	186	50	-7.2	90	-4.6					
182	56	19.5	86	-3.8	184	48	-8.2	88	-4.8					
180	54	17.4	84	-4.2	182	46	-6.5	86	-5.0					
178	52	20.3	82	-4.4	180	44	-5.7	84	-5.2					
176	50	20.6	80	-4.6	178	42	-5.9	82	-5.4					
174	48	16.9	78	-4.8	176	40	-7.8	80	-5.6					
172	46	21.3	76	-5.0	174	38	-5.7	78	-5.8					
170	44	19.5	74	-5.2	172	36	-7.4	76	-6.0					
168	42	17.7	72	-5.4	170	34	-11.0*	74	-6.2					
166	40	15.9	70	-5.6	168	32	-14.7	72	-6.4					
164	38	15.4	68	-5.8	166	30	-10.1	70	-6.6					
162	36	17.1	66	-6.0	164	28	-12.2	68	-6.8					
160	34	16.2	64	-6.4	162	26	-13.1	66	-7.0					
158	32	17.3	62	-6.6	160	24	-14.7	64	-7.2					
156	30	23.7	60	-6.8	158	22	-16.6	62	-7.4					
154	28	22.0	58	-7.0	156	20	-17.3	60	-7.6					
152	26	24.3	56	-7.2	154	18	-17.8	58	-7.8					
150	24	26.7	54	-7.4	152	16	-23.5	56	-8.0					
148	22	29.4	52	-7.6	150	14	-18.0	54	-8.2					
146	20	33.4	50	-7.8	148	12	-20.3	52	-8.4					
144	18	30.5	48	-8.0	146	10	-25.5	50	-8.6					
142	16	50.2	46	-8.2	144	8	-37.0	48	-8.8					
140	14	59.4	44	-8.4	142	6	-59.2	46	-9.0					
138	12	57.6	42	-8.6	140	4	-72.8	44	-9.2					
136	10	55.8*	40	-8.8	138	2	-136.0*	42	-9.4					
134	8	84.6	38	-9.0	136	0	-199.2	40	-9.6					
132	6	87.3	36	-9.2	134	-2	-93.7	38	-9.8					
130	4	87.3	34	-9.4	132	-4	-100.0	36	-10.0					
128	2	89.9	32	-9.6	130	-6	-151.3	34	-10.2					
126	0	127.2	30	-9.8	128	-8	-48.7	32	-10.4					
124	-2	-82.3	28	-10.0	126	-10	-39.2*	30	-10.6					
122	-4	-70.5	26	-10.2	124	-12	35.5	28	-10.8					
120	-6	-36.7	24	-10.4	122	-14	44.3	26	-11.0					
118	-8	-31.2	22	-10.6	120	-16	36.0	24	-11.2					
116	-10	-23.4	20	-10.8	118	-18	32.7	22	-11.4					
114	-12	-22.5	18	-11.0	116	-20	31.1	20	-11.6					
112	-14	-20.0	16	-11.2	114	-22	22.5	18	-11.8					
110	-16	-19.5	14	-11.4	112	-24	21.7	16	-12.0					
108	-18	-18.7*	12	-11.6	110	-26	21.0	14	-12.2					
106	-20	-18.0	10	-11.8	108	-28	17.8	12	-12.4					
104	-22	-20.2*	0	-12.0	106	-30	18.8	10	-12.6					

(\*P) = Vortex passed over top of tower

(O) = No vortex (Flyby flown for remote sensing systems)

(M) = Missing

(D) = Estimated

Flyby (Run) Number: 17	Date: 25 SEP 1990 (Day of Year: 268)	Abeam Time: 9:13:12 (MDT)
Configuration: Landing Glide Slope: -3 deg.	AIRCRAFT DATA Flaps: 30 deg. Indicated Air Speed: 132 kts	Gross Weight: 184,000lbs. Altitude: 300 ft AGL
Wind Speed: 5.3 kts	Wind Direction: 22 deg.	Atmospheric Stability: Unstable
Maximum Velocity: (D) fps Descent Rate: (D) f/s	METEOROLOGICAL DATA (200 ft Sensor Level) Air Temperature: 10.2°C	Estimated Core Radius: (D) ft Tower Penetration Height: (D) ft AGL
Maximum Velocity: (D) f/s Descent Rate: (D) f/s	DOWNDOWN VORTEX CHARACTERISTICS Age: (D) s Advection Rate: (D) f/s	Upwind Vortex Characteristics Age: (D) s Advection Rate: (D) f/s
Sensor Height (ft)	Relative Height (ft)	Relative Height (ft)
198	(D)	102
196	(D)	100
194	(D)	98
192	(D)	96
190	(D)	94
188	(D)	92
186	(D)	90
184	(D)	88
182	(D)	86
180	(D)	84
178	(D)	82
176	(D)	80
174	(D)	78
172	(D)	76
170	(D)	74
168	(D)	72
166	(D)	70
164	(D)	68
162	(D)	66
160	(D)	64
158	(D)	62
156	(D)	60
154	(D)	58
152	(D)	56
150	(D)	54
148	(D)	52
146	(D)	50
144	(D)	48
142	(D)	46
140	(D)	44
138	(D)	42
136	(D)	40
134	(D)	38
132	(D)	36
130	(D)	34
128	(D)	32
126	(D)	30
124	(D)	28
122	(D)	26
120	(D)	24
118	(D)	22
116	(D)	20
114	(D)	18
112	(D)	16
110	(D)	14
108	(D)	12
106	(D)	10
104	(D)	104

(D) = No vortex (Flyby flown for remote sensing systems) (P) = Vortex passed over top of tower

(M) = Missing (D) = Vortex dissipated upwind of tower

Flyby (Run) Number: 18

UAL B757-200

Date: 25 SEP 1980 (Day of Year: 268)

Abeam Time: 9:19:44 (MDT)

Configuration: Landing  
Glide Slope: 3 deg.

AIRCRAFT DATA  
Flaps: 30 deg.  
Indicated Air Speed: 132 kts

Gross Weight: 183,000 lbs.  
Altitude: 300 ft AGL

Wind Speed: 5.8 kts  
Maximum Velocity: 150.9 fps  
Descent Rate: 4.1 fps

METEOROLOGICAL DATA  
(200 ft Sensor Level)  
Wind Direction: 26 deg.  
Air Temperature: 10.5 °C

UPWIND VORTEX CHARACTERISTICS  
Age: 60 s  
Advection Rate: 4.5 fps

Estimated Core Radius: 0.4 ft  
Tower Penetration Height: 130 ft AGL

Wind Speed: 5.8 kts  
Maximum Velocity: 150.9 fps  
Descent Rate: 4.1 fps

DOWNWIND VORTEX CHARACTERISTICS  
Age: 41 s  
Advection Rate: 4.9 fps

Estimated Core Radius: 0.7 ft  
Tower Penetration Height: 84 ft AGL

#### Downwind Vortex Tangential Velocities

Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)
198	68	9.8	102	-28	-130	198	114	-3.5	102	18	-10.5
196	66	11.4	100	-30	-115*	196	112	-1.4	100	16	-10.0*
194	64	12.3	98	-32	-103	194	110	-2.5	98	14	-9.4
192	62	13.0*	96	-34	-10.9	192	108	-2.3	96	12	-10.4
190	60	13.7	94	-36	-9.7	190	106	-4.2	94	10	-17.8*
188	58	14.5*	92	-38	-7.5	188	104	-5.5	92	8	-22.9
186	56	15.3	90	-40	-11.0	186	102	-2.5	90	6	-27.4
184	54	14.9	88	-42	-11.7	184	100	-2.5*	88	4	-39.4
182	52	17.5	86	-44	-9.1	182	98	-2.5	86	2	-45.2
180	50	10.0	84	-46	-6.0	180	96	-6.6	84	0	-73.7
178	48	14.7	82	-48	-4.9	178	94	-6.1	82	-2	-47.9
176	46	16.2	80	-50	-7.5	176	92	-3.5	80	-4	-43.8*
174	44	16.3	78	-52	-8.3	174	90	-4.6	78	-6	-40.2
172	42	17.6	76	-54	-7.0	172	88	-7.5	76	-8	-38.9*
170	40	17.9	74	-56	-7.9	170	86	-3.5	74	-10	-37.6
168	38	18.1	72	-58	-8.1	168	84	-2.5	72	-12	-28.2
166	36	18.3	70	-60	-8.5	166	82	-0.8	70	-14	-25.7
164	34	22.9	68	-62	-9.2	164	80	-0.3	68	-16	-18
162	32	32	66	-64	-9.7	162	78	-2.0	66	-18	-27.2
160	30	19.6	64	-66	-8.8	160	76	-3.0	64	-20	-21.1
158	28	28	62	-68	-8.8	158	74	-1.9	62	-22	-23.0
156	26	14.3	60	-70	-9.1	156	72	-1.1	60	-24	-20.3
154	24	19.1	58	-72	-7.4	154	70	0.1	58	-26	-18.3
152	22	21.6*	56	-74	-5.9	152	68	-2.2	56	-28	-18.2
150	20	24.1	54	-76	-4.7	150	66	-1.2	54	-30	-15.6
148	18	23.5	52	-78	-5.3	148	64	-2.5	52	-32	-15.3
146	16	26.0	50	-80	-3.9	146	62	-1.9	50	-34	-12.6
144	14	32.0	48	-82	-3.9	144	60	-4.6	48	-36	-13.4
142	12	34.5	46	-84	-3.1	142	58	-4.4	46	-38	-13.2
140	10	30.0	44	-86	-3.1	140	56	-5.0	44	-40	-11.9
138	8	24.5	42	-88	-0.9	138	54	-4.2	42	-42	-10.8
136	6	41.3	40	-90	-1.0	136	52	-5.3	40	-44	-11.9
134	4	58.7	38	-92	-2.5	134	50	-5.1	38	-46	-13.1
132	2	132	36	-94	-1.8	132	48	-5.6	36	-48	-12.4
130	0	150.9	34	-96	-1.8	130	46	-4.3	34	-50	-11.3
128	-2	-82.1	32	-98	-1.6	128	44	-5.6	32	-52	-12.5
126	-4	-26.7	30	-100	-1.4	126	42	-3.7	30	-54	-11.1
124	-6	-23.7	28	-102	-1.9	124	40	-5.0	28	-56	-7.2
122	-8	-29.0	26	-104	-2.1	122	38	-6.7	26	-58	8.1
120	-10	-27.5	24	-106	-1.6	120	36	-7.3	24	-60	7.3
118	-12	-26.4	22	-108	-2.5	118	34	-7.3	22	-62	7.1
116	-14	-23.8	20	-110	-2.6	116	32	-6.0	20	-64	9.8
114	-16	-15.6	18	-112	-3.3	114	30	-5.5	18	-66	9.6
112	-18	-13.2	16	-114	-3.6	112	28	-7.6	16	-68	8.5
110	-20	-12.8	14	-116	-3.6	110	26	-8.5	14	-70	7.7
108	-22	-9.8	12	-118	-4.7	108	24	-6.9	12	-72	8.3
106	-24	-14.0	10	-120	-4.4	106	22	-9.9	10	-74	10.6
104	-26	-13.5*	104			104	20	-10.2			

\* = Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex (Flyby flown for remote sensing systems)

[P] = Vortex passed over top of tower

Flyby (Run) Number: 19		Date: 25 SEP 1980 (Day of Year: 268)		Abeam Time: 9:26:00 (MDT)	
AIRCRAFT DATA		METEOROLOGICAL DATA		Atmospheric Stability: Unstable	
Configuration: Landing Glide Slope: 0 deg.		Flaps: 30 deg. Indicated Air Speed: 131 kts		Gross Weight: 182,000 lbs. Altitude: 280 ft AGL	
Wind Speed: 5.3 kts		Age: (O) s Advection Rate: (O) fps		Estimated Core Radius: (O) ft Tower Penetration Height: (O) ft AGL	
Maximum Velocity: (O) fps Descent Rate: (O) fpm		Wind Direction: 27 deg. Air Temperature: 11.1 °C		Atmospheric Stability: Unstable	
DOWNWIND VORTEX CHARACTERISTICS		UPWIND VORTEX CHARACTERISTICS		Estimated Core Radius: (O) ft Tower Penetration Height: (O) ft AGL	
Age: (O) s Advection Rate: (O) fpm		Age: (O) s Advection Rate: (O) fpm		Tower Penetration Height: (O) ft AGL	
Downwind Vortex Tangential Velocities			Upwind Vortex Tangential Velocities		
Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)
198	102	100	198	196	102
196	98	96	194	94	98
194	96	94	192	92	96
192	94	92	190	90	94
190	92	90	188	88	92
188	90	88	186	86	88
186	88	86	184	84	86
184	86	84	182	82	84
182	84	82	180	80	82
180	82	80	178	78	80
178	80	78	176	76	78
176	78	76	174	74	76
174	76	74	172	72	74
172	74	72	170	70	72
170	72	70	168	68	70
168	70	68	166	66	68
166	68	66	164	64	66
164	66	64	162	62	64
162	64	62	160	60	62
160	62	60	158	58	60
158	60	58	156	56	58
156	58	56	154	54	56
154	56	54	152	52	54
152	54	52	150	50	52
150	52	50	148	48	50
148	50	48	146	46	48
146	48	46	144	44	46
144	46	44	142	42	44
142	44	42	140	40	42
140	42	40	138	38	40
138	40	38	136	36	38
136	38	36	134	34	36
134	36	34	132	32	34
132	34	32	130	30	32
130	32	30	128	28	30
128	30	28	126	26	28
126	28	26	124	24	26
124	26	24	122	22	24
122	24	22	120	20	22
120	22	20	118	18	20
118	20	18	116	16	18
116	18	16	114	14	16
114	16	14	112	12	14
112	14	12	110	10	12
110	12	10	108	10	10
108	10	10	106	10	10

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(ii) .....

Flyby (Run) Number: 20		Date: 25 SEP 1990 (Day of Year: 268)	Absent Time: 9:32:15 (MDT)
<b>AIRCRAFT DATA</b>		Gross Weight: 181,500 lbs.	
Configuration: Landing	Flaps: 30 deg.	Altitude: 290 ft AGL	
Glide Slope: 0 deg.	Indicated Air Speed: 130 kts		
<b>METEOROLOGICAL DATA</b>			
(200 ft Sensor Level)			
Wind Speed: 5.8 kts	Wind Direction: 35 deg.	Air Temperature: 11.4 °C	Atmospheric Stability: Unstable
<b>DOWNWIND VORTEX CHARACTERISTICS</b>			
Maximum Velocity: (0) fps		Age: (0) s	Estimated Core Radius: (0) ft
Descent Rate: (0) fps		Advection Rate: (0) fps	Tower Penetration Height: (0) ft AGL
<b>UPWIND VORTEX CHARACTERISTICS</b>			
Maximum Velocity: (0) fps		Age: (0) s	Estimated Core Radius: (0) ft
Descent Rate: (0) fps		Advection Rate: (0) fps	Tower Penetration Height: (0) ft AGL
<b>Downwind Vortex Tangential Velocities</b>			
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
198	0	102	198
196	0	100	196
194	0	98	194
192	0	96	192
190	0	94	190
188	0	92	188
186	0	90	186
184	0	88	184
182	0	86	182
180	0	84	180
178	0	82	178
176	0	80	176
174	0	78	174
172	0	76	172
170	0	74	170
168	0	72	168
166	0	70	166
164	0	68	164
162	0	66	162
160	0	64	160
158	0	62	158
156	0	60	156
154	0	58	154
152	0	56	152
150	0	54	150
148	0	52	148
146	0	50	146
144	0	48	144
142	0	46	142
140	0	44	140
138	0	42	138
136	0	40	136
134	0	38	134
132	0	36	132
130	0	34	130
128	0	32	128
126	0	30	126
124	0	28	124
122	0	26	122
120	0	24	120
118	0	22	118
116	0	20	116
114	0	18	114
112	0	16	112
110	0	14	110
108	0	12	108
106	0	10	106
104	0	0	104

\* = Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(I) = No vortex

(F) = Flyby flown for remote sensing systems

(P) = Flyby passed over top of tower

UAL B757-200		Date: 25 SEP 1990 (Day of Year: 268)		Abeam Time: 9:38:27 (MDT)	
Configuration: Takeoff Glide Slope: 0 deg.		AIRCRAFT DATA Flaps: 5 deg. Indicated Air Speed: 150 kts		Gross Weight: 18,100 lbs. Altitude: 300 ft AGL	
Wind Speed: 7.1 kts		METEOROLOGICAL DATA (200 ft Sensor Level) Wind Direction: 43 deg.		Atmospheric Stability: Unstable Estimated Core Radius: (0) ft Tower Penetration Height: (0) ft AGL	
Maximum Velocity: (0) fpm	Descent Rate: (0) fpm	DOWNWIND VORTEX CHARACTERISTICS Age: (0) s Advection Rate: (0) fpm		Upwind Vortex Characteristics Age: (0) s Advection Rate: (0) fpm	
Maximum Velocity: (0) fpm	Descent Rate: (0) fpm	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
Configuration: Takeoff Glide Slope: 0 deg.	Wind Speed: 7.1 kts	Relative Height (ft)	Relative Height (ft)	Relative Height (ft)	Relative Height (ft)
198	196	102	198	102	100
194	192	98	196	98	98
190	188	96	194	96	96
186	184	94	192	94	94
182	180	92	190	92	92
178	176	88	188	88	88
174	172	86	184	86	86
170	168	84	182	84	84
166	164	82	180	82	82
162	160	80	178	80	80
158	156	78	176	78	78
154	152	76	174	76	76
150	148	74	172	74	74
146	144	72	170	72	72
142	140	70	168	70	70
138	136	68	166	68	68
134	132	66	164	66	66
130	128	64	162	64	64
126	124	62	160	62	62
122	120	60	158	60	60
118	116	58	156	58	58
114	112	56	154	56	56
110	108	54	152	54	54
106	104	52	150	52	52
102	100	50	148	50	50
98	96	48	146	48	48
94	92	46	144	46	46
90	88	44	142	44	44
86	84	42	140	42	42
82	80	40	138	40	40
78	76	38	136	38	38
74	72	36	134	36	36
70	68	34	132	34	34
66	64	32	130	32	32
62	60	30	128	30	30
58	56	28	126	28	28
54	52	26	124	26	26
50	48	24	122	24	24
46	44	22	120	22	22
42	40	20	118	20	20
38	36	18	116	18	18
34	32	16	114	16	16
30	28	14	112	14	14
26	24	12	110	12	12
22	20	10	108	10	10
18	16	10	106	10	10

\* = Estimated

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O = No vortex (Flyby flown for remote sensing systems) (P) = Vortex passed over top of tower

FLYBY (Run) Number: 22		UAL B757-200		Date: 25 SEP 1990 (Day of Year: 268)		Abeam Time: 11:45:47 (MDT)	
Configuration: Takeoff		AIRCRAFT DATA		Gross Weight: 200,100 lbs.		Altitude: 270 ft AGL	
Glide Slope: 0 deg.		Flaps: 20 deg.		Indicated Air Speed: 143 kts		Atmospheric Stability: Unstable	
Wind Speed: 1.6 kts		METEOROLOGICAL DATA [200 ft Sensor Level]		Wind Direction: 138 deg.		Air Temperature: 18.1 °C	
Maximum Velocity: (D) fps		Age: (D) s		Advection Rate: (D) fps		Estimated Core Radius: (D) ft	
Descent Rate: (D) fps		Advection Rate: (D) s		Tower Penetration Height: (D) ft AGL		Estimated Core Radius: (D) ft	
Upwind Vortex Characteristics		Downwind Vortex Characteristics		Upwind Vortex Tangential Velocities		Upwind Vortex Tangential Velocities	
Maximum Velocity: (D) fps		Age: (D) s		Sensor Height: (D) ft		Sensor Height: (D) ft	
Descent Rate: (D) fps		Advection Rate: (D) fps		Relative Height: (ft)		Relative Height: (ft)	
Downwind Vortex Tangential Velocities		Downwind Vortex Tangential Velocities		Sensor Height: (ft)		Sensor Height: (ft)	
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
198	(D)	(D)	102	(D)	198	(D)	102
196	(D)	(D)	100	(D)	196	(D)	100
194	(D)	(D)	98	(D)	194	(D)	98
192	(D)	(D)	96	(D)	192	(D)	96
190	(D)	(D)	94	(D)	190	(D)	94
188	(D)	(D)	92	(D)	188	(D)	92
186	(D)	(D)	90	(D)	186	(D)	90
184	(D)	(D)	88	(D)	184	(D)	88
182	(D)	(D)	86	(D)	182	(D)	86
180	(D)	(D)	84	(D)	180	(D)	84
178	(D)	(D)	82	(D)	178	(D)	82
176	(D)	(D)	80	(D)	176	(D)	80
174	(D)	(D)	78	(D)	174	(D)	78
172	(D)	(D)	76	(D)	172	(D)	76
170	(D)	(D)	74	(D)	170	(D)	74
168	(D)	(D)	72	(D)	168	(D)	72
166	(D)	(D)	70	(D)	166	(D)	70
164	(D)	(D)	68	(D)	164	(D)	68
162	(D)	(D)	66	(D)	162	(D)	66
160	(D)	(D)	64	(D)	160	(D)	64
158	(D)	(D)	62	(D)	158	(D)	62
156	(D)	(D)	60	(D)	156	(D)	60
154	(D)	(D)	58	(D)	154	(D)	58
152	(D)	(D)	56	(D)	152	(D)	56
150	(D)	(D)	54	(D)	150	(D)	54
148	(D)	(D)	52	(D)	148	(D)	52
146	(D)	(D)	50	(D)	146	(D)	50
144	(D)	(D)	48	(D)	144	(D)	48
142	(D)	(D)	46	(D)	142	(D)	46
140	(D)	(D)	44	(D)	140	(D)	44
138	(D)	(D)	42	(D)	138	(D)	42
136	(D)	(D)	40	(D)	136	(D)	40
134	(D)	(D)	38	(D)	134	(D)	38
132	(D)	(D)	36	(D)	132	(D)	36
130	(D)	(D)	34	(D)	130	(D)	34
128	(D)	(D)	32	(D)	128	(D)	32
126	(D)	(D)	30	(D)	126	(D)	30
124	(D)	(D)	28	(D)	124	(D)	28
122	(D)	(D)	26	(D)	122	(D)	26
120	(D)	(D)	24	(D)	120	(D)	24
118	(D)	(D)	22	(D)	118	(D)	22
116	(D)	(D)	20	(D)	116	(D)	20
114	(D)	(D)	18	(D)	114	(D)	18
112	(D)	(D)	16	(D)	112	(D)	16
110	(D)	(D)	14	(D)	110	(D)	14
108	(D)	(D)	12	(D)	108	(D)	12
106	(D)	(D)	10	(D)	106	(D)	10
104	(D)	(D)		(D)	104	(D)	

(P) = Vortex passed over top of tower

(M) = Missing

(D) = Estimated

Flyby (Run) Number: 23		UAL B757-200		Date: 25 SEP 1990 (Day of Year: 268)		Abeam Time: 12:11:34 (MDT)	
Configuration: Landing		AIRCRAFT DATA		METEOROLOGICAL DATA		Atmospheric Stability: Unstable	
Glide Slope: 0 deg.		Flaps: 30 deg; 136 kts		Indicated Air Speed: 136 kts		Gross Weight: 196,500 lbs.	
Wind Speed: 3.0 kts		Wind Direction: 214 deg.		Age: 46 s		Estimated Core Radius: 0.1 ft	
Maximum Velocity: 171.7 fps		Advection Rate: 3.0 fps		Tower Penetration Height: 142 ft AGL		Altitude: 290 ft AGL	
Descent Rate: 3.2 fps		Wind Temperature: 18.7 °C		Tower Penetration Height: 142 ft AGL		Tower Penetration Height: 142 ft AGL	
Upwind Vortex Characteristics		Downwind Vortex Characteristics		Upwind Vortex Characteristics		Downwind Vortex Characteristics	
Maximum Velocity: (O) fps		Age: (O) s		Advection Rate: (O) fps		Sensor Height: (ft)	
Descent Rate: (O) fps		Wind Direction: 214 deg.		Age: (O) s		Relative Height: (ft)	
Wind Speed: 3.0 kts		Wind Temperature: 18.7 °C		Advection Rate: 3.0 fps		Sensor Height: (ft)	
Maximum Velocity: 171.7 fps		Wind Direction: 214 deg.		Age: 46 s		Relative Height: (ft)	
Descent Rate: 3.2 fps		Wind Temperature: 18.7 °C		Advection Rate: 3.0 fps		Sensor Height: (ft)	
Upwind Vortex Tangential Velocities		Downwind Vortex Tangential Velocities		Upwind Vortex Tangential Velocities		Downwind Vortex Tangential Velocities	
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
198	56	-11.1	102	-40	2.7*	198	102
196	54	-15.5	100	-40	2.7*	196	100
194	52	-10.5	98	-44	2.6	194	98
192	50	-12.7	96	-46	0.6	192	96
190	48	-9.9	94	-48	1.8	190	94
188	46	-8.4	92	-50	1.8	188	92
186	44	-10.5	90	-52	1.2	186	90
184	42	-12.0	88	-54	0.7	184	88
182	40	-12.0	86	-56	2.8	180	86
180	38	-13.3	84	-58	2.6	178	84
178	36	-17.5	82	-60	2.5	176	82
176	34	-13.5	80	-62	2.5	174	80
174	32	-0.9	78	-64	2.5	172	78
172	30	-11.0	76	-66	3.2	170	76
170	28	-11.0	74	-68	3.4	168	74
168	26	-11.0	72	-70	4.6	166	72
166	24	-11.1	70	-72	3.9	164	70
164	22	-13.3	68	-74	3.7	162	68
162	20	-12.4	66	-76	2.6	160	66
160	18	-14.9	64	-78	3.2	158	64
158	16	-14.6	62	-80	2.7	156	62
156	14	-11.5	60	-82	2.2	154	60
154	12	-16.2	58	-84	2.3	152	58
152	10	-13.8*	56	-86	1.9	150	56
150	8	-11.3	54	-88	1.9	148	54
148	6	-11.8	52	-90	0.9	146	52
146	4	-23.8	50	-92	0.4	144	50
144	2	-32.6	48	-94	0.6	142	48
142	0	-17.1	46	-96	0.8	140	46
140	-2	-35.8	44	-98	1.2	138	44
138	-4	-30.4	42	-100	1.1	136	42
136	-6	-22.2	40	-102	1.1	134	40
134	-8	-13.9	38	-104	1.7	132	38
132	-10	-0.2	36	-106	0.3	130	36
130	-12	-0.2	34	-108	0.4	128	34
128	-14	-1.1	32	-110	0.1	126	32
126	-16	-1.3	30	-112	0.3	124	30
124	-18	-2.0	28	-114	0.1	122	28
122	-20	-2.0	26	-116	0.8	120	26
120	-22	-0.2	24	-118	0.2	118	24
118	-24	-1.3	22	-120	-0.2	116	22
116	-26	-4.3	20	-122	0.9	114	20
114	-28	-4.5	18	-124	0.6	112	18
112	-30	-3.4	16	-126	0.8	110	16
110	-32	-2.9	14	-128	0.8	108	14
108	-34	-2.9	12	-130	1.2	106	12
106	-36	-3.7	10	-132	0.2	104	10
104	-38	-3.2*					

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Flyby (Run) Number: 24	Date: 25 SEP 1990 (Day of Year: 268)	AIRCRAFT DATA	Atmospheric Stability: Unstable			
Configuration: Takeoff	Flaps: 20 deg.	Indicated Air Speed: 142 kts	Gross Weight: 195,500 lbs.			
Glide Slope: 0 deg.			Altitude: 290 ft AGL			
			Atmospheric Stability: Unstable			
Wind Speed: 3.5 kts	Wind Direction: 179 deg.	Air Temperature: 19.2 °C	Estimated Core Radius: (O) ft			
Maximum Velocity: 28.8 fps	Advection Rate: 2.4 fps		Tower Penetration Height: 110 ft AGL			
Descent Rate: 3.5 fps			Estimated Core Radius: (O) ft			
Maximum Velocity: (O) fps	Age: (O) s	Upwind Vortex Characteristics	Tower Penetration Height: (O) ft AGL			
Descent Rate: (O) fps	Advection Rate: (O) fps	Upwind Vortex Tangential Velocities				
Downwind Vortex Tangential Velocities	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)
Wind Speed: 3.5 kts	Wind Direction: 179 deg.	Age: 51 s	Wind Speed: 3.5 kts	Wind Direction: 179 deg.	Age: (O) s	Wind Speed: 3.5 kts
Maximum Velocity: 28.8 fps	Advection Rate: 2.4 fps	Upwind Vortex Characteristics	Maximum Velocity: 28.8 fps	Advection Rate: 2.4 fps	Upwind Vortex Characteristics	Maximum Velocity: 28.8 fps
Configuration: Takeoff	Flaps: 20 deg.	Indicated Air Speed: 142 kts	Meteorological Data (200 ft Sensor Level)	Air Temperature: 19.2 °C	Tower Penetration Height: 110 ft AGL	Tower Penetration Height: 110 ft AGL
Glide Slope: 0 deg.						

= Estimated (D) = Vortex dissipated upwind of tower (M) = Missing (O) = No vortex (Flyby down for remote sensing systems) (P) = Vortex passed over top of tower

Flyby (Run) Number: 25	UAL B757-200	Date: 25 SEP 1990 (Day of Year: 268)	Abeam Time: 12:25:38 (MDT)																																																																																																																																																																																																																																																																																										
Configuration: Landing Glide Slope: 0 deg.	AIRCRAFT DATA Flaps: 30 deg. Indicated Air Speed: 136 kts	Gross Weight: 194,500 lbs. Altitude: 620 ft AGL																																																																																																																																																																																																																																																																																											
Wind Speed: 5.8 kts	Wind Direction: 25.2 deg.	Air Temperature: 19.2 °C	Atmospheric Stability: Unstable																																																																																																																																																																																																																																																																																										
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Height (ft)	Relative Height (ft)	V <sub>θ</sub> (f/s)	198	196	0	194	192	0	190	94	100	188	92	98	186	90	96	184	88	94	182	86	92	180	84	80	178	82	78	176	80	76	174	78	74	172	76	72	170	74	70	168	72	68	166	70	66	164	68	64	162	66	62	160	64	60	158	62	58	156	60	56	154	58	54	152	56	52	150	54	50	148	52	48	146	50	46	144	48	44	142	46	42	140	44	40	138	42	38	136	40	36	134	38	34	132	36	32	130	34	30	128	32	28	126	30	26	124	28	24	122	26	22	120	24	20	118	22	18	116	20	16	114	18	14	112	16	12	110	14	10	108	12	10	106	10	08	104	06	04	<table border="1"><thead><tr><th>Sensor Height (ft)</th><th>Relative Height (ft)</th><th>V<sub>θ</sub> 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\* = Estimated (D) = Vortex dissipated upwind of tower

(M) = Missing (O) = No vortex (Flyby flown for remote sensing systems) (P) = Vortex passed over top of tower

Flyby (Run) Number: 26		UAL B757-200		Date: 25 SEP 1990 (Day of Year: 268)		Abeam Time: 12:31:55 (MDT)							
Configuration: Holding		Glide Slope: 0 deg.		Elevs: 0 deg.		Indicated Air Speed: 210 kts							
Wind Speed: 4.7 kts		Wind Direction: 199 deg.		Age: (D) s		Metereological Data (200 ft Sensor Level)							
Maximum Velocity: (D) fpm		Air Temperature: 19.8 °C		Advection Rate: (D) fpm		Atmospheric Stability: Unstable							
Descent Rate: (D) fpm		Wind Direction: 199 deg.		Estimated Core Radius: (D) ft		Tower Penetration Height: (D) ft AGL							
Configuration: Holding		Glide Slope: 0 deg.		Elevs: 0 deg.		Gross Weight: 193,500 lbs.							
Wind Speed: 4.7 kts		Wind Direction: 199 deg.		Age: (D) s		Estimated Core Radius: (D) ft							
Maximum Velocity: (D) fpm		Air Temperature: 19.8 °C		Advection Rate: (D) fpm		Tower Penetration Height: (D) ft AGL							
Descent Rate: (D) fpm		Wind Direction: 199 deg.		Age: (D) s		Estimated Core Radius: (D) ft							
Configuration: Holding		Glide Slope: 0 deg.		Advection Rate: (D) fpm		Tower Penetration Height: (D) ft AGL							
<b>AIRCRAFT DATA</b>													
Elevs: 0 deg.													
Indicated Air Speed: 210 kts													
<b>METEOROLOGICAL DATA</b>													
(200 ft Sensor Level)													
<b>DOWNWIND VORTEX CHARACTERISTICS</b>													
Wind Direction: 199 deg.													
Age: (D) s													
Advection Rate: (D) fpm													
<b>UPWIND VORTEX CHARACTERISTICS</b>													
Wind Direction: 199 deg.													
Age: (D) s													
Advection Rate: (D) fpm													
<b>Downwind Vortex Tangential Velocities</b>													
Sensor Height (ft)													
Relative Height (ft)													
V <sub>θ</sub> (fps)													
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128													
126													
124													
122													
120													
118													
116													
114													
112													
110													
108													
106													
104													
<b>Upwind Vortex Tangential Velocities</b>													
Sensor Height (ft)													
Relative Height (ft)													
V <sub>θ</sub> (fps)													
198													
196													
194													
192													
190													
188													
186													
184													
182													
180													
178													
176													
174													
172													
170													
168													
166													
164													
162													
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158													
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126													
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122													
120													
118													
116													
114													
112													
110													
108													
106													
104													
<b>Tower Penetration Height: (D) ft AGL</b>													
Relative Height (ft)													
V <sub>θ</sub> (fps)													
102													
100													
98													
96													
94													
92													
90													
88													
86													
84													
82													
80													
78													
76													
74													
72													
70													

Flyby (Run) Number: 27		Date: 25 SEP 1990 (Day of Year: 268)		Abeam Time: 12:38:33 (MDT)	
Configuration: Takeoff		AIRCRAFT DATA		Gross Weight: 192,500lbs.	
Glide Slope: 0 deg.		Flaps: 20 deg.		Altitude: 240 ft AGL	
Indicated Air Speed: 14.2 kts		Advection Rate: 6.0 fps		Atmospheric Stability: Unstable	
Wind Speed: 7.2 kts		Wind Direction: 199 deg.		Air Temperature: 19.9 °C	
Maximum Velocity: 89.1 fps		Age: 16 s		Estimated Core Radius: (M) ft	
Descent Rate: 9.5 fps		(200 ft Sensor Level)		Tower Penetration Height: 88 ft AGL	
Maximum Velocity: (M) fps		UPWIND VORTEX CHARACTERISTICS		Estimated Core Radius: (M) ft	
Descent Rate: (M) fps		Age: (M) s		Tower Penetration Height: (M) ft AGL	
Downwind Vortex Tangential Velocities		Advection Rate: (M) fps		Upwind Vortex Tangential Velocities	
Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)
198	110	-16.2	102	14	-29.2*
196	108	-15.7	100	12	-32.8*
194	104	-15.6	98	10	-36.4
192	102	-16.5	96	8	-48.7
190	100	-17.4	94	6	-50.7*
188	98	-17.4	92	4	-52.7*
186	98	-18.4	90	2	-54.7
184	96	-18.3	88	0	-89.1
182	94	-18.8	86	-2	-18.1
180	92	-20.3	84	-4	-66.9
178	90	-19.4	82	-6	-54.0
176	88	-20.1	80	-8	-44.6
174	86	-17.4	78	-10	-37.0
172	84	-17.7	76	-12	-33.5*
170	82	-20.6	74	-14	-30.0*
168	80	-13.9	72	-16	-26.5*
166	78	-15.9	70	-18	-23.0
164	76	-16.5	68	-20	-20.2
162	74	-18.0	66	-22	-17.3*
160	72	-18.0	64	-24	-14.5*
158	70	-16.5	62	-26	-11.6
156	68	-17.4	60	-28	-10.7*
154	66	-19.9	58	-30	-9.7*
152	64	-19.0	56	-32	-8.7*
150	62	-18.5	54	-34	-7.7*
148	60	-17.9	52	-36	-6.7*
146	58	-19.5	50	-38	-5.8*
144	56	-18.2	48	-40	-4.9*
142	54	-19.5	46	-42	-4.6*
140	52	-19.5	44	-44	-4.2*
138	50	-16.8	42	-46	-5.2*
136	48	-15.2	40	-48	-5.7*
134	46	-16.7	38	-50	-6.1*
132	44	-15.3*	36	-52	-5.9*
130	42	-13.8	34	-54	-5.7*
128	40	-16.2	32	-56	-5.5*
126	38	-18.3	30	-58	-5.0*
124	36	-24.0	28	-60	-4.5*
122	34	-23.5	26	-62	-4.0*
120	32	-23.7	24	-64	-3.6*
118	30	-23.0	22	-66	-3.6*
116	28	-20.6	20	-70	-3.6*
114	26	-18.8	18	-72	-3.6*
112	24	-21.2	16	-74	-3.6*
110	22	-25.2	14	-76	-3.6*
108	20	-29.5	12	-78	-3.6*
106	18	-22.2	10	-80	-10.6
104	16	-22.6	10	-84	-10.4

\* = Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

UAL B757-200									
Date: 25 SEP 1990 (Day of Year: 268)									Abeam Time: 12:44:05 (MDT)
<b>AIRCRAFT DATA</b>									
Configuration: Clean									Gross Weight: 191,600lbs.
Glide Slope: 0 deg.									Altitude: 220 ft AGL
<b>METEOROLOGICAL DATA</b>									
Indicated Air Speed: 250 kts									
[200 ft Sensor Level]									
Wind Speed: 8.8 kts									
Maximum Velocity: 91.4 fps									Atmospheric Stability: Unstable
Descent Rate: 5.0 ips									
<b>DOWNWIND VORTEX CHARACTERISTICS</b>									
Wind Direction: 205 deg.									Estimated Core Radius: 0.5 ft
Age: 26 s									Tower Penetration Height: 90 ft AGL
Advection Rate: 7.9 fps									
<b>UPWIND VORTEX CHARACTERISTICS</b>									
Wind Direction: 205 deg.									Estimated Core Radius: 0.8 ft
Age: 31 s									Tower Penetration Height: 84 ft AGL
Advection Rate: 9.0 fps									
<b>Downwind Vortex Tangential Velocities</b>									
Sensor Height									Upwind Vortex Tangential Velocities
Relative Height (ft)									
V <sub>θ</sub> (fps)									
198	108	-14.6	102	12	-12.5	198	114	2.1	102
196	106	-13.4	100	10	-16.4*	196	112	3.2	100
194	104	-8.7	98	6	-20.2	194	108	3.3	98
192	102	-8.9	96	4	-18.0	192	106	3.0	96
190	100	-20.5	94	2	-23.7	190	104	3.1	94
188	98	-19.9	92	0	-39.7	188	102	3.6	92
186	96	-19.5	90	0	91.4	186	100	3.4	90
184	94	-20.4	88	-2	68.0	184	98	3.8	88
182	92	-19.6	86	-4	31.9	182	96	3.5	86
180	90	-23.7	84	-6	22.9	180	94	4.1	84
178	88	-21.7	82	-8	22.3	178	92	4.4	82
176	86	-20.2	80	-10	19.1	176	90	4.2	80
174	84	-16.7	78	-12	16.6	174	88	4.4	78
172	82	-20.9	76	-14	14.7	172	86	3.7	76
170	80	-22.7	74	-16	10.5*	170	84	4.5	74
168	78	-20.8	72	-18	6.2	168	82	3.6	72
166	76	-20.3	70	-20	3.6	166	80	4.3	70
164	74	-22.2	68	-22	0.8	164	78	4.6	68
162	72	-16.5	66	-24	2.1*	162	76	5.8	66
160	70	-6.1	64	-26	3.3	160	74	6.0	64
158	68	-14.9	62	-28	4.9	158	72	6.6	62
156	66	-13.9	60	-30	6.0	156	70	6.7	60
154	64	-14.3	58	-32	3.2	154	68	7.8	58
152	62	-19.9	56	-34	4.8*	152	66	6.7	56
150	60	-16.5	54	-36	3.5	150	64	6.5	54
148	58	-7.4	52	-38	4.7	148	62	5.8	52
146	56	-5.1	50	-40	3.3	146	60	10.7	50
144	54	-14.8	48	-42	7.8*	144	58	4.8	48
142	52	-18.0	46	-44	1.0	142	56	6.9	46
140	50	-19.4	44	-46	8.2	140	54	8.3	44
138	48	-15.3	42	-48	9.9*	138	52	3.4	42
136	46	-20.8	40	-50	1.1	136	50	3.2	40
134	44	-20.3	38	-52	5.8	134	48	3.8	38
132	42	-10.9	36	-54	6.7	132	46	3.4	36
130	40	-10.5	34	-56	7.6*	130	44	7.0	34
128	38	-12.0	32	-58	8.4	128	42	5.5	32
126	36	-13.5	30	-60	8.5	126	40	8.4	30
124	34	-4.2	28	-62	7.2*	124	38	8.7	28
122	32	-12.4	26	-64	8.6*	122	36	11.1	26
120	30	-14.4	24	-66	8.7	120	34	11.7	24
118	28	-1.5	22	-68	1.0	118	32	9.0	22
116	26	-15.9	20	-70	9.3	116	30	12.0	20
114	24	-3.7	18	-72	9.0*	114	28	11.7	18
112	22	-2.9	16	-74	8.6	112	26	11.9	16
110	20	-1.2	14	-76	8.5	110	24	12.8	14
108	18	-1.6	12	-78	6.4	108	22	11.5	12
106	16	-10.4	10	-80	6.4*	106	20	10.1	10
104	14	-1.6				104	18	-7.4	9.1

(P) = Vortex passed over top of tower

(O) = No vortex (Flyby flown for remote sensing systems)

= Estimated

Flyby (Run) Number: 29		Date: 25 SEP 1990 (Day of Year: 268)		Abeam Time: 12:50:21 (MDT)	
Configuration: Landing Glide Slope: 0 deg.		AIRCRAFT DATA Flaps: 25 deg. Indicated Air Speed: 136 kts		Gross Weight: 191,000 lbs. Altitude: 220 ft AGL	
Wind Speed: 8.5 kts		METEOROLOGICAL DATA (200 ft Sensor Level)		Atmospheric Stability: Unstable	
Maximum Velocity: 169.8 fps Descent Rate: 3.4 f/s		Wind Direction: 226 deg. Air Temperature: 20.4 °C		Estimated Core Radius: 0.3 ft Tower Penetration Height: 128 ft AGL	
Maximum Velocity: 118.3 fps Descent Rate: 4.1 f/s		DOWNWIND VORTEX CHARACTERISTICS Age: 27 s Advection Rate: 5.7 f/s		Estimated Core Radius: 0.3 ft Tower Penetration Height: 74 ft AGL	
Downwind Vortex Tangential Velocities		UPWIND VORTEX CHARACTERISTICS Age: 36 s Advection Rate: 6.3 f/s		Upwind Vortex Tangential Velocities	
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)
198	70	-12.8	102	-26	9.7
196	68	-15.5	100	-28	9.8*
194	66	-13.7	98	-30	9.8
192	64	-14.5	96	-32	9.5
190	62	-16.1	94	-34	6.1
188	60	-14.9	92	-36	8.8
186	58	-12.6	90	-38	6.6
184	56	-14.3	88	-40	6.6
182	54	-17.1	86	-42	7.4
180	52	-19.3	84	-44	9.1
178	50	-14.6	82	-46	6.0
176	48	-16.2	80	-48	6.5
174	46	-17.4	78	-50	5.5
172	44	-13.0	76	-52	2.7
170	42	-16.9	74	-54	6.0
168	40	-16.9	72	-56	7.0
166	38	-11.9	70	-58	3.3
164	36	-13.7	68	-60	4.1
162	34	-12.7	66	-62	3.9
160	32	-13.6	64	-64	3.8
158	30	-13.6	62	-66	4.4
156	28	-13.1	60	-68	2.8
154	26	-14.6	58	-70	3.1
152	24	-22.1	56	-72	1.7
150	22	-14.3	54	-74	1.3
148	20	-14.0	52	-76	2.9
146	18	-19.9	50	-78	3.6
144	16	-16.7	48	-80	3.5
142	14	-22.0	46	-82	3.7
140	12	-25.4	44	-84	3.4
138	10	-24.5	42	-86	3.6
136	8	-37.4*	40	-88	4.7
134	6	-50.3*	38	-90	3.2
132	4	-63.0*	36	-92	2.6
130	2	-75.6	34	-94	1.9
128	0	-169.8	32	-96	2.3
126	-2	-53.6	30	-98	2.0
124	-4	-55.5	28	-100	0.9
122	-6	-45.1	26	-102	1.3
120	-8	-30.4	24	-104	3.2
118	-10	-32.9	22	-106	2.6
116	-12	-15.4	20	-108	1.1
114	-14	-19.1	18	-110	1.5
112	-16	-16.8	16	-112	1.8
110	-18	-16.8	14	-114	3.1
108	-20	-13.7	12	-116	0.7
106	-22	-13.1	10	-118	1.8
104	-24	-12.6	-	-	-

\* = Estimated (D) = Vortex dissipated upwind of tower (P) = Vortex passed over top of tower

(M) = Missing (O) = No vortex (F) = Flyby flown for remote sensing systems

Flyby (Run) Number: 30		Date: 25 SEP 1990 [Day of Year: 268]		Abeam Time: 12:57:09 (MDT)	
<b>AIRCRAFT DATA</b>		<b>METEOROLOGICAL DATA</b>		<b>Atmospheric Stability: Unstable</b>	
Configuration: Landing		Flaps: 25 deg.		Estimated Core Radius: 0.4 ft	
Glide Slope: 0 deg.		Indicated Air Speed: 136 kts		Gross Weight: 190,300 lbs.	
Wind Speed: 7.7 kts		Wind Direction: 256 deg.		Altitude: 230 ft AGL	
Maximum Velocity: 166.3 fps		Age: 28 s		Estimated Core Penetration Height: 92 ft AGL	
Descent Rate: 4.9 ips		Advection Rate: 6.1 ips		Tower Penetration Height: 34 ft AGL	
Maximum Velocity: 155.4 fps		Age: 42 s		Estimated Core Radius: 0.3 ft	
Descent Rate: 4.7 ips		Advection Rate: 5.8 ips		Tower Penetration Height: 34 ft AGL	
<b>DOWNWIND VORTEX CHARACTERISTICS</b>					
Wind Direction: 256 deg.		Age: 42 s		Estimated Core Radius: 0.3 ft	
Maximum Velocity: 166.3 fps		Advection Rate: 6.1 ips		Tower Penetration Height: 92 ft AGL	
<b>UPWIND VORTEX CHARACTERISTICS</b>					
Wind Direction: 256 deg.		Age: 42 s		Estimated Core Radius: 0.3 ft	
Maximum Velocity: 155.4 fps		Advection Rate: 5.8 ips		Tower Penetration Height: 34 ft AGL	
<b>Downwind Vortex Tangential Velocities</b>					
Sensor Height [ft]	Relative Height [ft]	$V_{\theta}$ (fps)	Sensor Height [ft]	Relative Height [ft]	$V_{\theta}$ (fps)
198	106	-13.7	102	10	-31.9
196	104	-13.7	100	-8	-31.3*
194	102	-14.5	98	6	-42.2
192	100	-15.6	96	4	-40.3
190	98	-14.5	94	2	-73.9
188	96	-15.7	92	0	166.3
186	94	-16.4	90	-2	74.4
184	92	-16.7	88	-4	52.0
182	90	-16.5	86	-6	4.0
180	88	-17.1	84	-8	29.1
178	86	-14.2	82	-10	23.2
176	84	-17.0	80	-12	18.2
174	82	-12.6	78	-14	15.9
172	80	-11.3	76	-16	11.8
170	78	-12.9	74	-18	12.8
168	76	-14.0	72	-20	14.3
166	74	-12.5	70	-22	13.1
164	72	-12.6	68	-24	12.0
162	70	-13.1	66	-26	11.2
160	68	-12.5	64	-28	11.6
158	66	-13.1	62	-30	12.9
156	64	-13.1	60	-32	10.2
154	62	-14.9	58	-34	8.5
152	60	-12.8	56	-36	7.6
150	58	-12.4	54	-38	8.7
148	56	-11.8	52	-40	9.8
146	54	-13.3	50	-42	8.4
144	52	-15.3	48	-44	11.7
142	50	-13.5	46	-46	8.4
140	48	-14.9	44	-48	10.5
138	46	-12.8	42	-50	10.5
136	44	-14.7	40	-52	14.4
134	42	-13.6*	38	-54	9.4
132	40	-13.6	36	-56	9.4
130	38	-12.6	34	-58	8.3
128	36	-12.6	32	-60	8.2
126	34	-10.1	30	-62	6.7
124	32	-12.2	28	-64	7.9
122	30	-10.9	26	-66	7.6
120	28	-12.8	24	-70	7.4
118	26	-14.8	22	-72	5.8
116	24	-16.0	20	-74	1.8
114	22	-18.3	18	-76	4.2
112	20	-17.5	16	-78	11.4
110	18	-20.3	14	-80	11.2
108	16	-19.2	12	-82	10.8
106	14	-24.0	10	-82	3.3
104	12	-31.4	8	-82	3.3
			106	-72	4.9
			104	-70	4.2

\* = Estimated

(D) = Dissipated

(M) = Missing

(O) = No vortex

(P) = Passed over top of tower

(O) = Flyby flown for remote sensing systems

(P) = Vortex passed over top of tower

Flyby (Run) Number: 31	Date: 25 SEP 1990 [Day of Year: 268]	Abeam Time: 13:03:49 (MDT)
Configuration: Landing	AIRCRAFT DATA	
Glide Slope: -3 deg.	Flags: 25 deg	Gross Weight: 189,600 lbs.
Descent Rate: 3.5 fpm	Indicated Air Speed: 136 kts	Altitude: 250 ft AGL
Wind Speed: 7.9 kts	Wind Direction: 241 deg.	Atmospheric Stability: Unstable
Maximum Velocity: 160.0 fpm	Age: 19 s	Estimated Core Radius: 0.3 ft
Descent Rate: 3.5 fpm	Advection Rate: 7.7 fpm	Tower Penetration Height: 184 ft AGL
Maximum Velocity: 97.0 fpm	Age: 29 s	Estimated Core Radius: 0.6 ft
Descent Rate: 4.1 fpm	Advection Rate: 7.6 fpm	Tower Penetration Height: 130 ft AGL
DOWNDOWN VORTEX CHARACTERISTICS		
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)
198	14	-38.9
196	12	-41.9*
194	10	-40.9*
192	8	-39.9
190	6	-40.3
188	4	-39.0
186	2	-61.7
184	0	160.0
182	-2	64.8
180	-4	45.5
178	-6	30.8
176	-8	29.4
174	-10	23.4
172	-12	21.4
170	-14	22.5
168	-16	14.3
166	-18	11.7
164	-20	10.9
162	-22	11.1
160	-24	64
158	-26	8.4
156	-28	8.6
154	-30	9.6
152	-32	9.3
150	-34	10.5
148	-36	12.7
146	-38	8.3
144	-40	3.8
142	-42	2.3
140	-44	4.1
138	-46	5.0
136	-48	7.5
134	-50	5.2
132	-52	1.3
130	-54	3.9
128	-56	2.5
126	-58	3.2
124	-60	2.4
122	-62	2.7
120	-64	4.0
118	-66	4.3
116	-68	1.9
114	-70	1.4
112	-72	-1.0
110	-74	-2.8
108	-76	-0.8
106	-78	-0.4
104	-80	1.1
METEOROLOGICAL DATA (200 ft Sensor Level)		
UPWIND VORTEX CHARACTERISTICS		
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)
198	14	-82
196	12	-84
194	10	-86
192	8	-88
190	6	-90
188	4	-92
186	2	-94
184	0	-96
182	-2	-98
180	-4	-84
178	-6	-100
176	-8	-102
174	-10	-104
172	-12	-106
170	-14	-108
168	-16	-110
166	-18	-112
164	-20	-114
162	-22	-116
160	-24	-118
158	-26	-120
156	-28	-122
154	-30	-124
152	-32	-126
150	-34	-128
148	-36	-130
146	-38	-132
144	-40	-134
142	-42	-136
140	-44	-138
138	-46	-140
136	-48	-142
134	-50	-144
132	-52	-146
130	-54	-148
128	-56	-150
126	-58	-152
124	-60	-154
122	-62	-156
120	-64	-158
118	-66	-160
116	-68	-162
114	-70	-164
112	-72	-166
110	-74	-168
108	-76	-170
106	-78	-172
104	-80	-174
Downwind Vortex Tangential Velocities		
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)
198	14	-82
196	12	-84
194	10	-86
192	8	-88
190	6	-90
188	4	-92
186	2	-94
184	0	-96
182	-2	-98
180	-4	-100
178	-6	-102
176	-8	-104
174	-10	-106
172	-12	-108
170	-14	-110
168	-16	-112
166	-18	-114
164	-20	-116
162	-22	-118
160	-24	-120
158	-26	-122
156	-28	-124
154	-30	-126
152	-32	-128
150	-34	-130
148	-36	-132
146	-38	-134
144	-40	-136
142	-42	-138
140	-44	-140
138	-46	-142
136	-48	-144
134	-50	-146
132	-52	-148
130	-54	-150
128	-56	-152
126	-58	-154
124	-60	-156
122	-62	-158
120	-64	-160
118	-66	-162
116	-68	-164
114	-70	-166
112	-72	-168
110	-74	-170
108	-76	-172
106	-78	-174
104	-80	-176
Upwind Vortex Tangential Velocities		
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)
198	14	198
196	12	196
194	10	194
192	8	192
190	6	190
188	4	188
186	2	186
184	0	184
182	-2	182
180	-4	180
178	-6	178
176	-8	176
174	-10	174
172	-12	172
170	-14	170
168	-16	168
166	-18	166
164	-20	164
162	-22	162
160	-24	160
158	-26	158
156	-28	156
154	-30	154
152	-32	152
150	-34	150
148	-36	152
146	-38	154
144	-40	156
142	-42	158
140	-44	160
138	-46	162
136	-48	164
134	-50	166
132	-52	168
130	-54	170
128	-56	172
126	-58	174
124	-60	176
122	-62	178
120	-64	180
118	-66	182
116	-68	184
114	-70	186
112	-72	188
110	-74	190
108	-76	192
106	-78	194
104	-80	196
Sensor Height (ft)		
198	14	68
196	12	66
194	10	64
192	8	62
190	6	60
188	4	58
186	2	56
184	0	54
182	-2	52
180	-4	50
178	-6	48
176	-8	46
174	-10	44
172	-12	42
170	-14	40
168	-16	38
166	-18	36
164	-20	34
162	-22	32
160	-24	30
158	-26	28
156	-28	26
154	-30	24
152	-32	22
150	-34	20
148	-36	18
146	-38	16
144	-40	14
142	-42	12
140	-44	10
138	-46	8
136	-48	6
134	-50	4
132	-52	2
130	-54	0
128	-56	-2
126	-58	-4
124	-60	-6
122	-62	-8
120	-64	-10
118	-66	-12
116	-68	-14
114	-70	-16
112	-72	-18
110	-74	-20
108	-76	-22
106	-78	-24
104	-80	-26
Sensor Height (ft)		
198	14	3.9
196	12	3.7
194	10	3.5
192	8	3.3
190	6	3.1
188	4	2.9
186	2	2.7
184	0	2.5
182	-2	2.3
180	-4	2.1
178	-6	1.9
176	-8	1.7
174	-10	1.5
172	-12	1.3
170	-14	1.1
168	-16	0.9
166	-18	0.7
164	-20	0.5
162	-22	0.3
160	-24	0.1
158	-26	-0.1
156	-28	-0.3
154	-30	-0.5
152	-32	-0.7
150	-34	-0.9
148	-36	-1.1
146	-38	-1.3
144	-40	-1.5
142	-42	-1.7
140	-44	-1.9
138	-46	-2.1
136	-48	-2.3
134	-50	-2.5
132	-52	-2.7
130	-54	-2.9
128	-56	-3.1
126	-58	-3.3
124	-60	-3.5
122	-62	-3.7
120	-64	-3.9
118	-66	-4.1
116	-68	-4.3
114	-70	-4.5
112	-72	-4.7
110	-74	-4.9
108	-76	-5.1
106	-78	-5.3
104	-80	-5.5

\* = Estimated

(D) = Vortex dissipated upwind of tower

(I) = Missing

(O) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

Flyby (Run) Number: 32		Date: 25 SEP 1990 (Day of Year: 268)		Abeam Time: 13:10:37 (MDT)	
Configuration: Landing		AIRCRAFT DATA		Estimated Core Radius: (M) ft	
Glide Slope: -3 deg.		Flaps: 25 deg.		Tower Penetration Height: (M) ft AGL	
Indicated Air Speed: 135 kts		Gross Weight: 188 400 lbs.		Altitude: 260 ft AGL	
Wind Speed: 7.6 kts		METEOROLOGICAL DATA		Atmospheric Stability: Unstable	
Maximum Velocity: (M) fps		(200 ft Sensor Level)		(M) ft AGL	
Descent Rate: (M) fps		Wind Direction: 199 deg.		Estimated Core Radius: (M) ft	
Maximum Velocity: (M) fps		Air Temperature: 21.1 °C		Tower Penetration Height: (M) ft AGL	
Descent Rate: (M) fps		Age: (M) s		Estimated Core Radius: (M) ft	
Descent Rate: (M) fps		Advection Rate: (M) fps		Tower Penetration Height: (M) ft AGL	
Wind Speed: 7.6 kts		DOWNWIND VORTEX CHARACTERISTICS		Estimated Core Radius: (M) ft	
Maximum Velocity: (M) fps		Age: (M) s		Tower Penetration Height: (M) ft AGL	
Descent Rate: (M) fps		Advection Rate: (M) fps		Estimated Core Radius: (M) ft	
Downwind Vortex Tangential Velocities		UPWIND VORTEX CHARACTERISTICS		Estimated Core Radius: (M) ft	
Sensor Height (ft)		Sensor Height (ft)		Tower Penetration Height: (M) ft AGL	
Relative Height (ft)		V <sub>θ</sub> (fps)		Estimated Core Radius: (M) ft	
198		(M)		Tower Penetration Height: (M) ft AGL	
196		(M)		Estimated Core Radius: (M) ft	
194		(M)		Tower Penetration Height: (M) ft AGL	
192		(M)		Estimated Core Radius: (M) ft	
190		(M)		Tower Penetration Height: (M) ft AGL	
188		(M)		Estimated Core Radius: (M) ft	
186		(M)		Tower Penetration Height: (M) ft AGL	
184		(M)		Estimated Core Radius: (M) ft	
182		(M)		Tower Penetration Height: (M) ft AGL	
180		(M)		Estimated Core Radius: (M) ft	
178		(M)		Tower Penetration Height: (M) ft AGL	
176		(M)		Estimated Core Radius: (M) ft	
174		(M)		Tower Penetration Height: (M) ft AGL	
172		(M)		Estimated Core Radius: (M) ft	
170		(M)		Tower Penetration Height: (M) ft AGL	
168		(M)		Estimated Core Radius: (M) ft	
166		(M)		Tower Penetration Height: (M) ft AGL	
164		(M)		Estimated Core Radius: (M) ft	
162		(M)		Tower Penetration Height: (M) ft AGL	
160		(M)		Estimated Core Radius: (M) ft	
158		(M)		Tower Penetration Height: (M) ft AGL	
156		(M)		Estimated Core Radius: (M) ft	
154		(M)		Tower Penetration Height: (M) ft AGL	
152		(M)		Estimated Core Radius: (M) ft	
150		(M)		Tower Penetration Height: (M) ft AGL	
148		(M)		Estimated Core Radius: (M) ft	
146		(M)		Tower Penetration Height: (M) ft AGL	
144		(M)		Estimated Core Radius: (M) ft	
142		(M)		Tower Penetration Height: (M) ft AGL	
140		(M)		Estimated Core Radius: (M) ft	
138		(M)		Tower Penetration Height: (M) ft AGL	
136		(M)		Estimated Core Radius: (M) ft	
134		(M)		Tower Penetration Height: (M) ft AGL	
132		(M)		Estimated Core Radius: (M) ft	
130		(M)		Tower Penetration Height: (M) ft AGL	
128		(M)		Estimated Core Radius: (M) ft	
126		(M)		Tower Penetration Height: (M) ft AGL	
124		(M)		Estimated Core Radius: (M) ft	
122		(M)		Tower Penetration Height: (M) ft AGL	
120		(M)		Estimated Core Radius: (M) ft	
118		(M)		Tower Penetration Height: (M) ft AGL	
116		(M)		Estimated Core Radius: (M) ft	
114		(M)		Tower Penetration Height: (M) ft AGL	
112		(M)		Estimated Core Radius: (M) ft	
110		(M)		Tower Penetration Height: (M) ft AGL	
108		(M)		Estimated Core Radius: (M) ft	
106		(M)		Tower Penetration Height: (M) ft AGL	
104		(M)		Estimated Core Radius: (M) ft	

= Estimated (D) = Vortex dissipated upwind of tower (O) = Missing (M) = No vortex (Flyby flown for remote sensing systems) (P) = Vortex passed over top of tower (I) = Vortex passed over remote sensing systems

Flyby (Run) Number: 33	Date: 25 SEP 1990 (Day of Year: 268)	Abeam Time: 13:17:52(MDT)
Configuration: Landing Glide Slope: -3 deg.	AIRCRAFT DATA Flaps: 30 deg. Indicated Air Speed: 133 kts	Gross Weight: 187,500 lbs. Altitude: 270 ft AGL
Wind Speed: 9.3 kts	Wind Direction: 234 deg.	Air Temperature: 21.2 °C
Maximum Velocity: (P) fps Descent Rate: (P) fpm	Age: (P) s Advection Rate: (P) fpm	Atmospheric Stability: Unstable
Maximum Velocity: 33.9 fps Descent Rate: 2.7 fpm	Age: 31 s Advection Rate: 7.6 fpm	Estimated Core Radius: (P) ft AGL Tower Penetration Height: (P) ft AGL
METEOROLOGICAL DATA (200 ft Sensor Level)		
DOWNMWIND VORTEX CHARACTERISTICS		
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)
198	(P)	102
196	(P)	100
194	(P)	98
192	(P)	96
190	(P)	94
188	(P)	92
186	(P)	90
184	(P)	88
182	(P)	86
180	(P)	84
178	(P)	82
176	(P)	80
174	(P)	78
172	(P)	76
170	(P)	74
168	(P)	72
166	(P)	70
164	(P)	68
162	(P)	66
160	(P)	64
158	(P)	62
156	(P)	60
154	(P)	58
152	(P)	56
150	(P)	54
148	(P)	52
146	(P)	50
144	(P)	48
142	(P)	46
140	(P)	44
138	(P)	42
136	(P)	40
134	(P)	38
132	(P)	36
130	(P)	34
128	(P)	32
126	(P)	30
124	(P)	28
122	(P)	26
120	(P)	24
118	(P)	22
116	(P)	20
114	(P)	18
112	(P)	16
110	(P)	14
108	(P)	12
106	(P)	10
104	(P)	104
UPWIND VORTEX CHARACTERISTICS		
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)
198	(P)	198
196	(P)	194
192	(P)	190
190	(P)	190
188	(P)	188
186	(P)	186
184	(P)	184
182	(P)	182
180	(P)	180
178	(P)	178
176	(P)	176
174	(P)	174
172	(P)	172
170	(P)	170
168	(P)	168
166	(P)	166
164	(P)	164
162	(P)	162
160	(P)	160
158	(P)	158
156	(P)	156
154	(P)	154
152	(P)	152
150	(P)	150
148	(P)	148
146	(P)	146
144	(P)	144
142	(P)	142
140	(P)	140
138	(P)	138
136	(P)	136
134	(P)	134
132	(P)	132
130	(P)	130
128	(P)	128
126	(P)	126
124	(P)	124
122	(P)	122
120	(P)	120
118	(P)	118
116	(P)	116
114	(P)	114
112	(P)	112
110	(P)	110
108	(P)	108
106	(P)	106
104	(P)	104
Upwind Vortex Tangential Velocities		
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)
198	(P)	1.2
196	(P)	1.0
194	(P)	0.8
192	(P)	0.6
190	(P)	0.4
188	(P)	0.2
186	(P)	0.0
184	(P)	-0.2
182	(P)	-0.4
180	(P)	-0.6
178	(P)	-0.8
176	(P)	-1.0
174	(P)	-1.2
172	(P)	-1.4
170	(P)	-1.6
168	(P)	-1.8
166	(P)	-2.0
164	(P)	-2.2
162	(P)	-2.4
160	(P)	-2.6
158	(P)	-2.8
156	(P)	-3.0
154	(P)	-3.2
152	(P)	-3.4
150	(P)	-3.6
148	(P)	-3.8
146	(P)	-4.0
144	(P)	-4.2
142	(P)	-4.4
140	(P)	-4.6
138	(P)	-4.8
136	(P)	-5.0
134	(P)	-5.2
132	(P)	-5.4
130	(P)	-5.6
128	(P)	-5.8
126	(P)	-6.0
124	(P)	-6.2
122	(P)	-6.4
120	(P)	-6.6
118	(P)	-6.8
116	(P)	-7.0
114	(P)	-7.2
112	(P)	-7.4
110	(P)	-7.6
108	(P)	-7.8
106	(P)	-8.0
104	(P)	-8.2
Upwind Vortex Tangential Velocities		
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)
198	(P)	-3.5
196	(P)	-3.1
194	(P)	-2.7
192	(P)	-2.3
190	(P)	-1.9
188	(P)	-1.5
186	(P)	-1.1
184	(P)	-0.7
182	(P)	-0.3
180	(P)	0.1
178	(P)	0.5
176	(P)	0.9
174	(P)	1.3
172	(P)	1.7
170	(P)	2.1
168	(P)	2.5
166	(P)	2.9
164	(P)	3.3
162	(P)	3.7
160	(P)	4.1
158	(P)	4.5
156	(P)	4.9
154	(P)	5.3
152	(P)	5.7
150	(P)	6.1
148	(P)	6.5
146	(P)	6.9
144	(P)	7.3
142	(P)	7.7
140	(P)	8.1
138	(P)	8.5
136	(P)	8.9
134	(P)	9.3
132	(P)	9.7
130	(P)	10.1
128	(P)	10.5
126	(P)	10.9
124	(P)	11.3
122	(P)	11.7
120	(P)	12.1
118	(P)	12.5
116	(P)	12.9
114	(P)	13.3
112	(P)	13.7
110	(P)	14.1
108	(P)	14.5
106	(P)	14.9
104	(P)	15.3
Upwind Vortex Tangential Velocities		
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)
198	(P)	102
196	(P)	100
194	(P)	98
192	(P)	96
190	(P)	94
188	(P)	92
186	(P)	90
184	(P)	88
182	(P)	86
180	(P)	84
178	(P)	82
176	(P)	80
174	(P)	78
172	(P)	76
170	(P)	74
168	(P)	72
166	(P)	70
164	(P)	68
162	(P)	66
160	(P)	64
158	(P)	62
156	(P)	60
154	(P)	58
152	(P)	56
150	(P)	54
148	(P)	52
146	(P)	50
144	(P)	48
142	(P)	46
140	(P)	44
138	(P)	42
136	(P)	40
134	(P)	38
132	(P)	36
130	(P)	34
128	(P)	32
126	(P)	30
124	(P)	28
122	(P)	26
120	(P)	24
118	(P)	22
116	(P)	20
114	(P)	18
112	(P)	16
110	(P)	14
108	(P)	12
106	(P)	10
104	(P)	104
Upwind Vortex Tangential Velocities		
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)
198	(P)	-84
196	(P)	-86
194	(P)	-88
192	(P)	-90
190	(P)	-92
188	(P)	-94
186	(P)	-96
184	(P)	-98
182	(P)	-100
180	(P)	-102
178	(P)	-104
176	(P)	-106
174	(P)	-108
172	(P)	-110
170	(P)	-112
168	(P)	-114
166	(P)	-116
164	(P)	-118
162	(P)	-120
160	(P)	-122
158	(P)	-124
156	(P)	-126
154	(P)	-128
152	(P)	-130
150	(P)	-132
148	(P)	-134
146	(P)	-136
144	(P)	-138
142	(P)	-140
140	(P)	-142
138	(P)	-144
136	(P)	-146
134	(P)	-148
132	(P)	-150
130	(P)	-152
128	(P)	-154
126	(P)	-156
124	(P)	-158
122	(P)	-160
120	(P)	-162
118	(P)	-164
116	(P)	-166
114	(P)	-168
112	(P)	-170
110	(P)	-172
108	(P)	-174
106	(P)	-176

\* = Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

Flyby (Run) Number: 34	Date: 25 SEP 1990 (Day of Year: 268)	Abeam Time: 13:24:51 (MDT)
Configuration: Landing Glide Slope: -3 deg.	AIRCRAFT DATA	
Flaps: 30 deg. Indicated Air Speed: 132 kts	Gross Weight: 186,500 lbs. Altitude: 280 ft AGL	
Wind Speed: 3.5 kts	Wind Direction: 179 deg.	Air Temperature: 19.2 °C
Maximum Velocity: (M) fpm Descent Rate: (M) fpm	METEOROLOGICAL DATA (200 ft Sensor Level)	Atmospheric Stability: Unstable
Maximum Velocity: (D) fpm Descent Rate: (D) fpm	UPWIND VORTEX CHARACTERISTICS	Estimated Core Radius: (M) ft Tower Penetration Height: (M) ft AGL
Wind Speed: 3.5 kts	DOWNMIND VORTEX CHARACTERISTICS	Estimated Core Radius: (D) ft Tower Penetration Height: (D) ft AGL
Maximum Velocity: (M) fpm Descent Rate: (M) fpm	Age: (M) s Advection Rate: (M) fpm	Upwind Vortex Tangential Velocities
Maximum Velocity: (D) fpm Descent Rate: (D) fpm	Age: (D) s Advection Rate: (D) fpm	Upwind Vortex Tangential Velocities
Configuration: Landing Glide Slope: -3 deg.	Downdownwind Vortex Tangential Velocities	Upwind Vortex Tangential Velocities
Flaps: 30 deg. Indicated Air Speed: 132 kts	Sensor Height (ft)	Sensor Height (ft)
Wind Speed: 3.5 kts	Relative Height (ft)	Relative Height (ft)
Maximum Velocity: (M) fpm Descent Rate: (M) fpm	V <sub>θ</sub> (fpm)	V <sub>θ</sub> (fpm)
Maximum Velocity: (D) fpm Descent Rate: (D) fpm	(M)	(M)
Wind Speed: 3.5 kts	198	198
Configuration: Landing Glide Slope: -3 deg.	196	196
Flaps: 30 deg. Indicated Air Speed: 132 kts	194	194
Wind Speed: 3.5 kts	192	192
Maximum Velocity: (M) fpm Descent Rate: (M) fpm	190	190
Maximum Velocity: (D) fpm Descent Rate: (D) fpm	188	188
Wind Speed: 3.5 kts	186	186
Configuration: Landing Glide Slope: -3 deg.	184	184
Flaps: 30 deg. Indicated Air Speed: 132 kts	182	182
Wind Speed: 3.5 kts	180	180
Maximum Velocity: (M) fpm Descent Rate: (M) fpm	178	178
Maximum Velocity: (D) fpm Descent Rate: (D) fpm	176	176
Wind Speed: 3.5 kts	174	174
Configuration: Landing Glide Slope: -3 deg.	172	172
Flaps: 30 deg. Indicated Air Speed: 132 kts	170	170
Wind Speed: 3.5 kts	168	168
Configuration: Landing Glide Slope: -3 deg.	166	166
Flaps: 30 deg. Indicated Air Speed: 132 kts	164	164
Wind Speed: 3.5 kts	162	162
Configuration: Landing Glide Slope: -3 deg.	160	160
Flaps: 30 deg. Indicated Air Speed: 132 kts	158	158
Wind Speed: 3.5 kts	156	156
Configuration: Landing Glide Slope: -3 deg.	154	154
Flaps: 30 deg. Indicated Air Speed: 132 kts	152	152
Wind Speed: 3.5 kts	150	150
Configuration: Landing Glide Slope: -3 deg.	148	148
Flaps: 30 deg. Indicated Air Speed: 132 kts	146	146
Wind Speed: 3.5 kts	144	144
Configuration: Landing Glide Slope: -3 deg.	142	142
Flaps: 30 deg. Indicated Air Speed: 132 kts	140	140
Wind Speed: 3.5 kts	138	138
Configuration: Landing Glide Slope: -3 deg.	136	136
Flaps: 30 deg. Indicated Air Speed: 132 kts	134	134
Wind Speed: 3.5 kts	132	132
Configuration: Landing Glide Slope: -3 deg.	130	130
Flaps: 30 deg. Indicated Air Speed: 132 kts	128	128
Wind Speed: 3.5 kts	126	126
Configuration: Landing Glide Slope: -3 deg.	124	124
Flaps: 30 deg. Indicated Air Speed: 132 kts	122	122
Wind Speed: 3.5 kts	120	120
Configuration: Landing Glide Slope: -3 deg.	118	118
Flaps: 30 deg. Indicated Air Speed: 132 kts	116	116
Wind Speed: 3.5 kts	114	114
Configuration: Landing Glide Slope: -3 deg.	112	112
Flaps: 30 deg. Indicated Air Speed: 132 kts	110	110
Wind Speed: 3.5 kts	108	108
Configuration: Landing Glide Slope: -3 deg.	106	106
Flaps: 30 deg. Indicated Air Speed: 132 kts	104	104

= Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(P) = Vortex passed over top of tower

(O) = No vortex Flyby flown for remote sensing systems

Flyby (Run) Number: 35		Date: 25 SEP 1990 (Day of Year: 268)		Abeam Time: 13:31:42 (MDT)	
Configuration: Landing Glide Slope: 0 deg.		<b>AIRCRAFT DATA</b>			
Flaps: 30 deg. Indicated Air Speed: 132 kts		Gross Weight: 185,500 lbs. Altitude: 240 ft AGL			
Wind Speed: 10.0 kts		Air Temperature: 22.0 °C		Atmospheric Stability: Unstable	
Maximum Velocity: 140.3 fpm		Wind Direction: 223 deg.		Estimated Core Radius: 0.4 ft	
Descent Rate: 5.2 fpm		Age: 19 s		Estimated Penetration Height: 14.2 ft AGL	
METEOROLOGICAL DATA (200 ft Sensor Level)		Advection Rate: 9.6 fpm		Tower Penetration Height: 12.2 ft AGL	
Maximum Velocity: 181.1 fpm		Age: 25 s		Atmospheric Stability: Unstable	
Descent Rate: 4.7 fpm		Advection Rate: 10.2 fpm		Estimated Core Radius: 0.3 ft	
<b>DOWNWIND VORTEX CHARACTERISTICS</b>					
Sensor Height (ft)		Downwind Vortex Tangential Velocities		Upwind Vortex Tangential Velocities	
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)
198	56	-15.7	102	-40	3.6
196	54	-16.9	100	-42	5.7*
194	52	-17.6	98	-44	6.8
192	50	-17.4	96	-46	4.8
190	48	-20.5	94	-48	3.7*
188	46	-18.1	92	-50	2.7
186	44	-18.8	90	-52	6.1
184	42	-19.0	88	-54	3.5
182	40	-18.0	86	-56	-2.3
180	38	-17.4	84	-58	-1.4
178	36	-18.0	82	-60	5.7
176	34	-19.0	80	-62	5.1
174	32	-24.1	78	-64	5.4
172	30	-24.2	76	-66	4.4
170	28	-22.1*	74	-68	5.6
168	26	-26.1	72	-70	4.2
166	24	-20.8	70	-72	4.7
164	22	-25.0	68	-74	5.0
162	20	-23.4	66	-76	2.5
160	18	-33.9	64	-78	2.0
158	16	-29.0	62	-80	2.7
156	14	-41.9	60	-82	3.7
154	12	-39.8	58	-84	2.5
152	10	-31.7	56	-86	2.8
150	8	-37.1	54	-88	2.8
148	6	-52.5*	52	-90	4.4
146	4	-68.0	50	-92	2.0
144	2	-86.6	48	-94	3.6
142	0	-140.3	46	-96	5.3
140	-2	-52.1	44	-98	3.4
138	-4	-42.2	42	-100	2.2
136	-6	-33.4*	40	-102	3.4
134	-8	-24.5	38	-104	1.3
132	-10	-23.3	36	-106	0.8
130	-12	-20.9	34	-108	-1.4
128	-14	-24.1	32	-110	-0.1
126	-16	-33.5	30	-112	0.6
124	-18	-35.8	28	-114	0.0
122	-20	-27.2*	26	-116	-1.7
120	-22	-18.6	24	-118	0.6
118	-24	-10.9	22	-120	0.8
116	-26	-11.3*	20	-122	-0.4
114	-28	-12.6	18	-124	-0.9
112	-30	-9.3	16	-126	-1.0
110	-32	-7.3*	14	-128	-0.5
108	-34	-5.3	12	-130	-0.8
106	-36	-9.9	10	-132	-0.2
104	-38	-13.0	104	-104	-1.8

\* = Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(N) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

UAL B757-200									
Date: 25 SEP 1990 (Day of Year: 268)									Abeam Time: 13:38:50 (MDT)
AIRCRAFT DATA									
Flaps: 20 deg.									Gross Weight: 184,600 lbs.
Indicated Air Speed: 138 kts									Altitude: 220 ft AGL
METEOROLOGICAL DATA									
(200 ft Sensor Level)									Atmospheric Stability: Unstable
DOWNTWIND VORTEX CHARACTERISTICS									
Wind Speed: 6.1 knts									Estimated Core Radius: 0.4 ft
Maximum Velocity: 112.9 fps									Tower Penetration Height: 28 ft AGL
Descent Rate: 3.0 ips									Estimated Core Radius: 0.2 ft
Wind Direction: 241 deg.									Tower Penetration Height: 38 ft AGL
UPWIND VORTEX CHARACTERISTICS									
Age: 33 s									Estimated Core Radius: 0.2 ft
Advective Rate: 5.2 fps									Tower Penetration Height: 38 ft AGL
Age: 61.5									Estimated Core Radius: 0.4 ft
Advective Rate: 4.0 fps									Tower Penetration Height: 28 ft AGL
Downwind Vortex Tangential Velocities									
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)
198	170	-19.8	102	74	-13.9	198	160	-1.5	102
196	168	-18.3	100	72	-15.0*	196	158	-1.3	100
194	164	-19.4	98	70	-16.0	194	156	-1.0	98
192	162	-17.0	68	66	-6.1	192	154	-1.8	96
188	160	-15.9	94	66	-6.1	190	152	-1.5	94
186	158	-18.8	90	64	-7.5	188	150	-1.6	92
184	156	-23.2	88	62	-18.4	186	148	-2.8	90
182	154	-19.2*	86	60	-15.3	184	146	-4.3	88
180	152	-15.3	84	58	-14.6	182	144	-4.3	86
178	150	-16.3	82	56	-17.0	180	142	-1.0	84
176	148	-16.3	80	54	-15.2	178	140	-0.3	82
174	146	-19.6	78	52	-13.9	176	138	0.8	80
172	144	-19.2	50	50	-15.7	174	136	1.5	78
170	142	-19.1	48	48	-13.7	172	134	2.0	76
168	140	-15.1	74	46	-16.1	170	132	2.1	74
166	138	-15.7	70	44	-16.2	168	130	1.5	72
164	136	-16.9	68	42	-13.5	166	128	2.0	70
162	134	-17.7	66	40	-15.1	164	126	1.2	68
160	132	-19.4	64	38	-14.3	162	124	0.6	66
158	130	-18.1	62	36	-12.9	160	122	-1.0	64
156	128	-17.1	60	34	-12.7	158	120	-0.9	62
154	126	-19.2	58	32	-14.9	156	118	-0.5*	60
152	124	-19.3	56	30	-15.9	154	116	0.0	58
150	122	-18.5	54	28	-13.3	152	114	-2.2	56
148	120	-18.0	52	24	-13.0	150	112	-0.6	54
146	118	-19.4	50	22	-14.3	148	110	-1.5*	52
144	116	-18.5	48	20	-14.3	146	108	-2.4	50
142	114	-20.1	46	18	-17.0	144	106	-1.5	48
140	112	-20.0	44	16	-16.3	142	104	-1.4	46
138	110	-19.2	42	14	-19.4	140	102	-1.2	44
136	108	-18.3	40	12	-18.5	138	100	-2.8	42
134	106	-18.4	38	10	-23.9*	136	98	-1.8	40
132	104	-18.4	36	8	-29.2	134	96	-0.3	38
130	102	-18.4	34	6	-35.6	132	94	-1.7	36
128	100	-18.4	32	4	-39.8	130	92	-1.7	34
126	98	-19.4	30	2	-49.8	128	90	-0.6	32
124	96	-19.2	28	0	112.9	126	88	-0.9	30
122	94	-17.6	26	-2	142.0	124	86	-2.8	28
120	92	-17.0	24	-4	32.0	122	84	-5.7	26
118	90	-17.9	22	-6	27.2	120	82	-0.6	24
116	88	-17.3	20	-8	28.1	118	80	-0.7	22
114	86	-16.8	18	-10	18.8	116	78	-3.8	20
112	84	-15.6	16	-12	11.2	114	76	-1.2	18
110	82	-15.9	14	-14	20.0	112	74	1.0	16
108	80	-17.3	12	-16	11.0	110	72	1.4	14
106	78	-17.8	10	-18	14.7	108	70	0.3	12
104	76	-16.1	-	-	10.6	106	68	3.0	10
					104	104	66	1.6	

= Estimated

(D) = Vortex dissipated upwind of tower

(N) = Missing

(O) = No vortex

(P) = Vortex flown over top of tower

(O) = No vortex (Flyby) flown for remote sensing systems

(P) = Vortex passed over top of tower

Flyby (Run) Number: 37		Date: 26 SEP 1990 (Day of Year: 268)		Abeam Time: 13:45:25 (MDT)	
Configuration: Takeoff Glide Slope: 0 deg.		AIRCRAFT DATA		Gross Weight: 183,900 lbs. Altitude: 270 ft AGL	
Wind Speed: 11.5 kts		Wind Direction: 225 deg.		Atmospheric Stability: Unstable	
Maximum Velocity: 57.0 fps		DOWNWIND VORTEX CHARACTERISTICS (200 ft Sensor Level)		Estimated Core Radius: 3.0 ft Tower Penetration Height: 188 ft AGL	
Descent Rate: 7.5 fps		Age: 11 s Advection Rate: 16.0 fps		Estimated Core Radius: 0.8 ft Tower Penetration Height: 148 ft AGL	
Maximum Velocity: 83.2 fps		UPWIND VORTEX CHARACTERISTICS		Estimated Core Radius: 0.8 ft Tower Penetration Height: 148 ft AGL	
Descent Rate: 7.6 fps		Age: 16 s Advection Rate: 15.6 fps		Upwind Vortex Tangential Velocities	
Downwind Vortex Tangential Velocities					
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
		V <sub>θ</sub> (fps)		V <sub>θ</sub> (fps)	
198	10	-37.9	102	-86	9.8
196	8	-40.5*	100	-90	8.8*
194	6	-43.1	98	-92	9.5
192	4	-52.4	96	-92	9.4
190	2	-56.4	94	-94	10.4
188	0	-57.0	92	-96	10.1
186	-2	39.6	90	-98	10.3
184	-4	35.6*	88	-100	8.9
182	-6	31.6	86	-102	8.84
180	-8	35.9	84	-104	8.9
178	-10	35.1	82	-106	9.1
176	-12	30.6	80	-108	8.9
174	-14	28.9	78	-110	10.6
172	-16	26.6	76	-112	8.8
170	-18	25.6	74	-114	10.2
168	-20	23.1	72	-116	10.6
166	-22	25.6	70	-118	9.9
164	-24	25.4	68	-120	9.8
162	-26	23.2	66	-122	11.0
160	-28	20.3	64	-124	11.3
158	-30	19.1	62	-126	11.8
156	-32	14.9	60	-128	10.3
154	-34	15.1	58	-130	11.9
152	-36	17.4	56	-132	11.4
150	-38	15.3	54	-134	11.6
148	-40	12.8	52	-136	9.9
146	-42	12.1	50	-138	9.9
144	-44	11.3	48	-140	9.9
142	-46	15.6	46	-142	11.3
140	-48	15.6	44	-144	11.0
138	-50	10.1	42	-146	10.8
136	-52	12.1	40	-148	12.2
134	-54	11.2	38	-150	9.0
132	-56	9.8	36	-152	10.7
130	-58	5.8	34	-154	11.3
128	-60	12.4	32	-156	12.1
126	-62	10.7	30	-158	10.8
124	-64	10.6	28	-160	12.3
122	-66	11.2	26	-162	12.2
120	-68	11.4	24	-164	11.8
118	-70	11.3	22	-166	14.8
116	-72	12.2	20	-168	14.1
114	-74	12.7	18	-170	11.6
112	-76	12.5	16	-172	12.5
110	-78	10.4	14	-174	13.1
108	-80	11.6	12	-176	6.2
106	-82	12.4	10	-178	3.1
104	-84	10.2			104

\* = Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex [Flyby flown for remote sensing systems] (P) = Vortex passed over top of tower

Flyby (Run) Number: 38		Date: 25 SEP 1990 (Day of Year: 268)		Abeam Time: 13:51:52 (MDT)	
Configuration: Takeoff		AIRCRAFT DATA			
Glide Slope: 0 deg.		Flaps: 5 deg.		Gross Weight: 183,000 lbs.	
Indicated Air Speed: 152 kts		Altitude: 240 ft AGL			
Wind Speed: 11.5 kts		METEOROLOGICAL DATA		Atmospheric Stability: Unstable	
Maximum Velocity: 78.4 fps		(200 ft Sensor Level)		Wind Direction: 239 deg.	
Descent Rate: 7.5 fps		Air Temperature: 22.1 °C		Air Pressure: 1013 mb	
Maximum Velocity: 78.4 fps		Advection Rate: 13.9 fps		Estimated Core Radius: (P) ft	
Descent Rate: 7.5 fps		Age: 15 s		Tower Penetration Height: 128 ft AGL	
<b>DOWNWIND VORTEX CHARACTERISTICS</b>					
Sensor Height (ft)	Relative Height (ft)	Downwind Vortex Tangential Velocities (P) f/s	Upwind Vortex Tangential Velocities (P) f/s	Sensor Height (ft)	Relative Height (ft)
198	(P)	10.2	70	198	0.4
196	(P)	10.0	68	194	-0.3
194	(P)	9.8	66	192	-2.0
192	(P)	9.6	64	190	-1.9
190	(P)	9.4	62	188	-3.8
188	(P)	9.2	60	186	-3.9
186	(P)	9.0	58	184	-3.9
184	(P)	8.8	56	182	-4.1
182	(P)	8.6	54	180	-4.2
180	(P)	8.4	52	178	-4.6
178	(P)	8.2	50	176	-4.8
176	(P)	8.0	48	174	-5.0
174	(P)	7.8	46	172	-5.2
172	(P)	7.6	44	170	-5.4
170	(P)	7.4	42	168	-5.6
168	(P)	7.2	40	166	-5.8
166	(P)	7.0	38	164	-6.0
164	(P)	6.8	36	162	-6.2
162	(P)	6.6	34	160	-6.4
160	(P)	6.4	32	158	-6.6
158	(P)	6.2	30	156	-6.8
156	(P)	6.0	28	154	-7.0
154	(P)	5.8	26	152	-7.2
152	(P)	5.6	24	150	-7.4
150	(P)	5.4	22	148	-7.6
148	(P)	5.2	20	146	-7.8
146	(P)	5.0	18	144	-8.0
144	(P)	4.8	16	142	-8.2
142	(P)	4.6	14	140	-8.4
140	(P)	4.4	12	138	-8.6
138	(P)	4.2	10	136	-8.8
136	(P)	4.0	8	134	-9.0
134	(P)	3.8	6	132	-9.2
132	(P)	3.6	4	130	-9.4
130	(P)	3.4	2	128	-9.6
128	(P)	3.2	0	126	-9.8
126	(P)	3.0	-2	124	-100
124	(P)	2.8	-4	122	-102
122	(P)	2.6	-6	120	-104
120	(P)	2.4	-8	118	-106
118	(P)	2.2	-10	116	-108
116	(P)	2.0	-12	114	-110
114	(P)	1.8	-14	112	-112
112	(P)	1.6	-16	110	-114
110	(P)	1.4	-18	108	-116
108	(P)	1.2	-20	106	-118
106	(P)	1.0	-22	104	-124
104	(P)	0.8	-24	102	-15.5

= Estimated (D) = Vortex dissipated upwind of tower (M) = Missing (O) = No vortex (Flyby flown for remote sensing systems) (P) = Vortex passed over top of tower

(I) = No vortex (Flyby flown for remote sensing systems) (P) = Vortex passed over top of tower

Flyby / Run Number: 39		Date: 25 SEP 1980 (Day of Year: 268)		Abeam Time: 13:58:39 (MDT)	
AIRCRAFT DATA		METEOROLOGICAL DATA		Atmospheric Stability: Unstable	
Configuration: Takeoff		Indicated Air Speed: 144 kts		Gross Weight: 182,000 lbs.	
.Glide Slope: 0 deg.		Altitude: 280 ft AGL			
Wind Speed: 12.9 kts		Wind Direction: 243 deg.		Air Temperature: 22.0 °C	
Maximum Velocity: 57.1 fps		Age: 20 s		Estimated Core Radius: 0.6 ft	
Descent Rate: 5.3 fps		Advection Rate: 10.0 fps		Tower Penetration Height: 174 ft AGL	
Maximum Velocity: 33.5 fps		Age: 26 s		Estimated Core Radius: 2.5 ft	
Descent Rate: 4.1 fps		Advection Rate: 10.5 fps		Tower Penetration Height: 174 ft AGL	
DOWNWIND VORTEX CHARACTERISTICS					
Downwind Vortex Tangential Velocities		Upwind Vortex Tangential Velocities		Upwind Vortex Tangential Velocities	
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)
198	24	-27.1	102	-7.2	-2.5
196	22	-27.0	100	-7.4	-3.3*
192	18	-25.6	98	-7.6	-2.5
190	16	-31.9	96	-1.9	1.94
188	14	-34.1	94	-2.6	1.92
186	12	-38.4	92	-2.2	1.88
184	10	-47.3	88	-3.1	1.86
182	8	-46.5	86	-4.3	1.84
180	6	-51.2*	84	-3.6	1.82
178	4	-55.9	82	-3.2	1.80
176	2	-56.5*	80	-2.7	1.78
174	0	57.1	78	-9.4	1.76
172	-2	35.1	76	-9.6	1.74
170	-4	26.3	74	-9.8	1.72
168	-6	18.1	72	-10.0	1.70
166	-8	17.1	70	-10.4	1.68
164	-10	13.4	68	-10.6	1.66
162	-12	10.3	66	-10.8	1.64
160	-14	10.2	64	-11.0	1.62
158	-16	9.5	62	-11.2	1.60
156	-18	7.7	60	-11.4	1.58
154	-20	7.1	58	-11.6	1.56
152	-22	9.2	56	-11.8	1.54
150	-24	4.0	54	-12.0	0.9
148	-26	4.4	52	-12.2	0.7
146	-28	3.6	50	-12.4	0.3
144	-30	2.6	48	-12.6	-1.4
142	-32	3.4	46	-12.8	-1.4
140	-34	1.4	44	-13.0	-1.0
138	-36	2.1	42	-13.2	-0.9
136	-38	1.3	40	-13.4	-1.5
134	-40	3.1	38	-13.6	-1.2
132	-42	1.5	36	-13.8	-2.4
130	-44	1.0	34	-14.0	-2.4
128	-46	0.9	32	-14.2	-2.1
126	-48	0.9	30	-14.4	-2.5
124	-50	0.9	28	-14.6	-3.5
122	-52	0.9	26	-14.8	-3.1
120	-54	1.6	24	-15.0	-3.5
118	-56	0.7	22	-15.2	-2.5
116	-58	1.2	20	-15.4	-1.3
114	-60	2.2	18	-15.6	-0.9
112	-62	0.8	16	-15.8	-2.1
110	-64	0.0	14	-16.0	-1.3
108	-66	-1.3	12	-16.2	-1.1
106	-68	-2.5	10	-16.4	-1.9
104	-70	-2.0			

\* = Estimated

(D) = Vortex dissipated upwind of tower (M) = Missing

(O) = No vortex (Flyby flown for remote sensing systems) (P) = Vortex passed over top of tower

FlyBy (Run) Number: 40		Date: 25 SEP 1990 (Day of Year: 268)	Absent Time: 14:04:42 (MDT)
<b>AIRCRAFT DATA</b>			
Configuration: Holding	Glide Slope: 0 deg.	Flaps: 0 deg.	Indicated Air Speed: 206 kts
Descent Rate: 1.7 fps	Maximum Velocity: 110.8 fps	Gross Weight: 181,300 lbs	Altitude: 230 ft AGL
<b>METEOROLOGICAL DATA</b> (200 ft Sensor Level)			
Wind Speed: 10.4 kts	Wind Direction: 243 deg.	Air Temperature: 21.9 °C	Atmospheric Stability: Unstable
Descent Rate: 4.1 fps	Age: 20 s	Advection Rate: 10.9 fps	Estimated Core Radius: 0.6 ft
Descent Rate: 4.1 fps	Age: 24 s	Advection Rate: 12.1 fps	Tower Penetration Height: 196 ft AGL
<b>DOWNDOWN VORTEX CHARACTERISTICS</b>			
Maximum Velocity: 93.9 fps	Wind Direction: 243 deg.	Air Temperature: 21.9 °C	Atmospheric Stability: Unstable
Descent Rate: 4.1 fps	Age: 20 s	Advection Rate: 10.9 fps	Tower Penetration Height: 132 ft AGL
<b>UPWIND VORTEX CHARACTERISTICS</b>			
Maximum Velocity: 93.9 fps	Wind Direction: 243 deg.	Air Temperature: 21.9 °C	Atmospheric Stability: Unstable
Descent Rate: 4.1 fps	Age: 24 s	Advection Rate: 12.1 fps	Tower Penetration Height: 132 ft AGL
<b>Downwind Vortex Tangential Velocities</b>			
Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)
			Relative Height (ft)
198	2	-59.7	102
196	0	110.8	-94
194	-2	70.1	-96
192	-4	47.1	-98
190	-6	32.1	-100
188	-8	27.0	-102
186	-10	22.5	-104
184	-12	21.5	-106
182	-14	15.9	-108
180	-16	14.9	-110
178	-18	14.5	-112
176	-20	14.5	-114
174	-22	15.1	-116
172	-24	10.6	-118
170	-26	11.6	-120
168	-28	5.9	-122
166	-30	6.8	-124
164	-32	7.7	-126
162	-34	8.9	-128
160	-36	7.0	-130
158	-38	7.5	-132
156	-40	4.0	-134
154	-42	3.4	-136
152	-44	2.8	-138
150	-46	4.0	-140
148	-48	4.8	-142
146	-50	6.4	-144
144	-52	6.4	-146
142	-54	4.4	-148
140	-56	3.7	-150
138	-58	4.3	-152
136	-60	4.7	-154
134	-62	4.5	-156
132	-64	2.9	-158
130	-66	5.1	-160
128	-68	5.8	-162
126	-70	2.2	-164
124	-72	3.1	-166
122	-74	-0.1	-168
120	-76	1.4	-170
118	-78	1.8	-172
116	-80	0.3	-174
114	-82	1.6	-176
112	-84	5.0	-178
110	-86	0.8	-180
108	-88	0.3	-182
106	-90	-0.1	-184
104	-92	0.1	-186

(P) = Vortex passed over top of tower

(M) = Missing

(D) = Vortex dissipated upwind of tower

UAL 8757-200									Date: 25 SEP 1990 [Day of Year: 268]	Abeam Time: 14:10:20 (MDT)
AIRCRAFT DATA									Flaps: 0 deg.	Gross Weight: 180,500lbs.
Indicated Air Speed: 250 kts									Altitude: 240 ft AGL	Altitude: 240 ft AGL
Wind Speed: 6.4 kts									Wind Direction: 220 deg.	Atmospheric Stability: Unstable
Maximum Velocity: 55.4 fps									Air Temperature: 21.9 °C	Estimated Core Radius: (D) ft
Descent Rate: 2.9 fps									Advection Rate: 4.7 fps	Tower Penetration Height: 90 ft AGL
Maximum Velocity: (D) fps									Age: (D) s	Estimated Core Radius: (D) ft
Descent Rate: (D) fps									Advection Rate: (D) fps	Tower Penetration Height: (D) ft AGL
Downwind Vortex Tangential Velocities									Upwind Vortex Tangential Velocities	
Sensor Height [ft]	Relative Height [ft]	Downwind Vortex Tangential Velocities V <sub>θ</sub> (fps)	Sensor Height [ft]	Relative Height [ft]	Upwind Vortex Tangential Velocities V <sub>θ</sub> (fps)	Sensor Height [ft]	Relative Height [ft]	Upwind Vortex Tangential Velocities V <sub>θ</sub> (fps)	Sensor Height [ft]	Relative Height [ft]
198	108	-11.3	102	12	-16.9	198	196	(D)	(D)	102
196	106	-8.4	100	10	-20.4*	194	194	(D)	(D)	100
194	104	-8.7	98	8	-24.2	192	192	(D)	(D)	98
192	102	-10.9	96	6	-21.8	190	190	(D)	(D)	96
190	100	-8.1	94	4	-26.3	188	188	(D)	(D)	94
188	98	-6.0	92	2	-40.9*	186	186	(D)	(D)	92
186	96	-8.9	90	0	55.4	184	184	(D)	(D)	90
184	94	-10.5	88	-2	24.9	182	182	(D)	(D)	88
182	92	-11.8	86	-4	14.9	180	180	(D)	(D)	86
180	90	-9.8	84	-6	4.9	178	178	(D)	(D)	84
178	88	-10.2	82	-8	2.7	176	176	(D)	(D)	82
176	86	-8.5	80	-10	1.5	174	174	(D)	(D)	80
174	84	-4.7	78	-12	0.9	172	172	(D)	(D)	78
172	82	-5.5	76	-14	1.3	170	170	(D)	(D)	76
170	80	-6.0	74	-16	1.7*	168	168	(D)	(D)	74
168	78	-6.4	72	-18	2.0	166	166	(D)	(D)	72
166	76	-8.0	70	-20	3.2	164	164	(D)	(D)	70
164	74	-15.4	68	-22	4.8	162	162	(D)	(D)	68
162	72	-14.3*	66	-24	6.5	160	160	(D)	(D)	66
160	70	-13.2	64	-26	6.9	158	158	(D)	(D)	64
158	68	-0.3	62	-28	5.9	156	156	(D)	(D)	62
156	66	-9.8	60	-30	3.7	154	154	(D)	(D)	60
154	64	-9.6	58	-32	9.1	152	152	(D)	(D)	58
152	62	-8.7	56	-34	6.1	150	150	(D)	(D)	56
150	60	-11.5	54	-36	6.3	148	148	(D)	(D)	54
148	58	-0.5	52	-38	5.6	146	146	(D)	(D)	52
146	56	-1.8	50	-40	5.6	144	144	(D)	(D)	50
144	54	-12.1	48	-42	6.5	142	142	(D)	(D)	48
142	52	-11.7	46	-44	6.5	140	140	(D)	(D)	46
140	50	-10.3	44	-46	4.4	138	138	(D)	(D)	44
138	48	-10.0	42	-48	5.3	136	136	(D)	(D)	42
136	46	-11.3	40	-50	6.6	134	134	(D)	(D)	40
134	44	-0.9	38	-52	4.3	132	132	(D)	(D)	38
132	42	-5.1	36	-54	4.3	130	130	(D)	(D)	36
130	40	-10.3	34	-56	5.4	128	128	(D)	(D)	34
128	38	-14.1	32	-58	6.1	126	126	(D)	(D)	32
126	36	-12.4	30	-60	3.8	124	124	(D)	(D)	30
124	34	-9.8	28	-62	4.4	122	122	(D)	(D)	28
122	32	-9.3	26	-64	2.7	120	120	(D)	(D)	26
120	30	-11.3	24	-66	2.2	118	118	(D)	(D)	24
118	28	-7.7	22	-68	3.0	116	116	(D)	(D)	22
116	26	-7.9	20	-70	4.6	114	114	(D)	(D)	20
114	24	-9.8	18	-72	5.9	112	112	(D)	(D)	18
112	22	-9.6	16	-74	7.8	110	110	(D)	(D)	16
110	20	-7.3	14	-76	9.0	108	108	(D)	(D)	14
108	18	-8.8	12	-78	6.0	106	106	(D)	(D)	12
106	16	-8.5	10	-80	5.3	104	104	(D)	(D)	10
104	14	-6.8								

\* = Estimated (D) = Vortex dissipated upwind of tower (M) = Missing (N) = No vortex (Flyby flown for remote sensing systems) (P) = Vortex passed over top of tower

AIRCRAFT DATA									
METEOROLOGICAL DATA (200 ft Sensor Level)					Atmospheric Stability: Stable				
DOWNWIND VORTEX CHARACTERISTICS Age: 32 s Advection Rate: 3.7 fps					Estimated Core Radius: 0.8 ft Tower Penetration Height: 84 ft AGL				
UPWIND VORTEX CHARACTERISTICS Age: 71 s Advection Rate: 2.7 fps					Estimated Core Radius: 0.3 ft Tower Penetration Height: 60 ft AGL				
Wind Speed: 4.1 kts	Wind Direction: 45 deg.	Air Temperature: 11.2 °C		Upwind Vortex Tangential Velocities		Upwind Vortex Tangential Velocities		Upwind Vortex Tangential Velocities	
Maximum Velocity: 92.8 fps	Indicated Air Speed: 143 kts	Age: 32 s		Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
Descent Rate: 4.9 fps	Flaps: 20 deg.	Advection Rate: 3.7 fps		V <sub>g</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>g</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>g</sub> (fps)	V <sub>θ</sub> (fps)
Maximum Velocity: 129.7 fps	Glide Slope: 0 deg.	Age: 71 s		102	18	198	138	102	42
Descent Rate: 2.5 fps	Configuration: Takeoff	Advection Rate: 2.7 fps		100	16	196	136	100	40
Wind Speed: 4.1 kts	Configuration: Takeoff	Age: 71 s		100	14	252*	134	98	38
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		98	12	194	132	96	36
Descent Rate: 4.9 fps	Configuration: Takeoff	Age: 32 s		96	10	39.3	130	94	34
Wind Speed: 4.1 kts	Configuration: Takeoff	Advection Rate: 3.7 fps		94	8	38.7	128	92	32
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Age: 32 s		94	6	42.3	126	90	30
Descent Rate: 4.9 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		92	4	47.0*	124	88	28
Wind Speed: 4.1 kts	Configuration: Takeoff	Age: 71 s		90	2	51.8	122	86	26
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		90	0	72.3*	120	84	24
Descent Rate: 4.9 fps	Configuration: Takeoff	Age: 32 s		88	-2	92.8	118	82	22
Wind Speed: 4.1 kts	Configuration: Takeoff	Advection Rate: 3.7 fps		86	-4	53.7	116	80	20
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Age: 32 s		84	-2	43.7	114	78	18
Descent Rate: 4.9 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		82	-4	31.5	112	76	16
Wind Speed: 4.1 kts	Configuration: Takeoff	Age: 71 s		80	-6	31.4	110	74	14
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		78	-8	22.9	108	72	12
Descent Rate: 4.9 fps	Configuration: Takeoff	Age: 32 s		76	-10	18.7	106	70	10
Wind Speed: 4.1 kts	Configuration: Takeoff	Advection Rate: 3.7 fps		74	-12	22.6	104	68	8
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Age: 32 s		72	-14	18.5	102	66	6
Descent Rate: 4.9 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		70	-16	16.5	100	64	4
Wind Speed: 4.1 kts	Configuration: Takeoff	Age: 71 s		68	-18	17.7	98	62	2
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		66	-16	17.9	96	60	0
Descent Rate: 4.9 fps	Configuration: Takeoff	Age: 32 s		64	-20	14.0	94	58	-16.8
Wind Speed: 4.1 kts	Configuration: Takeoff	Advection Rate: 3.7 fps		62	-22	12.6	92	56	-19.6*
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Age: 32 s		60	-24	12.9	90	54	-22.4
Descent Rate: 4.9 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		58	-26	12.9	88	52	-31.6
Wind Speed: 4.1 kts	Configuration: Takeoff	Age: 71 s		56	-28	12.9	86	50	-50.4
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		54	-30	12.9	84	48	-129.7
Descent Rate: 4.9 fps	Configuration: Takeoff	Age: 32 s		52	-32	12.9	82	46	-129.3
Wind Speed: 4.1 kts	Configuration: Takeoff	Advection Rate: 3.7 fps		50	-34	12.9	80	44	-55.1*
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Age: 32 s		48	-36	12.8	78	42	-18
Descent Rate: 4.9 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		46	-38	12.8	76	40	-40.9
Wind Speed: 4.1 kts	Configuration: Takeoff	Age: 71 s		44	-40	12.7	74	38	-20
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		42	-42	12.7	72	36	-14.3
Descent Rate: 4.9 fps	Configuration: Takeoff	Age: 32 s		40	-44	12.7	70	34	-33.6
Wind Speed: 4.1 kts	Configuration: Takeoff	Advection Rate: 3.7 fps		38	-46	12.6	68	32	-51.5*
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Age: 32 s		36	-48	12.6	66	30	-19.6*
Descent Rate: 4.9 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		34	-50	12.5	64	28	-23.6
Wind Speed: 4.1 kts	Configuration: Takeoff	Age: 71 s		32	-52	12.5	62	26	-32.6
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		30	-54	12.5	60	24	-24
Descent Rate: 4.9 fps	Configuration: Takeoff	Age: 32 s		28	-56	12.4	58	22	-12
Wind Speed: 4.1 kts	Configuration: Takeoff	Advection Rate: 3.7 fps		26	-58	12.4	56	20	-31.7
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Age: 32 s		24	-60	12.3	54	18	-16.8
Descent Rate: 4.9 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		22	-62	12.3	52	16	-25.1*
Wind Speed: 4.1 kts	Configuration: Takeoff	Age: 71 s		20	-64	12.2	50	14	-55.1*
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		18	-66	12.2	48	12	-23.6
Descent Rate: 4.9 fps	Configuration: Takeoff	Age: 32 s		16	-68	12.1	46	10	-14.3
Wind Speed: 4.1 kts	Configuration: Takeoff	Advection Rate: 3.7 fps		14	-70	12.1	44	8	-33.6
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Age: 32 s		12	-72	12.0	42	6	-50.4
Descent Rate: 4.9 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		10	-74	11.9	40	4	-129.3
Wind Speed: 4.1 kts	Configuration: Takeoff	Age: 71 s		8	-76	11.8	38	2	-55.1*
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		6	-78	11.7	36	0	-18
Descent Rate: 4.9 fps	Configuration: Takeoff	Age: 32 s		4	-80	11.6	34	-2.6	-12
Wind Speed: 4.1 kts	Configuration: Takeoff	Advection Rate: 3.7 fps		2	-82	11.5	32	-2.8	-28
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Age: 32 s		0	-84	11.4	30	-1.6	-13.6*
Descent Rate: 4.9 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		-2	-86	11.3	28	-1.4	-16.8
Wind Speed: 4.1 kts	Configuration: Takeoff	Age: 71 s		-4	-88	11.2	26	-1.2	-23.6
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		-6	-90	11.1	24	-1.0	-32.6
Descent Rate: 4.9 fps	Configuration: Takeoff	Age: 32 s		-8	-92	11.0	22	-0.8	-40.9
Wind Speed: 4.1 kts	Configuration: Takeoff	Advection Rate: 3.7 fps		-10	-94	10.9	20	-0.6	-49.9
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Age: 32 s		-12	-96	10.8	18	-0.4	-58.0*
Descent Rate: 4.9 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		-14	-98	10.7	16	-0.2	-66.7
Wind Speed: 4.1 kts	Configuration: Takeoff	Age: 71 s		-16	-100	10.6	14	0.0	-75.1*
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		-18	-102	10.5	12	-1.2	-84.0
Descent Rate: 4.9 fps	Configuration: Takeoff	Age: 32 s		-20	-104	10.4	10	-1.4	-93.0
Wind Speed: 4.1 kts	Configuration: Takeoff	Advection Rate: 3.7 fps		-22	-106	10.3	8	-1.6	-102.0
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Age: 32 s		-24	-108	10.2	6	-1.8	-111.0
Descent Rate: 4.9 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		-26	-110	10.1	4	-2.0	-120.0
Wind Speed: 4.1 kts	Configuration: Takeoff	Age: 71 s		-28	-112	10.0	2	-2.2	-129.0
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		-30	-114	9.9	0	-2.4	-138.0
Descent Rate: 4.9 fps	Configuration: Takeoff	Age: 32 s		-32	-116	9.8	-2	-2.6	-147.0
Wind Speed: 4.1 kts	Configuration: Takeoff	Advection Rate: 3.7 fps		-34	-118	9.7	-4	-2.8	-156.0
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Age: 32 s		-36	-120	9.6	-6	-3.0	-165.0
Descent Rate: 4.9 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		-38	-122	9.5	-8	-3.2	-174.0
Wind Speed: 4.1 kts	Configuration: Takeoff	Age: 71 s		-40	-124	9.4	-10	-3.4	-183.0
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		-42	-126	9.3	-12	-3.6	-192.0
Descent Rate: 4.9 fps	Configuration: Takeoff	Age: 32 s		-44	-128	9.2	-14	-3.8	-201.0
Wind Speed: 4.1 kts	Configuration: Takeoff	Advection Rate: 3.7 fps		-46	-130	9.1	-16	-4.0	-210.0
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Age: 32 s		-48	-132	9.0	-18	-4.2	-219.0
Descent Rate: 4.9 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		-50	-134	8.9	-20	-4.4	-228.0
Wind Speed: 4.1 kts	Configuration: Takeoff	Age: 71 s		-52	-136	8.8	-22	-4.6	-237.0
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		-54	-138	8.7	-24	-4.8	-246.0
Descent Rate: 4.9 fps	Configuration: Takeoff	Age: 32 s		-56	-140	8.6	-26	-5.0	-255.0
Wind Speed: 4.1 kts	Configuration: Takeoff	Advection Rate: 3.7 fps		-58	-142	8.5	-28	-5.2	-264.0
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Age: 32 s		-60	-144	8.4	-30	-5.4	-273.0
Descent Rate: 4.9 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		-62	-146	8.3	-32	-5.6	-282.0
Wind Speed: 4.1 kts	Configuration: Takeoff	Age: 71 s		-64	-148	8.2	-34	-5.8	-291.0
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		-66	-150	8.1	-36	-6.0	-300.0
Descent Rate: 4.9 fps	Configuration: Takeoff	Age: 32 s		-68	-152	8.0	-38	-6.2	-309.0
Wind Speed: 4.1 kts	Configuration: Takeoff	Advection Rate: 3.7 fps		-70	-154	7.9	-40	-6.4	-318.0
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Age: 32 s		-72	-156	7.8	-42	-6.6	-327.0
Descent Rate: 4.9 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		-74	-158	7.7	-44	-6.8	-336.0
Wind Speed: 4.1 kts	Configuration: Takeoff	Age: 71 s		-76	-160	7.6	-46	-7.0	-345.0
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		-78	-162	7.5	-48	-7.2	-354.0
Descent Rate: 4.9 fps	Configuration: Takeoff	Age: 32 s		-80	-164	7.4	-50	-7.4	-363.0
Wind Speed: 4.1 kts	Configuration: Takeoff	Advection Rate: 3.7 fps		-82	-166	7.3	-52	-7.6	-372.0
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Age: 32 s		-84	-168	7.2	-54	-7.8	-381.0
Descent Rate: 4.9 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		-86	-170	7.1	-56	-8.0	-390.0
Wind Speed: 4.1 kts	Configuration: Takeoff	Age: 71 s		-88	-172	7.0	-58	-8.2	-409.0
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		-90	-174	6.9	-60	-8.4	-418.0
Descent Rate: 4.9 fps	Configuration: Takeoff	Age: 32 s		-92	-176	6.8	-62	-8.6	-427.0
Wind Speed: 4.1 kts	Configuration: Takeoff	Advection Rate: 3.7 fps		-94	-178	6.7	-64	-8.8	-436.0
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Age: 32 s		-96	-180	6.6	-66	-9.0	-445.0
Descent Rate: 4.9 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		-98	-182	6.5	-68	-9.2	-454.0
Wind Speed: 4.1 kts	Configuration: Takeoff	Age: 71 s		-100	-184	6.4	-70	-9.4	-463.0
Maximum Velocity: 92.8 fps	Configuration: Takeoff	Advection Rate: 3.7 fps		-102	-186	6.3	-72	-9.6	-472.0
Descent Rate: 4.9 fps	Configuration: Takeoff	Age: 32 s		-104	-188				

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ENVIRONMENTAL MONITORING FOR REMOTE SENSING SYSTEMS

(P) = Vortex passed over top of tower

Flyby (Run) Number: 43	UAL B757-200					
Configuration: Takeoff	Date: 26 SEP 1990 [Day of Year: 269]					
Glide Slope: 0 deg.	AIRCRAFT DATA					
Wind Speed: 6.0 kts	Flaps: 15 deg.	Indicated Air Speed: 150 kts	Gross Weight: 198,700lbs. Altitude: 250 ft AGL			
Maximum Velocity: 81.1 fps	METEOROLOGICAL DATA					
Descent Rate: 5.0 fps	(200 ft Sensor Level)					
Maximum Velocity: 30.2 fps	Estimated Core Radius: 1.0 ft					
Descent Rate: 2.3 fps	Tower Penetration Height: 80 ft AGL					
Atmospheric Stability: Stable						
Wind Direction: 66 deg.						
Air Temperature: 11.3 °C						
Age: 34 s						
Advection Rate: 3.8 fps						
DOWNWIND VORTEX CHARACTERISTICS						
Age: 84 s						
Advection Rate: 2.4 fps						
UPWIND VORTEX CHARACTERISTICS						
Age: 84 s						
Advection Rate: 2.4 fps						
Downwind Vortex Tangential Velocities						
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)			
		V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)			
198	118	14.0	22			
196	116	14.3	20.0			
194	114	14.5*	21.6*			
192	112	14.0*	23.1			
190	110	13.5	16			
188	108	8.5	94			
186	106	12.6	90			
184	104	12.5	88			
182	102	11.8	86			
180	100	10.8	84			
178	98	12.9	82			
176	96	14.2	80			
174	94	12.9	78			
172	92	12.7	76			
170	90	15.7*	74			
168	88	8.6	72			
166	86	13.1	70			
164	84	13.4	68			
162	82	13.6	66			
160	80	13.6	64			
158	78	13.0	62			
156	76	14.2	60			
154	74	12.8	58			
152	72	16.6	56			
150	70	12.0	54			
148	68	12.3	52			
146	66	14.4	50			
144	64	11.1	48			
142	62	11.8	46			
140	60	10.0	44			
138	58	11.7	42			
136	56	10.8	40			
134	54	10.9	38			
132	52	9.3	36			
130	50	9.3	34			
128	48	10.7	32			
126	46	6.2	30			
124	44	9.2	28			
122	42	13.0	26			
120	40	9.1	24			
118	38	14.1	22			
116	36	13.0	20			
114	34	15.7	18			
112	32	15.0	16			
110	30	10.3	14			
108	28	14.2	12			
106	26	16.3	10			
104	24	19.9	-70			
Upwind Vortex Tangential Velocities						
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)			
		V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)			
198	118	20.0	198			
196	116	22	196			
194	114	20	194			
192	112	23.1	192			
190	110	16	28.8			
188	108	12	26.6			
186	106	10	39.4			
184	104	8	47.7			
182	102	6	43.5			
180	100	4	50.6*			
178	98	2	57.6			
176	96	0	-81.1			
174	94	-2	-43.4			
172	92	-4	-39.1			
170	90	-6	-33.9			
168	88	-8	-30.2			
166	86	-10	-28.2			
164	84	-12	-24.2			
162	82	-14	-25.1			
160	80	-16	-22.6*			
158	78	-18	-20.9			
156	76	-20	-21.7			
154	74	-22	-18.3			
152	72	-24	-11.2			
150	70	-26	-9.5			
148	68	-28	-9.8			
146	66	-30	-6.6			
144	64	-32	-9.8			
142	62	-34	-9.9			
140	60	-36	-9.4			
138	58	-44	-3.6			
136	56	-58	-3.8			
134	54	-40	-4.2			
132	52	-44	-4.4			
130	50	-36	-4.6			
128	48	-46	-5.9			
126	46	-36	-4.8			
124	44	-50	-5.3			
122	42	-52	-6.7			
120	40	-54	-7.2			
118	38	-56	-7.7			
116	36	-58	-8.2			
114	34	-60	-4.6			
112	32	-62	-4.7			
110	30	-64	-4.9			
108	28	-66	-4.7			
106	26	-68	-5.3			
104	24	-70	-4.5			
(D) = Vortex dissipated upwind of tower						
(M) = Missing						
(I) = No vortex (Flyby flown for remote sensing systems)						
(P) = Vortex passed over top of tower						

\* = Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(I) = No vortex (Flyby passed over top of tower)

Flyby (Run) Number: 44		Abeam Time: 7:17:51 (MDT)	
Date: 26 SEP 1990 (Day of Year: 269)			
<b>AIRCRAFT DATA</b>			
Configuration: Takeoff		Gross Weight: 197,900 lbs.	
Glide Slope: 0 deg.		Altitude: 260 ft AGL	
Indicated Air Speed: 157 kts			
<b>METEOROLOGICAL DATA</b>			
(200 ft Sensor Level)			
Wind Speed: 2.0 kts		Wind Direction: 106 deg.	
Maximum Velocity: (D) fps		Air Temperature: 10.9 °C	
Descent Rate: (D) fps			
<b>DOWNWIND VORTEX CHARACTERISTICS</b>			
Age: (D) s		Estimated Core Radius: (D) ft	
Advection Rate: (D) fps		Tower Penetration Height: (D) ft AGL	
<b>UPWIND VORTEX CHARACTERISTICS</b>			
Age: (D) s		Estimated Core Radius: (D) ft	
Descent Rate: (D) fps		Tower Penetration Height: (D) ft AGL	
<b>Downwind Vortex Tangential Velocities</b>			
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
198	(D)	102	(D)
196	(D)	100	(D)
194	(D)	98	(D)
192	(D)	96	(D)
190	(D)	94	(D)
188	(D)	92	(D)
186	(D)	90	(D)
184	(D)	88	(D)
182	(D)	86	(D)
180	(D)	84	(D)
178	(D)	82	(D)
176	(D)	80	(D)
174	(D)	78	(D)
172	(D)	76	(D)
170	(D)	74	(D)
168	(D)	72	(D)
166	(D)	70	(D)
164	(D)	68	(D)
162	(D)	66	(D)
160	(D)	64	(D)
158	(D)	62	(D)
156	(D)	60	(D)
154	(D)	58	(D)
152	(D)	56	(D)
150	(D)	54	(D)
148	(D)	52	(D)
146	(D)	50	(D)
144	(D)	48	(D)
142	(D)	46	(D)
140	(D)	44	(D)
138	(D)	42	(D)
136	(D)	40	(D)
134	(D)	38	(D)
132	(D)	36	(D)
130	(D)	34	(D)
128	(D)	32	(D)
126	(D)	30	(D)
124	(D)	28	(D)
122	(D)	26	(D)
120	(D)	24	(D)
118	(D)	22	(D)
116	(D)	20	(D)
114	(D)	18	(D)
112	(D)	16	(D)
110	(D)	14	(D)
108	(D)	12	(D)
106	(D)	10	(D)
104	(D)	8	(D)

(P) = Vortex passed over top of tower

(O) = No vortex (Flyby flown for remote sensing systems)

(M) = Missing

(D) = Estimated

Flyby (Run) Number: 45	Date: 26 SEP 1990 (Day of Year: 269)	Abeam Time: 7:49:16 (MDT)					
<b>AIRCRAFT DATA</b>							
Configuration: Takeoff	Flaps: 20 deg.	Gross Weight: 194,000 lbs.					
Glide Slope: 0 deg.	Indicated Air Speed: 142 kts	Altitude: 2600 ft AGL					
Wind Speed: 5.5 kts	Wind Direction: 74 deg.	Atmospheric Stability: Stable					
Maximum Velocity: (D) fps	Age: 44 s	Estimated Core Radius: (D) ft					
Descent Rate: 4.8 fps	Advection Rate: 3.2 fps	Tower Penetration Height: 48 ft AGL					
Maximum Velocity: (D) fps	<b>METEOROLOGICAL DATA</b>						
Descent Rate: (D) fps	(200 ft Sensor Level)						
Wind Speed: 5.5 kts	Wind Direction: 74 deg.						
Maximum Velocity: (D) fps	Age: (D) s	Estimated Core Radius: (D) ft					
Descent Rate: (D) fps	Advection Rate: (D) fps	Tower Penetration Height: (D) ft AGL					
<b>DOWNWIND VORTEX CHARACTERISTICS</b>							
Downwind Vortex Tangential Velocities	Upwind Vortex Tangential Velocities						
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
		V <sub>θ</sub> (fps)		V <sub>θ</sub> (fps)		V <sub>θ</sub> (fps)	
198	150	13.4	102	54	12.1	198	102
196	148	13.3	98	52	10.4*	198	102
192	144	12.9	96	48	8.6	194	98
190	142	12.8	94	46	10.1	192	96
188	140	9.8	92	44	13.4	190	94
186	138	15.8	90	42	18.4	188	92
184	136	13.3	88	40	19.6	186	90
182	134	12.7	86	38	12.0	184	88
180	132	11.2	84	36	11.9	182	86
178	130	11.3	82	34	10.4	178	84
176	128	11.3	80	32	11.3	176	82
174	126	11.9	78	30	13.3	174	80
172	124	12.9	76	28	20.5	172	78
170	122	6.7	74	26	17.7	170	76
168	120	8.3	72	24	18.7	168	74
166	118	9.9	70	22	24.0	166	72
164	116	9.8	68	20	20.1	164	70
162	114	9.4	66	18	19.2	162	68
160	112	9.8	64	16	16.0	160	66
158	110	10.6	62	14	15.3	158	64
156	108	9.4	60	12	15.2	156	62
154	106	9.6	58	10	17.2	154	60
152	104	11.5	56	8	9.0	152	58
150	102	8.9	54	6	8.7	150	56
148	100	8.3	52	4	17.5	148	54
146	98	10.0	50	2	14.6	146	52
144	96	7.6	48	0	21.6	144	50
142	94	7.1	46	-2	-17.2	142	48
140	92	8.5	44	-4	4.0	140	46
138	90	9.6	42	-6	-25.2	138	44
136	88	9.1	40	-8	-20.7	136	42
134	86	7.4	38	-10	-16.2	134	40
132	84	8.3	36	-12	-15.4	132	38
130	82	5.4	34	-14	-13.9	130	36
128	80	6.6	32	-16	-16.6	128	34
126	78	2.7	30	-18	-12.5	126	32
124	76	4.9	28	-20	-9.8	124	30
122	74	5.9	26	-22	-10.2	122	28
120	72	4.9	24	-24	-5.4	120	26
118	70	4.9	22	-26	-7.7	118	24
116	68	5.9	20	-28	-6.3	116	22
114	66	5.7	18	-30	-8.0	114	20
112	64	5.0	16	-32	-7.9	112	18
110	62	4.9	14	-34	-6.9	110	16
108	60	8.7	12	-36	-9.2	108	14
106	58	11.2	10	-38	-9.5	106	12
104	56	12.9	04	-40	-10.4	104	10

\* = Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

Flyby (Run) Number: 46		Date: 26 SEP 1990 (Day of Year: 269)		Abeam Time: 7:55:31 (MDT)					
AIRCRAFT DATA		Gross Weight: 193,000 lbs.		Altitude: 230 ft AGL					
Configuration: Takeoff		Flaps: 15 deg.		Indicated Air Speed: 148 kts					
Glide Slope: 0 deg.		Tower Penetration Height: 84 ft AGL		Atmospheric Stability: Stable					
Wind Speed: 5.3 kts		Wind Direction: 73 deg.		Estimated Core Radius: 0.8 ft					
Maximum Velocity: 71.6 fps		Age: 35 s		Tower Penetration Height: 84 ft AGL					
Descent Rate: 5.9 fps		Advection Rate: 3.6 fps		Atmospheric Stability: Stable					
Maximum Velocity: (D) fps		Age: (D) s		Estimated Core Radius: (D) ft					
Descent Rate: (D) fps		Advection Rate: (D) fps		Tower Penetration Height: (D) ft AGL					
<b>METEOROLOGICAL DATA</b> (200 ft Sensor Level)									
DOWNWIND VORTEX CHARACTERISTICS									
Wind Direction: 73 deg.		Air Temperature: 10.7 °C		Sensor Height (ft)					
Age: 35 s		Relative Height (ft)		Relative Height (ft)					
Advection Rate: 3.6 fps		V <sub>θ</sub> (fps)		V <sub>θ</sub> (fps)					
UPWIND VORTEX CHARACTERISTICS		Sensor Height (ft)		Sensor Height (ft)					
Age: (D) s		(D)		(D)					
Advection Rate: (D) fps		(D)		(D)					
<b>Downwind Vortex Tangential Velocities</b>									
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)				
198	114	14.4	102	18	25.5				
196	112	15.0	100	16	22.8*				
194	110	14.6	98	14	19.9				
192	108	15.5*	96	12	37.3				
190	106	16.4	94	10	31.5				
188	104	11.1	92	8	33.7				
186	102	16.8	90	6	42.3				
184	100	14.4	88	4	48.8				
182	98	15.0	86	2	60.1*				
180	96	12.1	84	0	71.6				
178	94	14.6	82	-2	43.9				
176	92	13.3	80	-4	32.1				
174	90	15.8	78	-6	25.0				
172	88	13.1	76	-8	19.1				
170	86	7.9	74	-10	17.2				
168	84	12.0	72	-12	23.4				
166	82	15.0	70	-14	18.8				
164	80	13.1	68	-16	16.0				
162	78	13.7	66	-18	16.8				
160	76	13.7	64	-20	13.8				
158	74	12.4	62	-22	10.7				
156	72	11.9	60	-24	12.5				
154	70	11.9	58	-26	8.1				
152	68	11.5	56	-28	7.4				
150	66	9.9	54	-30	5.0				
148	64	9.5	52	-32	3.1				
146	62	11.8	50	-34	1.6				
144	60	11.6	48	-36	1.6				
142	58	10.0	46	-38	1.4				
140	56	6.5	44	-40	3.2				
138	54	8.2	42	-42	3.2				
136	52	9.6	40	-44	3.6				
134	50	8.0	38	-46	3.6				
132	48	10.0	36	-48	3.4				
130	46	11.4	34	-50	3.7				
128	44	10.3	32	-52	3.6				
126	42	4.7	30	-54	3.7				
124	40	7.9	28	-56	3.7				
122	38	12.4	26	-60	2.7				
120	36	11.4	24	-62	3.1				
118	34	12.7	22	-64	2.7				
116	32	14.1	20	-66	2.8				
114	30	14.4	18	-68	2.4				
112	28	14.2	16	-70	2.5				
110	26	14.9	14	-72	1.0				
108	24	16.4	12	-74	2.4				
106	22	19.7	10	-76	1.0				
104	20	19.3	8	-78	1.0				

\* = Estimated (D) = Vortex dissipated upwind of tower (M) = Missing (O) = No vortex (Flyby flown for remote sensing systems) (P) = Vortex passed over top of tower

Flyby (Run) Number: 47	Date: 26 SEP 1990 (Day of Year: 269)	Abeam Time: 8:01:36 (MDT)					
Configuration: Takeoff Glide Slope: 0 deg.	AIRCRAFT DATA Flaps: 5 deg. Indicated Air Speed: 155 kts	Gross Weight: 192,400 lbs. Altitude: 300 ft AGL					
Wind Speed: 5.7 kts	METEOROLOGICAL DATA (200 ft Sensor Level)	Atmospheric Stability: Stable					
Maximum Velocity: 22.6 fps	Wind Direction: 72 deg.	Air Temperature: 10.7 °C					
Descent Rate: 2.2 fps	Advection Rate: 3.9 fps	Estimated Core Radius: 2.3 ft					
Maximum Velocity: 20.7 fps	Age: 35 s	Tower Penetration Height: 110 ft AGL					
Descent Rate: 3.2 fps	Advection Rate: 3.2 fps	Tower Penetration Height: 152 ft AGL					
Downwind Vortex Tangential Velocities	Upwind Vortex Characteristics	Upwind Vortex Tangential Velocities					
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
198	88	11.4	102	.8	-15.0	46	-2.6
196	86	10.7	100	-10	-13.5*	44	-2.4
194	84	11.9	98	-12	-12.0	42	-3.0
192	82	12.8*	96	-14	-8.2	40	-1.8
190	80	13.8	94	-16	-7.6	38	-2.8
188	78	12.7*	92	-18	-8.0	36	-2.2
186	76	11.7	90	-20	-7.7	34	-2.3
184	74	11.4	88	-22	-8.4	32	-3.1
182	72	11.4	86	-24	-6.7	30	-3.3
180	70	9.8	84	-26	-8.0	28	-1.2
178	68	13.9	82	-28	-6.7	180	-3.5
176	66	14.4	80	-30	-3.7	178	-2.0
174	64	14.4	78	-32	-3.0	176	-1.2
172	62	13.3	76	-34	-2.4	174	-2.8
170	60	15.4*	74	-36	-3.4	172	-7.8
168	58	17.4	72	-38	-6.6	168	-6.6
166	56	11.2	70	-40	-5.8	166	-7.0
164	54	10.6	68	-42	-6.0	164	-8.2
162	52	2.1	66	-44	-7.4	162	-7.0
160	50	2.0	64	-46	-8.0	160	-7.4
158	48	12.3	62	-48	-6.8	158	-6.8
156	46	13.2	60	-50	-6.9	156	-4
154	44	12.2	58	-52	-7.3	154	-13.7
152	42	14.9	56	-54	-15.2	152	-20.7
150	40	12.8	54	-56	-4.6	150	-16.5
148	38	11.9	52	-58	-2.5	148	-4
146	36	12.6	50	-60	-2.1	146	-20.0
144	34	9.0	48	-62	-2.9	144	-6
142	32	10.4	46	-64	-3.0	142	-8
140	30	12.2	44	-66	-3.0	140	-23.6
138	28	8.2	42	-68	-2.5	138	-1.2
136	26	8.9	40	-70	-2.0	136	-10.2
134	24	10.0	38	-72	-1.8	134	-1.8
132	22	12.7	36	-74	-2.1	132	-20.1
130	20	11.4	34	-76	-1.8	130	-20
128	18	7.9	32	-78	-2.0	128	-2.4
126	16	5.0	30	-80	-1.8	126	-24
124	14	10.6	28	-82	-1.5	124	-28
122	12	12.3	26	-84	-1.3	122	-30
120	10	12.5	24	-86	-0.6	120	-32
118	8	8.4	22	-88	-0.9	118	-9.3
116	6	11.4	20	-90	-1.0	116	-3.6
114	4	24.1	18	-92	-0.2	114	-3.8
112	2	22.5	16	-94	-0.2	112	-4.0
110	0	-22.6	14	-96	-0.2	110	-6.6
108	-2	-19.5	12	-98	-0.6	108	-4.4
106	-4	-15.2	10	-100	-0.7	106	-14.2
104	-6	-15.0			-104	-4.8	-10.8

\* = Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(I) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

Flyby (Run) Number: 48		UAL B757-200		Date: 26 SEP 1990 (Day of Year: 269)	Absent Time: 8:06:48 (MDT)
AIRCRAFT DATA					
Configuration: Clean		Gross Weight: 191,600 lbs.			
Glide Slope: 0 deg.		Altitude: 230 ft AGL			
Flaps: 0 deg.		Air Speed: 250 kts			
Indicated Air Speed:					
Wind Speed: 5.2 kts		Wind Direction: 70 deg.		Air Temperature: 10.6 °C	
Maximum Velocity: (P) fps		Age: (P) s		Atmospheric Stability: Stable	
Descent Rate: (P) ips		Advection Rate: (P) ips			
Maximum Velocity: (P) ips		Age: (P) s			
Descent Rate: (P) ips		Advection Rate: (P) ips			
Downwind Vortex Tangential Velocities		Upwind Vortex Tangential Velocities			
Sensor Height [ft]		Sensor Height [ft]		Sensor Height [ft]	
Relative Height [ft]		Relative Height [ft]		Relative Height [ft]	
V <sub>θ</sub> (fps)		V <sub>θ</sub> (fps)		V <sub>θ</sub> (fps)	
(P)		(P)		(P)	
198	(P)	102	(P)	198	(P)
196	(P)	100	(P)	196	(P)
194	(P)	98	(P)	192	(P)
190	(P)	96	(P)	190	(P)
188	(P)	94	(P)	188	(P)
186	(P)	92	(P)	186	(P)
184	(P)	90	(P)	184	(P)
182	(P)	88	(P)	182	(P)
180	(P)	86	(P)	180	(P)
178	(P)	84	(P)	178	(P)
176	(P)	82	(P)	176	(P)
174	(P)	80	(P)	174	(P)
172	(P)	78	(P)	172	(P)
170	(P)	76	(P)	170	(P)
168	(P)	74	(P)	168	(P)
166	(P)	72	(P)	166	(P)
164	(P)	70	(P)	164	(P)
162	(P)	68	(P)	162	(P)
160	(P)	66	(P)	160	(P)
158	(P)	64	(P)	158	(P)
156	(P)	62	(P)	156	(P)
154	(P)	60	(P)	154	(P)
152	(P)	58	(P)	152	(P)
150	(P)	56	(P)	150	(P)
148	(P)	54	(P)	148	(P)
146	(P)	52	(P)	146	(P)
144	(P)	50	(P)	144	(P)
142	(P)	48	(P)	142	(P)
140	(P)	46	(P)	140	(P)
138	(P)	44	(P)	138	(P)
136	(P)	42	(P)	136	(P)
134	(P)	40	(P)	134	(P)
132	(P)	38	(P)	132	(P)
130	(P)	36	(P)	130	(P)
128	(P)	34	(P)	128	(P)
126	(P)	32	(P)	126	(P)
124	(P)	30	(P)	124	(P)
122	(P)	28	(P)	122	(P)
120	(P)	26	(P)	120	(P)
118	(P)	24	(P)	118	(P)
116	(P)	22	(P)	116	(P)
114	(P)	20	(P)	114	(P)
112	(P)	18	(P)	112	(P)
110	(P)	16	(P)	110	(P)
108	(P)	14	(P)	108	(P)
106	(P)	12	(P)	106	(P)
104	(P)	10	(P)	104	(P)

(P) = Vortex passed over top of tower

(D) = Estimated (I) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex (F)ly by flown for remote sensing systems

(P) = Vortex passed over top of tower

Flyby (Run) Number: 49	Date: 26 SEP 1990 (Day of Year: 269)	Abeam Time: 8:12:17 (MDT)					
Configuration: Landing Glide Slope: 0 deg.	AIRCRAFT DATA Flaps: 25 deg. Indicated Air Speed: 136 kts	Gross Weight: 191,000 lbs. Altitude: 260 ft AGL					
Wind Speed: 4.8 kts	Wind Direction: 86 deg.	Atmospheric Stability: Stable					
Maximum Velocity: (D) fps Descent Rate: (D) fpm	Age: (D) s Advection Rate: (D) fpm	Estimated Core Radius: (D) ft Tower Penetration Height: (D) ft AGL					
Maximum Velocity: (D) fps Descent Rate: (D) fpm	Age: (D) s Advection Rate: (D) fpm	Estimated Core Radius: (D) ft Tower Penetration Height: (D) ft AGL					
Downwind Vortex Tangential Velocities	Upwind Vortex Characteristics	Upwind Vortex Tangential Velocities					
Sensor Height [ft]	Relative Height [ft]	Sensor Height [ft]	Relative Height [ft]	Sensor Height [ft]	Relative Height [ft]	Sensor Height [ft]	Relative Height [ft]
198	(D)	102	(D)	198	(D)	102	(D)
196	(D)	100	(D)	196	(D)	100	(D)
194	(D)	98	(D)	194	(D)	98	(D)
192	(D)	96	(D)	192	(D)	96	(D)
190	(D)	94	(D)	190	(D)	94	(D)
188	(D)	92	(D)	188	(D)	92	(D)
186	(D)	90	(D)	186	(D)	90	(D)
184	(D)	88	(D)	184	(D)	88	(D)
182	(D)	86	(D)	182	(D)	86	(D)
180	(D)	84	(D)	180	(D)	84	(D)
178	(D)	82	(D)	178	(D)	82	(D)
176	(D)	80	(D)	176	(D)	80	(D)
174	(D)	78	(D)	174	(D)	78	(D)
172	(D)	76	(D)	172	(D)	76	(D)
170	(D)	74	(D)	170	(D)	74	(D)
168	(D)	72	(D)	168	(D)	72	(D)
166	(D)	70	(D)	166	(D)	70	(D)
164	(D)	68	(D)	164	(D)	68	(D)
162	(D)	66	(D)	162	(D)	66	(D)
160	(D)	64	(D)	160	(D)	64	(D)
158	(D)	62	(D)	158	(D)	62	(D)
156	(D)	60	(D)	156	(D)	60	(D)
154	(D)	58	(D)	154	(D)	58	(D)
152	(D)	56	(D)	152	(D)	56	(D)
150	(D)	54	(D)	150	(D)	54	(D)
148	(D)	52	(D)	148	(D)	52	(D)
146	(D)	50	(D)	146	(D)	50	(D)
144	(D)	48	(D)	144	(D)	48	(D)
142	(D)	46	(D)	142	(D)	46	(D)
140	(D)	44	(D)	140	(D)	44	(D)
138	(D)	42	(D)	138	(D)	42	(D)
136	(D)	40	(D)	136	(D)	40	(D)
134	(D)	38	(D)	134	(D)	38	(D)
132	(D)	36	(D)	132	(D)	36	(D)
130	(D)	34	(D)	130	(D)	34	(D)
128	(D)	32	(D)	128	(D)	32	(D)
126	(D)	30	(D)	126	(D)	30	(D)
124	(D)	28	(D)	124	(D)	28	(D)
122	(D)	26	(D)	122	(D)	26	(D)
120	(D)	24	(D)	120	(D)	24	(D)
118	(D)	22	(D)	118	(D)	22	(D)
116	(D)	20	(D)	116	(D)	20	(D)
114	(D)	18	(D)	114	(D)	18	(D)
112	(D)	16	(D)	112	(D)	16	(D)
110	(D)	14	(D)	110	(D)	14	(D)
108	(D)	12	(D)	108	(D)	12	(D)
106	(D)	10	(D)	106	(D)	10	(D)
104	(D)	8	(D)	104	(D)	8	(D)

\* = Estimated

(D) = Missing

(M) = No vortex

(F) = Flyby

over top of tower

(V) = Vortex passed over remote sensing systems

(P) = Vortex passed over top of tower

Flyby (Run) Number: 50		UAL B757-200		Date: 26 SEP 1990 (Day of Year: 269)	Abeam Time: 8:18:05 (MDT)		
Configuration: Landing		AIRCRAFT DATA		Gross Weight: 190,200lbs.			
Glide Slope: 0 deg.		Indicated Air Speed: 36 kts		Altitude: 290 ft AGL			
Wind Speed: 4.2 kts		METEOROLOGICAL DATA (200 ft Sensor Level)		Atmospheric Stability: Stable			
Maximum Velocity: 184.0 fps		Wind Direction: 103 deg.		Estimated Core Radius: 0.2 ft			
Descent Rate: 5.0 ips		Age: 44 s		Tower Penetration Height: 70 ft AGL			
Maximum Velocity: (D) fps		Advection Rate: 1.0 ips		Estimated Core Radius: (D) ft			
Descent Rate: (D) ips		Age: (D) s		Tower Penetration Height: (D) ft AGL			
DOWNWIND VORTEX CHARACTERISTICS							
UPWIND VORTEX CHARACTERISTICS							
Sensor Height (ft)	Relative Height (ft)	Downwind Vortex Tangential Velocities	Upwind Vortex Tangential Velocities	Sensor Height (ft)	Relative Height (ft)		
		$V_\theta$ (fps)	$V_\theta$ (fps)		$V_\theta$ (fps)		
198	128	7.2	10.2	32	10.4		
196	126	7.0	10.0	30	11.1*		
194	124	7.3	9.8	28	11.7		
192	122	6.1	9.4	26	16.7		
190	120	6.0	9.4	24	2.9		
188	118	4.9	9.2	22	17.1		
186	116	8.6	9.0	20	20.5		
184	114	6.3	8.8	18	19.6		
182	112	7.4	8.6	16	25.7		
180	110	7.4	8.4	14	27.9*		
178	108	10.4	8.2	12	30.1		
176	106	8.7	8.0	10	25.3		
174	104	9.0	7.8	8	17.6		
172	102	8.2	7.6	6	26.1		
170	100	4.2	7.4	4	27.3		
168	98	5.4	7.2	2	43.4		
166	96	6.7	7.0	0	46.1		
164	94	9.2	6.8	-2	-184.0		
162	92	10.3	6.6	-4	-47.0		
160	90	9.3	6.4	-6	-3.2		
158	88	10.3	6.2	-8	-4.2		
156	86	9.6	6.0	-10	-2.0		
154	84	9.2	5.8	-12	-0.6		
152	82	10.3	5.6	-14	-1.3		
150	80	9.3	5.4	-16	-1.5		
148	78	8.4	5.2	-18	-0.9		
146	76	10.4	5.0	-20	-4.3		
144	74	8.2	4.8	-22	-9.7		
142	72	7.4	4.6	-24	-9.4		
140	70	5.8	4.4	-26	-8.5		
138	68	6.2	4.2	-28	-6.2		
136	66	7.8	4.0	-30	-7.3		
134	64	8.7	3.8	-32	-8.0		
132	62	10.1	3.6	-34	-9.7		
130	60	9.6	3.4	-36	-13.2		
128	58	12.6	3.2	-38	-3.9		
126	56	17.3	3.0	-40	-3.2		
124	54	10.2	2.8	-42	-4.4		
122	52	13.5	2.6	-44	-1.8		
120	48	11.4	2.4	-46	-2.1		
118	46	12.1	2.2	-48	-5.4		
116	44	9.1	2.0	-50	-3.1		
114	42	12.7	1.8	-52	-2.9		
112	40	13.4	1.6	-54	-1.1		
110	38	10.7	1.4	-56	-0.0		
108	36	10.8	1.2	-58	0.1		
106	34	11.3	1.0	-60	-0.1		
104	32	15.0	0.1	-	104		

= Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing (O) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

Flyby (Run) Number: 51	Date: 26 SEP 1990 (Day of Year: 269)	Abeam Time: 8:23:39 (MDT)
Configuration: Landing Glide Slope: -3 deg.	AIRCRAFT DATA Flaps: 25 deg. Indicated Air Speed: 136 kts	Gross Weight: 189,400 lbs. Altitude: 330 ft AGL
Wind Speed: 2.7 kts	Wind Direction: 109 deg.	Air Temperature: 11.1 °C
Maximum Velocity: (D) fps Descent Rate: (D) fps	Age: (D) s Advection Rate: (D) fps	Atmospheric Stability: Neutral
Maximum Velocity: (D) fps Descent Rate: (D) fps	Age: (D) s Advection Rate: (D) fps	Estimated Core Radius: (D) ft Tower Penetration Height: (D) ft AGL
Maximum Velocity: (D) fps Descent Rate: (D) fps	Age: (D) s Advection Rate: (D) fps	Estimated Core Radius: (D) ft Tower Penetration Height: (D) ft AGL
METEOROLOGICAL DATA [200 ft Sensor Level]		
DOWNWIND VORTEX CHARACTERISTICS		
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)
198	(D)	102
196	(D)	100
194	(D)	98
192	(D)	96
190	(D)	94
188	(D)	92
186	(D)	90
184	(D)	88
182	(D)	86
180	(D)	84
178	(D)	82
176	(D)	80
174	(D)	78
172	(D)	76
170	(D)	74
168	(D)	72
166	(D)	70
164	(D)	68
162	(D)	66
160	(D)	64
158	(D)	62
156	(D)	60
154	(D)	58
152	(D)	56
150	(D)	54
148	(D)	52
146	(D)	50
144	(D)	48
142	(D)	46
140	(D)	44
138	(D)	42
136	(D)	40
134	(D)	38
132	(D)	36
130	(D)	34
128	(D)	32
126	(D)	30
124	(D)	28
122	(D)	26
120	(D)	24
118	(D)	22
116	(D)	20
114	(D)	18
112	(D)	16
110	(D)	14
108	(D)	12
106	(D)	10
104	(D)	104

\* = Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(P) = Vortex passed over top of tower

(O) = No vortex (Flyby flown for remote sensing systems)

Flyby (Run) Number: 52		UAL B757-200		Date: 26 SEP 1990 (Day of Year: 269)	Absent Time: 8:41:26 (MDT)
AIRCRAFT DATA		AIRPLANE		Fins: 25 deg.	Gross Weight: 187,000 lbs.
Configuration: Landing		Indicated Air Speed: 1,35 kts		Altitude: 300 ft AGL	
Glide Slope: -3 deg.		METEOROLOGICAL DATA		Atmospheric Stability: Neutral	
Wind Speed: 5.1 kts		Wind Direction: 62 deg.		Air Temperature: 11.3 °C	
Maximum Velocity: (P) fps		Age: (P) s		Estimated Core Radius: (P) ft	
Descent Rate: (P) fps		Advection Rate: (P) fps		Tower Penetration Height: (P) ft AGL	
<b>DOWNWIND VORTEX CHARACTERISTICS</b>					
Sensor Height (ft)		Age: (P) s		Estimated Core Radius: (P) ft	
Relative Height (ft)		Advection Rate: (P) fps		Tower Penetration Height: (P) ft AGL	
<b>UPWIND VORTEX CHARACTERISTICS</b>					
Sensor Height (ft)		Age: (P) s		Estimated Core Radius: (P) ft	
Relative Height (ft)		Advection Rate: (P) fps		Tower Penetration Height: (P) ft AGL	
<b>Downwind Vortex Tangential Velocities</b>					
Sensor Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	V <sub>θ</sub> (fps)
198	(P)	102	(P)	198	(P)
196	(P)	100	(P)	196	(P)
194	(P)	98	(P)	194	(P)
192	(P)	96	(P)	192	(P)
190	(P)	94	(P)	190	(P)
188	(P)	92	(P)	188	(P)
186	(P)	90	(P)	186	(P)
184	(P)	88	(P)	184	(P)
182	(P)	86	(P)	182	(P)
180	(P)	84	(P)	180	(P)
178	(P)	82	(P)	178	(P)
176	(P)	80	(P)	176	(P)
174	(P)	78	(P)	174	(P)
172	(P)	76	(P)	172	(P)
170	(P)	74	(P)	170	(P)
168	(P)	72	(P)	168	(P)
166	(P)	70	(P)	166	(P)
164	(P)	68	(P)	164	(P)
162	(P)	66	(P)	162	(P)
160	(P)	64	(P)	160	(P)
158	(P)	62	(P)	158	(P)
156	(P)	60	(P)	156	(P)
154	(P)	58	(P)	154	(P)
152	(P)	56	(P)	152	(P)
150	(P)	54	(P)	150	(P)
148	(P)	52	(P)	148	(P)
146	(P)	50	(P)	146	(P)
144	(P)	48	(P)	144	(P)
142	(P)	46	(P)	142	(P)
140	(P)	44	(P)	140	(P)
138	(P)	42	(P)	138	(P)
136	(P)	40	(P)	136	(P)
134	(P)	38	(P)	134	(P)
132	(P)	36	(P)	132	(P)
130	(P)	34	(P)	130	(P)
128	(P)	32	(P)	128	(P)
126	(P)	30	(P)	126	(P)
124	(P)	28	(P)	124	(P)
122	(P)	26	(P)	122	(P)
120	(P)	24	(P)	120	(P)
118	(P)	22	(P)	118	(P)
116	(P)	20	(P)	116	(P)
114	(P)	18	(P)	114	(P)
112	(P)	16	(P)	112	(P)
110	(P)	14	(P)	110	(P)
108	(P)	12	(P)	108	(P)
106	(P)	10	(P)	106	(P)
104	(P)		(P)	104	(P)

\* = Estimated (D) = Vortex dissipated upwind of tower (M) = Missing (O) = No vortex (Fyby flown for remote sensing systems)

(P) = Vortex passed over top of tower (O) = Missing (Fyby flown for remote sensing systems)

Flyby (Run) Number: 53	Date: 26 SEP 1990 (Day of Year: 269)	Abeam Time: 8:47:27 (MDT)						
Configuration: Landing Glide Slope: -3 deg.	AIRCRAFT DATA Flaps: 30 deg. Indicated Air Speed: 132 kts	Gross Weight: 186,000 lbs. Altitude: 300 ft AGL						
Wind Speed: 5.1 knts	METEOROLOGICAL DATA (200 ft Sensor Level)	Air Temperature: 11.7°C Atmospheric Stability: Neutral						
Maximum Velocity: 227.4 fpm Descent Rate: 4.5 fpm	Wind Direction: 69 deg. Wind Velocity: 208.2 fpm Descent Rate: 3.9 fpm	Age: 23 s Advection Rate: 6.8 fpm						
Maximum Velocity: 227.4 fpm Descent Rate: 3.9 fpm	Age: 38 s Advection Rate: 6.0 fpm	UPWIND VORTEX CHARACTERISTICS Estimated Core Radius: 0.4 ft Tower Penetration Height: 196 ft AGL						
Downwind Vortex Tangential Velocities	Upwind Vortex Tangential Velocities	Tower Penetration Height: 152 ft AGL						
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)
198	2	60.7	102	-94	-4.1*	198	46	-7.5
196	0	-227.4	100	-96	-4.8*	196	44	-7.1
194	-2	-97.4*	98	-98	-5.4	194	42	-8.8
192	-4	-72.7*	96	-100	-3.9	192	40	-5.2
190	-6	-53.8*	94	-102	-2.5	190	38	-5.0
188	-8	-45.7*	92	-104	-1.9	188	36	-5.0
186	-10	-37.6*	90	-106	-2.5	186	34	-5.3
184	-12	-30.9*	88	-108	-2.1	184	32	-5.7
182	-14	-25.0*	86	-110	-1.4	182	30	-6.0
180	-16	-20.1	84	-112	-2.1	180	28	-6.3
178	-18	-17.5	82	-114	-1.8	178	26	-6.8
176	-20	-18.2	80	-116	-1.7	176	24	-7.1
174	-22	-13.7	78	-118	-1.7	174	22	-7.5
172	-24	-16.5	76	-120	-2.2	172	20	-7.9
170	-26	-15.2*	74	-122	-2.0	170	18	-8.1
168	-28	-13.9	72	-124	-2.0	168	16	-8.3
166	-30	-12.6	70	-126	-1.8	166	14	-8.6*
164	-32	-10.7	68	-128	-1.8	164	12	-9.0
162	-34	-11.5	66	-130	-1.8	162	10	-9.2
160	-36	-9.8	64	-132	-1.5	160	8	-9.5
158	-38	-4.0	62	-134	-1.6	158	6	-9.8
156	-40	-3.6	60	-136	-1.8	156	4	-9.5
154	-42	-7.9	58	-138	-1.0	154	2	-9.5
152	-44	-6.4	56	-140	-0.8	152	0	-10.1
150	-46	-6.4	54	-142	-0.9	150	-2	-10.5
148	-48	-4.6	52	-144	-0.9	148	-4	-10.8
146	-50	-4.3	50	-146	-1.2	146	-6	-11.2
144	-52	-7.1	48	-148	-1.1	144	-8	-11.5
142	-54	-8.4*	46	-150	-1.3	142	-10	-11.8
140	-56	-9.2	44	-152	-0.8	140	-12	-12.1
138	-58	-7.3	42	-154	-0.7	138	-14	-12.4
136	-60	-4.5	40	-156	-0.5	136	-16	-12.7
134	-62	-5.0	38	-158	-0.8	134	-18	-13.0
132	-64	-4.0	36	-160	-0.5	132	-20	-13.3
130	-66	-2.4	34	-162	-0.5	130	-22	-13.6
128	-68	-2.9	32	-164	-0.5	128	-24	-13.9
126	-70	-3.0	30	-166	-0.4	126	-26	-14.2
124	-72	-3.6	28	-168	-0.4	124	-28	-14.5
122	-74	-3.9	26	-170	0.4	122	-30	-14.8
120	-76	-0.8	24	-172	0.3	120	-32	-15.1
118	-78	-3.1	22	-174	0.8	118	-34	-15.4
116	-80	-8.0	20	-176	0.8	116	-36	-15.7
114	-82	-2.0	18	-178	0.3	114	-38	-16.0
112	-84	-2.9	16	-180	0.0	112	-40	-16.3
110	-86	-3.5	14	-182	0.6	110	-42	-16.6
108	-88	-1.1	12	-184	-0.5	108	-44	-16.9
106	-90	-4.3	10	-186	-1.1	106	-46	-17.2
104	-92	-5.9				104	-48	-17.5

\* = Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(N) = No vortex (Flyby) flown for remote sensing systems

(P) = Vortex passed over top of tower

Flyby (Run) Number: 54	UAL B757-200	Date: 26 SEP 1990 [Day of Year: 269]	Abeam Time: 8:54:04 (MDT)
Configuration: Landing	AIRCRAFT DATA		
Glide Slope: -3 deg.	Flaps: 30 deg.	Gross Weight: 185,300lbs.	
Descent Rate: 4.4 fpm	Indicated Air Speed: 132 kts	Altitude: 230 ft AGL	
Wind Speed: 3.3 kts	Wind Direction: 73 deg.	Air Temperature: 11.9 °C	Atmospheric Stability: Neutral
Maximum Velocity: 69.4 fpm	Age: 56 s	Estimated Core Radius: 0.9 ft	
Descent Rate: 4.4 fpm	Advection Rate: 2.7 fpm	Tower Penetration Height: 32 ft AGL	
Maximum Velocity: (D) fpm	Age: (D) s	Estimated Core Radius: (D) ft	
Descent Rate: (D) fpm	Advection Rate: (D) fpm	Tower Penetration Height: (D) ft AGL	
<b>METEOROLOGICAL DATA</b>			
[200 ft Sensor Level]			
<b>DOWNWIND VORTEX CHARACTERISTICS</b>			
Wind Direction: 73 deg.			
Age: 56 s			
Advection Rate: 2.7 fpm			
<b>UPWIND VORTEX CHARACTERISTICS</b>			
Wind Direction: 73 deg.			
Age: (D) s			
Advection Rate: (D) fpm			
<b>Downwind Vortex Tangential Velocities</b>			
Sensor Height (ft)	Relative Height (ft)	Downwind Vortex Tangential Velocities	Upwind Vortex Tangential Velocities
		Sensor Height (ft)	Sensor Height (ft)
		V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)
198	166	7.4	10.3
196	164	8.2	10.2
194	162	8.0	10.0
192	160	7.6	9.8
190	158	11.9	9.6
188	156	11.9	9.4
186	154	7.2	9.0
184	152	8.2	8.8
182	150	9.0	8.6
180	148	8.7	8.4
178	146	9.6	8.2
176	144	10.5	8.0
174	142	12.3	4.8
172	140	11.6	7.8
170	138	7.5	4.6
168	136	14.0	4.2
166	134	7.5	4.0
164	132	9.8	3.8
162	130	8.9	3.6
160	128	9.8	3.4
158	126	7.5	3.2
156	124	8.8	3.0
154	122	8.7	2.8
152	120	10.6	2.6
150	118	8.2	2.4
148	116	9.0	2.2
146	114	11.3	2.0
144	112	8.7	1.8
142	110	9.4	1.6
140	108	7.4	1.4
138	106	7.3	1.2
136	104	9.9	1.0
134	102	8.9	0.8
132	100	9.4	0.6
130	98	7.5	0.4
128	96	9.4	0.2
126	94	4.5	-0.2
124	92	7.8	-2.4
122	90	10.3	-4.6
120	88	8.9	-6.8
118	86	8.9	-8.0
116	84	10.2	-10.0
114	82	10.2	-12.0
112	80	10.4	-14.0
110	78	10.7	-16.0
108	76	10.3	-18.0
106	74	12.2	-20.0
104	72	10.1	-22.0

= Estimated (D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

Flyby (Run) Number: 55	Date: 26 SEP 1980 (Day of Year: 269)	Abeam Time: 9:00:25 (MDT)						
<b>AIRCRAFT DATA</b>								
Configuration: Landing Glide Slope: 0 deg.	Gross Weight: 184,300lbs. Altitude: 270 ft AGL							
Wind Speed: 3.9 kts	Wind Direction: 56 deg.	Air Temperature: 12.4 °C						
Maximum Velocity: 28.7 fps	Downwind Vortex Characteristics	Atmospheric Stability: Unstable						
Descent Rate: 3.2 fps	Age: 64 s Advection Rate: 2.2 fps	Estimated Core Radius: 0.9 ft Tower Penetration Height: 66 ft AGL						
Maximum Velocity: (D) fps	Upwind Vortex Characteristics	Estimated Core Radius: (D) ft Tower Penetration Height: (D) ft AGL						
Descent Rate: (D) fps	Age: (D) s Advection Rate: (D) fps							
	Downwind Vortex Tangential Velocities	Upwind Vortex Tangential Velocities						
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)
198	132	10.2	102	36	7.4	198	102	0
196	130	11.0	100	34	12.9	196	100	0
194	128	11.1	98	32	6.0	194	98	0
192	126	6.4	96	30	6.5	192	96	0
190	124	11.7	94	28	9.0	190	94	0
188	122	7.4	92	26	8.8	188	92	0
186	120	14.4	90	24	8.0	186	90	0
184	118	10.4	88	22	8.0	184	88	0
182	116	10.5	86	20	9.2	182	86	0
180	114	8.8	84	18	9.7	180	84	0
178	112	10.0	82	16	11.2	178	82	0
176	110	11.2	80	14	13.4	176	80	0
174	108	11.0	78	12	22.4	174	78	0
172	106	10.1	76	10	25.3	172	76	0
170	104	5.1	74	8	27.5	170	74	0
168	102	7.2	72	6	23.1	168	72	0
166	100	9.2	70	4	25.0	166	70	0
164	98	8.9	68	2	26.8	164	68	0
162	96	9.0	66	0	-28.7	162	66	0
160	94	11.2	64	-2	-9.3	160	64	0
158	92	13.2	62	-4	-11.9	158	62	0
156	90	15.3	60	-6	-13.7	156	60	0
154	88	11.6	58	-8	-9.2	154	58	0
152	86	11.0	56	-10	-10.5	152	56	0
150	84	8.7	54	-12	-8.5	150	54	0
148	82	7.7	52	-14	-8.7	148	52	0
146	80	8.8	50	-16	-6.2	146	50	0
144	78	9.5	48	-18	-6.3	144	48	0
142	76	9.1	46	-20	-6.3	142	46	0
140	74	5.9	44	-22	-6.3	140	44	0
138	72	8.1	42	-24	-4.4	138	42	0
136	70	9.8	40	-26	-10.0	136	40	0
134	68	10.3	38	-28	-6.3	134	38	0
132	66	11.3	36	-30	-4.7	132	36	0
130	64	10.0	34	-32	-7.4	130	34	0
128	62	10.4	32	-34	-5.3	128	32	0
126	60	5.5	30	-36	-4.3	126	30	0
124	58	10.9	28	-38	-4.6	124	28	0
122	56	10.0*	26	-40	-7.1	122	26	0
120	54	9.1	24	-42	-6.2	120	24	0
118	52	14.4	22	-44	-7.8	118	22	0
116	50	10.4	20	-46	-8.0	116	20	0
114	48	12.8	18	-48	-9.3	114	18	0
112	46	15.2	16	-50	-3.5	112	16	0
110	44	13.2*	14	-52	-8.4	110	14	0
108	42	11.2	12	-54	-8.9	108	12	0
106	40	10.6	10	-56	-8.7	106	10	0
104	38	7.8				104	10	0

\* = Estimated (D) = Vortex dissipated upwind of tower (M) = Missing (O) = No vortex (Flyby lawn for remote sensing systems) (P) = Flyby passed over top of tower

(O) = Missing (P) = Flyby lawn for remote sensing systems) (P) = Flyby passed over top of tower

Flyby (Run) Number: 56		Date: 26 SEP 1990 (Day of Year: 269)		Abeam Time: 9:06:13 (MDT)	
Configuration: Landing		AIRCRAFT DATA			
Glide Slope: -3 deg.		Flaps: 30 deg.		Gross Weight: 183,100 lbs.	
Indicated Air Speed: 1,32 kts		Altitude: 310 ft AGL			
Wind Speed: 4.4 kts		METEOROLOGICAL DATA		Atmospheric Stability: Unstable	
Maximum Velocity: 164.4 fps		(200 ft Sensor Level)		Estimated Core Radius: 0.5 ft	
Descent Rate: 5.9 fps		Wind Direction: 54 deg.		Tower Penetration Height: 140 ft AGL	
Wind Speed: 4.4 kts		Air Temperature: 12.6 °C		Estimated Core Radius: 0.5 ft	
Maximum Velocity: 111.4 fps		Age: 29 s		Tower Penetration Height: 106 ft AGL	
Descent Rate: 4.5 fps		Advection Rate: 5.1 fps			
Wind Speed: 4.4 kts		Age: 45 s			
Maximum Velocity: 111.4 fps		Advection Rate: 4.9 fps			
DOWNWIND VORTEX CHARACTERISTICS					
Wind Speed: 4.4 kts		Age: 29 s		Upwind Vortex Tangential Velocities	
Maximum Velocity: 164.4 fps		Age: 45 s		Upwind Vortex Tangential Velocities	
Descent Rate: 5.9 fps		Advection Rate: 5.1 fps		Upwind Vortex Tangential Velocities	
Wind Speed: 4.4 kts		Age: 45 s		Upwind Vortex Tangential Velocities	
UPWIND VORTEX CHARACTERISTICS					
Wind Speed: 4.4 kts		Age: 29 s		Sensor Height [ft]	
Maximum Velocity: 111.4 fps		Age: 45 s		Sensor Height [ft]	
Descent Rate: 4.5 fps		Advection Rate: 4.9 fps		Sensor Height [ft]	
Wind Speed: 4.4 kts		Age: 45 s		Sensor Height [ft]	
Downwind Vortex Tangential Velocities				Sensor Height [ft]	
Sensor Height [ft]	Relative Height [ft]	V <sub>θ</sub> [fps]	Sensor Height [ft]	Relative Height [ft]	V <sub>θ</sub> [fps]
198	58	10.6	102	-38	-12.5
196	56	12.2	100	-40	-9.7
194	54	12.2	98	-42	-4.3*
192	52	8.0	96	-44	-9.9
190	50	12.0	94	-46	-10.9
188	48	8.6	92	-48	-11.6
186	46	9.0	90	-50	-12.3
184	44	12.2	88	-52	-8.5
182	42	12.8	86	-54	-10.4
180	40	10.0	84	-56	-6.4
178	38	10.7	82	-58	-8.2
176	36	13.1	80	-60	-8.4
174	34	12.5	78	-62	-8.8
172	32	15.4	76	-64	-8.4
170	30	17.1*	74	-66	-11.8
168	28	18.7	72	-68	-8.6
166	26	20.2	70	-70	-8.4
164	24	19.9	68	-72	-8.2
162	22	22.1	66	-74	-8.6
160	20	22.8	64	-76	-7.4
158	18	24.6	62	-78	-7.5
156	16	24.2	60	-80	-4.6
154	14	22.6	58	-82	-4.3
152	12	25.9	56	-84	-3.9
150	10	31.8	54	-86	-4.2
148	8	32.0	52	-88	-4.3
146	6	44.0	50	-90	-3.5
144	4	45.5	48	-92	-3.9
142	2	98.9	46	-94	-2.9
140	0	164.4	44	-96	-3.3
138	-2	-96.7	42	-98	-3.2
136	-4	-53.7	40	-100	-3.4
134	-6	-33.0	38	-102	-3.3
132	-8	-25.0	36	-104	-3.1
130	-10	-25.8*	34	-106	-3.1
128	-12	-26.6	32	-108	-3.0
126	-14	-25.7*	30	-110	-3.2
124	-16	-24.7	28	-112	-2.5
122	-18	-22.3*	26	-114	-3.2
120	-20	-19.7	24	-116	-1.6
118	-22	-17.3	22	-118	-1.6
116	-24	-14.7	20	-120	-3.1
114	-26	-17.5	18	-122	-3.0
112	-28	-15.2*	16	-124	-3.1
110	-30	-12.8	14	-126	-3.1
108	-32	-11.8	12	-128	-2.6
106	-34	-10.6	10	-130	-2.6
104	-36	-14.9	-	-	-

\* = Estimated

(D) = Vortex dissipated upwind of tower

(I) = Missing

(O) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

Flyby /Run Number:	57	Date:	26 SEP 1980 (Day of Year: 269)	Abeam Time:	9:12:00 (MDT)
Configuration: Landing		AIRCRAFT DATA		Gross Weight:	182,500 lbs.
Glide Slope: -3 deg.		Flaps: 25 deg.		Altitude:	290 ft AGL
Wind Speed: 6.0 kts		Indicated Air Speed: 133 kts		Atmospheric Stability:	Unstable
Maximum Velocity: 143.9 fps		(200 ft Sensor Level)		Estimated Core Radius: 0.2 ft	
Descent Rate: 5.1 fpm		Airspeed: 29.5		Tower Penetration Height: 142 ft AGL	
Maximum Velocity: 178.9 fps		Wind Direction: 36 deg.		Estimated Core Radius: 0.3 ft	
Descent Rate: 4.4 fpm		Airspeed: 3.8 fpm		Tower Penetration Height: 88 ft AGL	
METEOROLOGICAL DATA					
(200 ft Sensor Level)					
DOWNMWIND VORTEX CHARACTERISTICS					
Airspeed: 29.5					
Advection Rate: 3.8 fpm					
UPWIND VORTEX CHARACTERISTICS					
Airspeed: 46 s					
Advection Rate: 4.0 fpm					
Downwind Vortex Tangential Velocities					
Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)
198	56	17.2	102	-40	-1.4
196	54	19.3	100	-42	-0.2*
194	52	19.5	98	-44	-0.8
192	50	12.2	96	-46	-2.1
190	48	19.0	94	-50	0.1
188	46	10.9	92	-50	0.4
186	44	18.5	90	-52	0.5
184	42	16.4	88	-54	0.2
182	40	16.9	86	-56	-1.3
180	38	15.7	84	-58	-0.5
178	36	15.6	82	-60	0.6
176	34	18.0	80	-62	-1.2
174	32	16.7	78	-64	-1.9
172	30	16.8	76	-66	-1.5
170	28	22.6	74	-68	-2.6
168	26	28.3	72	-70	-4.6
166	24	21.8	70	-72	-2.1
164	22	24.5	68	-74	-2.8
162	20	23.1	66	-76	-3.2
160	18	27.1	64	-78	-2.8
158	16	30.5	62	-80	-4.9
156	14	31.3	60	-82	-5.7
154	12	37.6	58	-84	-4.8
152	10	37.5	56	-86	-5.0
150	8	37.3	54	-88	-5.2
148	6	54.5	52	-90	-2.0
146	4	61.9	50	-92	-1.9
144	2	69.2	48	-94	-2.6
142	0	69.2	46	-96	-2.4
140	-2	44	44	-98	-2.9
138	-4	-37.3	42	-100	-2.8
136	-6	-36.3	40	-102	-2.3
134	-8	-21.4	38	-104	-1.8
132	-10	-16.8	36	-106	-1.9
130	-12	-12.5	34	-108	-2.7
128	-14	-10.6	32	-110	-3.6
126	-16	-4.0	30	-112	-2.6
124	-18	-7.9	28	-114	-1.6
122	-20	-7.6	26	-116	-1.8
120	-22	-7.3	24	-118	-1.6
118	-24	-7.2	22	-120	-2.2
116	-26	-6.5	20	-124	-2.0
114	-28	-3.5	18	-126	-2.8
112	-30	-5.8	16	-128	-2.7
110	-32	-4.1	14	-130	-2.4
108	-34	-0.8	12	-132	-1.8
106	-36	-1.8	10	-134	-2.5
104	-38	-0.4		-136	-2.5

(D) = Vortex dissipated upwind of tower

\* = Estimated

(M) = Missing

(O) = No vortex Flyby flown for remote sensing systems

(P) = Vortex passed over top of tower

Flyby (Run) Number:	58	Date:	26 SEP 1990 (Day of Year: 269)	Abeam Time:	9:17:00 (MDT)
Configuration: Landing					
Glide Slope: -3 deg.					
Wind Speed:	6.4 kts	Wind Direction:	15.6 deg.	Advection Rate:	4.2 s
Maximum Velocity:	192.0 fps	Age:	29 s	Advection Rate:	5.3 fps
Descent Rate:	5.3 fps	Age:	42 s	Advection Rate:	5.4 fps
AIRCRAFT DATA A					
Flaps:	25 deg.	Indicated Air Speed:	133 kts	Meteorological Data	Atmospheric Stability: Unstable
Gross Weight:	182,000 lbs.	Altitude:	300 ft AGL	Tower Penetration Height:	78 ft AGL
METEOROLOGICAL DATA [200 ft Sensor Level]					
DOWNWIND VORTEX CHARACTERISTICS					
Wind Speed:	6.4 kts	Wind Direction:	15.6 deg.	Advection Rate:	4.2 s
Maximum Velocity:	151.6 fps	Age:	29 s	Advection Rate:	5.3 fps
Descent Rate:	5.3 fps	Age:	42 s	Advection Rate:	5.4 fps
UPWIND VORTEX CHARACTERISTICS					
Wind Speed:	6.4 kts	Wind Direction:	42.4 deg.	Advection Rate:	4.2 s
Maximum Velocity:	192.0 fps	Age:	29 s	Advection Rate:	5.3 fps
Descent Rate:	5.3 fps	Age:	42 s	Advection Rate:	5.4 fps
Downwind Vortex Tangential Velocities					
Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)
198	64	12.0	102	-3.2	-15.6
196	62	11.2	100	-3.4	-13.0*
194	60	10.3	98	-3.6	-10.5
192	58	7.7	96	-3.8	-7.3
190	56	9.9	94	-4.0	-6.0
188	54	6.5	92	-4.2	-4.2
186	52	11.9	90	-4.4	-6.7
184	50	12.0	88	-4.6	-6.0
182	48	16.4	86	-4.8	-6.7
180	46	11.3	84	-5.0	-5.3
178	44	19.3	82	-5.2	-2.3
176	42	21.4	80	-5.4	-3.1
174	40	18.8	78	-5.6	-3.5
172	38	19.1	76	-5.8	-2.1
170	36	20.7*	74	-6.0	-2.1
168	34	22.4	72	-6.2	-2.3
166	32	21.8	70	-6.4	-2.7
164	30	18.8	68	-6.6	-0.7
162	28	17.5	66	-6.8	-1.3
160	26	18.7	64	-7.0	-2.4
158	24	19.8	62	-7.2	-4.5
156	22	25.6	60	-7.4	-3.4
154	20	29.8	58	-7.6	-1.9
152	18	37.2*	56	-7.8	-2.7
150	16	37.3*	54	-8.0	-3.1
148	14	37.4	52	-8.2	-2.7
146	12	38.9	50	-8.4	-3.2
144	10	38.6*	48	-8.6	-1.9
142	8	37.6*	46	-8.8	-3.7
140	6	36.6	44	-9.0	-3.5
138	4	36.6	42	-9.2	-2.2
136	2	115.0	40	-9.4	-2.5
134	0	-151.6	38	-9.6	-2.1
132	-2	-88.7	36	-9.8	-1.9
130	-4	-54.7	34	-10.0	-2.8
128	-6	-31.1*	32	-10.2	-1.2
126	-8	-25.1*	30	-10.4	-2.4
124	-10	-19.1	28	-10.6	-2.0
122	-12	-23.5	26	-10.8	-3.7
120	-14	-22.1	24	-11.0	-2.8
118	-16	-1.8	22	-11.2	-3.7
116	-18	-1.8	20	-11.4	-3.7
114	-20	-15.6	18	-11.6	-4.2
112	-22	-6.4	16	-11.8	-4.2
110	-24	-10.2	14	-12.0	-4.7
108	-26	-14.8	12	-12.2	-5.5
106	-28	-15.4	10	-12.4	-4.7
104	-30	-19.4	10	-12.2	-5.5
Upwind Vortex Tangential Velocities					
Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)
198	64	12.0	198	120	-1.5
196	62	11.2	196	118	-0.9
194	60	10.3	194	116	-0.8
192	58	7.7	192	114	-2.5
190	56	9.9	190	112	-1.3
188	54	6.5	188	110	-0.8
186	52	11.9	186	108	-0.8
184	50	12.0	184	106	-0.5
182	48	16.4	182	104	0.0
180	46	11.3	180	102	-0.9
178	44	19.3	178	100	-2.1
176	42	21.4	176	98	-1.7
174	40	18.8	174	96	-1.1
172	38	19.1	172	94	-1.6
170	36	20.7*	170	92	-0.5
168	34	22.4	170	90	-4.2
166	32	21.8	168	88	-4.5
164	30	18.8	166	86	-2.9
162	28	17.5	162	84	-2.6
160	26	18.7	160	82	-1.9
158	24	19.8	158	80	-1.0
156	22	25.6	156	78	-2.9
154	20	29.8	154	76	-2.4
152	18	37.2*	152	74	0.4
150	16	37.3*	150	72	-1.0
148	14	37.4	148	70	-6.8
146	12	38.9	146	68	-6.4
144	10	38.6*	144	66	-6.8
142	8	37.6*	142	64	-10.2*
140	6	36.6	140	62	-12.3
138	4	36.6	138	60	-4.4
136	2	115.0	136	58	-7.6
134	0	-151.6	134	56	-8.2
132	-2	-88.7	132	54	-12.6
130	-4	-54.7	130	52	-8.0
128	-6	-31.1*	128	50	-5.9
126	-8	-25.1*	126	48	-3.6
124	-10	-19.1	124	46	-3.5
122	-12	-23.5	122	44	-4.2
120	-14	-22.1	120	42	-5.0
118	-16	-1.8	118	40	-0.8
116	-18	-1.8	116	38	-4.4
114	-20	-15.6	114	36	-2.0
112	-22	-6.4	112	34	-7.1
110	-24	-10.2	110	32	-7.8
108	-26	-14.8	108	30	-4.8
106	-28	-15.4	106	28	-7.4
104	-30	-19.4	104	26	-12.2

\* = Estimated    (D) = Vortex dissipated upwind of tower    (M) = Missing    (O) = No vortex    (F) = Flyby flown for remote sensing systems    (P) = Vortex passed over top of tower

Flyby (Run) Number: 59		Date: 26 SEP 1990 (Day of Year: 269)		Abeam Time: 9:23:35 (MDT)	
AIRCRAFT DATA		METEOROLOGICAL DATA		Atmospheric Stability: Unstable	
Configuration: Landing Glide Slope: -3 deg.		Flaps: 25 deg. Indicated Air Speed: 132 kts		Gross Weight: 181,200 lbs. Altitude: 250 ft AGL	
Wind Speed: 5.4 kts		Air Temperature: 13.2 °C		Estimated Core Radius: 0.8 ft	
Maximum Velocity: 128.6 fps		Wind Direction: 52 deg.		Tower Penetration Height: 118 ft AGL	
Descent Rate: 5.5 fps		Age: 31 s		Estimated Core Radius: 0.2 ft	
Maximum Velocity: 172.4 fps		Advection Rate: 4.3 fps		Tower Penetration Height: 88 ft AGL	
Descent Rate: 4.9 fps		Age: 41 s			
DOWNTWIND VORTEX CHARACTERISTICS		UPWIND VORTEX CHARACTERISTICS		Estimated Core Radius: 0.2 ft	
Wind Direction: 52 deg.		Age: 41 s		Tower Penetration Height: 88 ft AGL	
Maximum Velocity: 128.6 fps		Advection Rate: 5.1 fps		Estimated Core Radius: 0.8 ft	
Descent Rate: 5.5 fps		Age: 31 s		Tower Penetration Height: 118 ft AGL	
Downwind Vortex Tangential Velocities		Upwind Vortex Tangential Velocities		Estimated Core Radius: 0.8 ft	
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
198	80	11.5	102	-16	-2.8
196	78	12.0	100	-16.5	-3.0
194	76	10.4	98	-13.4	100
192	74	7.4	96	-7.1	98
190	72	14.3	94	-2.4	96
188	70	8.0	92	-14.9	94
186	68	11.3	90	-2.6	100
184	66	12.4	88	-8.8	-1.9
182	64	11.9	86	-3.2	-2.5
180	62	8.6	84	-8.5	92
178	60	13.6	82	-3.4	-2.9
176	58	10.5	80	-3.6	84
174	56	10.4	78	-9.1	82
172	54	12.8	76	-4.0	80
170	52	6.6	74	-4.2	-3.8
168	50	10.8	72	-7.3	78
166	48	14.9	70	-4.8	-3.3
164	46	15.1	68	-5.0	70
162	44	14.9	66	-5.2	-2.8
160	42	17.1	64	-5.4	64
158	40	14.0	62	-5.6	-3.8
156	38	15.9	60	-5.8	-3.6
154	36	17.8	58	-1.8	62
152	34	33.7	56	-6.0	-2.5
150	32	31.3	54	-6.2	58
148	30	27.3	52	-6.4	-5.0
146	28	23.8	50	-6.6	62
144	26	18.5	48	-7.0	-5.4
142	24	20.0	46	-7.2	48
140	22	22.6	44	-7.4	-5.2
138	20	22.6	42	-7.6	50
136	18	22.1*	40	-7.8	-5.4
134	16	21.8	38	-8.0	48
132	14	24.7*	36	-8.2	-1.2
130	12	1.0	34	-8.4	44
128	10	28.1	32	-8.6	-3.5
126	8	31.5*	30	-8.8	42
124	6	34.9	28	-9.0	-4.0
122	4	43.8	26	-9.2	40
120	2	54.8	24	-9.4	-2.5
118	0	-128.6	22	-9.6	-3.7
116	-2	-91.1	20	-9.8	18
114	-4	-72.0	18	-100	-3.2
112	-6	-57.9*	16	-102	14
110	-8	-43.7	14	-104	-2.6
108	-10	-21.7	12	-106	-3.7
106	-12	-21.4	10	-108	-3.3
104	-14	-20.5*			104

\* = Estimated

(D) = Vortex dissipated upwind of tower

(O) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

Flyby (Run) Number: 60	Date: 26 SEP 1990 (Day of Year: 269)	Abeam Time: 9:29:24 (MDT)						
Configuration: Landing Glide Slope: -3 deg.	AIRCRAFT DATA Flaps: 30 deg. Indicated Air Speed: 130 kts	Gross Weight: 180,500 lbs. Altitude: 290 ft AGL						
Wind Speed: 6.0 kts	Wind Direction: 54 deg. Age: 23 s Advection Rate: 5.6 fps	Estimated Core Radius: 0.3 ft Tower Penetration Height: 146 ft AGL						
Maximum Velocity: 139.4 fps Descent Rate: 6.3 fps	Age: 34 s Advection Rate: 6.0 fps	Atmospheric Stability: Unstable						
Maximum Velocity: 138.3 fps Descent Rate: 4.5 fps	Wind Direction: 54 deg. Age: 23 s Advection Rate: 5.6 fps	Estimated Core Radius: 0.5 ft Tower Penetration Height: 138 ft AGL						
METEOROLOGICAL DATA [200 ft Sensor Level]								
UPWIND VORTEX CHARACTERISTICS								
DOWNWIND VORTEX CHARACTERISTICS								
Sensor Height (ft)	Relative Height (ft)	Downwind Vortex Tangential Velocities	Sensor Height (ft)	Relative Height (ft)	Upwind Vortex Tangential Velocities	Sensor Height (ft)	Relative Height (ft)	Tower Penetration Velocities
		V <sub>θ</sub> (fps)			V <sub>θ</sub> (fps)			V <sub>θ</sub> (fps)
198	52	16.2	102	-44	-10.2	198	60	-2.2
196	50	17.5	100	-46	-16.7*	196	58	-6.0
194	48	19.1	98	-48	-3.2	194	56	-4.1
192	46	18.2*	96	-50	-4.0	192	54	-3.0
190	44	17.4	94	-52	-3.6	190	52	-6.1
188	42	17.9*	92	-54	-3.8	188	50	-4.6
186	40	18.4	90	-56	-5.0	186	48	-9.0
184	38	17.0	88	-58	-4.6	184	46	-7.9
182	36	16.1	86	-60	-4.8	182	44	-8.4
180	34	14.8	84	-62	-5.3	180	42	-5.5
178	32	20.2	82	-64	-4.8	178	40	-8.1
176	30	17.3	80	-66	-3.0	176	38	-8.9
174	28	18.2	78	-68	-3.3	174	36	-7.6
172	26	17.7	76	-70	-2.2	172	34	-10.2
170	24	20.5*	74	-72	-4.5	170	32	-12.9
168	22	23.3	72	-74	-7.3	168	30	-16.5
166	20	24.8	70	-76	-4.6	166	28	-11.7
164	18	24.1	68	-78	-2.5	164	26	-10.9
162	16	27.7	66	-80	-2.9	162	24	-12.5
160	14	34.2	64	-82	-0.6	160	22	-16.1
158	12	35.9	62	-84	0.3	158	20	-16.1
156	10	46.1	60	-86	-1.9	156	18	-16.2
154	8	49.5*	58	-88	-2.5	154	16	-24.2
152	6	52.8	56	-90	-2.9	152	14	-24.6*
150	4	62.3	54	-92	-0.4	150	12	-24.9
148	2	111.2	52	-94	-0.4	148	10	-16.8
146	0	139.4	50	-96	-0.6	146	8	-15.5
144	-2	35.9	48	-98	-2.8	144	6	-31.9
142	-4	-57.0	46	-100	-1.2	142	4	-41.4
140	-6	-43.2	46	-102	-0.6	140	2	-89.9*
138	-8	-27.5	44	-104	-1.0	138	0	-138.3
136	-10	-19.4	42	-106	-2.0	136	-2	-91.0
134	-12	-19.7	40	-108	-0.7	134	-4	-73.3
132	-14	-15.9	38	-110	-1.0	132	-6	-51.1
130	-16	-19.8	36	-112	-2.3	130	-8	-35.5
128	-18	-16.4	34	-114	-1.2	128	-10	-30.4
126	-20	-13.0	32	-116	-0.9	126	-12	-31.3*
124	-22	-8.0	30	-118	-4.5	124	-14	-32.2
122	-24	-12.0	28	-120	-1.2	122	-16	-27.1
120	-26	-7.4	26	-122	-4.6	120	-18	-25.7
118	-28	-8.8	24	-124	-0.7	118	-20	-26.3
116	-30	-9.1	22	-126	-0.7	116	-22	-20.9
114	-32	-9.1	20	-128	-0.7	114	-24	-18.0
112	-34	-6.4	18	-130	-3.2	112	-26	-19.1
110	-36	-3.2	16	-132	-1.3	110	-28	-17.3
108	-38	-2.0	14	-134	-1.2	108	-30	-14.6
106	-40	-12.0	12	-136	-3.9	106	-32	-14.8
104	-42	-7.3	10	-136	-10.4	104	-34	-10.1

\* = Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

Flyby (Run) Number: 61		Date: 26 SEP 1980 (Day of Year: 269)		Abeam Time: 14:15:46 (MDT)	
Configuration: Takeoff		AIRCRAFT DATA			
Glide Slope: 0 deg.		Flaps: 1 deg.		Gross Weight: 176,000 lbs.	
Descent Rate: 5.1 fpm		Indicated Air Speed: 161 kts		Altitude: 230 ft AGL	
Wind Speed: 6.5 kts		Wind Direction: 9 deg.		Atmospheric Stability: Unstable	
Maximum Velocity: 122.1 fpm		Air Temperature: 18.9 °C			
Descent Rate: (D) fpm		DOWNWIND VORTEX CHARACTERISTICS			
Maximum Velocity: (D) fpm		Age: 35 s		Estimated Core Radius: 0.3 ft	
Descent Rate: (D) fpm		Advection Rate: 3.6 fpm		Tower Penetration Height: 50 ft AGL	
Wind Speed: (200 ft Sensor Level)		UPWIND VORTEX CHARACTERISTICS			
Maximum Velocity: (D) fpm		Age: (D) s		Estimated Core Radius: (D) ft	
Descent Rate: (D) fpm		Advection Rate: (D) fpm		Tower Penetration Height: (D) ft AGL	
Wind Direction: 9 deg.		Downwind Vortex Tangential Velocities			
Sensor Height (ft)		Sensor Height (ft)		Upwind Vortex Tangential Velocities	
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fpm)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
198	148	7.6	102	52	8.8
196	146	6.9	100	48	9.7
194	144	5.4	98	46	10.6
192	142	3.6	96	44	10.6
190	140	8.7	94	42	14.0
188	138	3.5	92	40	12.4
186	136	8.7	90	38	12.4
184	134	6.4	88	36	13.0
182	132	7.2	86	34	18.2
180	130	7.3	84	32	11.0
178	128	10.8	82	32	11.5
176	126	7.8	80	30	11.2
174	124	6.2	78	28	11.6
172	122	7.0	76	26	13.1
170	120	3.4	74	24	14.2
168	118	4.6	72	22	11.5
166	116	5.7	70	20	13.2
164	114	6.2	68	18	13.3
162	112	9.5	66	16	19.6
160	110	6.7	64	14	19.3
158	108	6.4	62	12	22.8
156	106	7.1	60	10	24.6
154	104	6.5	58	8	25.4
152	102	5.6	56	6	25.9
150	100	5.8	54	4	34.0
148	98	6.1	52	2	66.9
146	96	7.4	50	0	-122.1
144	94	8.4	48	-2	-53.5
142	92	7.8	46	-4	-32.3
140	90	8.3	44	-6	-22.3
138	88	7.2	42	-8	-17.1
136	86	7.8	40	-10	-17.1
134	84	6.6	38	-12	-13.6
132	82	4.7	36	-14	-14.9
130	80	7.7	34	-16	-14.8
128	78	4.4	32	-18	-13.4
126	76	3.3	30	-20	-13.7
124	74	5.0	28	-22	-11.0
122	72	6.6	26	-24	-13.0
120	70	8.2	24	-26	-10.2
118	68	7.7	22	-28	-1.2
116	66	8.2	20	-30	-10.4
114	64	1.0	18	-32	-1.6
112	62	7.5	16	-34	-11.9
110	60	6.3	14	-36	-11.0
108	58	8.3	12	-38	-9.4
106	56	9.5	10	-40	-10.4
104	54	10.6			104

\* = Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

Flyby (Run) Number: 62	Date: 26 SEP 1990 (Day of Year: 269)	Abeam Time: 14:21:15 (MDT)						
Configuration: Takeoff								
Glide Slope: 0 deg.								
Wind Speed: 4.4 knts	Wind Direction: 341 deg.	Atmospheric Stability: Unstable						
Descent Rate: 2.5 f/s	Age: 62 s	Estimated Core Radius: 1.5 ft						
Maximum Velocity: 26.2 f/s	Advection Rate: 2.2 f/s	Tower Penetration Height: 74 ft AGL						
Descent Rate: (D) f/s	Age: (D) s							
Maximum Velocity: (D) f/s	Advection Rate: (D) f/s							
Descent Rate: (D) f/s	Age: (D) s							
METEOROLOGICAL DATA (200 ft Sensor Level)								
AIRCRAFT DATA								
Flaps: 1 deg.		Gross Weight: 175,200 lbs.						
Indicated Air Speed: 161 kts		Altitude: 230 ft AGL						
DOWNWIND VORTEX CHARACTERISTICS								
Wind Speed: 4.4 knts	Wind Direction: 341 deg.	Atmospheric Stability: Unstable						
Descent Rate: 2.5 f/s	Age: 62 s	Estimated Core Radius: 1.5 ft						
Maximum Velocity: 26.2 f/s	Advection Rate: 2.2 f/s	Tower Penetration Height: 74 ft AGL						
Descent Rate: (D) f/s	Age: (D) s							
Maximum Velocity: (D) f/s	Advection Rate: (D) f/s							
Descent Rate: (D) f/s	Age: (D) s							
UPWIND VORTEX CHARACTERISTICS								
Wind Speed: 4.4 knts	Wind Direction: 341 deg.	Atmospheric Stability: Unstable						
Descent Rate: 2.5 f/s	Age: 62 s	Estimated Core Radius: 1.5 ft						
Maximum Velocity: 26.2 f/s	Advection Rate: 2.2 f/s	Tower Penetration Height: 74 ft AGL						
Descent Rate: (D) f/s	Age: (D) s							
Maximum Velocity: (D) f/s	Advection Rate: (D) f/s							
Descent Rate: (D) f/s	Age: (D) s							
Downwind Vortex Tangential Velocities								
Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)
198	124	2.8	102	28	5.4*	198	102	(D)
196	122	3.0	98	24	5.6*	196	100	(D)
194	120	3.1	94	20	3.0	194	98	(D)
192	118	3.6	94	22	6.0	192	96	(D)
190	116	4.7	92	18	6.4	190	94	(D)
188	114	1.7	90	16	13.6	188	92	(D)
186	112	5.5	88	14	1.6	186	88	(D)
184	110	4.8	86	12	7.3	184	86	(D)
182	108	3.2	84	10	5.1	182	84	(D)
180	106	2.2	82	8	4.7	180	82	(D)
178	104	4.8	80	6	5.1	178	80	(D)
176	102	3.2	78	4	2.1	176	78	(D)
174	100	3.5	76	2	14.5	174	76	(D)
172	98	3.5	74	0	2.6.2	172	74	(D)
170	96	3.0	72	-2	-9.5	170	72	(D)
168	94	4.1	70	-4	-13.8	168	70	(D)
166	92	4.4	68	-6	-14.1	166	68	(D)
164	90	4.4	66	-8	-10.9	164	66	(D)
162	88	4.5	64	-10	-11.3	162	64	(D)
160	86	4.4	62	-12	-14.0	160	62	(D)
158	84	3.7	60	-14	-3.9	158	60	(D)
156	82	2.9	58	-16	-1.0	156	58	(D)
154	80	2.7	56	-18	-15.6	154	56	(D)
152	78	3.4	54	-20	-3.9	152	54	(D)
150	76	2.3	52	-22	-4.5	150	52	(D)
148	74	2.4	50	-24	-9.4	148	50	(D)
146	72	4.1	48	-26	-4.9	146	48	(D)
144	70	6.1	46	-28	-9.9	144	46	(D)
142	68	4.5	44	-30	-1.0	142	44	(D)
140	66	3.7	42	-32	-8.9	140	42	(D)
138	64	3.9	40	-34	-8.2	138	40	(D)
136	62	4.3	38	-36	-5.9	136	38	(D)
134	60	3.2	36	-38	-6.8	134	36	(D)
132	58	4.6	34	-40	-7.2	132	34	(D)
130	56	2.1	32	-42	-1.8	130	32	(D)
128	54	4.5	30	-44	-8.6	128	30	(D)
126	52	1.9	28	-46	-5.8	126	28	(D)
124	50	1.7	26	-48	-7.0	124	26	(D)
122	48	2.8	24	-50	-14.0	122	24	(D)
120	46	3.6	22	-52	-10.7	120	22	(D)
118	44	3.6	20	-54	-7.3	118	20	(D)
116	42	3.1	18	-56	-10.2	116	18	(D)
114	40	4.7	16	-58	-5.5	114	16	(D)
112	38	4.3	14	-60	-5.3	112	14	(D)
110	36	4.1	12	-62	-2.7	108	12	(D)
108	34	4.1	10	-64	-4.2	106	10	(D)
106	32	4.1	8	-64	-4.7	104	10	(D)
104	30	4.7						

= Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex [Flyby flown for remote sensing systems]

(P) = Vortex passed over top of tower

UAL B737-200				Date: 26 SEP 1990 (Day of Year: 269)	Abeam Time: 14:27:14 (MDT)
AIRCRAFT DATA				Gross Weight: 174,500 lbs.	
Configuration: Takeoff				Altitude: 230 ft AGL	
Glide Slope: 0 deg.					
Indicated Air Speed: 135 kts					
METEOROLOGICAL DATA					
(200 ft Sensor Level)					
Wind Speed: 6.0 kts				Atmospheric Stability: Unstable	
Wind Direction: 18 deg.				Tower Penetration Height: 15.2 ft AGL	
Air Temperature: 19.2 °C					
Maximum Velocity: 102.0 fps					
Descent Rate: 2.4 fps					
Downwind Vortex Tangential Velocities				Upwind Vortex Tangential Velocities	
Sensor Height [ft]	Relative Height [ft]	V <sub>θ</sub> [fps]	Sensor Height [ft]	Relative Height [ft]	V <sub>θ</sub> [fps]
198	22	14.4	102	-74	-1.5
196	20	20.7	100	-76	0.0*
194	16	28.6	98	-78	-0.3
192	14	30.6*	96	-80	-0.3
190	12	32.5	94	-82	0.0
188	10	38.9	92	-84	-0.1
186	8	34.4	90	-86	-1.1
184	6	39.3*	88	-88	-1.6
182	4	44.2	86	-90	-3.7
180	2	59.4*	84	-92	-2.5
178	0	74.5	82	-94	-2.2
176	-2	78.9	80	-96	-2.7
174	-4	57.6	78	-98	-3.1
172	-6	40.8	76	-100	-0.2
170	-8	33.9*	74	-102	-0.2
168	-10	-26.9	72	-104	-2.7
166	-12	-22.4*	70	-106	-2.6
164	-14	-17.9	68	-108	-2.0
162	-16	-16.2	66	-110	-2.5
160	-18	-5.6	64	-112	-1.7
158	-20	-7.2	62	-114	-0.7
156	-22	-8.4	60	-116	-0.2
154	-24	-2.4	58	-118	-1.1
152	-26	-8.4	56	-120	-0.7
150	-28	-4.7	54	-122	-2.7
148	-30	-5.2*	52	-124	-0.2
146	-32	-8.6	50	-126	-0.8
144	-34	-7.4*	48	-128	-2.6
142	-36	-6.2	46	-130	-0.9
140	-38	-6.0	44	-132	-0.9
138	-40	-6.7	42	-134	-1.3
136	-42	-5.5	40	-138	-2.9
134	-44	-6.1	38	-140	-1.7
132	-46	-4.9	36	-142	-3.1
130	-48	-3.9	34	-144	-3.1
128	-50	-2.0	32	-146	-3.1
126	-52	-4.2	30	-148	-2.5
124	-54	-4.7	28	-150	-1.9
122	-56	-7.1	26	-152	-1.6
120	-58	-6.9	24	-154	-1.8
118	-60	-5.5	22	-156	-1.8
116	-62	-3.2	20	-158	-1.1
114	-64	-3.5	18	-160	-1.4
112	-66	-2.6	16	-162	-2.7
110	-68	-2.1	14	-164	-0.4
108	-70	-0.7	12	-166	-2.1
106	-72	-0.7	10	-168	-0.7
104	-74	-0.7			

\* = Estimated (D) = Vortex dissipated upwind of tower (M) = Missing (O) = No vortex (P) = Vortex flown for remote sensing systems (P) = Vortex passed over top of tower

UAL B757-200									
Date: 26 SEP 1990 (Day of Year: 269)					Abeam Time: 14:32:54 (MDT)				
<b>AIRCRAFT DATA</b>					Gross Weight: 174,000 lbs. Altitude: 240 ft AGL				
Configuration: Takeoff Glide Slope: 0 deg.					Flaps: 15 deg. Indicated Air Speed: 141 kts				
<b>METEOROLOGICAL DATA</b> (200 ft Sensor Level)					Air Temperature: 19.0 °C Atmospheric Stability: Unstable				
Wind Speed: 5.8 kts Descent Rate: 5.0 fpm					Wind Direction: 335 deg. Advection Rate: 3.6 fpm				
<b>DOWNWIND VORTEX CHARACTERISTICS</b>					<b>UPWIND VORTEX CHARACTERISTICS</b>				
Maximum Velocity: 69.9 fpm Descent Rate: (D) fpm					Age: 39 s Advection Rate: (D) fpm				
Sensor Height (ft)					Sensor Height (ft)				
Relative Height (ft)					Relative Height (ft)				
Downwind Vortex Tangential Velocities					Upwind Vortex Tangential Velocities				
Sensor Height (ft)					Sensor Height (ft)				
Relative Height (ft)					Relative Height (ft)				
Downwind Vortex Tangential Velocities					Upwind Vortex Tangential Velocities				
Sensor Height (ft)					Sensor Height (ft)				
Relative Height (ft)					Relative Height (ft)				
Downwind Vortex Tangential Velocities					Upwind Vortex Tangential Velocities				
Sensor Height (ft)					Sensor Height (ft)				
Relative Height (ft)					Relative Height (ft)				
Downwind Vortex Tangential Velocities					Upwind Vortex Tangential Velocities				
Sensor Height (ft)					Sensor Height (ft)				
Relative Height (ft)					Relative Height (ft)				
Downwind Vortex Tangential Velocities					Upwind Vortex Tangential Velocities				
Sensor Height (ft)					Sensor Height (ft)				
Relative Height (ft)					Relative Height (ft)				
Downwind Vortex Tangential Velocities					Upwind Vortex Tangential Velocities				
Sensor Height (ft)					Sensor Height (ft)				
Relative Height (ft)					Relative Height (ft)				
Downwind Vortex Tangential Velocities					Upwind Vortex Tangential Velocities				
Sensor Height (ft)					Sensor Height (ft)				
Relative Height (ft)					Relative Height (ft)				
Downwind Vortex Tangential Velocities					Upwind Vortex Tangential Velocities				
Sensor Height (ft)					Sensor Height (ft)				
Relative Height (ft)					Relative Height (ft)				
Downwind Vortex Tangential Velocities					Upwind Vortex Tangential Velocities				
Sensor Height (ft)					Sensor Height (ft)				
Relative Height (ft)					Relative Height (ft)				
Downwind Vortex Tangential Velocities					Upwind Vortex Tangential Velocities				
Sensor Height (ft)					Sensor Height (ft)				
Relative Height (ft)					Relative Height (ft)				
Downwind Vortex Tangential Velocities					Upwind Vortex Tangential Velocities				
Sensor Height (ft)					Sensor Height (ft)				
Relative Height (ft)					Relative Height (ft)				
Downwind Vortex Tangential Velocities					Upwind Vortex Tangential Velocities				
Sensor Height (ft)					Sensor Height (ft)				
Relative Height (ft)					Relative Height (ft)				
Downwind Vortex Tangential Velocities					Upwind Vortex Tangential Velocities				
Sensor Height (ft)					Sensor Height (ft)				
Relative Height (ft)					Relative Height (ft)				
Downwind Vortex Tangential Velocities					Upwind Vortex Tangential Velocities				
Sensor Height (ft)					Sensor Height (ft)				
Relative Height (ft)					Relative Height (ft)				
Downwind Vortex Tangential Velocities					Upwind Vortex Tangential Velocities				
Sensor Height (ft)					Sensor Height (ft)				
Relative Height (ft)					Relative Height (ft)				
Downwind Vortex Tangential Velocities					Upwind Vortex Tangential Velocities				
Sensor Height (ft)					Sensor Height (ft)				
Relative Height (ft)					Relative Height (ft)				
Downwind Vortex Tangential Velocities					Upwind Vortex Tangential Velocities				
Sensor Height (ft)					Sensor Height (ft)				
Relative Height (ft)					Relative Height (ft)				
Downwind Vortex Tangential Velocities					Upwind Vortex Tangential Velocities				
Sensor Height (ft)					Sensor Height (ft)				
Relative Height (ft)					Relative Height (ft)				
Downwind Vortex Tangential Velocities					Upwind Vortex Tangential Velocities				
Sensor Height (ft)					Sensor Height (ft)				
Relative Height (ft)					Relative Height (ft)				
Downwind Vortex Tangential Velocities					Upwind Vortex Tangential Velocities				
Sensor Height (ft)					Sensor Height (ft)				
Relative Height (ft)					Relative Height (ft)				
Downwind Vortex Tangential Velocities					Upwind Vortex Tangential Velocities				
Sensor Height (ft)					Sensor Height (ft)				
Relative Height (ft)					Relative Height (ft)				
Downwind Vortex Tangential Velocities					Upwind Vortex Tangential Velocities				
Sensor Height (ft)					Sensor Height (ft)				
Relative Height (ft)					Relative Height (ft)				
Downwind Vortex Tangential Velocities					Upwind Vortex Tangential Velocities				
Sensor Height (ft)					Sensor Height (ft)				
Relative Height (ft)					Relative Height (ft)				
Downwind Vortex Tangential Velocities					Upwind Vortex Tangential Velocities				
Sensor Height (ft)					Sensor Height (ft)				
Relative Height (ft)					Relative Height (ft)				
Downwind Vortex Tangential Velocities					Upwind Vortex Tangential Velocities				
Sensor Height (ft)					Sensor Height (ft)				
Relative Height (ft)					Relative Height (ft)				
Downwind Vortex Tangential Velocities					Upwind Vortex Tangential Velocities				
Sensor Height (ft)					Sensor Height (ft)				
Relative Height (ft)					Relative Height (ft)				
Downwind Vortex Tangential Velocities					Upwind Vortex Tangential Velocities				
Sensor Height (ft)					Sensor Height (ft)				
Relative Height (ft)					Relative Height (ft)				
Downwind Vortex Tangential Velocities					Upwind Vortex Tangential Velocities				
Sensor Height (ft)					Sensor Height (ft)				
Relative Height (ft)					Relative Height (ft)				
Downwind Vortex Tangential Velocities					Upwind Vortex Tangential Velocities				
Sensor Height (ft)					Sensor Height (ft)				
Relative Height (ft)					Relative Height (ft)				
Downwind Vortex Tangential Velocities					Upwind Vortex				

Flyby (Run) Number: 65	Date: 26 SEP 1990 (Day of Year: 269)	Abeam Time: 14:38:35(MDT)					
Configuration: Takeoff	AIRCRAFT DATA						
Glide Slope: 0 deg.	Flaps: 5 deg.	Gross Weight: 173,600lbs.					
	Indicated Air Speed: 148 kts	Altitude: 220 ft AGL					
Wind Speed: 3.9 knts	METEOROLOGICAL DATA	Atmospheric Stability: Unstable					
	(200 ft Sensor Level)	Air Temperature: 19.1 °C					
Maximum Velocity: (D) fps	Wind Direction: 339 deg.						
Descent Rate: (D) fpm	Advection Rate: (D) fpm						
Maximum Velocity: (D) fpm	Age: (D) s	Estimated Core Radius: (D) ft					
Descent Rate: (D) fpm	Advection Rate: (D) fpm	Tower Penetration Height: (D) ft AGL					
Downwind Vortex Characteristics	Upwind Vortex Characteristics						
Downwind Vortex Velocities	Upwind Vortex Velocities						
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
		V <sub>θ</sub> (fps)		V <sub>θ</sub> (fps)		V <sub>θ</sub> (fps)	
198	102	100	196	194	192	190	188
194	100	98	194	192	190	188	186
192	98	96	194	192	190	188	186
190	96	94	194	192	190	188	186
188	94	92	194	192	190	188	186
186	92	90	194	192	190	188	186
184	90	88	194	192	190	188	186
182	88	86	194	192	190	188	186
180	86	84	194	192	190	188	186
178	84	82	194	192	190	188	186
176	82	80	194	192	190	188	186
174	80	78	194	192	190	188	186
172	78	76	194	192	190	188	186
170	76	74	194	192	190	188	186
168	74	72	194	192	190	188	186
166	72	70	194	192	190	188	186
164	70	68	194	192	190	188	186
162	68	66	194	192	190	188	186
160	66	64	194	192	190	188	186
158	64	62	194	192	190	188	186
156	62	60	194	192	190	188	186
154	60	58	194	192	190	188	186
152	58	56	194	192	190	188	186
150	56	54	194	192	190	188	186
148	54	52	194	192	190	188	186
146	52	50	194	192	190	188	186
144	50	48	194	192	190	188	186
142	48	46	194	192	190	188	186
140	46	44	194	192	190	188	186
138	44	42	194	192	190	188	186
136	42	40	194	192	190	188	186
134	40	38	194	192	190	188	186
132	38	36	194	192	190	188	186
130	36	34	194	192	190	188	186
128	34	32	194	192	190	188	186
126	32	30	194	192	190	188	186
124	30	28	194	192	190	188	186
122	28	26	194	192	190	188	186
120	26	24	194	192	190	188	186
118	24	22	194	192	190	188	186
116	22	20	194	192	190	188	186
114	20	18	194	192	190	188	186
112	18	16	194	192	190	188	186
110	16	14	194	192	190	188	186
108	14	12	194	192	190	188	186
106	12	10	194	192	190	188	186
104	10		194	192	190	188	186

= Estimated (D) = Vortex dissipated upwind of tower (M) = Missing

(O) = No vortex (Flyby flown for remote sensing systems) (P) = Vortex passed over top of tower

Flyby (Run) Number: 66	Date: 26 SEP 1990 (Day of Year: 269)	AIRCRAFT DATA	Abeam Time: 14:44:08 (MDT)
Configuration: Landing	Flaps: 25 deg.	Gross Weight: 172,900 lbs.	
Glide Slope: 0 deg.	Indicated Air Speed: 129 kts	Altitude: 230 ft AGL	
Wind Speed: 4.2 kts	Wind Direction: 320 deg.	Air Temperature: 19.3 °C	Atmospheric Stability: Unstable
Maximum Velocity: (D) f/s	Age: (D) s		Estimated Core Radius: (D) ft
Descent Rate: (D) f/s	Advection Rate: (D) f/s		Tower Penetration Height: (D) ft AGL
Maximum Velocity: (D) f/s	Age: (D) s		Estimated Core Radius: (D) ft
Descent Rate: (D) f/s	Advection Rate: (D) f/s		Tower Penetration Height: (D) ft AGL
DOWNWIND VORTEX CHARACTERISTICS			
Sensor Height (ft)	Relative Height (ft)	Upwind Vortex Tangential Velocities	
		Relative Height (ft)	Relative Height (ft)
198	(D)	102	198
196	(D)	100	196
194	(D)	98	194
192	(D)	96	192
190	(D)	94	190
188	(D)	92	188
186	(D)	90	186
184	(D)	88	184
182	(D)	86	182
180	(D)	84	180
178	(D)	82	178
176	(D)	80	176
174	(D)	78	174
172	(D)	76	172
170	(D)	74	170
168	(D)	72	168
166	(D)	70	166
164	(D)	68	164
162	(D)	66	162
160	(D)	64	160
158	(D)	62	158
156	(D)	60	156
154	(D)	58	154
152	(D)	56	152
150	(D)	54	150
148	(D)	52	148
146	(D)	50	146
144	(D)	48	144
142	(D)	46	142
140	(D)	44	140
138	(D)	42	138
136	(D)	40	136
134	(D)	38	134
132	(D)	36	132
130	(D)	34	130
128	(D)	32	128
126	(D)	30	126
124	(D)	28	124
122	(D)	26	122
120	(D)	24	120
118	(D)	22	118
116	(D)	20	116
114	(D)	18	114
112	(D)	16	112
110	(D)	14	110
108	(D)	12	108
106	(D)	10	106
104	(D)		104

\* = Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

Flyby (Run) Number: 67		Date: 26 SEP 1990 [Day of Year: 269]		Abeam Time: 14:51:03 (MDT)	
<b>AIRCRAFT DATA</b>		<b>METEOROLOGICAL DATA</b>		Gross Weight: 172,300lbs. Altitude: 280 ft AGL	
Configuration: Landing Glide Slope: -3 deg.		Flaps: 25 deg. Indicated Air Speed: 129 kts		Atmospheric Stability: Unstable	
Wind Speed: 5.2 kts		Wind Direction: 23 deg. Air Temperature: 19.5 °C		Estimated Core Radius: (D) ft Tower Penetration Height: (D) ft AGL	
Maximum Velocity: (D) fps Descent Rate: (D) fps		<b>DOWNWIND VORTEX CHARACTERISTICS</b>		Estimated Core Radius: (D) ft Tower Penetration Height: (D) ft AGL	
Age: (D) s Advection Rate: (D) fps		Age: (D) s Advection Rate: (D) fps		Estimated Core Radius: (D) ft Tower Penetration Height: (D) ft AGL	
Maximum Velocity: (D) fps Descent Rate: (D) fps		<b>UPWIND VORTEX CHARACTERISTICS</b>		Estimated Core Radius: (D) ft Tower Penetration Height: (D) ft AGL	
Age: (D) s Advection Rate: (D) fps		Age: (D) s Advection Rate: (D) fps		Estimated Core Radius: (D) ft Tower Penetration Height: (D) ft AGL	
<b>Downwind Vortex Tangential Velocities</b>					
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)
198	(D)	(D)	102	(D)	(D)
196	(D)	(D)	98	(D)	(D)
194	(D)	(D)	96	(D)	(D)
192	(D)	(D)	94	(D)	(D)
190	(D)	(D)	92	(D)	(D)
188	(D)	(D)	90	(D)	(D)
186	(D)	(D)	88	(D)	(D)
184	(D)	(D)	86	(D)	(D)
182	(D)	(D)	84	(D)	(D)
180	(D)	(D)	82	(D)	(D)
178	(D)	(D)	80	(D)	(D)
176	(D)	(D)	78	(D)	(D)
174	(D)	(D)	76	(D)	(D)
172	(D)	(D)	74	(D)	(D)
170	(D)	(D)	72	(D)	(D)
168	(D)	(D)	70	(D)	(D)
166	(D)	(D)	68	(D)	(D)
164	(D)	(D)	66	(D)	(D)
162	(D)	(D)	64	(D)	(D)
160	(D)	(D)	62	(D)	(D)
158	(D)	(D)	60	(D)	(D)
156	(D)	(D)	58	(D)	(D)
154	(D)	(D)	56	(D)	(D)
152	(D)	(D)	54	(D)	(D)
150	(D)	(D)	52	(D)	(D)
148	(D)	(D)	50	(D)	(D)
146	(D)	(D)	48	(D)	(D)
144	(D)	(D)	46	(D)	(D)
142	(D)	(D)	44	(D)	(D)
140	(D)	(D)	42	(D)	(D)
138	(D)	(D)	40	(D)	(D)
136	(D)	(D)	38	(D)	(D)
134	(D)	(D)	36	(D)	(D)
132	(D)	(D)	34	(D)	(D)
130	(D)	(D)	32	(D)	(D)
128	(D)	(D)	30	(D)	(D)
126	(D)	(D)	28	(D)	(D)
124	(D)	(D)	26	(D)	(D)
122	(D)	(D)	24	(D)	(D)
120	(D)	(D)	22	(D)	(D)
118	(D)	(D)	20	(D)	(D)
116	(D)	(D)	18	(D)	(D)
114	(D)	(D)	16	(D)	(D)
112	(D)	(D)	14	(D)	(D)
110	(D)	(D)	12	(D)	(D)
108	(D)	(D)	10	(D)	(D)
106	(D)	(D)	8	(D)	(D)
104	(D)	(D)	6	(D)	(D)

= Estimated (D) = No vortex (Flyby flown for remote sensing systems) (P) = Vortex passed over top of tower (M) = Missing

UVAL B757-200		Abeam Time: 14:57:07 (MDT)	
Flyby (Run) Number: 68		Date: 26 SEP 1990 (Day of Year: 269)	
AIRCRAFT DATA		Gross Weight: 171,400 lbs.	
Configuration: Landing		Altitude: 4,260 ft AGL	
Glide Slope: 0 deg.			
Flaps: 25 deg.		Atmospheric Stability: Unstable	
Indicated Air Speed: 129 kts		Gross Weight: 171,400 lbs.	
METEOROLOGICAL DATA		Altitude: 4,260 ft AGL	
[200 ft Sensor Level]			
Wind Speed: 5.7 kts	Wind Direction: 359 deg.	Air Temperature: 19.6 °C	
DOWNWIND VORTEX CHARACTERISTICS		Estimated Core Radius: (D) ft	
Age: (D) s		Tower Penetration Height: (D) ft AGL	
Advection Rate: (D) fps		Upwind Vortex Characteristics	
UPWIND VORTEX CHARACTERISTICS		Estimated Core Radius: (D) ft	
Age: (D) s		Tower Penetration Height: (D) ft AGL	
Advection Rate: (D) fps		Upwind Vortex Tangential Velocities	
Maximum Velocity: (D) fps		Sensor Height (ft)	Relative Height (ft)
Descent Rate: (D) fps		V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)
Downwind Vortex Tangential Velocities			
Sensor Height [ft]	Relative Height [ft]	Sensor Height [ft]	Relative Height [ft]
198	(D)	102	(D)
196	(D)	100	198
194	(D)	98	196
192	(D)	96	194
190	(D)	94	192
188	(D)	92	190
186	(D)	90	188
184	(D)	88	186
182	(D)	86	184
180	(D)	84	182
178	(D)	82	180
176	(D)	80	178
174	(D)	78	176
172	(D)	76	174
170	(D)	74	172
168	(D)	72	170
166	(D)	70	168
164	(D)	68	166
162	(D)	66	164
160	(D)	64	162
158	(D)	62	160
156	(D)	60	158
154	(D)	58	156
152	(D)	56	154
150	(D)	54	152
148	(D)	52	150
146	(D)	50	148
144	(D)	48	146
142	(D)	46	144
140	(D)	44	142
138	(D)	42	140
136	(D)	40	138
134	(D)	38	136
132	(D)	36	134
130	(D)	34	132
128	(D)	32	130
126	(D)	30	128
124	(D)	28	126
122	(D)	26	124
120	(D)	24	122
118	(D)	22	120
116	(D)	20	118
114	(D)	18	116
112	(D)	16	114
110	(D)	14	112
108	(D)	12	108
106	(D)	10	106
104	(D)	8	104

(P) = Vortex passed over top of tower

(O) = No vortex [Flyby flown for remote sensing systems]

\* = Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

Flyby (Run) Number: 69	Date: 26 SEP 1990 (Day of Year: 269)	Abeam Time: 15:04:00 (MDT)						
Configuration: Landing Glide Slope: 0 deg.	AIRCRAFT DATA Flaps: 25 deg. Indicated Air Speed: 128 kts	Gross Weight: 170,300 lbs. Altitude: 270 ft AGL						
Wind Speed: 3.5 knts	Wind Direction: 5 deg. Air Temperature: 20.0 °C	Atmospheric Stability: Unstable						
Maximum Velocity: (O) fps Descent Rate: (O) fpm	METEOROLOGICAL DATA (200 ft Sensor Level)	Estimated Core Radius: (O) ft Tower Penetration Height: (O) ft AGL						
Maximum Velocity: (O) fps Descent Rate: (O) fpm	DOWNMWIND VORTEX CHARACTERISTICS Age: (O) s Advection Rate: (O) fps	Tower Penetration Height: (O) ft AGL						
Maximum Velocity: (O) fps Descent Rate: (O) fpm	UPWMWIND VORTEX CHARACTERISTICS Age: (O) s Advection Rate: (O) fps	Estimated Core Radius: (O) ft Tower Penetration Height: (O) ft AGL						
Sensor Height (ft)	Relative Height (ft)	Downwind Vortex Tangential Velocities	Sensor Height (ft)	Relative Height (ft)	Upwind Vortex Tangential Velocities	Sensor Height (ft)	Relative Height (ft)	Upwind Vortex Tangential Velocities
Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)
198	196	(O)	102	98	(O)	198	196	(O)
194	192	(O)	100	96	(O)	194	100	(O)
190	188	(O)	94	92	(O)	192	98	(O)
186	184	(O)	90	88	(O)	190	96	(O)
182	180	(O)	86	84	(O)	188	94	(O)
178	176	(O)	82	80	(O)	176	80	(O)
174	172	(O)	78	76	(O)	174	78	(O)
170	168	(O)	74	72	(O)	172	76	(O)
166	164	(O)	70	68	(O)	170	74	(O)
162	160	(O)	66	64	(O)	168	72	(O)
158	156	(O)	62	60	(O)	166	70	(O)
154	152	(O)	58	56	(O)	164	68	(O)
150	148	(O)	54	52	(O)	162	66	(O)
146	144	(O)	50	48	(O)	160	64	(O)
142	140	(O)	46	44	(O)	158	62	(O)
138	136	(O)	42	40	(O)	156	60	(O)
134	132	(O)	38	36	(O)	154	58	(O)
130	128	(O)	34	32	(O)	152	56	(O)
126	124	(O)	30	28	(O)	150	54	(O)
122	120	(O)	26	24	(O)	148	52	(O)
118	116	(O)	22	20	(O)	146	50	(O)
114	112	(O)	18	16	(O)	144	48	(O)
110	108	(O)	14	12	(O)	142	46	(O)
106	104	(O)	10	(O)	(O)	140	44	(O)
						138	42	(O)
						136	40	(O)
						134	38	(O)
						132	36	(O)
						130	34	(O)
						128	32	(O)
						126	30	(O)
						124	28	(O)
						122	26	(O)
						120	24	(O)
						118	22	(O)
						116	20	(O)
						114	18	(O)
						112	16	(O)
						110	14	(O)
						108	12	(O)
						106	10	(O)
						104	8	(O)

= Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

Flyby (Run) Number: 700	UAL B757-200	Date: 26 SEP 1990 (Day of Year: 269)	Abeam Time: 15:10:00 (MDT)
Configuration: Takeoff	AIRCRAFT DATA		
Glide Slope: 0 deg.	Flaps: 15 deg.		
	Indicated Air Speed: 128 kts		
Wind Speed: 2.0 kts	METEOROLOGICAL DATA (200 ft Sensor Level)		
Maximum Velocity: (O) f/s	Wind Direction: 45 deg.	Air Temperature: 19.9 °C	Atmospheric Stability: Unstable
Descent Rate: (O) f/s	Age: (O) s	Advection Rate: (O) f/s	Estimated Core Radius: (O) ft AGL
Maximum Velocity: (O) f/s	Age: (O) s	Advection Rate: (O) f/s	Tower Penetration Height: (O) ft AGL
Descent Rate: (O) f/s	Age: (O) s	Advection Rate: (O) f/s	Estimated Core Radius: (O) ft AGL
Wind Speed: 2.0 kts	DOWNWIND VORTEX CHARACTERISTICS	UPWIND VORTEX CHARACTERISTICS	Tower Penetration Height: (O) ft AGL
Maximum Velocity: (O) f/s	Downwind Vortex Tangential Velocities	Upwind Vortex Tangential Velocities	
Descent Rate: (O) f/s	Sensor Height (ft)	Sensor Height (ft)	
	Relative Height (ft)	Relative Height (ft)	
	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	
198	0	0	0
196	0	0	0
192	0	0	0
190	98	96	98
188	92	94	96
186	90	90	92
184	88	88	90
182	86	86	88
180	84	84	86
178	82	82	84
176	80	78	82
174	78	76	80
172	76	74	78
170	74	72	76
168	72	70	74
166	70	68	72
164	68	66	70
162	66	64	68
160	64	62	66
158	62	60	64
156	60	58	62
154	58	56	60
152	56	54	58
150	54	52	56
148	52	50	54
146	50	48	52
144	48	46	50
142	46	44	48
140	44	42	46
138	42	40	44
136	40	38	42
134	38	36	40
132	36	34	38
130	34	32	36
128	32	30	34
126	30	28	32
124	28	26	30
122	26	24	26
120	24	22	24
118	22	20	22
116	20	18	20
114	18	16	18
112	16	14	16
110	14	12	14
108	12	10	12
106	10	8	10
104	8	6	10

= Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

Flyby (Run) Number: 1	Date: 29 SEP 1990 (Day of Year: 272)	Abeam Time: 7:16:30 (MDT)
Configuration: Takeoff		
Glide Slope: 0 deg.		
Wind Speed: 7.2 kts	Wind Direction: 14 deg.	Air Temperature: 8.7 °C
Maximum Velocity: (P) fps	Age: (P) s	Atmospheric Stability: Stable
Descent Rate: (P) fpm	Advection Rate: (P) fpm	Estimated Core Radius: (P) ft AGL
METEOROLOGICAL DATA (200 ft Sensor Level)		Tower Penetration Height: (P) ft AGL
AIRCRAFT DATA		
Flaps: 20 deg		Gross Weight: 260,000 lbs.
Indicated Air Speed: 140 kts		Altitude: 270 ft AGL
DOWNMWIND VORTEX CHARACTERISTICS	Age: (P) s	Estimated Core Radius: (P) ft AGL
UPWIND VORTEX CHARACTERISTICS	Advection Rate: 8.6 fpm	Tower Penetration Height: 188 ft AGL
Wind Speed: 7.2 kts	Age: 22 s	
Maximum Velocity: 83.3 fps	Advection Rate: 8.6 fpm	
Descent Rate: 3.7 fpm		
Downwind Vortex Tangential Velocities		
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)
198	(P) 102	(P) 198
196	(P) 100	(P) 196
194	(P) 98	(P) 194
192	(P) 96	(P) 192
190	(P) 94	(P) 190
188	(P) 92	(P) 188
186	(P) 90	(P) 186
184	(P) 88	(P) 184
182	(P) 86	(P) 182
180	(P) 84	(P) 180
178	(P) 82	(P) 178
176	(P) 80	(P) 176
174	(P) 78	(P) 174
172	(P) 76	(P) 172
170	(P) 74	(P) 170
168	(P) 72	(P) 168
166	(P) 70	(P) 166
164	(P) 68	(P) 164
162	(P) 66	(P) 162
160	(P) 64	(P) 160
158	(P) 62	(P) 158
156	(P) 60	(P) 156
154	(P) 58	(P) 154
152	(P) 56	(P) 152
150	(P) 54	(P) 150
148	(P) 52	(P) 148
146	(P) 50	(P) 146
144	(P) 48	(P) 144
142	(P) 46	(P) 142
140	(P) 44	(P) 140
138	(P) 42	(P) 138
136	(P) 40	(P) 136
134	(P) 38	(P) 134
132	(P) 36	(P) 132
130	(P) 34	(P) 130
128	(P) 32	(P) 128
126	(P) 30	(P) 126
124	(P) 28	(P) 124
122	(P) 26	(P) 122
120	(P) 24	(P) 120
118	(P) 22	(P) 118
116	(P) 20	(P) 116
114	(P) 18	(P) 114
112	(P) 16	(P) 112
110	(P) 14	(P) 110
108	(P) 12	(P) 108
106	(P) 10	(P) 106
104	(P) 8	(P) 104

(P) = Vortex passed over top of tower

(O) = Missing (Flyby flown for remote sensing systems)

= Estimated (D) = Vortex dissipated upwind of tower

Flyby (Run) Number: 2		UAL B767-200		Date: 29 SEP 1990 (Day of Year: 272)		Abeam Time: 7:22:19 (MDT)	
Configuration: Takeoff		AIRCRAFT DATA		Flaps: 15 deg.		Gross Weight: 258,600 lbs.	
Glide Slope: 0 deg.		Indicated Air Speed: 143 kts		Altitude: 300 ft AGL			
Wind Speed: 7.3 kts		METEOROLOGICAL DATA		Atmospheric Stability: Stable			
Maximum Velocity: (P) fps		(200 ft Sensor Level)		Estimated Core Radius: (P) ft			
Descent Rate: (P) fps		Advection Rate: (P) fps		Tower Penetration Height: (P) ft AGL			
Wind Direction: 17 deg.		DOWNWIND VORTEX CHARACTERISTICS		Upwind Vortex Tangential Velocities			
Maximum Velocity: (P) fps		Age: (P) s		Sensor Height (ft)			
Descent Rate: (P) fps		Advection Rate: (P) fps		Relative Height (ft)			
				Relative Height (ft)			
Sensor Height (ft)		Downwind Vortex Tangential Velocities		Sensor Height (ft)			
Relative Height (ft)		V <sub>θ</sub> (fps)		Relative Height (ft)			
198		(P)		(P)			
196		(P)		(P)			
194		(P)		(P)			
192		(P)		(P)			
190		(P)		(P)			
188		(P)		(P)			
186		(P)		(P)			
184		(P)		(P)			
182		(P)		(P)			
180		(P)		(P)			
178		(P)		(P)			
176		(P)		(P)			
174		(P)		(P)			
172		(P)		(P)			
170		(P)		(P)			
168		(P)		(P)			
166		(P)		(P)			
164		(P)		(P)			
162		(P)		(P)			
160		(P)		(P)			
158		(P)		(P)			
156		(P)		(P)			
154		(P)		(P)			
152		(P)		(P)			
150		(P)		(P)			
148		(P)		(P)			
146		(P)		(P)			
144		(P)		(P)			
142		(P)		(P)			
140		(P)		(P)			
138		(P)		(P)			
136		(P)		(P)			
134		(P)		(P)			
132		(P)		(P)			
130		(P)		(P)			
128		(P)		(P)			
126		(P)		(P)			
124		(P)		(P)			
122		(P)		(P)			
120		(P)		(P)			
118		(P)		(P)			
116		(P)		(P)			
114		(P)		(P)			
112		(P)		(P)			
110		(P)		(P)			
108		(P)		(P)			
104		(P)		(P)			

(D) = Estimated

(O) = Missing

(N) = No vortex

(P) = Vortex dissipated upwind of tower

(P) = Vortex passed over top of tower

(P) = Vortex flown for remote sensing systems

UAL B767-200		Date: 29 SEP 1990 [Day of Year: 272]	Abeam Time: 7:28:24 (MDT)								
Configuration: Takeoff	Glide Slope: 0 deg.	Flaps: 5 deg.	Indicated Air Speed: 150 kts								
Gross Weight: 257,800lbs.	Altitude: 240 ft AGL										
Wind Speed: 9.5 kts	Wind Direction: 16 deg.	Air Temperature: 8.9 °C	Atmospheric Stability: Stable								
<b>AIRCRAFT DATA</b>											
Maximum Velocity: 187.1 fps	Age: 14 s	Estimated Core Radius: 0.5 ft	Tower Penetration Height: 196 ft AGL								
Descent Rate: 3.1 ips	Advection Rate: 11.1 fps										
Maximum Velocity: 167.6 fps	Age: 23 s	Estimated Core Radius: 0.5 ft	Tower Penetration Height: 148 ft AGL								
Descent Rate: 4.0 ips	Advection Rate: 10.8 fps										
<b>METEOROLOGICAL DATA</b>											
(200 ft Sensor Level)											
<b>DOWNMIND VORTEX CHARACTERISTICS</b>											
Wind Speed: 9.5 kts	Age: 16 s	Upwind Vortex Tangential Velocities									
<b>UPWIND VORTEX CHARACTERISTICS</b>											
Wind Speed: 9.5 kts	Age: 16 s	Upwind Vortex Tangential Velocities									
Maximum Velocity: 187.1 fps	Age: 14 s	Sensor Height (ft)	Relative Height (ft)	$V_{\theta}$ (fps)	$V_g$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_{\theta}$ (fps)	$V_g$ (fps)		
Descent Rate: 3.1 ips	Advection Rate: 11.1 fps										
Maximum Velocity: 167.6 fps	Age: 23 s										
Descent Rate: 4.0 ips	Advection Rate: 10.8 fps										
<b>Downwind Vortex Tangential Velocities</b>											
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	$V_{\theta}$ (fps)	$V_g$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_{\theta}$ (fps)	$V_g$ (fps)		
198	2	71.7	102	-94	-4.2	198	50	-5.8	102	-4.6	9.5
196	0	-118.5	100	-96	-5.9*	196	48	-11.9	100	-4.8	10.1*
194	-2	-81.0*	98	-98	-4.6	194	46	-11.2*	98	-5.0	10.7
192	-4	-43.4	96	-100	-4.6	192	44	-0.5	96	-5.2	8.7
190	-6	-29.1	94	-102	-4.6	190	42	-8.7	92	-5.4	8.6
188	-8	-28.7	92	-104	-2.2	188	40	-13.6	90	-5.6	9.0*
186	-10	-28.3	88	-106	-4.5	186	38	-10.9	88	-6.0	9.5
184	-12	-28.2	86	-108	-4.2	184	36	-13.5	86	-6.2	10.1
182	-14	-22.6	84	-110	-3.9	182	34	-13.2	84	-6.4	10.2
180	-16	-21.8	82	-112	-3.9	180	32	-13.2	82	-6.6	10.3
178	-18	-20.3	80	-114	-3.0	178	30	-14.9	80	-6.8	8.9
176	-20	-15.6	78	-116	-3.4	176	28	-15.5	78	-7.0	9.8
174	-22	-10.5	76	-118	-3.4	174	26	-14.2	76	-7.2	9.2
172	-24	-7.5	74	-120	-2.5	172	24	-14.1	74	-7.4	9.8
170	-26	-10.5	72	-122	-2.5	170	22	-14.3	72	-7.6	8.7
168	-28	-1.3	70	-124	-2.6	168	20	-18.5	70	-7.8	8.3
166	-30	-1.2	70	-126	-2.4	166	18	-22.2	68	-8.0	9.1
164	-32	-1.2	68	-128	-2.6	164	16	-22.3	66	-8.2	9.9
162	-34	-1.0	66	-130	-2.1	162	14	-23.3	64	-8.4	7.5
160	-36	-1.0	64	-132	-1.8	160	12	-26.7	62	-8.6	8.6
158	-38	-1.3	62	-134	-2.1	158	10	-28.1	60	-8.8	7.4
156	-40	-9.5	60	-136	-1.9	156	8	-15.4	58	-9.0	8.5
154	-42	-1.4	58	-138	-2.6	154	6	-15.4	56	-9.2	7.7
152	-44	-9.7	56	-140	-2.1	152	4	-68.6	54	-9.4	8.1
150	-46	-14.3	54	-142	-2.1	150	2	-109.6	52	-9.6	8.1
148	-48	-16.3	52	-144	-1.7	148	0	-167.6	50	-9.8	7.0
146	-50	-14.0	50	-146	-1.6	146	-4	-45.7	48	-100	6.9
144	-52	-10.2	48	-148	-1.5	144	-4	-41.5*	46	-102	6.8
142	-54	-10.0	46	-150	-1.3	142	-6	-37.3	44	-104	6.3
140	-56	-9.0	44	-152	-1.2	140	-8	-33.2	42	-106	5.5
138	-58	-8.1	42	-154	-1.1	138	-10	-28.1	40	-108	5.9
136	-60	-8.3	40	-156	-1.3	136	-12	-30.5	38	-110	7.0
134	-62	-9.0	38	-158	-0.8	134	-14	-30.5	36	-112	5.8
132	-64	-10.2	36	-160	-1.0	132	-16	-16.5	34	-114	5.0
130	-66	-6.8	34	-162	-1.0	130	-18	-14.5	32	-116	4.7
128	-68	-6.4	32	-164	-0.8	128	-20	-14.1*	30	-118	4.5
126	-70	-4.6	30	-166	-0.8	126	-22	-14.1*	28	-120	3.3
124	-72	-5.5	28	-168	-0.3	124	-24	-14.6	26	-122	3.3
122	-74	-6.1	26	-170	-0.7	122	-26	-12.0	24	-124	3.3
120	-76	-5.8	24	-172	-0.8	120	-28	-10.7	20	-126	3.6
118	-78	-5.9	22	-174	-0.9	118	-30	-9.0	18	-128	3.9
116	-80	-5.2	20	-176	-0.8	116	-32	-10.5	16	-132	3.4
114	-82	-4.6	18	-178	-1.4	114	-36	-10.1	14	-134	4.2
112	-84	-4.9	16	-180	-0.6	112	-38	-10.4	12	-136	4.5
110	-86	-4.8	14	-182	-0.6	110	-40	-10.3	10	-138	3.0
108	-88	-4.8	12	-184	-0.5	108	-42	-10.3	10	-138	
106	-90	-5.4	10	-186	-0.5	106	-44	-10.2			
104	-92	-5.1				104					

\* = Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex (Flyby down for remote sensing systems)

(P) = Vortex passed over top of tower



Flyby (Run) Number: 5		UAL B767-200		Date: 29 SEP 1990 (Day of Year: 272)	Abeam Time: 7:41:01 (MDT)				
Configuration: Holding		AIRCRAFT DATA		Gross Weight: 255,500lbs.					
Glide Slope: 0 deg.		Flaps: 0 deg.		Altitude: 260 ft AGL					
Wind Speed: 10.1 kts		Indicated Air Speed: 212 kts		Atmospheric Stability: Stable					
Maximum Velocity: (P) fps		Wind Direction: 11 deg.		Air Temperature: 2.9 °C					
Descent Rate: (P) fpm		(200 ft Sensor Level)		Estimated Core Radius: (P) ft					
Configuration: Holding		Age: (P) s		Tower Penetration Height: (P) ft AGL					
Glide Slope: 0 deg.		Advection Rate: (P) fpm		Estimated Core Radius: (M) ft					
Wind Speed: 10.1 kts		(200 ft Sensor Level)		Tower Penetration Height: (M) ft AGL					
Maximum Velocity: (M) fps		Age: (M) s		Estimated Core Radius: (M) ft					
Descent Rate: (M) fpm		Advection Rate: (M) fpm		Tower Penetration Height: (M) ft AGL					
<b>METEOROLOGICAL DATA</b>									
Downwind Vortex Characteristics									
Upwind Vortex Characteristics		Age: (P) s		Upwind Vortex Tangential Velocities					
Upwind Vortex Characteristics		Advection Rate: (P) fpm		Sensor Height (ft)					
Downwind Vortex Tangential Velocities		Age: (M) s		Relative Height (ft)					
Downwind Vortex Tangential Velocities		Advection Rate: (M) fpm		Sensor Height (ft)					
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)				
(P)	(P)	(P)	(P)	(M)	(M)				
198	196	194	192	190	188				
196	194	192	190	188	186				
190	188	186	184	182	180				
188	186	184	182	180	178				
186	184	182	180	178	176				
184	182	180	178	176	174				
182	180	178	176	174	172				
180	178	176	174	172	170				
178	176	174	172	170	168				
176	174	172	170	168	166				
174	172	170	168	166	164				
172	170	168	166	164	162				
170	168	166	164	162	160				
168	166	164	162	160	158				
166	164	162	160	158	156				
164	162	160	158	156	154				
162	160	158	156	154	152				
160	158	156	154	152	150				
158	156	154	152	150	148				
156	154	152	150	148	146				
154	152	150	148	146	144				
152	150	148	146	144	142				
150	148	146	144	142	140				
148	146	144	142	140	138				
146	144	142	140	138	136				
144	142	140	138	136	134				
142	140	138	136	134	132				
140	138	136	134	132	130				
138	136	134	132	130	128				
136	134	132	130	128	126				
134	132	130	128	126	124				
132	130	128	126	124	122				
130	128	126	124	122	120				
128	126	124	122	120	118				
126	124	122	120	118	116				
124	122	120	118	116	114				
122	120	118	116	114	112				
120	118	116	114	112	110				
118	116	114	112	110	108				
116	114	112	110	108	106				
114	112	110	108	106	104				
112	110	108	106	104					
110	108	106	104						
108	106	104							
106	104								
104									

(P) = Vortex passed over top of tower

(M) = Missing

(D) = Vortex dissipated upwind of tower

(O) = No vortex (Flyby flown for remote sensing systems)

(I) = Estimated

Flyby (Run) Number: 6		Date: 29 SEP 1980 (Day of Year: 272)		Abeam Time: 7:46:25 (MDT)	
AIRCRAFT DATA		Air Speed: 250 kts		Gross Weight: 254,700 lbs.	
Configuration: Clean		Indicated Air Speed: 250 kts		Altitude: 240 ft AGL	
Wind Speed: 9.7 kts		Wind Direction: 10 deg.		Air Temperature: 8.4 °C	
Maximum Velocity: (P) fpm		Age: (P) s		Estimated Core Radius: (P) ft	
Descent Rate: (P) fpm		Advection Rate: (P) fpm		Tower Penetration Height: (P) ft AGL	
METEOROLOGICAL DATA (200ft Sensor Level)		Atmospheric Stability: Stable		Estimated Core Radius: 0.2 ft	
Downwind Vortex Characteristics		To tower Penetration Height: 188 ft AGL			
Upwind Vortex Characteristics					
Wind Direction: 10 deg.		Age: 31 s			
Upwind Vortex Tangential Velocities		Advection Rate: 11.0 fpm			
Downwind Vortex Tangential Velocities					
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
(P)	(P)	(P)	(P)	(P)	(P)
198	198	198	198	198	198
196	194	192	190	188	186
192	190	188	186	184	182
190	188	186	184	182	180
188	186	184	182	180	178
186	184	182	180	178	176
184	182	180	178	176	174
182	180	178	176	174	172
180	178	176	174	172	170
178	176	174	172	170	168
176	174	172	170	168	166
174	172	170	168	166	164
172	170	168	166	164	162
170	168	166	164	162	160
168	166	164	162	160	158
166	164	162	160	158	156
164	162	160	158	156	154
162	160	158	156	154	152
160	158	156	154	152	150
158	156	154	152	150	148
156	154	152	150	148	146
154	152	150	148	146	144
152	150	148	146	144	142
150	148	146	144	142	140
148	146	144	142	140	138
146	144	142	140	138	136
144	142	140	138	136	134
142	140	138	136	134	132
140	138	136	134	132	130
138	136	134	132	130	128
136	134	132	130	128	126
134	132	130	128	126	124
132	130	128	126	124	122
130	128	126	124	122	120
128	126	124	122	120	118
126	124	122	120	118	116
124	122	120	118	116	114
122	120	118	116	114	112
120	118	116	114	112	110
118	116	114	112	110	108
116	114	112	110	108	106
114	112	110	108	106	104
112	110	108	106	104	104
110	108	106	104	104	104
108	106	104	102	104	104
106	104	102	100	104	104
104	102	100	98	104	104
102	100	98	96	102	102
100	98	96	94	100	100
98	96	94	92	98	98
96	94	92	90	96	96
94	92	90	88	94	94
92	90	88	86	92	92
90	88	86	84	90	90
88	86	84	82	88	88
86	84	82	80	86	86
84	82	80	78	84	84
82	80	78	76	82	82
80	78	76	74	80	80
78	76	74	72	78	78
76	74	72	70	76	76
74	72	70	68	74	74
72	70	68	66	72	72
70	68	66	64	70	70
68	66	64	62	68	68
66	64	62	60	66	66
64	62	60	58	64	64
62	60	58	56	62	62
60	58	56	54	60	60
58	56	54	52	58	58
56	54	52	50	56	56
54	52	50	48	54	54
52	50	48	46	52	52
50	48	46	44	50	50
48	46	44	42	48	48
46	44	42	40	46	46
44	42	40	38	44	44
42	40	38	36	42	42
40	38	36	34	40	40
38	36	34	32	38	38
36	34	32	30	36	36
34	32	30	28	34	34
32	30	28	26	32	32
30	28	26	24	36	36
28	26	24	22	30	30
26	24	22	20	34	34
24	22	20	18	38	38
22	20	18	16	42	42
20	18	16	14	46	46
18	16	14	12	50	50
16	14	12	10	54	54
14	12	10	8	58	58
12	10	8	6	62	62
10	8	6	4	66	66
8	6	4	2	70	70
6	4	2	-	74	74
4	2	-	-	78	78
2	-	-	-	82	82
-	-	-	-	86	86

(D) = Vortex dissipated upwind of tower (M) = Missing (O) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower (I) = Vortex passed over top of tower

(N) = Estimated (S) = Standard Deviation

(V) = Vortex passed over top of tower (W) = Wind direction

(X) = Wind speed (Y) = Wind shear (Z) = Wind direction shear

Flyby (Run) Number: 7	UAI B767-200	Date: 29 SEP 1990 (Day of Year: 272)	Abeam Time: 7:53:25 (MDT)							
<b>AIRCRAFT DATA</b>										
Configuration: Landing	Flaps: 25 deg.	Gross Weight: 253,700lbs.								
Glide Slope: 0 deg.	Indicated Air Speed: 140 kts	Altitude: 230 ft AGL								
Wind Speed: 8.1 kts	Wind Direction: 14 deg.	Air Temperature: 7.8 °C	Atmospheric Stability: Stable							
Maximum Velocity: 129.1 fpm	DOWNWIND VORTEX CHARACTERISTICS									
Descent Rate: 2.8 fpm	Age: 20.5 s	Advection Rate: 9.2 fpm	Estimated Core Radius: 0.6 ft							
Maximum Velocity: 74.4 fpm	UPWIND VORTEX CHARACTERISTICS									
Descent Rate: 2.4 fpm	Age: 35.5 s	Advection Rate: 7.9 fpm	Tower Penetration Height: 174 ft AGL							
Sensor Height (ft)										
Relative Height (ft)										
Sensor Height (ft)	Relative Height (ft)	Relative Height (ft)	Relative Height (ft)							
V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)							
Downwind Vortex Tangential Velocities	Upwind Vortex Tangential Velocities									
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)							
V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)							
198	24	11.8	102	-7.2	-12.1	5.2	-8.0	102	-4.4	11.0
196	22	13.5	100	-7.6	-10.6*	198	50	100	-4.6	9.9*
194	20	17.8	98	-8.4	-9.0	196	48	98	-4.8	8.8
192	18	20.0*	96	-8.8	-8.4	192	46	96	-5.0	9.4
190	16	22.3	94	-8.2	-8.8	190	44	94	-5.2	10.0
188	14	24.5*	92	-8.4	-7.9*	188	42	92	-5.4	10.3*
186	12	26.8	90	-7.1	-7.1	186	40	90	-5.6	10.7
184	10	29.5	88	-8.6	-7.9	184	38	88	-5.8	8.4
182	8	36.9	86	-8.8	-7.6	182	36	86	-6.0	6.0
180	6	34.1	84	-9.0	-8.4	180	34	84	-6.2	12.7
178	4	53.2	82	-9.2	-7.5	178	32	82	-6.4	10.7
176	2	96.5	80	-9.4	-7.8	176	30	80	-6.6	6.7
174	0	-129.1	78	-9.6	-7.6	174	28	78	-6.8	9.4
172	-2	-61.4	76	-9.8	-2.4	172	26	76	-7.0	9.5
170	-4	-56.0*	74	-100	-4.6	170	24	74	-7.2	10.3
168	-6	-50.8	72	-102	-4.4	168	22	72	-7.4	6.9
166	-8	-33.1	70	-104	-5.4	166	20	70	-7.6	8.8
164	-10	-28.1	68	-106	-3.6	164	18	68	-7.8	7.3
162	-12	-27.3	66	-108	-4.2	162	16	66	-8.0	7.5
160	-14	-24.4	64	-110	-2.7	160	14	64	-8.2	5.8
158	-16	-21.2	62	-112	-2.2	158	12	62	-8.4	6.6
156	-18	-18.2	60	-114	-2.7	156	10	60	-8.6	6.3
154	-20	-14.2	58	-116	-2.6	154	8	58	-8.8	5.9
152	-22	-21.0	56	-118	-2.0	152	6	56	-9.0	5.0
150	-24	-16.0	54	-120	-2.0	150	4	54	-9.2	5.3
148	-26	-14.3	52	-122	-2.1	148	2	52	-9.4	5.2
146	-28	-14.4	50	-124	-1.1	146	0	50	-9.6	4.7
144	-30	-10.3	48	-126	-1.9	144	-2	48	-9.8	4.9
142	-32	-11.3	46	-128	-0.7	142	4	58.6	-100	6.7
140	-34	-10.6	44	-130	-1.4	140	2	41.1	56	6.9
138	-36	-10.6	42	-132	-0.9	138	8	44.0	42	104
136	-38	-10.3	40	-134	-1.0	136	-10	227.7	40	106
134	-40	-9.3	38	-136	-0.9	134	-12	27.3	38	108
132	-42	-13.6	36	-138	-0.9	132	-14	30.3	36	110
130	-44	-8.9	34	-140	-1.0	130	-16	30.8*	34	112
128	-46	-3.7	32	-142	-0.9	128	-18	31.2	32	114
126	-48	-5.9	30	-144	-0.2	126	-20	36.0	44	116
124	-50	-11.3	28	-146	-0.1	124	-22	26.8	42	118
122	-52	-10.4	26	-148	-0.9	122	-24	23.1	26	120
120	-54	-15.2	24	-150	-0.7	120	-26	24.9*	24	122
118	-56	-14.0	22	-152	-0.6	118	-28	23.1	22	124
116	-58	-11.2	20	-154	-0.3	116	-30	23.1	18	126
114	-60	-13.7	18	-156	-0.1	114	-32	15.9	-116	5.8
112	-62	-10.6	16	-158	0.2	112	-34	16.1	-118	4.3
110	-64	-12.2	14	-160	0.3	110	-36	13.4	-120	3.8
108	-66	-11.7	12	-162	0.1	108	-38	11.3	-122	4.1
106	-68	-12.4	10	-164	-0.2	106	-40	13.3	-124	4.4
104	-70	-13.4				104	-42	10.5	-126	5.7

\* = Estimated      (D) = Vortex dissipated upwind of tower      (M) = Missing      (O) = No vortex (Flyby flown for remote sensing systems)      (P) = Vortex passed over top of tower

UAL B767-200									
Date: 29 SEP 1990 (Day of Year: 272)									Absent Time: 7:59:52 (MDT)
AIRCRAFT DATA									
Flaps: 25 deg.									Gross Weight: 252,000 lbs.
Indicated Air Speed: 1,440 kts									Altitude: 230 ft AGL
METEOROLOGICAL DATA									
(200 ft Sensor Level)									Atmospheric Stability: Stable
Wind Speed: 6.5 kts									
Wind Direction: 17 deg.									Air Temperature: 7.3 °C
Maximum Velocity: 107.0 fps									
Descent Rate: 2.1 fps									Estimated Core Radius: 0.8 ft
Downwind Vortex Characteristics									
Age: 16 s									Tower Penetration Height: 196 ft AGL
Advection Rate: 9.1 fps									Estimated Core Radius: 0.9 ft
Upwind Vortex Characteristics									
Age: 32 s									Tower Penetration Height: 142 ft AGL
Downwind Vortex Velocities									
Sensor Height [ft]									Upwind Vortex Tangential Velocities
Sensor Height [ft]	Relative Height [ft]	V <sub>θ</sub> [fps]	Relative Height [ft]	V <sub>θ</sub> [fps]	Sensor Height [ft]	Relative Height [ft]	V <sub>θ</sub> [fps]	Sensor Height [ft]	Relative Height [ft]
198	2	67.7	102	-3.7	198	56	-10.5	102	-40
196	0	-197.0	100	-94	196	54	-10.5*	100	-42
194	-2	-76.8	98	-4.4*	194	52	-10.3	98	-44
192	-4	-33.6	96	-5.0	192	50	-11.8	96	-46
190	-6	-35.8	94	-10.2	190	48	-9.8	94	-48
188	-8	-29.5	92	-10.4	188	46	-10.6	92	-50
186	-10	-35.4	90	-1.6	186	44	-10.9	90	-52
184	-12	-27.3	88	-0.8	184	42	-12.0	88	-54
182	-14	-40	86	-1.0	182	40	-12.6	86	-56
180	-16	-29.6	84	-4.8	180	38	-11.4	84	-58
178	-18	-25.5	82	-1.4	178	36	-11.9	82	-60
176	-20	-30.6	80	-1.1	176	34	-12.4	80	-62
174	-22	-18.7	78	-1.8	174	32	-12.9	78	-64
172	-24	-17.7	76	-2.0	172	30	-16.2	76	-66
170	-26	-11.3	74	-1.2	170	28	-10.8	74	-68
168	-28	-13.8	72	-1.2	168	26	-12.6	72	-70
166	-30	-16.2	70	-3.1	166	24	-16.0	70	-72
164	-32	-15.9	68	-1.2	164	22	-16.8	68	-74
162	-34	-15.2	66	-1.8	162	20	-17.8	66	-76
160	-36	-15.4	64	-3.2	160	18	-18.5	64	-78
158	-38	-14.4	62	-1.8	158	16	-19.2	62	-80
156	-40	-14.2	60	-1.8	156	14	-19.6	60	-82
154	-42	-13.7	58	-3.6	154	12	-23.6	58	-84
152	-44	-12.0*	56	-1.7	152	10	-24.2*	56	-86
150	-46	-10.3	54	-1.4	150	8	-24.8	54	-88
148	-48	-9.5	52	-1.8	148	6	-26.7	52	-90
146	-50	-8.8	50	-1.3	146	4	-39.0	50	-92
144	-52	-8.2	48	-1.9	144	2	-62.6	48	-94
142	-54	-8.2	46	-1.3	142	0	-88.6	46	-96
140	-56	-8.0	44	-1.4	140	-2	-56.0	44	-98
138	-58	-6.5	42	-1.4	138	-4	-53.4	42	-100
136	-60	-8.9	40	-1.5	136	-6	-48.2	40	-102
134	-62	-7.8	38	-1.7	134	-8	-40.9	38	-104
132	-64	-8.4	36	-1.5	132	-10	-40.2*	36	-106
130	-66	-6.9	34	-1.9	130	-12	-39.5*	34	-108
128	-68	-7.3	32	-1.8	128	-14	-38.8	32	-110
126	-70	-4.4	30	-1.8	126	-16	-36.2*	30	-112
124	-72	-4.4	28	-1.6	124	-18	-33.5	28	-114
122	-74	-5.1	26	-1.7	122	-20	-35.6	26	-116
120	-76	-2.4	24	-1.5	120	-22	-37.8	24	-118
118	-78	-5.8	22	-1.5	118	-24	-33.1	22	-120
116	-80	-5.5	20	-1.7	116	-26	-26.9*	20	-122
114	-82	-5.2	18	-1.8	114	-28	-12.7	18	-124
112	-84	-4.9	16	-1.8	112	-30	-22.4	16	-126
110	-86	-4.7	14	-0.6	110	-32	-17.4	14	-128
108	-88	-4.0	12	-0.9	108	-34	-16.6	12	-130
106	-90	-3.2	10	-0.5	106	-36	-20.7	10	-132
104	-92	-3.8			104	-38	-15.5		

(\*P) = Vortex passed over top of tower

(O) = No vortex (Flys flown for remote sensing systems)

= Estimated

(D) = Vortex dissipated upwind of tower

Flyby (Run) Number: 9	Date: 29 SEP 1990 (Day of Year: 272)	Abeam Time: 8:06:26 (MDT)
Configuration: Landing Glide Slope: -3 deg.	AIRCRAFT DATA Flaps: 25 deg. Indicated Air Speed: 140 kts	Gross Weight: 250,000lbs. Altitude: 260 ft AGL
Wind Speed: 6.8 kts	Wind Direction: 50 deg.	Atmospheric Stability: Stable
Maximum Velocity: (P) fps Descent Rate: (P) fpm	METEOROLOGICAL DATA (200 ft Sensor Level) Air Temperature: 7.6 °C	Estimated Core Radius: (P) ft Tower Penetration Height: (P) ft AGL
Maximum Velocity: 78.7 fpm Descent Rate: 2.5 fpm	DOWNTWIND VORTEX CHARACTERISTICS Age: (P) s Advection Rate: (P) fpm	DOWNTWIND VORTEX CHARACTERISTICS Age: 41.5 Advection Rate: 6.3 fpm
Sensor Height (ft)	Relative Height (ft)	Relative Height (ft)
198	(P)	102
196	(P)	100
194	(P)	98
192	(P)	96
190	(P)	94
188	(P)	92
186	(P)	90
184	(P)	88
182	(P)	86
180	(P)	84
178	(P)	82
176	(P)	80
174	(P)	78
172	(P)	76
170	(P)	74
168	(P)	72
166	(P)	70
164	(P)	68
162	(P)	66
160	(P)	64
158	(P)	62
156	(P)	60
154	(P)	58
152	(P)	56
150	(P)	54
148	(P)	52
146	(P)	50
144	(P)	48
142	(P)	46
140	(P)	44
138	(P)	42
136	(P)	40
134	(P)	38
132	(P)	36
130	(P)	34
128	(P)	32
126	(P)	30
124	(P)	28
122	(P)	26
120	(P)	24
118	(P)	22
116	(P)	20
114	(P)	18
112	(P)	16
110	(P)	14
108	(P)	12
106	(P)	10
104	(P)	04

\* = Estimated      (D) = Vortex dissipated upwind of tower      (M) = Missing      (O) = No vortex (Flyby flown for remote sensing systems)      (P) = Vortex passed over top of tower

Flyby (Run) Number: 10	UAL B767-200	Date: 29 SEP 1990 (Day of Year: 272)	Abeam Time: 8:12:47 (MDT)
Configuration: Landing			
Glide Slope: 0 deg.			
Wind Speed: 4.0 kts			
Maximum Velocity: [P] fps			
Descent Rate: [P] fps			
Maximum Velocity: 65.0 fps			
Descent Rate: 0.8 fps			
AIRCRAFT DATA			
Flaps: 30 deg.	Indicated Air Speed: 135 kts	Gross Weight: 249,000 lbs.	
		Altitude: 220 ft AGL	
METEOROLOGICAL DATA [200 ft Sensor Level]			
Wind Direction: 47 deg. Air Temperature: 6.9 °C Atmospheric Stability: Stable			
Downwind Vortex Characteristics			
Age: [P] s		Estimated Core Radius: (P) ft	
Advection Rate: (P) fps		Tower Penetration Height: (P) ft AGL	
Upwind Vortex Characteristics			
Age: 112 s		Estimated Core Radius: 1.0 ft	
Advection Rate: 2.7 fps		Tower Penetration Height: 128 ft AGL	
Downwind Vortex Tangential Velocities			
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
198	[P]	102	[P]
196	[P]	100	[P]
194	[P]	98	[P]
192	[P]	96	[P]
190	[P]	94	[P]
188	[P]	92	[P]
186	[P]	90	[P]
184	[P]	88	[P]
182	[P]	86	[P]
180	[P]	84	[P]
178	[P]	82	[P]
176	[P]	80	[P]
174	[P]	78	[P]
172	[P]	76	[P]
170	[P]	74	[P]
168	[P]	72	[P]
166	[P]	70	[P]
164	[P]	68	[P]
162	[P]	66	[P]
160	[P]	64	[P]
158	[P]	62	[P]
156	[P]	60	[P]
154	[P]	58	[P]
152	[P]	56	[P]
150	[P]	54	[P]
148	[P]	52	[P]
146	[P]	50	[P]
144	[P]	48	[P]
142	[P]	46	[P]
140	[P]	44	[P]
138	[P]	42	[P]
136	[P]	40	[P]
134	[P]	38	[P]
132	[P]	36	[P]
130	[P]	34	[P]
128	[P]	32	[P]
126	[P]	30	[P]
124	[P]	28	[P]
122	[P]	26	[P]
120	[P]	24	[P]
118	[P]	22	[P]
116	[P]	20	[P]
114	[P]	18	[P]
112	[P]	16	[P]
110	[P]	14	[P]
108	[P]	12	[P]
106	[P]	10	[P]
104	[P]	8	[P]
(D) = Estimated			
(M) = Missing			
(O) = No vortex (Flyby flown for remote sensing systems)			
(P) = Vortex passed over top of tower			

Flyby (Run) Number: 11		Date: 29 SEP 1990 (Day of Year: 272)		Abeam Time: 8:19:15 (MDT)	
AIRCRAFT DATA		Gross Weight: 248,000lbs. Altitude: 260 ft AGL			
Configuration: Landing Glide Slope: -3 deg.		Flaps: 30 deg. Indicated Air Speed: 134 kts			
Wind Speed: 8.1 kts		Wind Direction: 44 deg.		Air Temperature: 7.7°C	
Maximum Velocity: (P) fps		Age: (P) s		Estimated Core Radius: (P) ft	
Descent Rate: (P) fps		Advection Rate: (P) fps		Tower Penetration Height: (P) ft AGL	
METEOROLOGICAL DATA		Estimated Core Radius: 0.9 ft			
(200 ft Sensor Level)		Tower Penetration Height: 146 ft AGL			
UPWIND VORTEX CHARACTERISTICS		Atmospheric Stability: Stable			
Downwind Vortex Characteristics					
Wind Direction: 44 deg.		Age: 33 s		Upwind Vortex Tangential Velocities	
Maximum Velocity: 109.6 fps		Advection Rate: 8.6 fps		Sensor Height (ft)	
Descent Rate: 3.5 fps		Relative Height (ft)		V <sub>θ</sub> (fps)	
Sensor Height (ft)		Sensor Height (ft)		Sensor Height (ft)	
Relative Height (ft)		Relative Height (ft)		V <sub>θ</sub> (fps)	
198 (P)		102 (P)		198 (P)	
196 (P)		100 (P)		196 (P)	
194 (P)		98 (P)		194 (P)	
192 (P)		96 (P)		192 (P)	
190 (P)		94 (P)		190 (P)	
188 (P)		92 (P)		188 (P)	
186 (P)		90 (P)		186 (P)	
184 (P)		88 (P)		184 (P)	
182 (P)		86 (P)		182 (P)	
180 (P)		84 (P)		180 (P)	
178 (P)		82 (P)		178 (P)	
176 (P)		80 (P)		176 (P)	
174 (P)		78 (P)		174 (P)	
172 (P)		76 (P)		172 (P)	
170 (P)		74 (P)		170 (P)	
168 (P)		72 (P)		168 (P)	
166 (P)		70 (P)		166 (P)	
164 (P)		68 (P)		164 (P)	
162 (P)		66 (P)		162 (P)	
160 (P)		64 (P)		160 (P)	
158 (P)		62 (P)		158 (P)	
156 (P)		60 (P)		156 (P)	
154 (P)		58 (P)		154 (P)	
152 (P)		56 (P)		152 (P)	
150 (P)		54 (P)		150 (P)	
148 (P)		52 (P)		148 (P)	
146 (P)		50 (P)		146 (P)	
144 (P)		48 (P)		144 (P)	
142 (P)		46 (P)		142 (P)	
140 (P)		44 (P)		140 (P)	
138 (P)		42 (P)		138 (P)	
136 (P)		40 (P)		136 (P)	
134 (P)		38 (P)		134 (P)	
132 (P)		36 (P)		132 (P)	
130 (P)		34 (P)		130 (P)	
128 (P)		32 (P)		128 (P)	
126 (P)		30 (P)		126 (P)	
124 (P)		28 (P)		124 (P)	
122 (P)		26 (P)		122 (P)	
120 (P)		24 (P)		120 (P)	
118 (P)		22 (P)		118 (P)	
116 (P)		20 (P)		116 (P)	
114 (P)		18 (P)		114 (P)	
112 (P)		16 (P)		112 (P)	
110 (P)		14 (P)		110 (P)	
108 (P)		12 (P)		108 (P)	
106 (P)		10 (P)		106 (P)	
104 (P)		8 (P)		104 (P)	

(O) = No vortex (Flyby flown for remote sensing systems)

(M) = Missing

(D) = Vortex dissipated upwind of tower

(P) = Vortex passed over top of tower

Flyby (Run) Number: 12	Date: 29 SEP 1990 (Day of Year: 272)	Abeam Time: 8:26:37 (MDT)						
Configuration: Landing	AIRCRAFT DATA							
Glide Slope: -3 deg.	Flaps: 30 deg.	Gross Weight: 247,000 lbs.						
Indicated Air Speed: 134 kts		Altitude: 240 ft AGL						
Wind Speed: 7.8 kts	Wind Direction: 46 deg.	Atmospheric Stability: Stable						
Maximum Velocity: (P) fpm	Age: (P)s	Estimated Core Radius: (P) ft						
Descent Rate: (P) fpm	Advection Rate: (P) fpm	Tower Penetration Height: (P) ft AGL						
Maximum Velocity: 95.7 fpm	Age: 26 s	Estimated Core Radius: 1.3 ft						
Descent Rate: 4.5 fpm	Advection Rate: 9.1 fpm	Tower Penetration Height: 124 ft AGL						
Downwind Vortex tangential Velocities	Downwind VORTEX CHARACTERISTICS	Upwind Vortex Tangential Velocities						
Sensor Height (ft)	Relative Height (ft)	V <sub>e</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	V <sub>e</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	V <sub>e</sub> (fps)
198	(P)	102	(P)	198	74	-8.4	102	-22
196	(P)	100	(P)	196	72	-9.5	98	-24
192	(P)	98	(P)	194	70	-7.0	98	-26
190	(P)	96	(P)	192	68	-8.8	96	-28
188	(P)	94	(P)	190	66	-7.8	94	-30
186	(P)	92	(P)	188	64	-9.4	92	-32
184	(P)	90	(P)	186	62	-9.4	90	-34
182	(P)	88	(P)	184	60	-10.3	88	-36
180	(P)	86	(P)	182	58	-11.6	86	-38
178	(P)	84	(P)	180	56	-10.5	84	-40
176	(P)	82	(P)	178	54	-12.3	82	-42
174	(P)	80	(P)	176	52	-13.1	80	-44
172	(P)	78	(P)	174	50	-12.9	78	-46
170	(P)	76	(P)	172	48	-14.2	76	-48
168	(P)	74	(P)	170	46	-14.2	74	-50
166	(P)	72	(P)	168	44	-13.9	72	-52
164	(P)	70	(P)	166	42	-13.8	70	-54
162	(P)	68	(P)	164	40	-15.5	68	-56
160	(P)	66	(P)	162	38	-15.3	66	-58
158	(P)	64	(P)	160	36	-15.1	64	-60
156	(P)	62	(P)	158	34	-15.5	62	-62
154	(P)	60	(P)	156	32	-16.9	60	-64
152	(P)	58	(P)	154	30	-19.0	58	-66
150	(P)	56	(P)	152	28	-21.5	56	-68
148	(P)	54	(P)	150	26	-21.2	54	-70
146	(P)	52	(P)	148	24	-19.8	52	-72
144	(P)	50	(P)	146	22	-21.9	50	-74
142	(P)	48	(P)	144	20	-21.8	48	-76
140	(P)	46	(P)	142	18	-23.9	46	-78
138	(P)	44	(P)	140	16	-23.6	44	-80
136	(P)	42	(P)	138	14	-24.1	42	-82
134	(P)	40	(P)	136	12	-32.8	40	-84
132	(P)	38	(P)	134	10	-36.8*	38	6.5
130	(P)	36	(P)	132	8	-40.8	36	-86
128	(P)	34	(P)	130	6	-36.0	34	-88
126	(P)	32	(P)	128	4	-61.8	32	-90
124	(P)	30	(P)	126	2	-64.4	30	-94
122	(P)	28	(P)	124	0	-95.7	28	6.5
120	(P)	26	(P)	122	-2	57.0	26	-96
118	(P)	24	(P)	120	-4	48.9	24	-100
116	(P)	22	(P)	118	-6	36.4	22	-102
114	(P)	20	(P)	116	-8	42.3	20	-104
112	(P)	18	(P)	114	-10	28.2	18	5.9
110	(P)	16	(P)	112	-12	28.2*	16	-106
108	(P)	14	(P)	110	-14	27.2	14	7.0
106	(P)	12	(P)	108	-16	29.2	12	3.7
104	(P)	10	(P)	106	-18	25.6	10	-112
				104	-20	26.9		4.6

= Estimated

(D) = Vortex dissipated upwind of tower

O

(M) = Missing

(O) = No vortex (Flyby passed over top of tower)

(P) = Vortex flown for remote sensing systems

UAL B767-200				Date: 29 SEP 1990 (Day of Year: 272)	Abeam Time: 8:33:16 (MDT)
AIRCRAFT DATA					
Configuration: Takeoff Glide Slope: 0 deg.				Gross Weight: 245,400lbs. Altitude: 220 ft AGL	
Flaps: 20 deg. Indicated Air Speed: 135 kts					
Wind Speed: 5.6 kts	Wind Direction: 30 deg.	Air Temperature: 7.9 °C	Atmospheric Stability: Stable	Estimated Core Radius: 1.4 ft	Tower Penetration Height: 26 ft AGL
Maximum Velocity: 24.8 fps				Estimated Core Radius: (D) ft	
Descent Rate: 3.5 fps	Age: 55 s	Advection Rate: 3.6 fps	Tower Penetration Height: (D) ft AGL		
METEOROLOGICAL DATA (200 ft Sensor Level)				Atmospheric Stability: Steble	
Wind Speed: 5.6 kts	Wind Direction: 30 deg.	Air Temperature: 7.9 °C	Atmospheric Stability: Steble		
DOWNWIND VORTEX CHARACTERISTICS					
Age: (D) s				Estimated Core Radius: (D) ft	
Advection Rate: (D) fps				Tower Penetration Height: (D) ft AGL	
UPWIND VORTEX CHARACTERISTICS					
Age: (D) s				Estimated Core Radius: (D) ft	
Advection Rate: (D) fps				Tower Penetration Height: (D) ft AGL	
Downwind Vortex Tangential Velocities					
Sensor Height (ft)	Relative Height (ft)	Downwind Vortex $V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	Upwind Vortex $V_\theta$ (fps)
198	172	12.4	102	7.4	(D)
196	170	12.4	100	7.6	(D)
194	168	10.9	98	6.0*	(D)
192	166	7.3	70	4.7	(D)
190	164	8.4	94	5.8	(D)
188	162	9.4	68	5.8	(D)
186	160	13.7	92	6.6	(D)
184	158	11.0	90	6.4	(D)
182	156	13.2	88	6.2	(D)
180	154	10.8	84	5.8	(D)
178	152	12.9	82	5.6	(D)
176	150	12.1	80	5.4	(D)
174	148	12.7	78	5.2	(D)
172	146	10.6	76	5.0	(D)
170	144	7.0	74	4.8	(D)
168	142	9.4	72	4.6	(D)
166	140	11.7	70	4.4	(D)
164	138	11.9	68	4.2	(D)
162	136	12.2	66	4.0	(D)
160	134	12.2	64	3.8	(D)
158	132	11.4	62	3.6	(D)
156	130	12.1	60	3.4	(D)
154	128	10.9	58	3.2	(D)
152	126	13.3	56	3.0	(D)
150	124	9.2	54	2.8	(D)
148	122	10.9	52	2.6	(D)
146	120	13.4	50	2.4	(D)
144	118	9.2	48	2.2	(D)
142	116	5.7	46	2.0	(D)
140	114	7.0	44	1.8	(D)
138	112	6.5	42	1.6	(D)
136	110	8.7	40	1.4	(D)
134	108	6.6	38	1.2	(D)
132	106	6.4	36	1.0	(D)
130	104	6.2	34	0.8	(D)
128	102	7.0	32	0.6	(D)
126	100	2.7	30	4	(D)
124	98	4.5	28	2	(D)
122	96	8.8	26	0	(D)
120	94	6.5	24	-2	(D)
118	92	5.6	22	-4	(D)
116	90	8.1	20	-6	(D)
114	88	7.3	18	-8	(D)
112	86	9.0	16	-10	(D)
110	84	9.0	14	-12	(D)
108	82	8.5	12	-14	(D)
106	80	8.0	10	-14	(D)
104	78	6.2	-16	-16	(D)
					104

\* = Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

Flyby (Run) Number: 14		UAL B767-200		Date: 29 SEP 1990 (Day of Year: 272)		Absent Time: 8:39:24 (MDT)	
Configuration: Takeoff Glide Slope: 0 deg.		AIRCRAFT DATA Flaps: 15 deg. Indicated Air Speed: 139 kts		METEOROLOGICAL DATA (200 ft Sensor Level) Age: 57 s Wind Direction: 13 deg.		Atmospheric Stability: Stable Estimated Core Radius: 0.5 ft Tower Penetration Height: 30 ft AGL	
Wind Speed: 3.6 kts		DOWNDOWN VORTEX CHARACTERISTICS Advection Rate: 2.1 fps		UPWIND VORTEX CHARACTERISTICS Age: 93 s Advection Rate: 2.3 fps		Tower Penetration Height: 156 ft AGL Estimated Core Radius: 0.6 ft	
Sensor Height (ft)	Relative Height (ft)	Downwind Vortex Tangential Velocities $V_{\theta}$ (fps)	Sensor Height (ft)	Downdown Vortex Tangential Velocities $V_{\theta}$ (fps)	Sensor Height (ft)	Upwind Vortex Tangential Velocities $V_{\theta}$ (fps)	Tower Penetration Velocities $V_{\theta}$ (fps)
198	168	9.4	102	7.2	4.5	198	102
196	166	8.8	100	7.0	4.6*	196	5.4
194	164	9.2	98	6.8	4.7	194	5.6
192	162	5.8	96	3.6	3.3	192	5.2
190	160	11.1	94	6.4	7.0	190	3.7
188	158	5.9	92	6.2	5.9*	188	6.7
186	156	11.2	90	6.0	4.7	186	5.1
184	154	9.3	88	5.8	5.3	184	9.2
182	152	9.6	86	5.6	5.5	182	2.8
180	150	8.4	84	5.4	6.5	180	24
178	148	12.0	82	5.2	7.7	178	22
176	146	10.6	80	5.0	5.2	176	20
174	144	9.8	78	4.8	7.1	174	18
172	142	9.6	76	4.6	7.8	172	16
170	140	9.8*	74	4.4	8.0	170	14
168	138	9.9	72	4.2	7.6	168	12
166	136	10.0	70	4.0	6.3	166	10
164	134	9.7	68	3.8	4.8	164	8
162	132	9.3	66	3.6	6.8	162	6
160	130	9.9	64	3.4	7.2	160	4
158	128	7.4	62	3.2	5.0	158	2
156	126	8.4	60	3.0	6.2	156	0
154	124	9.0	58	2.8	5.0	154	-2
152	122	10.4	56	2.6	5.2	152	-4
150	120	8.7	54	2.4	6.3	150	-6
148	118	9.3	52	2.2	5.2	148	-8
146	116	11.1	50	2.0	9.2	146	-12
144	114	9.2	48	1.8	9.7	144	-14
142	112	8.9	46	1.6	13.3	142	-16
140	110	4.4	44	1.4	16.4	140	-18
138	108	7.2	42	1.2	9.7	138	-20
136	106	6.9	40	1.0	8.1	136	-20
134	104	10.4	8.2	0.8	17.1	134	-22
132	102	9.5	36	0.6	20.0	132	-24
130	100	6.4	4	0.4	16.4	130	-26
128	98	7.1	34	0.2	19.7	128	-28
126	96	3.8	32	0.0	53.1	126	-30
124	94	6.5	28	-2	124	24	-32
122	92	8.2	26	-4	23.0	122	-34
120	90	7.5	24	-6	12.5	120	-36
118	88	2.2	22	-8	5.8	118	-38
116	86	6.3	20	-10	6.3	116	-40
114	84	9.0	18	-12	6.9	114	-42
112	82	6.5	16	-14	5.0	112	-44
110	80	7.1	14	-16	5.8	110	-46
108	78	7.3	12	-18	3.7	108	-48
106	76	5.2	10	-20	7.0	106	-50
104	74	4.8	0	-20	10.4	104	-52

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Flyby (Run) Number: 15		Date: 29 SEP 1990 (Day of Year: 272)		Abeam Time: 8:45:58 (MDT)
<b>AIRCRAFT DATA</b>		Gross Weight: 242,500 lbs. Altitude: 230 ft AGL		
Configuration: Takeoff Glide Slope: 0 deg.		Flaps: 5 deg. Indicated Air Speed: 146 kts		
Wind Speed: 3.5 kts		Air Temperature: 7.4 °C		
Maximum Velocity: 189.6 fpm Descent Rate: 2.0 fpm		Atmospheric Stability: Neutral		
Maximum Velocity: 56.0 fpm Descent Rate: 2.0 fpm		Tower Penetration Height: 36 ft AGL		
Wind Direction: 7 deg.		Estimated Core Radius: 0.3 ft		
Downwind Vortex Characteristics		Tower Penetration Height: 114 ft AGL		
Age: 59 s		Estimated Core Radius: 0.6 ft		
Advection Rate: 2.0 fpm		Tower Penetration Height: 0.3 ft		
Upwind Vortex Characteristics		Tower Penetration Height: 114 ft AGL		
Age: 99 s		Estimated Core Radius: 0.6 ft		
Advection Rate: 2.1 fpm		Tower Penetration Height: 36 ft AGL		
Downwind Vortex Tangential Velocities		Upwind Vortex Tangential Velocities		
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)
198	84	4.4	102	198
196	82	4.3	100	196
194	80	5.2	-14	184
192	78	4.3	-16	-17.1*
190	76	7.3	-18	-15.8
188	74	4.1	-20	-15.7
186	72	4.1	-22	-15.5*
184	70	4.1	-24	-15.3
182	68	4.0	-26	-14.9
180	66	5.0	-28	-14.6
178	64	4.5	-30	-14.5
176	62	6.1	-32	-9.9
174	60	7.0	-34	-9.2
172	58	5.8	-36	-14.2
170	56	3.7	-38	-10.7
168	54	5.7	-40	-9.1
166	52	7.6	-72	-4.2
164	50	7.9	-44	-8.0
162	48	6.6	-46	-7.6
160	46	7.6	-48	-5.0
158	44	7.3	-64	-5.2
156	42	9.1	-62	-5.4
154	40	8.0	-58	-4.6
152	38	8.8	-56	-3.9
150	36	6.8	-54	-5.1
148	34	7.0	-52	-6.1
146	32	11.6	-50	-6.4
144	30	10.4	-48	-6.8
142	28	11.0	-46	-7.2
140	26	10.9	-44	-7.2
138	24	9.7	-42	-7.2
136	22	12.1	-40	-7.4
134	20	11.4	-38	-6.3
132	18	16.0	-36	-5.6
130	16	15.1	-34	-5.2
128	14	17.3	-32	-8.2
126	12	11.6	-30	-8.4
124	10	16.9	-28	-8.6
122	8	24.2	-26	-8.8
120	6	21.8	-24	-9.0
118	4	33.3	-22	-9.2
116	2	34.0	-20	-9.4
114	0	-189.6	-18	-9.6
112	-2	-75.5	-16	-9.8
110	-4	-100	-14	-4.7
108	-6	-19.1	-12	-10.2
106	-8	-24.6	-10	-5.0
104	-10	-22.6	-104	-10.6

(\*) = No vortex (Flyby passed over top of tower) (P) = Vortex dissipated upwind of tower

(M) = Missing (W) = Vortex flown for remote sensing systems

\* = Estimated

Flyby (Run) Number: 16	Date: 29 SEP 1990 (Day of Year: 272)	Abeam Time: 8:51:36 (MDT)					
Configuration: Takeoff	AIRCRAFT DATA						
Glide Slope: 0 deg.	Flaps: 1 deg.	Gross Weight: 241,800 lbs.					
	Indicated Air Speed: 151 kts	Altitude: 230 ft AGL					
Wind Speed: 5.0 kts	Wind Direction: 14 deg.	Air Temperature: 7.6 °C					
Maximum Velocity: (D) fps	Age: (D) s	Atmospheric Stability: Neutral					
Descent Rate: (D) fps	Advection Rate: (D) fps						
Downwind Vortex Tangential Velocities	Upwind Vortex Characteristics						
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
Relative Height (ft)	V <sub>θ</sub> (fps)	Relative Height (ft)	V <sub>θ</sub> (fps)	Relative Height (ft)	V <sub>θ</sub> (fps)	Relative Height (ft)	V <sub>θ</sub> (fps)
198	D	102	D	198	D	102	D
196	D	100	D	196	D	100	D
194	D	98	D	192	D	98	D
192	D	96	D	190	D	94	D
190	D	94	D	188	D	92	D
188	D	92	D	186	D	90	D
186	D	90	D	184	D	88	D
184	D	88	D	182	D	86	D
182	D	86	D	180	D	84	D
180	D	84	D	178	D	82	D
178	D	82	D	176	D	80	D
176	D	80	D	174	D	78	D
174	D	78	D	172	D	76	D
172	D	76	D	170	D	74	D
170	D	74	D	168	D	72	D
168	D	72	D	166	D	70	D
166	D	70	D	164	D	68	D
164	D	68	D	162	D	66	D
162	D	66	D	160	D	64	D
160	D	64	D	158	D	62	D
158	D	62	D	156	D	60	D
156	D	60	D	154	D	58	D
154	D	58	D	152	D	56	D
152	D	56	D	150	D	54	D
150	D	54	D	148	D	52	D
148	D	52	D	146	D	50	D
146	D	50	D	144	D	48	D
144	D	48	D	142	D	46	D
142	D	46	D	140	D	44	D
140	D	44	D	138	D	42	D
138	D	42	D	136	D	40	D
136	D	40	D	134	D	38	D
134	D	38	D	132	D	36	D
132	D	36	D	130	D	34	D
130	D	34	D	128	D	32	D
128	D	32	D	126	D	30	D
126	D	30	D	124	D	28	D
124	D	28	D	122	D	26	D
122	D	26	D	120	D	24	D
120	D	24	D	118	D	22	D
118	D	22	D	116	D	20	D
116	D	20	D	114	D	18	D
114	D	18	D	112	D	16	D
112	D	16	D	110	D	14	D
110	D	14	D	108	D	12	D
108	D	12	D	106	D	10	D
106	D	10	D	104	D	104	D

\*(M) = Missing

(D) = Estimated

\*(P) = Flyby passed over top of tower

(O) = No vortex (Flyby flown for remote sensing systems)

Flyby (Run) Number: 17	Date: 29 SEP 1990 (Day of Year: 272)	Abeam Time: 8:57:11 (MDT)						
Configuration: Landing Glide Slope: -3 deg.	AIRCRAFT DATA Flaps: 30 deg. Indicated Air Speed: 133 kts	Gross Weight: 241,000 lbs. Altitude: 240 ft AGL						
Wind Speed: 5.6 kts	Wind Direction: 12 deg.	Atmospheric Stability: Neutral						
Maximum Velocity: 78.3 fps	Age: 33 s	Estimated Core Radius: 0.6 ft						
Descent Rate: 4.0 fpm	Advection Rate: 4.3 fpm	Tower Penetration Height: 108 ft AGL						
Maximum Velocity: 86.3 fps	Age: 57 s	Estimated Core Radius: 0.9 ft						
Descent Rate: 2.9 fpm	Advection Rate: 4.1 fpm	Tower Penetration Height: 72 ft AGL						
Downwind Vortex Tangential Velocities	Upwind Vortex Characteristics	Upwind Vortex Tangential Velocities						
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	
V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	
198	90	11.8	-6	-17.1	19.8	-1.0	102	-8.8
196	88	11.8	-8	-18.6*	1.24	-2.6	98	-10.0
194	86	10.9	-10	-20.0	1.22	-1.4	96	-11.2
192	84	11.6*	-12	-16.9	1.92	-2.6	94	-14.6
190	82	12.3	94	-17.8	1.90	-3.6	92	-15.1
188	80	13.5*	92	-16	1.88	-1.6	90	-15.6
186	78	14.7	18	-16.5	1.86	-1.4	88	-16
184	76	13.5	88	-20	1.84	-1.2	86	-18.1
182	74	13.1	86	-22	1.82	-1.0	84	-22.0
180	72	14.4	84	-24	1.80	-0.8	82	-26.0
178	70	14.3	82	-26	1.78	-0.6	80	-28.1
176	68	16.2	80	-28	1.76	-0.4	78	-33.2
174	66	15.9	78	-30	1.74	-0.2	76	-41.4
172	64	16.3*	76	-32	1.72	0.0	74	-39.1
170	62	15.3*	74	-34	1.70	0.2	72	-50.8
168	60	14.3	72	-36	1.68	0.4	70	-86.3
166	58	13.3	70	-38	1.66	0.6	68	-2
164	56	13.9	68	-40	1.64	0.8	66	49.4
162	54	13.0	66	-42	1.62	0.9	64	46.1*
160	52	13.2	64	-44	1.60	0.9	62	42.8
158	50	12.1	62	-46	1.58	0.9	60	26.3
156	48	13.4	60	-48	1.56	0.8	58	-10
154	46	13.2	58	-50	1.54	0.8	56	-12
152	44	18.0	56	-52	1.52	0.7	54	-20
150	42	13.4	54	-54	1.50	0.5	52	-22
148	40	13.8	52	-56	1.48	0.3	50	8.2
146	38	15.7	50	-58	1.46	0.1	48	-24
144	36	10.8	48	-60	1.44	-0.1	46	-26
142	34	13.1	46	-62	1.42	-0.3	44	6.9
140	32	13.4	44	-64	1.40	-0.5	42	-28
138	30	9.3	42	-66	1.38	-0.7	40	-14
136	28	14.1	40	-68	1.36	-0.9	38	-16.4
134	26	12.5	38	-70	1.34	-1.1	36	-18
132	24	14.7	36	-72	1.32	-1.3	34	-34
130	22	11.3	34	-74	1.30	-1.5	32	-40
128	20	8.5*	32	-76	1.28	-1.7	30	-42
126	18	5.6	30	-78	1.26	-1.9	28	7.3
124	16	10.4	28	-80	1.24	-2.1	26	-32
122	14	12.1	26	-82	1.22	-2.3	24	-46
120	12	17.3	24	-84	1.20	-2.5	22	4.8
118	10	22.7	22	-86	1.18	-2.7	20	-54
116	8	14.5	20	-88	1.16	-2.9	18	8.9
114	6	20.3	18	-90	1.14	-3.1	16	-56
112	4	30.5	16	-92	1.12	-3.3	14	8.0
110	2	49.7	14	-94	1.10	-3.5	12	-58
108	0	-78.3	12	-96	1.08	-3.6	10	6.8*
106	2	-35.2	10	-98	1.06	-3.7	8	-60
104	4	-30.2	-	-	1.04	-3.8	10	6.3

\* = Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing (O) = No vortex (P) = Vortex passed over top of tower

(I) = Flyby (Run) Number (O) = No vortex (P) = Vortex passed over top of tower

Flyby (Run) Number: 18	Date: 29 SEP 1980 (Day of Year: 272)	Abeam Time: 9:03:09 (MDT)			
Configuration: Landing					
Glide Slope: -3 deg.					
Wind Speed: 5.7 kts					
Maximum Velocity: 92.8 fps					
Descent Rate: 3.3 fps					
Wind Direction: 10 deg.	Age: 20 s Advection Rate: 8.1 fps	Estimated Core Radius: 0.9 ft Tower Penetration Height: 162 ft AGL			
Maximum Velocity: 133.7 fps	Age: 33 s Advection Rate: 7.7 fps	Atmospheric Stability: Neutral Estimated Core Radius: 1.0 ft Tower Penetration Height: 152 ft AGL			
DOWNTWIND VORTEX CHARACTERISTICS					
Sensor Height (ft)	Relative Height (ft)	Downwind Vortex Tangential Velocities			
		Sensor Height (ft)      Relative Height (ft)			
		V <sub>θ</sub> (fps)      V <sub>θ</sub> (fps)			
198	36	14.9	102	-60	-0.2
196	34	11.9	100	-62	-2.0*
192	32	13.9	98	-64	-3.7
190	30	10.5	96	-66	-1.9
188	28	12.4	94	-78	-0.5
186	26	14.3	92	-70	-2.4
184	24	16.8	90	-72	-4.4
182	22	19.3	88	-74	-0.5
180	20	23.1	86	-76	-0.5
178	18	21.8	84	-78	-0.5
176	16	24.6	82	-80	-0.5
174	14	30.3	80	-82	-0.5
172	12	32.3	78	-84	-0.6
170	10	29.5	76	-86	-0.3
168	8	33.1	74	-88	-0.9
166	6	36.7	72	-90	-0.7
164	4	40.3	70	-92	-0.3
162	2	48.6	68	-94	-0.3
160	0	-92.6	66	-96	-0.6
158	-2	-64.6	64	-98	-0.6
156	-4	-47.4	62	-100	-0.4
154	-6	-35.6	60	-102	-0.1
152	-8	-37.1	58	-104	-0.4
150	-10	-24.8	56	-106	-0.5
148	-12	-24.6	54	-108	-0.1
146	-14	-14.8	52	-110	-0.5
144	-16	-14.4	50	-112	-0.4
142	-18	-14.1	48	-114	-0.1
140	-20	-15.3	46	-116	-0.3
138	-22	-13.6	44	-118	-0.4
136	-24	-12.3	42	-120	-0.7
134	-26	-13.8	40	-122	-0.3
132	-28	-12.2	38	-124	-0.4
130	-30	-14.7*	36	-126	-0.4
128	-32	-15.1	34	-128	-0.2
126	-34	-10.2	32	-130	-0.4
124	-36	-9.2	30	-132	-0.4
122	-38	-9.2	28	-134	-0.5
120	-40	-6.2	26	-136	-0.4
118	-42	-6.7	24	-138	-0.4
116	-44	-8.2	22	-140	-0.3
114	-46	-6.6	20	-142	-0.1
112	-48	-7.9	18	-144	-0.3
110	-50	-4.2	16	-146	-0.5
108	-52	-7.9	14	-148	-0.7
106	-54	-8.3	12	-150	-0.7
104	-56	-5.4	10	-152	-1.2
	-58	-2.1			

\* = Estimated

(D) = Missing

(O) = No vortex (Flyby down for remote sensing systems)

(P) = Vortex passed over top of tower

AIRCRAFT DATA									
Configuration: Landing Glide Slope: -3 deg.					Gross Weight: 238,700 lbs. Altitude: 240 ft AGL				
Wind Speed: 8.2 kts Descent Rate: 3.6 fpm					Atmospheric Stability: Neutral				
METEOROLOGICAL DATA (200 ft Sensor Level)					Estimated Core Radius: 0.5 ft Tower Penetration Height: 186 ft AGL				
Wind Speed: 8.2 kts Descent Rate: 3.6 fpm					Estimated Core Radius: 0.6 ft Tower Penetration Height: 148 ft AGL				
DOWNWIND VORTEX CHARACTERISTICS									
Age: 15 s Advection Rate: 8.4 fpm					Upwind Vortex Characteristics				
Wind Direction: 23 deg.					Age: 25 s Advection Rate: 8.7 fpm				
MAXIMUM VORTEX TANGENTIAL VELOCITIES									
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fpm)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fpm)
198	12	43.5	102	-8.4	198	-8.5	102	-4.6	9.2
196	10	42.3	100	-8.6	196	-9.0	100	-4.8	14.6*
194	8	39.1	98	-3.5*	194	-12.4	98	-5.0	11.4
192	6	30.6	96	-8.8	192	-9.2	96	-5.2	9.8
190	4	46.6	94	-9.2	190	-11.7	94	-5.4	10.1*
188	2	100.3*	92	-9.4	188	-8.4	92	-5.6	10.3
186	0	-154.0	90	-9.6	186	-3.8	-9.4	90	-5.8
184	-2	-69.6	88	-9.8	184	36	-9.0	88	9.4
182	-4	-56.8	86	-10.0	182	34	-10.9	86	6.2
180	-6	-32.6	84	-10.2	180	32	-8.9	84	6.4
178	-8	-18.5	82	-2.0	178	30	-12.2	82	6.6
176	-10	-41.6	80	-10.6	176	28	-14.9	80	6.8
174	-12	-31.6	78	-10.8	174	26	-15.0*	78	10.2
172	-14	-31.7	76	-11.0	172	24	-15.0	76	10.0
170	-16	-28.0*	74	-11.2	170	22	-16.4*	74	8.9
168	-18	-24.3	72	-11.4	168	20	-17.8	72	7.6
166	-20	-20.5	70	-11.6	166	18	-19.1	70	7.0
164	-22	-18.5	68	-11.8	164	16	-16.8	68	8.0
162	-24	-16.3	66	-12.0	162	14	-16.8	66	8.2
160	-26	-11.5	64	-12.2	160	12	-21.2	64	8.4
158	-28	-12.8	62	-12.4	158	10	-28.0	62	8.6
156	-30	-15.2	60	-12.6	156	8	-18.0	60	8.8
154	-32	-20.7	58	-13.0	154	6	-28.4	58	10.4
152	-34	-20.5	56	-0.6	152	4	-63.2	56	9.2
150	-36	-18.0	54	-13.2	150	2	-78.0	54	9.4
148	-38	-12.9	52	-13.4	148	0	-129.0	52	9.6
146	-40	-15.9	50	-13.6	146	-2	-81.0	50	8.9
144	-42	-4.2	48	-0.3	144	-4	-48.6	48	10.5
142	-44	-1.1	46	-4.0	142	-6	-41.5	46	10.4
140	-46	-10.1	44	-1.2	140	-8	-34.1	42	10.2
138	-48	-9.1	42	-1.4	138	-10	-24.9	42	10.0
136	-50	-12.1	40	-1.4	136	-12	-37.7	40	8.7
134	-52	-12.0	38	-1.4	134	-14	-38.6*	38	11.0
132	-54	-9.9	36	-0.4	132	-16	-39.1	36	10.6
130	-56	-9.9	34	-0.4	130	-18	-25.7	34	11.2
128	-58	-10.4	32	-1.54	128	-20	-25.1	32	11.6
126	-60	-5.8	30	-1.56	126	-22	-22.3*	30	11.8
124	-62	-6.1	28	-1.58	124	-24	-19.5	28	12.0
122	-64	-5.3	26	-0.3	122	-26	-22.2	26	12.2
120	-66	-7.9	24	-1.60	120	-28	-18.3	24	12.4
118	-68	-4.8	22	-0.2	118	-30	-17.0	22	12.6
116	-70	-5.6	20	-1.66	116	-32	-15.9	20	12.8
114	-72	-3.7	18	-1.68	114	-34	-14.6	18	13.0
112	-74	-3.4	16	-1.70	112	-36	-15.0	16	13.2
110	-76	-4.0	14	-1.72	110	-38	-14.6	14	13.4
108	-78	-3.1	12	-1.74	108	-40	-12.1	12	13.6
106	-80	-0.4	10	-0.2	106	-42	-13.0	10	13.8
104	-82	-4.6	10	-0.4	104	-44	-12.2	10	14.4

= Estimated (D) = Vortex dissipated upwind of tower

$\langle P \rangle$  = Vortex passed over top of tower

M1 = Missing

Flyby (Run) Number: 20		UAL B767-200		Abeam Time: 9:18:00 (MDT)	
Date: 29 SEP 1990 (Day of Year: 272)					
<b>AIRCRAFT DATA</b>		Gross Weight: 237,500 lbs.		Altitude: 380 ft AGL	
Flaps: 30 deg.		Indicated Air Speed: 132 kts			
<b>METEOROLOGICAL DATA</b>					
[200 ft Sensor Level]		Estimated Core Radius: (0) ft		Atmospheric Stability: Neutral	
Wind Speed: 8.5 kts		Wind Direction: 25 deg.		Tower Penetration Height: (0) ft AGL	
Maximum Velocity: (0) fps		Age: (0) s			
Descent Rate: (0) fps		Advection Rate: (0) fps			
<b>UPWIND VORTEX CHARACTERISTICS</b>					
Wind Speed: 8.5 kts		Age: (0) s		Estimated Core Radius: (0) ft	
Maximum Velocity: (0) fps		Advection Rate: (0) fps		Tower Penetration Height: (0) ft AGL	
<b>DOWNWIND VORTEX CHARACTERISTICS</b>					
Maximum Velocity: (0) fps		Age: (0) s		Estimated Core Radius: (0) ft	
Descent Rate: (0) fps		Advection Rate: (0) fps		Tower Penetration Height: (0) ft AGL	
<b>Downwind Vortex Tangential Velocities</b>					
Sensor Height (ft)	Relative Height (ft)	$V_e$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_e$ (fps)
198	(0)	(0)	102	(0)	(0)
196	(0)	(0)	100	(0)	(0)
194	(0)	(0)	98	(0)	(0)
192	(0)	(0)	96	(0)	(0)
190	(0)	(0)	94	(0)	(0)
188	(0)	(0)	92	(0)	(0)
186	(0)	(0)	90	(0)	(0)
184	(0)	(0)	88	(0)	(0)
182	(0)	(0)	86	(0)	(0)
180	(0)	(0)	84	(0)	(0)
178	(0)	(0)	82	(0)	(0)
176	(0)	(0)	80	(0)	(0)
174	(0)	(0)	78	(0)	(0)
172	(0)	(0)	76	(0)	(0)
170	(0)	(0)	74	(0)	(0)
168	(0)	(0)	72	(0)	(0)
166	(0)	(0)	70	(0)	(0)
164	(0)	(0)	68	(0)	(0)
162	(0)	(0)	66	(0)	(0)
160	(0)	(0)	64	(0)	(0)
158	(0)	(0)	62	(0)	(0)
156	(0)	(0)	60	(0)	(0)
154	(0)	(0)	58	(0)	(0)
152	(0)	(0)	56	(0)	(0)
150	(0)	(0)	54	(0)	(0)
148	(0)	(0)	52	(0)	(0)
146	(0)	(0)	50	(0)	(0)
144	(0)	(0)	48	(0)	(0)
142	(0)	(0)	46	(0)	(0)
140	(0)	(0)	44	(0)	(0)
138	(0)	(0)	42	(0)	(0)
136	(0)	(0)	40	(0)	(0)
134	(0)	(0)	38	(0)	(0)
132	(0)	(0)	36	(0)	(0)
130	(0)	(0)	34	(0)	(0)
128	(0)	(0)	32	(0)	(0)
126	(0)	(0)	30	(0)	(0)
124	(0)	(0)	28	(0)	(0)
122	(0)	(0)	26	(0)	(0)
120	(0)	(0)	24	(0)	(0)
118	(0)	(0)	22	(0)	(0)
116	(0)	(0)	20	(0)	(0)
114	(0)	(0)	18	(0)	(0)
112	(0)	(0)	16	(0)	(0)
110	(0)	(0)	14	(0)	(0)
108	(0)	(0)	12	(0)	(0)
106	(0)	(0)	10	(0)	(0)
104	(0)	(0)	8	(0)	(0)

\* = Estimated      (D) = Vortex dissipated upwind of tower      (M) = Missing      (O) = No vortex (Flyby flown for remote sensing systems)      (P) = Vortex passed over top of tower

Flyby (Run) Number: 21	Date: 29 SEP 1990 (Day of Year: 272)	Abeam Time: 7:21:00 (MDT)									
Configuration: Takeoff Glide Slope: 0 deg.	AIRCRAFT DATA Flaps: 5 deg. Indicated Air Speed: 144 kts	Gross Weight: 236,600 lbs. Altitude: 390 ft AGL									
Wind Speed: 6.7 knts	Wind Direction: 26 deg.	Air Temperature: 9.2 °C									
Maximum Velocity: (O) fpm Descent Rate: (O) fpm	Downwind Vortex Characteristics Age: (O) s Advection Rate: (O) fpm	Estimated Core Radius: (O) ft Tower Penetration Height: (O) ft AGL									
Maximum Velocity: (O) fpm Descent Rate: (O) fpm	Upwind Vortex Characteristics Age: (O) s Advection Rate: (O) fpm	Estimated Core Radius: (O) ft Tower Penetration Height: (O) ft AGL									
<b>Downwind Vortex Tangential Velocities</b>											
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	
198	(O)	196	(O)	102	(O)	198	(O)	(O)	100	(O)	102
194	192	190	188	98	96	94	92	90	88	86	84
186	184	182	180	88	86	84	82	80	78	76	74
176	174	172	170	78	76	74	72	70	68	66	64
166	164	162	160	68	66	64	62	60	58	56	54
156	154	152	150	62	60	58	56	54	52	50	48
148	146	144	142	58	56	54	52	50	48	46	44
138	136	134	132	52	50	48	46	44	42	40	38
130	128	126	124	48	46	44	42	40	38	36	34
120	118	116	114	44	42	40	38	36	34	32	30
110	108	106	104	38	36	34	32	30	28	26	24
104	(M)	(P)	(P)	32	30	28	26	24	22	20	18
106	108	108	104	16	14	12	10	8	6	4	2
104	104	104	104	10	10	10	10	10	10	10	10

\* = Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

UAL B767-200					
Date: 30 SEP 1990 (Day of Year: 273)					Abeam Time: 8:27:44 (MDT)
<b>AIRCRAFT DATA</b>					
Configuration: Takeoff					Gross Weight: 252,600lbs.
Flaps: 20 deg.					Altitude: 210 ft AGL
Indicated Air Speed: 137 kts					
<b>METEOROLOGICAL DATA</b>					
Wind Speed: 2.9 kts					Atmospheric Stability: Stable
Wind Direction: 44 deg.					Air Temperature: 8.3 °C
Maximum Velocity: 72.9 fps					Estimated Core Radius: 1.3 ft
Descent Rate: 3.1 fps					Tower Penetration Height: 96 ft AGL
Glide Slope: 0 deg.					Estimated Core Radius: 1.2 ft
Maximum Velocity: 55.2 fps					Tower Penetration Height: 106 ft AGL
Descent Rate: 1.2 fps					Upwind Vortex Tangential Velocities
Sensor Height (ft)	Relative Height (ft)	Downwind Vortex Tangential Velocities	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)
198	102	10.2	102	6	28.4
196	100	8.7	100	4	40.6*
194	98	10.0	98	-2	52.8
192	96	10.9	96	-2	72.9
190	94	11.9	94	-6	63.3
188	92	12.5	92	-4	47.1*
186	90	13.1	90	-6	30.9
184	88	9.2	88	-8	28.6
182	86	9.1	86	-10	31.9
180	84	7.5	84	-12	21.7
178	82	8.4	82	-14	21.3
176	80	9.1	80	-16	17.9
174	78	8.8	78	-18	17.0
172	76	7.3	76	-20	15.2
170	74	7.4	74	-22	14.6
168	72	7.2	72	-24	14.4
166	70	7.2	70	-26	13.2
164	68	8.8	68	-28	9.1
162	66	8.1	66	-30	9.3
160	64	8.3	64	-32	6.4
158	62	6.2	62	-34	4.7
156	60	5.6	60	-36	6.0
154	58	5.6	58	-38	6.1
152	56	5.7	56	-40	7.5
150	54	5.3	54	-42	9.1
148	52	6.8	52	-44	7.6
146	50	9.0	50	-46	9.2
144	48	4.8	48	-48	5.5
142	46	10.3	46	-50	4.8
140	44	17.6	44	-52	6.4
138	42	4.4	42	-54	6.4
136	40	10.9	40	-56	4.2
134	38	10.0	38	-58	6.5
132	36	12.7	36	-60	6.0
130	34	9.4	34	-62	5.7
128	32	10.3	32	-64	4.7
126	30	6.5	30	-66	4.6
124	28	7.4	30	-68	3.0
122	26	14.2	28	-70	3.7
120	24	19.0	26	-72	2.0
118	22	15.2	24	-74	2.1
116	20	16.9	20	-76	1.6
114	18	20.1	18	-78	1.1
112	16	20.3	16	-80	1.4
110	14	25.2	14	-82	1.6
108	12	20.8	12	-84	1.2
106	10	24.9	10	-86	2.3
104	8	37.4	10	-88	0

(D) = Vortex dissipated upwind of tower

(M) = Missing

(P) = Vortex passed over top of tower

(O) = No vortex (Flyby flown for remote sensing systems)

\* = Estimated

Flyby (Run) Number: 23		UAL B767-200		Date: 30 SEP 1990 (Day of Year: 273)		Abeam Time: 8:33:59 (MDT)	
AIRCRAFT DATA		Air Temperature: 8.1 °C		Atmospheric Stability: Stable			
Configuration: Takeoff		Flaps: 15 deg.		Gross Weight: 251,200 lbs.			
Glide Slope: 0 deg.		Indicated Air Speed: 140 kts		Altitude: 250 ft AGL			
Wind Speed: 3.5 kts		Wind Direction: 64° deg.		Estimated Core Radius: 0.9 ft			
Maximum Velocity: 55.9 fpm		Age: 44 s		Tower Penetration Height: 84 ft AGL			
Descent Rate: 3.8 fpm		Advection Rate: 2.7 fpm					
Maximum Velocity: 49.8 fpm		Age: 131 s		Estimated Core Radius: 1.0 ft			
Descent Rate: 1.2 fpm		Advection Rate: 1.6 fpm		Tower Penetration Height: 96 ft AGL			
METEOROLOGICAL DATA							
(200 ft Sensor Level)		Wind Direction: 64° deg.		Upwind Vortex Tangential Velocities			
Downwind Vortex Tangential Velocities		Age: 44 s		Sensor Height (ft)		Relative Height (ft)	
Downwind Vortex Tangential Velocities		Age: 131 s		Sensor Height (ft)		Sensor Height (ft)	
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)
198	114	8.9	102	18	198	102	0.8
196	112	7.4	100	16	196	100	1.5
194	110	7.7	98	14	194	98	1.2
192	108	4.2	96	12	192	96	1.1
190	106	8.2	94	10	190	94	1.8
188	104	10.2*	92	8	188	92	1.8
186	102	12.2	90	6	186	90	1.3
184	100	8.8	88	4	184	88	0.7
182	98	8.1	86	2	182	86	0.4
180	96	8.5	84	0	180	84	-1.7
178	94	7.6	82	-2	178	82	-0.8
176	92	7.5	80	-4	176	80	0.9
174	90	7.6	78	-6	174	78	0.6
172	88	8.8	76	-8	172	76	1.8
170	86	9.6*	74	-10	170	74	1.2
168	84	9.2	72	-12	168	72	1.6
166	82	9.1	70	-14	166	70	1.6
164	80	8.0	68	-16	164	68	3.2
162	78	6.3	66	-18	162	66	4.3
160	76	6.1	64	-20	160	64	5.1
158	74	6.2	62	-22	158	62	3.2
156	72	6.0	60	-24	156	60	0.1
154	70	6.4	58	-26	154	58	0.1
152	68	8.9	56	-28	152	56	-1.9
150	66	5.7	54	-30	150	54	-0.2
148	64	6.3	52	-32	148	52	0.0
146	62	7.6	50	-34	146	50	3.1
144	60	4.6	48	-36	144	48	2.6
142	58	5.9	46	-38	142	46	2.8
140	56	6.9	44	-40	140	44	0.5
138	54	5.4	42	-42	138	42	4.4
136	52	6.8	40	-44	136	40	2.5
134	50	5.7	38	-46	134	38	4.3
132	48	8.0	36	-48	132	36	6.7
130	46	3.4	50	-50	130	34	5.4
128	44	10.5	32	-52	128	32	4.3
126	42	9.0*	30	-54	126	30	3.6
124	40	7.5	28	-56	124	28	4.5
122	38	12.0	26	-58	122	26	6.6
120	36	12.8	24	-60	120	24	8.2
118	34	11.5	22	-62	118	22	10.5
116	32	12.7	20	-64	116	20	7.8
114	30	10.5	18	-66	114	18	8.1
112	28	17.4	16	-68	112	16	8.5
110	26	15.9	14	-70	110	14	11.2
108	24	14.9	12	-72	108	12	9.2
106	22	20.3	10	-74	106	10	12.9
104	20	24.1		-76	104	8	13.8

(\* = Estimated (D) = Vortex dissipated upwind of tower (M) = Missing

(O) = No vortex (P) = Vortex passed over top of tower (R) = Remote sensing systems

(P) = Vortex passed over top of tower

UAL B767-200		Abeam Time: 8:40:05 (MDT)	
Date: 30 SEP 1990 (Day of Year: 273)			
<b>AIRCRAFT DATA</b>		Gross Weight: 250,000 lbs.	Altitude: 240 ft AGL
Flaps: 5 deg. Indicated Air Speed: 147 kts			
Wind Speed: 3.4 kts	Wind Direction: 60 deg.	Air Temperature: 8.1 °C	Atmospheric Stability: Stable
Maximum Velocity: 138.4 fps	Age: 62 s	Estimated Core Radius: 0.1 ft	
Descent Rate: 3.3 fps	Advection Rate: 1.6 fps	Tower Penetration Height: 34 ft AGL	
Maximum Velocity: 26.0 fps	Age: 114 s	Estimated Core Radius: 1.2 ft	
Descent Rate: 0.9 fps	Advection Rate: 1.7 fps	Tower Penetration Height: 142 ft AGL	
<b>METEOROLOGICAL DATA</b> (200 ft Sensor Level)			
Downwind Vortex Characteristics		Upwind Vortex Characteristics	
Wind Direction: 60 deg.		Sensor Height (ft)	
Age: 62 s		Relative Height (ft)	
Advection Rate: 1.6 fps		Sensor Height (ft)	
Upwind Vortex Tangential Velocities <sup>b</sup>		Relative Height (ft)	
Wind Direction: 60 deg.		Sensor Height (ft)	
Age: 114 s		Relative Height (ft)	
Advection Rate: 1.7 fps		Sensor Height (ft)	
Downwind Vortex Tangential Velocities	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
198	164	10.3	10.2
196	162	10.3	10.0
194	160	10.1	9.8
192	158	5.5	6.0
190	156	9.0	9.4
188	154	6.3	9.2
186	152	10.2	9.0
184	150	8.6	8.8
182	148	8.6	8.6
180	146	6.9	8.4
178	144	8.4	8.2
176	142	7.8	8.0
174	140	8.8	7.8
172	138	8.5	7.6
170	136	8.5	7.4
168	134	8.4	7.2
166	132	8.4	7.0
164	130	8.6	6.8
162	128	9.2	6.4
160	126	8.5	6.4
158	124	8.6	6.2
156	122	8.6	6.0
154	120	8.4	5.8
152	118	9.7	5.6
150	116	6.9	5.4
148	114	8.1	5.2
146	112	11.2	5.0
144	110	8.9	4.8
142	108	7.6	4.6
140	106	7.8	4.4
138	104	7.9	4.2
136	102	7.9	4.0
134	100	8.2	3.8
132	98	8.4	3.6
130	96	8.0	3.4
128	94	6.8	3.2
126	92	3.0	-2
124	90	6.4	-4
122	88	10.3	-6
120	86	10.4	-8
118	84	7.4	-10
116	82	8.6	-12
114	80	9.6	-14
112	78	8.0	-16
110	76	7.6	-18
108	74	8.7	-20
106	72	9.4	-22
104	70	7.3	-24

(P) = Vortex passed over top of tower

(M) = Missing

(D) = Vortex dissipated upwind of tower

= Estimated

Flyby (Run) Number: 25		UAL B767-200		Date: 30 SEP 1990 (Day of Year: 273)	Abeam Time: 8:45:44 (MDT)
Configuration: Takeoff		AIRCRAFT DATA		Gross Weight: 248,900 lbs.	
Glide Slope: 0 deg.		Flaps: 1 deg.		Altitude: 240 ft AGL	
Indicated Air Speed: 152 kts		METEOROLOGICAL DATA			
Wind Speed: 3.1 kts		[200 ft Sensor Level]		Air Temperature: 8.8 °C	Atmospheric Stability: Stable
Maximum Velocity: 152.4 fps		Wind Direction: 35 deg.		Age: 59 s	
Descent Rate: 3.2 fpm		Advection Rate: 2.3 fpm		Age: 105 s	
Maximum Velocity: 45.3 fps		Advection Rate: 2.2 fpm		Estimated Core Radius: 0.1 ft	
Descent Rate: 1.4 fpm		Downwind Vortex Characteristics		Tower Penetration Height: 50 ft AGL	
Sensor Height		Upwind Vortex Characteristics		Estimated Core Radius: 0.5 ft	
Relative Height (ft)		Age: 2.3 fpm		Tower Penetration Height: 92 ft AGL	
Downwind Vortex Tangential Velocities		Advection Rate: 2.2 fpm		Atmospheric Stability: Stable	
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)
198	148	8.6	102	5.2	3.4
196	144	10.1	100	5.0	3.9*
194	142	9.8	98	4.8	4.5
192	140	6.7	96	4.6	5.6
190	138	6.6*	94	4.4	4.0
188	136	6.4	92	4.2	4.3*
186	134	7.3*	90	4.0	4.7
184	132	8.2	88	3.8	5.5
182	130	8.1	86	3.6	7.3
180	128	6.1	84	3.4	5.9
178	126	6.9	82	3.2	7.8
176	124	7.1	80	3.0	7.6
174	122	9.0	78	2.8	7.4
172	120	7.7	76	2.6	7.2
170	118	7.5*	74	2.4	7.0
168	116	7.3	72	2.2	7.8
166	114	7.2	70	2.0	6.8
164	112	7.2	68	1.8	6.4
162	110	8.3	66	1.6	6.2
160	108	7.7	64	1.4	6.0
158	106	9.8	62	1.2	5.8
156	104	9.4	60	1.0	5.6
154	102	10.6	58	8.0	5.4
152	100	6.0	56	6.4	5.2
150	98	7.0	54	4.2	4.8
148	96	8.6	52	2.0	4.2
146	94	6.9	50	-1.52.4	4.6
144	92	6.2	48	-1.39.8	4.4
142	90	5.5	46	-1.18.5	4.8
140	88	5.4	44	-1.16.5	4.0
138	86	5.6	42	-1.14.8*	4.2
136	84	2.9	40	-1.13.2	4.4
134	82	3.7	38	-1.12.1	4.6
132	80	2.2	36	-1.13.9	4.9
130	78	3.2	34	-1.13.3	4.9
128	76	1.8	32	-1.12.8	4.9
126	74	4.7	30	-1.12.4	4.9
124	72	3.7	28	-1.22	4.9
122	70	4.9	26	-1.24	4.9
120	68	3.9	24	-1.26	4.9
118	66	4.2	22	-1.28	4.9
116	64	4.8	20	-1.30	4.9
114	62	4.4	18	-1.32	4.9
112	60	4.6	16	-1.34	4.9
110	58	6.1	14	-1.36	4.9
108	56	7.0	12	-1.38	4.9
106	54	4.6	10	-1.40	4.9
104	54				

\* = Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex (If flyby flown for remote sensing systems (P) = Vortex passed over top of tower

Flyby (Run) Number: 26	Date: 30 SEP 1990 (Day of Year: 273)	Abeam Time: 8:51:52 (MDT)						
Configuration: Landing	AIRCRAFT DATA	Gross Weight: 248,000lbs.						
Glide Slope: 0 deg.	Flaps: 30 deg.	Altitude: 240 ft AGL						
Wind Speed: 4.3 kts	Indicated Air Speed: 134 kts	Atmospheric Stability: Stable						
Maximum Velocity: 83.0 fpm	Wind Direction: 13 deg.	Estimated Core Radius: 0.8 ft						
Descent Rate: 4.4 fpm	Age: 29 s	Tower Penetration Height: 112 ft AGL						
Descent Rate: 1.6 fpm	Advection Rate: 3.9 fpm	Estimated Core Radius: 0.4 ft						
Maximum Velocity: 109.5 fpm	Age: 98 s	Tower Penetration Height: 80 ft AGL						
Descent Rate: 1.6 fpm	Advection Rate: 2.1 fpm	Upwind Vortex Tangential Velocities						
Sensor Height [ft]	Relative Height [ft]	V <sub>θ</sub> [fps]	Sensor Height [ft]	Relative Height [ft]	V <sub>θ</sub> [fps]	Sensor Height [ft]	Relative Height [ft]	V <sub>θ</sub> [fps]
198	86	7.2	102	-10	-24.1	198	118	-0.5
196	84	7.7*	100	-12	-20.8*	196	116	-0.2
194	82	8.2	98	-14	-16.7	194	114	-0.3
192	80	5.0	96	-16	-17.0	192	112	-0.8
190	78	6.6	94	-18	-14.7	190	108	-0.8
188	76	8.4	92	-20	-13.7*	188	106	0.3
186	74	12.1	90	-22	-12.7*	186	104	1.6
184	72	14.4	88	-24	-11.7	184	102	0.8
182	70	8.5	86	-26	-9.0	182	102	-1.3
180	68	7.7	84	-28	-8.1	180	100	-1.7
178	66	11.4	82	-30	-6.7	178	98	-5.3
176	64	13.6	80	-32	-6.8	176	96	-2.2
174	62	12.7	78	-34	-10.9	174	94	-1.5
172	60	11.0	76	-36	-9.6*	172	92	-1.8
170	58	7.6	74	-38	-8.4	170	90	-7.6
168	56	11.5	72	-40	-9.6	168	88	-0.4
166	54	15.5	70	-42	-6.8	166	86	-0.9
164	52	16.4	68	-44	-6.3	164	84	-1.8
162	50	14.3	66	-46	-5.1	162	82	-0.7
160	48	14.0	64	-48	-6.0	160	80	-3.2*
158	46	13.5	62	-50	-6.4	158	78	-5.7
156	44	14.0	60	-52	-6.7	156	76	-6.2
154	42	13.6	58	-54	-6.3	154	74	-1.6
152	40	17.2	56	-56	-7.4	152	72	-0.7
150	38	12.7	54	-58	-7.2	150	70	-1.9
148	36	17.1	52	-60	-5.2	148	68	-2.3
146	34	18.7	50	-62	-4.6	146	66	-3.0
144	32	14.7	48	-64	-4.6	144	64	-2.9
142	30	18.4	46	-66	-3.8	142	62	-5.5*
140	28	16.9	44	-68	-4.1	140	60	-8.1
138	26	12.7	42	-70	-3.8	138	58	-3.2
136	24	17.1	40	-72	-4.3	136	56	-3.4
134	22	19.0	38	-74	-5.1	134	54	-7.2*
132	20	36	76	-76	-5.2	132	52	-7.2
130	18	19.4	34	-78	-5.3	130	50	-3.0
128	16	20.6	32	-80	-6.0	128	48	-6.0*
126	14	17.6	30	-82	-4.3	126	46	-8.9
124	12	21.2	28	-84	-3.1	124	44	-8.2*
122	10	36.5	26	-86	-3.4	122	42	-7.6
120	8	42.0	24	-88	-2.4	120	40	-8.0*
118	6	46.1*	22	-90	-2.8	118	38	-8.3*
116	4	50.1	20	-92	-3.1	116	36	-8.3*
114	2	47.1	18	-94	-3.7	114	34	-8.4
112	0	83.0	16	-96	-3.5	112	32	-4.8
110	-2	-45.3	14	-98	-3.2	110	30	-7.6*
108	-4	-43.5	12	-100	-4.1	108	28	-12.0
106	-6	-29.7	10	-102	-2.6	106	26	-6.6
104	-8	-28.7	-	-	-	104	24	-5.1

= Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(P) = Vortex passed over top of tower

(O) = No vortex (Flyby flown for remote sensing systems)

Flyby (Run) Number:	27	Date:	30 SEP 1990 (Day of Year: 273)	Abeam Time:	8:58:29 (MDT)
AIRCRAFT DATA					
Configuration: Landing					
Glide Slope: -3 deg.					
Wind Speed: 4.8 kts		Wind Direction: 5 deg.	Air Temperature: 10.0 °C		Atmospheric Stability: Stable
Maximum Velocity: 98.2 fps					
Descent Rate: 4.3 fps					
Maximum Velocity: (D) fps					
Descent Rate: (D) fps					
Downwind Vortex Tangential Velocities					
Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)
198	154	10.3	102	58	7.3*
196	152	6.6	100	56	7.7*
194	150	7.9	98	54	8.0
192	148	7.1	96	52	8.0
190	146	12.0	94	50	8.7
188	144	5.7*	92	48	7.3*
186	142	10.1	90	46	5.9
184	140	9.0	88	44	8.3
182	138	9.2	86	42	8.7
180	136	7.8	84	40	8.6
178	134	7.9	82	38	8.0
176	132	14.6	80	36	10.9
174	130	12.5	78	34	9.2
172	128	9.1	76	32	9.6
170	126	8.4*	74	30	9.6
168	124	7.7	72	28	9.6
166	122	7.0	70	26	10.4
164	120	8.9	68	24	12.8
162	118	8.4	66	22	16.2
160	116	8.4	64	20	11.0
158	114	8.1	62	18	15.6
156	112	9.7	60	16	15.6
154	110	8.2	58	14	13.7
152	108	9.0	56	12	15.4
150	106	7.5	54	10	16.8
148	104	7.3	52	8	26.3
146	102	10.2	50	6	34.8
144	100	8.0	48	4	30.5
142	98	8.1	46	2	144
140	96	7.5	44	0	56
138	94	6.3	42	-2	98.2
136	92	7.8	40	-4	38
134	90	6.9	38	-6	42.7
132	88	7.6	36	-8	36
130	86	5.3	34	-10	34
128	84	5.7	32	-12	32
126	82	3.1	30	-14	30
124	80	4.8	28	-16	28
122	78	6.5	26	-18	26
120	76	7.3	24	-20	24
118	74	7.7	22	-22	22
116	72	7.2	20	-24	20
114	70	8.8	18	-26	18
112	68	6.0	16	-28	16
110	66	7.3	14	-30	14
108	64	7.5	12	-32	12
106	62	7.4	10	-34	10
104	60	7.8			104

\* = Estimated

(M) = Missing

(W) = Vortex dissipated upwind of tower

(O) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower



Flyby (Run) Number: 29	Date: 30 SEP 1990 [Day of Year: 273]	Abeam Time: 9:11:25 (MDT)						
Configuration: Landing Glide Slope: -3 deg.	AIRCRAFT DATA Flaps: 25 deg. Indicated Air Speed: 137 kts	Gross Weight: 243,800 lbs. Altitude: 260 ft AGL						
Wind Speed: 4.6 kts	Wind Direction: 11 deg.	Atmospheric Stability: Stable						
Maximum Velocity: 86.8 fps Descent Rate: 3.7 fpm	Age: 25 s (200 ft Sensor Level)	Estimated Core Radius: 2.0 ft Tower Penetration Height: 168 ft AGL						
Maximum Velocity: 65.9 fps Descent Rate: 1.7 fpm	Age: 94 s Advection Rate: 2.2 fpm	Estimated Core Radius: 1.3 ft Tower Penetration Height: 98 ft AGL						
METEOROLOGICAL DATA								
DOWNWIND VORTEX CHARACTERISTICS								
Wind Speed: 4.6 kts	Age: 25 s Advection Rate: 4.7 fpm	Air Temperature: 10.5 °C						
UPWIND VORTEX CHARACTERISTICS								
Wind Speed: 4.6 kts	Age: 94 s Advection Rate: 2.2 fpm	Tower Penetration Height: 98 ft AGL						
Downwind Vortex Tangential Velocities								
Sensor Height [ft]	Relative Height [ft]	Sensor Height [ft]	Relative Height [ft]	Sensor Height [ft]	Relative Height [ft]	Sensor Height [ft]	Relative Height [ft]	$V_\theta$ [fps]
198	30	12.8	102	-6.1	198	100	-2.1	-36.2
196	28	14.0	98	-7.2*	194	98	-2.4	-51.2
194	26	10.7	70	-6.1	192	94	-1.7	-65.9
192	24	17.6	96	-6.5	190	92	-1.9	0
190	22	17.4	94	-6.1	188	90	-1.7	0
188	20	22.3	92	-7.6	186	88	-1.7	4.7
186	18	88	80	-5.0*	184	86	-1.7	37.0
184	16	20.9	88	-8.0	182	84	-1.7	22.5
182	14	24.3	86	-8.2	180	82	-2.7	22.8
180	12	24.7	84	-8.4	178	80	-2.6	1.0
178	10	31.1	82	-8.6	176	78	-4.3	-1.2
176	8	80	88	-4.1	174	76	-5.5	-1.4
174	6	32.7	78	-9.0	172	74	-4.6	-1.4
172	4	43.5	92	-2.4	170	72	-4.6	-1.6
170	2	32.2	74	-9.4	168	70	-4.3	-1.6
168	0	-86.8	72	-9.6	166	68	-5.2	-1.6
166	-2	-50.6	70	-9.8	164	66	-5.2	-1.6
164	-4	-48.4	68	-10.0	162	64	-5.2	-1.6
162	-6	-56.0	66	-10.2	160	62	-6.4	-1.8
160	-8	-58.9	64	-10.4	158	60	-6.7	-1.8
158	-10	-44.2	62	-10.6	156	58	-7.2	-1.8
156	-12	-40.9	60	-10.8	154	56	-8.0*	-1.8
154	-14	-36.3	58	-11.0	152	54	-8.7	-1.8
152	-16	-36.8	56	-11.2	150	52	-6.5	-1.8
150	-18	-34.4*	54	-11.4	148	50	-7.3*	-1.8
148	-20	-31.6	52	-11.6	146	48	-7.7	-1.8
146	-22	-25.3	50	-11.8	144	46	-8.8	-1.8
144	-24	-18.2	48	-12.0	142	44	-7.3	-1.8
142	-26	-18.5	46	-12.2	140	42	-7.3	-1.8
140	-28	-14.4	44	-12.4	138	40	-8.4*	-1.8
138	-30	-13.6	42	-12.6	136	38	-9.4	-1.8
136	-32	-15.8	40	-12.8	134	36	-9.5	-1.8
134	-34	-16.8	38	-13.0	132	34	-10.1	-1.8
132	-36	-16.1	36	-13.2	130	32	-10.2*	-1.8
130	-38	-12.0	34	-13.4	128	30	-10.3	-1.8
128	-40	-1.3.9	32	-13.6	126	28	-7.6	-1.8
126	-42	-1.3.9*	30	-13.8	124	26	-10.6	-1.8
124	-44	-9.2	28	-14.0	122	24	-13.3*	-1.8
122	-46	-10.8	26	-14.2	120	22	-16.1	-1.8
120	-48	-12.3	24	-14.4	118	20	-16.3	-1.8
118	-50	-10.3	22	-14.6	116	18	-16.4	-1.8
116	-52	-1.7	20	-14.8	114	16	-19.3*	-1.8
114	-54	-9.9	18	-15.0	112	14	-21.2	-1.8
112	-56	-8.6	16	-15.2	110	12	-24.6	-1.8
110	-58	-8.9	14	-15.4	108	10	-24.6	-1.8
108	-60	-8.4	12	-15.6	106	8	-28.7	-1.8
106	-62	-7.0	10	-15.8	104	6	-32.8	-1.8
104	-64	-7.8						

\* = Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex [Flyby flown for remote sensing systems] (P) = Vortex passed over top of tower

UAL B767-200		Date: 30 SEP 1990 (Day of Year: 273)		Abeam Time: 9:17:31 (MDT)	
AIRCRAFT DATA		Flaps: 25 deg.		Gross Weight: 242,700 lbs.	
Configuration: Landing		Indicated Air Speed: 137 kts		Altitude: 260 ft AGL	
Glide Slope: -3 deg.		Atmospheric Stability: Neutral		Atmospheric Stability: Neutral	
METEOROLOGICAL DATA		Estimated Core Radius: 1.2 ft		Estimated Core Radius: 0.8 ft	
(200 ft Sensor Level)		Tower Penetration Height: 114 ft AGL		Tower Penetration Height: 110 ft AGL	
Wind Speed: 4.1 kts		Wind Direction: 13 deg.		Air Temperature: 10.4 °C	
Maximum Velocity: 84.9 fpm		Age: 35 s		Tower Penetration Height: 110 ft AGL	
Descent Rate: 4.2 fpm		Advection Rate: 3.6 fpm		Estimated Core Radius: 1.2 ft	
Descent Rate: 2.4 fpm		Age: 62 s		Tower Penetration Height: 114 ft AGL	
Downwind Vortex Tangential Velocities		Upwind Vortex Tangential Velocities		Upwind Vortex Tangential Velocities	
Sensor Height [ft]	Relative Height [ft]	$V_\theta$ (fpm)	Sensor Height [ft]	Relative Height [ft]	$V_\theta$ (fpm)
198	84	10.8	102	-1.2	88
196	82	11.1	100	-1.4	86
194	80	12.9	98	-2.2	84
192	78	13.6*	96	-1.8	82
190	76	14.4*	94	-1.3	80
188	74	14.6*	92	-2.2	78
186	72	14.8	90	-2.4	76
184	70	12.2	88	-2.6	74
182	68	11.6	86	-2.8	72
180	66	11.4	84	-3.0	70
178	64	12.3	82	-10.8	68
176	62	12.8	80	-3.2	66
174	60	13.5	78	-3.4	64
172	58	12.9	76	-3.6	62
170	56	13.7*	74	-3.8	60
168	54	13.3	72	-4.0	58
166	52	14.1	70	-4.2	56
164	50	15.0	68	-4.4	54
162	48	15.1	66	-4.6	52
160	46	14.6	64	-4.8	50
158	44	14.3	62	-5.0	48
156	42	14.0	60	-5.2	46
154	40	16.2	58	-5.4	44
152	38	16.2	56	-5.6	42
150	36	16.2*	54	-5.8	40
148	34	16.2	52	-6.0	38
146	32	16.8	50	-6.2	36
144	30	16.2	64	-6.4	34
142	28	16.2	66	-3.4	32
140	26	18.3	48	-2.4	30
138	24	15.0	42	-7.0	28
136	22	15.1	40	-7.4	26
134	20	17.3	38	-2.3	24
132	18	23.0	36	-2.4	22
130	16	25.3*	34	-3.0	20
128	14	27.6	32	-1.5	18
126	12	25.4*	30	-2.6	16
124	10	23.2	84	-3.3	14
122	8	36.4	86	-4.1	12
120	6	36.3	26	-4.2	10
118	4	44.4	90	-2.4	8
116	2	63.6	92	-2.6	118
114	0	-84.9	20	-9.4	6
112	-2	-63.1	16	-0.9	114
110	-4	-54.8	14	-1.8	4
108	-6	-45.1	12	-100	112
106	-8	-36.5	10	-5.5	0
104	-10	-31.4	104	-104	-6

\* = Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex (Flyby flown for remote sensing systems) (P) = Vortex passed over top of tower

Flyby (Run) Number: 31	Date: 30 SEP 1980 (Day of Year: 273)	Abeam Time: 9:23:52 (MDT)
Configuration: Landing Glide Slope: 0 deg.	AIRCRAFT DATA Flaps: 30 deg. Indicated Air Speed: 133 kts	Gross Weight: 241,300 lbs. Altitude: 230 ft AGL
Wind Speed: 3.9 kts	Wind Direction: 18 deg.	Air Temperature: 10.6 °C
Maximum Velocity: 88.3 fps Descent Rate: 4.2 fps	Age: 32 s Advection Rate: 3.7 fps	Estimated Core Radius: 0.7 ft Tower Penetration Height: 96 ft AGL
Maximum Velocity: 91.3 fps Descent Rate: 1.9 fps	Age: 90 s Advection Rate: 2.4 fps	Estimated Core Radius: 0.4 ft Tower Penetration Height: 62 ft AGL
Atmospheric Stability: Neutral		
METEOROLOGICAL DATA (200 ft Sensor Level)		
DOWNTWIND VORTEX CHARACTERISTICS		
Sensor Height (ft)	Relative Height (ft)	Downwind Vortex tangential Velocities
		Relative Height (ft)
Sensor Height (ft)	Relative Height (ft)	Relative Height (ft)
		V <sub>θ</sub> (fps)
198	102	7.3
196	100	5.7
194	98	5.5
192	96	4.6
190	94	9.8
188	92	5.3
186	90	7.9
184	88	6.6
182	86	6.1
180	84	5.4
178	82	8.2
176	80	7.6
174	78	12.4
172	76	8.2
170	74	8.3*
168	72	7.4
166	70	8.5
164	68	9.4
162	66	9.1
160	64	7.3
158	62	7.5
156	60	9.6
154	58	9.1
152	56	11.5
150	54	12.2
148	52	14.9
146	50	14.1
144	48	12.9
142	46	11.6
140	44	11.4
138	42	11.9
136	40	14.1
134	38	12.6
132	36	12.3
130	34	11.2
128	32	13.3
126	30	13.8*
124	28	14.3
122	26	18.7
120	24	18.5
118	22	19.7
116	20	20.3
114	18	18.0
112	16	24.4
110	14	30.5
108	12	32.2*
106	10	33.8
104	8	37.2*

(P) = Vortex passed over top of tower

(I) = No vortex (Flyby flown for remote sensing systems)

(M) = Missing

\* = Estimated

(D) = Vortex dissipated upwind of tower

Flyby (Run) Number: 32		UAL B767-200		Date: 30 SEP 1990 (Day of Year: 273)	Abeam Time: 9:30:13 (MDT)		
<b>AIRCRAFT DATA</b>							
Configuration: Landing Glide Slope: -3 deg. Flaps: 30 deg. Indicated Air Speed: 132 kts							
Gross Weight: 240,000 lbs. Altitude: 260 ft AGL							
<b>METEOROLOGICAL DATA</b> (200ft Sensor Level)							
Wind Speed: 4.0 kts Maximum Velocity: 78.2 fpm Descent Rate: 4.1 fpm							
Wind Direction: 16 deg. Age: 28 s Advection Rate: 4.1 fpm							
Air Temperature: 10.9 °C Atmospheric Stability: Neutral							
<b>DOWNDOWN VORTEX CHARACTERISTICS</b>							
Wind Direction: 16 deg. Age: 52 s Advection Rate: 4.1 fpm							
<b>UPWIND VORTEX CHARACTERISTICS</b>							
Wind Direction: 16 deg. Age: 28 s Advection Rate: 4.3 fpm							
Air Temperature: 10.9 °C Atmospheric Stability: Neutral							
<b>Upwind Vortex Tangential Velocities</b>							
Sensor Height (ft)	Relative Height (ft)	Downwind Vortex Tangential Velocities $V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	Upwind Vortex Tangential Velocities $V_\theta$ (fps)		
198	54	12.6	102	-9.6	70		
196	52	13.8	100	-12.3*	198		
194	50	13.8	98	-17.8	196		
192	48	14.0*	96	-6.4	192		
190	46	14.1	94	-5.6	62		
188	44	11.3	92	-5.2	60		
186	42	17.0	90	-6.5	58		
184	40	14.1	88	-5.5	56		
182	38	18.0	86	-5.8	54		
180	36	13.6	84	-3.1	182		
178	34	15.8	82	-6.2	180		
176	32	16.8	80	-4.4	178		
174	30	15.5	78	-6.4	176		
172	28	16.2	76	-5.4	174		
170	26	16.6	74	-4.5	172		
168	24	16.9	72	-7.0	170		
166	22	17.2	70	-6.6	42		
164	20	17.5	68	-6.3	40		
162	18	27.7	66	-4.8	38		
160	16	27.6	64	-5.8	36		
158	14	26.9	62	-6.2	34		
156	12	26.3	60	-5.1	32		
154	10	39.2	58	-8.4	30		
152	8	33.5	56	-8.6	28		
150	6	33.4*	54	-3.0	24		
148	4	33.6	52	-4.0	22		
146	2	52.4	50	-9.0	20		
144	0	78.2	48	-6.2	18		
142	-2	62.7	46	-5.0	16		
140	-4	42.4	44	-100	14		
138	-6	31.4	42	-102	12		
136	-8	24.9	40	-104	10		
134	-10	22.8	38	-106	8		
132	-12	20.8	36	-108	6		
130	-14	15.7	34	-110	4		
128	-16	17.5	32	-112	2		
126	-18	16.2	30	-114	0		
124	-20	4.9	28	-116	-2		
122	-22	1.1	18	-118	-4		
120	-24	1.4	24	-120	-6		
118	-26	1.2	22	-122	-8		
116	-28	1.1	20	-124	-10		
114	-30	1.0	18	-126	-12		
112	-32	0.8	16	-128	-14		
110	-34	0.8	14	-130	-16		
108	-36	0.6	12	-132	-18		
106	-38	0.3	10	-134	-20		
104	-40	0.4	8.4	104	-24		

\* = Estimated      (D) = Vortex dissipated upwind of tower      (M) = Missing

(O) = No vortex (Flyby flown for remote sensing systems)      (P) = Vortex passed over top of tower

UAL B767-200												
FLYBY (Run) Number: 33					Date: 30 SEP 1990 (Day of Year: 273)		Abeam Time: 9:36:11 (MDT)					
AIRCRAFT DATA					METEOROLOGICAL DATA							
Configuration: Landing Glide Slope: -3 deg.					(200 ft Sensor Level)							
Wind Speed: 5.0 knts					Wind Direction: 14 deg.							
Maximum Velocity: 108.8 fips	Relative Height [ft]	V <sub>θ</sub> [fips]	Sensor Height [ft]	Relative Height [ft]	Age: 38 s	Advection Rate: 3.6 fips	DOWNWIND VORTEX CHARACTERISTICS					
Descent Rate: 5.3 fips	198	7.4	102	34	14.7	198	152	2.0	Estimated Core Radius: 0.6 ft			
	196	7.1	100	32	11.5*	196	150	3.6	To Tower Penetration Height: 68 ft AGL			
	194	7.4	98	30	18.3	94	148	-3.1				
	192	4.5	96	28	12.9	92	146	-2.0	Gross Weight: 238,700 lbs.			
	190	12.2	94	26	17.8	90	144	-3.2	Altitude: 27,000 ft AGL			
	188	8.8	92	24	14.2*	88	142	-2.4				
	186	6.1	90	22	10.5	86	140	-2.7				
	184	11.8	88	20	14.0	84	138	-2.0				
	182	9.1	86	18	14.3	82	136	-3.7				
	180	11.4	84	16	20.7	80	134	-3.9				
	178	11.2	82	14	22.8	78	132	-2.3				
	176	10.8	80	12	31.9	76	130	-2.4				
	174	10.6	78	10	31.3	74	128	-1.4				
	172	10.4	76	8	41.9	72	126	-2.6				
	170	10.2	74	6	39.0	70	124	-2.9				
	168	10.0	72	4	46.4	68	122	-1.3				
	166	9.8	70	2	58.4	66	120	-3.0				
	164	9.6	68	0	-108.8	64	118	-2.1				
	162	9.4	66	-2	-63.8	62	116	-2.4				
	160	92	64	-4	-36.3	60	114	-3.0				
	158	90	71	-6	-24.3	58	112	-3.0				
	156	88	69	-8	-26.3	56	110	-2.2				
	154	86	67	-10	-21.9*	54	108	-1.7				
	152	84	65	-12	-20.9*	52	106	-3.1				
	150	82	63	-14	-19.9	50	104	-2.0				
	148	80	9.5	-16	-19.8	48	102	-1.8				
	146	78	10.6*	-18	-11.8	46	100	-1.2				
	144	76	12.1	-20	-17.1	44	98	-0.7				
	142	74	12.9	-22	-14.8	42	96	-1.7				
	140	72	13.2	-24	-12.1	40	94	-1.2				
	138	70	10.3	-26	-12.8	38	92	-1.1				
	136	68	13.6	-28	-14.8	36	90	-1.4				
	134	66	12.1	-30	-11.3	34	88	-1.7				
	132	64	14.0	-32	-13.6	32	86	-2.6				
	130	62	11.6	-34	-14.3	30	84	-1.5				
	128	60	12.9	-36	-10.6	28	82	0.7				
	126	58	11.6*	-38	-11.4	26	80	-1.4				
	124	56	10.3	-28	-11.3	24	78	-0.0				
	122	54	15.0	-26	-12.8	22	76	0.1				
	120	52	12.7	-24	-4.4	20	74	-2.1				
	118	50	13.0	-22	-4.6	18	72	-1.9				
	116	48	13.6	-20	-4.8	16	70	-2.9				
	114	46	12.5	-18	-5.0	14	68	-2.3				
	112	44	13.4	-16	-5.2	12	66	-2.6				
	110	42	10.8	-14	-10.7	10	64	-4.5				
	108	40	10.8	-12	-6.4	8	62	-3.8				
	106	38	11.4	-10	-5.8	6	60	-1.2				
	104	36	13.9	-10	-3.0	4	58	-3.8				

\* = Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex (If flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

Flyby (Run) Number: 34		Date: 30 SEP 1990 (Day of Year: 273)	Abeam Time: 9:42:08 (MDT)								
AIRCRAFT DATA		Gross Weight: 237,900 lbs.									
Configuration: Takeoff Glide Slope: 0 deg.		Altitude: 220 ft AGL									
Flaps: 20 deg. Indicated Air Speed: 1,344 kts		Tower Penetration Height: 110 ft AGL									
METEOROLOGICAL DATA (200 ft Sensor Level)		Atmospheric Stability: Unstable									
Wind Speed: 5.3 kts		Wind Direction: 18 deg.	Air Temperature: 11.3 °C								
Maximum Velocity: 61.5 fps		Age: 28 s	Estimated Core Radius: 1.4 ft								
Descent Rate: 3.2 fps		Advection Rate: 4.5 fps	Tower Penetration Height: 110 ft AGL								
Maximum Velocity: 76.4 fps		Age: 43 s	Estimated Core Radius: 0.8 ft								
Downwind Vortex Characteristics		Advection Rate: 5.1 fps	Tower Penetration Height: 82 ft AGL								
Wind Direction: 18 deg.		Upwind Vortex Characteristics									
Maximum Velocity: 61.5 fps		Age: 43 s	Upwind Vortex Tangential Velocities								
Descent Rate: 3.2 fps		Advection Rate: 4.5 fps									
Downwind Vortex Tangential Velocities		Upwind Vortex Tangential Velocities									
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)								
V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)								
198	88	10.9	102	8	-25.0*	198	116	-1.9	102	20	-10.1
196	86	11.1	100	-10	-19.3*	196	114	-2.1	100	18	-13.6
194	84	11.0	98	-12	-13.6	194	112	0.4	98	16	-30.0
192	82	10.0*	96	-16	-24.3	192	110	1.7	96	14	-30.5
190	80	9.1*	94	-16	-24.0	190	108	1.0	90	12	-28.8
188	78	8.1	92	-18	-24.1	188	106	-2.6	90	10	-25.9
186	76	8.1	90	-20	-19.3	186	104	-2.4	88	8	-25.9
184	74	8.1	88	-22	-12.0	184	102	-2.7	86	6	-36.0
182	72	8.1	86	-24	-1.9	182	100	-2.7	84	4	-40.8
180	70	11.2	84	-26	-10.4	180	98	-1.9	82	2	-76.4
178	68	11.3	82	-28	-12.2	178	96	-1.4	80	-2	56.6
176	66	16.9	80	-30	-10.9	176	94	0.3	78	-4	32.1
174	64	14.5	78	-32	-11.6	174	92	-1.8	76	-6	29.9
172	62	12.9*	76	-34	-7.9	172	90	-1.5	74	-8	30.3*
170	60	13.1*	74	-36	-9.7	170	88	-2.5	72	-10	30.6
168	58	13.3	72	-38	-9.6	168	86	-3.7	70	-12	28.0
166	56	13.5	70	-40	-9.1	166	84	-3.0	68	-14	30.5
164	54	13.0	68	-42	-9.8	164	82	-4.5	66	-16	30.2
162	52	13.4	66	-44	-9.8	162	80	-6.4	64	-18	23.9
160	50	14.0	64	-46	-9.5	160	78	-5.6	62	-20	22.9
158	48	14.4	62	-48	-1.6	158	76	-5.2	60	-22	22.9
156	46	15.0	60	-50	-1.8	156	74	-2.1	58	-24	20.4
154	44	13.2	58	-52	-0.1	154	72	-2.9	56	-26	21.9
152	42	15.3	56	-54	-1.6	152	70	-2.9	54	-28	18.4
150	40	12.6	54	-56	-1.9	150	68	-0.4	52	-30	17.5
148	38	12.5	52	-58	-7.5	148	66	-2.4	50	-32	12.4
146	36	16.0	50	-60	-5.4	146	64	-0.2	48	-34	16.4
144	34	16.0	48	-62	-7.0	144	62	-4.3	46	-36	14.0
142	32	15.6*	46	-64	-7.1	142	60	-6.3	44	-38	15.4
140	30	15.2	44	-66	-7.1	140	58	-6.9	42	-40	10.6
138	28	20.3	42	-68	-5.6	138	56	-7.4	40	-42	13.1
136	26	19.0*	40	-70	-7.0	136	54	-9.1	38	-44	11.2
134	24	17.7*	38	-72	-5.8	134	52	-7.0	36	-46	11.3
132	22	16.3	36	-74	-6.5	132	50	-3.5	34	-48	9.3
130	20	15.1	34	-76	-10.2	130	48	-4.3*	32	-50	10.7
128	18	15.9*	32	-78	-9.0	128	46	-4.3	30	-52	9.8
126	16	16.6	30	-80	-7.4	126	44	-2.9	28	-54	10.2
124	14	24.4	28	-82	-4.7	124	42	-4.2	26	-56	13.2
122	12	26.8*	26	-84	-6.4	122	40	-4.2	24	-58	7.2
120	10	29.1	24	-86	-7.2	120	38	-3.0	22	-60	10.3
118	8	28.7	22	-88	-8.0	118	36	-4.7	20	-62	7.5
116	6	28.6*	20	-90	-6.8	116	34	-6.3	18	-64	7.9
114	4	28.5	18	-92	-6.2	114	32	-8.6	16	-66	7.5
112	2	61.5	16	-94	-4.4	112	30	-7.5*	14	-68	9.4
110	0	108	12	-96	-4.0	110	28	-6.4	12	-70	10.0
108	-4	106	10	-98	-4.3	108	26	-9.1*	10	-72	7.8
104	-6	104	-6	-100	-4.5	106	24	-11.7	22	-11.7	

\* = Estimated (D) = Vortex dissipated upwind of tower

(O) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

Flyby (Run) Number: 35		UAL B767-200		Date: 30 SEP 1990 (Day of Year: 273)	Abeam Time: 9:48:08 (MDT)																																																																																																																																																																																																																																																																																																												
Configuration: Takeoff		AIRCRAFT DATA		Gross Weight: 237,000 lbs.																																																																																																																																																																																																																																																																																																													
Glide Slope: 0 deg.		Indicated Air Speed: 137 kts		Altitude: 230 ft AGL																																																																																																																																																																																																																																																																																																													
Wind Speed: 5.6 kts		Wind Direction: 15 deg.		Atmospheric Stability: Unstable																																																																																																																																																																																																																																																																																																													
Maximum Velocity: 59.7 fps		(200 ft Sensor Level)		Air Temperature: 11.3 °C																																																																																																																																																																																																																																																																																																													
Descent Rate: 3.5 fps		METEOROLOGICAL DATA		Estimated Core Radius: 1.4 ft																																																																																																																																																																																																																																																																																																													
Maximum Velocity: 96.0 fps		(200 ft Sensor Level)		Tower Penetration Height: 154 ft AGL																																																																																																																																																																																																																																																																																																													
Descent Rate: 3.1 fps		Wind Direction: 15 deg.		Estimated Core Radius: 0.5 ft																																																																																																																																																																																																																																																																																																													
Wind Speed: 5.6 kts		Age: 22 s		Tower Penetration Height: 120 ft AGL																																																																																																																																																																																																																																																																																																													
Maximum Velocity: 59.7 fps		DOWNWIND VORTEX CHARACTERISTICS		(P) = Vortex passed over top of tower																																																																																																																																																																																																																																																																																																													
Descent Rate: 3.5 fps		Age: 36 s		(O) = Missing																																																																																																																																																																																																																																																																																																													
Maximum Velocity: 96.0 fps		UPWIND VORTEX CHARACTERISTICS		(D) = Vortex dissipated upwind of tower																																																																																																																																																																																																																																																																																																													
Descent Rate: 3.1 fps		Age: 5.8 s		(M) = Missing																																																																																																																																																																																																																																																																																																													
<table border="1"> <thead> <tr> <th colspan="3">Downwind Vortex Tangential Velocities</th> <th colspan="3">Upwind Vortex Tangential Velocities</th> </tr> <tr> <th>Sensor Height (ft)</th> <th>Relative Height (ft)</th> <th><math>V_\theta</math> (fps)</th> <th>Sensor Height (ft)</th> <th>Relative Height (ft)</th> <th><math>V_\theta</math> (fps)</th> </tr> </thead> <tbody> <tr><td>198</td><td>44</td><td>10.2</td><td>102</td><td>-5.2</td><td>-9.4</td></tr> <tr><td>196</td><td>42</td><td>13.2</td><td>100</td><td>-5.4</td><td>-7.2*</td></tr> <tr><td>194</td><td>40</td><td>11.0</td><td>98</td><td>-5.6</td><td>-5.0</td></tr> <tr><td>192</td><td>38</td><td>13.2*</td><td>96</td><td>-5.8</td><td>-4.2*</td></tr> <tr><td>190</td><td>36</td><td>15.4</td><td>94</td><td>-6.0</td><td>-7.5</td></tr> <tr><td>188</td><td>34</td><td>11.9</td><td>92</td><td>-6.2</td><td>-7.6*</td></tr> <tr><td>186</td><td>32</td><td>16.1*</td><td>90</td><td>-6.4</td><td>-8.1</td></tr> <tr><td>184</td><td>30</td><td>15.4*</td><td>88</td><td>-6.6</td><td>-8.6</td></tr> <tr><td>182</td><td>28</td><td>14.8</td><td>86</td><td>-6.8</td><td>-9.3</td></tr> <tr><td>180</td><td>26</td><td>12.4</td><td>84</td><td>-7.0</td><td>-10.4*</td></tr> <tr><td>178</td><td>24</td><td>18.0</td><td>82</td><td>-7.2</td><td>-10.4</td></tr> <tr><td>176</td><td>22</td><td>18.7</td><td>80</td><td>-7.4</td><td>-10.4</td></tr> <tr><td>174</td><td>20</td><td>25.9</td><td>78</td><td>-7.6</td><td>-10.4</td></tr> <tr><td>172</td><td>18</td><td>29.9</td><td>76</td><td>-7.8</td><td>-10.4</td></tr> <tr><td>170</td><td>16</td><td>34.0*</td><td>74</td><td>-8.0</td><td>-10.4</td></tr> <tr><td>168</td><td>14</td><td>38.0</td><td>72</td><td>-8.2</td><td>-10.4</td></tr> <tr><td>166</td><td>12</td><td>42.1</td><td>70</td><td>-8.4</td><td>-10.4</td></tr> <tr><td>164</td><td>10</td><td>28.9</td><td>68</td><td>-8.6</td><td>-10.4</td></tr> <tr><td>162</td><td>8</td><td>29.9</td><td>66</td><td>-8.8</td><td>-10.4</td></tr> <tr><td>160</td><td>6</td><td>42.7</td><td>64</td><td>-9.0</td><td>-10.4</td></tr> <tr><td>158</td><td>4</td><td>34.0</td><td>62</td><td>-9.2</td><td>-10.4</td></tr> <tr><td>156</td><td>2</td><td>47.7</td><td>60</td><td>-9.4</td><td>-10.4</td></tr> <tr><td>154</td><td>0</td><td>59.7</td><td>58</td><td>-9.6</td><td>-10.4</td></tr> <tr><td>152</td><td>-2</td><td>55.9</td><td>56</td><td>-9.8</td><td>-10.4</td></tr> <tr><td>150</td><td>-4</td><td>35.0</td><td>54</td><td>-10.0</td><td>-10.4</td></tr> <tr><td>148</td><td>-6</td><td>33.0</td><td>52</td><td>-10.2</td><td>-10.4</td></tr> <tr><td>146</td><td>-8</td><td>34.1</td><td>50</td><td>-10.4</td><td>-10.4</td></tr> <tr><td>144</td><td>-10</td><td>-2.5</td><td>48</td><td>-10.6</td><td>-10.4</td></tr> <tr><td>142</td><td>-12</td><td>18.6</td><td>46</td><td>-10.8</td><td>-10.4</td></tr> <tr><td>140</td><td>-14</td><td>-1.4</td><td>44</td><td>-11.0</td><td>-10.4</td></tr> <tr><td>138</td><td>-16</td><td>-1.2</td><td>42</td><td>-11.2</td><td>-10.4</td></tr> <tr><td>136</td><td>-18</td><td>-1.2</td><td>40</td><td>-11.4</td><td>-10.4</td></tr> <tr><td>134</td><td>-20</td><td>-10.8</td><td>38</td><td>-11.6</td><td>-10.4</td></tr> <tr><td>132</td><td>-22</td><td>-9.6*</td><td>36</td><td>-11.8</td><td>-10.4</td></tr> <tr><td>130</td><td>-24</td><td>-8.4</td><td>34</td><td>-12.0</td><td>-10.4</td></tr> <tr><td>128</td><td>-26</td><td>-9.0</td><td>32</td><td>-12.2</td><td>-10.4</td></tr> <tr><td>126</td><td>-28</td><td>-6.4</td><td>30</td><td>-12.4</td><td>-10.4</td></tr> <tr><td>124</td><td>-30</td><td>-10.9</td><td>28</td><td>-12.6</td><td>-10.4</td></tr> <tr><td>122</td><td>-32</td><td>-8.0</td><td>26</td><td>-12.8</td><td>-10.4</td></tr> <tr><td>120</td><td>-34</td><td>-12.1</td><td>24</td><td>-13.0</td><td>-10.4</td></tr> <tr><td>118</td><td>-36</td><td>-11.8</td><td>22</td><td>-13.2</td><td>-10.4</td></tr> <tr><td>116</td><td>-38</td><td>-7.1</td><td>20</td><td>-13.4</td><td>-10.4</td></tr> <tr><td>114</td><td>-40</td><td>-4.2</td><td>18</td><td>-13.6</td><td>-10.4</td></tr> <tr><td>112</td><td>-42</td><td>-8.0</td><td>16</td><td>-13.8</td><td>-10.4</td></tr> <tr><td>110</td><td>-44</td><td>-4.4</td><td>14</td><td>-14.0</td><td>-10.4</td></tr> <tr><td>108</td><td>-46</td><td>-6.4</td><td>12</td><td>-14.2</td><td>-10.4</td></tr> <tr><td>106</td><td>-48</td><td>-6.7</td><td>10</td><td>-14.4</td><td>-10.4</td></tr> <tr><td>104</td><td>-50</td><td>-8.2</td><td>8</td><td>-14.6</td><td>-10.4</td></tr> </tbody> </table>	Downwind Vortex Tangential Velocities			Upwind Vortex Tangential Velocities			Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	198	44	10.2	102	-5.2	-9.4	196	42	13.2	100	-5.4	-7.2*	194	40	11.0	98	-5.6	-5.0	192	38	13.2*	96	-5.8	-4.2*	190	36	15.4	94	-6.0	-7.5	188	34	11.9	92	-6.2	-7.6*	186	32	16.1*	90	-6.4	-8.1	184	30	15.4*	88	-6.6	-8.6	182	28	14.8	86	-6.8	-9.3	180	26	12.4	84	-7.0	-10.4*	178	24	18.0	82	-7.2	-10.4	176	22	18.7	80	-7.4	-10.4	174	20	25.9	78	-7.6	-10.4	172	18	29.9	76	-7.8	-10.4	170	16	34.0*	74	-8.0	-10.4	168	14	38.0	72	-8.2	-10.4	166	12	42.1	70	-8.4	-10.4	164	10	28.9	68	-8.6	-10.4	162	8	29.9	66	-8.8	-10.4	160	6	42.7	64	-9.0	-10.4	158	4	34.0	62	-9.2	-10.4	156	2	47.7	60	-9.4	-10.4	154	0	59.7	58	-9.6	-10.4	152	-2	55.9	56	-9.8	-10.4	150	-4	35.0	54	-10.0	-10.4	148	-6	33.0	52	-10.2	-10.4	146	-8	34.1	50	-10.4	-10.4	144	-10	-2.5	48	-10.6	-10.4	142	-12	18.6	46	-10.8	-10.4	140	-14	-1.4	44	-11.0	-10.4	138	-16	-1.2	42	-11.2	-10.4	136	-18	-1.2	40	-11.4	-10.4	134	-20	-10.8	38	-11.6	-10.4	132	-22	-9.6*	36	-11.8	-10.4	130	-24	-8.4	34	-12.0	-10.4	128	-26	-9.0	32	-12.2	-10.4	126	-28	-6.4	30	-12.4	-10.4	124	-30	-10.9	28	-12.6	-10.4	122	-32	-8.0	26	-12.8	-10.4	120	-34	-12.1	24	-13.0	-10.4	118	-36	-11.8	22	-13.2	-10.4	116	-38	-7.1	20	-13.4	-10.4	114	-40	-4.2	18	-13.6	-10.4	112	-42	-8.0	16	-13.8	-10.4	110	-44	-4.4	14	-14.0	-10.4	108	-46	-6.4	12	-14.2	-10.4	106	-48	-6.7	10	-14.4	-10.4	104	-50	-8.2	8	-14.6	-10.4					
Downwind Vortex Tangential Velocities			Upwind Vortex Tangential Velocities																																																																																																																																																																																																																																																																																																														
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198	44	10.2	102	-5.2	-9.4																																																																																																																																																																																																																																																																																																												
196	42	13.2	100	-5.4	-7.2*																																																																																																																																																																																																																																																																																																												
194	40	11.0	98	-5.6	-5.0																																																																																																																																																																																																																																																																																																												
192	38	13.2*	96	-5.8	-4.2*																																																																																																																																																																																																																																																																																																												
190	36	15.4	94	-6.0	-7.5																																																																																																																																																																																																																																																																																																												
188	34	11.9	92	-6.2	-7.6*																																																																																																																																																																																																																																																																																																												
186	32	16.1*	90	-6.4	-8.1																																																																																																																																																																																																																																																																																																												
184	30	15.4*	88	-6.6	-8.6																																																																																																																																																																																																																																																																																																												
182	28	14.8	86	-6.8	-9.3																																																																																																																																																																																																																																																																																																												
180	26	12.4	84	-7.0	-10.4*																																																																																																																																																																																																																																																																																																												
178	24	18.0	82	-7.2	-10.4																																																																																																																																																																																																																																																																																																												
176	22	18.7	80	-7.4	-10.4																																																																																																																																																																																																																																																																																																												
174	20	25.9	78	-7.6	-10.4																																																																																																																																																																																																																																																																																																												
172	18	29.9	76	-7.8	-10.4																																																																																																																																																																																																																																																																																																												
170	16	34.0*	74	-8.0	-10.4																																																																																																																																																																																																																																																																																																												
168	14	38.0	72	-8.2	-10.4																																																																																																																																																																																																																																																																																																												
166	12	42.1	70	-8.4	-10.4																																																																																																																																																																																																																																																																																																												
164	10	28.9	68	-8.6	-10.4																																																																																																																																																																																																																																																																																																												
162	8	29.9	66	-8.8	-10.4																																																																																																																																																																																																																																																																																																												
160	6	42.7	64	-9.0	-10.4																																																																																																																																																																																																																																																																																																												
158	4	34.0	62	-9.2	-10.4																																																																																																																																																																																																																																																																																																												
156	2	47.7	60	-9.4	-10.4																																																																																																																																																																																																																																																																																																												
154	0	59.7	58	-9.6	-10.4																																																																																																																																																																																																																																																																																																												
152	-2	55.9	56	-9.8	-10.4																																																																																																																																																																																																																																																																																																												
150	-4	35.0	54	-10.0	-10.4																																																																																																																																																																																																																																																																																																												
148	-6	33.0	52	-10.2	-10.4																																																																																																																																																																																																																																																																																																												
146	-8	34.1	50	-10.4	-10.4																																																																																																																																																																																																																																																																																																												
144	-10	-2.5	48	-10.6	-10.4																																																																																																																																																																																																																																																																																																												
142	-12	18.6	46	-10.8	-10.4																																																																																																																																																																																																																																																																																																												
140	-14	-1.4	44	-11.0	-10.4																																																																																																																																																																																																																																																																																																												
138	-16	-1.2	42	-11.2	-10.4																																																																																																																																																																																																																																																																																																												
136	-18	-1.2	40	-11.4	-10.4																																																																																																																																																																																																																																																																																																												
134	-20	-10.8	38	-11.6	-10.4																																																																																																																																																																																																																																																																																																												
132	-22	-9.6*	36	-11.8	-10.4																																																																																																																																																																																																																																																																																																												
130	-24	-8.4	34	-12.0	-10.4																																																																																																																																																																																																																																																																																																												
128	-26	-9.0	32	-12.2	-10.4																																																																																																																																																																																																																																																																																																												
126	-28	-6.4	30	-12.4	-10.4																																																																																																																																																																																																																																																																																																												
124	-30	-10.9	28	-12.6	-10.4																																																																																																																																																																																																																																																																																																												
122	-32	-8.0	26	-12.8	-10.4																																																																																																																																																																																																																																																																																																												
120	-34	-12.1	24	-13.0	-10.4																																																																																																																																																																																																																																																																																																												
118	-36	-11.8	22	-13.2	-10.4																																																																																																																																																																																																																																																																																																												
116	-38	-7.1	20	-13.4	-10.4																																																																																																																																																																																																																																																																																																												
114	-40	-4.2	18	-13.6	-10.4																																																																																																																																																																																																																																																																																																												
112	-42	-8.0	16	-13.8	-10.4																																																																																																																																																																																																																																																																																																												
110	-44	-4.4	14	-14.0	-10.4																																																																																																																																																																																																																																																																																																												
108	-46	-6.4	12	-14.2	-10.4																																																																																																																																																																																																																																																																																																												
106	-48	-6.7	10	-14.4	-10.4																																																																																																																																																																																																																																																																																																												
104	-50	-8.2	8	-14.6	-10.4																																																																																																																																																																																																																																																																																																												

\* = Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(P) = Vortex passed over top of tower

Flyby (Run) Number: 36		UAL B767-200		Date: 30 SEP 1990 (Day of Year: 273)	Abeam Time: 9:53:46 (MDT)					
<b>AIRCRAFT DATA</b>										
Flaps: 5 deg.			Gross Weight: 235,800 lbs.							
Indicated Air Speed: 144 kts			Altitude: 240 ft AGL							
<b>METEOROLOGICAL DATA</b>										
(200 ft Sensor Level)										
Wind Speed: 5.1 kts	Wind Direction: 26 deg.	Air Temperature: 11.7 °C	Atmospheric Stability: Unstable							
Maximum Velocity: 133.1 fps	Age: 23 s	Advection Rate: 4.7 fps								
Descent Rate: 4.9 fps										
Maximum Velocity: 160.5 fps	Age: 39 s	Advection Rate: 5.1 fps								
Descent Rate: 3.9 fps										
<b>DOWNWIND VORTEX CHARACTERISTICS</b>										
Wind Direction: 26 deg.										
Age: 23 s										
Advection Rate: 4.7 fps										
<b>UPWIND VORTEX CHARACTERISTICS</b>										
Wind Direction: 26 deg.										
Age: 39 s										
Advection Rate: 5.1 fps										
<b>Downwind Vortex Tangential Velocities</b>										
Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)					
198	70	7.0	102	-26	-8.5					
196	68	8.1	100	-28	-5.8*					
194	66	7.6	98	-30	-8.0					
192	64	5.3	96	-32	-8.0					
190	62	10.7	94	-34	-7.0					
188	60	5.9	92	-36	-7.5*					
186	58	10.8	90	-38	-8.1					
184	56	7.7	88	-40	-8.1					
182	54	7.6	86	-42	-8.0					
180	52	8.4	84	-44	-6.7					
178	50	12.5	82	-46	-6.1					
176	48	13.6	80	-48	-6.4					
174	46	13.6	78	-50	-5.3					
172	44	12.3	76	-52	-4.9					
170	42	12.8	74	-54	-5.7					
168	40	12.9	72	-56	-7.8					
166	38	13.1	70	-58	-7.3					
164	36	15.9	68	-60	-7.9					
162	34	16.2	66	-62	-7.3					
160	32	18.1	64	-64	-6.0					
158	30	17.7	62	-66	-5.4					
156	28	19.4	60	-68	-6.5					
154	26	19.5	58	-70	-7.1					
152	24	20.3	56	-72	-6.2					
150	22	21.2	54	-74	-5.6					
148	20	23.1	52	-76	-4.5					
146	18	27.4*	48	-78	-2.9					
144	16	27.4*	48	-80	-2.0					
142	14	27.2	46	-82	-2.1					
140	12	26.6	44	-84	-1.5					
138	10	21.8	42	-86	-1.7					
136	8	35.2	40	-88	-1.3					
134	6	31.8	38	-90	-1.3					
132	4	43.2	36	-92	-2.2					
130	2	47.8	34	-94	-2.0					
128	0	47.2	32	-96	-1.8					
126	-2	133.1	30	-98	-2.0					
124	-4	30.7	-100	-100	-2.7					
122	-6	29.4	28	-102	-1.5					
120	-8	31.2	26	-104	-1.0					
118	-10	34.8	24	-106	-0.6					
116	-12	20.7	22	-108	-2.6					
114	-14	14.8	20	-110	-1.0					
112	-16	13.3	18	-112	-4.0					
110	-18	13.4	16	-114	-3.6					
108	-20	13.6	14	-116	-1.2					
106	-22	13.1	12	-118	-5.6					
104	-24	12.1	10	-118	-5.2					

= Estimated

(D) = Vortex dissipated upwind of tower

(M) = Missing

(O) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

UAL B767-200																			
AIRCRAFT DATA				Atmospheric Stability: Unstable															
Configuration: Takeoff	Indicated Air Speed: 149 kts	Gross Weight: 235,000 lbs.	Abeam Time: 9:59:29 (MDT)																
Glide Slope: 0 deg.	Tower Penetration Height: 124 ft AGL					Altitude: 250 ft AGL													
Wind Speed: 5.2 kts	Wind Direction: 34 deg.		Air Temperature: 11.9 °C		Estimated Core Radius: 0.8 ft														
Maximum Velocity: 86.1 fps	Age: 28 s		Advection Rate: 5.1 fps		Tower Penetration Height: 106 ft AGL														
Descent Rate: 4.5 fps	(200 ft Sensor Level)		Age: 44 s		Estimated Core Radius: 0.6 ft														
Maximum Velocity: 77.7 fps	Advection Rate: 5.4 fps		Tower Penetration Height: 106 ft AGL		Tower Penetration Height: 106 ft AGL														
Descent Rate: 3.3 fps																			
METEOROLOGICAL DATA																			
(200 ft Sensor Level)																			
DOWNWIND VORTEX CHARACTERISTICS																			
Age: 28 s																			
ADVECTION RATE: 5.1 FPS																			
UPWIND VORTEX CHARACTERISTICS																			
Age: 44 s																			
ADVECTION RATE: 5.4 FPS																			
Downwind Vortex Tangential Velocities																			
Sensor Height [ft]	Relative Height [ft]	V <sub>θ</sub> [fps]	Sensor Height [ft]	Relative Height [ft]	V <sub>θ</sub> [fps]	Sensor Height [ft]	Relative Height [ft]	V <sub>θ</sub> [fps]											
198	74	14.2	102	-22	-9.9	92	-1.2	102											
196	72	11.3	100	-24	-10.4*	90	-3.1	100											
194	70	15.3	98	-26	-10.8	88	-0.5	98											
192	68	11.0	96	-28	-7.9	92	-1.9	94											
190	66	15.4	94	-30	-8.6*	82	-0.5	92											
188	64	13.6	92	-32	-9.3	88	-2.3	92											
186	62	12.3*	90	-34	-4.4	80	-4.0	88											
184	60	11.0	88	-36	-6.5	78	-4.2	88											
182	58	10.4	86	-38	-7.5	82	-4.2	86											
180	56	9.2	84	-40	-10.0	78	-7.0	86											
178	54	11.9	82	-42	-10.6	72	-5.0	84											
176	52	12.5	80	-44	-10.1	78	-5.8	82											
174	50	13.4*	78	-46	-10.9	74	-6.1	78											
172	48	14.3	76	-48	-7.5	72	-5.9	78											
170	46	10.0	74	-50	-8.3	66	-5.3	76											
168	44	10.7	72	-52	-6.0	64	-3.3	74											
166	42	11.5	70	-54	-6.4	62	-4.2	72											
164	40	11.9	68	-56	-6.8	60	-5.2	70											
162	38	13.0	66	-58	-5.8	58	-4.5	68											
160	36	12.5	64	-60	-4.2	62	-5.0	66											
158	34	11.8	62	-62	-3.6	54	-5.4	64											
156	32	18.9	60	-64	-3.2	52	-6.7	62											
154	30	17.3	58	-66	-6.3	54	-8.0	46											
152	28	16.2*	56	-68	-6.0	50	-5.3	58											
150	26	21.0	54	-70	-6.0	48	-8.6	56											
148	24	21.2	52	-72	-6.8	44	-12.8	54											
146	22	21.1*	50	-74	-4.7	42	-14.9	52											
144	20	21.1	48	-76	-4.4	40	-13.5*	50											
142	18	17.0	46	-78	-4.5	44	-38	48											
140	16	14.5	44	-80	-4.7	42	-12.2	40											
138	14	17.4	42	-82	-6.2*	36	-10.0	36											
136	12	19.6	40	-84	-6.6	34	-9.3	34											
134	10	26.7	38	-86	-7.3	32	-10.8	32											
132	8	27.4	36	-88	-7.3	30	-7.0	36											
130	6	25.8	34	-90	-5.9*	28	-11.7	34											
128	4	31.0	32	-92	-4.1	26	-14.0	32											
126	2	18.6	30	-94	-4.7	24	-17.6*	30											
124	0	-86.1	28	-96	-4.3	22	-9.4	44											
122	-2	-68.2	26	-98	-5.9	20	-6.5	42											
120	-4	-32.8	24	-100	-3.5	18	-21.9	38											
118	-6	-22.3	22	-102	-4.8	16	-19.3	24											
116	-8	-16.2	20	-104	-4.1	14	-15.0	22											
114	-10	-22.8	18	-106	-3.9	12	-12.3	20											
112	-12	-27.5	16	-108	-3.6	10	-17.2	18											
110	-14	-26.5	14	-110	-3.7	8	-26.5	16											
108	-16	-13.3	12	-112	-4.2	6	-23.3	14											
106	-18	-13.3	10	-114	-5.0	4	-29.6	12											
104	-20	-8.7	-	-	-	-	-77.7	10											
							-44.3	-2											

(D) = Vortex dissipated upwind of tower (M) = Missing (I) = No vortex (F) = Vortex passed over top of tower

(I) = Vortex passed over top of tower

(P) = Vortex passed over remote sensing systems

(M) = Missing      (O) = No vortext (Flyby flown for remote sensing systems)      (P) = Vortex passed over top of tower

UAL B767-200							
AIRCRAFT DATA				METEOROLOGICAL DATA			
Configuration: Landing Glide Slope: 0 deg.				(200 ft Sensor Level)			
Wind Speed: 6.5 kts				Wind Direction: 47 deg.			
Maximum Velocity: 134.3 fps				Age: 24 s			
Descent Rate: 3.9 fps				Advection Rate: 5.5 fps			
Wind Speed: 6.5 kts				Age: 42 s			
Maximum Velocity: 97.7 fps				Advection Rate: 5.3 fps			
Maximum Velocity: 134.3 fps Descent Rate: 3.9 fps							
DOWNWIND VORTEX CHARACTERISTICS				UPWIND VORTEX CHARACTERISTICS			
Wind Direction: 47 deg.				Wind Direction: 47 deg.			
Age: 24 s				Age: 42 s			
Downwind Vortex Tangential Velocities				Upwind Vortex Tangential Velocities			
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)
198	42	12.0	102	-54	-4.2	198	82
196	40	13.7	100	-56	-4.8*	196	80
194	38	15.3	98	-58	-5.4	194	78
192	36	14.7	96	-60	-4.8	192	76
190	34	14.2	94	-62	-4.6	190	74
188	32	10.4	92	-64	-5.8	188	72
186	30	15.0	90	-66	-4.8	186	70
184	28	13.9	88	-68	-2.5	184	68
182	26	16.9	86	-70	-2.3	182	66
180	24	18.5	84	-72	-2.2	180	64
178	22	20.0	82	-74	0.4	178	62
176	20	19.5	80	-76	0.5	176	60
174	18	15.7	78	-78	0.3	174	58
172	16	21.4	76	-80	-1.7	172	56
170	14	24.1	74	-82	-0.8	170	54
168	12	26.8	72	-84	-3.0	168	52
166	10	29.5	70	-86	-0.2	166	50
164	8	40.0	68	-88	0.9	164	48
162	6	45.3	66	-90	0.2	162	46
160	4	57.3	64	-92	0.2	160	44
158	2	56.2	62	-94	-0.3	158	42
156	0	-134.3	60	-96	-0.1	156	40
154	-2	-58.2	58	-98	-0.1	154	38
152	-4	-60.8	56	-100	0.0	152	36
150	-6	-24.2	54	-102	-0.1	150	34
148	-8	-33.1	52	-104	-0.4	148	32
146	-10	-27.9	50	-106	-0.5	146	30
144	-12	-19.4	48	-108	-0.6	144	28
142	-14	-17.1*	46	-110	0.4	142	26
140	-16	-15.8	44	-112	0.2	140	24
138	-18	-14.2	42	-114	0.0	138	22
136	-20	-2.0	40	-116	-0.1	136	20
134	-22	-4.2	38	-118	-1.3	134	18
132	-24	-10.8	36	-120	1.1	132	16
130	-26	-8.8	34	-122	0.8	130	14
128	-28	-7.9	32	-124	0.9	128	12
126	-30	-5.6	30	-126	1.3	126	10
124	-32	-7.7	28	-128	1.1	124	8
122	-34	-8.4	26	-130	0.2	122	6
120	-36	-9.3	24	-132	0.9	120	4
118	-38	-7.4	22	-134	0.3	118	2
116	-40	-7.7	20	-136	0.7	116	0
114	-42	-6.2	18	-138	0.0	114	-2
112	-44	-4.4	16	-140	0.4	112	-4
110	-46	-4.3	14	-142	0.6	110	-6
108	-48	-4.2	12	-144	1.4	108	-8
106	-50	-2.8	10	-146	1.5	106	-10
104	-52	-3.6				104	-12

\* = Estimated      (D) = Vortex dissipated upwind of tower      (M) = Missing      (O) = No vortex (Flyby flown for remote sensing systems)      (P) = Vortex passed over top of tower

Flyby (Run) Number: 39		Date: 30 SEP 1990 (Day of Year: 273)		Abeam Time: 10:12:46(MDT)	
Configuration: Landing		AIRCRAFT DATA		Gross Weight: 232,800 lbs.	
Glide Slope: -3 deg.		Indicated Air Speed: 130 kts		Altitude: 250 ft AGL	
Wind Speed: 5.7 kts		METEOROLOGICAL DATA		Atmospheric Stability: Unstable	
Maximum Velocity: 67.7 fpm		(200 ft Sensor Level)		Estimated Core Radius: 1.5 ft	
Descent Rate: 5.2 fpm		Wind Direction: 48 deg.		Tower Penetration Height: 140 ft AGL	
Maximum Velocity: 72.8 fpm		Air Temperature: 12.4 °C		Estimated Core Radius: 1.1 ft	
Descent Rate: 4.2 fpm		Age: 38 s		Tower Penetration Height: 90 ft AGL	
Wind Speed: 5.7 kts		DOWNWIND VORTEX CHARACTERISTICS		Upwind Vortex Tangential Velocities	
Maximum Velocity: 72.8 fpm		Age: 21 s		Sensor Height [ft]	
Descent Rate: 4.2 fpm		Advection Rate: 5.1 fpm		$V_{\theta}$ [fps]	
Wind Speed: 5.7 kts		UPWIND VORTEX CHARACTERISTICS		Relative Height [ft]	
Maximum Velocity: 67.7 fpm		Age: 38 s		Sensor Height [ft]	
Descent Rate: 5.2 fpm		Advection Rate: 5.3 fpm		$V_{\theta}$ [fps]	
Downwind Vortex Tangential Velocities					
Sensor Height [ft]	Relative Height [ft]	$V_{\theta}$ [fps]	Sensor Height [ft]	Relative Height [ft]	$V_{\theta}$ [fps]
198	58	14.6	102	-38	-11.1
196	56	14.9	100	-40	-9.3*
194	54	13.9	98	-42	-7.6
192	52	14.5*	96	-44	-8.6
190	50	15.1	94	-46	-10.5*
188	48	17.3*	92	-48	-12.4
186	46	19.5	90	-50	-14.0
184	44	16.9	88	-52	-15.4
182	42	19.1	86	-54	-10.4
180	40	15.7	84	-56	-10.3
178	38	17.5	82	-58	-9.8
176	36	20.0	80	-60	-10.1
174	34	19.8	78	-62	-8.3
172	32	21.1	76	-64	-7.1
170	30	21.7	74	-66	-8.2
168	28	22.3	72	-68	-8.2
166	26	22.8	70	-70	-8.8
164	24	22.5	68	-72	-7.8
162	22	22.7	66	-74	-6.0
160	20	23.9	64	-76	-5.9
158	18	27.6	62	-78	-8.9
156	16	29.7	60	-80	-7.5
154	14	32.3	58	-82	-8.6
152	12	32.2*	56	-84	-8.6
150	10	30.1	54	-86	-5.4
148	8	40.7	52	-88	-5.9
146	6	40.9*	50	-90	-6.5
144	4	41.1	48	-92	-7.0
142	2	45.2	46	-94	-5.8
140	0	47.7	44	-96	-4.8
138	-2	42.4	42	-98	-3.8
136	-4	45.0	40	-100	-2.7
134	-6	36.4	38	-102	-3.4
132	-8	28.3	36	-104	-3.4
130	-10	26.2	34	-106	-3.8
128	-12	22.9	32	-108	-2.9
126	-14	20.2*	30	-110	-2.8
124	-16	17.4	28	-112	-1.9
122	-18	21.4	26	-114	-2.6
120	-20	20.5	24	-116	-1.6
118	-22	19.5*	22	-118	-2.3
116	-24	18.4	20	-120	-2.9
114	-26	15.4	18	-122	-2.4
112	-28	13.7	16	-124	-1.7
110	-30	13.3	14	-126	-1.8
108	-32	13.4	12	-128	-1.5
106	-34	11.6	10	-130	-0.5
104	-36	12.7			

\* = Estimated      (D) = Vortex dissipated upwind of tower      (M) = Missing      (O) = No vortex (Flyby flown for remote sensing systems)      (P) = Vortex passed over top of tower

Flyby (Run) Number: 40		UAL B767-200		Date: 30 SEP 1990 (Day of Year: 273)		Abeam Time: 10:18:15 (MDT)	
Configuration: Landing		AIRCRAFT DATA		METEOROLOGICAL DATA		Atmospheric Stability: Unstable	
Glide Slope: 0 deg.		Flaps: 30 deg.		Indicated Air Speed: 130 kts		Gross Weight: 231,400lbs.	
Wind Speed: 5.8 kts		Wind Direction: 52 deg.		Altitude: 400 ft AGL		Altitude: 400 ft AGL	
Maximum Velocity: (O) fps		Age: (O) s		Advection Rate: (O) ips		Estimated Core Radius: (O) ft	
Descent Rate: (O) fpm		Tower Penetration Height: (O) ft AGL		Tower Penetration Height: (O) ft AGL		Tower Penetration Height: (O) ft AGL	
Downwind Vortex Characteristics		Upwind Vortex Characteristics		Upwind Vortex Tangential Velocities		Upwind Vortex Tangential Velocities	
Wind Direction: 52 deg.		Age: (O) s		Advection Rate: (O) ips		Advection Rate: (O) ips	
Downwind Vortex		Upwind Vortex		Relative Height (ft)		Relative Height (ft)	
Sensor Height (ft)		Sensor Height (ft)		Sensor Height (ft)		Sensor Height (ft)	
Relative Height (ft)		V <sub>θ</sub> (fps)		Relative Height (ft)		V <sub>θ</sub> (fps)	
198		102		198		102	
196		100		196		100	
194		98		194		98	
192		96		192		96	
190		94		190		94	
188		92		188		92	
186		90		186		90	
184		88		184		88	
182		86		182		86	
180		84		180		84	
178		82		178		82	
176		80		176		80	
174		78		174		78	
172		76		172		76	
170		74		170		74	
168		72		168		72	
166		70		166		70	
164		68		164		68	
162		66		162		66	
160		64		160		64	
158		62		158		62	
156		60		156		60	
154		58		154		58	
152		56		152		56	
150		54		150		54	
148		52		148		52	
146		50		146		50	
144		48		144		48	
142		46		142		46	
140		44		140		44	
138		42		138		42	
136		40		136		40	
134		38		134		38	
132		36		132		36	
130		34		130		34	
128		32		128		32	
126		30		126		30	
124		28		124		28	
122		26		122		26	
120		24		120		24	
118		22		118		22	
116		20		116		20	
114		18		114		18	
112		16		112		16	
110		14		110		14	
108		12		108		12	
106		10		106		10	

Estimated

D) = Vortex dissipated upwind of tower (M)

**Q = NaYtex** ( $\text{NaY}_{\text{tex}}$ ) for remote sensing systems

= Vortex passed over top of tower

Flyby (Run) Number: 41		Date: 30 SEP 1990 (Day of Year: 273)		Abeam Time: 10:24:27 (MDT)	
Configuration: Landing	Glide Slope: 0 deg.	Flaps: 30 deg	AIRCRAFT DATA	Gross Weight: 230,000 lbs	Altitude: 500 ft AGL
Wind Speed: 4.7 kts	Wind Direction: 42 deg.	Indicated Air Speed: 130 kts	METEOROLOGICAL DATA (200 ft Sensor Level)	Estimated Core Radius: (0) ft	Atmospheric Stability: Unstable
Maximum Velocity: (0) fpm	Age: (0) s	Advection Rate: (0) fpm	DOWNDOWN VORTEX CHARACTERISTICS	Tower Penetration Height: (0) ft AGL	
Descent Rate: (0) fpm	Wind Speed: 4.7 kts	Wind Direction: 42 deg.	UPWIND VORTEX CHARACTERISTICS	Estimated Core Radius: (0) ft	
Maximum Velocity: (0) fpm	Age: (0) s	Advection Rate: (0) fpm	Downwind Vortex Tangential Velocities	Tower Penetration Height: (0) ft AGL	
Descent Rate: (0) fpm	Wind Speed: 4.7 kts	Wind Direction: 42 deg.	Sensor Height (ft)	Relative Height (ft)	Relative Height (ft)
			$V_\theta$ (fps)	$V_\theta$ (fps)	$V_\theta$ (fps)
			0	0	0
198	196	194	102	198	102
192	190	188	100	196	100
186	184	182	98	194	98
180	178	176	96	192	96
174	172	170	94	190	94
168	166	164	92	188	92
162	160	158	90	186	90
156	154	152	88	184	88
150	148	146	86	182	86
144	142	140	84	180	84
138	136	134	82	178	82
132	130	128	80	176	80
126	124	122	78	174	78
120	118	116	76	172	76
114	112	110	74	170	74
108	106	104	72	168	72
			68	166	70
			64	164	68
			60	162	66
			56	160	64
			52	158	62
			50	156	60
			48	154	58
			44	152	56
			42	150	54
			40	148	52
			38	146	50
			36	144	48
			34	142	46
			32	140	44
			30	138	42
			28	136	40
			24	134	38
			22	132	36
			20	130	34
			18	128	32
			16	126	30
			14	124	28
			12	122	26
			10	120	24
			8	118	22
			6	116	20
			4	114	18
			2	112	16
			0	110	14
			106	108	12
			104	106	10



Flyby (Run) Number: 43	Date: 30 SEP 1990 (Day of Year: 273)	Abeam Time: 12:22:16 (MDT)					
Configuration: Takeoff Glide Slope: 0 deg.	AIRCRAFT DATA Flaps: 15 deg. Indicated Air Speed: 142 kts	Gross Weight: 263,500 lbs. Altitude: 230 ft AGL					
Wind Speed: 4.1 kts	Wind Direction: 163 deg.	Air Temperature: 19.2 °C					
Maximum Velocity: 53.0 fps Descent Rate: 2.7 fps	Age: 46 s Advection Rate: 2.7 fps (200 ft Sensor Level)	Atmospheric Stability: Unstable Estimated Core Radius: 0.5 ft Tower Penetration Height: 94 ft AGL					
Maximum Velocity: (D) fps Descent Rate: (D) fps	UPWIND VORTEX CHARACTERISTICS Age: (D) s Advection Rate: (D) fps	Upwind Vortex Tangential Velocities Estimated Core Radius: (D) ft Tower Penetration Height: (D) ft AGL					
DOWNWIND VORTEX CHARACTERISTICS							
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)
		V <sub>θ</sub> (fps)		V <sub>θ</sub> (fps)		V <sub>θ</sub> (fps)	
198	104	-4.4	102	8	-12.5	198	(D)
196	102	-4.6*	100	6	-24.8*	196	(D)
194	100	-4.8*	98	4	-36.1	194	98
192	98	-5.1	96	2	-35.5	192	96
190	96	-5.0	94	0	53.0	190	94
188	94	-4.4	92	-2	27.9	188	92
186	92	-5.8	90	-4	19.9	186	90
184	90	-5.5	88	-6	12.9	184	88
182	88	-6.2	86	-8	13.1	182	86
180	86	-7.2	84	-10	12.8	180	84
178	84	-6.8	82	-12	7.2	178	82
176	82	-7.1	80	-14	6.5	176	80
174	80	-7.2	78	-16	7.8	174	78
172	78	-7.2	76	-18	6.0	172	76
170	76	-8.9	74	-20	5.7	170	74
168	74	-8.3	72	-22	8.4	168	72
166	72	-8.4	70	-24	6.3	166	70
164	70	-8.4	68	-26	9.0	164	68
162	68	-8.8	66	-28	6.6	162	66
160	66	-7.8	64	-30	6.9	160	64
158	64	-8.0	62	-32	6.1	158	62
156	62	-8.0	60	-34	7.3	156	60
154	60	-7.3	58	-36	6.0	154	58
152	58	-8.2	56	-38	6.0	152	56
150	56	-6.6	54	-40	7.6	150	54
148	54	-8.1	52	-42	6.8	148	52
146	52	-10.3	50	-44	6.1	146	50
144	50	-6.6	48	-46	4.3	144	48
142	48	-7.1	46	-48	4.1	142	46
140	46	-7.3	44	-50	3.9	140	44
138	44	-7.9	42	-52	4.4	138	42
136	42	-7.9	40	-54	5.0	136	40
134	40	-6.9	38	-56	4.6	134	38
132	38	-5.4	36	-58	5.6	132	36
130	36	-9.3	34	-60	4.5	130	34
128	34	-10.7	32	-62	5.2	128	32
126	32	-12.0	30	-64	4.6	126	30
124	30	-7.6	28	-66	6.6	124	28
122	28	-6.3	26	-68	5.0	122	26
120	26	-1.7	24	-70	5.2	120	24
118	24	-8.3	22	-72	6.0	118	22
116	22	-1.7	20	-74	5.9	116	20
114	20	-13.7	18	-76	5.9	114	18
112	18	-15.8	16	-78	5.6	112	16
110	16	-15.1	14	-80	3.8	110	14
108	14	-17.4	12	-82	4.1	108	12
106	12	-16.0	10	-84	3.8	106	10
104	10	-16.8			104	10	

\* = Estimated      (D) = Missing      (M) = Vortex dissipated upwind of tower      (O) = No vortex (Flyby flown for remote sensing systems)      (P) = Vortex passed over top of tower

Flyby (Run) Number: 44		UAL B767-200		Date: 30 SEP 1990 (Day of Year: 273)	Abeam Time: 12:28:06 (MDT)																																																																																																																																																																																																																																																																																																									
AIRCRAFT DATA		Gross Weight: 252,000 lbs.		Altitude: 170 ft AGL																																																																																																																																																																																																																																																																																																										
Configuration: Takeoff		Flaps: 5 deg.		Indicated Air Speed: 148 kts																																																																																																																																																																																																																																																																																																										
Glide Slope: 0 deg.		METEOROLOGICAL DATA		(200 ft Sensor Level)																																																																																																																																																																																																																																																																																																										
Wind Speed: 3.9 kts		Wind Direction: 159 deg.		Air Temperature: 19.6 °C																																																																																																																																																																																																																																																																																																										
Maximum Velocity: 136.7 fps		Age: 5.2 s		Estimated Core Radius: 0.2 ft																																																																																																																																																																																																																																																																																																										
Descent Rate: 0.6 fps		Advection Rate: 3.0 fps		Tower Penetration Height: 138 ft AGL																																																																																																																																																																																																																																																																																																										
Upwind Vortex Characteristics		Atmospheric Stability: Unstable		Atmospheric Stability: Unstable																																																																																																																																																																																																																																																																																																										
Maximum Velocity: (D) fps		Age: (D) s		Estimated Core Radius: (D) ft																																																																																																																																																																																																																																																																																																										
Descent Rate: (D) fps		Advection Rate: (D) fps		Tower Penetration Height: (D) ft AGL																																																																																																																																																																																																																																																																																																										
<table border="1"> <thead> <tr> <th colspan="4">Downwind Vortex Characteristics</th> <th colspan="2">Upwind Vortex Tangential Velocities</th> </tr> <tr> <th>Sensor Height [ft]</th> <th>Relative Height [ft]</th> <th>V<sub>θ</sub> (fps)</th> <th>Sensor Height [ft]</th> <th>Relative Height [ft]</th> <th>Sensor Height [ft]</th> </tr> </thead> <tbody> <tr><td>198</td><td>60</td><td>-8.9</td><td>102</td><td>-36</td><td>8.4</td></tr> <tr><td>196</td><td>58</td><td>-8.8*</td><td>100</td><td>-38</td><td>7.0*</td></tr> <tr><td>194</td><td>56</td><td>-8.6</td><td>98</td><td>-42</td><td>6.9</td></tr> <tr><td>192</td><td>54</td><td>-8.5</td><td>96</td><td>-44</td><td>6.8</td></tr> <tr><td>190</td><td>52</td><td>-8.2</td><td>94</td><td>-46</td><td>4.8</td></tr> <tr><td>188</td><td>50</td><td>-8.7</td><td>92</td><td>-46</td><td>4.5</td></tr> <tr><td>186</td><td>48</td><td>-9.6</td><td>90</td><td>-48</td><td>4.2</td></tr> <tr><td>184</td><td>46</td><td>-11.4</td><td>88</td><td>-50</td><td>3.9</td></tr> <tr><td>182</td><td>44</td><td>-12.1</td><td>86</td><td>-52</td><td>4.0</td></tr> <tr><td>180</td><td>42</td><td>-12.9</td><td>84</td><td>-54</td><td>3.6</td></tr> <tr><td>178</td><td>40</td><td>-13.2</td><td>82</td><td>-56</td><td>4.5</td></tr> <tr><td>176</td><td>38</td><td>-14.0</td><td>80</td><td>-58</td><td>3.7</td></tr> <tr><td>174</td><td>36</td><td>-10.9</td><td>78</td><td>-60</td><td>5.9</td></tr> <tr><td>172</td><td>34</td><td>-8.5</td><td>76</td><td>-62</td><td>2.6</td></tr> <tr><td>170</td><td>32</td><td>-11.9</td><td>74</td><td>-64</td><td>2.7</td></tr> <tr><td>168</td><td>30</td><td>-9.9</td><td>72</td><td>-66</td><td>4.5</td></tr> <tr><td>166</td><td>28</td><td>-10.5</td><td>70</td><td>-68</td><td>2.3</td></tr> <tr><td>164</td><td>26</td><td>-11.1</td><td>68</td><td>-70</td><td>4.1</td></tr> <tr><td>162</td><td>24</td><td>-13.4</td><td>66</td><td>-72</td><td>6.3</td></tr> <tr><td>160</td><td>22</td><td>-11.7</td><td>64</td><td>-74</td><td>5.0</td></tr> <tr><td>158</td><td>20</td><td>-14.7</td><td>62</td><td>-76</td><td>5.0</td></tr> <tr><td>156</td><td>18</td><td>-17.0</td><td>60</td><td>-78</td><td>158</td></tr> <tr><td>154</td><td>16</td><td>-15.8</td><td>58</td><td>-80</td><td>156</td></tr> <tr><td>152</td><td>14</td><td>-18.6</td><td>56</td><td>-82</td><td>154</td></tr> <tr><td>150</td><td>12</td><td>-18.1</td><td>54</td><td>-84</td><td>152</td></tr> <tr><td>148</td><td>10</td><td>-24.2</td><td>52</td><td>-86</td><td>4.1</td></tr> <tr><td>146</td><td>8</td><td>-28.5</td><td>50</td><td>-88</td><td>4.0</td></tr> <tr><td>144</td><td>6</td><td>-16.7</td><td>48</td><td>-90</td><td>2.9</td></tr> <tr><td>142</td><td>4</td><td>-35.2</td><td>46</td><td>-92</td><td>144</td></tr> <tr><td>140</td><td>2</td><td>-55.0</td><td>44</td><td>-94</td><td>142</td></tr> <tr><td>138</td><td>0</td><td>136.7</td><td>42</td><td>-96</td><td>54</td></tr> <tr><td>136</td><td>-2</td><td>54.2</td><td>40</td><td>-98</td><td>52</td></tr> <tr><td>134</td><td>-4</td><td>30.5</td><td>38</td><td>-100</td><td>38</td></tr> <tr><td>132</td><td>-6</td><td>12.7</td><td>36</td><td>-102</td><td>36</td></tr> <tr><td>130</td><td>-8</td><td>15.1</td><td>34</td><td>-104</td><td>34</td></tr> <tr><td>128</td><td>-10</td><td>13.7</td><td>32</td><td>-106</td><td>32</td></tr> <tr><td>126</td><td>-12</td><td>19.8</td><td>30</td><td>-108</td><td>30</td></tr> <tr><td>124</td><td>-14</td><td>11.1</td><td>28</td><td>-110</td><td>28</td></tr> <tr><td>122</td><td>-16</td><td>10.5</td><td>26</td><td>-112</td><td>26</td></tr> <tr><td>120</td><td>-18</td><td>6.3</td><td>24</td><td>-114</td><td>24</td></tr> <tr><td>118</td><td>-20</td><td>6.6</td><td>22</td><td>-116</td><td>22</td></tr> <tr><td>116</td><td>-22</td><td>8.9</td><td>20</td><td>-118</td><td>20</td></tr> <tr><td>114</td><td>-24</td><td>9.6</td><td>18</td><td>-120</td><td>18</td></tr> <tr><td>112</td><td>-26</td><td>8.5</td><td>16</td><td>-122</td><td>16</td></tr> <tr><td>110</td><td>-28</td><td>9.3</td><td>14</td><td>-124</td><td>14</td></tr> <tr><td>108</td><td>-30</td><td>8.2</td><td>12</td><td>-126</td><td>12</td></tr> <tr><td>106</td><td>-32</td><td>7.9</td><td>10</td><td>-128</td><td>10</td></tr> <tr><td>104</td><td>-34</td><td>7.3</td><td></td><td></td><td>104</td></tr> </tbody> </table>	Downwind Vortex Characteristics				Upwind Vortex Tangential Velocities		Sensor Height [ft]	Relative Height [ft]	V <sub>θ</sub> (fps)	Sensor Height [ft]	Relative Height [ft]	Sensor Height [ft]	198	60	-8.9	102	-36	8.4	196	58	-8.8*	100	-38	7.0*	194	56	-8.6	98	-42	6.9	192	54	-8.5	96	-44	6.8	190	52	-8.2	94	-46	4.8	188	50	-8.7	92	-46	4.5	186	48	-9.6	90	-48	4.2	184	46	-11.4	88	-50	3.9	182	44	-12.1	86	-52	4.0	180	42	-12.9	84	-54	3.6	178	40	-13.2	82	-56	4.5	176	38	-14.0	80	-58	3.7	174	36	-10.9	78	-60	5.9	172	34	-8.5	76	-62	2.6	170	32	-11.9	74	-64	2.7	168	30	-9.9	72	-66	4.5	166	28	-10.5	70	-68	2.3	164	26	-11.1	68	-70	4.1	162	24	-13.4	66	-72	6.3	160	22	-11.7	64	-74	5.0	158	20	-14.7	62	-76	5.0	156	18	-17.0	60	-78	158	154	16	-15.8	58	-80	156	152	14	-18.6	56	-82	154	150	12	-18.1	54	-84	152	148	10	-24.2	52	-86	4.1	146	8	-28.5	50	-88	4.0	144	6	-16.7	48	-90	2.9	142	4	-35.2	46	-92	144	140	2	-55.0	44	-94	142	138	0	136.7	42	-96	54	136	-2	54.2	40	-98	52	134	-4	30.5	38	-100	38	132	-6	12.7	36	-102	36	130	-8	15.1	34	-104	34	128	-10	13.7	32	-106	32	126	-12	19.8	30	-108	30	124	-14	11.1	28	-110	28	122	-16	10.5	26	-112	26	120	-18	6.3	24	-114	24	118	-20	6.6	22	-116	22	116	-22	8.9	20	-118	20	114	-24	9.6	18	-120	18	112	-26	8.5	16	-122	16	110	-28	9.3	14	-124	14	108	-30	8.2	12	-126	12	106	-32	7.9	10	-128	10	104	-34	7.3			104	<p>= Estimated (D) = Vortex dissipated upwind of tower (M) = Missing (O) = No vortex (P) = Vortex flown over top of tower (P) = Vortex passed over remote sensing systems</p>	
Downwind Vortex Characteristics				Upwind Vortex Tangential Velocities																																																																																																																																																																																																																																																																																																										
Sensor Height [ft]	Relative Height [ft]	V <sub>θ</sub> (fps)	Sensor Height [ft]	Relative Height [ft]	Sensor Height [ft]																																																																																																																																																																																																																																																																																																									
198	60	-8.9	102	-36	8.4																																																																																																																																																																																																																																																																																																									
196	58	-8.8*	100	-38	7.0*																																																																																																																																																																																																																																																																																																									
194	56	-8.6	98	-42	6.9																																																																																																																																																																																																																																																																																																									
192	54	-8.5	96	-44	6.8																																																																																																																																																																																																																																																																																																									
190	52	-8.2	94	-46	4.8																																																																																																																																																																																																																																																																																																									
188	50	-8.7	92	-46	4.5																																																																																																																																																																																																																																																																																																									
186	48	-9.6	90	-48	4.2																																																																																																																																																																																																																																																																																																									
184	46	-11.4	88	-50	3.9																																																																																																																																																																																																																																																																																																									
182	44	-12.1	86	-52	4.0																																																																																																																																																																																																																																																																																																									
180	42	-12.9	84	-54	3.6																																																																																																																																																																																																																																																																																																									
178	40	-13.2	82	-56	4.5																																																																																																																																																																																																																																																																																																									
176	38	-14.0	80	-58	3.7																																																																																																																																																																																																																																																																																																									
174	36	-10.9	78	-60	5.9																																																																																																																																																																																																																																																																																																									
172	34	-8.5	76	-62	2.6																																																																																																																																																																																																																																																																																																									
170	32	-11.9	74	-64	2.7																																																																																																																																																																																																																																																																																																									
168	30	-9.9	72	-66	4.5																																																																																																																																																																																																																																																																																																									
166	28	-10.5	70	-68	2.3																																																																																																																																																																																																																																																																																																									
164	26	-11.1	68	-70	4.1																																																																																																																																																																																																																																																																																																									
162	24	-13.4	66	-72	6.3																																																																																																																																																																																																																																																																																																									
160	22	-11.7	64	-74	5.0																																																																																																																																																																																																																																																																																																									
158	20	-14.7	62	-76	5.0																																																																																																																																																																																																																																																																																																									
156	18	-17.0	60	-78	158																																																																																																																																																																																																																																																																																																									
154	16	-15.8	58	-80	156																																																																																																																																																																																																																																																																																																									
152	14	-18.6	56	-82	154																																																																																																																																																																																																																																																																																																									
150	12	-18.1	54	-84	152																																																																																																																																																																																																																																																																																																									
148	10	-24.2	52	-86	4.1																																																																																																																																																																																																																																																																																																									
146	8	-28.5	50	-88	4.0																																																																																																																																																																																																																																																																																																									
144	6	-16.7	48	-90	2.9																																																																																																																																																																																																																																																																																																									
142	4	-35.2	46	-92	144																																																																																																																																																																																																																																																																																																									
140	2	-55.0	44	-94	142																																																																																																																																																																																																																																																																																																									
138	0	136.7	42	-96	54																																																																																																																																																																																																																																																																																																									
136	-2	54.2	40	-98	52																																																																																																																																																																																																																																																																																																									
134	-4	30.5	38	-100	38																																																																																																																																																																																																																																																																																																									
132	-6	12.7	36	-102	36																																																																																																																																																																																																																																																																																																									
130	-8	15.1	34	-104	34																																																																																																																																																																																																																																																																																																									
128	-10	13.7	32	-106	32																																																																																																																																																																																																																																																																																																									
126	-12	19.8	30	-108	30																																																																																																																																																																																																																																																																																																									
124	-14	11.1	28	-110	28																																																																																																																																																																																																																																																																																																									
122	-16	10.5	26	-112	26																																																																																																																																																																																																																																																																																																									
120	-18	6.3	24	-114	24																																																																																																																																																																																																																																																																																																									
118	-20	6.6	22	-116	22																																																																																																																																																																																																																																																																																																									
116	-22	8.9	20	-118	20																																																																																																																																																																																																																																																																																																									
114	-24	9.6	18	-120	18																																																																																																																																																																																																																																																																																																									
112	-26	8.5	16	-122	16																																																																																																																																																																																																																																																																																																									
110	-28	9.3	14	-124	14																																																																																																																																																																																																																																																																																																									
108	-30	8.2	12	-126	12																																																																																																																																																																																																																																																																																																									
106	-32	7.9	10	-128	10																																																																																																																																																																																																																																																																																																									
104	-34	7.3			104																																																																																																																																																																																																																																																																																																									

Flyby (Run) Number: 45		UAL B767-200		Date: 30 SEP 1990 (Day of Year: 273)	Abeam Time: 12:33:36 (MDT)
AIRCRAFT DATA		Estimated Core Radius: 0.3 ft		Gross Weight: 251,000 lbs.	
Configuration: Takeoff		Tower Penetration Height: 58 ft AGL		Glide Slope: 0 deg.	Indicated Air Speed: 153 kts
METEOROLOGICAL DATA		Atmospheric Stability: Unstable		(200 ft Sensor Level)	(200 ft Sensor Level)
Wind Speed: 5.4 kts		Wind Direction: 168 deg.		Air Temperature: 19.8 °C	
Maximum Velocity: 144.5 fps		DOWNWIND VORTEX CHARACTERISTICS		Age: 37 s	Advection Rate: 4.0 fps
Descent Rate: 4.9 ips		UPWIND VORTEX CHARACTERISTICS		Age: (D) s	Advection Rate: (D) 1fps
Maximum Velocity: (D) fps		Downwind Vortex Tangential Velocities		Upwind Vortex Tangential Velocities	
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)
198	140	-5.7	102	44	-4.4
196	138	-3.8	100	42	-4.7*
194	136	-5.1*	98	40	-8.9
192	134	-6.4	96	38	-6.7
190	132	-5.3	94	36	-5.3
188	130	-5.2	92	34	-6.8
186	128	-5.0	90	32	-4.3
184	126	-5.7	88	30	-4.3
182	124	-5.1	86	28	-7.2
180	122	-5.3	84	26	-4.9
178	120	-4.3	82	24	-8.9
176	118	-3.0	80	22	-7.2*
174	116	-7.2	78	20	-5.5
172	114	-7.2	76	18	-7.0
170	112	-5.8	74	16	-5.2
168	110	-6.5	72	14	-5.9*
166	108	-6.6	70	12	-6.6
164	106	-5.5	68	10	-8.8
162	104	-5.6	66	8	-15.8
160	102	-5.8	64	6	-26.2
158	100	-5.3	62	4	-34.3
156	98	-8.0	60	2	-48.5
154	96	-7.1	58	0	144.5
152	94	-5.9	56	-2	154
150	92	-9.9	54	-4	147
148	90	-8.4	52	-6	152
146	88	-6.6	50	-8	148
144	86	-5.5	48	-10	146
142	84	-5.3	46	-12	144
140	82	-7.2	44	-14	142
138	80	-5.0	42	-16	140
136	78	-5.0	40	-18	138
134	76	-5.6	38	-20	136
132	74	-2.3	36	-22	134
130	72	-6.6	34	-24	132
128	70	-4.9	32	-26	130
126	68	-6.6	30	-28	128
124	66	-8.2	28	-30	126
122	64	-5.0	26	-32	124
120	62	-6.8	24	-34	122
118	60	-5.7	22	-36	120
116	58	-9.6	20	-38	118
114	56	-6.5	18	-40	116
112	54	-7.8	16	-42	114
110	52	-9.8	14	-44	112
108	50	-6.1	12	-46	110
106	48	-5.7	10	-48	108
104	46	-5.3			104

\* = Estimated (D) = Vortex dissipated upwind of tower (M) = Missing

(O) = No vortex (P) = Vortex flown for remote sensing systems) (P) = Vortex passed over top of tower

= Estimated

Missing

(P) = Vortex passed over top of tower

Flyby (Run) Number: 47	Date: 30 SEP 1990 (Day of Year: 273)	Abeam Time: 12:45:06 (MDT)
Configuration: Landing Glide Slope: -3 deg.	AIRCRAFT DATA Flaps: 30 deg. Indicated Air Speed: 135 kts	Gross Weight: 249,000 lbs. Altitude: 280 ft AGL
Wind Speed: 5.7 kts	Wind Direction: 189 deg.	Atmospheric Stability: Unstable
Maximum Velocity: 109.6 fps Descent Rate: 7.0 f/s	Age: 25 s Advection Rate: 5.7 f/s	Estimated Core Radius: 0.4 ft Tower Penetration Height: 106 ft AGL
Maximum Velocity: 24.2 f/s Descent Rate: 3.8 f/s	Age: 67 s Advection Rate: 3.5 f/s	Estimated Core Radius: 0.8 ft Tower Penetration Height: 28 ft AGL
DOWNWIND VORTEX CHARACTERISTICS		
Sensor Height (ft)	Relative Height (ft)	Relative Height (ft)
198	92	-8.8
196	90	-5.8
194	88	-9.7
192	86	-11.1
190	84	-11.3
188	82	-10.2
186	80	-11.1
184	78	-9.9
182	76	-8.5
180	74	-10.3
178	72	-8.2
176	70	-8.7
174	68	-9.0
172	66	-9.5
170	64	-10.5
168	62	-9.2
166	60	-10.1
164	58	-12.1
162	56	-12.4
160	54	-10.8
158	52	-12.0
156	48	-13.1
154	46	-10.4
152	44	-12.8
150	42	-12.1
148	40	-11.7
146	38	-12.5
144	36	-11.9
142	34	-13.8
140	32	-13.4
138	30	-13.2
136	28	-13.8
134	26	-15.3*
132	24	-16.8
130	22	-20.0
128	20	-18.7
126	18	-24.0
124	18	-21.2
122	16	-18.5
120	14	-19.0
118	12	-22.4
116	10	-25.2
114	8	-4.2
112	6	-37.0
110	4	-72.9
108	2	-106
106	0	-109.6
104	-2	49.7

(P) = Vortex passed over top of tower

(M) = Missing (D) = Vortex dissipated upwind of tower

\* = Estimated

Flyby (Run) Number: 48		Date: 30 SEP 1990 (Day of Year: 273)	Abeam Time: 12:51:07 (MDT)
Configuration: Landing	Glide Slope: -3 deg.		
Wind Speed: 6.2 kts			
Maximum Velocity: 98.7 fps	Descent Rate: 3.2 fps	Wind Direction: 184 deg.	Age: 24 s Advection Rate: 6.7 fps
Indicated Air Speed: 134 kts			Age: 24 s Advection Rate: [P] ft/s
<b>AIRCRAFT DATA</b>		<b>METEOROLOGICAL DATA</b> (200 ft Sensor Level)	
Flaps: 30 deg.	Altitude: 250 ft AGL	Gross Weight: 248,200 lbs.	Estimated Core Radius: 0.6 ft
		Altitude: 250 ft AGL	Tower Penetration Height: 174 ft AGL
<b>DOWNWIND VORTEX CHARACTERISTICS</b>		<b>UPWIND VORTEX CHARACTERISTICS</b>	
Wind Speed: 6.2 kts		Wind Direction: 184 deg.	Age: (P) s Advection Rate: [P] ft/s
Maximum Velocity: (P) fps	Descent Rate: (P) fps		
<b>Downwind Vortex Tangential Velocities</b>			
Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)
198	24	-14.7	102
196	22	-17.0	100
194	20	-18.5	98
192	18	-16.2	96
190	16	-20.8	94
188	14	-21.5	92
186	12	-19.2	90
184	10	-27.3	88
182	8	-43.7	86
180	6	-42.1	84
178	4	-56.4	82
176	2	-54.8	80
174	0	98.7	78
172	-2	47.2	76
170	-4	41.9	74
168	-6	33.3	72
166	-8	22.4	70
164	-10	19.0	68
162	-12	20.8	66
160	-14	14.1	64
158	-16	17.0	62
156	-18	15.6*	60
154	-20	14.1	58
152	-22	13.4*	56
150	-24	13.5*	54
148	-26	13.7	52
146	-28	11.9	50
144	-30	12.0	48
142	-32	10.9	46
140	-34	11.2	44
138	-36	6.8	42
136	-38	4.0	40
134	-40	4.7	38
132	-42	3.7	36
130	-44	7.0	34
128	-46	4.5	32
126	-48	6.4	30
124	-50	7.4	28
122	-52	7.6	26
120	-54	9.3	24
118	-56	10.2	22
116	-58	7.3	20
114	-60	6.0	18
112	-62	2.3	16
110	-64	0.8	14
108	-66	3.6	12
106	-68	1.5	10
104	-70	1.3	104

= Estimated

[D] = Vortex dissipated upwind of tower

[M] = Missing

(O) = No vortex [Flyby] flown for remote sensing systems

(P) = Vortex passed over top of tower

Flyby (Run) Number: 49	Date: 30 SEP 1990 (Day of Year: 273)	Abeam Time: 12:56:59 (MDT)				
Configuration: Landing Glide Slope: -3 deg.	AIRCRAFT DATA Flaps: 25 deg. Indicated Air Speed: 138 kts	Gross Weight: 246,500 lbs. Altitude: 240 ft AGL				
Wind Speed: 7.6 kts	Wind Direction: 164 deg.	Air Temperature: 20.2 °C				
Maximum Velocity: (D) fps Descent Rate: (D) fps	Age: (D) s Advection Rate: (D) fps	Atmospheric Stability: Unstable				
Maximum Velocity: (D) fps Descent Rate: (D) fps	Age: (D) s Advection Rate: (D) fps	Estimated Core Radius: (D) ft Tower Penetration Height: (D) ft AGL				
Maximum Velocity: (D) fps Descent Rate: (D) fps	Age: (D) s Advection Rate: (D) fps	Estimated Core Radius: (D) ft Tower Penetration Height: (D) ft AGL				
Downwind Vortex Tangential Velocities	Upwind Vortex Tangential Velocities					
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)
198	(D)	102	(D)	198	(D)	(D)
196	194	98	96	196	194	100
192	190	94	92	192	190	98
188	186	90	88	188	186	94
184	182	86	84	184	182	92
180	178	82	80	180	178	80
176	174	78	76	176	174	78
172	170	74	72	172	170	76
168	166	70	68	168	166	74
164	162	66	64	164	162	70
160	158	62	60	160	158	72
156	154	58	56	156	154	76
152	150	54	52	152	150	68
148	146	50	48	148	146	64
144	142	46	44	144	142	62
140	138	42	40	140	138	66
136	134	38	36	136	134	52
132	130	34	32	132	130	50
128	126	30	28	128	126	48
124	122	26	24	124	122	44
120	118	22	20	120	118	40
116	114	18	16	116	114	38
112	110	14	12	112	110	36
108	106	10	10	108	106	34
104				104		32
						30
						28
						26
						24
						22
						20
						18
						16
						14
						12
						10

= Estimated (D) = Vortex dissipated upwind of tower (M) = Missing (O) = No vortex (Flyby flown for remote sensing systems) (P) = Vortex passed over top of tower

Flyby (Run) Number: 50		UAL B767-200		Date: 30 SEP 1990 [Day of Year: 273]	Abeam Time: 13:02:38 (MDT)																																																																																																																																																																																																																																																																																																						
Configuration: Landing		AIRCRAFT DATA		Gross Weight: 245,500 lbs.																																																																																																																																																																																																																																																																																																							
Glide Slope: -3 deg.		Flaps: 25 deg.		Altitude: 250 ft AGL																																																																																																																																																																																																																																																																																																							
Wind Speed: 7.4 kts		Indicated Air Speed: 138 kts		Atmospheric Stability: Unstable																																																																																																																																																																																																																																																																																																							
Maximum Velocity: 61.7 fps		Wind Direction: 184 deg.		Estimated Core Radius: 1.1 ft																																																																																																																																																																																																																																																																																																							
Descent Rate: 8.0 fps		Age: 16 s		Tower Penetration Height: 122 ft AGL																																																																																																																																																																																																																																																																																																							
Maximum Velocity: 61.4 fps		Air Temperature: 20.3 °C		Estimated Core Radius: 0.8 ft																																																																																																																																																																																																																																																																																																							
Descent Rate: 6.1 fps		Advection Rate: 8.6 fps		Tower Penetration Height: 80 ft AGL																																																																																																																																																																																																																																																																																																							
Downwind Vortex Characteristics		Upwind Vortex Characteristics		Upwind/Vortex Tangential Velocities																																																																																																																																																																																																																																																																																																							
Wind Speed: 7.4 kts		Age: 184 deg.		Sensor Height (ft)	Relative Height (ft)																																																																																																																																																																																																																																																																																																						
Maximum Velocity: 61.7 fps		Age: 16 s		$V_{\theta}$ (fps)	$V_{\theta}$ (fps)																																																																																																																																																																																																																																																																																																						
Descent Rate: 8.0 fps		Advection Rate: 8.6 fps																																																																																																																																																																																																																																																																																																									
Maximum Velocity: 61.4 fps		Age: 28 s																																																																																																																																																																																																																																																																																																									
Descent Rate: 6.1 fps		Advection Rate: 8.2 fps																																																																																																																																																																																																																																																																																																									
<table border="1"> <thead> <tr> <th>Sensor Height (ft)</th> <th>Relative Height (ft)</th> <th>Downwind Vortex Tangential Velocities</th> <th>Sensor Height (ft)</th> <th>Relative Height (ft)</th> <th>Upwind Vortex Tangential Velocities</th> </tr> </thead> <tbody> <tr><td>198</td><td>76</td><td>-13.6</td><td>102</td><td>-20</td><td>11.2</td></tr> <tr><td>196</td><td>74</td><td>-9.0</td><td>100</td><td>-22</td><td>9.3*</td></tr> <tr><td>194</td><td>72</td><td>-13.1</td><td>98</td><td>-24</td><td>11.2</td></tr> <tr><td>192</td><td>70</td><td>-12.8</td><td>96</td><td>-26</td><td>9.3</td></tr> <tr><td>190</td><td>68</td><td>-13.7</td><td>94</td><td>-28</td><td>1.0</td></tr> <tr><td>188</td><td>66</td><td>-13.5</td><td>92</td><td>-30</td><td>8.6</td></tr> <tr><td>186</td><td>64</td><td>-15.5</td><td>90</td><td>-32</td><td>186</td></tr> <tr><td>184</td><td>62</td><td>-14.7</td><td>88</td><td>-34</td><td>8.7</td></tr> <tr><td>182</td><td>60</td><td>-16.1</td><td>86</td><td>-36</td><td>184</td></tr> <tr><td>180</td><td>58</td><td>-15.8</td><td>84</td><td>-38</td><td>182</td></tr> <tr><td>178</td><td>56</td><td>-14.2</td><td>82</td><td>-40</td><td>7.2</td></tr> <tr><td>176</td><td>54</td><td>-16.5</td><td>80</td><td>-42</td><td>180</td></tr> <tr><td>174</td><td>52</td><td>-16.4</td><td>78</td><td>-44</td><td>178</td></tr> <tr><td>172</td><td>50</td><td>-16.2</td><td>76</td><td>-46</td><td>176</td></tr> <tr><td>170</td><td>48</td><td>-17.4</td><td>74</td><td>-48</td><td>174</td></tr> <tr><td>168</td><td>46</td><td>-19.8</td><td>72</td><td>-50</td><td>5.9</td></tr> <tr><td>166</td><td>44</td><td>-20.0*</td><td>70</td><td>-52</td><td>5.8</td></tr> <tr><td>164</td><td>42</td><td>-20.1</td><td>68</td><td>-54</td><td>5.5</td></tr> <tr><td>162</td><td>40</td><td>-23.6</td><td>66</td><td>-56</td><td>4.7</td></tr> <tr><td>160</td><td>38</td><td>-23.5*</td><td>64</td><td>-58</td><td>4.2</td></tr> <tr><td>158</td><td>36</td><td>-23.3*</td><td>62</td><td>-60</td><td>3.0</td></tr> <tr><td>156</td><td>34</td><td>-23.4*</td><td>60</td><td>-62</td><td>5.8</td></tr> <tr><td>154</td><td>32</td><td>-23.6</td><td>58</td><td>-64</td><td>6.3</td></tr> <tr><td>152</td><td>30</td><td>-23.0</td><td>56</td><td>-66</td><td>3.4</td></tr> <tr><td>150</td><td>28</td><td>-21.8</td><td>54</td><td>-68</td><td>3.6</td></tr> <tr><td>148</td><td>26</td><td>-22.9</td><td>52</td><td>-70</td><td>1.4</td></tr> <tr><td>146</td><td>24</td><td>-23.8</td><td>50</td><td>-72</td><td>148</td></tr> <tr><td>144</td><td>22</td><td>-25.0</td><td>48</td><td>-74</td><td>3.6</td></tr> <tr><td>142</td><td>20</td><td>-28.2</td><td>46</td><td>-76</td><td>147</td></tr> <tr><td>140</td><td>18</td><td>-31.1</td><td>44</td><td>-78</td><td>2.9</td></tr> <tr><td>138</td><td>16</td><td>-31.7*</td><td>42</td><td>-80</td><td>2.1</td></tr> <tr><td>136</td><td>14</td><td>-32.3</td><td>40</td><td>-82</td><td>1.4</td></tr> <tr><td>134</td><td>12</td><td>-35.4</td><td>38</td><td>-84</td><td>2.1</td></tr> <tr><td>132</td><td>10</td><td>-39.4*</td><td>36</td><td>-86</td><td>3.3</td></tr> <tr><td>130</td><td>8</td><td>-43.4</td><td>34</td><td>-88</td><td>3.0</td></tr> <tr><td>128</td><td>6</td><td>-47.7</td><td>32</td><td>-90</td><td>128</td></tr> <tr><td>126</td><td>4</td><td>-52.2</td><td>30</td><td>-92</td><td>3.0</td></tr> <tr><td>124</td><td>2</td><td>-67.8</td><td>28</td><td>-94</td><td>2.8</td></tr> <tr><td>122</td><td>-0</td><td>-61.7</td><td>26</td><td>-96</td><td>0.5</td></tr> <tr><td>120</td><td>-2</td><td>-48.7</td><td>24</td><td>-98</td><td>1.2</td></tr> <tr><td>118</td><td>-4</td><td>-41.3</td><td>22</td><td>-100</td><td>2.1</td></tr> <tr><td>116</td><td>-6</td><td>-27.1</td><td>20</td><td>-102</td><td>1.1</td></tr> <tr><td>114</td><td>-8</td><td>-27.5</td><td>18</td><td>-104</td><td>1.1</td></tr> <tr><td>112</td><td>-10</td><td>-19.9*</td><td>16</td><td>-106</td><td>1.5</td></tr> 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Velocities	198	76	-13.6	102	-20	11.2	196	74	-9.0	100	-22	9.3*	194	72	-13.1	98	-24	11.2	192	70	-12.8	96	-26	9.3	190	68	-13.7	94	-28	1.0	188	66	-13.5	92	-30	8.6	186	64	-15.5	90	-32	186	184	62	-14.7	88	-34	8.7	182	60	-16.1	86	-36	184	180	58	-15.8	84	-38	182	178	56	-14.2	82	-40	7.2	176	54	-16.5	80	-42	180	174	52	-16.4	78	-44	178	172	50	-16.2	76	-46	176	170	48	-17.4	74	-48	174	168	46	-19.8	72	-50	5.9	166	44	-20.0*	70	-52	5.8	164	42	-20.1	68	-54	5.5	162	40	-23.6	66	-56	4.7	160	38	-23.5*	64	-58	4.2	158	36	-23.3*	62	-60	3.0	156	34	-23.4*	60	-62	5.8	154	32	-23.6	58	-64	6.3	152	30	-23.0	56	-66	3.4	150	28	-21.8	54	-68	3.6	148	26	-22.9	52	-70	1.4	146	24	-23.8	50	-72	148	144	22	-25.0	48	-74	3.6	142	20	-28.2	46	-76	147	140	18	-31.1	44	-78	2.9	138	16	-31.7*	42	-80	2.1	136	14	-32.3	40	-82	1.4	134	12	-35.4	38	-84	2.1	132	10	-39.4*	36	-86	3.3	130	8	-43.4	34	-88	3.0	128	6	-47.7	32	-90	128	126	4	-52.2	30	-92	3.0	124	2	-67.8	28	-94	2.8	122	-0	-61.7	26	-96	0.5	120	-2	-48.7	24	-98	1.2	118	-4	-41.3	22	-100	2.1	116	-6	-27.1	20	-102	1.1	114	-8	-27.5	18	-104	1.1	112	-10	-19.9*	16	-106	1.5	110	-12	-17.1*	14	-108	2.1	108	-14	-14.3	12	-110	1.0	106	-16	-13.8	10	-112	2.2	104	-18	-12.4	104	-112	1.6					
Sensor Height (ft)	Relative Height (ft)	Downwind Vortex Tangential Velocities	Sensor Height (ft)	Relative Height (ft)	Upwind Vortex Tangential Velocities																																																																																																																																																																																																																																																																																																						
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186	64	-15.5	90	-32	186																																																																																																																																																																																																																																																																																																						
184	62	-14.7	88	-34	8.7																																																																																																																																																																																																																																																																																																						
182	60	-16.1	86	-36	184																																																																																																																																																																																																																																																																																																						
180	58	-15.8	84	-38	182																																																																																																																																																																																																																																																																																																						
178	56	-14.2	82	-40	7.2																																																																																																																																																																																																																																																																																																						
176	54	-16.5	80	-42	180																																																																																																																																																																																																																																																																																																						
174	52	-16.4	78	-44	178																																																																																																																																																																																																																																																																																																						
172	50	-16.2	76	-46	176																																																																																																																																																																																																																																																																																																						
170	48	-17.4	74	-48	174																																																																																																																																																																																																																																																																																																						
168	46	-19.8	72	-50	5.9																																																																																																																																																																																																																																																																																																						
166	44	-20.0*	70	-52	5.8																																																																																																																																																																																																																																																																																																						
164	42	-20.1	68	-54	5.5																																																																																																																																																																																																																																																																																																						
162	40	-23.6	66	-56	4.7																																																																																																																																																																																																																																																																																																						
160	38	-23.5*	64	-58	4.2																																																																																																																																																																																																																																																																																																						
158	36	-23.3*	62	-60	3.0																																																																																																																																																																																																																																																																																																						
156	34	-23.4*	60	-62	5.8																																																																																																																																																																																																																																																																																																						
154	32	-23.6	58	-64	6.3																																																																																																																																																																																																																																																																																																						
152	30	-23.0	56	-66	3.4																																																																																																																																																																																																																																																																																																						
150	28	-21.8	54	-68	3.6																																																																																																																																																																																																																																																																																																						
148	26	-22.9	52	-70	1.4																																																																																																																																																																																																																																																																																																						
146	24	-23.8	50	-72	148																																																																																																																																																																																																																																																																																																						
144	22	-25.0	48	-74	3.6																																																																																																																																																																																																																																																																																																						
142	20	-28.2	46	-76	147																																																																																																																																																																																																																																																																																																						
140	18	-31.1	44	-78	2.9																																																																																																																																																																																																																																																																																																						
138	16	-31.7*	42	-80	2.1																																																																																																																																																																																																																																																																																																						
136	14	-32.3	40	-82	1.4																																																																																																																																																																																																																																																																																																						
134	12	-35.4	38	-84	2.1																																																																																																																																																																																																																																																																																																						
132	10	-39.4*	36	-86	3.3																																																																																																																																																																																																																																																																																																						
130	8	-43.4	34	-88	3.0																																																																																																																																																																																																																																																																																																						
128	6	-47.7	32	-90	128																																																																																																																																																																																																																																																																																																						
126	4	-52.2	30	-92	3.0																																																																																																																																																																																																																																																																																																						
124	2	-67.8	28	-94	2.8																																																																																																																																																																																																																																																																																																						
122	-0	-61.7	26	-96	0.5																																																																																																																																																																																																																																																																																																						
120	-2	-48.7	24	-98	1.2																																																																																																																																																																																																																																																																																																						
118	-4	-41.3	22	-100	2.1																																																																																																																																																																																																																																																																																																						
116	-6	-27.1	20	-102	1.1																																																																																																																																																																																																																																																																																																						
114	-8	-27.5	18	-104	1.1																																																																																																																																																																																																																																																																																																						
112	-10	-19.9*	16	-106	1.5																																																																																																																																																																																																																																																																																																						
110	-12	-17.1*	14	-108	2.1																																																																																																																																																																																																																																																																																																						
108	-14	-14.3	12	-110	1.0																																																																																																																																																																																																																																																																																																						
106	-16	-13.8	10	-112	2.2																																																																																																																																																																																																																																																																																																						
104	-18	-12.4	104	-112	1.6																																																																																																																																																																																																																																																																																																						

\* = Estimated

(D) = Vortex dissipated upwind of tower

(O) = No vortex (Flyby flown for remote sensing systems)

(P) = Vortex passed over top of tower

Flyby (Run) Number: 51	Date: 30 SEP 1990 (Day of Year: 273)	Abeam Time: 13:08:07 (MDT)									
Configuration: Landing Glide Slope: 0 deg.	AIRCRAFT DATA Flaps: 30 deg. Indicated Air Speed: 134 kts	Gross Weight: 244,500 lbs. Altitude: 2400 ft AGL									
Wind Speed: 6.0 kts	METEOROLOGICAL DATA (200 ft Sensor Level)	Atmospheric Stability: Unstable Estimated Core Radius: 1.2 ft Tower Penetration Height: 188 ft AGL									
Maximum Velocity: 77.2 fps Descent Rate: 5.2 ips	DOWNTWIND VORTEX CHARACTERISTICS Wind Direction: 178 deg. Age: 10 s	Estimated Core Radius: 0.8 ft Tower Penetration Height: 158 ft AGL									
Maximum Velocity: 74.2 fps Descent Rate: 4.8 ips	UPWIND VORTEX CHARACTERISTICS Wind Direction: 178 deg. Age: 17 s	Tower Penetration Height: 158 ft AGL									
Downwind Vortex Tangential Velocities											
Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)
198	10	-43.5	102	-86	3.7	198	40	5.8	102	-56	-14.4
196	8	-44.0*	100	-88	5.9*	196	38	5.3	100	-58	-12.7
194	6	-44.4	98	-90	4.8	194	36	8.0	98	-60	-14.1
192	4	-40.4	96	-92	2.0	192	34	7.0	96	-62	-12.8
190	2	-56.5	94	-94	3.2	190	32	10.2	94	-64	-14.8
188	0	-77.2	92	-96	5.2	188	30	9.5	92	-66	-14.7
186	-2	-52.4	90	-98	6.5	186	28	1.1	90	-68	-15.5
184	-4	-36.8	88	-100	6.4	184	26	8.9	88	-70	-13.0
182	-6	-31.6	86	-102	6.9	182	24	12.7*	86	-72	-15.2
180	-8	-27.2	84	-104	7.1	180	22	16.5	84	-74	-16.1
178	-10	-29.8	82	-106	7.6	178	20	17.8	82	-76	-12.9
176	-12	-25.4	80	-108	7.1	176	18	17.7	80	-78	-11.0
174	-14	-26.5	78	-110	8.5	174	16	17.3	78	-80	-11.0
172	-16	-20.7	76	-112	8.1	172	14	18.7	76	-82	-10.4
170	-18	-18.5	74	-114	6.4	170	12	20.9	74	-84	-10.3
168	-20	-20.0	72	-116	5.3	168	10	20.7	72	-86	-12.2
166	-22	-20.1	70	-118	4.8	166	8	23.0	70	-88	-10.4
164	-24	-17.2	68	-120	4.1	164	6	25.9	68	-90	-10.7
162	-26	-18.1	66	-122	4.0	162	4	30.2	66	-92	-12.2
160	-28	-16.8	64	-124	3.8	160	2	44.2	64	-94	-11.2
158	-30	-13.6	62	-126	5.7	158	0	74.2	62	-96	-10.6
156	-32	-10.5	60	-128	4.3	156	-2	67.7	60	-98	-13.2
154	-34	-14.1	58	-130	3.6	154	-4	51.8	58	-100	-16.0
152	-36	-12.9	56	-132	3.4	152	-6	50.9	56	-102	-11.4
150	-38	-11.3	54	-134	3.1	150	-8	46.6	54	-104	-10.4
148	-40	-14.2	52	-136	4.7	148	-10	43.1	52	-106	-12.9
146	-42	-19.7	50	-138	2.8	146	-12	39.9	50	-108	-10.9
144	-44	-17.2	48	-140	2.7	144	-14	29.0	48	-110	-12.4
142	-46	-14.7	46	-142	3.0	142	-16	28.5	46	-112	-14.9
140	-48	-14.0	44	-144	4.4	140	-18	26.1	44	-114	-12.6
138	-50	-12.8	42	-146	5.0	138	-20	24.7	42	-116	-12.7
136	-52	-9.2*	40	-148	6.5	136	-22	17.5	40	-118	-12.2*
134	-54	-5.5	38	-150	5.0	134	-24	16.1	38	-120	-11.7
132	-56	-3.2	36	-152	4.7	132	-26	13.8*	36	-122	-13.4
130	-58	-5.8	34	-154	4.4	130	-28	11.5	34	-124	-12.2
128	-60	-4.5	32	-156	4.9	128	-30	12.6	32	-126	-11.9
126	-62	-7.7	30	-158	3.2	126	-32	13.1	30	-128	-10.9
124	-64	-8.8	28	-160	3.2	124	-34	12.8*	28	-130	-13.3
122	-66	-6.0	26	-162	3.2	122	-36	12.5	26	-132	-10.4
120	-68	-11.4	24	-164	2.2	120	-38	12.5*	24	-134	-10.1
118	-70	-6.8	22	-166	2.6	118	-40	12.5	22	-136	-11.3
116	-72	-4.8	20	-168	3.8	116	-42	10.9	20	-138	-12.3
114	-74	-5.7	18	-170	2.8	114	-44	9.2	18	-140	-11.5
112	-76	-3.6	16	-172	2.5	112	-46	10.6	16	-142	-11.5
110	-78	-4.5	14	-174	2.9	110	-48	10.9	14	-144	-10.0
108	-80	-2.2	12	-176	3.4	108	-50	12.1	12	-146	-8.0
106	-82	0.8	10	-178	2.6	106	-52	12.8	10	-148	-8.2
104	-84	1.1	8	-180	1.0	104	-54	15.9	104		

\* = Estimated      (D) = Vortex dissipated upwind of tower      (M) = Missing      (O) = No vortex (Flyby flown for remote sensing systems)      (P) = Vortex passed over top of tower

Flyby (Run) Number: 52		UAL B767-200		Date: 30 SEP 1990 (Day of Year: 273)		Abeam Time: 13:14:20 (MDT)	
Configuration: Takeoff		AIRCRAFT DATA		Gross Weight: 243,000 lbs.		Altitude: 2400 ft AGL	
Glide Slope: 0 deg.		Indicated Air Speed: 146 kts		Atmospheric Stability: Unstable		Estimated Core Radius: (M) ft	
Wind Speed: 9.1 kts		Wind Direction: 173 deg.		Air Temperature: 20.6 °C		Tower Penetration Height: (M) ft AGL	
Maximum Velocity: (M) fps		Age: (M) s		Advection Rate: (M) fps		Estimated Core Radius: (M) ft	
Descent Rate: (M) fps		Downwind Vortex Characteristics		Tower Penetration Height: (M) ft AGL		Estimated Core Radius: (M) ft	
Maximum Velocity: (M) fps		Upwind Vortex Characteristics		Tower Penetration Height: (M) ft AGL		Estimated Core Radius: (M) ft	
Descent Rate: (M) fps		Age: (M) s		Advection Rate: (M) fps		Tower Penetration Height: (M) ft AGL	
Downwind Vortex Tangential Velocities							
Sensor Height (ft)	Relative Height (ft)	$V_e$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_e$ (fps)	Sensor Height (ft)	Relative Height (ft)
198	198	(M)	102	(M)	(M)	198	(M)
196	196	(M)	100	(M)	(M)	196	(M)
194	194	(M)	98	(M)	(M)	194	(M)
192	192	(M)	96	(M)	(M)	192	(M)
190	190	(M)	94	(M)	(M)	190	(M)
188	188	(M)	92	(M)	(M)	188	(M)
186	186	(M)	90	(M)	(M)	186	(M)
184	184	(M)	88	(M)	(M)	184	(M)
182	182	(M)	86	(M)	(M)	182	(M)
180	180	(M)	84	(M)	(M)	180	(M)
178	178	(M)	82	(M)	(M)	178	(M)
176	176	(M)	80	(M)	(M)	176	(M)
174	174	(M)	78	(M)	(M)	174	(M)
172	172	(M)	76	(M)	(M)	172	(M)
170	170	(M)	74	(M)	(M)	170	(M)
168	168	(M)	72	(M)	(M)	168	(M)
166	166	(M)	70	(M)	(M)	166	(M)
164	164	(M)	68	(M)	(M)	164	(M)
162	162	(M)	66	(M)	(M)	162	(M)
160	160	(M)	64	(M)	(M)	160	(M)
158	158	(M)	62	(M)	(M)	158	(M)
156	156	(M)	60	(M)	(M)	156	(M)
154	154	(M)	58	(M)	(M)	154	(M)
152	152	(M)	56	(M)	(M)	152	(M)
150	150	(M)	54	(M)	(M)	150	(M)
148	148	(M)	52	(M)	(M)	148	(M)
146	146	(M)	50	(M)	(M)	146	(M)
144	144	(M)	48	(M)	(M)	144	(M)
142	142	(M)	46	(M)	(M)	142	(M)
140	140	(M)	44	(M)	(M)	140	(M)
138	138	(M)	42	(M)	(M)	138	(M)
136	136	(M)	40	(M)	(M)	136	(M)
134	134	(M)	38	(M)	(M)	134	(M)
132	132	(M)	36	(M)	(M)	132	(M)
128	128	(M)	34	(M)	(M)	128	(M)
126	126	(M)	32	(M)	(M)	126	(M)
124	124	(M)	30	(M)	(M)	124	(M)
122	122	(M)	28	(M)	(M)	122	(M)
120	120	(M)	26	(M)	(M)	120	(M)
118	118	(M)	24	(M)	(M)	118	(M)
116	116	(M)	22	(M)	(M)	116	(M)
114	114	(M)	20	(M)	(M)	114	(M)
112	112	(M)	18	(M)	(M)	112	(M)
110	110	(M)	16	(M)	(M)	110	(M)
108	108	(M)	14	(M)	(M)	108	(M)
106	106	(M)	12	(M)	(M)	106	(M)
104	104	(M)	10	(M)	(M)	104	(M)

(P) = Vortex passed over top of tower

(D) = Vortex dissipated upwind of tower

= Estimated

(M) = Missing

(O) = No vortex (Flyby flown for remote sensing systems)

Flyby (Run) Number: 53	Date: 30 SEP 1990 (Day of Year: 273)	Abeam Time: 13:19:43 (MDT)						
Configuration: Takeoff Glide Slope: 0 deg.	AIRCRAFT DATA Flaps: 1 deg. Indicated Air Speed: 151 kts	Gross Weight: 242,300 lbs. Altitude: 210 ft AGL						
Wind Speed: 7.9 kts	Wind Direction: 200 deg.	Air Temperature: 20.9 °C						
Maximum Velocity: 101.2 fps	Age: 33 s	Atmospheric Stability: Unstable						
Descent Rate: 4.4 f/s	Advection Rate: 6.2 f/s							
Maximum Velocity: (D) f/s	Age: (D) s							
Descent Rate: (D) f/s	Advection Rate: (D) f/s							
METEOROLOGICAL DATA (200 ft Sensor Level)								
Downwind vortex characteristics	Upwind vortex characteristics							
Sensor Height (ft)	Relative Height (ft)	Downwind Vortex Tangential Velocities	Sensor Height (ft)	Relative Height (ft)	Upwind Vortex Tangential Velocities	Sensor Height (ft)	Relative Height (ft)	Tower Penetration Height: (D) ft AGL
		$V_\theta$ (fps)		$V_\theta$ (fps)			$V_\theta$ (fps)	
198	134	-13.6	102	38	-10.7	198	102	0.4 ft
196	130	-14.5*	100	34	-8.5	196	100	Tower Penetration Height: 64 ft AGL
194	128	-15.3	98	32	-7.6	194	98	
192	126	-15.9	96	30	-7.9	192	96	
190	124	-16.5	94	28	-8.4	188	94	
188	122	-13.9	92	26	-8.1	186	92	
186	120	-15.1	90	24	-7.2	184	90	
184	118	-15.5	88	22	-1.2	182	88	
182	116	-12.0	86	20	-5.0	180	86	
180	114	-14.0	84	18	-15.0	178	84	
178	112	-14.5	82	16	-18.6	176	82	
176	110	-16.1	80	14	-23.9	174	80	
174	108	-12.8	78	12	-21.6	172	78	
172	106	-13.0	76	10	-23.5	170	76	
170	104	-14.0	74	8	-34.2	168	74	
168	102	-12.8	72	6	-40.6	166	72	
166	100	-13.4	70	4	-58.4	164	70	
164	98	-11.7	68	2	-60.8	162	68	
162	96	-10.8	66	0	-101.2	160	66	
160	94	-11.6	64	-2	-151.0	158	64	
158	92	-10.4	62	-4	-24.4	156	62	
156	90	-13.2	60	-6	-20.3	154	60	
154	88	-15.1	58	-8	-17.7	152	58	
152	86	-13.0	56	-10	-15.7	150	56	
150	84	-11.5	54	-12	-16.2	148	54	
148	82	-13.1	52	-14	-12.5	146	52	
146	80	-13.4	50	-16	-13.6	144	50	
144	78	-13.6	48	-18	-13.8	142	48	
142	76	-14.7	46	-20	-11.5	140	46	
140	74	-16.3	44	-22	-12.9	138	44	
138	72	-18.9	42	-24	-11.3	136	42	
136	70	-18.3	40	-26	-9.6	134	40	
134	68	-17.0*	38	-28	-10.1	132	38	
132	66	-15.6	36	-30	-9.2	130	36	
130	64	-15.3	34	-32	-9.5	128	34	
128	62	-11.6	30	-34	-9.0	126	32	
126	60	-10.4	28	-36	-8.6	124	30	
124	58	-9.9	26	-38	-7.4	122	28	
122	56	-9.6	24	-40	-6.5	120	26	
120	54	-8.5	22	-42	-6.5	118	24	
118	52	-8.5	20	-44	-7.5	116	22	
116	50	-8.3	18	-46	-7.1	114	20	
114	48	-9.1	16	-48	-5.2	112	18	
112	46	-11.6	14	-50	-6.1	110	16	
110	44	-12.0	12	-52	-4.0	108	14	
108	42	-11.1	10	-54	-3.1	106	12	
106	40	-10.3	8	-55	-1.04	104	10	

\* = Estimated (D) = Vortex dissipated upwind of tower (M) = Missing (O) = No vortex (Flyby flown for remote sensing systems) (P) = Vortex passed over top of tower

(O) = No vortex (Flyby flown for remote sensing systems) (P) = Vortex passed over top of tower

Flyby (Run) Number: 54		UAL B767-200		Date: 30 SEP 1990 (Day of Year: 273)		Abeam Time: 13:25:03 (MDT)	
Configuration: Holding		AIRCRAFT DATA		Flaps: 0 deg.		Gross Weight: 241,700 lbs.	
Glide Slope: 0 deg.				Indicated Air Speed: 207 kts		Altitude: 200 ft AGL	
Wind Speed: 8.6 kts		METEOROLOGICAL DATA (200 ft Sensor Level)		Wind Direction: 176 deg.		Air Temperature: 21.3 °C	
Maximum Velocity: (D) fpm		DOWNDOWN VORTEX CHARACTERISTICS		Estimated Core Radius: (D) ft		Atmospheric Stability: Unstable	
Descent Rate: (D) fpm				Tower Penetration Height: (D) ft AGL			
Maximum Velocity: (D) fpm		UPWIND VORTEX CHARACTERISTICS		Estimated Core Radius: (D) ft		Tower Penetration Height: (D) ft AGL	
Descent Rate: (D) fpm							
Downwind Vortex Tangential Velocities				Upwind Vortex Tangential Velocities			
Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	Relative Height (ft)	$V_\theta$ (fps)	Sensor Height (ft)	$V_\theta$ (fps)
198	196	(D)	102	198	(D)	102	(D)
194	192	(D)	100	196	(D)	100	(D)
190	188	(D)	98	194	(D)	98	(D)
186	184	(D)	96	192	(D)	96	(D)
182	180	(D)	94	190	(D)	94	(D)
178	176	(D)	92	188	(D)	92	(D)
174	172	(D)	90	186	(D)	90	(D)
170	168	(D)	88	184	(D)	88	(D)
166	164	(D)	86	182	(D)	86	(D)
162	160	(D)	84	180	(D)	84	(D)
158	156	(D)	82	178	(D)	82	(D)
154	152	(D)	80	176	(D)	80	(D)
150	148	(D)	78	174	(D)	78	(D)
146	144	(D)	76	172	(D)	76	(D)
142	140	(D)	74	170	(D)	74	(D)
138	136	(D)	72	168	(D)	72	(D)
134	132	(D)	70	166	(D)	70	(D)
130	128	(D)	68	164	(D)	68	(D)
126	124	(D)	66	162	(D)	66	(D)
122	120	(D)	64	160	(D)	64	(D)
118	116	(D)	62	158	(D)	62	(D)
114	112	(D)	60	156	(D)	60	(D)
110	108	(D)	58	154	(D)	58	(D)
106	104	(D)	56	152	(D)	56	(D)
102	100	(D)	54	150	(D)	54	(D)
98	96	(D)	52	148	(D)	52	(D)
94	92	(D)	50	146	(D)	50	(D)
90	88	(D)	48	144	(D)	48	(D)
86	84	(D)	46	142	(D)	46	(D)
82	80	(D)	44	140	(D)	44	(D)
78	76	(D)	42	138	(D)	42	(D)
74	72	(D)	40	136	(D)	40	(D)
70	68	(D)	38	134	(D)	38	(D)
66	64	(D)	36	132	(D)	36	(D)
62	60	(D)	34	130	(D)	34	(D)
58	56	(D)	32	128	(D)	32	(D)
54	52	(D)	30	126	(D)	30	(D)
50	48	(D)	28	124	(D)	28	(D)
46	44	(D)	26	122	(D)	26	(D)
42	40	(D)	24	120	(D)	24	(D)
38	36	(D)	22	118	(D)	22	(D)
34	32	(D)	20	116	(D)	20	(D)
30	28	(D)	18	114	(D)	18	(D)
26	24	(D)	16	112	(D)	16	(D)
22	20	(D)	14	110	(D)	14	(D)
18	16	(D)	12	108	(D)	12	(D)
16	14	(D)	10	106	(D)	10	(D)
12	10	(D)	8	104	(D)	8	(D)

Flyby (Run) Number: 55	Date: 30 SEP 1990 (Day of Year: 273)	Abeam Time: 13:30:40 (MDT)										
Configuration: Takeoff Glide Slope: 0 deg.	AIRCRAFT DATA Flaps: 1 deg. Indicated Air Speed: 150 kts	Gross Weight: 240,500 lbs. Altitude: 210 ft AGL										
Wind Speed: 4.1 kts	Wind Direction: 157 deg.	Air Temperature: 21.2 °C Atmospheric Stability: Unstable										
Maximum Velocity: (D) fps Descent Rate: (D) fps	METEOROLOGICAL DATA (200 ft Sensor Level)	Estimated Core Radius: (D) ft Tower Penetration Height: (D) ft AGL										
Maximum Velocity: (D) fps Descent Rate: (D) fps	DOWNWIND VORTEX CHARACTERISTICS Age: (D) s Advection Rate: (D) fpm	Upwind Vortex Tangential Velocities Age: (D) s Advection Rate: (D) fpm										
Sensor Height (ft)	Relative Height (ft)	Downwind Vortex Tangential Velocities	Sensor Height (ft)	Relative Height (ft)	Upwind Vortex Tangential Velocities	Sensor Height (ft)	Relative Height (ft)	Upwind Vortex Tangential Velocities	Sensor Height (ft)	Relative Height (ft)	Upwind Vortex Tangential Velocities	
V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	
198	196	194	192	190	188	186	184	182	180	178	176	174
100	102	100	98	96	94	92	90	88	86	84	82	80
198	196	194	192	190	188	186	184	182	180	178	176	174
102	104	102	100	98	96	94	92	90	88	86	84	82
198	196	194	192	190	188	186	184	182	180	178	176	174
100	102	100	98	96	94	92	90	88	86	84	82	80
198	196	194	192	190	188	186	184	182	180	178	176	174
102	104	102	100	98	96	94	92	90	88	86	84	82
198	196	194	192	190	188	186	184	182	180	178	176	174
100	102	100	98	96	94	92	90	88	86	84	82	80
198	196	194	192	190	188	186	184	182	180	178	176	174
102	104	102	100	98	96	94	92	90	88	86	84	82
198	196	194	192	190	188	186	184	182	180	178	176	174
100	102	100	98	96	94	92	90	88	86	84	82	80
198	196	194	192	190	188	186	184	182	180	178	176	174
102	104	102	100	98	96	94	92	90	88	86	84	82
198	196	194	192	190	188	186	184	182	180	178	176	174
100	102	100	98	96	94	92	90	88	86	84	82	80
198	196	194	192	190	188	186	184	182	180	178	176	174
102	104	102	100	98	96	94	92	90	88	86	84	82
198	196	194	192	190	188	186	184	182	180	178	176	174
100	102	100	98	96	94	92	90	88	86	84	82	80
198	196	194	192	190	188	186	184	182	180	178	176	174
102	104	102	100	98	96	94	92	90	88	86	84	82
198	196	194	192	190	188	186	184	182	180	178	176	174
100	102	100	98	96	94	92	90	88	86	84	82	80
198	196	194	192	190	188	186	184	182	180	178	176	174
102	104	102	100	98	96	94	92	90	88	86	84	82
198	196	194	192	190	188	186	184	182	180	178	176	174
100	102	100	98	96	94	92	90	88	86	84	82	80
198	196	194	192	190	188	186	184	182	180	178	176	174
102	104	102	100	98	96	94	92	90	88	86	84	82
198	196	194	192	190	188	186	184	182	180	178	176	174
100	102	100	98	96	94	92	90	88	86	84	82	80
198	196	194	192	190	188	186	184	182	180	178	176	174
102	104	102	100	98	96	94	92	90	88	86	84	82
198	196	194	192	190	188	186	184	182	180	178	176	174
100	102	100	98	96	94	92	90	88	86	84	82	80
198	196	194	192	190	188	186	184	182	180	178	176	174
102	104	102	100	98	96	94	92	90	88	86	84	82
198	196	194	192	190	188	186	184	182	180	178	176	174
100	102	100	98	96	94	92	90	88	86	84	82	80
198	196	194	192	190	188	186	184	182	180	178	176	174
102	104	102	100	98	96	94	92	90	88	86	84	82
198	196	194	192	190	188	186	184	182	180	178	176	174
100	102	100	98	96	94	92	90	88	86	84	82	80
198	196	194	192	190	188	186	184	182	180	178	176	174
102	104	102	100	98	96	94	92	90	88	86	84	82
198	196	194	192	190	188	186	184	182	180	178	176	174
100	102	100	98	96	94	92	90	88	86	84	82	80
198	196	194	192	190	188	186	184	182	180	178	176	174
102	104	102	100	98	96	94	92	90	88	86	84	82
198	196	194	192	190	188	186	184	182	180	178	176	174
100	102	100	98	96	94	92	90	88	86	84	82	80
198	196	194	192	190	188	186	184	182	180	178	176	174
102	104	102	100	98	96	94	92	90	88	86	84	82
198	196	194	192	190	188	186	184	182	180	178	176	174
100	102	100	98	96	94	92	90	88	86	84	82	80
198	196	194	192	190	188	186	184	182	180	178	176	174
102	104	102	100	98	96	94	92	90	88	86	84	82
198	196	194	192	190	188	186	184	182	180	178	176	174
100	102	100	98	96	94	92	90	88	86	84	82	80
198	196	194	192	190	188	186	184	182	180	178	176	174
102	104	102	100	98	96	94	92	90	88	86	84	82
198	196	194	192	190	188	186	184	182	180	178	176	174
100	102	100	98	96	94	92	90	88	86	84	82	80
198	196	194	192	190	188	186	184	182	180	178	176	174
102	104	102	100	98	96	94	92	90	88	86	84	82
198	196	194	192	190	188	186	184	182	180	178	176	174
100	102	100	98	96	94	92	90	88	86	84	82	80
198	196	194	192	190	188	186	184	182	180	178	176	174
102	104	102	100	98	96	94	92	90	88	86	84	82
198	196	194	192	190	188	186	184	182	180	178	176	174
100	102	100	98	96	94	92	90	88	86	84	82	80
198	196	194	192	190	188	186	184	182	180	178	176	174
102	104	102	100	98	96	94	92	90	88	86	84	82
198	196	194	192	190	188	186	184	182	180	178	176	174
100	102	100	98	96	94	92	90	88	86	84	82	80
198	196	194	192	190	188	186	184	182	180	178	176	174
102	104	102	100	98	96	94	92	90	88	86	84	82
198	196	194	192	190	188	186	184	182	180	178	176	174
100	102	100	98	96	94	92	90	88	86	84	82	80
198	196	194	192	190	188	186	184	182	180	178	176	174
102	104	102	100	98	96	94	92	90	88	86	84	82
198	196	194	192	190	188	186	184	182	180	178	176	174
100	102	100	98	96	94	92	90	88	86	84	82	80
198	196	194	192	190	188	186	184	182	180	178	176	174
102	104	102	100	98	96	94	92	90	88	86	84	82
198	196	194	192	190	188	186	184	182	180	178	176	174
100	102	100	98	96	94	92	90	88	86	84	82	80
198	196	194	192	190	188	186	184	182	180	178	176	174
102	104	102	100	98	96	94	92	90	88	86	84	82
198	196	194	192	190	188	186	184	182	180	178	176	174
100	102	100	98	96	94	92	90	88	86	84	82	80
198	196	194	192	190	188	186	184	182	180	178	176	174
102	104	102	100	98	96	94	92	90	88	86	84	82
198	196	194	192	190	188	186	184	182	180	178	176	174
100	102	100	98	96	94	92	90	88	86	84	82	80
198	196	194	192	190	188	186	184	182	180	178	176	174
102	104	102	100	98	96	94	92	90</				

Flyby (Run) Number: 56		UAL B767-200		Date: 30 SEP 1990 (Day of Year: 273)		Absm Time: 13:36:07 (MDT)			
<b>AIRCRAFT DATA</b>									
Flags: 5 deg. Indicated Air Speed: 145 kts			Gross Weight: 239,500 lbs. Altitude: 200 ft AGL						
Wind Speed: 8.7 kts	Wind Direction: 194 deg.	Age: 18 s	Wind Direction: 194 deg.	Age: 13 s	Advection Rate: 10.6 fps	Age: 18 s	Advection Rate: 12.8 fps		
Maximum Velocity: 169.6 fps Descent Rate: 1.8 fps	Maximum Velocity: 131.8 fps Descent Rate: 0.2 ips	Downwind Vortex Characteristics	Upwind Vortex Characteristics	Meteorological Data (200 ft Sensor Level)	Air Temperature: 21.4 °C	Tower Penetration Height: 176 ft AGL	Atmospheric Stability: Unstable		
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)		
198	22	-15.0*	102	-74	9.9	198	2		
196	20	-17.4	100	-76	9.7	196	0		
194	18	-19.8	98	-78	7.3	194	-2		
192	16	-26.2	96	-80	6.6	192	-4		
190	14	-28.4	94	-82	2.8	190	-6		
188	12	-36.3	92	-84	3.9	188	-8		
186	10	-32.1	90	-86	3.7	186	-10		
184	8	-45.4	88	-88	3.6	184	-12		
182	6	-56.4	86	-90	3.9	182	-14		
180	4	-66.6	84	-92	4.6	180	-16		
178	2	-76.9	82	-94	4.1	178	-18		
176	0	-169.6	80	-96	4.0	176	-20		
174	-2	-55.6	78	-98	4.6	174	-22		
172	-4	-26.1	76	-100	3.8	172	-24		
170	-6	-15.5	74	-102	3.4	170	-26		
168	-8	-14.1	72	-104	4.2	168	-28		
166	-10	-10.8	70	-106	2.9	166	-30		
164	-12	-13.4	68	-108	3.8	164	-32		
162	-14	-13.0	66	-110	4.4	162	-34		
160	-16	-15.2	64	-112	3.2	160	-36		
158	-18	-17.2	62	-114	2.6	158	-38		
156	-20	-15.5	60	-116	2.8	156	-40		
154	-22	-15.4	58	-118	3.5*	154	-42		
152	-24	-12.8*	56	-120	4.3	152	-44		
150	-26	-10.2	54	-122	4.2	150	-46		
148	-28	-11.4	52	-124	0.4	148	-48		
146	-30	-12.0*	50	-126	-0.4	146	-50		
144	-32	-12.6	48	-128	-0.4	144	-52		
142	-34	-12.4	46	-130	-0.6	142	-54		
140	-36	-12.9	44	-132	0.1	140	-56		
138	-38	-11.6	42	-134	1.9	138	-58		
136	-40	-11.8	40	-136	2.7	136	-60		
134	-42	-8.9	38	-138	0.8	134	-62		
132	-44	-6.5	36	-140	0.4	132	-64		
130	-46	-3.4	34	-142	-0.4	130	-66		
128	-48	-9.1	32	-144	0.0	128	-68		
126	-50	-10.7	30	-146	-0.8	126	-70		
124	-52	-12.0	28	-148	-0.8	124	-72		
122	-54	-10.7	26	-150	-0.1	122	-74		
120	-56	-12.9	24	-152	-0.9	120	-76		
118	-58	-10.7	22	-154	-0.7	118	-78		
116	-60	-4.4	20	-156	-0.5	116	-80		
114	-62	-6.2	18	-158	-1.2	114	-82		
112	-64	-9.6	16	-160	-1.2	112	-84		
110	-66	-6.7	14	-162	-2.1	110	-86		
108	-68	-10.3	12	-164	-2.0	108	-88		
106	-70	-10.2	10	-166	-2.7	106	-90		
104	-72	-9.8				104	-92		

(P) = Vortex passed over top of tower

(M) = Missing

(D) = Vortex dissipated upwind of tower

= Estimated

(N) = No vortex (Flyby flown for remote sensing systems)

Flyby (Run) Number: 57	UAL B767-200	Date: 30 SEP 1990 (Day of Year: 273)	Abeam Time: 13:41:57 (MDT)								
Configuration: Takeoff Glide Slope: 0 deg.	AIRCRAFT DATA Flaps: 1 deg. Indicated Air Speed: 150 kts	Gross Weight: 238,600 lbs. Altitude: 200 ft AGL									
Wind Speed: 7.9 kts	Wind Direction: 183 deg.	Airspeed: 12 s (200 ft Sensor Level)	Atmospheric Stability: Unstable								
Maximum Velocity: 51.1 fpm		Airspeed: 21.7 °C									
Descent Rate: 6.0 fpm		Advection Rate: 14.4 fpm	Estimated Core Radius: 1.6 ft Tower Penetration Height: 128 ft AGL								
Maximum Velocity: 45.3 fpm	DOWNWIND VORTEX CHARACTERISTICS Airspeed: 16 s (200 ft Sensor Level)	UPWIND VORTEX CHARACTERISTICS Airspeed: 16 s Advection Rate: 16.6 fpm	Estimated Core Radius: 1.7 ft Tower Penetration Height: 110 ft AGL								
Descent Rate: 5.6 fpm			Tower Penetration Height: 110 ft AGL								
Downwind Vortex Tangential Velocities											
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)								
V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)	V <sub>θ</sub> (fps)								
198	70	-13.0	102	-26	16.7	198	88	7.1	102	-8	-10.6
196	68	-11.8*	100	-28	15.2*	194	84	5.6	98	-10	-11.9*
194	66	-10.5	98	-30	13.6	192	82	9.5	98	-12	-14.2
192	64	-12.1	96	-32	14.5	190	80	7.8	94	-14	-12.7
190	62	-11.6	94	-34	13.5	188	78	8.4	92	-16	-15.0
188	60	-10.8	92	-36	15.2	186	76	7.7	90	-18	-19.8
186	58	-6.9	90	-38	16.1	184	74	8.6	88	-20	-17.4
184	56	-10.1	88	-40	16.1	182	72	7.8	86	-22	-15.2*
182	54	-11.9	86	-42	15.7	180	70	11.3	84	-24	-14.9
180	52	-13.3	84	-44	15.4	178	68	12.7	82	-26	-17.2
178	50	-13.6*	82	-46	13.3	176	66	12.0	80	-28	-15.3
176	48	-14.0	80	-48	5.8	174	64	9.1	78	-30	-18.6
174	46	-10.5	78	-50	6.5	172	62	9.1	76	-32	-15.1
172	44	-8.5	76	-52	5.6	170	60	11.8	74	-34	-14.8
170	42	-7.3	74	-54	5.6	168	58	10.5	72	-36	-14.5
168	40	-10.2	72	-56	5.9	166	56	8.6	70	-38	-14.5
166	38	-10.4	70	-58	5.6	164	54	10.9	68	-40	-16.5
164	36	-8.5	68	-60	6.0	162	52	11.2	66	-42	-14.3*
162	34	-8.0	66	-62	6.5	160	50	12.5	64	-44	-13.1
160	32	-7.4	64	-64	5.5	158	48	10.8	62	-46	-16.3
158	30	-8.3	62	-66	6.2	156	46	8.9	60	-48	-16.3
156	28	-11.0	60	-68	6.0	154	44	10.2	58	-50	-15.1*
154	26	-10.1	58	-70	9.3	152	42	11.6	56	-52	-13.9
152	24	-5.9	56	-72	6.1	150	40	10.9	54	-54	-15.6
150	22	-8.2	54	-74	6.0	148	38	10.2	52	-56	-20.2
148	20	-7.7	52	-76	6.0	146	36	12.3	50	-60	-21.4
146	18	-7.9	50	-78	5.6	144	34	14.0	48	-62	-16.9
144	16	-5.6	48	-80	4.5	142	32	17.0	46	-64	-16.4
142	14	-5.6	46	-82	5.7	140	30	19.9	44	-66	-16.1
140	12	-9.0	44	-84	5.2	138	28	17.6*	42	-68	-18.1*
138	10	-11.5	42	-86	5.8	136	26	15.3	40	-70	-20.0
136	8	-12.9	40	-88	7.2	134	24	14.5	38	-72	-19.2*
134	6	-23.2	38	-90	4.8	132	22	14.0	36	-74	-18.3
132	4	-20.4	36	-92	5.3	130	20	13.4	34	-76	-12.4
130	2	-4.2	34	-94	5.1	128	18	18.5	32	-78	-10.4
128	0	-5.1	32	-96	4.2	126	16	18.3	30	-80	-14.5
126	-2	33.9	30	-98	4.3	124	14	15.3	28	-82	-13.1
124	-4	23.2	28	-100	5.3	122	12	14.1	26	-84	-10.0
122	-6	26.2	26	-102	4.5	120	10	16.6*	24	-86	-11.4
120	-8	22.9	24	-104	3.4	118	8	19.0	22	-88	-15.4
118	-10	29.1*	22	-106	4.4	116	6	19.0	20	-90	-16.0
116	-12	17.3	20	-108	4.9	114	4	17.3	18	-92	-13.1
114	-14	15.8	18	-110	4.3	112	2	37.6	16	-94	-13.1
112	-16	16.2	16	-112	3.4	110	0	45.3	14	-96	-14.2
110	-18	15.2	14	-114	4.1	108	-4	30.3	12	-98	-11.0
108	-20	18.7	12	-116	3.2	106	-6	23.2	10	-100	-12.0
106	-22	18.3	10	-118	3.4	104	-6	12.3			
104	-24	17.6									

(M) = Missing (O) = No vortex (Flyby flown for remote sensing systems) (P) = Vortex passed over top of tower

\* = Estimated (D) = Vortex dissipated upwind of tower

Flyby (Run) Number: 58		UAL B767-200		Date: 30 SEP 1990 (Day of Year: 273)	Abeam Time: 13:47:16 (MDT)	
Configuration: Takeoff Glide Slope: 0 deg.		AIRCRAFT DATA		Gross Weight: 238,000 lbs; Altitude: 210 ft AGL		
Flaps: 5 deg. Indicated Air Speed: 144 kts		METEOROLOGICAL DATA (200 ft Sensor Level)		Atmospheric Stability: Unstable		
Wind Speed: 7.8 kts		Wind Direction: 187 deg.		Age: 15 s Advection Rate: 10.7 fps	Estimated Core Radius: 0.4 ft Tower Penetration Height: 136 ft AGL	
Maximum Velocity: 153.0 fps Descent Rate: 4.9 ips		Air Temperature: 22.3 °C		Atmospheric Stability: Unstable		
Maximum Velocity: 44.6 fps Descent Rate: 2.2 ips		UPWIND VORTEX CHARACTERISTICS		Age: 25 s Advection Rate: 10.1 fps	Estimated Core Radius: 1.4 ft Tower Penetration Height: 154 ft AGL	
Downwind Vortex Tangential Velocities		Downwind Vortex Tangential Velocities		Upwind Vortex Tangential Velocities		
Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)	Sensor Height (ft)
198	62	-14.6	102	-34	11.6	198
196	60	-10.7	100	-36	8.7*	196
194	58	-2.2	98	-38	9.4	194
192	56	-12.9	96	-40	1.8	192
190	54	-14.5	94	-42	1.25	190
188	52	-15.0	92	-44	1.25	188
186	50	-16.6	90	-46	1.00	186
184	48	-17.7	88	-48	8.8	184
182	46	-15.9	86	-50	7.1	182
180	44	-15.7*	84	-52	6.8	180
178	42	-15.5	82	-54	5.5	178
176	40	-13.7*	80	-56	4.45	176
174	38	-11.8	78	-58	3.8	174
172	36	-11.7	76	-60	3.8	172
170	34	-13.2	74	-62	5.5	170
168	32	-10.5	72	-64	6.4	168
166	30	-10.6	70	-66	5.5	166
164	28	-9.7	68	-68	5.8	164
162	26	-12.3	66	-70	5.4	162
160	24	-15.0	64	-72	4.8	160
158	22	-13.7	62	-74	5.3	158
156	20	-11.1	60	-76	6.1	156
154	18	-14.9	58	-78	5.8*	154
152	16	-12.9	56	-80	5.5	152
150	14	-14.3*	54	-82	6.2	150
148	12	-15.6	52	-84	6.1	148
146	10	-20.9	50	-86	5.2	146
144	8	-24.1	48	-88	5.2	144
142	6	-31.4	46	-90	5.9	142
140	4	-33.3	44	-92	5.7	140
138	2	-64.3	42	-94	6.5	138
136	0	153.0	40	-96	6.3	136
134	-2	62.5	38	-98	6.8	134
132	-4	27.6	36	-100	6.0	132
130	-6	35.8	34	-102	6.0	130
128	-8	29.5	32	-104	6.1*	128
126	-10	27.4	30	-106	6.5	126
124	-12	24.5	28	-108	7.3	124
122	-14	24.2	26	-110	5.6	122
120	-16	22.1*	24	-112	5.1	120
118	-18	19.9	22	-114	5.2	118
116	-20	16.8	20	-116	11.2	116
114	-22	17.2	18	-118	10.0	114
112	-24	19.7	16	-120	8.1	112
110	-26	16.7	14	-122	7.6	110
108	-28	19.9	12	-124	5.3	108
106	-30	18.8*	10	-126	10.6	106
104	-32	17.8	8	-128	4.8	104

\* = Estimated    (D) = Dissipated upwind of tower

(M) = Missing

(O) = No vortex (F) = Vortex flown for remote sensing systems

(P) = Vortex passed over top of tower

Flyby (Run) Number: 59	Date: 30 SEP 1980 (Day of Year: 273)	Abeam Time: 13:52:16 (MDT)						
Configuration: Takeoff Glide Slope: 0 deg.	AIRCRAFT DATA Flaps: 15 deg. Indicated Air Speed: 137 kts	Gross Weight: 237,000 lbs. Altitude: 200 ft AGL						
Wind Speed: 6.2 knts	Wind Direction: 178 deg.	Air Temperature: 22.3 °C						
Maximum Velocity: 76.5 fps Descent Rate: 4.7 fps	DOWNDOWN VORTEX CHARACTERISTICS (200 ft Sensor Level) Age: 28 s Advection Rate: 6.2 fps	Atmospheric Stability: Unstable Estimated Core Radius: 0.7 ft Tower Penetration Height: 68 ft AGL						
Maximum Velocity: (D) fps Descent Rate: (D) fps	UPWIND VORTEX CHARACTERISTICS Age: (D) s Advection Rate: (D) fps	Estimated Core Radius: (D) ft Tower Penetration Height: (D) ft AGL						
Downwind Vortex Tangential Velocities	Upwind Vortex Tangential Velocities	Tower Tangential Velocities						
Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	Sensor Height (ft)	Relative Height (ft)	V <sub>θ</sub> (fps)
198	130	-5.9	102	34	-9.8	198	102	(D)
196	128	-3.7	100	32	-11.9*	194	100	(D)
194	126	-7.0	98	30	-5.4	192	98	96
192	124	-7.4	96	28	-7.8	190	96	94
190	122	-7.5	94	26	-12.3*	188	92	90
188	120	-8.3	92	24	-16.8	186	90	88
186	118	-8.5	90	22	-13.8	184	88	86
184	116	-7.6	88	20	-16.8	182	86	84
182	114	-7.5	86	18	-15.6	180	84	82
180	112	-9.3	84	16	-18.2	178	82	80
178	110	-8.2	82	14	-23.0	176	80	78
176	108	-9.7	80	12	-23.2	174	78	76
174	106	-8.6	78	10	-21.7*	172	76	74
172	104	-8.2	76	8	-20.2	170	74	72
170	102	-9.8	74	6	-23.7	168	72	70
168	100	-9.0	72	4	-26.6	166	70	68
166	98	-7.9	70	2	-53.4	164	68	66
164	96	-8.3	68	0	76.5	162	66	64
162	94	-9.2	66	-2	37.4	160	64	62
160	92	-9.9	64	-4	29.3	158	62	60
158	90	-8.7	62	-6	28.7	156	60	58
156	88	-6.2	60	-8	25.2	154	58	56
154	86	-8.5	58	-10	21.4*	152	56	54
152	84	-7.7	56	-12	17.5	150	54	52
150	82	-6.1	54	-14	16.7	148	52	50
148	80	-5.5	52	-16	15.9	146	50	48
146	78	-10.0	50	-18	14.2*	144	48	46
144	76	-7.1	48	-20	12.4	142	46	44
142	74	-9.8	46	-22	11.7	140	44	42
140	72	-10.9	44	-24	10.3	138	42	40
138	70	-9.2	42	-26	11.6	136	40	38
136	68	-10.2	40	-28	11.4*	134	38	36
134	66	-6.0	38	-30	11.2	132	36	34
132	64	-5.4	36	-32	9.6	130	34	32
130	62	-7.2*	34	-34	10.2	128	32	30
128	60	-8.9	32	-36	12.3	126	30	28
126	58	-5.9	30	-38	9.3	124	28	26
124	56	-6.3	28	-40	9.7	122	26	24
122	54	-4.6	26	-42	8.7	120	24	22
120	52	-7.4	24	-44	8.6	118	22	20
118	50	-8.2	22	-46	7.2	116	20	18
116	48	-5.7	20	-48	8.8	114	18	16
114	46	-9.6	18	-50	7.3	112	16	14
112	44	-6.7	16	-52	9.0	110	14	12
110	42	-6.0	14	-54	7.6	108	12	10
108	40	-9.2	12	-58	8.6	106	10	104
106	38	-10.1	10	-11.0	36	104	10	104

\* = Estimated      (D) = Vortex dissipated upwind of tower      (M) = Missing      (O) = No vortex (Flyby flown for remote sensing systems)      (P) = Vortex passed over top of tower

**APPENDIX G**

**VORTEX  
TANGENTIAL  
VELOCITY  
DISTRIBUTION  
DATA  
GRAPHS**

## VORTEX TANGENTIAL VELOCITY DISTRIBUTION GRAPHS

This appendix contains graphs of velocity profiles for each vortex from each flyby (run).

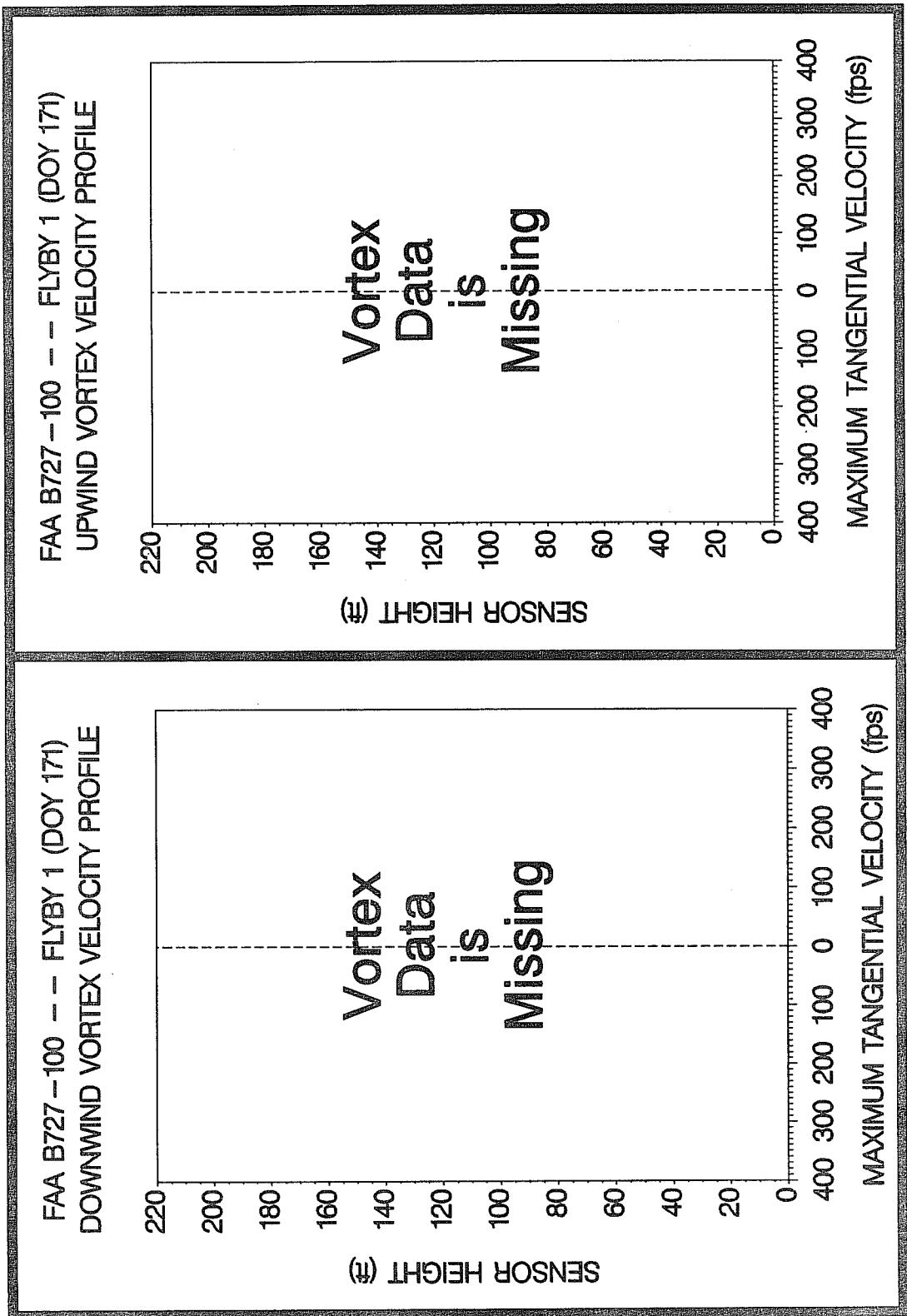


Figure G-1. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 171, Flyby 1, ambient wind speed = 4.3 kts,  $\delta_F = 0^\circ$ , IAS = 210 kts, GW = 138,000 lbs. Ages, radii, and velocities of the vortex cores are (M) and (M) s, (M) and (M) fit, and (M) and (M) fps, respectively.

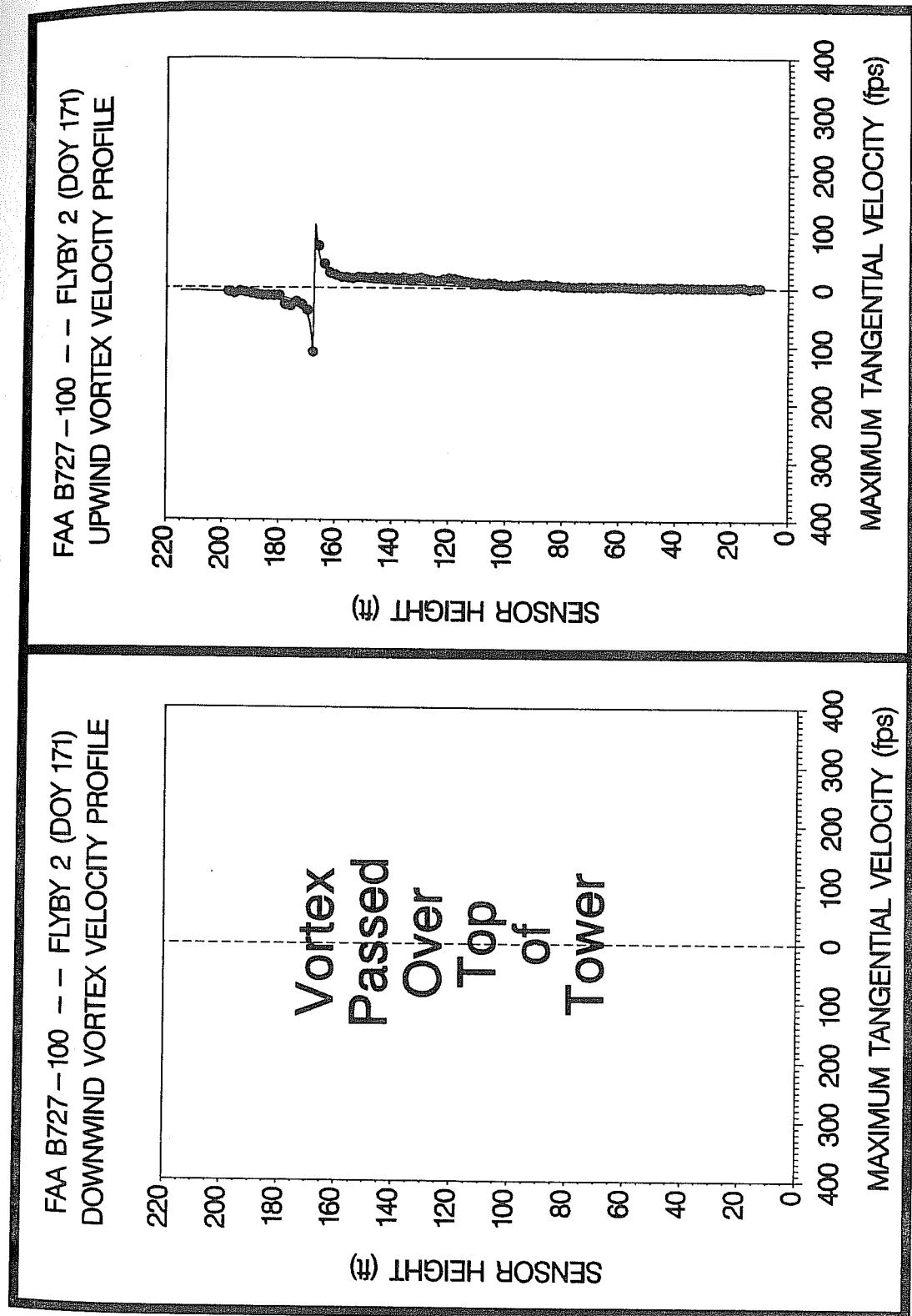
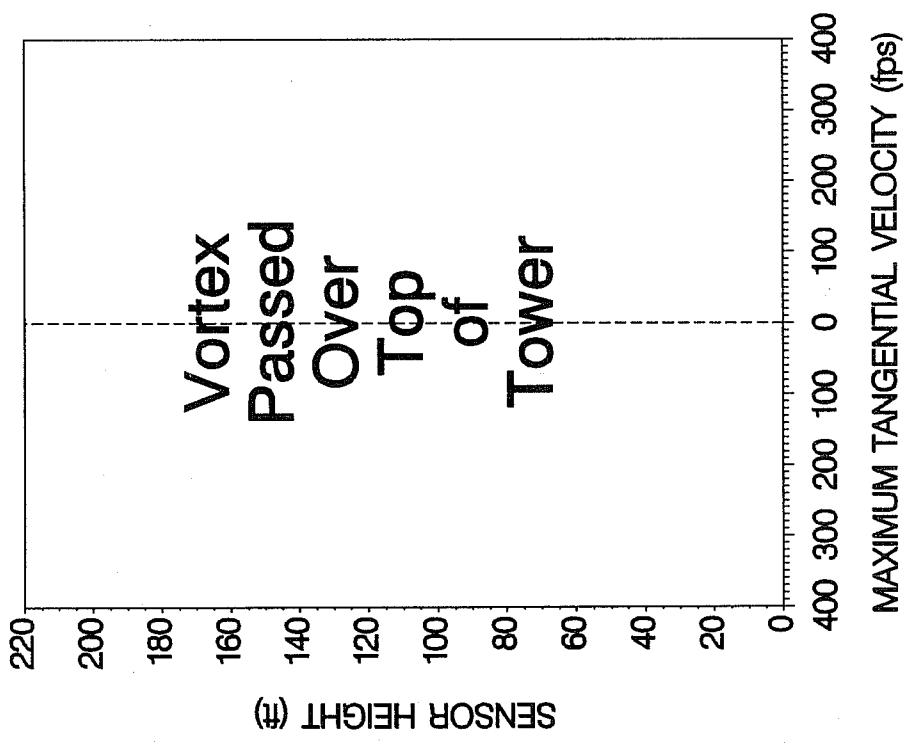


Figure G-2. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 171, Flyby 2, ambient wind speed = 3.7 kts,  $\delta_F = 0^\circ$ , IAS = 255 kts, GW = 136,500 lbs. Ages, radii, and velocities of the vortex cores are (P) and 32 s, (P) and 0.3 ft, and (P) and 110.4 fps, respectively.

FAA B727-100 -- FLYBY 3 (DOY 171)  
DOWNWIND VORTEX VELOCITY PROFILE



FAA B727-100 -- FLYBY 3 (DOY 171)  
UPWIND VORTEX VELOCITY PROFILE

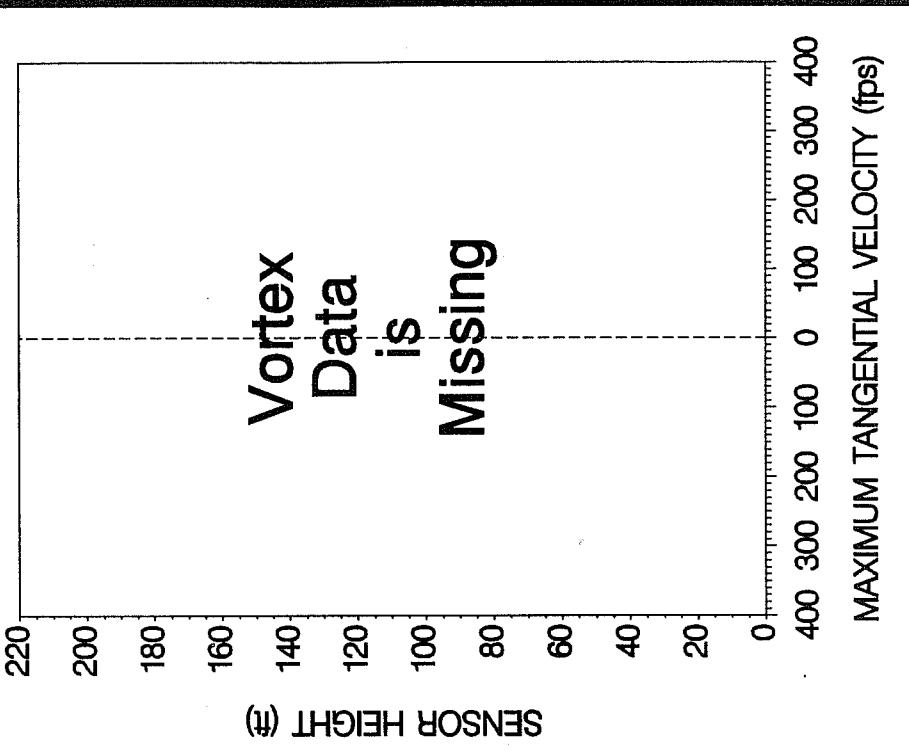


Figure G-3. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 171, Flyby 3, ambient wind speed = 3.0 kts,  $\delta_F = 0^\circ$ , IAS = 300 kts, GW = 135,000 lbs. Ages, radii, and velocities of the vortex cores are (P) and (M) ft, and (P) and (M) fps, respectively.

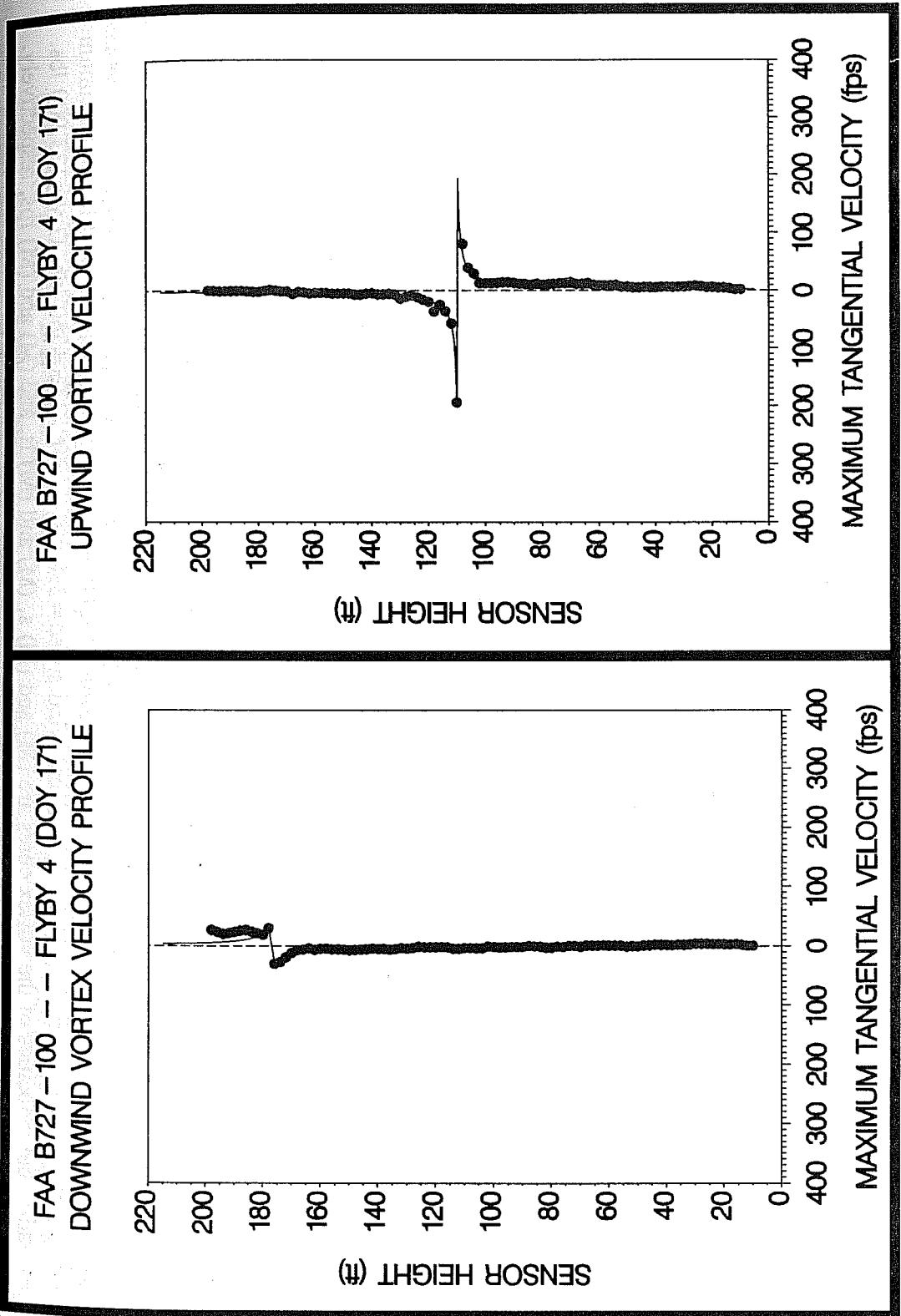
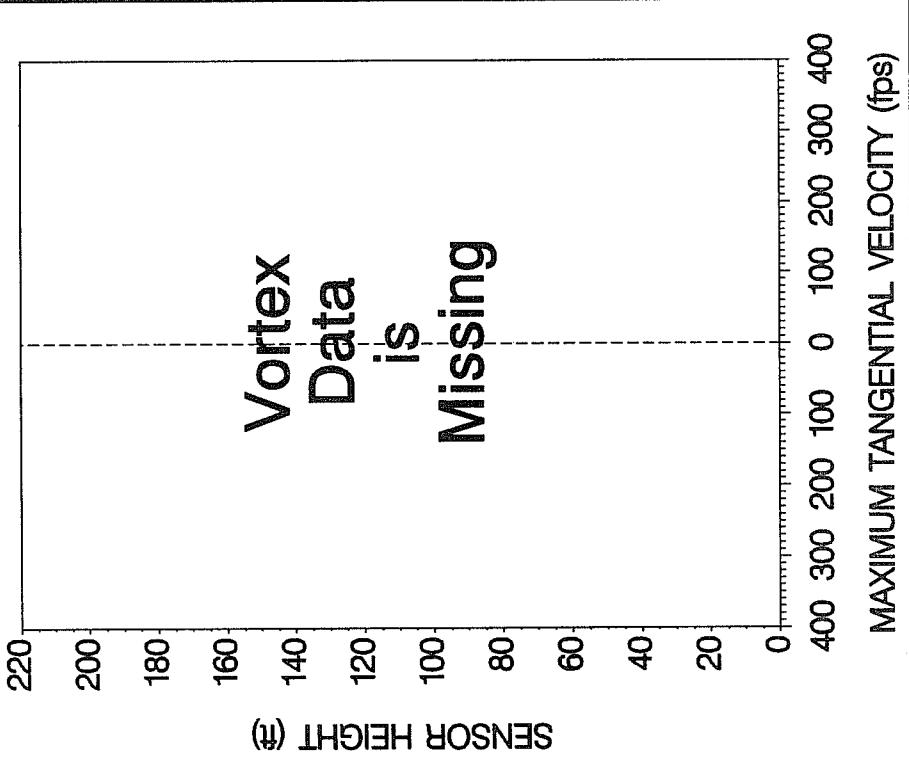


Figure G-4. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 171, Flyby 4, ambient wind speed = 0.8 kts,  $\delta_F = 0^\circ$ , IAS = 210 kts, GW = 134,000 lbs. Ages, radii, and velocities of the vortex cores are 28 and 41 s, 1.0 and 0.2 ft, and 30.3 and 193.5 fps, respectively.

FAA B727-100 -- FLYBY 5 (DOY 171)  
DOWNWIND VORTEX VELOCITY PROFILE



FAA B727-100 -- FLYBY 5 (DOY 171)  
UPWIND VORTEX VELOCITY PROFILE

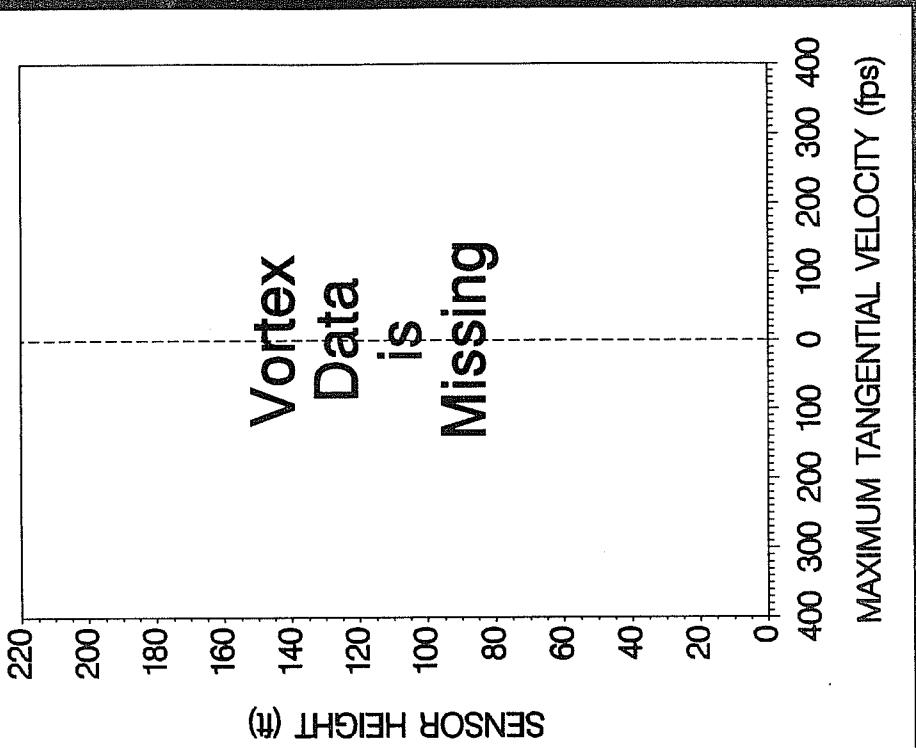


Figure G-5. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 171, Flyby 5, ambient wind speed = 2.4 kts,  $\delta_F = 0^\circ$ , IAS = 250 kts, GW = 133,000 lbs. Ages, radii, and velocities of the vortex cores are (M) and (M) s, (M) and (M) ft, and (M) and (M) fps, respectively.

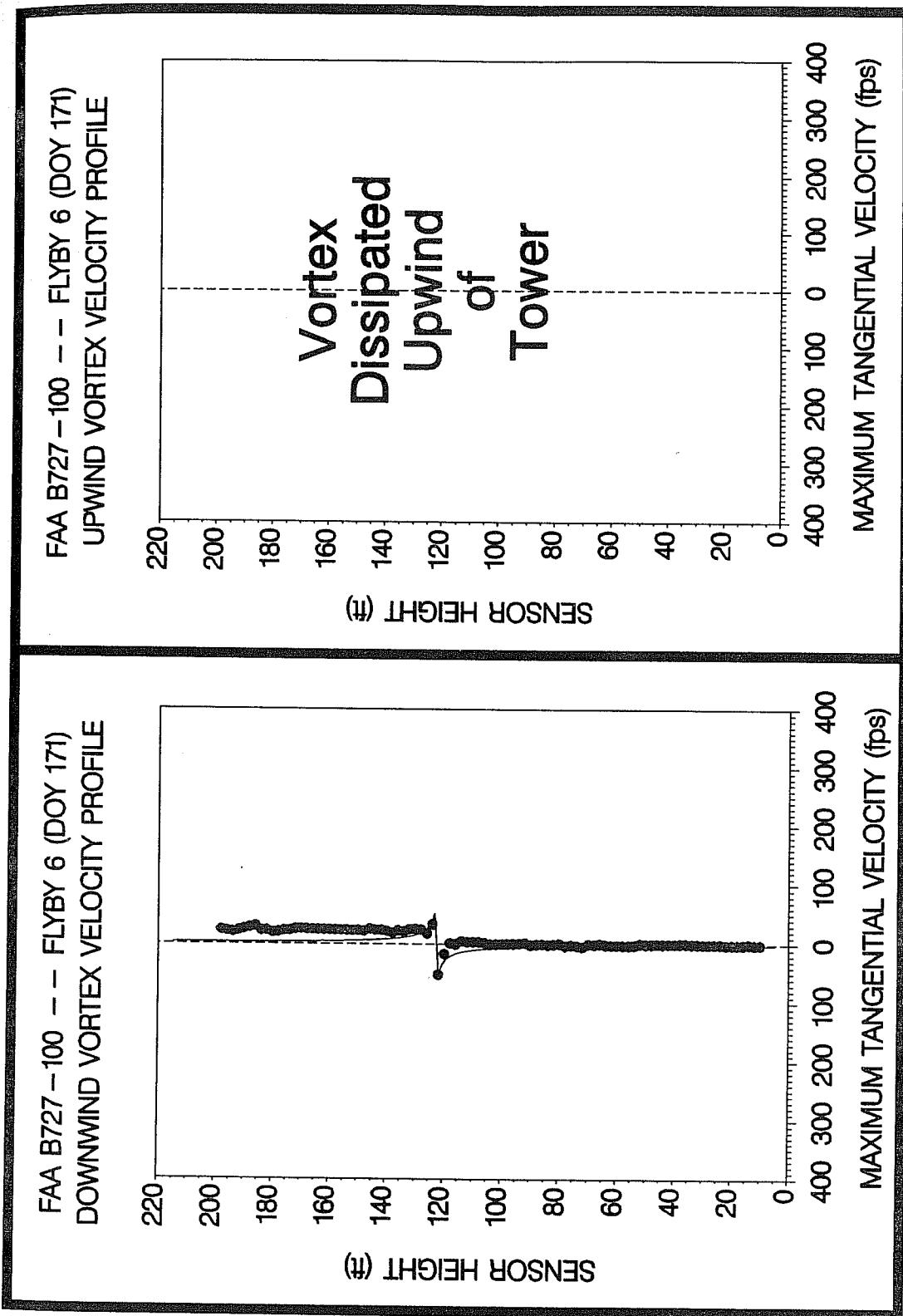
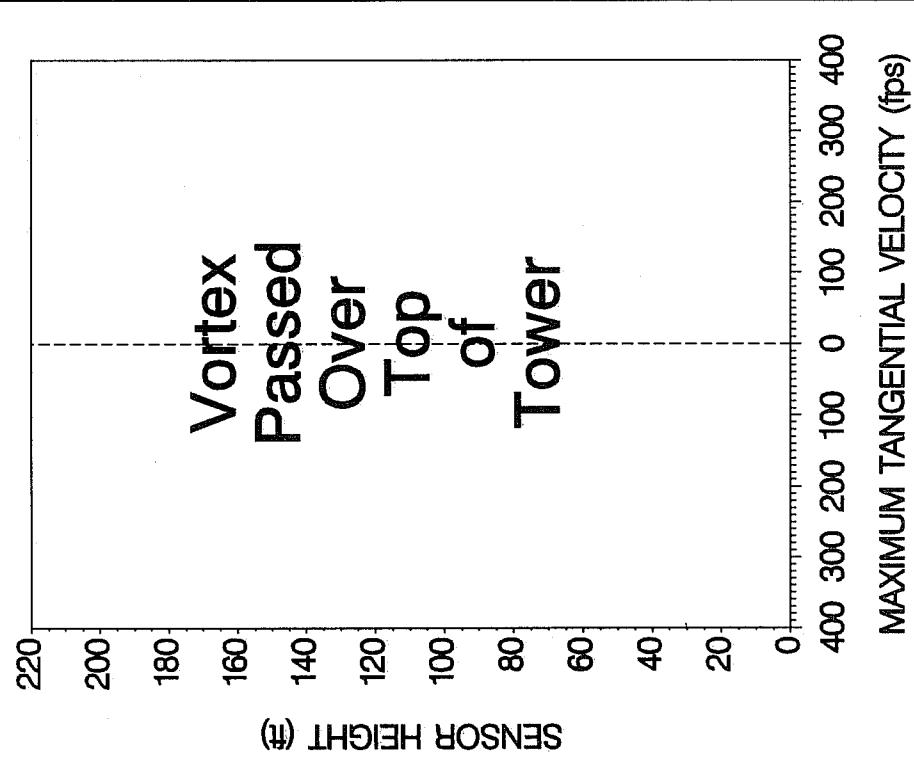


Figure G-6. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 171, Flyby 6, ambient wind speed=1.3 kts,  $\delta_F=0^\circ$ , IAS=330 kts, GW=132,500 lbs. Ages, radii, and velocities of the vortex cores are 58 and (D) s, 0.6 and (D) ft, and 51.7 and (D) fps, respectively.

FAA B727-100 -- FLYBY 7 (DOY 171)  
DOWNWIND VORTEX VELOCITY PROFILE



FAA B727-100 -- FLYBY 7 (DOY 171)  
UPWIND VORTEX VELOCITY PROFILE

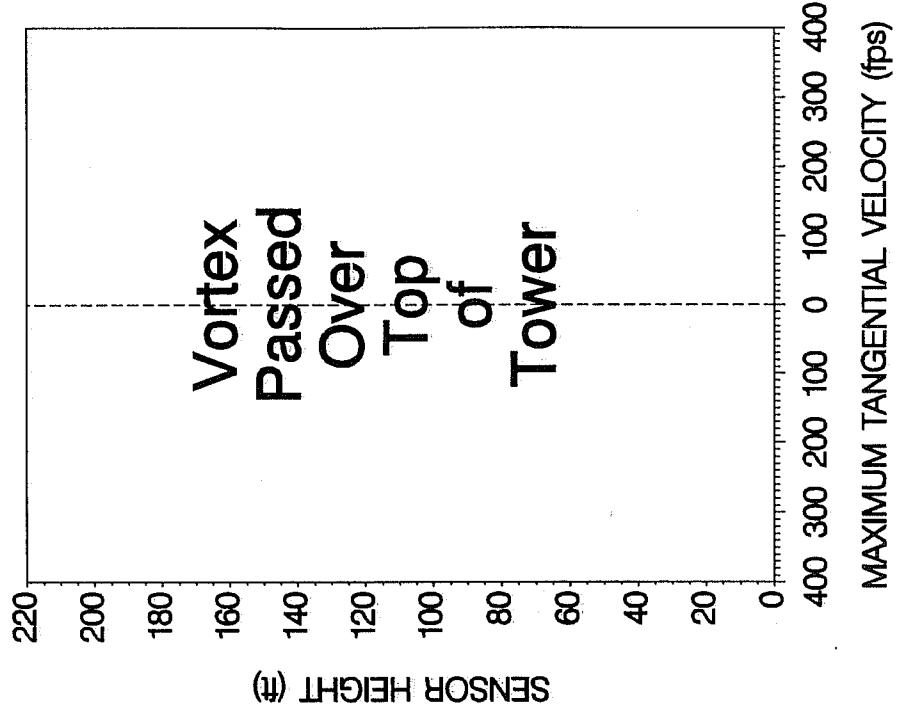
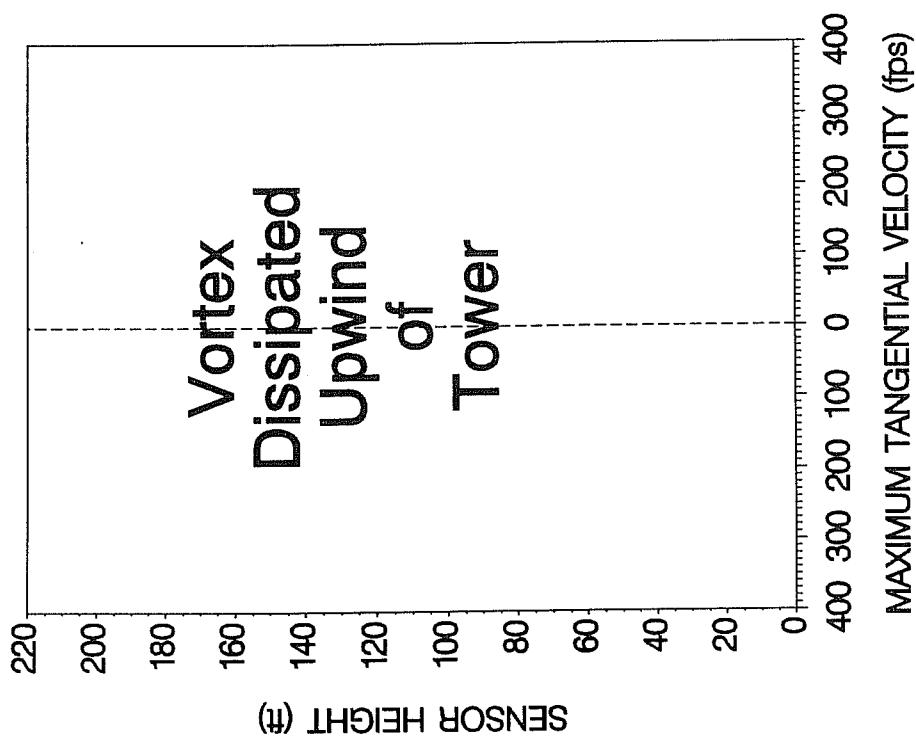


Figure G-7. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 171, Flyby 7, ambient wind speed = 0.5 kts,  $\delta_F = 0^\circ$ , IAS = 205 kts, GW = 132,000 lbs. Ages, radii, and velocities of the vortex cores are (P) and (P) s, (P) and (P) ft, and (P) and (P) fps, respectively.

FAA B727-100 -- FLYBY 8 (DOY 171)  
DOWNWIND VORTEX VELOCITY PROFILE



FAA B727-100 -- FLYBY 8 (DOY 171)  
UPWIND VORTEX VELOCITY PROFILE

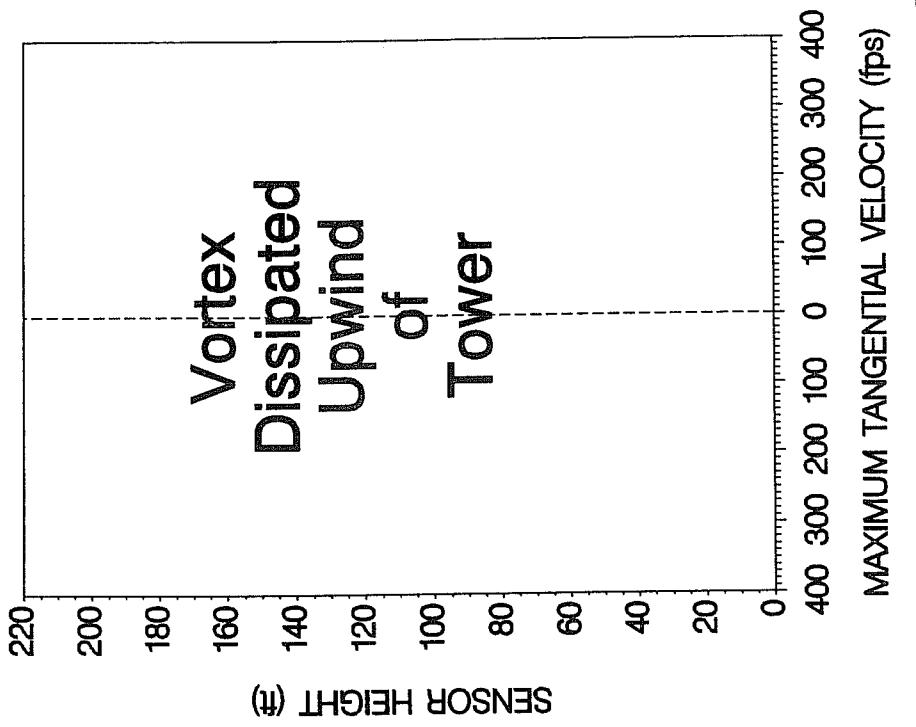


Figure G-8. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 171, Flyby 8, ambient wind speed = 3.4 kts,  $\delta_F = 30^\circ$ , IAS = 132 kts, GW = 120,000 lbs. Ages, radii, and velocities of the vortex cores are (D) and (D) s, (D) and (D) ft, and (D) and (D) fps, respectively.

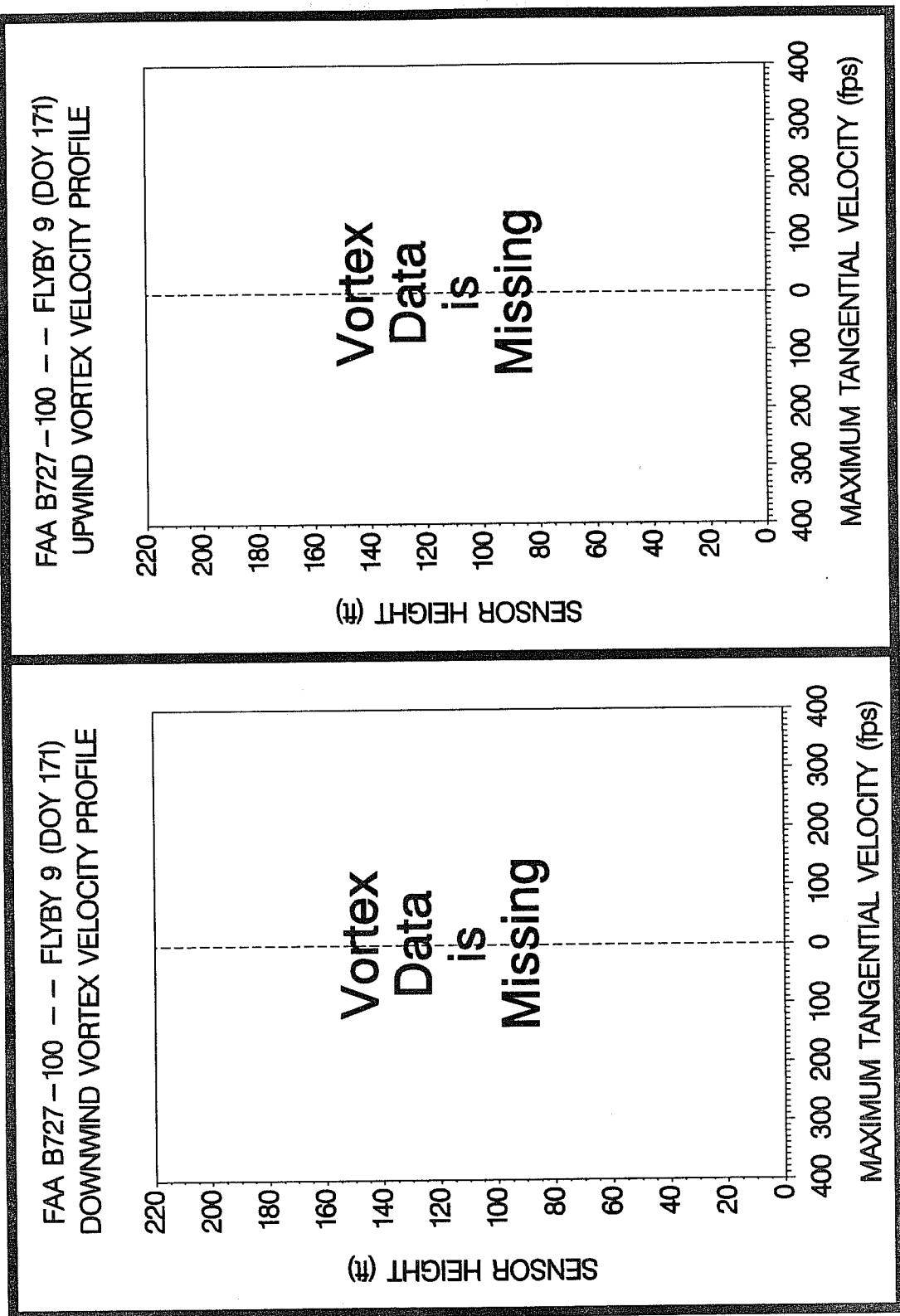
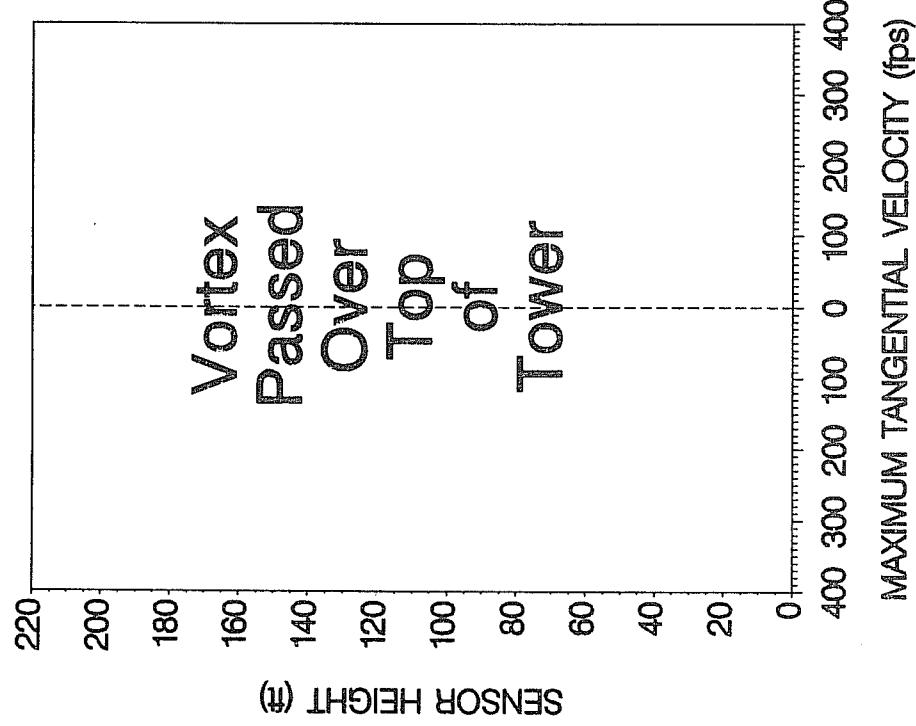


Figure G-9. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 171, Flyby 9, ambient wind speed = 10.9 kts,  $\delta_F = 30^\circ$ , IAS = 150 kts, GW = 138,000 lbs. Ages, radii, and velocities of the vortex cores are (M) and (M) s, (M) and (M) ft, and (M) and (M) fps, respectively.

FAA B727 - 100 -- FLYBY 10 (DOY 171)  
DOWNWIND VORTEX VELOCITY PROFILE



FAA B727 - 100 -- FLYBY 10 (DOY 171)  
UPWIND VORTEX VELOCITY PROFILE

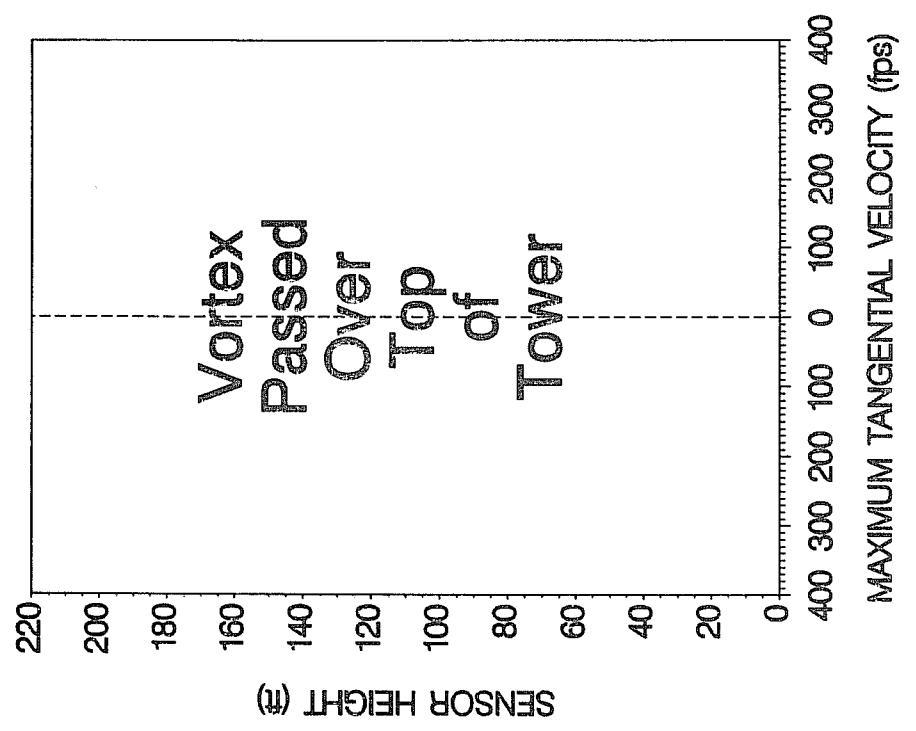


Figure G-10. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 171, Flyby 10, ambient wind speed = 15.5 kts,  $\delta_F = 30^\circ$ , IAS = 145 kts, GW = 136,500 lbs. Ages, radii, and velocities of the vortex cores are (P) and (P) ft, and (P) and (P) ft, and (P) and (P) fps, respectively.

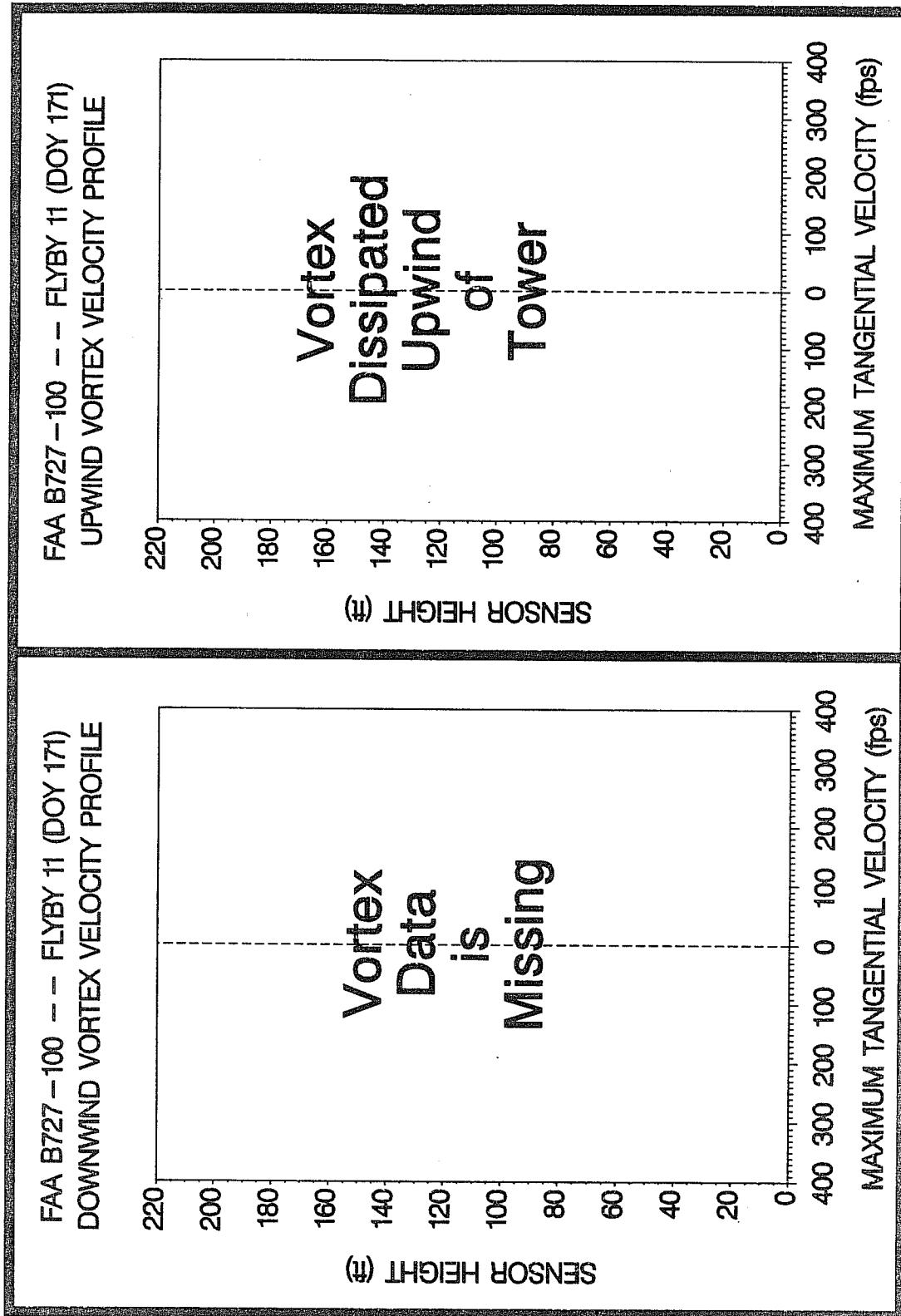
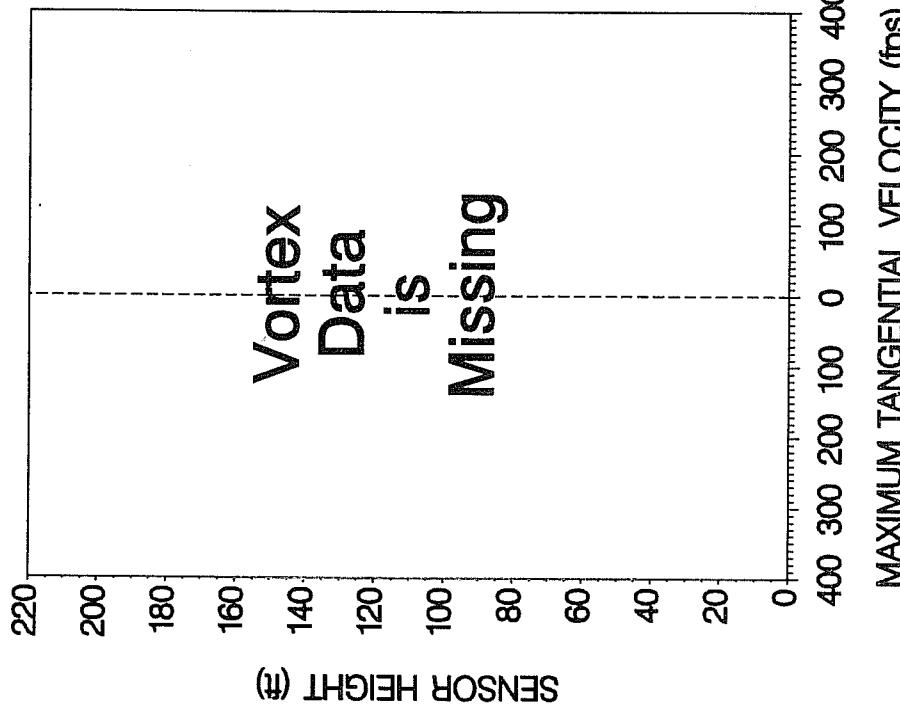


Figure G-11. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 171, Flyby 11, ambient wind speed = 13.0 kts,  $\delta_F = 30^\circ$ ,  $IAS = 130$  kts,  $GW = 135,000$  lbs. Ages, radii, and velocities of the vortex cores are (M) and (D) s, (M) and (D) ft, and (M) and (D) fps, respectively.

FAA B727-100 -- FLYBY 12 (DOY 171)  
DOWNWIND VORTEX VELOCITY PROFILE



FAA B727-100 -- FLYBY 12 (DOY 171)  
UPWIND VORTEX VELOCITY PROFILE

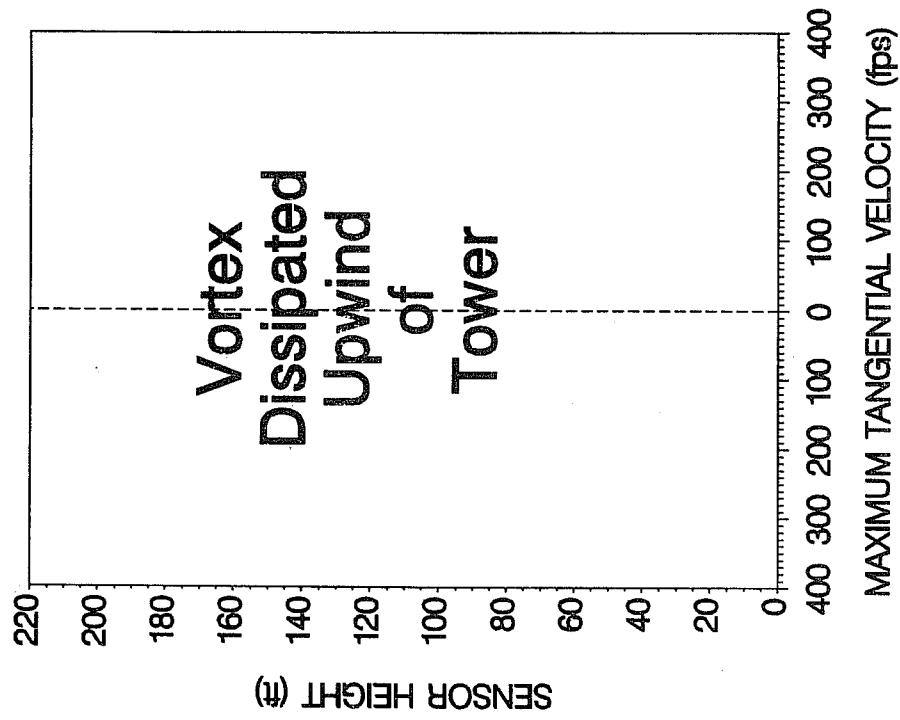
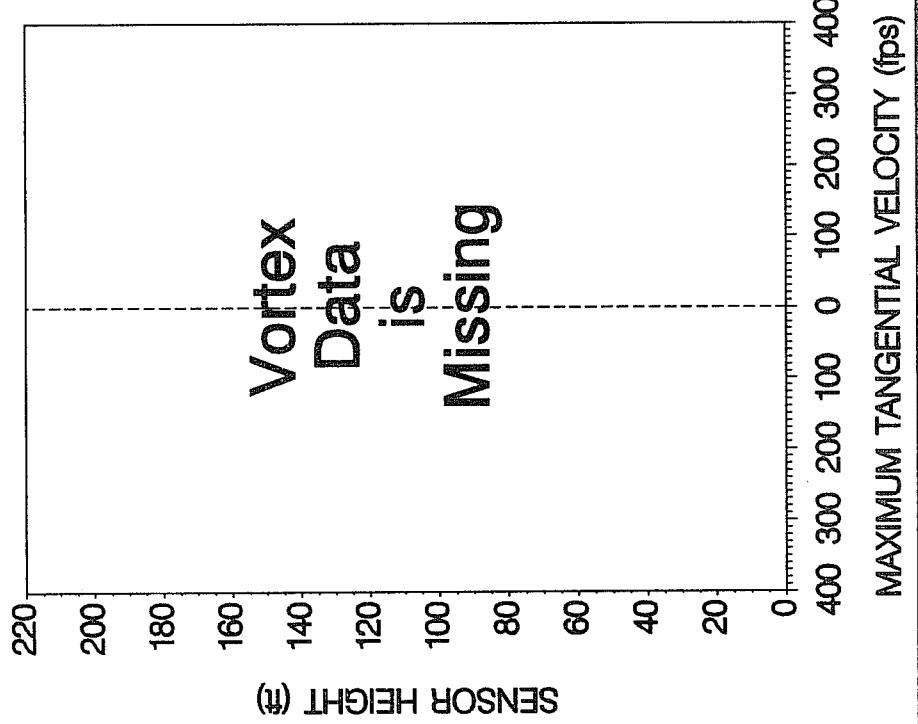


Figure G-12. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 171, Flyby 12, ambient wind speed = 13.5 kts,  $\delta_F = 30^\circ$ , IAS = 128 kts, GW = 134,000 lbs. Ages, radii, and velocities of the vortex cores are (M) and (D) s, (M) and (D) ft, and (M) and (D) fps, respectively.

FAA B727-100 -- FLYBY 13 (DOY 171)  
DOWNWIND VORTEX VELOCITY PROFILE



FAA B727-100 -- FLYBY 13 (DOY 171)  
UPWIND VORTEX VELOCITY PROFILE

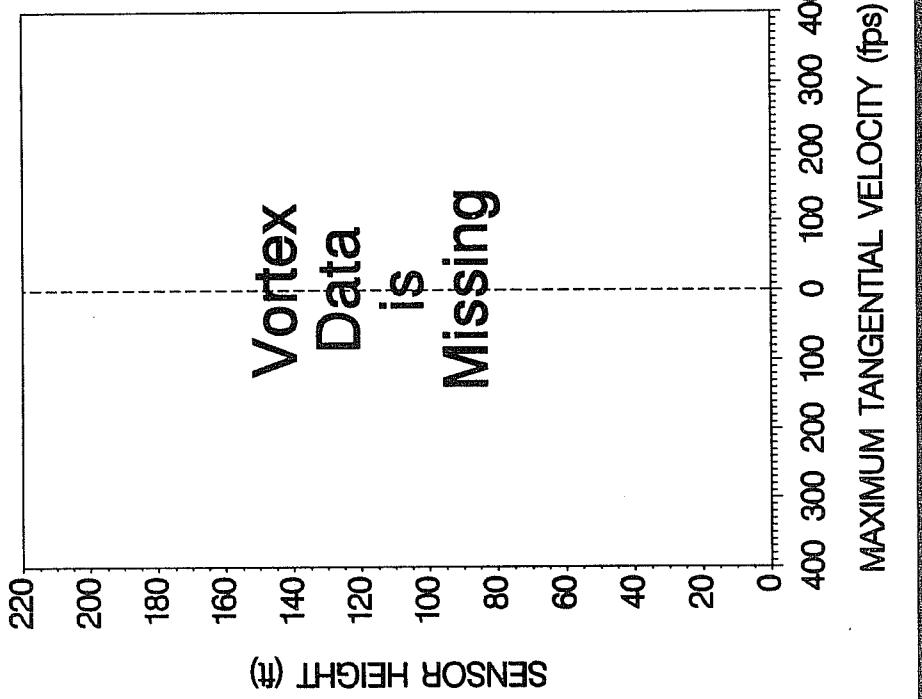


Figure G-13. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 171, Flyby 13, ambient wind speed = 11.7 kts,  $\delta_F = 30^\circ$ ,  $IAS = 128$  kts,  $GW = 132,000$  lbs. Ages, radii, and velocities of the vortex cores are (M) and (M) ft, and (M) and (M) fps, respectively.

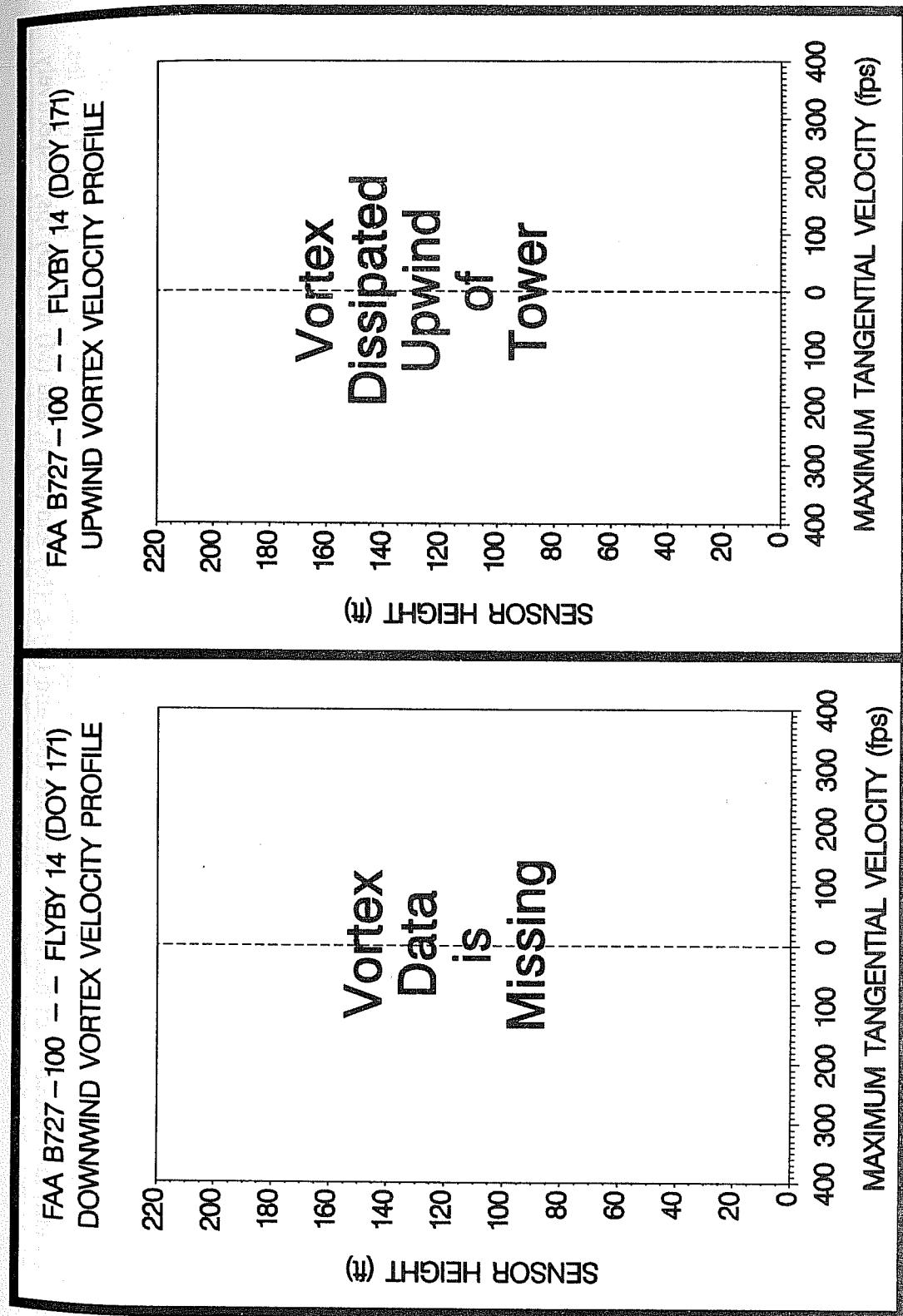


Figure G-14. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 171, Flyby 14, ambient wind speed=12.5 kts,  $\delta_F=30^\circ$ ,  $IAS=128$  kts,  $GW=130,000$  lbs. Ages, radii, and velocities of the vortex cores are (M) and (D) s, (M) and (D) ft, and (M) and (D) fps, respectively.

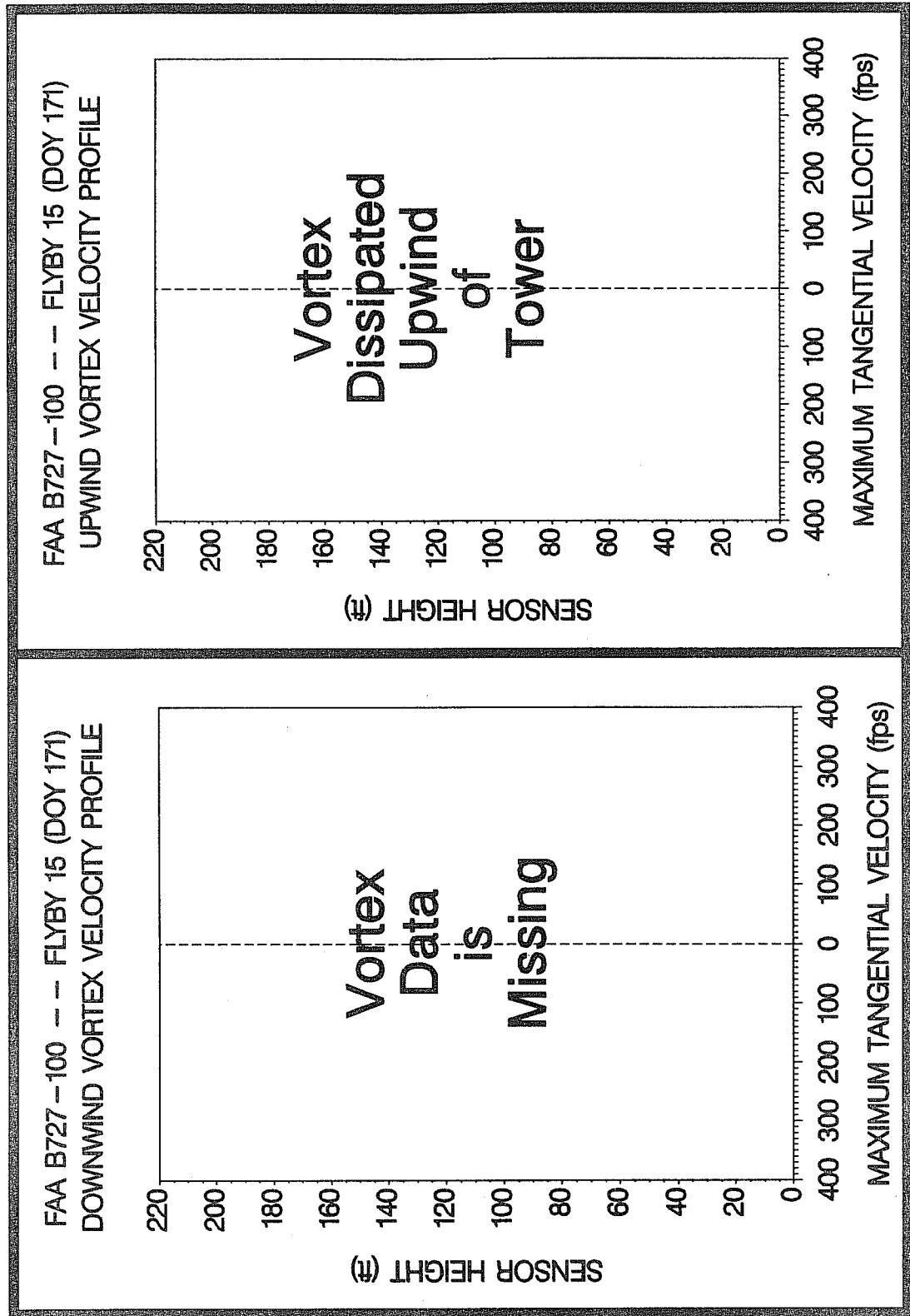
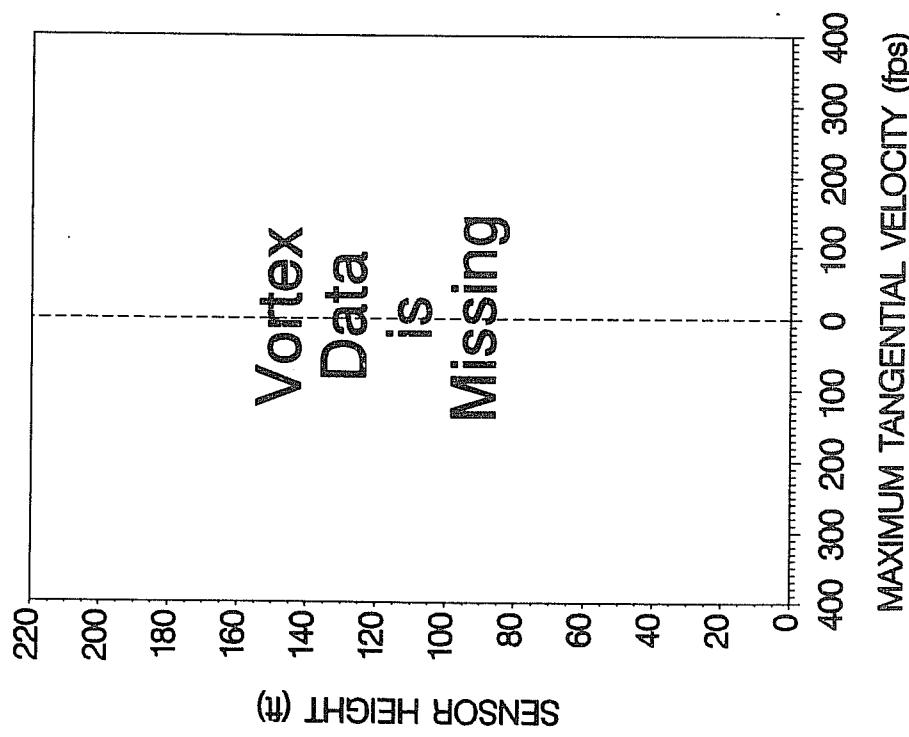


Figure G-15. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 171, Flyby 15, ambient wind speed = 9.8 kts,  $\delta_F = 30^\circ$ , IAS = 126 kts, GW = 129,500 lbs. Ages, radii, and velocities of the vortex cores are (M) and (D) s, (M) and (D) ft, and (M) and (D) fps, respectively.

FAA B727-100 -- FLYBY 16 (DOY 171)  
DOWNWIND VORTEX VELOCITY PROFILE



FAA B727-100 -- FLYBY 16 (DOY 171)  
UPWIND VORTEX VELOCITY PROFILE

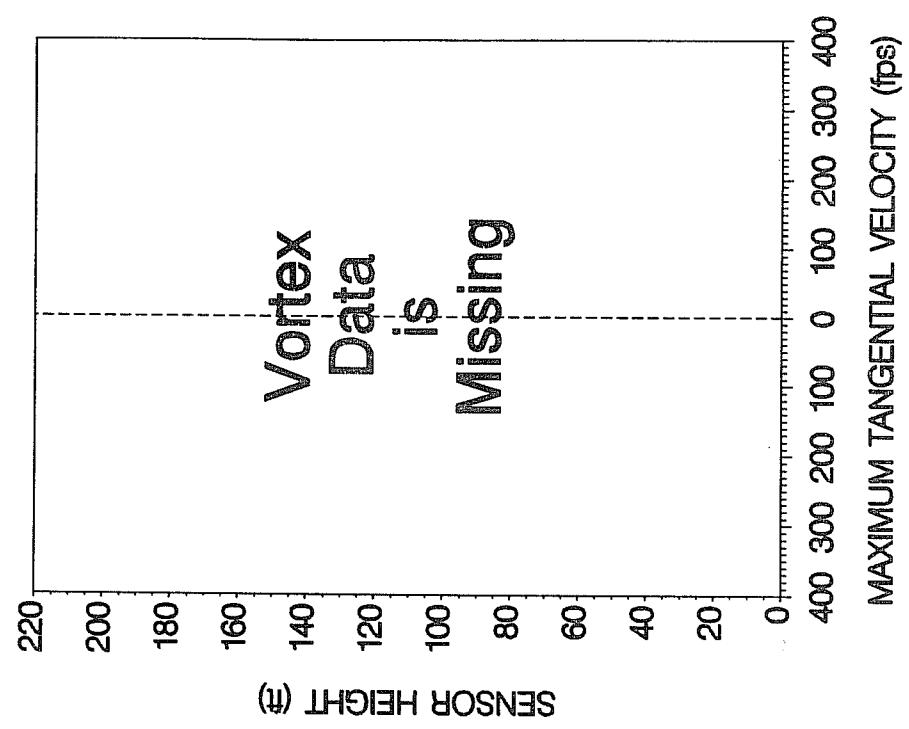


Figure G-16. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 171, Flyby 16, ambient wind speed = 16.0 kts,  $\delta_F = 15^\circ$ , IAS = 140 kts, GW = 129,000 lbs. Ages, radii, and velocities of the vortex cores are (M) and (M) ft, and (M) and (M) s, (M) and (M) ft, and (M) and (M) fps, respectively.

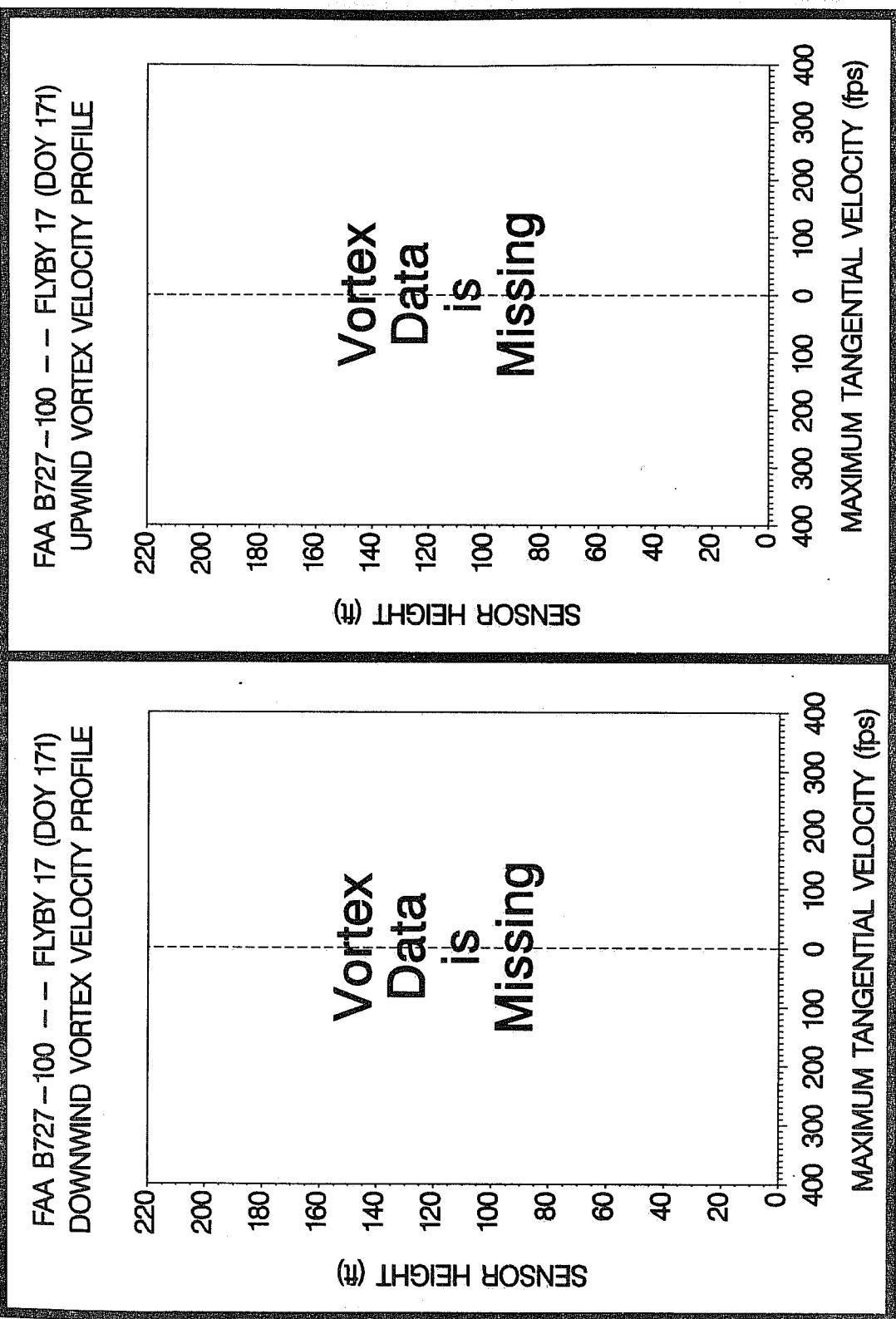
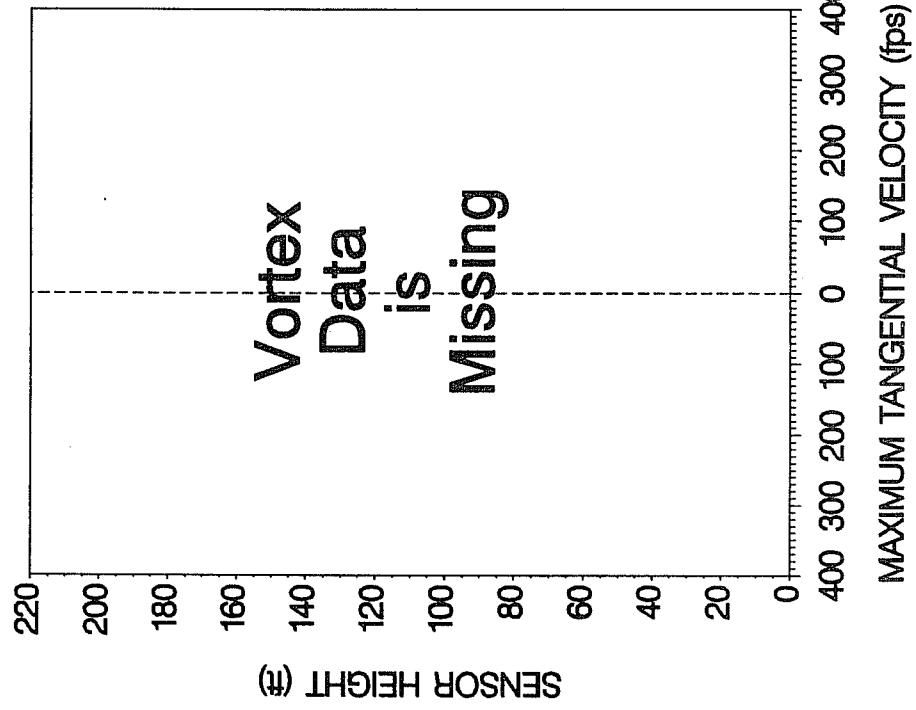


Figure G-17. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 171, Flyby 17, ambient wind speed = 15.9 kts,  $\delta_F = 15^\circ$ ,  $\delta_{AS} = 146$  kts,  $GW = 128,000$  lbs. Ages, radii, and velocities of the vortex cores are (M) and (M) ft, and (M) and (M) fps, respectively.

FAA B727 – 100 – – FLYBY 18 (DOY 171)  
DOWNWIND VORTEX VELOCITY PROFILE



FAA B727 – 100 – – FLYBY 18 (DOY 171)  
UPWIND VORTEX VELOCITY PROFILE

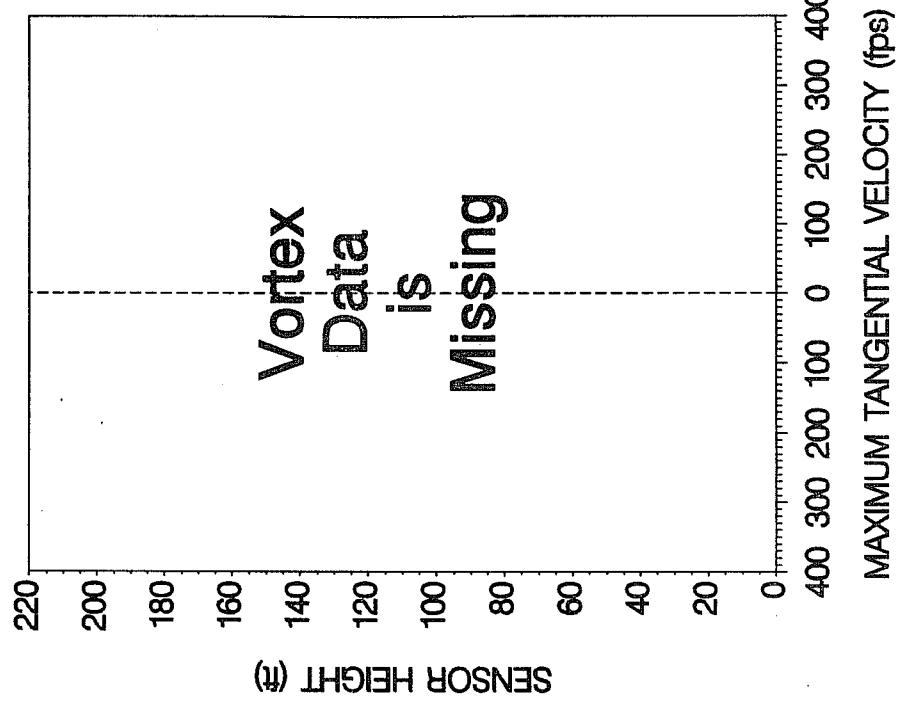
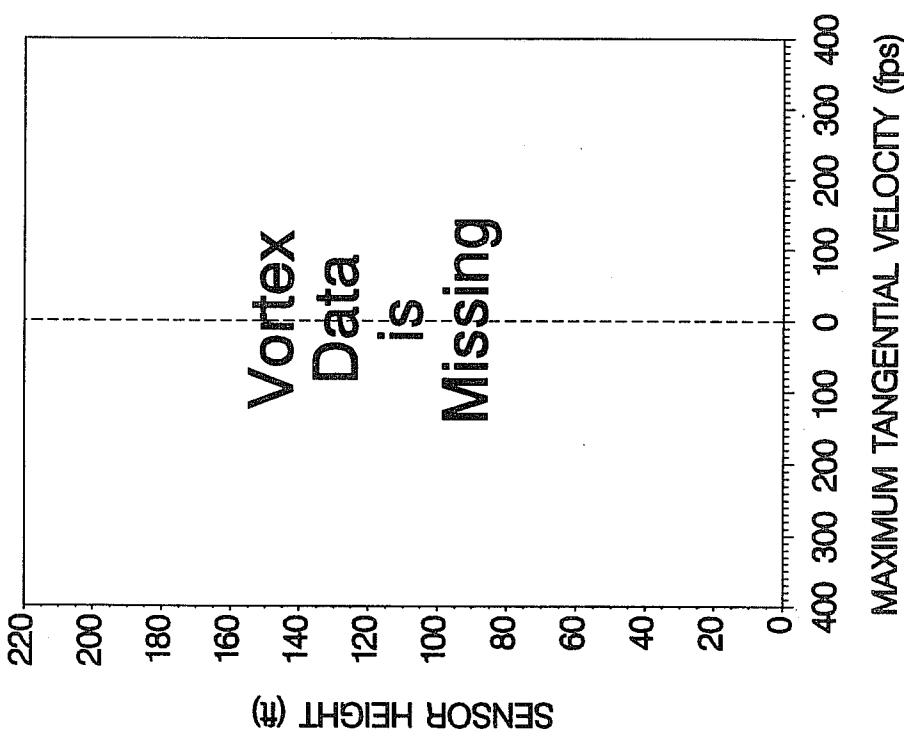


Figure G-18. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 171, Flyby 18, ambient wind speed = 12.2 kts,  $\delta_F = 15^\circ$ ,  $IAS = 143$  kts,  $GW = 127,500$  lbs. Ages, radii, and velocities of the vortex cores are (M) and (M) ft, and (M) s, (M) and (M) ft, and (M) and (M) fps, respectively.

FAA B727-100 -- FLYBY 1 (DOY 172)  
DOWNWIND VORTEX VELOCITY PROFILE



FAA B727-100 -- FLYBY 1 (DOY 172)  
UPWIND VORTEX VELOCITY PROFILE

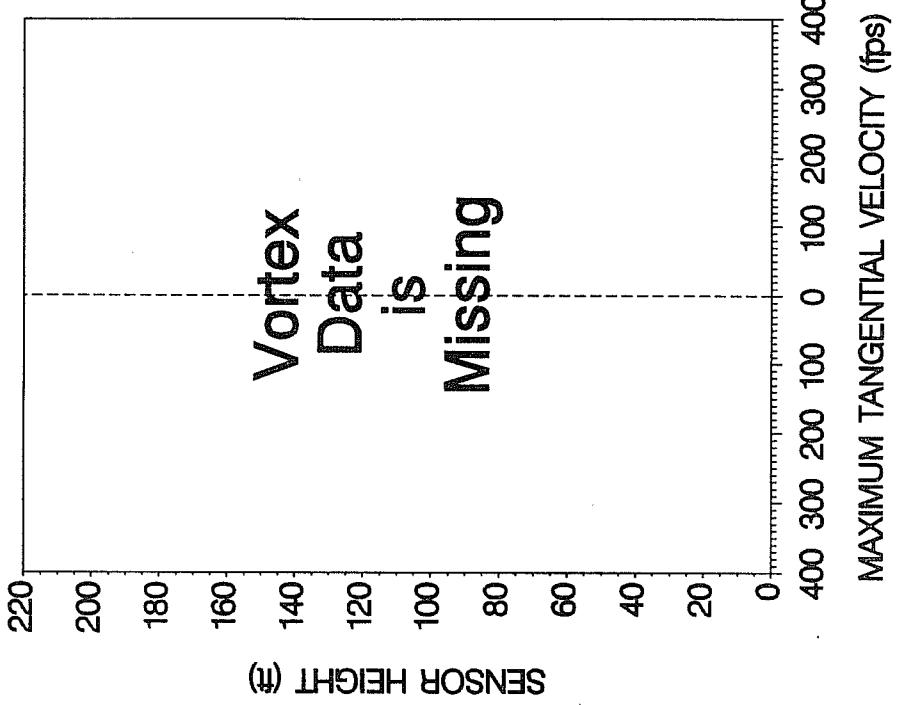


Figure G-19. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 172, Flyby 1, ambient wind speed = 12.3 kts,  $\delta_F = 15^\circ$ , IAS = 147 kts, GW = 137,000 lbs. Ages, radii, and velocities of the vortex cores are (M) and (M) s, (M) and (M) ft, and (M) and (M) fps, respectively.

... max vortex cores are (M) and (M) s, (M) and (M) ft, and (M) and (M) fps, respectively.

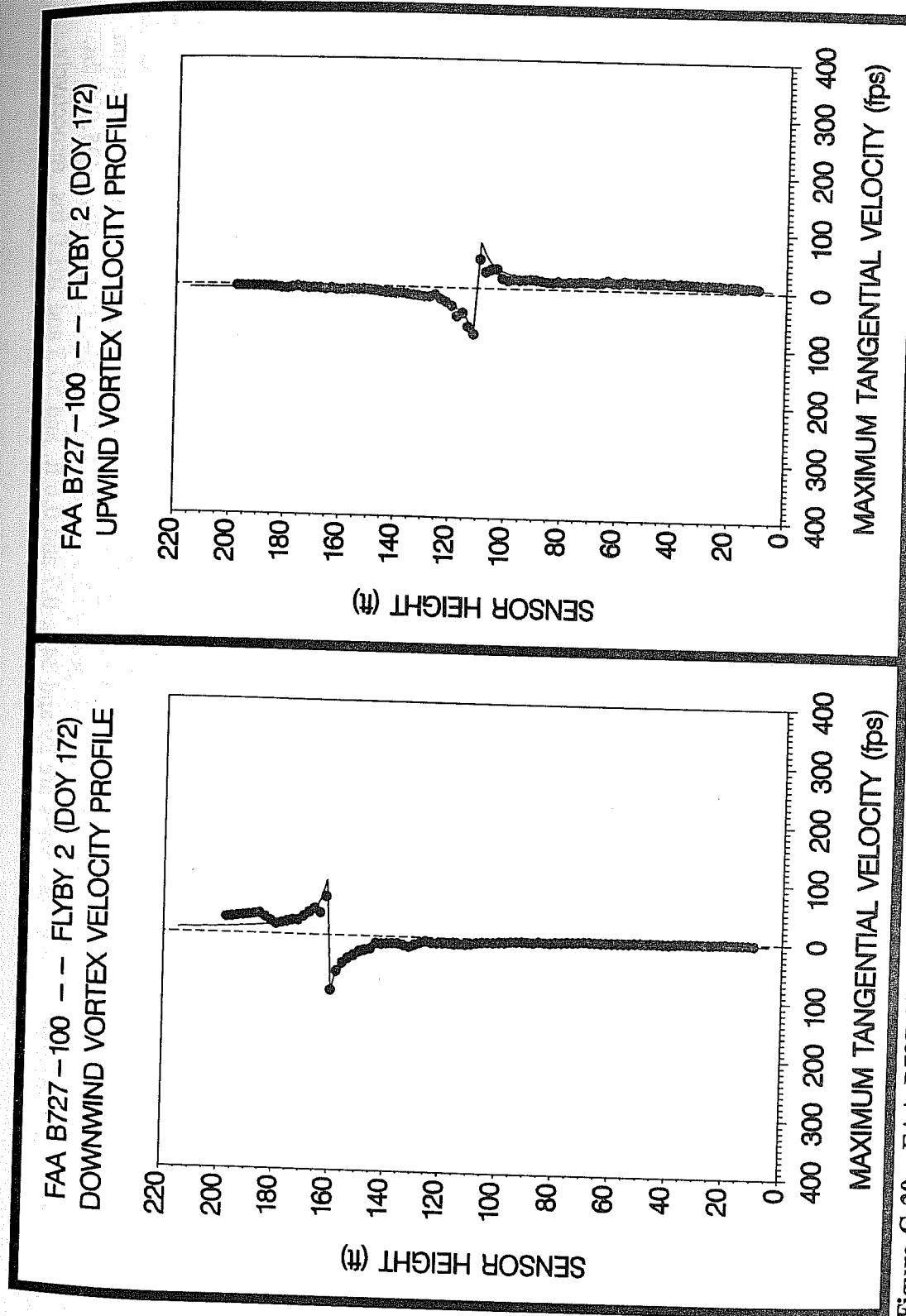
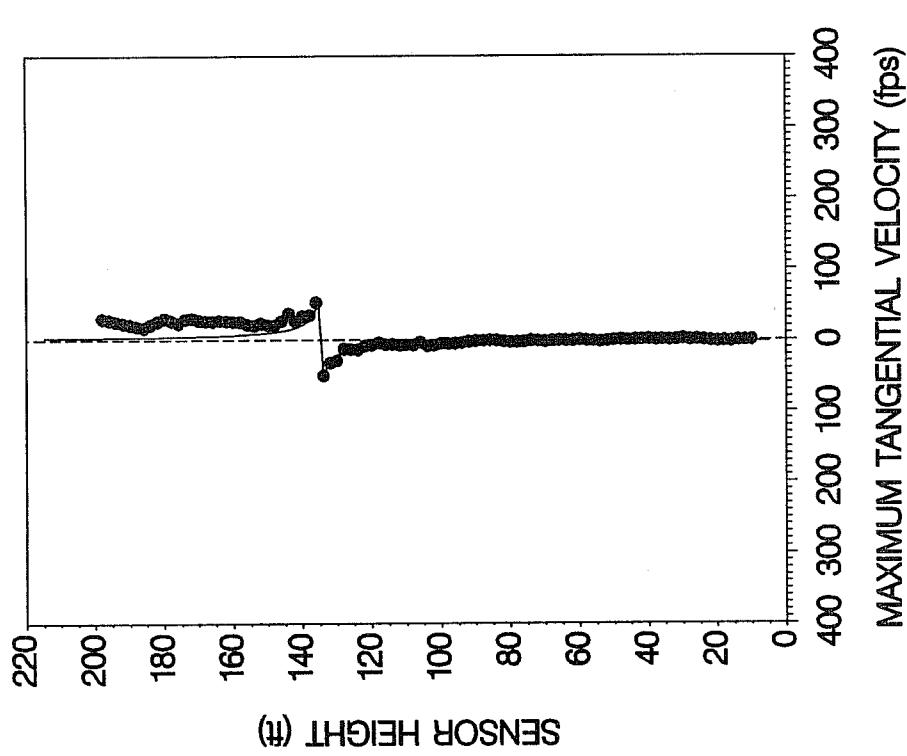


Figure G-20. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 172, Flyby 2, ambient wind speed = 12.7 kts,  $\delta_F = 15^\circ$ , IAS = 143 kts, GW = 136,000 lbs. Ages, radii, and velocities of the vortex cores are 21 and 27 s, 0.9 and 1.1 ft, and 93.4 and 79.1 fps, respectively.

FAA B727-100 — FLYBY 3 (DOY 172)  
DOWNWIND VORTEX VELOCITY PROFILE



FAA B727-100 — FLYBY 3 (DOY 172)  
UPWIND VORTEX VELOCITY PROFILE

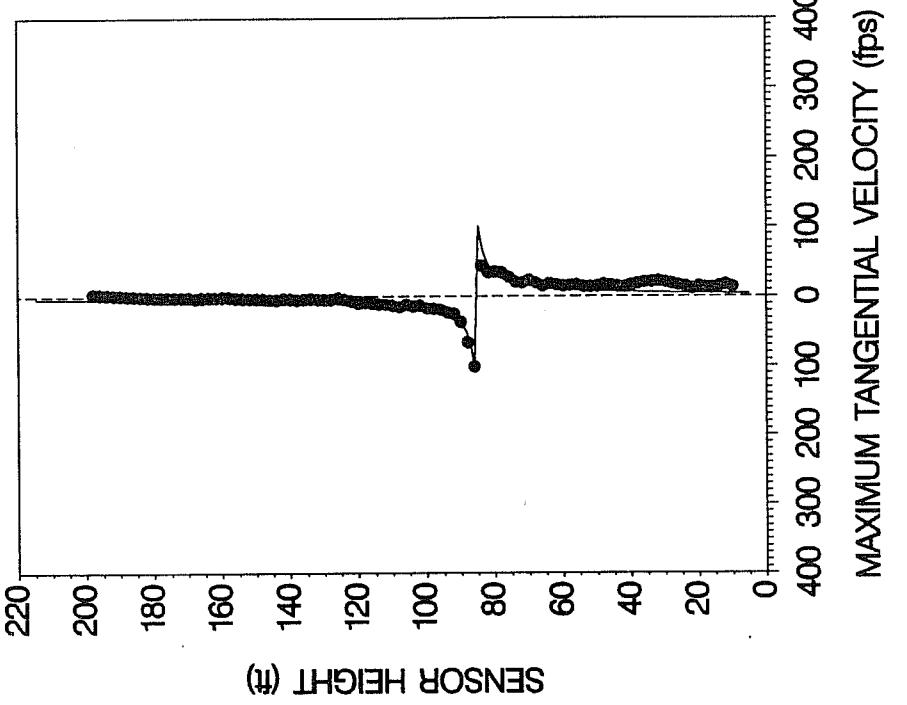


Figure G-21. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 172, Flyby 3, ambient wind speed = 13.1 kts,  $\delta_F = 15^\circ$ ,  $IAS = 147$  kts,  $GW = 135,000$  lbs. Ages, radii, and velocities of the vortex cores are 29 and 34 s, 0.7 and 0.6 ft, and 50.3 and 101.0 fps, respectively.

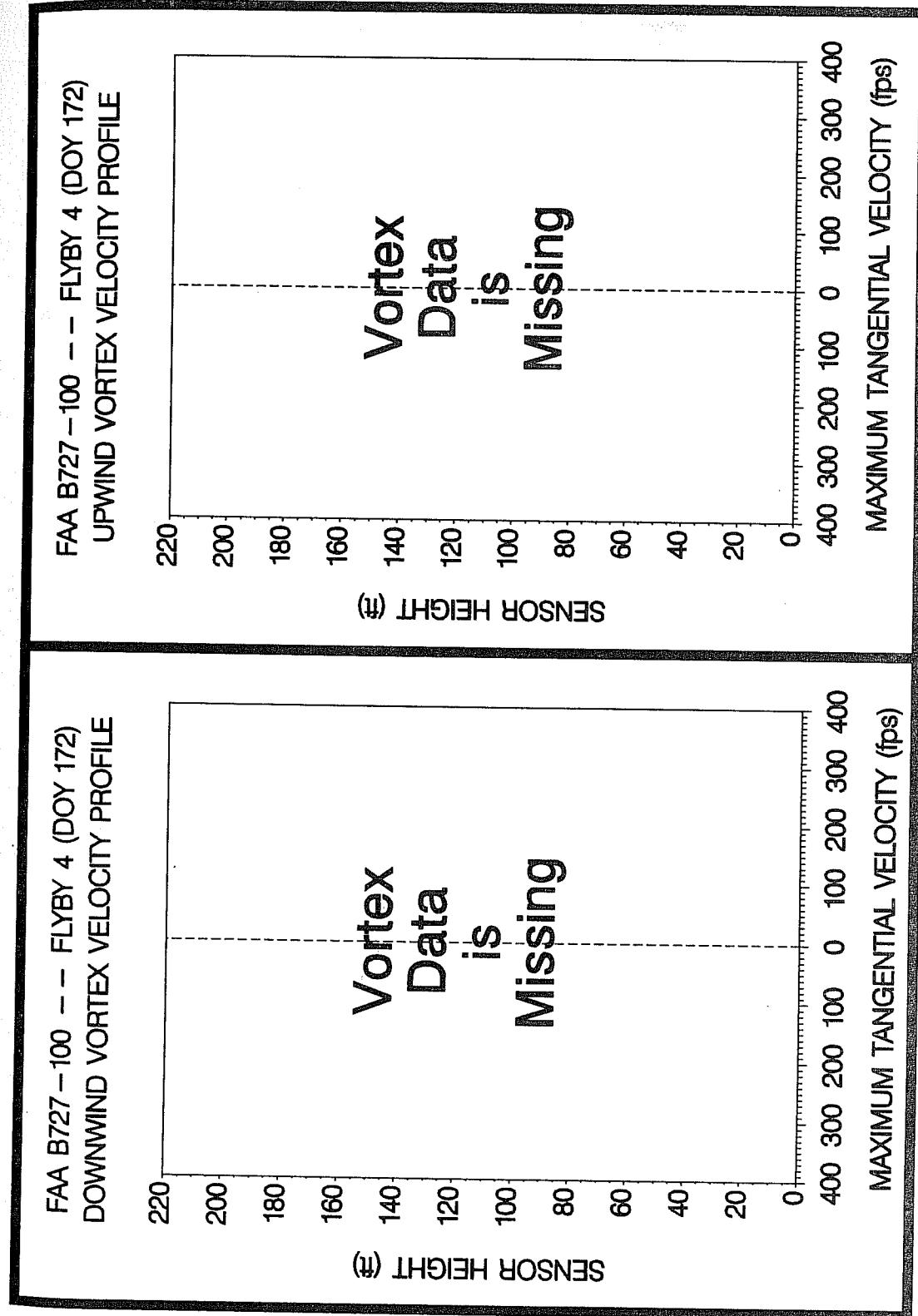


Figure G-22. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 172, Flyby 4, ambient wind speed = 16.4 kts,  $\delta_F = 15^\circ$ , IAS = 148 kts, GW = 134,000 lbs. Ages, radii, and velocities of the vortex cores are (M) and (M) s, (M) and (M) ft, and (M) and (M) fps, respectively.

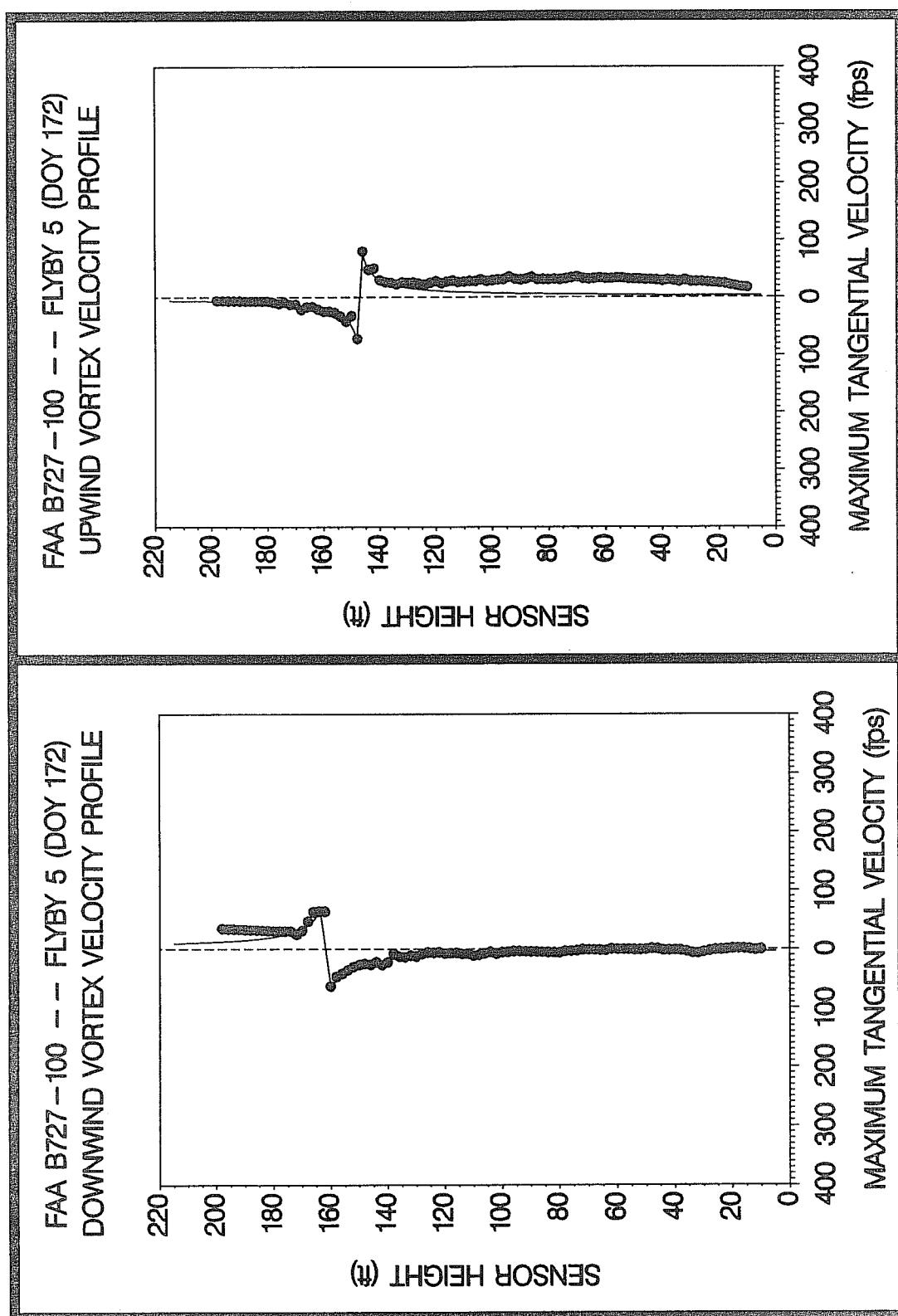
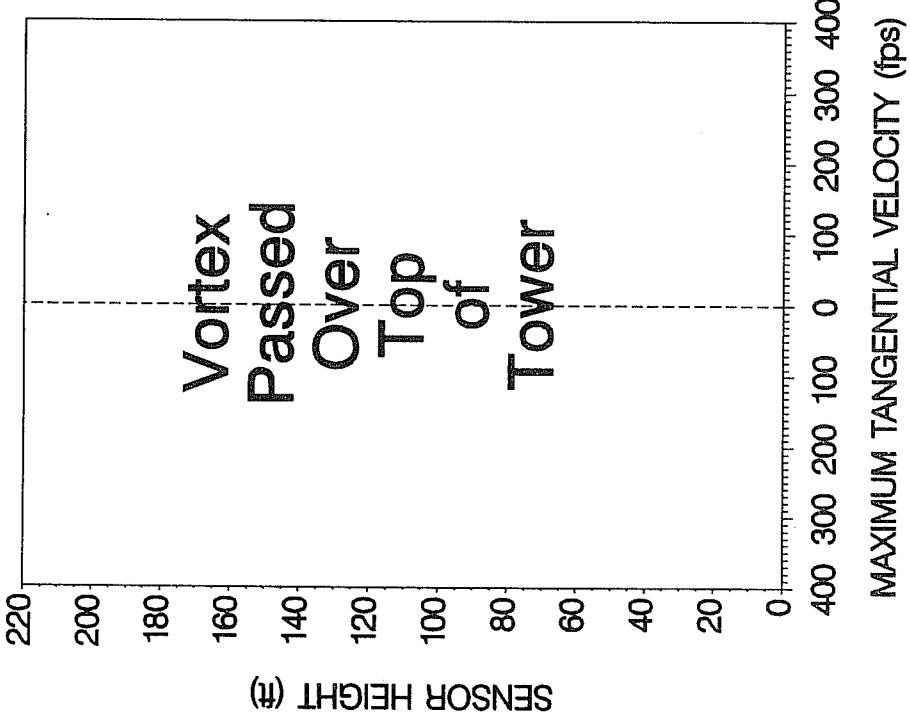


Figure G-23. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 172, Flyby 5, ambient wind speed = 16.9 kts,  $\delta_F = 15^\circ$ , IAS = 146 kts, GW = 133,000 lbs. Ages, radii, and velocities of the vortex cores are 19 and 22 s, 1.7 and 1.0 ft, and 63.5 and 71.5 fps, respectively.

FAA B727-100 -- FLYBY 6 (DOY 172)  
DOWNWIND VORTEX VELOCITY PROFILE



FAA B727-100 -- FLYBY 6 (DOY 172)  
UPWIND VORTEX VELOCITY PROFILE

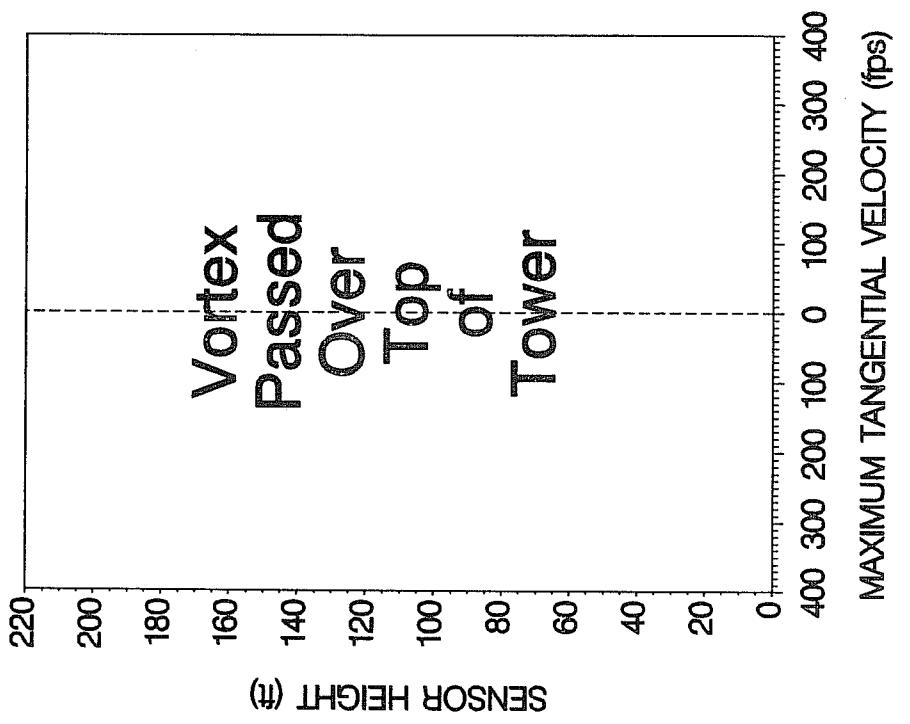


Figure G-24. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 172, Flyby 6, ambient wind speed = 18.1 kts,  $\delta_F = 15^\circ$ , IAS = 147 kts, GW = 132,000 lbs. Ages, radii, and velocities of the vortex cores are (P) and (P) s, (P) and (P) ft, and (P) and (P) fps, respectively.

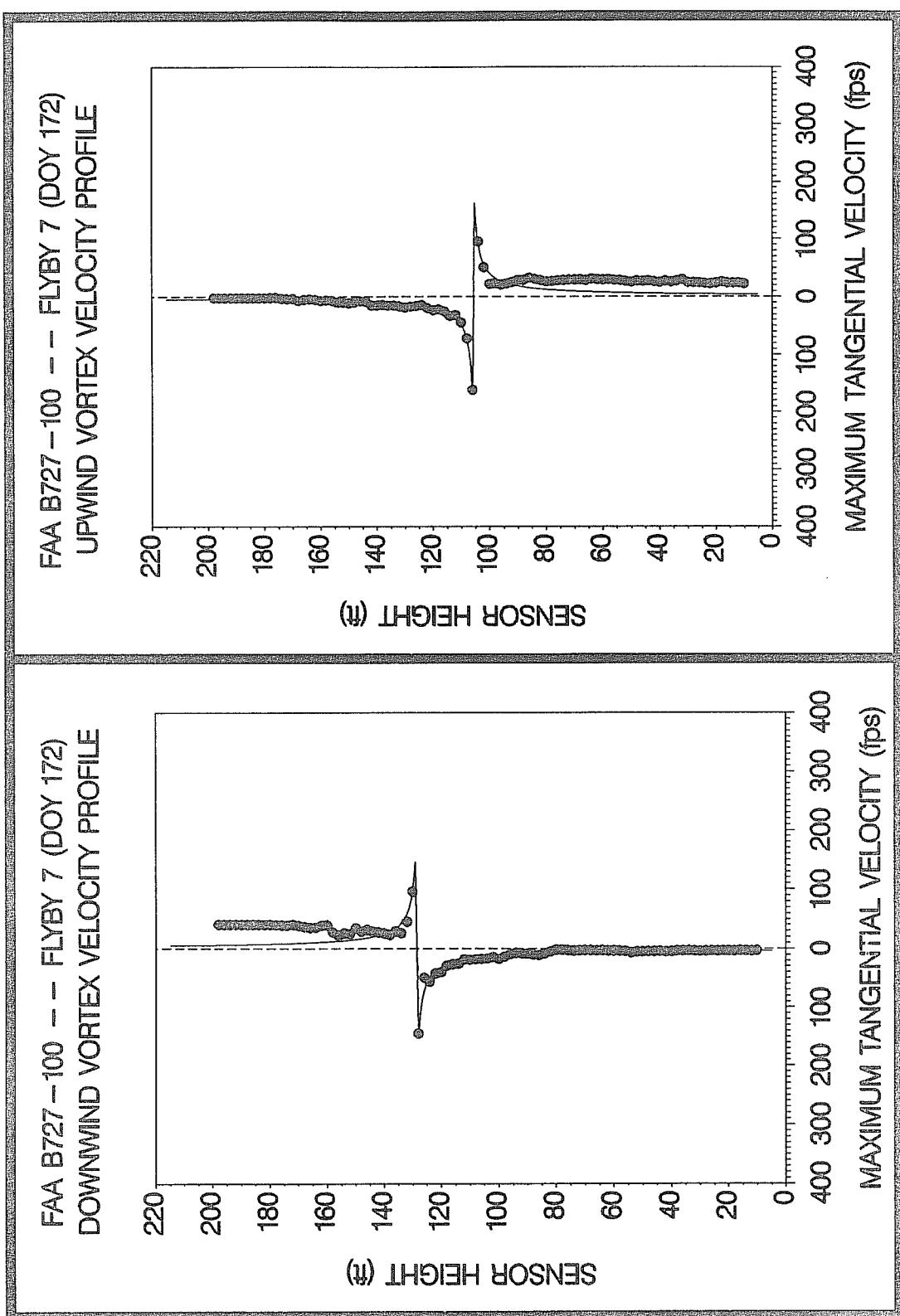
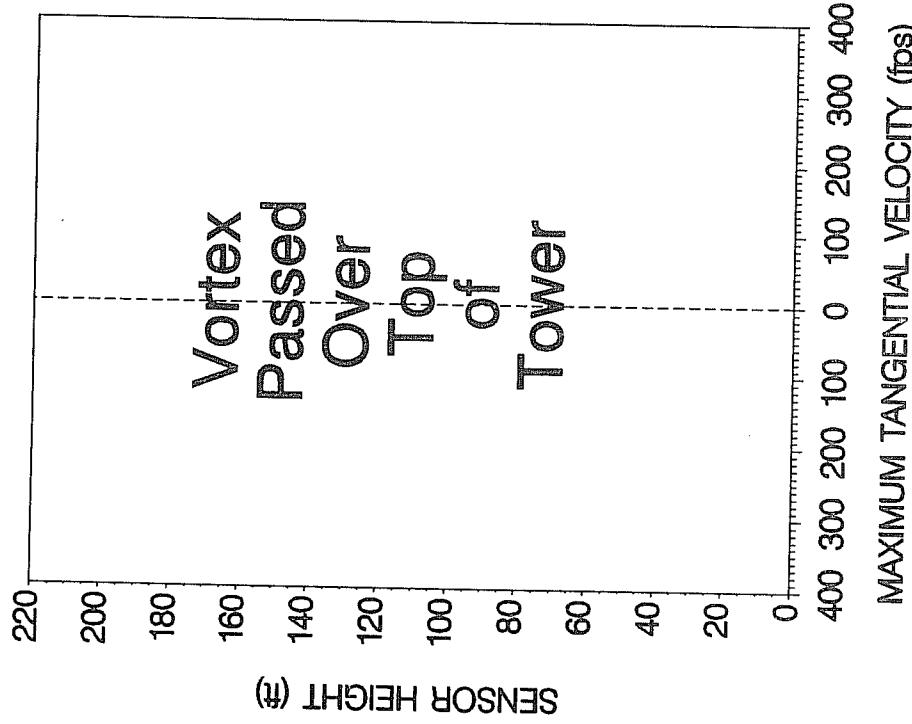


Figure G-25. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 172, Flyby 7, ambient wind speed = 17.8 kts,  $\delta_F = 30^\circ$ ,  $\delta_S = 130$  kts,  $GW = 130,500$  lbs. Ages, radii, and velocities of the vortex cores are 19 and 22 s, 0.5 and 0.4 ft, and 145.1 and 161.7 fps, respectively.

FAA B727 - 100 -- FLYBY 8 (DOY 172)  
DOWNWIND VORTEX VELOCITY PROFILE



FAA B727 - 100 -- FLYBY 8 (DOY 172)  
UPWIND VORTEX VELOCITY PROFILE

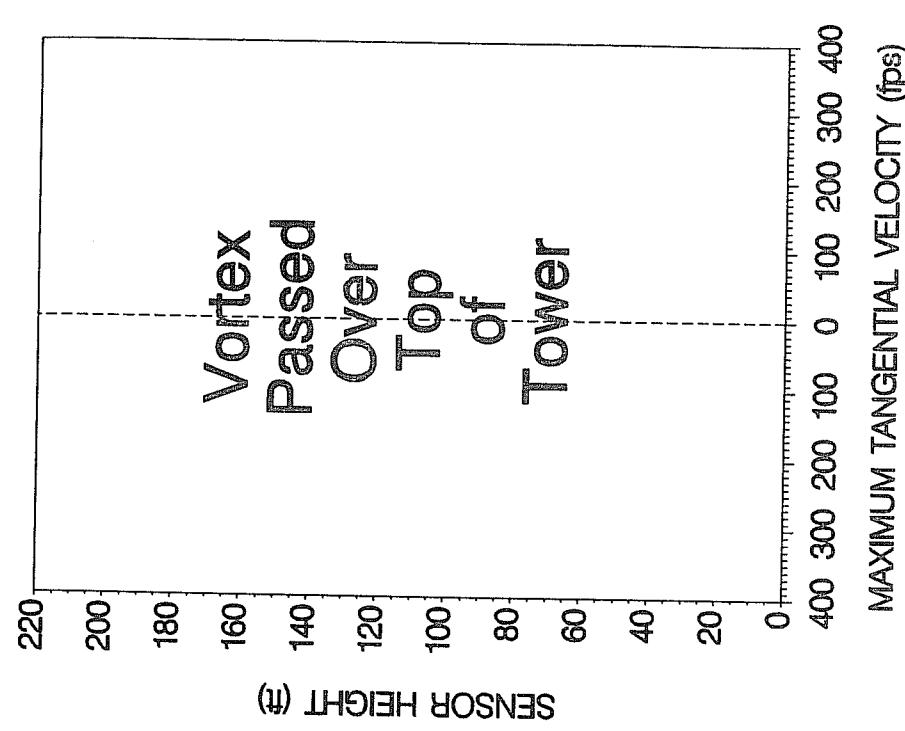


Figure G-26. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 172, Flyby 8, ambient wind speed = 15.6 kts,  $\delta_F = 30^\circ$ , IAS = 141 kts, GW = 129,000 lbs. Ages, radii, and velocities of the vortex cores are (P) and (P) s, (P) and (P) ft, and (P) and (P) fps, respectively.

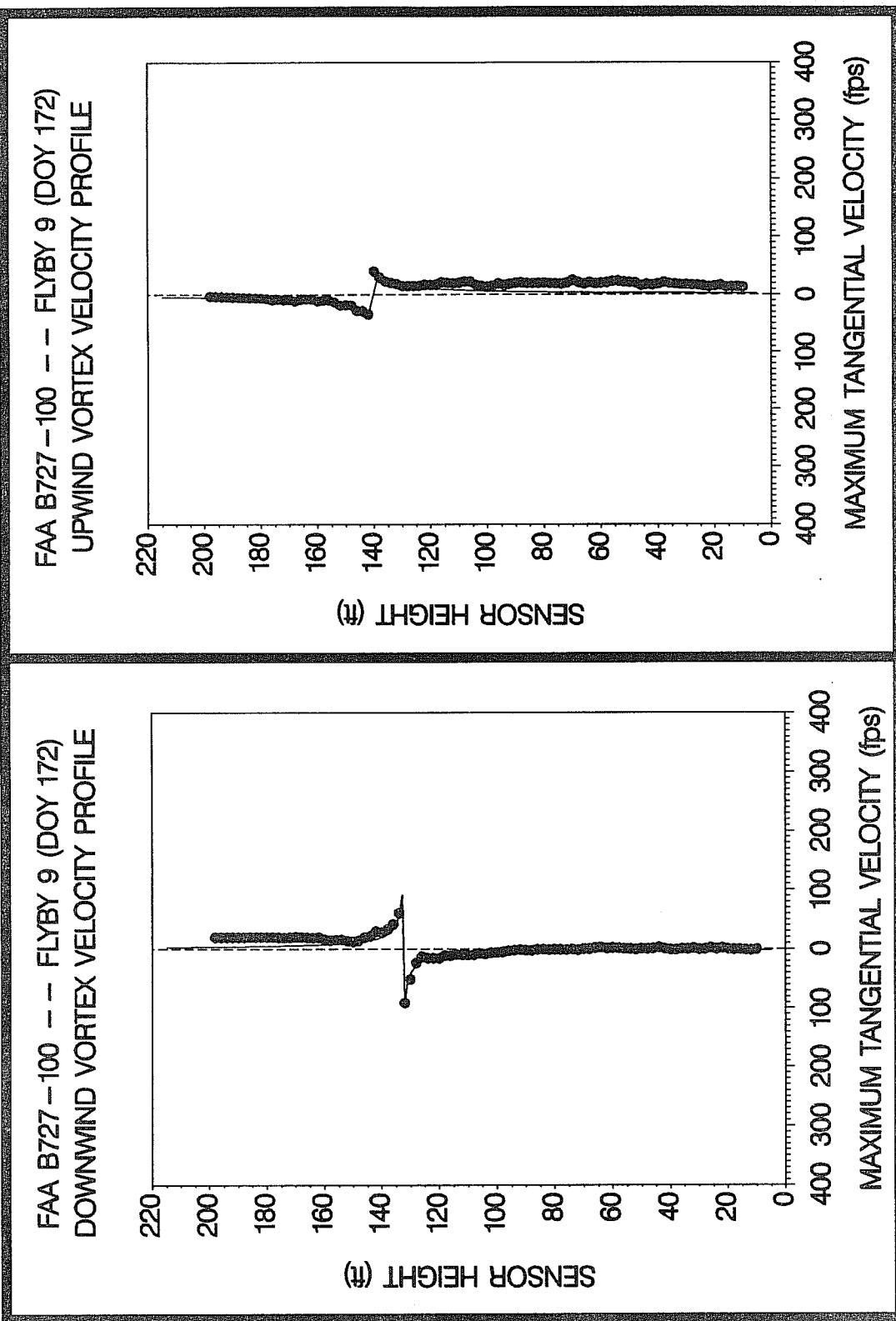


Figure G-27. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 172, Flyby 9, ambient wind speed = 9.2 kts,  $\delta_F = 30^\circ$ , IAS = 132 kts, GW = 127,000 lbs. Ages, radii, and velocities of the vortex cores are 34 and 40 s, 0.4 and 1.8 ft, and 91.2 and 34.5 fps, respectively.

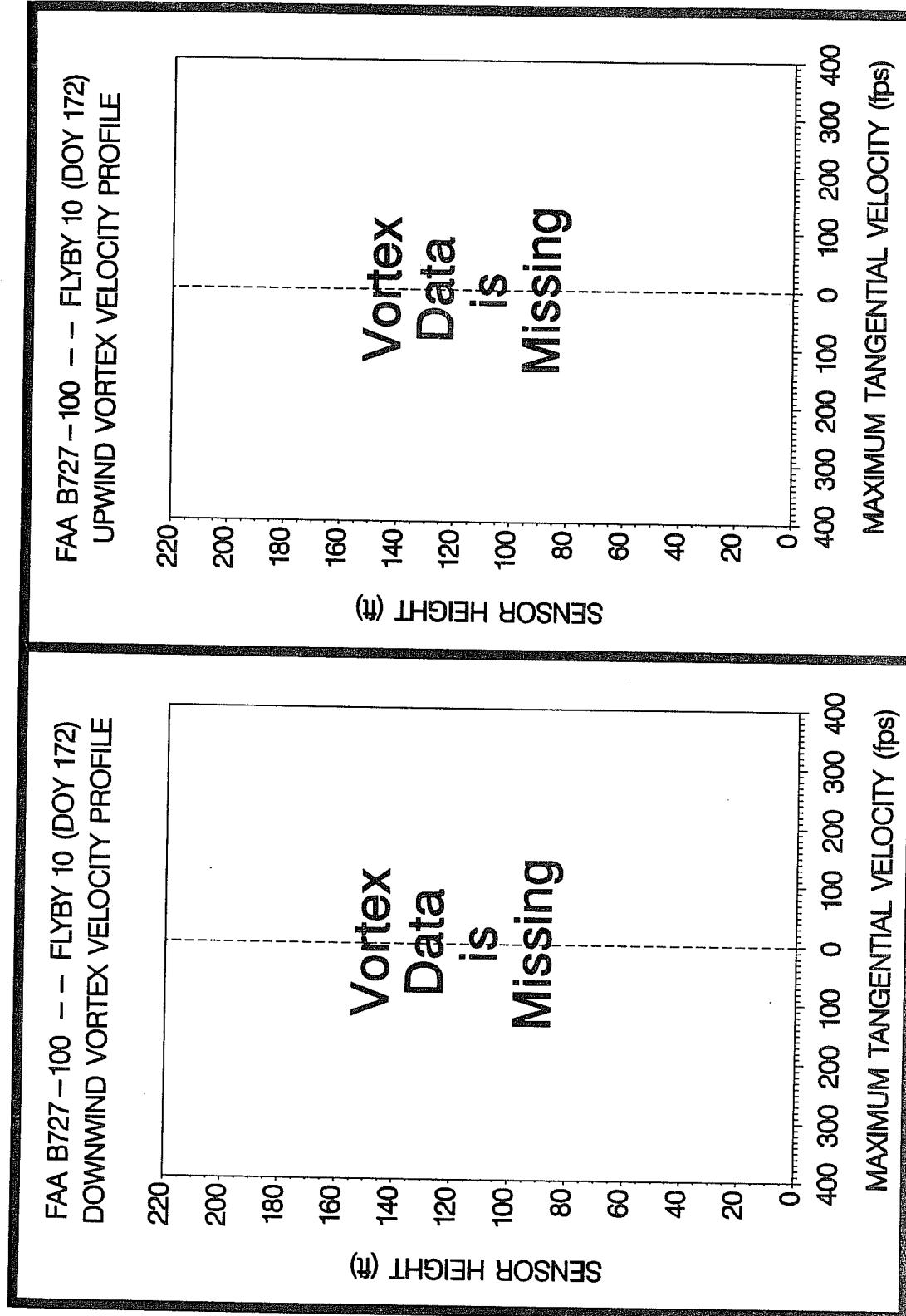


Figure G-28. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 172, Flyby 10, ambient wind speed = 9.4 kts,  $\delta_F = 30^\circ$ , IAS = 126 kts, GW = 125,500 lbs. Ages, radii, and velocities of the vortex cores are (M) and (M) s, (M) and (M) ft, and (M) and (M) fps, respectively.

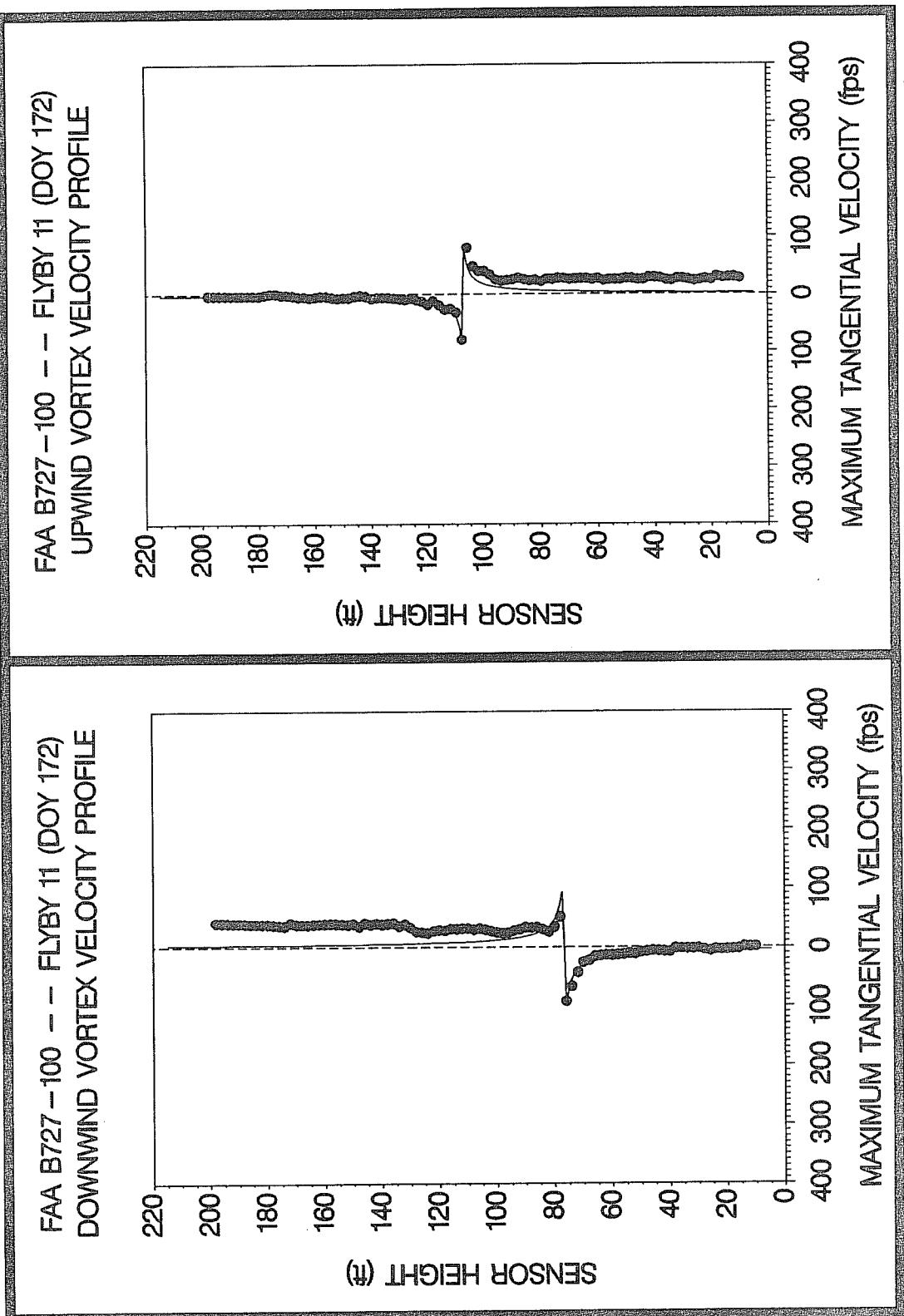
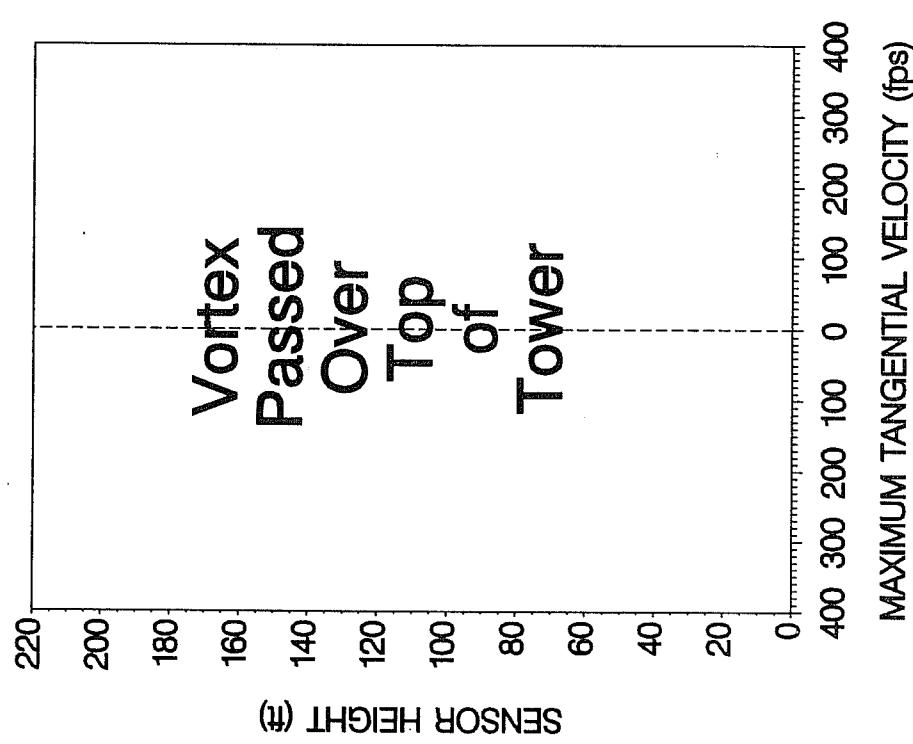


Figure G-29. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 172, Flyby 11, ambient wind speed = 13.3 kts,  $\delta_F = 30^\circ$ , IAS = 128 kts, GW = 124,000 lbs. Ages, radii, and velocities of the vortex cores are 27 and 29 s, 0.7 and 0.4 ft, and 91.6 and 79.6 fps, respectively.

FAA B727-100 -- FLYBY 12 (DOY 172)  
DOWNWIND VORTEX VELOCITY PROFILE



FAA B727-100 -- FLYBY 12 (DOY 172)  
UPWIND VORTEX VELOCITY PROFILE

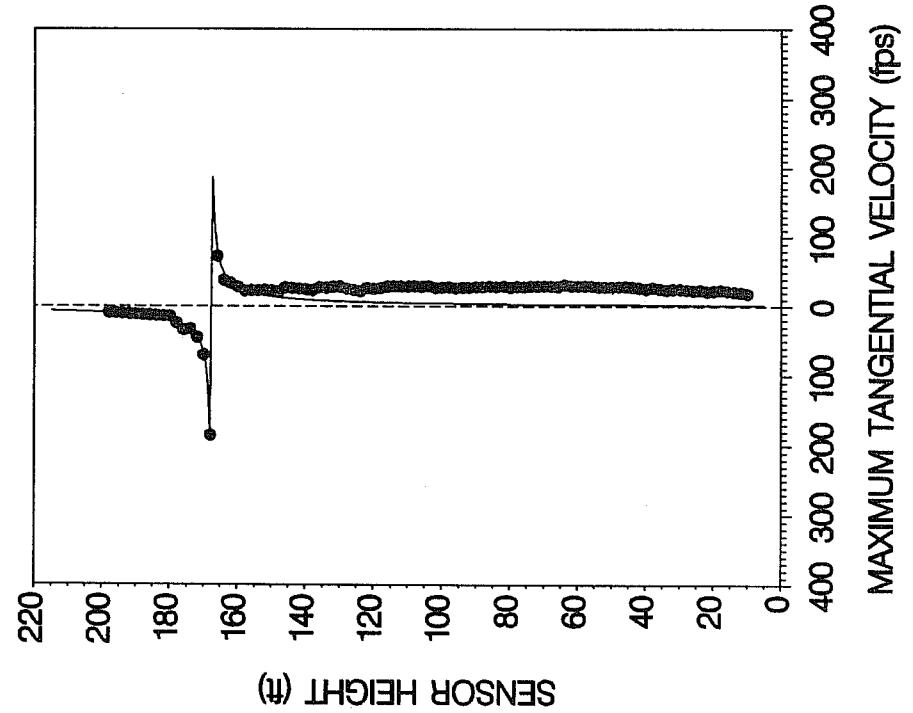


Figure G-30. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 172, Flyby 12, ambient wind speed = 14.1 kts,  $\delta_F = 30^\circ$ ,  $\delta_S = 132$  kts,  $GW = 123,000$  lbs. Ages, radii, and velocities of the vortex cores are (P) and 25 s, (P) and 0.3 ft, and (P) and 184.9 fps, respectively.

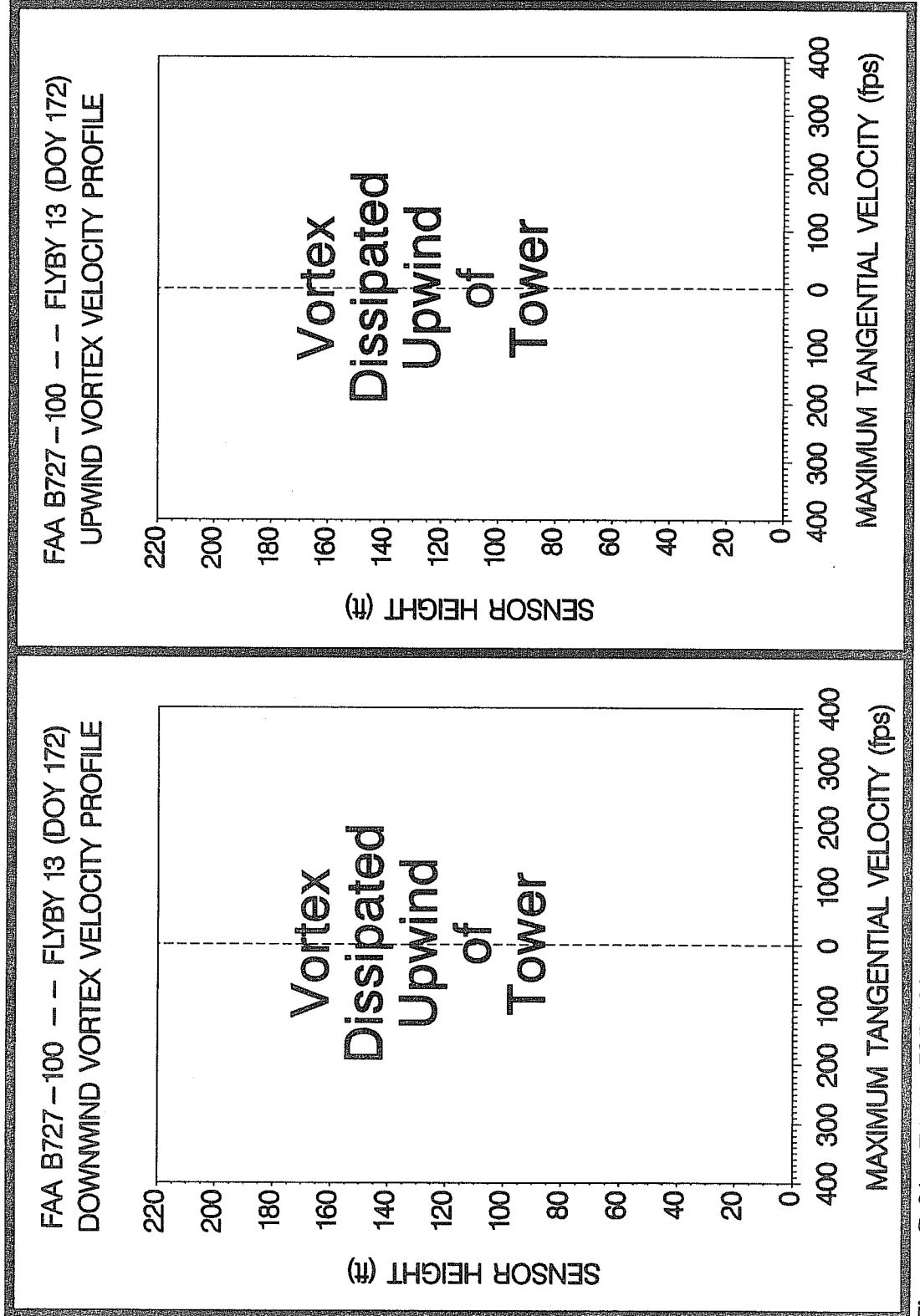
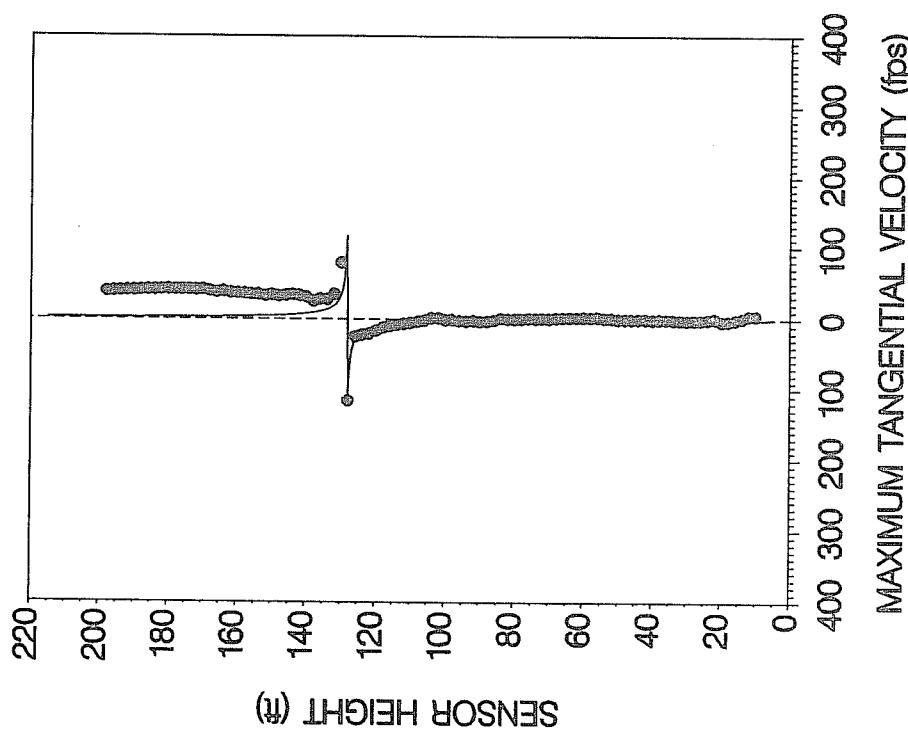


Figure G-31. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 172, Flyby 13, ambient wind speed = 14.3 kts,  $\delta_F = 0^\circ$ , IAS = 197 kts, GW = 122,000 lbs. Ages, radii, and velocities of the vortex cores are (D) and (D) ft, and (D) and (D) fps, respectively.

FAA B727-100 — FLYBY 14 (DOY 172)  
DOWNWIND VORTEX VELOCITY PROFILE



FAA B727-100 — FLYBY 14 (DOY 172)  
UPWIND VORTEX VELOCITY PROFILE

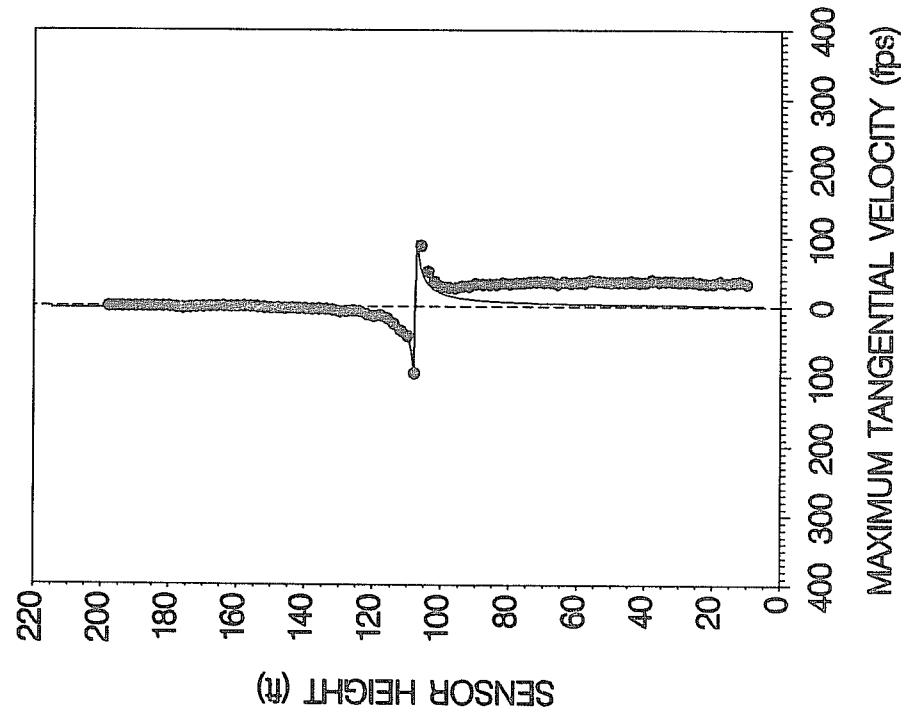


Figure G-32. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 172, Flyby 14, ambient wind speed = 16.2 kts,  $\delta_F = 0^\circ$ , IAS = 197 kts, GW = 121,000 lbs. Ages, radii, and velocities of the vortex cores are 22 and 24 s, 0.1 and 0.4 ft, and 115.8 and 95.8 fps, respectively.

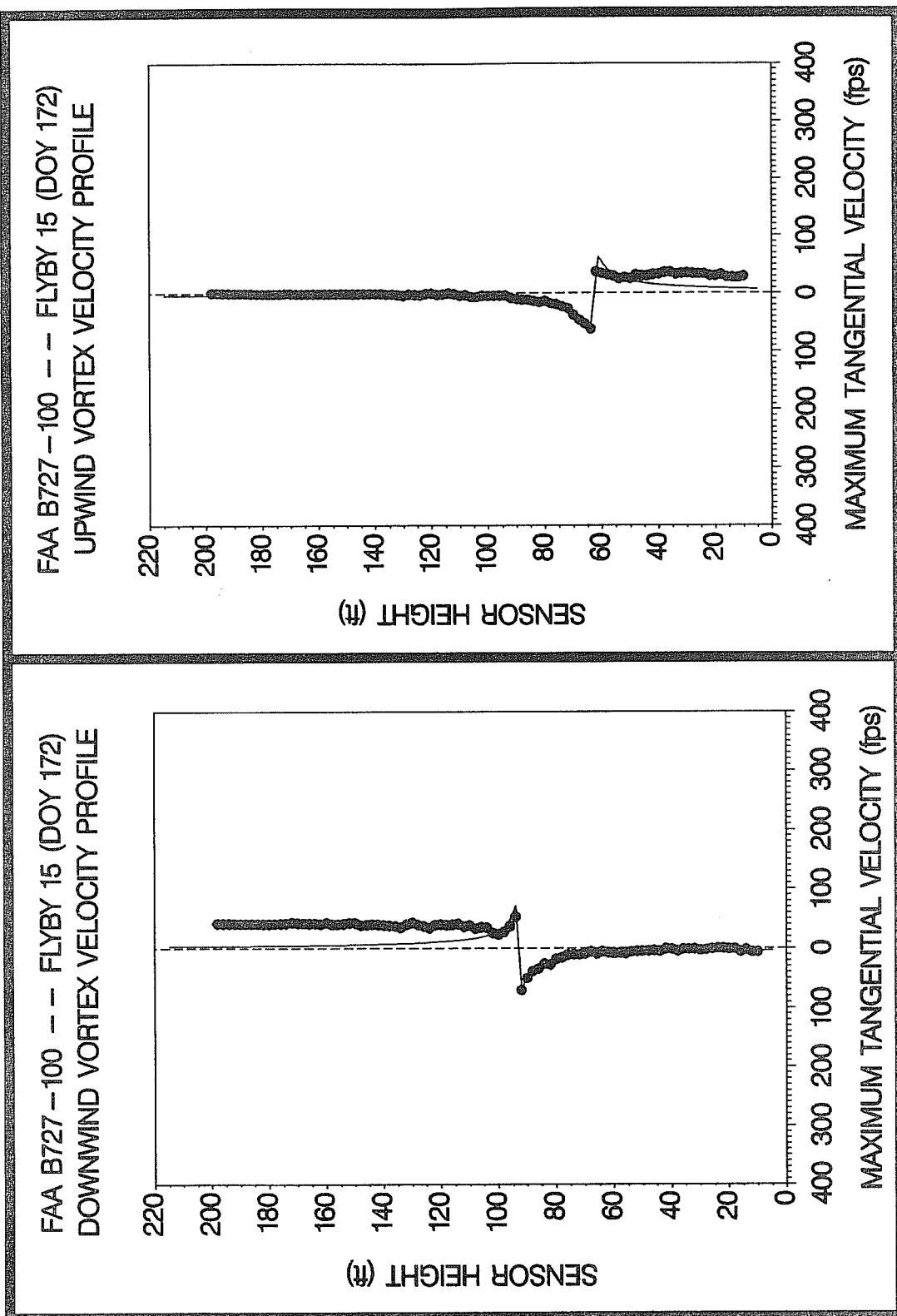


Figure G-33. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 172, Flyby 15,  $\delta_F = 14.0$  kts,  $\delta_F = 5^\circ$ , IAS = 165 kts, GW = 120,000 lbs. Ages, radii, and velocities of the vortex cores are 22 and 25 s, 1.0 and 1.4 ft, and 70.5 and 61.7 fps, respectively.

intensity from Day 16  
Ages, radii, and velocities of the vortex cores are --

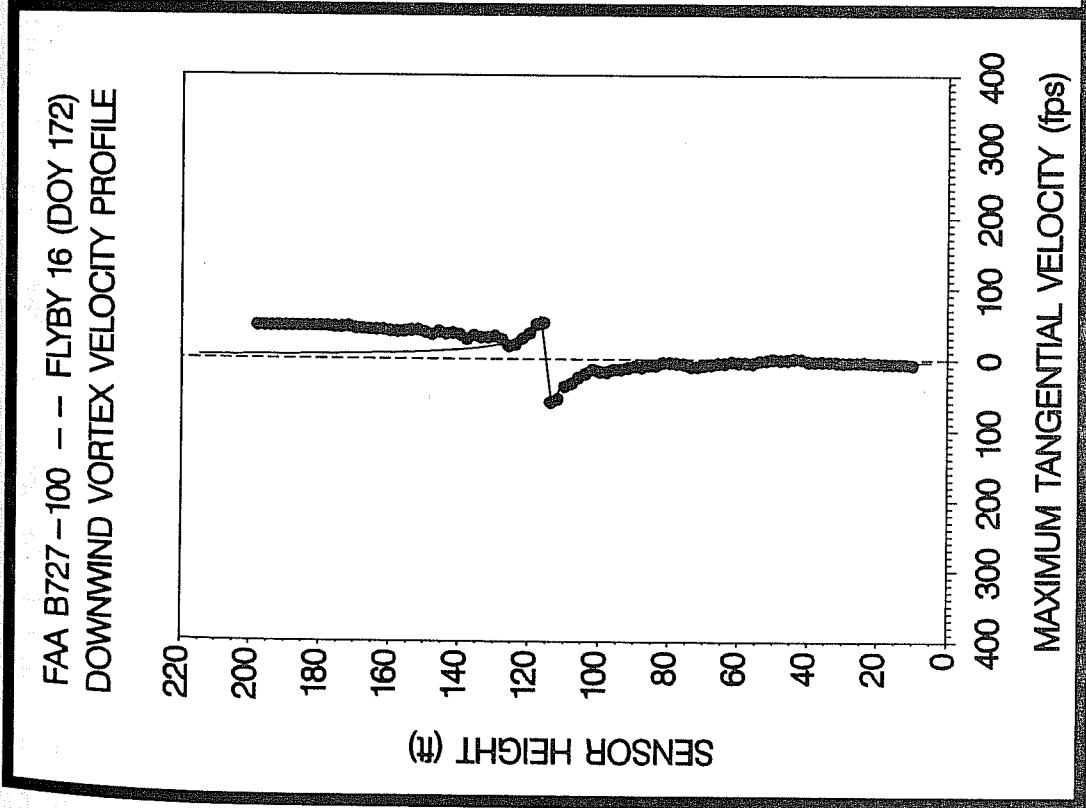
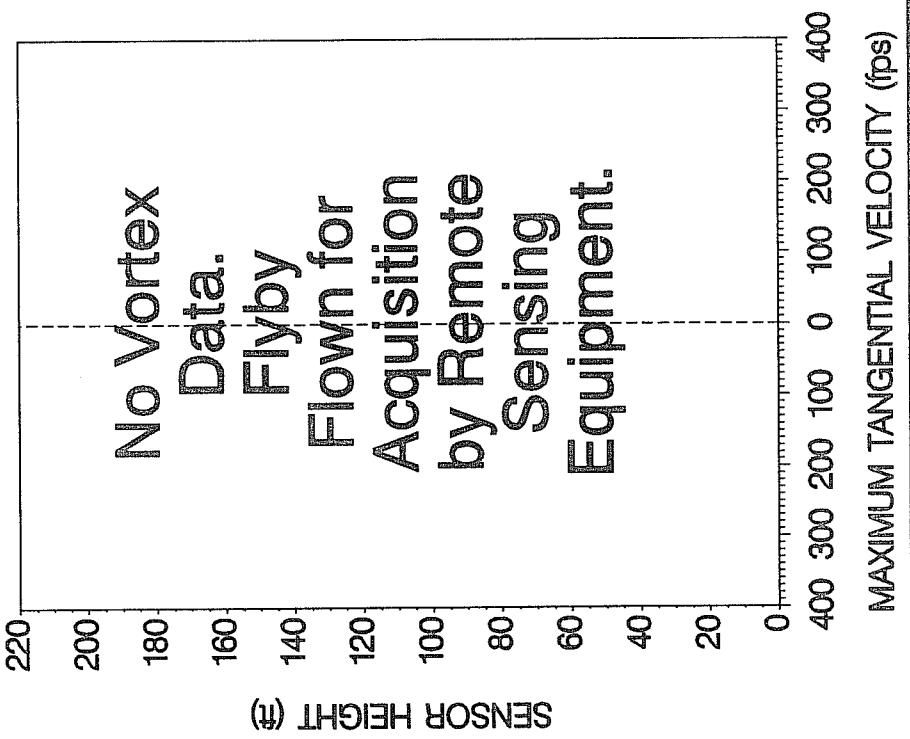


Figure G-34. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 172, Flyby 16, ambient wind speed = 17.7 kts,  $\delta_F = 5^\circ$ , IAS = 166 kts, GW = 119,000 lbs. Ages, radii, and velocities of the vortex cores are 22 and 24 s, 1.4 and 0.5 ft, and 60.3 and 49.6 fps, respectively.

FAA B727 – 100 – – FLYBY 1 (DOY 264)  
DOWNWIND VORTEX VELOCITY PROFILE



FAA B727 – 100 – – FLYBY 1 (DOY 264)  
UPWIND VORTEX VELOCITY PROFILE

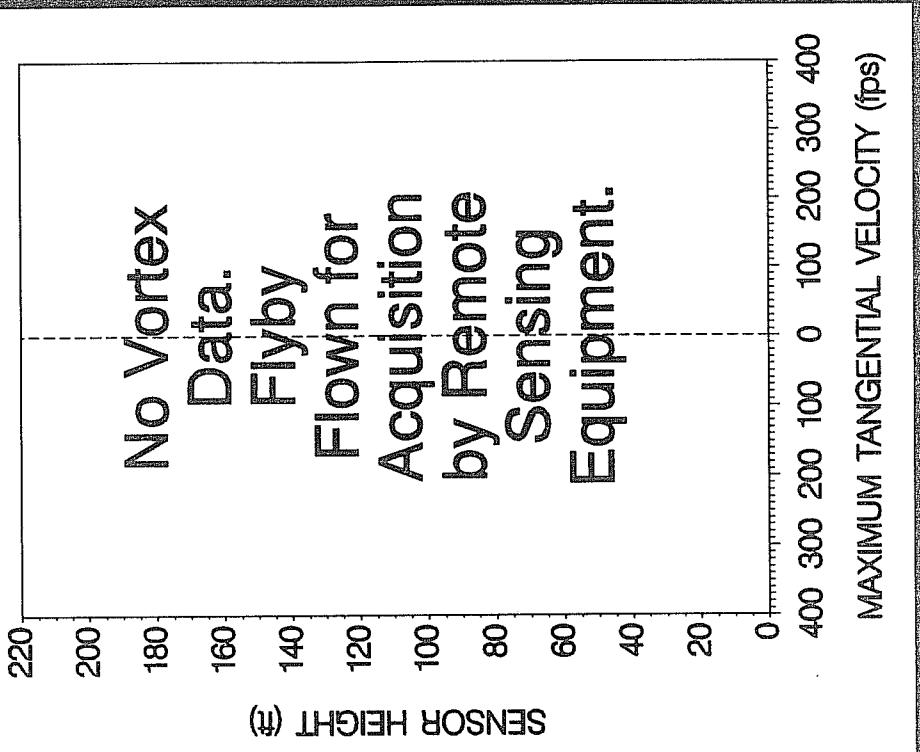
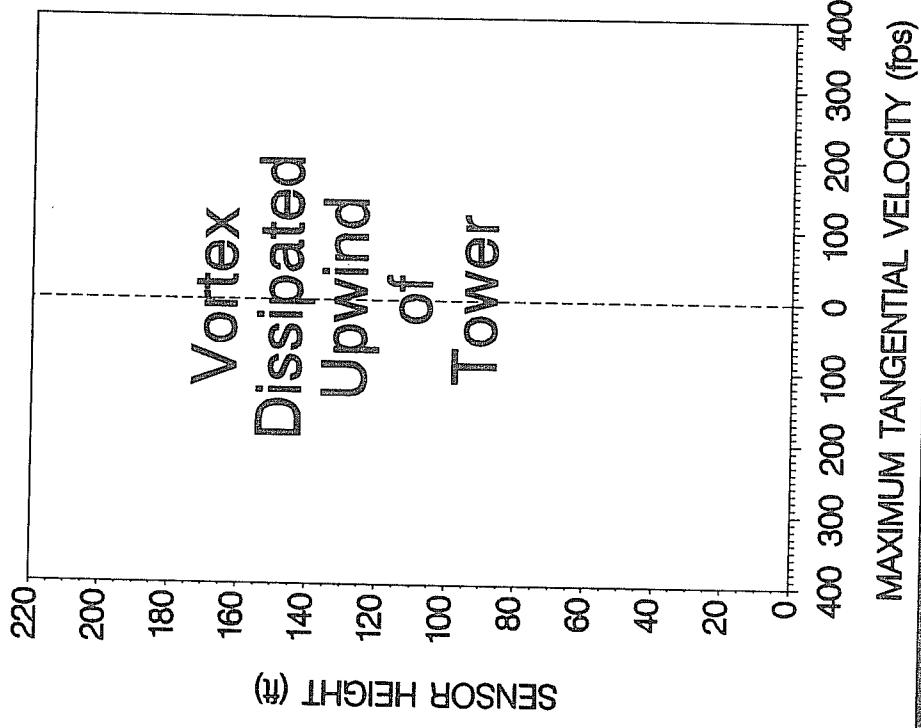


Figure G-35. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 264, Flyby 1, ambient wind speed = 5.4 kts,  $\delta_F = 30^\circ$ , IAS = 150 kts, GW = 135,000 lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) s, (O) and (O) ft, and (O) and (O) fps, respectively.

FAA B727-100 -- FLYBY 2 (DOY 264)  
DOWNWIND VORTEX VELOCITY PROFILE



FAA B727-100 -- FLYBY 2 (DOY 264)  
UPWIND VORTEX VELOCITY PROFILE

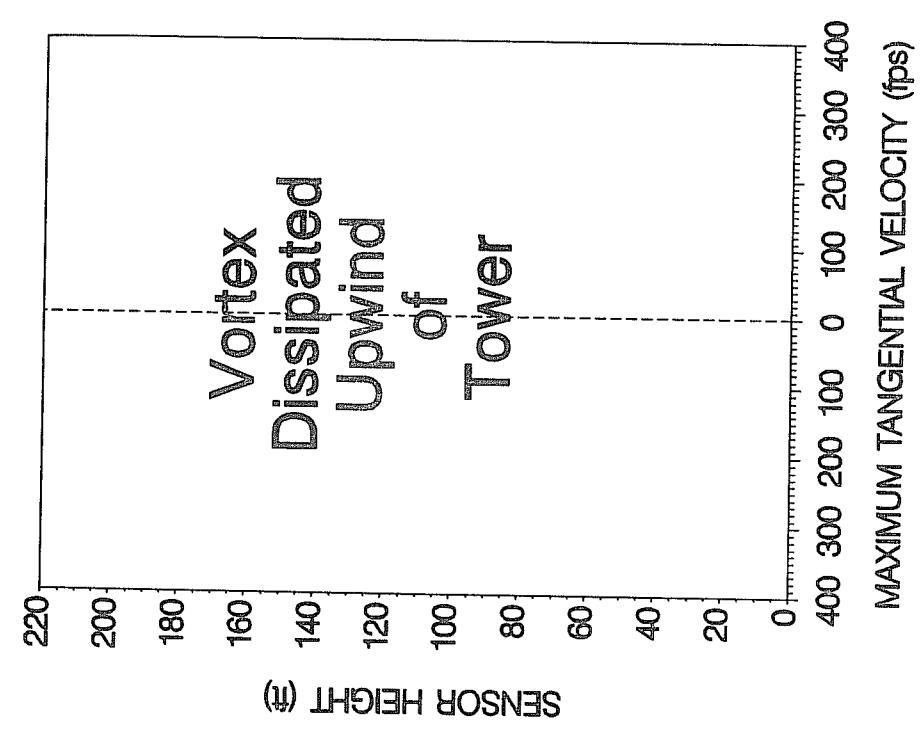


Figure G-36. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 264, Flyby 2, ambient wind speed = 6.7 kts,  $\delta_F = 30^\circ$ ,  $IAS = 140$  kts,  $GW = 134,000$  lbs. Ages, radii, and velocities of the vortex cores are (D) and (D) s, (D) and (D) ft, and (D) and (D) fps, respectively.

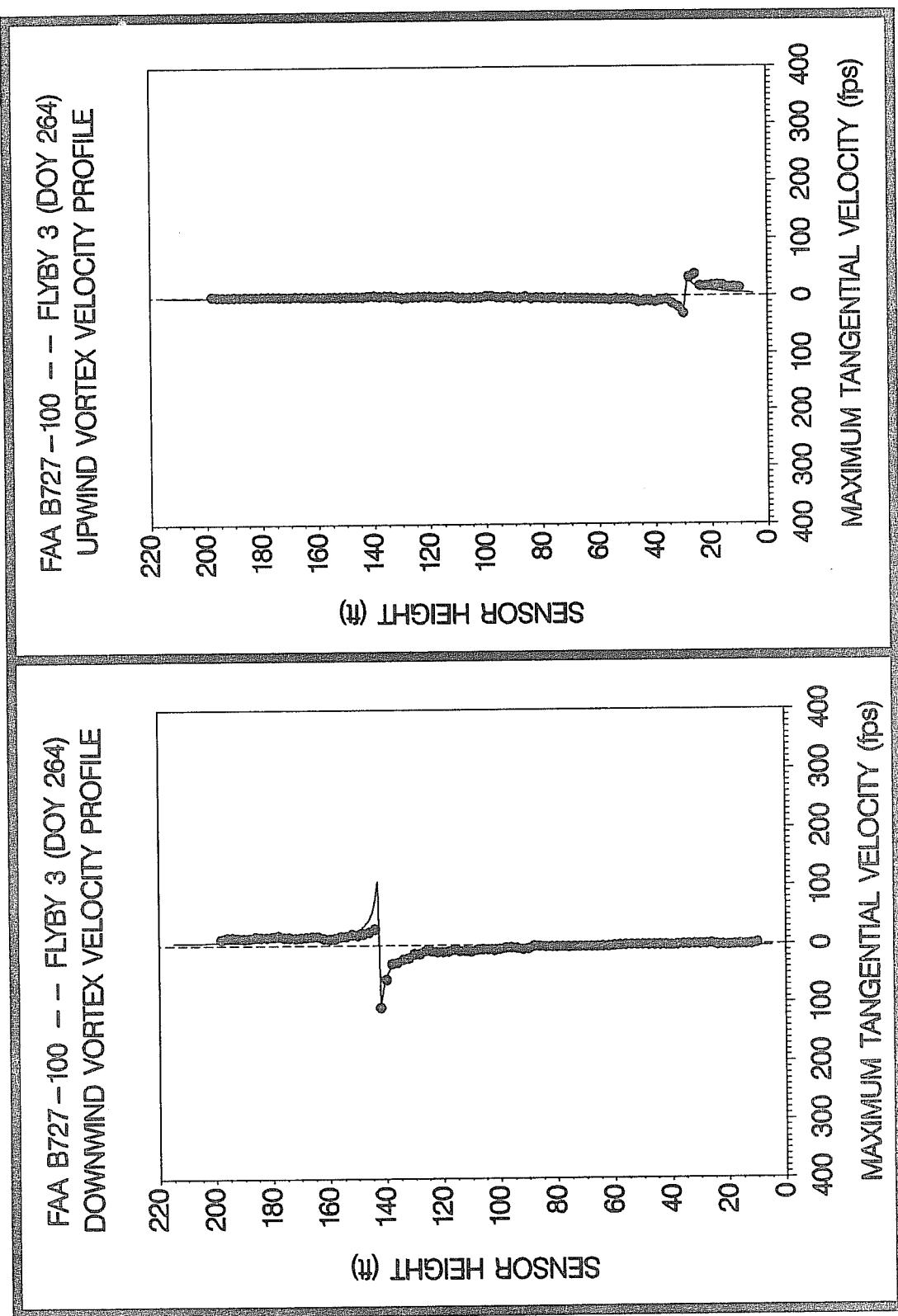


Figure G-37. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 264, Flyby 3, ambient wind speed = 6.4 kts,  $\delta_F = 30^\circ$ ,IAS = 144 kts, GW = 133,000 lbs. Ages, radii, and velocities of the vortex cores are 25 and 42 s, 0.5 and 0.8 ft, and 107.4 and 30.5 fpm, respectively.

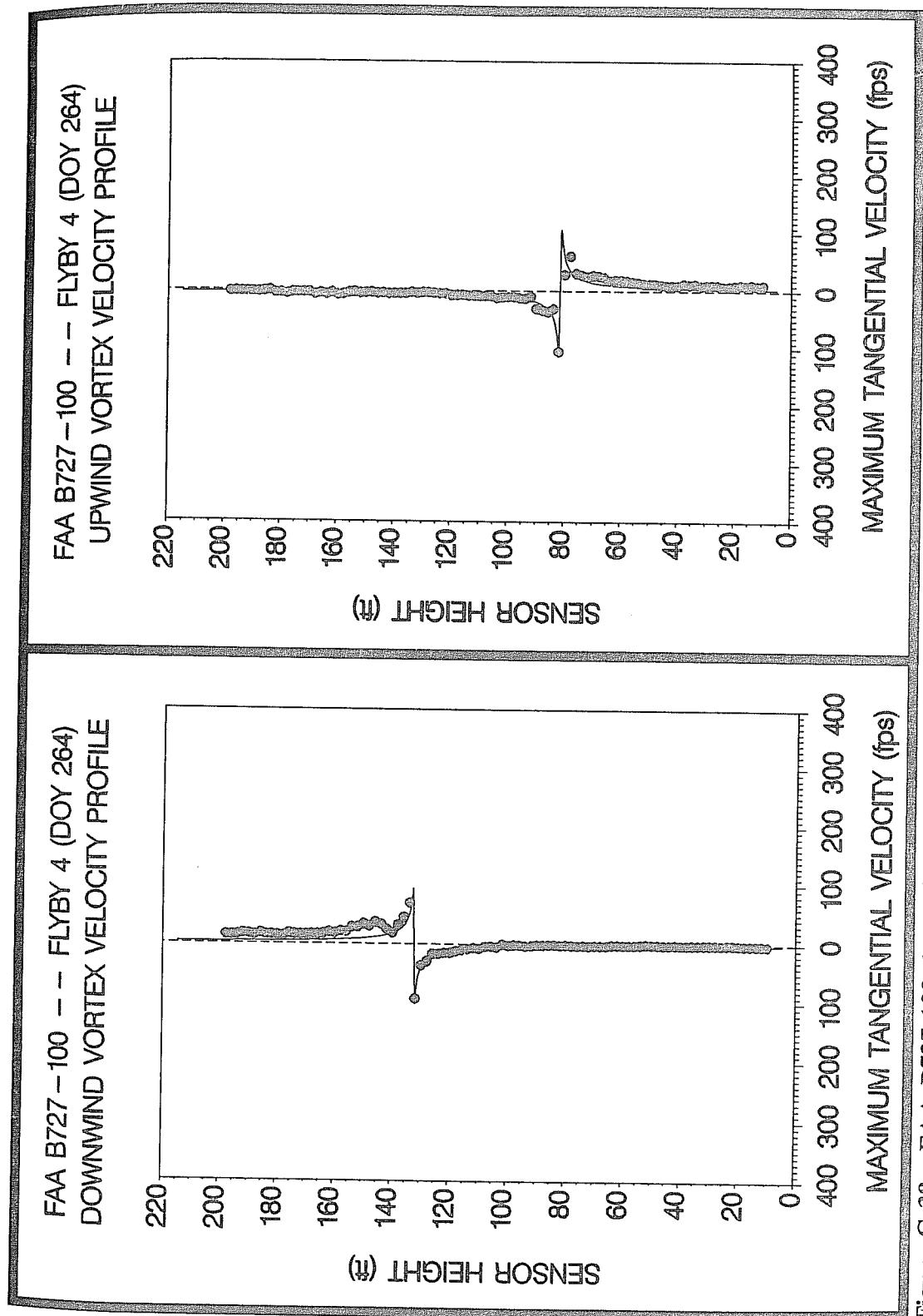
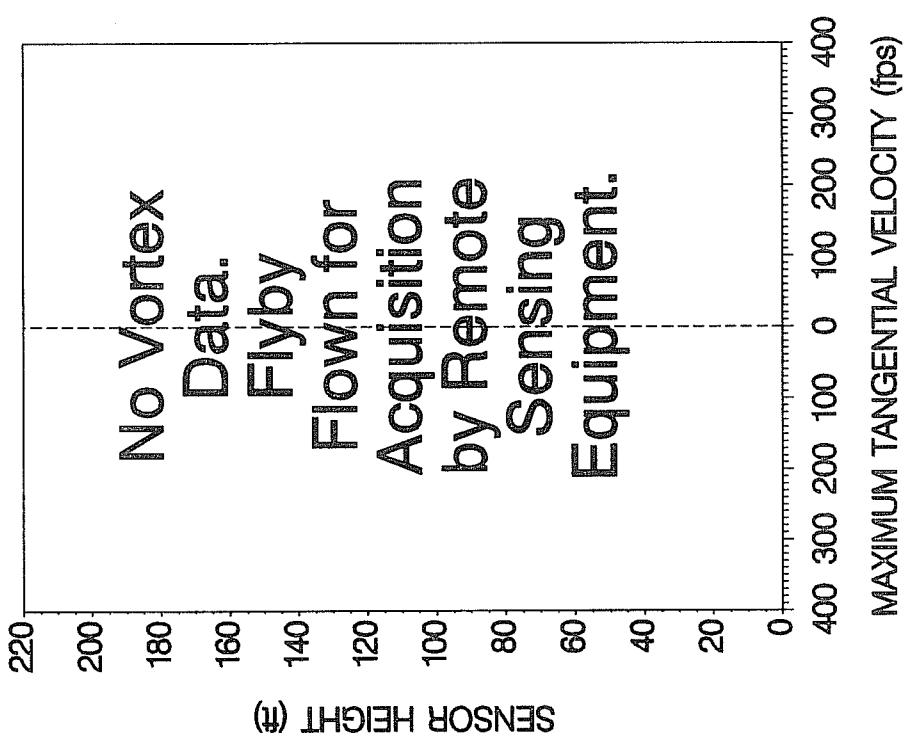


Figure G-38. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 264, Flyby 4, ambient wind speed = 5.9 kts,  $\delta_F = 30^\circ$ , IAS = 146 kts,  $GW = 132,000$  lbs. Ages, radii, and velocities of the vortex cores are 16 and 28 s, 0.3 and 0.4 ft, and 93.1 and 105.5 fps, respectively.

FAA B727 – 100 – – FLYBY 5 (DOY 264)  
DOWNWIND VORTEX VELOCITY PROFILE



FAA B727 – 100 – – FLYBY 5 (DOY 264)  
UPWIND VORTEX VELOCITY PROFILE

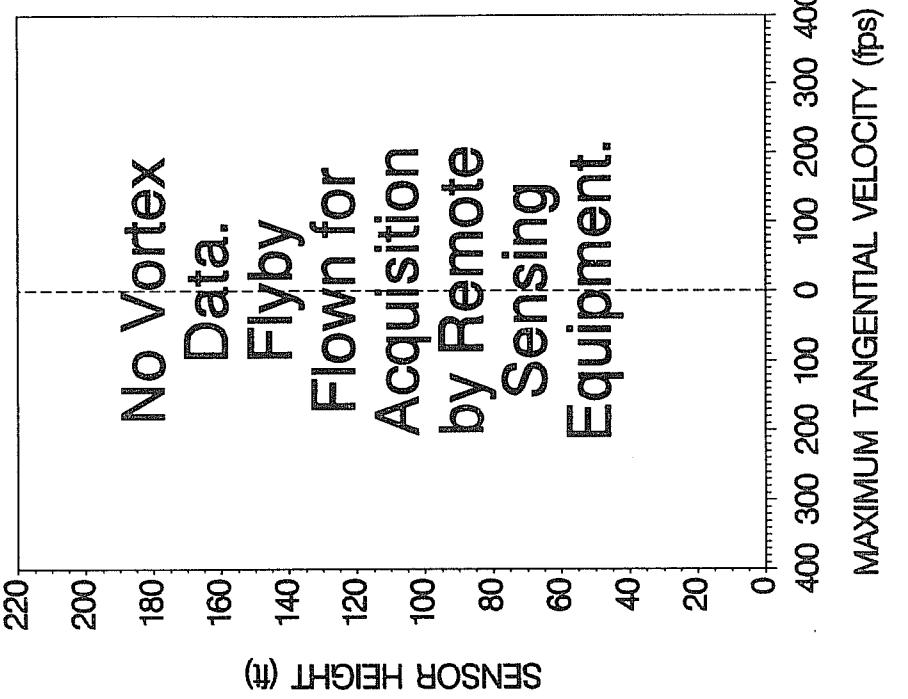
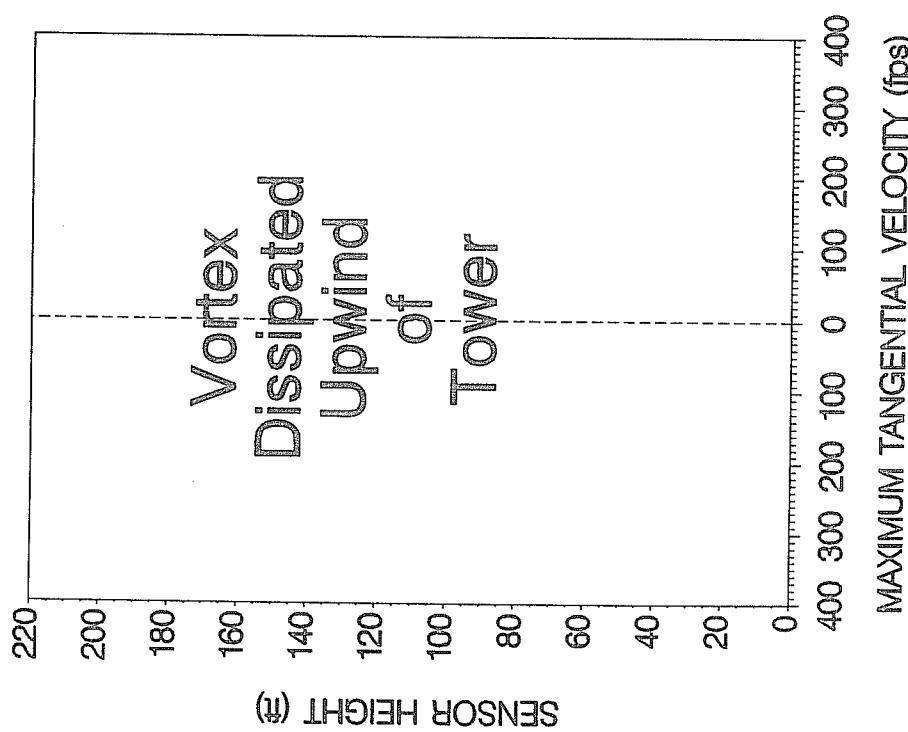


Figure G-39. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 264, Flyby 5, ambient wind speed = 7.5 kts,  $\delta_F = 0^\circ$ , IAS = 200 kts, GW = 131,000 lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) ft, and (O) and (O) ft/s, respectively.

FAA B727-100 -- FLYBY 6 (DOY 264)  
DOWNWIND VORTEX VELOCITY PROFILE



FAA B727-100 -- FLYBY 6 (DOY 264)  
UPWIND VORTEX VELOCITY PROFILE

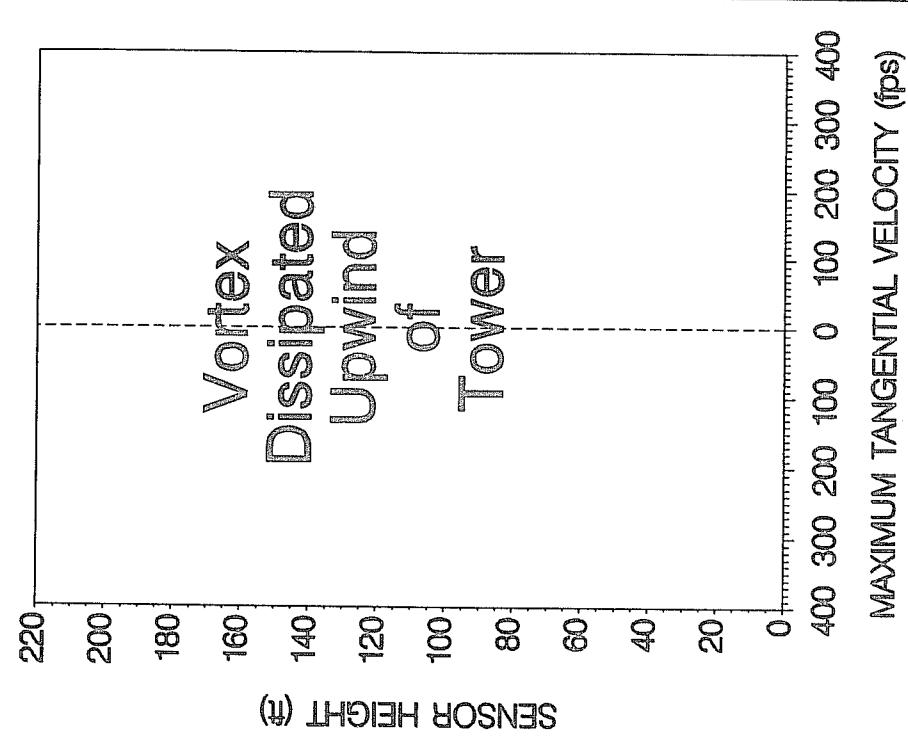
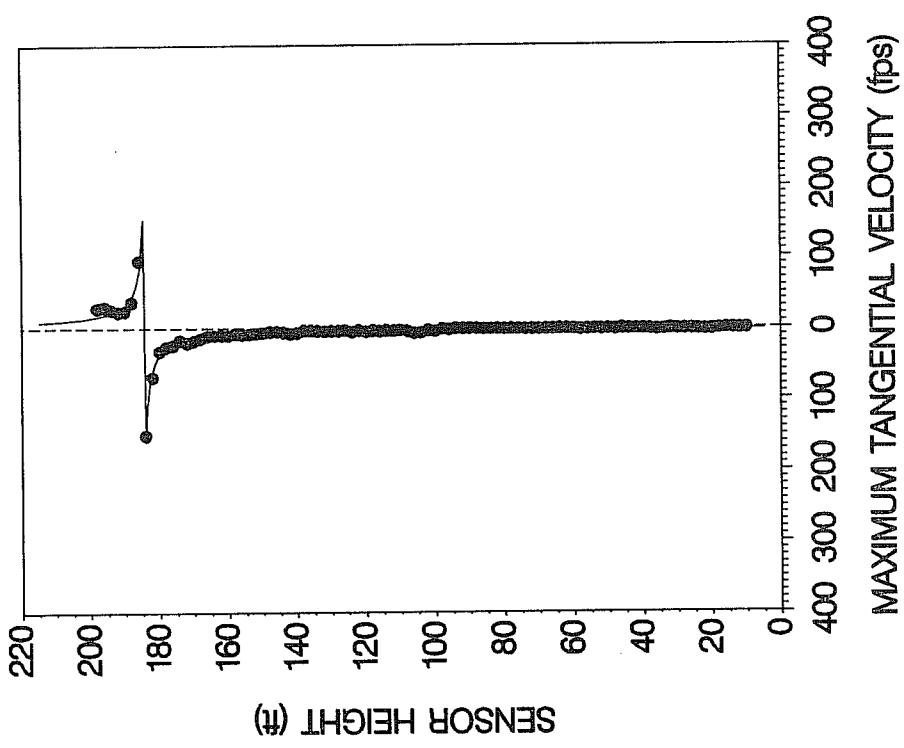


Figure G-40. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 264, Flyby 6, ambient wind speed = 7.0 kts,  $\delta_F = 0^\circ$ , IAS = 206 kts, GW = 130,000 lbs. Ages, radii, and velocities of the vortex cores are (D) and (D) s, (D) and (D) ft, and (D) and (D) fps, respectively.

FAA B727-100 -- FLYBY 7 (DOY 264)  
DOWNWIND VORTEX VELOCITY PROFILE



FAA B727-100 -- FLYBY 7 (DOY 264)  
UPWIND VORTEX VELOCITY PROFILE

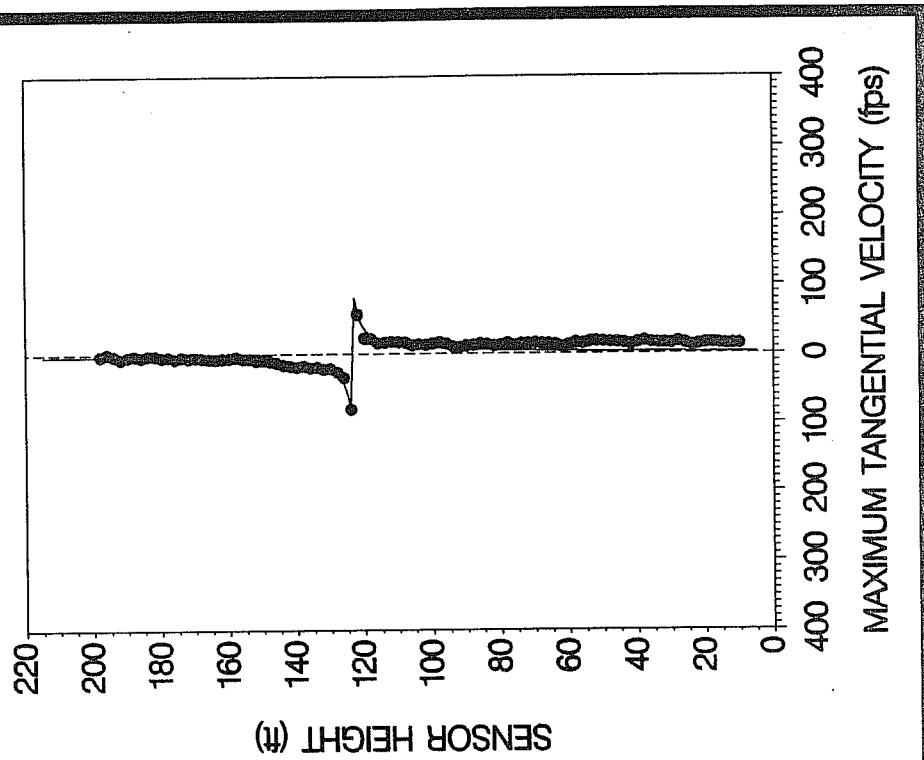


Figure G-41. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 264, Flyby 7, ambient wind speed = 5.6 kts,  $\delta_F = 30^\circ$ , IAS = 132 kts, GW = 129,000 lbs. Ages, radii, and velocities of the vortex cores are 26 and 30 s, 0.3 and 0.6 ft, and 151.0 and 80.7 fps, respectively.

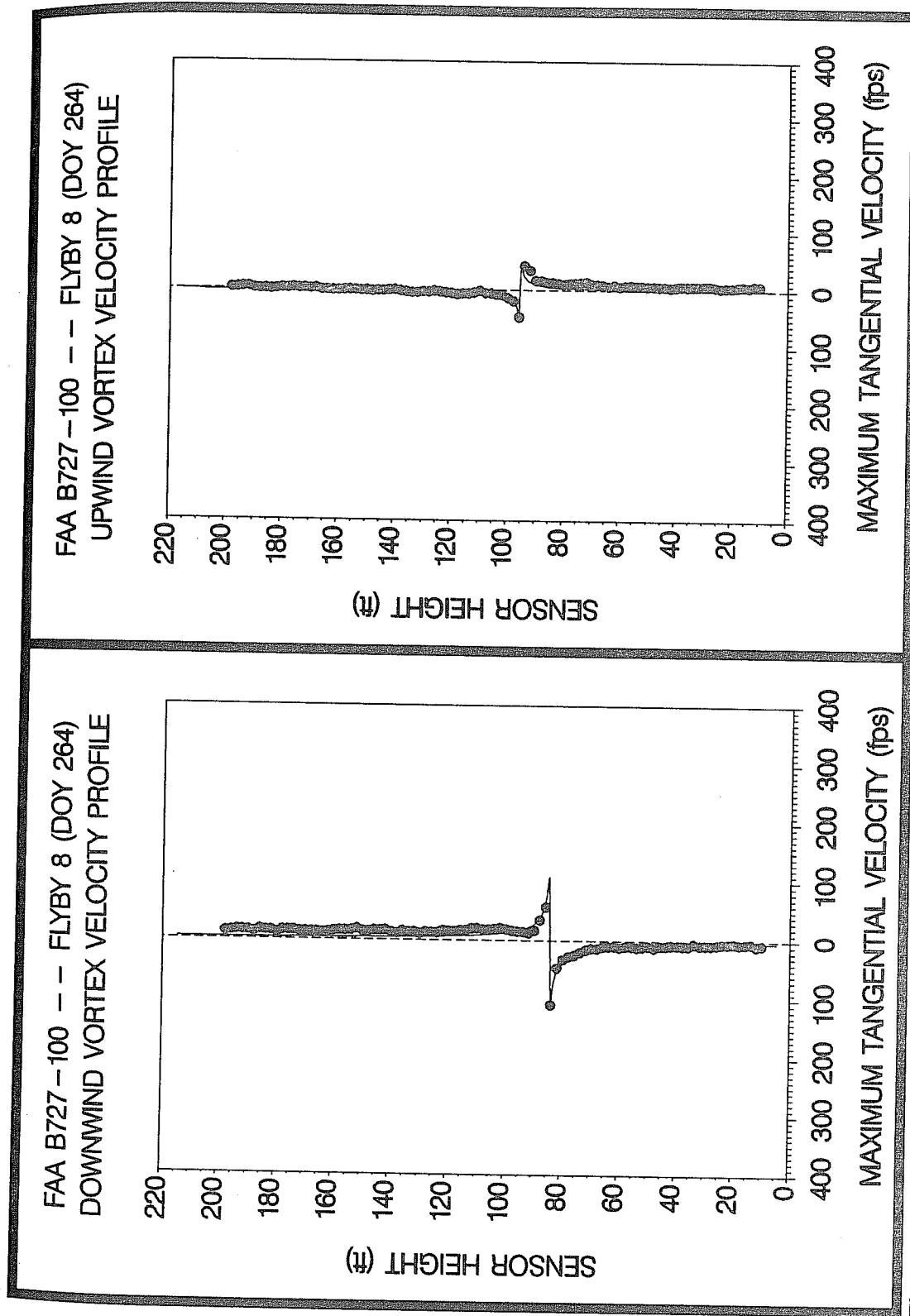
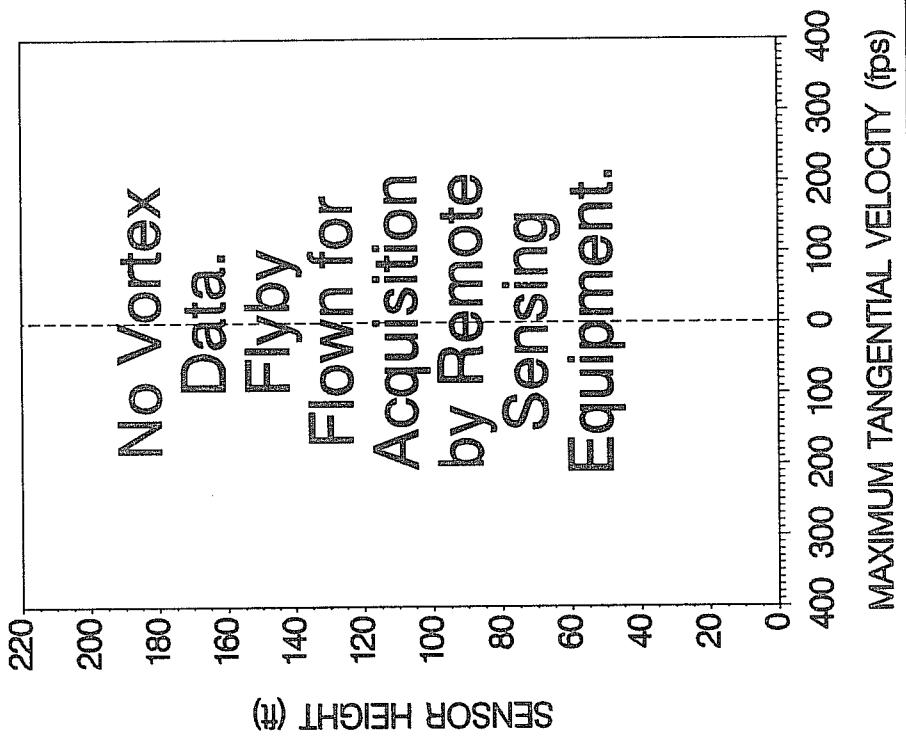


Figure G-42. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 264, Flyby 8, ambient wind speed = 6.0 kts,  $\delta_F = 30^\circ$ , IAS = 132 kts, GW = 128,000 lbs. Ages, radii, and velocities of the vortex cores are 39 and 62 s, 0.4 and 0.3 ft, and 108.8 and 46.3 fps, respectively.

FAA B727 – 100 – – FLYBY 9 (DOY 264)  
DOWNWIND VORTEX VELOCITY PROFILE



FAA B727 – 100 – – FLYBY 9 (DOY 264)  
UPWIND VORTEX VELOCITY PROFILE

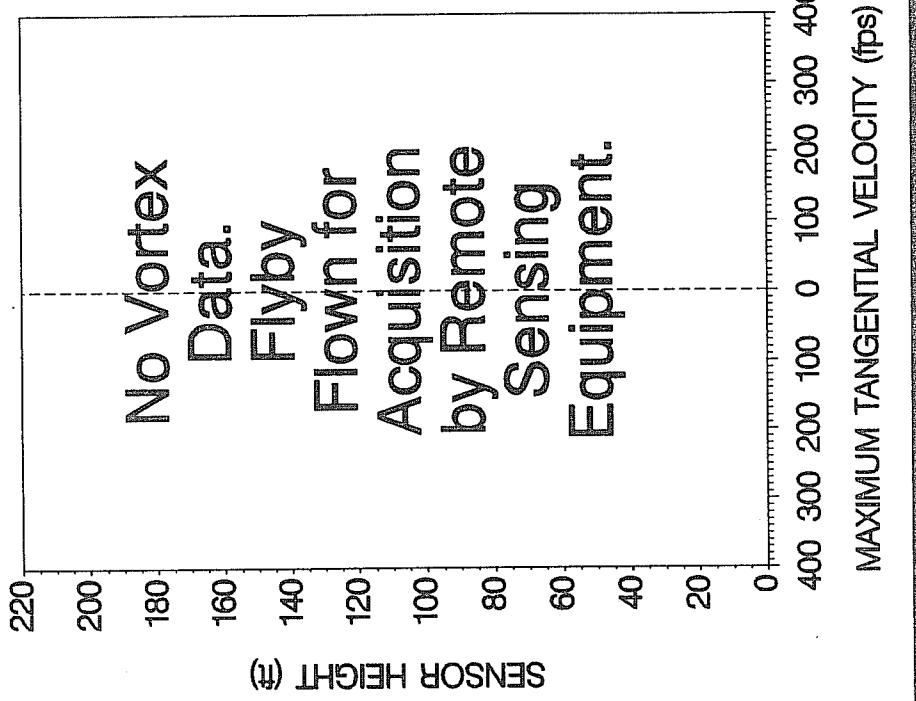
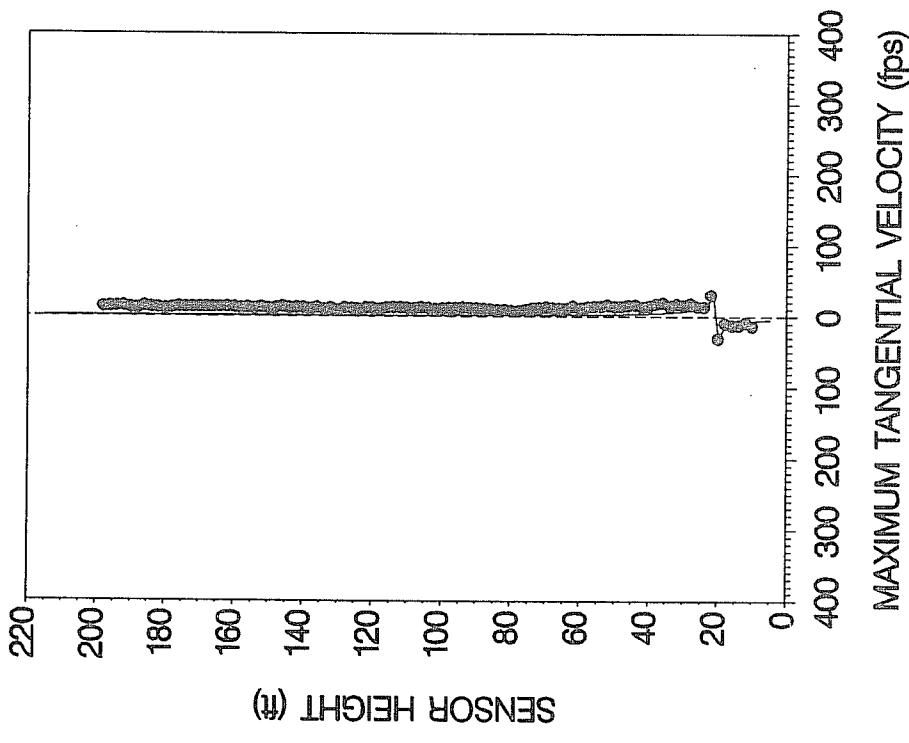


Figure G-43. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 264, Flyby 9, ambient wind speed = 6.3 kts,  $\delta_F = 30^\circ$ , IAS = 140 kts, GW = 126,000 lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) s, (O) and (O) ft, and (O) and (O) fps, respectively.

FAA B727-100 -- FLYBY 10 (DOY 264)  
DOWNWIND VORTEX VELOCITY PROFILE



FAA B727-100 -- FLYBY 10 (DOY 264)  
UPWIND VORTEX VELOCITY PROFILE

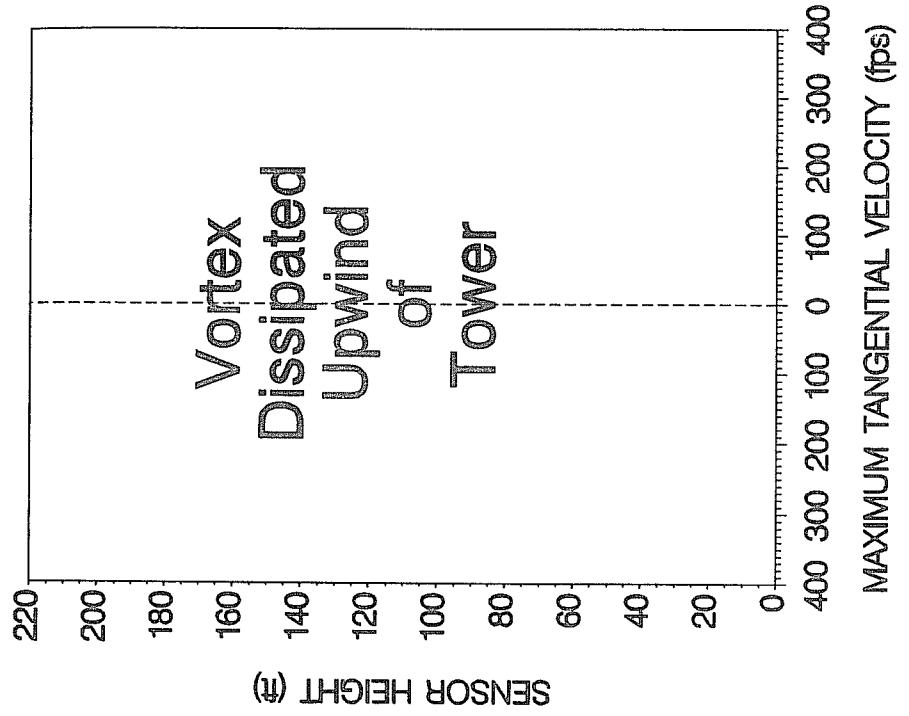
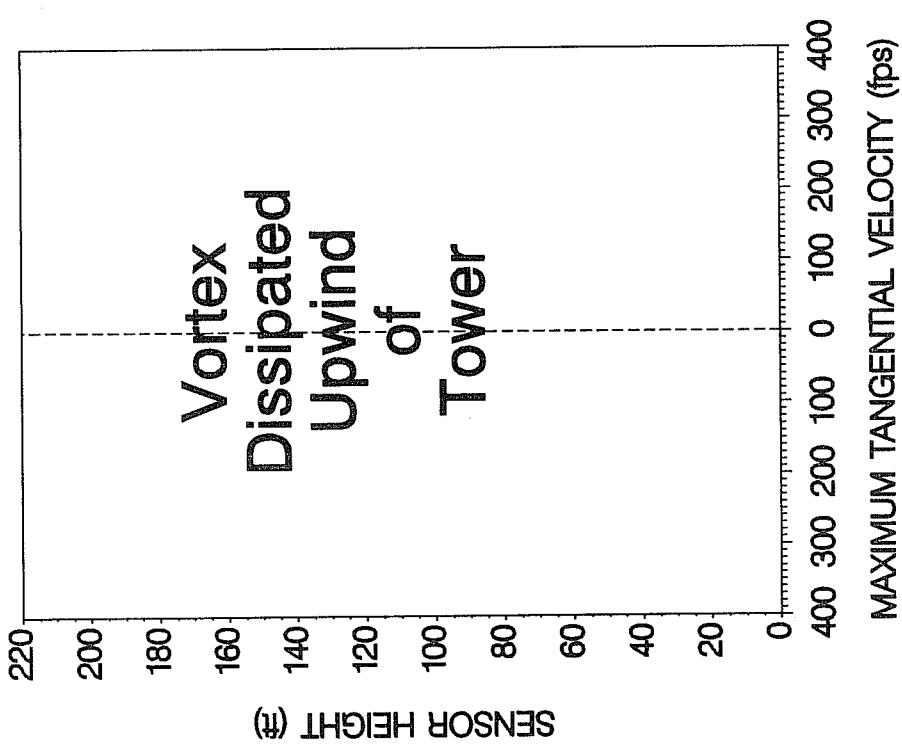


Figure G-44. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 264, Flyby 10, ambient wind speed = 3.7 kts,  $\delta_F = 30^\circ$ , IAS = 134 kts, GW = 125,000 lbs. Ages, radii, and velocities of the vortex cores are 47 and (D) s, 0.6 and (D) ft, and 30.6 and (D) fps, respectively.

FAA B727-100 --- FLYBY 11 (DOY 264)  
DOWNWIND VORTEX VELOCITY PROFILE



FAA B727-100 --- FLYBY 11 (DOY 264)  
UPWIND VORTEX VELOCITY PROFILE

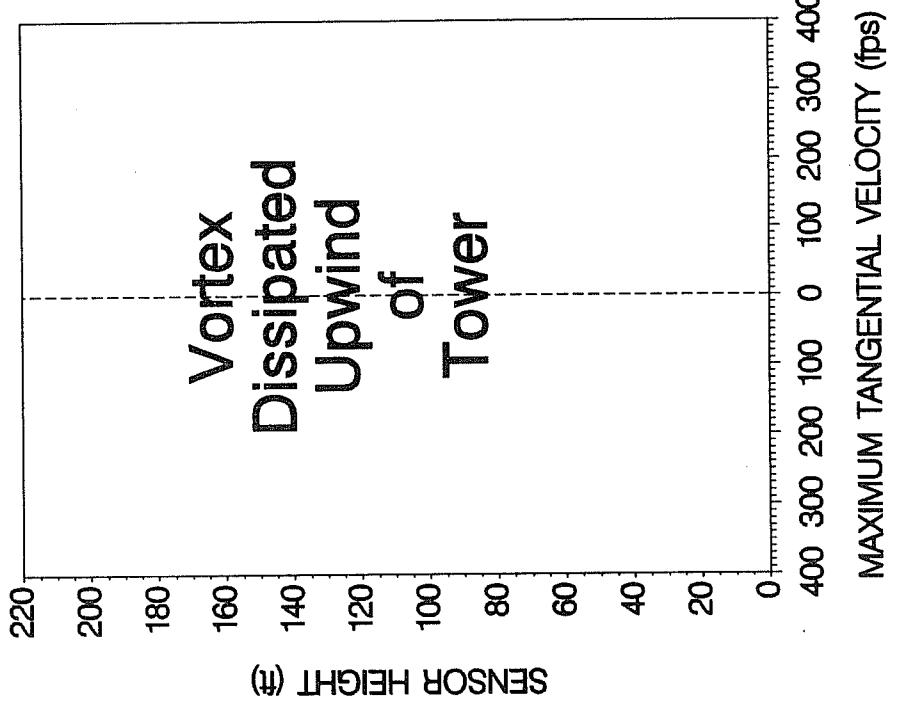
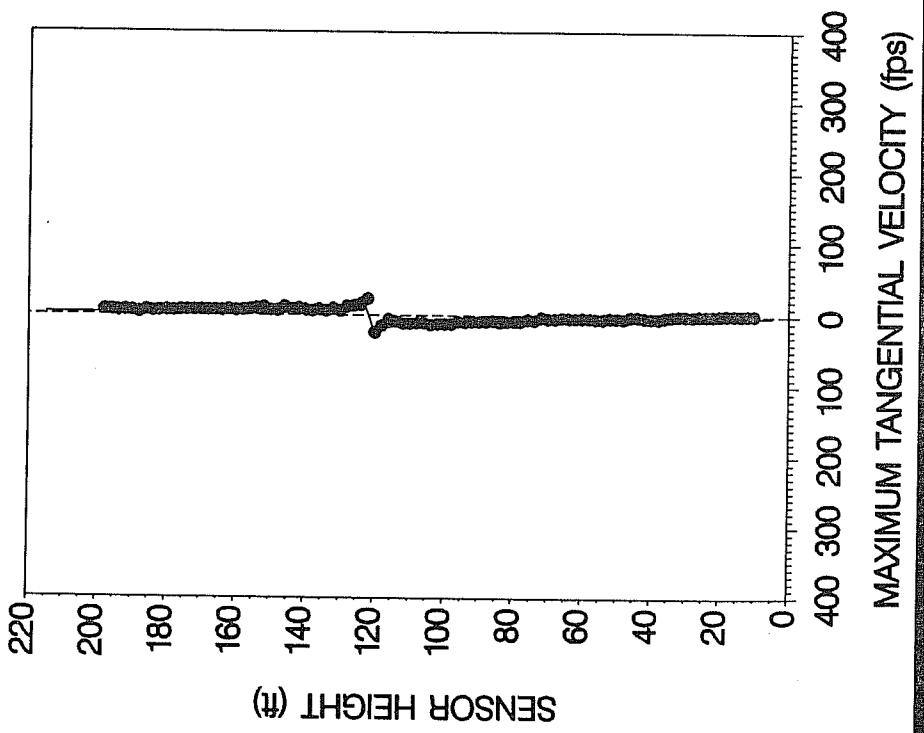
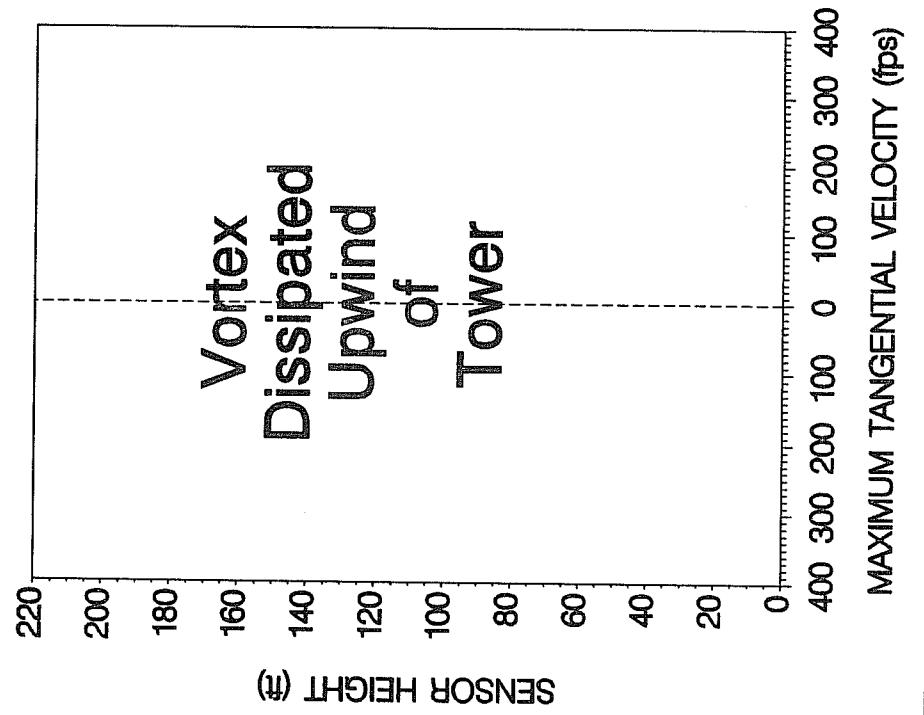


Figure G-45. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 264, Flyby 11, ambient wind speed = 3.6 kts,  $\delta_F = 30^\circ$ , IAS = 130 kts, GW = 125,000 lbs. Ages, radii, and velocities of the vortex cores are (D) and (D) ft, and (D) and (D) fps, respectively.

FAA B727-100 -- FLYBY 12 (DOY 264)  
DOWNWIND VORTEX VELOCITY PROFILE



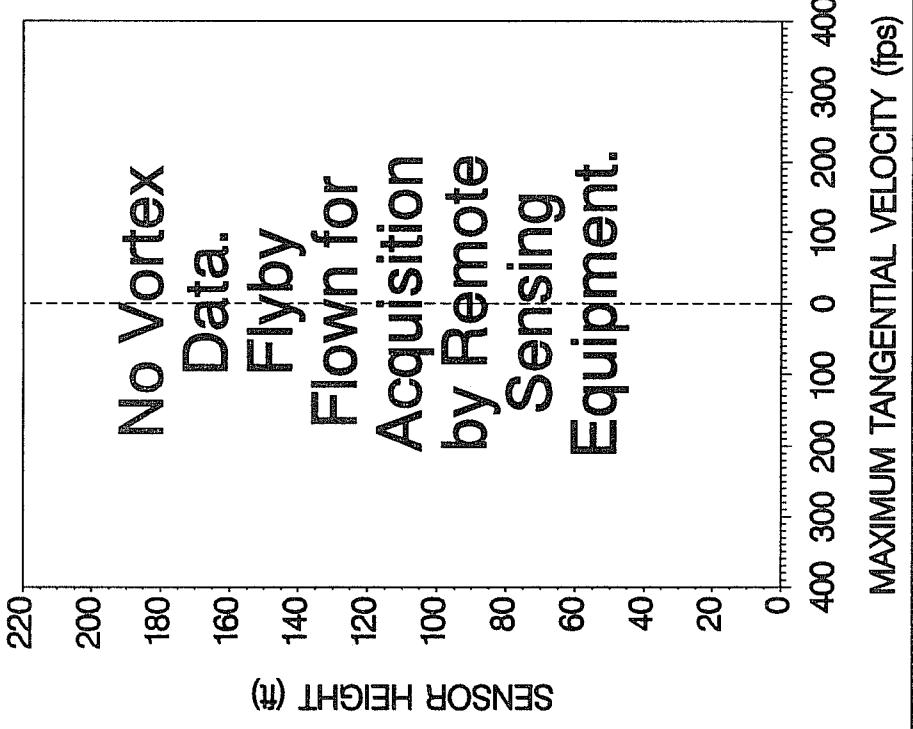
FAA B727-100 -- FLYBY 12 (DOY 264)  
UPWIND VORTEX VELOCITY PROFILE



Vortex  
Dissipated  
Upwind  
of  
Tower

Figure G-46. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 264, Flyby 12, ambient wind speed = 4.1 kts,  $\delta_F = 30^\circ$ , IAS = 134 kts, GW = 124,000 lbs. Ages, radii, and velocities of the vortex cores are 50 and (D) s, 2.1 and (D) ft, and 24.3 and (D) fps, respectively.

FAA B727 – 100 – – FLYBY 13 (DOY 264)  
DOWNWIND VORTEX VELOCITY PROFILE



FAA B727 – 100 – – FLYBY 13 (DOY 264)  
UPWIND VORTEX VELOCITY PROFILE

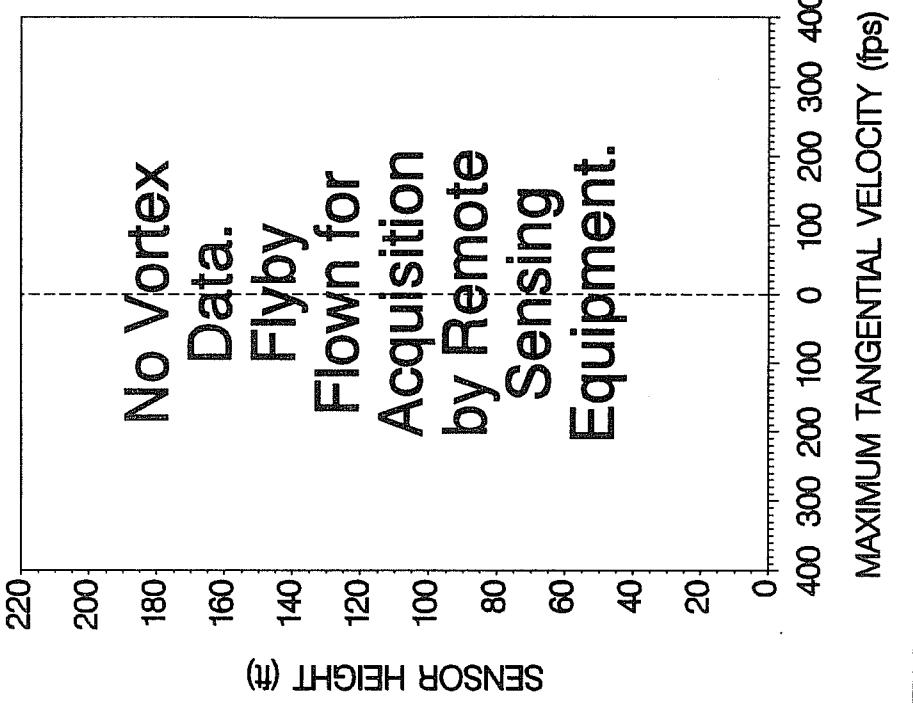
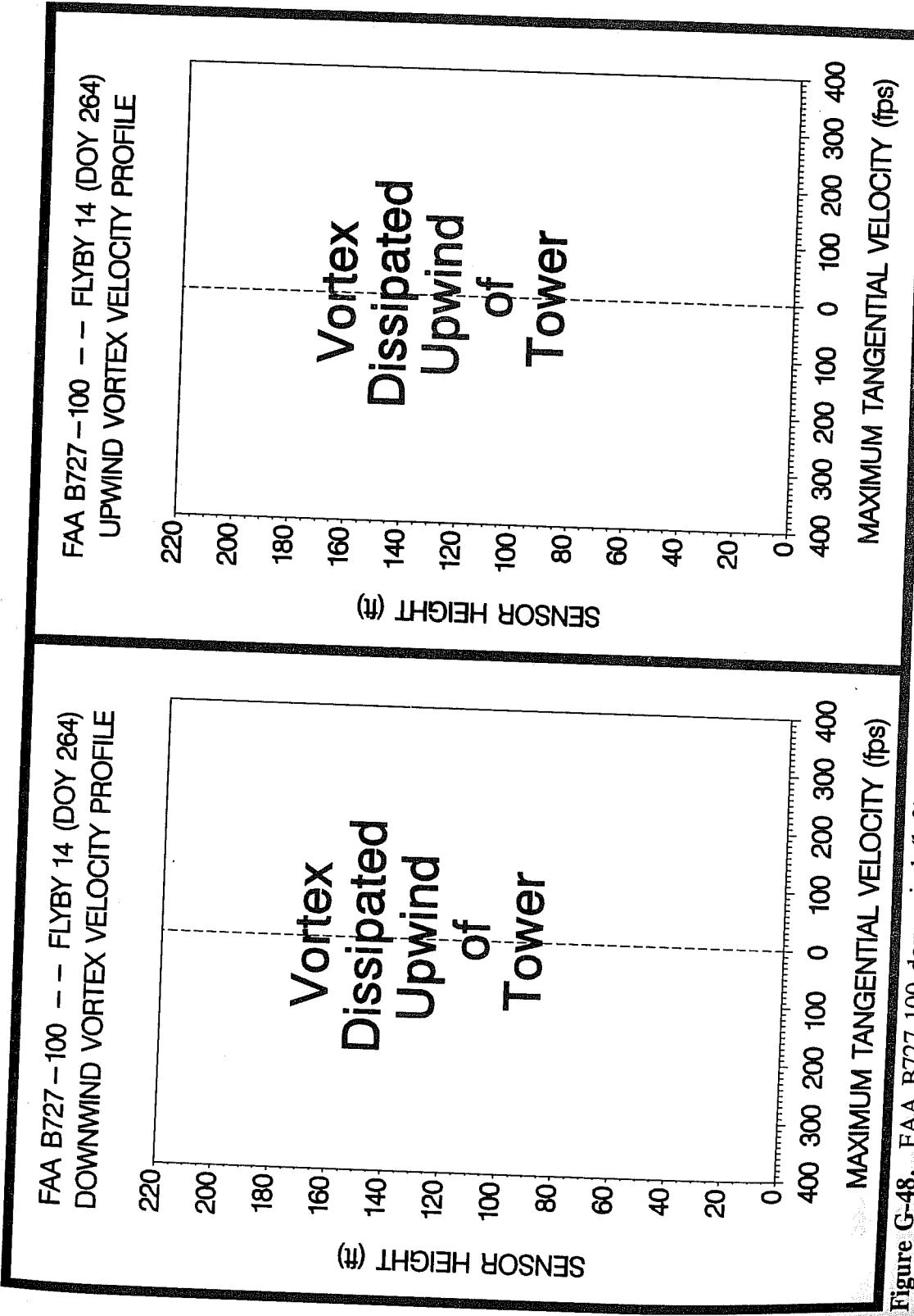


Figure G-47. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 264, Flyby 13, ambient wind speed = 4.0 kts,  $\delta_F = 30^\circ$ , IAS = 130 kts, GW = 123,000 lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) s, (O) and (O) ft, and (O) and (O) fps, respectively.



**Figure G-48.** FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 264, Flyby 14, ambient wind speed = 4.7 kts,  $\delta_F = 30^\circ$ , IAS = 130 kts, GW = 122,000 lbs. Ages, radii, and velocities of the vortex cores are (D) and (D) s, (D) and (D) ft, and (D) and (D) fps, respectively.

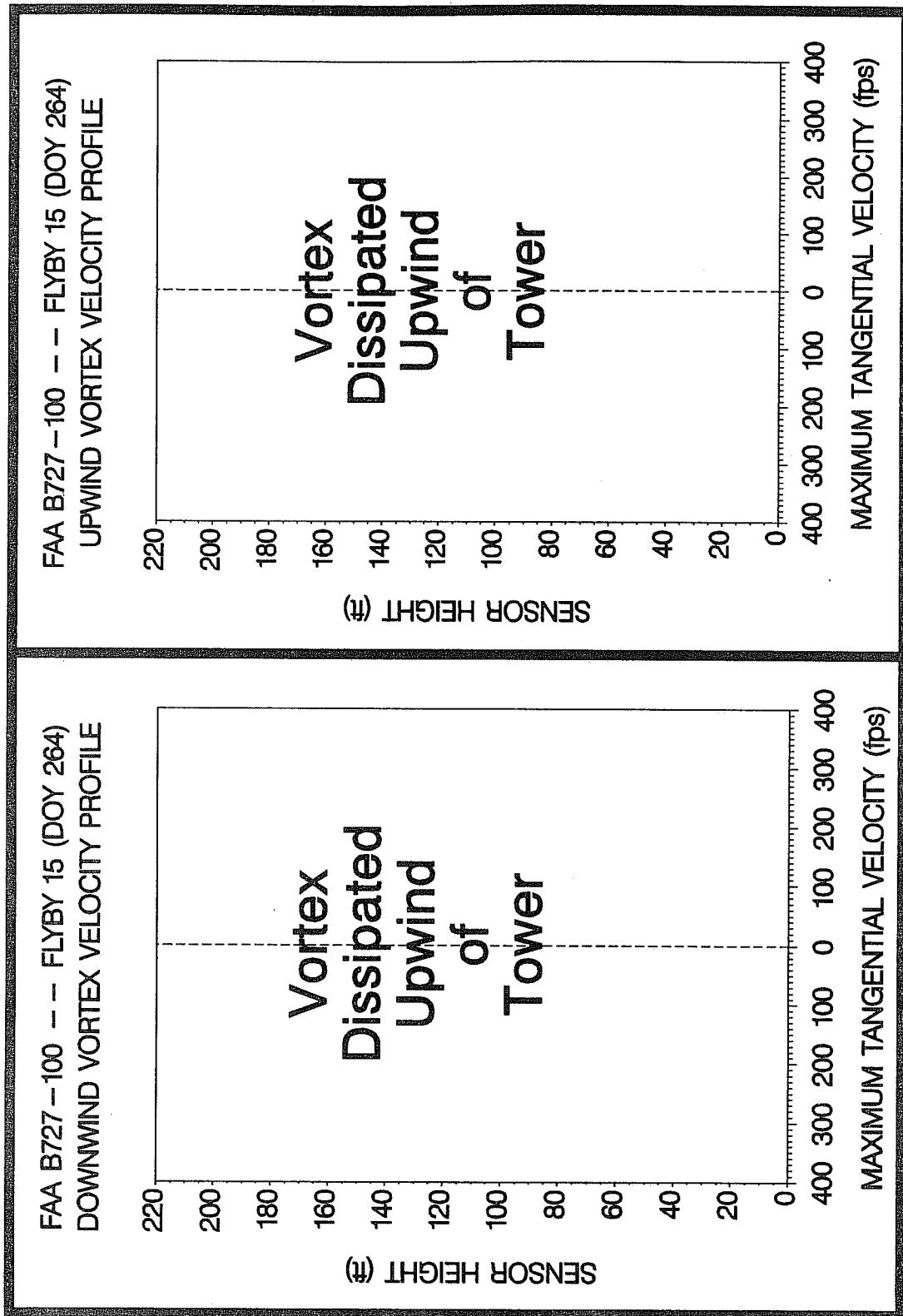
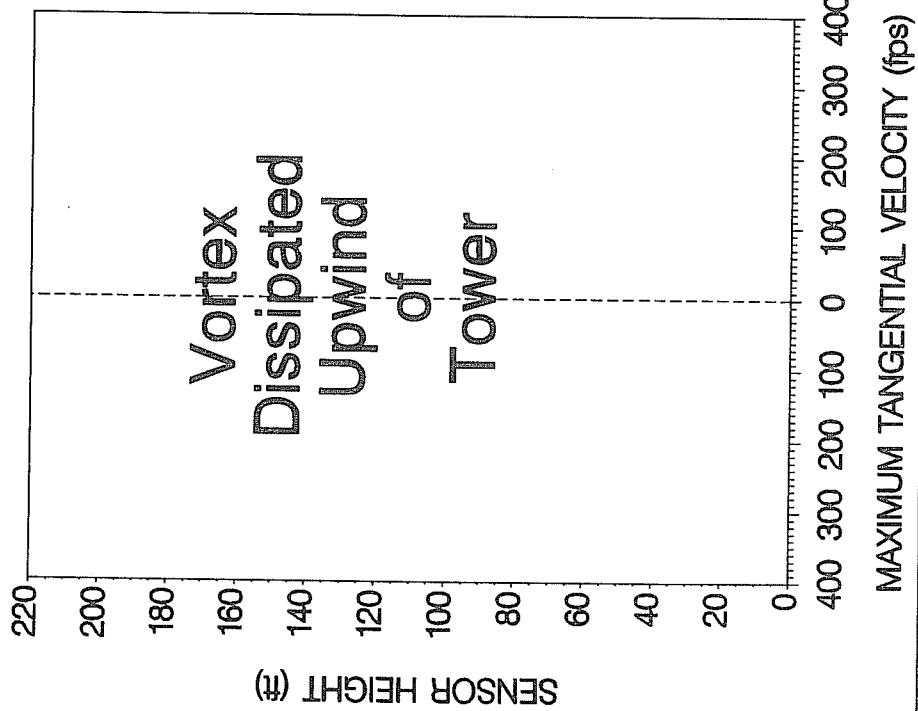


Figure G-49. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 264, Flyby 15, ambient wind speed = 2.6 kts,  $\delta_F = 30^\circ$ ,  $G_W = 130$  kts,  $G_W = 117,000$  lbs. Ages, radii, and velocities of the vortex cores are (D) and (D) ft, and (D) and (D) fps, respectively.

FAA B727-100 -- FLYBY 16 (DOY 264)  
DOWNWIND VORTEX VELOCITY PROFILE



FAA B727-100 -- FLYBY 16 (DOY 264)  
UPWIND VORTEX VELOCITY PROFILE

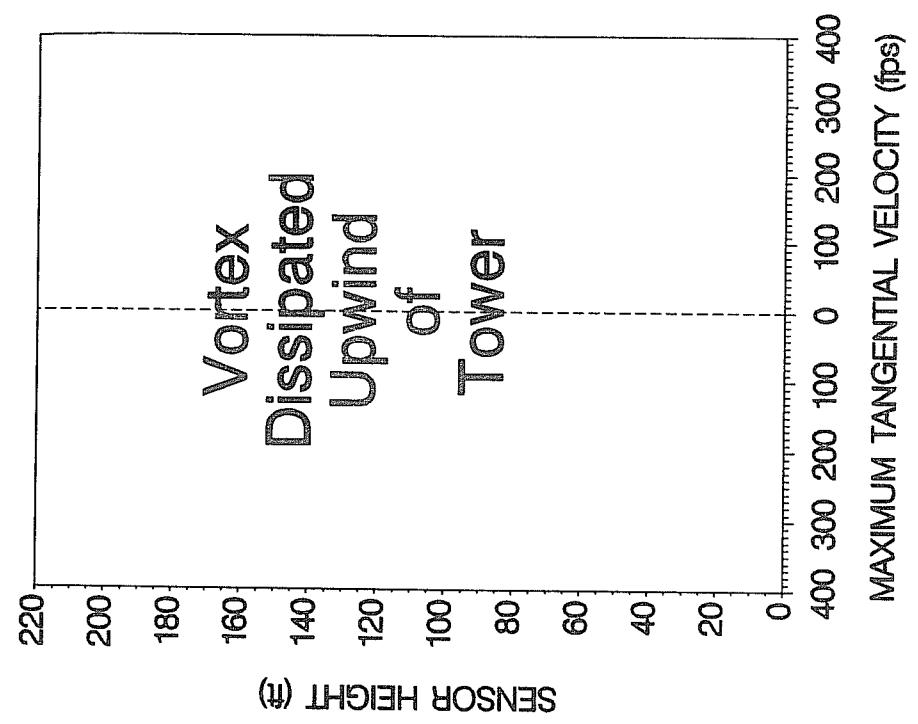
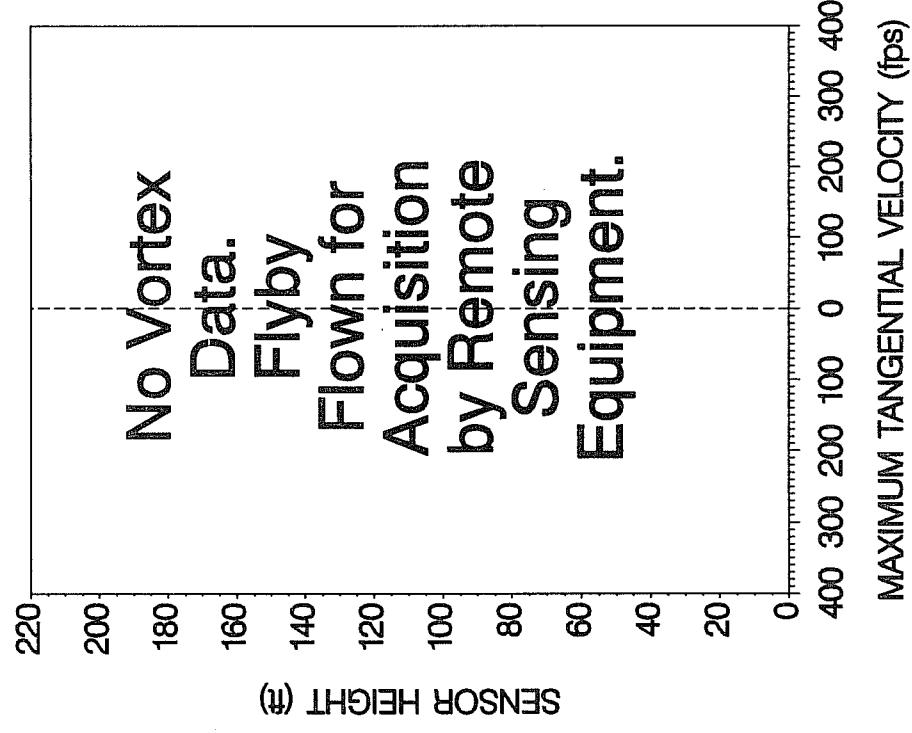


Figure G-50. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 264, Flyby 16, ambient wind speed = 1.2 kts,  $\delta_F = 30^\circ$ , IAS = 126 kts, GW = 115,000 lbs. Ages, radii, and velocities of the vortex cores are (D) and (D) s, (D) and (D) ft, and (D) and (D) fps, respectively.

FAA B727-100 -- FLYBY 17 (DOY 264)  
DOWNWIND VORTEX VELOCITY PROFILE



FAA B727-100 -- FLYBY 17 (DOY 264)  
UPWIND VORTEX VELOCITY PROFILE

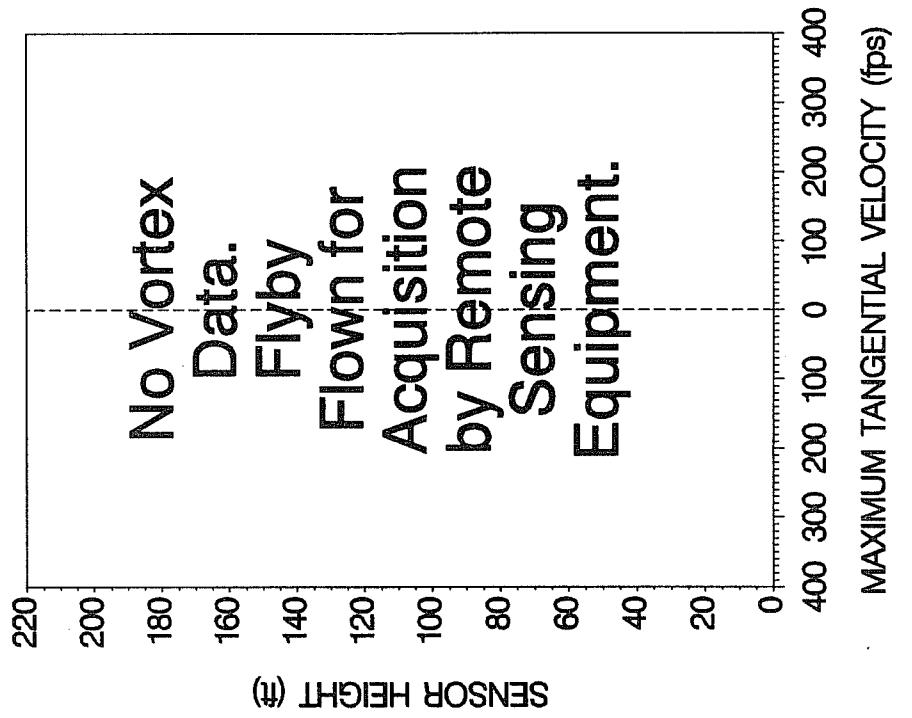


Figure G-51. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 264, Flyby 17, ambient wind speed = 4.3 kts,  $\delta_F = 15^\circ$ , IAS = 130 kts, GW = 114,000 lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) ft, and (O) and (O) fps, respectively.

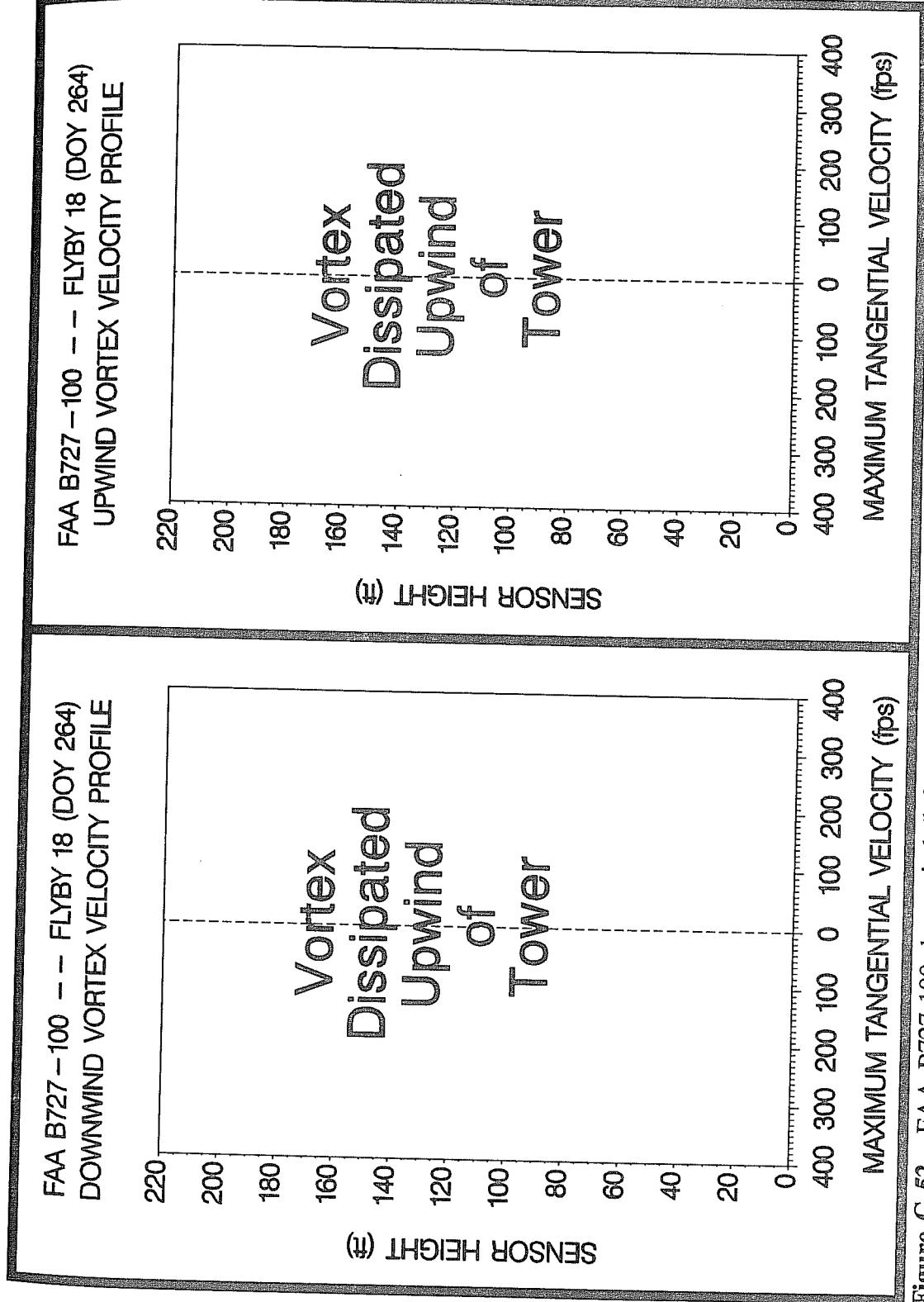


Figure G-52. FAA B727-100 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 264, Flyby 18, ambient wind speed=4.1 kts,  $\delta_F=15^\circ$ , IAS=129 kts, GW=113,000 lbs. Ages, radii, and velocities of the vortex cores are (D) and (D) s, (D) and (D) ft, and (D) and (D) fps, respectively.

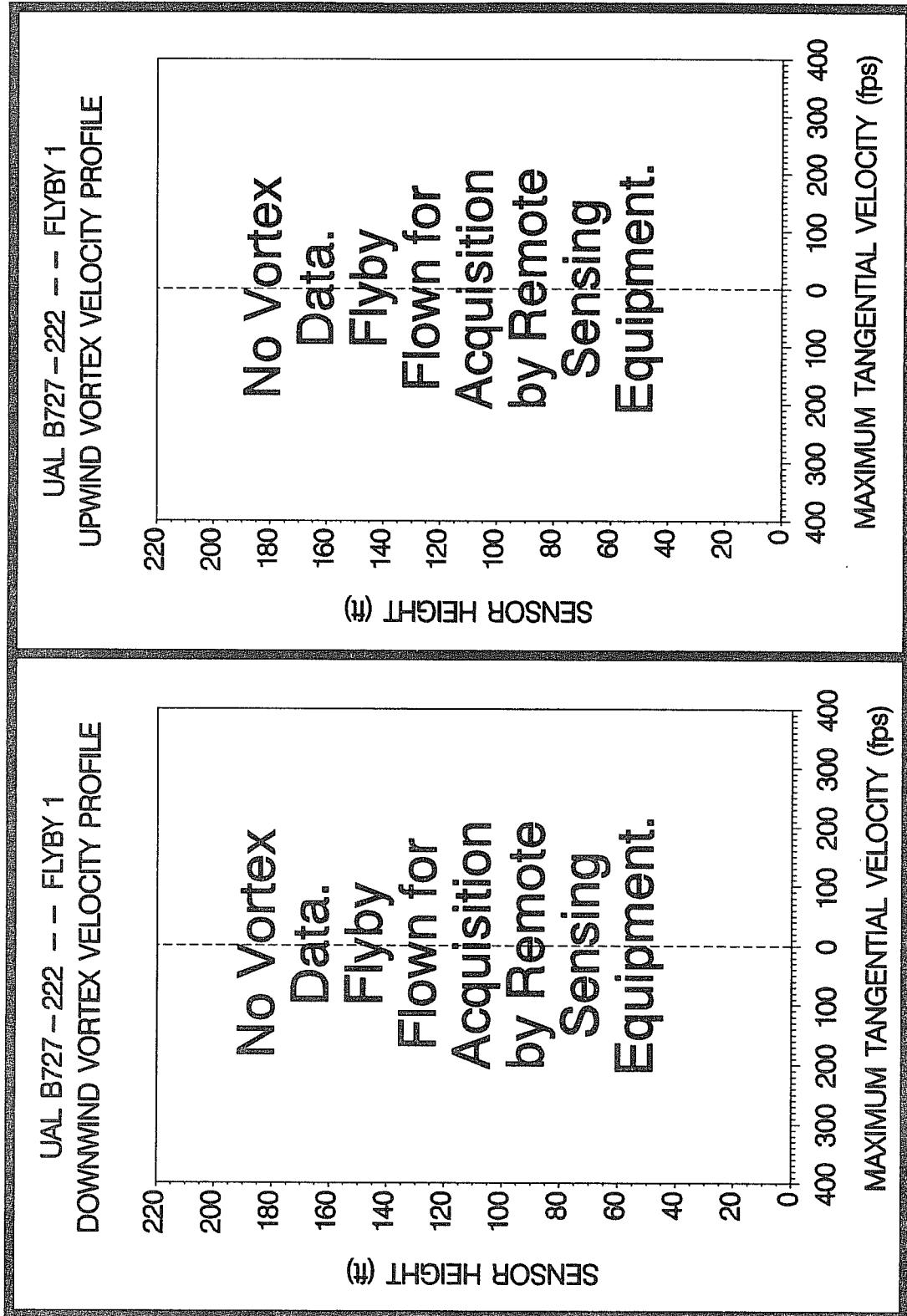


Figure G-53. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 1, ambient wind speed = 9.6 kts,  $\delta_F = 30^\circ$ ,  $IAS = 130$  kts,  $GW = 142,500$  lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) ft, and (O) and (O) fps, respectively.

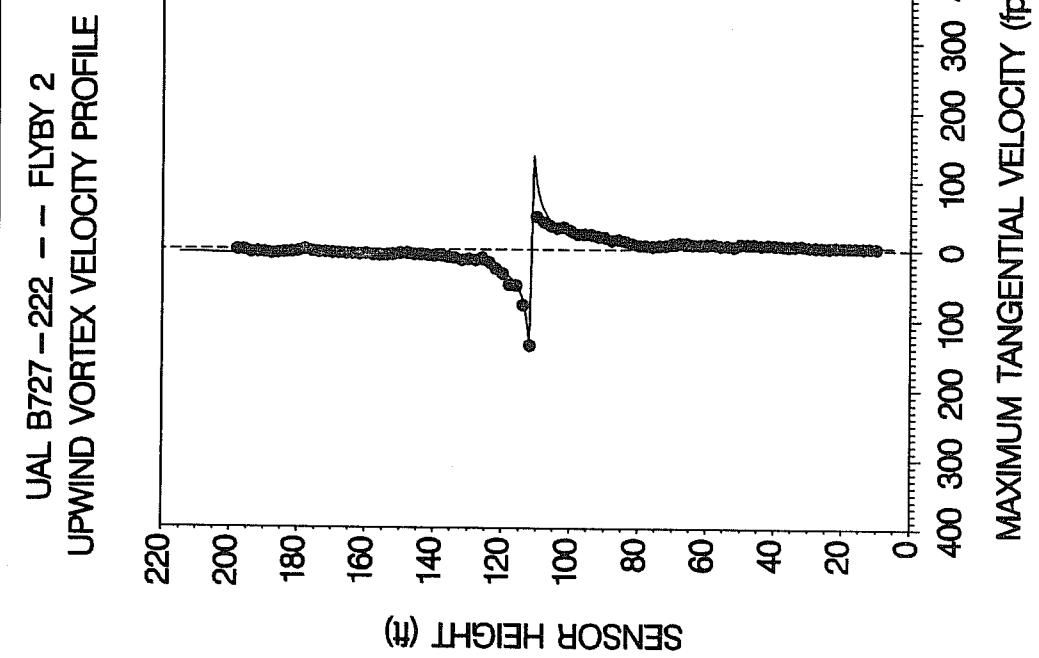
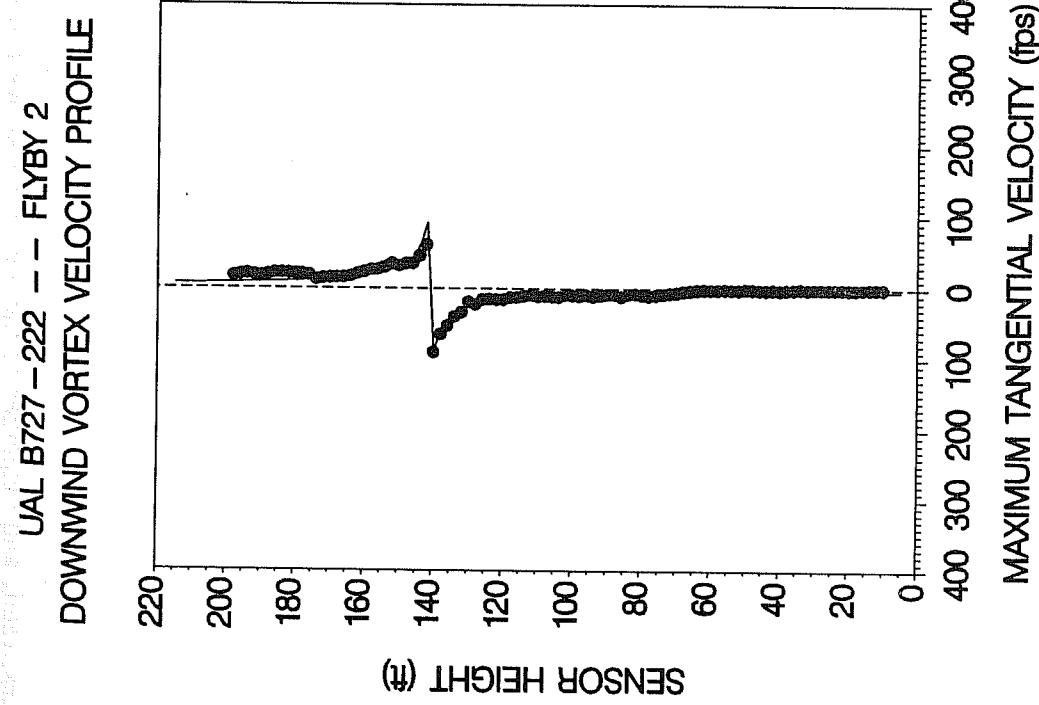
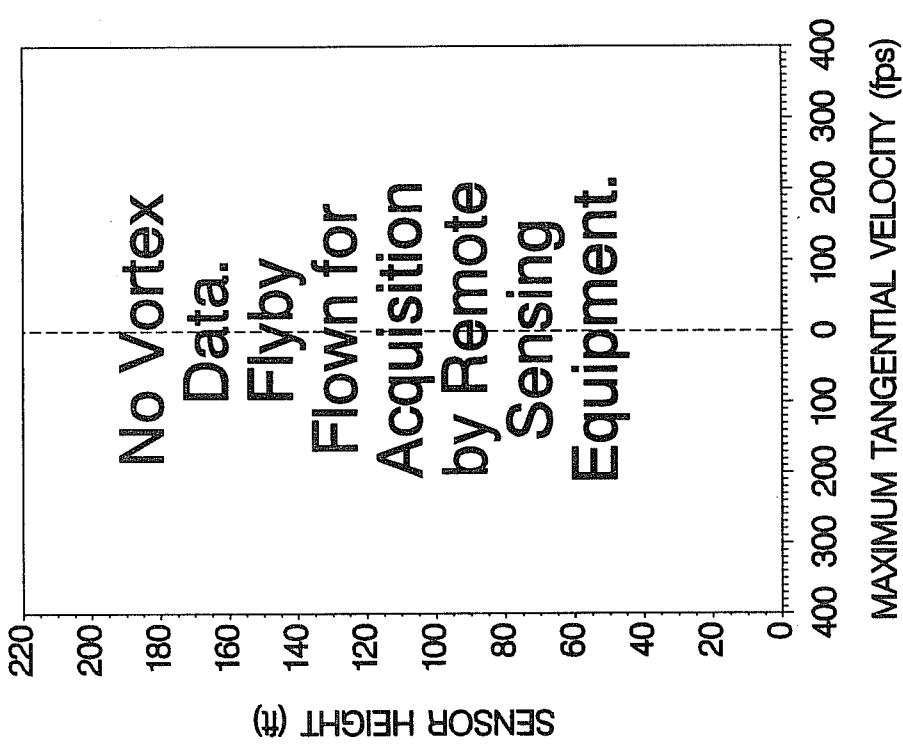


Figure G-54. UAL B772-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 2, ambient wind speed = 8.7 kts,  $\delta_F = 30^\circ$ ,  $GW = 141,000$  lbs. Ages, radii, and velocities of the vortex cores are 26 and 36 s, 0.9 and 0.5 ft, and 90.6 and 136.3 fps, respectively.

UAL B727-222 - - FLYBY 3  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B727-222 - - FLYBY 3  
UPWIND VORTEX VELOCITY PROFILE

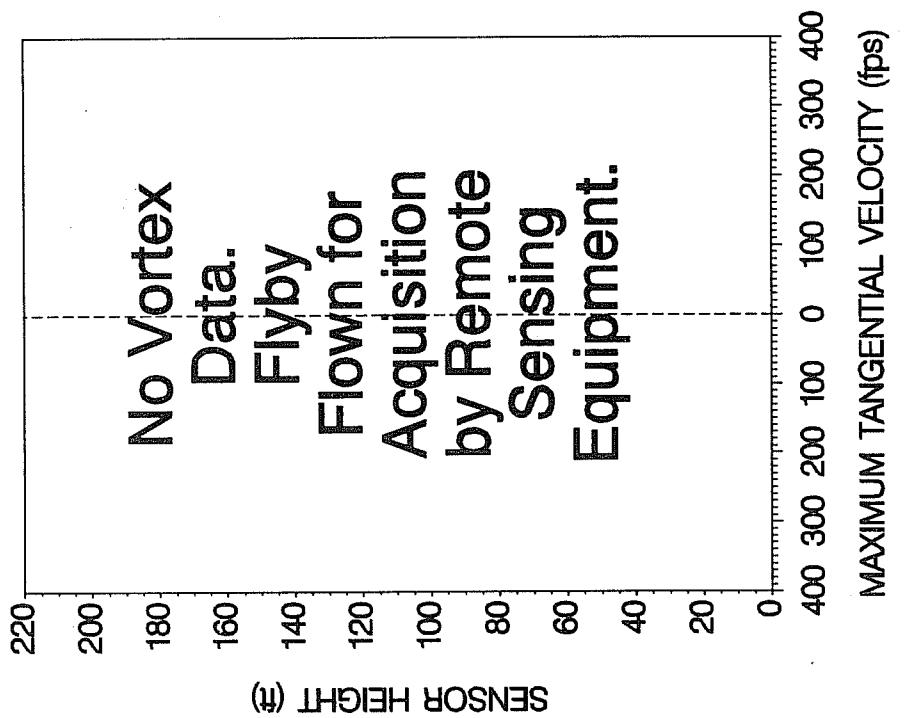


Figure G-55. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 3, ambient wind speed = 8.8 kts,  $\delta_F = 5^\circ$ , IAS = 147 kts, GW = 140,000 lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) s, (O) and (O) ft, and (O) and (O) fps, respectively.

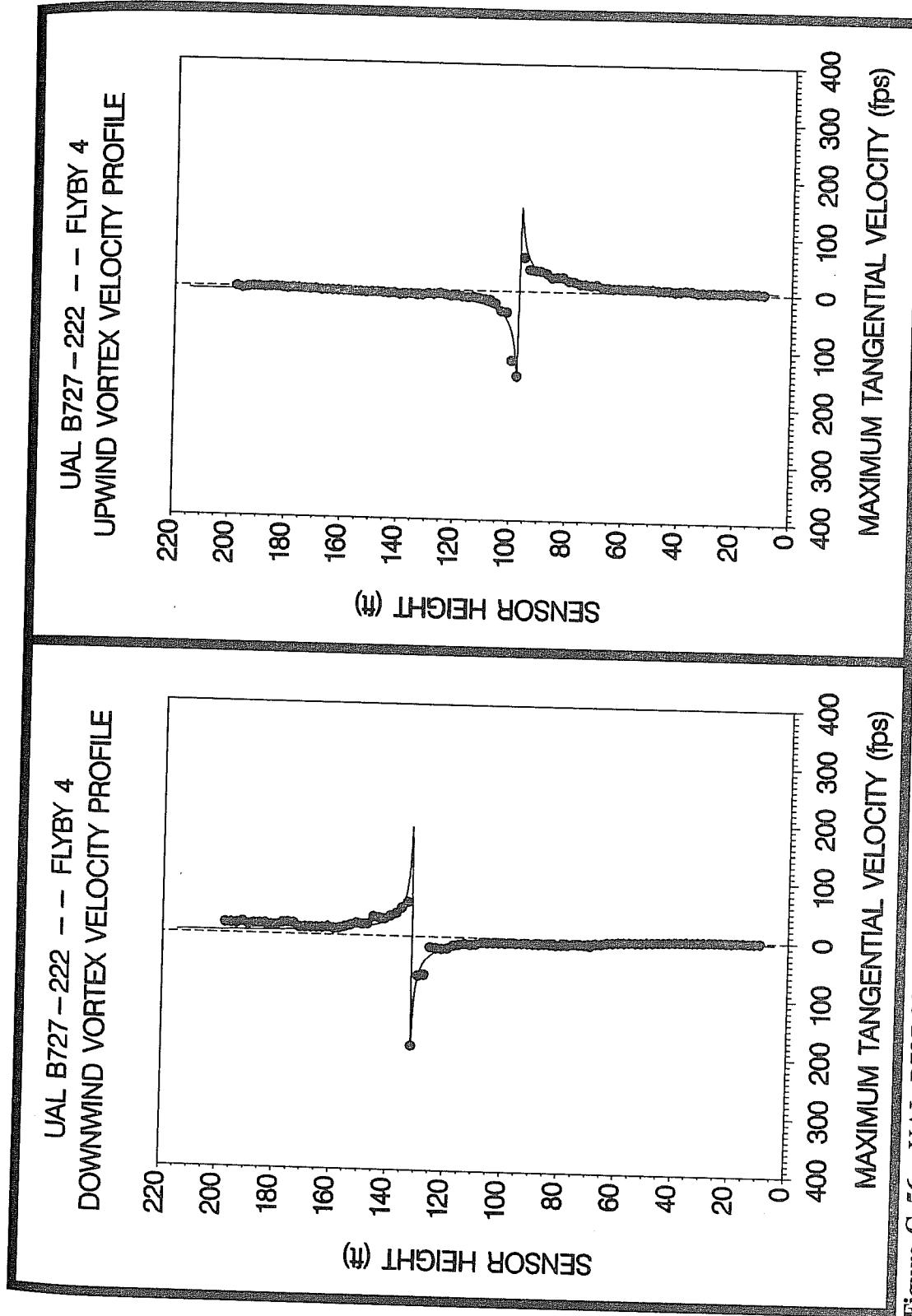
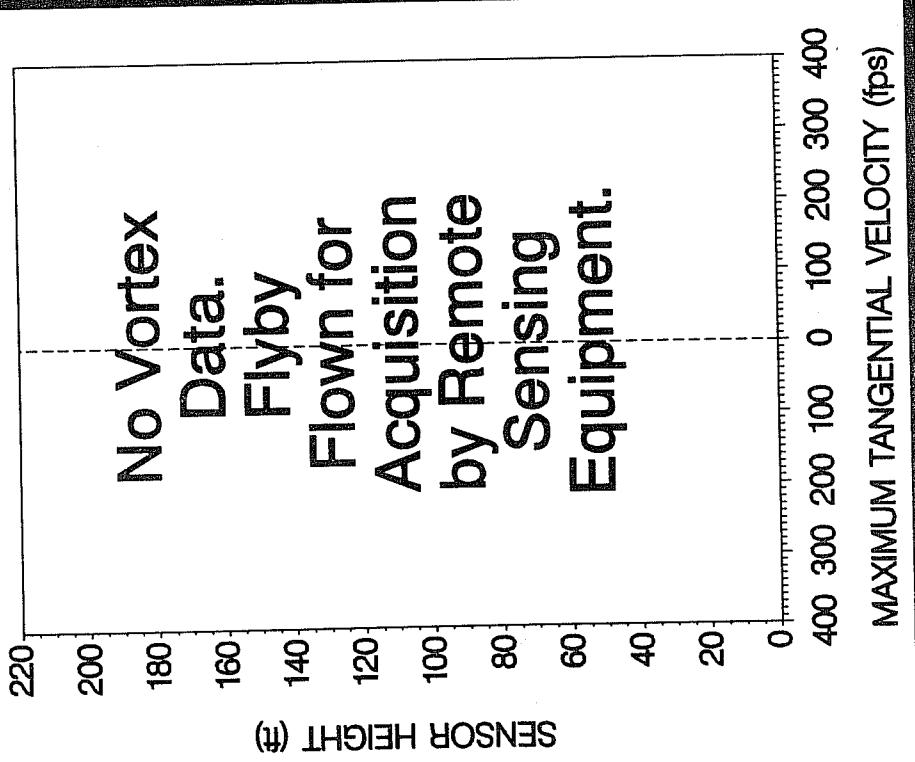


Figure G-56. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 4, ambient wind speed=8.1 kts,  $\delta_F=5^\circ$ , IAS = 154 kts, GW = 138,000 lbs. Ages, radii, and velocities of the vortex cores are 23 and 31 s, 0.3 and 0.5 ft, and 187.2 and 148.0 fps, respectively.

UAL B727 - 222 -- FLYBY 5  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B727 - 222 -- FLYBY 5  
UPWIND VORTEX VELOCITY PROFILE

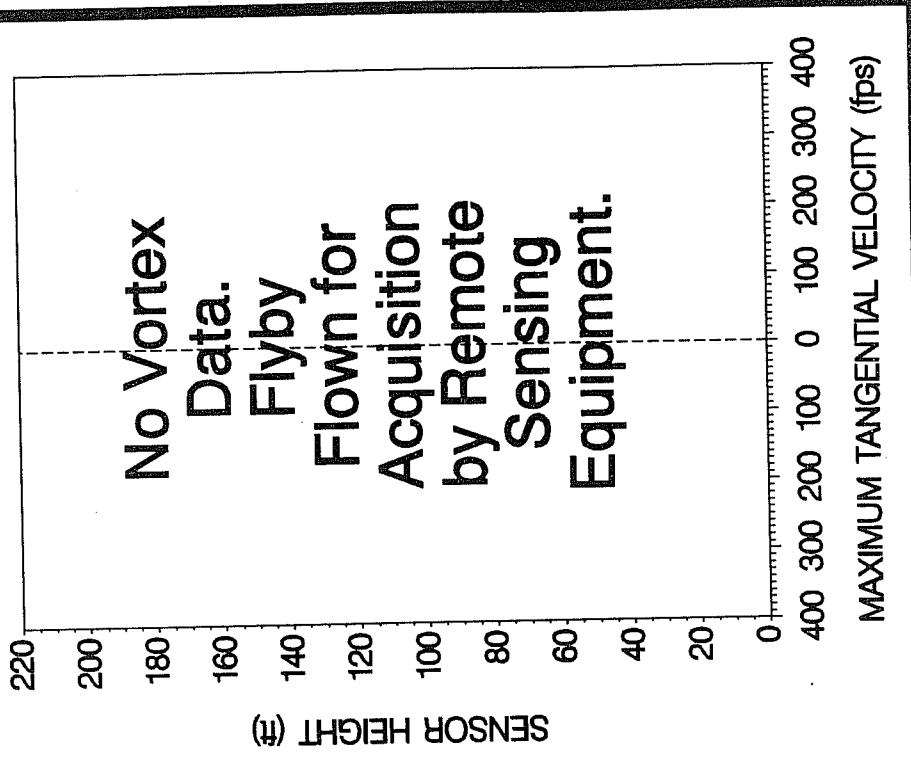


Figure G-57. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 5, ambient wind speed = 8.3 kts,  $\delta_F = 30^\circ$ ,  $GW = 137,500$  lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) ft, and (O) and (O) fps, respectively.

G-59

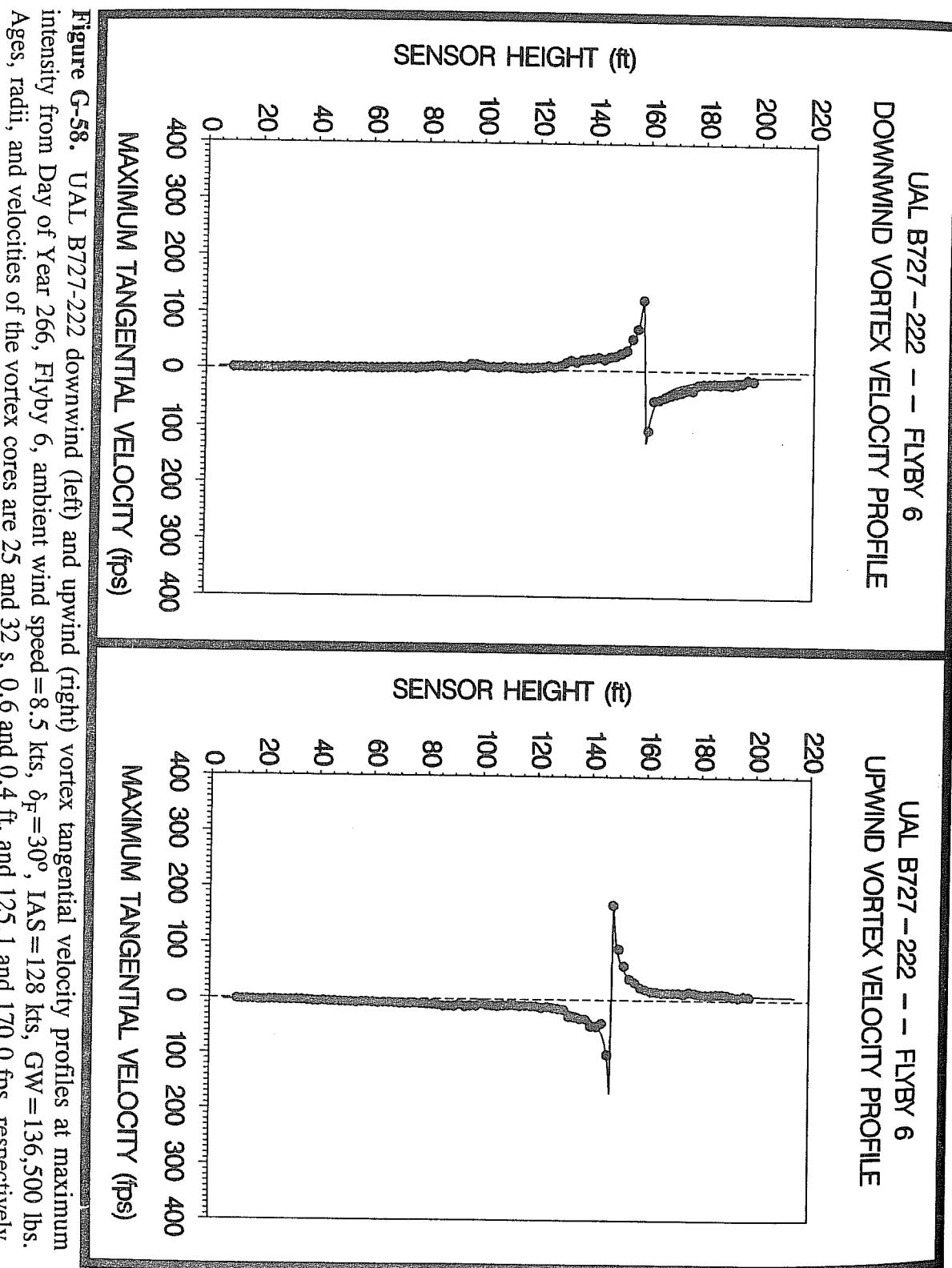


Figure G-58. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 6, ambient wind speed = 8.5 kts,  $\delta_F = 30^\circ$ , IAS = 128 kts, GW = 136,500 lbs. Ages, radii, and velocities of the vortex cores are 25 and 32 s, 0.6 and 0.4 ft, and 125.1 and 170.0 fps, respectively.

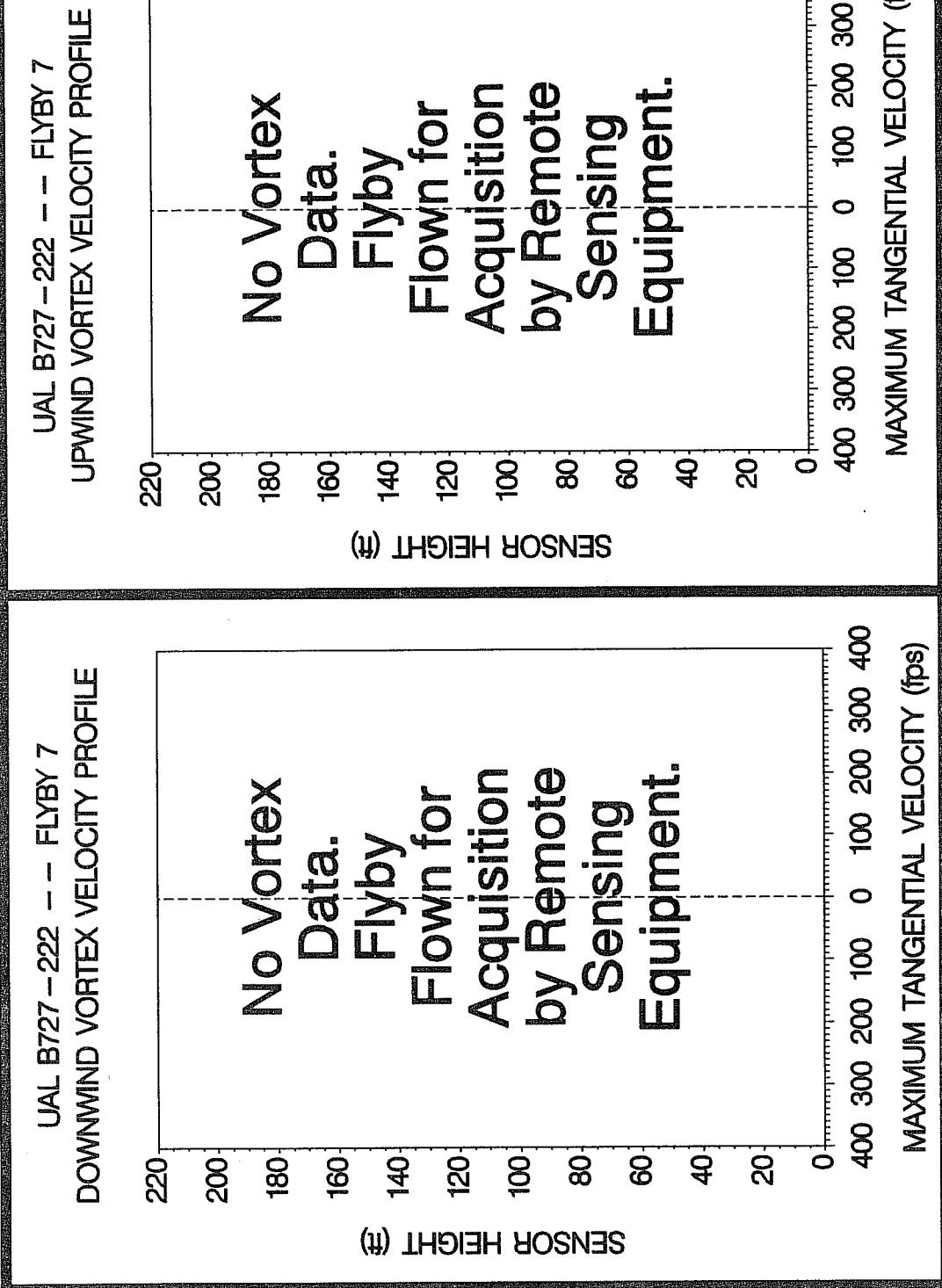


Figure G-59. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 7, ambient wind speed = 8.9 kts,  $\delta_F = 0^\circ$ , IAS = 215 kts, GW = 135,500 lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) s, (O) and (O) ft, and (O) and (O) fps, respectively.

G-61

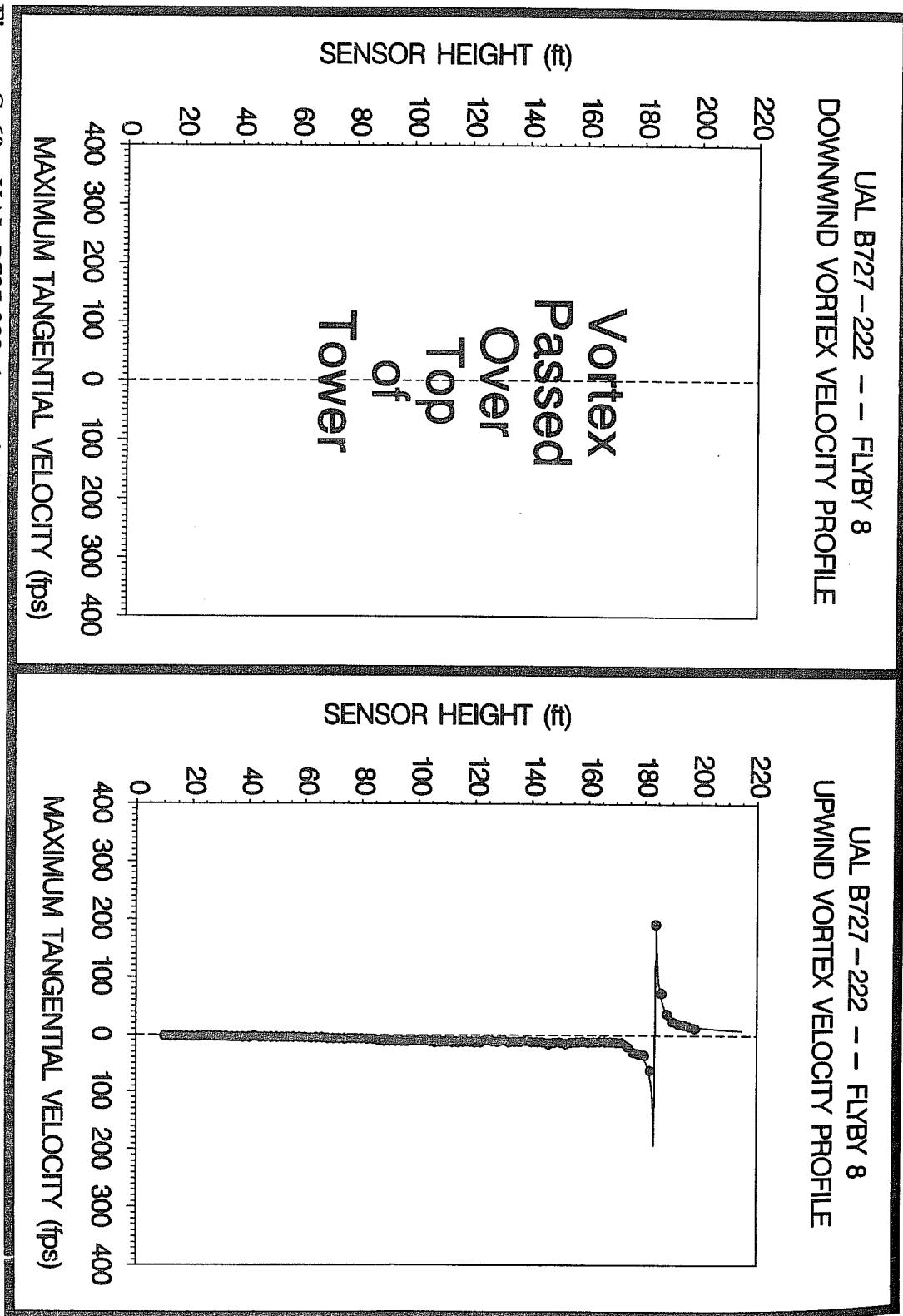
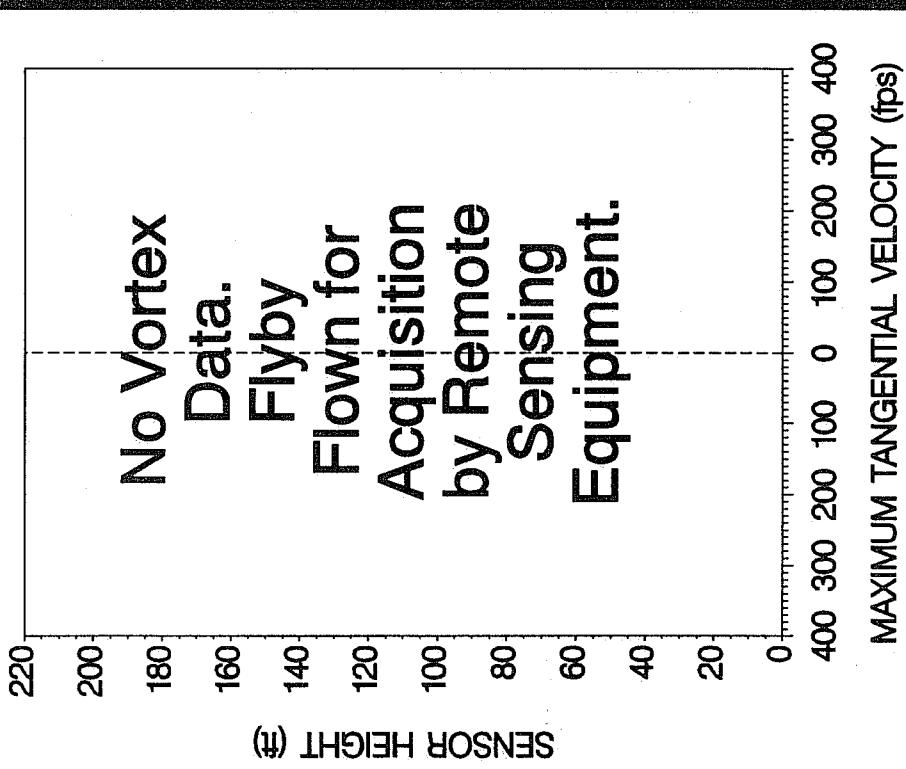


Figure G-60. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 8, ambient wind speed = 7.6 kts,  $\delta_F = 0^\circ$ , IAS = 215 kts, GW = 134,500 lbs. Ages, radii, and velocities of the vortex cores are (P) and 27 s, (P) and 0.2 ft, and (P) and 191.8 fps, respectively.

UAL B727-222 -- FLYBY 9  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B727-222 -- FLYBY 9  
UPWIND VORTEX VELOCITY PROFILE

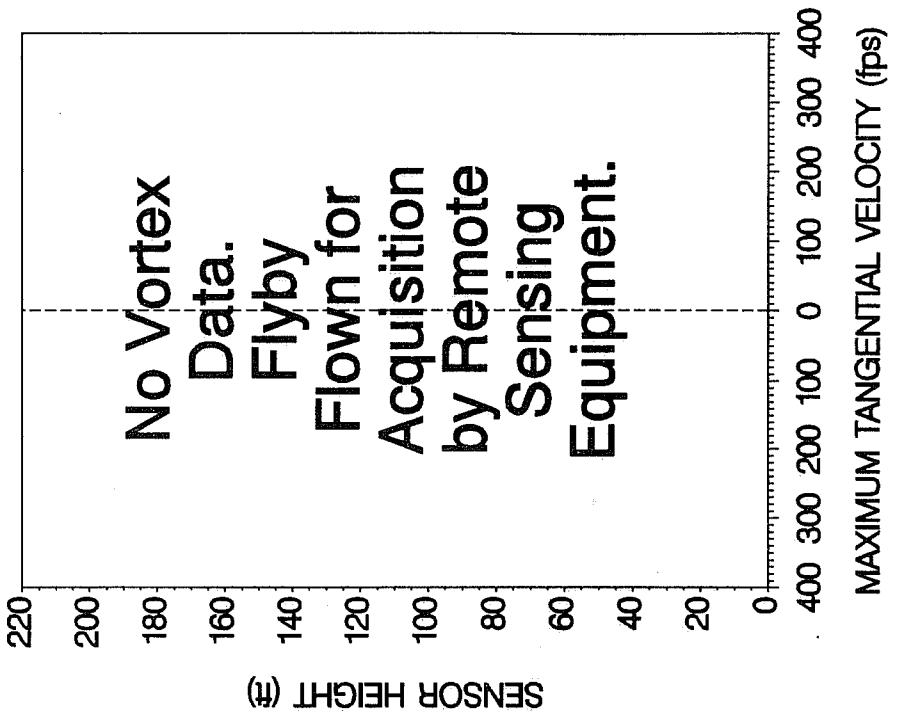


Figure G-61. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 9, ambient wind speed = 7.7 kts,  $\delta_F = 30^\circ$ ,  $GW = 125$  kts,  $IAS = 134,000$  lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) s, (O) and (O) ft, and (O) and (O) fps, respectively.

G-63

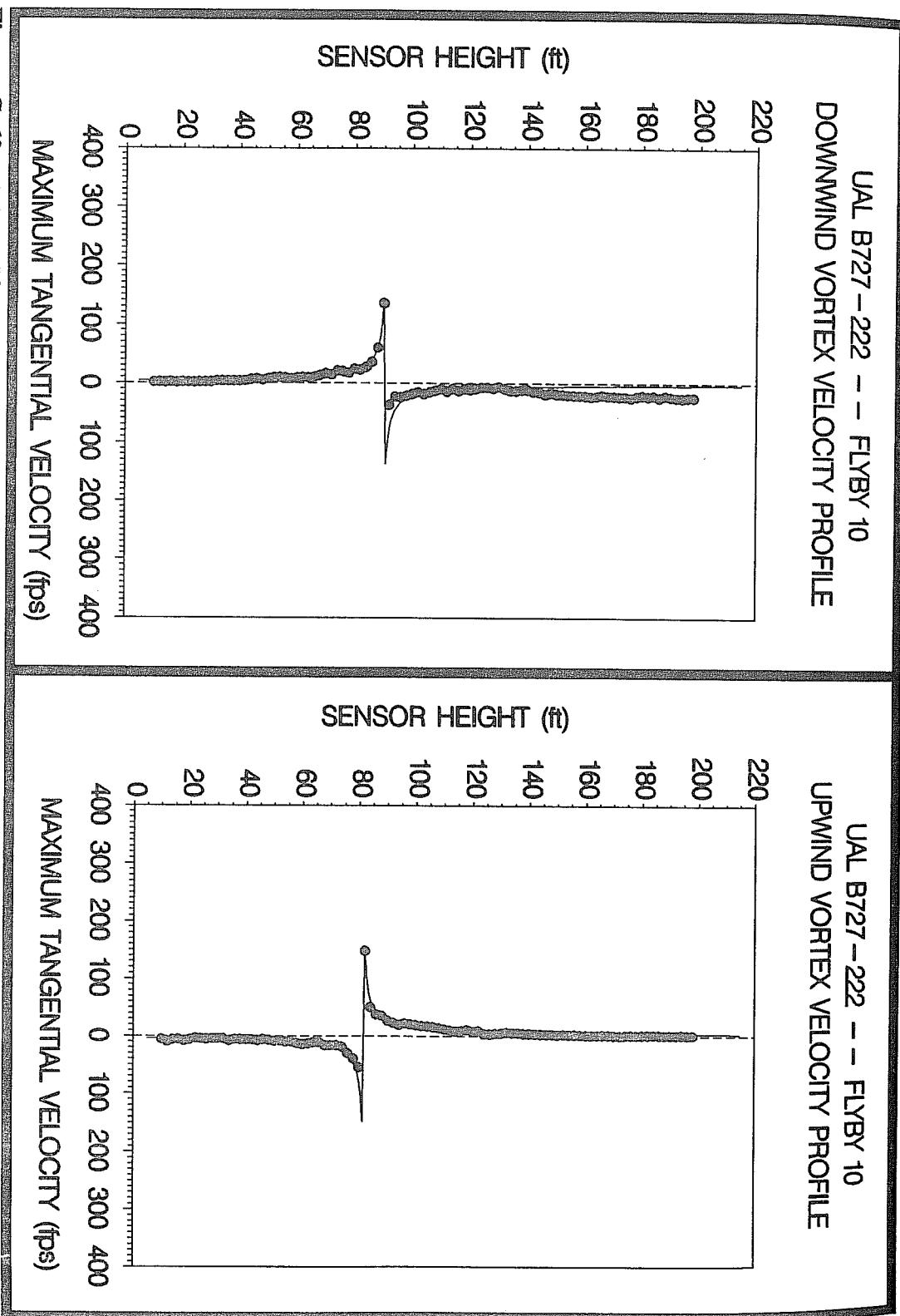
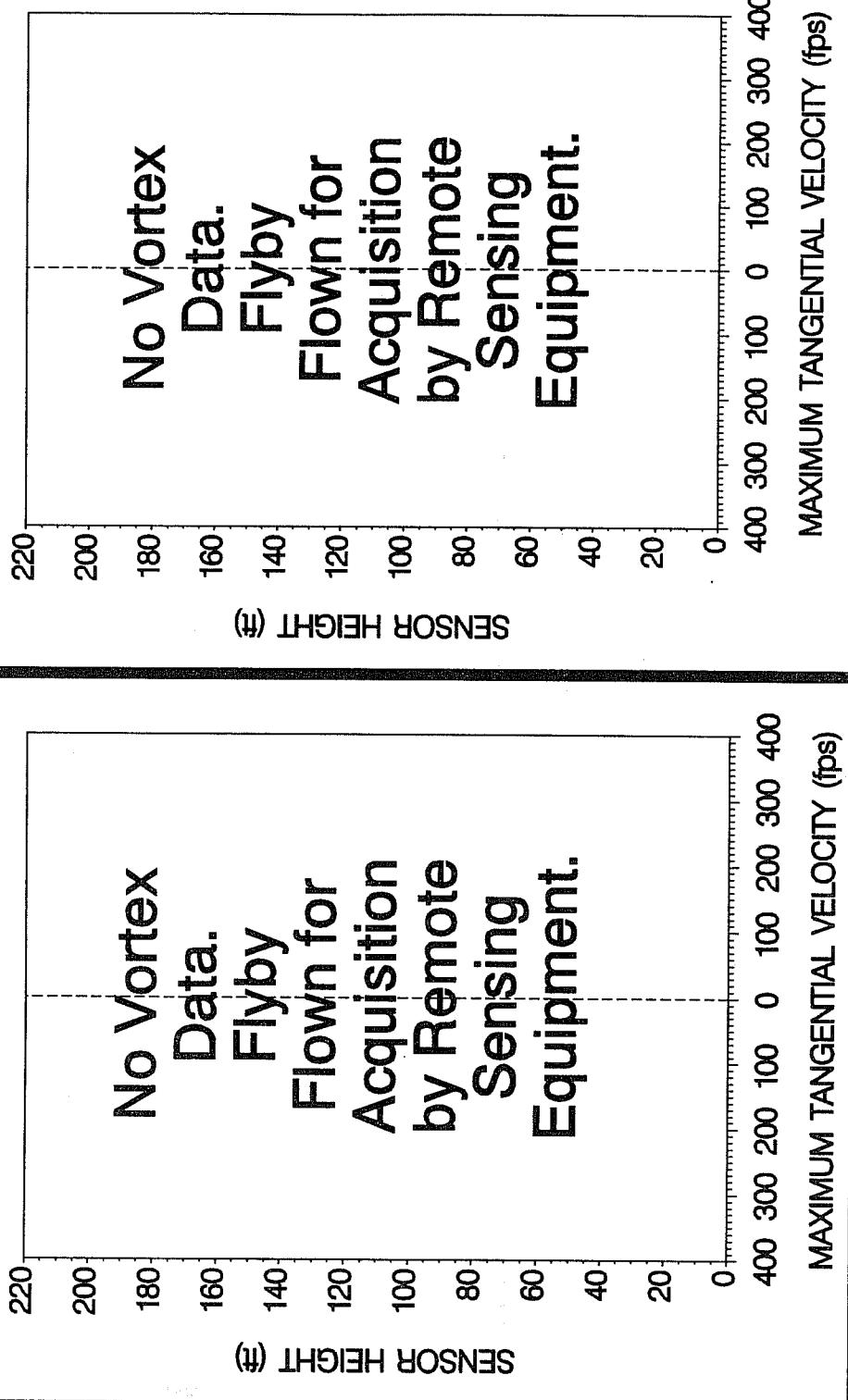


Figure G-62. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 10, ambient wind speed = 7.3 kts,  $\delta_F = 30^\circ$ , IAS = 125 kts, GW = 132,000 lbs. Ages, radii, and velocities of the vortex cores are 29 and 47 s, 0.4 and 0.3 ft, and 135.5 and 148.1 fps, respectively.

UAL B727-222 -- FLYBY 11  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B727-222 -- FLYBY 11  
UPWIND VORTEX VELOCITY PROFILE

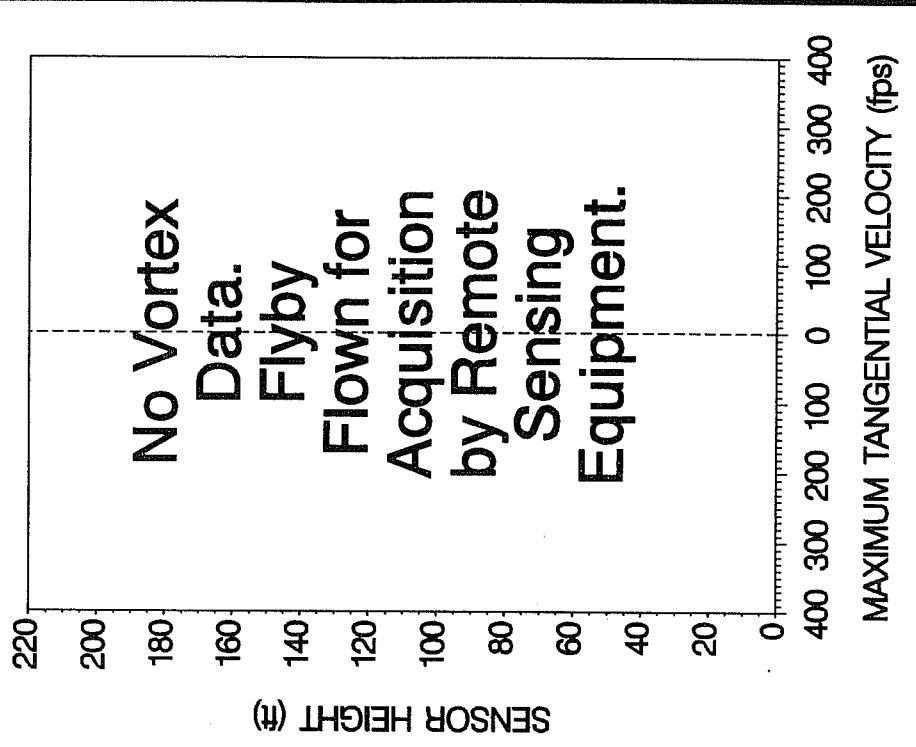


Figure G-63. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 11, ambient wind speed = 8.0 kts,  $\delta_F = 40^\circ$ , IAS = 120 kts, GW = 131,000 lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) s, (O) and (O) ft, and (O) and (O) fps, respectively.

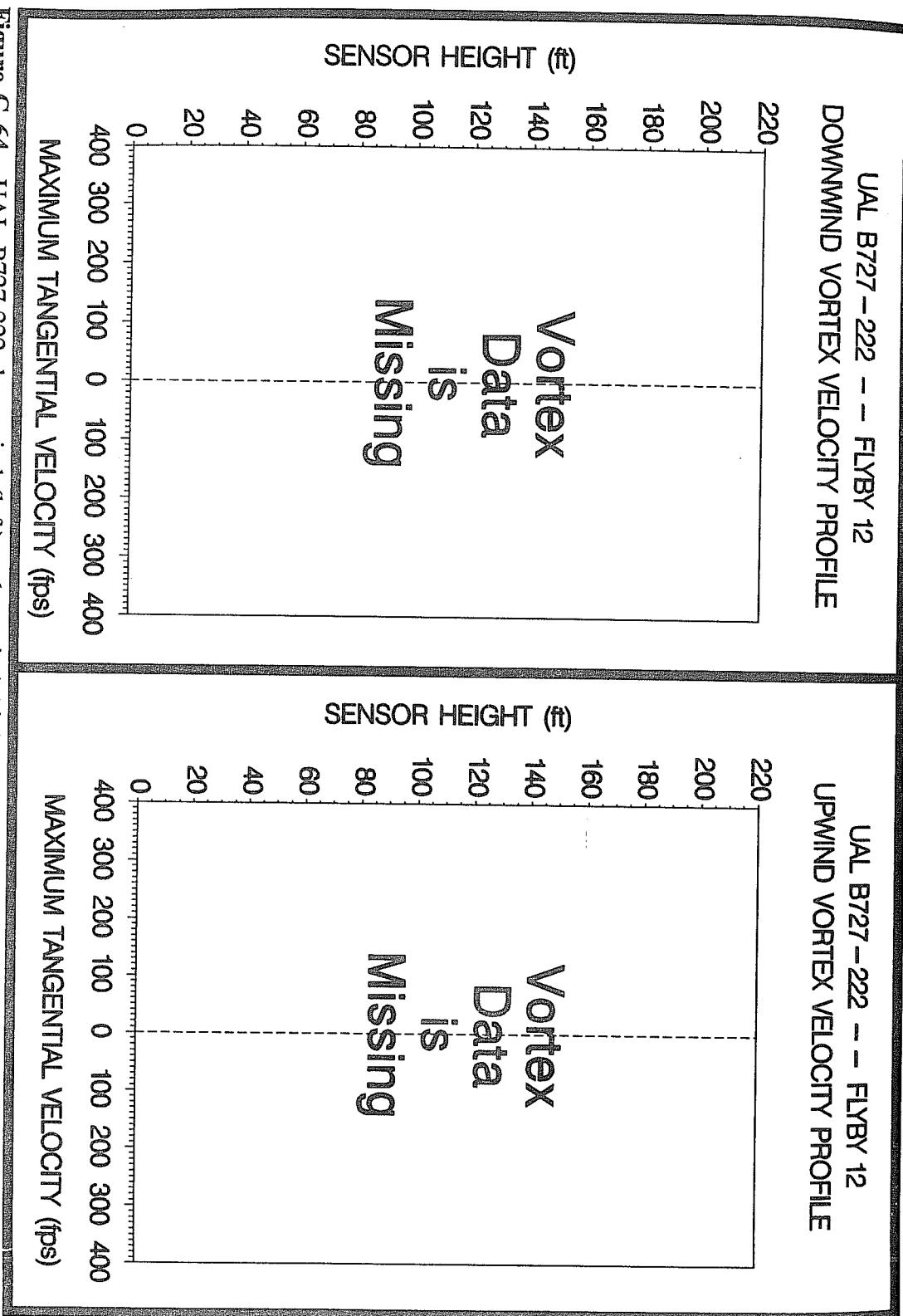
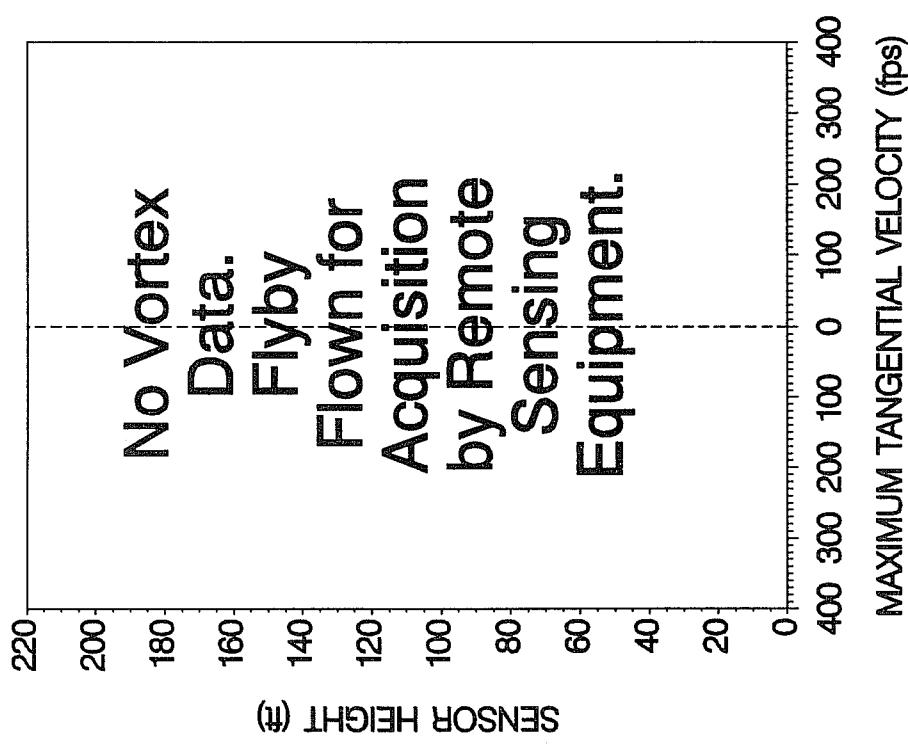


Figure G-64. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 12, ambient wind speed = 8.5 kts,  $\delta_F = 40^\circ$ , IAS = 120 kts, GW = 129,500 lbs. Ages, radii, and velocities of the vortex cores are (M) and (M) s, (M) and (M) ft, and (M) and (M) fps, respectively.

UAL B727-222 -- FLYBY 13  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B727-222 -- FLYBY 13  
UPWIND VORTEX VELOCITY PROFILE

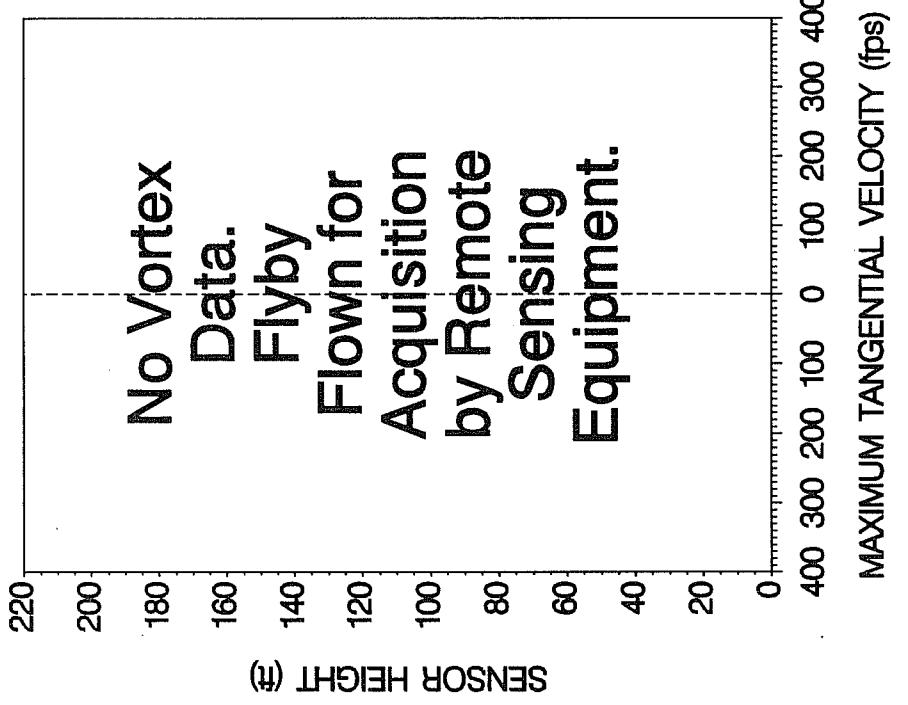


Figure G-65. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 13, ambient wind speed = 7.0 kts,  $\delta_F = 15^\circ$ , IAS = 142 kts, GW = 128,500 lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) s, (O) and (O) ft, and (O) and (O) fps, respectively.

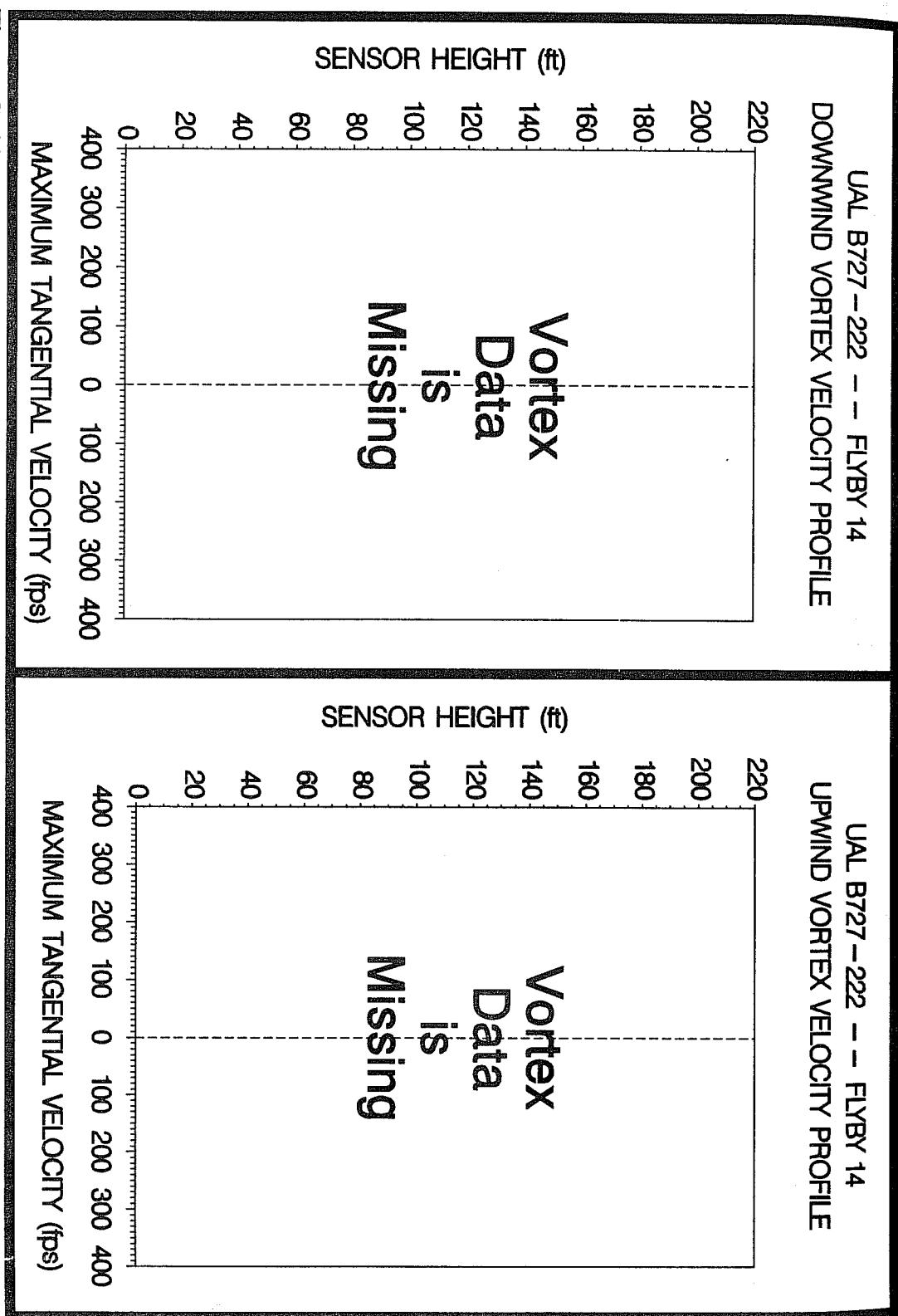


Figure G-66. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 14, ambient wind speed = 8.4 kts,  $\delta_F = 15^\circ$ , IAS = 142 kts, GW = 127,500 lbs. Ages, radii, and velocities of the vortex cores are (M) and (M) s, (M) and (M) ft, and (M) and (M) fps, respectively.

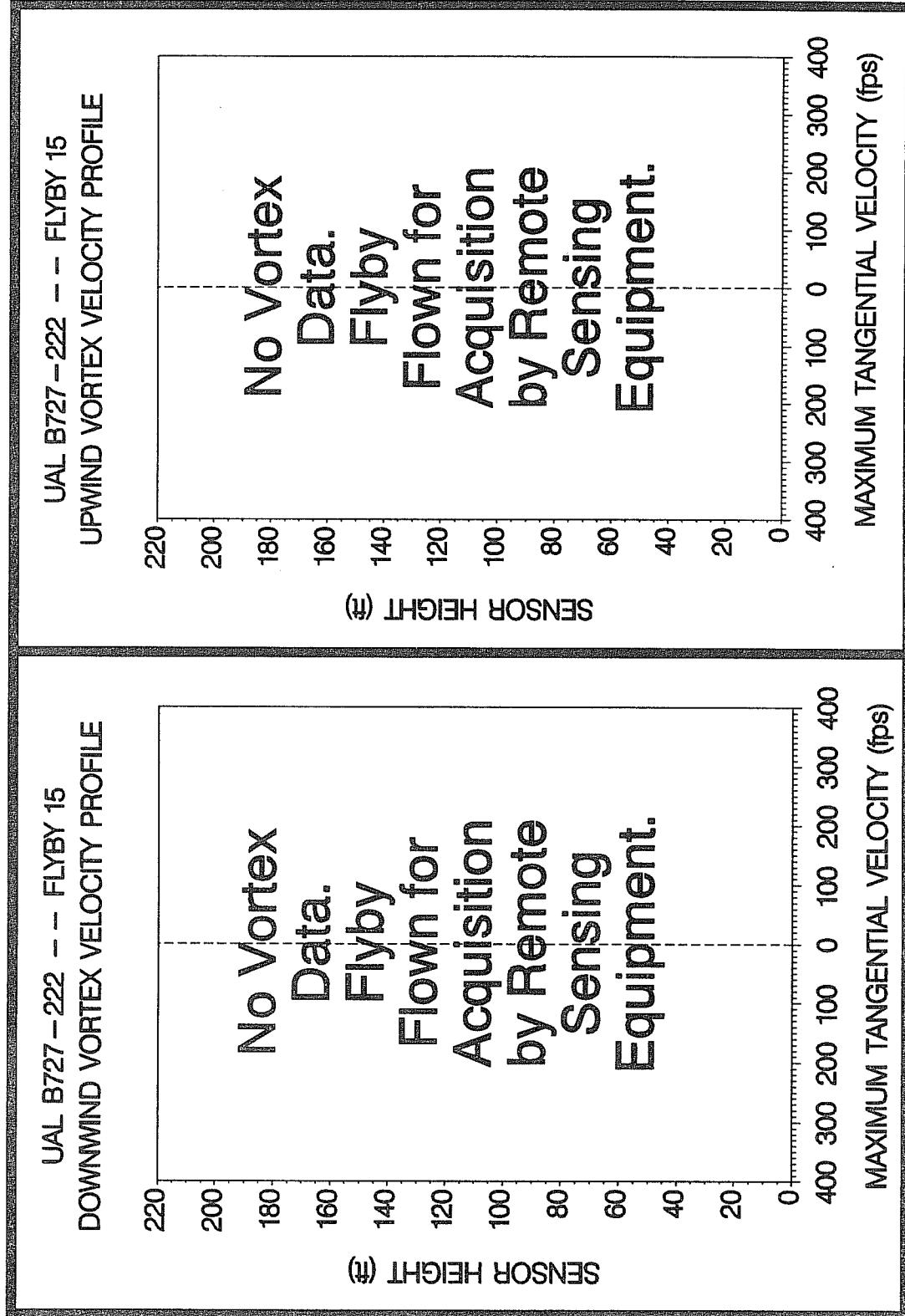


Figure G-67. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 15, ambient wind speed = 8.5 kts,  $\delta_F = 40^\circ$ ,  $IAS = 121$  kts,  $GW = 126,500$  lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) ft, and (O) and (O) fps, respectively.

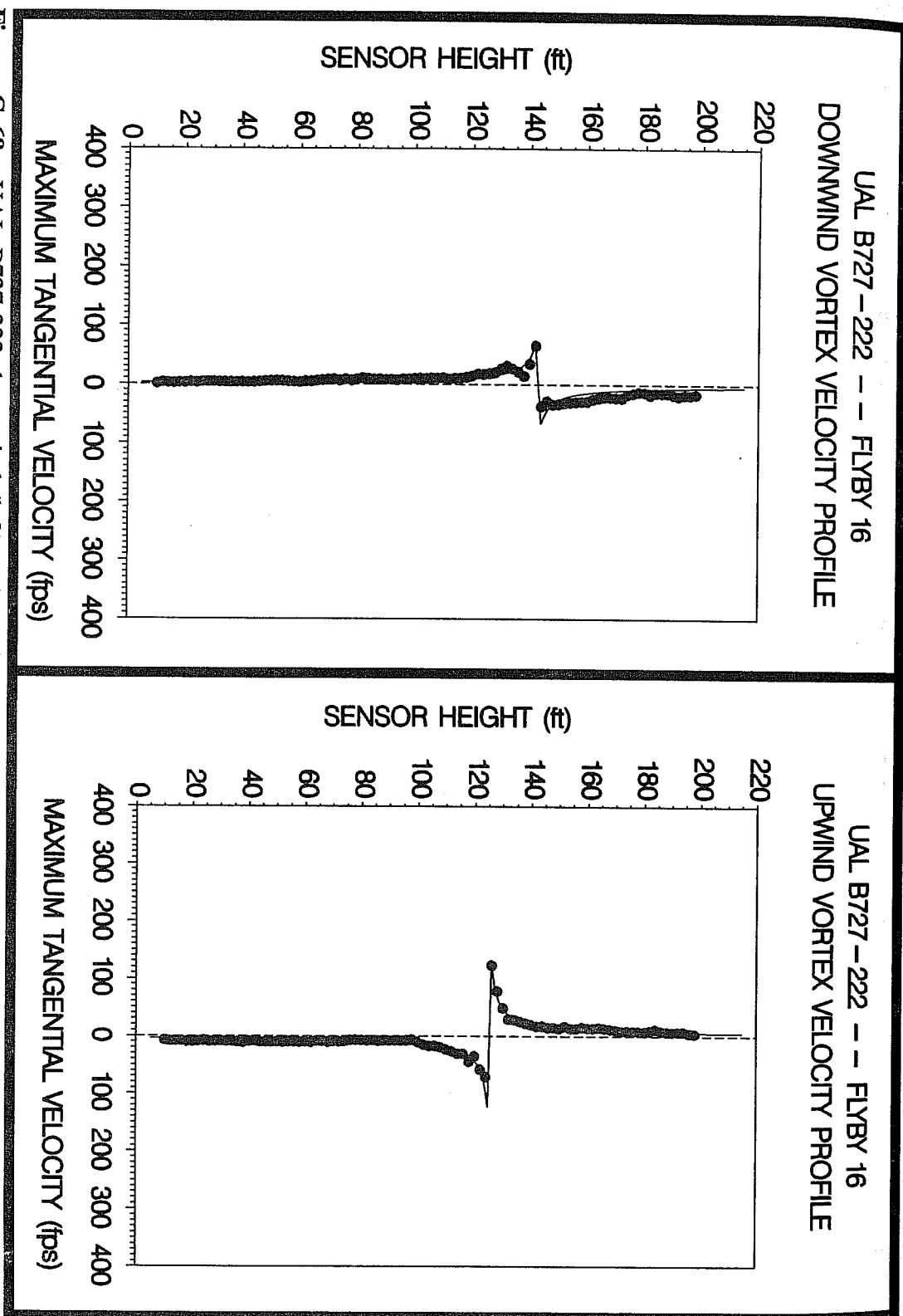


Figure G-68. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 16, ambient wind speed = 6.4 kts,  $\delta_F = 40^\circ$ , IAS = 120 kts, GW = 125,500 lbs. Ages, radii, and velocities of the vortex cores are 19 and 26 s, 0.9 and 0.6 ft, and 65.3 and 123.1 fps, respectively.

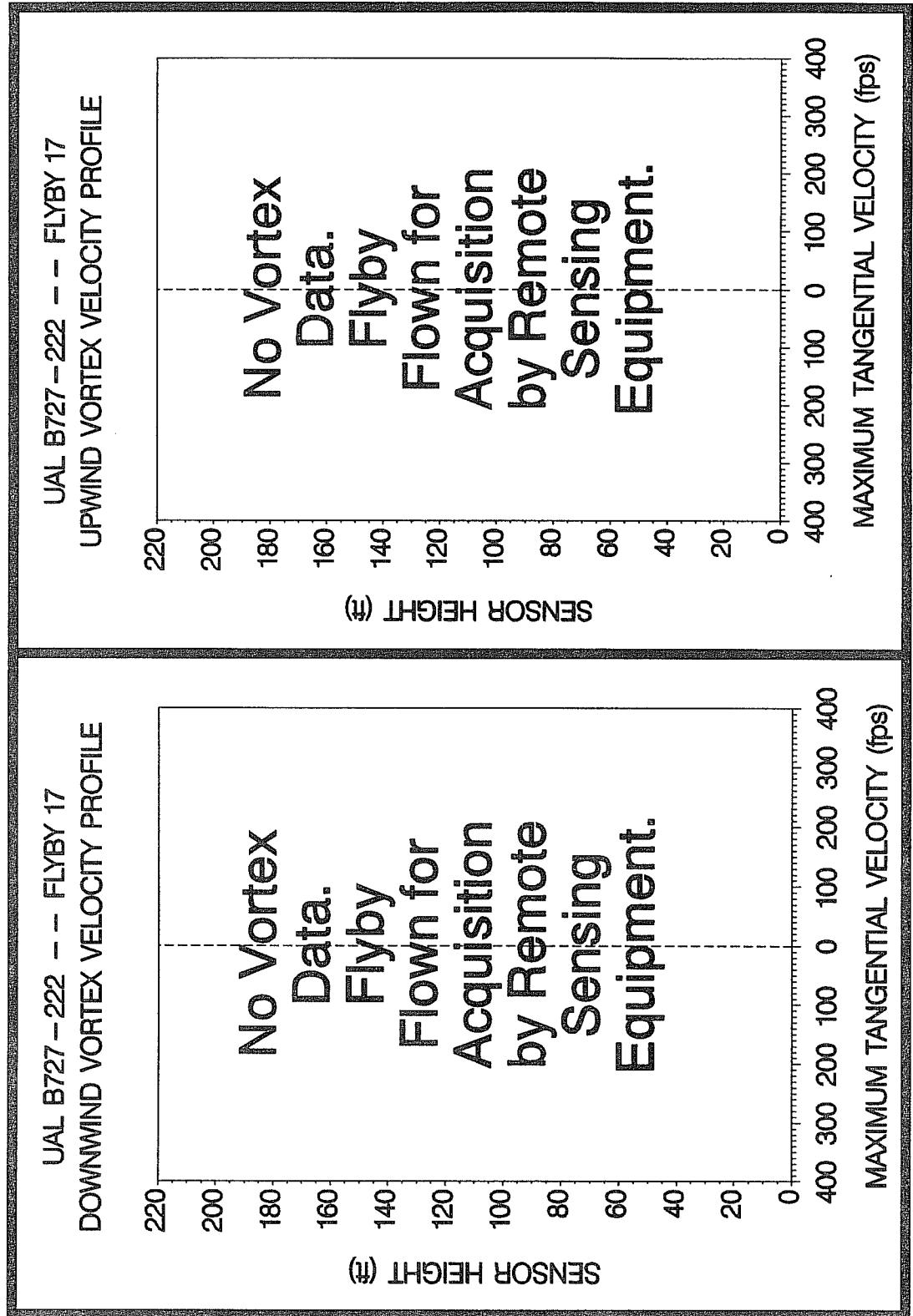


Figure G-69. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 17, ambient wind speed=10.6 kts,  $\delta_F=0^\circ$ , IAS=205 kts, GW=124,000 lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) s, (O) and (O) ft, and (O) and (O) fps, respectively.

G-71

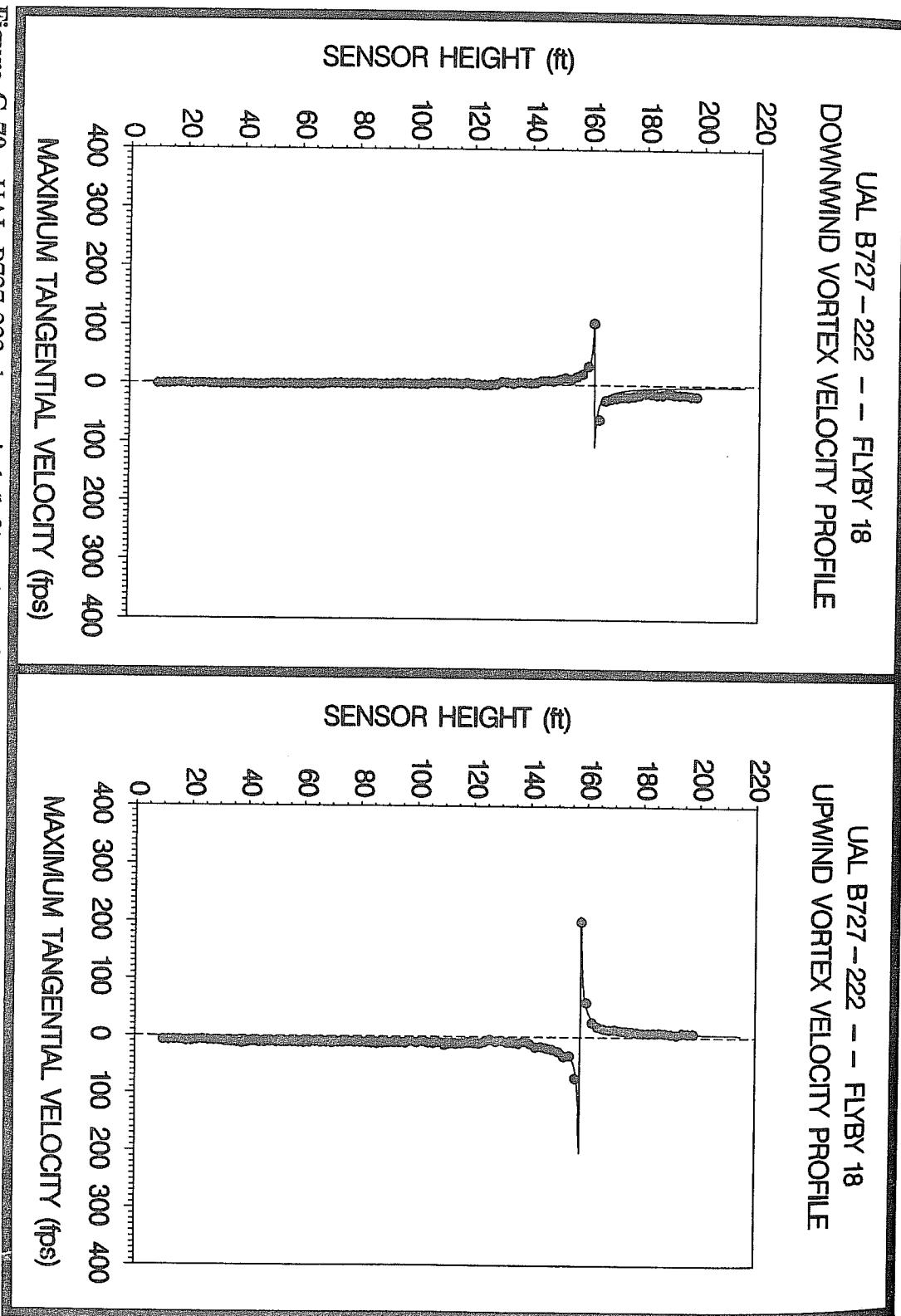
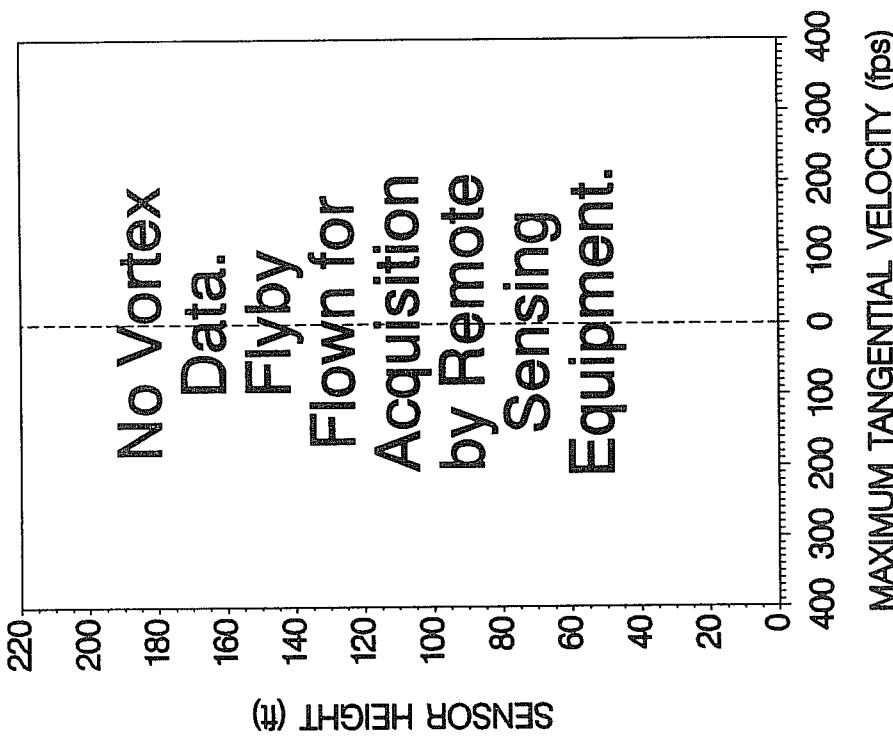


Figure G-70. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 18, ambient wind speed = 6.5 kts,  $\delta_F = 0^\circ$ , IAS = 205 kts, GW = 123,000 lbs. Ages, radii, and velocities of the vortex cores are 26 and 32 s, 0.2 and 0.1 ft, and 105.8 and 201.4 fps, respectively.

UAL B727-222 - - FLYBY 19  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B727-222 - - FLYBY 19  
UPWIND VORTEX VELOCITY PROFILE

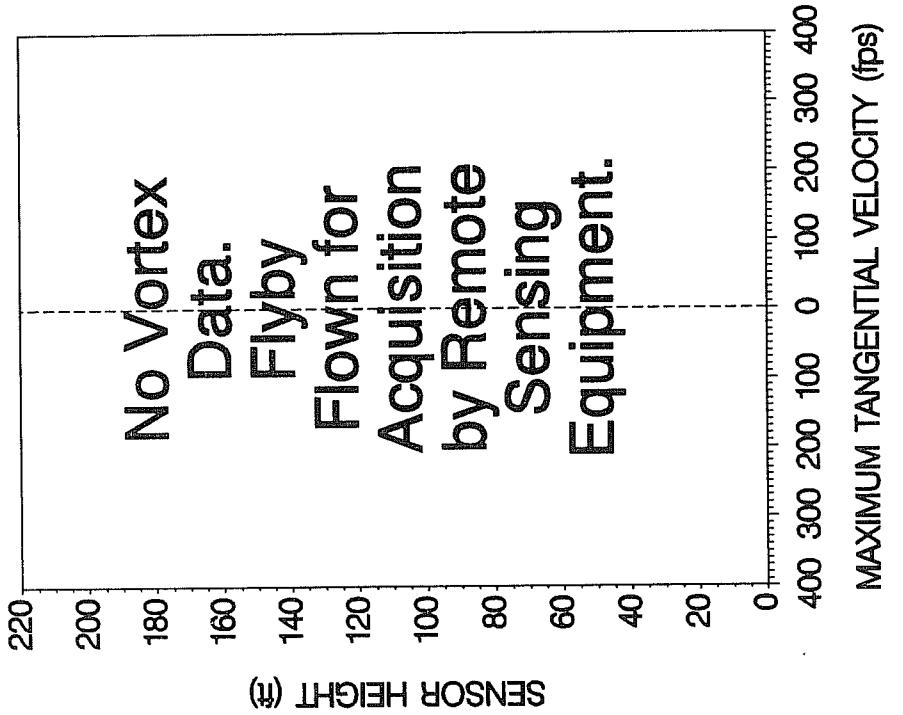


Figure G-71. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 19, ambient wind speed = 6.2 kts,  $\delta_F = 40^\circ$ , IAS = 114 kts, GW = 122,500 lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) s, (O) and (O) ft, and (O) and (O) fps, respectively.

G-73

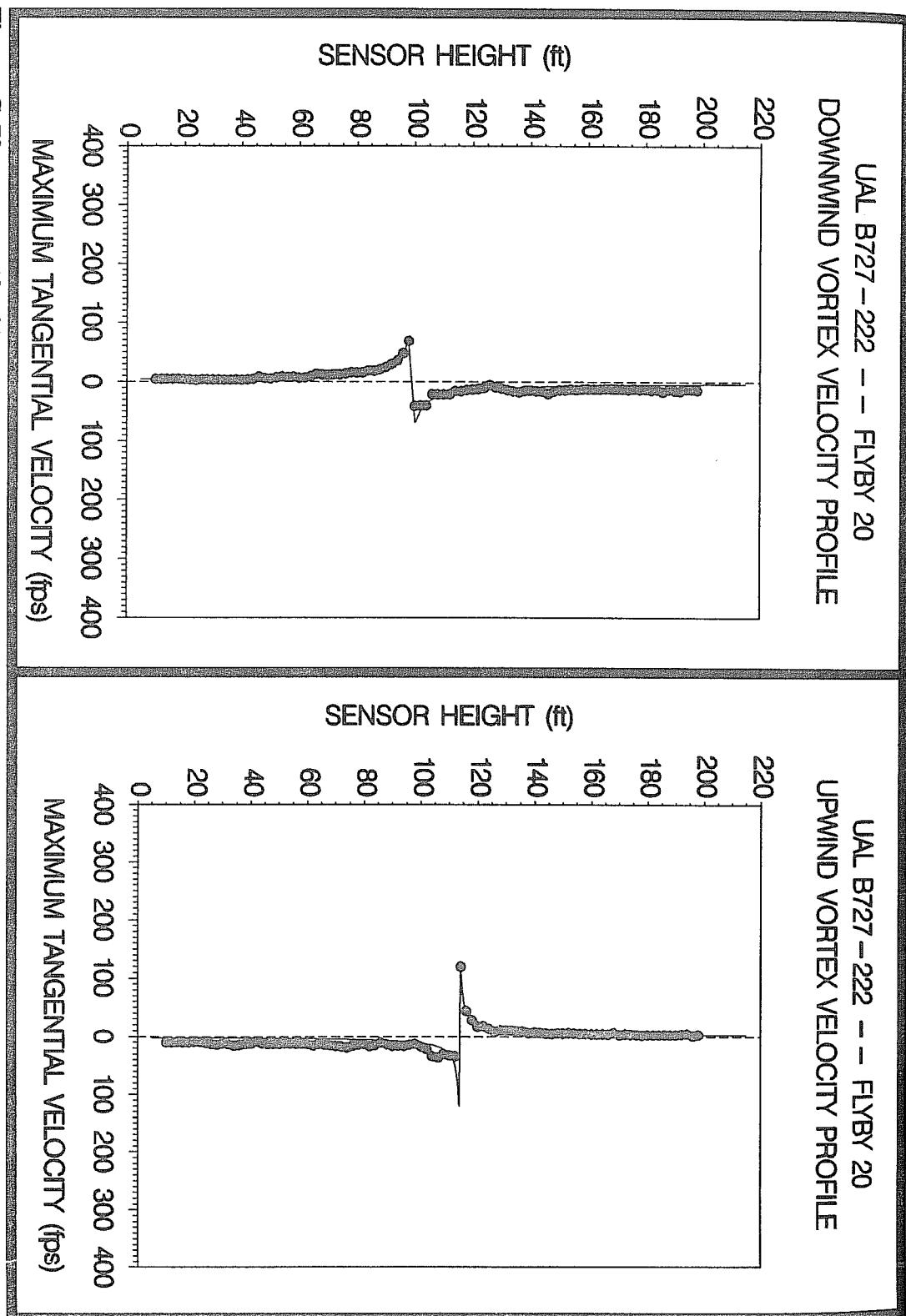
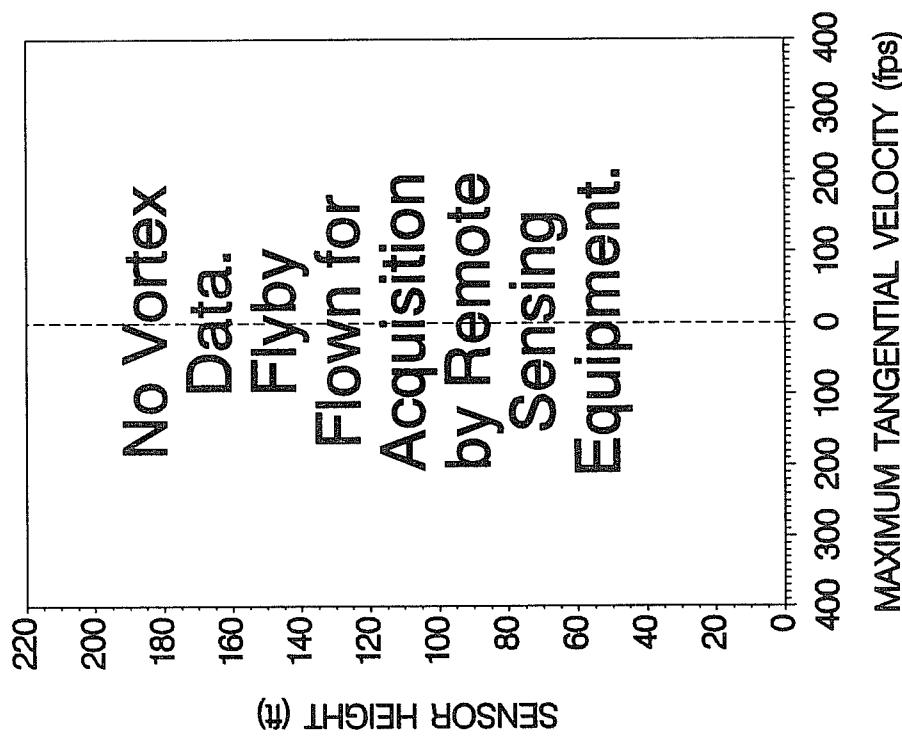


Figure G-72. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 20, ambient wind speed = 6.5 kts,  $\delta_F = 40^\circ$ , IAS = 114 kts, GW = 121,000 lbs. Ages, radii, and velocities of the vortex cores are 28 and 39 s, 1.1 and 0.2 ft, and 68.7 and 120.2 fps, respectively.

UAL B727-222 -- FLYBY 21  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B727-222 -- FLYBY 21  
UPWIND VORTEX VELOCITY PROFILE

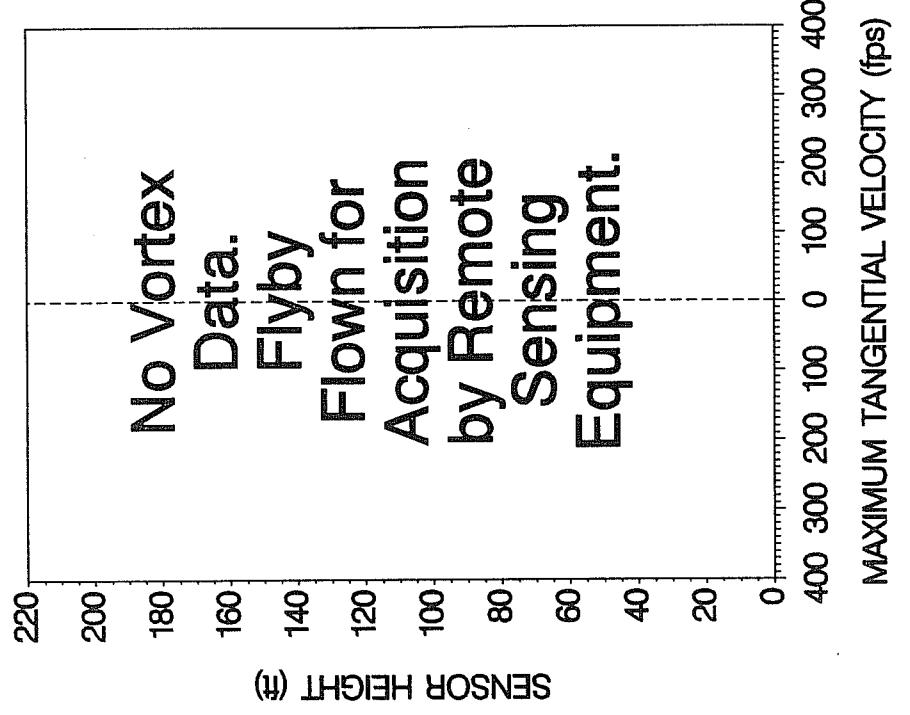


Figure G-73. UAL B727-222 downwind (left) and upwind (right) vortex velocity profiles at maximum intensity from Day of Year 266, Flyby 21, ambient wind speed = 8.3 kts,  $\delta_F = 30^\circ$ ,  $IAS = 119$  kts,  $GW = 119,000$  lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) ft, and (O) and (O) fps, respectively.

G-75

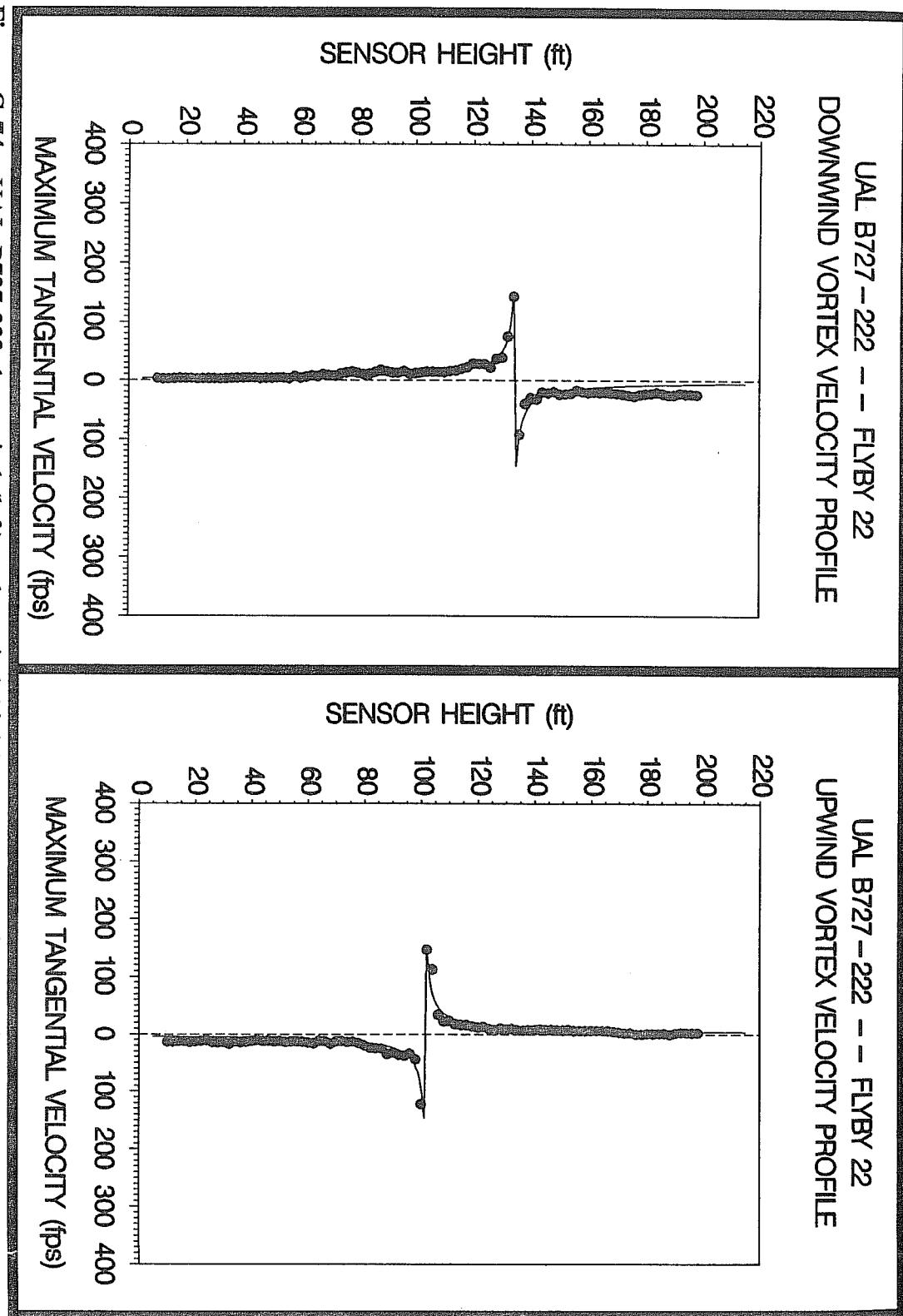


Figure G-74. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 22, ambient wind speed=9.2 kts,  $\delta_F=30^\circ$ , IAS=118 kts, GW=118,500 lbs. Ages, radii, and velocities of the vortex cores are 16 and 24 s, 0.5 and 0.4 ft, and 143.6 and 146.7 fps, respectively.

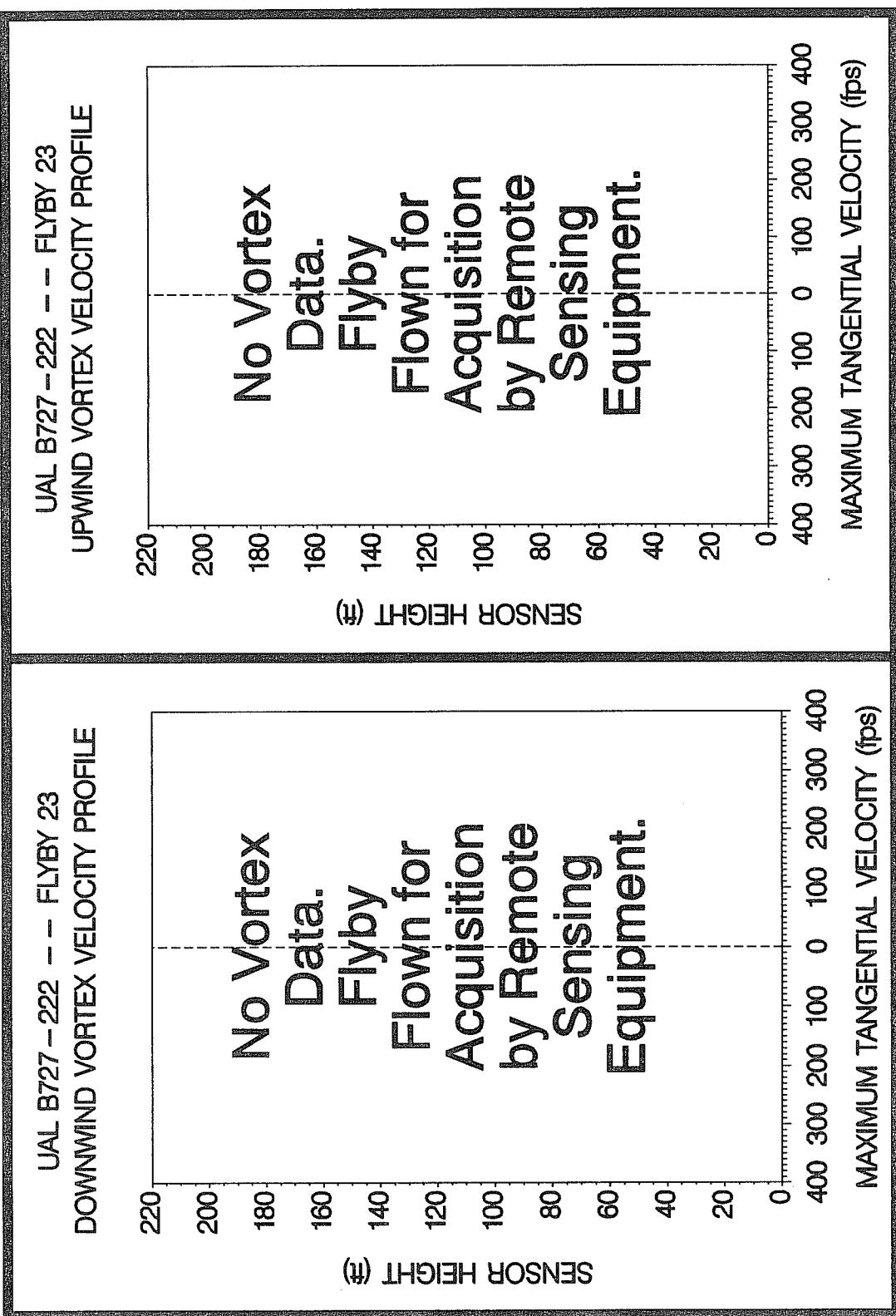


Figure G-75. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 23, ambient wind speed = 8.1 kts,  $\delta_F = 30^\circ$ ,  $IAS = 122$  kts,  $GW = 117,000$  lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) s, (O) and (O) ft, and (O) and (O) fps, respectively.

G-77

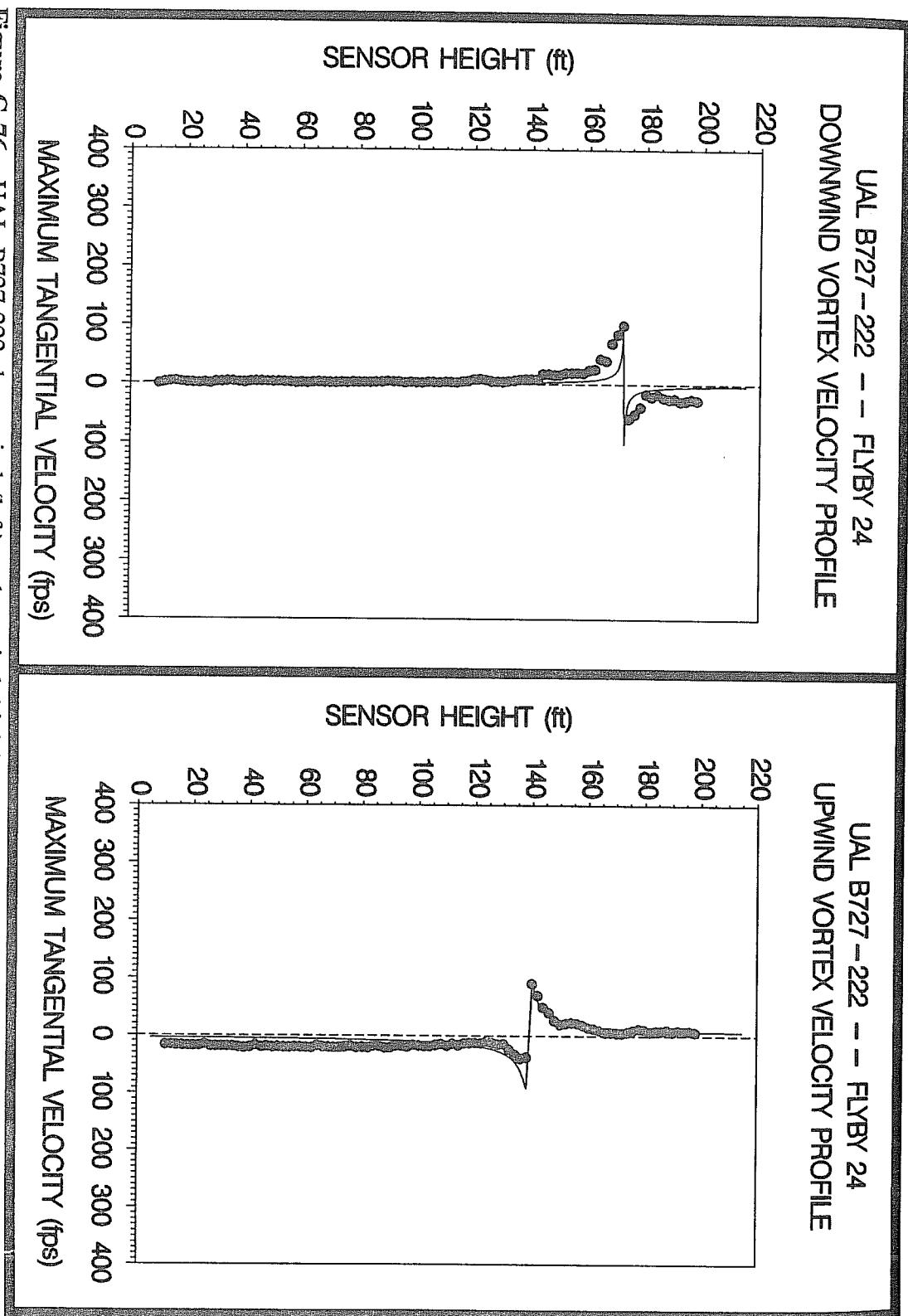
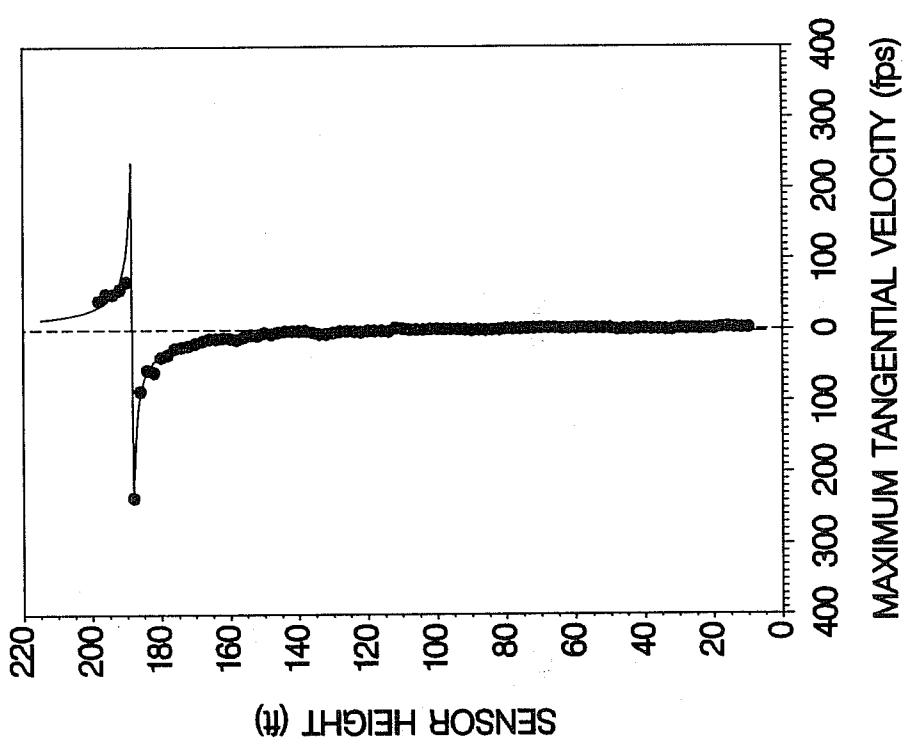


Figure G-76. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 24, ambient wind speed = 8.3 kts,  $\delta_F = 30^\circ$ , IAS = 119 kts, GW = 116,000 lbs. Ages, radii, and velocities of the vortex cores are 18 and 22 s, 1.1 and 0.9 ft, and 100.4 and 90.4 fps, respectively.

UAL B727-222 - FLYBY 25  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B727-222 - FLYBY 25  
UPWIND VORTEX VELOCITY PROFILE

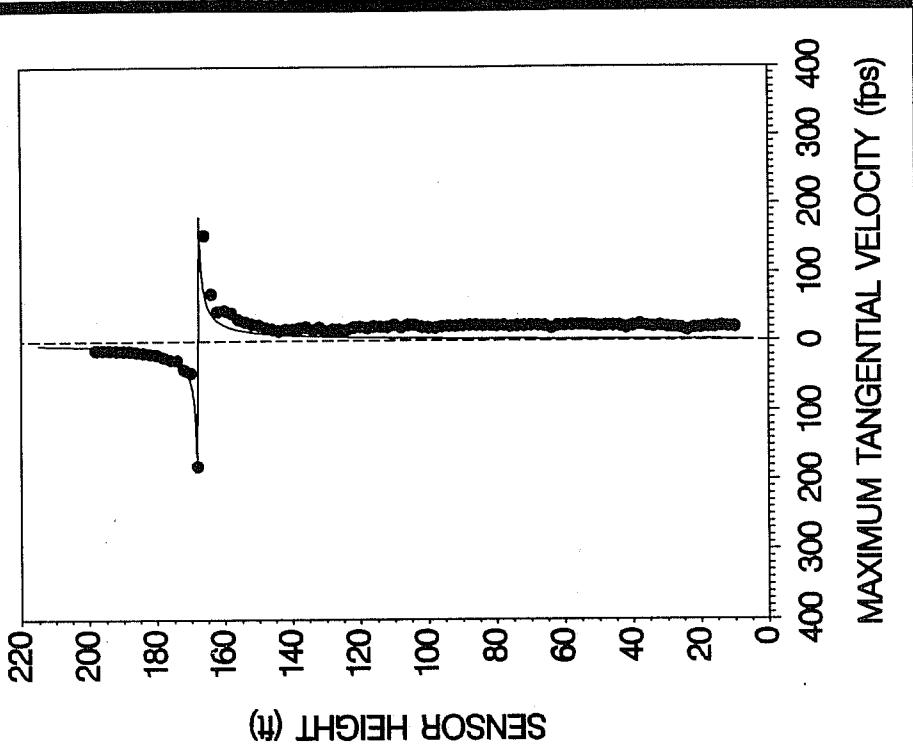


Figure G-77. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 25, ambient wind speed = 9.1 kts,  $\delta_F = 30^\circ$ ,  $IAS = 115$  kts,  $GW = 114,500$  lbs. Ages, radii, and velocities of the vortex cores are 12 and 18 s, 0.3 and 0.2 ft, and 235.8 and 179.6 fps, respectively.

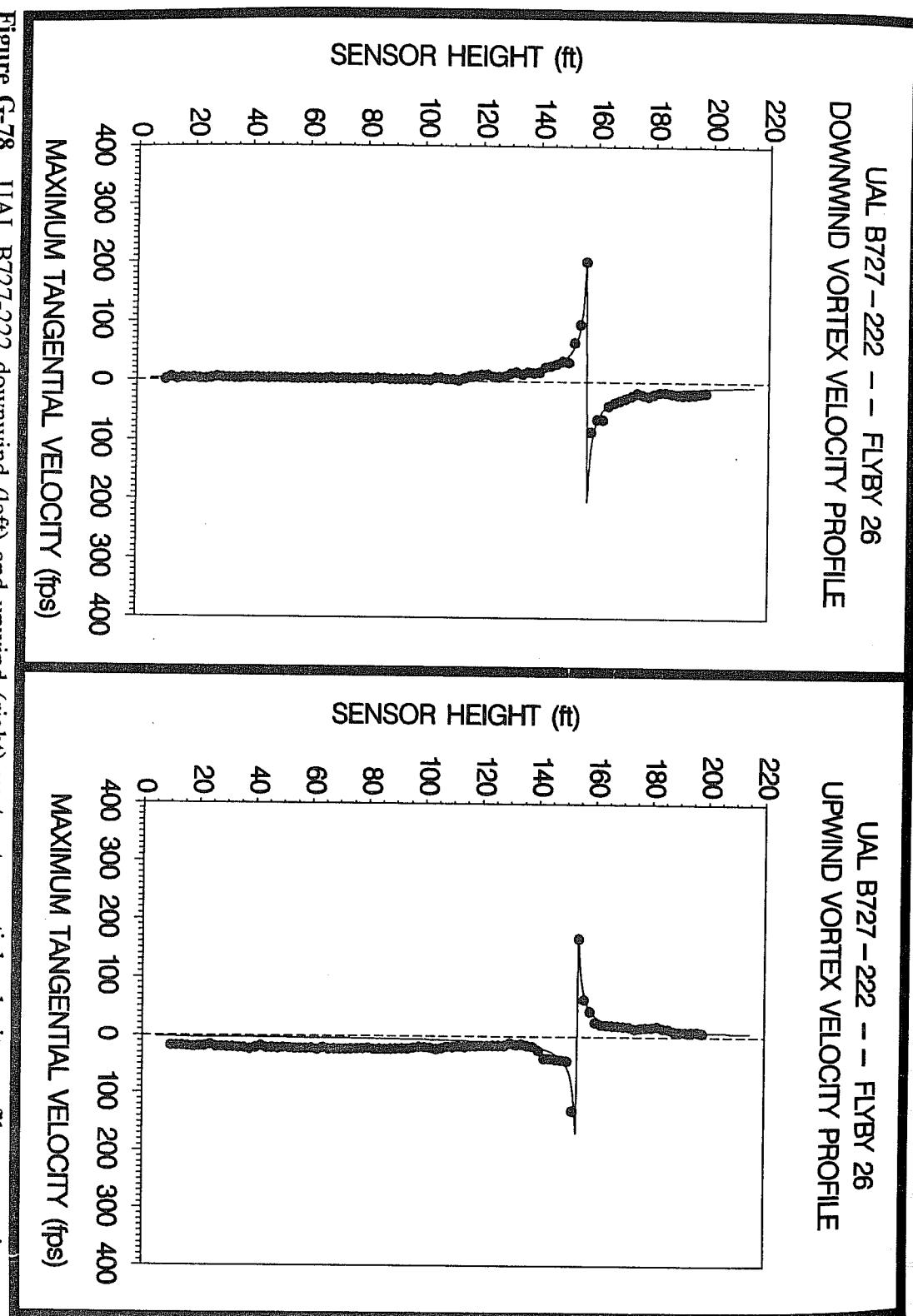


Figure G-78. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 26, ambient wind speed = 8.5 kts,  $\delta_F = 30^\circ$ , IAS = 120 kts, GW = 113,000 lbs. Ages, radii, and velocities of the vortex cores are 13 and 18 s, 0.4 and 0.3 ft, and 202.8 and 167.9 fps, respectively.

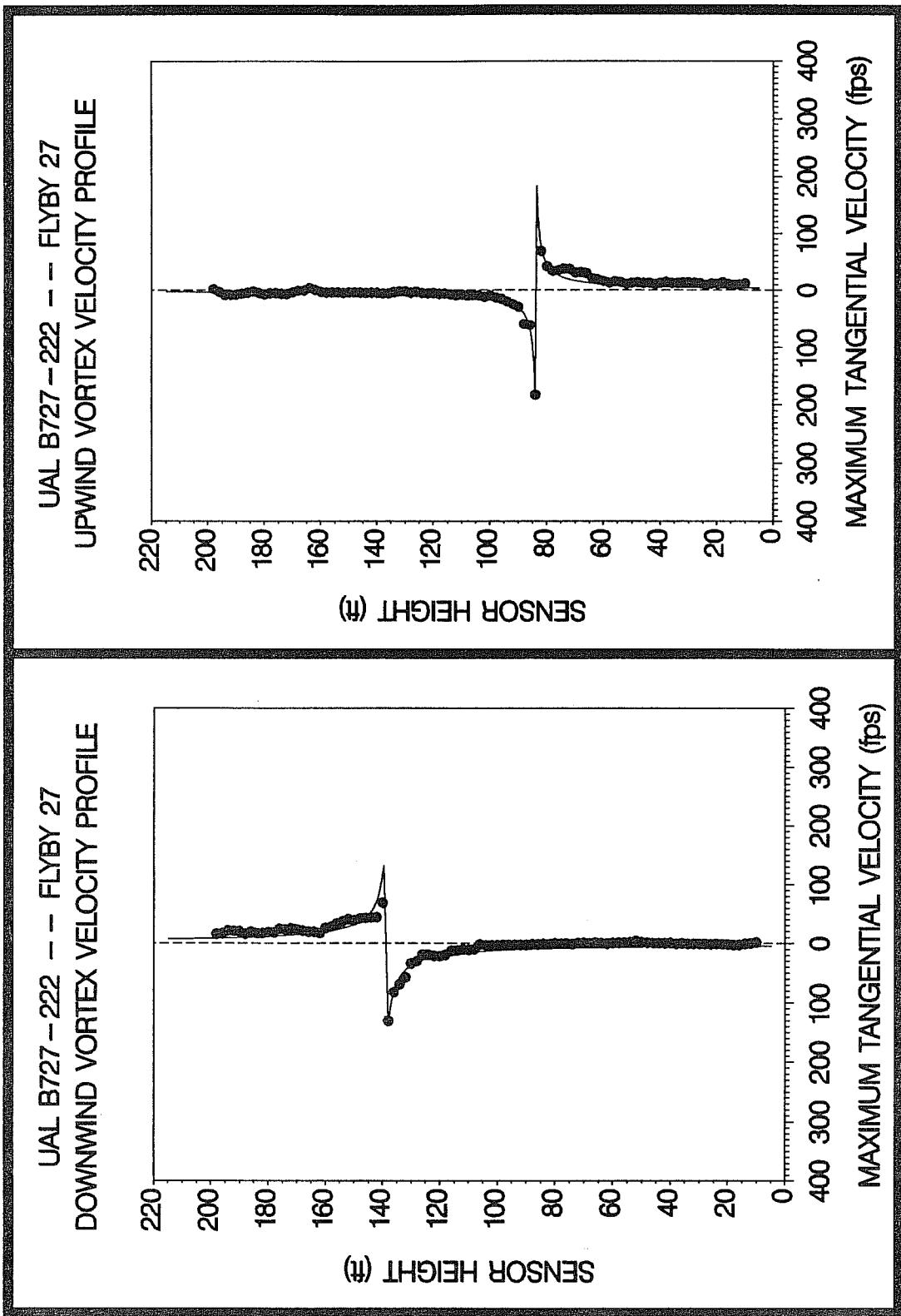


Figure G-79. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 27, ambient wind speed = 5.1 kts,  $\delta_F = 30^\circ$ , IAS = 130 kts, GW = 143,500 lbs. Ages, radii, and velocities of the vortex cores are 10 and 18 s, 0.7 and 0.2 ft, and 130.8 and 182.6 fps, respectively.

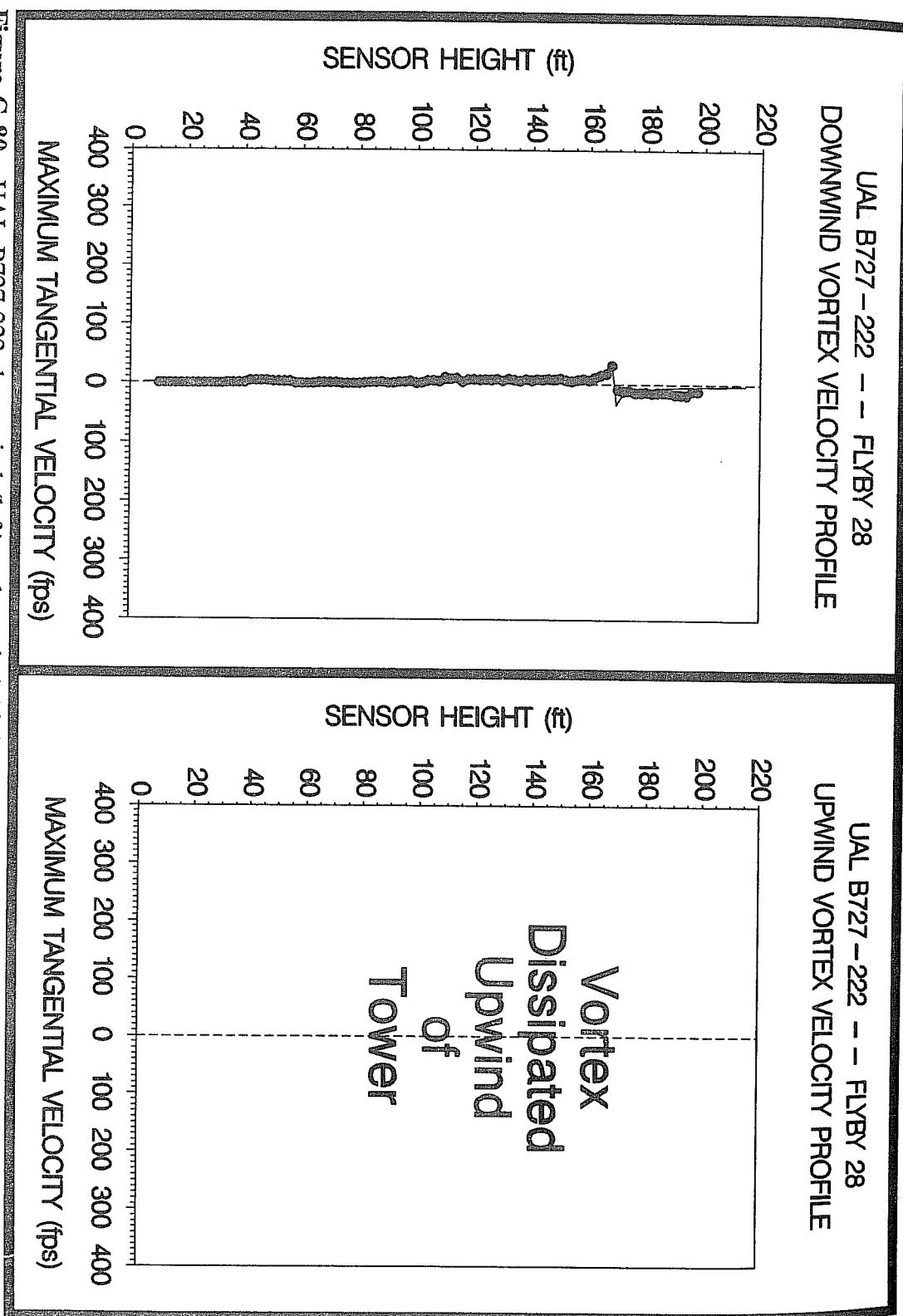
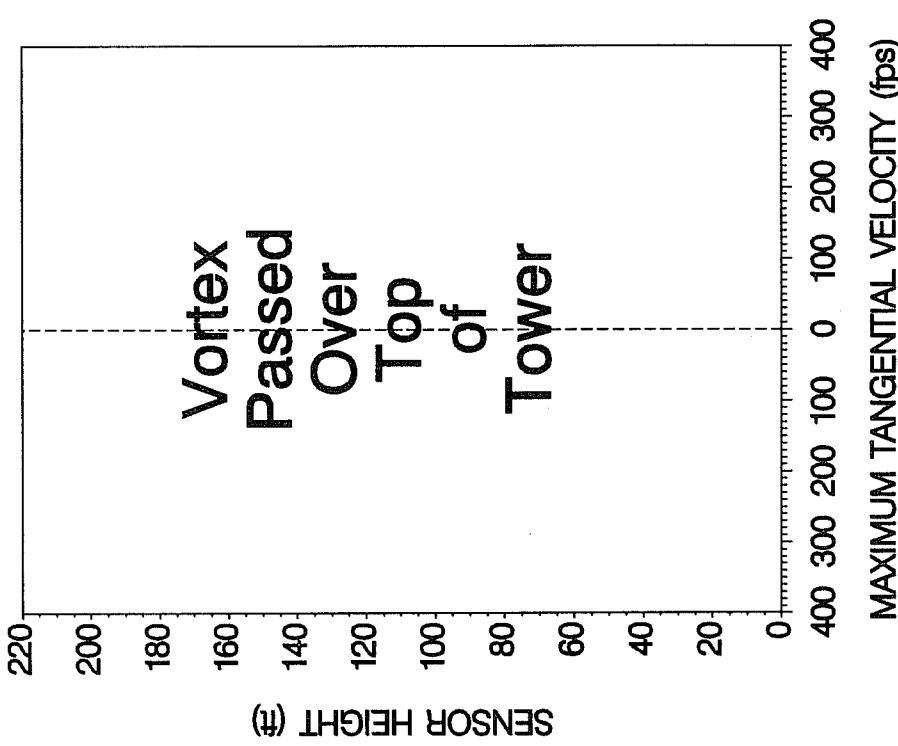


Figure G-80. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 28, ambient wind speed = 2.3 kts,  $\delta_F = 30^\circ$ , IAS = 132 kts, GW = 142,000 lbs. Ages, radii, and velocities of the vortex cores are 38 and (D) s, 0.8 and (D) ft, and 31.9 and (D) fps, respectively.

UAL B727-222 -- FLYBY 29  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B727-222 -- FLYBY 29  
UPWIND VORTEX VELOCITY PROFILE

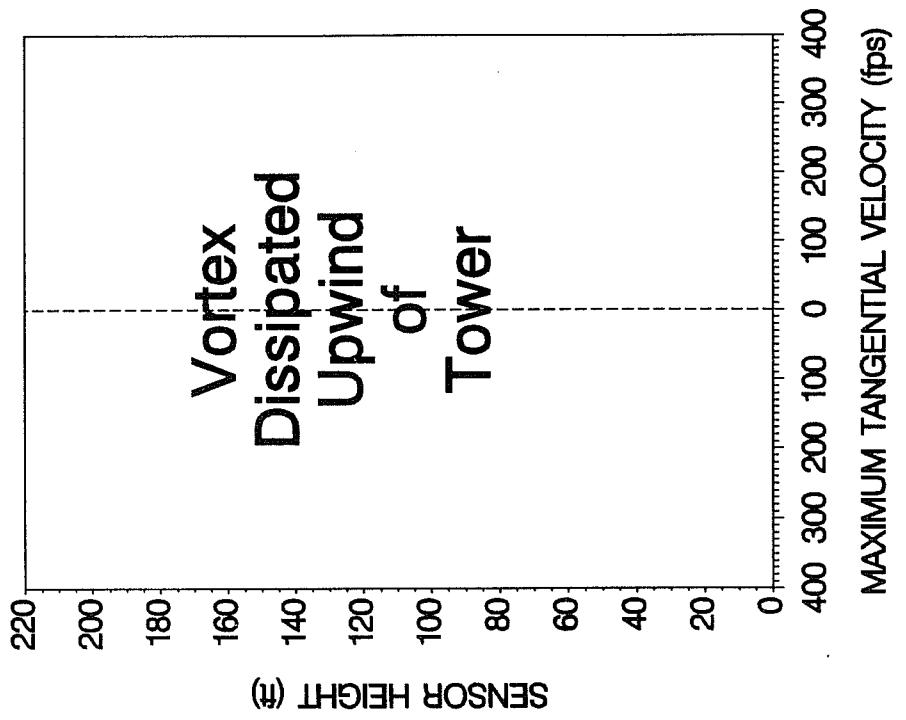


Figure G-81. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 29, ambient wind speed = 4.3 kts,  $\delta_F = 30^\circ$ , IAS = 132 kts, GW = 141,000 lbs. Ages, radii, and velocities of the vortex cores are (P) and (D) ft, and (P) and (D) fps, respectively.

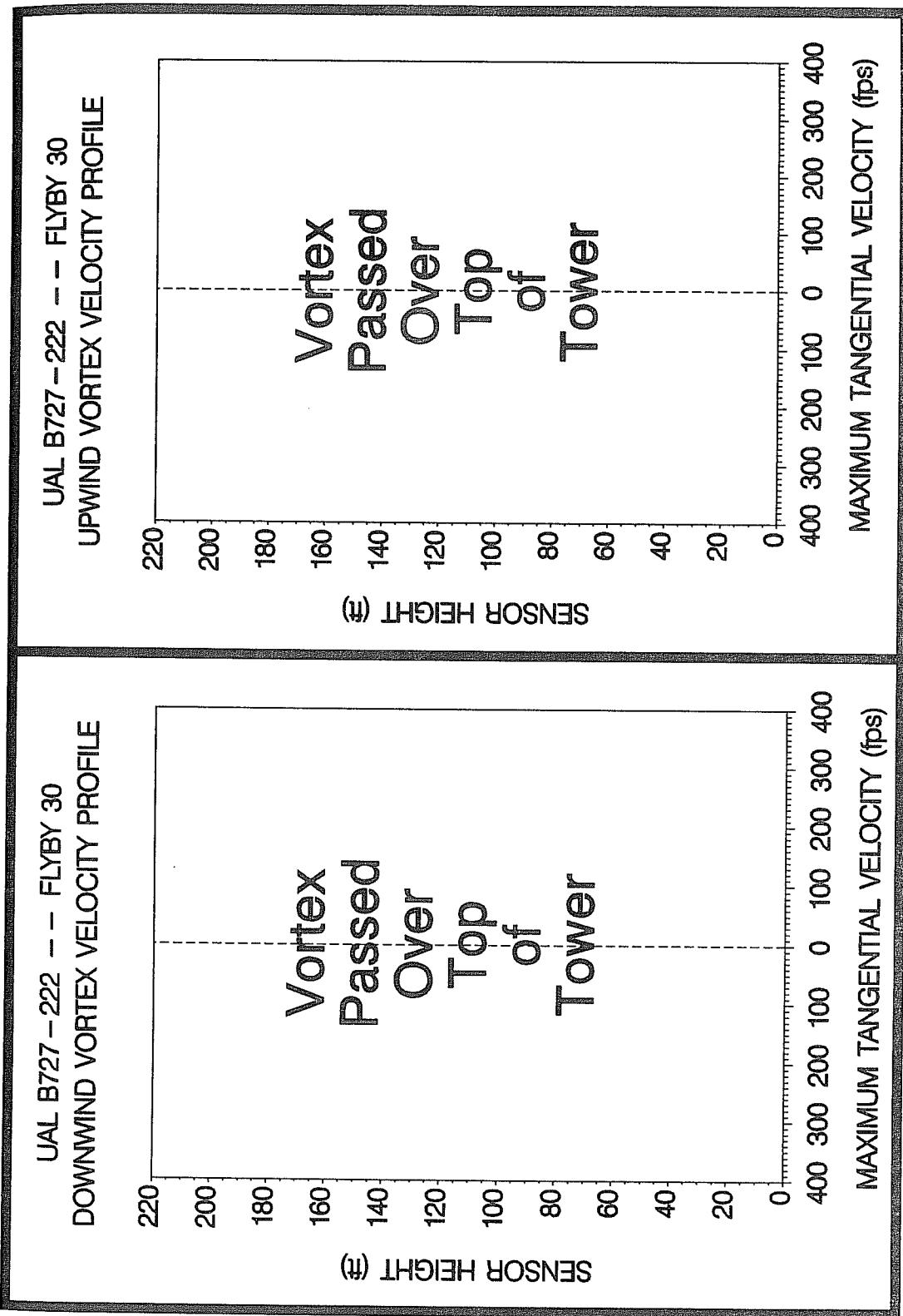
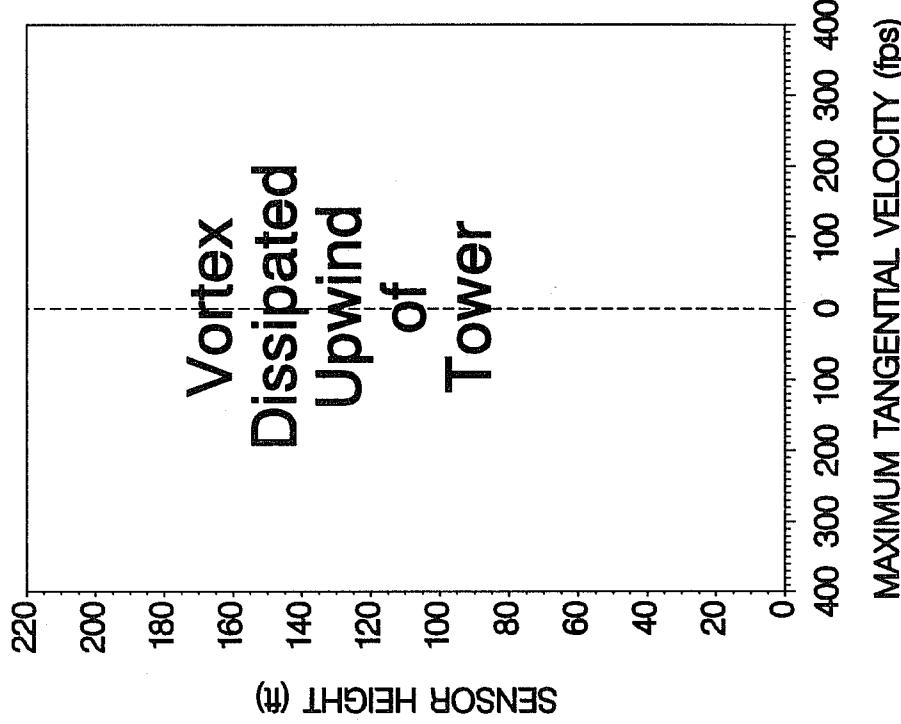


Figure G-82. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 30, ambient wind speed = 3.1 kts,  $\delta_F = 30^\circ$ , IAS = 128 kts, GW = 140,000 lbs. Ages, radii, and velocities of the vortex cores are (P) and (P) ft, and (P) and (P) s, (P) and (P) and (P) fps, respectively.

UAL B727-222 -- FLYBY 31  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B727-222 -- FLYBY 31  
UPWIND VORTEX VELOCITY PROFILE

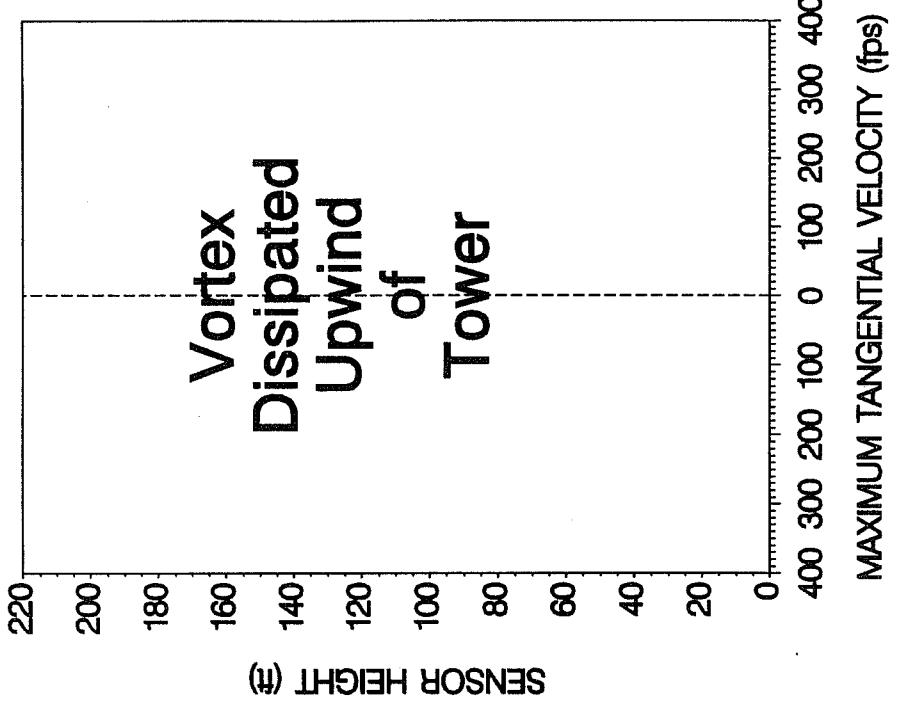


Figure G-83. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 31, ambient wind speed = 2.2 kts,  $\delta_F = 30^\circ$ , IAS = 130 kts, GW = 139,000 lbs. Ages, radii, and velocities of the vortex cores are (D) and (D) s, (D) and (D) ft, and (D) and (D) fps, respectively.

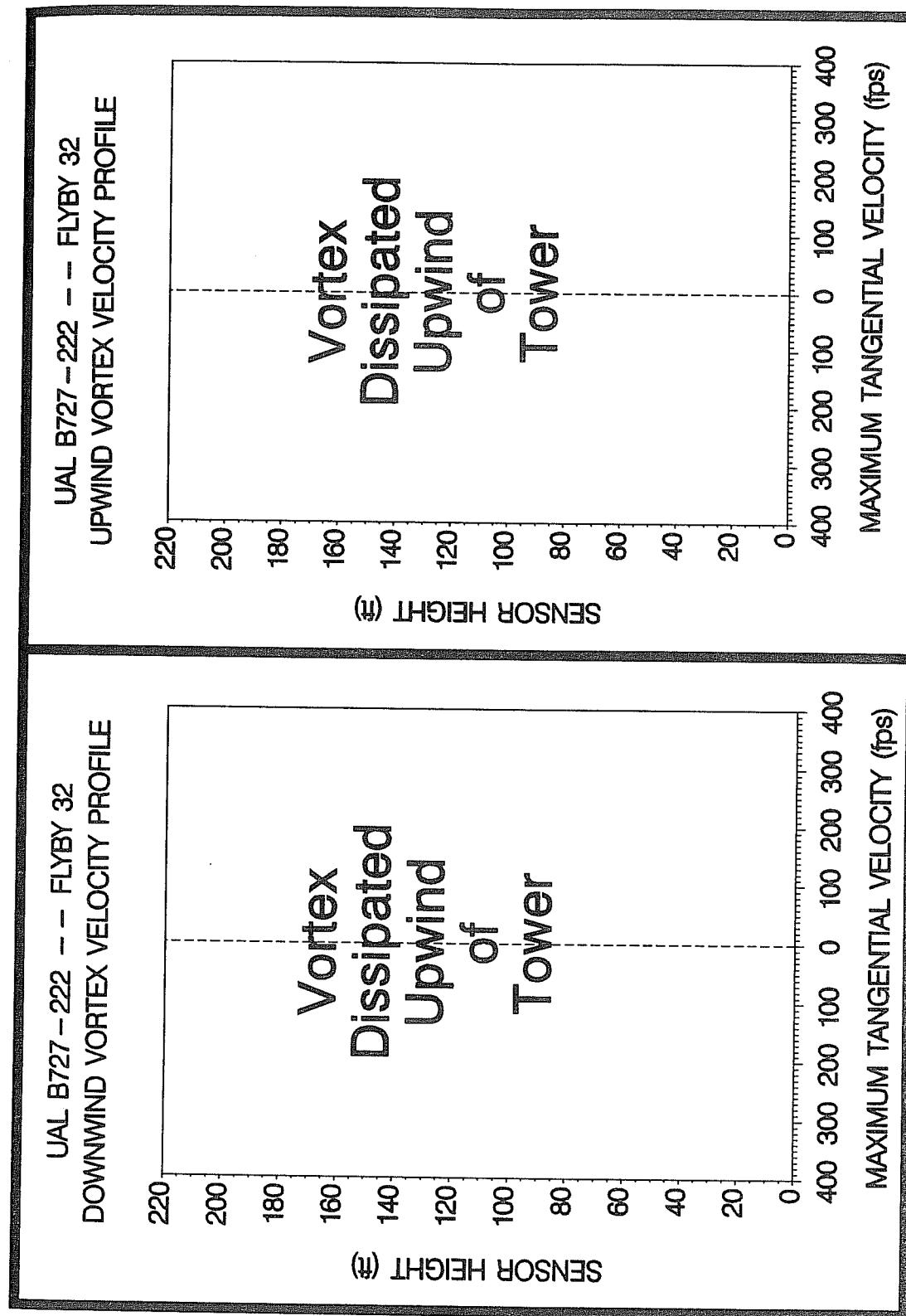
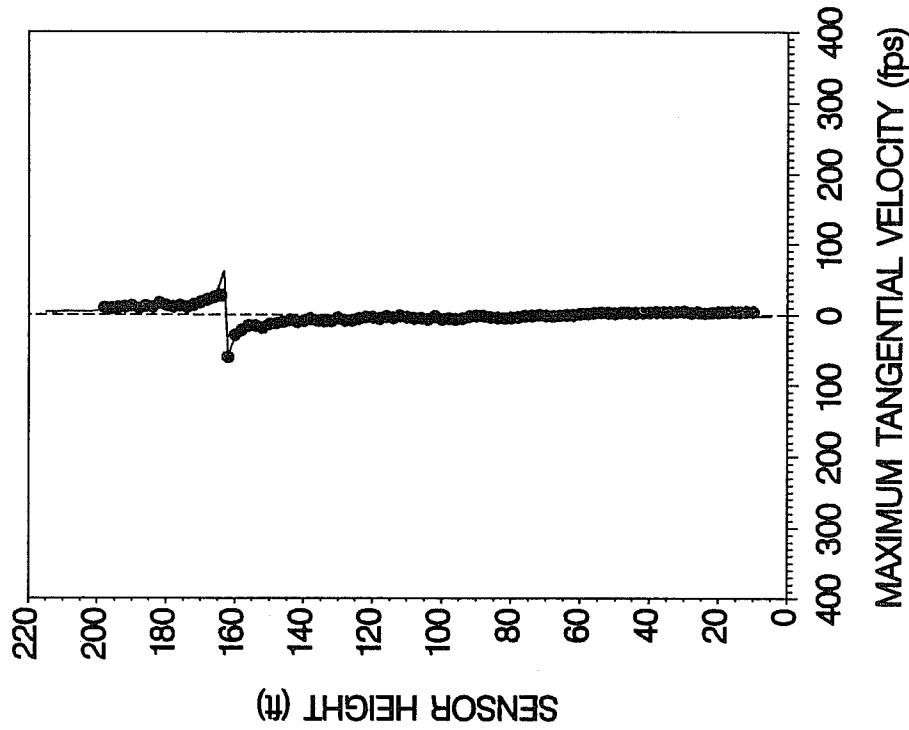


Figure G-84. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 32, ambient wind speed = 0.9 kts,  $\delta_F = 30^\circ$ , IAS = 130 kts, GW = 137,500 lbs. Ages, radii, and velocities of the vortex cores are (D) and (D) s, (D) and (D) ft, and (D) and (D) fps, respectively.

UAL B727-222 -- FLYBY 33  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B727-222 -- FLYBY 33  
UPWIND VORTEX VELOCITY PROFILE

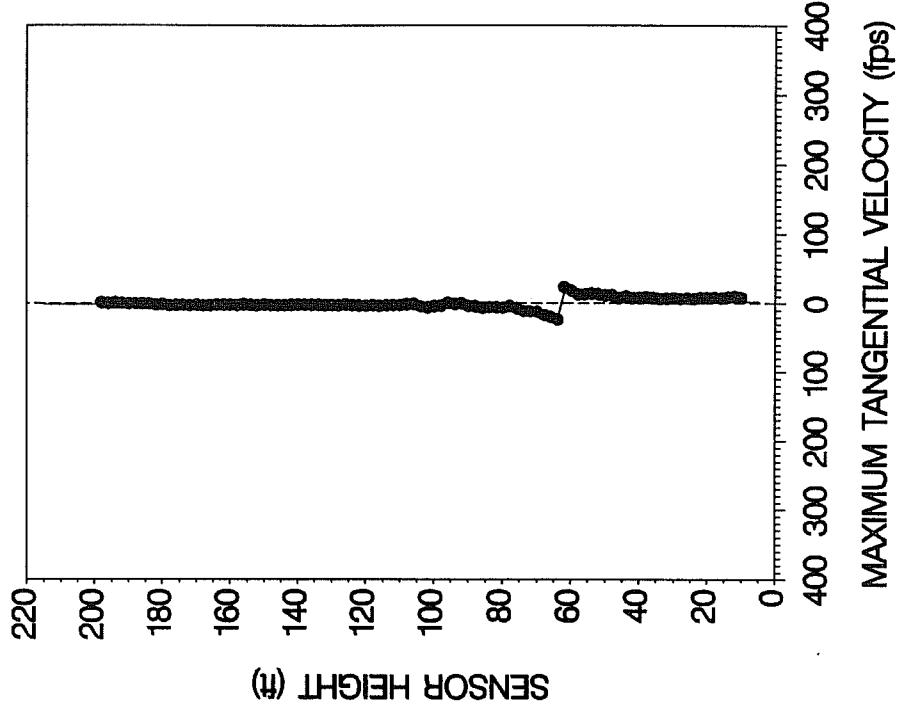
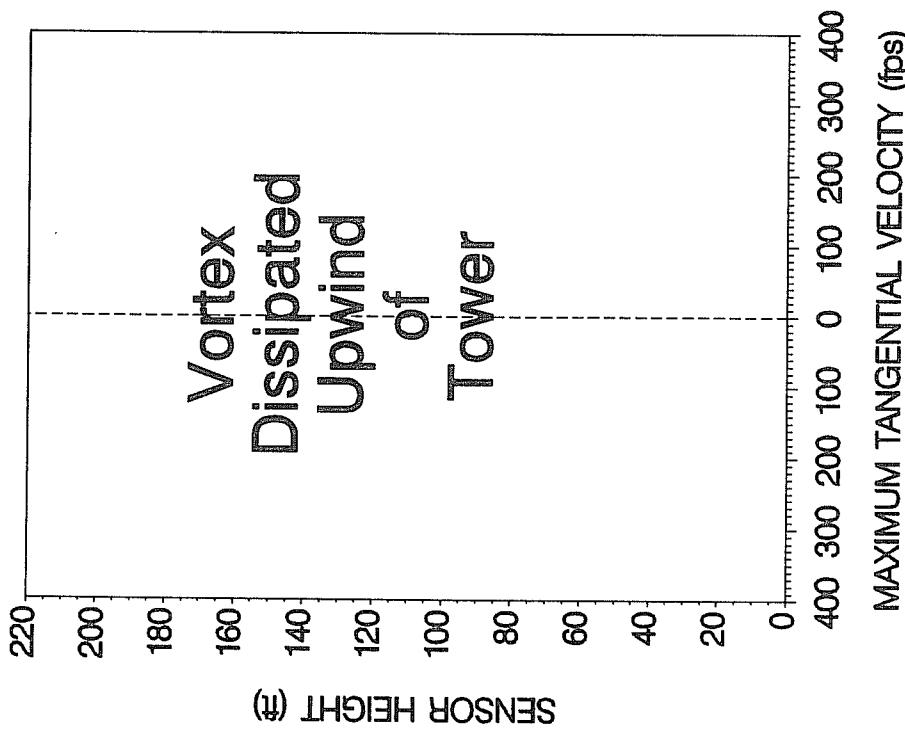


Figure G-85. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 33, ambient wind speed = 2.1 kts,  $\delta_F = 40^\circ$ , IAS = 126 kts, GW = 136,000 lbs. Ages, radii, and velocities of the vortex cores are 36 and 49 s, 0.6 and 1.3 ft, and 60.2 and 23.4 fps, respectively.

UAL B727-222 -- FLYBY 34  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B727-222 -- FLYBY 34  
UPWIND VORTEX VELOCITY PROFILE

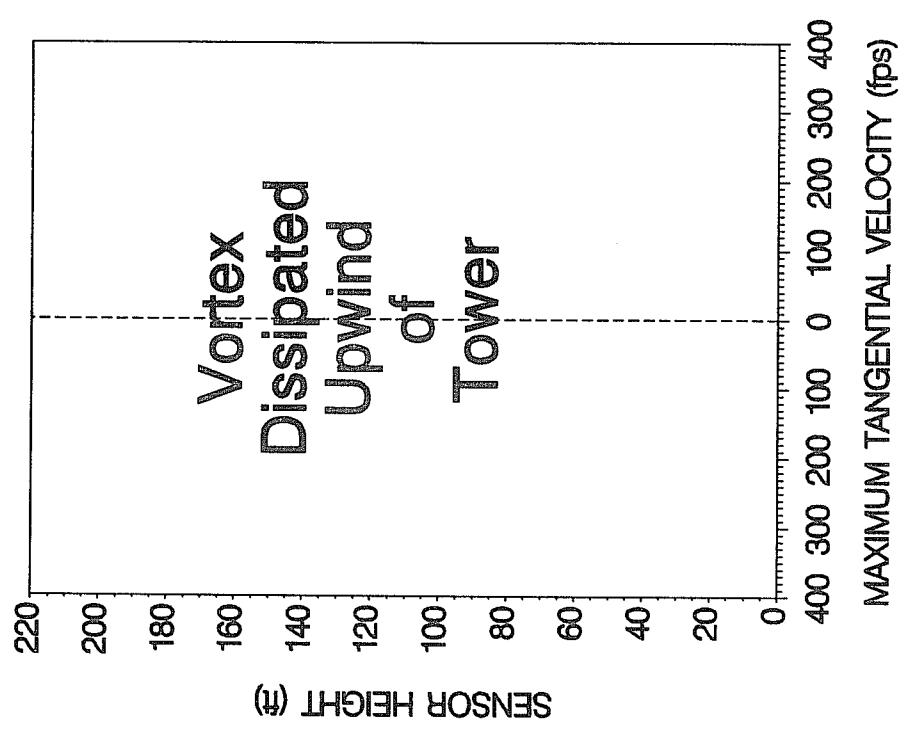


Figure G-86. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 34, ambient wind speed = 3.1 kts,  $\delta_F = 40^\circ$ , IAS = 124 kts, GW = 135,000 lbs. Ages, radii, and velocities of the vortex cores are (D) and (D) s, (D) and (D) ft, and (D) and (D) fps, respectively.

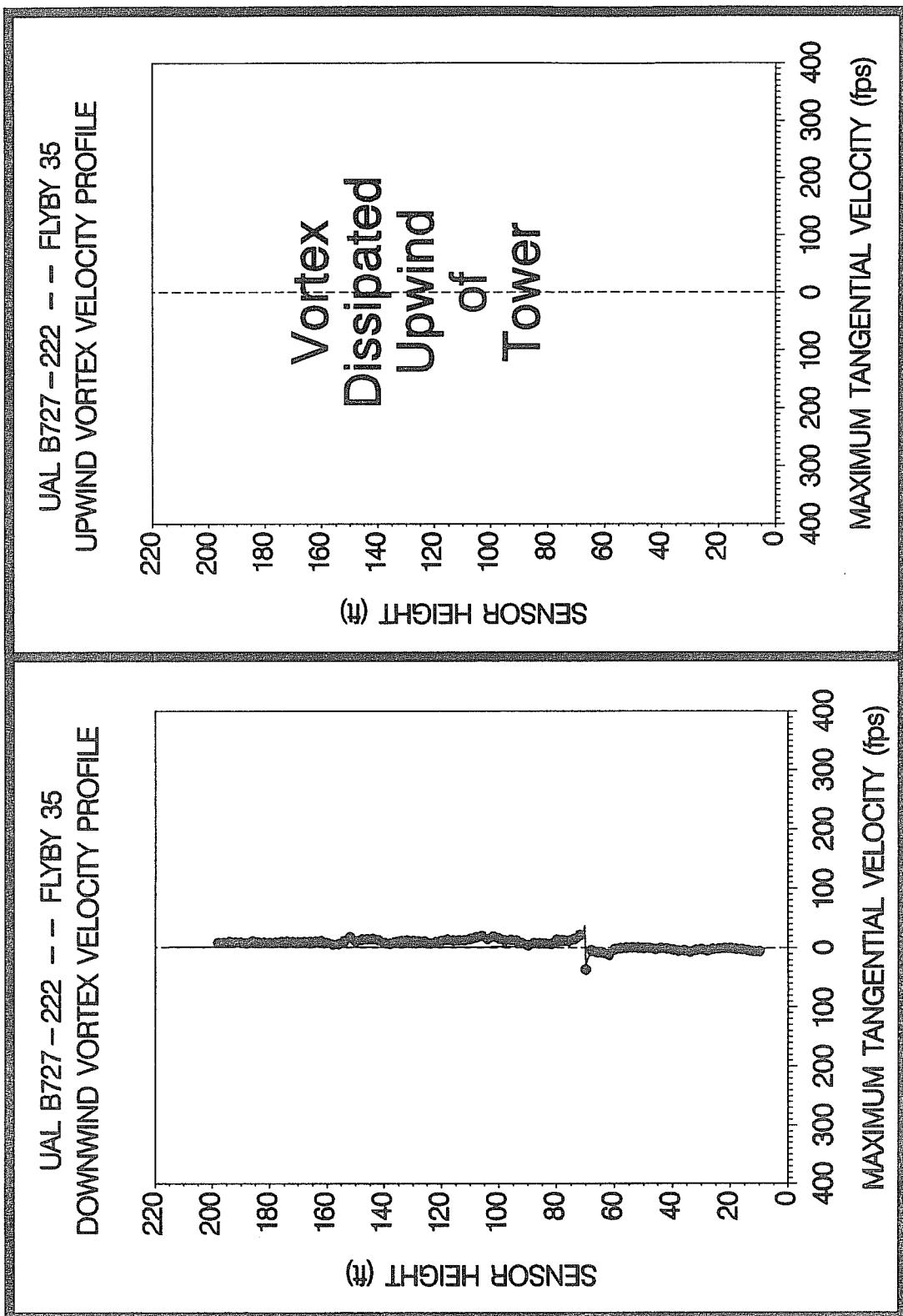


Figure G-87. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 35, ambient wind speed = 2.0 kts,  $\delta_F = 5^\circ$ , IAS = 155 kts, GW = 134,000 lbs. Ages, radii, and velocities of the vortex cores are 38 and (D) s, 0.2 and (D) ft, and 36.9 and (D) fps, respectively.

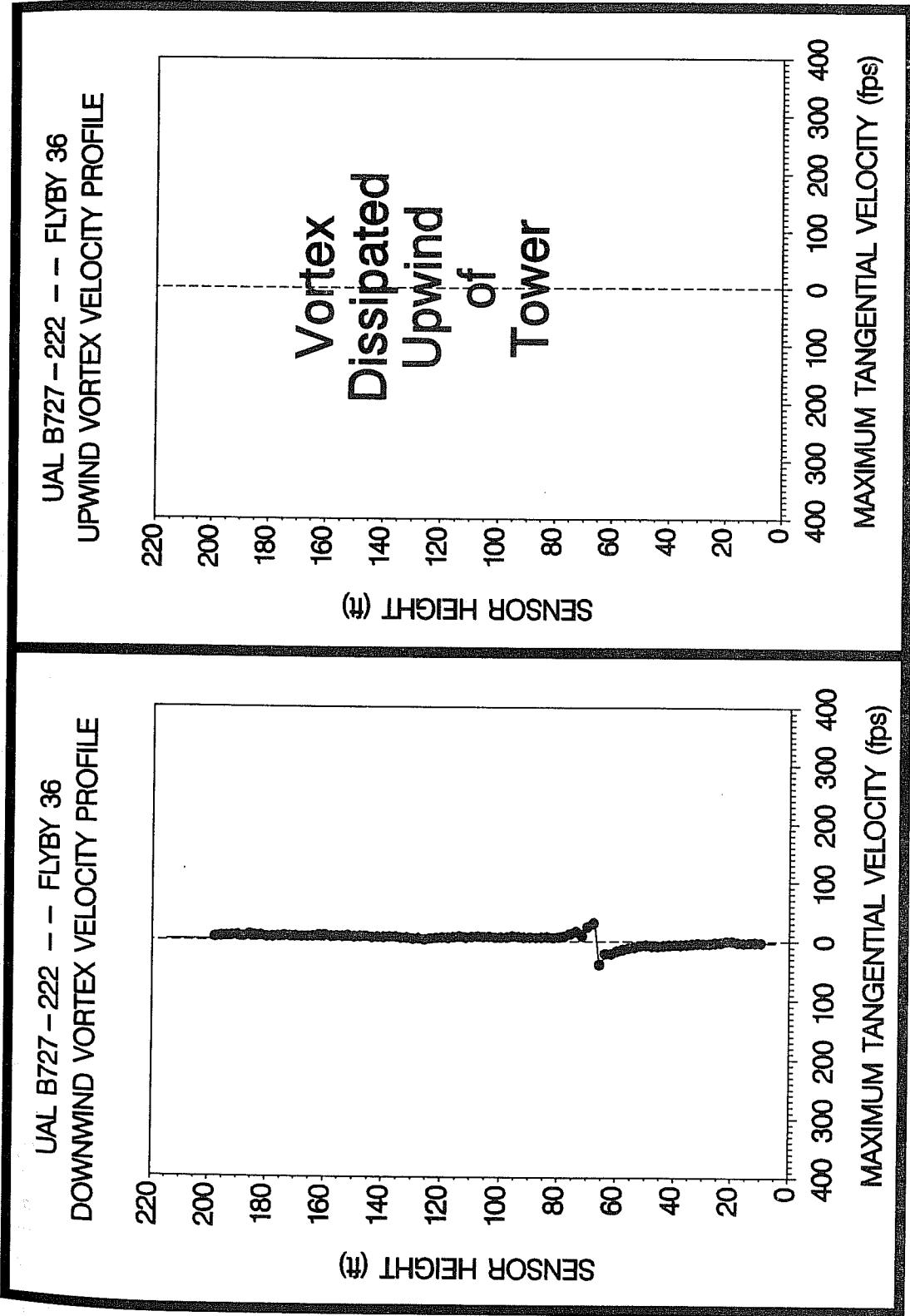


Figure G-88. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 266, Flyby 36, ambient wind speed = 3.6 kts,  $\delta_F = 0^\circ$ , IAS = 250 kts, GW = 132,000 lbs. Ages, radii, and velocities of the vortex cores are 4.5 and (D) s, 0.9 and (D) ft, and 39.2 and (D) fps, respectively.

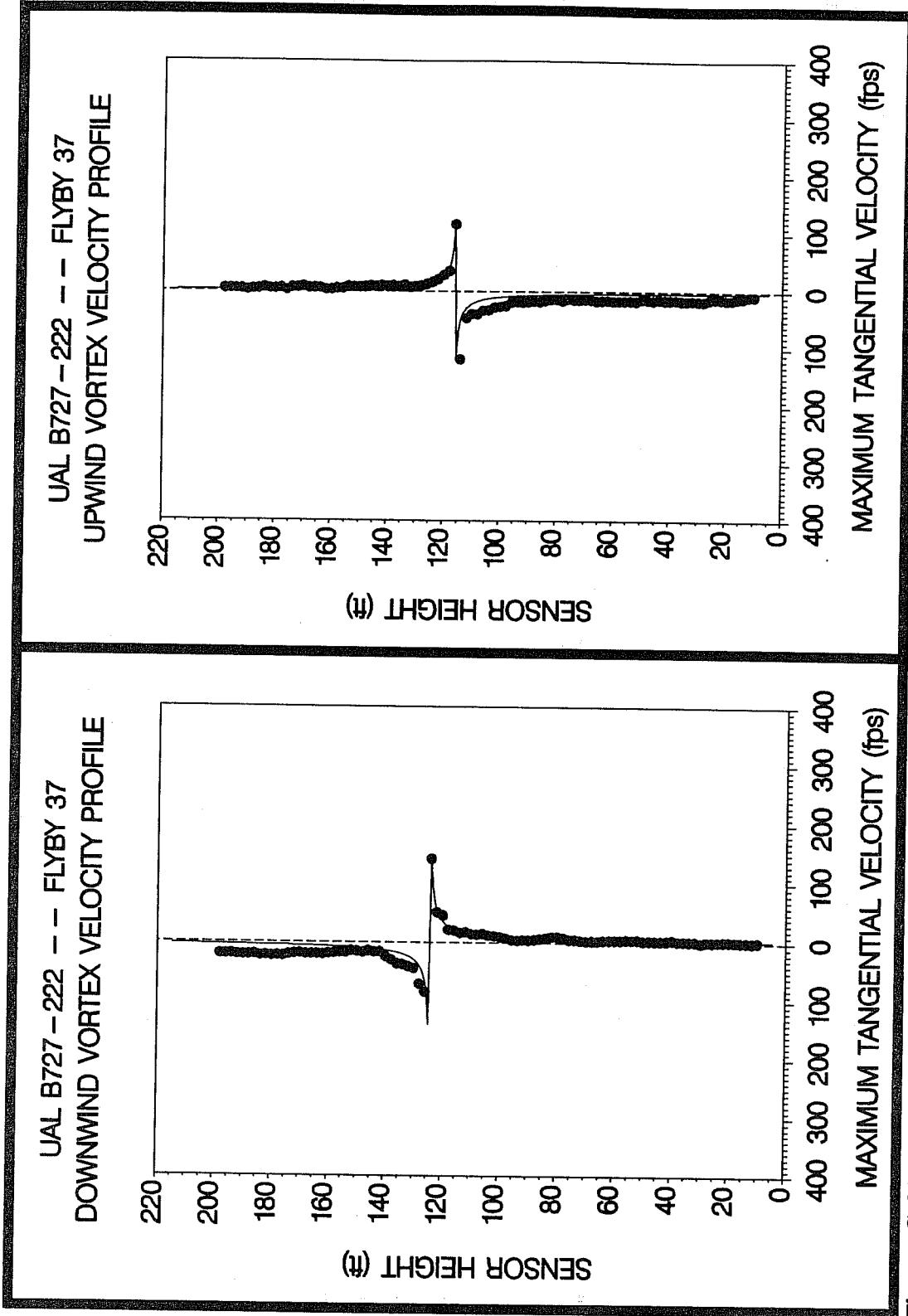


Figure G-89. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 267, Flyby 37, ambient wind speed = 8.5 kts,  $\delta_F = 30^\circ$ , IAS = 130 kts, GW = 142,500 lbs. Ages, radii, and velocities of the vortex cores are 21 and 30 s, 0.3 and 0.2 ft, and 140.9 and 116.2 fps, respectively.

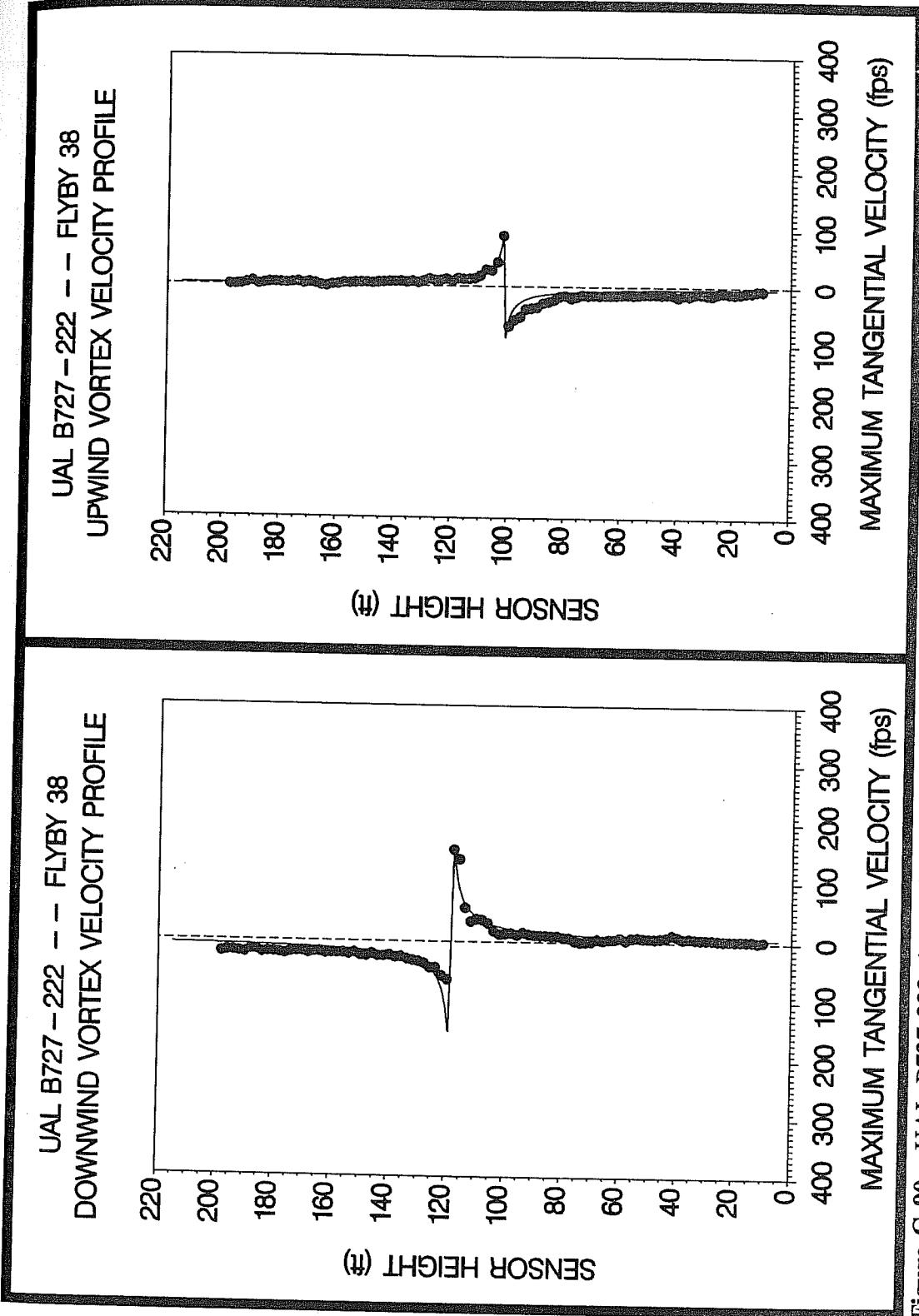
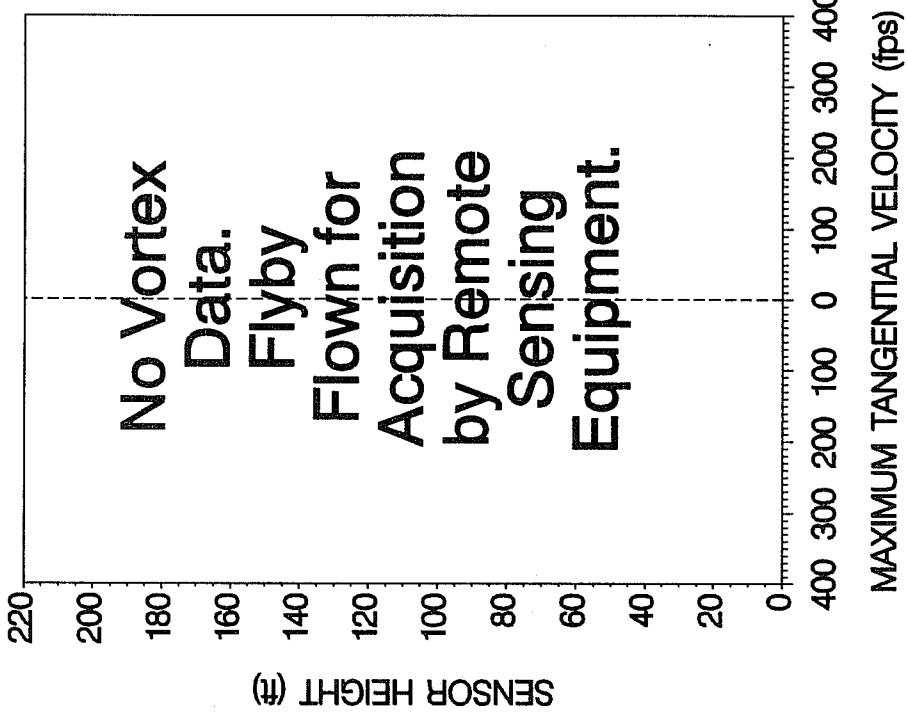


Figure G-90. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 267, Flyby 38, ambient wind speed = 8.0 kts,  $\delta_F = 30^\circ$ , IAS = 130 kts, GW = 141,500 lbs. Ages, radii, and velocities of the vortex cores are 20 and 29 s, 0.6 and 0.5 ft, and 152.9 and 89.2 fps, respectively.

UAL B727-222 -- FLYBY 39  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B727-222 -- FLYBY 39  
UPWIND VORTEX VELOCITY PROFILE

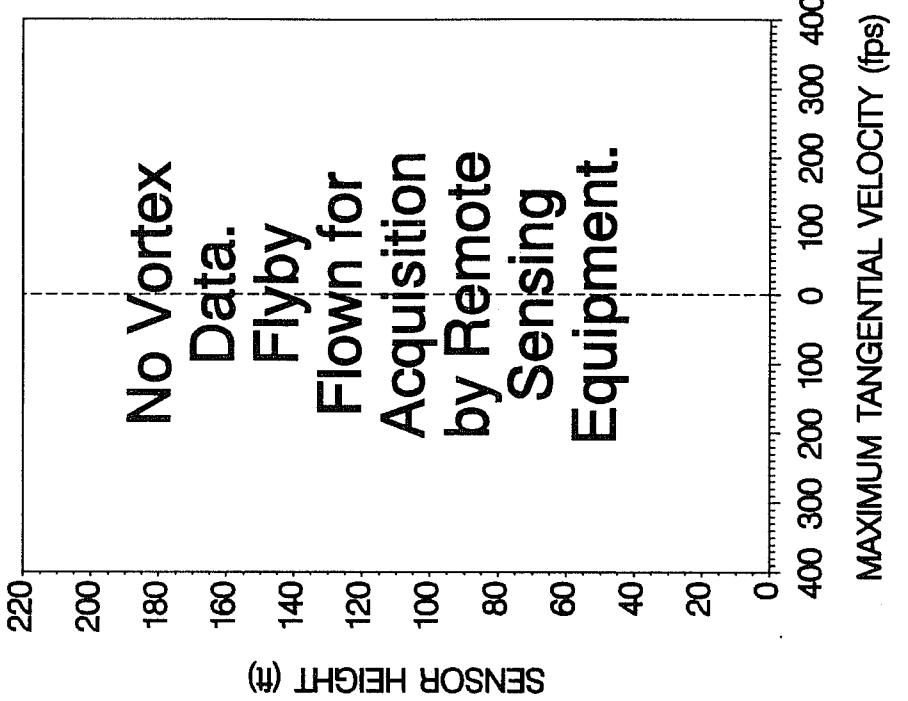


Figure G-91. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 267, Flyby 39, ambient wind speed = 9.0 kts,  $\delta_F = 30^\circ$ ,  $GW = 129$  kts,  $GW = 140,000$  lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) s, (O) and (O) ft, and (O) and (O) fps, respectively.

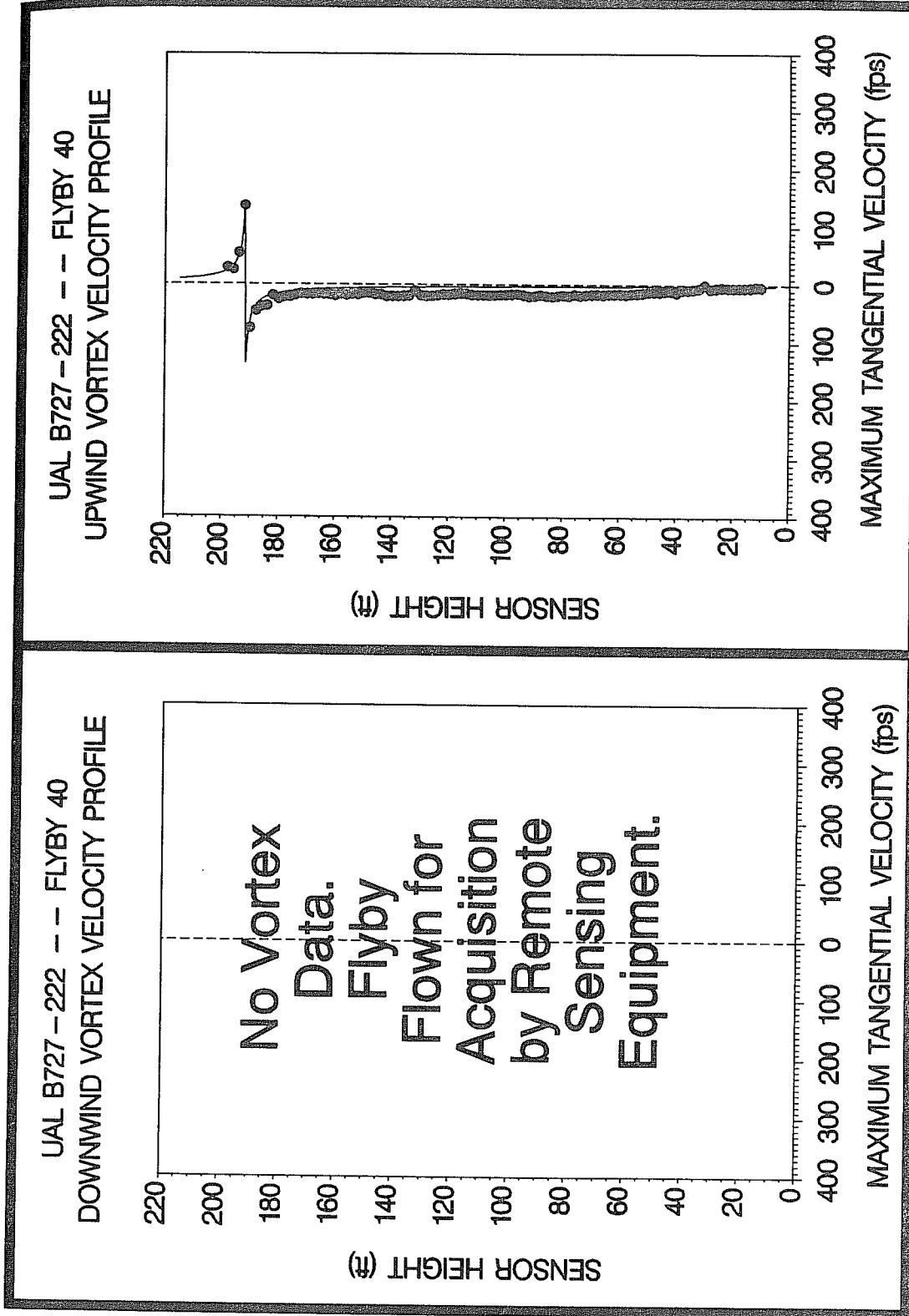


Figure G-92. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 267, Flyby 40, ambient wind speed = 7.3 kts,  $\delta_F = 30^\circ$ , IAS = 128 kts, GW = 139,000 lbs. Ages, radii, and velocities of the vortex cores are (O) and 0.3 ft, and (O) and 28 s, (O) and 0.3 ft, and (O) and 136.7 fps, respectively.

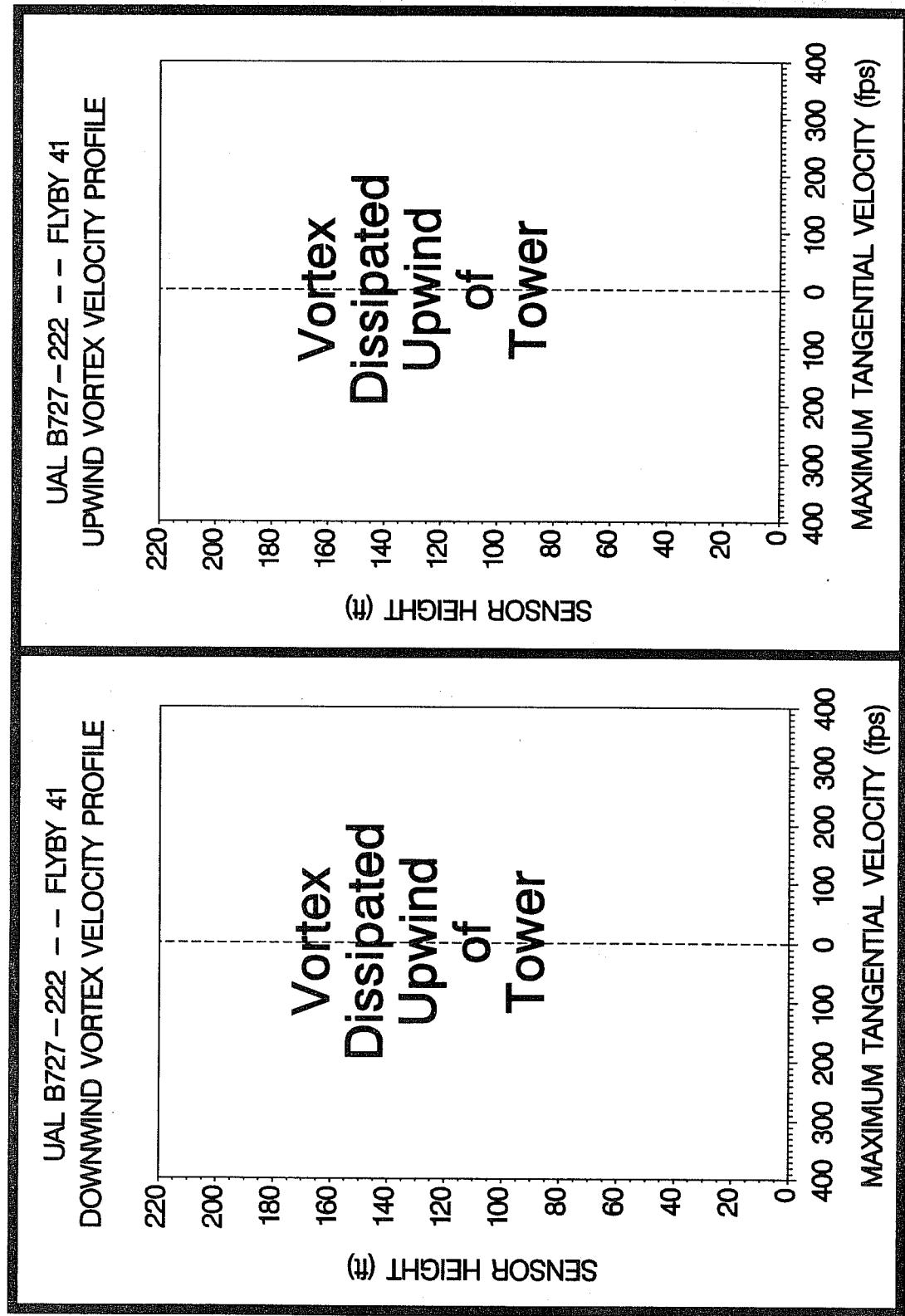


Figure G-93. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 267, Flyby 41, ambient wind speed = 3.3 kts,  $\delta_F = 30^\circ$ , IAS = 129 kts, GW = 138,000 lbs. Ages, radii, and velocities of the vortex cores are (D) and (D) s, (D) and (D) ft, and (D) and (D) fps, respectively.

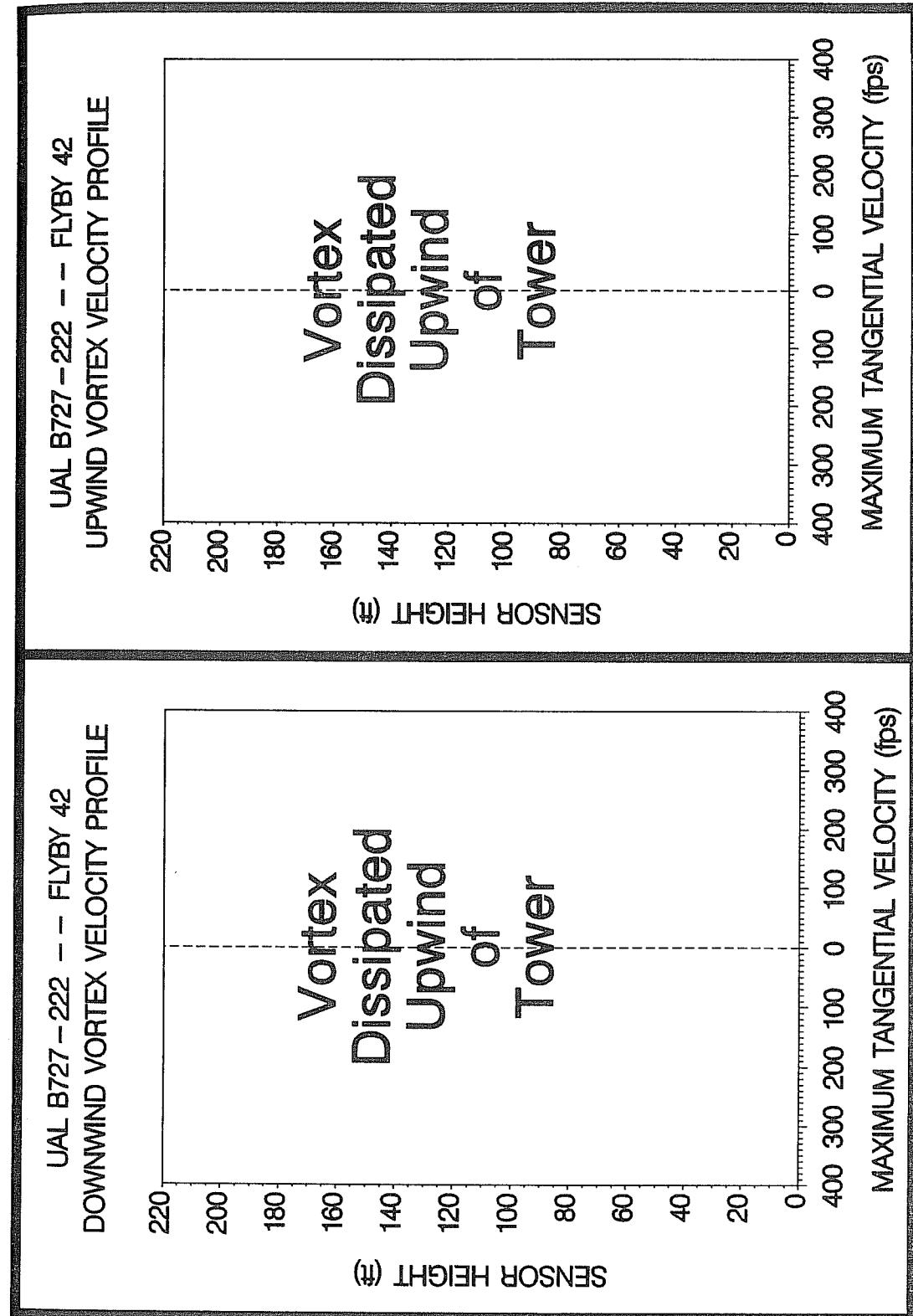
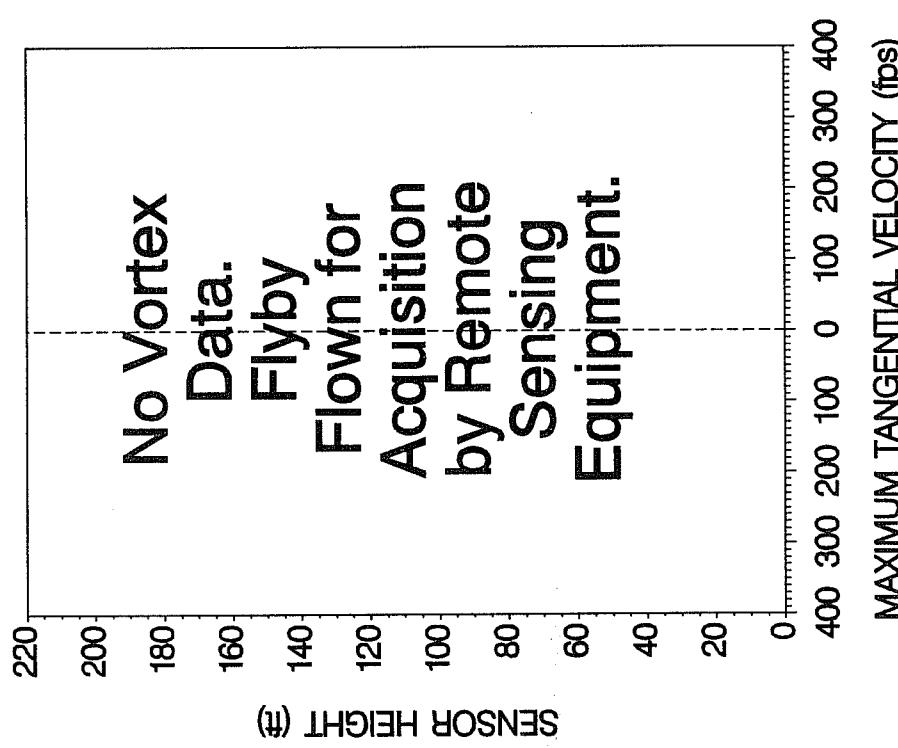


Figure G-94. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 267, Flyby 42, ambient wind speed = 2.5 kts,  $\delta_F = 30^\circ$ , IAS = 130 kts, GW = 137,500 lbs. Ages, radii, and velocities of the vortex cores are (D) and (D) s, (D) and (D) ft, and (D) and (D) fps, respectively.

UAL B727-222 -- FLYBY 43  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B727-222 -- FLYBY 43  
UPWIND VORTEX VELOCITY PROFILE

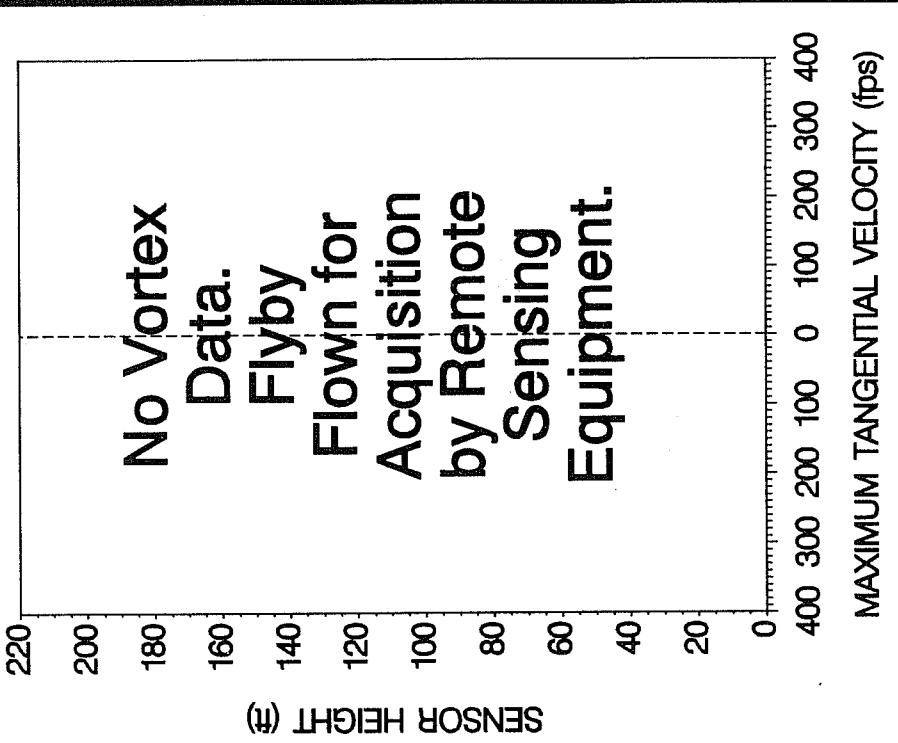
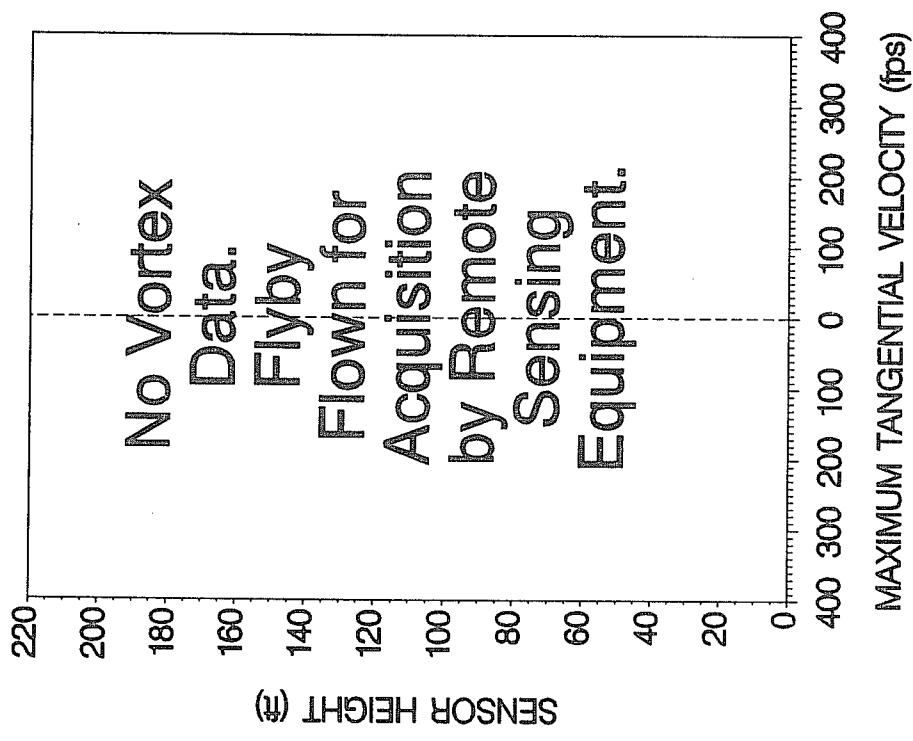


Figure G-95. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 267, Flyby 43, ambient wind speed = 3.9 kts,  $\delta_F = 40^\circ$ , IAS = 121 kts, GW = 136,000 lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) s, (O) and (O) ft, and (O) and (O) fps, respectively.

UAL B727-222 -- FLYBY 44  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B727-222 -- FLYBY 44  
UPWIND VORTEX VELOCITY PROFILE

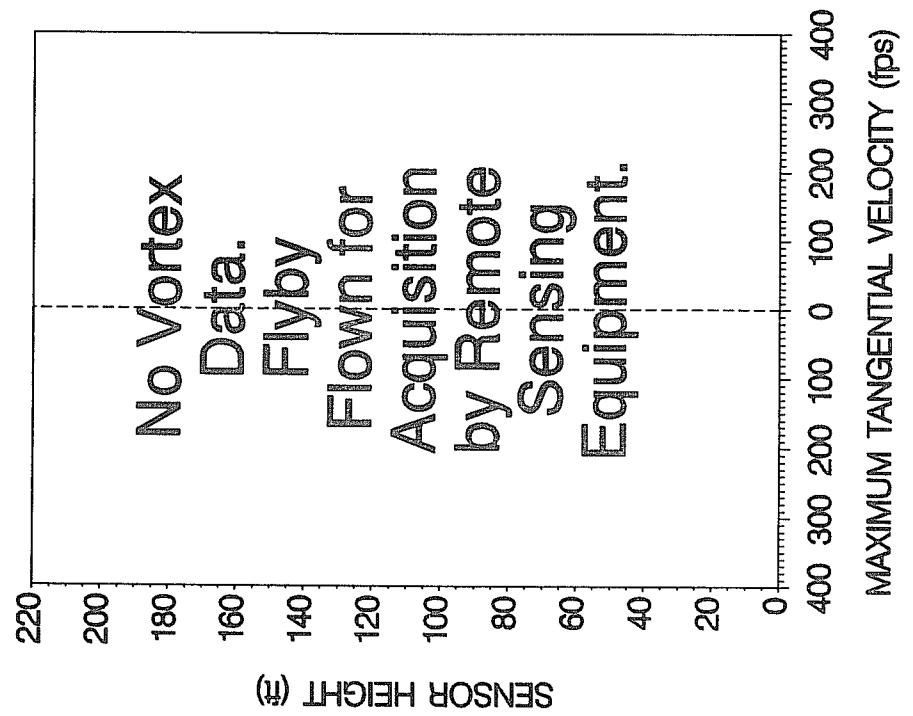


Figure G-96. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 267, Flyby 44, ambient wind speed = 5.1 kts,  $\delta_F = 40^\circ$ , IAS = 121 kts, GW = 134,000 lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) s, (O) and (O) ft, and (O) and (O) fps, respectively.

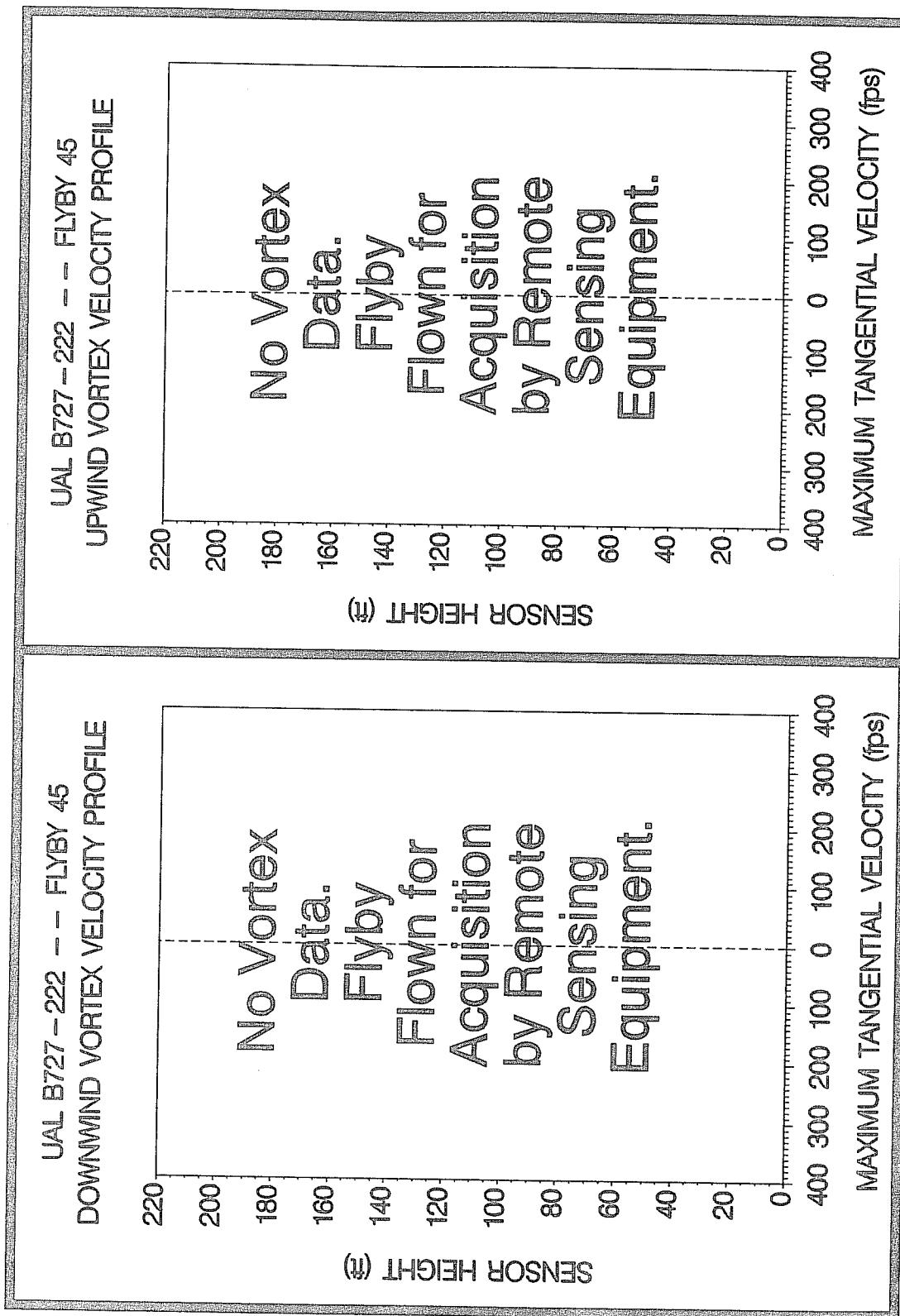


Figure G-97. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 267, Flyby 45, ambient wind speed = 5.2 kts,  $\delta_F = 40^\circ$ , IAS = 120 kts, GW = 132,000 lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) ft, and (O) and (O) fps, respectively.

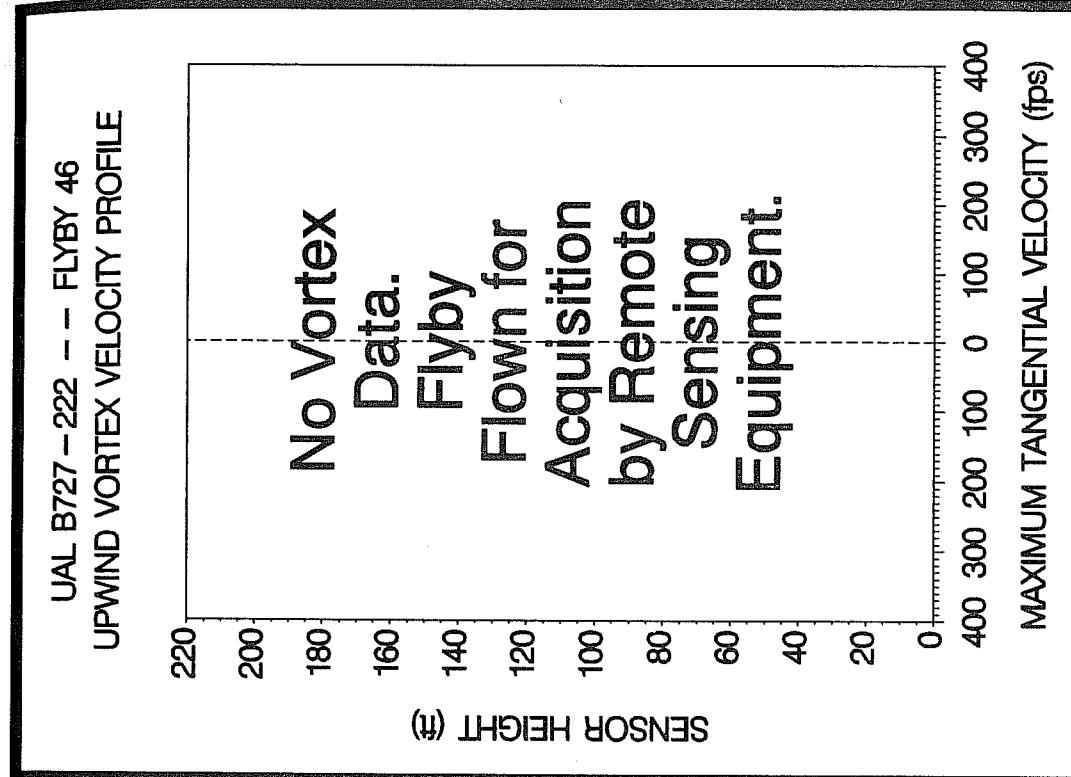
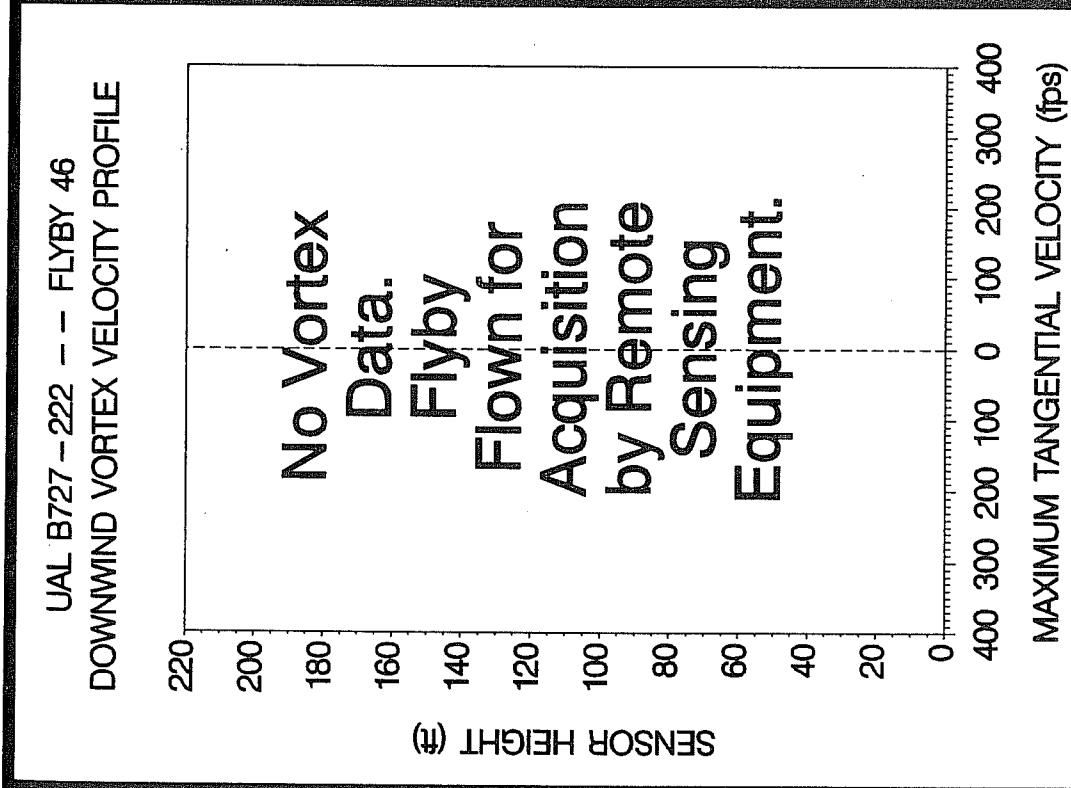


Figure G-98. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 267, Flyby 46, ambient wind speed=5.9 kts,  $\delta_F=40^\circ$ ,  $IAS=119$  kts,  $GW=130,000$  lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) s, (O) and (O) ft, and (O) and (O) fps, respectively.

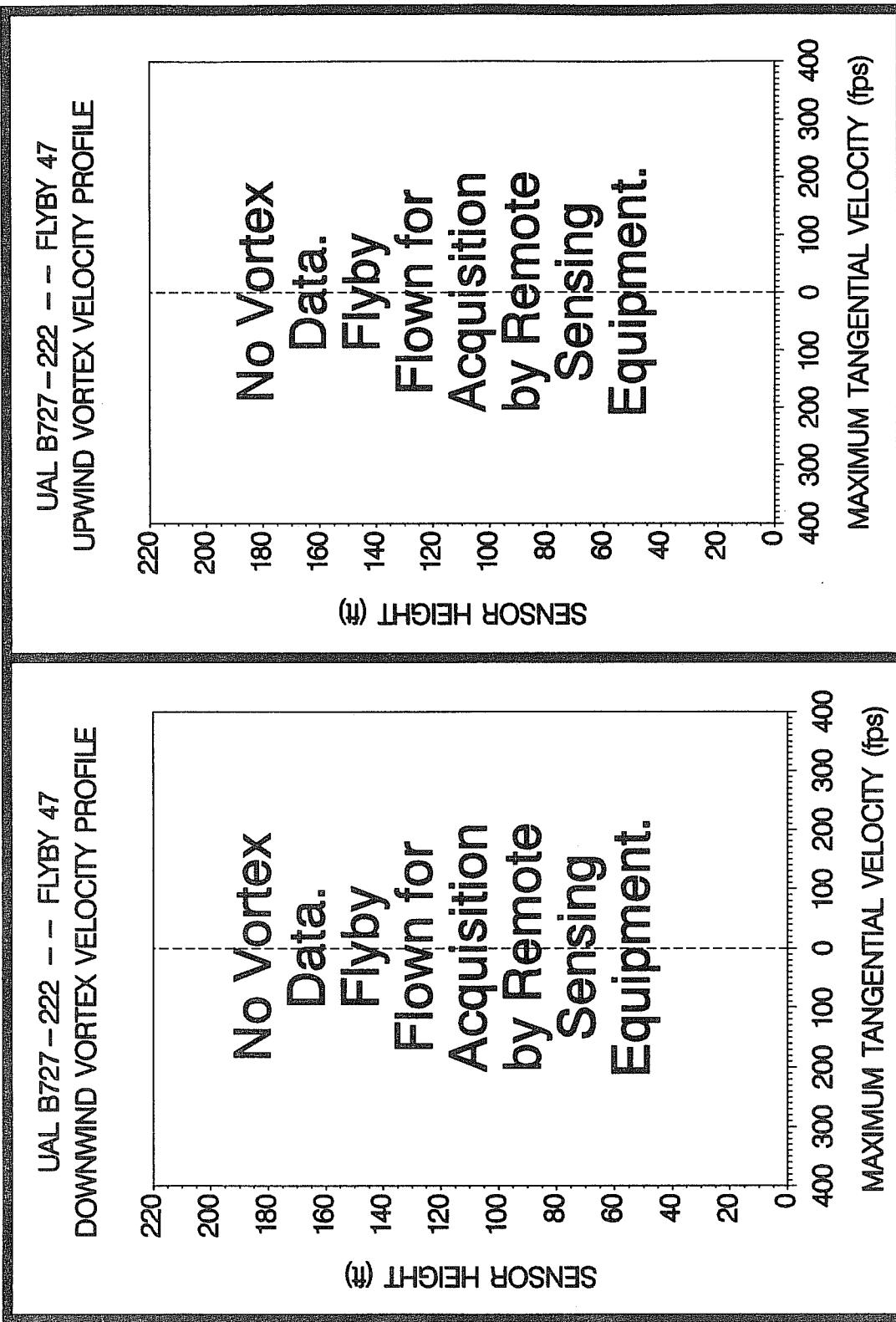


Figure G-99. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 267, Flyby 47, ambient wind speed = 7.0 kts,  $\delta_F = 40^\circ$ , IAS = 120 kts, GW = 128,500 lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) s, (O) and (O) ft, and (O) and (O) fps, respectively.

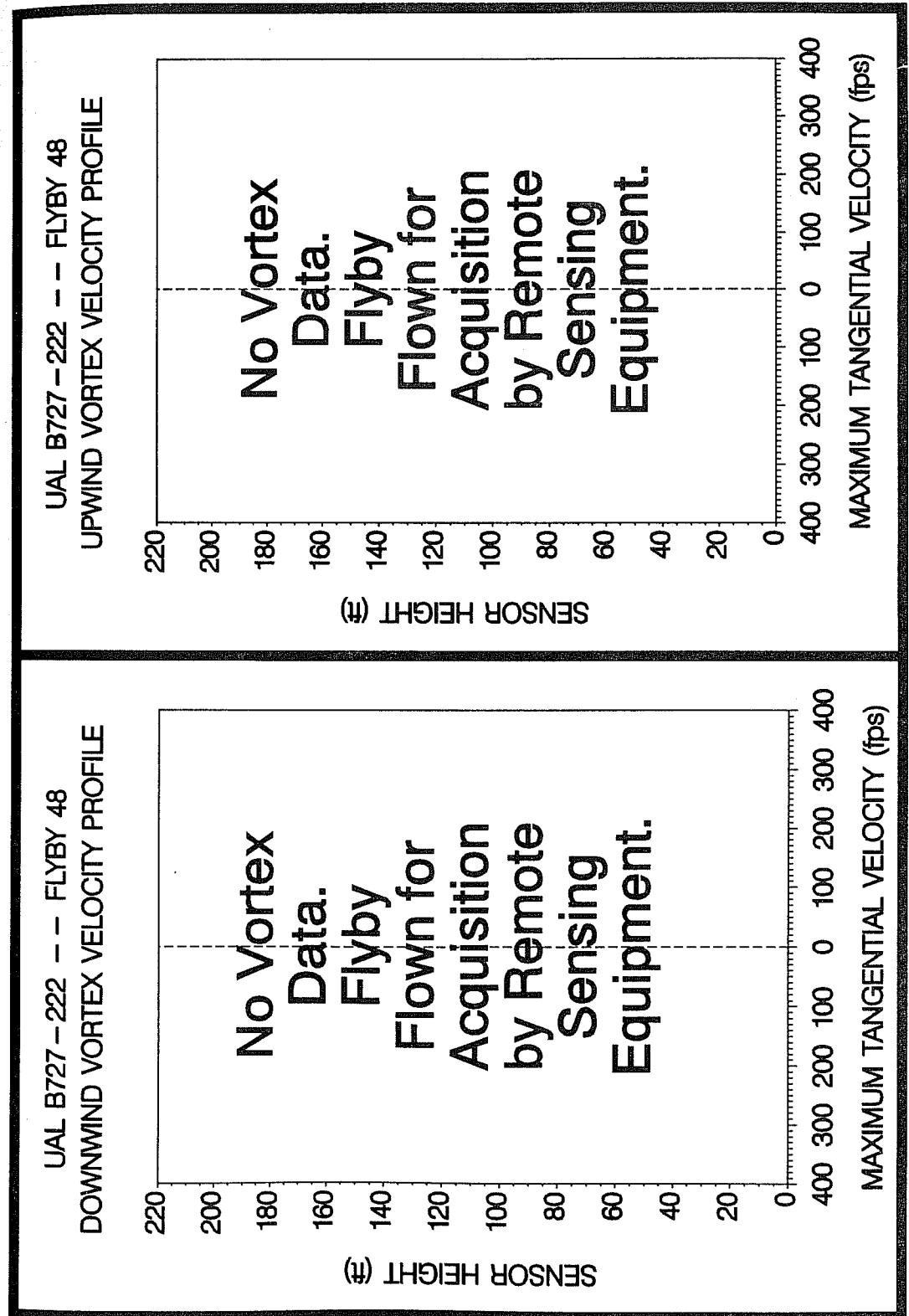
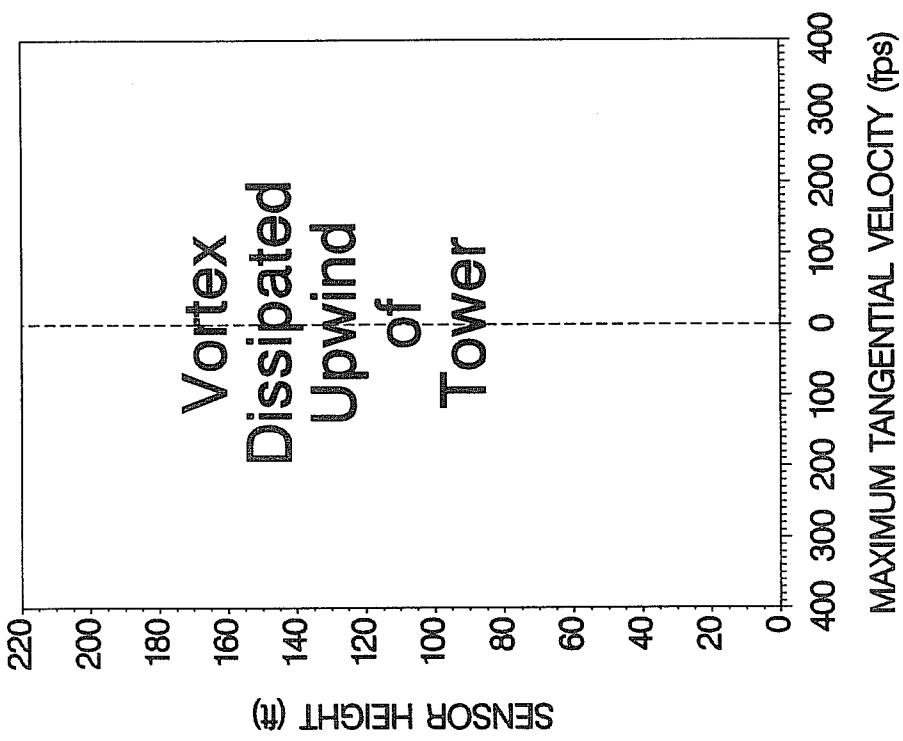


Figure G-100. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 267, Flyby 48, ambient wind speed=6.7 kts,  $\delta_F=40^\circ$ ,  $IAS=118$  kts,  $GW=128,000$  lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) s, (O) and (O) ft, and (O) and (O) fps, respectively.

UAL B727-222 -- FLYBY 49  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B727-222 -- FLYBY 49  
UPWIND VORTEX VELOCITY PROFILE

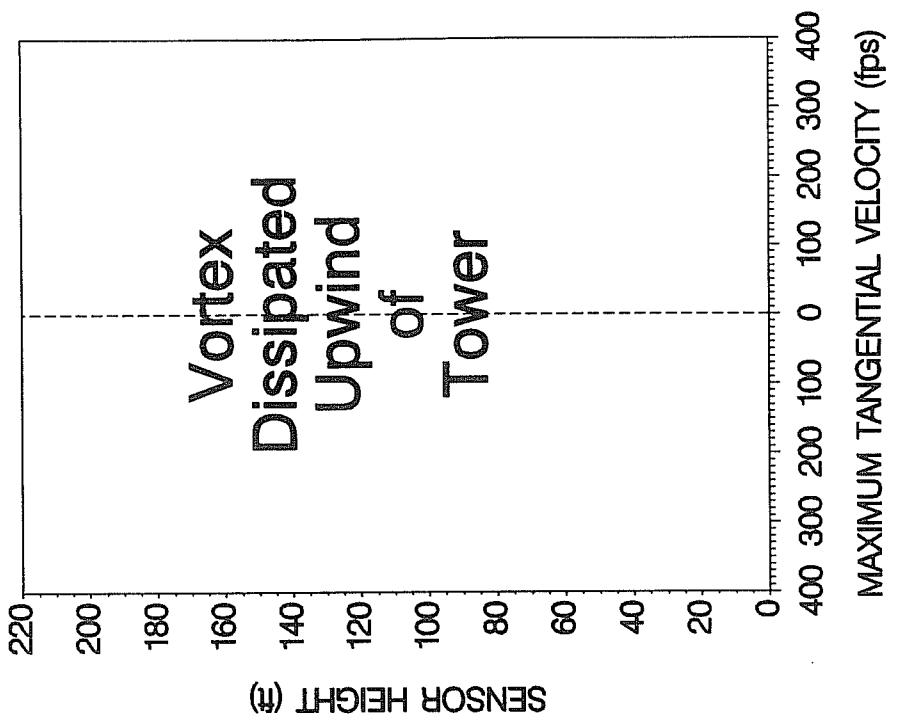


Figure G-101. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 267, Flyby 49, ambient wind speed=2.1 kts,  $\delta_F=30^\circ$ ,  $IAS=131$  kts,  $GW=143,500$  lbs. Ages, radii, and velocities of the vortex cores are (D) and (D) s, (D) and (D) ft, and (D) and (D) fps, respectively.

MAXIMUM DOWNWIND VORTEX VELOCITY (fps)  
Ages, radii, and velocities of the vortex cores are (D) and (D) s, (D) and (D) ft, and (D) m. (D) and (D) are (D) and (D) m.

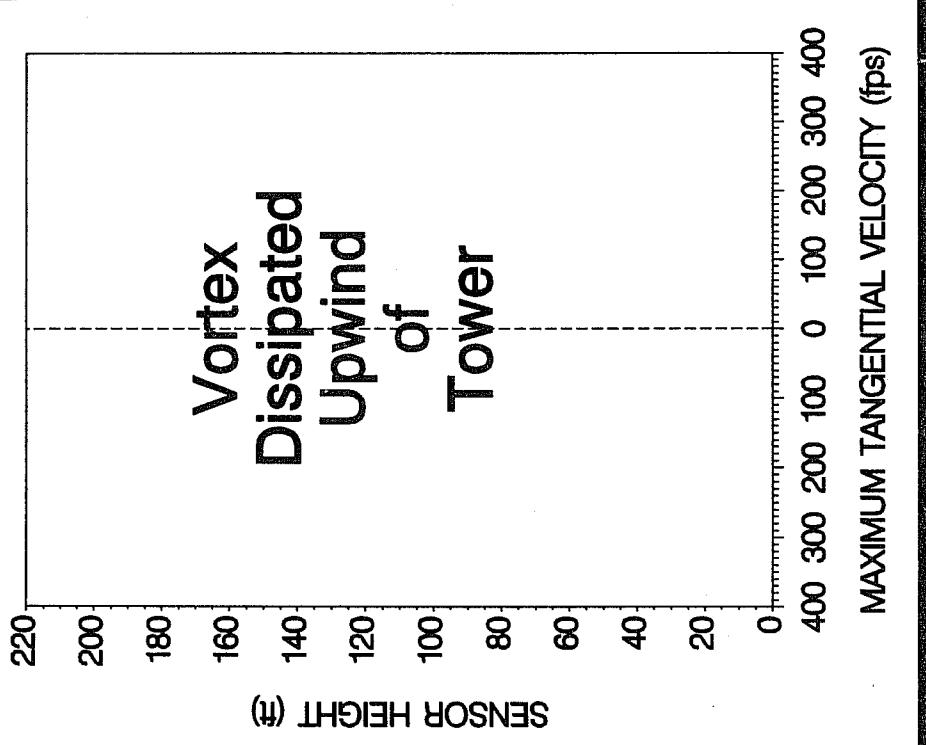
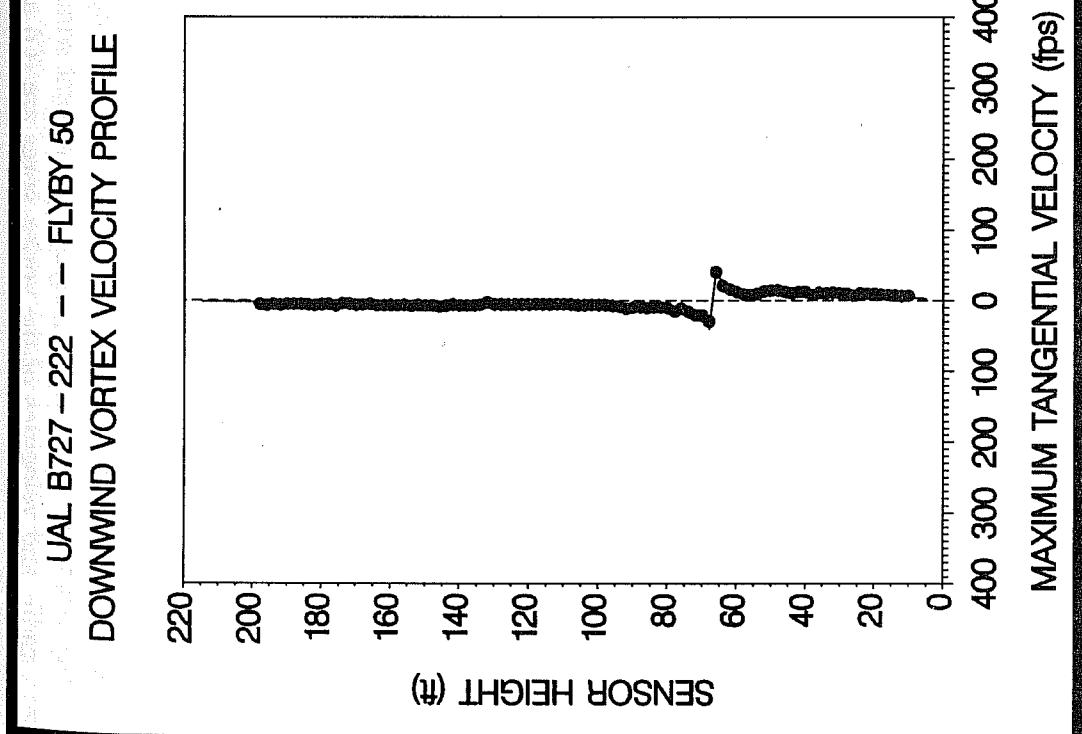


Figure G-102. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 267, Flyby 50, ambient wind speed=3.0 kts,  $\delta_F=30^\circ$ , IAS=130 kts, GW=142,800 lbs. Ages, radii, and velocities of the vortex cores are 43 and (D) s, 0.9 and (D) ft, and 40.4 and (D) fps, respectively.

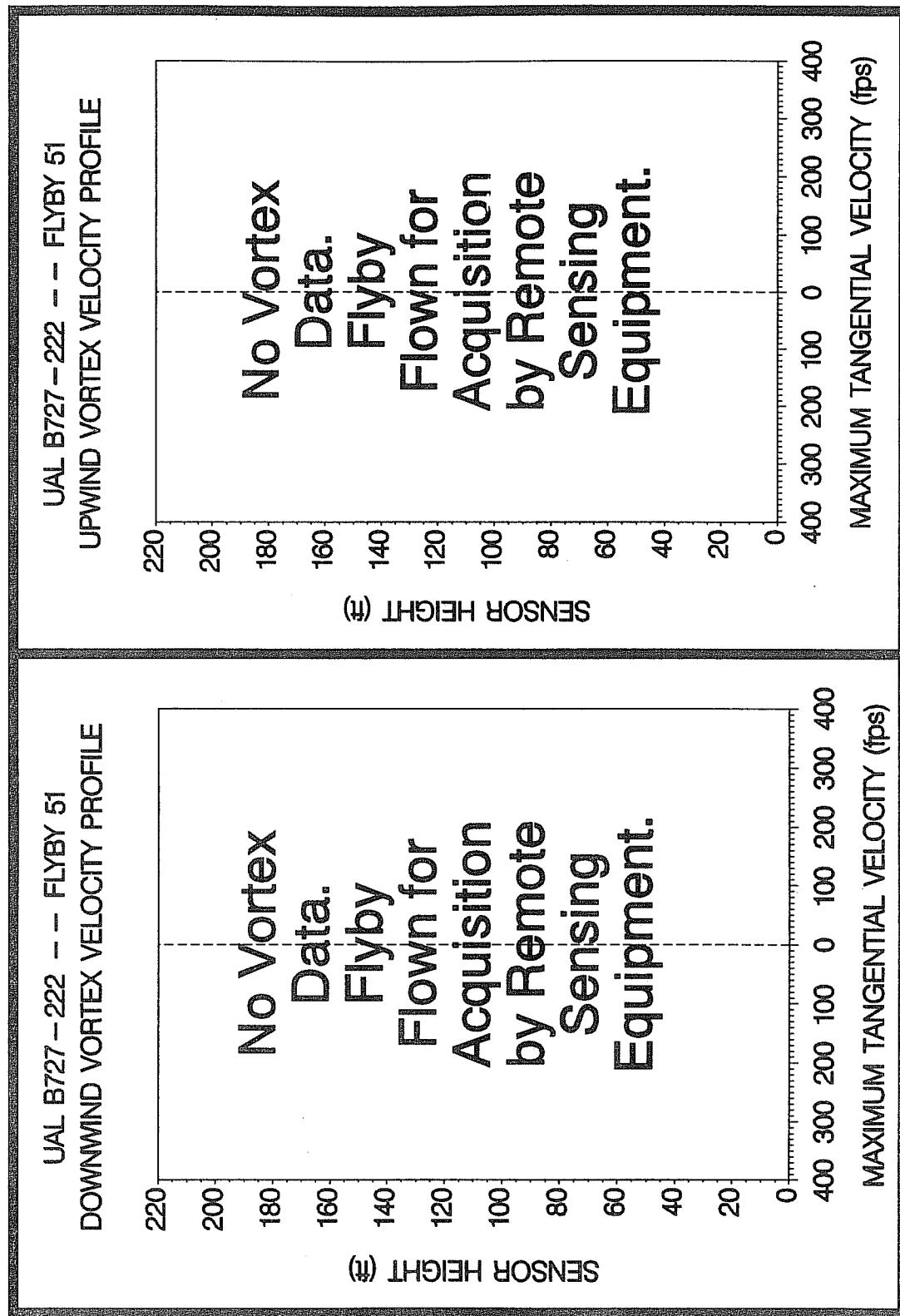


Figure G-103. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 267, Flyby 51, ambient wind speed = 3.1 kts,  $\delta_F = 30^\circ$ ,  $\delta_R = 3.1^\circ$ ,  $G_W = 129$  kts,  $G_W = 141,500$  lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) s, (O) and (O) ft, and (O) and (O) fps, respectively.

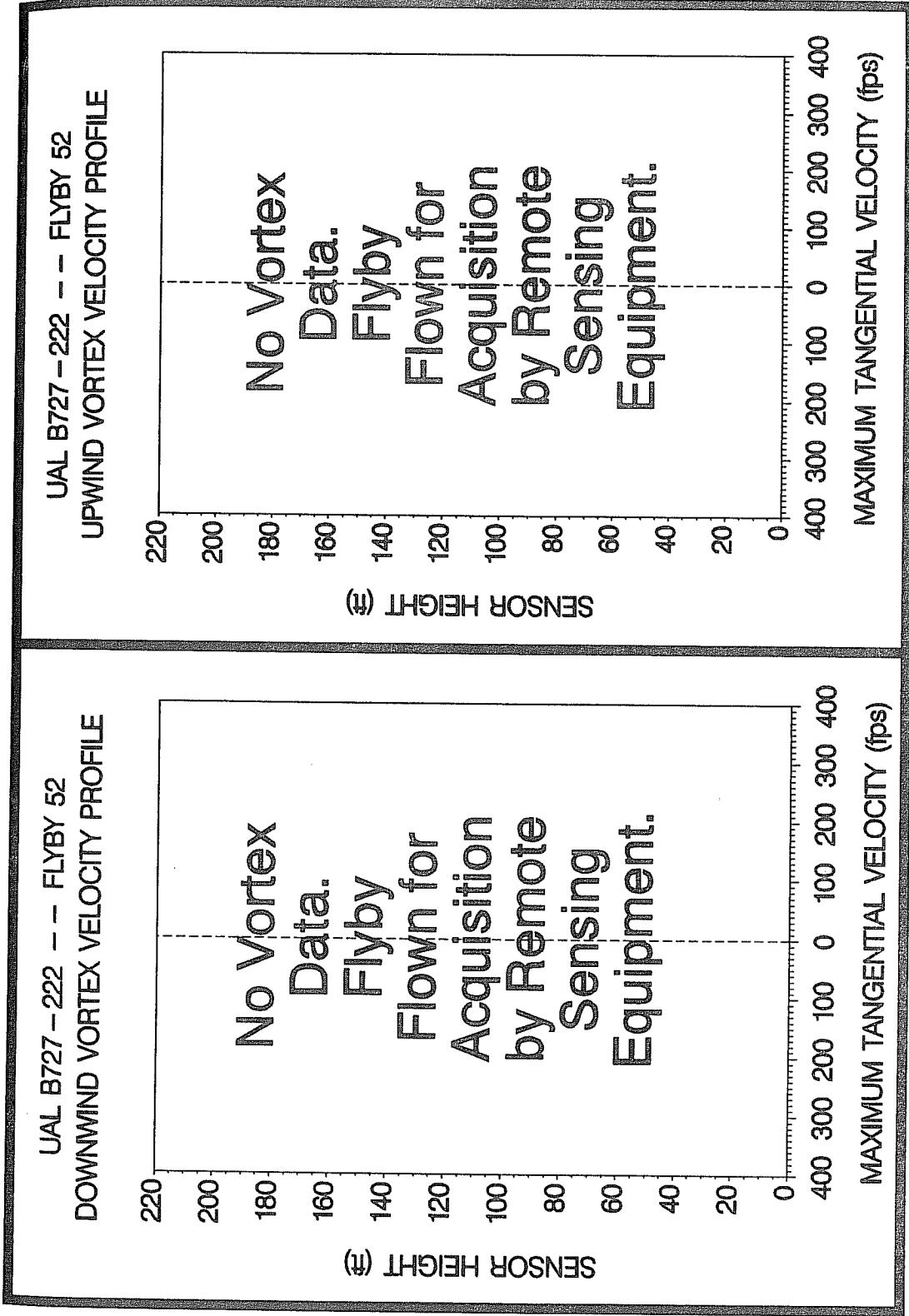
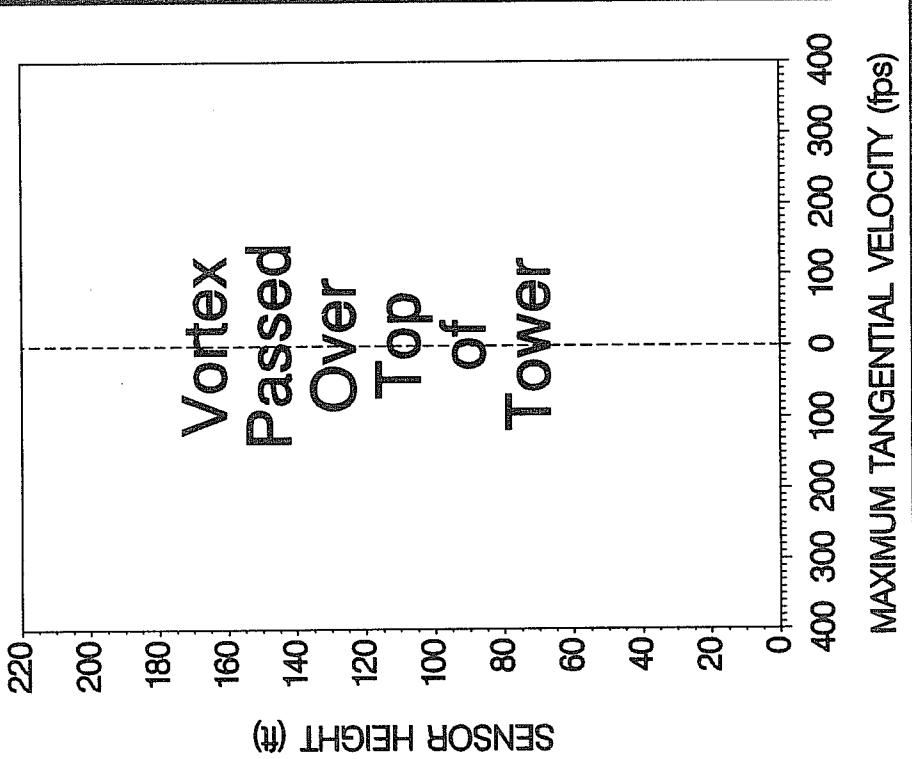


Figure G-104. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 267, Flyby 52, ambient wind speed = 1.8 kts,  $\delta_F = 30^\circ$ , IAS = 128 kts, GW = 140,000 lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) s, (O) and (O) ft, and (O) and (O) fps, respectively.

UAL B727-222 - - FLYBY 53  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B727-222 - - FLYBY 53  
UPWIND VORTEX VELOCITY PROFILE

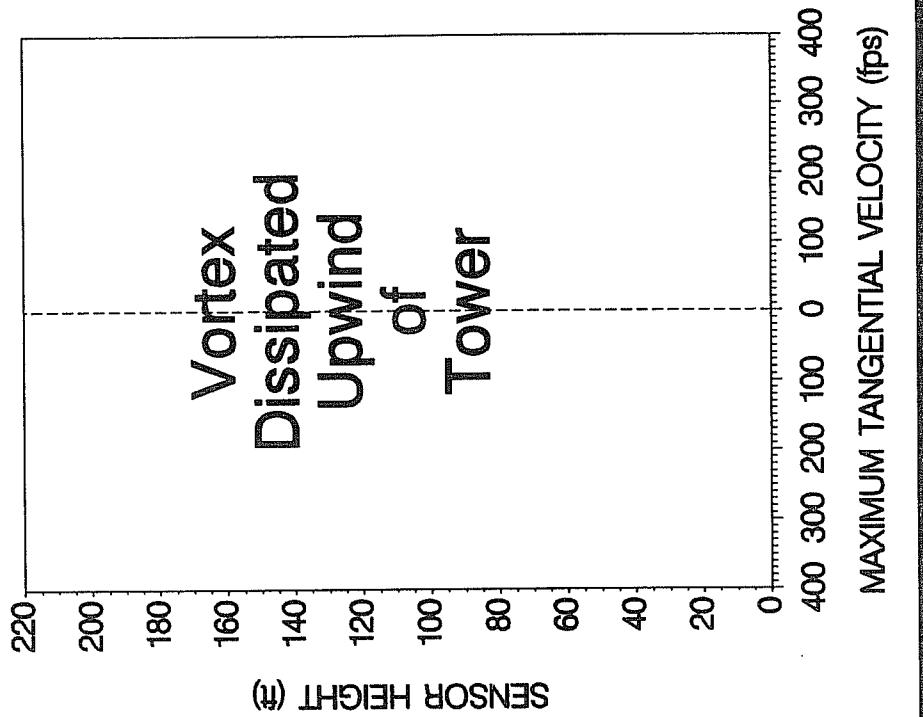


Figure G-105. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 267, Flyby 53, ambient wind speed = 3.4 kts,  $\delta_F = 30^\circ$ , IAS = 127 kts, GW = 139,000 lbs. Ages, radii, and velocities of the vortex cores are (P) and (D) s, (P) and (D) ft, and (P) and (D) fps, respectively.

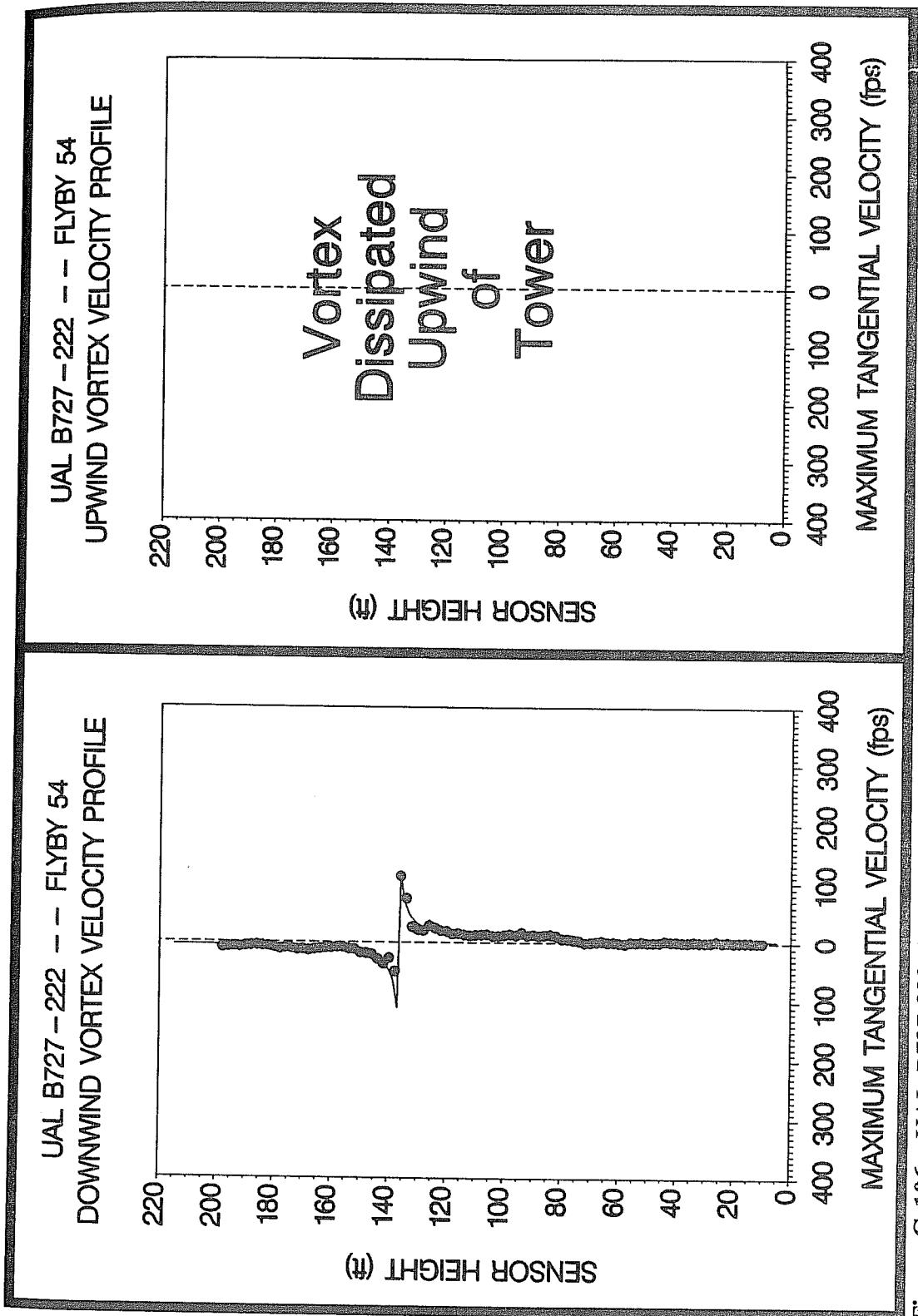


Figure G-106. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 267, Flyby 54, ambient wind speed = 3.9 kts,  $\delta_F = 30^\circ$ , IAS = 127 kts, GW = 138,000 lbs. Ages, radii, and velocities of the vortex cores are 33 and (D) s, 0.5 and (D) ft, and 111.1 and (D) fps, respectively.

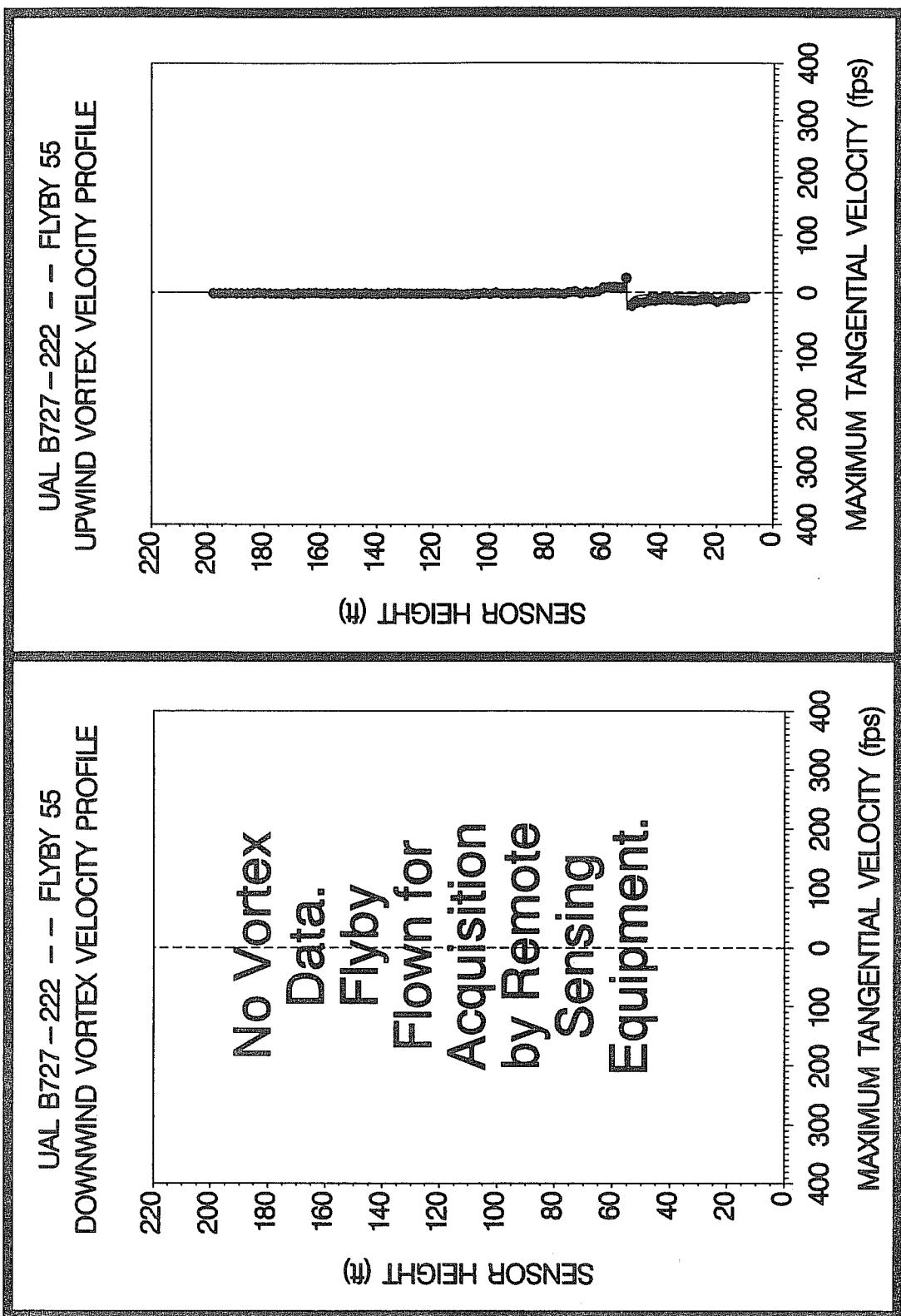
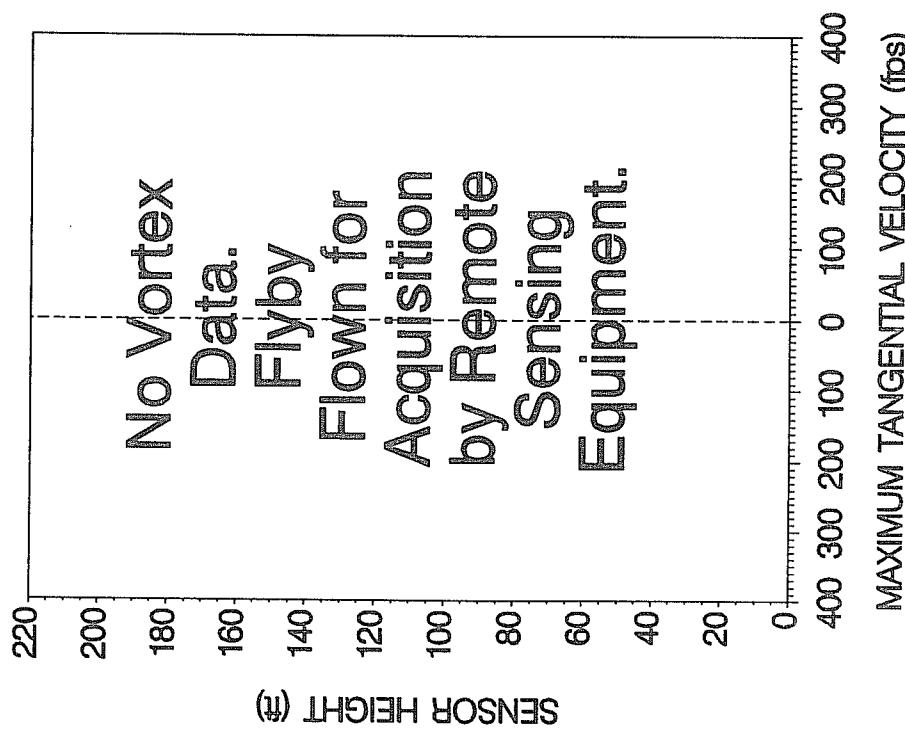


Figure G-107. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 267, Flyby 55, ambient wind speed = 3.6 kts,  $\delta_F = 30^\circ$ ,  $\delta_{AS} = 126$  kts,  $GW = 136,500$  lbs. Ages, radii, and velocities of the vortex cores are (O) and 54 s, (O) and 0.2 ft, and (O) and 24.8 fps, respectively.

UAL B727 - 222 — FLYBY 56  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B727 - 222 — FLYBY 56  
UPWIND VORTEX VELOCITY PROFILE

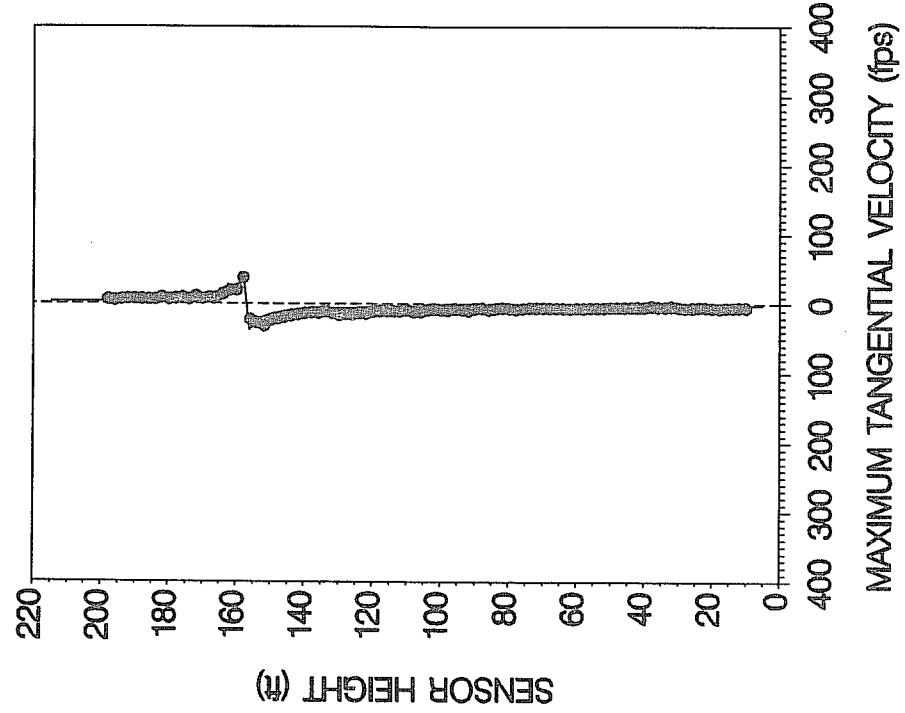
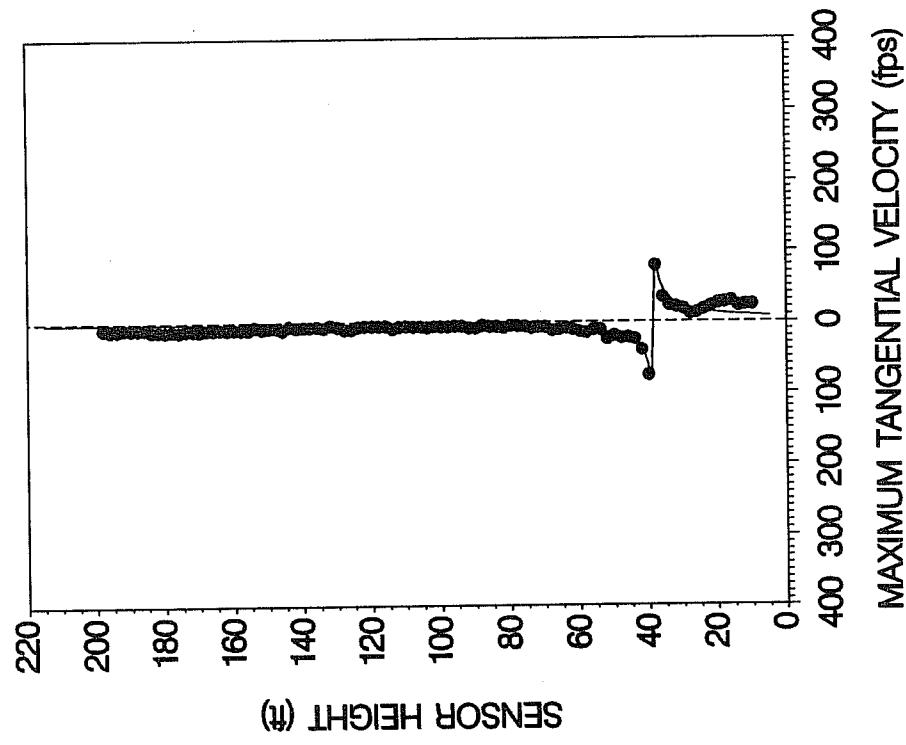


Figure G-108. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 267, Flyby 56, ambient wind speed = 3.5 kts,  $\delta_F = 30^\circ$ , IAS = 126 kts, GW = 135,000 lbs. Ages, radii, and velocities of the vortex cores are (O) and 40 s, (O) and 0.9 ft, and (O) and 37.7 fps, respectively.

UAL B727-222 -- FLYBY 57  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B727-222 -- FLYBY 57  
UPWIND VORTEX VELOCITY PROFILE

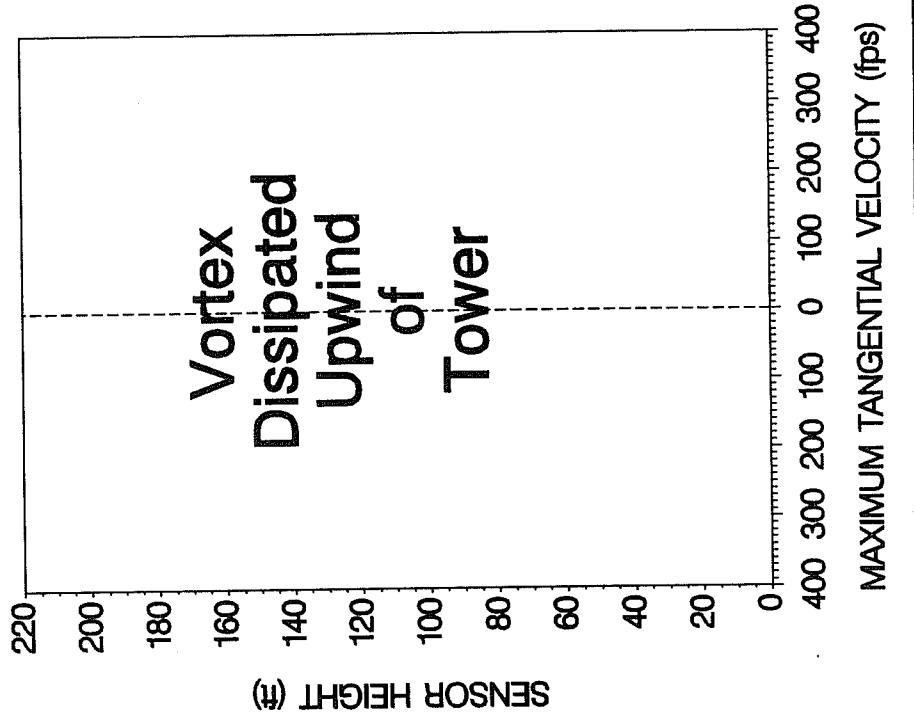
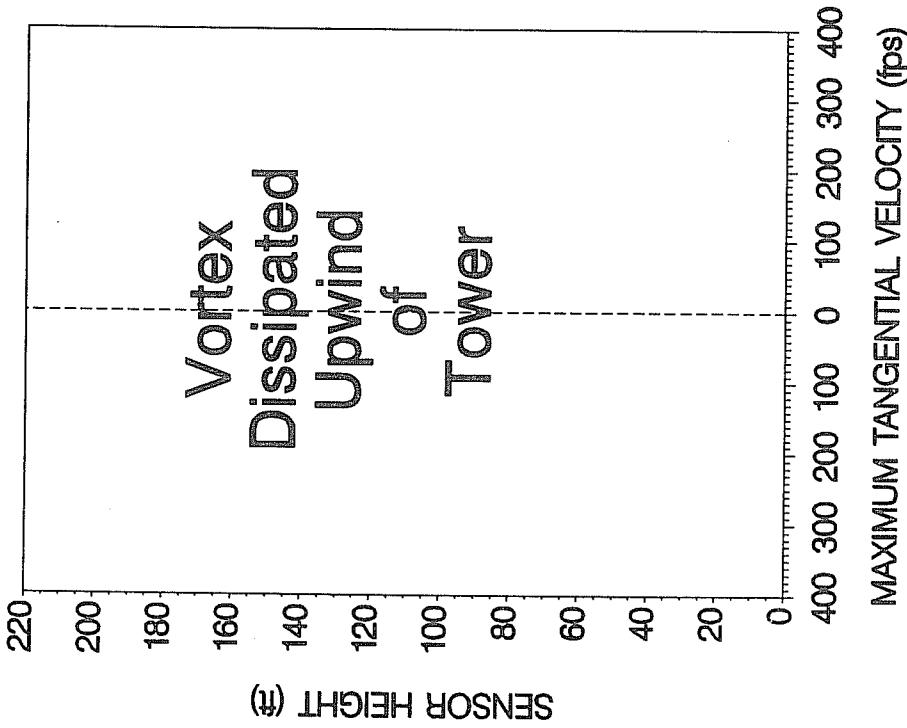


Figure G-109. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 267, Flyby 57, ambient wind speed = 4.6 kts,  $\delta_F = 30^\circ$ ,  $\delta_T = 125$  kts,  $GW = 133,500$  lbs. Ages, radii, and velocities of the vortex cores are 38 and (D) s, 0.7 and (D) ft, and 78.3 and (D) fps, respectively.

UAL B727-222 --- FLYBY 58  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B727-222 --- FLYBY 58  
UPWIND VORTEX VELOCITY PROFILE

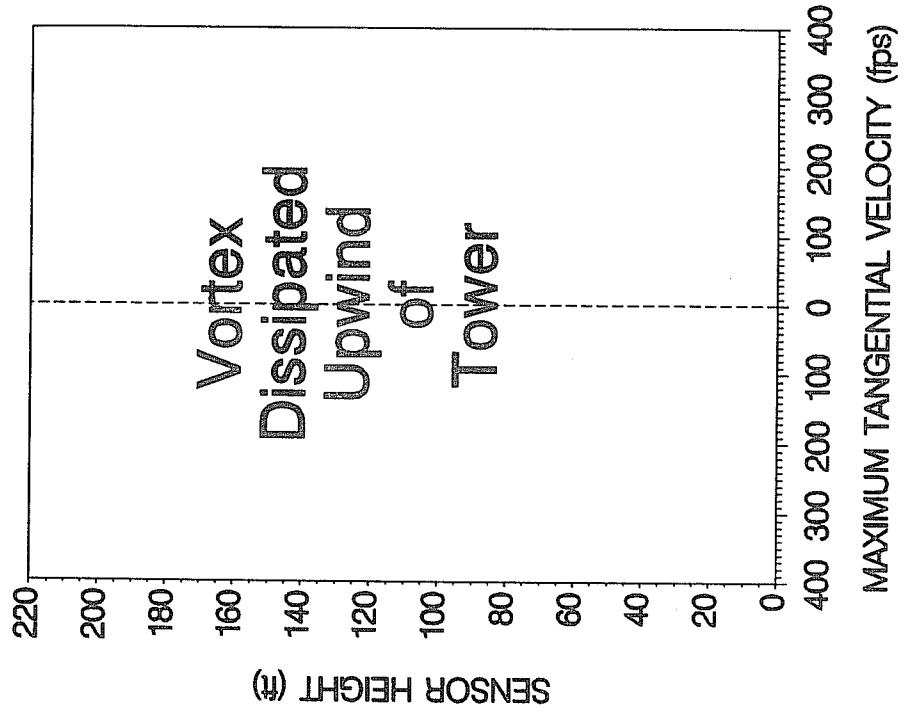


Figure G-110. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 267, Flyby 58, ambient wind speed = 3.4 kts,  $\delta_F = 30^\circ$ , IAS = 124 kts, GW = 132,000 lbs. Ages, radii, and velocities of the vortex cores are (D) and (D) s, (D) and (D) ft, and (D) and (D) fps, respectively.

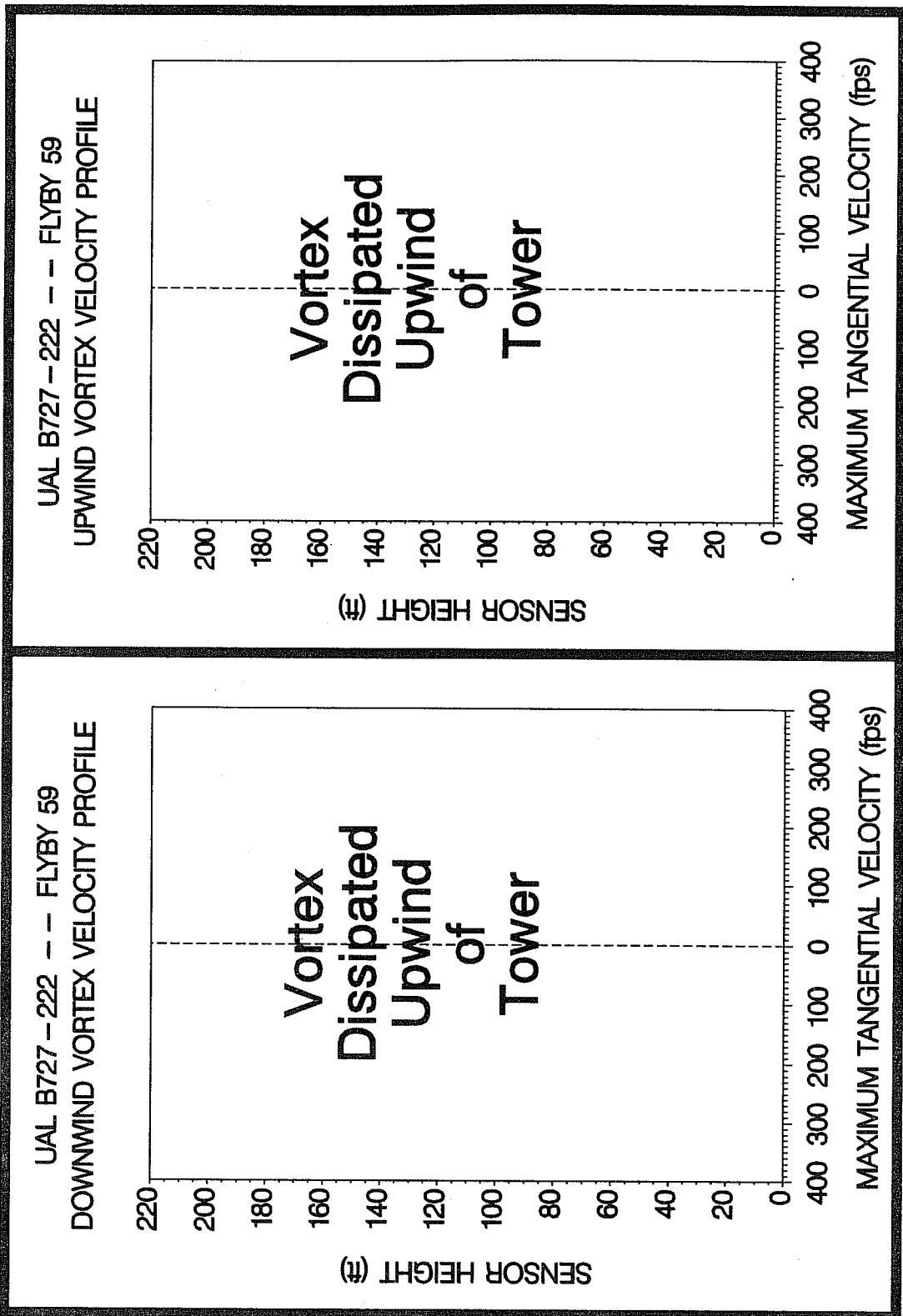


Figure G-111. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 267, Flyby 59, ambient wind speed = 3.5 kts,  $\delta_F = 15^\circ$ ,  $\delta_S = 142$  kts,  $GW = 131,000$  lbs. Ages, radii, and velocities of the vortex cores are (D) and (D) s, (D) and (D) ft, and (D) and (D) fps, respectively.

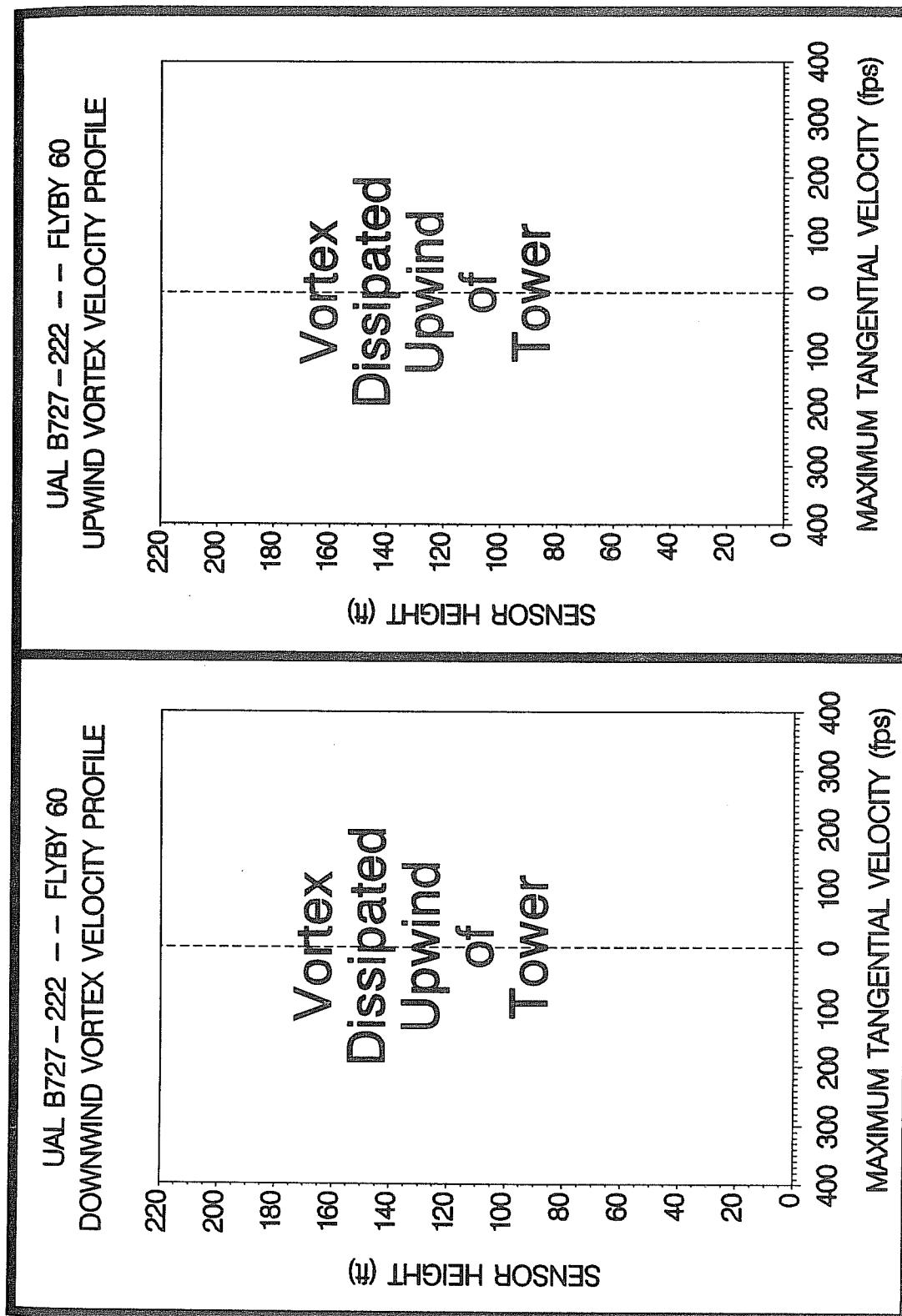


Figure G-112. UAL B727-222 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 267, Flyby 60, ambient wind speed = 2.1 kts,  $\delta_F = 0^\circ$ , IAS = 250 kts, GW = 130,000 lbs. Ages, radii, and velocities of the vortex cores are (D) and (D) ft, and (D) and (D) s, (D) and (D) and (D) fps, respectively.

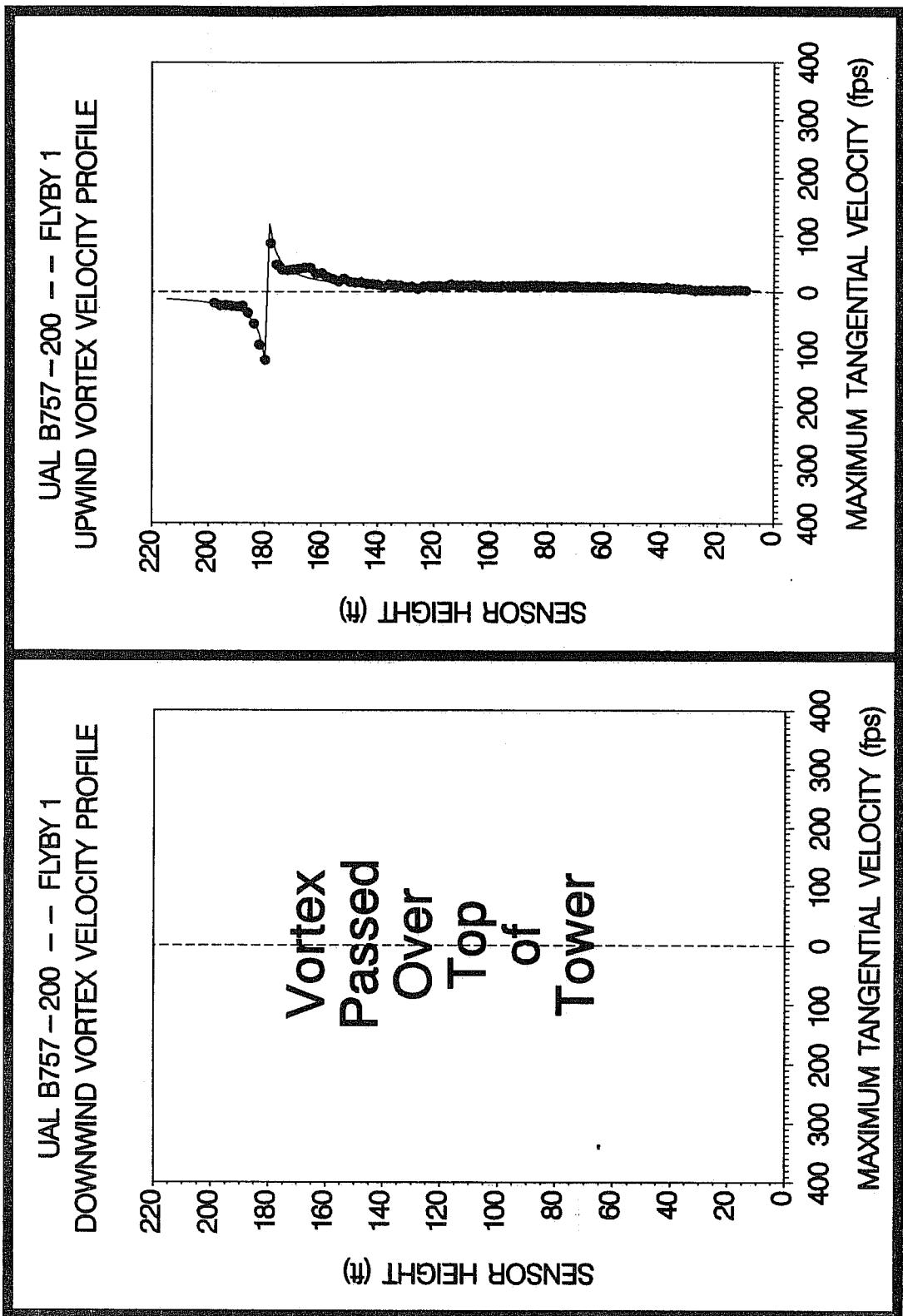
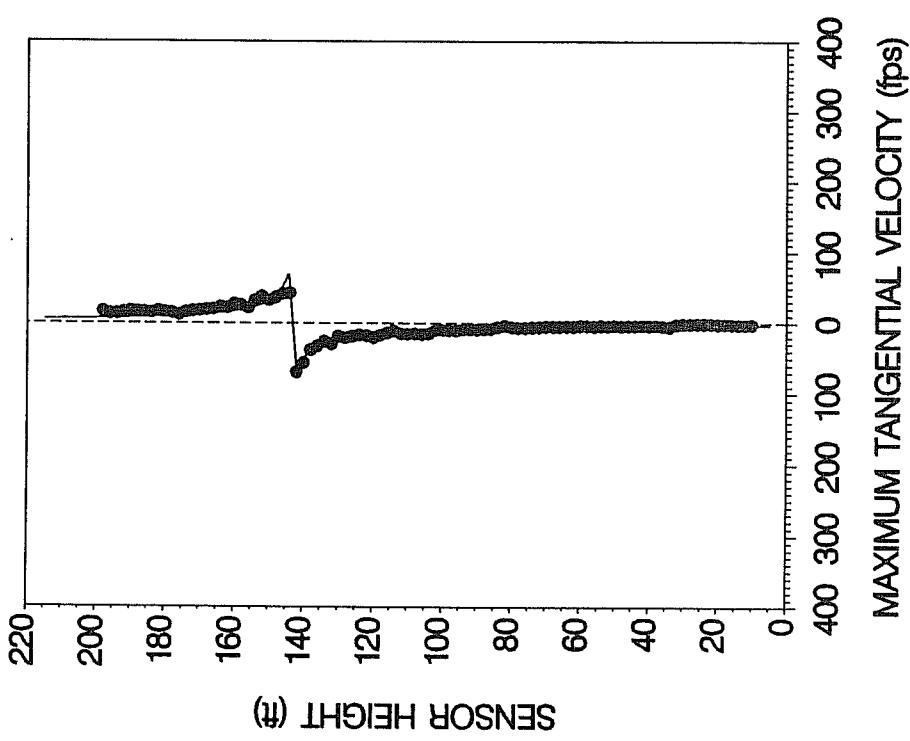


Figure G-113. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 1, ambient wind speed = 6.4 kts,  $\delta_F = 20^\circ$ ,  $IAS = 143$  kts,  $GW = 200,000$  lbs. Ages, radii, and velocities of the vortex cores are (P) and 20 s, (P) and 0.8 ft, and (P) and 119.7 fps, respectively.

UAL B757-200 -- FLYBY 2  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B757-200 -- FLYBY 2  
UPWIND VORTEX VELOCITY PROFILE

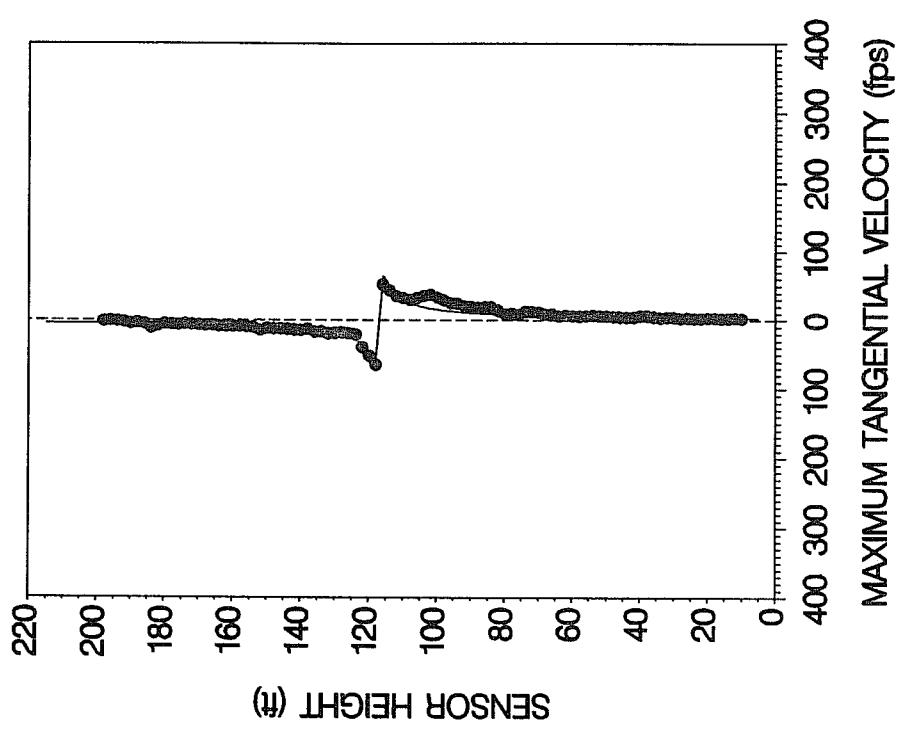


Figure G-114. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 2, ambient wind speed = 6.6 kts,  $\delta_F = 15^\circ$ , IAS = 150 kts, GW = 199,000 lbs. Ages, radii, and velocities of the vortex cores are 23 and 35 s, 1.3 and 1.1 ft, and 69.1 and 64.4 fps, respectively.

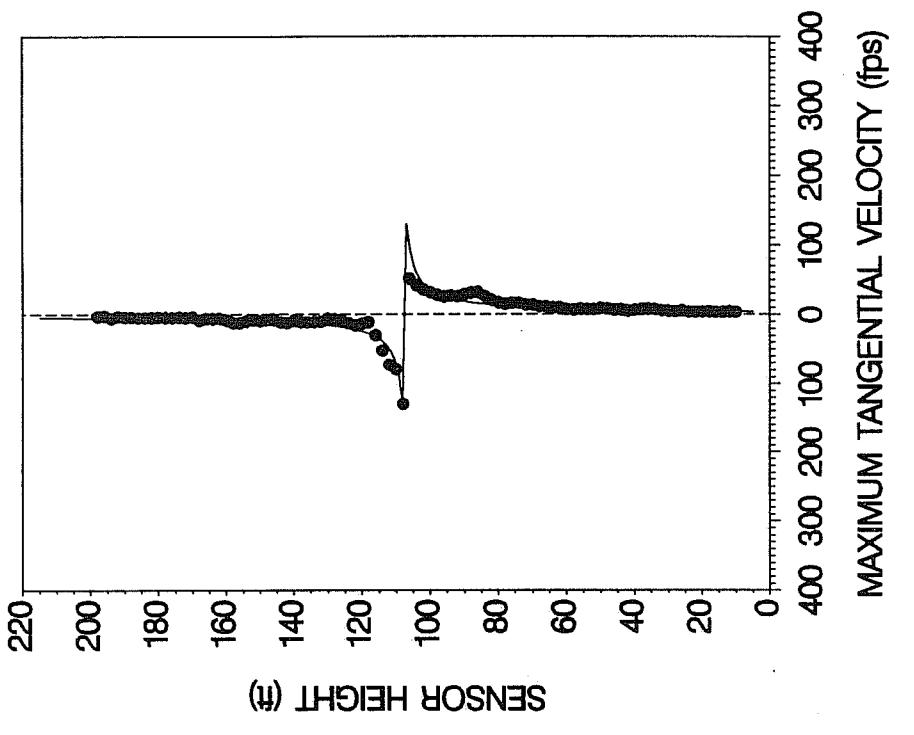
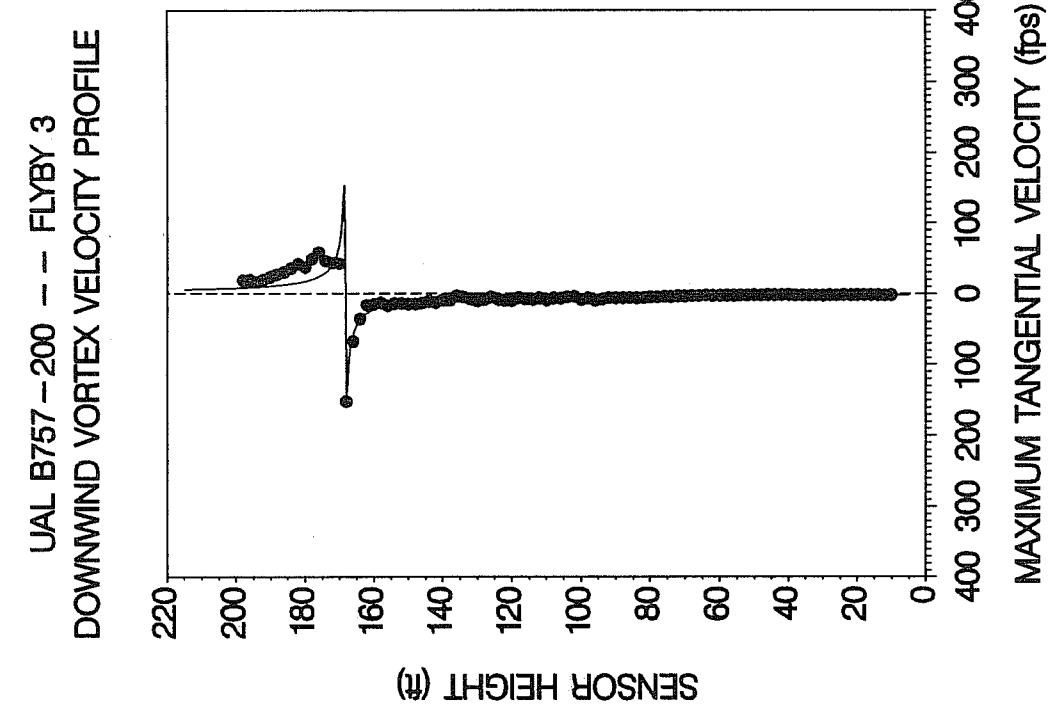


Figure G-115. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 3, ambient wind speed = 8.3 kts,  $\delta_F = 5^\circ$ , IAS = 157 kts, GW = 198,000 lbs. Ages, radii, and velocities of the vortex cores are 18 and 28 s, 0.3 and 0.6 ft, and 152.2 and 130.0 fps, respectively.

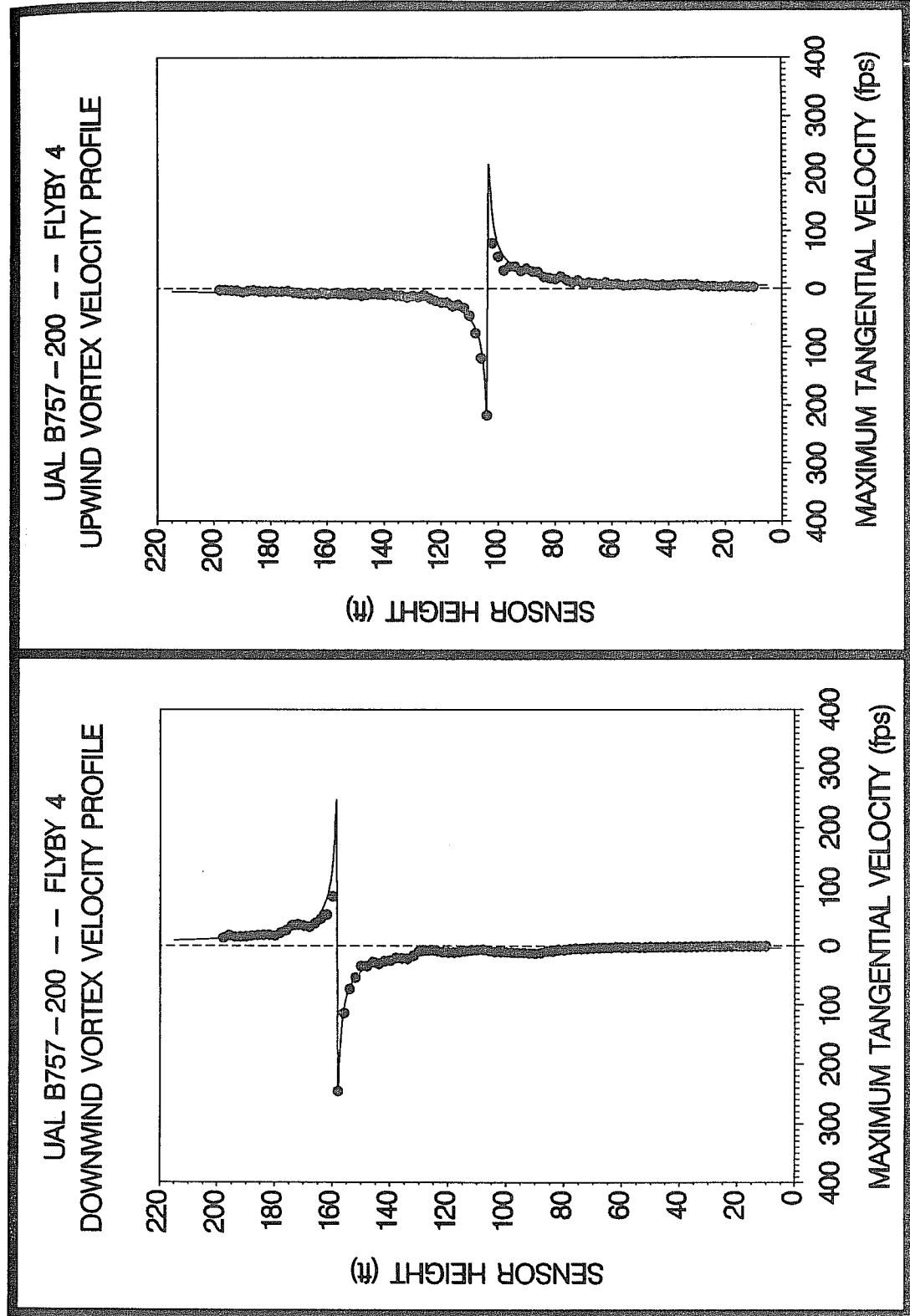
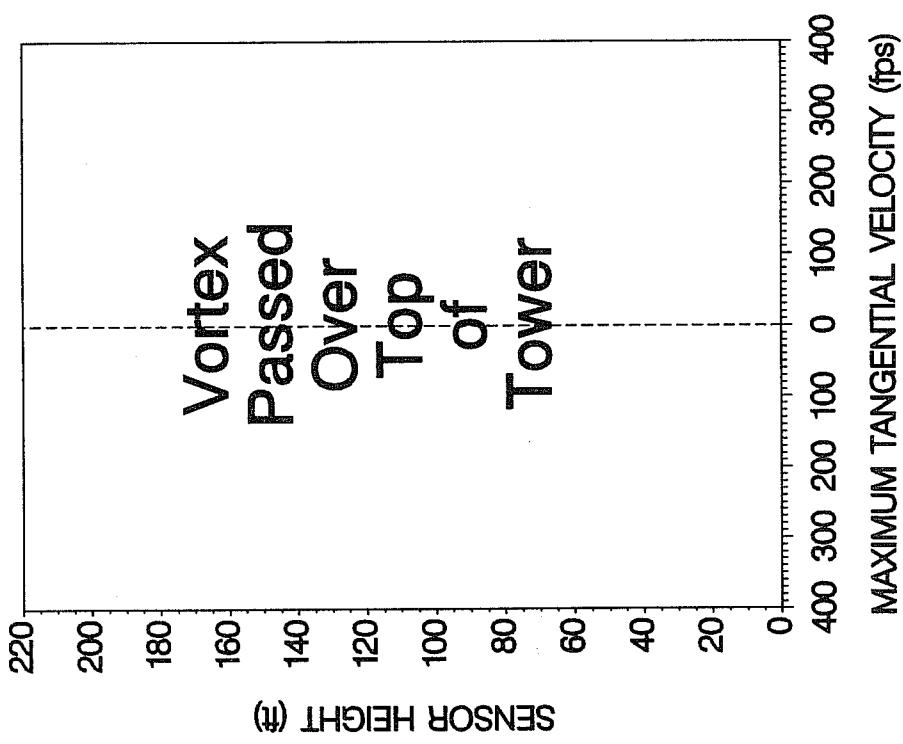


Figure G-116. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 4, ambient wind speed = 6.7 kts,  $\delta_F = 30^\circ$ , IAS = 137 kts, GW = 197,000 lbs. Ages, radii, and velocities of the vortex cores are 21 and 33 s, 0.4 and 0.4 ft, and 245.3 and 217.0 fps, respectively.

UAL B757-200 -- FLYBY 5  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B757-200 -- FLYBY 5  
UPWIND VORTEX VELOCITY PROFILE

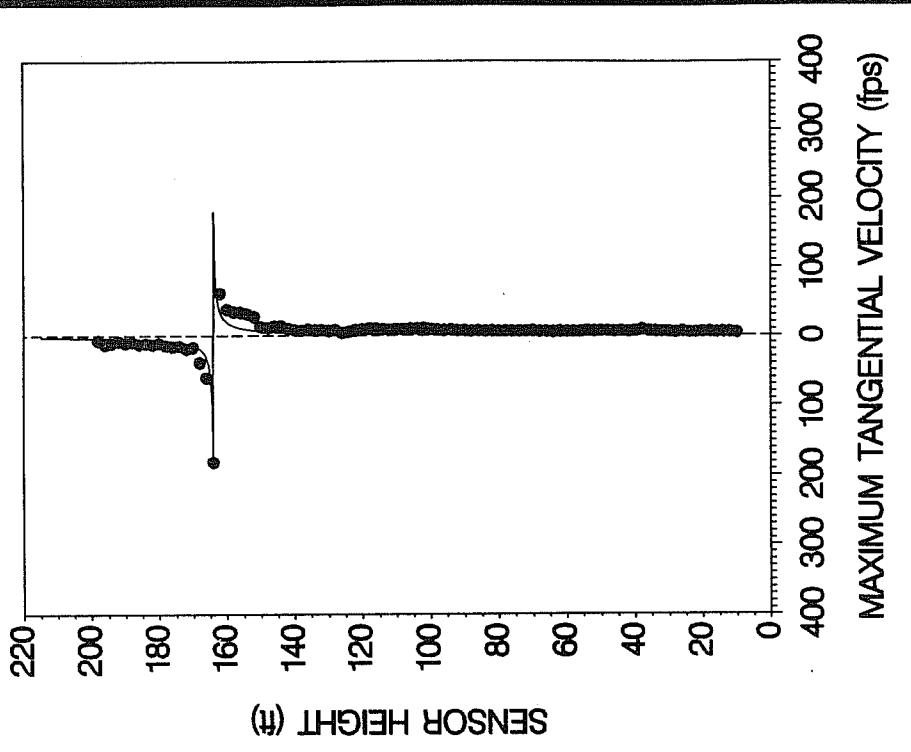


Figure G-117. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 5, ambient wind speed = 8.8 kts,  $\delta_F = 0^\circ$ , IAS = 211 kts, GW = 196,000 lbs. Ages, radii, and velocities of the vortex cores are (P) and 26 s, (P) and 0.2 ft, and (P) and 180.2 fps, respectively.

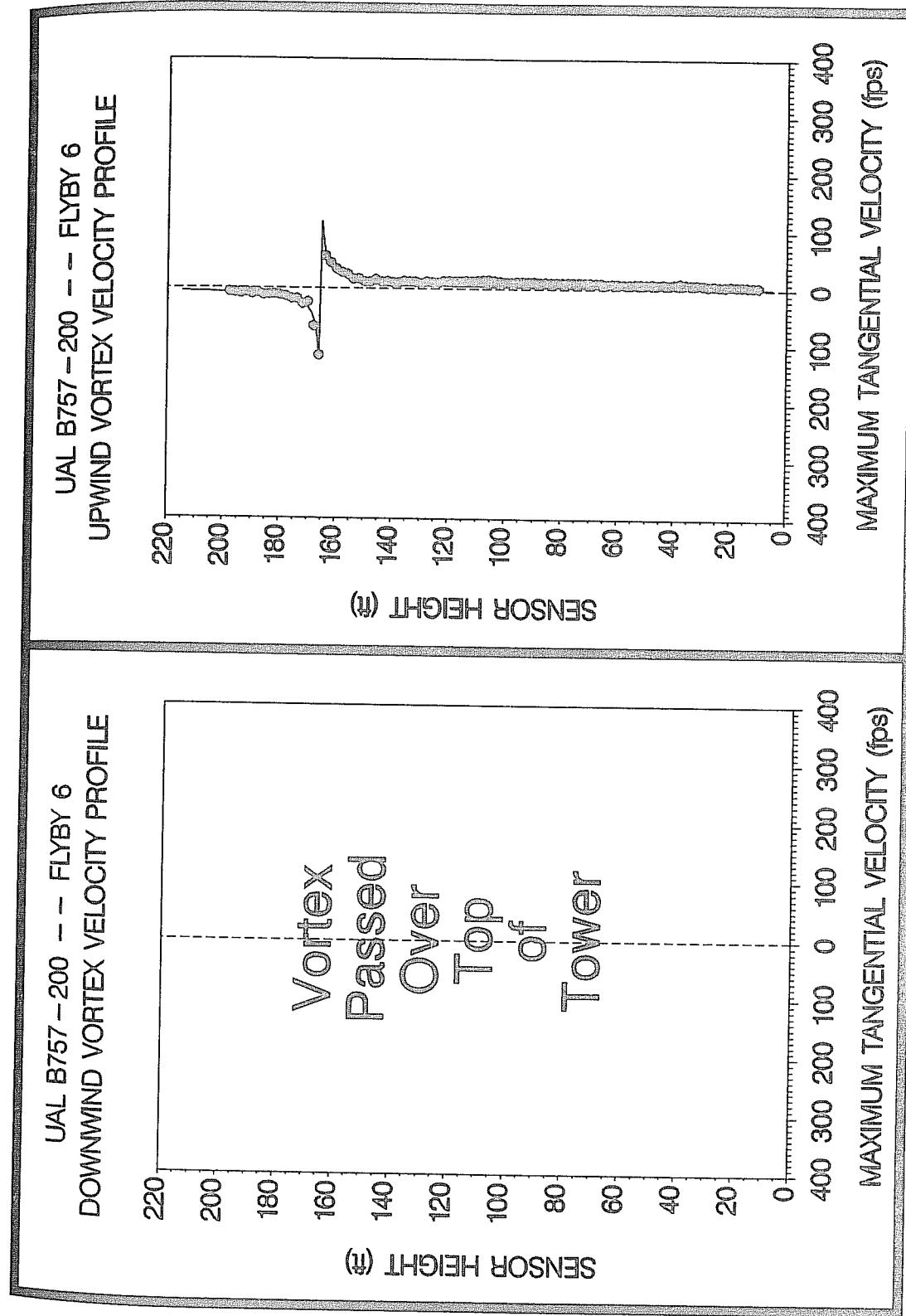


Figure G-118. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 6, ambient wind speed = 9.8 kts,  $\delta_F = 0^\circ$ , IAS = 210 kts, GW = 195,000 lbs. Ages, radii, and velocities of the vortex cores are (P) and 21 s, (P) and 0.4 ft, and (P) and 117.0 fps, respectively.

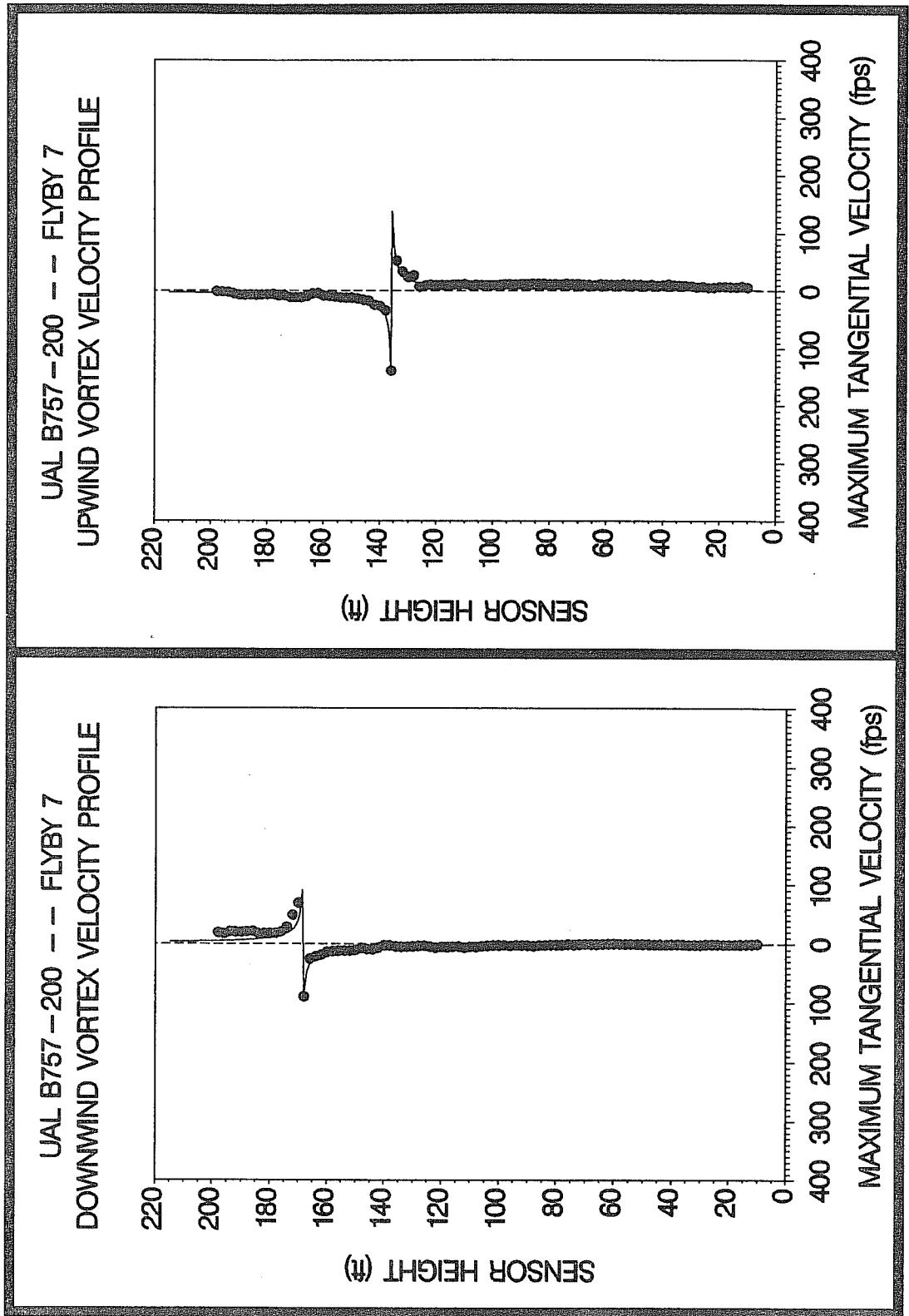
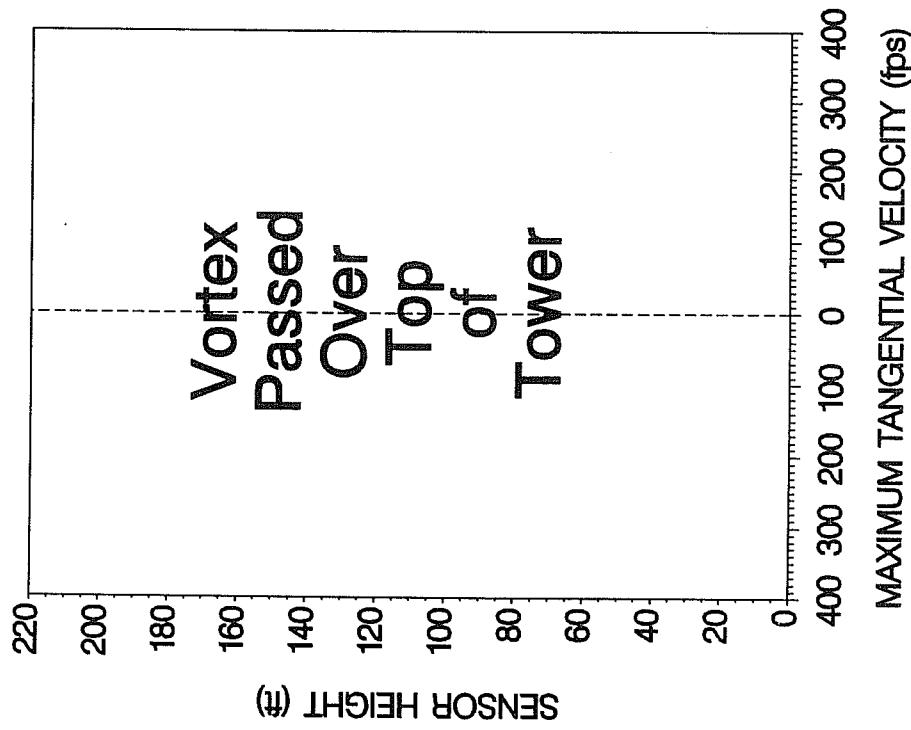


Figure G-119. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 7, ambient wind speed = 9.0 kts,  $\delta_F = 0^\circ$ , IAS = 250 kts, GW = 194,000 lbs. Ages, radii, and velocities of the vortex cores are 25 and 32 s, 0.3 and 0.2 ft, and 89.5 and 138.3 fps, respectively.

UAL B757-200 — FLYBY 8  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B757-200 — FLYBY 8  
UPWIND VORTEX VELOCITY PROFILE

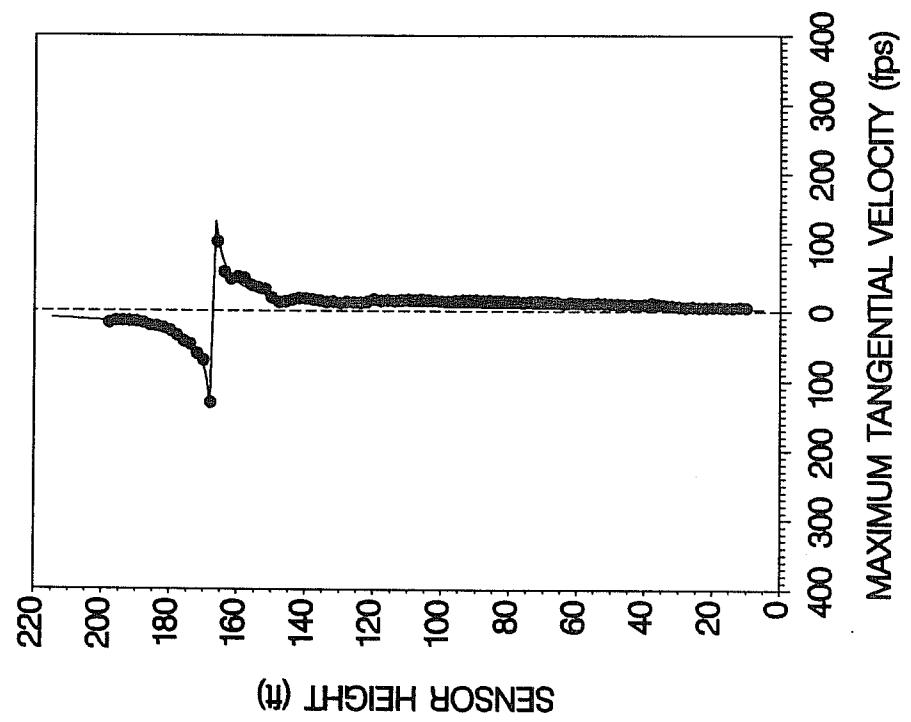


Figure G-120. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 8, ambient wind speed = 11.0 kts,  $\delta_F = 25^\circ$ , IAS = 137 kts, GW = 193,500 lbs. Ages, radii, and velocities of the vortex cores are (P) and 19 s, (P) and 0.7 ft, and (P) and 130.8 fps, respectively.

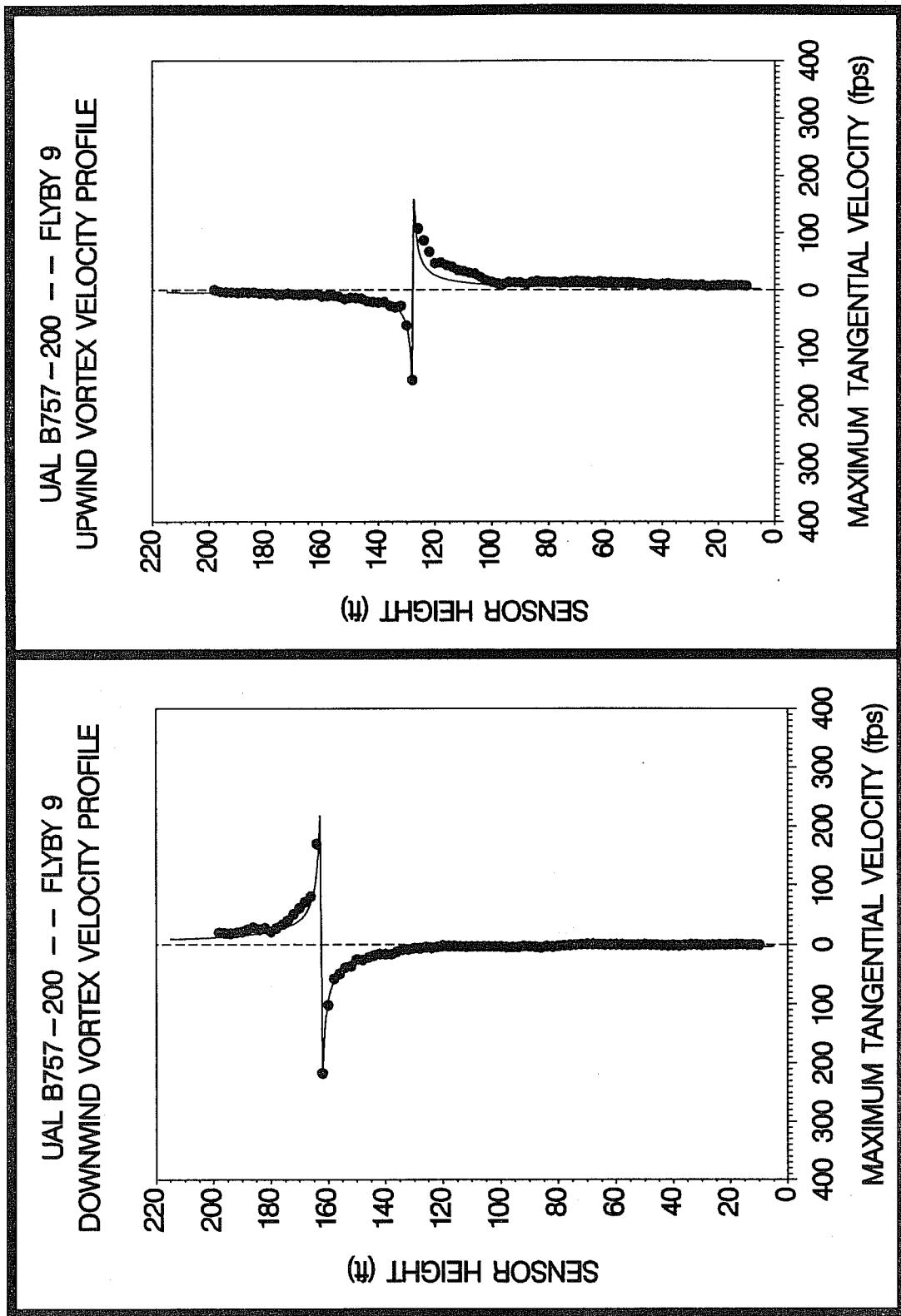


Figure G-121. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 9, ambient wind speed = 11.1 kts,  $\delta_F = 30^\circ$ , IAS = 135 kts, GW = 192,000 lbs. Ages, radii, and velocities of the vortex cores are 14 and 22 s, 0.3 and 22 s, 0.3 and 156.3 fps, respectively.

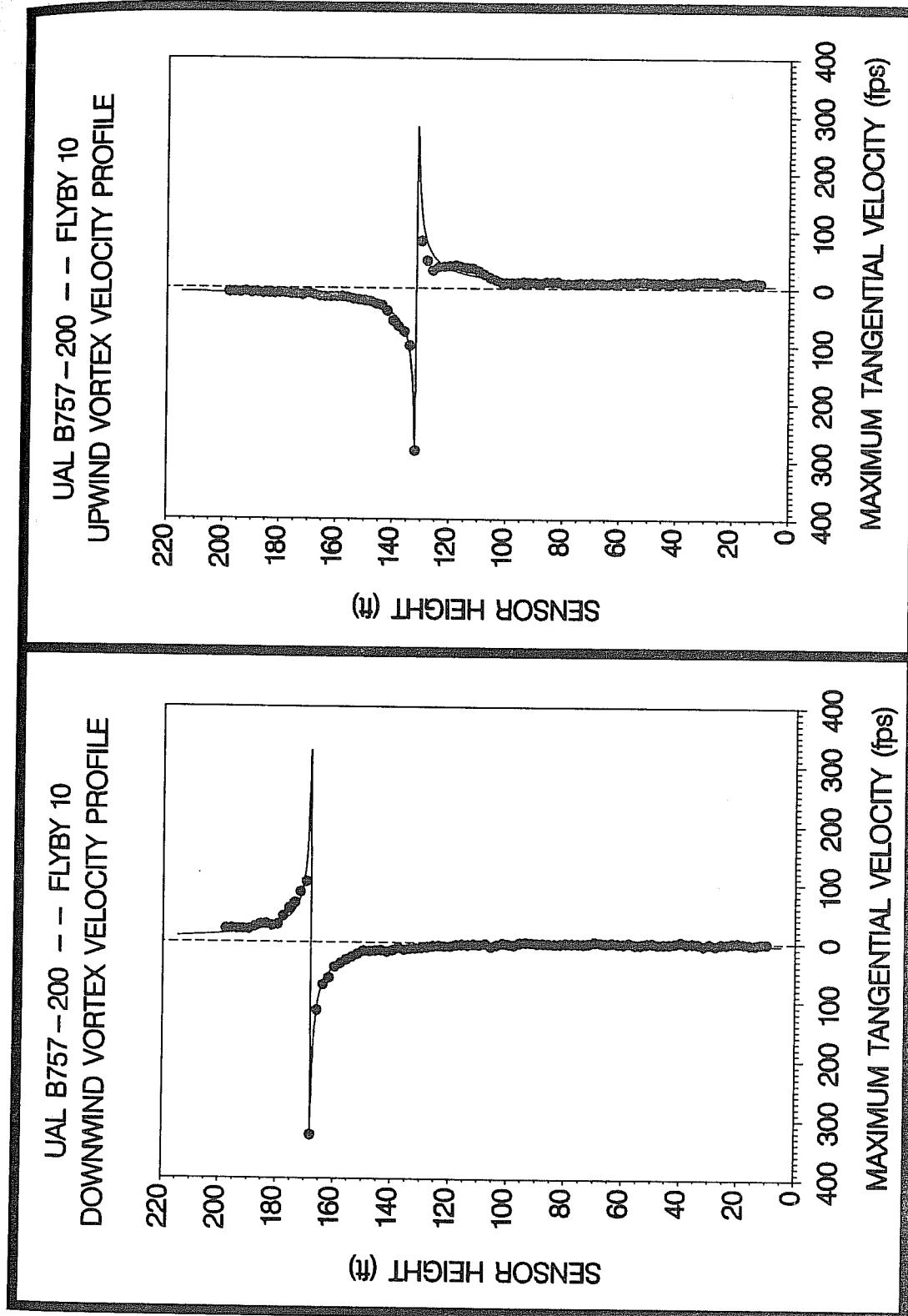
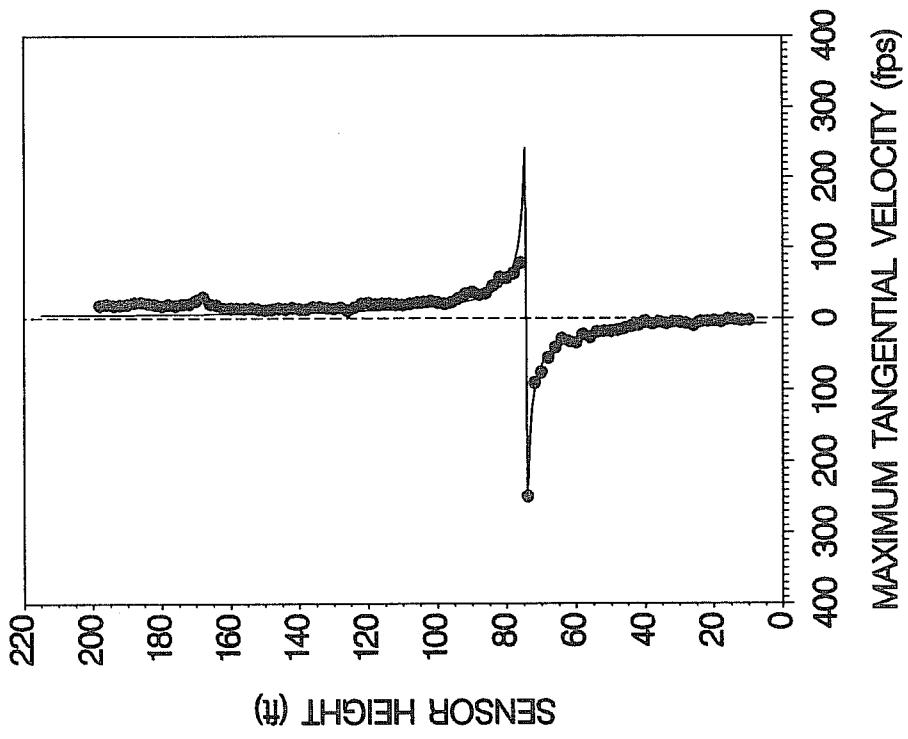


Figure G-122. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 10, ambient wind speed = 8.2 kts,  $\delta_F = 30^\circ$ , IAS = 134 kts, GW = 191,000 lbs. Ages, radii, and velocities of the vortex cores are 16 and 25 s, 0.2 and 0.3 ft, and 325.8 and 281.7 fps, respectively.

UAL B757-200 -- FLYBY 11  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B757-200 -- FLYBY 11  
UPWIND VORTEX VELOCITY PROFILE

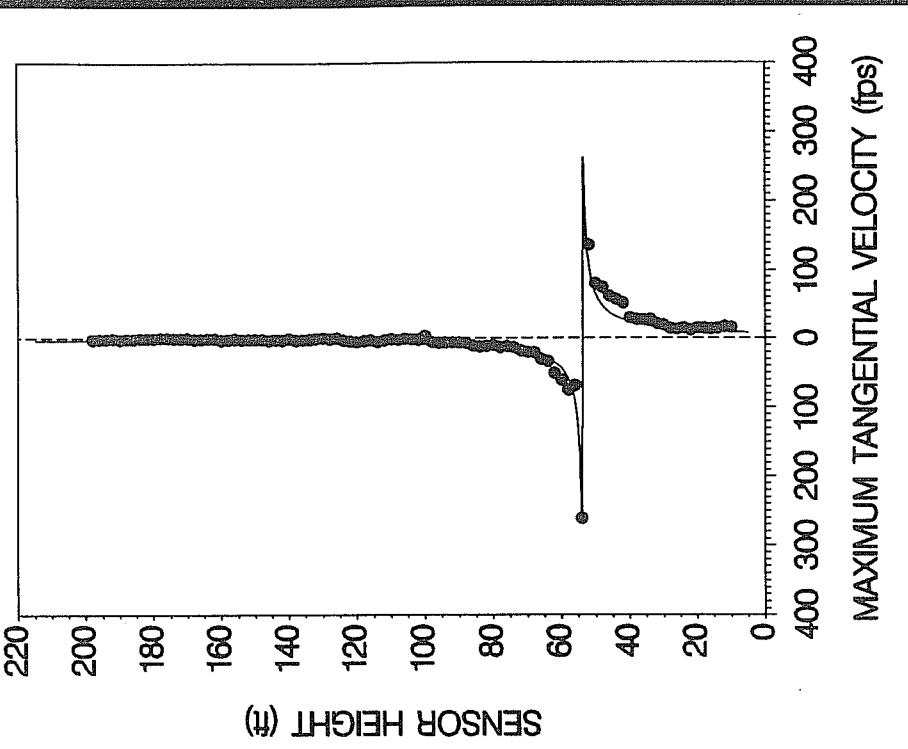
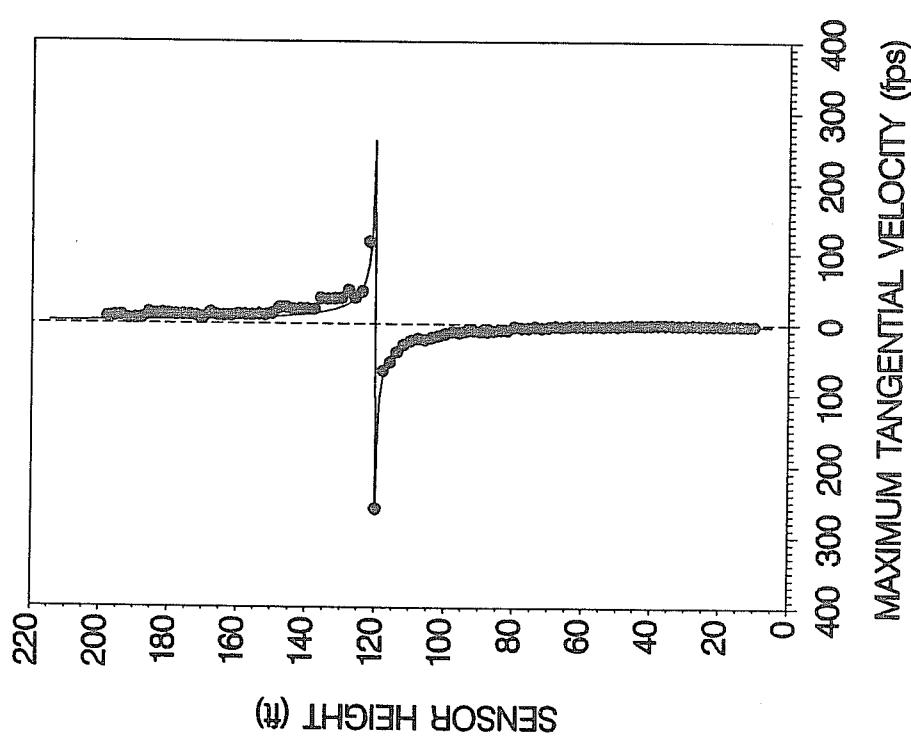


Figure G-123. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 11, ambient wind speed = 7.5 kts,  $\delta_F = 30^\circ$ , IAS = 134 kts, GW = 190,000 lbs. Ages, radii, and velocities of the vortex cores are 28 and 40 s, 0.3 and 0.2 ft, and 249.0 and 261.0 fps, respectively.

UAL B757-200 — FLYBY 12  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B757-200 — FLYBY 12  
UPWIND VORTEX VELOCITY PROFILE

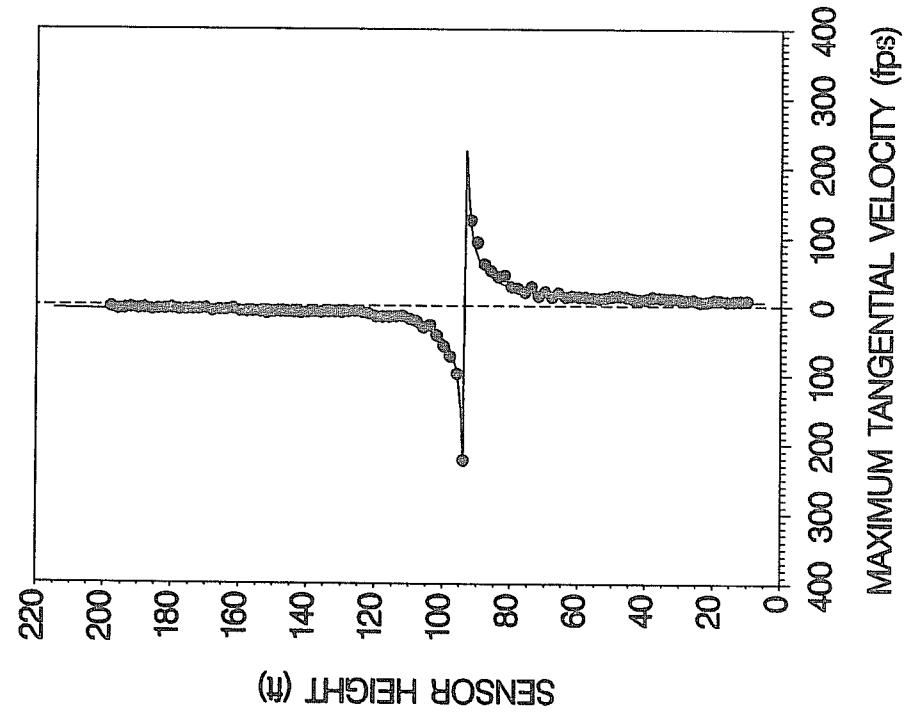


Figure G-124. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 12, ambient wind speed = 6.0 kts,  $\delta_F = 30^\circ$ , IAS = 133 kts, GW = 189,000 lbs. Ages, radii, and velocities of the vortex cores are 23 and 35 s, 0.2 and 0.4 ft, and 260.6 and 223.1 fps, respectively.

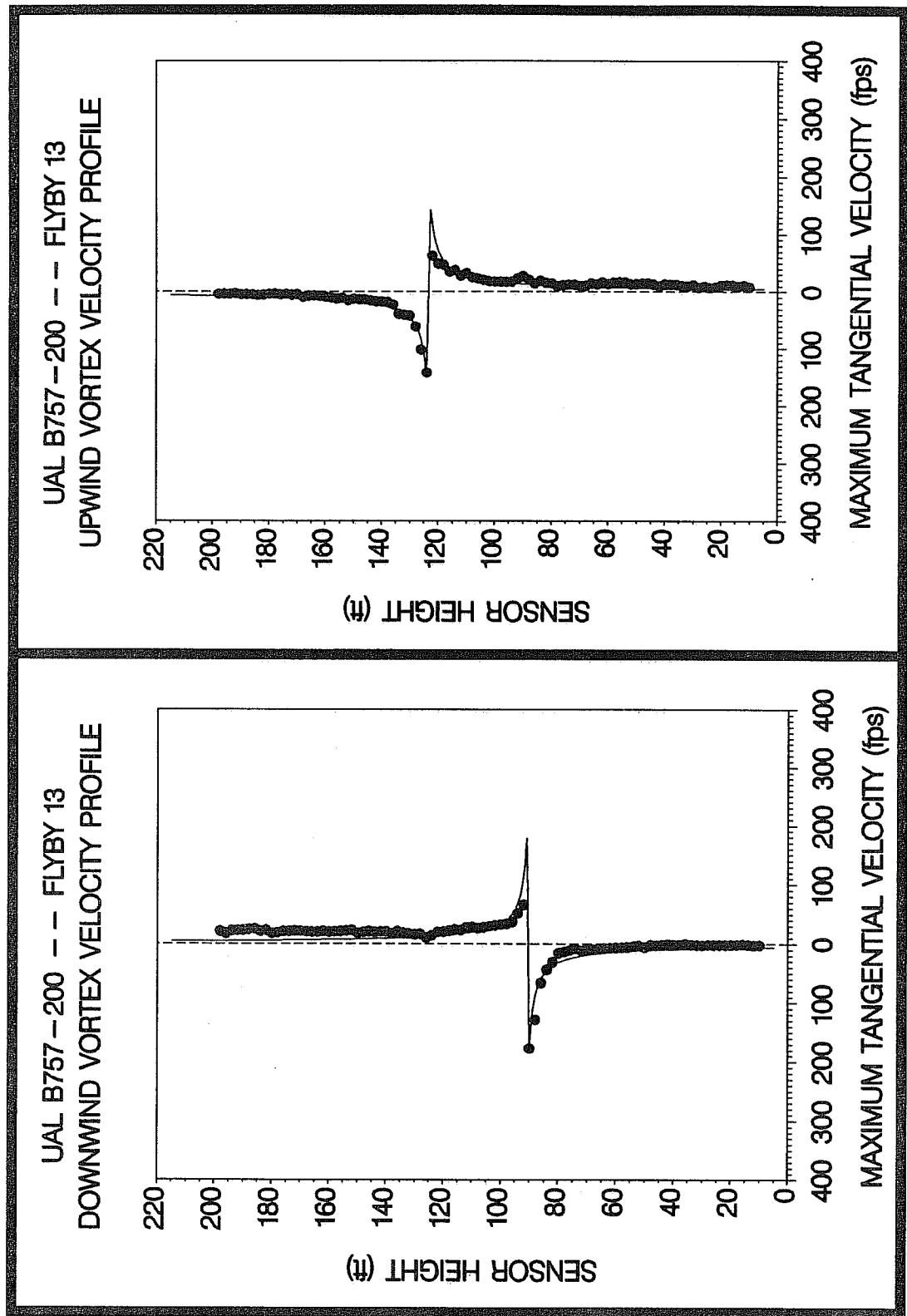


Figure G-125. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 13, ambient wind speed = 5.4 kts,  $\delta_F = 30^\circ$ , IAS = 133 kts, GW = 188,000 lbs. Ages, radii, and velocities of the vortex cores are 34 and 46 s, 0.5 and 0.7 ft, and 177.3 and 142.0 fps, respectively.

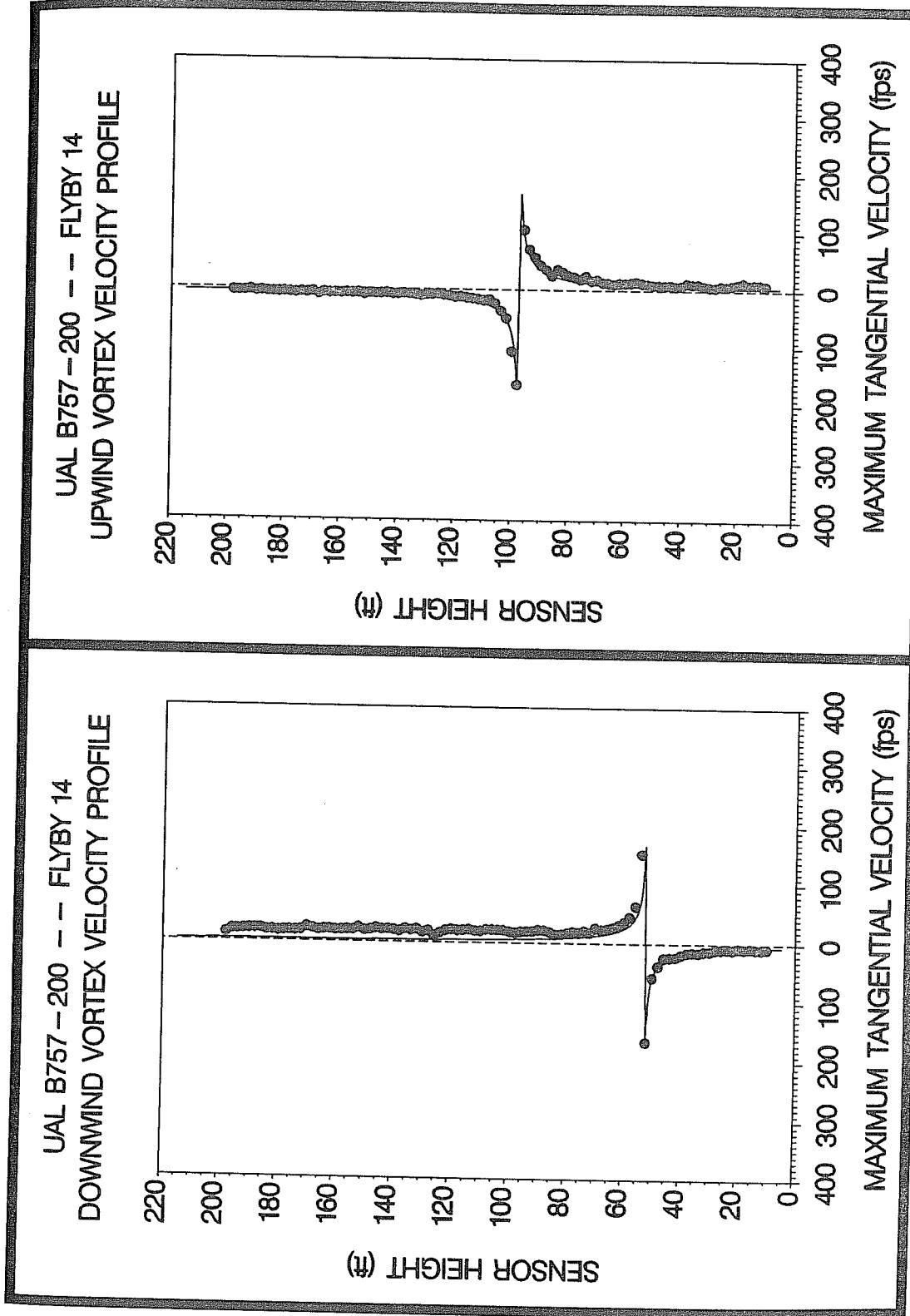


Figure G-126. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 14, ambient wind speed = 5.7 kts,  $\delta_F = 30^\circ$ , IAS = 133 kts, GW = 187,000 lbs. Ages, radii, and velocities of the vortex cores are 41 and 54 s, 0.2 and 0.4 ft, and 166.4 and 165.2 fps, respectively.

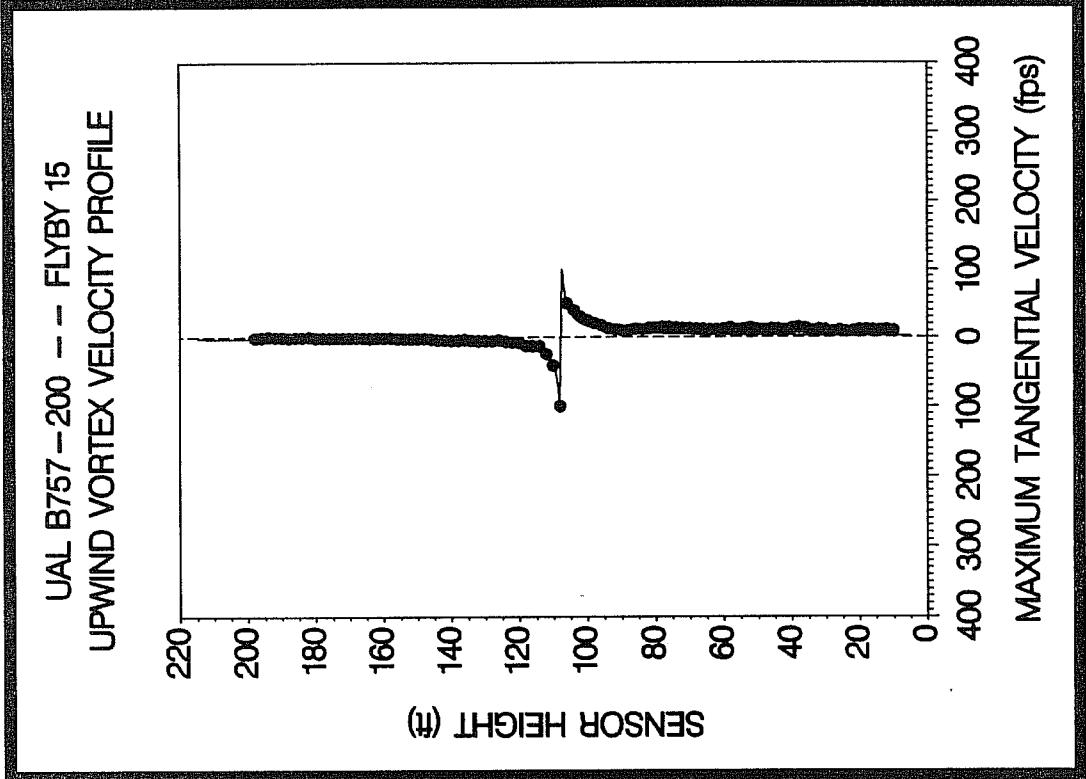
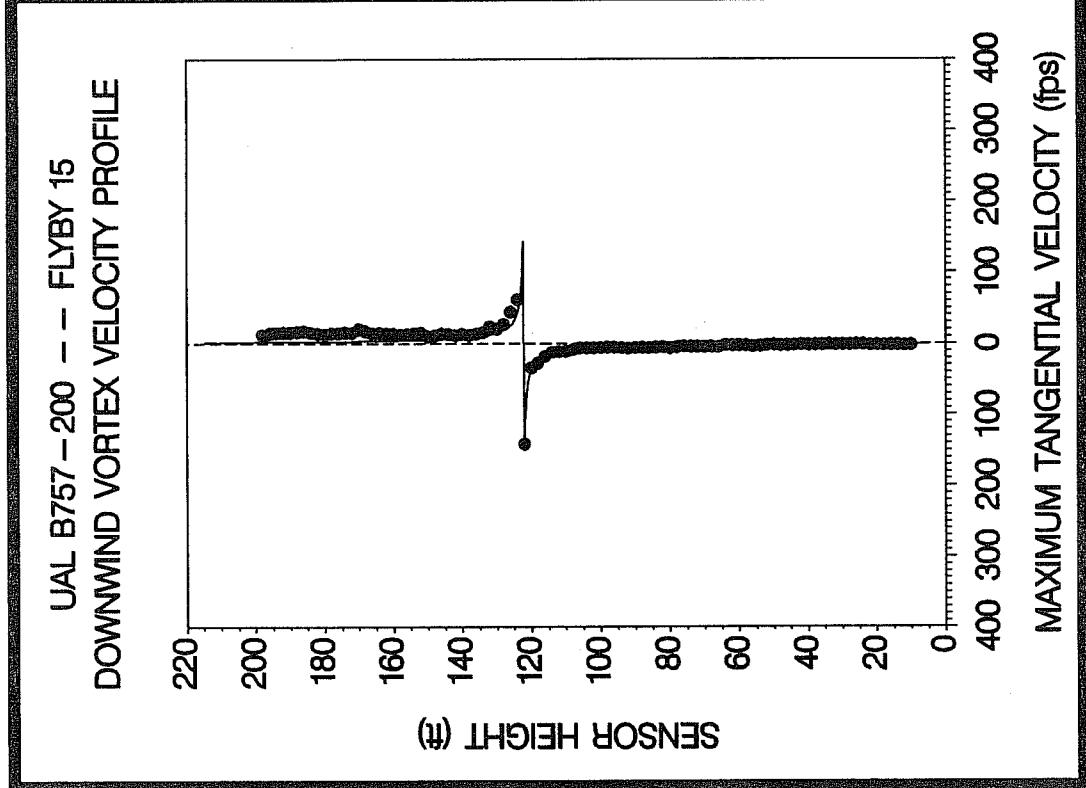


Figure G-127. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 15, ambient wind speed = 6.5 kts,  $\delta_F = 0^\circ$ , IAS = 250 kts, GW = 186,000 lbs. Ages, radii, and velocities of the vortex cores are 34 and 47 s, 0.2 and 0.3 ft, and 141.7 and 99.6 fps, respectively.

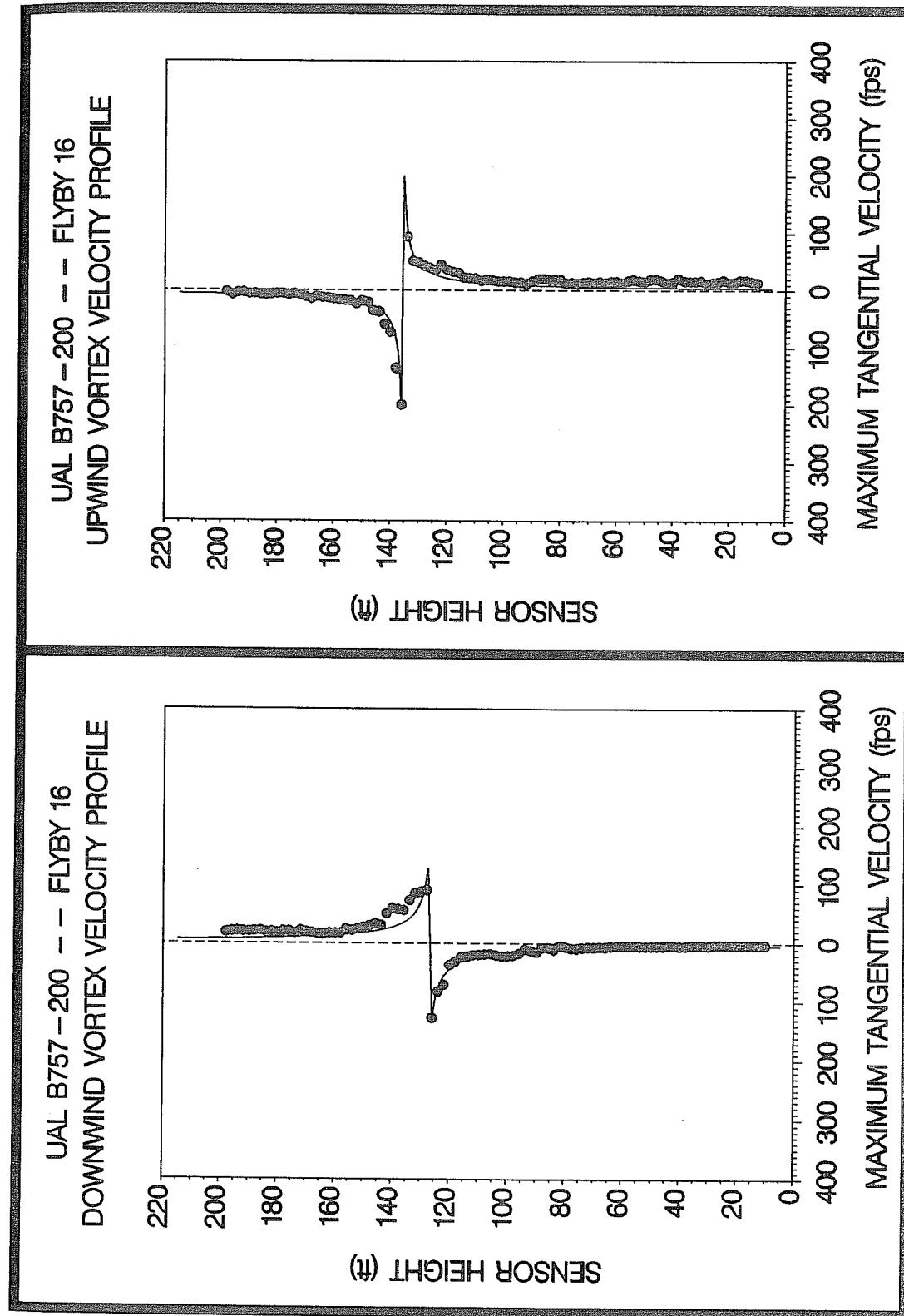


Figure G-128. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 16, ambient wind speed = 7.5 kts,  $\delta_F = 30^\circ$ , IAS = 132 kts, GW = 185,000 lbs. Ages, radii, and velocities of the vortex cores are 26 and 35 s, 0.7 and 0.5 ft, and 127.2 and 199.2 fps, respectively.

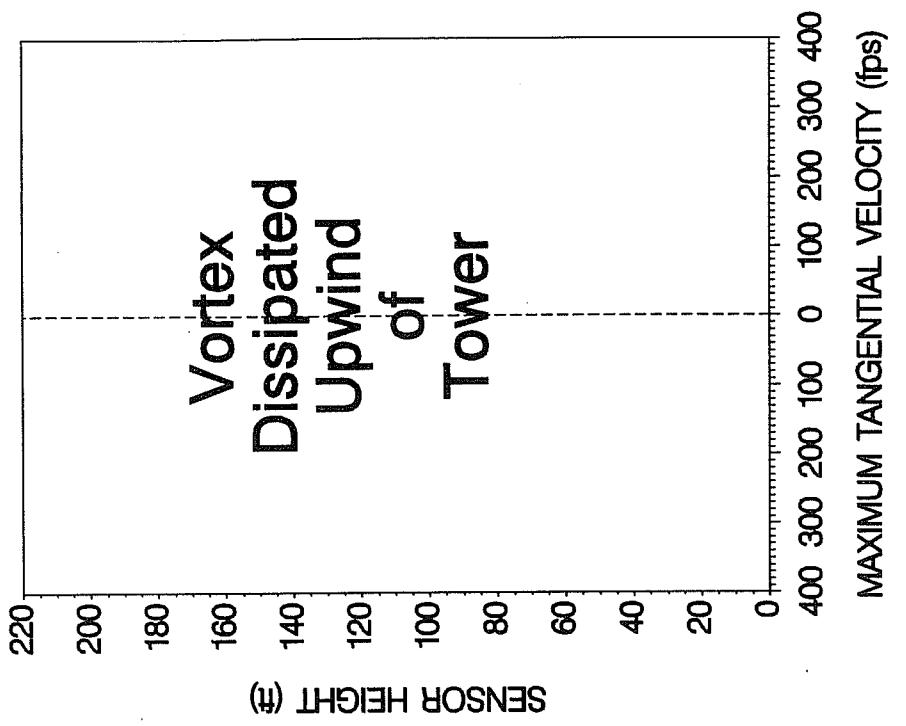
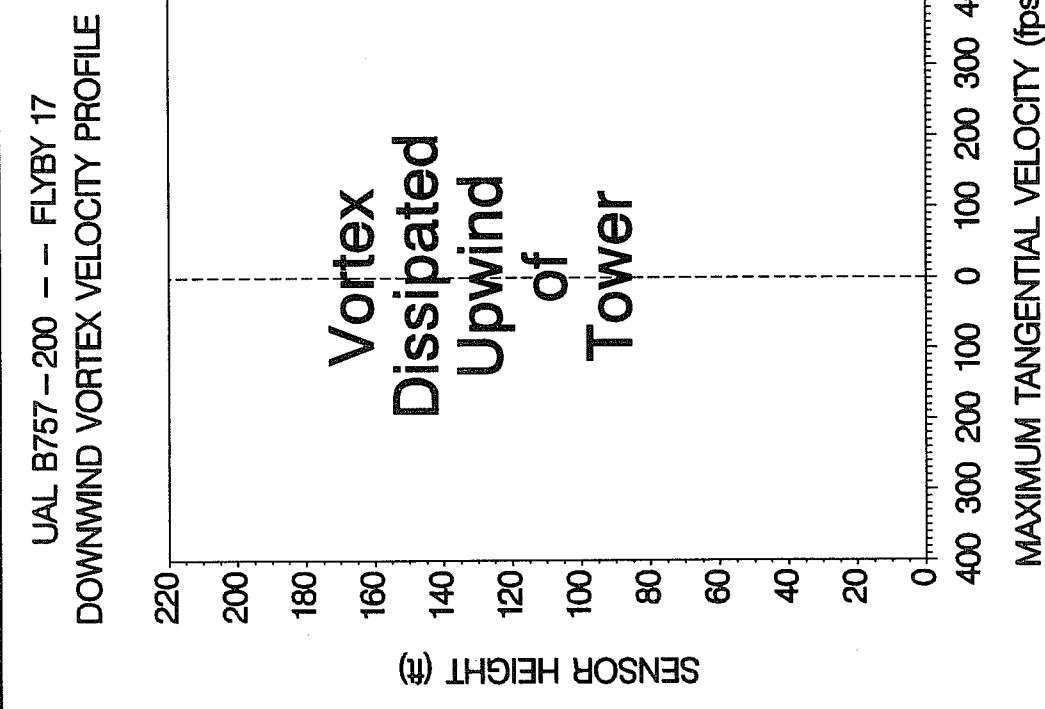


Figure G-129. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 17, ambient wind speed = 5.3 kts,  $\delta_F = 30^\circ$ , IAS = 132 kts, GW = 184,000 lbs. Ages, radii, and velocities of the vortex cores are (D) and (D) ft, and (D) and (D) s, (D) and (D) ft, and (D) and (D) fps, respectively.

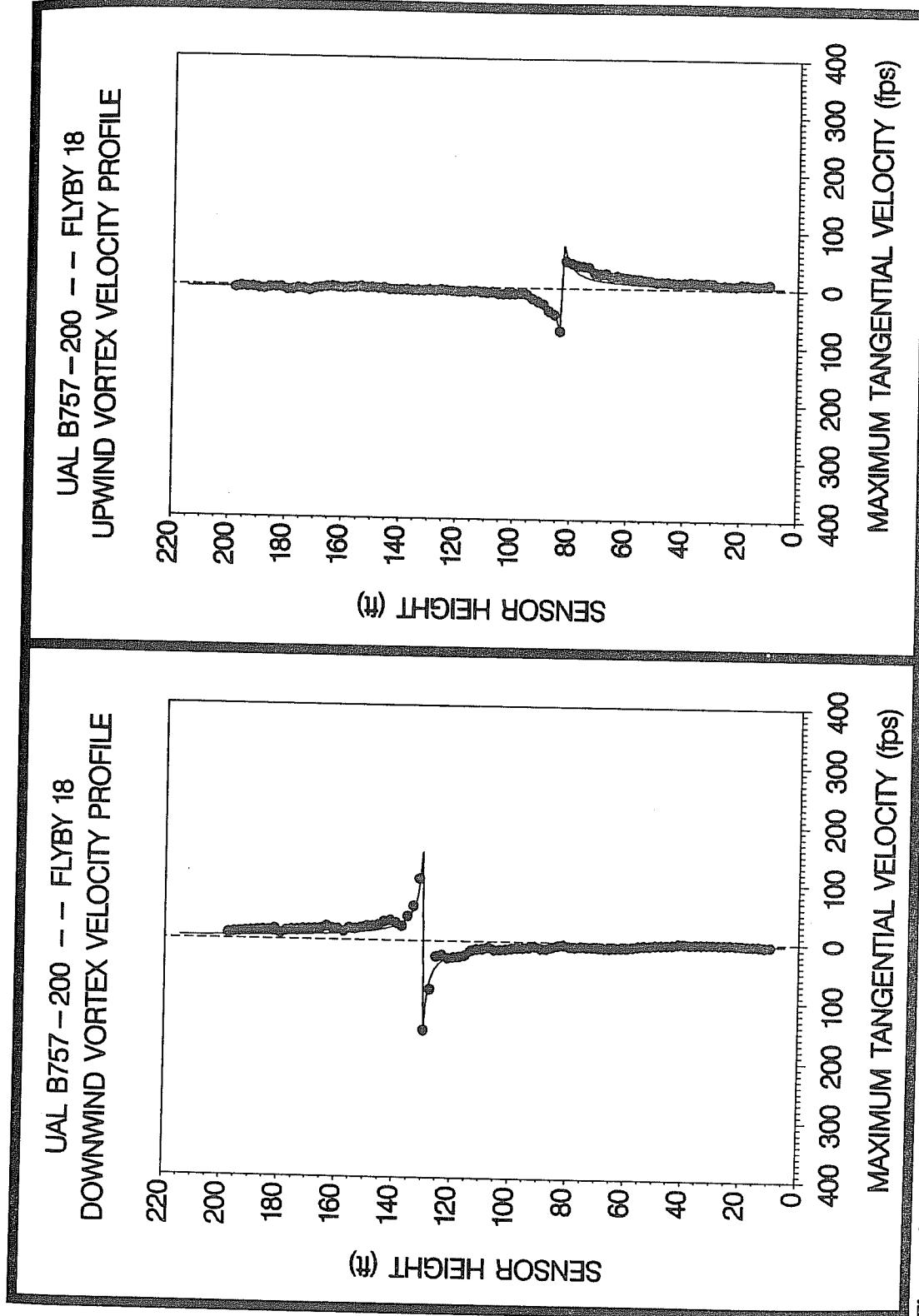
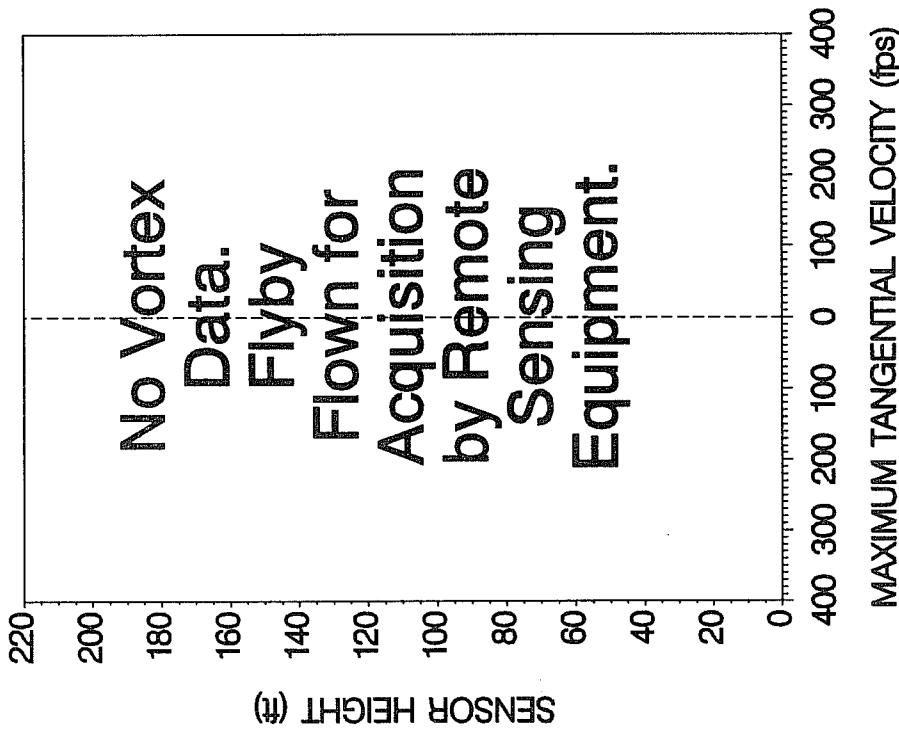


Figure G-130. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 18, ambient wind speed = 5.8 kts,  $\delta_F = 30^\circ$ , IAS = 132 kts, GW = 183,000 lbs. Ages, radii, and velocities of the vortex cores are 41 and 60 s, 0.4 and 0.7 ft, and 150.9 and 73.7 fps, respectively.

UAL B757-200 -- FLYBY 19  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B757-200 -- FLYBY 19  
UPWIND VORTEX VELOCITY PROFILE

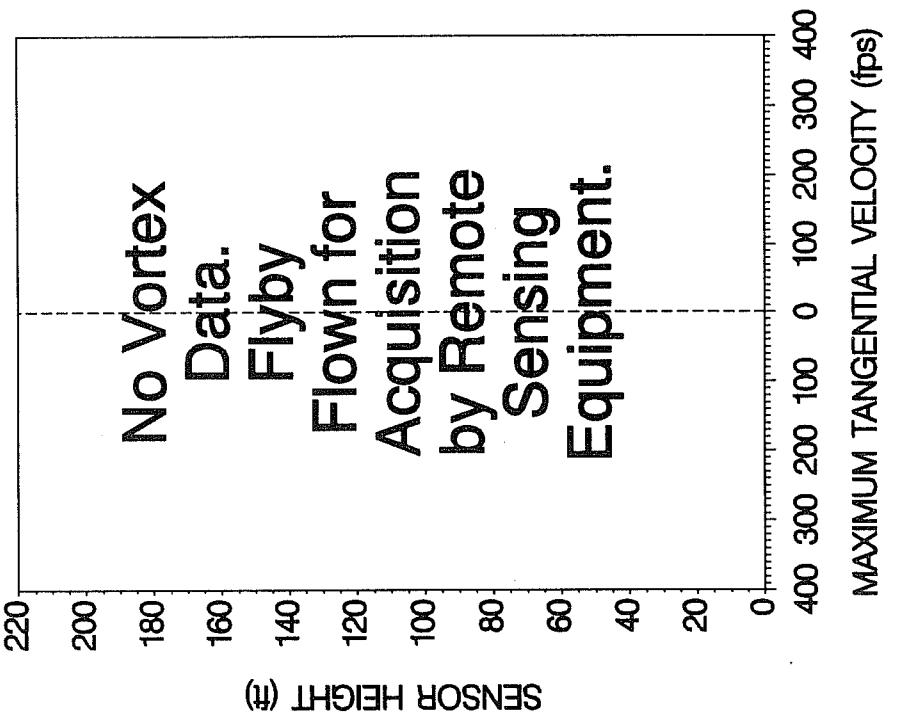
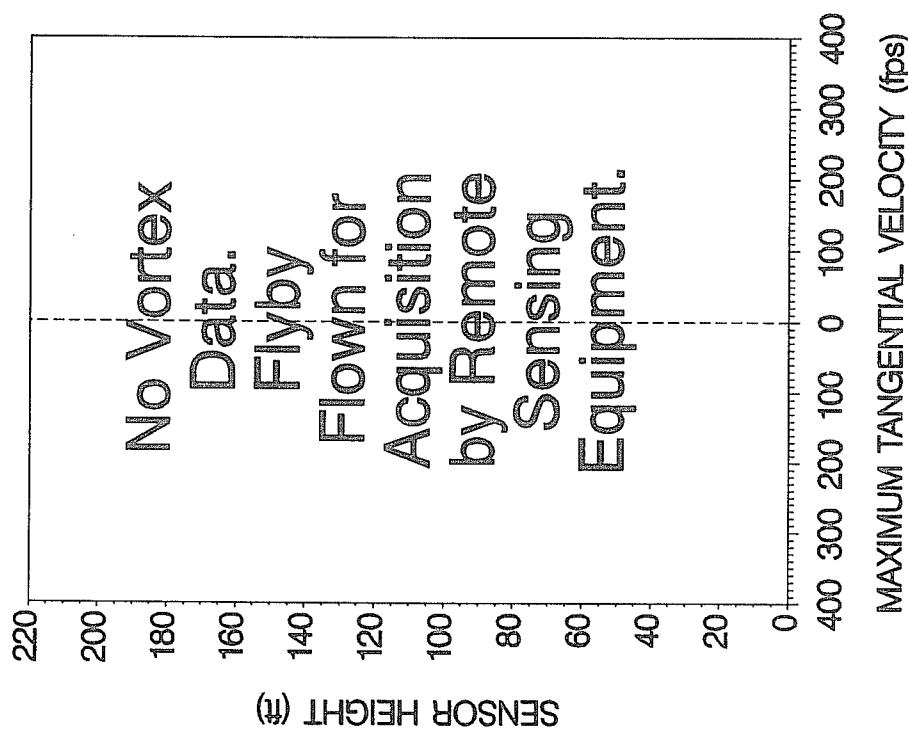
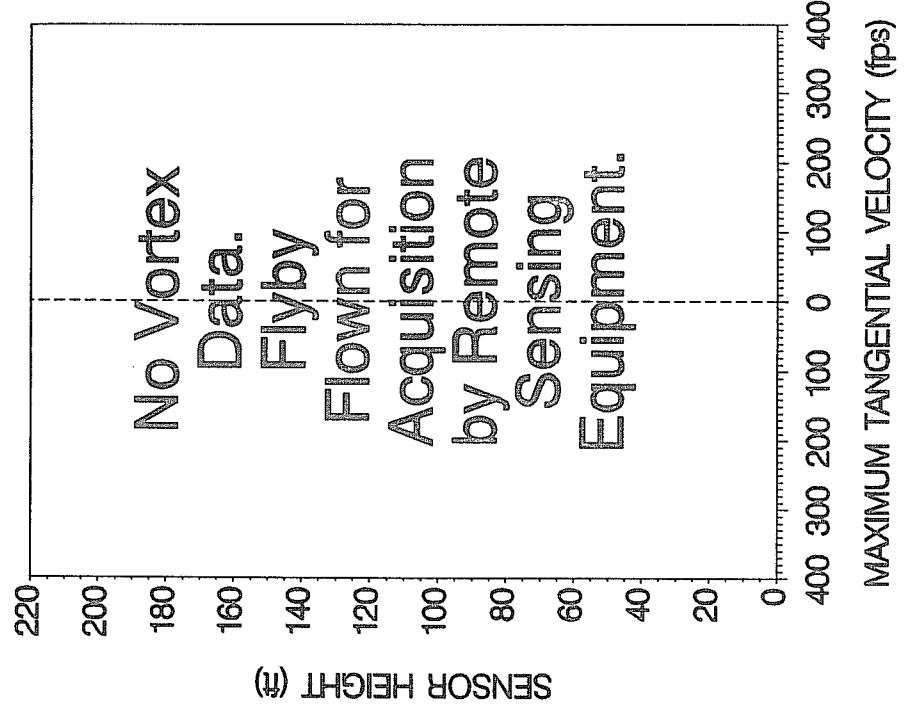


Figure G-131. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 19, ambient wind speed = 5.3 kts,  $\delta_F = 30^\circ$ , IAS = 131 kts, GW = 182,000 lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) s, (O) and (O) ft, and (O) and (O) fps, respectively.

UAL B757 - 200 — FLYBY 20  
DOWNWIND VORTEX VELOCITY PROFILE



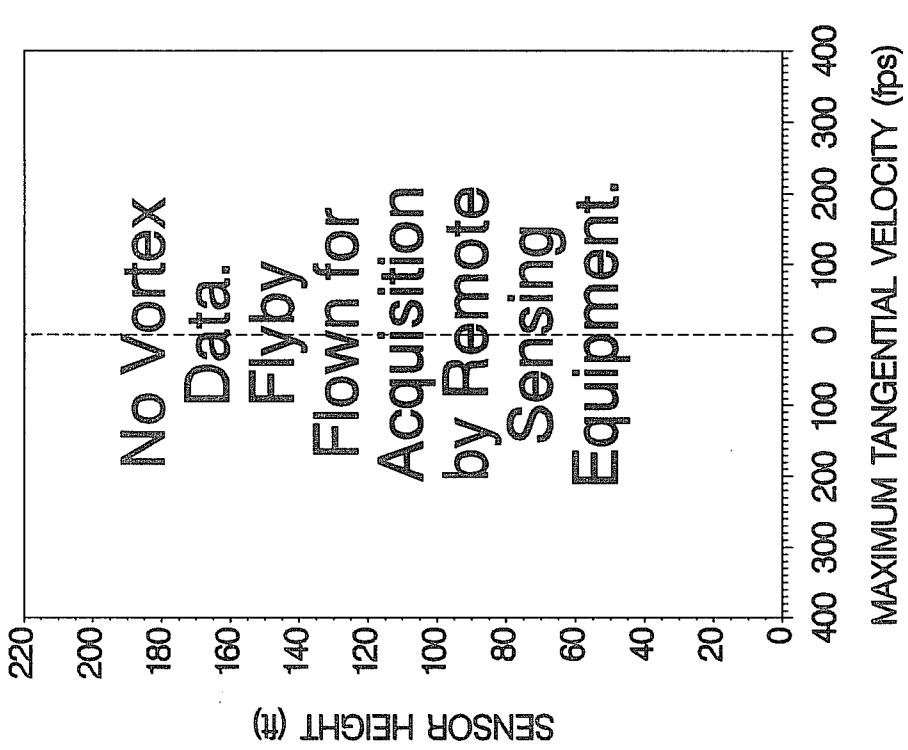
UAL B757 - 200 — FLYBY 20  
UPWIND VORTEX VELOCITY PROFILE



MAXIMUM TANGENTIAL VELOCITY (fps)

Figure G-132. UAL B757-200 downwind (left) and upwind (right) vortex profiles at maximum intensity from Day of Year 268, Flyby 20, ambient wind speed = 5.8 kts,  $\delta_F = 30^\circ$ , IAS = 130 kts, GW = 181,500 lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) s, (O) and (O) ft, and (O) and (O) fps, respectively.

UAL B757 - 200 -- FLYBY 21  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B757 - 200 -- FLYBY 21  
UPWIND VORTEX VELOCITY PROFILE

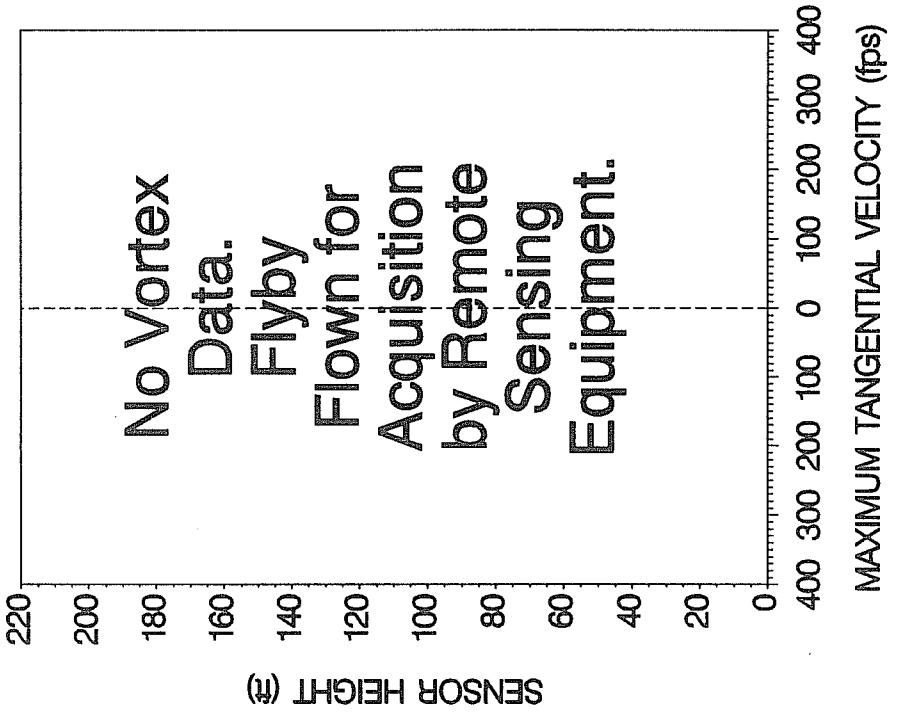


Figure G-133. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 21, ambient wind speed = 7.1 kts,  $\delta_F = 5^\circ$ , IAS = 150 kts, GW = 18,100 lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) s, (O) and (O) ft, and (O) and (O) fps, respectively.

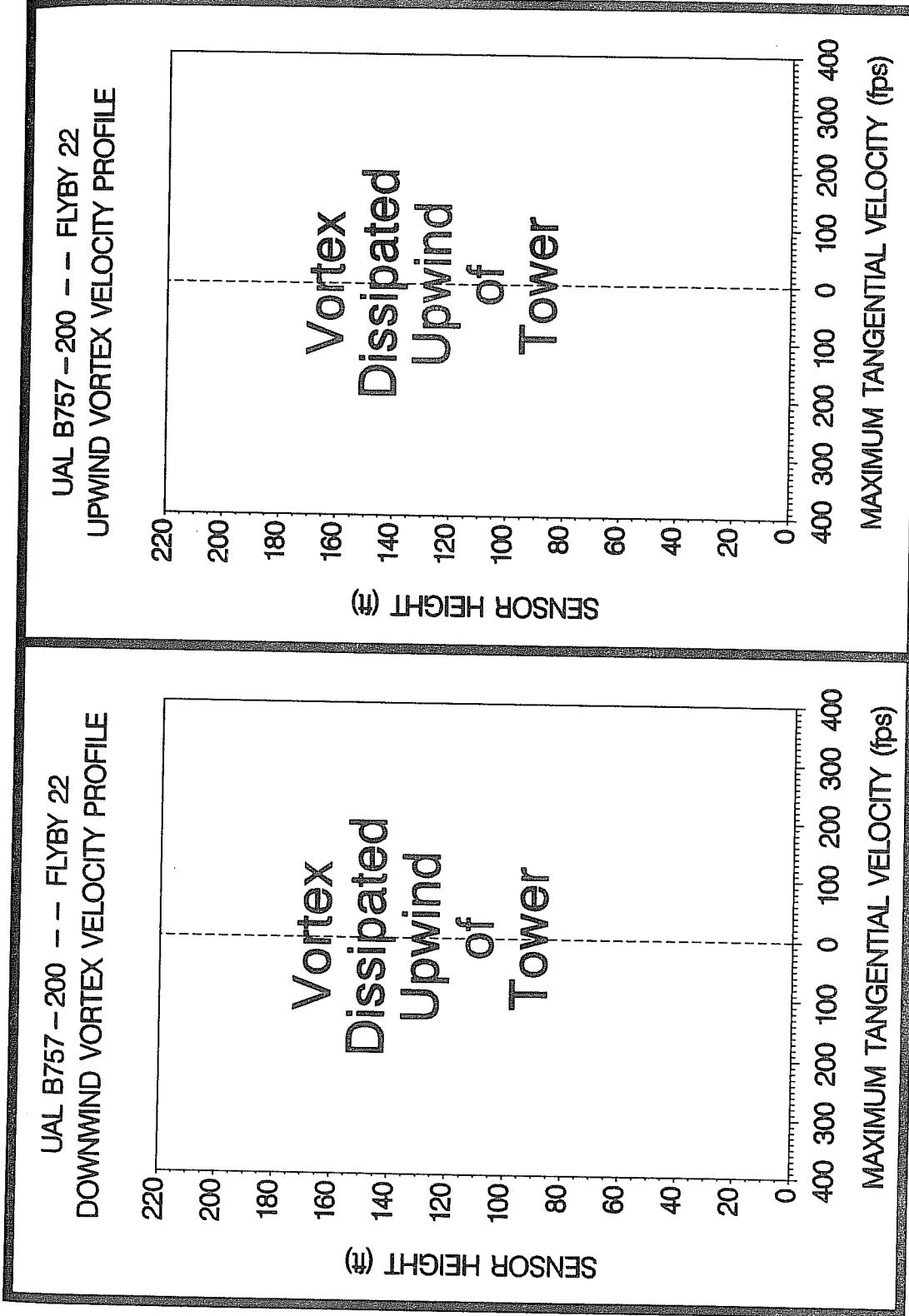
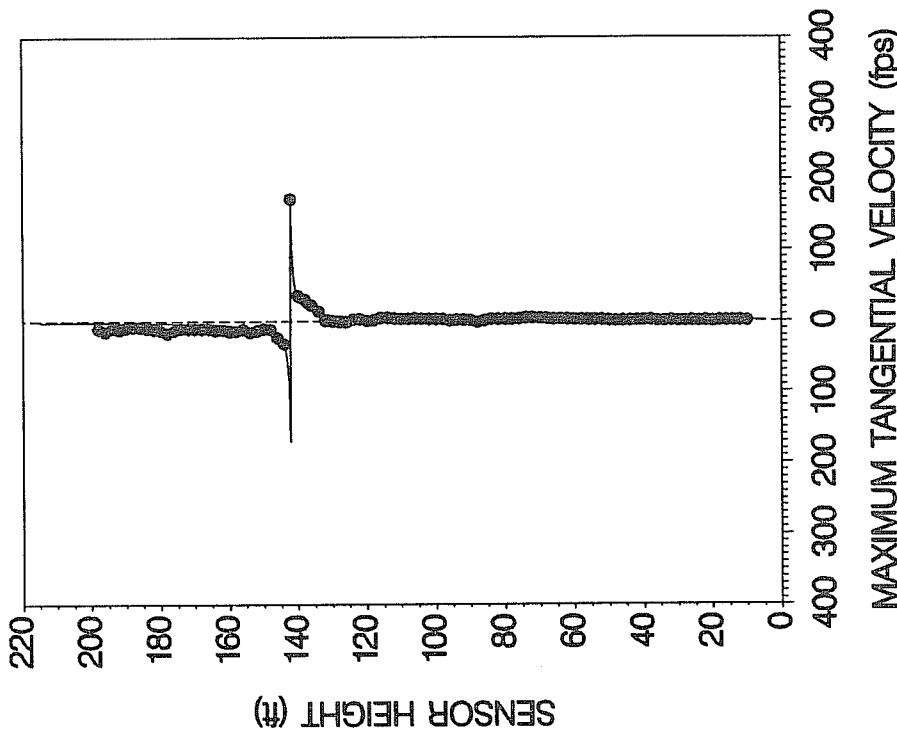
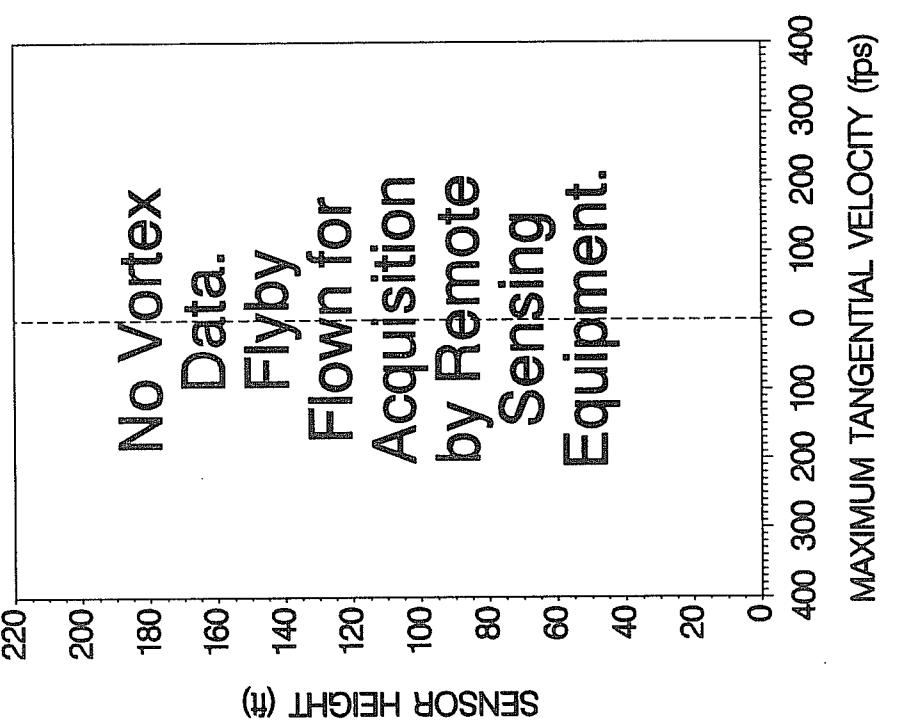


Figure G-134. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 22, ambient wind speed = 1.6 kts,  $\delta_F = 20^\circ$ , IAS = 143 kts,  $GW = 200, 100$  lbs. Ages, radii, and velocities of the vortex cores are (D) and (D) ft, and (D) and (D) s, (D) and (D) ft, and (D) and (D) fps, respectively.

UAL B757 - 200 -- FLYBY 23  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B757 - 200 -- FLYBY 23  
UPWIND VORTEX VELOCITY PROFILE



No Vortex Data.  
Flyby Flown for Acquisition by Remote Sensing Equipment.

Figure G-135. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 23, ambient wind speed = 3.0 kts,  $\delta_F = 30^\circ$ ,  $IAS = 136$  kts,  $GW = 196,500$  lbs. Ages, radii, and velocities of the vortex cores are 46 and (O) s, 0.1 and (O) ft, and 171.7 and (O) fps, respectively.

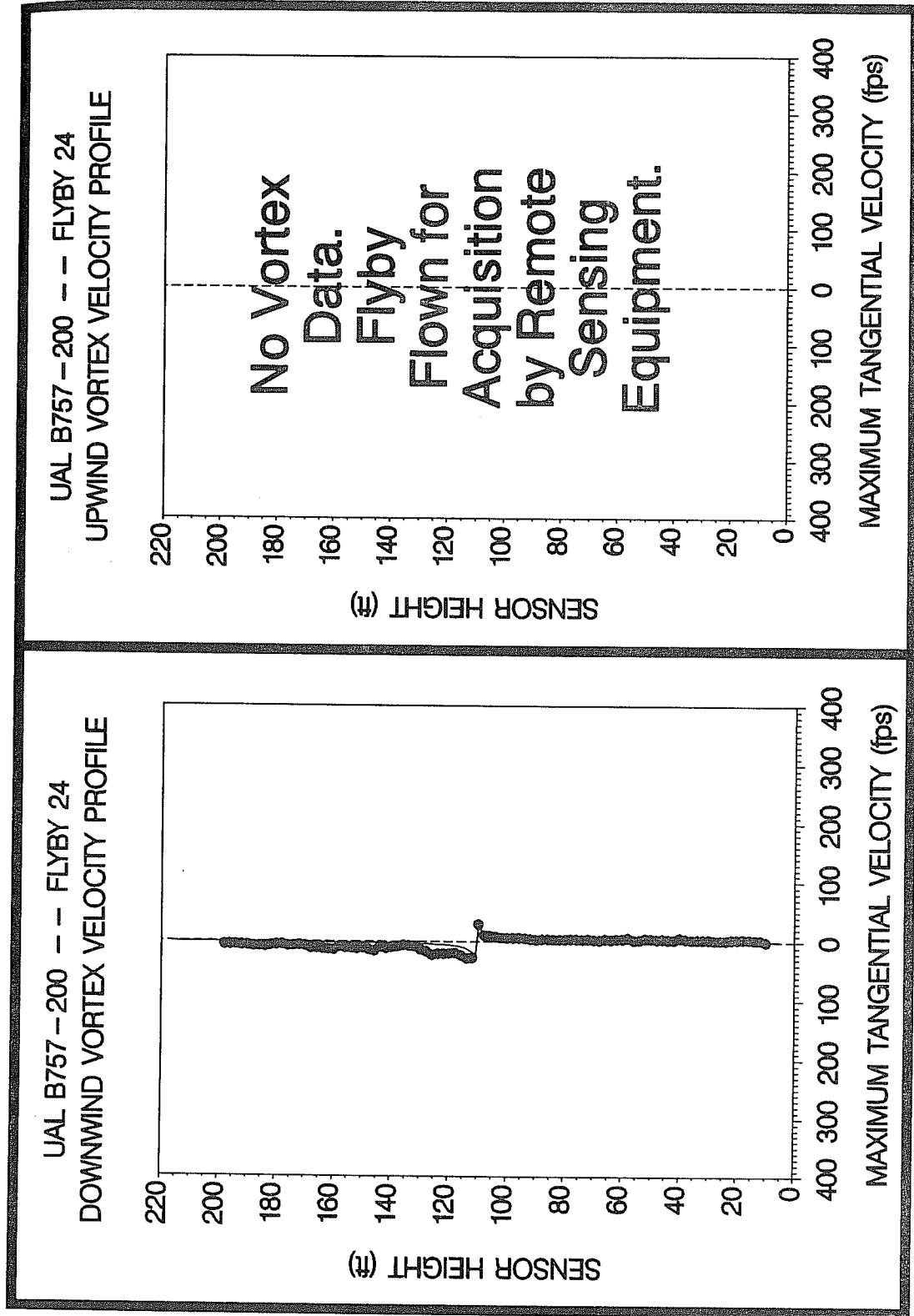
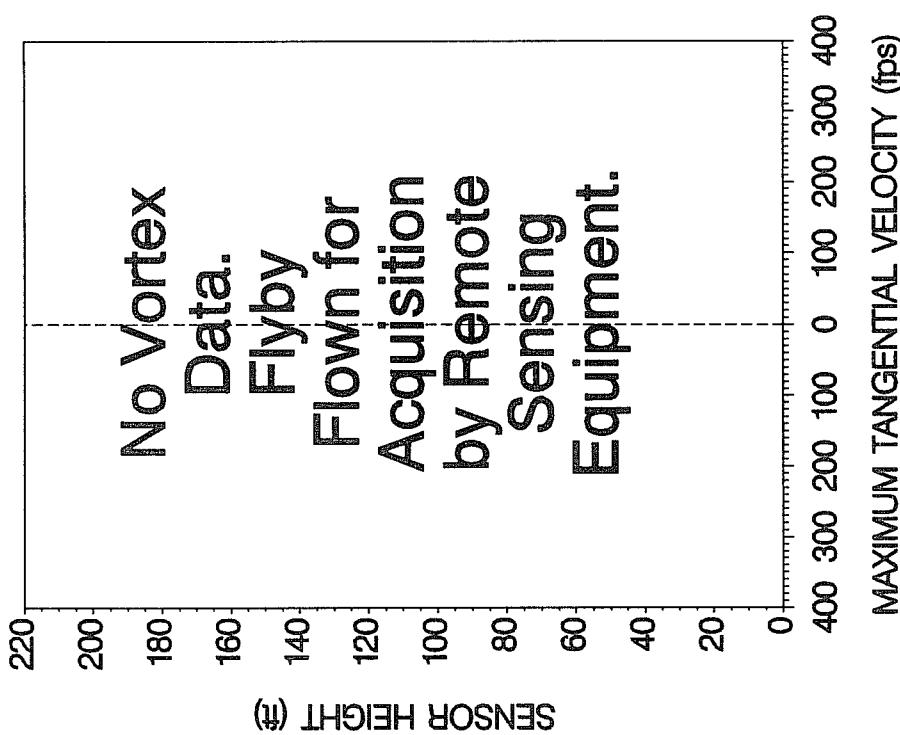


Figure G-136. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 24, ambient wind speed = 3.5 kts,  $\delta_F = 20^\circ$ , IAS = 142 kts, GW = 195,500 lbs. Ages, radii, and velocities of the vortex cores are 51 and (O) s, 0.5 and (O) ft, and 28.8 and (O) fps, respectively.

UAL B757-200 -- FLYBY 25  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B757-200 -- FLYBY 25  
UPWIND VORTEX VELOCITY PROFILE

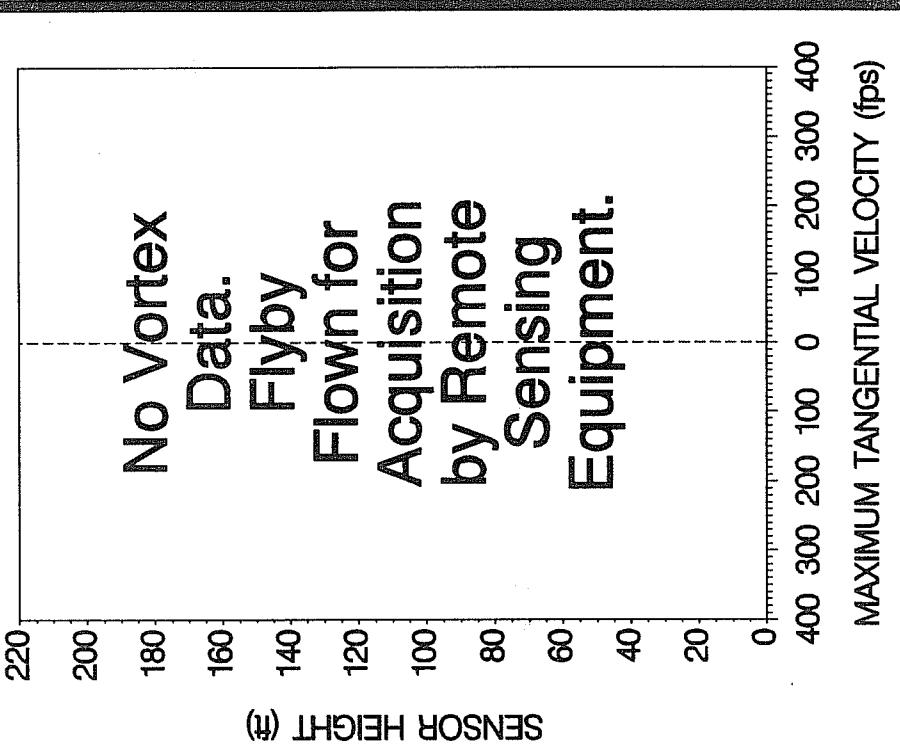


Figure G-137. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 25, ambient wind speed = 5.8 kts,  $\delta_F = 30^\circ$ , IAS = 136 kts, GW = 194,500 lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) s, (O) and (O) ft, and (O) and (O) fps, respectively.

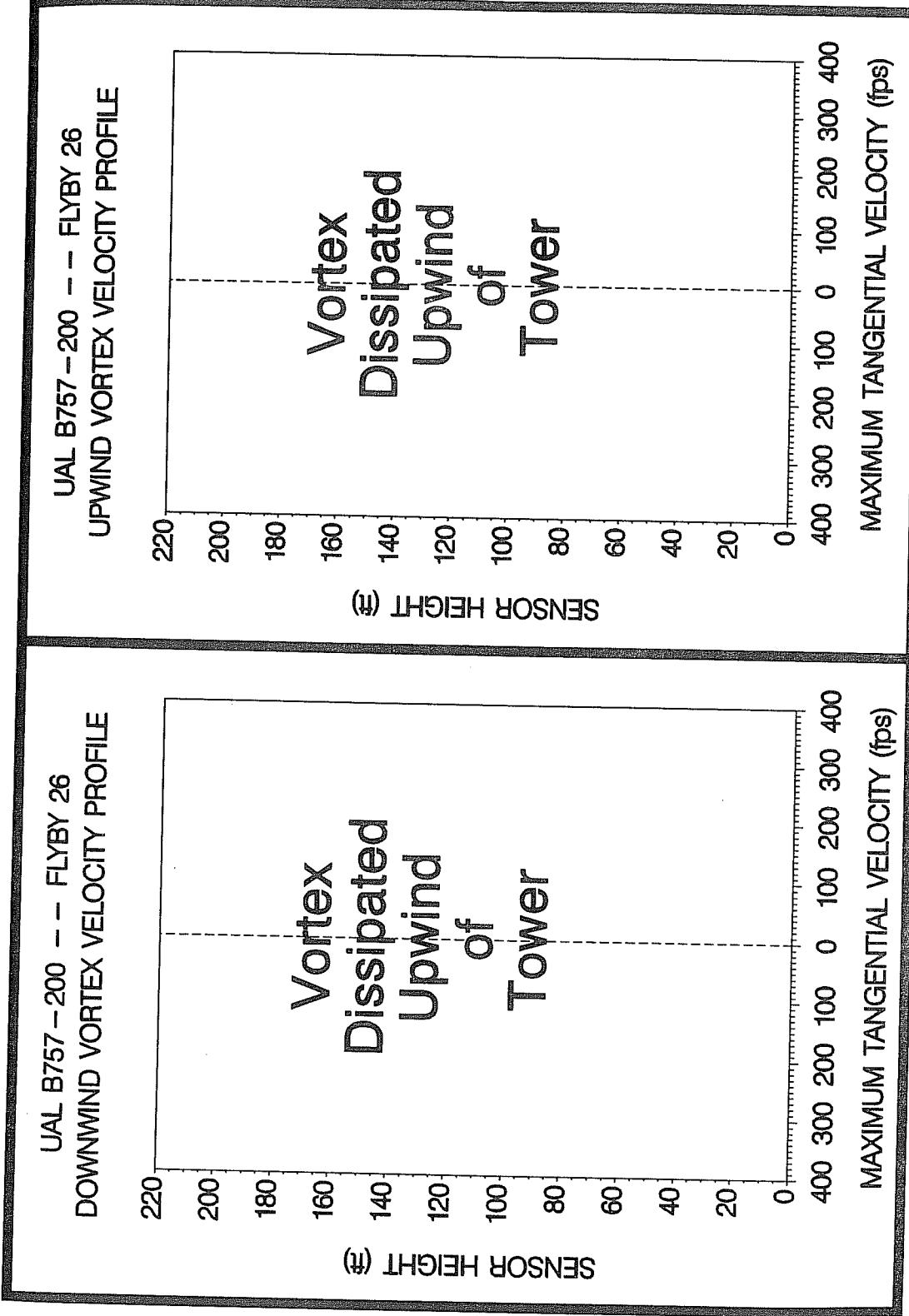


Figure G-138. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 26, ambient wind speed = 4.7 kts,  $\delta_F = 0^\circ$ , IAS = 210 kts, GW = 193,500 lbs. Ages, radii, and velocities of the vortex cores are (D) and (D) ft, and (D) and (D) s, (D) and (D) ft, and (D) and (D) fps, respectively.

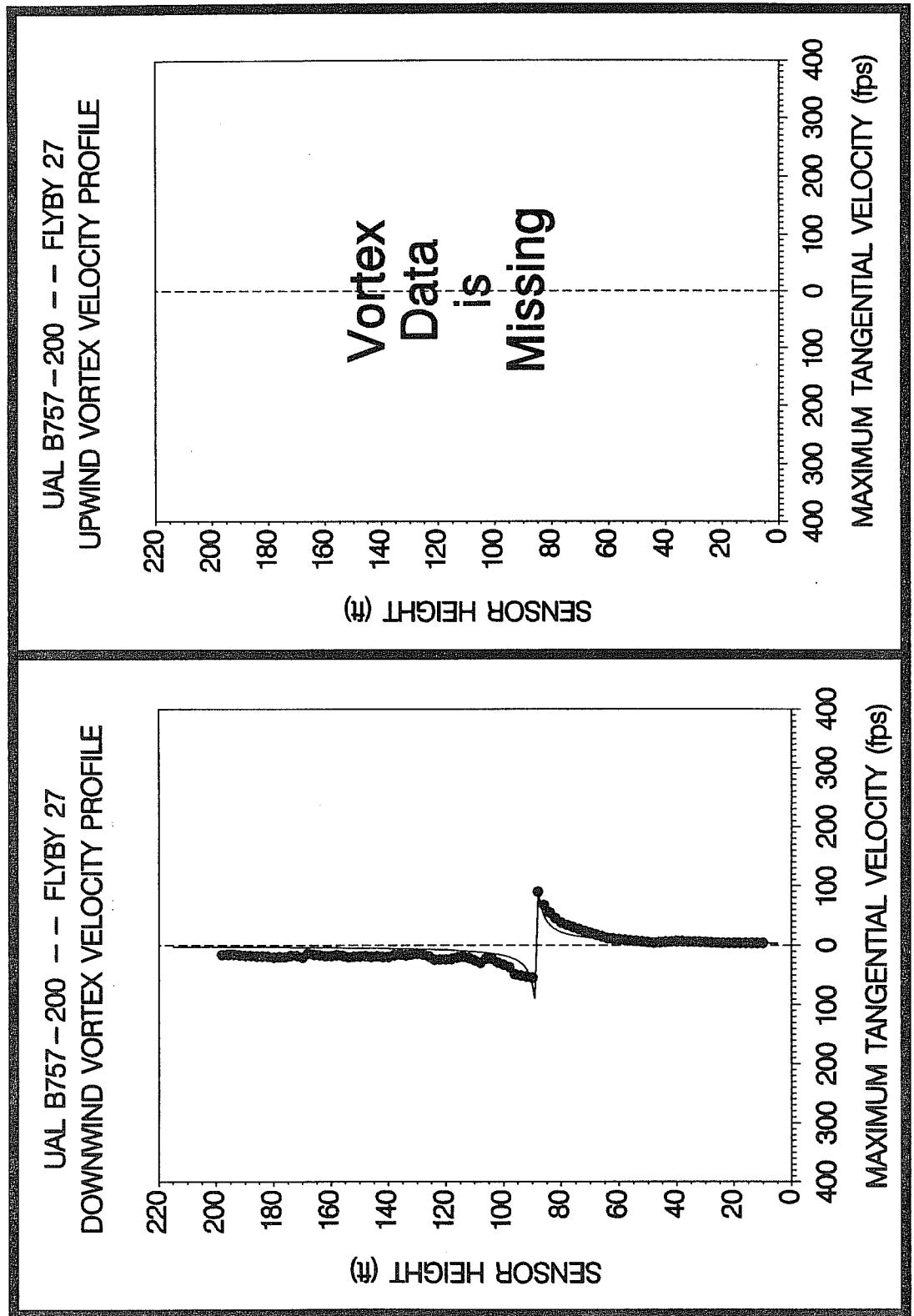


Figure G-139. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 27, ambient wind speed = 7.2 kts,  $\delta_F = 20^\circ$ , IAS = 142 kts, GW = 192,500 lbs. Ages, radii, and velocities of the vortex cores are 16 and (M) s, 1.2 and (M) ft, and 89.1 and (M) fps, respectively.

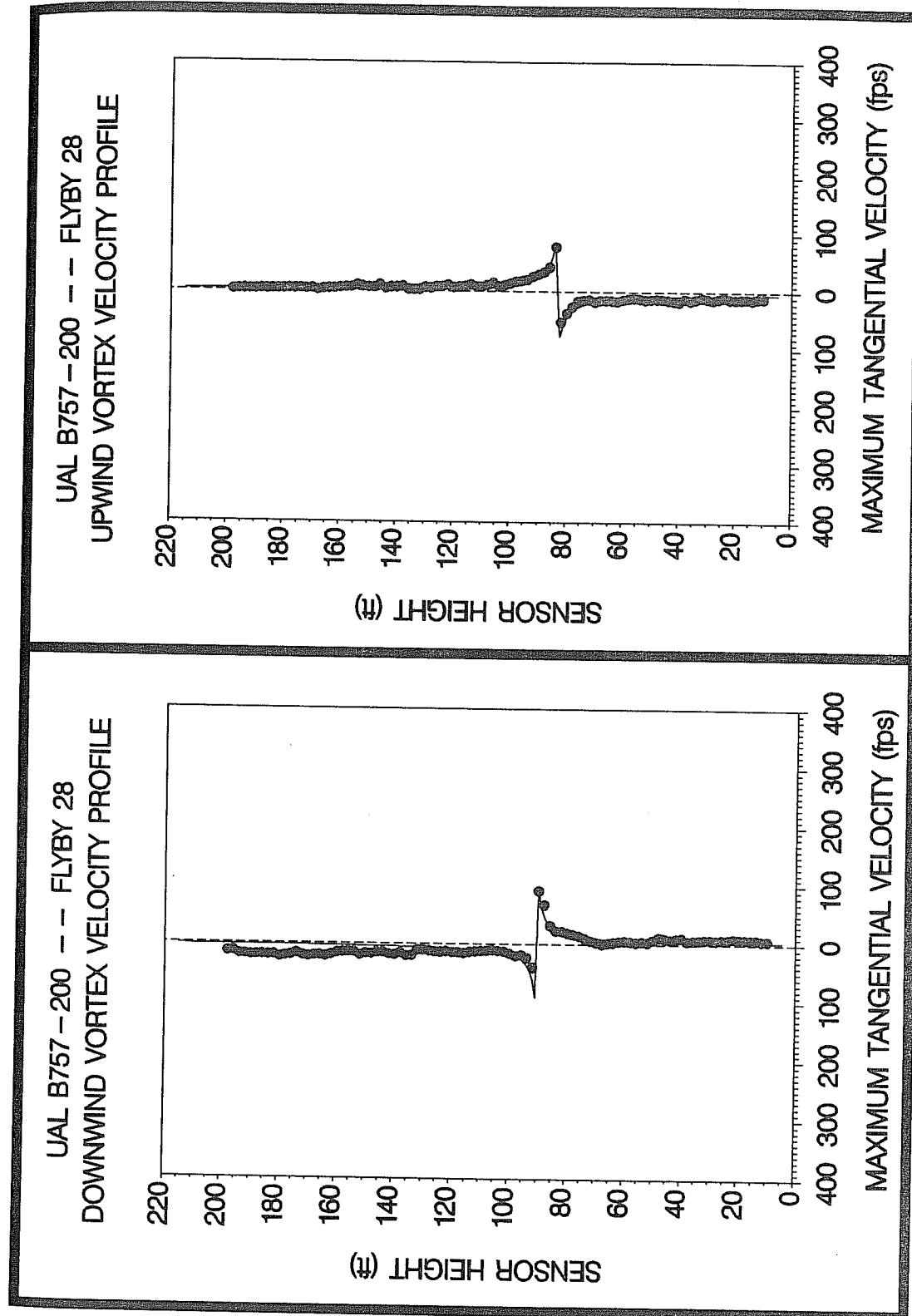


Figure G-140. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 28, ambient wind speed = 8.8 kts,  $\delta_F = 0^\circ$ , IAS = 250 kts, GW = 191,600 lbs. Ages, radii, and velocities of the vortex cores are 26 and 31 s, 0.5 and 0.8 ft, and 91.4 and 77.8 fps, respectively.

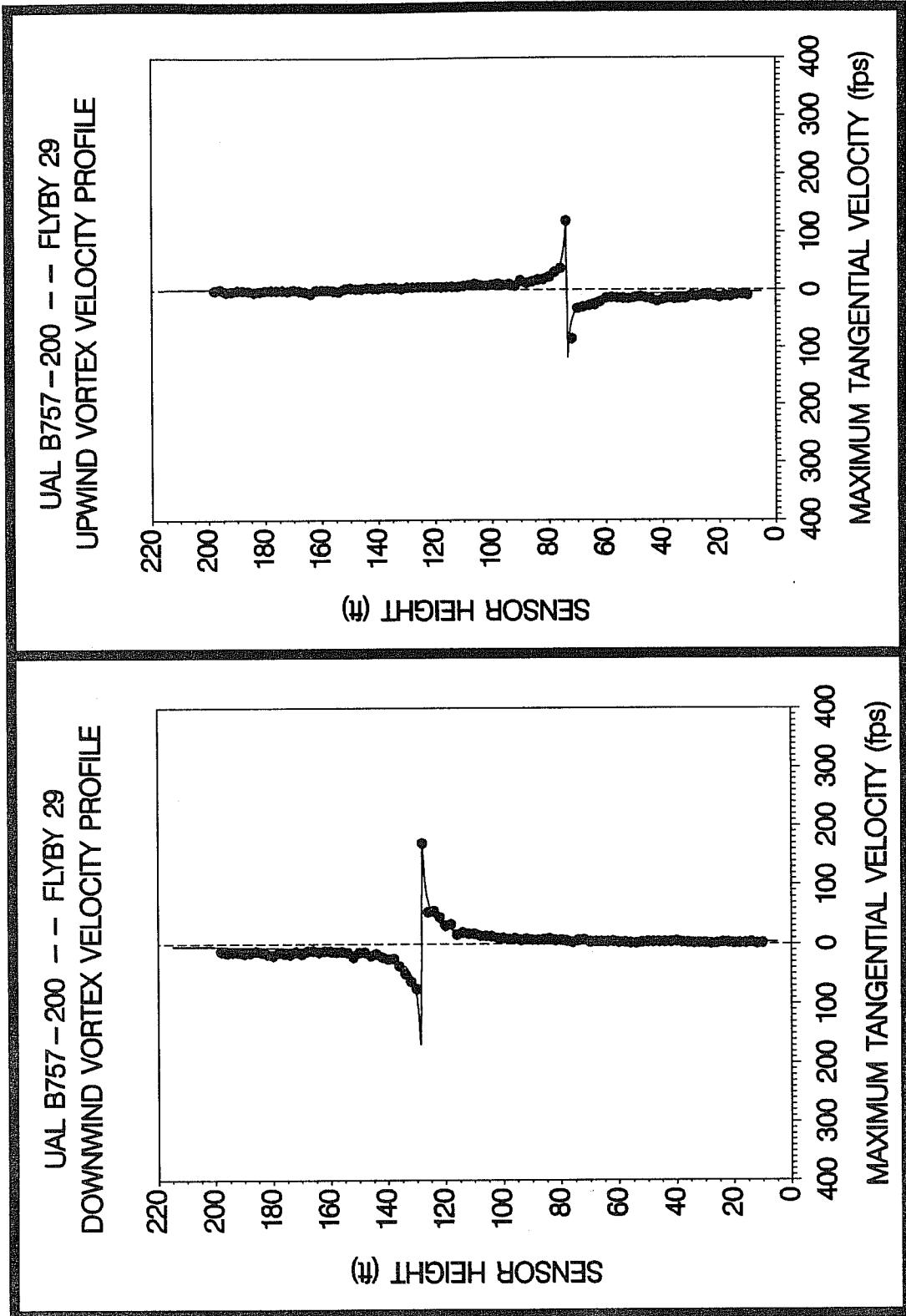
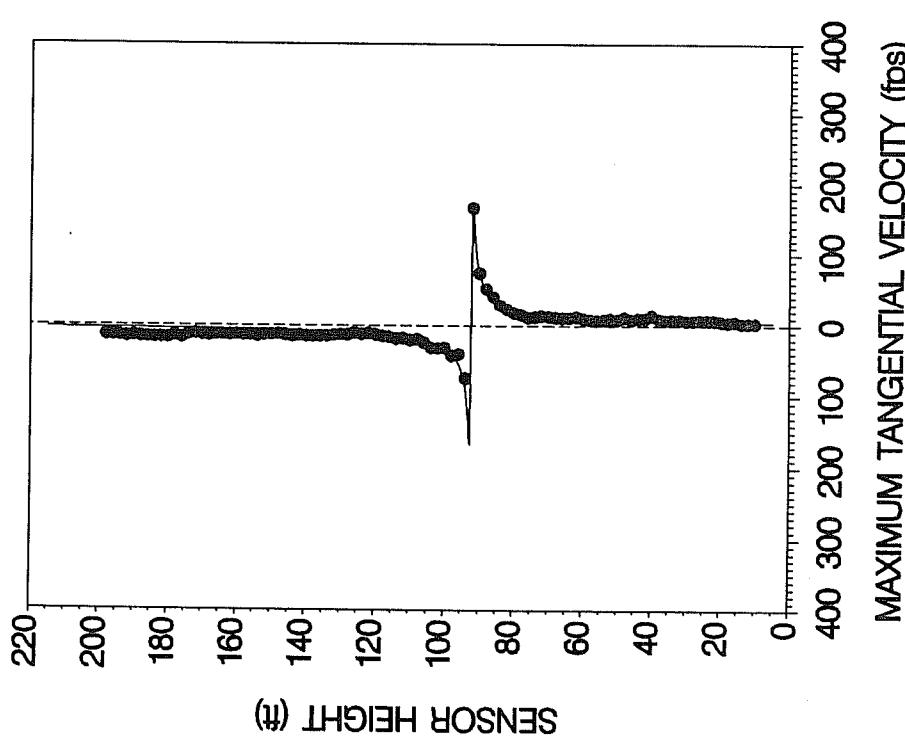


Figure G-141. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 29, ambient wind speed = 8.5 kts,  $\delta_F = 25^\circ$ , IAS = 136 kts,  $G_W = 191,000$  lbs. Ages, radii, and velocities of the vortex cores are 27 and 36 s, 0.3 and 0.3 ft, and 169.8 and 118.3 fps, respectively.

UAL B757-200 --- FLYBY 30  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B757-200 --- FLYBY 30  
UPWIND VORTEX VELOCITY PROFILE

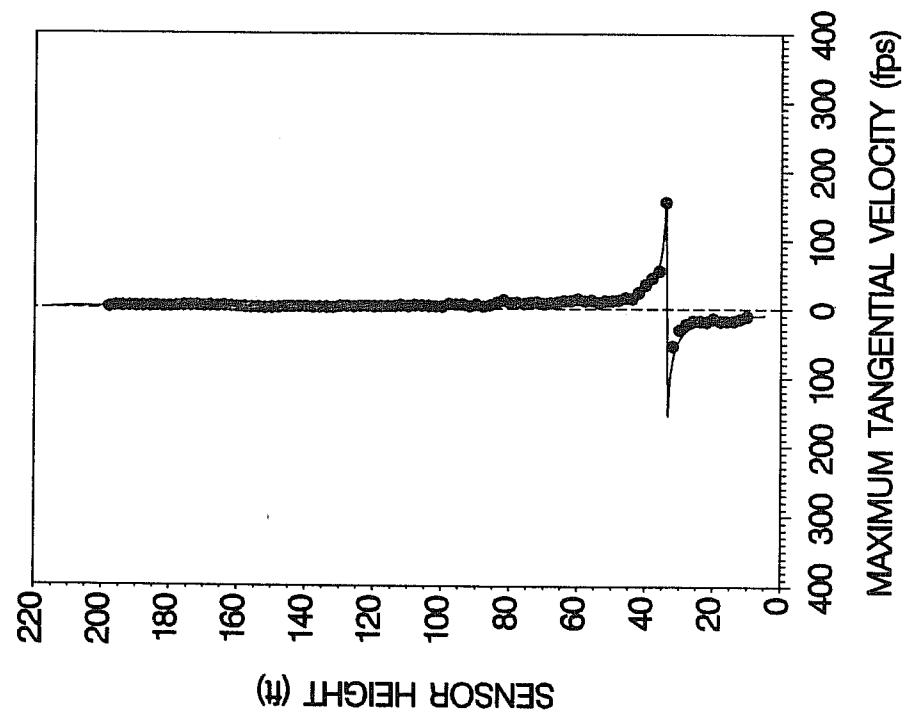


Figure G-142. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 30, ambient wind speed = 7.7 kts,  $\delta_F = 25^\circ$ , IAS = 136 kts, GW = 190,300 lbs. Ages, radii, and velocities of the vortex cores are 28 and 42 s, 0.4 and 0.3 ft, and 166.3 and 155.4 fps, respectively.

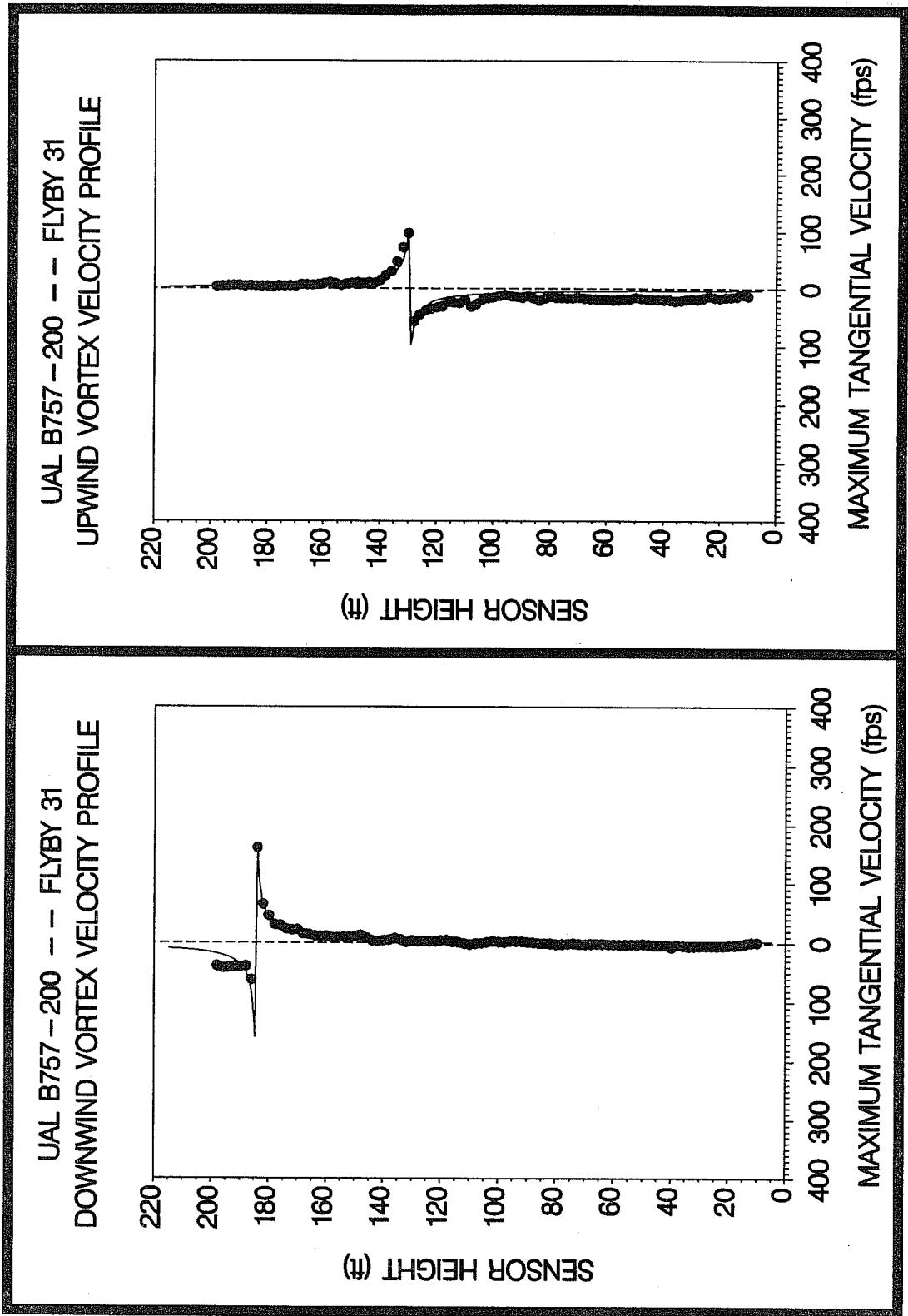


Figure G-143. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 31, ambient wind speed = 7.9 kts,  $\delta_F = 25^\circ$ , IAS = 136 kts, GW = 189,600 lbs. Ages, radii, and velocities of the vortex cores are 19 and 29 s, 0.3 and 0.6 ft, and 160.0 and 97.0 fps, respectively.

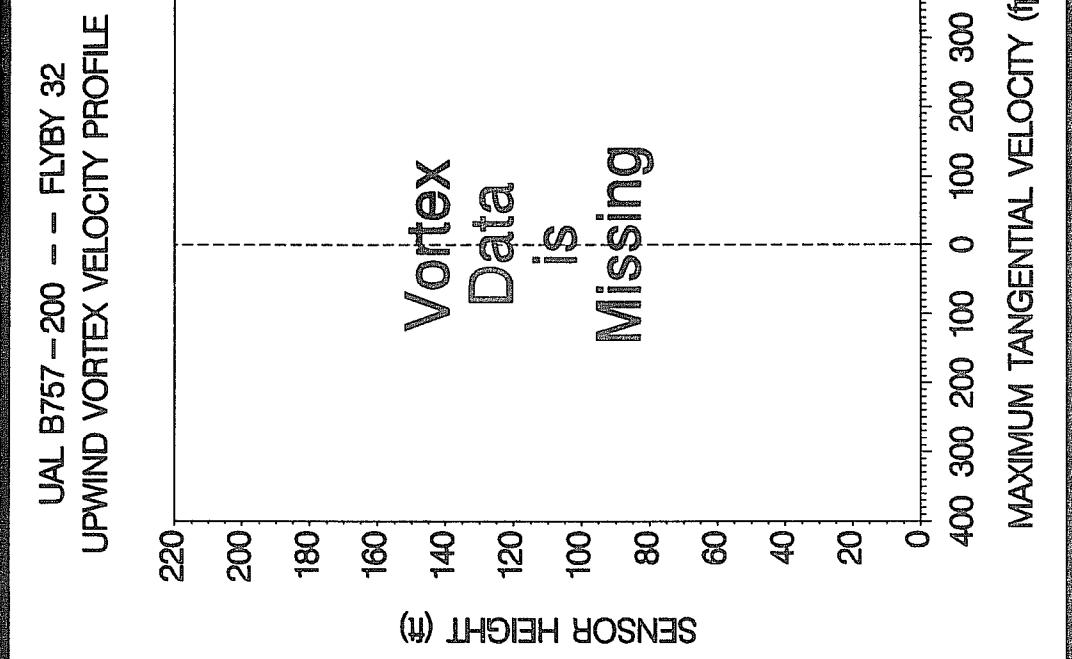
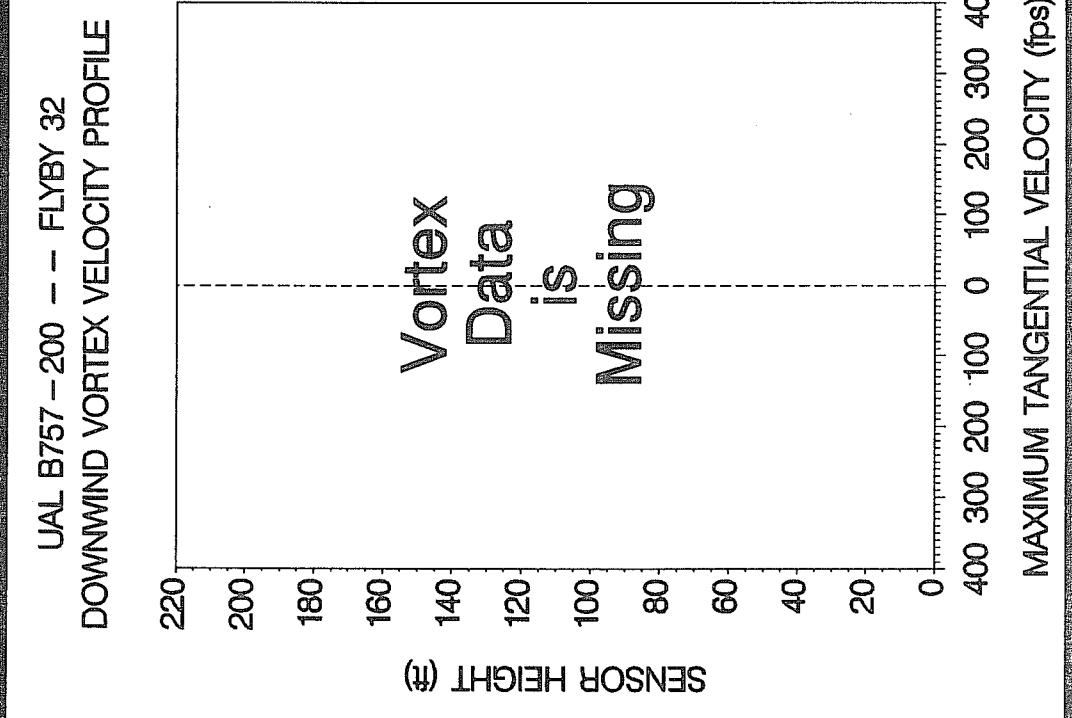


Figure G-144. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 32, ambient wind speed = 7.6 kts,  $\delta_F = 25^\circ$ , IAS = 135 kts, GW = 188,400 lbs. Ages, radii, and velocities of the vortex cores are (M) and (M) ft, and (M) and (M) fps, respectively.

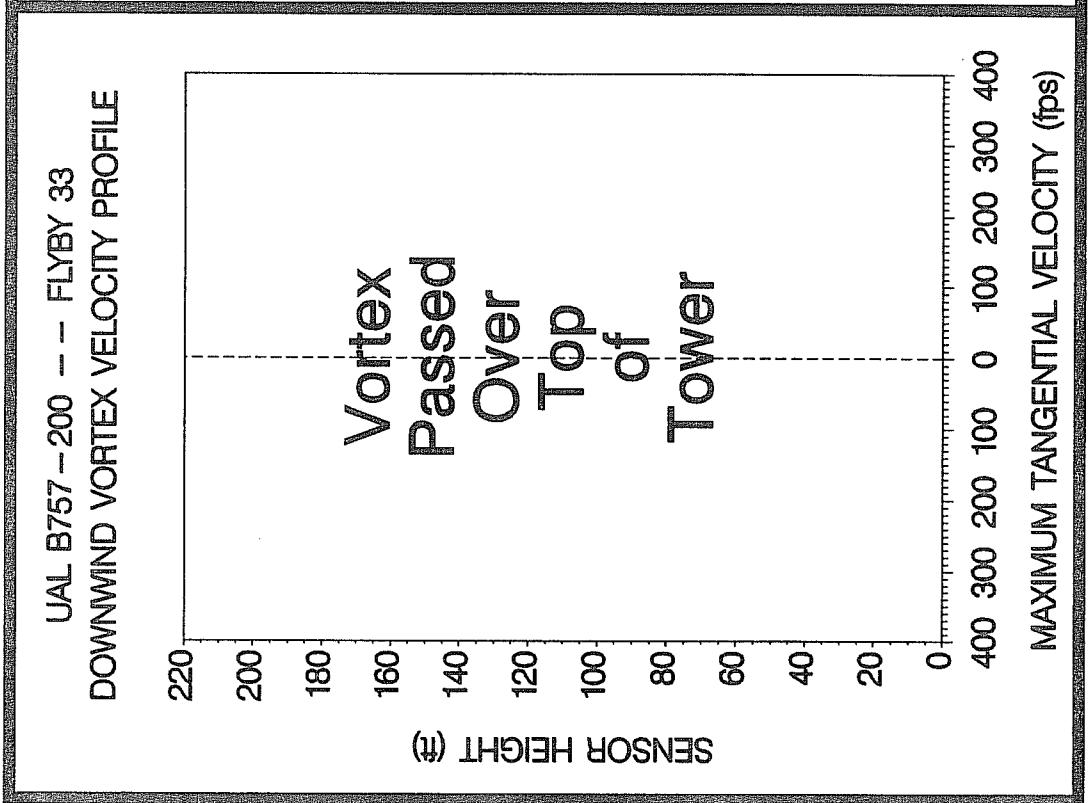


Figure G-145. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 33, ambient wind speed=9.3 kts,  $\delta_F=30^\circ$ , IAS=133 kts, GW=187,500 lbs. Ages, radii, and velocities of the vortex cores are (P) and 31 s, (P) and 0.7 ft, and (P) and 33.9 fps, respectively.

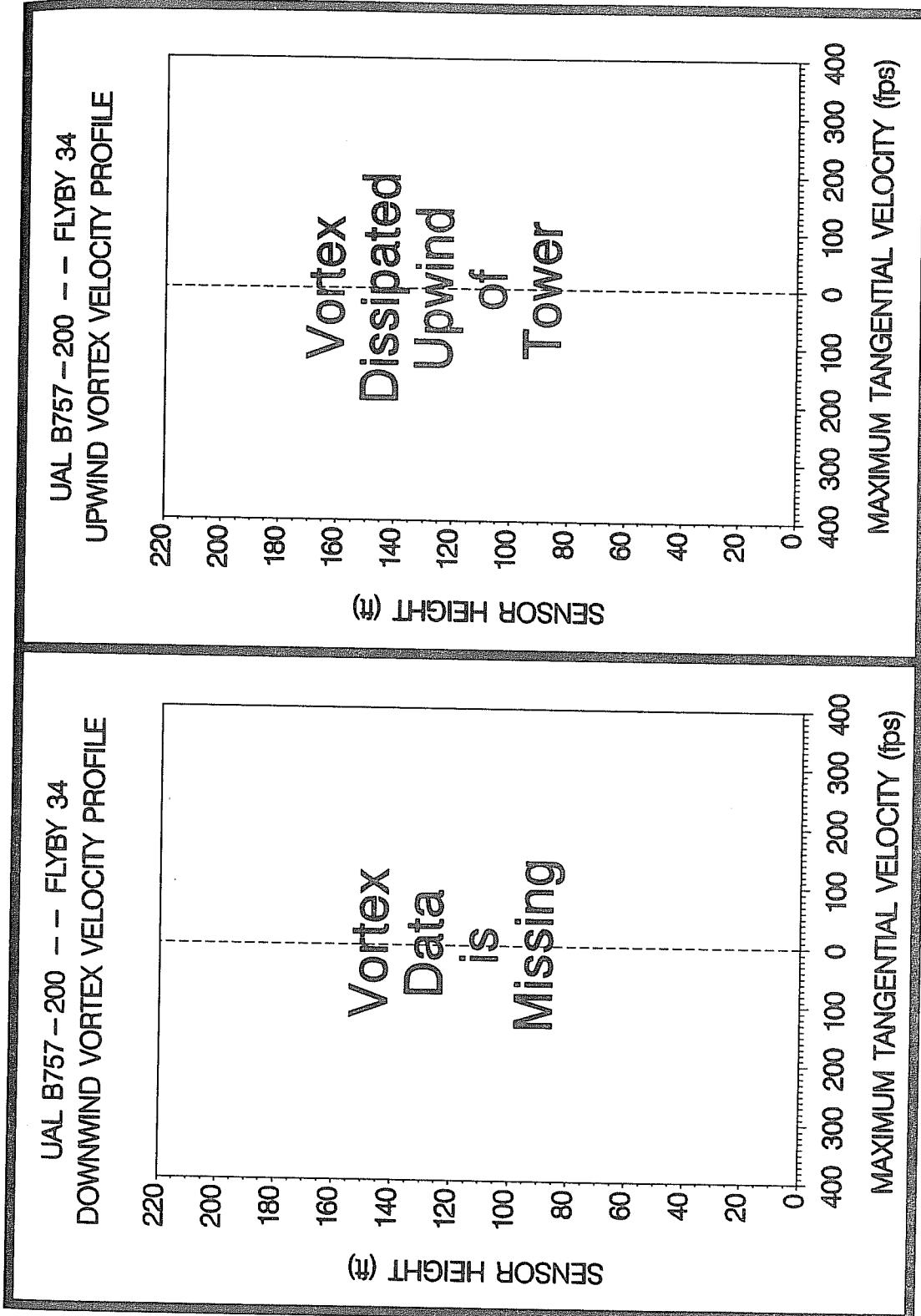
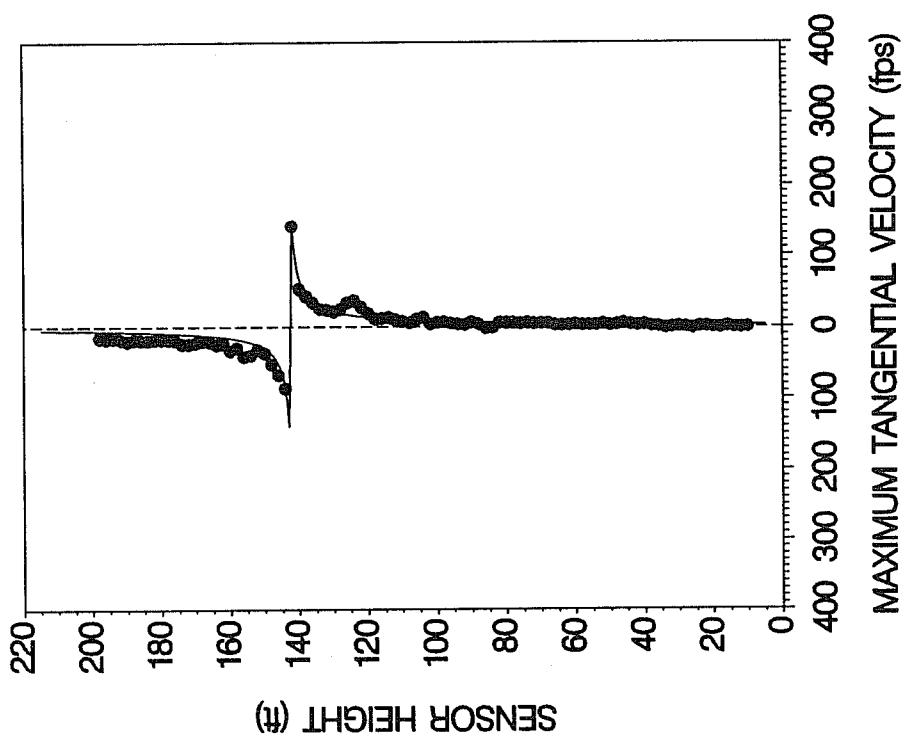


Figure G-146. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 34, ambient wind speed = 3.5 kts,  $\delta_F = 30^\circ$ , IAS = 132 kts, GW = 186,500 lbs. Ages, radii, and velocities of the vortex cores are (M) and (D) s, (M) and (D) ft, and (M) and (D) fps, respectively.

UAL B757-200 -- FLYBY 35  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B757-200 -- FLYBY 35  
UPWIND VORTEX VELOCITY PROFILE

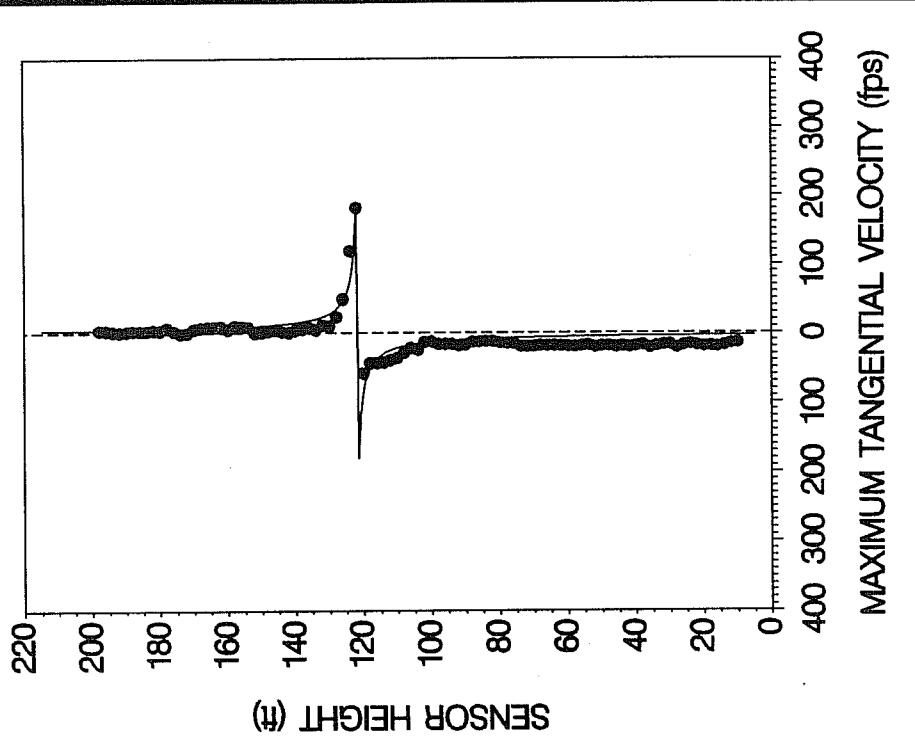
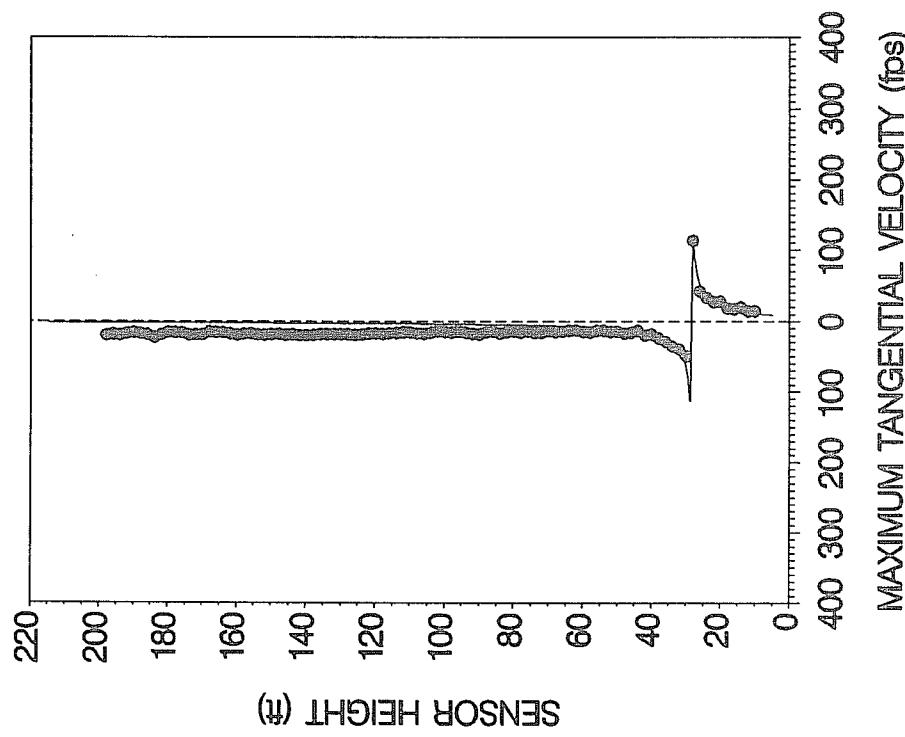


Figure G-147. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 35, ambient wind speed = 10.0 kts,  $\delta_F = 30^\circ$ , IAS = 132 kts, GW = 185,500 lbs. Ages, radii, and velocities of the vortex cores are 19 and 25 s, 0.4 and 0.3 ft, and 140.3 and 181.1 fps, respectively.

UAL B757-200 — FLYBY 36  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B757-200 — FLYBY 36  
UPWIND VORTEX VELOCITY PROFILE

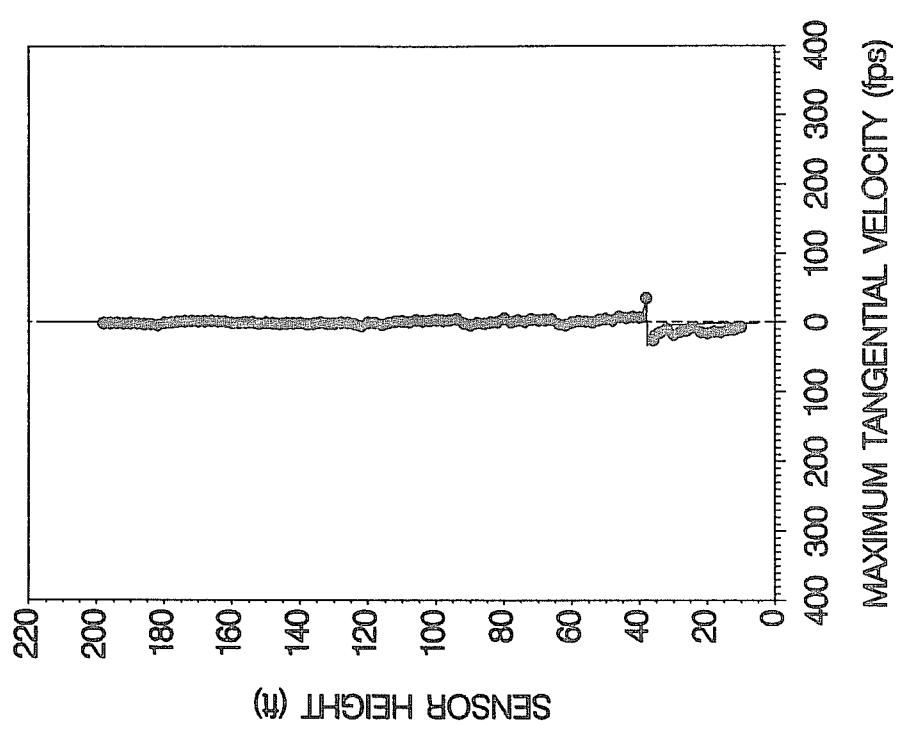
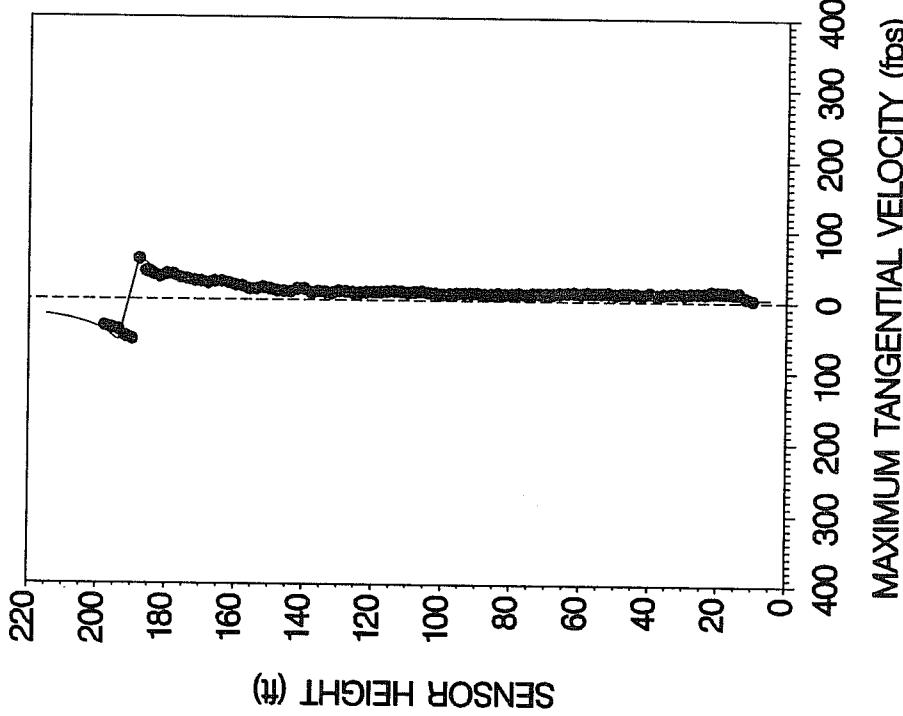


Figure G-148. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 36, ambient wind speed = 6.1 kts,  $\delta_F = 20^\circ$ , IAS = 138 kts, GW = 184,600 lbs. Ages, radii, and velocities of the vortex cores are 33 and 61 s, 0.4 and 0.2 ft, and 112.9 and 34.9 fps, respectively.

UAL B757-200 -- FLYBY 37  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B757-200 -- FLYBY 37  
UPWIND VORTEX VELOCITY PROFILE

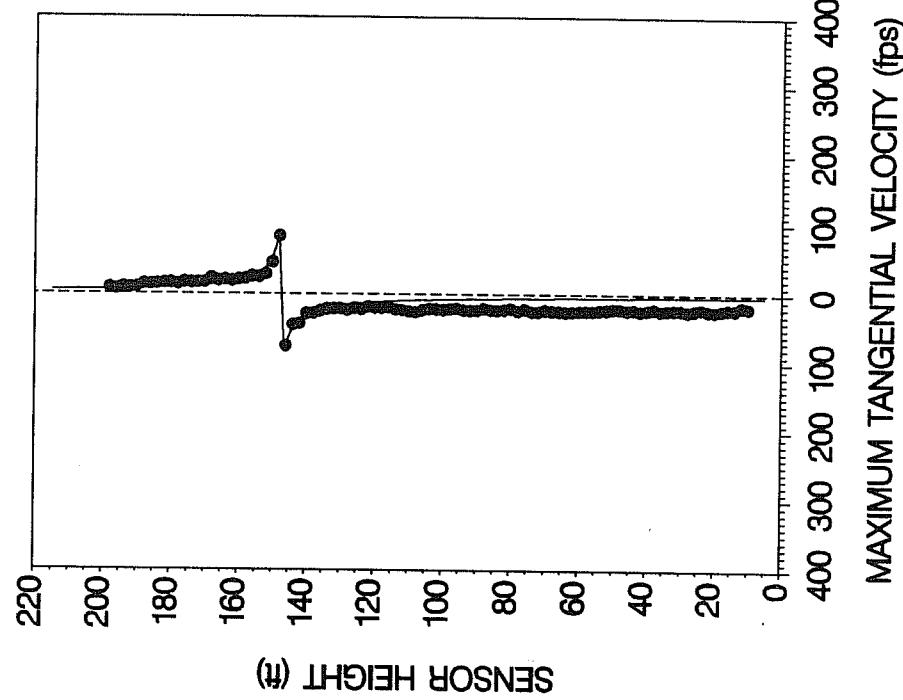


Figure G-149. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 37, ambient wind speed = 11.5 kts,  $\delta_F = 15^\circ$ , IAS = 145 kts, GW = 183,900 lbs. Ages, radii, and velocities of the vortex cores are 11 and 16 s, 3.0 and 0.8 ft, and 57.0 and 83.2 fps, respectively.

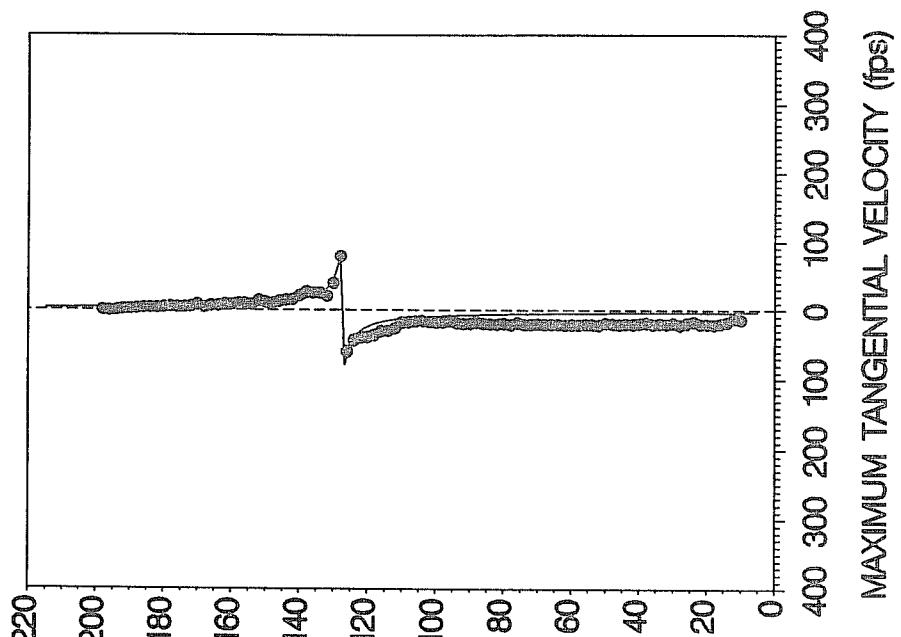


(ii)

Vortex  
Passed  
Over  
Top  
of  
Tower



(ii)



MAXIMUM TANGENTIAL VELOCITY (fps)

MAXIMUM TANGENTIAL VELOCITY (fps)

Figure G-150. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 38, ambient wind speed = 11.5 kts,  $\delta_F = 5^\circ$ , IAS = 152 kts, GW = 183,000 lbs. Ages, radii, and velocities of the vortex cores are (P) and 15 s, (P) and 0.6 ft, and (P) and 78.4 fps, respectively.

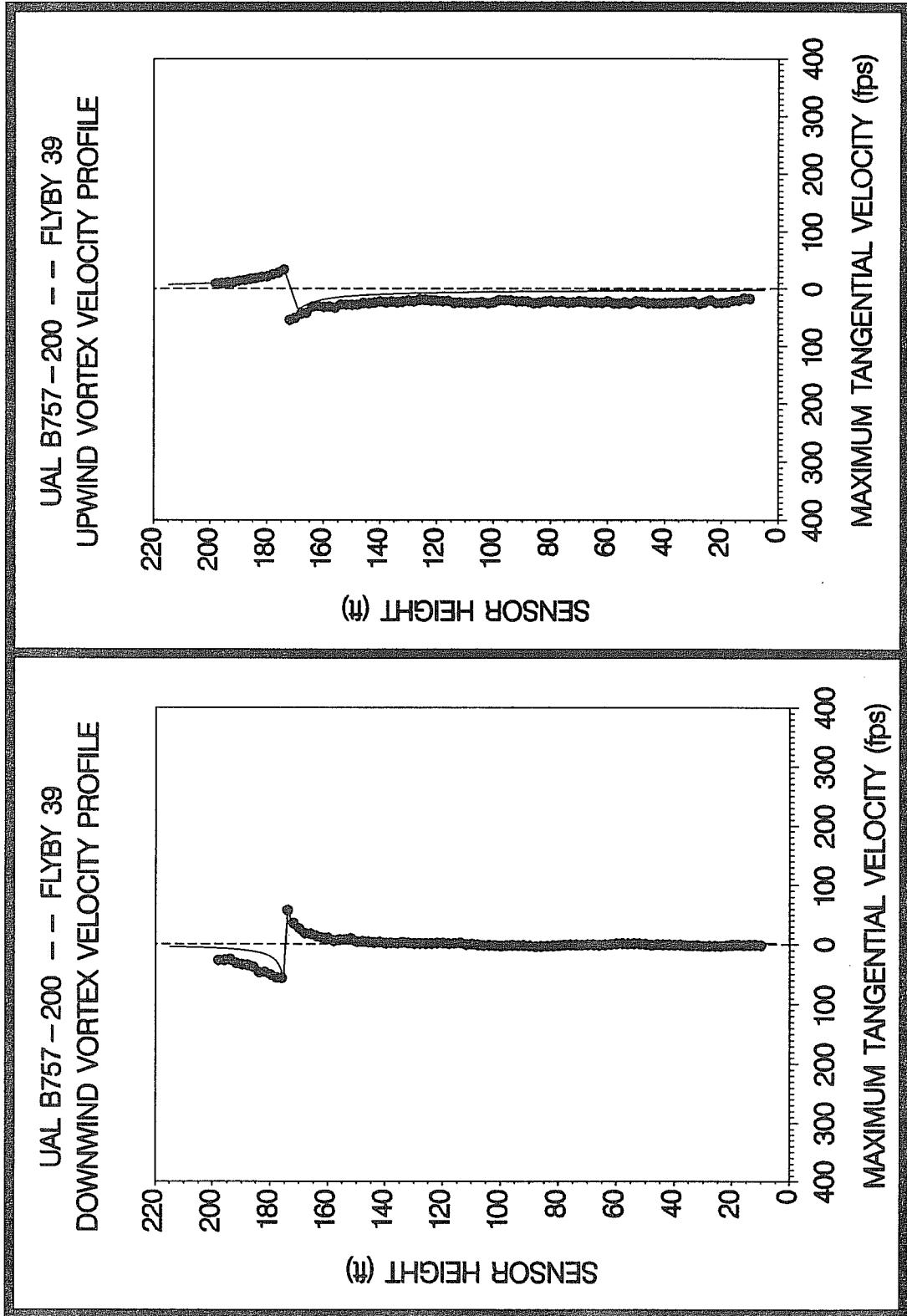


Figure G-151. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 39, ambient wind speed = 12.9 kts,  $\delta_F = 15^\circ$ , IAS = 144 kts, GW = 182,000 lbs. Ages, radii, and velocities of the vortex cores are 20 and 26 s, 0.6 and 2.5 ft, and 57.1 and 33.5 fps, respectively.

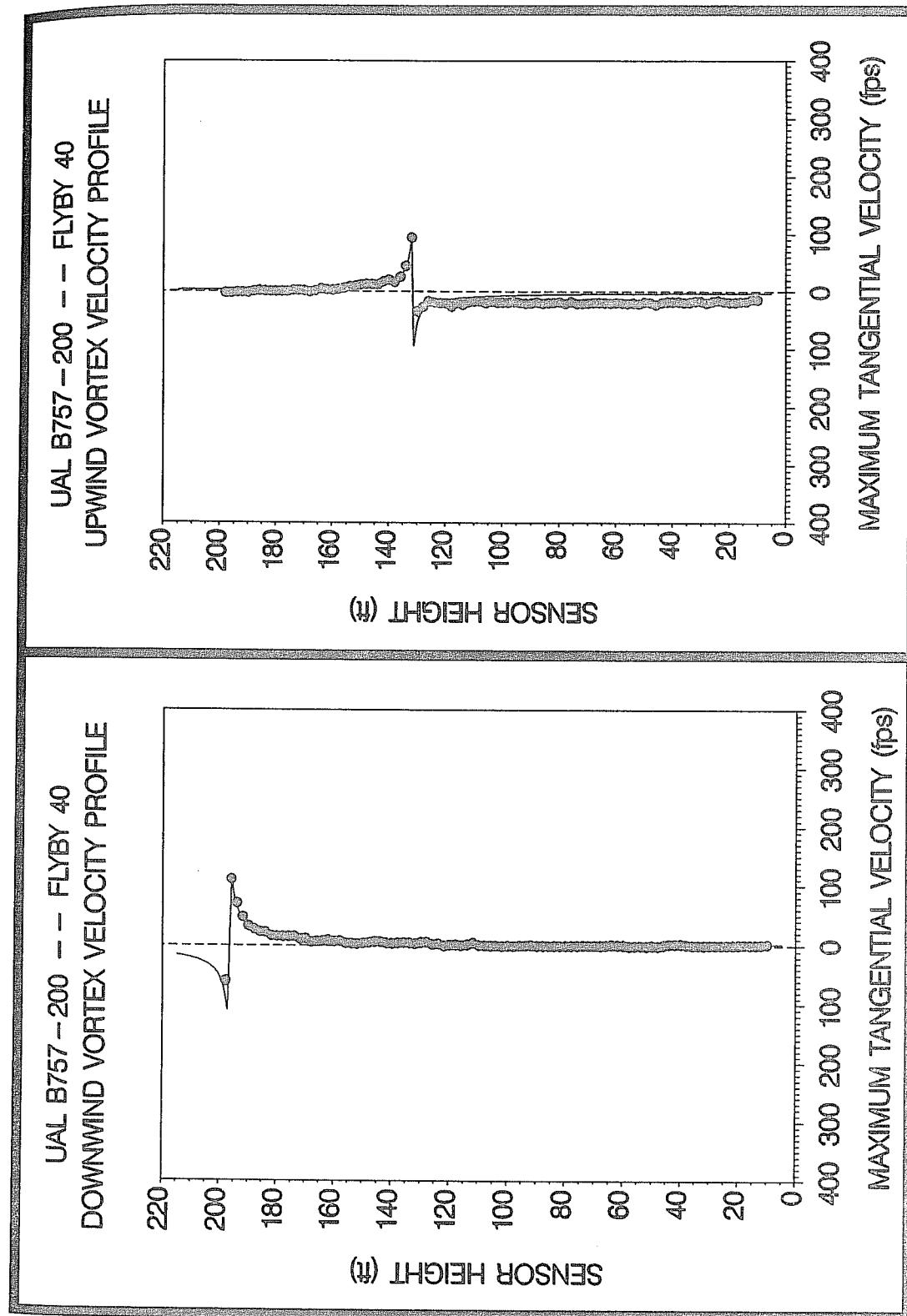
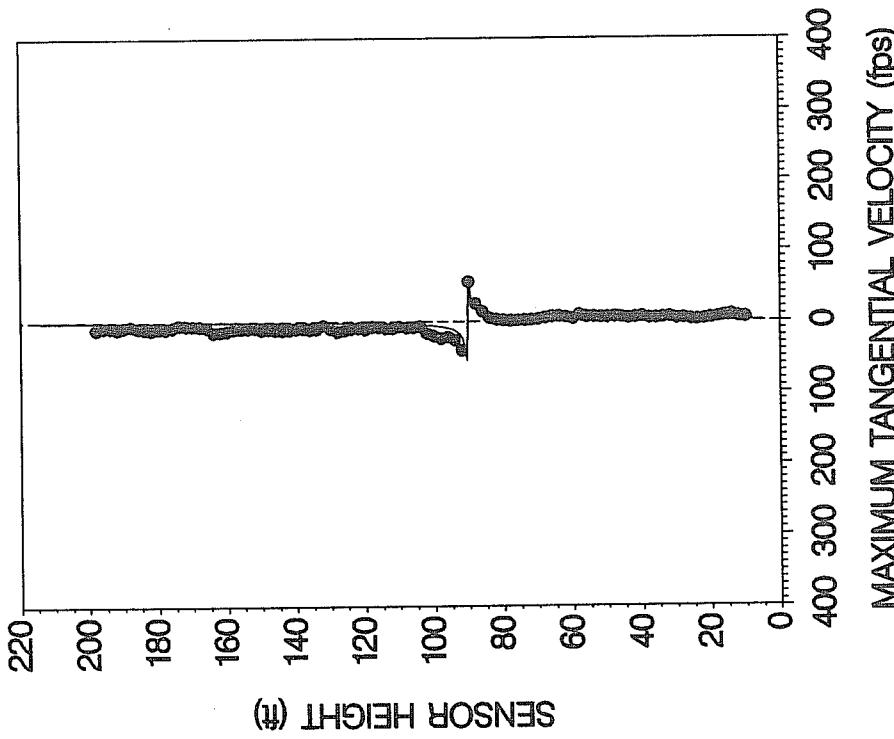


Figure G-152. UAL B757-200 downwind (left) and upwind (right) vortex velocity profiles at maximum intensity from Day of Year 268, Flyby 40, ambient wind speed = 10.4 kts,  $\delta_F = 0^\circ$ , IAS = 206 kts, GW = 181,300 lbs. Ages, radii, and velocities of the vortex cores are 20 and 24 s, 0.6 and 0.4 ft, and 110.8 and 93.9 fps, respectively.

UAL B757-200 -- FLYBY 41  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B757-200 -- FLYBY 41  
UPWIND VORTEX VELOCITY PROFILE

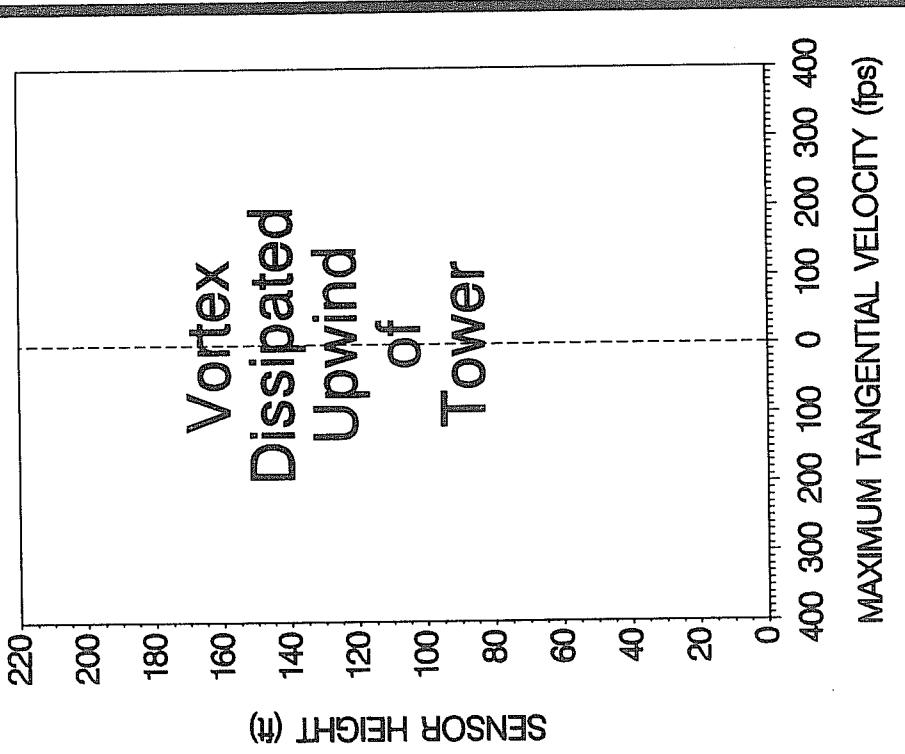


Figure G-153. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 268, Flyby 41, ambient wind speed = 6.4 kts,  $\delta_F = 0^\circ$ , IAS = 250 kts, GW = 180,500 lbs. Ages, radii, and velocities of the vortex cores are 51 and (D) s, 0.2 and (D) ft, and 55.4 and (D) fps, respectively.

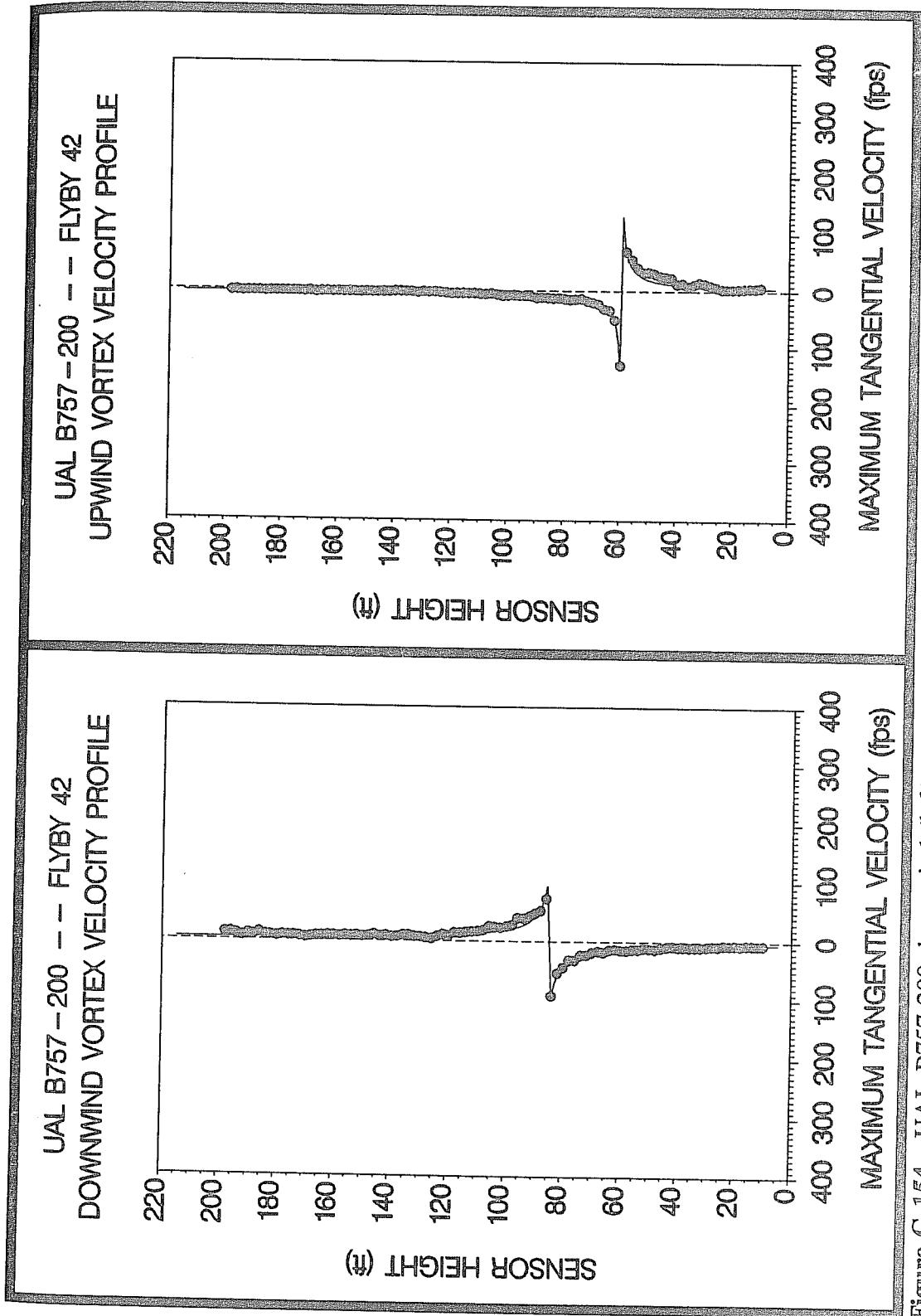


Figure G-154. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 269, Flyby 42, ambient wind speed = 4.1 kts,  $\delta_F = 20^\circ$ , IAS = 143 kts, GW = 199,600 lbs. Ages, radii, and velocities of the vortex cores are 32 and 71 s, 0.8 and 0.3 ft, and 92.8 and 129.7 fps, respectively.

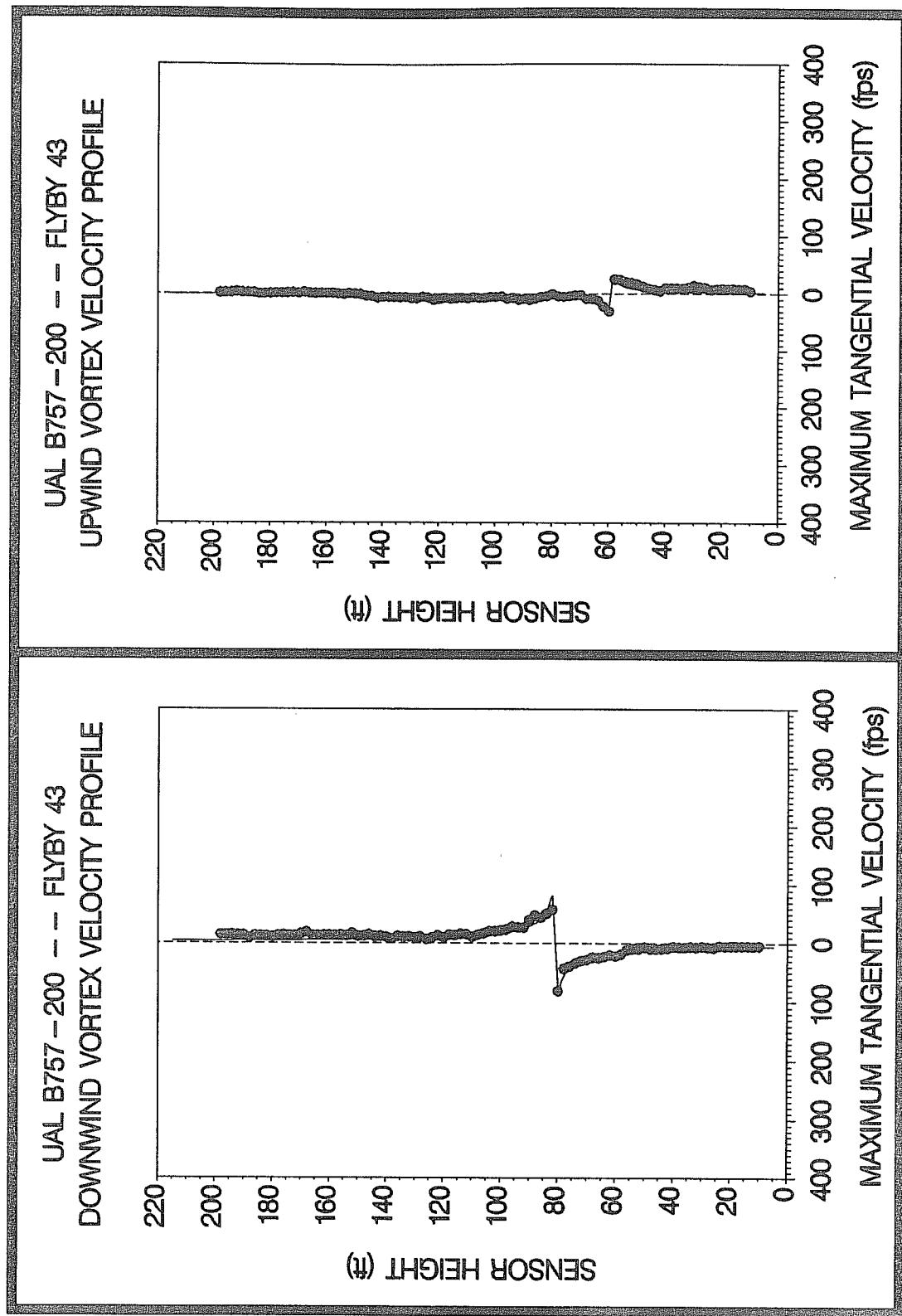


Figure G-155. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 269, Flyby 43, ambient wind speed = 6.0 kts,  $\delta_F = 15^\circ$ , IAS = 150 kts, GW = 198,700 lbs. Ages, radii, and velocities of the vortex cores are 34 and 84 s, 1.0 and 0.7 ft, and 81.1 and 30.2 fps, respectively.

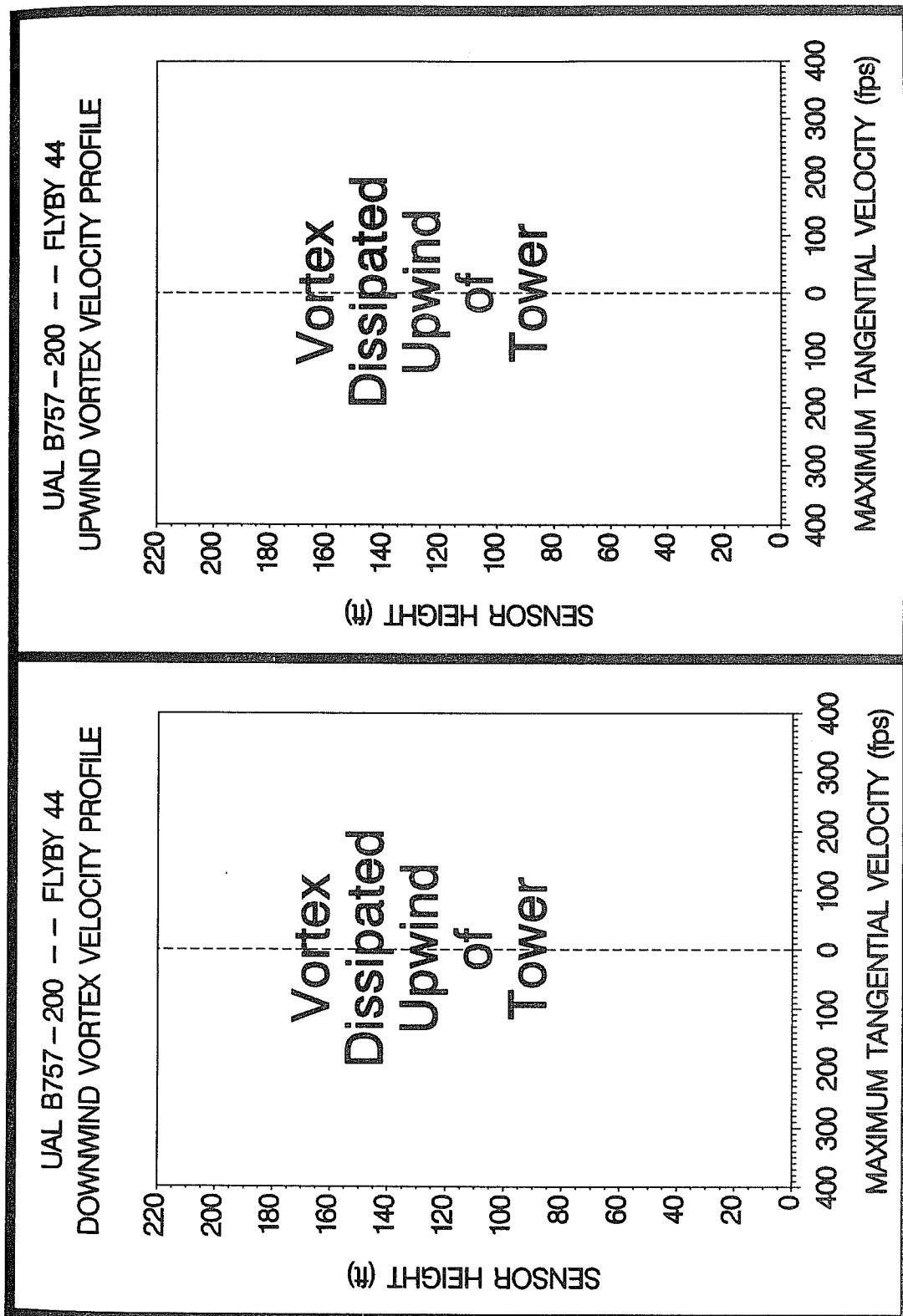
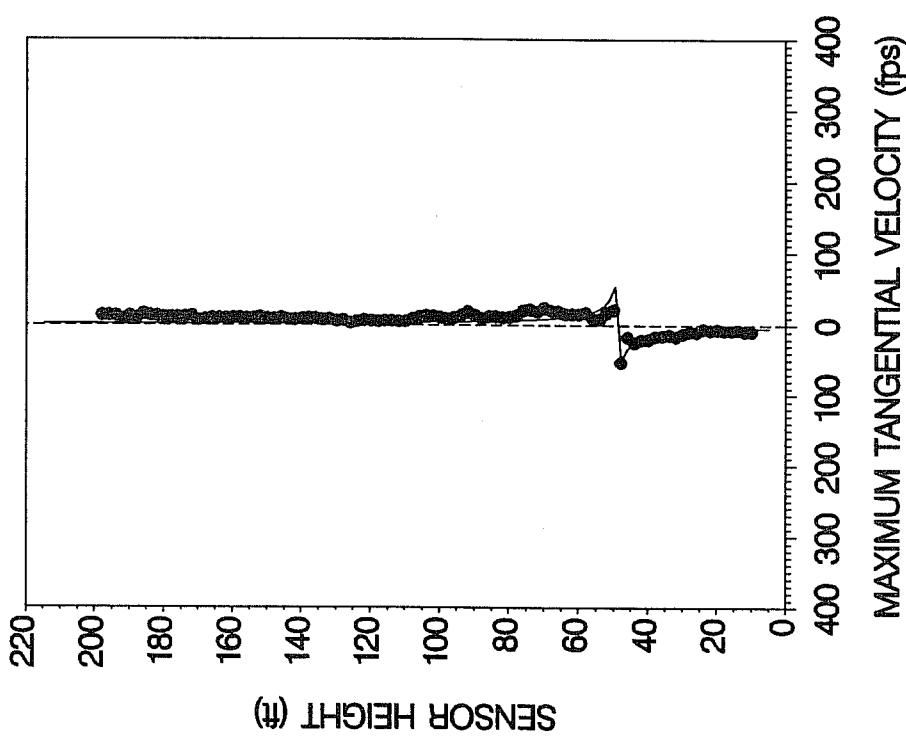


Figure G-156. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 269, Flyby 44, ambient wind speed = 2.0 kts,  $\delta_F = 5^\circ$ , IAS = 157 kts, GW = 197,900 lbs. Ages, radii, and velocities of the vortex cores are (D) and (D) s, (D) and (D) ft, and (D) and (D) fps, respectively.

UAL B757-200 -- FLYBY 45  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B757-200 -- FLYBY 45  
UPWIND VORTEX VELOCITY PROFILE

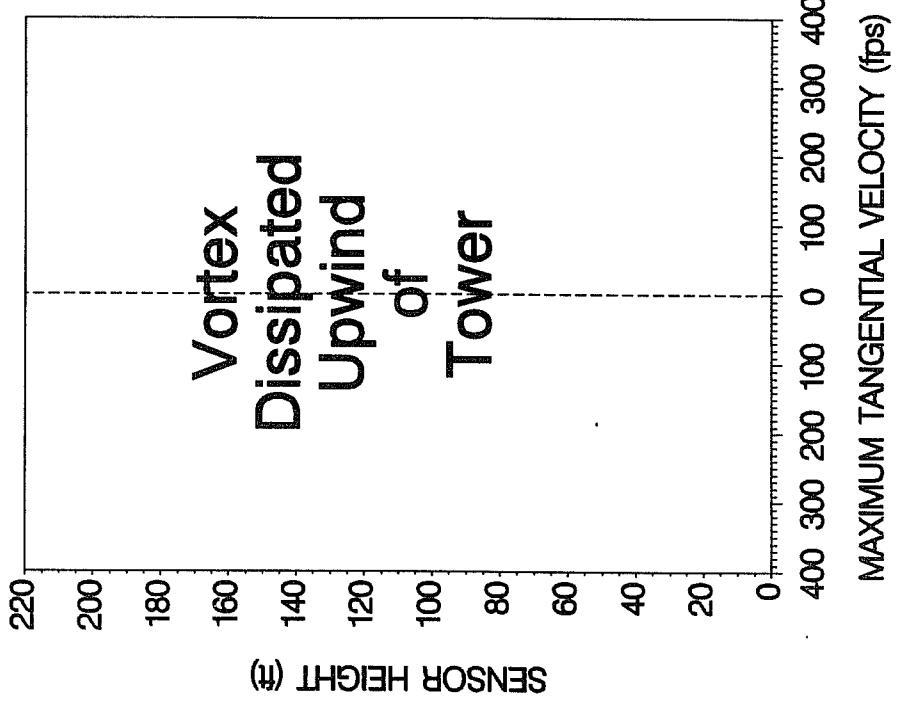


Figure G-157. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 269, Flyby 45, ambient wind speed=5.5 kts,  $\delta_F=20^\circ$ , IAS=142 kts, GW=194,000 lbs. Ages, radii, and velocities of the vortex cores are 44 and (D) s, 0.8 and (D) ft, and 53.2 and (D) fps, respectively.

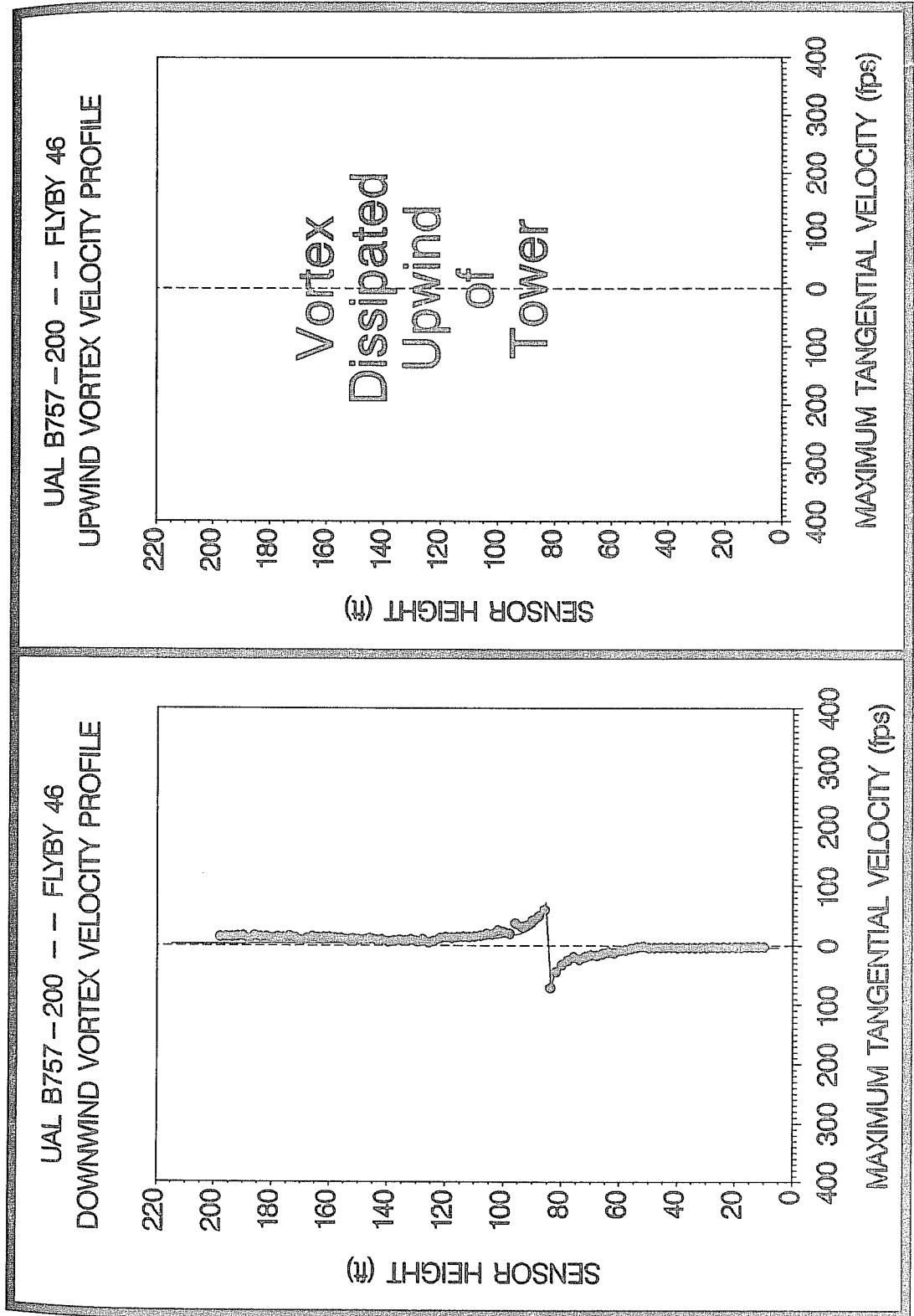


Figure G-158. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 269, Flyby 46, ambient wind speed = 5.3 kts,  $\delta_F = 15^\circ$ ,  $\delta_S = 148$  kts,  $GW = 193,000$  lbs. Ages, radii, and velocities of the vortex cores are 35 and (D) s, 0.8 and (D) ft, and 71.6 and (D) fps, respectively.

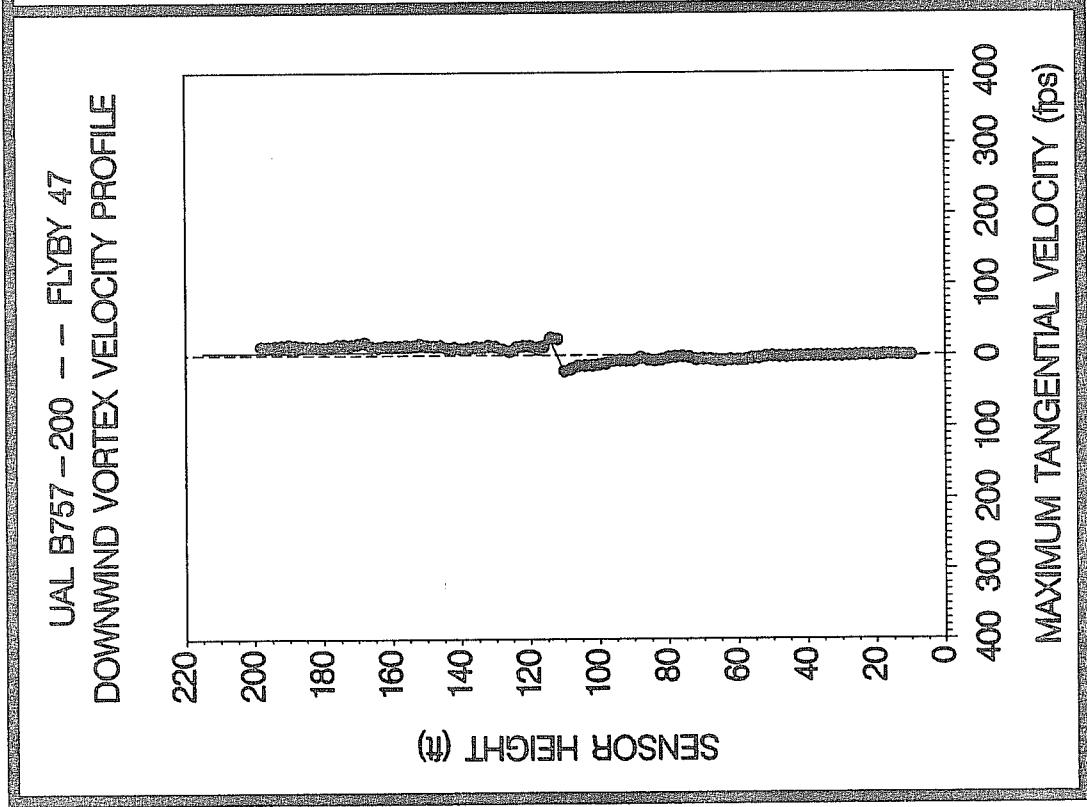
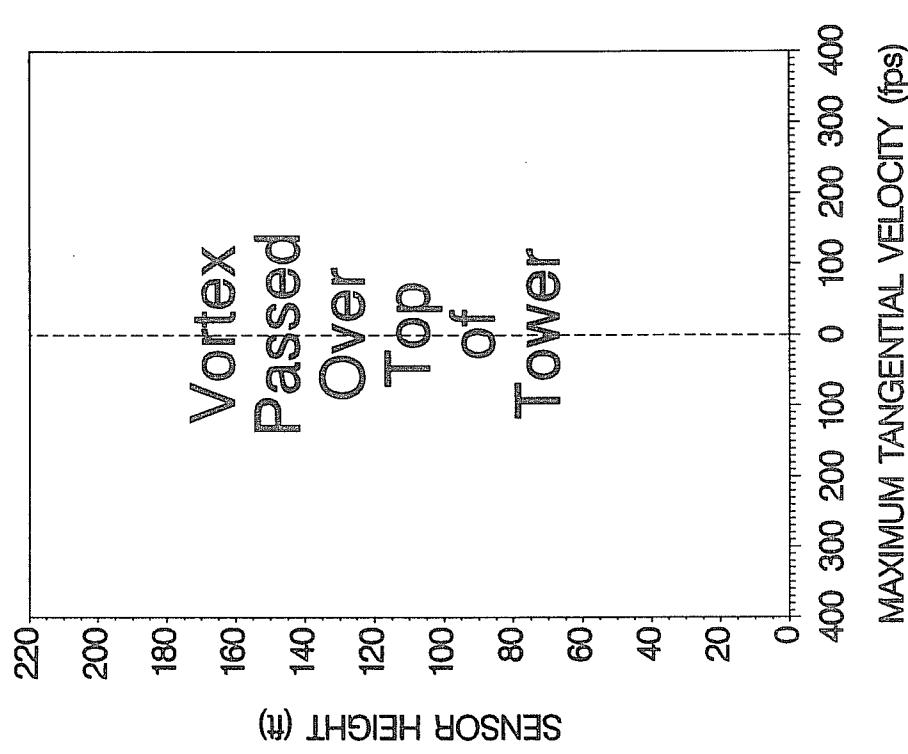


Figure G-159. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 269, Flyby 47, ambient wind speed = 5.7 kts,  $\delta_F = 5^\circ$ , IAS = 155 kts, GW = 192,400 lbs. Ages, radii, and velocities of the vortex cores are 35 and 66 s, 2.3 and 0.9 ft, and 22.6 and 20.7 fps, respectively.

UAL B757 – 200 – – FLYBY 48  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B757 – 200 – – FLYBY 48  
UPWIND VORTEX VELOCITY PROFILE

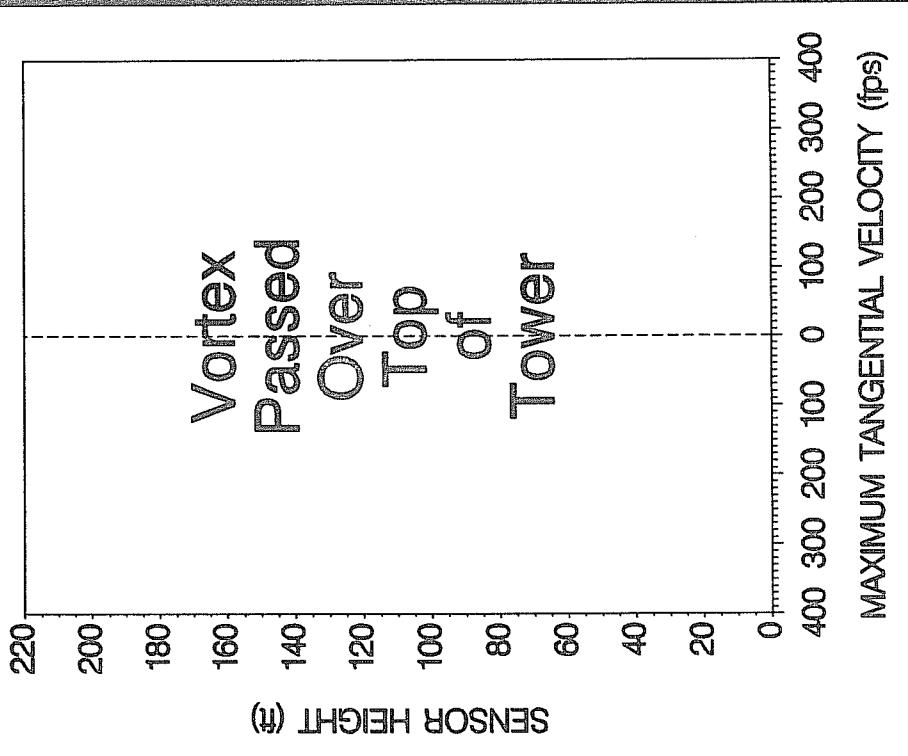


Figure G-160. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 269, Flyby 48, ambient wind speed=5.2 kts,  $\delta_F = 0^\circ$ , IAS=250 kts, GW=191,600 lbs. Ages, radii, and velocities of the vortex cores are (P) and (P) ft, and (P) s, (P) and (P) ft, and (P) and (P) fps, respectively.

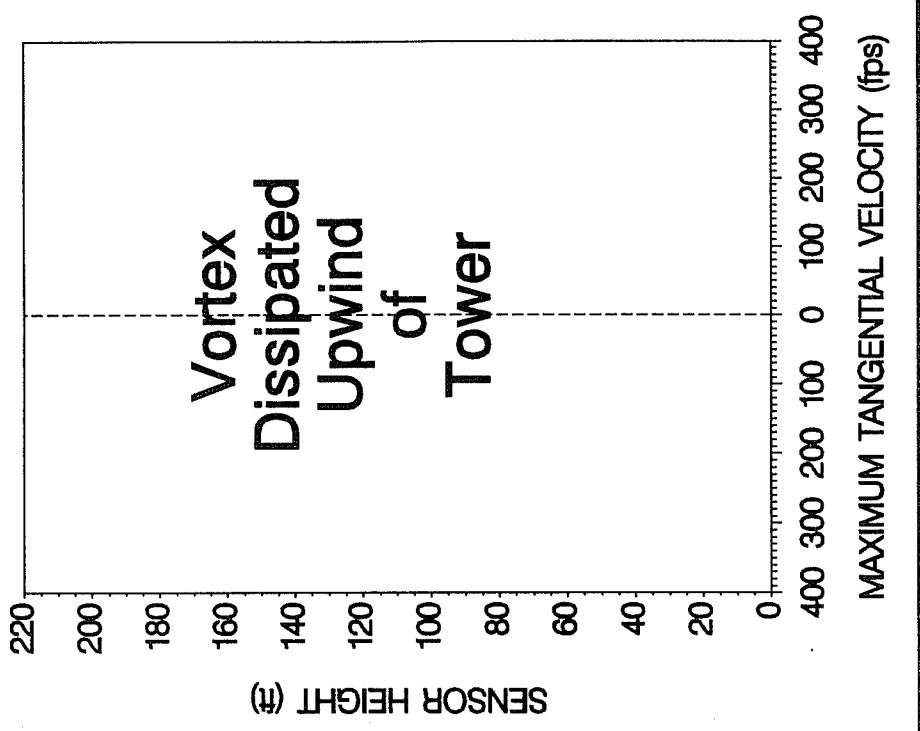
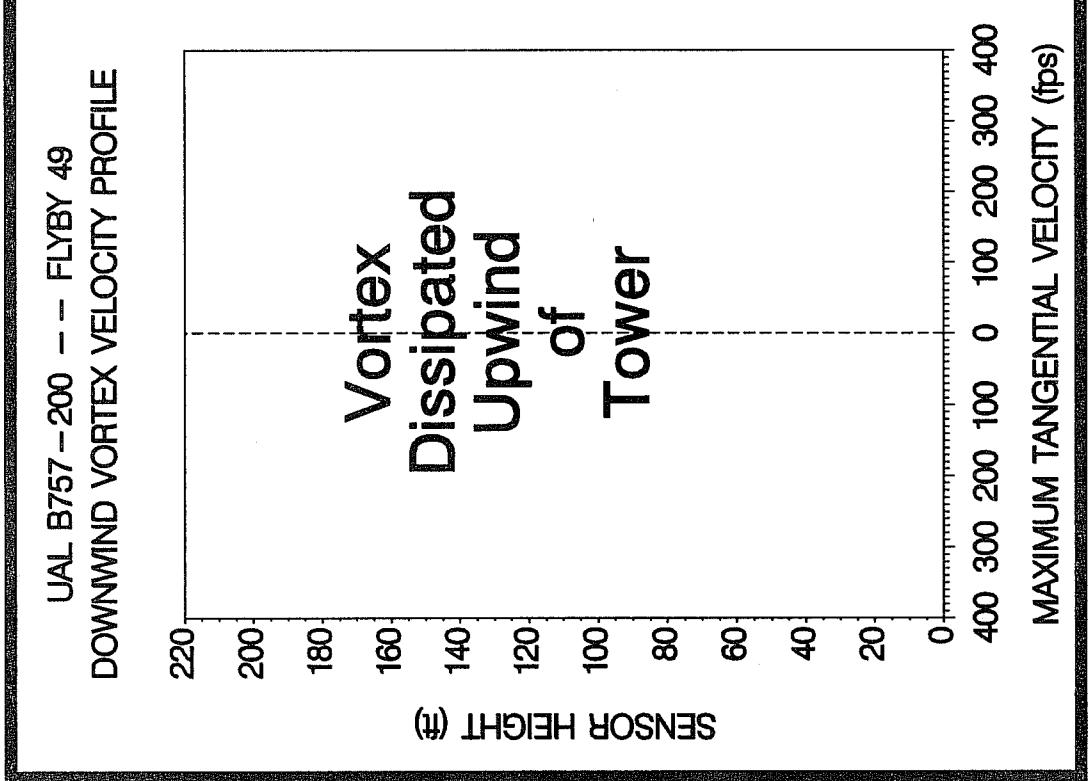


Figure G-161. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 269, Flyby 49, ambient wind speed = 4.8 kts,  $\delta_F = 25^\circ$ , IAS = 136 kts, GW = 191,000 lbs. Ages, radii, and velocities of the vortex cores are (D) and (D) s, (D) and (D) ft, and (D) and (D) fps, respectively.

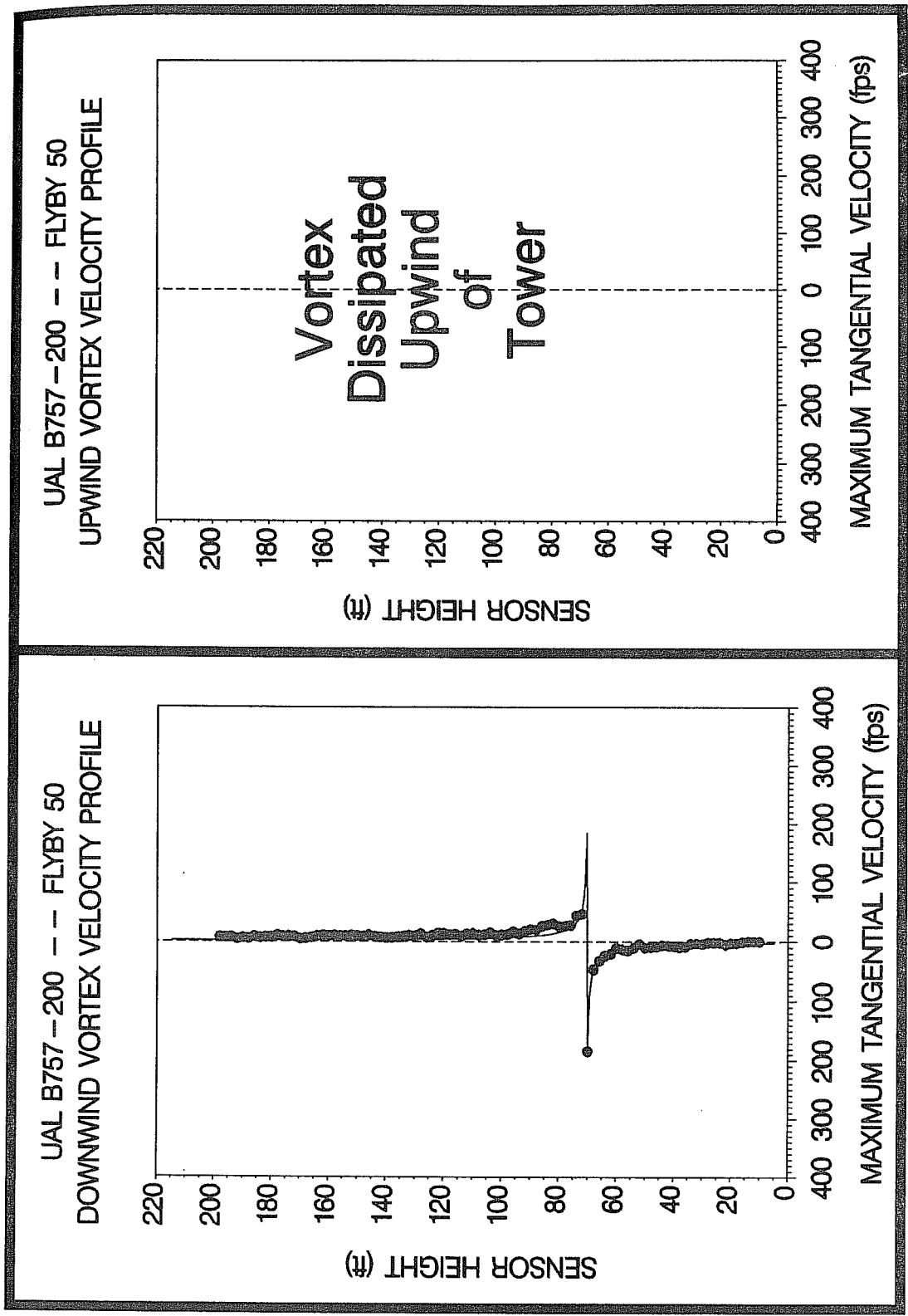
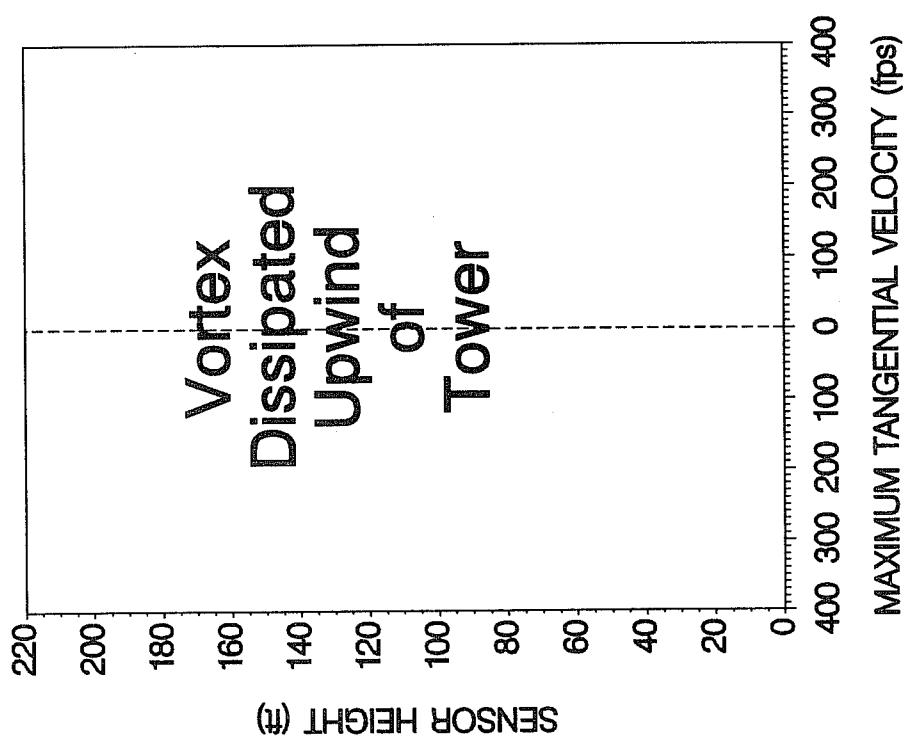


Figure G-162. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 269, Flyby 50, ambient wind speed = 4.2 kts,  $\delta_F = 25^\circ$ , IAS = 136 kts, GW = 190,200 lbs. Ages, radii, and velocities of the vortex cores are 44 and (D) s, 0.2 and (D) ft, and 184.0 and (D) fps, respectively.

UAL B757-200 -- FLYBY 51  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B757-200 -- FLYBY 51  
UPWIND VORTEX VELOCITY PROFILE

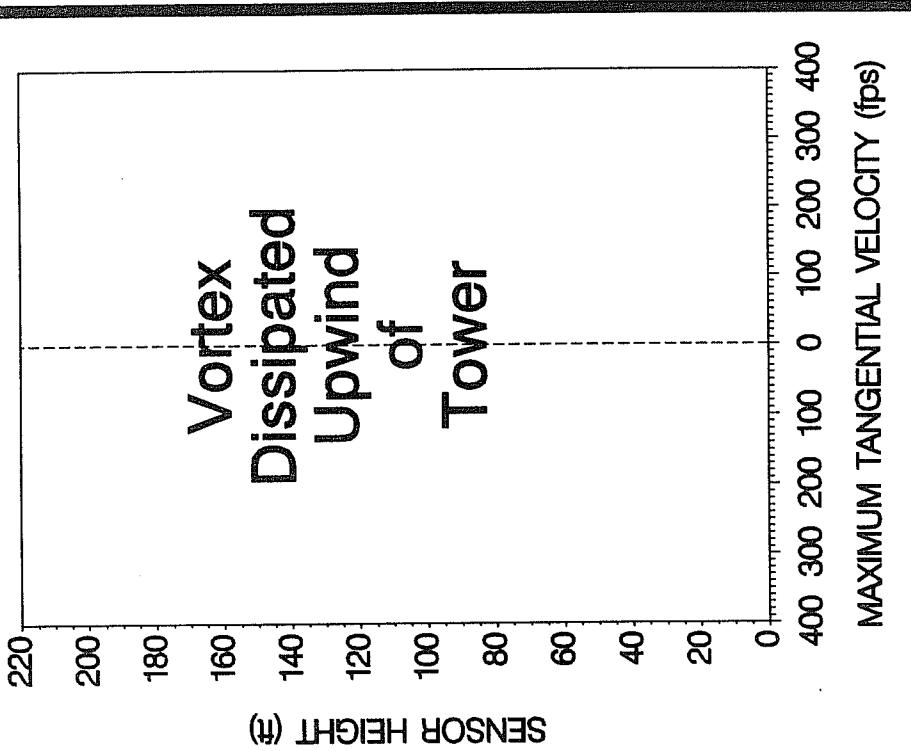
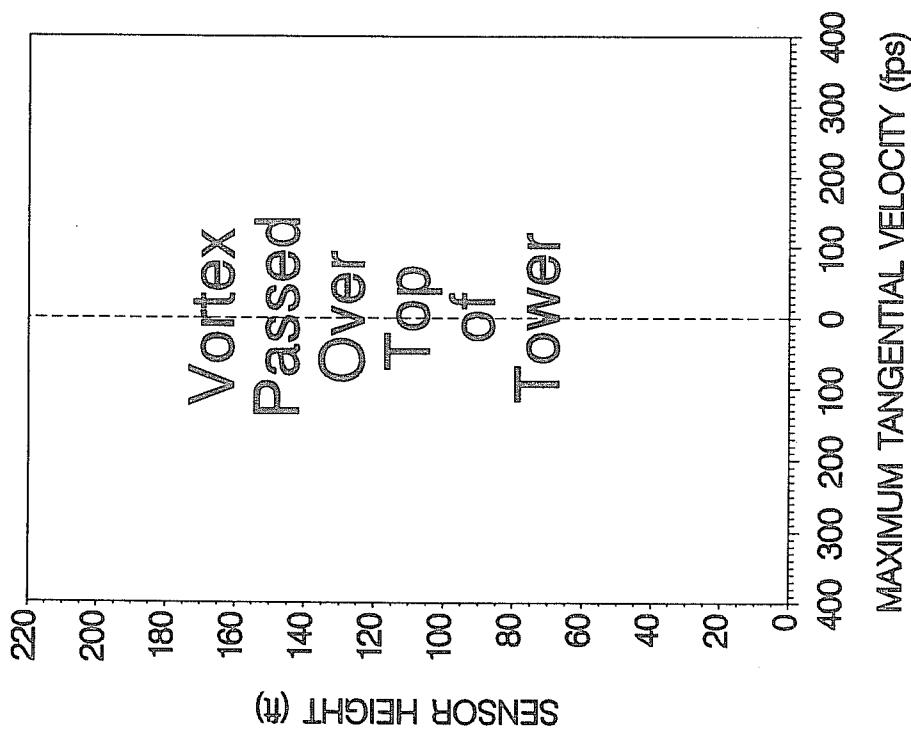


Figure G-163. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 269, Flyby 51, ambient wind speed = 2.7 kts,  $\delta_F = 25^\circ$ , IAS = 136 kts, GW = 189,400 lbs. Ages, radii, and velocities of the vortex cores are (D) and (D) s, (D) and (D) ft, and (D) and (D) fps, respectively.

UAL B757-200 -- FLYBY 52  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B757-200 -- FLYBY 52  
UPWIND VORTEX VELOCITY PROFILE

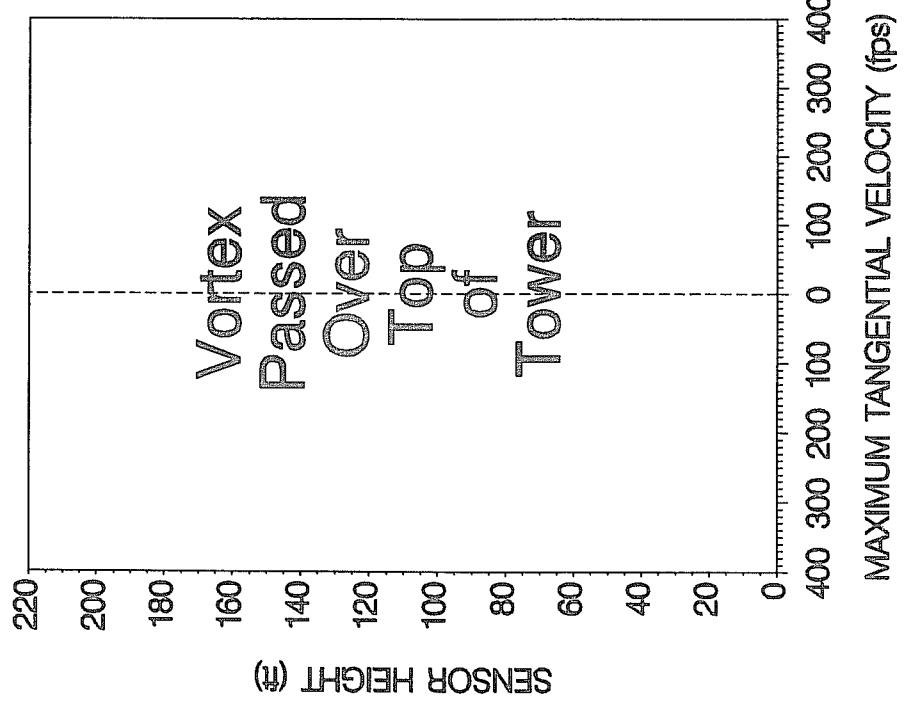


Figure G-164. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 269, Flyby 52, ambient wind speed=5.1 kts,  $\delta_F=25^\circ$ , IAS=135 kts, GW=187,000 lbs. Ages, radii, and velocities of the vortex cores are (P) and (P) ft, and (P) and (P) fps, respectively.

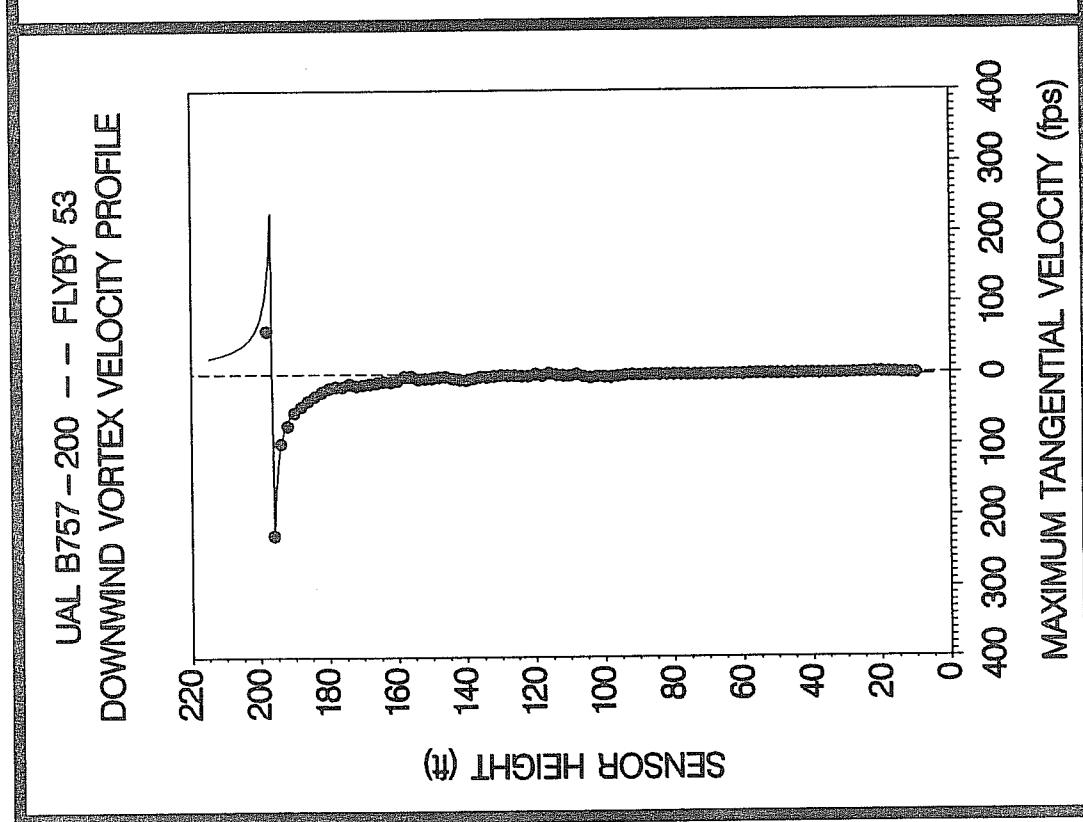


Figure G-165. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 269, Flyby 53, ambient wind speed = 5.1 kts,  $\delta_F = 30^\circ$ , IAS = 132 kts, GW = 186,000 lbs. Ages, radii, and velocities of the vortex cores are 23 and 38 s, 0.4 and 0.4 ft, and 227.4 and 208.2 fps, respectively.

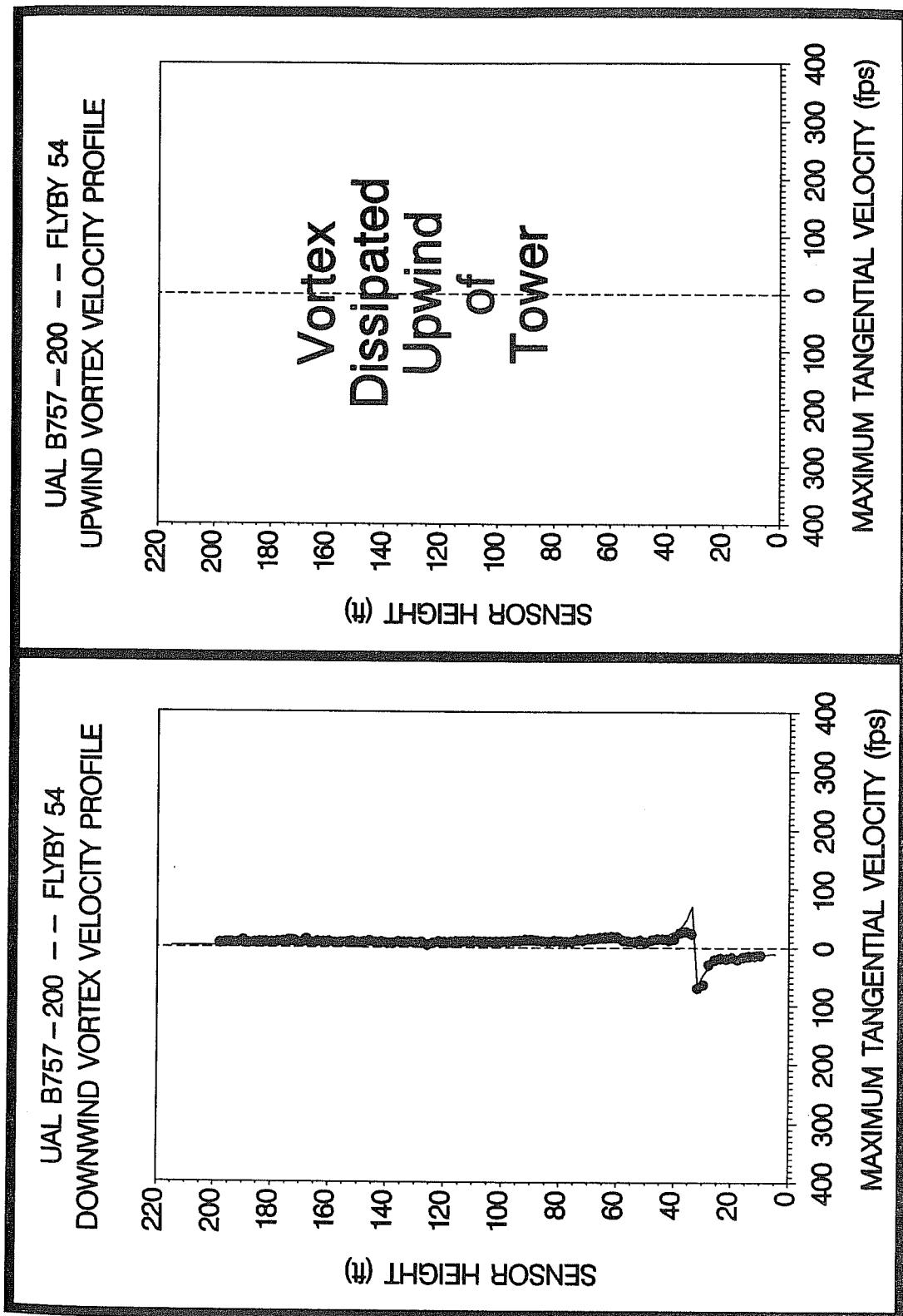


Figure G-166. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 269, Flyby 54, ambient wind speed = 3.3 kts,  $\delta_F = 30^\circ$ , IAS = 132 kts, GW = 185,300 lbs. Ages, radii, and velocities of the vortex cores are 56 and (D) s, 0.9 and (D) ft, and 69.4 and (D) fps, respectively.

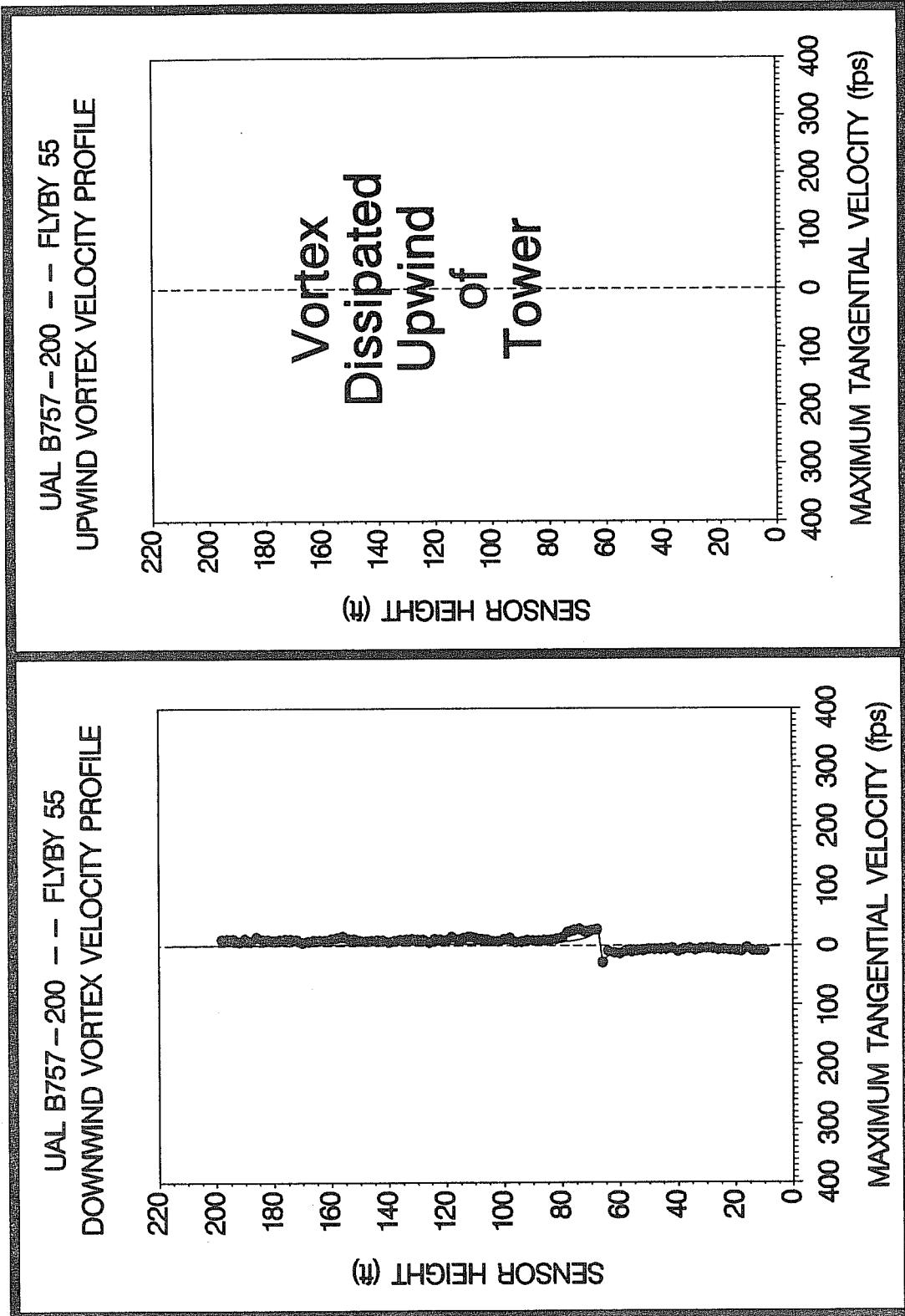


Figure G-167. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 269, Flyby 55, ambient wind speed = 3.9 kts,  $\delta_F = 30^\circ$ , IAS = 132 kts, GW = 184,300 lbs. Ages, radii, and velocities of the vortex cores are 64 and (D) s, 0.9 and (D) ft, and 28.7 and (D) fps, respectively.

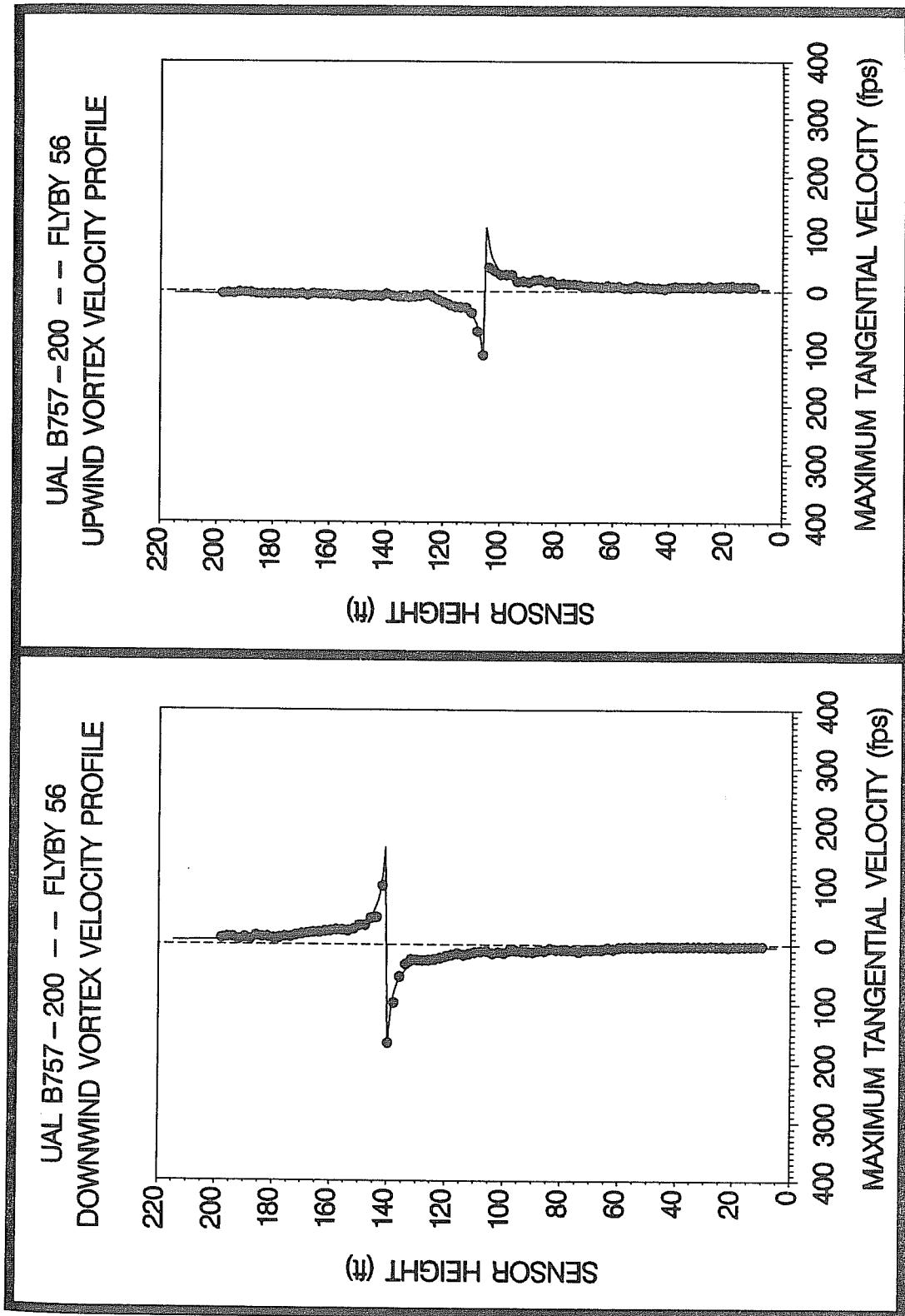
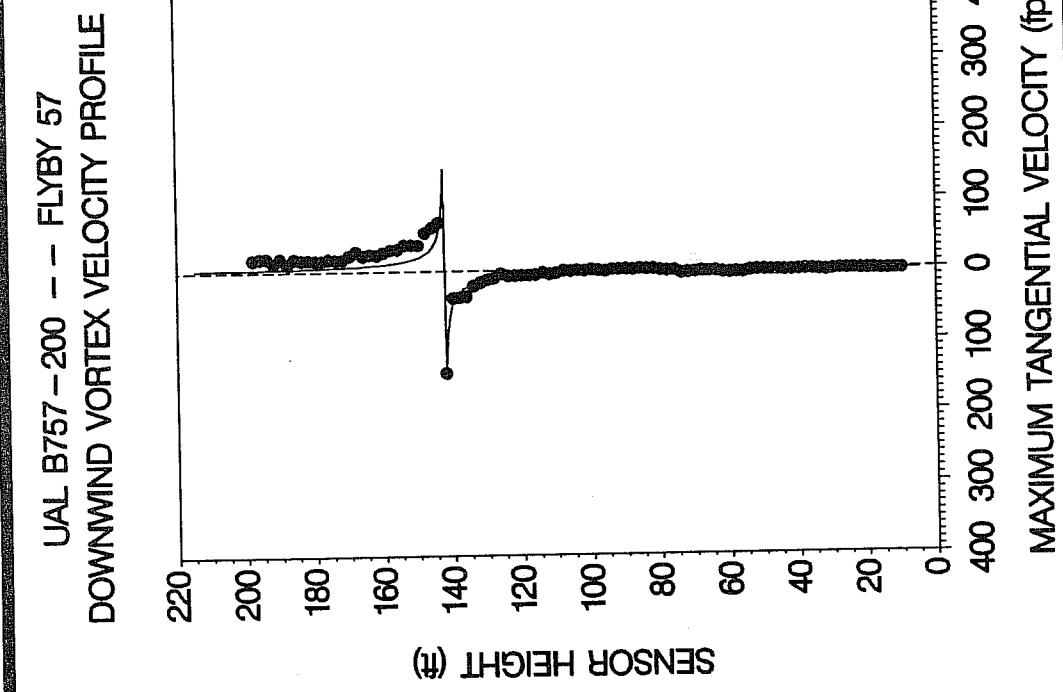
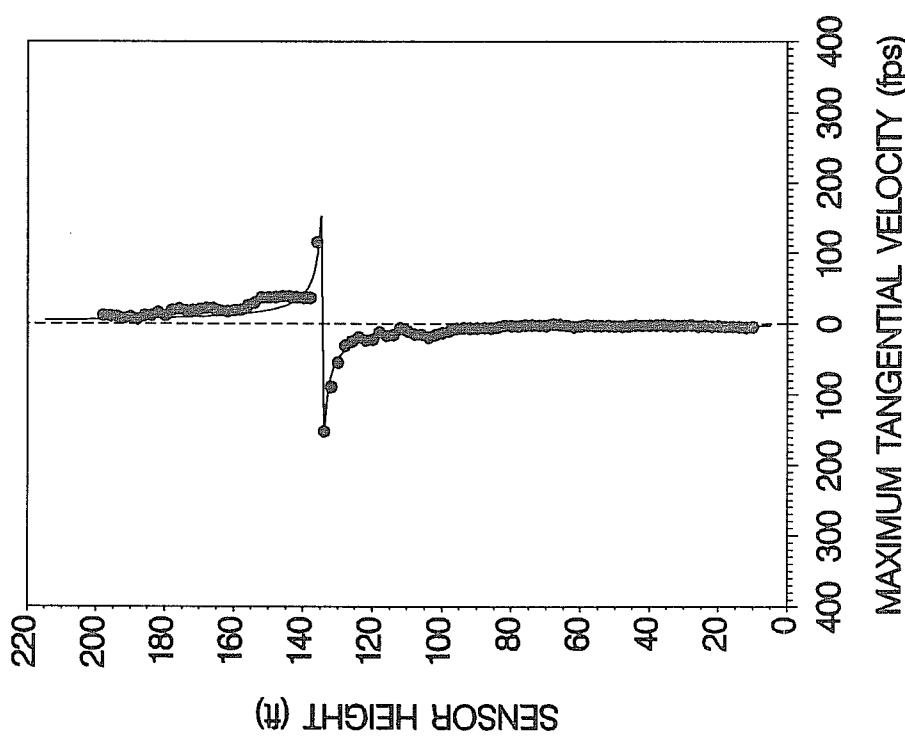


Figure G-168. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 269, Flyby 56, ambient wind speed=4.4 kts,  $\delta_F=30^\circ$ , IAS=132 kts, GW=183, 100 lbs. Ages, radii, and velocities of the vortex cores are 29 and 45 s, 0.5 and 0.5 ft, and 164.4 and 111.4 fps, respectively.



**Figure G-169.** UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 269, Flyby 57, ambient wind speed=6.0 kts,  $\delta_F=25^\circ$ , IAS=133 kts, GW=182,500 lbs. Ages, radii, and velocities of the vortex cores are 29 and 46 s, 0.2 and 0.3 ft, and 143.9 and 178.9 fps, respectively.

UAL B757 - 200 — FLYBY 58  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B757 - 200 — FLYBY 58  
UPWIND VORTEX VELOCITY PROFILE

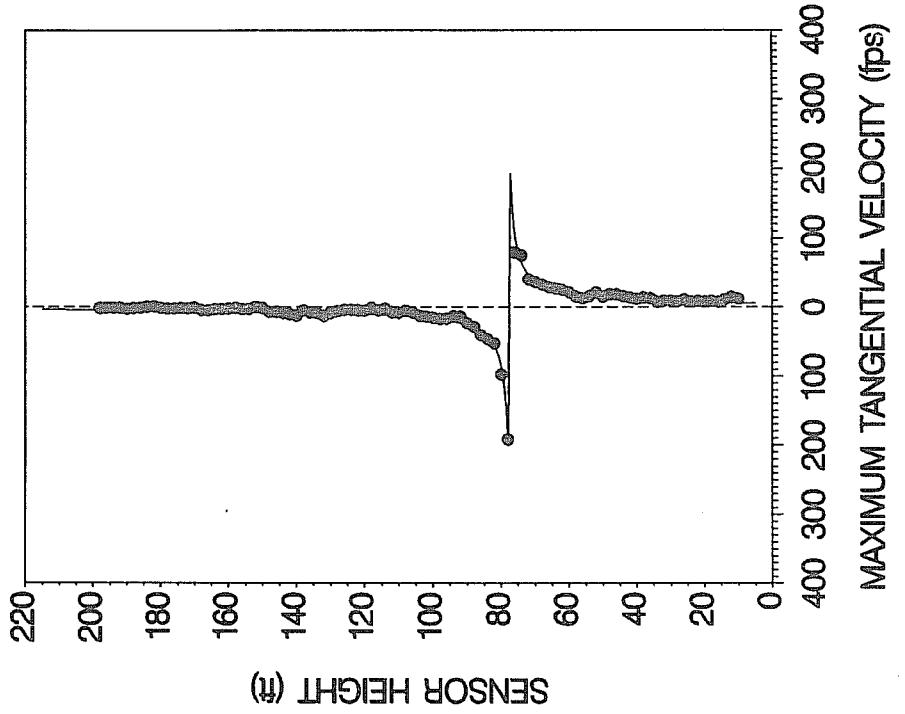
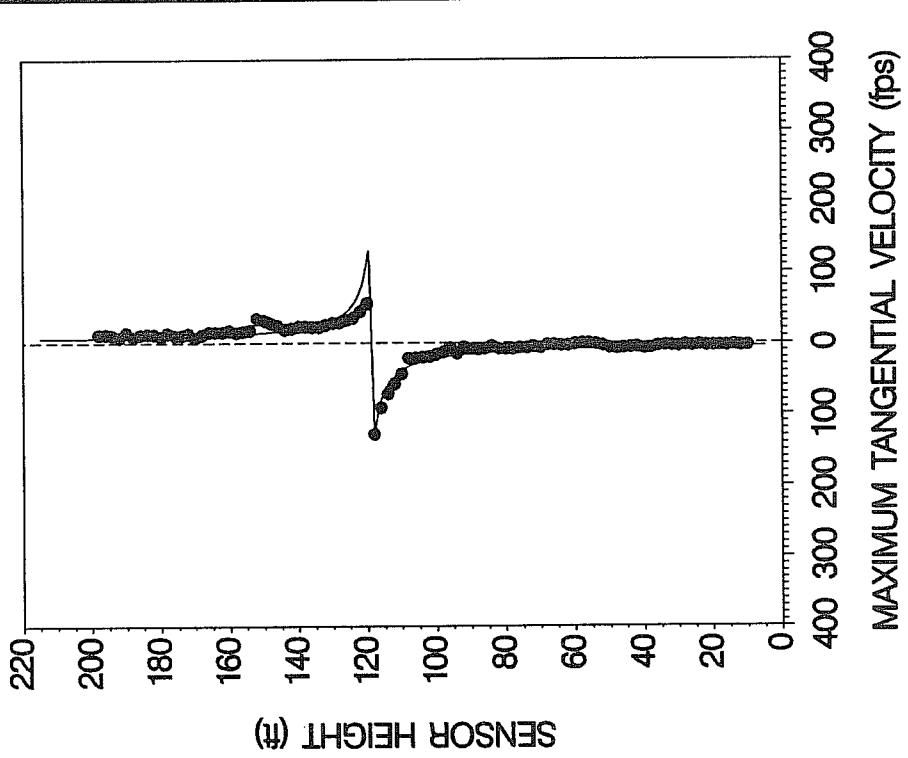


Figure G-170. UAL B757-200 downwind (left) and upwind (right) vortex profiles at maximum intensity from Day of Year 269, Flyby 58, ambient wind speed = 6.4 kts,  $\delta_F = 25^\circ$ ,  $\delta_{F\text{c}} = 133$  kts,  $GW = 182,000$  lbs. Ages, radii, and velocities of the vortex cores are 29 and 42 s, 0.4 and 0.4 ft, and 151.6 and 192.0 fps, respectively.

UAL B757-200 -- FLYBY 59  
DOWNWIND VORTEX VELOCITY PROFILE



UAL B757-200 -- FLYBY 59  
UPWIND VORTEX VELOCITY PROFILE

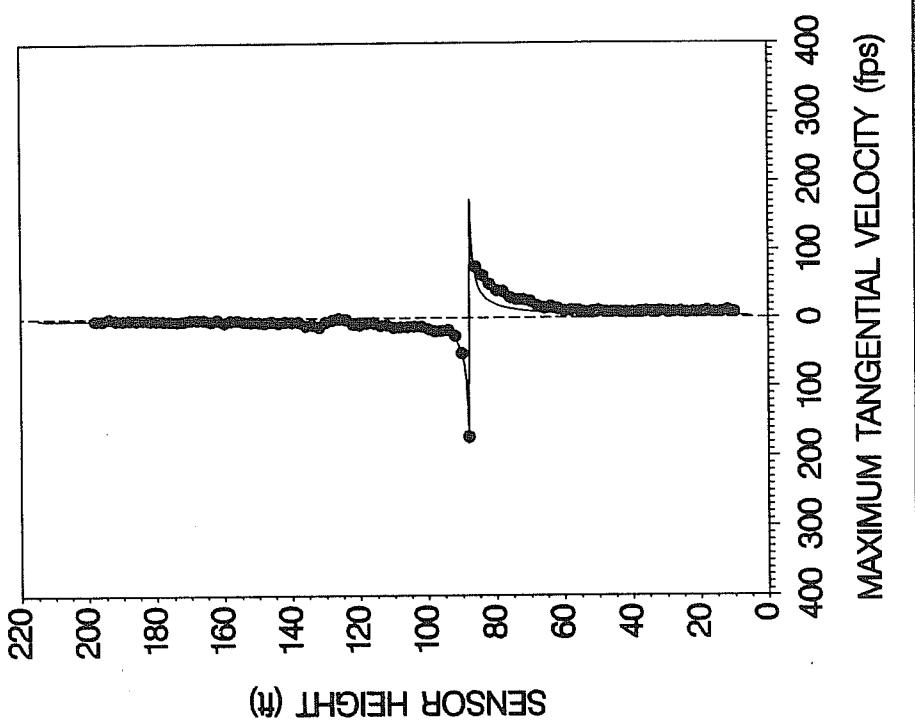


Figure G-171. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 269, Flyby 59, ambient wind speed = 5.4 kts,  $\delta_F = 25^\circ$ , IAS = 132 kts, GW = 181,200 lbs. Ages, radii, and velocities of the vortex cores are 31 and 41 s, 0.8 and 0.2 ft, and 128.6 and 172.4 fps, respectively.

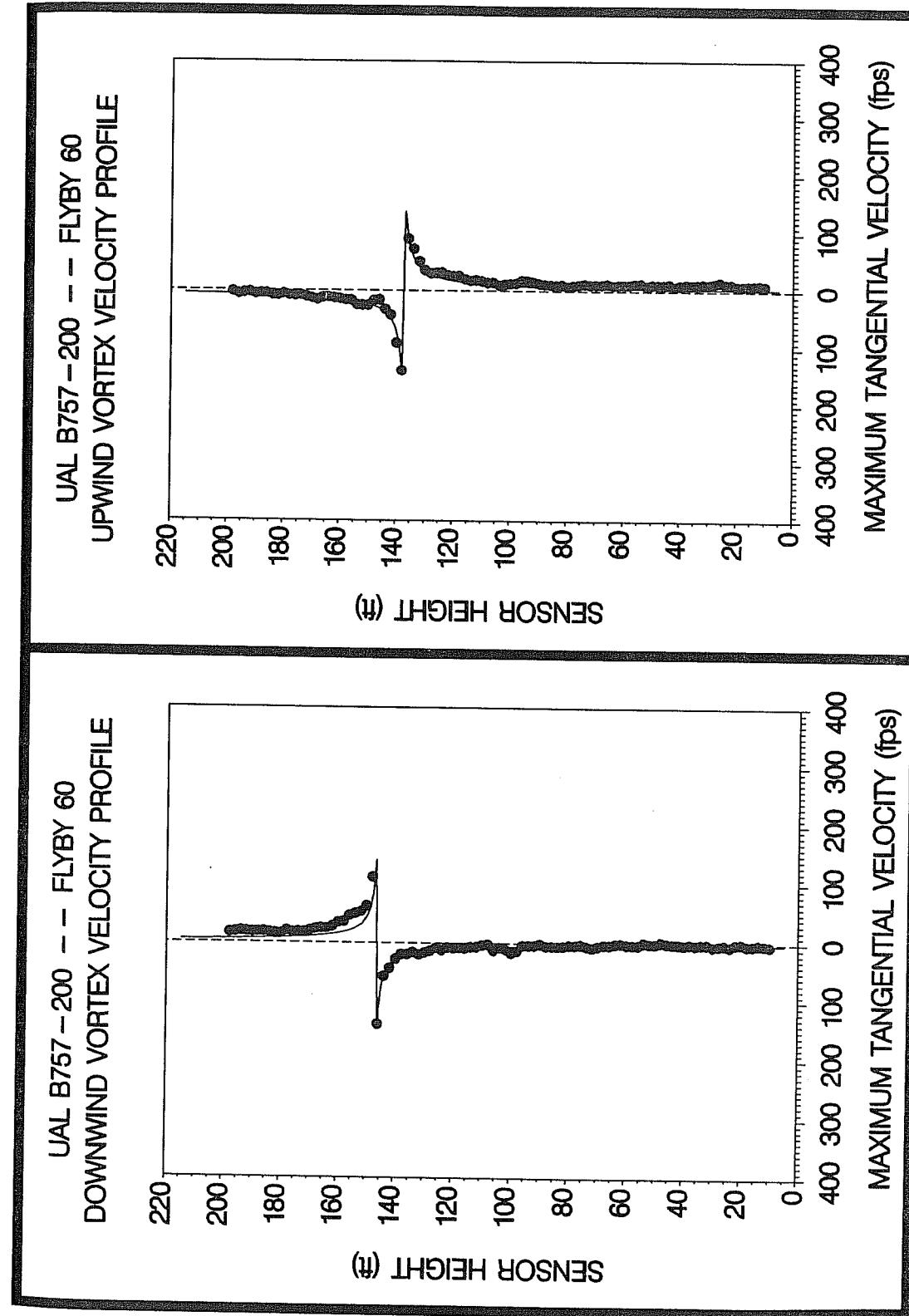


Figure G-172. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 269, Flyby 60, ambient wind speed = 6.0 kts,  $\delta_F = 30^\circ$ , IAS = 130 kts, GW = 180,500 lbs. Ages, radii, and velocities of the vortex cores are 23 and 34 s, 0.3 and 0.5 ft, and 139.4 and 138.3 fps, respectively.

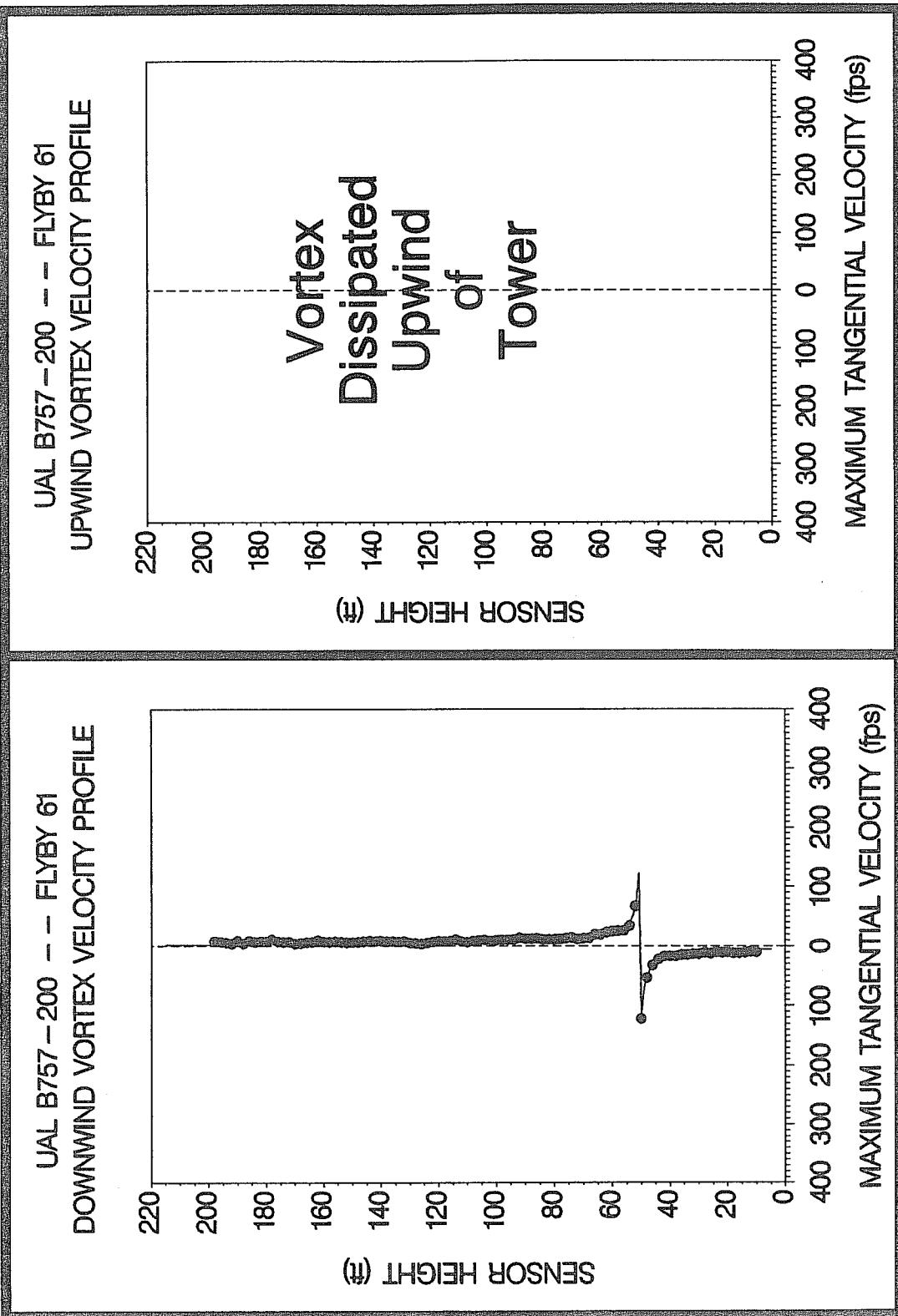


Figure G-173. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 269, Flyby 61, ambient wind speed = 6.5 kts,  $\delta_F = 1^\circ$ , IAS = 161 kts, GW = 176,000 lbs. Ages, radii, and velocities of the vortex cores are 35 and (D) s, 0.3 and (D) ft, and 122.1 and (D) fps, respectively.

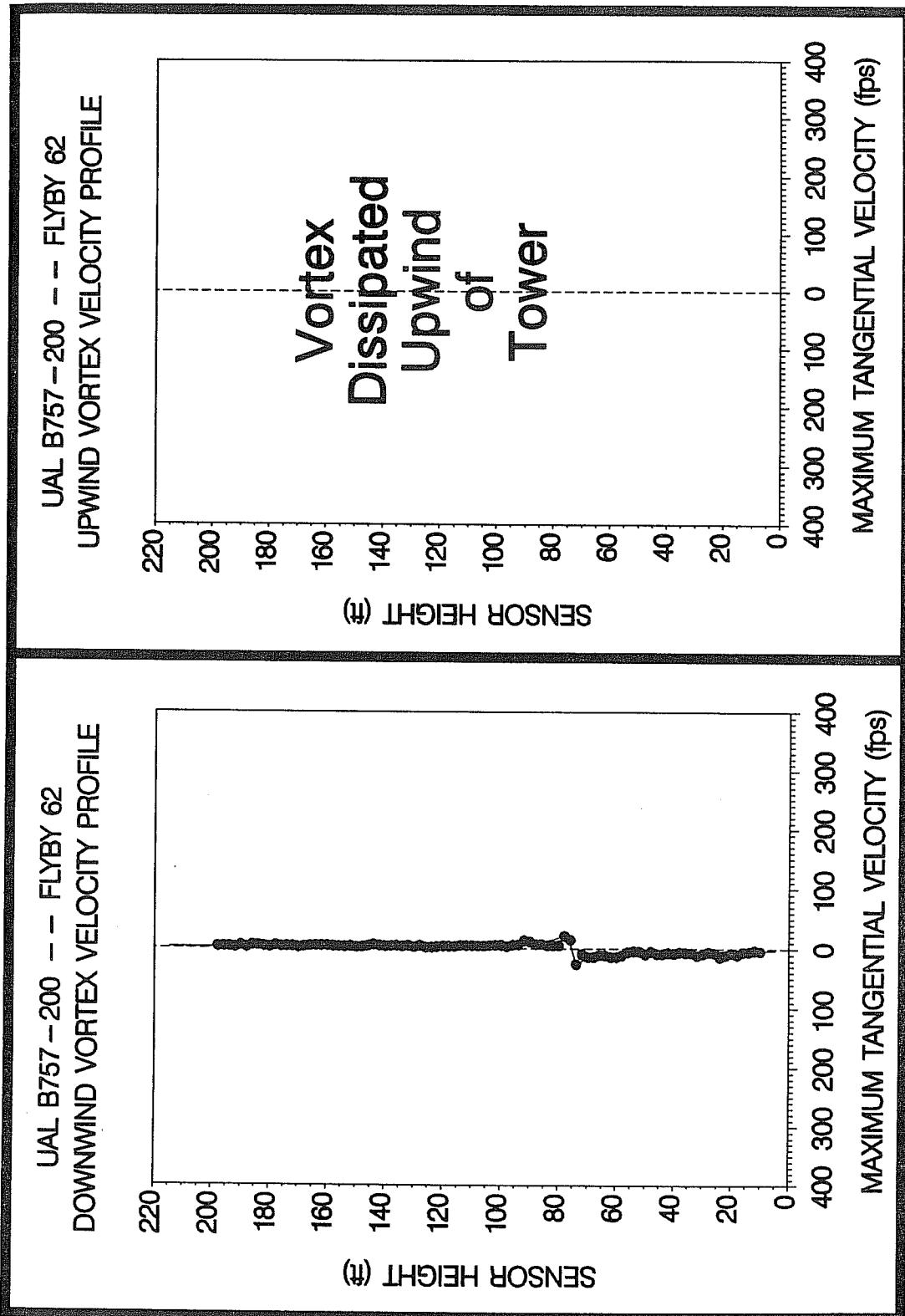


Figure G-174. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 269, Flyby 62, ambient wind speed = 4.4 kts,  $\delta_F = 1^\circ$ ,  $GW = 161$  kts,  $IAS = 161$  kts. Ages, radii, and velocities of the vortex cores are 62 and (D) s, 1.5 and (D) ft, and 26.2 and (D) fps, respectively.

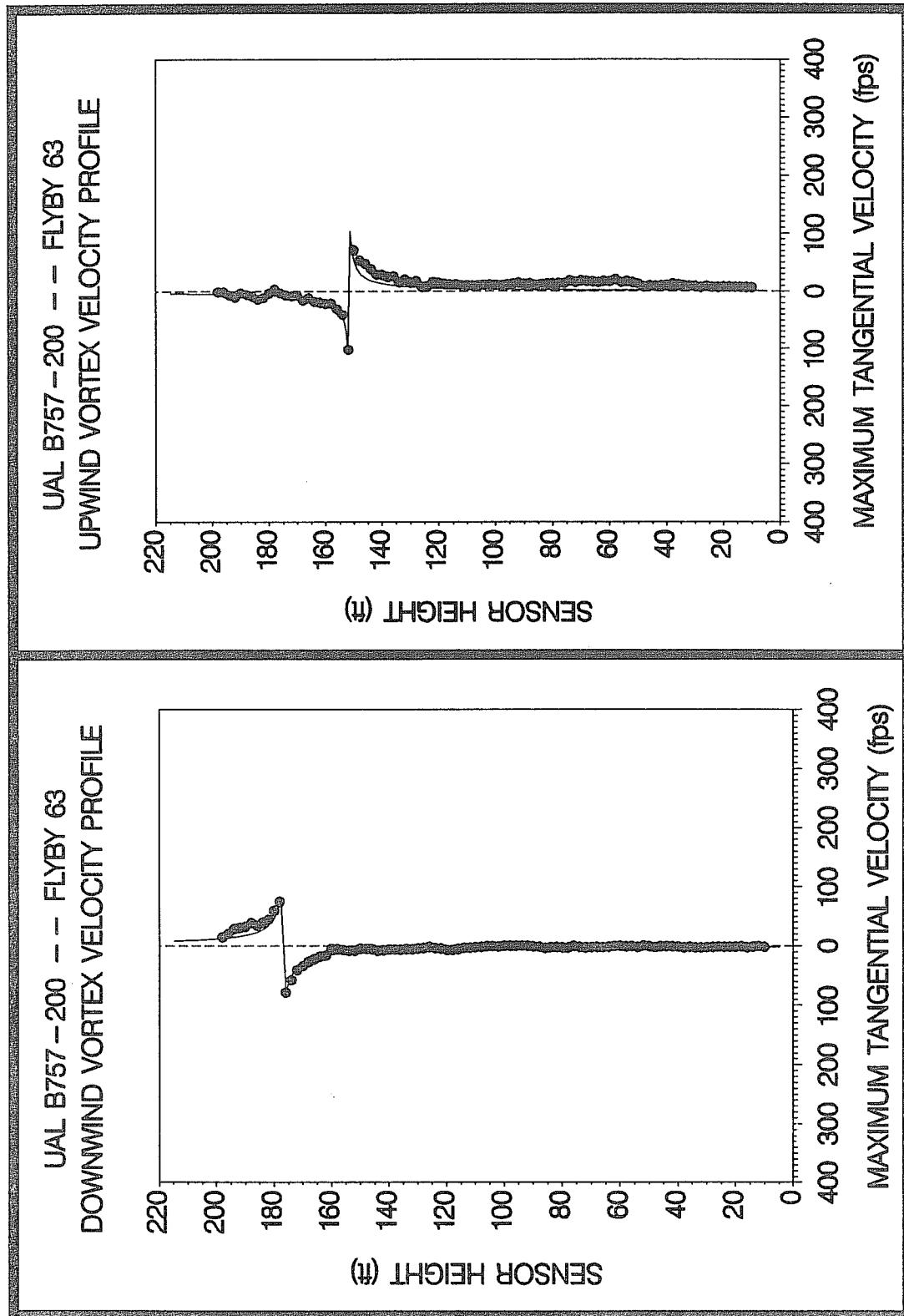
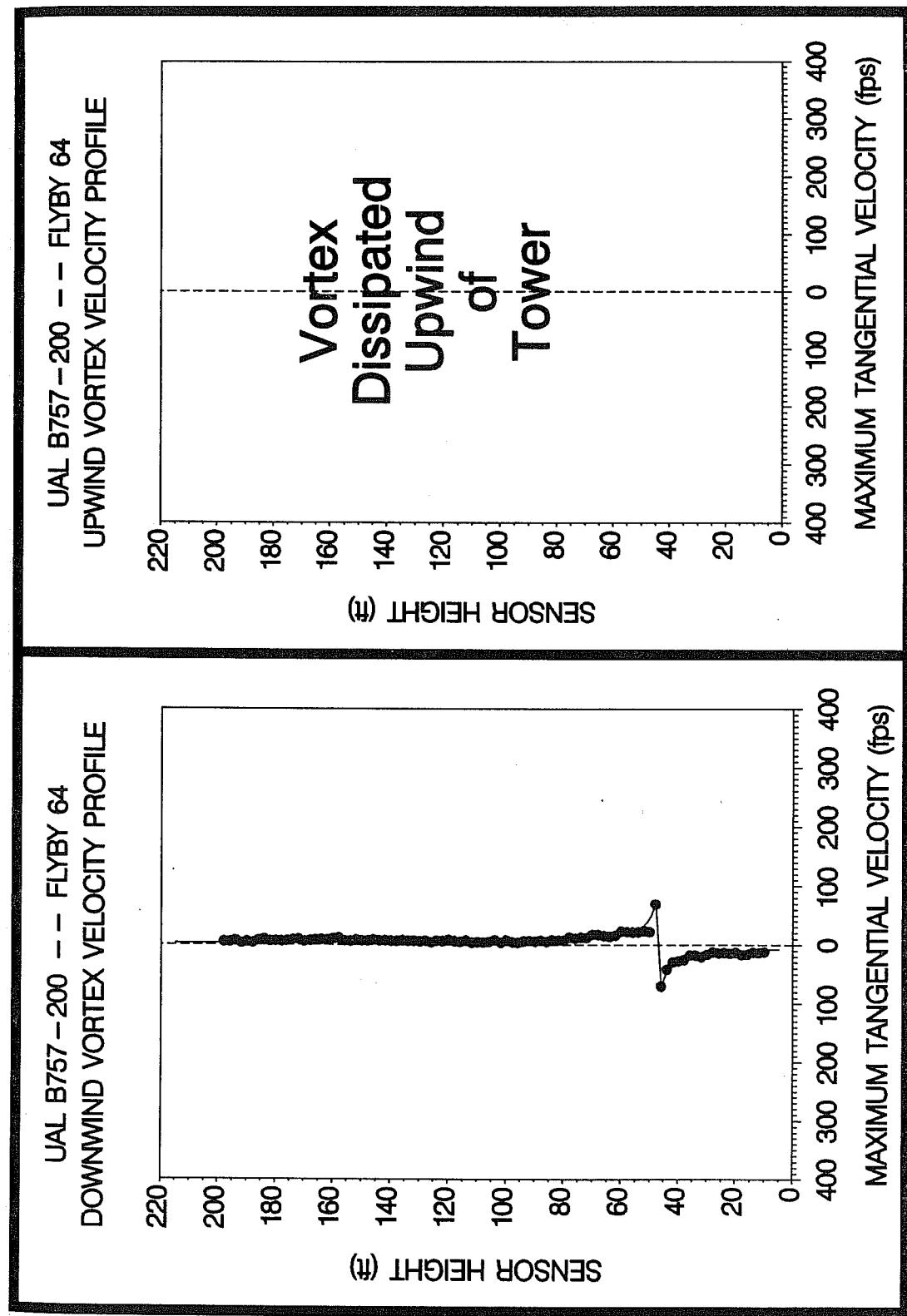


Figure G-175. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 269, Flyby 63, ambient wind speed = 6.0 kts,  $\delta_F = 20^\circ$ , IAS = 135 kts, GW = 174,500 lbs. Ages, radii, and velocities of the vortex cores are 19 and 32 s, 0.8 and 0.3 ft, and 78.9 and 102.0 fps, respectively.



**Figure G-176.** UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 269, Flyby 64, ambient wind speed = 5.8 kts,  $\delta_F = 15^\circ$ , IAS = 141 kts, GW = 174,000 lbs. Ages, radii, and velocities of the vortex cores are 39 and (D) s, 0.9 and (D) ft, and 69.9 and (D) fps, respectively.

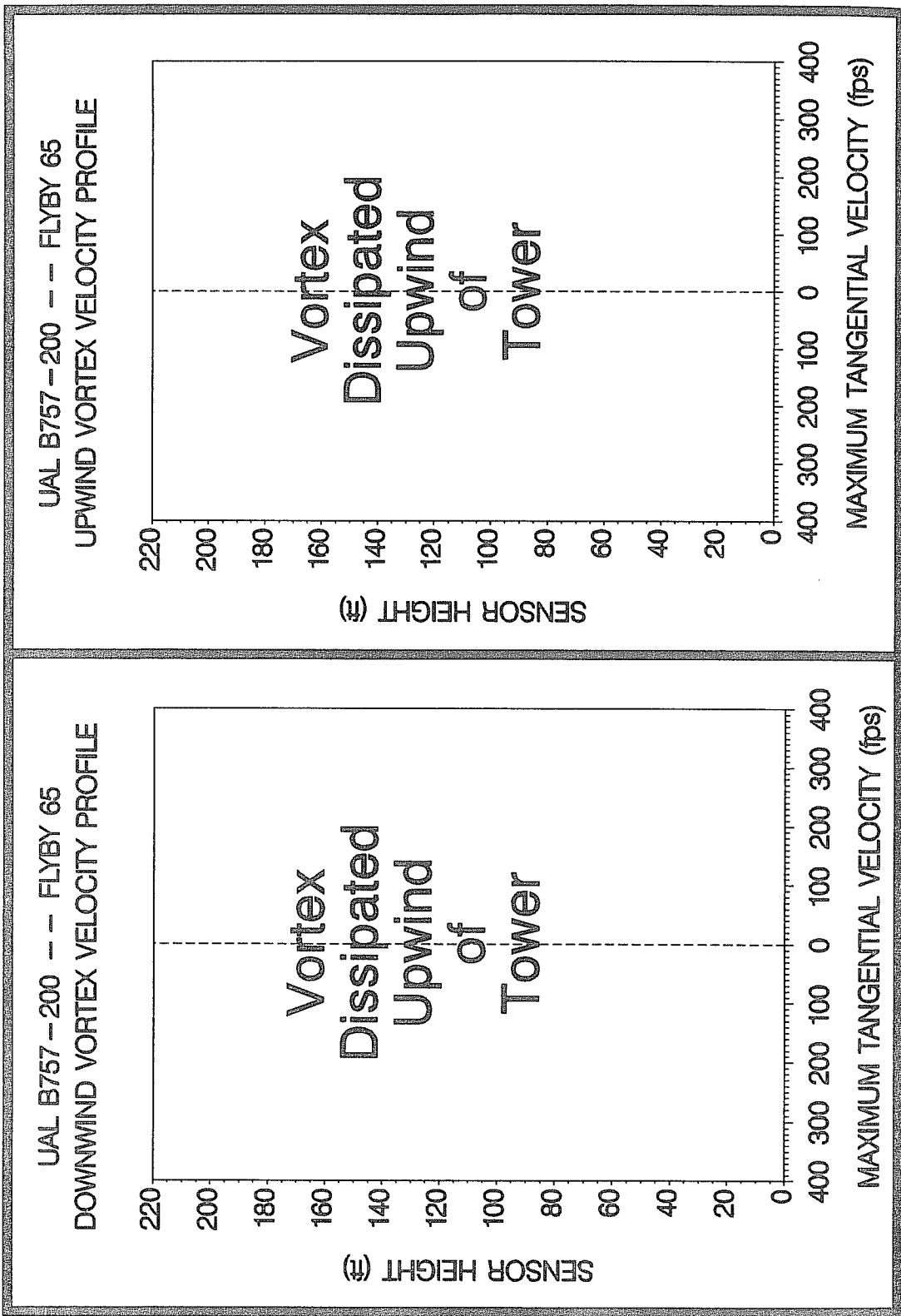


Figure G-177. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 269, Flyby 65, ambient wind speed = 3.9 kts,  $\delta_F = 5^\circ$ , IAS = 148 kts, GW = 173,600 lbs. Ages, radii, and velocities of the vortex cores are (D) and (D) s, (D) and (D) ft, and (D) and (D) fps, respectively.

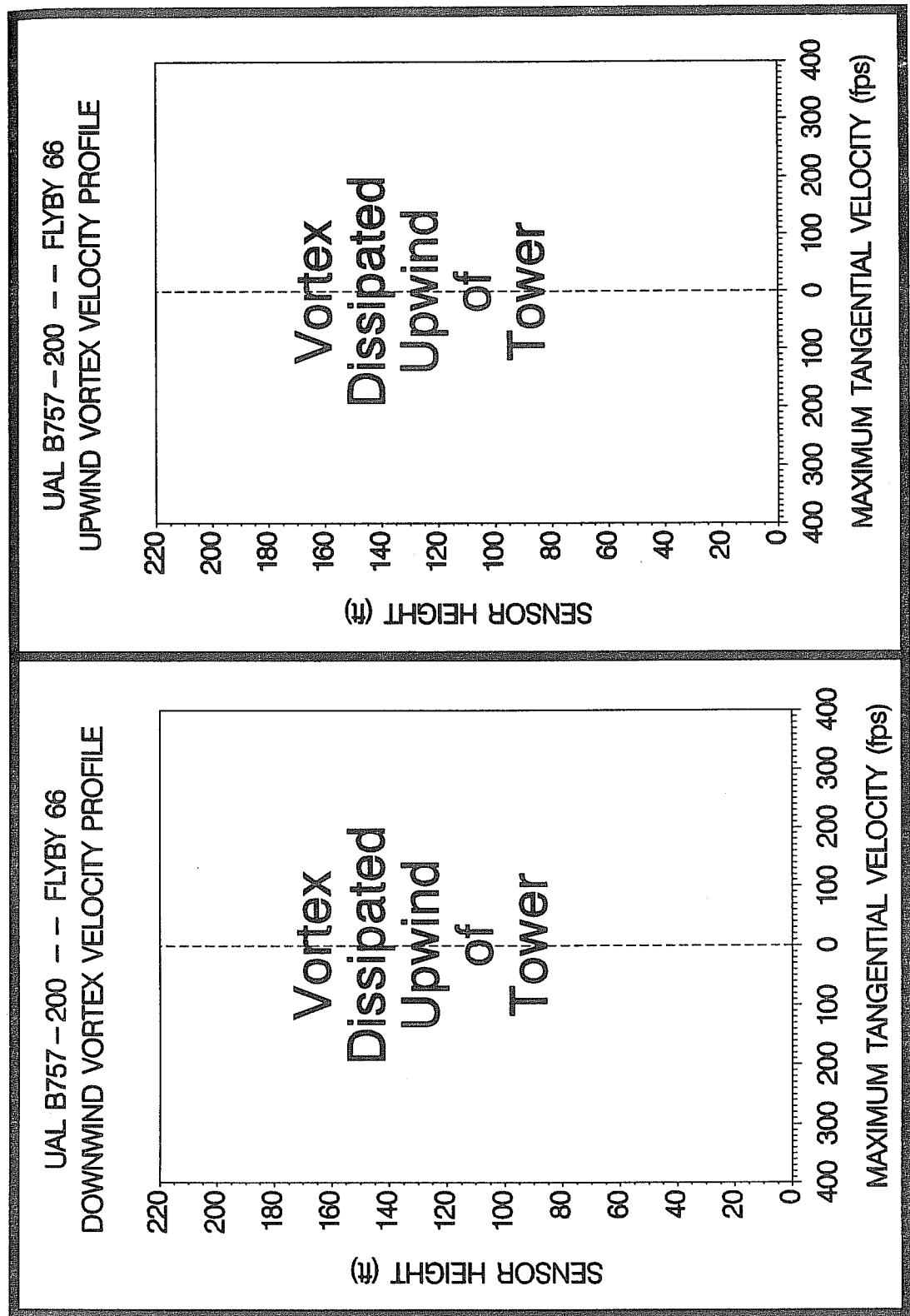


Figure G-178. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 269, Flyby 66, ambient wind speed = 4.2 kts,  $\delta_F = 25^\circ$ , IAS = 129 kts, GW = 172,900 lbs. Ages, radii, and velocities of the vortex cores are (D) and (D) ft, and (D) and (D) fps, respectively.

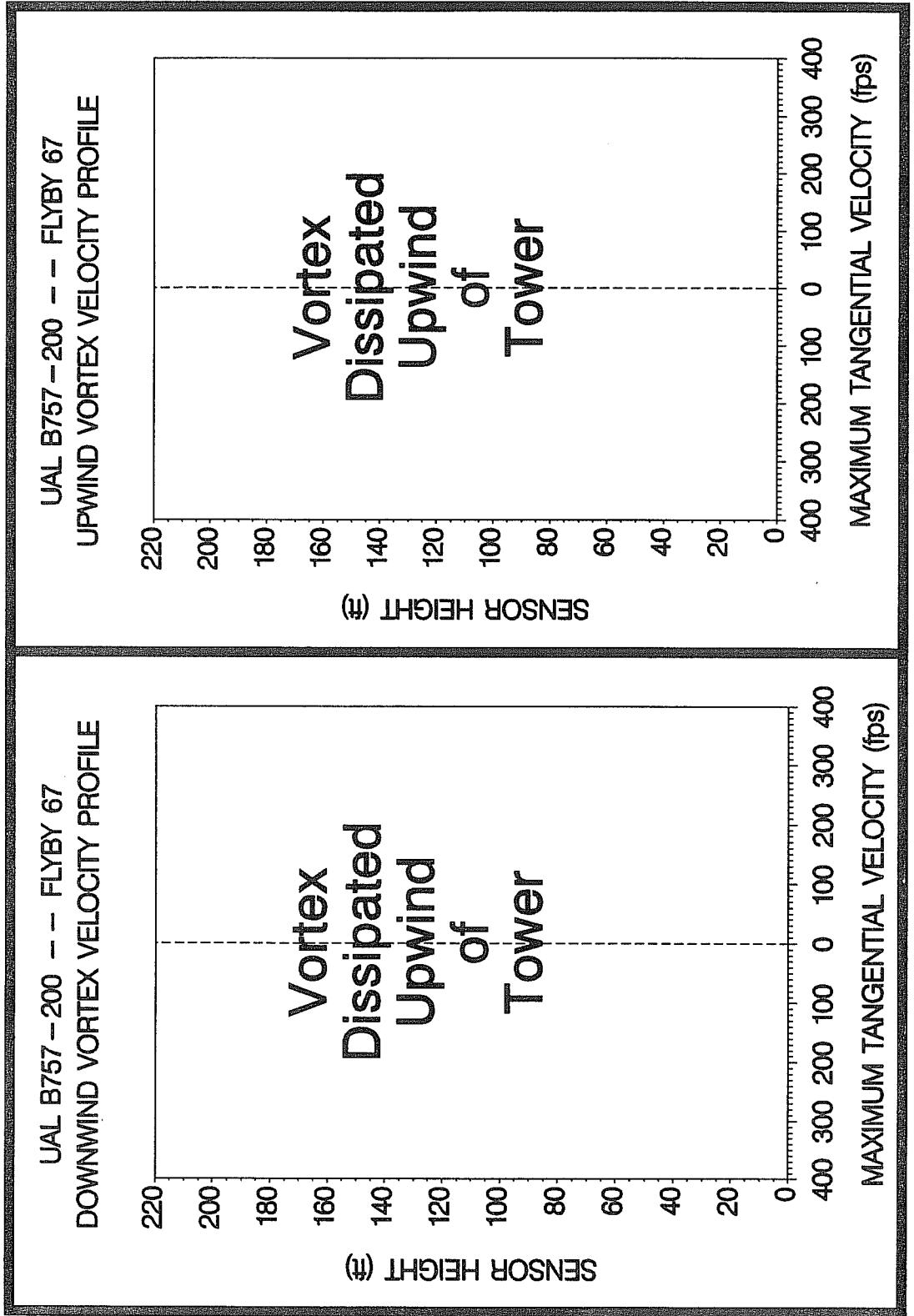


Figure G-179. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 269, Flyby 67, ambient wind speed = 5.2 kts,  $\delta_F = 25^\circ$ ,  $\delta_T = 5.2^\circ$ ,  $G_W = 129$  kts,  $G_W = 172$ , 300 lbs. Ages, radii, and velocities of the vortex cores are (D) and (D) s, (D) and (D) ft, and (D) and (D) fps, respectively.

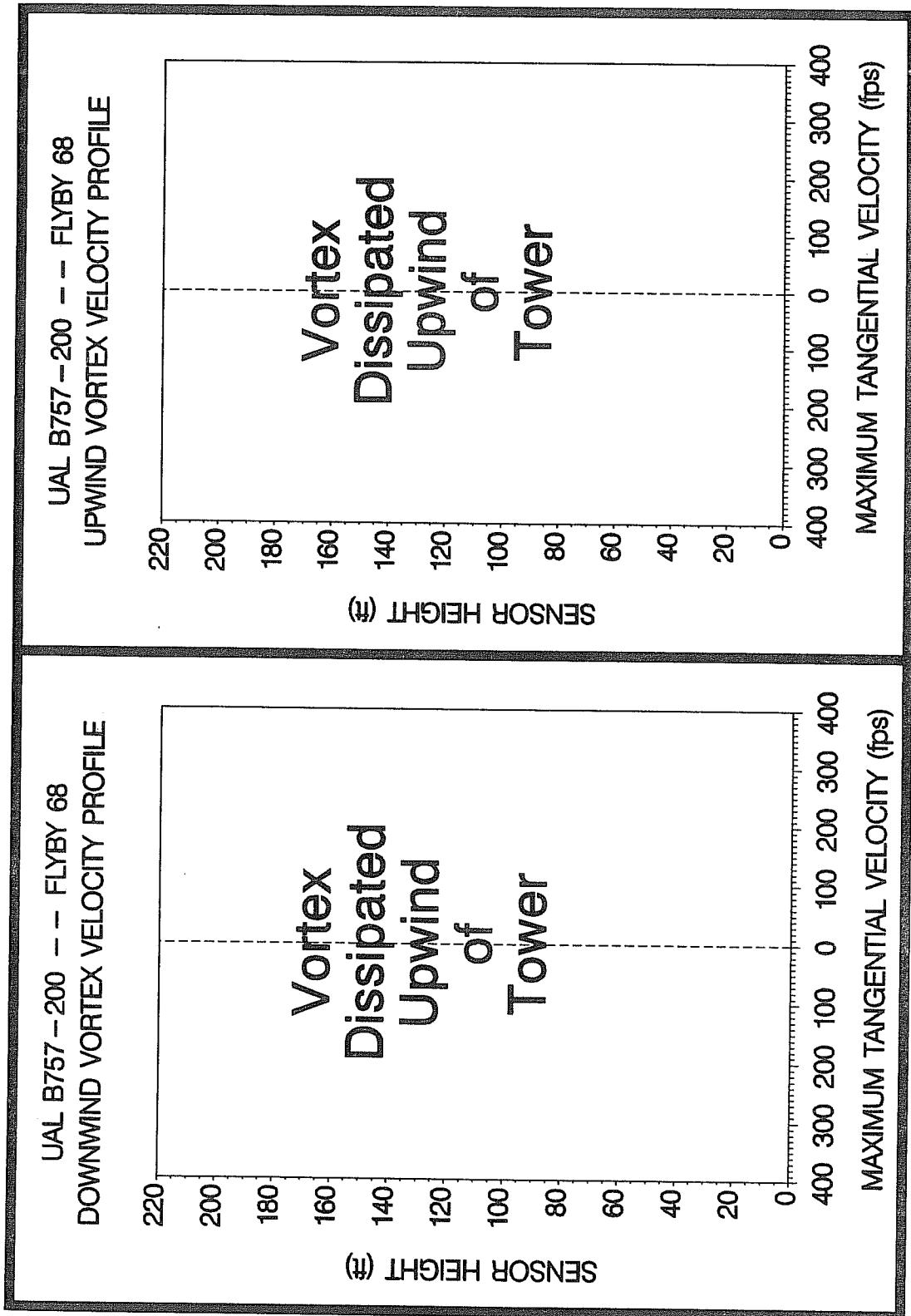


Figure G-180. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 269, Flyby 68, ambient wind speed = 5.7 kts,  $\delta_F = 25^\circ$ ,  $GW = 129$  kts,  $IAS = 129$  kts,  $AG = 5.7$  ft, and  $VD = 171,400$  lbs. Ages, radii, and velocities of the vortex cores are (D) and (D) s, (D) and (D) ft, and (D) and (D) fps, respectively.

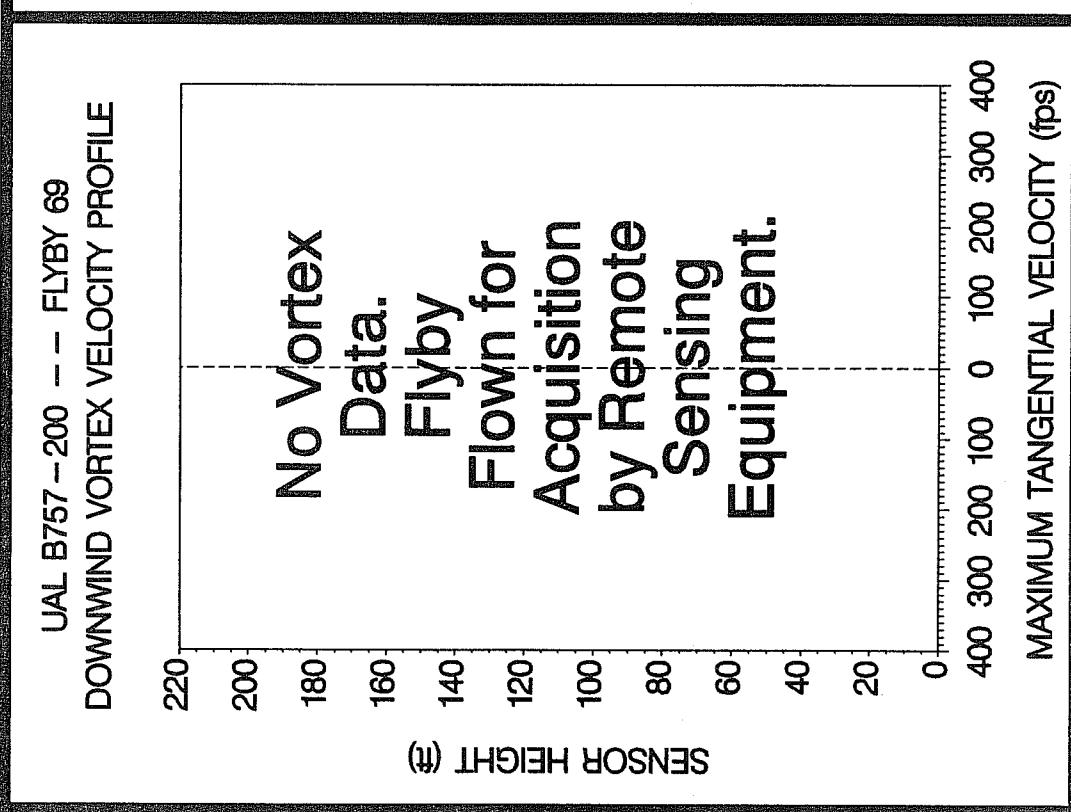


Figure G-181. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 269, Flyby 69, ambient wind speed = 3.5 kts,  $\delta_F = 25^\circ$ , IAS = 128 kts, GW = 170,300 lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) ft, and (O) and (O) fps, respectively.

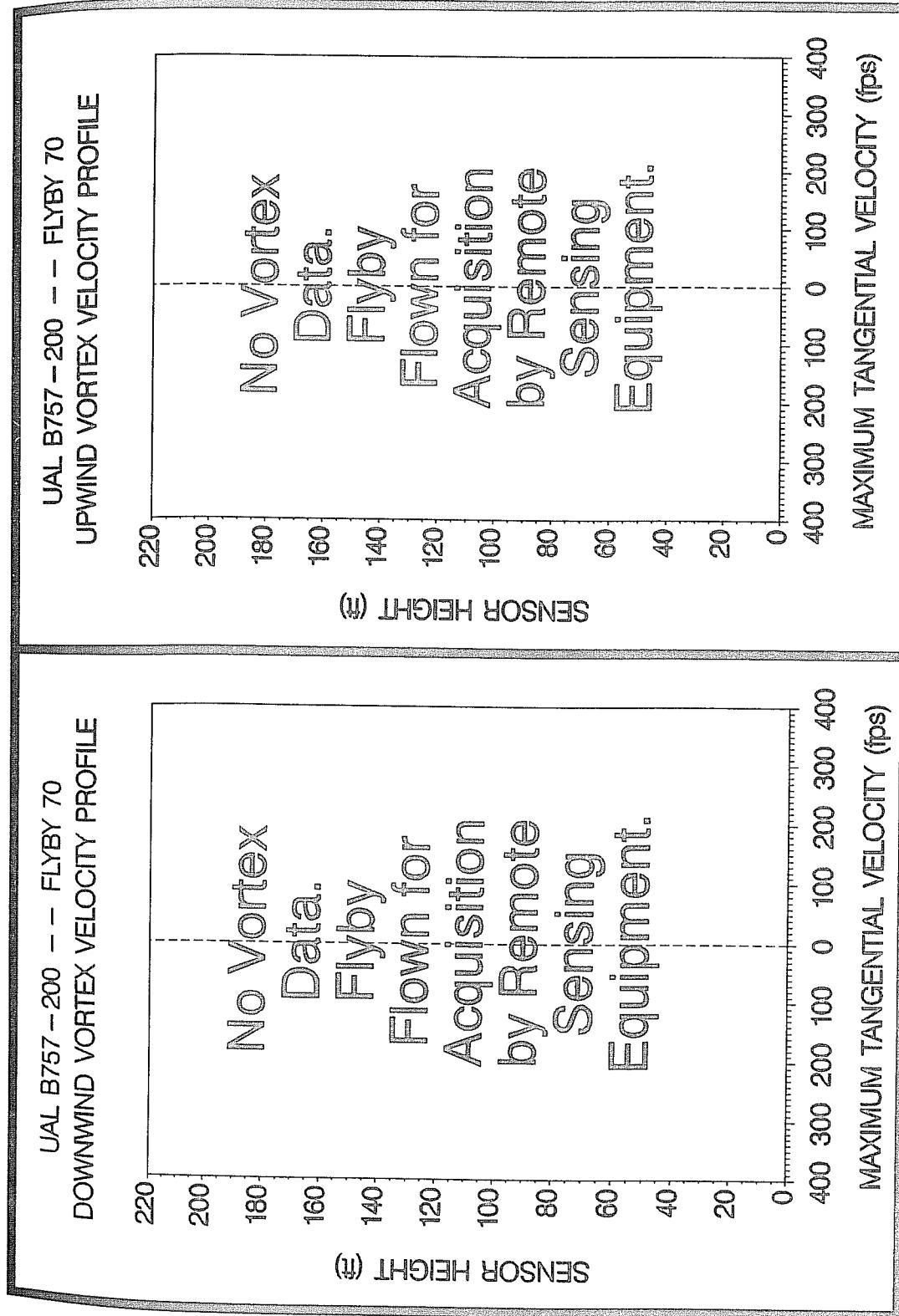


Figure G-182. UAL B757-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 269, Flyby 70, ambient wind speed = 2.0 kts,  $\delta_F = 15^\circ$ , IAS = 128 kts, GW = 169,500 lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) ft, and (O) and (O) fps, respectively.

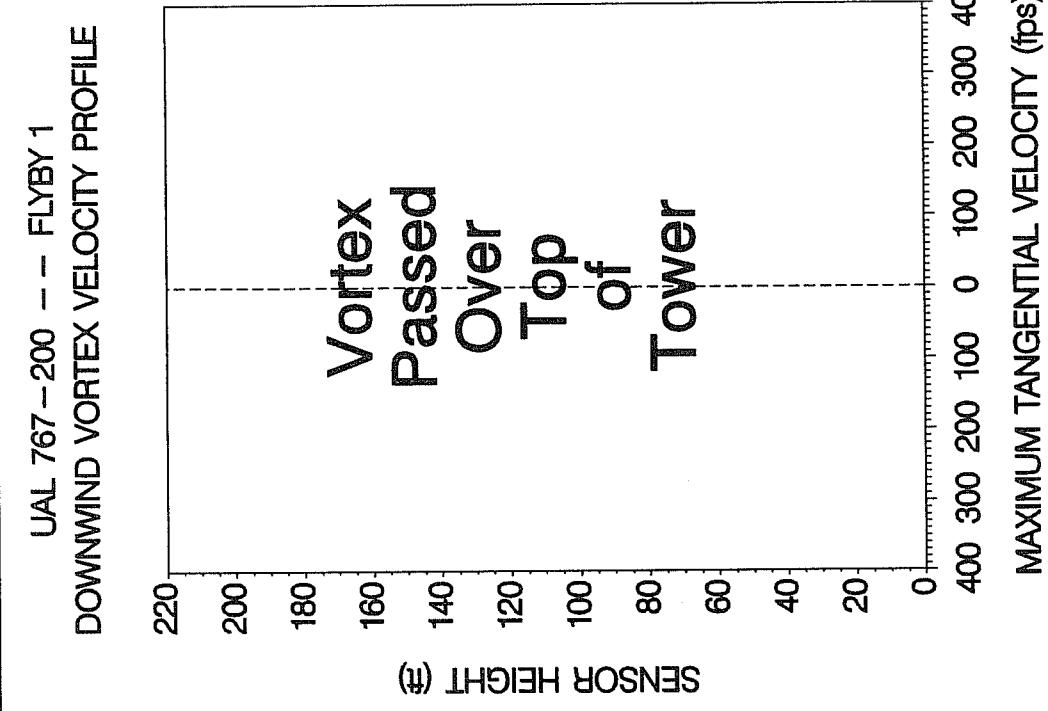


Figure G-183. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 272, Flyby 1, ambient wind speed = 7.2 kts,  $\delta_F = 20^\circ$ , IAS = 140 kts, GW = 260,000 lbs. Ages, radii, and velocities of the vortex cores are (P) and 22 s, (P) and 1.0 ft, and (P) and 83.3 fps, respectively.

intensity from Day of Year 272, Flyby 1, ambient wind speed = 7.2 kts,  $\delta_F=20^\circ$ , IAS = 140 kts,  $GW=260,000$  lbs. Ages, radii, and velocities of the vortex cores are (P) and 22 s, (P) and 1.0 ft, and (P) and 83.3 fps, respectively.

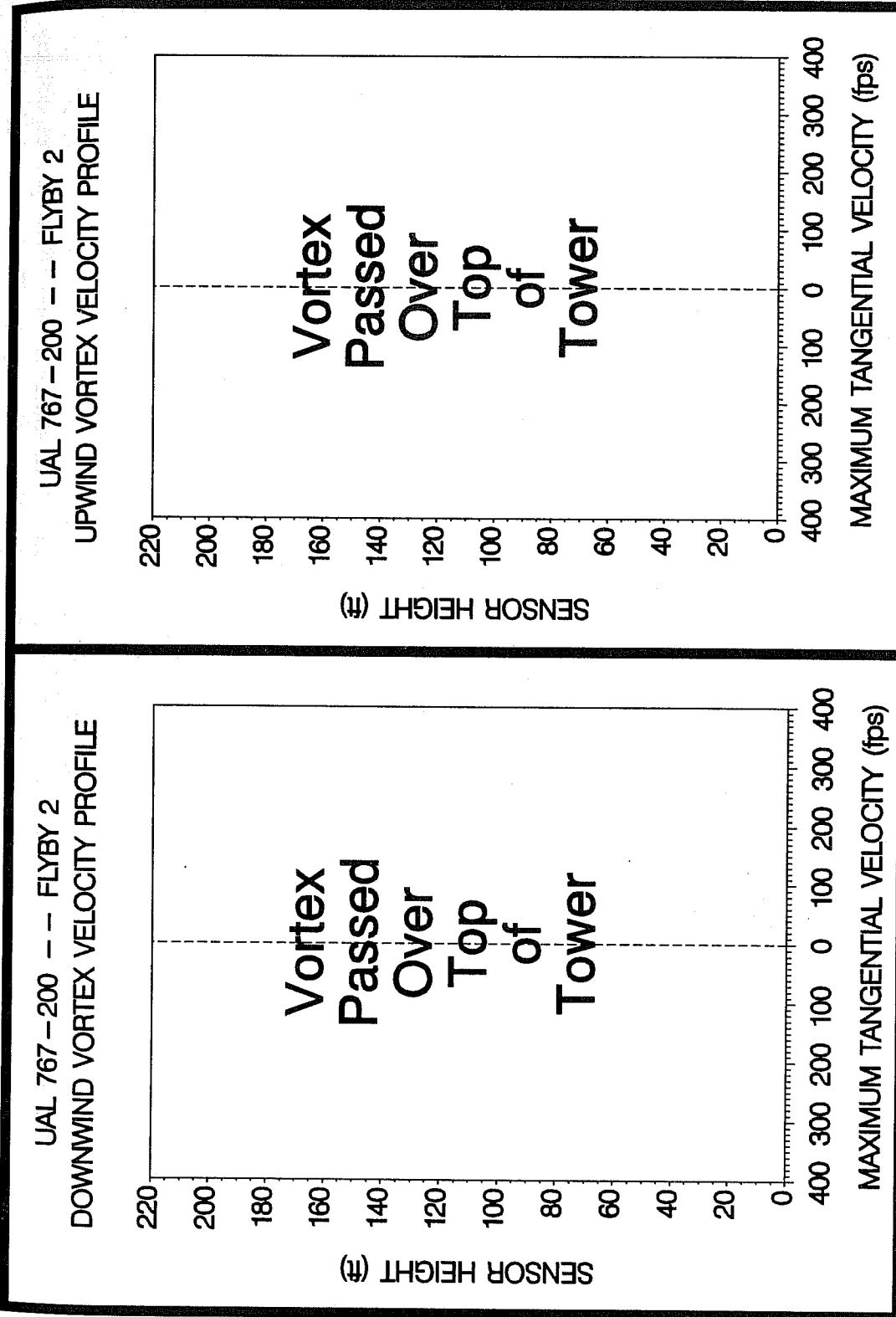


Figure G-184. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 272, Flyby 2, ambient wind speed = 7.3 kts,  $\delta_F=15^\circ$ , IAS = 143 kts,  $GW=258,600$  lbs. Ages, radii, and velocities of the vortex cores are (P) and (P) s, (P) and (P) ft, and (P) and (P) fps, respectively.

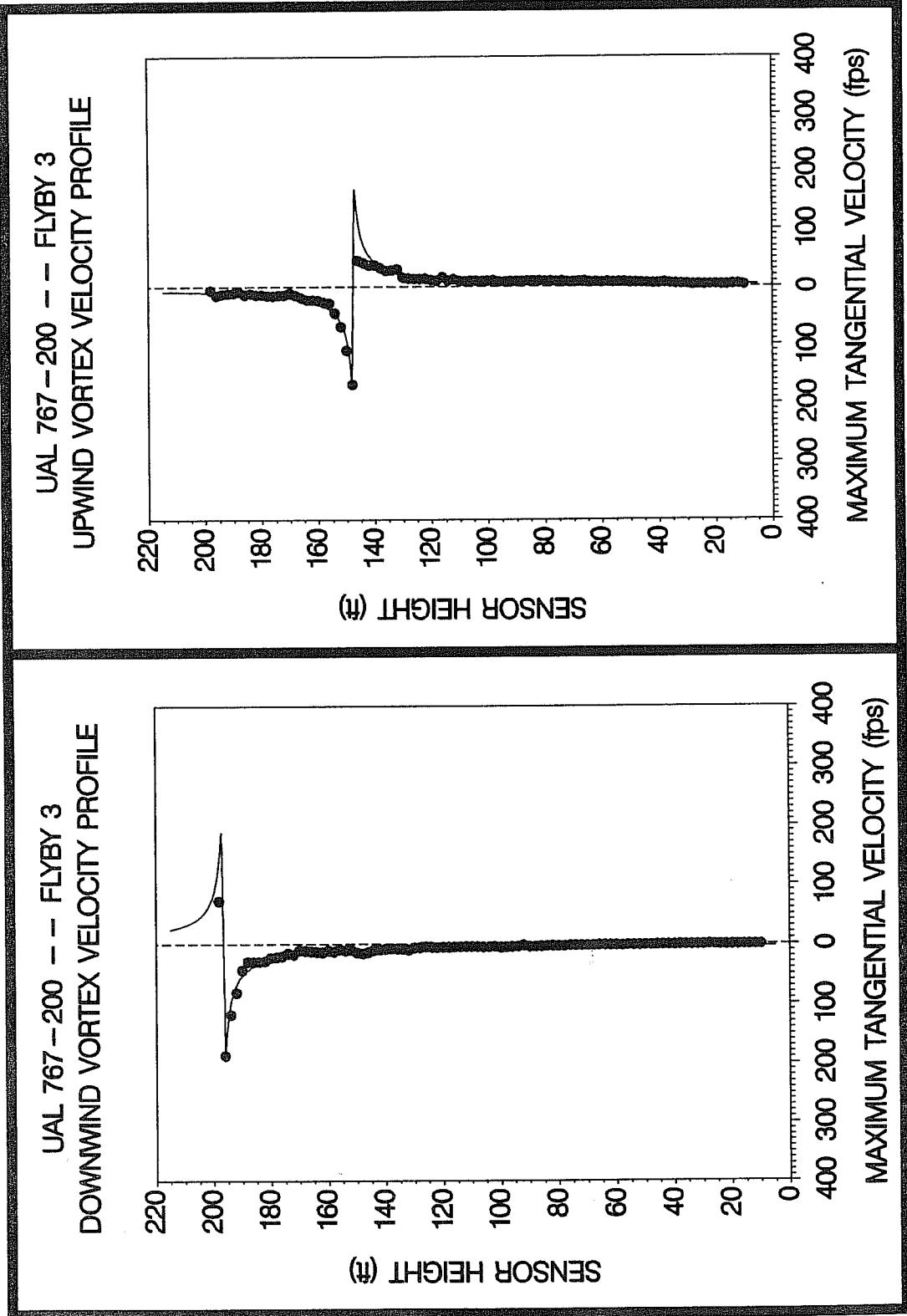


Figure G-185. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 272, Flyby 3, ambient wind speed = 9.5 kts,  $\delta_F = 5^\circ$ , IAS = 150 kts, GW = 257,800 lbs. Ages, radii, and velocities of the vortex cores are 14 and 23 s, 0.5 and 0.5 ft, and 187.1 and 167.6 fps, respectively.

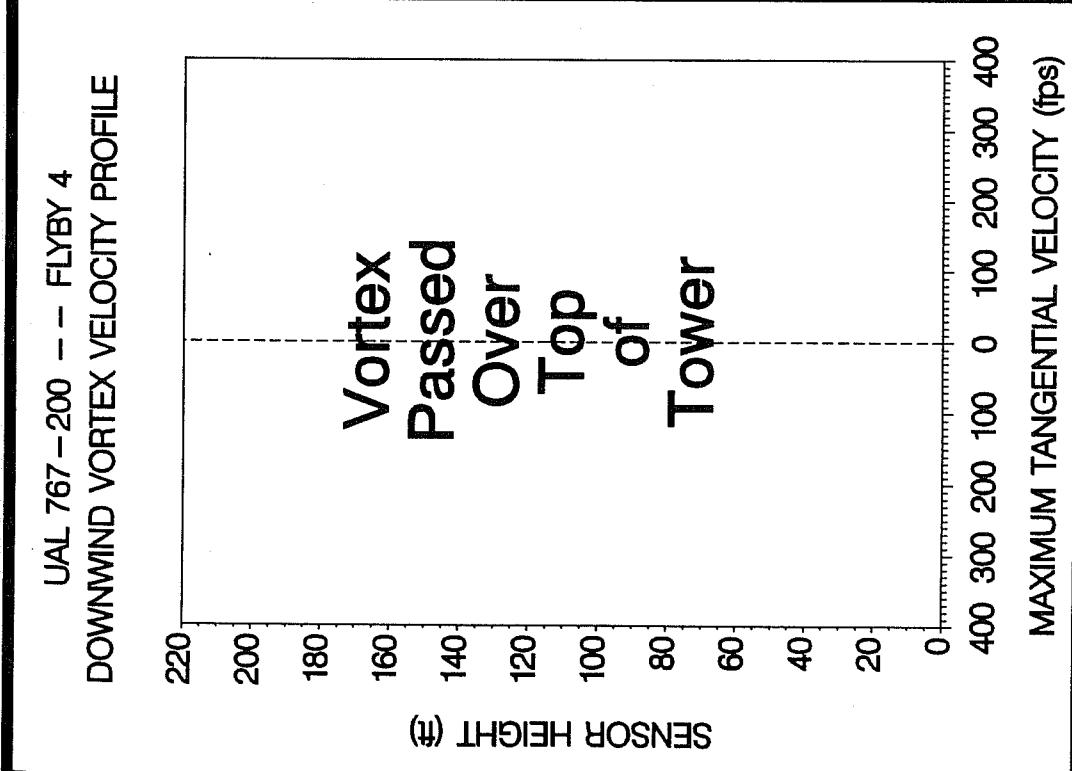
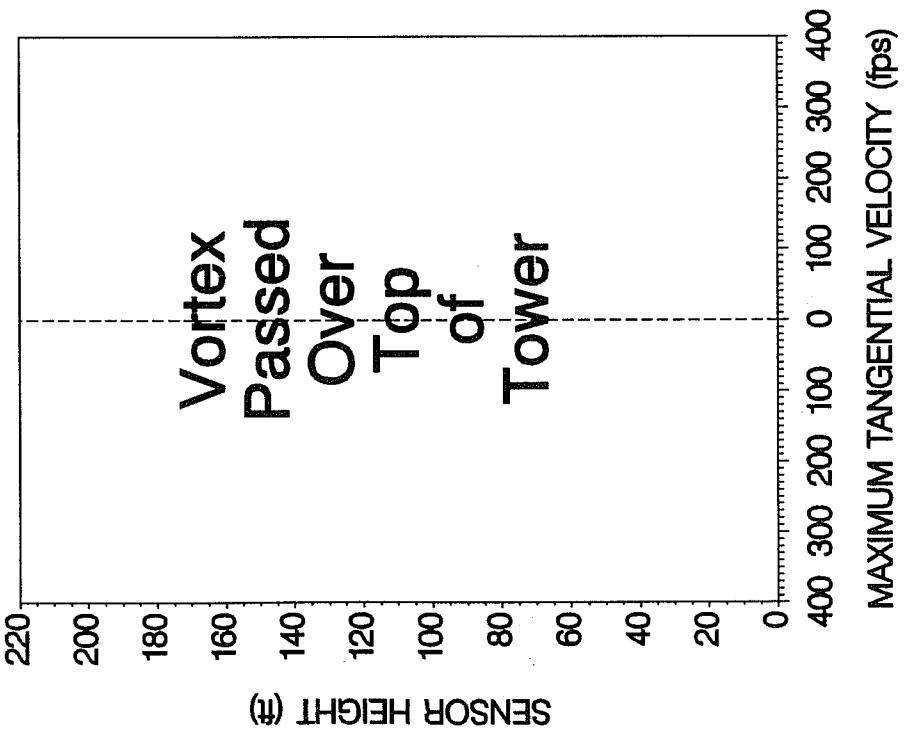


Figure G-186. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 272, Flyby 4, ambient wind speed = 11.0 kts,  $\delta_F = 1^\circ$ , IAS = 154 kts, GW = 256,600 lbs. Ages, radii, and velocities of the vortex cores are (P) and 22 s, (P) and 0.5 ft, and (P) and 179.2 fps, respectively.

UAL 767-200 -- FLYBY 5  
DOWNWIND VORTEX VELOCITY PROFILE



UAL 767-200 -- FLYBY 5  
UPWIND VORTEX VELOCITY PROFILE

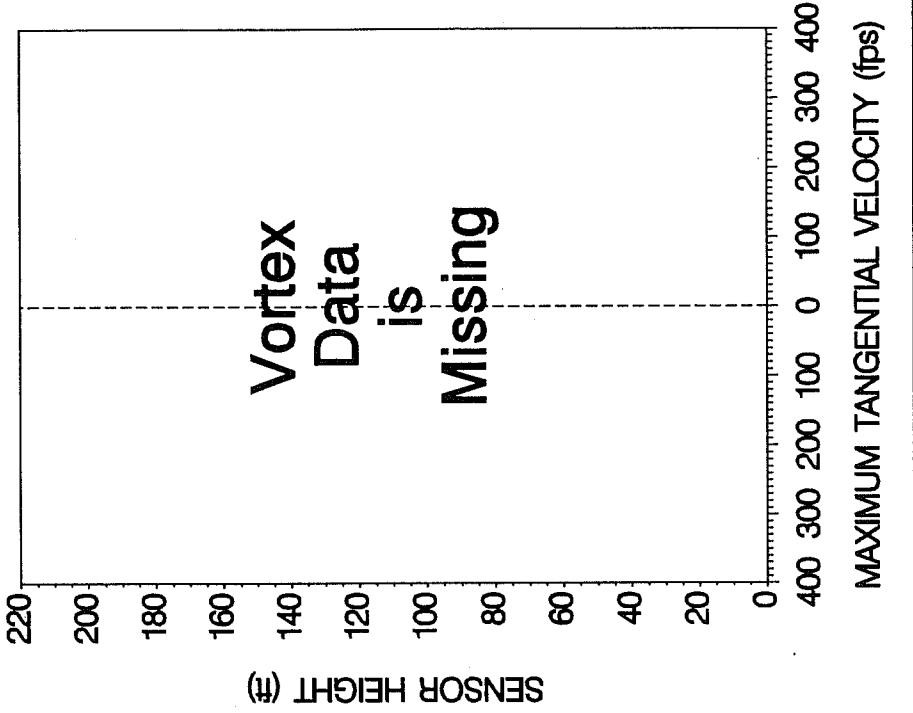


Figure G-187. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 272, Flyby 5, ambient wind speed = 10.1 kts,  $\delta_F = 0^\circ$ , GW = 212 kts, GW = 255,500 lbs. Ages, radii, and velocities of the vortex cores are (P) and (M) s, (P) and (M) ft, and (P) and (M) fps, respectively.

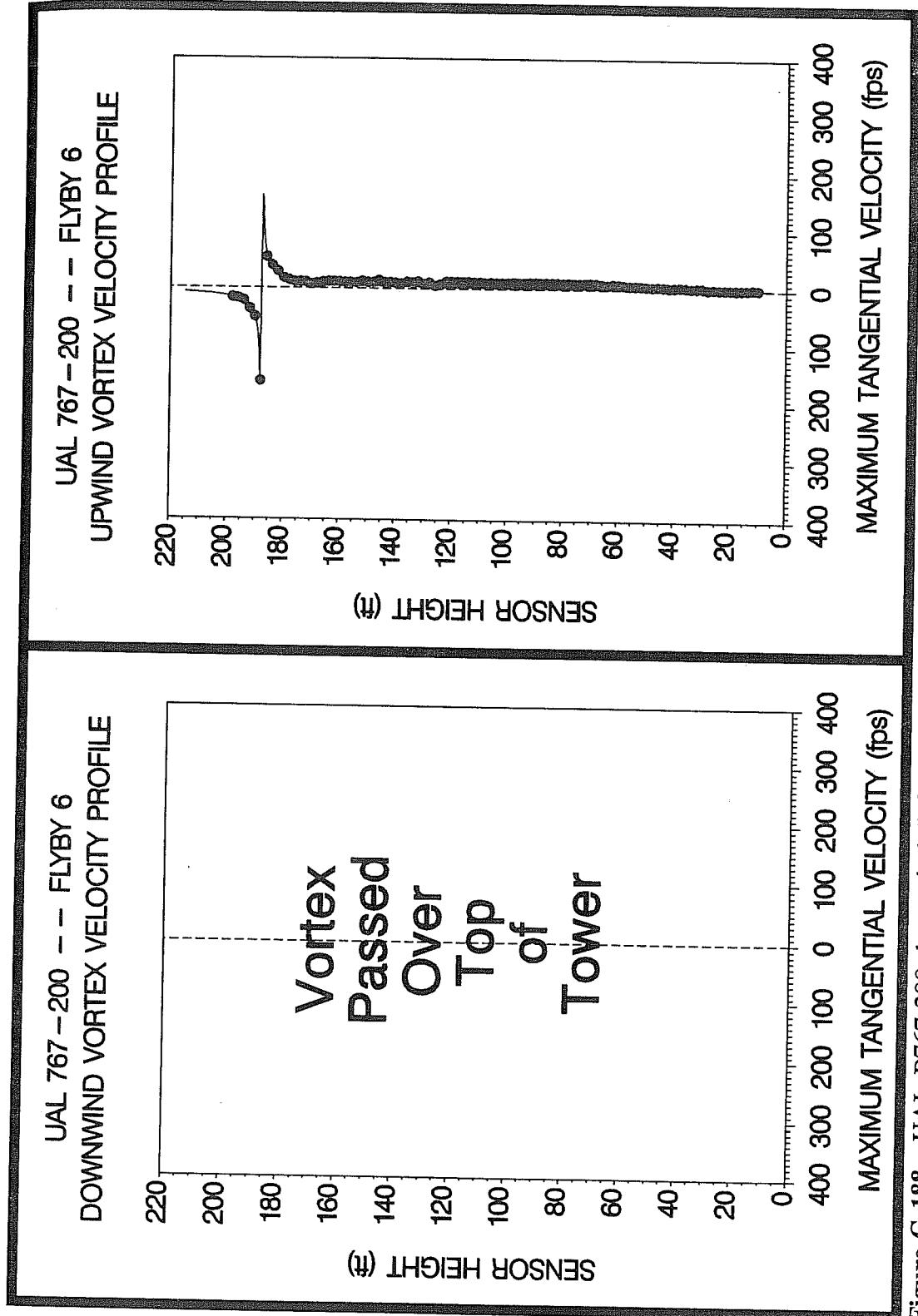


Figure G-188. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 272, Flyby 6, ambient wind speed = 9.7 kts,  $\delta_F = 0^\circ$ , IAS = 250 kts, GW = 254,700 lbs. Ages, radii, and velocities of the vortex cores are (P) and 31 s, (P) and 0.2 ft, and (P) and 160.9 fps, respectively.

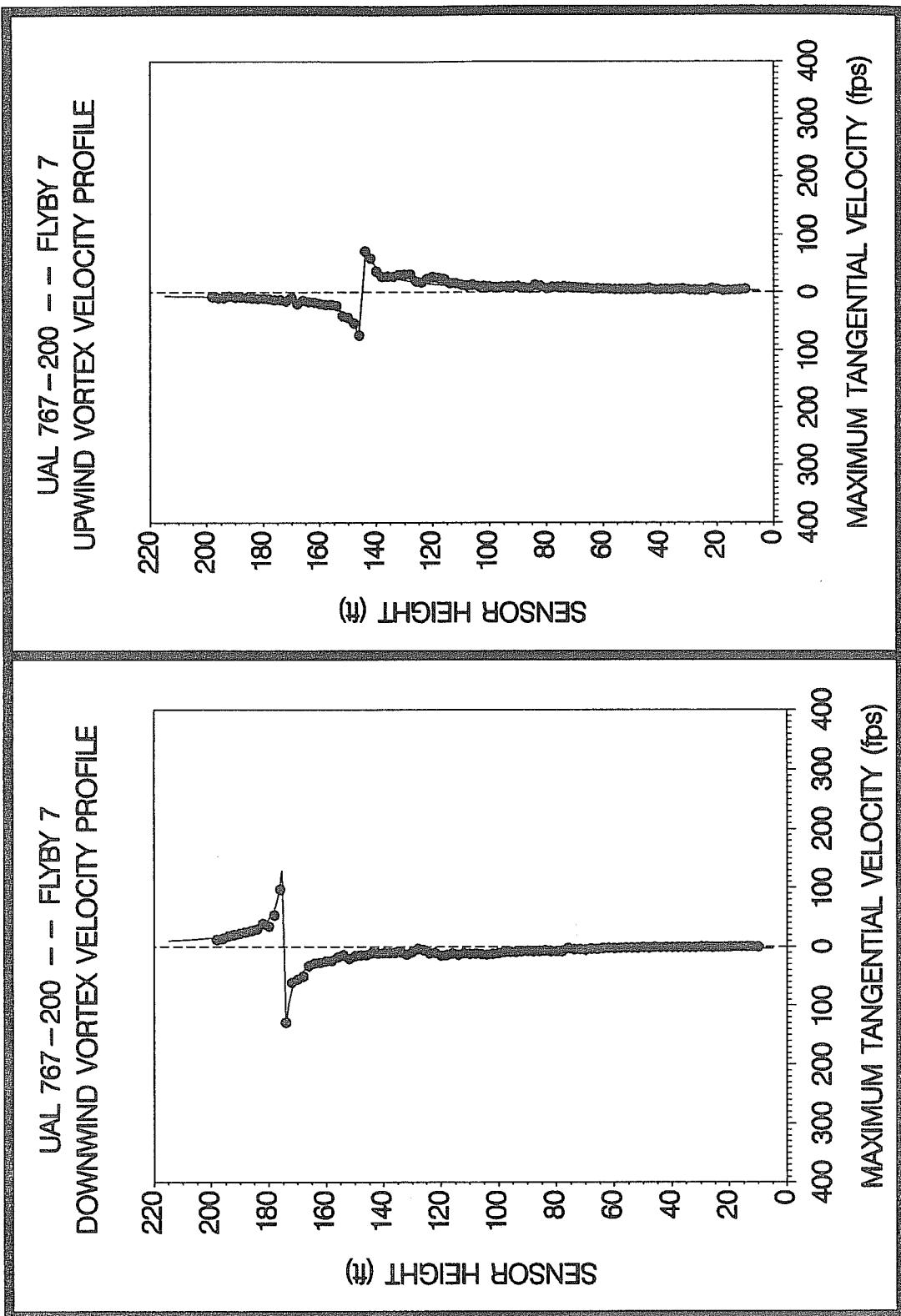


Figure G-189. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 272, Flyby 7, ambient wind speed = 8.1 kts,  $\delta_F = 25^\circ$ , IAS = 140 kts, GW = 253,700 lbs. Ages, radii, and velocities of the vortex cores are 20 and 35 s, 0.6 and 1.2 ft, and 129.1 and 74.4 fps, respectively.

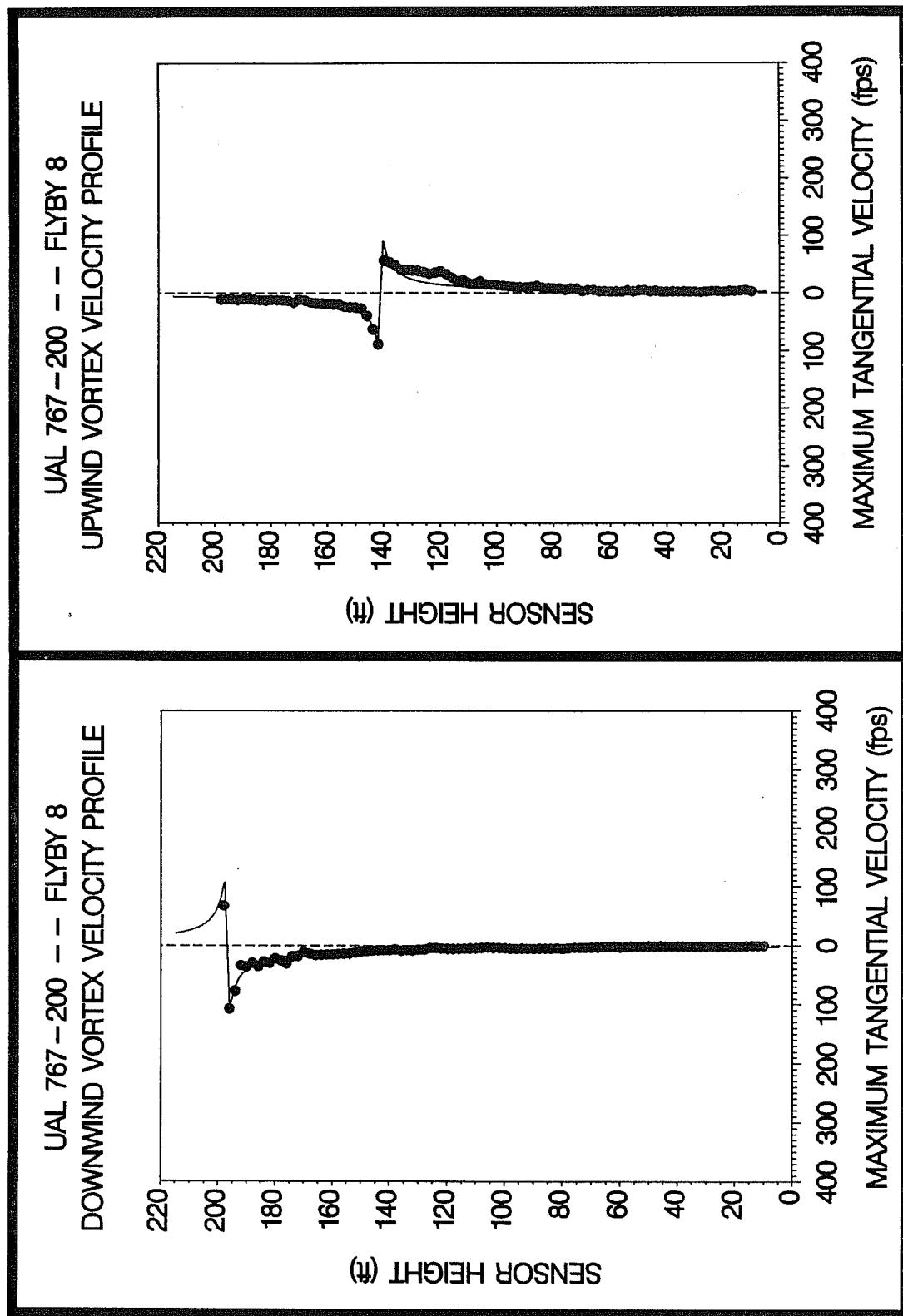


Figure G-190. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 272, Flyby 8, ambient wind speed = 6.5 kts,  $\delta_F = 25^\circ$ , IAS = 140 kts, GW = 252,000 lbs. Ages, radii, and velocities of the vortex cores are 16 and 32 s, 0.8 and 0.9 ft, and 107.0 and 88.6 fps, respectively.

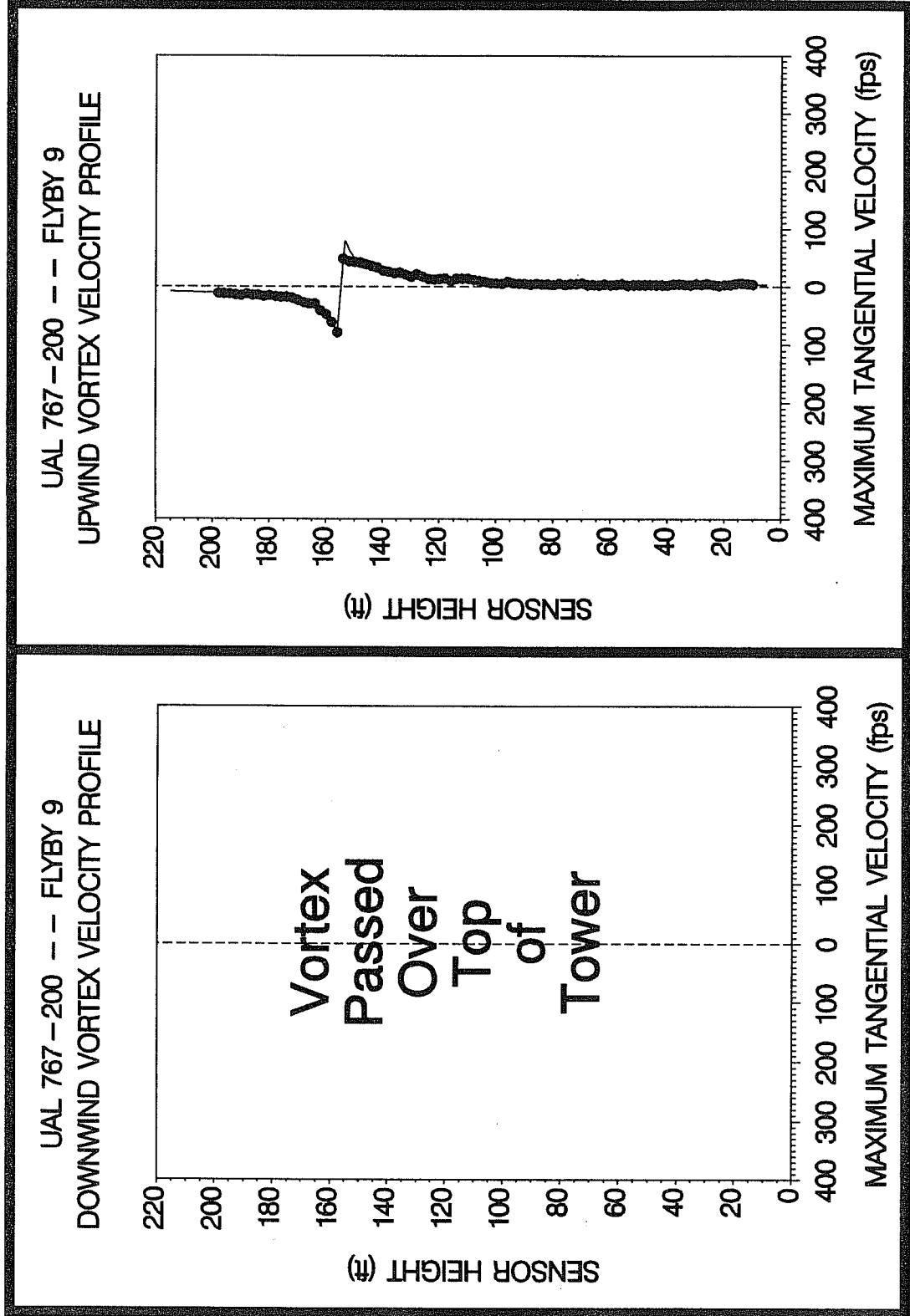


Figure G-191. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 272, Flyby 9, ambient wind speed = 6.8 kts,  $\delta_F = 25^\circ$ , IAS = 140 kts, GW = 250,000 lbs. Ages, radii, and velocities of the vortex cores are (P) and 41 s, (P) and 1.3 ft, and (P) and 78.7 fps, respectively.

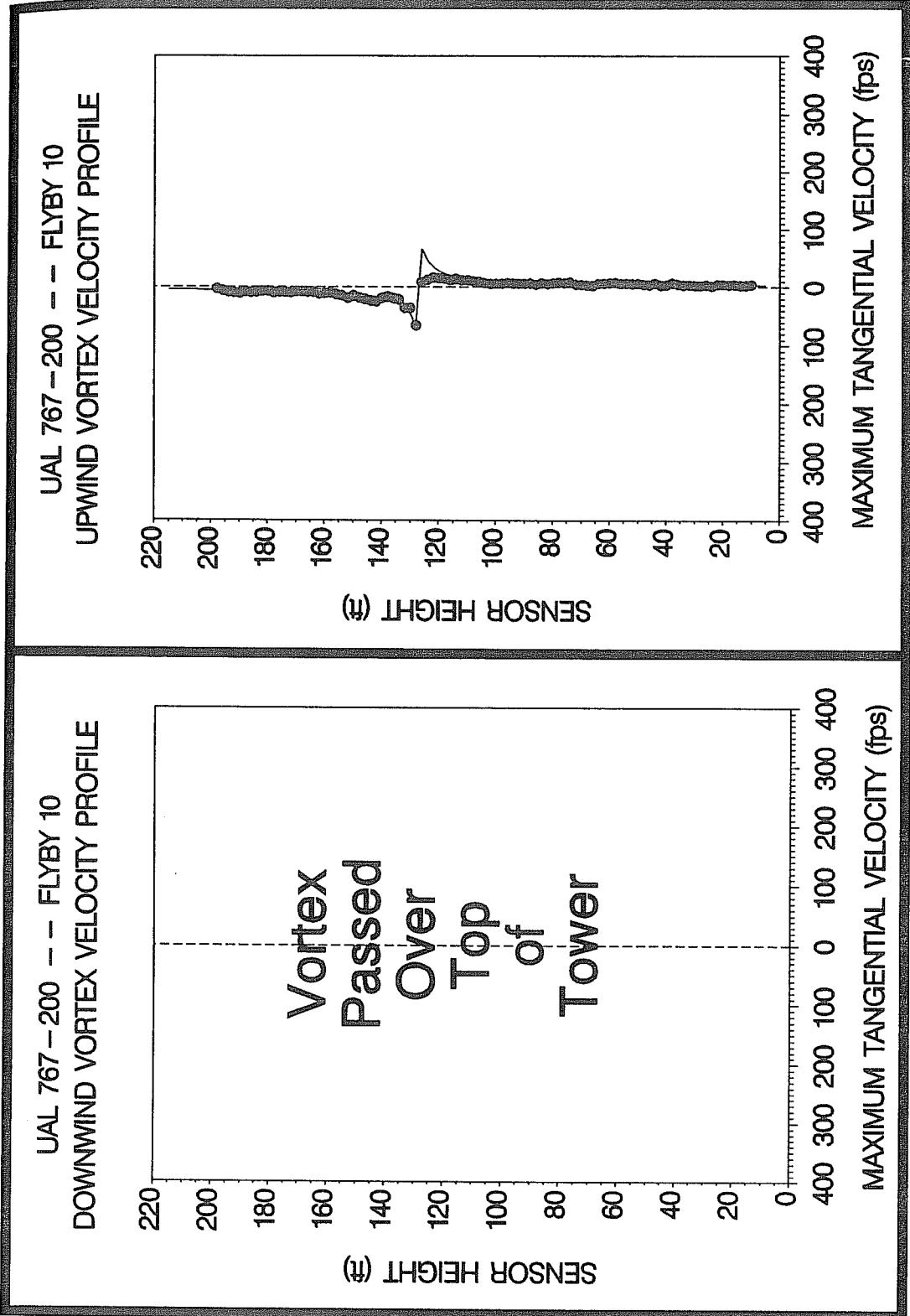


Figure G-192. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 272, Flyby 10, ambient wind speed = 4.0 kts,  $\delta_F = 30^\circ$ , IAS = 135 kts, GW = 249,000 lbs. Ages, radii, and velocities of the vortex cores are (P) and 112 s, (P) and 1.0 ft, and (P) and 65.0 fps, respectively.

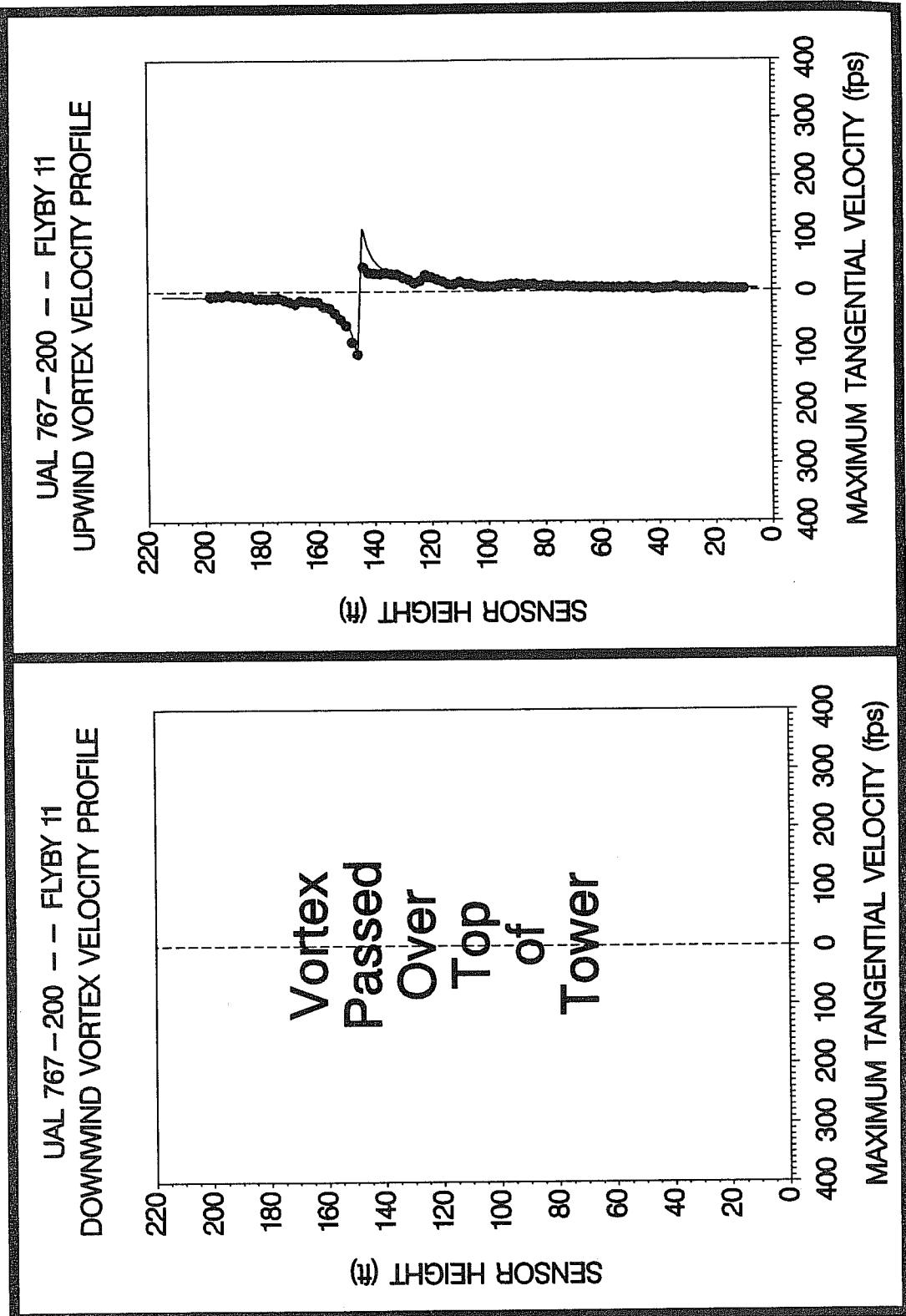


Figure G-193. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 272, Flyby 11, ambient wind speed = 8.1 kts,  $\delta_F = 30^\circ$ ,  $IAS = 134$  kts,  $GW = 248,000$  lbs. Ages, radii, and velocities of the vortex cores are (P) and 33 s, (P) and 0.9 ft, and (P) and 109.6 fps, respectively.

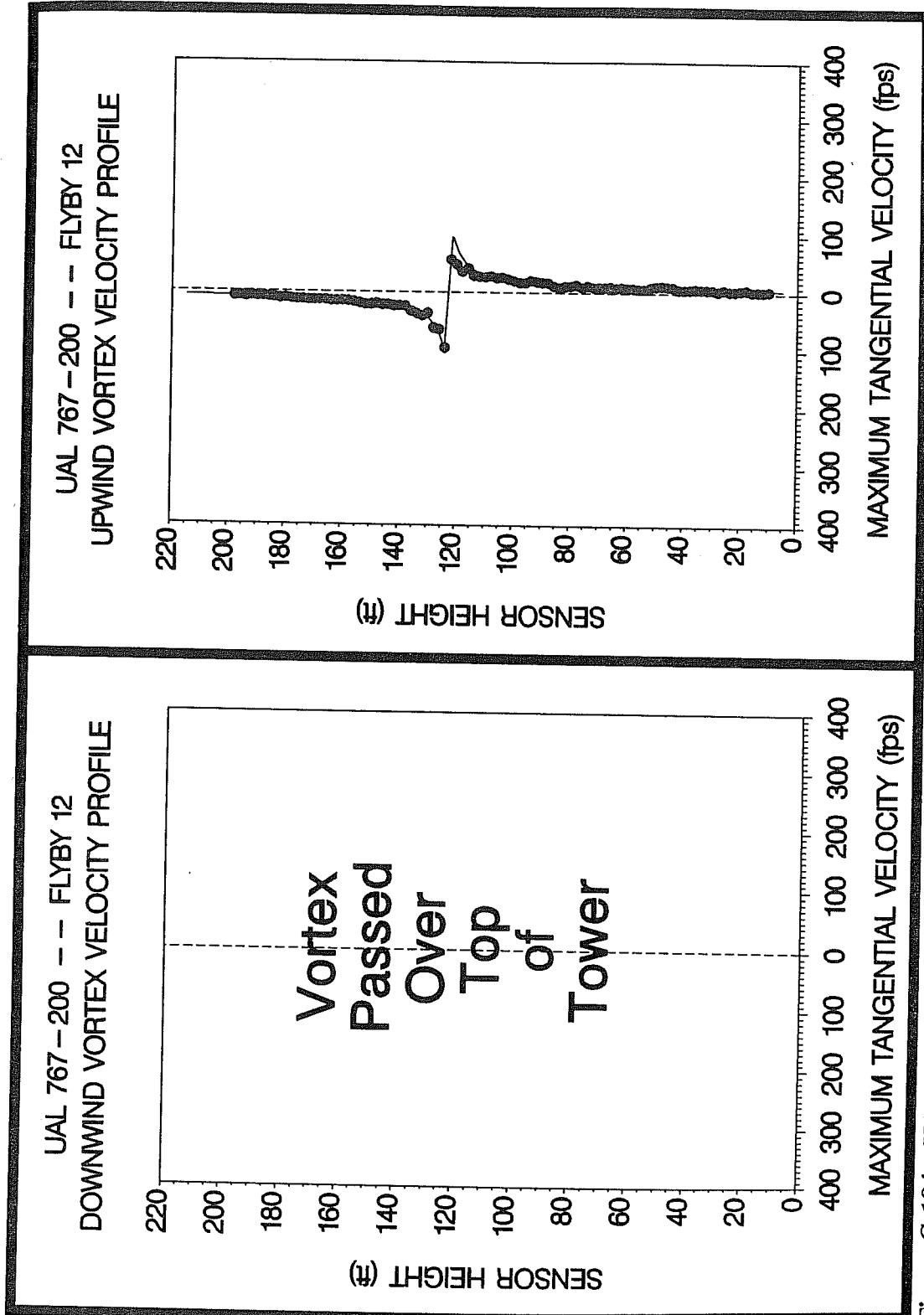


Figure G-194. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 272, Flyby 12, ambient wind speed = 7.8 kts,  $\delta_F = 30^\circ$ , IAS = 134 kts, GW = 247,000 lbs. Ages, radii, and velocities of the vortex cores are (P) and 26 s, (P) and 1.3 ft, and (P) and 95.7 fps, respectively.

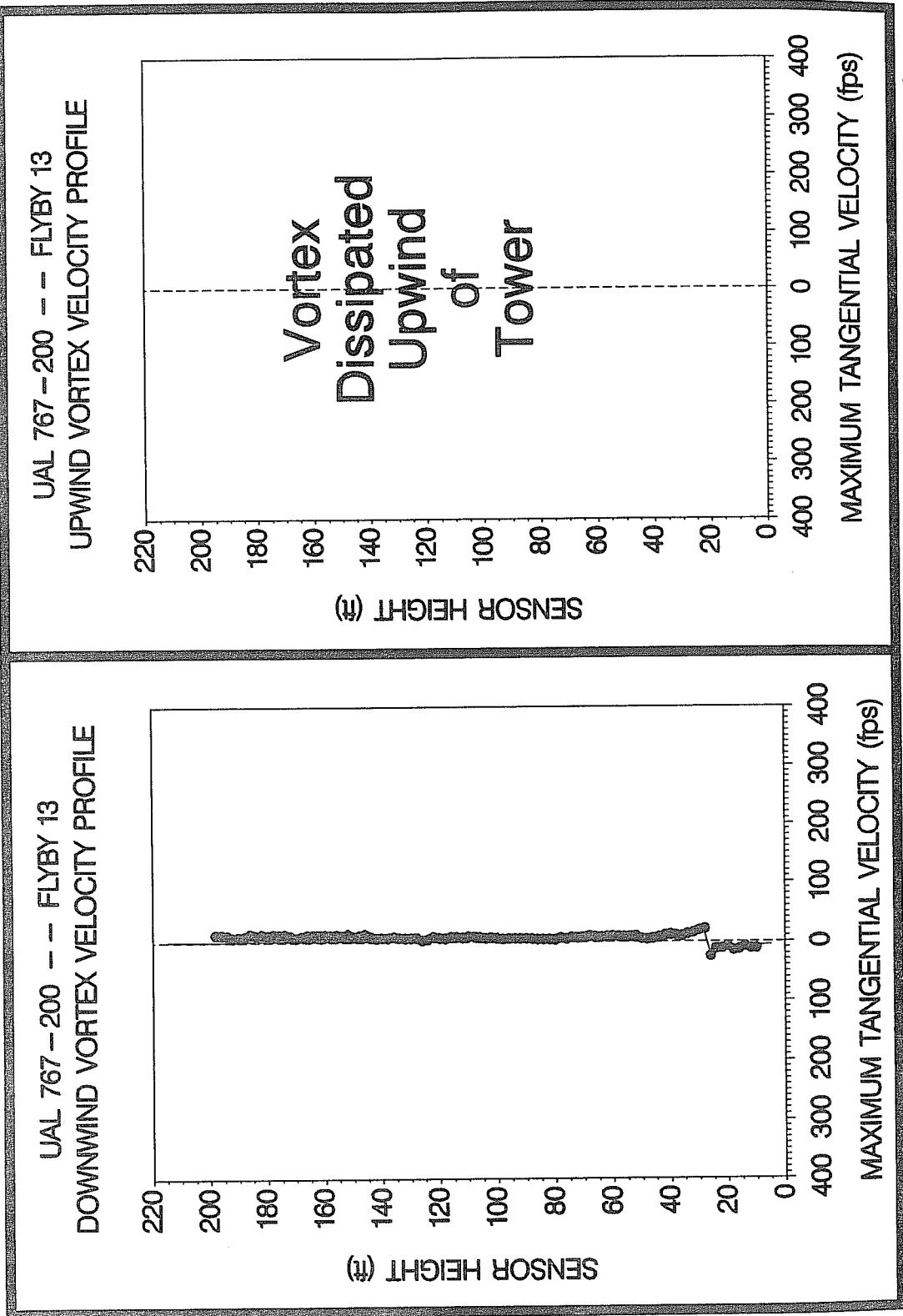


Figure G-195. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 272, Flyby 13, ambient wind speed = 5.6 kts,  $\delta_F = 20^\circ$ ,  $IAS = 135$  kts,  $GW = 245,400$  lbs. Ages, radii, and velocities of the vortex cores are 55 and (D) s, 1.4 and (D) ft, and 24.8 and (D) fps, respectively.

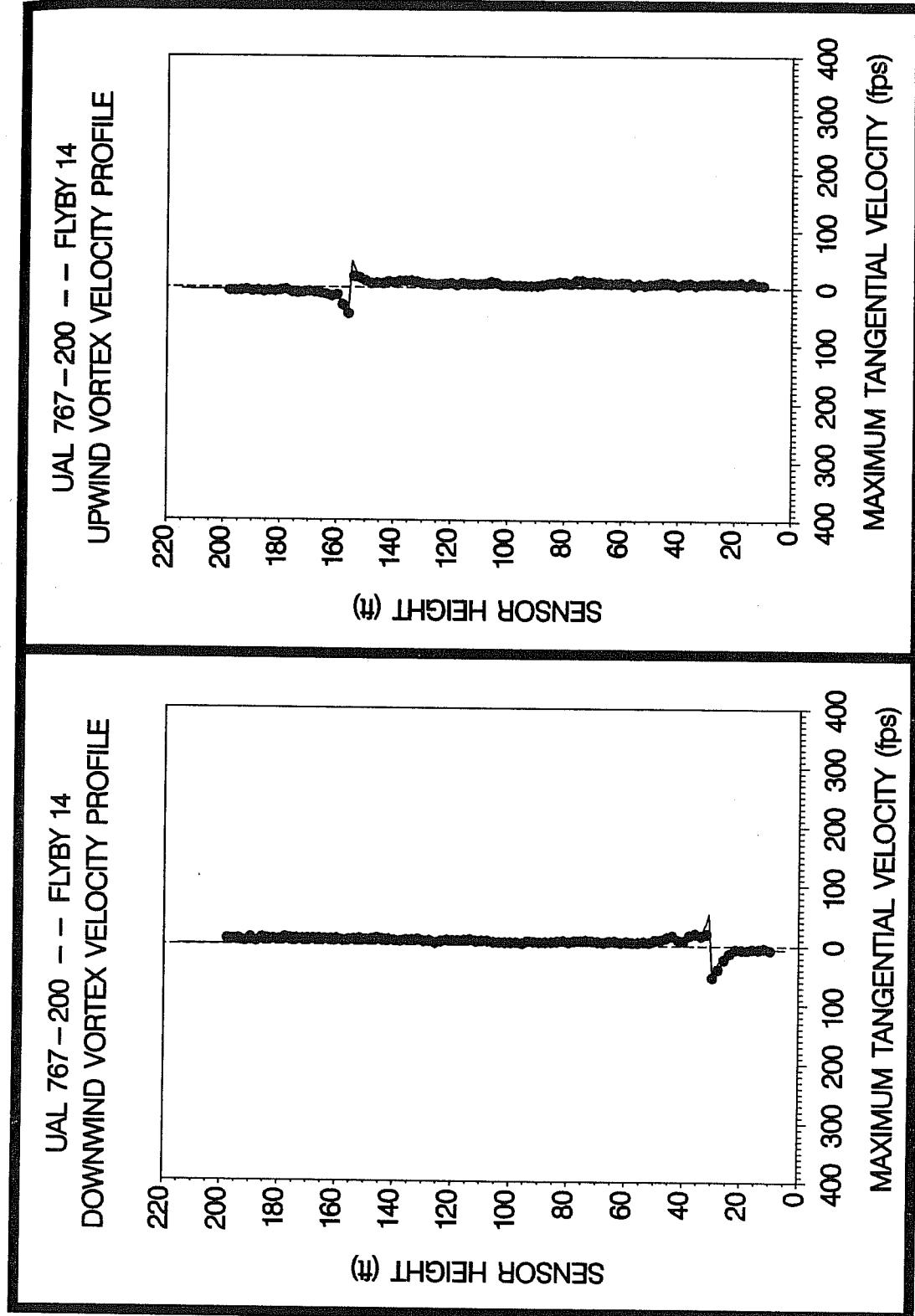
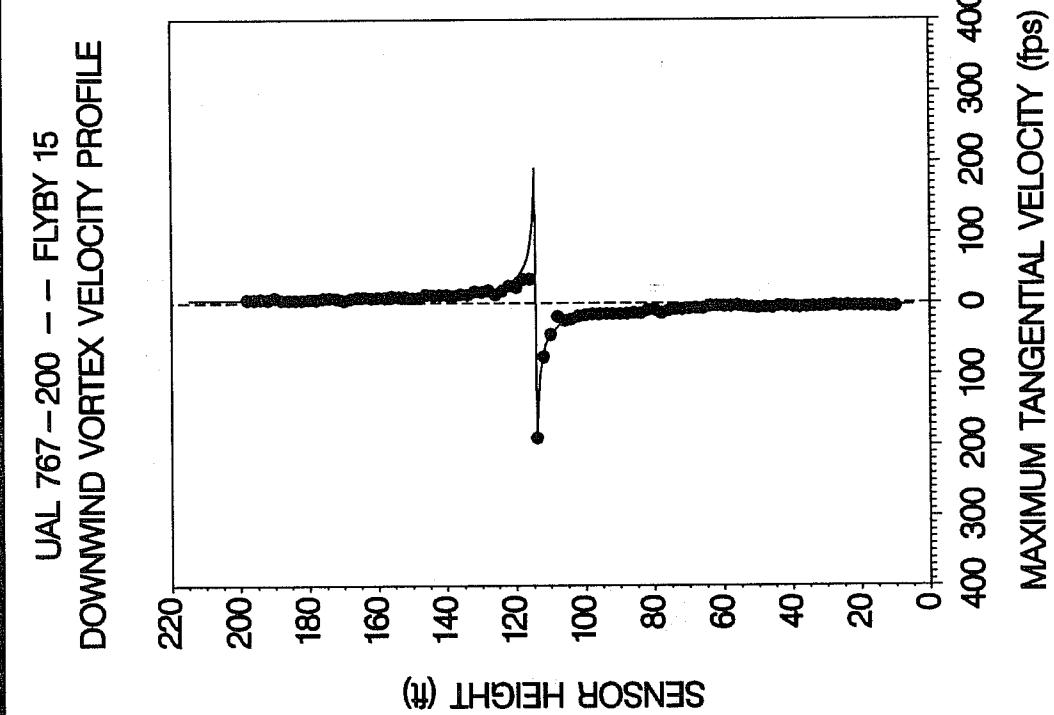


Figure G-196. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 272, Flyby 14, ambient wind speed=3.6 kts,  $\delta_F=15^\circ$ , IAS=139 kts, GW=244,000 lbs. Ages, radii, and velocities of the vortex cores are 57 and 93 s, 0.5 and 0.6 ft, and 53.1 and 45.9 fps, respectively.



**Figure G-197.** UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 272, Flyby 15, ambient wind speed = 3.5 kts,  $\delta_F = 5^\circ$ , IAS = 146 kts, GW = 242,500 lbs. Ages, radii, and velocities of the vortex cores are 59 and 99 s, 0.3 and 0.6 ft, and 189.6 and 56.0 fps, respectively.

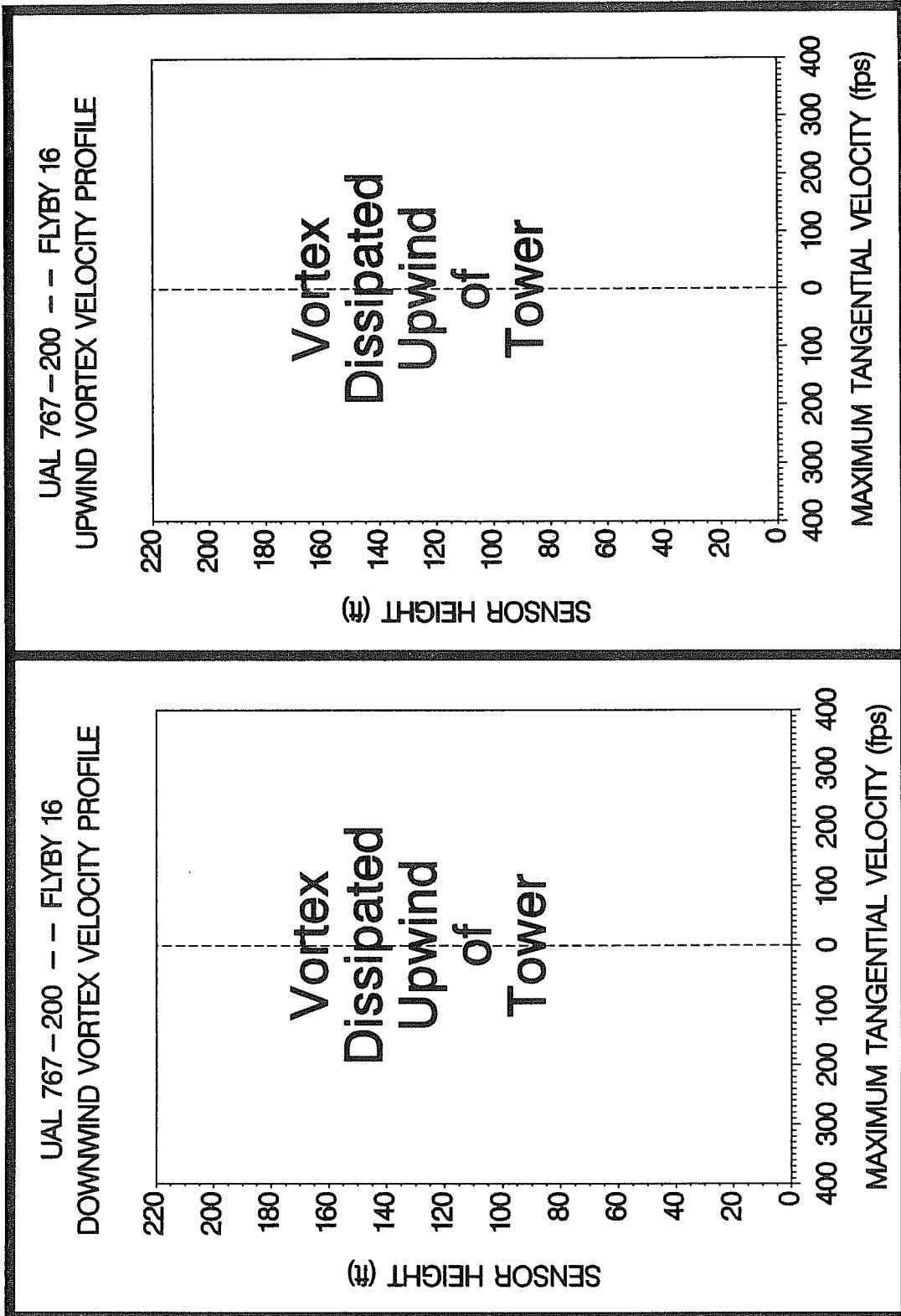


Figure G-198. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 272, Flyby 16, ambient wind speed = 5.0 kts,  $\delta_F = 1^\circ$ , IAS = 151 kts, GW = 241,800 lbs. Ages, radii, and velocities of the vortex cores are (D) and (D) s, (D) and (D) ft, and (D) and (D) fps, respectively.

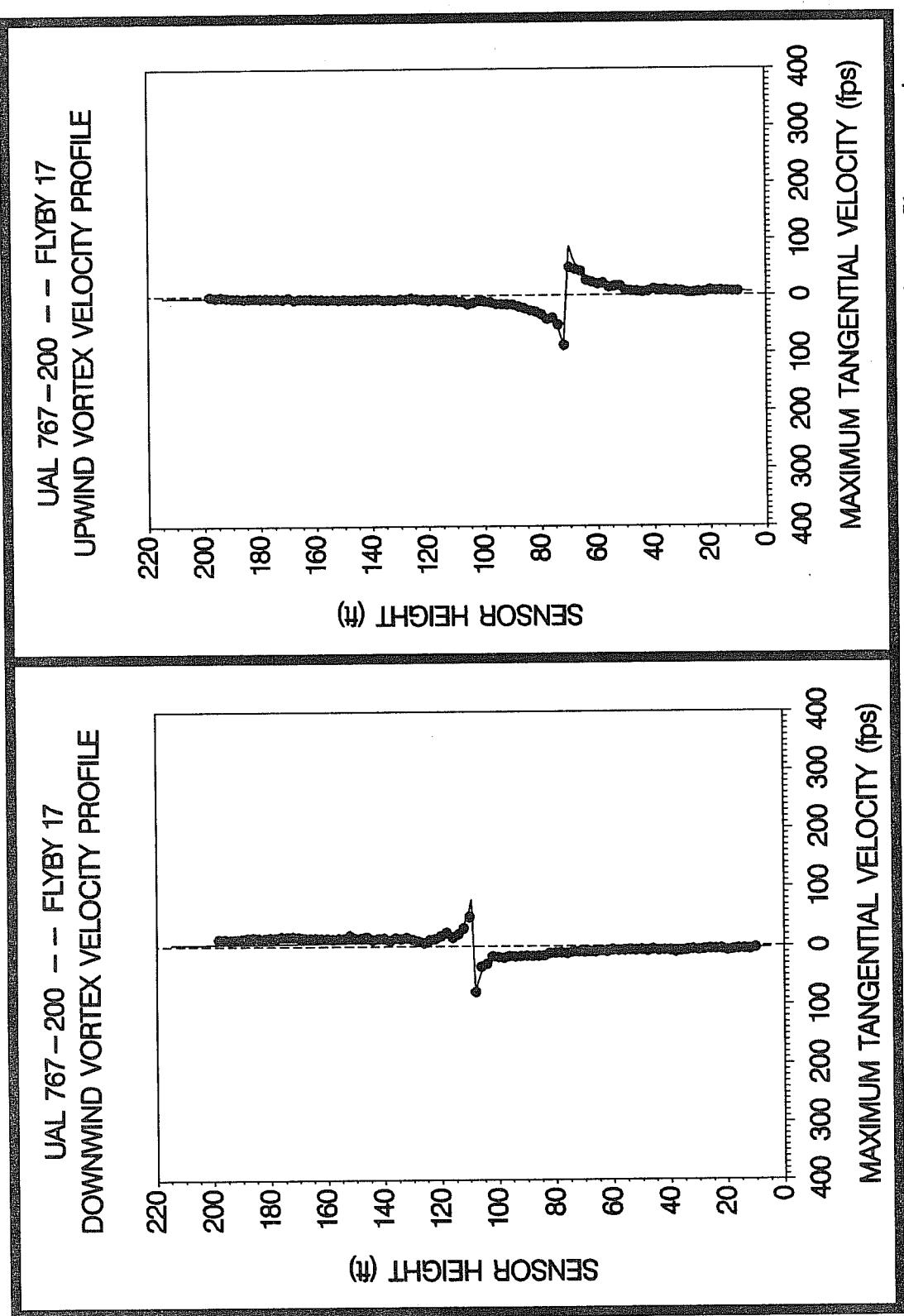


Figure G-199. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 272, Flyby 17, ambient wind speed = 5.6 kts,  $\delta_F = 30^\circ$ , IAS = 133 kts, GW = 241,000 lbs. Ages, radii, and velocities of the vortex cores are 33 and 57 s, 0.6 and 0.9 ft, and 78.3 and 86.3 fps, respectively.

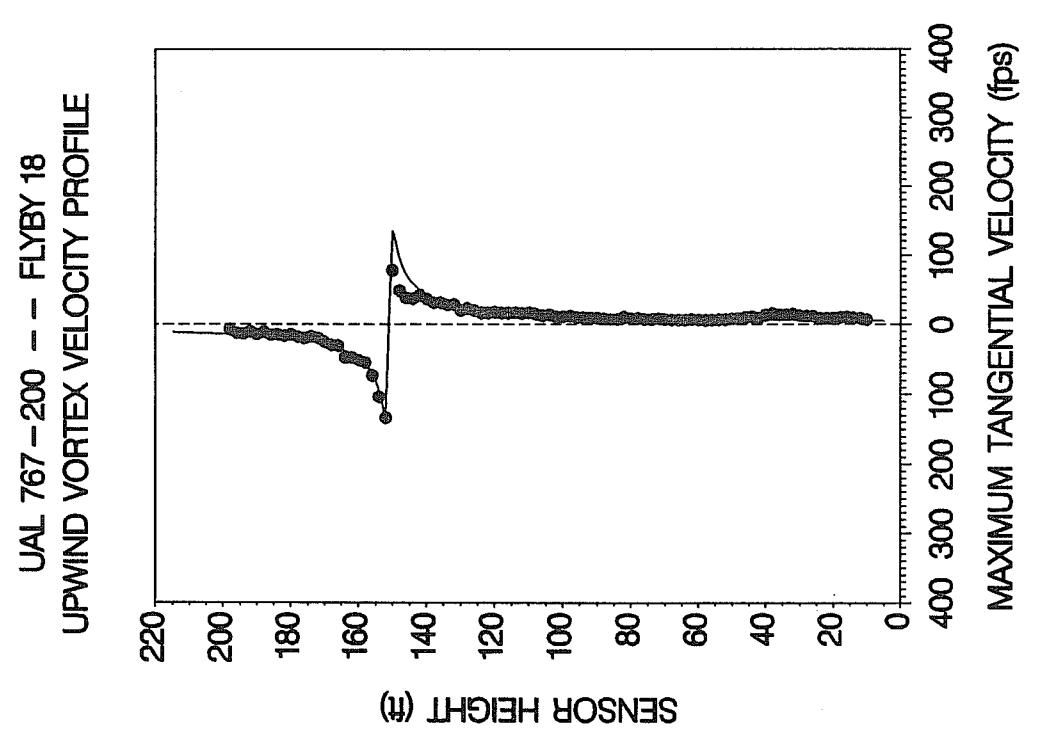
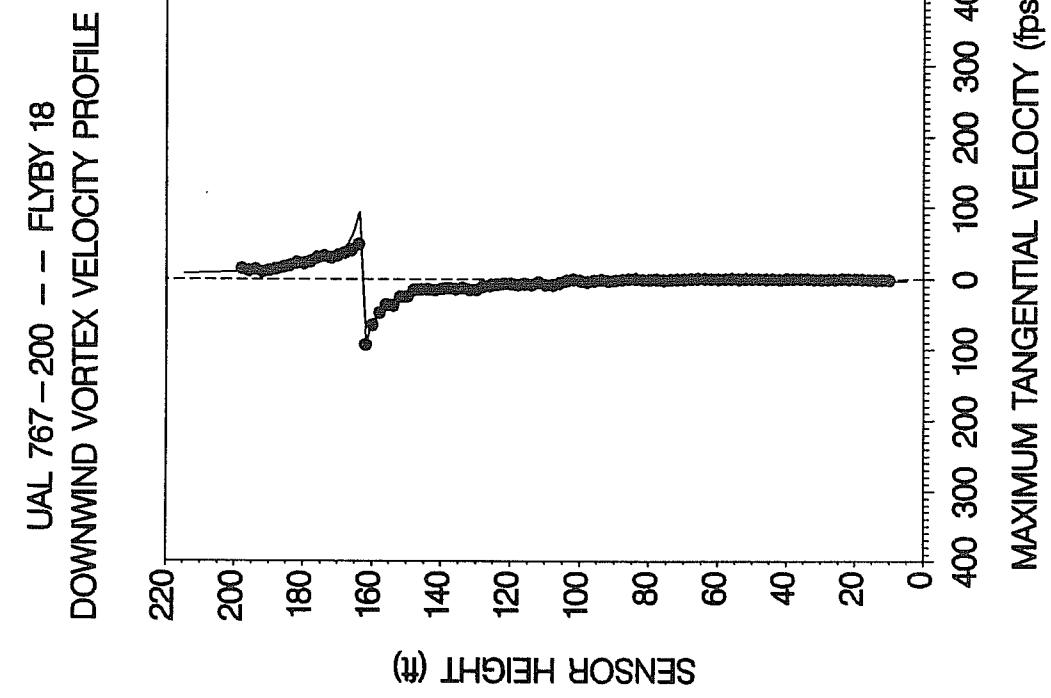
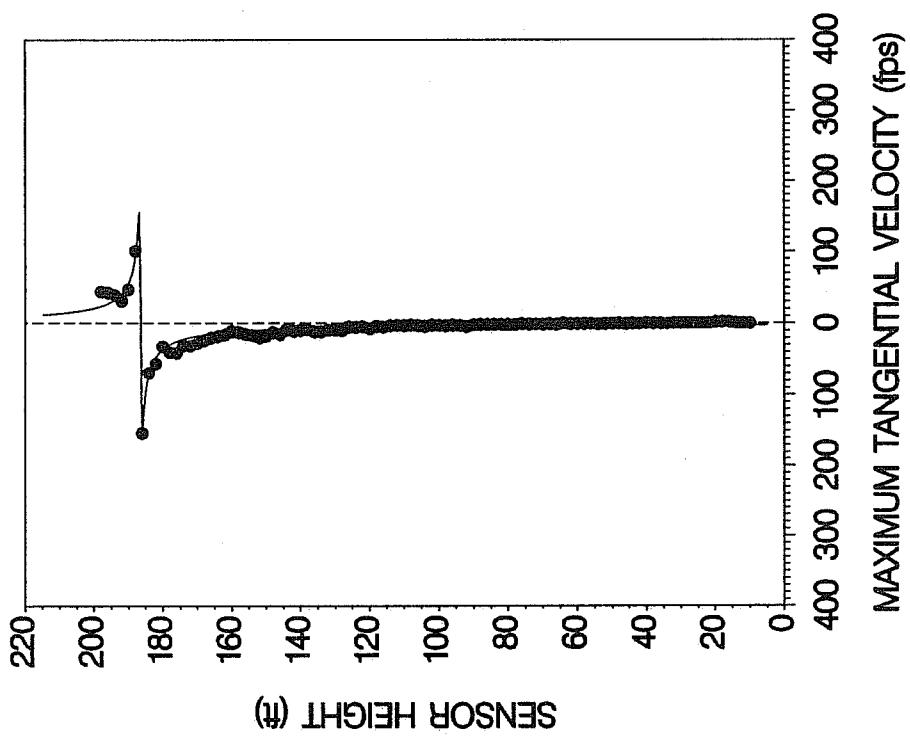


Figure G-200. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 272, Flyby 18, ambient wind speed = 5.7 kts,  $\delta_F = 30^\circ$ , IAS = 132 kts, GW = 240,000 lbs. Ages, radii, and velocities of the vortex cores are 20 and 33 s, 0.9 and 1.0 ft, and 92.8 and 133.7 fps, respectively.

UAL 767-200 --- FLYBY 19  
DOWNWIND VORTEX VELOCITY PROFILE



UAL 767-200 --- FLYBY 19  
UPWIND VORTEX VELOCITY PROFILE

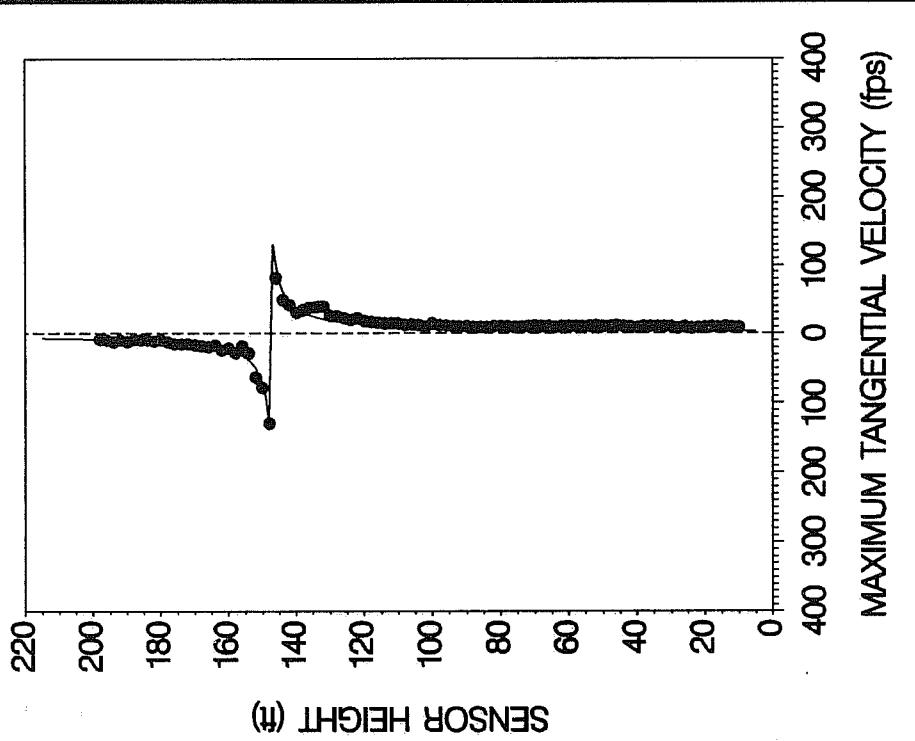
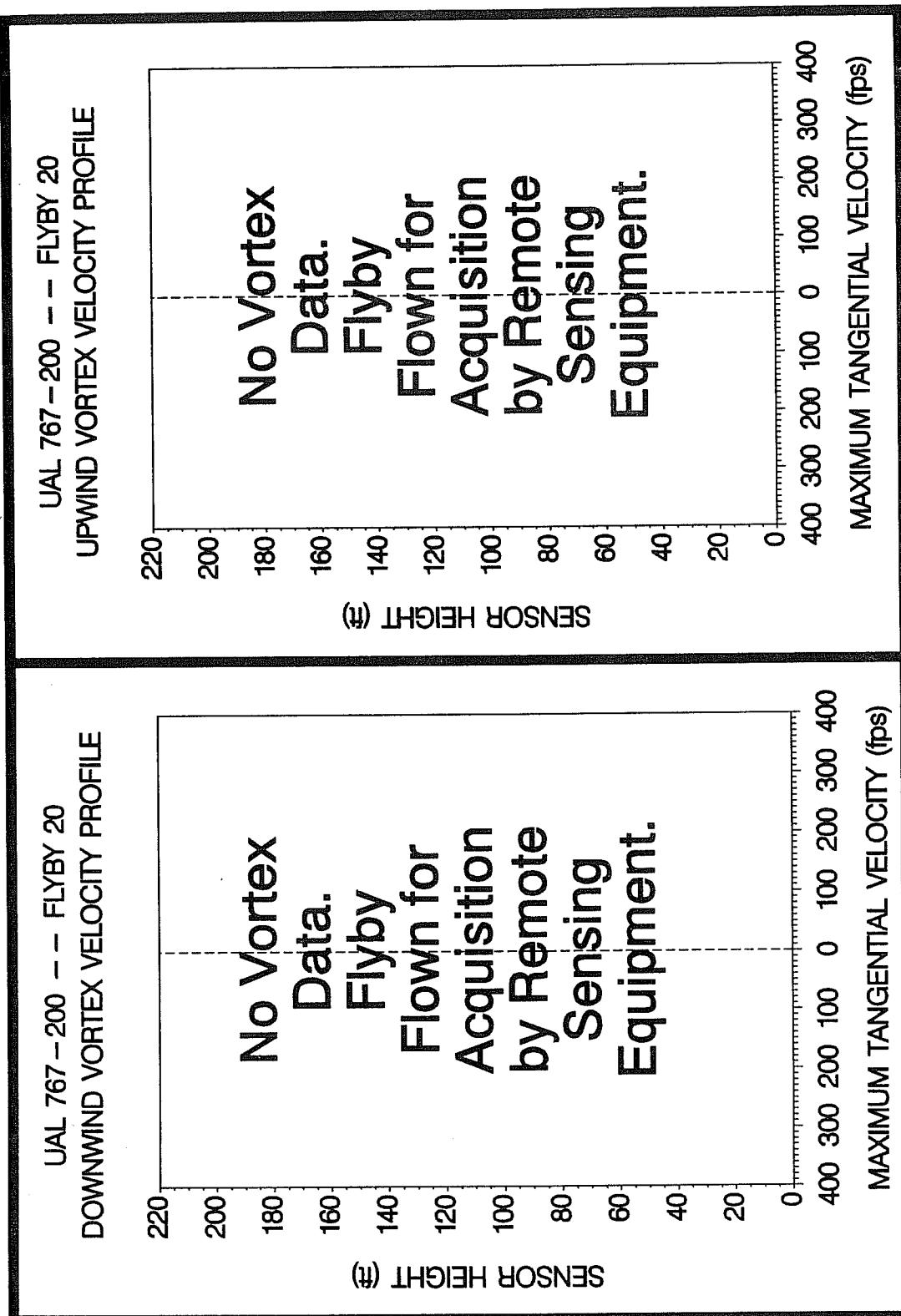


Figure G-201. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 272, Flyby 19, ambient wind speed = 8.2 kts,  $\delta_F = 30^\circ$ , IAS = 132 kts, GW = 238,700 lbs. Ages, radii, and velocities of the vortex cores are 15 and 25 s, 0.5 and 0.6 ft, and 154.0 and 129.0 fps, respectively.



**Figure G-202.** UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 272, Flyby 20, ambient wind speed = 8.5 kts,  $\delta_F = 30^\circ$ , IAS = 132 kts, GW = 237,500 lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) s, (O) and (O) ft, and (O) and (O) fps, respectively.

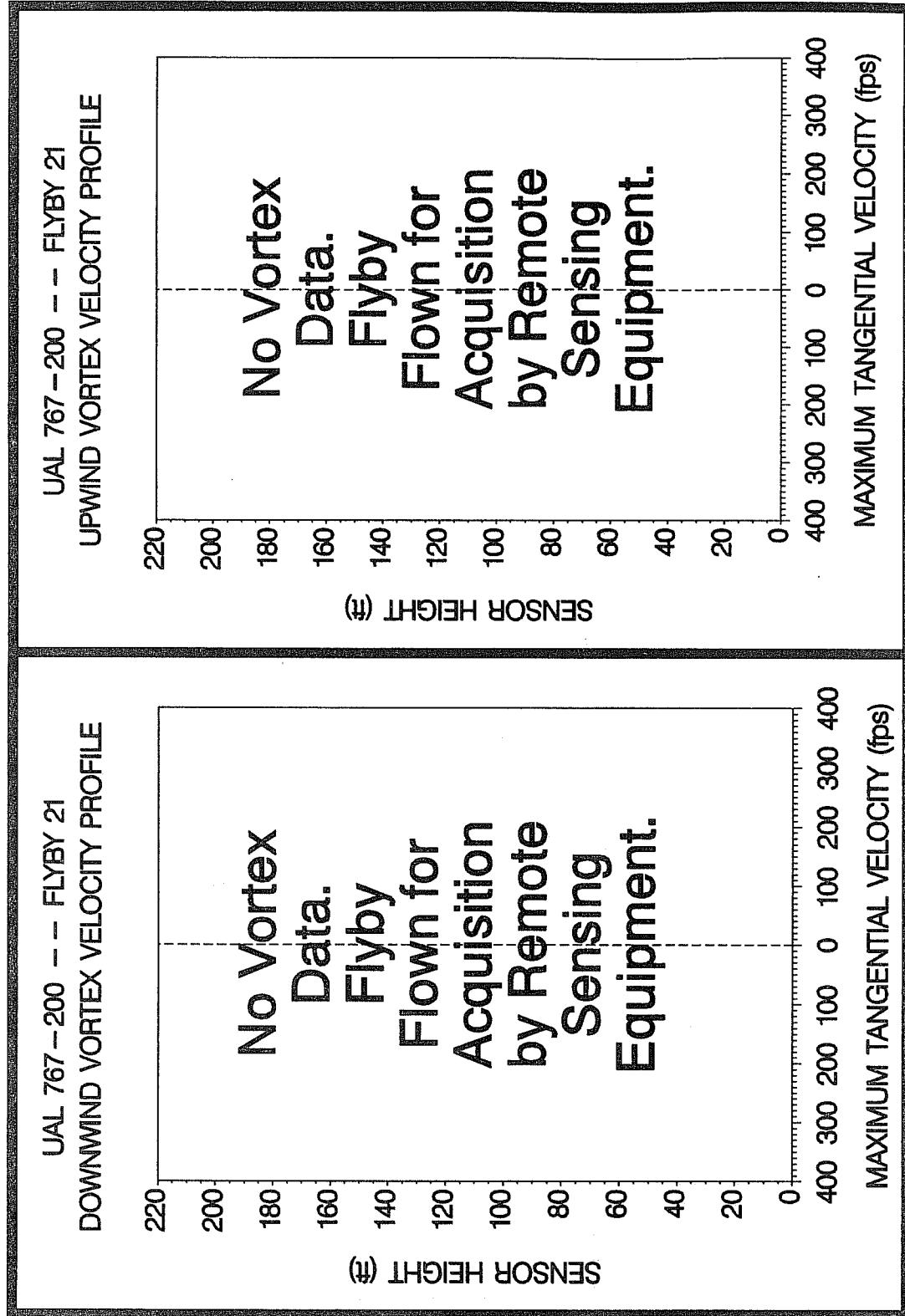


Figure G-203. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 272, Flyby 21, ambient wind speed = 6.7 kts,  $\delta_F = 5^\circ$ , IAS = 144 kts, GW = 236,600 lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) s, (O) and (O) ft, and (O) and (O) fps, respectively.

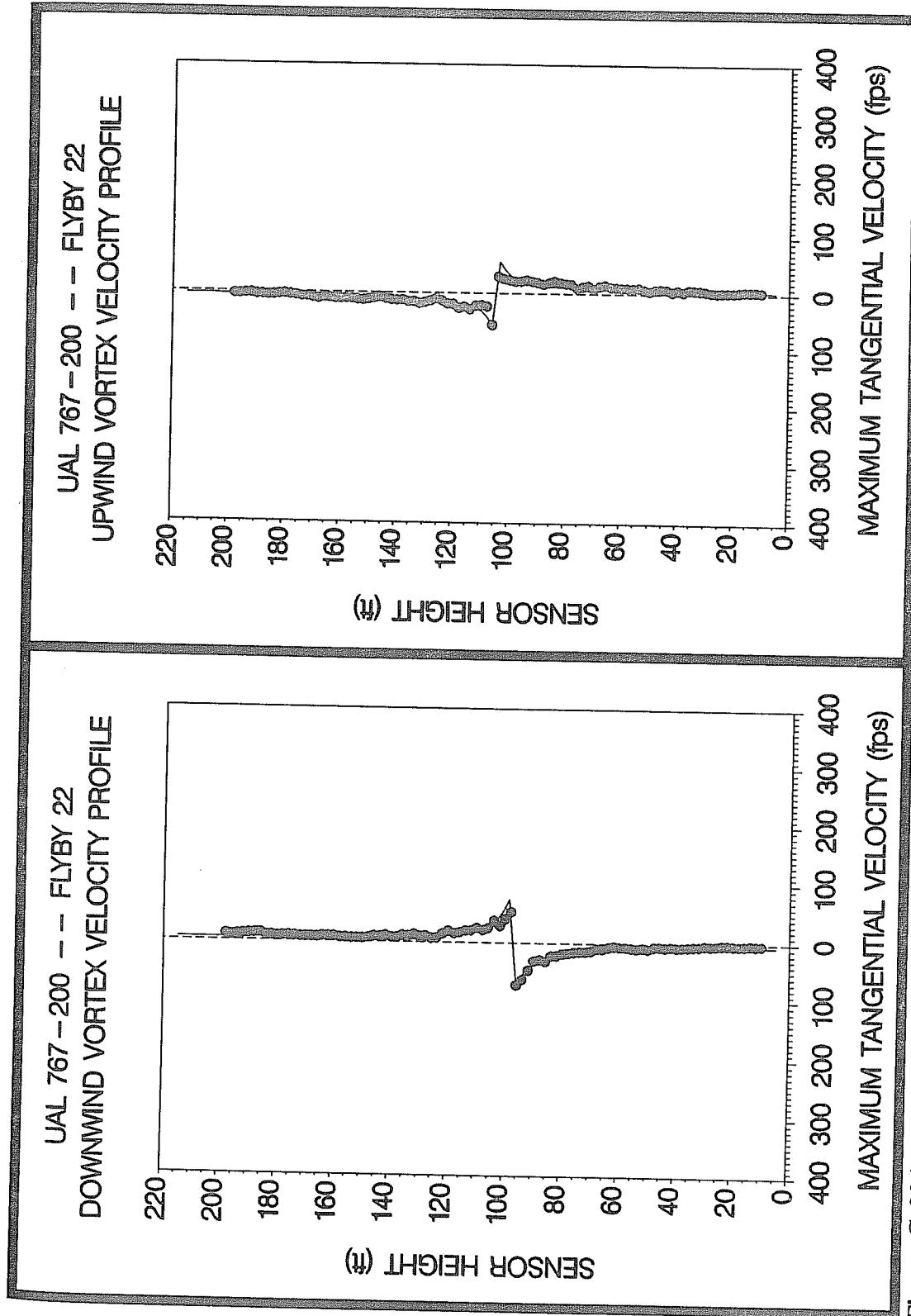


Figure G-204. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 22, ambient wind speed = 2.9 kts,  $\delta_F = 20^\circ$ , IAS = 137 kts, GW = 252,600 lbs. Ages, radii, and velocities of the vortex cores are 37 and 86 s, 1.3 and 1.2 ft, and 72.9 and 55.2 fps, respectively.

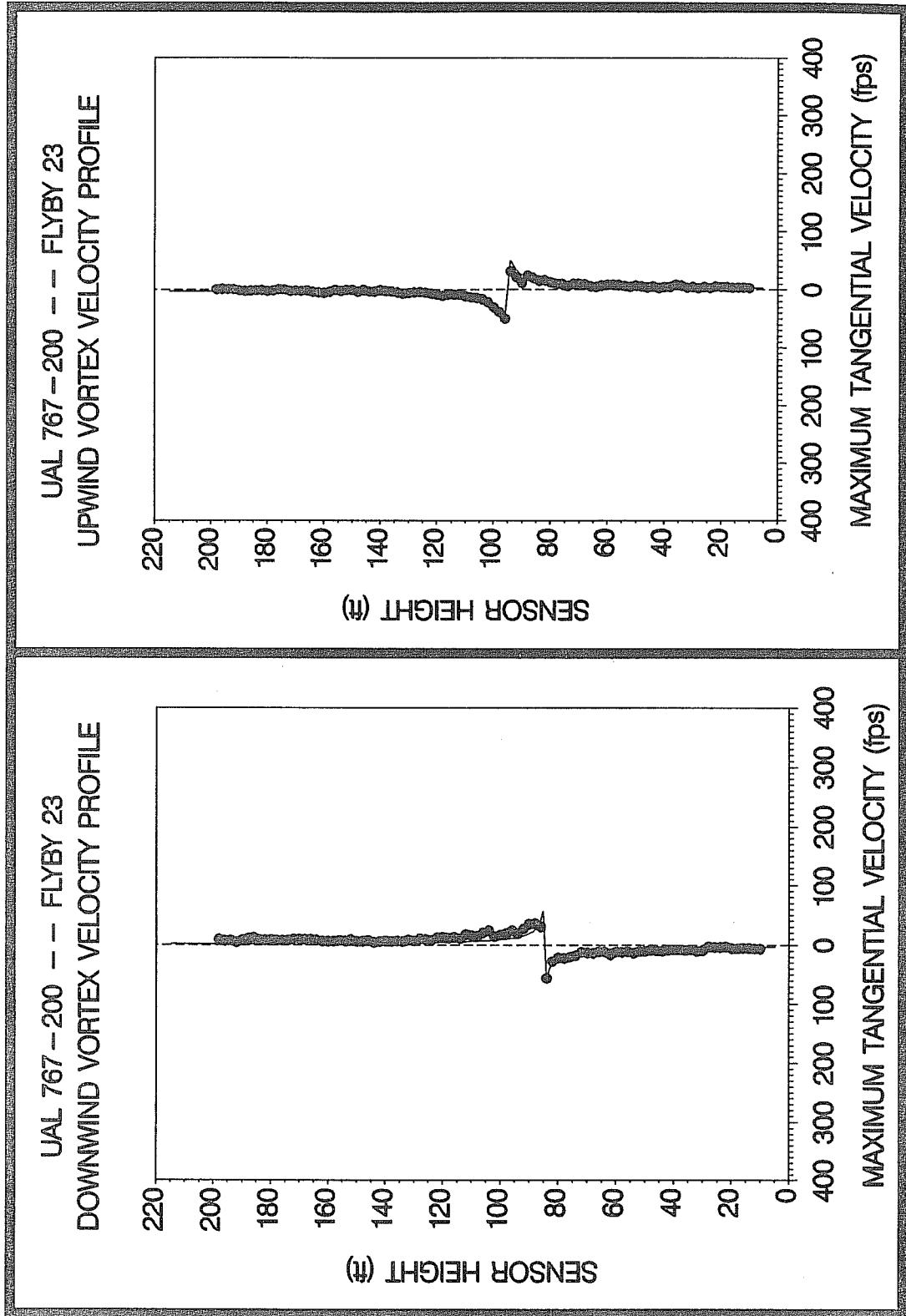


Figure G-205. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 23, ambient wind speed = 3.5 kts,  $\delta_F = 15^\circ$ , LAS = 140 kts, GW = 251,200 lbs. Ages, radii, and velocities of the vortex cores are 44 and 131 s, 0.9 and 1.0 ft, and 55.9 and 49.8 fps, respectively.

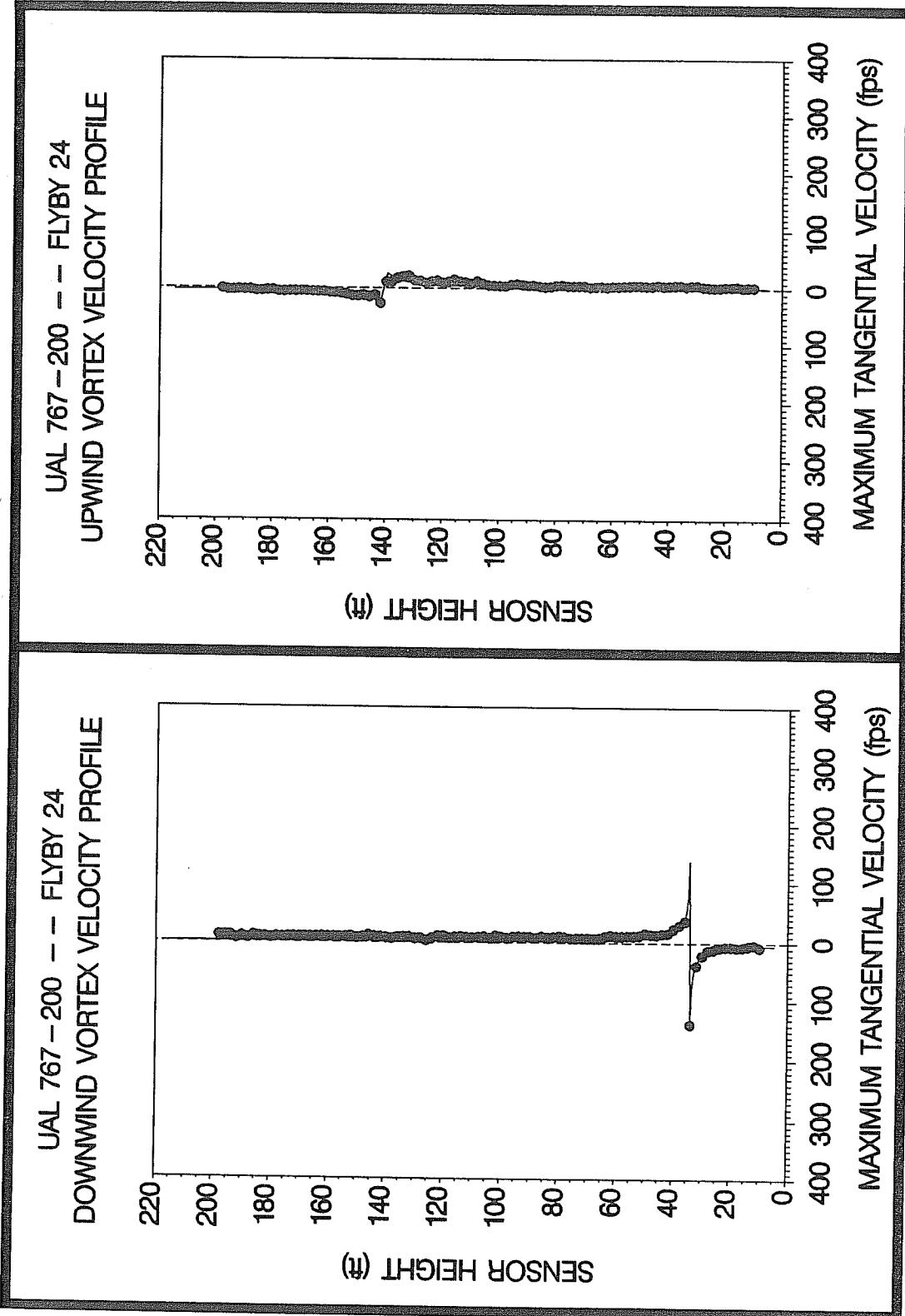
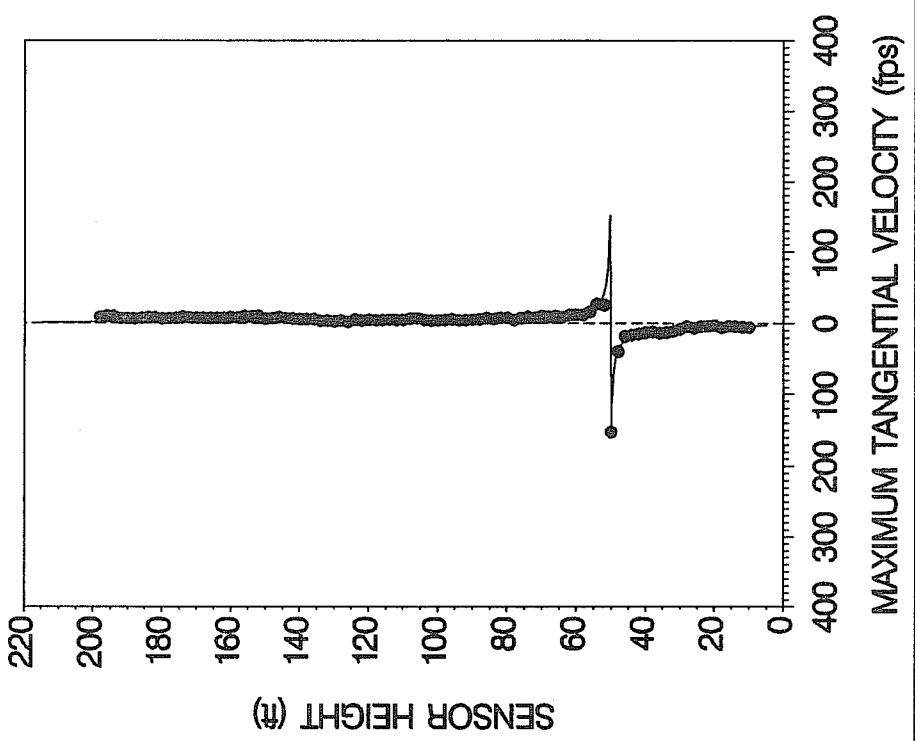


Figure G-206. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 24, ambient wind speed = 3.4 kts,  $\delta_F = 5^\circ$ , IAS = 147 kts, GW = 250,000 lbs. Ages, radii, and velocities of the vortex cores are 62 and 114 s, 0.1 and 1.2 ft, and 138.4 and 26.0 fps, respectively.

UAL 767 - 200 -- FLYBY 25  
DOWNWIND VORTEX VELOCITY PROFILE



UAL 767 - 200 -- FLYBY 25  
UPWIND VORTEX VELOCITY PROFILE

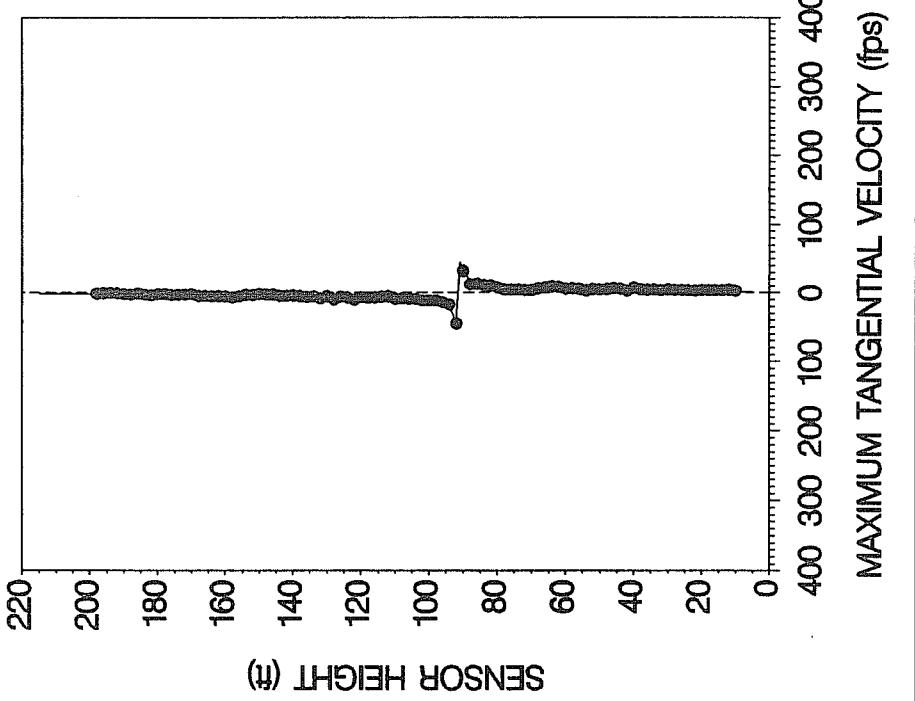
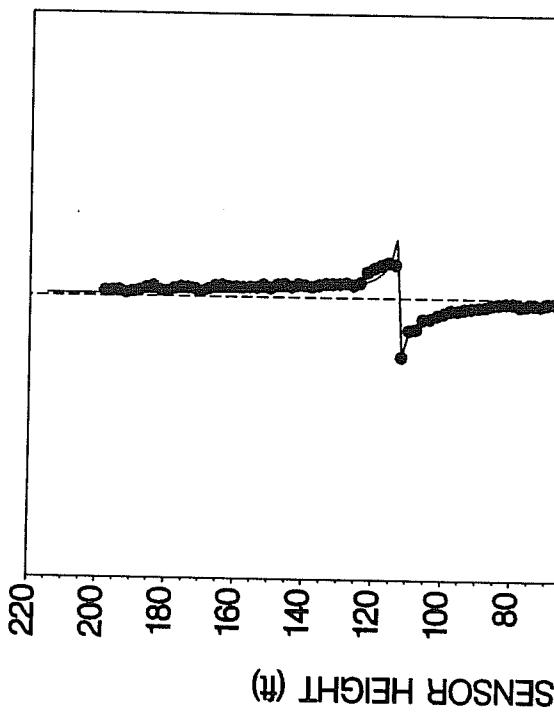


Figure G-207. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 25, ambient wind speed = 3.1 kts,  $\delta_F = 1^\circ$ , IAS = 152 kts, GW = 248,900 lbs. Ages, radii, and velocities of the vortex cores are 59 and 105 s, 0.1 and 0.5 ft, and 152.4 and 45.3 fps, respectively.

UAL 767 - 200 — FLYBY 26  
DOWNWIND VORTEX VELOCITY PROFILE



UAL 767 - 200 — FLYBY 26  
UPWIND VORTEX VELOCITY PROFILE

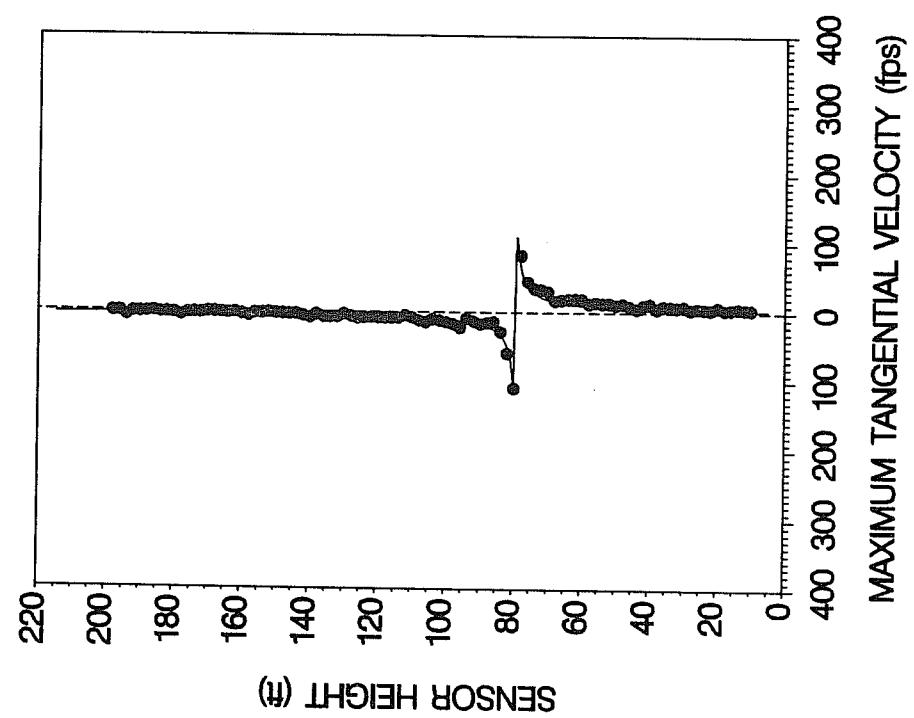


Figure G-208. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 26, ambient wind speed=4.3 kts,  $\delta_F=30^\circ$ , IAS=134 kts, GW=248,000 lbs. Ages, radii, and velocities of the vortex cores are 29 and 98 s, 0.8 and 0.4 ft, and 83.0 and 109.5 fps, respectively.

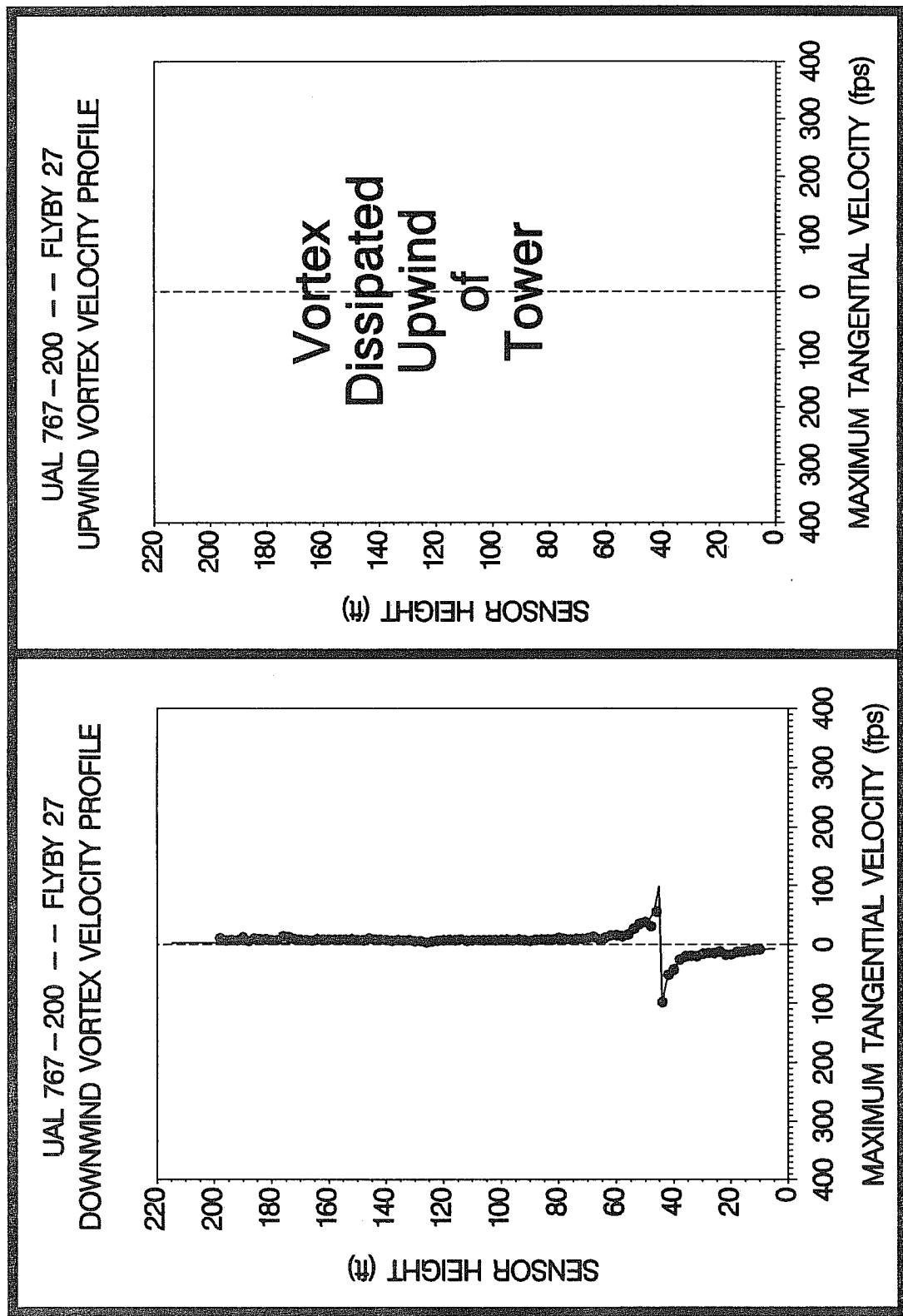


Figure G-209. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 27, ambient wind speed = 4.8 kts,  $\delta_F = 30^\circ$ ,  $IAS = 134$  kts,  $GW = 246,700$  lbs. Ages, radii, and velocities of the vortex cores are 50 and (D) s, 0.6 and (D) ft, and 98.2 and (D) fps, respectively.

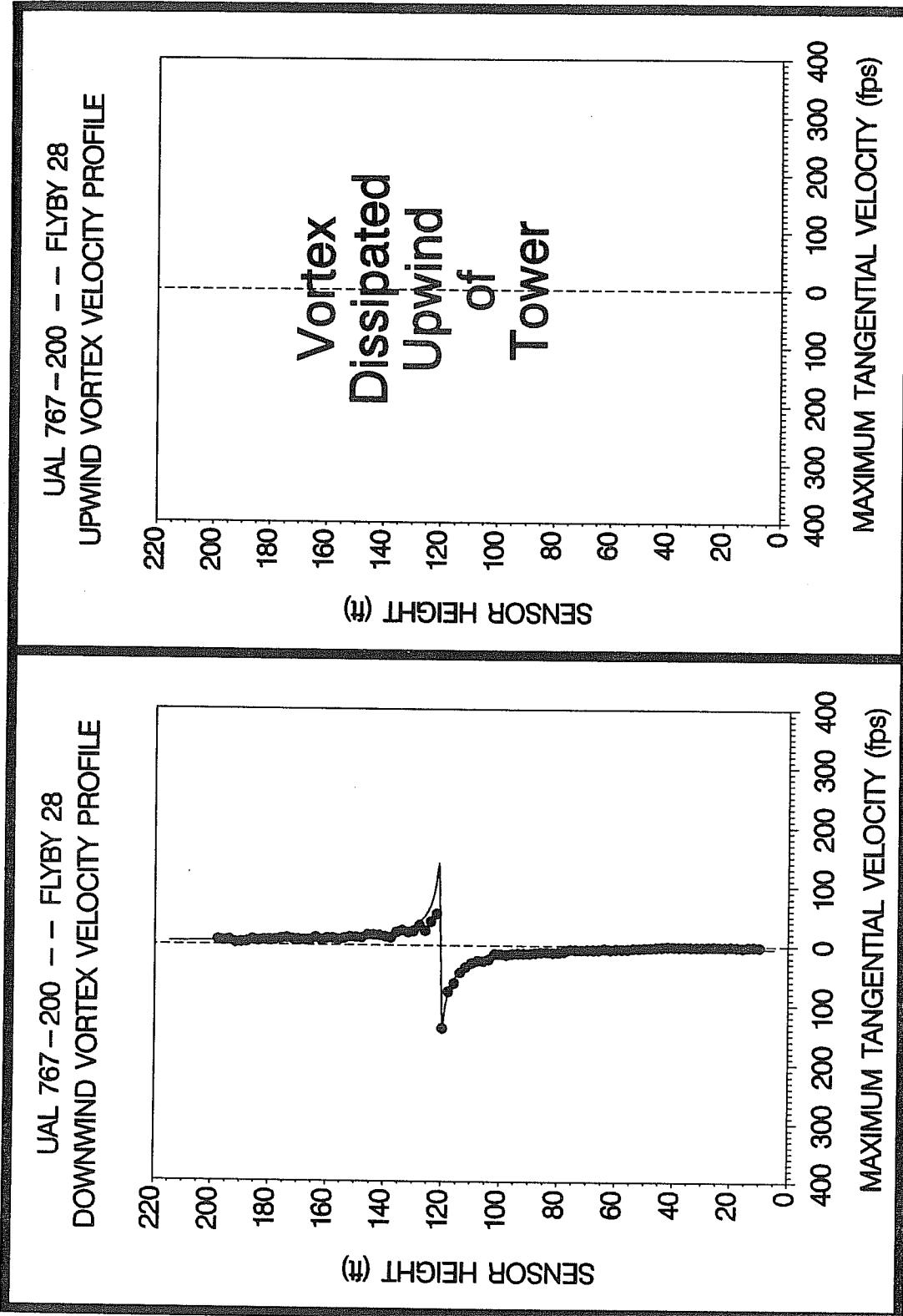


Figure G-210. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 28, ambient wind speed = 3.6 kts,  $\delta_F = 30^\circ$ , IAS = 134 kts, GW = 245,600 lbs. Ages, radii, and velocities of the vortex cores are 33 and (D) s, 0.6 and (D) ft, and 139.1 and (D) fps, respectively.

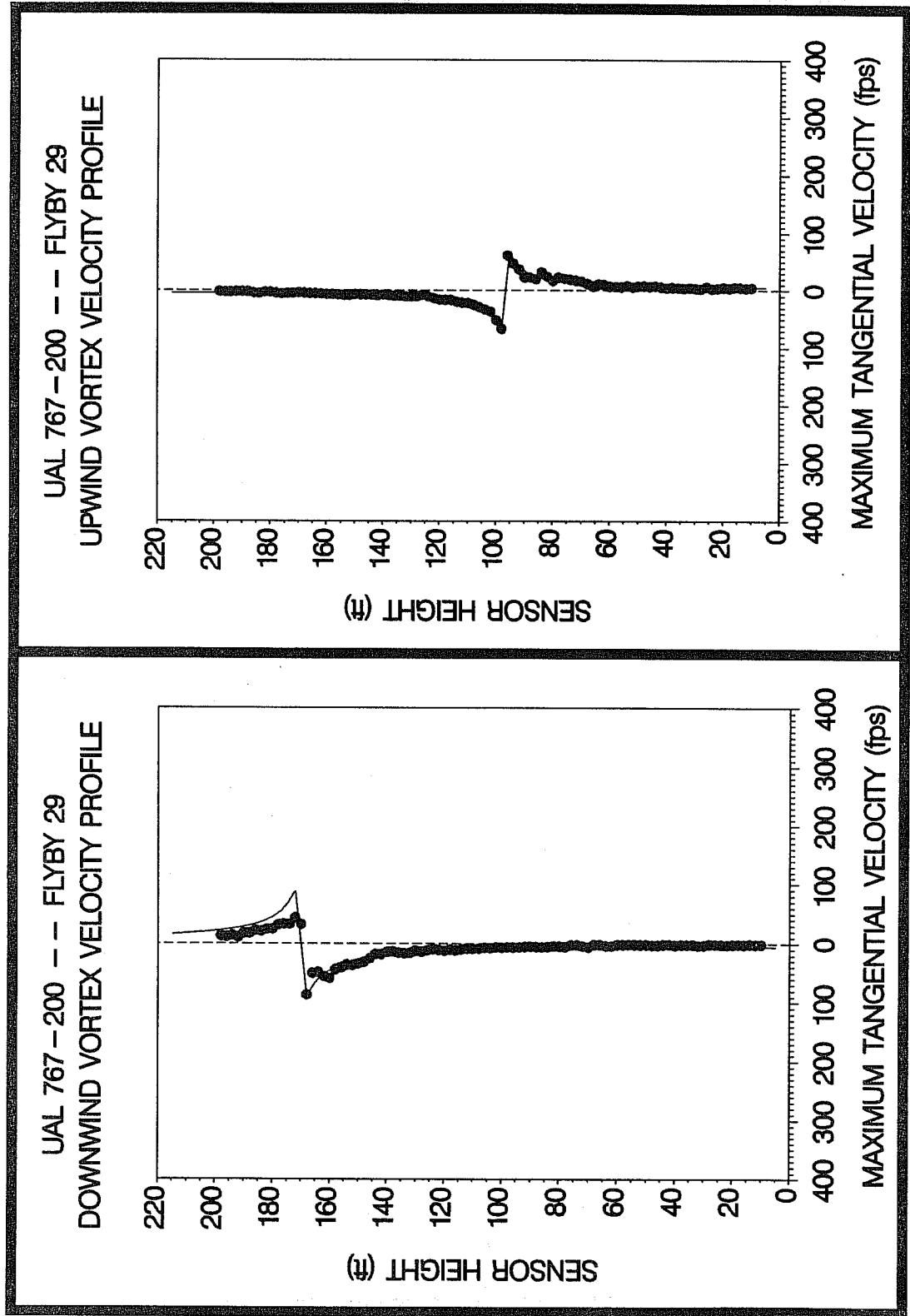


Figure G-211. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 29, ambient wind speed = 4.6 kts,  $\delta_F = 25^\circ$ , IAS = 137 kts, GW = 243,800 lbs. Ages, radii, and velocities of the vortex cores are 25 and 94 s, 2.0 and 1.3 ft, and 86.8 and 65.9 fps, respectively.

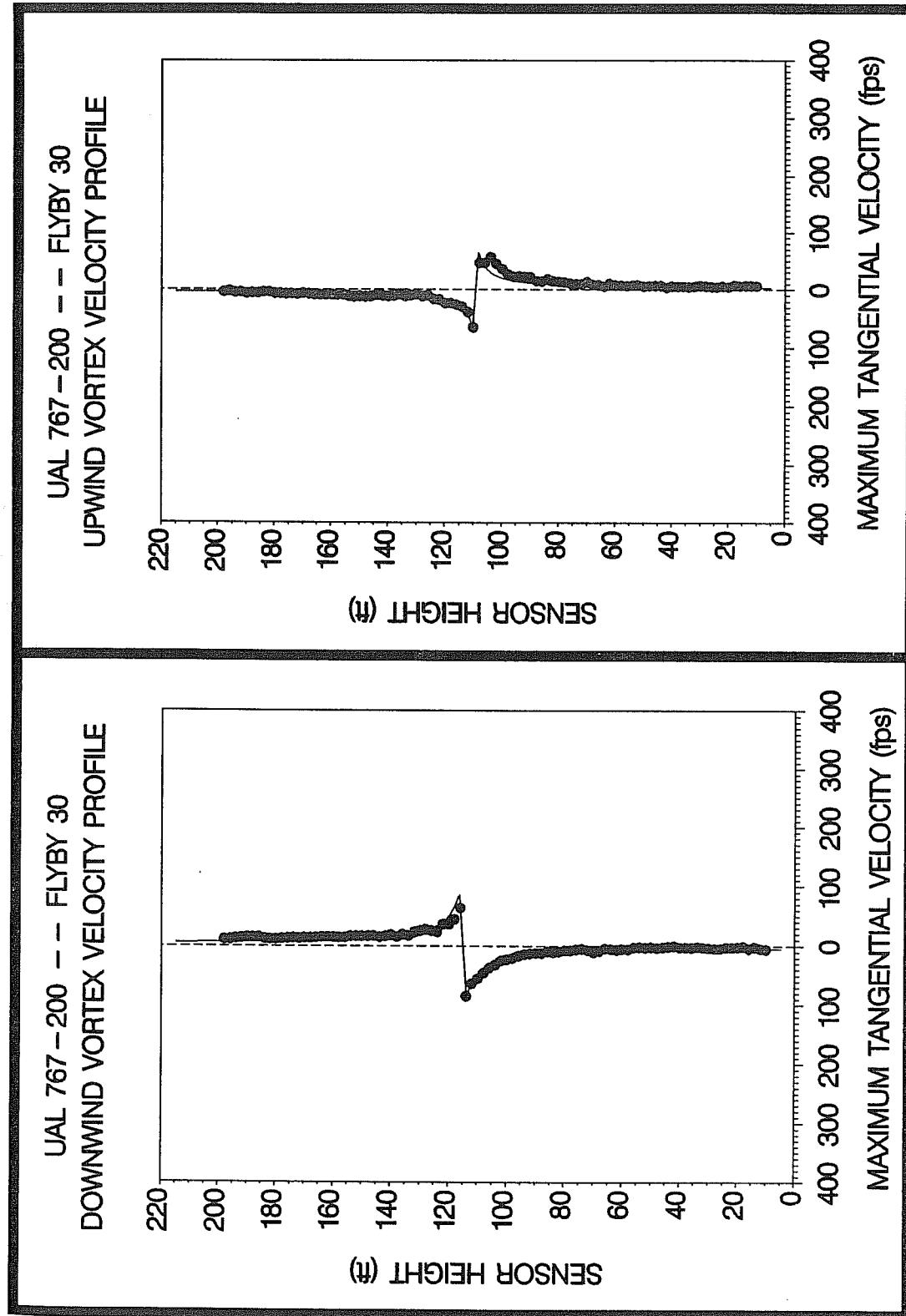


Figure G-212. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 30, ambient wind speed = 4.1 kts,  $\delta_F = 25^\circ$ , IAS = 137 kts, GW = 242,700 lbs. Ages, radii, and velocities of the vortex cores are 35 and 62 s, 1.2 and 0.8 ft, and 84.9 and 64.0 fps, respectively.

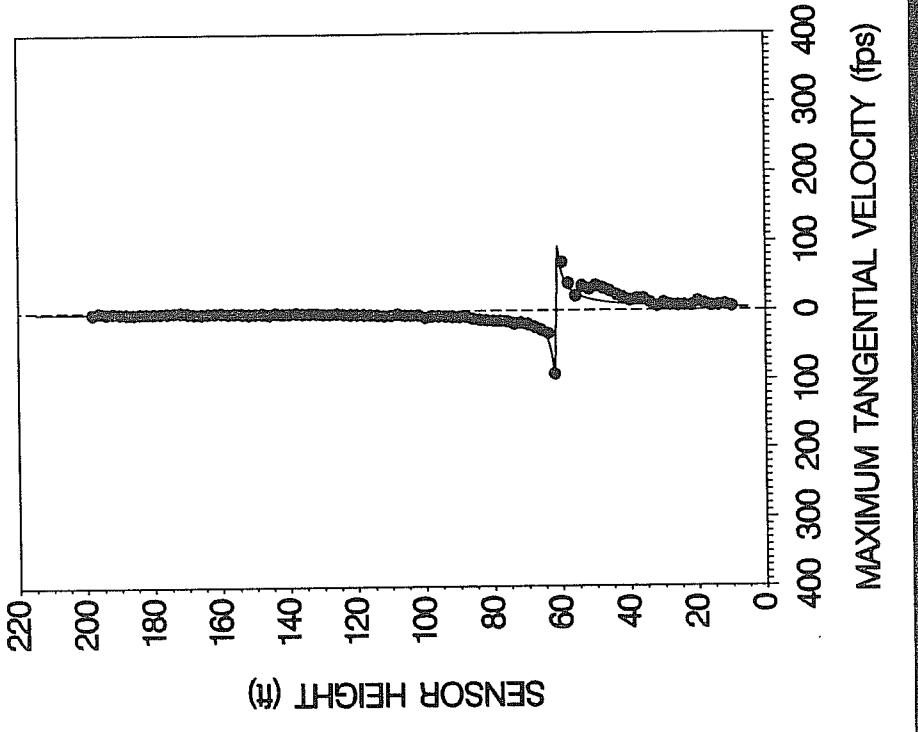
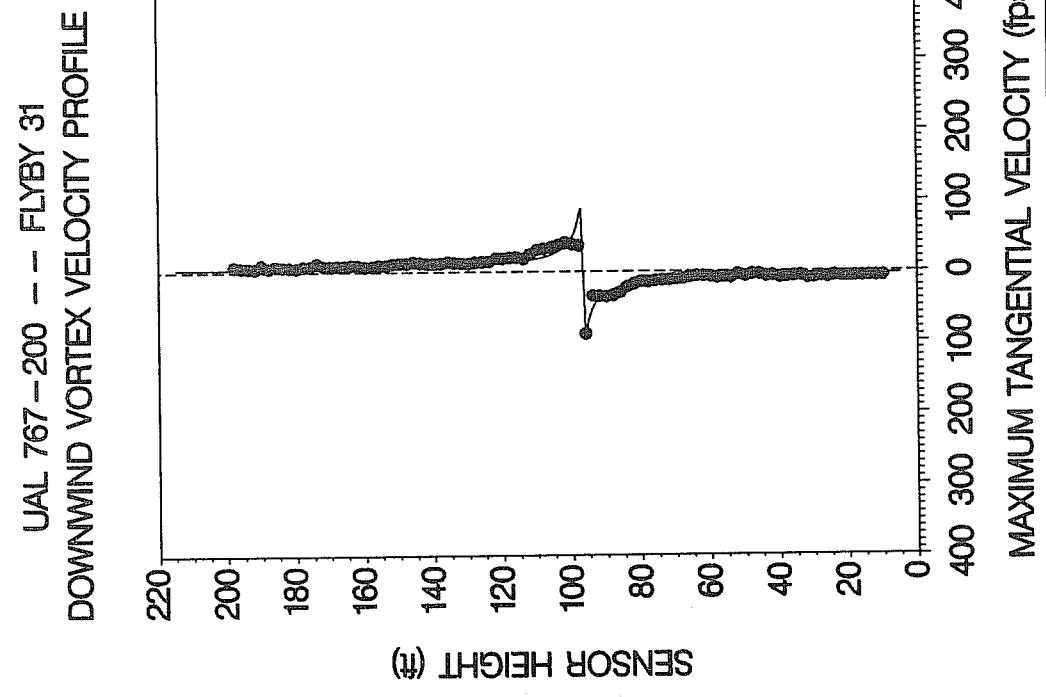
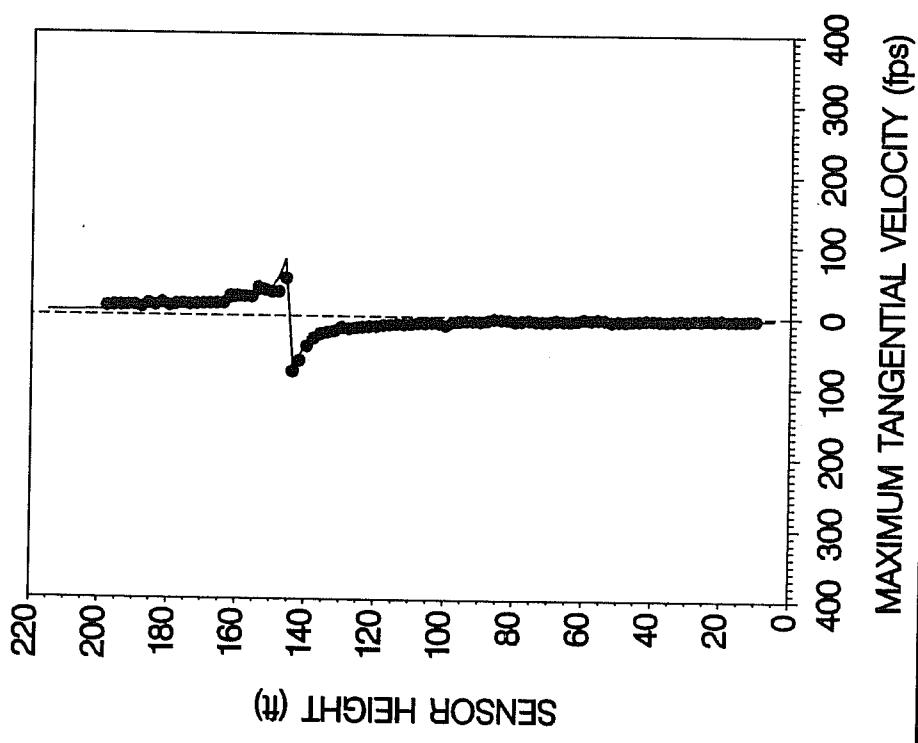


Figure G-213. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 31, ambient wind speed = 3.9 kts,  $\delta_F = 30^\circ$ , IAS = 133 kts, GW = 241,300 lbs. Ages, radii, and velocities of the vortex cores are 32 and 90 s, 0.7 and 0.4 ft, and 88.3 and 91.3 fps, respectively.

UAL 767 - 200 -- FLYBY 32  
DOWNWIND VORTEX VELOCITY PROFILE



UAL 767 - 200 -- FLYBY 32  
UPWIND VORTEX VELOCITY PROFILE

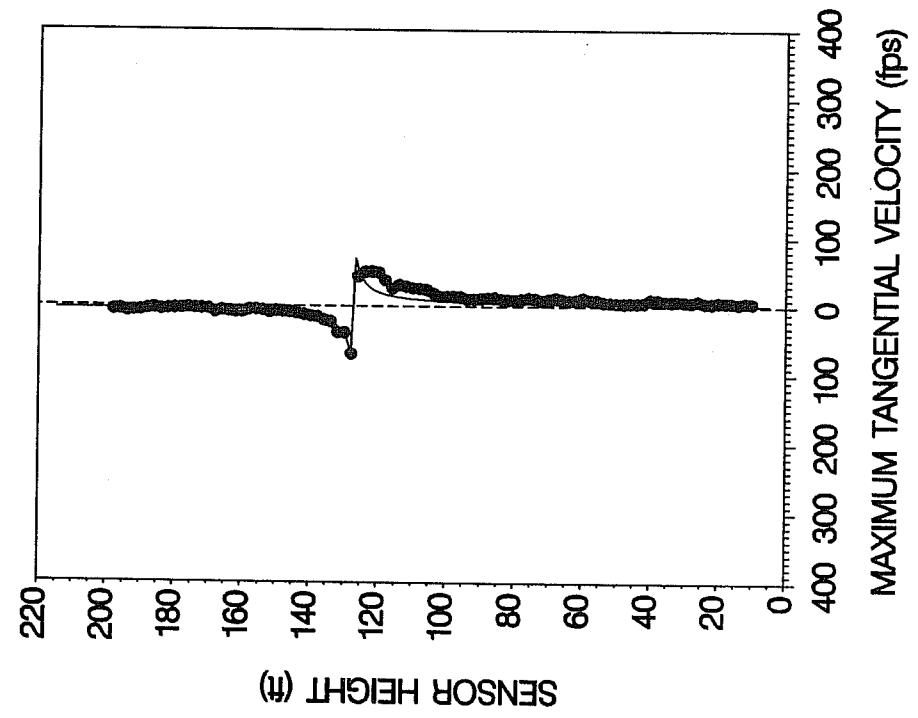


Figure G-214. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 32, ambient wind speed = 4.0 kts,  $\delta_F = 30^\circ$ , IAS = 132 kts, GW = 240,000 lbs. Ages, radii, and velocities of the vortex cores are 28 and 52 s, 1.0 and 0.6 ft, and 78.2 and 69.2 fps, respectively.

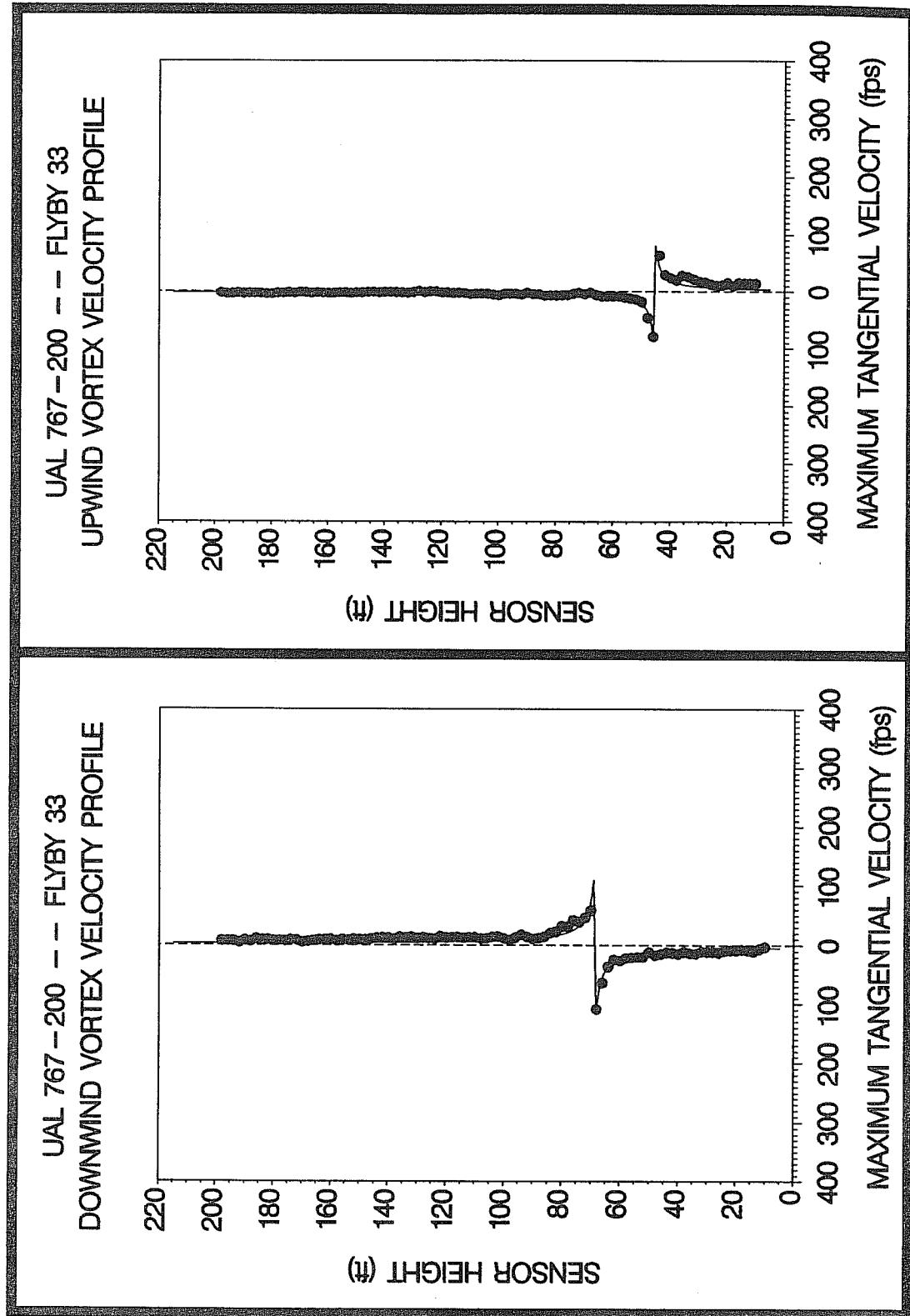


Figure G-215. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 33, ambient wind speed = 5.0 kts,  $\delta_F = 30^\circ$ ,  $IAS = 132$  kts,  $GW = 238,700$  lbs. Ages, radii, and velocities of the vortex cores are 38 and 79 s, 0.6 and 0.4 ft, and 108.8 and 79.6 fps, respectively.

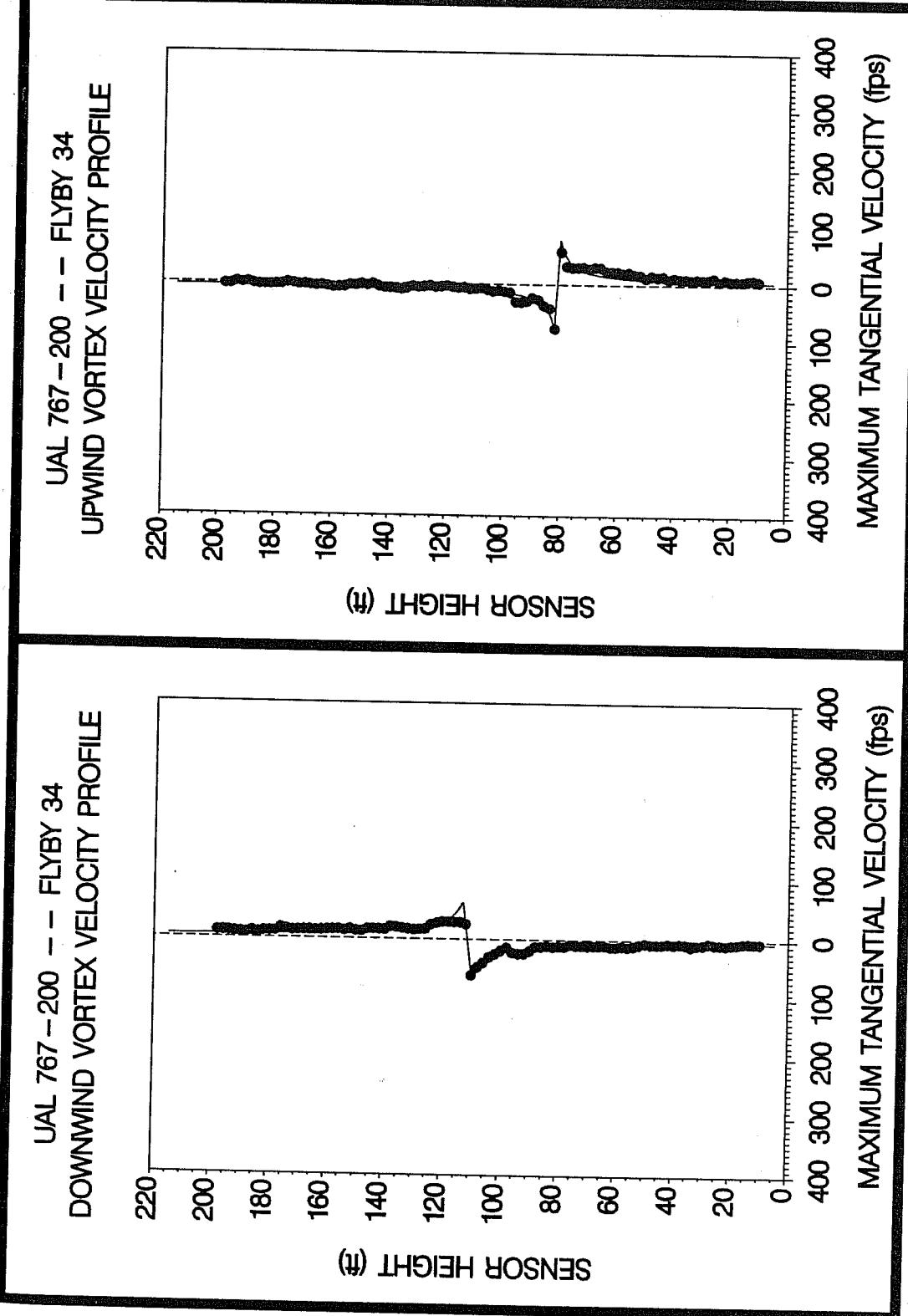


Figure G-216. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 34, ambient wind speed = 5.3 kts,  $\delta_F = 20^\circ$ , IAS = 134 kts, GW = 237,900 lbs. Ages, radii, and velocities of the vortex cores are 28 and 43 s, 1.4 and 0.8 ft, and 61.5 and 76.4 fps, respectively.

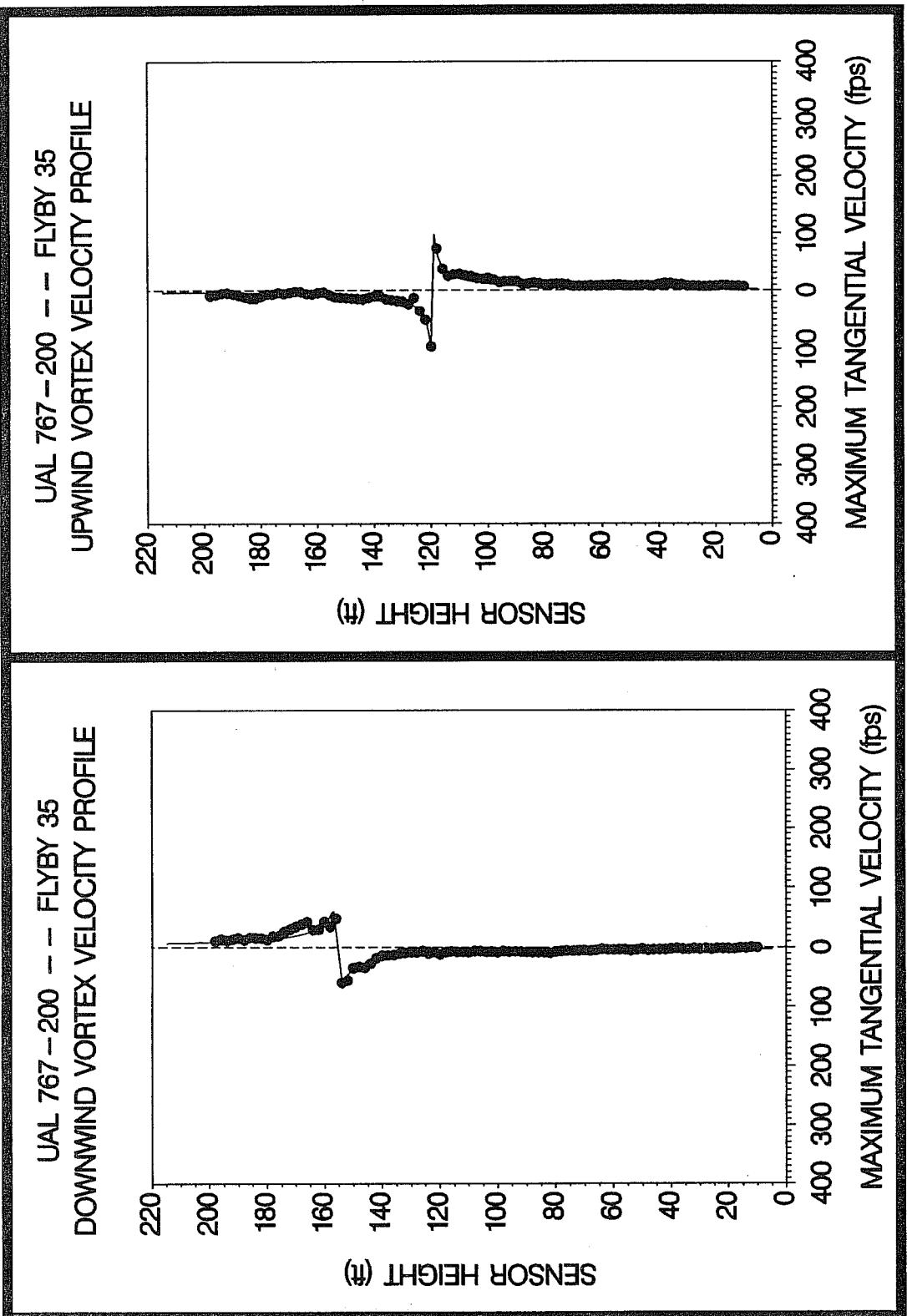


Figure G-217. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 35, ambient wind speed = 5.6 kts,  $\delta_F = 15^\circ$ , IAS = 137 kts, GW = 237,000 lbs. Ages, radii, and velocities of the vortex cores are 22 and 36 s, 1.4 and 0.5 ft, and 59.7 and 96.0 fps, respectively.

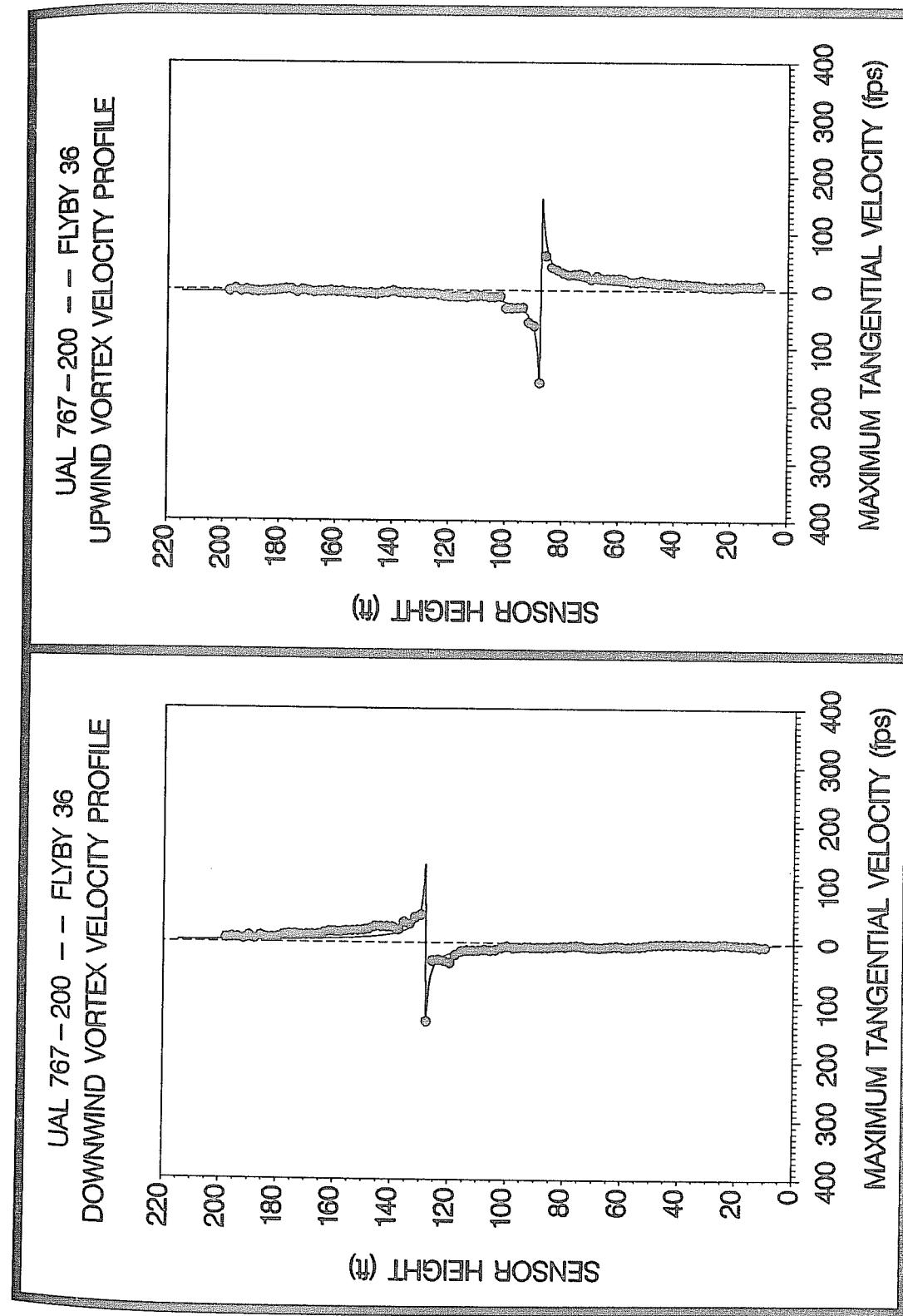


Figure G-218. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 36, ambient wind speed = 5.1 kts,  $\delta_F = 5^\circ$ , IAS = 144 kts, GW = 235,800 lbs. Ages, radii, and velocities of the vortex cores are 23 and 39 s, 0.3 and 0.3 ft, and 133.1 and 160.5 fps, respectively.

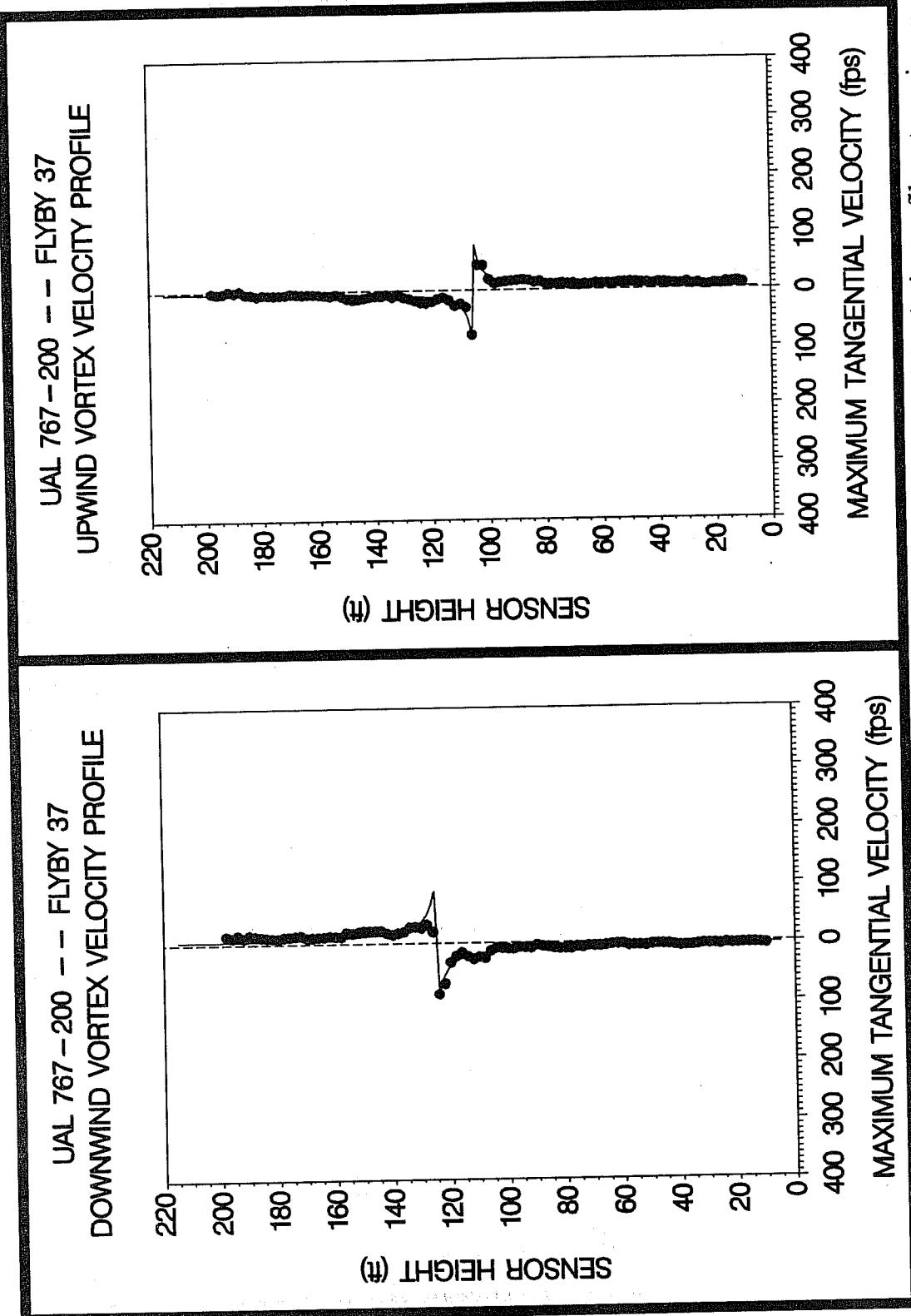


Figure G-219. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 37, ambient wind speed = 5.2 kts,  $\delta_F = 1^\circ$ , IAS = 149 kts, GW = 235,000 lbs. Ages, radii, and velocities of the vortex cores are 28 and 44 s, 0.8 and 0.6 ft, and 86.1 and 77.7 fps, respectively.

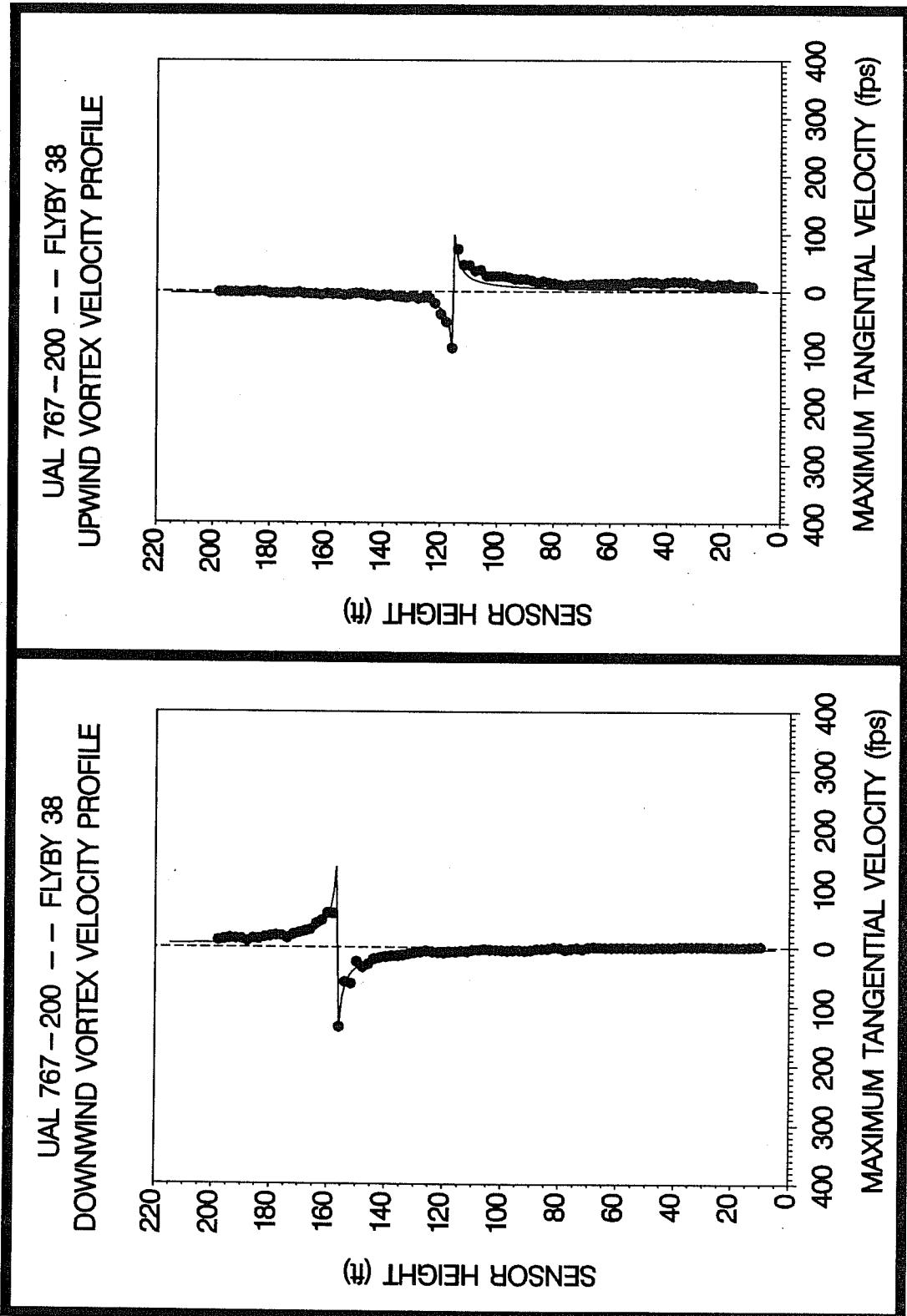


Figure G-220. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 38, ambient wind speed = 6.5 kts,  $\delta_F = 30^\circ$ , IAS = 131 kts, GW = 234,100 lbs. Ages, radii, and velocities of the vortex cores are 24 and 42 s, 0.4 and 0.4 ft, and 134.3 and 97.7 fps, respectively.

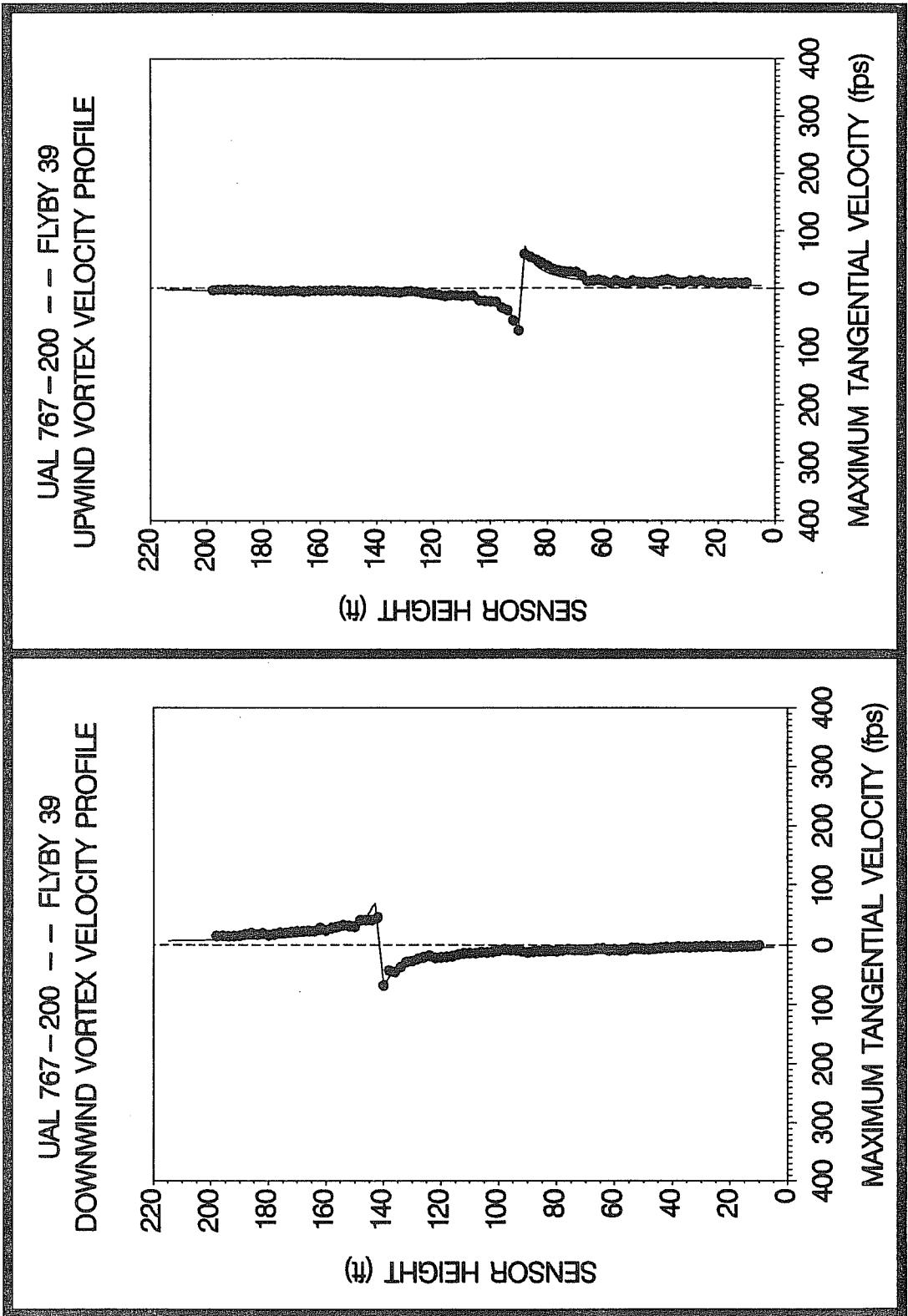


Figure G-221. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 39, ambient wind speed=5.7 kts,  $\delta_F=30^\circ$ ,  $\delta_F=5.7$  kts,  $IAS=130$  kts,  $GW=232,800$  lbs. Ages, radii, and velocities of the vortex cores are 21 and 38 s, 1.5 and 1.1 ft, and 67.7 and 72.8 fps, respectively.

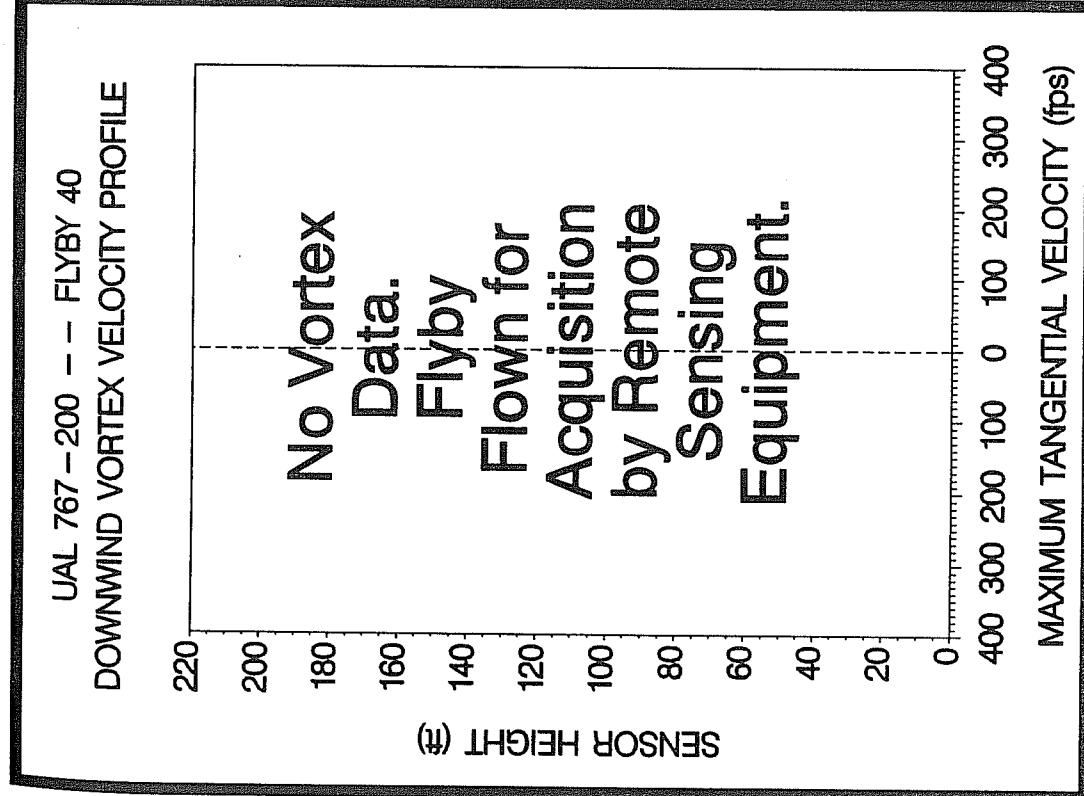
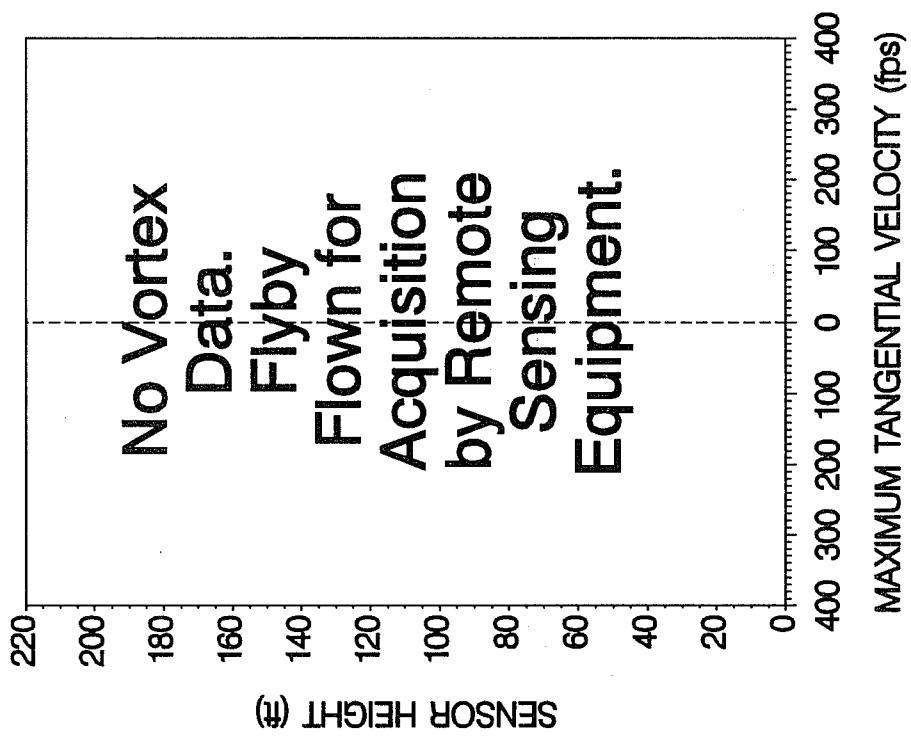


Figure G-222. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 40, ambient wind speed = 5.8 kts,  $\delta_F = 30^\circ$ , IAS = 130 kts, GW = 231,400 lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) s, (O) and (O) ft, and (O) and (O) fps, respectively.

UAL 767-200 -- FLYBY 41  
DOWNWIND VORTEX VELOCITY PROFILE



UAL 767-200 -- FLYBY 41  
UPWIND VORTEX VELOCITY PROFILE

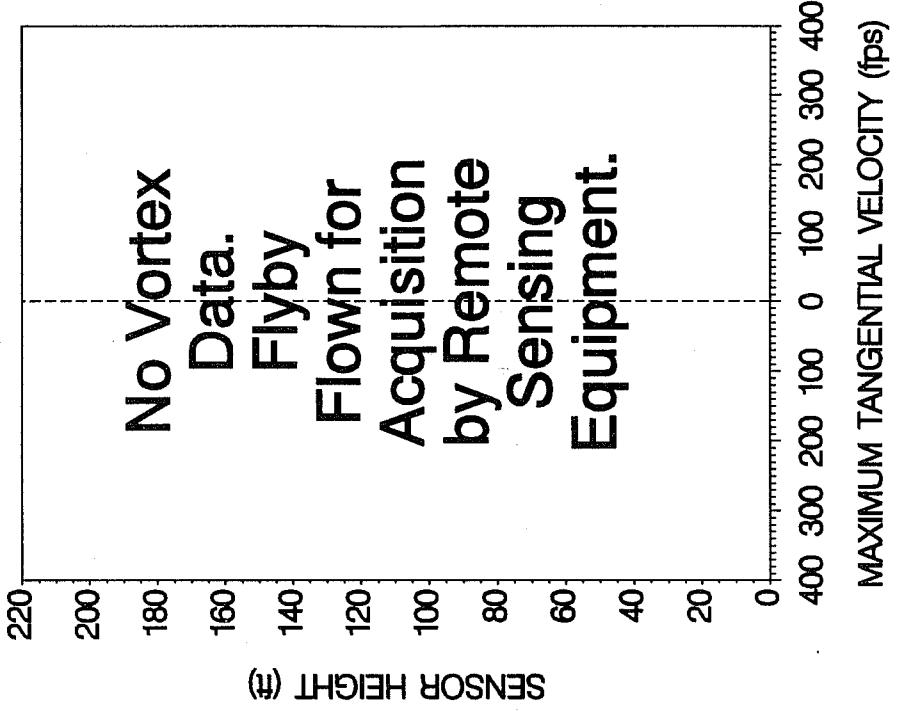


Figure G-223. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 41, ambient wind speed = 4.7 kts,  $\delta_F = 30^\circ$ , IAS = 130 kts, GW = 230,000 lbs. Ages, radii, and velocities of the vortex cores are (O) and (O) s, (O) and (O) ft, and (O) and (O) fps, respectively.

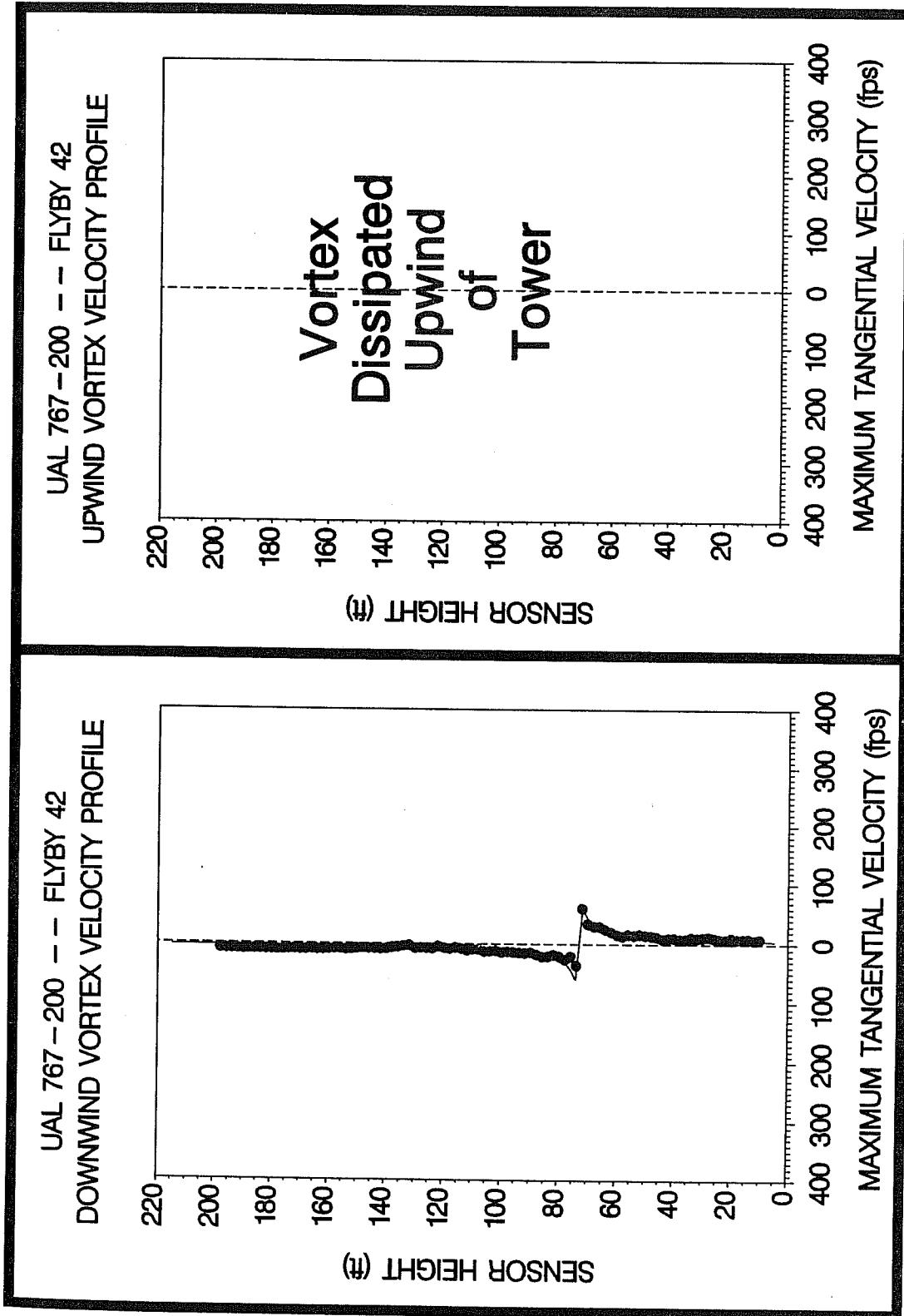


Figure G-224. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 42, ambient wind speed = 3.9 kts,  $\delta_F = 20^\circ$ , IAS = 138 kts, GW = 254,000 lbs. Ages, radii, and velocities of the vortex cores are 41 and (D) s, 1.1 and (D) ft, and 60.3 and (D) fps, respectively.

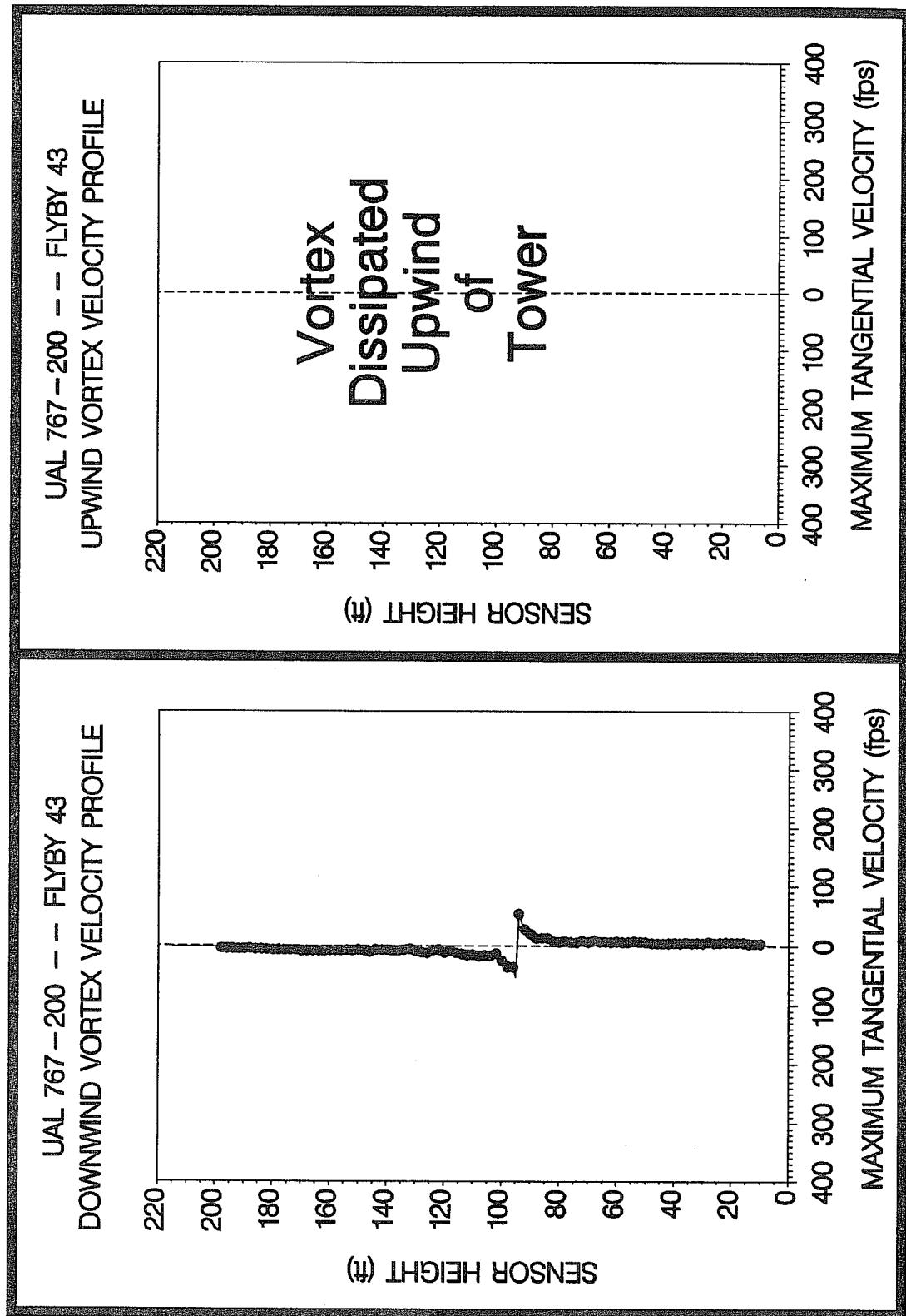


Figure G-225. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 43, ambient wind speed = 4.1 kts,  $\delta_F = 15^\circ$ ,  $\delta_S = 142$  kts,  $GW = 253,500$  lbs. Ages, radii, and velocities of the vortex cores are 46 and (D) s, 0.5 and (D) ft, and 53.0 and (D) fps, respectively.

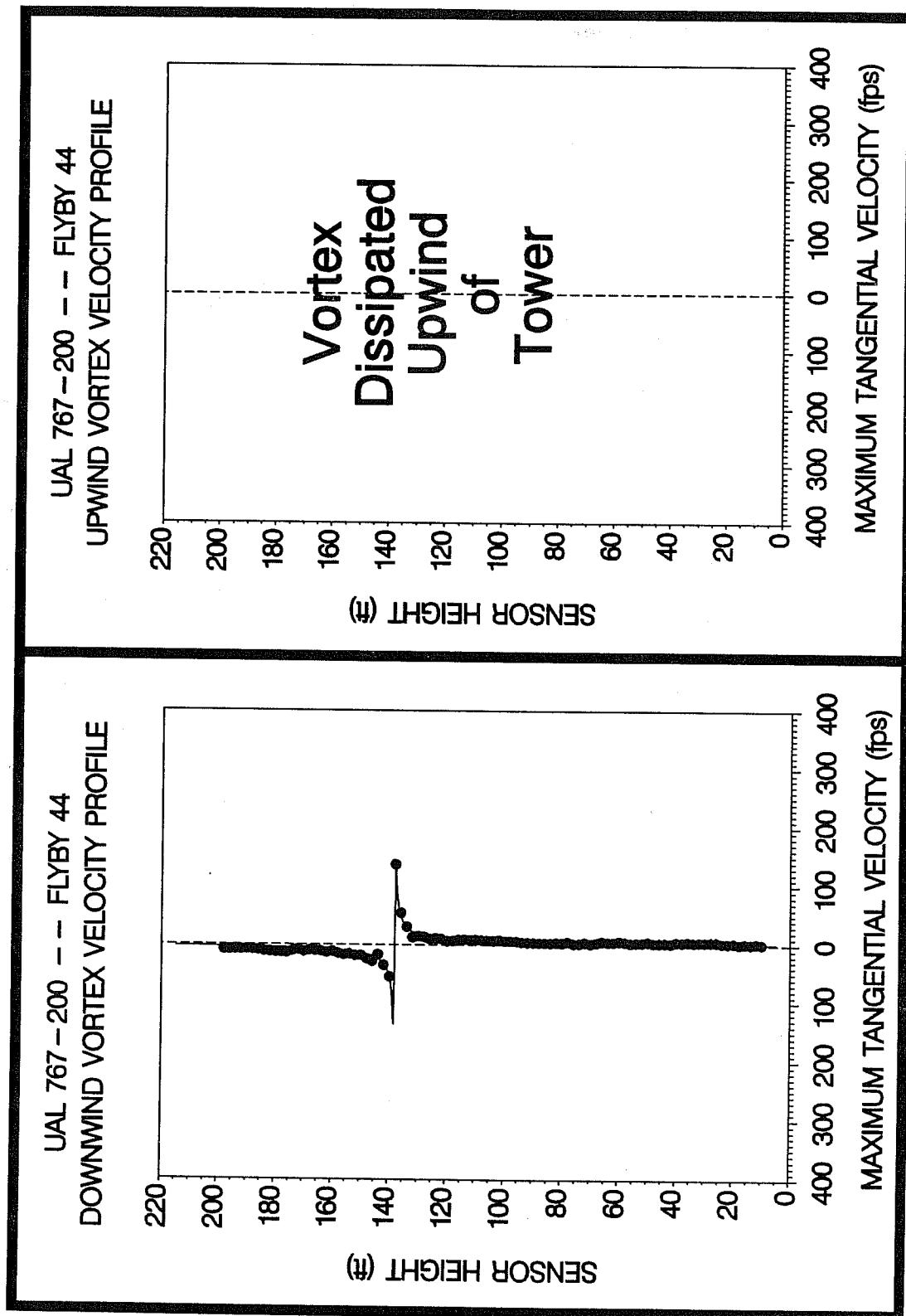


Figure G-226. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 44, ambient wind speed = 3.9 kts,  $\delta_F = 5^\circ$ , IAS = 148 kts, GW = 252,000 lbs. Ages, radii, and velocities of the vortex cores are 52 and (D) s, 0.2 and (D) ft, and 136.7 and (D) fps, respectively.

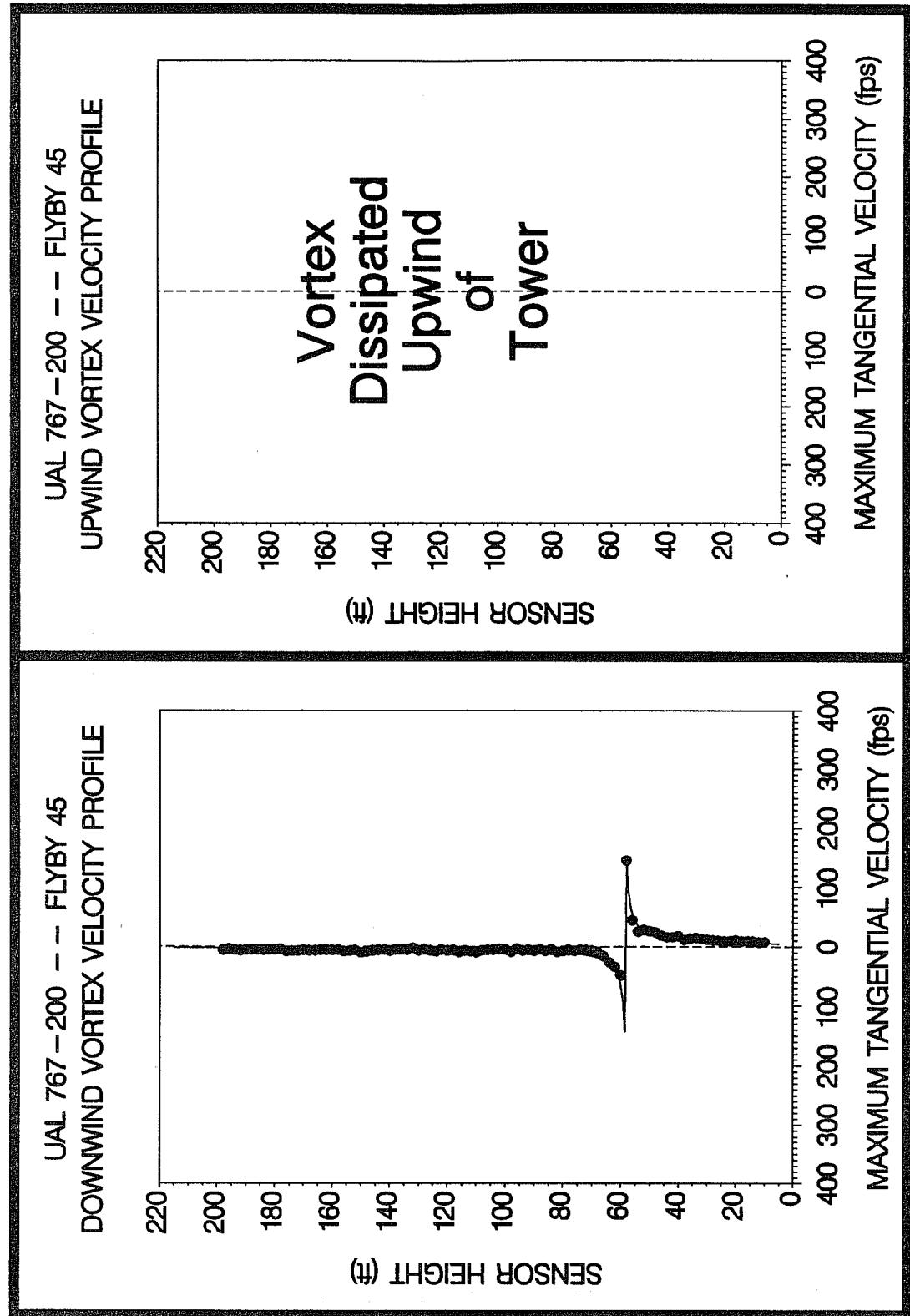


Figure G-227. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 45, ambient wind speed = 5.4 kts,  $\delta_F = 1^\circ$ , IAS = 153 kts, GW = 251,000 lbs. Ages, radii, and velocities of the vortex cores are 37 and (D) s, 0.3 and (D) ft, and 144.5 and (D) fps, respectively.

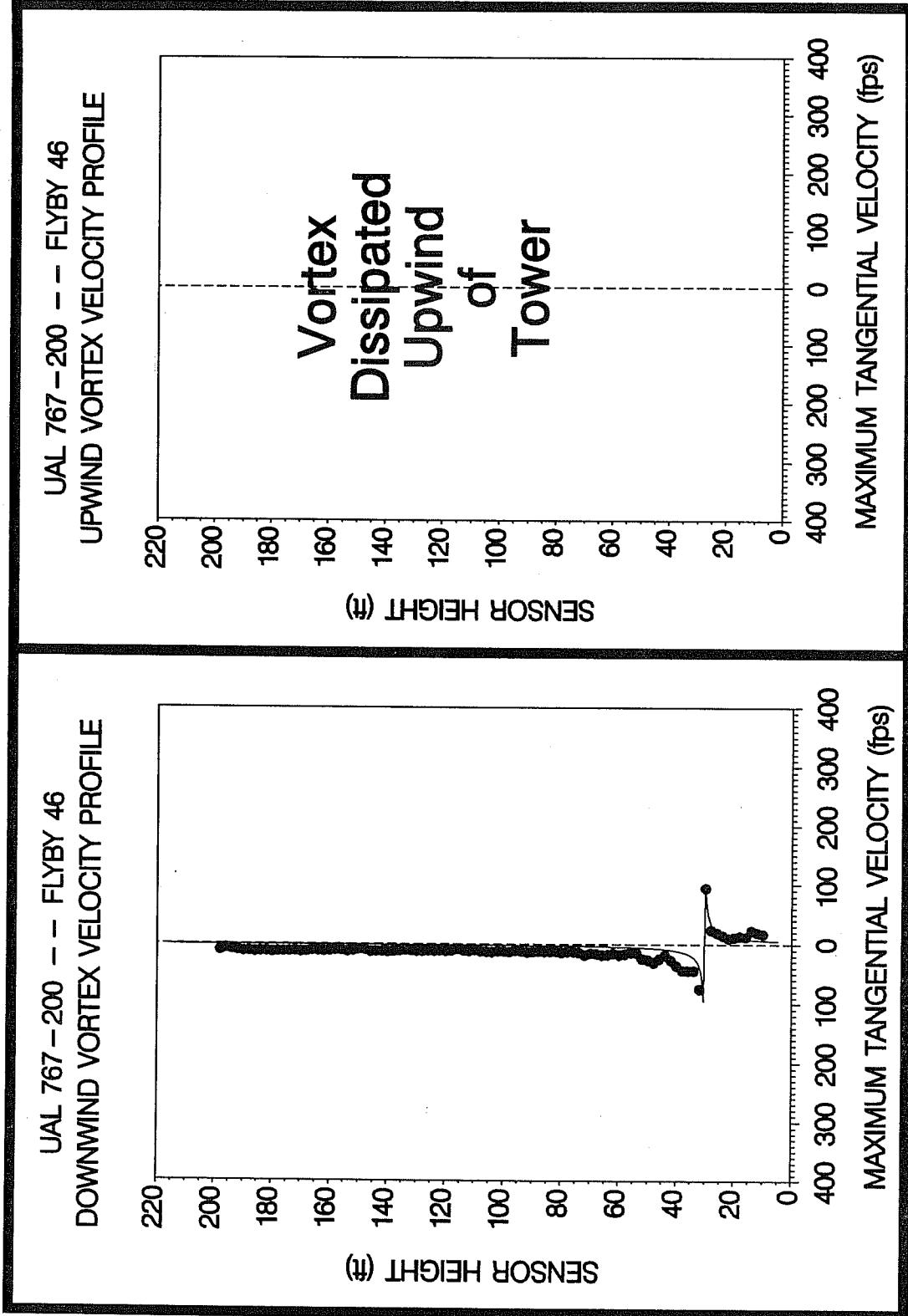


Figure G-228. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 46, ambient wind speed = 5.8 kts,  $\delta_F = 30^\circ$ , IAS = 135 kts, GW = 250,200 lbs. Ages, radii, and velocities of the vortex cores are 35 and (D) s, 0.2 and (D) ft, and 94.1 and (D) fps, respectively.

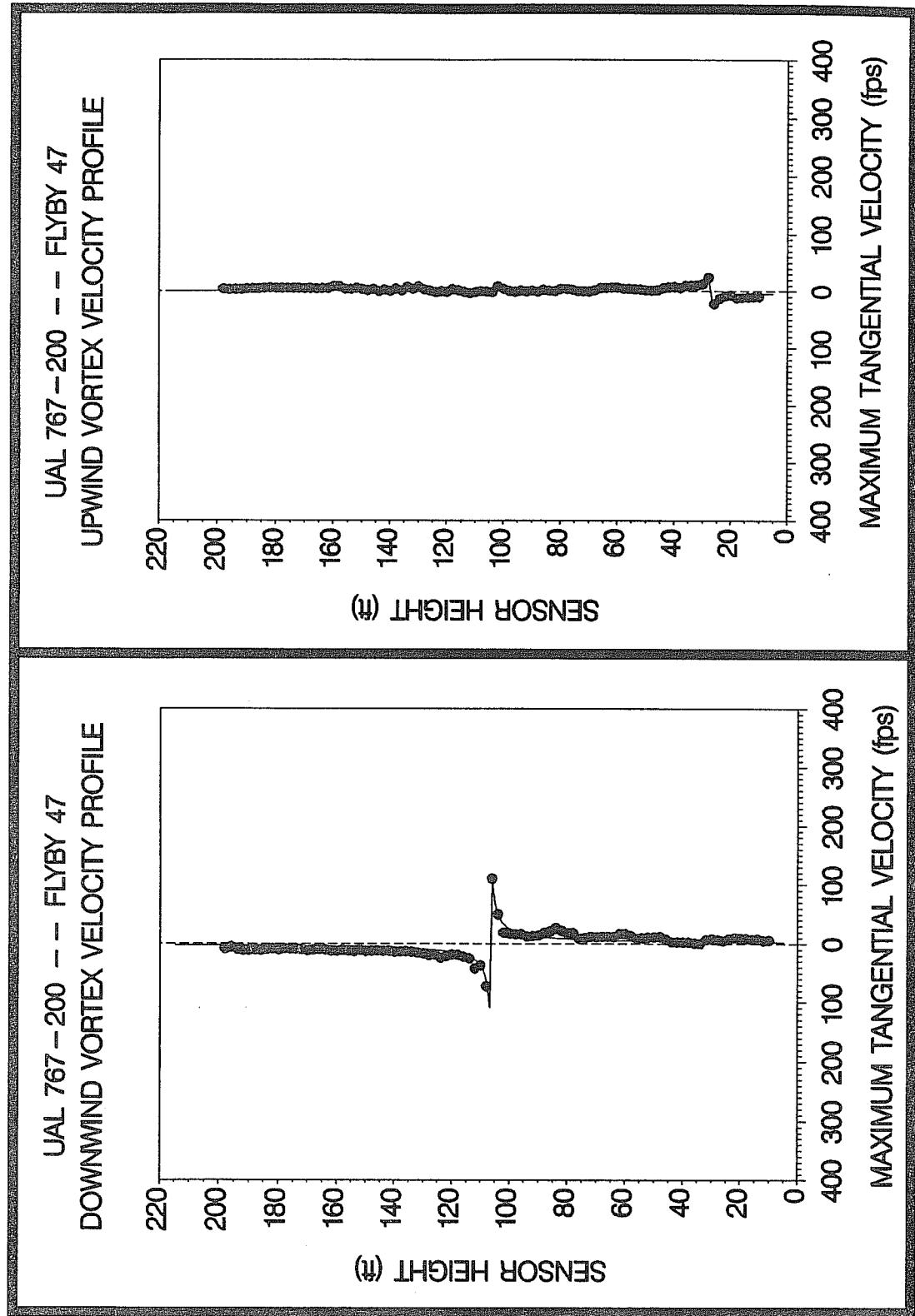


Figure G-229. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 47, ambient wind speed = 5.7 kts,  $\delta_F = 30^\circ$ , IAS = 135 kts, GW = 249,000 lbs. Ages, radii, and velocities of the vortex cores are 25 and 67 s, 0.4 and 0.8 ft, and 109.6 and 24.2 fps, respectively.

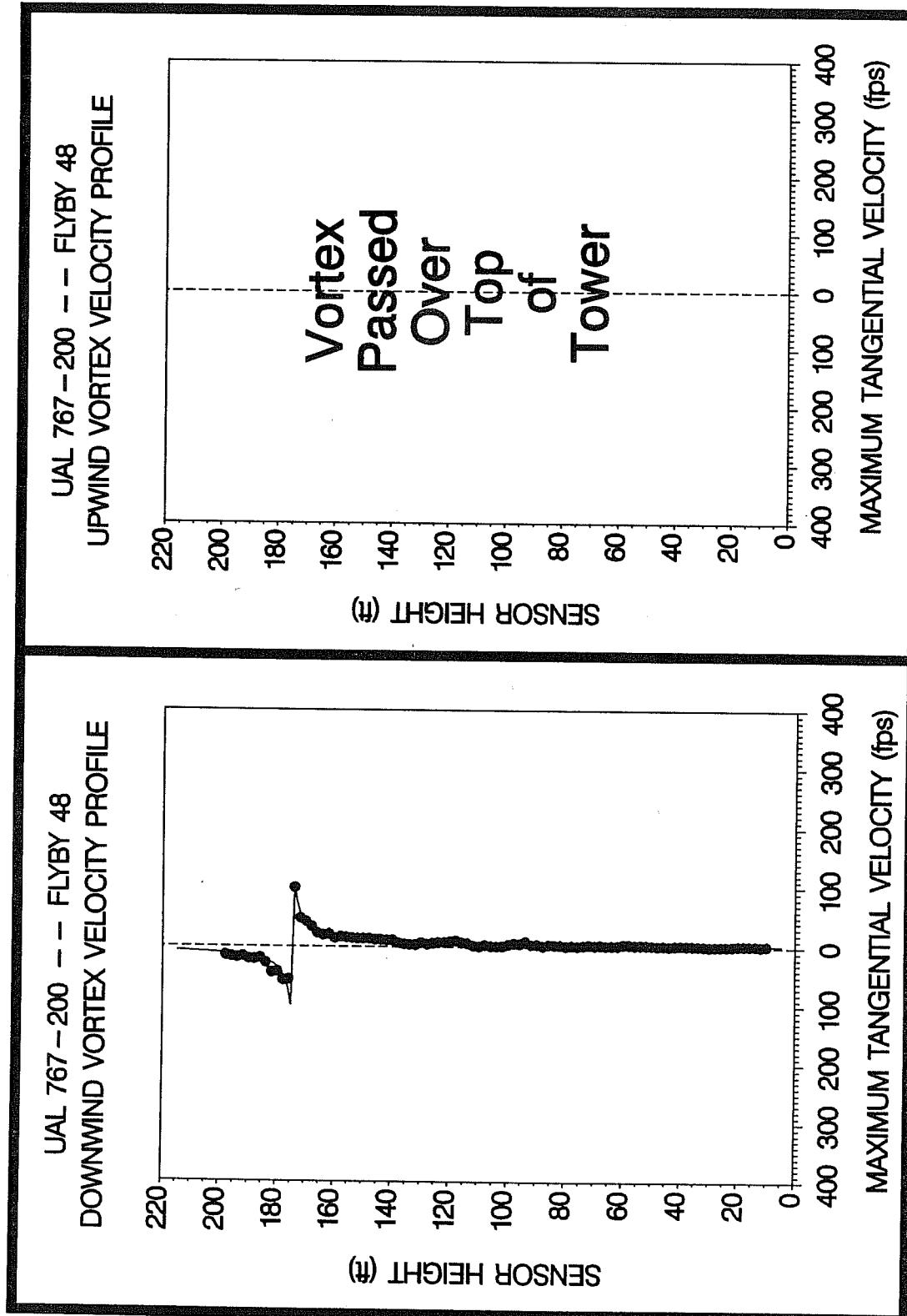


Figure G-230. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 48, ambient wind speed = 6.2 kts,  $\delta_F = 30^\circ$ , IAS = 134 kts, GW = 248,200 lbs. Ages, radii, and velocities of the vortex cores are 24 and (P) s, 0.6 and (P) ft, and 98.7 and (P) fps, respectively.

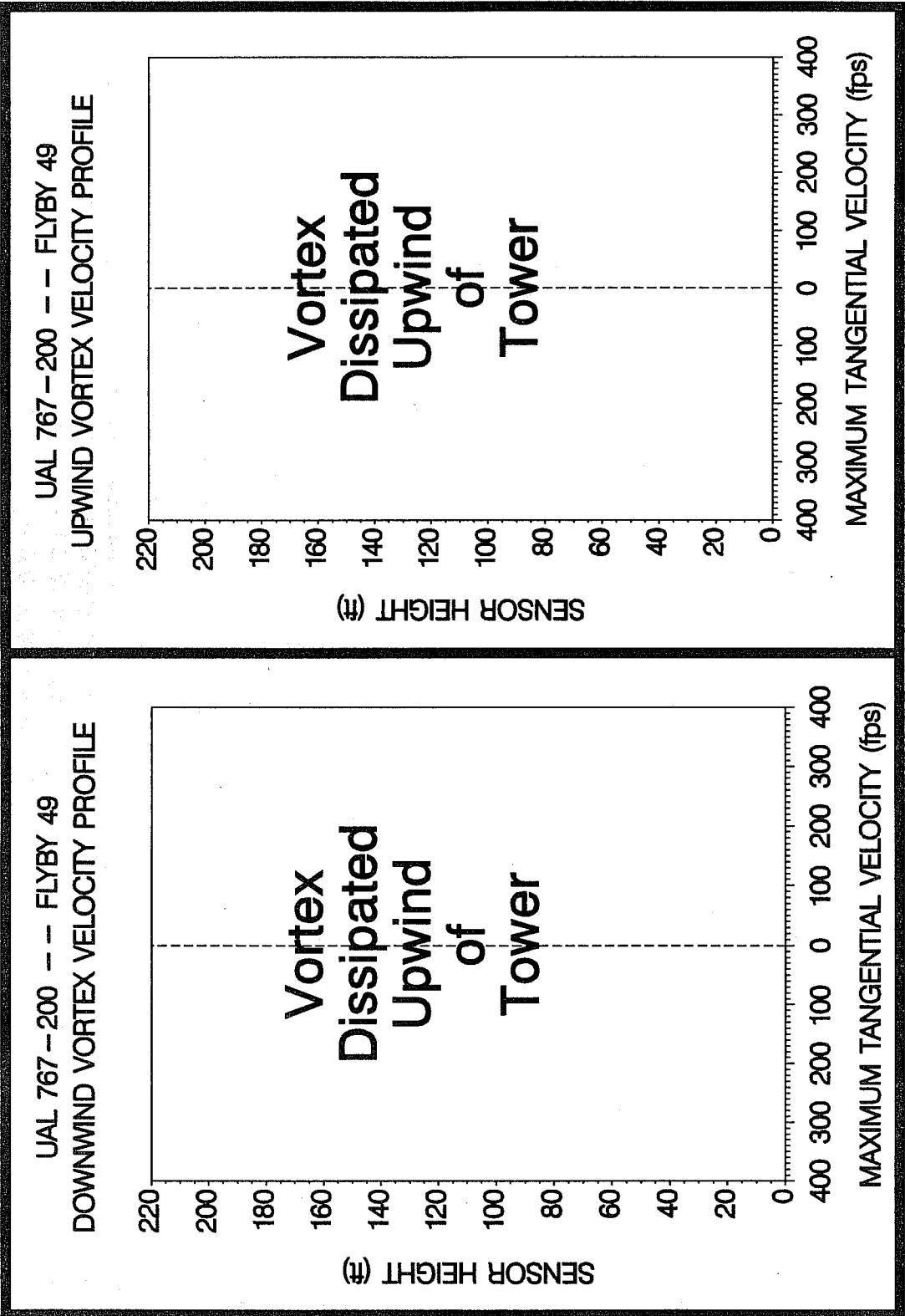


Figure G-231. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 49, ambient wind speed = 7.6 kts,  $\delta_F = 25^\circ$ , IAS = 138 kts, GW = 246,500 lbs. Ages, radii, and velocities of the vortex cores are (D) and (D) s, (D) and (D) ft, and (D) and (D) fps, respectively.

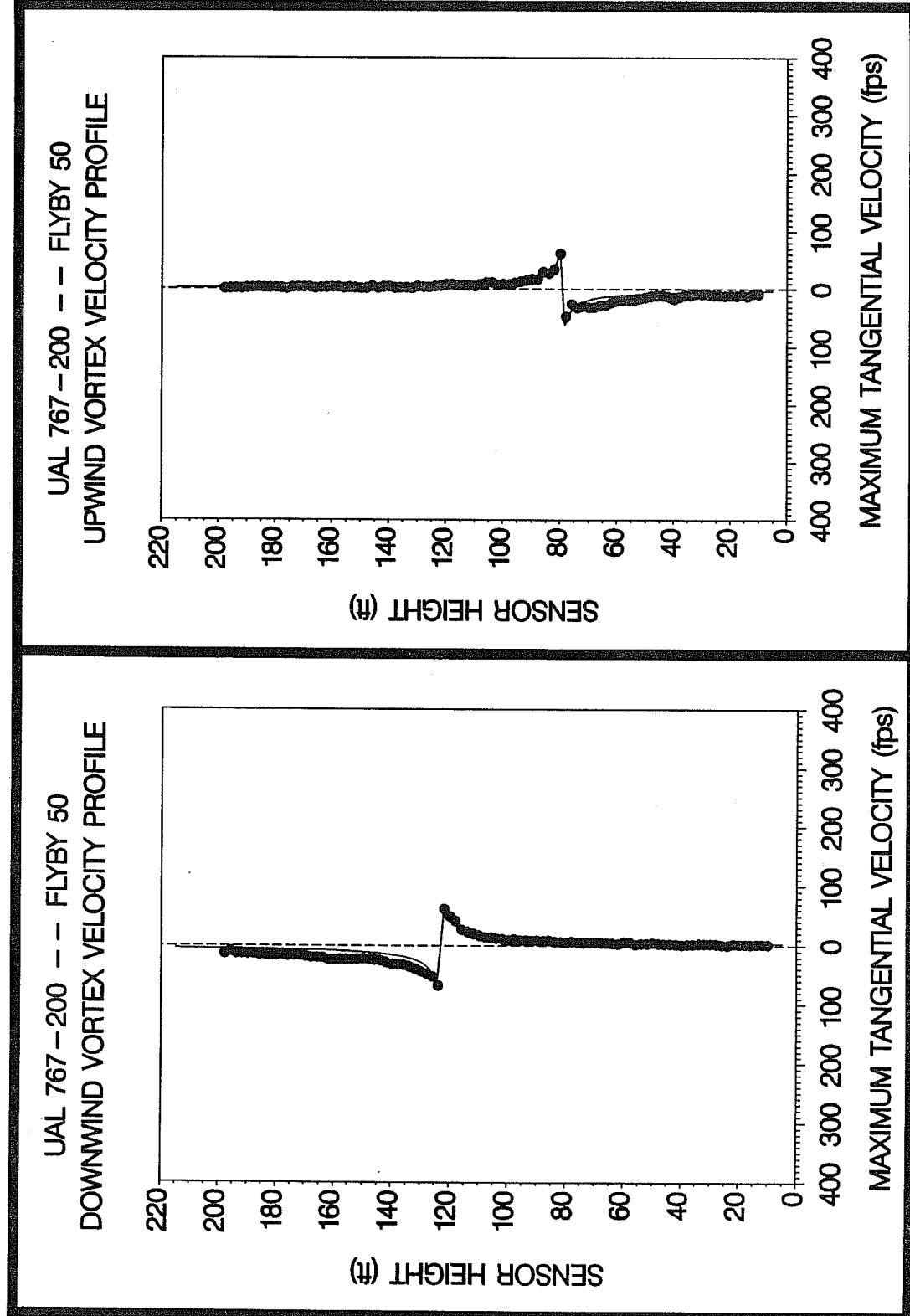
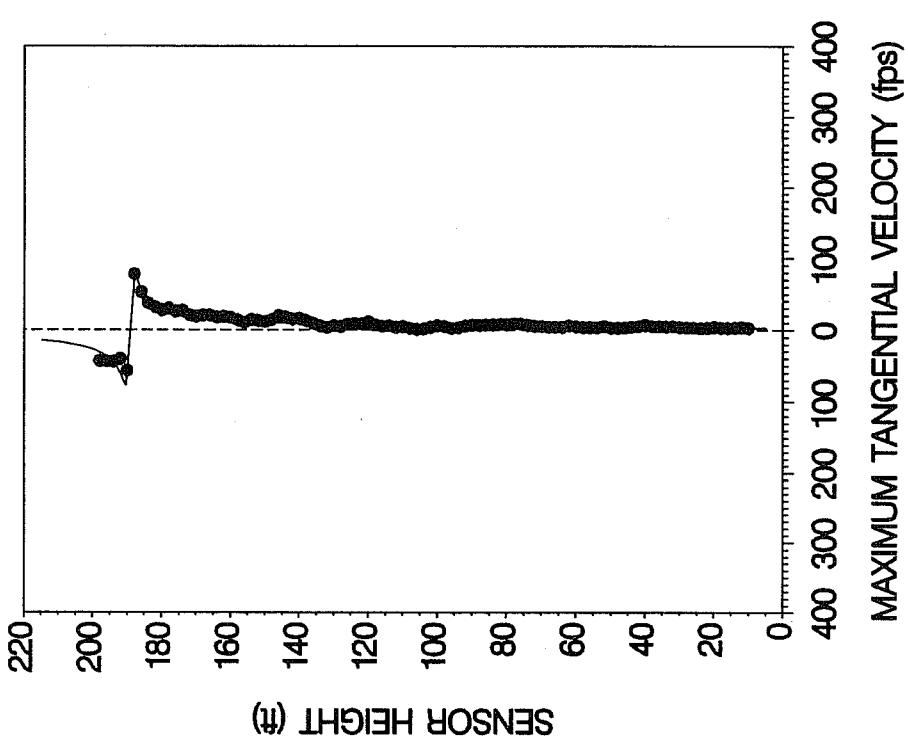


Figure G-232. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 50, ambient wind speed = 7.4 kts,  $\delta_F = 25^\circ$ , IAS = 138 kts, GW = 245,500 lbs. Ages, radii, and velocities of the vortex cores are 16 and 28 s, 1.1 and 0.8 ft, and 61.7 and 61.4 fps, respectively.

UAL 767-200 -- FLYBY 51  
DOWNWIND VORTEX VELOCITY PROFILE



UAL 767-200 -- FLYBY 51  
UPWIND VORTEX VELOCITY PROFILE

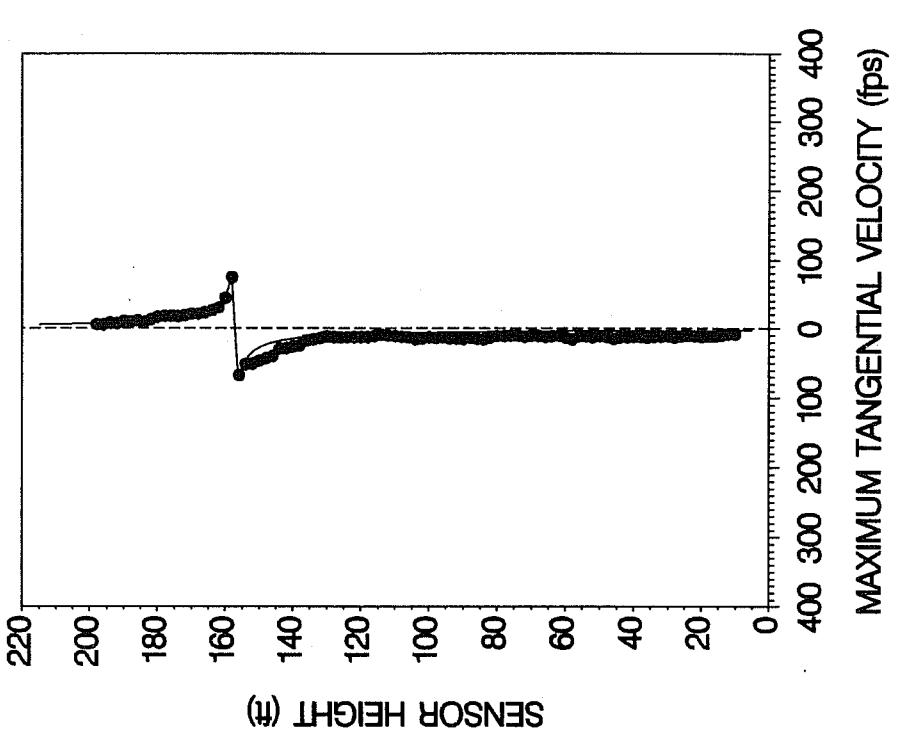
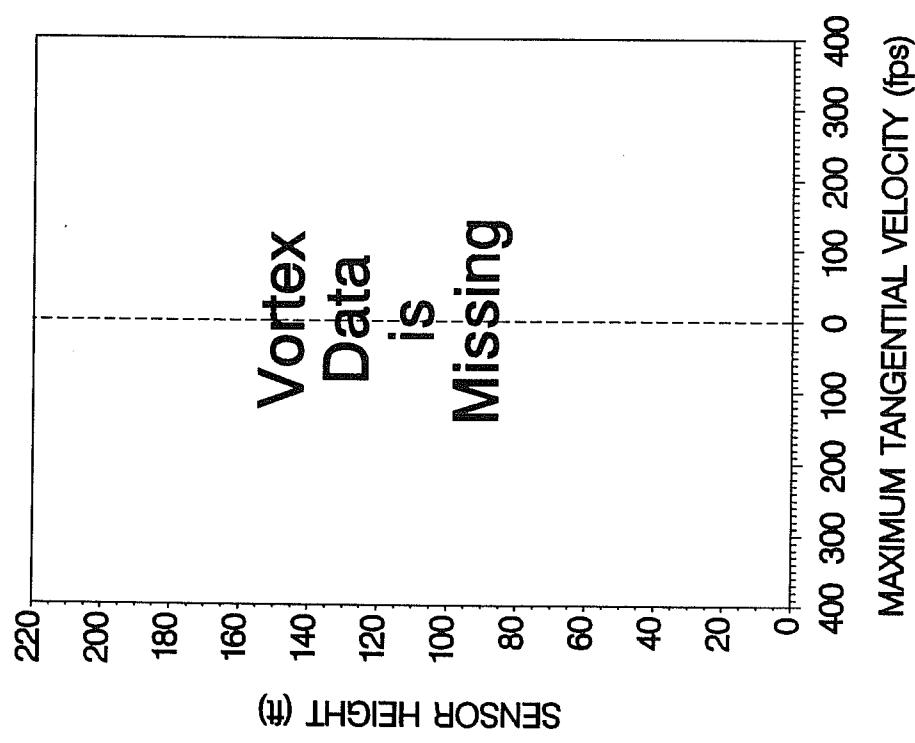


Figure G-233. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 51, ambient wind speed = 6.0 kts,  $\delta_F = 30^\circ$ , IAS = 134 kts, GW = 244,500 lbs. Ages, radii, and velocities of the vortex cores are 10 and 17 s, 1.2 and 0.8 ft, and 77.2 and 74.2 fps, respectively.

UAL 767-200 -- FLYBY 52  
DOWNWIND VORTEX VELOCITY PROFILE



UAL 767-200 -- FLYBY 52  
UPWIND VORTEX VELOCITY PROFILE

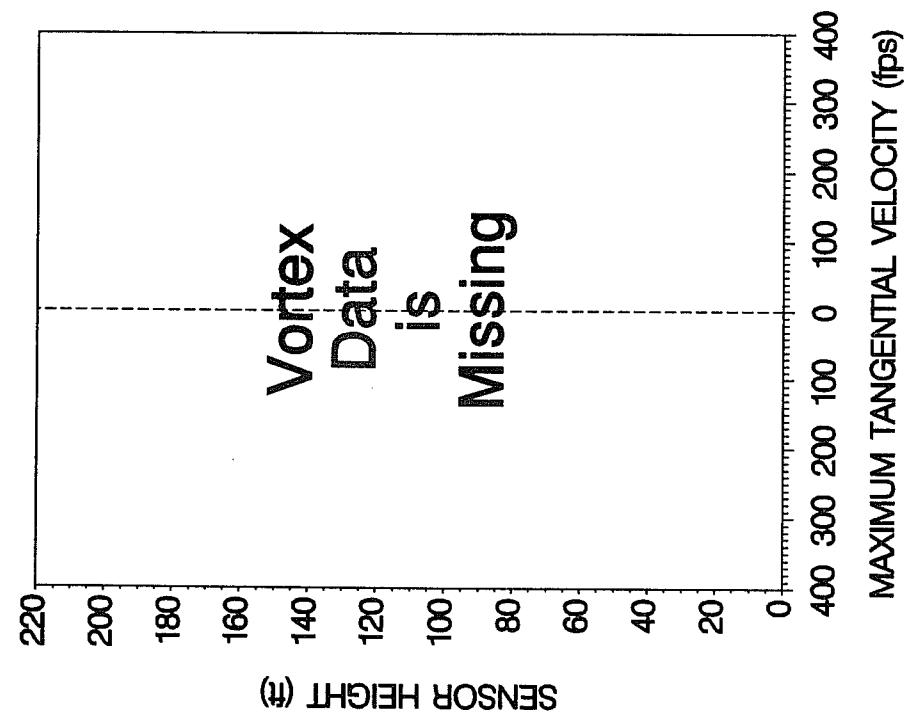


Figure G-234. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 52, ambient wind speed=9.1 kts,  $\delta_F=5^\circ$ , IAS=146 kts, GW=243,000 lbs. Ages, radii, and velocities of the vortex cores are (M) and (M) s, (M) and (M) ft, and (M) and (M) fps, respectively.

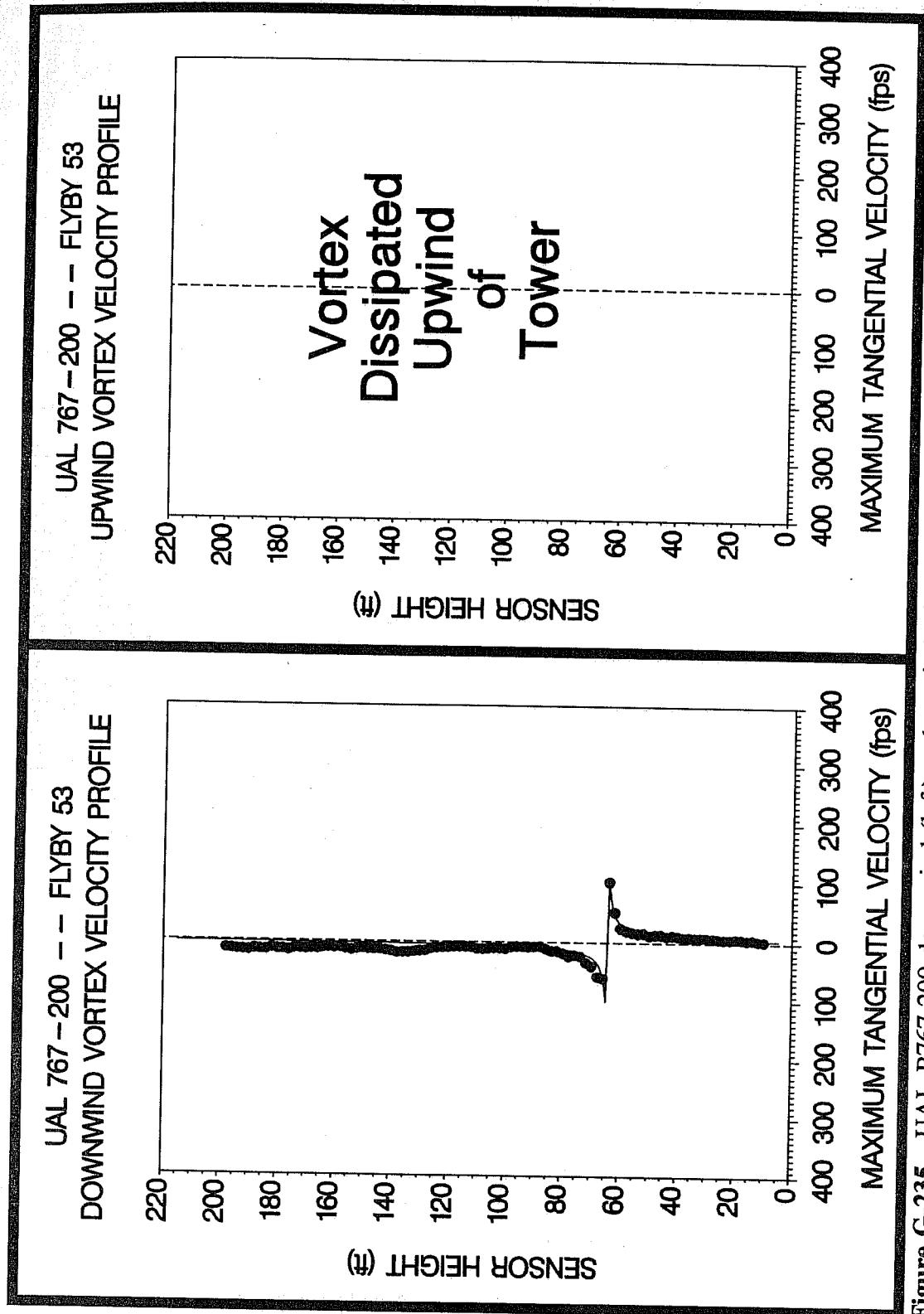
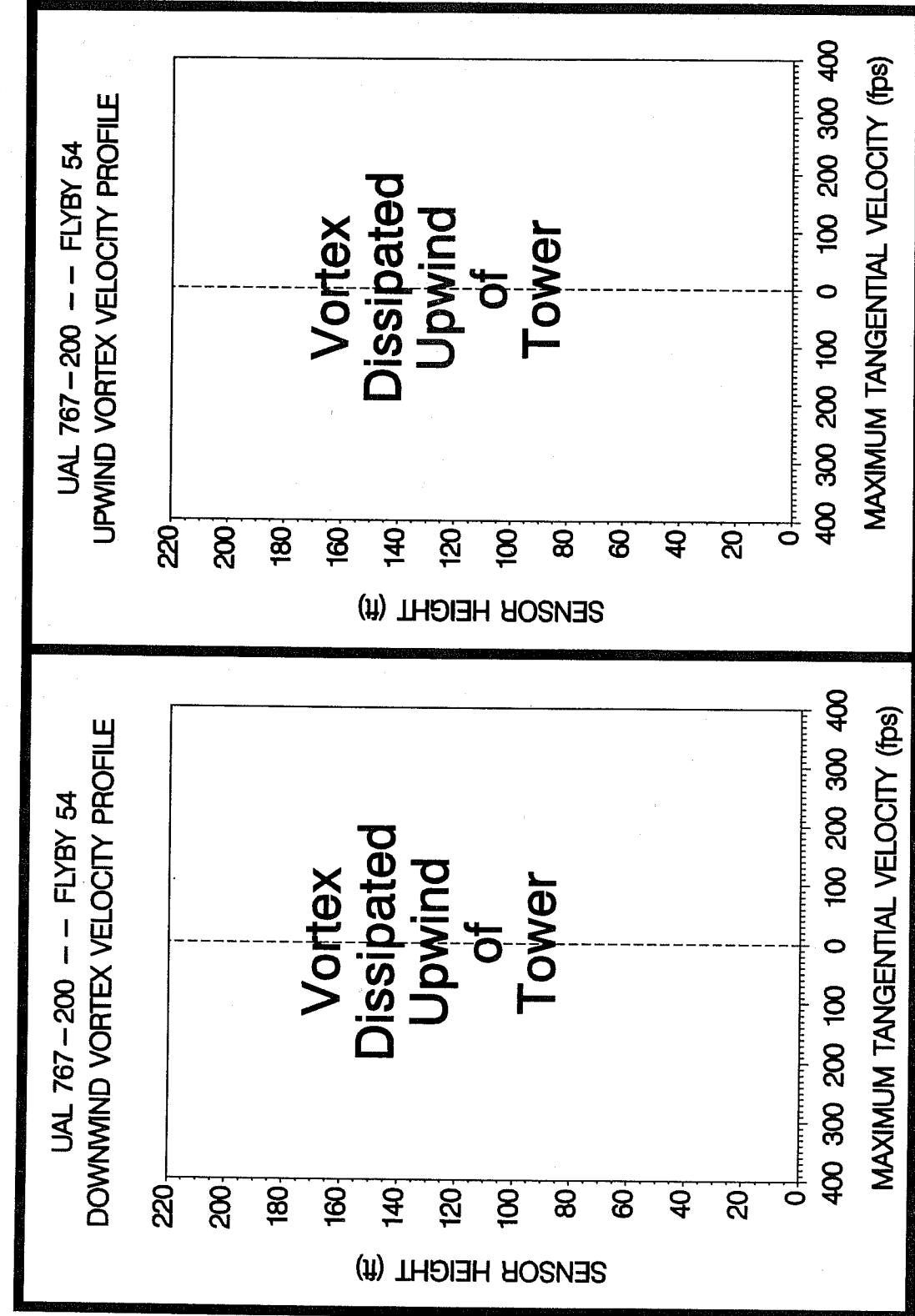


Figure G-235. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 53, ambient wind speed = 7.9 kts,  $\delta_F = 1^\circ$ ,  $IAS = 151$  kts,  $GW = 242,300$  lbs. Ages, radii, and velocities of the vortex cores are 33 and (D) s, 0.4 and (D) ft, and 101.2 and (D) fps, respectively.



**Figure G-236.** UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 54, ambient wind speed = 8.6 kts,  $\delta_F = 0^\circ$ , IAS = 207 kts, GW = 241,700 lbs. Ages, radii, and velocities of the vortex cores are (D) and (D) s, (D) and (D) ft, and (D) and (D) fps, respectively.

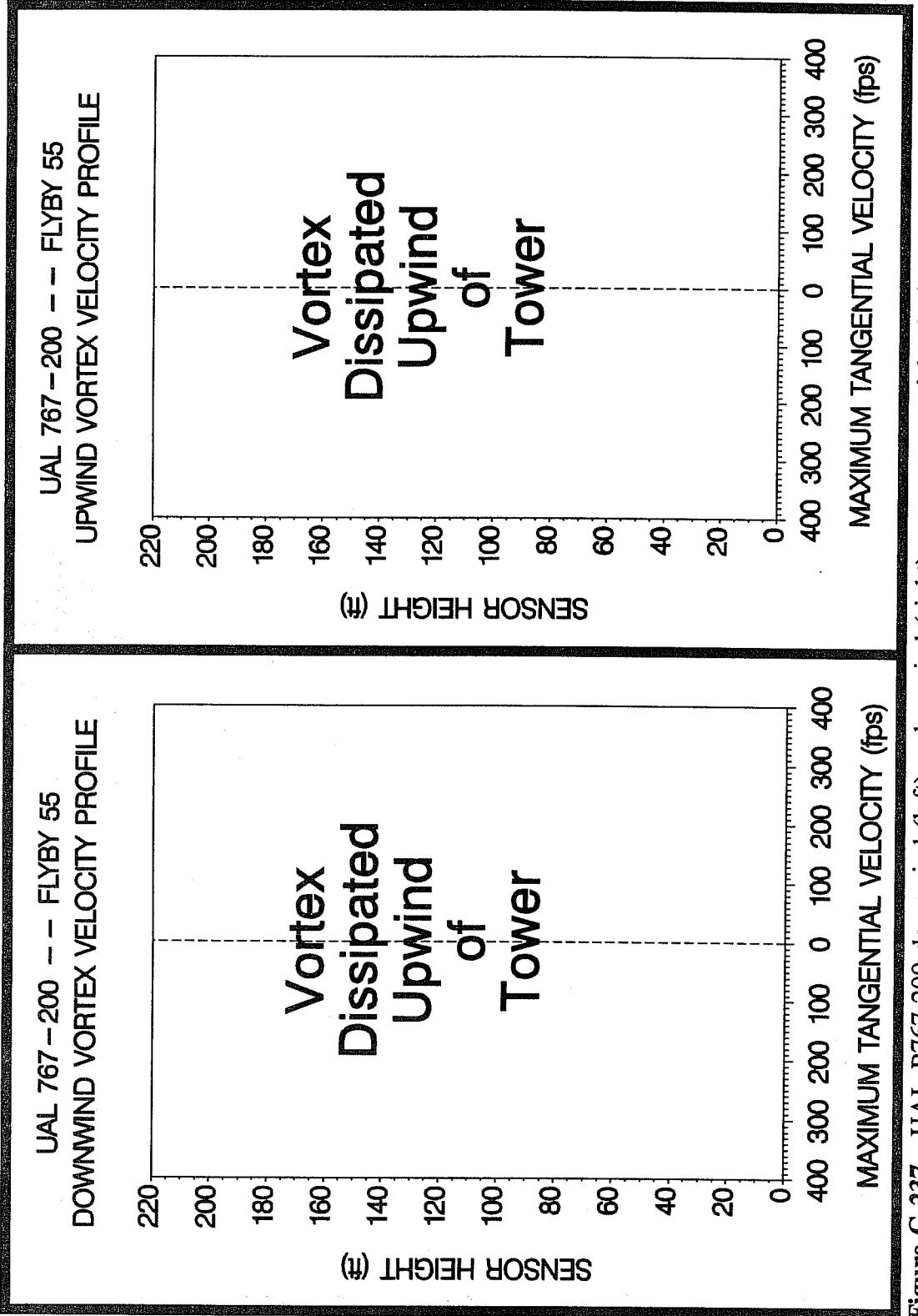


Figure G-237. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 55, ambient wind speed = 4.1 kts,  $\delta_F = 1^\circ$ , IAS = 150 kts, GW = 240,500 lbs. Ages, radii, and velocities of the vortex cores are (D) and (D) s, (D) and (D) ft, and (D) and (D) fps, respectively.

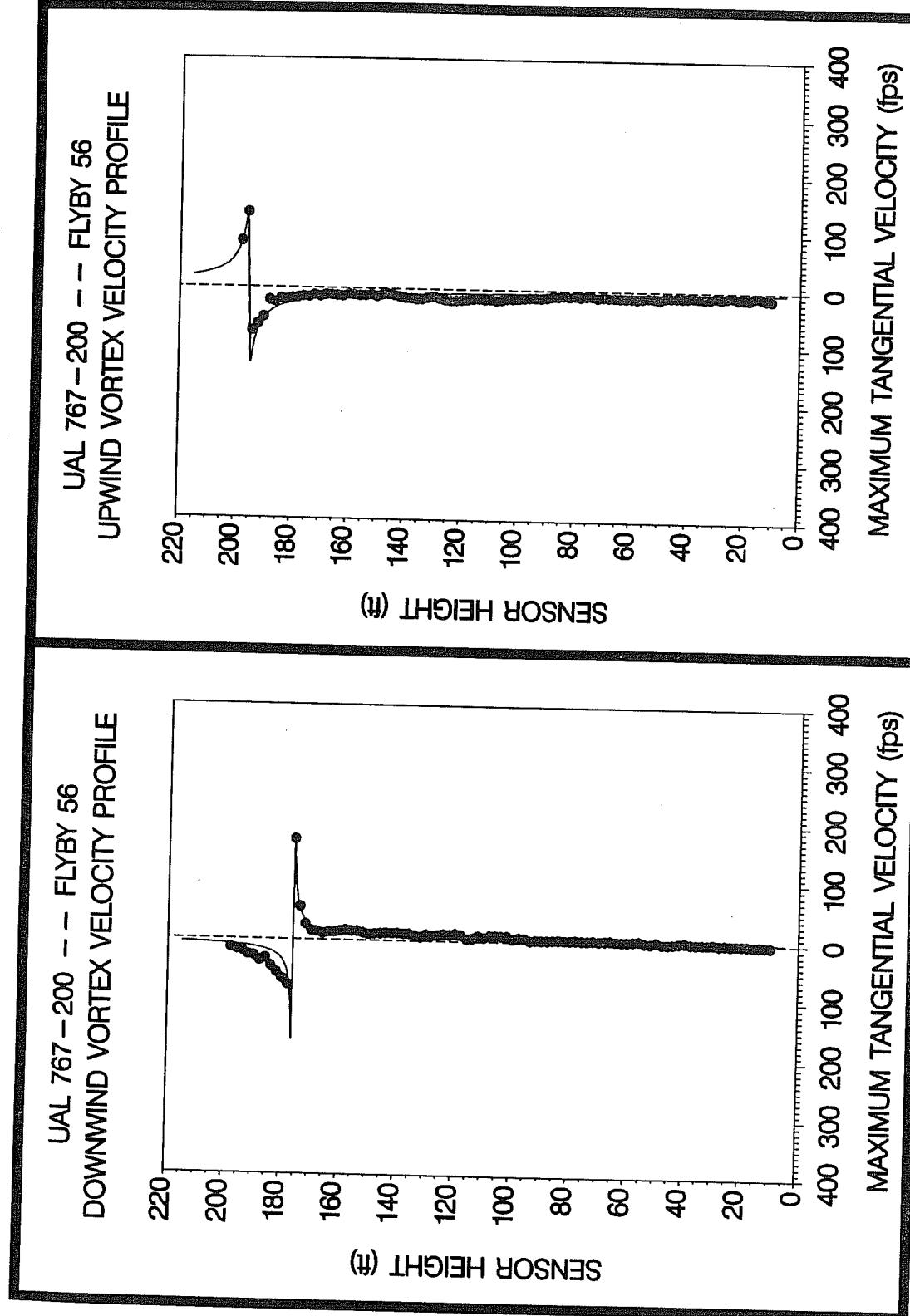


Figure G-238. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 56, ambient wind speed = 8.7 kts,  $\delta_F = 5^\circ$ ,  $IAS = 145$  kts,  $GW = 239,500$  lbs. Ages, radii, and velocities of the vortex cores are 13 and 18 s, 0.2 and 0.7 ft, and 169.6 and 131.8 fps, respectively.

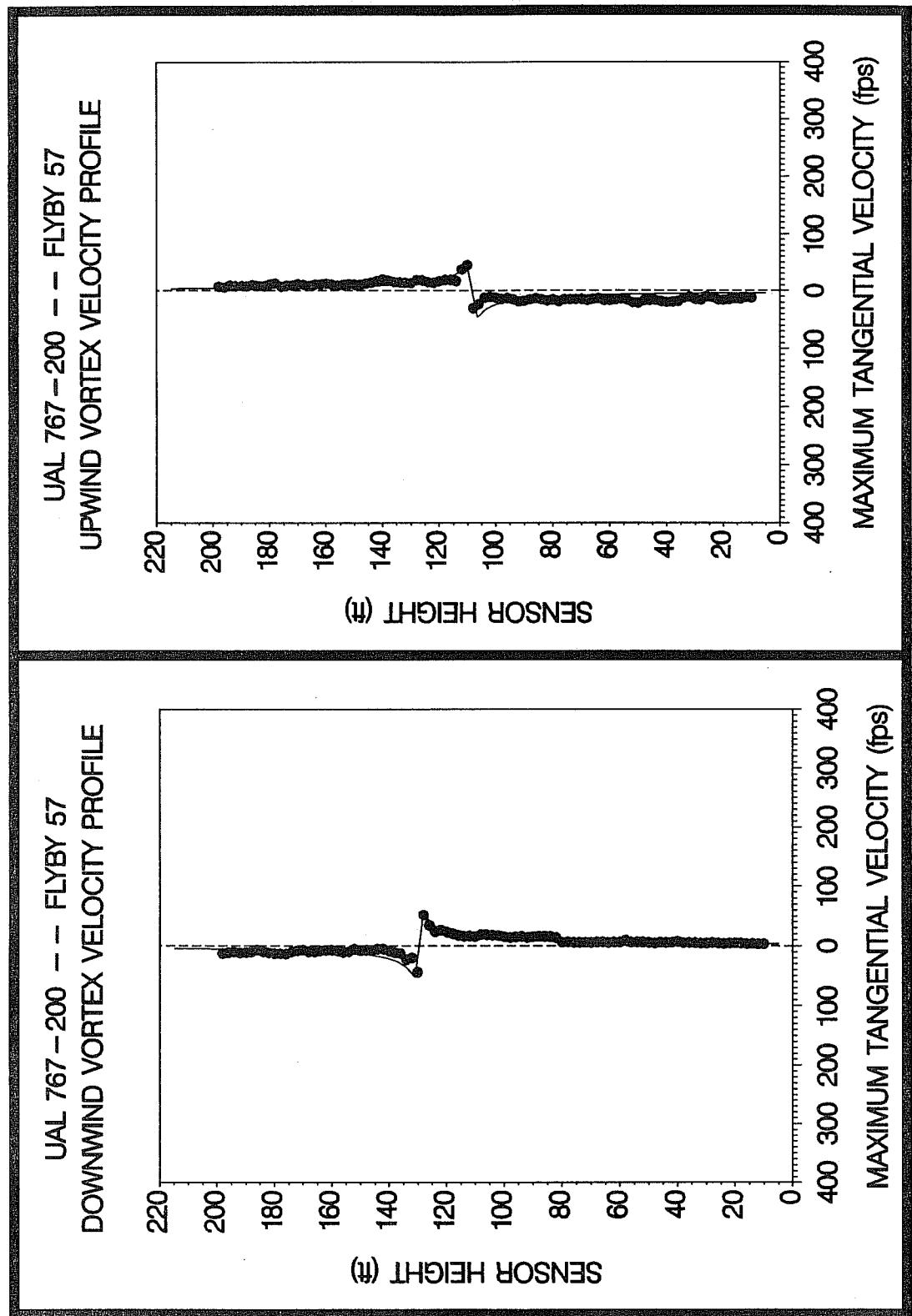


Figure G-239. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 57, ambient wind speed = 7.9 kts,  $\delta_F = 1^\circ$ , IAS = 150 kts, GW = 238,600 lbs. Ages, radii, and velocities of the vortex cores are 12 and 16 s, 1.6 and 1.7 ft, and 51.1 and 45.3 fps, respectively.

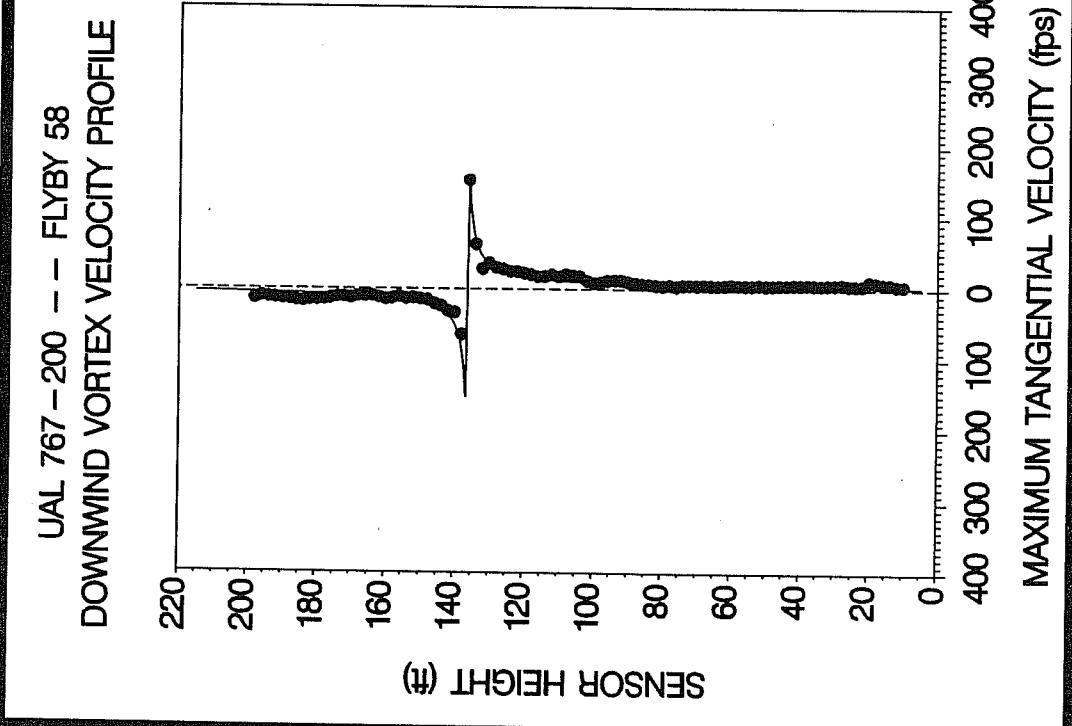
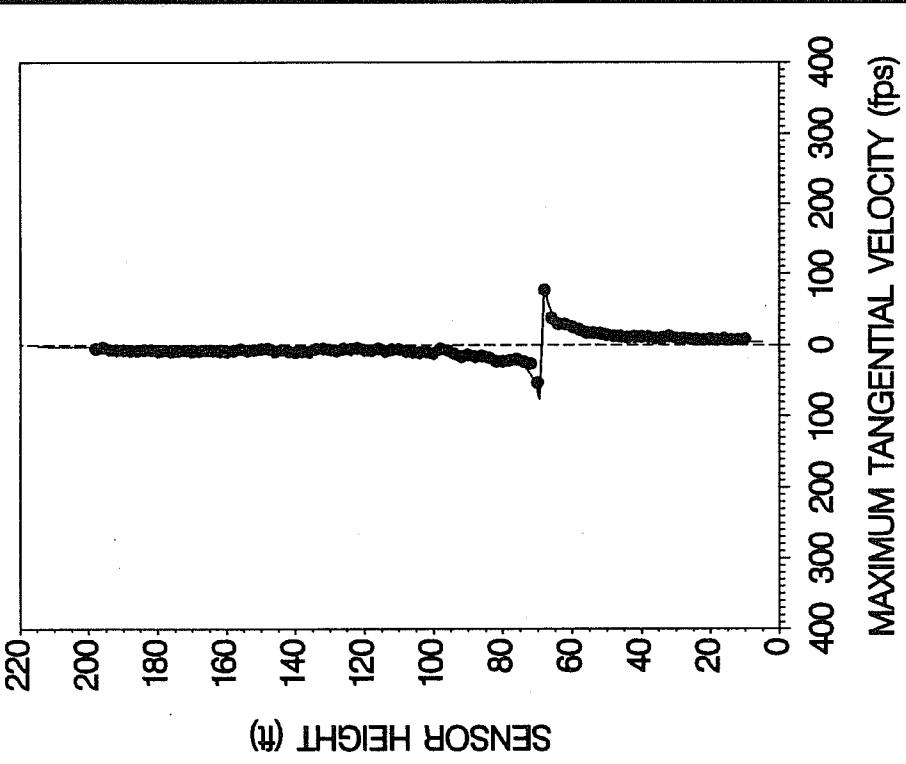


Figure G-240. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 58, ambient wind speed = 7.8 kts,  $\delta_F = 5^\circ$ , IAS = 144 kts, GW = 238,000 lbs. Ages, radii, and velocities of the vortex cores are 15 and 25 s, 0.4 and 1.4 ft, and 153.0 and 44.6 fps, respectively.

UAL 767-200 -- FLYBY 59  
DOWNWIND VORTEX VELOCITY PROFILE



UAL 767-200 -- FLYBY 59  
UPWIND VORTEX VELOCITY PROFILE

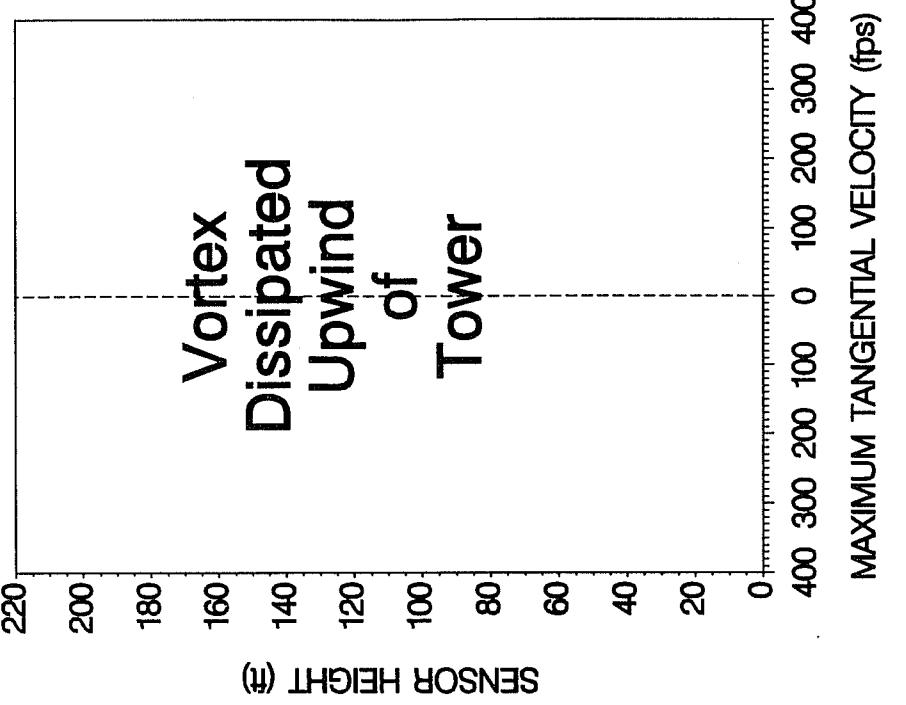


Figure G-241. UAL B767-200 downwind (left) and upwind (right) vortex tangential velocity profiles at maximum intensity from Day of Year 273, Flyby 59, ambient wind speed = 6.2 kts,  $\delta_F = 15^\circ$ , IAS = 137 kts, GW = 237,000 lbs. Ages, radii, and velocities of the vortex cores are 28 and (D) s, 0.7 and (D) ft, and 76.5 and (D) fps, respectively.