
Wake turbulence injury involving a Boeing 747 and Boeing 737, September 13, 2004

Micro-summary: This Boeing 737 encountered wake turbulence from a Boeing 747 on approach, seriously injuring a flight attendant.

Event Date: 2004-09-13 at 2003 PDT


Investigative Body: National Transportation Safety Board (NTSB), USA

Investigative Body's Web Site: <http://www.nts.gov/>

Cautions:

1. Accident reports can be and sometimes are revised. Be sure to consult the investigative agency for the latest version before basing anything significant on content (e.g., thesis, research, etc).
 2. Readers are advised that each report is a glimpse of events at specific points in time. While broad themes permeate the causal events leading up to crashes, and we can learn from those, the specific regulatory and technological environments can and do change. ***Your company's flight operations manual is the final authority as to the safe operation of your aircraft!***
 3. Reports may or may not represent reality. Many many non-scientific factors go into an investigation, including the magnitude of the event, the experience of the investigator, the political climate, relationship with the regulatory authority, technological and recovery capabilities, etc. It is recommended that the reader review all reports analytically. Even a "bad" report can be a very useful launching point for learning.
 4. Contact us before reproducing or redistributing a report from this anthology. Individual countries have very differing views on copyright! We can advise you on the steps to follow.
-

Aircraft Accident Reports on DVD, Copyright © 2006 by Flight Simulation Systems, LLC
All rights reserved.
www.fss.aero

		NTSB ID: LAX04LA318		Aircraft Registration Number: N601WN	
		Occurrence Date: 09/13/2004		Most Critical Injury: Serious	
		Occurrence Type: Accident		Investigated By: NTSB	
Location/Time					
Nearest City/Place Los Angeles		State CA	Zip Code 90045	Local Time 2003	Time Zone PDT
Airport Proximity: Off Airport/Airstrip		Distance From Landing Facility: 8		Direction From Airport: 270	
Aircraft Information Summary					
Aircraft Manufacturer Boeing		Model/Series 737-3H4		Type of Aircraft Airplane	
Sightseeing Flight: No			Air Medical Transport Flight: No		
Narrative					
<p>Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:</p> <p>On September 13, 2004, at 2003 Pacific daylight time, a Boeing 737-3H4 transport category airplane, N601WN, operated by Southwest Airlines as flight 1437, landed uneventfully after encountering wake turbulence while on approach to the Los Angeles International Airport (LAX), Los Angeles, California. Two flight crew, 2 cabin attendants, and 42 passengers were uninjured, while 1 flight attendant sustained serious injuries. The airplane was not damaged. Southwest Airlines was operating the airplane, registered to a trustee and leased to Southwest, under the provisions of 14 CFR Part 121 as a scheduled domestic passenger flight. The flight originated from Salt Lake City, Utah, and was destined for LAX. Visual meteorological conditions prevailed, and an instrument flight rules flight plan had been filed.</p> <p>According to a written statement provided by Southwest Airlines safety department, the airplane was on the SADDE 6 arrival into LAX, and was following a Boeing 747 located approximately 5 miles ahead at 10,000 feet. The accident flight was about 8 miles west of the Santa Monica (SMO) very-high frequency omni-directional radio range navigation aid and at 10,000 feet and 250 knots, when the flight crew experienced a "quick and violent roll of about 35 degrees to the left due to wake turbulence from the preceding [Boeing] 747." The captain righted the airplane and the first officer informed air traffic control that they had encountered wake turbulence and were going to offset to the north of the 747's course to avoid any additional wake turbulence. The remaining portion of the flight was uneventful.</p> <p>According to air traffic control records (from the Southern California Terminal Radar Control), controllers cautioned Southwest flight 1437 of wake turbulence from the preceding heavy Boeing 747. The flight crew responded and indicated that they had the Boeing 747 in sight.</p> <p>According to Southwest Airlines written statement, the fasten seat belt sign was illuminated and none of the passengers were out of their seats. However, the flight attendants had not been seated yet (usual time for flight attendants to be seated is during descent out of 10,000 feet). A flight attendant, who was standing in the aft galley at the time of the turbulence encounter, was injured in the cabin area. Southwest Airlines learned the extent of the flight attendant's injuries (broken ribs) 2 days following the event and then notified the National Transportation Safety Board Southwest Regional Office.</p> <p>The Safety Board authorized Southwest Airlines to download the data from the flight data recorder (FDR) for review. The information gleaned from the FDR revealed that the airplane experienced between +0.734 and +1.547 Gs in vertical acceleration, -0.028 and +0.104 Gs in longitudinal acceleration, and -0.181 and +0.271 Gs in lateral acceleration.</p> <p>According to the Federal Aviation Administration's (FAA) safety product brochure titled "CAUTION Wake Turbulence" (www.asy.faa.gov/safety_products/wake.htm), the intensity or strength of the vortex is primarily a function of aircraft weight and configuration. The strongest vortices are</p>					
FACTUAL REPORT - AVIATION					
Page 1					

National Transportation Safety Board

FACTUAL REPORT

AVIATION

SAFETY BOARD


NTSB ID: LAX04LA318


Occurrence Date: 09/13/2004

Occurrence Type: Accident

Narrative (Continued)

produced by heavy aircraft, flying slowly, in a clean configuration (i.e., flaps and landing gear retracted). For example, a large or heavy aircraft that must reduce its speed to 250 knots below 10,000 feet and is flying in a clean configuration while descending, produces a very strong wake. Extra caution is needed when flying below and behind such aircraft. The FAA recommends the following to avoid wake turbulence when following another aircraft: "Stay either on or above the preceding aircraft's flight path, upwind, or at least 1,000 feet below."

 National Transportation Safety Board FACTUAL REPORT AVIATION		NTSB ID: LAX04LA318			
		Occurrence Date: 09/13/2004			
		Occurrence Type: Accident			
Landing Facility/Approach Information					
Airport Name	Airport ID:	Airport Elevation	Runway Used	Runway Length	Runway Width
Los Angeles International	LAX	126 Ft. MSL	24R	8925	150
Runway Surface Type: Concrete					
Runway Surface Condition: Dry					
Type Instrument Approach: Visual					
VFR Approach/Landing: Full Stop					
Aircraft Information					
Aircraft Manufacturer		Model/Series		Serial Number	
Boeing		737-3H4		27695	
Airworthiness Certificate(s): Transport					
Landing Gear Type: Retractable - Tricycle					
Homebuilt Aircraft? No	Number of Seats: 145	Certified Max Gross Wt.	139000 LBS	Number of Engines: 2	
Engine Type:	Engine Manufacturer:	Model/Series:	Rated Power:		
Turbo Fan	General Electric	CFM-56	20000 LBS		
- Aircraft Inspection Information					
Type of Last Inspection	Date of Last Inspection	Time Since Last Inspection	Airframe Total Time		
Continuous Airworthiness	07/2004	792 Hours	32767 Hours		
- Emergency Locator Transmitter (ELT) Information					
ELT Installed? No	ELT Operated?	ELT Aided in Locating Accident Site?			
Owner/Operator Information					
Registered Aircraft Owner		Street Address			
Southwest Airlines Co		2833 Shorecrest Drive			
		City	State	Zip Code	
		Dallas	TX	75235	
Operator of Aircraft		Street Address			
Same as Reg'd Aircraft Owner		Same as Reg'd Aircraft Owner			
		City	State	Zip Code	
Operator Does Business As: Southwest Airlines			Operator Designator Code: SWAA		
- Type of U.S. Certificate(s) Held:					
Air Carrier Operating Certificate(s): Flag Carrier/Domestic					
Operating Certificate:			Operator Certificate:		
Regulation Flight Conducted Under: Part 121: Air Carrier					
Type of Flight Operation Conducted: Scheduled; Domestic; Passenger Only					
FACTUAL REPORT - AVIATION					

 <p>National Transportation Safety Board FACTUAL REPORT AVIATION</p>	NTSB ID: LAX04LA318
	Occurrence Date: 09/13/2004
	Occurrence Type: Accident

First Pilot Information

Name On File	City On File	State On File	Date of Birth On File	Age 47
-----------------	-----------------	------------------	--------------------------	-----------

Sex: M	Seat Occupied: Left	Principal Profession: Occupational Pilot	Certificate Number: On File
--------	---------------------	------------------------------------------	-----------------------------

Certificate(s): Airline Transport

Airplane Rating(s): Multi-engine Land

Rotorcraft/Glider/LTA: None

Instrument Rating(s): Airplane

Instructor Rating(s): None

Type Rating/Endorsement for Accident/Incident Aircraft? Yes	Current Biennial Flight Review? 08/2004
-------------------------------------------------------------	-----------------------------------------

Medical Cert.: Class 1	Medical Cert. Status: Valid Medical--no waivers/lim.	Date of Last Medical Exam: 07/2004
------------------------	------------------------------------------------------	------------------------------------

- Flight Time Matrix	All A/C	This Make and Model	Airplane Single Engine	Airplane Multi-Engine	Night	Instrument		Rotorcraft	Glider	Lighter Than Air
						Actual	Simulated			
Total Time	9300	4700								
Pilot In Command(PIC)	3000	175								
Instructor										
Last 90 Days	195	195								
Last 30 Days	64	64								
Last 24 Hours	5	5								

Seatbelt Used? Yes	Shoulder Harness Used? Yes	Toxicology Performed? No	Second Pilot? Yes
--------------------	----------------------------	--------------------------	-------------------

Flight Plan/Itinerary

Type of Flight Plan Filed: IFR

Departure Point Salt Lake City	State UT	Airport Identifier SLC	Departure Time 1915	Time Zone PDT
-----------------------------------	-------------	---------------------------	------------------------	------------------

Destination Same as Accident/Incident Location	State	Airport Identifier LAX	
---------------------------------------------------	-------	---------------------------	--


Type of Clearance: IFR; VFR

Type of Airspace: Class B

Weather Information

Source of Briefing: Company

Method of Briefing: Unknown

 <p>National Transportation Safety Board FACTUAL REPORT AVIATION</p>	NTSB ID: LAX04LA318
	Occurrence Date: 09/13/2004
	Occurrence Type: Accident

Weather Information

WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
LAX	2003	PDT	126 Ft. MSL	8 NM	90 Deg. Mag.

Sky/Lowest Cloud Condition: Few	1300 Ft. AGL	Condition of Light: Day
---------------------------------	--------------	-------------------------

Lowest Ceiling: None	Ft. AGL	Visibility: 10	SM	Altimeter: 29.79	"Hg
----------------------	---------	----------------	----	------------------	-----

Temperature: 22 °C	Dew Point: 18 °C	Wind Direction:	Density Altitude: Ft.
--------------------	------------------	-----------------	-----------------------

Wind Speed: Calm	Gusts:	Weather Conditions at Accident Site: Visual Conditions
------------------	--------	--------------------------------------------------------

Visibility (RVR): Ft.	Visibility (RVV) SM	Intensity of Precipitation:
-----------------------	---------------------	-----------------------------

Restrictions to Visibility: No Obscuration; No Precipitation

Type of Precipitation:

Accident Information

Aircraft Damage: None	Aircraft Fire: None	Aircraft Explosion: None
-----------------------	---------------------	--------------------------

Classification: U.S. Registered/U.S. Soil

- Injury Summary Matrix	Fatal	Serious	Minor	None	TOTAL
First Pilot				1	1
Second Pilot				1	1
Student Pilot					
Flight Instructor					
Check Pilot					
Flight Engineer					
Cabin Attendants		1		2	3
Other Crew					
Passengers				42	42
- TOTAL ABOARD -		1		46	47
Other Ground					
- GRAND TOTAL -		1		46	47

National Transportation Safety Board

FACTUAL REPORT

AVIATION



NTSB ID: LAX04LA318

Occurrence Date: 09/13/2004

Occurrence Type: Accident

Administrative Information

Investigator-In-Charge (IIC)

Nicole L. Charnon

Additional Persons Participating in This Accident/Incident Investigation:

Fred Griffin
Air Safety Inspector
Federal Aviation Administration
2250 E. Imperial Hwy, Suite 140
El Segundo, CA 90245