



Aviation Investigation Final Report

Location:	Laverne, Oklahoma	Accident Number:	WPR12LA144
Date & Time:	March 20, 2012, 08:30 Local	Registration:	N247WN
Aircraft:	Boeing 737-7H4	Aircraft Damage:	None
Defining Event:	Turbulence encounter	Injuries:	1 Serious, 141 None
Flight Conducted Under:	Part 121: Air carrier - Scheduled		

Analysis

The flight had been experiencing moderate turbulence along its route. Once the turbulence had subsided, the seatbelt sign was turned off. The flight attendants had resumed their service when the flight encountered three additional turbulence jolts. The aft galley flight attendant was trying to get seated and strapped into the jumpseat but was injured when another turbulence jolt occurred. She was thrown across the galley and hit her back/ribs on an object. Flight data recorder information showed that vertical accelerations fluctuated between about 0.75 g and 1.2 g; lateral accelerations also fluctuated during this period, between about +/- 0.05 g. An airmen’s meteorological information advisory for moderate turbulence was active for the accident location at the time. A significant meteorological information advisory for occasional severe turbulence was active for an area west of the accident location.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The airplane’s encounter with severe turbulence during cruise flight, which resulted in a serious injury to a flight attendant.

Findings

Environmental issues	Clear air turbulence - Effect on personnel
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Factual Information

History of Flight

Enroute-cruise	Turbulence encounter (Defining event)
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HISTORY OF FLIGHT

On March 20, 2012, at 0830 central daylight time, a Boeing 737-7H4, N247WN, experienced turbulence during cruise flight near Laverne, Oklahoma. Southwest Airlines operated the airplane as Flight 162 under the provisions of 14 Code of Federal Regulations Part 121. The flight crew, 2 flight attendants, and 137 passengers were not injured; 1 flight attendant sustained serious injuries. The airplane was not damaged. An instrument flight rules (IFR) flight plan had been filed for the flight that departed Tampa International Airport (TPA), Tampa, Florida, at 0653 eastern daylight time. The flight was destined for Phoenix Sky Harbor International Airport (PHX), Phoenix, Arizona.

According to Southwest Airlines, the airplane was in cruise flight over Laverne when it encountered three turbulence jolts. The aft galley flight attendant was injured while trying to get seated and strapped into the jump seat when another turbulence jolt occurred. The flight attendant was able to perform all required safety duties for the remainder of the flight, but reported significant back pain upon arrival to Phoenix. The flight attendant was not transported to a hospital. On March 22, the flight attendant informed the company that she had been diagnosed with a rib fracture.

In statements submitted by the flight attendants, they reported that there was a long duration of turbulence during cruise. When the turbulence diminished, the seatbelt sign was turned off. They got up and then it started to become turbulent again. As the two flight attendants in the back of the airplane attempted to secure themselves in the aft jumpseats, one of them was thrown across the galley and hit her back/ribs on an object.

FLIGHT RECORDERS

Data obtained from the flight data recorder (FDR) showed that the airplane climbed to flight level 380 shortly after departure. About 0824, winds aloft speed calculated by the flight management computer (FMC) was about 140 knots from about 160 degrees true. For about 5 minutes around this time at flight level 380, vertical accelerations fluctuated between about 0.75g and 1.2g; lateral accelerations also fluctuated during this period, between about +/- 0.05g. At 0827, the airplane descended from flight 380 to flight level 340. Shortly after the descent began, the fluctuations in vertical and lateral accelerations decreased, fluctuating between 0.997g and 1.004g and +/- 0.01g, respectively. After 9 minutes at flight level 340, during the period of otherwise decreased vertical and lateral accelerations, the vertical

acceleration varied from about 0.255g to 1.7g within a 1-second period of time at 08:38:20. About 20 minutes after this vertical acceleration encounter, the FMC calculated a decrease in winds aloft at flight level 320 to under 30 knots for about 12 minutes; during this 12-minute period the winds aloft shifted from about 160 degrees true to 340 degrees true.

Because this was not determined to be an accident until 2 days after the event, the cockpit voice recorder information was written over by normal use.

METEOROLOGICAL INFORMATION

A Senior Meteorologist completed a weather study. A 250-hectopascal (hPa) analysis chart obtained from the Storm Prediction Center and valid for 0700 central daylight time (CDT) identified a portion of a jet stream stretching north from central Texas into Canada. A jet streak (localized regions of very fast winds embedded within the jet stream) was identified in the vicinity of the accident location with southerly wind magnitudes greater than 150 knots. Calculations by the Rawinsonde Observation Program (RAOB) indicated the potential for significant clear-air turbulence between about 36,000 and 40,000 feet.

An Airmen’s Meteorological Information (AIRMET) advisory for moderate turbulence between FL220 and FL430 was issued at 0525 CDT and was active for the accident location at the accident time. A Significant Meteorological Information (SIGMET) advisory for occasional severe turbulence between FL330 and FL380 was issued at 0526 CDT for an area west of the accident location. This SIGMET was valid until 0926 CDT.

Pilot Information

Certificate:	Airline transport; Flight instructor	Age:	47, Male
Airplane Rating(s):	Single-engine land; Multi-engine land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine; Instrument airplane	Toxicology Performed:	No
Medical Certification:	Class 1 Without waivers/limitations	Last FAA Medical Exam:	March 14, 2012
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	February 3, 2012
Flight Time:	23050 hours (Total, all aircraft), 18050 hours (Total, this make and model), 17350 hours (Pilot In Command, all aircraft), 189 hours (Last 90 days, all aircraft), 83 hours (Last 30 days, all aircraft), 6 hours (Last 24 hours, all aircraft)		

Co-pilot Information

Certificate:	Airline transport	Age:	42, Male
Airplane Rating(s):	Single-engine land; Multi-engine land	Seat Occupied:	Right
Other Aircraft Rating(s):	None	Restraint Used:	
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 1 Without waivers/limitations	Last FAA Medical Exam:	October 18, 2011
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	September 9, 2011
Flight Time:	7997 hours (Total, all aircraft), 3622 hours (Total, this make and model), 2810 hours (Pilot In Command, all aircraft), 143 hours (Last 90 days, all aircraft), 19 hours (Last 30 days, all aircraft), 5 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Boeing	Registration:	N247WN
Model/Series:	737-7H4	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	
Airworthiness Certificate:	Transport	Serial Number:	32508
Landing Gear Type:	Retractable - Tricycle	Seats:	140
Date/Type of Last Inspection:	March 15, 2012 Continuous airworthiness	Certified Max Gross Wt.:	154500 lbs
Time Since Last Inspection:	103 Hrs	Engines:	2 Turbo fan
Airframe Total Time:	20917 Hrs as of last inspection	Engine Manufacturer:	CFM INTL
ELT:	Not installed	Engine Model/Series:	CFM56-7B24
Registered Owner:	SOUTHWEST AIRLINES CO	Rated Power:	24200 Lbs thrust
Operator:	SOUTHWEST AIRLINES CO	Operating Certificate(s) Held:	Flag carrier (121)
Operator Does Business As:		Operator Designator Code:	SWAA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:	WWR,2189 ft msl	Distance from Accident Site:	26 Nautical Miles
Observation Time:	08:35 Local	Direction from Accident Site:	315°
Lowest Cloud Condition:	Clear	Visibility	10 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	7 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	140°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	29.72 inches Hg	Temperature/Dew Point:	8°C / 6°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Tampa, FL (TPA)	Type of Flight Plan Filed:	IFR
Destination:	Phoenix, AZ (PHX)	Type of Clearance:	IFR
Departure Time:	06:53 Local	Type of Airspace:	

Airport Information

Airport:	West Woodward Airport WWR	Runway Surface Type:	
Airport Elevation:	2189 ft msl	Runway Surface Condition:	
Runway Used:		IFR Approach:	None
Runway Length/Width:		VFR Approach/Landing:	None

Wreckage and Impact Information

Crew Injuries:	1 Serious, 4 None	Aircraft Damage:	None
Passenger Injuries:	137 None	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Serious, 141 None	Latitude, Longitude:	36.700466,-99.889244(est)

Administrative Information

Investigator In Charge (IIC):	Cornejo, Tealeye
Additional Participating Persons:	Tod E Jacobs; Federal Aviation Administration - CMO; Phoenix, AZ Dennis Post; Southwest Airlines; Dallas, TX
Original Publish Date:	October 29, 2013
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=83196

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