



National Transportation Safety Board Aviation Accident Final Report

Location:	CROSS CITY, FL	Accident Number:	MIA98LA002
Date & Time:	10/01/1997, 2044 EDT	Registration:	N33502
Aircraft:	McDonnell Douglas DC-9-82	Aircraft Damage:	None
Defining Event:		Injuries:	1 Serious, 3 Minor, 91 None
Flight Conducted Under:	Part 121: Air Carrier - Scheduled		

Analysis

During cruise flight at flight level 330, while deviating to the right to avoid a nearby thunderstorm of level 6 intensity, the flight encountered turbulence that seriously injured a flight attendant. As reported by the captain, the moderate turbulence lasted about 1 second. At that time the seat belt sign was not illuminated. About 2 minutes after the accident, the Jacksonville Air Route Traffic Control Center Weather Service Unit issued a center weather advisory which indicated a thunderstorm with moderate rain, tops to flight level 450, 20 nautical miles in diameter. When plotted, the location was located about 23 nautical miles from the accident location.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The in-flight encounter with turbulence associated with a nearby level 6 thunderstorm with moderate rain while deviating.

Findings

Occurrence #1: IN FLIGHT ENCOUNTER WITH WEATHER
Phase of Operation: CRUISE - NORMAL

Findings

1. (C) WEATHER CONDITION - TURBULENCE(THUNDERSTORMS)

Factual Information

On October 1, 1997, about 2044 eastern daylight time, a McDonnell Douglas DC-9-82, N33052, registered to and operated by American Airlines, Inc., as flight 230, experienced in-flight turbulence during cruise flight near Cross City, Florida. Instrument meteorological conditions prevailed at the time and an IFR flight plan was filed for the 14 CFR Part 121 scheduled, domestic, passenger flight. The airplane was not damaged and the airline transport-rated captain, commercial-rated first officer, and 89 passengers were not injured. One flight attendant was seriously injured and two flight attendants and one passenger sustained minor injuries. The flight originated about 1755 central daylight time from the Chicago-O'Hare International Airport, Chicago, Illinois.

According to the captain, the flight was about 110 nautical miles north of the PIE VORTAC when they encountered a rapidly developing thunderstorm from below. As the cell appeared on radar, he checked the winds aloft on the Flight Management System (FMS) and began a turn to the right. The flight then experienced no more than 1 second of moderate turbulence which injured all 3 flight attendants; there were no reported injuries to any of the passengers. The flight continued and landed uneventfully about 24 minutes later. The seat belt sign was not illuminated at the time of the occurrence. The Digital Flight Data Recorder (DFDR) was removed from the airplane and read out. A copy of the readout is an attachment to this report.

A National Track Analysis Program (NTAP) from the Jacksonville Air Route Traffic Control Center which depicts changes in heading, altitude, and ground speed is an attachment to this report.

Review of the DFDR readout revealed that about 15 seconds before the autopilot system was deactivated and continuing for about 12 seconds, the airplane began a roll to the right which increased to about an 11 degree right wing low attitude. During that time frame, both engine EPRs decreased and the indicated airspeed increased from about 274 knots to a high of about 278 knots and ended at about 276 knots. Two seconds later the aircraft's vertical acceleration increased from a maximum of positive .95 Gs to a maximum of 1.75 Gs, and the aircraft rolled to the right about 15 degrees. One second later the autopilot system was deactivated, and one second after that the airplane rolled to the maximum of about 30 degrees right wing low and the airplane experienced a maximum of negative .28 Gs. The vertical acceleration values diminished and the airplane was returned to cruise flight.

According to the NTSB Meteorological Factual Report which is an attachment to this report, review of Weather Surveillance Radar from Tallahassee, Florida, for the period of 2033.15 to 2042.55, revealed a level 4 radar return located under and to the east of the flight track of the airplane in the area of the accident. Due to the configuration of the radar at the time, the highest elevation for detection was 30,500 feet. The same radar returns for the period 2043.03, and 2052.44, revealed a radar return of level 3 to 6 along and to the east of the flight track. Additionally, about 2 minutes after the accident, or 2046 local, the Jacksonville Air Route Traffic Control Center Weather Service Unit issued Center Weather Advisory 101. This indicated a cluster of level 5 thunderstorm/moderate rain with a diameter of 20 nautical miles with maximum tops to FL450. The center of which was located about 60 nautical miles west-southwest of Cross City, Florida. That location when plotted was about 23 nautical miles west-southwest of the accident location.

Pilot Information

Certificate:	Airline Transport; Commercial; Flight Engineer	Age:	41, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 1 Valid Medical--no waivers/lim.	Last FAA Medical Exam:	05/19/1997
Occupational Pilot:		Last Flight Review or Equivalent:	
Flight Time:	3389 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	McDonnell Douglas	Registration:	N33502
Model/Series:	DC-9-82 DC-9-82	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Transport	Serial Number:	49739
Landing Gear Type:	Retractable - Tricycle	Seats:	139
Date/Type of Last Inspection:	09/20/1997, Continuous Airworthiness	Certified Max Gross Wt.:	149500 lbs
Time Since Last Inspection:	28 Hours	Engines:	2 Turbo Fan
Airframe Total Time:	23882 Hours	Engine Manufacturer:	P&W
ELT:	Installed, not activated	Engine Model/Series:	JT8D
Registered Owner:	AMERICAN AIRLINES, INC.	Rated Power:	21000 lbs
Operator:	AMERICAN AIRLINES, INC.	Operating Certificate(s) Held:	Flag carrier (121)
Operator Does Business As:		Operator Designator Code:	AALA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument Conditions	Condition of Light:	Night/Bright
Observation Facility, Elevation:	GNV, 152 ft msl	Distance from Accident Site:	80 Nautical Miles
Observation Time:	2050 EDT	Direction from Accident Site:	89°
Lowest Cloud Condition:	Clear / 0 ft agl	Visibility	7 Miles
Lowest Ceiling:	None / 0 ft agl	Visibility (RVR):	0 ft
Wind Speed/Gusts:	4 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	300°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	29 inches Hg	Temperature/Dew Point:	23° C / 19° C
Precipitation and Obscuration:			
Departure Point:	CHICAGO, IL (ORD)	Type of Flight Plan Filed:	IFR
Destination:	TAMPA, FL (TPA)	Type of Clearance:	IFR
Departure Time:	1755 CDT	Type of Airspace:	Class A

Wreckage and Impact Information

Crew Injuries:	1 Serious, 2 Minor, 2 None	Aircraft Damage:	None
Passenger Injuries:	1 Minor, 89 None	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Serious, 3 Minor, 91 None	Latitude, Longitude:	

Administrative Information

Investigator In Charge (IIC):	TIMOTHY W MONVILLE	Report Date:	11/10/1998
Additional Participating Persons:	STAN F OKON; ORLANDO, FL		
Publish Date:			
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinquiry@ntsb.gov , or at 800-877-6799. Dockets released after this date are available at http://dms.nts.gov/pubdms/ .		

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The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).