Turbulence on descent, Boeing 777-223, February 25, 2003

Micro-summary: **This Boeing 777-223 encountered turbulence on descent, injuring two flight attendants.**

Event Date: **2003-02-25 at 1616 EST**

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

Investigative Body's Web Site: **http://www.ntsb.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.

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National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB ID: MIA03LA067	Aircraft Registration Number: N790AN
Occurrence Date: 02/25/2003	Most Critical Injury: Serious
Occurrence Type: Accident	Investigated By: NTSB

Location/Time

Nearest City/Place	State	Zip Code	Local Time	Time Zone	
Miami	FL	33159	1616	EST	

Airport Proximity: Off Airport/Airstrip	Distance From Landing Facility:	Direction From Airport:

Aircraft Information Summary

Aircraft Manufacturer	Model/Series	Type of Aircraft
Boeing	777-223	Airplane

Sightseeing Flight: No Air Medical Transport Flight: No

Narrative

Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:

On February 25, 2003, about 1616 eastern standard time, a Boeing 777-223, N790AN, operated by American Airlines Inc. (Flt AA1614), as a Title 14 CFR Part 121 scheduled domestic flight, encountered turbulence while on descent to Miami International Airport, Miami, Florida. Visual meteorological conditions prevailed. An instrument flight rules flight plan was filed. The airplane was not damaged. The two airline transport-rated pilots, six flight attendants, and 123 passengers reported no injuries. Two flight attendants reported serious injuries. The flight had departed from the Dallas-Fort Worth International Airport, Arlington, Texas en route to Miami, Florida, at 1356 eastern standard time.

According to the captain, while descending into Miami, they began deviating well south of a few small cumulous developments. The first officer was flying the airplane at the time of the event. They had begun reducing speed to turbulence penetration prior to encountering a few pockets of light chop at about FL240. The captain gave a public address system announcement to the flight attendants and passengers leaving FL180, asking that the cabin be prepared for landing early, due to possible chop during our approach. Air Traffic Control was advised of the speed reductions, and subsequently caused traffic behind them to also have to slow. As they approached the tops of a very thin cloud layer at about 11,000 feet, descending to 10,000 feet, at a speed of about 260 knots, they encountered a very brief pocket of moderate chop. Several minutes after the event, the number one flight attendant, advised the captain that two of the flight attendants in the aft part of the airplane had been injured during the turbulence event. She requested that medical assistance meet the airplane.

According to interviews with the cabin crew, the seatbelt sign was on, they were in the process of securing the cabin for landing, and the purser had made the announcement for passengers to prepare for landing right after the captain's pre-landing announcement. During the turbulence encounter, most of the flight attendants reported being lifted off their feet, and thrown to the floor. Three of the flight attendants commented that they were able to steady themselves with hand holds which kept them from falling. Following the turbulence encounter, two flight attendants noted a passenger exiting a lavatory uninjured. A few passengers had left their seats following the turbulence encounter to assist the injured flight attendants. After arriving at the gate, paramedics boarded the airplane, then the passengers were deplaned, and two flight attendants were transported to the hospital by ambulance.

Meteorological information obtained by an NTSB Meteorologist showed a convective SIGMET was valid for Florida and coastal waters at the time of the turbulence encounter. The convective SIGMET was issued in response to a developing area of thunderstorms moving from 260 degrees at 10 knots with tops extending to 32,000 feet. Radar images from the Miami Weather Surveillance Radar (WSR-88D) identified multiple storm cells in the area at the time of the turbulence encounter. The radar data indicated that the core intensity of these cells was strong to intense (40 to 50 dBZ). A radar image taken about the time of the turbulence encounter shows the airplanes path came about

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Occurrence Type:	Accident

Narrative (Continued)

five nautical miles from the core of one cell and three nautical miles from the core of a second cell.

The digital flight data recorder (DFDR) was removed from the airplane after the accident and sent to the NTSB Vehicles Recorder Laboratory, Washington, D.C. The recorder was in good condition, and the data were extracted normally from the recorder. The DFDR was downloaded to hard disk using NTSB readout equipment. The acquired accident data were verified for accuracy by examining take-off, cruise, and landing performance of the aircraft previously recorded on the medium. The data were found to be consistent with the normal operation of the aircraft.

The DFDR recording contained approximately 98 hours of data. The accident flight was the third from the end of the recording and began at approximately Subframe Reference Number (SRN) 292056. The duration of the incident flight was approximately 2 hours 48 minutes. The turbulence event occurred approximately 2 hours 20 minutes into the flight at approximately SRN 298456, while the aircraft was descending through an altitude of approximately 12,836 feet, on a heading of 115 degrees. During this event, the data shows the aircraft with a 2.04 g vertical acceleration load and 6 degrees of left roll. The pitch changed from -0.4 at SRN 298456 to -2.1 at SRN 298457. The autopilot remained on throughout the event and was turned off at SRN 298781. The DFDR was returned by NTSB to American Airlines on July 12, 2004.

Recorded radar data from the FAA Miami Air Route Traffic Control Center show that at about the time of the turbulence encounter the airplane was at position 25 degrees 56 minutes 50 seconds North latitude and 81 degrees 15 minutes 9 seconds West longitude, or about bearing 280 degrees at 53 nautical miles from Miami International Airport.

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FACTUAL REPORT AVIATION

NTSB ID: MIA03LA067

Occurrence Date: 02/25/2003

Occurrence Type: Accident

Landing Facility/Approach Information

Airport Name	Airport ID:	Airport Elevation	Runway Used	Runway Length	Runway Width
Miami International	MIA	Ft. MSL	NA		

Runway Surface Type: Unknown

Runway Surface Condition: Unknown

Type Instrument Approach: Unknown

VFR Approach/Landing: Unknown

Aircraft Information

Aircraft Manufacturer	Model/Series	Serial Number
Boeing	777-223	30251

Airworthiness Certificate(s): Transport

Landing Gear Type: Retractable - Tricycle

Homebuilt Aircraft?	Number of Seats:	Certified Max Gross Wt.	Number of Engines:
No	310	656000 LBS	2

Engine Type:	Engine Manufacturer:	Model/Series:	Rated Power:
Turbo Fan	Rolls-Royce	Trent 892-17	93400 LBS

- Aircraft Inspection Information

Type of Last Inspection	Date of Last Inspection	Time Since Last Inspection	Airframe Total Time
Continuous Airworthiness	02/2003	16 Hours	9809 Hours

- Emergency Locator Transmitter (ELT) Information

ELT Installed?	ELT Operated?	ELT Aided in Locating Accident Site?
No	No	No

Owner/Operator Information

Registered Aircraft Owner	Street Address		
AMERICAN AIRLINES INC	4333 Amon Carter Blvd. 5569		
	City: Fort Worth	State: TX	Zip Code: 76155

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:

Operator Designator Code: AALA

- 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

National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB ID: MIA03LA067

Occurrence Date: 02/25/2003

Occurrence Type: Accident

First Pilot Information

Name	City	State	Date of Birth	Age
On File	On File	On File	On File	54

Sex: M | Seat Occupied: Left | Principal Profession: Civilian Pilot | Certificate Number: On File

Certificate(s): Airline Transport; Flight Instructor

Airplane Rating(s): Multi-engine Land; Single-engine Land

Rotorcraft/Glider/LTA: None

Instrument Rating(s): Airplane

Instructor Rating(s): Airplane Multi-engine; Airplane Single-engine

Type Rating/Endorsement for Accident/Incident Aircraft? Yes | Current Biennial Flight Review?

Medical Cert.: Class 1 | Medical Cert. Status: Valid Medical--no waivers/lim. | Date of Last Medical Exam: 01/2003

- Flight Time Matrix	All A/C	This Make and Model	Airplane Single Engine	Airplane Mult-Engine	Night	Instrument Actual	Instrument Simulated	Rotorcraft	Glider	Lighter Than Air
Total Time		974								
Pilot In Command(PIC)										
Instructor										
Last 90 Days	221	221		221						
Last 30 Days	81	81		81						
Last 24 Hours	7	7		7						

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

Flight Plan/Itinerary

Type of Flight Plan Filed: IFR

Departure Point	State	Airport Identifier	Departure Time	Time Zone
Arlington	TX	KDFW	1356	EST

Destination	State	Airport Identifier
Same as Accident/Incident Location		KMIA

Type of Clearance: IFR

Type of Airspace: Class E

Weather Information

Source of Briefing: Company

Method of Briefing: In Person

National Transportation Safety Board

FACTUAL REPORT AVIATION

NTSB ID: MIA03LA067

Occurrence Date: 02/25/2003

Occurrence Type: Accident

Weather Information

WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
KMIA	1556	EST	8 Ft. MSL	53 NM	100 Deg. Mag.

Sky/Lowest Cloud Condition: Few 2500 Ft. AGL

Condition of Light: Day

Lowest Ceiling: Broken 9500 Ft. AGL

Visibility: 10 SM

Altimeter: 29.99 "Hg

Temperature: 24 °C

Dew Point: 21 °C

Wind Direction: 70

Density Altitude: 12000 Ft.

Wind Speed: 8

Gusts:

Weather Condtions at Accident Site: Visual Conditions

Visibility (RVR): Ft.

Visibility (RVV) SM

Intensity of Precipitation:

Restrictions to Visibility: None

Type of Precipitation: None

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		2		6	8
Other Crew					
Passengers				123	123
- TOTAL ABOARD -		2		131	133
Other Ground					
- GRAND TOTAL -		2		131	133

National Transportation Safety Board

FACTUAL REPORT

AVIATION

NTSB ID: MIA03LA067

Occurrence Date: 02/25/2003

Occurrence Type: Accident

Administrative Information

Investigator-In-Charge (IIC)

Jeffrey L. Kennedy

Additional Persons Participating in This Accident/Incident Investigation:

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