Aviation Investigation Final Report

Location:	GULF OF MEXICO,	**Accident Number:**	FTW00LA244
Date & Time:	August 23, 2000, 14:57 Local	**Registration:**	N657AM
Aircraft:	Boeing 757-223	**Aircraft Damage:**	Minor
Defining Event:		**Injuries:**	1 Serious, 13 Minor, 54 None
Flight Conducted Under:	Part 121: Air carrier - Scheduled		

Analysis

During cruise flight at 37,000 feet over the Gulf of Mexico, the scheduled international passenger flight encountered severe turbulence after inadvertently penetrating rapidly developing convective formations. One of the flight attendants was seriously injured. When the turbulence encounter occurred, the flight crew was attempting to deviate around cloud formations. The flight crew reported that the seat belt sign was illuminated prior to the turbulence encounter and that the captain made an announcement to the passengers reminding them to remain seated with their seatbelts secured. It is unknown whether the flight attendant was seated or standing, or where she was positioned at the time of the event. Following the turbulence encounter, the flight diverted to a nearby airport and landed without further incident.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: the flight crew's inadvertent encounter with convective turbulence while in cruise flight. A factor was the rapidly developing convective activity.

Findings

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

Findings
1. (F) WEATHER CONDITION - TURBULENCE,CONVECTION INDUCED
2. (C) FLIGHT INTO ADVERSE WEATHER - INADVERTENT - FLIGHTCREW

Factual Information

On August 23, 2000, at 1457 central daylight time, a Boeing 757-223, N657AM, operating as American Airlines flight 304, encountered severe turbulence during cruise flight at 37,000 feet mean sea level over the Gulf of Mexico, approximately 180 nautical miles southeast of the Sabine Pass VORTAC. There were 60 passengers, 2 flightcrew members, and 6 flight attendants aboard the airplane. One flight attendant was seriously injured, and 4 flight attendants and 8 passengers sustained minor injuries. The airplane received minor damage to the cabin interior. The scheduled passenger flight was operating under 14 Code of Federal Regulations Part 121. Flight 304 departed the Dallas/Fort Worth International Airport and was en route to San Juan, Puerto Rico. An instrument flight rules flight plan was filed and the airplane was operating in instrument meteorological conditions at the time of the accident. Following the turbulence encounter, the flight diverted to the George Bush Intercontinental Airport in Houston, Texas, and landed without further incident at 1543.

According to a written statement provided by American Airlines' Manager of Flight Operations Safety, the flight was in the vicinity of KELPP intersection and the flight crew requested an "easterly (left) deviation" from air traffic control (ATC) to avoid possible convective activity. The flight crew "chose this [deviation] in order to remain on the upwind side of the weather activity." Prior to their request for a deviation, "the captain made an assertive announcement to the passengers reminding them that the seat belt sign was on and to remain in their seats with their seat belts fastened." As the flight deviated off-course, the airplane "entered a layer of stratus" clouds. The on-board weather radar equipment continued to "display the convective activity to the right of their flight path." As the airplane exited the stratus layer of clouds, "a cloud formation that was not painting on the radar appeared in front of the aircraft's flight path." The captain "took immediate action to avoid the cloud" by using the maximum bank angle allowed by the autopilot. While maneuvering to avoid the cloud formation, the flight encountered "moderate turbulence followed by an updraft and then approximately 4-5 seconds of severe turbulence."

After the turbulence event, a flight attendant notified the pilots that one of the flight attendants and one or more passengers had sustained possible injuries. The captain declared a medical emergency and requested a diversion to Houston. The remainder of the flight and landing were uneventful.

According to the operator, one of the flight attendants sustained a "cracked #7 vertebrae." Written statements provided by the flight attendants indicated that they were serving meals to the passengers, and the seriously injured attendant was in the aft galley area at the time of the turbulence encounter.

Official ATC communication transcripts confirmed that the flight crew of flight 304 requested

a deviation at 1549:43, over KELPP due to weather. At 1552:05, flight 304 indicated that they were going to fly "seven miles left of course for weather that is to the east." At 1557:47, flight 304 informed ATC that they had encountered "severe turbulence."

Review of the flight data recorder (FDR) information indicated that the turbulence encounter occurred at 1556:25, and lasted approximately 20 seconds. The peak vertical accelerations sustained by the aircraft were +1.45 and -0.88 G's. At 1556:39, the altitude alert sounded when the flight deviated to 37,390 feet. The autopilot was engaged at the time the aircraft encountered the turbulence.

An NTSB meteorologist reviewed Geostationary Operational Environmental Satellite (GOES) visible and infrared data. GOES images for 1545 and 1615 depicted a short line of convective clouds oriented east-northeast/west-southwest along the route of flight. The NTSB meteorologist also reviewed Dopplar weather radar data from Houston between 1548:37 and 1608:32. That radar data revealed that reflectivity returns were present in the vicinity of the turbulence encounter area for the period surrounding the accident. The data also depicted increased reflectivity values and convective echoes throughout that period, which is indicative of rapid convective development. There were two in-flight weather advisories issued for the Gulf of Mexico coastal areas; however, flight 304's ground track passed well beyond those advisory areas at the time of the turbulence encounter.

Pilot Information

Certificate:	Airline transport; Commercial; Flight engineer; Flight instructor	**Age:**	59,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 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	August 1, 2000
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	8137 hours (Total, all aircraft), 4106 hours (Total, this make and model), 2502 hours (Pilot In Command, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Boeing	**Registration:**	N657AM
Model/Series:	757-223 757-223	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Transport	**Serial Number:**	24615
Landing Gear Type:	Retractable - Tricycle	**Seats:**	
Date/Type of Last Inspection:	August 22, 2000 Continuous airworthiness	**Certified Max Gross Wt.:**	0 lbs
Time Since Last Inspection:	18 Hrs	**Engines:**	2 Turbo fan
Airframe Total Time:	29566 Hrs	**Engine Manufacturer:**	Rolls-Royce
ELT:		**Engine Model/Series:**	RB211
Registered Owner:	AMERICAN AIRLINES, INC.	**Rated Power:**	42540 Lbs thrust
Operator:		**Operating Certificate(s) Held:**	Flag carrier (121)
Operator Does Business As:	AMERICAN AIRLINES	**Operator Designator Code:**	AALA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Day
Observation Facility, Elevation:		**Distance from Accident Site:**	
Observation Time:		**Direction from Accident Site:**	
Lowest Cloud Condition:	Unknown	**Visibility**	
Lowest Ceiling:	Unknown	**Visibility (RVR):**	
Wind Speed/Gusts:	5 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	45°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:		**Temperature/Dew Point:**	-60°C
Precipitation and Obscuration:			
Departure Point:	DALLAS/FT WORTH, TX (DFW)	**Type of Flight Plan Filed:**	IFR
Destination:	SAN JUAN , PR (SJU)	**Type of Clearance:**	IFR
Departure Time:	15:43 Local	**Type of Airspace:**	Class A

Airport Information

Airport:		**Runway Surface Type:**	
Airport Elevation:		**Runway Surface Condition:**	
Runway Used:	0	**IFR Approach:**	
Runway Length/Width:		**VFR Approach/Landing:**	Precautionary landing

Wreckage and Impact Information

Crew Injuries:	1 Serious, 4 Minor, 3 None	**Aircraft Damage:**	Minor
Passenger Injuries:	9 Minor, 51 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Serious, 13 Minor, 54 None	**Latitude, Longitude:**	

Administrative Information

Investigator In Charge (IIC):	Charnon, Nicole
Additional Participating Persons:	JOHN KOPPENHAVER; HOUSTON , TX
Original Publish Date:	October 9, 2001
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=50099