

---

## Turbulence injuries, Boeing 757-200, April 18, 2002

---

**Micro-summary:** This Boeing 757-200 experienced severe turbulence in cruise flight, injuring several people.

---

**Event Date:** 2002-04-18 at 1635 CDT


**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.
-

		NTSB ID: CHI02LA111		Aircraft Registration Number: N516AT	
		Occurrence Date: 04/18/2002		Most Critical Injury: Serious	
		Occurrence Type: Accident		Investigated By: NTSB	
Location/Time					
Nearest City/Place Springfield		State MO	Zip Code 65721	Local Time 1635	Time Zone CDT
Airport Proximity: Off Airport/Airstrip		Distance From Landing Facility:		Direction From Airport:	
Aircraft Information Summary					
Aircraft Manufacturer Boeing		Model/Series 757-200		Type of Aircraft Airplane	
Sightseeing Flight: No			Air Medical Transport Flight: No		
Narrative					
Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:					
HISTORY OF FLIGHT					
<p>On April 18, 2002, about 1635 central daylight time, a Boeing 757-200, N516AT, operated by American Trans Air (ATA), as flight 208, encountered severe turbulence during cruise flight at flight level 370 near Springfield, Missouri. The airplane was travelling in a predominately northern direction during the encounter. The flight diverted to the St. Louis International Airport (STL), St. Louis, Missouri without further incident. Three passengers received serious injuries and nine passengers and three flight attendants received minor injuries. The remaining 106 passengers, 4 cabin crewmembers, and 2 flight crewmembers were not injured. The airplane was not damaged during the encounter. The 14 CFR Part 121 airline flight was operating in instrument meteorological conditions and was on an instrument flight rules flight plan. The flight had departed Guadalajara, Mexico, and was destined for the Chicago Midway Airport, Chicago, Illinois.</p>					
METEOROLOGICAL INFORMATION					
<p>A Meteorological Specialist with the National Transportation Safety Board, Operational Factors Division, obtained and examined weather products related to the turbulence encounter. The full text of the Meteorological Report is included in the public docket of the accident report.</p>					
<p>Surface weather observations in the vicinity of the turbulence encounter indicated the presence of thunderstorms and lightning moving eastward.</p>					
<p>The National Weather Service (NWS) Radar Summary Chart indicated multiple areas of echoes from Wisconsin south-southwestward across Iowa, Missouri, Kansas, Oklahoma, Arkansas, and into Texas. The maximum intensity of the echoes in southern Missouri reached video integrator and processor (VIP) levels 5 and 6 or intense to extreme intensity, with echo tops ranging from 36,000 to 41,000 feet.</p>					
<p>The NWS Weather Surveillance Radar located in Springfield, Missouri, showed a band of echoes, at 1623, extending over the location of the turbulence encounter. The echoes had a reflectivity of 60 dBZ or VIP level 6 extreme intensity. This same radar station recorded, at 2138, a band of echoes in the area of the turbulence encounter. The strongest echo had a maximum intensity of 60 dBZ or VIP level 6 extreme intensity and was less than 5 miles east of the turbulence encounter. The echo intensities over the location of the turbulence encounter ranged from 36 to 45 dBZ or VIP level 3 to 4 strong to very strong intensity.</p>					
<p>Satellite data was used to determine cloud tops in the area of the turbulence encounter. An infrared image from April 18, 2002 at 1632 shows that the cloud tops along the flight path of the airplane were in the range of 28,000 to 33,000 feet. The image also showed the highest cloud tops in the vicinity to be about 39,000 feet. The highest cloud tops were located about 9 miles</p>					
FACTUAL REPORT - AVIATION					
					Page 1

National Transportation Safety Board

## FACTUAL REPORT

AVIATION

NTSB ID: CHI02LA111

Occurrence Date: 04/18/2002

Occurrence Type: Accident

## Narrative (Continued)

east-northeast of the turbulence encounter.

At 1210, the Kansas City (ZKC) Center Weather Service Unit (CWSU) issued a Center Weather Advisory (CWA) for a line of VIP level 3 to 5 thunderstorms with tops to 33,000 feet. This CWA however, was only valid until 1410 and had expired by the time of the turbulence encounter. At 1640, after the turbulence encounter, the ZKC CWSU issued a CWA for an area of VIP level 3 to 5 thunderstorms with tops to 38,000 feet. This CWA covered the location of the turbulence encounter.

No Significant Weather Information (SIGMET) advisories were issued by the NWS Aviation Weather Center that related to the accident flight. No Convective SIGMET's were in effect for the accident location.

## COMMUNICATIONS

Transcripts of voice communications between Air Traffic Control (ATC) and the airplane were obtained. The transcripts show that the flight crew requested a course deviation for weather avoidance at 1627. The ATC controller approved the deviation and requested that the flight crew advise when they were able to return on course. At 1632, the flight crew advised ATC that they were able to return on course.

At 1637, the flight crew requested a deviation to the Kansas City Missouri International Airport for landing. The flight crew subsequently informed ATC that they, "got too close to that ah thundershower there and we've got uh we've got some passengers on board who've been injured and uh we're gonna have to have ambulances standing by for them." The ATC controller asked the flight crew if they "would rather go to Saint Louis or would you want to go to Kansas City." The flight crew decided to divert to Saint Louis.

When asked by the ATC controller as to what type of turbulence that the airplane had encountered, the flight crew replied, "we just caught the very corner of one of the build---ah or the only buildup that's out there just uh like got one wing into it on the right hand side and uh that was---got a good up draft and a good down draft." The airplane continued to STL where a landing was made without further incident. The full transcripts of the communications are included in the public docket of this report.

## FLIGHT RECORDERS

The cockpit voice recorder was retained for examination. The 30-minute recording began as the airplane was on approach to STL and did not capture the turbulence event. No further examination of the recording was performed.

The digital flight data recorder was retained for examination of the data. A Flight Data Recorder Specialist in the National Transportation Safety Board Vehicle Recorders Division examined the data. Among the parameters recorded were the vertical acceleration, seat belt sign (ON/OFF), roll angle of the airplane, and pitch angle of the airplane.

The FDR Subframe Reference Number is a measure of relative time on the Flight Data Recorder. One frame is equivalent to one second. The data shows that the airplane experienced a series of vertical accelerations that began at a FDR Subframe Reference Number of 90903 and lasted for about 17 seconds. The maximum positive vertical acceleration of 2.099 g's occurred at a FDR Subframe Reference Number of 90906. The maximum negative vertical acceleration of -0.648 g's occurred at a FDR Subframe Reference Number of 90912. The data shows that the seat belt sign was turned on at a FDR Subframe Reference Number of 90894.

## TESTS AND RESEARCH

National Transportation Safety Board

## FACTUAL REPORT

AVIATION

NTSB ID: CHI02LA111

Occurrence Date: 04/18/2002


Occurrence Type: Accident


## Narrative (Continued)

According to a written statement by the first officer, the crew requested to deviate left of course for weather and ATC approved. He stated that the captain initiated the deviation and that he and the captain were monitoring the weather radar. He said that prior to being abeam the weather, the captain made an additional deviation to the west and turned on the fasten seat belt signs. He stated that the airplane subsequently encountered the turbulence and that he did not notice any "appreciable excursions in airspeed or attitude." He noted that the airplane had descended about 50 feet below the cruise altitude.

The ATA General Operations Manual (GOM) states that thunderstorms that are identified as severe or giving an intense in-flight weather radar echo should be avoided by at least 20 miles.

Plots of the Aircraft Situation Display from ATA Dispatch were obtained. The plots of the airplane's flight path are overlaid onto Doppler weather radar data. The plots show the airplane's flight path in relation to the Doppler weather radar returns in the area of the turbulence encounter. The plots are included in the public docket of this report.

 <b>National Transportation Safety Board</b> <b>FACTUAL REPORT</b> <b>AVIATION</b>		NTSB ID: CHI02LA111			
		Occurrence Date: 04/18/2002			
		Occurrence Type: Accident			
<b>Landing Facility/Approach Information</b>					
Airport Name	Airport ID:	Airport Elevation Ft. MSL	Runway Used	Runway Length	Runway Width
Runway Surface Type:					
Runway Surface Condition:					
Type Instrument Approach: NONE					
VFR Approach/Landing: None					
<b>Aircraft Information</b>					
Aircraft Manufacturer Boeing		Model/Series 757-200		Serial Number 27972	
Airworthiness Certificate(s): Transport					
Landing Gear Type: Retractable - Tricycle					
Homebuilt Aircraft? No	Number of Seats: 227	Certified Max Gross Wt.	256000 LBS	Number of Engines: 2	
Engine Type: Turbo Fan	Engine Manufacturer: Rolls-Royce	Model/Series: RB211-535E4	Rated Power: 40100 LBS		
- Aircraft Inspection Information					
Type of Last Inspection Continuous Airworthiness	Date of Last Inspection 03/2002	Time Since Last Inspection 210 Hours	Airframe Total Time 23720 Hours		
- Emergency Locator Transmitter (ELT) Information					
ELT Installed? No	ELT Operated? No	ELT Aided in Locating Accident Site? No			
<b>Owner/Operator Information</b>					
Registered Aircraft Owner AMERICAN TRANS AIR INC		Street Address 7337 West Washington Street			
		City Indianapolis	State IN	Zip Code 46231	
Operator of Aircraft Same as Reg'd Aircraft Owner		Street Address Same as Reg'd Aircraft Owner			
		City	State	Zip Code	
Operator Does Business As:			Operator Designator Code: AMTA		
- 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; International; Passenger Only					

 <p><b>National Transportation Safety Board</b> <b>FACTUAL REPORT</b> <b>AVIATION</b></p>	NTSB ID: CHI02LA111
	Occurrence Date: 04/18/2002
	Occurrence Type: Accident

**First Pilot Information**

Name On File	City On File	State On File	Date of Birth On File	Age 55
-----------------	-----------------	------------------	--------------------------	-----------

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

Certificate(s): Airline Transport; Commercial

Airplane Rating(s): Multi-engine Land; Single-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? 04/2002
---	---

Medical Cert.: Class 1	Medical Cert. Status: Valid Medical--w/ waivers/lim.	Date of Last Medical Exam: 04/2002
------------------------	--	------------------------------------

- 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	21225									
Pilot In Command(PIC)										
Instructor										
Last 90 Days	136									
Last 30 Days	57									
Last 24 Hours	7									

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

**Flight Plan/Itinerary**

Type of Flight Plan Filed: IFR

Departure Point GUADALAJARA	State	Airport Identifier GDL	Departure Time 1350	Time Zone CDT
--------------------------------	-------	---------------------------	------------------------	------------------

Destination CHICAGO	State IL	Airport Identifier MDW	
------------------------	-------------	---------------------------	--


Type of Clearance: IFR

Type of Airspace: Class A

**Weather Information**

Source of Briefing: Company

Method of Briefing: Unknown


 <p><b>National Transportation Safety Board</b> <b>FACTUAL REPORT</b> <b>AVIATION</b></p>	NTSB ID: CHI02LA111
	Occurrence Date: 04/18/2002
	Occurrence Type: Accident

<b>Weather Information</b>					
WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
KSGF	1654	CDT	1267 Ft. MSL	15 NM	180 Deg. Mag.
Sky/Lowest Cloud Condition: Unknown			Ft. AGL	Condition of Light: Day	
Lowest Ceiling: Broken		8000 Ft. AGL		Visibility: 8 SM	Altimeter: 29.94 "Hg
Temperature: 23 °C	Dew Point: 17 °C	Wind Direction: 220		Density Altitude: Ft.	
Wind Speed: Calm	Gusts:	Weather Conditions at Accident Site: Visual Conditions			
Visibility (RVR): Ft.	Visibility (RVV) SM	Intensity of Precipitation: Light			
Restrictions to Visibility: Unknown					
Type of Precipitation: Rain					

<b>Accident Information</b>		
Aircraft Damage: None	Aircraft Fire: None	Aircraft Explosion: None

Classification: U.S. Registered/U.S. Soil					
<b>- Injury Summary Matrix</b>	Fatal	Serious	Minor	None	TOTAL
First Pilot				1	1
Second Pilot				1	1
Student Pilot					
Flight Instructor					
Check Pilot					
Flight Engineer					
Cabin Attendants			3	3	6
Other Crew					
Passengers		3	9	106	118
- TOTAL ABOARD -		3	12	111	126
Other Ground					
- GRAND TOTAL -		3	12	111	126

--

 <p>National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION</p>	NTSB ID: CHI02LA111
	Occurrence Date: 04/18/2002
	Occurrence Type: Accident

Administrative Information

Investigator-In-Charge (IIC)

John M. Brannen

Additional Persons Participating in This Accident/Incident Investigation:

Donald Dunn  
Inspector  
FAA-St. Louis, Missouri-FSDO  
10801 Pear Tree Ln.  
St. Ann, MO 63074

Julie Harkey  
Manager, Safety Programs  
American Trans Air  
PO Box 51609  
Indianapolis, IN 46251

Edward Duchnowski  
Vice President/Safety and Security  
American Trans Air  
PO Box 51609  
Indianapolis, IN 46251