
Turbulence injuries, Boeing 737-824, July 8, 1999

Micro-summary: This Boeing 737-824 experienced clear air turbulence in cruise, injuring several people.


Event Date: 1999-07-08 at 1410 EDT

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

Investigative Body's Web Site: <http://www.nts.gov/>

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|---|--|---------------------------------|----------------------------------|--------------------------------------|------------------|
|  | | NTSB ID: IAD99FA052 | | Aircraft Registration Number: N12221 | |
| | | Occurrence Date: 07/08/1999 | | Most Critical Injury: Serious | |
| | | Occurrence Type: Accident | | Investigated By: NTSB | |
| Location/Time | | | | | |
| Nearest City/Place ATLANTIC OCEAN | | State AO | Zip Code | Local Time 1410 | Time Zone EDT |
| Airport Proximity: Unknown | | Distance From Landing Facility: | | Direction From Airport: | |
| Aircraft Information Summary | | | | | |
| Aircraft Manufacturer Boeing | | Model/Series 737-824 | | 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 July 8, 1999 at 1410 eastern daylight time, a Boeing 737-824, N12221, operated by Continental Airlines, sustained minor damage during a clear air turbulence encounter, while in cruise flight at 29,000 feet, approximately 180 miles south of Bermuda. The airline transport rated flight crew was not injured and the four cabin attendants received minor injuries. Of the 155 passengers on board, one passenger received serious injuries, 67 received minor injuries and 87 passengers were not injured. Visual meteorological conditions prevailed for the scheduled passenger flight that originated at Newark, New Jersey (EWR), approximately 1220. An instrument flight rules flight plan was filed for the flight destined for San Juan, Puerto Rico, and conducted under 14 CFR Part 121.</p> <p>In a telephone interview, a safety official for Continental Airlines reported the airplane was in cruise flight at 29,000 feet in smooth air with the seat belt sign turned off. He said the crew reported one jolt, and the airplane descended 500 feet. Due to possible injuries, the crew diverted to Bermuda (BDA) and landed at 1604.</p> <p>In a written statement, the captain said:</p> <p>"Approximately ten miles north of Pruit intersection on A523 at 29,000 ft. in clear air we encountered two severe jolts (turbulence). Our aircraft lost approximately 400 ft. and was descending at 2,000 ft. per minute. Speed was approaching MMO (Maximum Mach Operating Speed). I made a slow recovery back to 29,000, bottoming out our descent at 28,400. The seat belt sign was off and during recovery I placed it back on. When the aircraft was level we attempted to reach the flight attendants via the inter-phone, no response. I instructed my F.O. (First Officer) to go into the cabin and assess damages. He quickly informed me of numerous injuries, at that time I declared an emergency and diverted to Bermuda. Turning direct to BDA our location was 160 miles SSW...No reports of turbulence were reported by ATC (Air Traffic Control) along our route of flight or in our dispatched flight paper work."</p> <p>In a written statement, the first officer said:</p> <p>"We were level at FL 290 [29,000 feet]...It had been smooth for 30 minutes [and] the seat belt sign was off, there were no visual cues to an adverse ride. Both radars were on (we had deviated to avoid weather earlier in the flight) when the aircraft was hit by two severe jolts in quick succession. The Captain (Pilot Flying) recovered the aircraft from a nose down attitude, when the aircraft was once again level and on course the autopilot, L [lateral] nav and V [vertical] nav were re-selected."</p> <p>In a written statement, a cabin attendant said:</p> | | | | | |
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AVIATION

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Occurrence Type: Accident

Narrative (Continued)

"The crew had just completed the meal service and I was in the back of ...the main cabin approximately row 29 picking up trays from the meal service. The seat belt sign was off and we were flying through smooth air with no sign of turbulence. Then all of a sudden, the aircraft dropped abruptly, which caused my body to fly upward hitting my head on the ceiling. I fell back to the floor on my knees. Approximately 10 seconds later, the aircraft dropped again causing my head to hit the ceiling once again. At that point I lost consciousness. When I awoke, I was very dazed noticing my head bleeding, arms cut and bruised, and back and shoulders sore."

In a detailed written statement, a second cabin attendant described a similar sequence of events. She said people, carts, and equipment were tossed about and that she came to rest under a row of seats. The cabin attendant further described the crew coordination involved in treating and calming the passengers and the communication from the cockpit to the cabin about the egress and treatment of passengers upon arrival at Bermuda.

The captain arranged through ATC to have medical teams meet the airplane at BDA. Sixty-four passengers and 4 cabin attendants were examined at the hospital. One passenger suffered a head laceration and a fractured rib.

The accident occurred during the hours of daylight approximately 30 degrees 20 minutes north latitude, 066 degrees 43 minutes west longitude.

PILOT INFORMATION

The captain held an airline transport pilot's certificate with ratings for airplane multi-engine land. He held a commercial pilot's certificate with ratings for airplane single-engine land, rotorcraft helicopter and instrument helicopter. The captain held a flight instructor's certificate with ratings for airplane single-engine land and a mechanic's certificate with ratings for airframe and powerplant.

The captain's most recent FAA first class medical certificate was issued June 8, 1999.

The captain reported 14,800 hours of flight experience, 3,300 hours of which were in the Boeing 737. He reported 215 hours of flight experience in the previous 90 days, 76 hours of which were in the previous 30 days. All flight time reported in the previous 90 days was in the Boeing 737.

The first officer held an airline transport pilot's certificate with ratings for airplane multi-engine land. He held a commercial pilot's certificate with ratings for airplane single-engine land. The first officer held a flight engineer's certificate with a rating for turbojet powered.

The first officer's most recent FAA first class medical certificate was issued May 24, 1999.

The first officer reported 10,000 hours of total flight experience, 5,000 hours of which were in the Boeing 737. He reported 203 hours of flight experience in the previous 90 days, 18 hours of which were in the previous 30 days. All flight time reported in the previous 90 days was in the Boeing 737.

DAMAGE TO AIRCRAFT

Inspection of the airplane revealed no structural damage and the airplane was returned to service. Entries in the airplane's maintenance log reflected completion of the turbulence inspection and damage to interior ceiling panels in Row 25, 29, and in the aft galley.

AIRCRAFT INFORMATION

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Narrative (Continued)

The airplane was a 1998 Boeing 737-824, and the airworthiness certificate was issued December 2, 1998. The airplane was on a continuous airworthiness inspection program and had accrued 3,639 hours of total flight time. The last inspection was performed July 3, 1999, and the airplane accrued 51 hours of flight time since that date.

METEOROLOGICAL INFORMATION

A Safety Board Operational Factors investigator interviewed the captain by telephone. According to the interview summary:

"[The captain] stated that the flight departed Newark on schedule. The flight encountered weather at cruise altitude near KWINN intersection, about 300 miles north of the point where the turbulence encounter occurred. Clearance was requested by the flight crew and approved by air traffic control to deviate around the weather. The seatbelt sign was on.

"The flight proceeded around the thunderstorms and broke out into the clear with only some high clouds visible. [The captain] stated that the ride was 'not all that bad' and this was the 'only major weather we saw.' For about 45 minutes before the turbulence encounter, the ride was smooth. The seatbelt sign was turned off during this time.

"At the time of the turbulence encounter, the flight was in contact with New York Center via the VHF radio. [The captain] stated that there were two 'major jolts that came out of nowhere.' The flight attendants were called on the interphone but there was no answer. [The captain] then sent the first officer to the cabin to assess the situation.

"[The captain] said that Continental Airlines uses a 'shear rating indicator' to estimate the degree of turbulence that is anticipated along the route of flight. The shear rating indicator (SR) is shown on the flight plan and expressed as a number from zero to five, with five indicating the worst turbulence. During the first part of the flight, twos and threes were shown along the flight-planned route. Starting about GABES intersection, the SR was zero. The SR at PRUIT intersection was zero. [The captain] stated that 'nothing else indicated severe turbulence; no other ride reports; the sky was wide open.' [The captain] stated that he made a conscious effort to change the route about KWINN intersection to get around the weather to the east and to get into smooth air. At PRUIT intersection, he stated that they were in the clear with high clouds in view to the west. There were no towering cumulus clouds, nothing to indicate the existence of turbulence."

According to flight papers, the flight altitude was planned for FL 330 to FL 370. Therefore, no information concerning forecast turbulence at FL 290 was available to the flight crew.

The High Level Significant Weather Prognosis chart prepared by the Aviation Weather Center (AWC) at Kansas City, Missouri, valid for 1400, revealed that no significant weather was shown in the area where the turbulence was encountered.

FLIGHT RECORDERS

The airplane's flight data recorder (FDR) was forwarded to the Safety Board for examination. Examination of the data retrieved revealed a sequence of events consistent with that described in the crew statements.

A graph of several flight parameters indicated cruise flight at 29,000 feet with no change in heading, airspeed, or altitude for several minutes approaching the accident sequence. The altitude graph showed a slight climb before the airplane descended to 28,400 feet. The graph line indicated a slow recovery to 29,000 feet with no oscillations. Vertical g-forces sustained during the sequence varied in amplitude between a positive 2-g's and a negative 1-g. The elapsed time between

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Narrative (Continued)

the first altitude excursion to recovered cruise flight was approximately 75 seconds.

ADDITIONAL INFORMATION

The airplane was returned to service by Continental Airlines on July 9, 1999.

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|  National Transportation Safety Board FACTUAL REPORT AVIATION | | NTSB ID: IAD99FA052 | | | |
| | | Occurrence Date: 07/08/1999 | | | |
| | | Occurrence Type: Accident | | | |
| Landing Facility/Approach Information | | | | | |
| Airport Name | Airport ID: | Airport Elevation Ft. MSL | Runway Used 0 | Runway Length | Runway Width |
| Runway Surface Type: | | | | | |
| Runway Surface Condition: | | | | | |
| Type Instrument Approach: | | | | | |
| VFR Approach/Landing: | | | | | |
| Aircraft Information | | | | | |
| Aircraft Manufacturer Boeing | | Model/Series 737-824 | | Serial Number 28770 | |
| Airworthiness Certificate(s): Transport | | | | | |
| Landing Gear Type: Retractable - Tricycle | | | | | |
| Homebuilt Aircraft? No | Number of Seats: 155 | Certified Max Gross Wt. | 173000 LBS | Number of Engines: 2 | |
| Engine Type: Turbo Fan | Engine Manufacturer: Cfm | Model/Series: CFM 56-7B26 | Rated Power: 26300 LBS | | |
| - Aircraft Inspection Information | | | | | |
| Type of Last Inspection Continuous Airworthiness | Date of Last Inspection 07/1999 | Time Since Last Inspection 51 Hours | Airframe Total Time 3639 Hours | | |
| - Emergency Locator Transmitter (ELT) Information | | | | | |
| ELT Installed? No | ELT Operated? | ELT Aided in Locating Accident Site? | | | |
| Owner/Operator Information | | | | | |
| Registered Aircraft Owner FIRST SECURITY BANK | | Street Address 79 SOUTH MAIN STREET | | | |
| | | City SALT LAKE CITY | State UT | Zip Code 84111 | |
| Operator of Aircraft CONTINENTAL AIRLINES, INC | | Street Address P.O. BOX 4607 | | | |
| | | City HOUSTON | State TX | Zip Code 77210 | |
| Operator Does Business As: CONTINENTAL AIRLINES | | | Operator Designator Code: | | |
| - 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 | | | | | |
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| | Occurrence Type: Accident |

First Pilot Information

| | | | | |
|-----------------|-----------------|------------------|--------------------------|-----------|
| Name On File | City On File | State On File | Date of Birth On File | Age 43 |
|-----------------|-----------------|------------------|--------------------------|-----------|

| | | | |
|--------|---------------------|--------------------------------------|-----------------------------|
| 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: Helicopter

Instrument Rating(s): Airplane; Helicopter

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

| | |
|---|---------------------------------|
| 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: 06/1999 |
|------------------------|--|------------------------------------|

| - 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 | 14800 | 3300 | | 11000 | | | | | | |
| Pilot In Command(PIC) | 12000 | 3300 | | | | | | | | |
| Instructor | 500 | | | | | | | | | |
| Last 90 Days | 215 | 215 | | | | | | | | |
| Last 30 Days | 76 | 76 | | | | | | | | |
| Last 24 Hours | 2 | 2 | | | | | | | | |

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

Flight Plan/Itinerary

Type of Flight Plan Filed: IFR

| | | | | |
|---------------------------|-------------|---------------------------|------------------------|------------------|
| Departure Point NEWARK | State NJ | Airport Identifier EWR | Departure Time 1221 | Time Zone EDT |
|---------------------------|-------------|---------------------------|------------------------|------------------|

| | | | |
|-------------------------|-------------|---------------------------|--|
| Destination SAN JUAN | State PR | Airport Identifier SJU | |
|-------------------------|-------------|---------------------------|--|


Type of Clearance: IFR

Type of Airspace: Class A

Weather Information

Source of Briefing: Company

Method of Briefing:

| | |
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|---------------------------------------|-----------------------|--|---------------|---------------------------------|------------------------------|
| Weather Information | | | | | |
| WOF ID | Observation Time | Time Zone | WOF Elevation | WOF Distance From Accident Site | Direction From Accident Site |
| TXK | 1355 | EDT | 12 Ft. MSL | 180 NM | 180 Deg. Mag. |
| Sky/Lowest Cloud Condition: Scattered | | | 2000 Ft. AGL | Condition of Light: Day | |
| Lowest Ceiling: Broken | | 5000 Ft. AGL | | Visibility: 3 SM | Altimeter: 30.00 "Hg |
| Temperature: 28 °C | Dew Point: 25 °C | Wind Direction: 220 | | Density Altitude: 6 Ft. | |
| Wind Speed: 14 | Gusts: | Weather Conditions at Accident Site: Visual Conditions | | | |
| Visibility (RVR): 0 Ft. | Visibility (RVV) 0 SM | Intensity of Precipitation: Light | | | |
| Restrictions to Visibility: Fog | | | | | |
| Type of Precipitation: Rain Showers | | | | | |

| | | |
|-----------------------------|---------------------|--------------------------|
| Accident Information | | |
| Aircraft Damage: Minor | 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 | | | 4 | | 4 |
| Other Crew | | | | | |
| Passengers | | 1 | 67 | 87 | 155 |
| - TOTAL ABOARD - | | 1 | 71 | 89 | 161 |
| Other Ground | 0 | 0 | 0 | | 0 |
| - GRAND TOTAL - | 0 | 1 | 71 | 89 | 161 |

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NTSB ID: IAD99FA052

Occurrence Date: 07/08/1999

Occurrence Type: Accident

Administrative Information

Investigator-In-Charge (IIC)

BRIAN C. RAYNER

Additional Persons Participating in This Accident/Incident Investigation:

STAN BATOR
FSDO #15
GARDEN CITY, NY

TOBY CARROL
CONTINENTAL AIRLINES
HOUSTON, TX 77002