



# Aviation Investigation Final Report

<b>Location:</b>	Kansas City, Missouri	<b>Accident Number:</b>	CEN11LA250
<b>Date &amp; Time:</b>	March 26, 2011, 07:29 Local	<b>Registration:</b>	N931AE
<b>Aircraft:</b>	Embraer EMB-145LR	<b>Aircraft Damage:</b>	None
<b>Defining Event:</b>	Turbulence encounter	<b>Injuries:</b>	1 Serious, 51 None
<b>Flight Conducted Under:</b>	Part 121: Air carrier - Scheduled		

## Analysis

During climb to cruise flight, the flight attendant was returning to her jumpseat when the airplane encountered convectively induced turbulence associated with developing thunderstorms under the flight path. The flight attendant lost her footing and hit her head on the service galley door. While trying to find something to grab, the flight attendant fell again and injured her wrist and knee. She advised the flight crew that she would be unable to complete her duties and the flight was diverted to seek medical attention for the flight attendant. The operator subsequently confirmed that the flight attendant was seriously injured when her wrist and hand sustained fractures. The flight's flight data recorder data showed that an upset event occurred during climb; the vertical acceleration ranged from 1.54g to 0.60g in a 1-second period.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: An in-flight encounter with convectively induced turbulence associated with developing thunderstorms under the flight path during the airplane's climb to cruise flight.

## Findings

<b>Environmental issues</b>	(general) - Effect on personnel
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## Factual Information

### History of Flight

Enroute-climb to cruise	Turbulence encounter (Defining event)
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On March 26, 2011, about 0729 central daylight time, an Embraer EMB-145LR, N931AE, operated by American Eagle Airlines as flight 4355, sustained no damage when it encountered turbulence while in a climb north of Kansas City, Missouri, while en-route to the Chicago O'Hare International Airport (ORD), Chicago, Illinois. The 2 pilots and 49 passengers were uninjured. The flight attendant sustained a serious injury and the flight diverted to the Kansas City International Airport (MCI), near Kansas City, Missouri. The scheduled domestic passenger flight was conducted under the provisions of 14 Code of Federal Regulations Part 121. Visual meteorological conditions prevailed and an activated instrument flight rules flight plan was on file. The flight originated about 0705, from the Will Rogers World Airport (OKC), near Oklahoma City, Oklahoma.

The operator reported that the flight attendant had finished her cabin service and was returning to her jumpseat when the airplane encountered convectively induced turbulence associated with a developing thunderstorm under the flight path while climbing through flight level (FL) 320. The flight attendant lost her footing and hit her head on the service galley door. While trying to find something to grab the flight attendant fell again and injured her wrist and knee. Immediately the flight attendant noticed her hand swelling up. She contacted the flight crew, informed them of what had happened, and stated to the crew that she would be unable to complete her duties. The flight crew elected to divert to MCI so the flight attendant could seek immediate medical attention. The flight attendant was met by paramedics and taken to the hospital. The operator subsequently confirmed that the flight attendant was seriously injured when her wrist and hand sustained fractures.

The airplane's flight data recorder data was reviewed. The data showed that the upset event occurred during the climb approximately 07:29:35. The data showed the vertical acceleration ranged from 1.54g to 0.60g in a 1-second period and that the airplane was climbing through FL 299.

Review of the flight's dispatch records indicated scattered to broken areas of thunderstorms extending from eastern Oklahoma to western Arkansas with tops to 42,000 feet above sea level and it advised of possible convection over eastern Oklahoma. The dispatch paperwork did not include the latest convective significant meteorological information (SIGMET) 22C for an area of severe thunderstorms, which existed in the immediate vicinity of the upset location.

## Pilot Information

<b>Certificate:</b>	Airline transport	<b>Age:</b>	31, Male
<b>Airplane Rating(s):</b>	Multi-engine land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>		<b>Toxicology Performed:</b>	No
<b>Medical Certification:</b>	Class 1 With waivers/limitations	<b>Last FAA Medical Exam:</b>	June 8, 2010
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	January 12, 2011
<b>Flight Time:</b>	6788 hours (Total, all aircraft), 394 hours (Pilot In Command, all aircraft)		

## Co-pilot Information

<b>Certificate:</b>	Commercial	<b>Age:</b>	27, Male
<b>Airplane Rating(s):</b>	Multi-engine land	<b>Seat Occupied:</b>	Right
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>		<b>Toxicology Performed:</b>	No
<b>Medical Certification:</b>	Class 2 Without waivers/limitations	<b>Last FAA Medical Exam:</b>	October 12, 2010
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	August 12, 2010
<b>Flight Time:</b>	2936 hours (Total, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Embraer	<b>Registration:</b>	N931AE
<b>Model/Series:</b>	EMB-145LR	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>		<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Transport	<b>Serial Number:</b>	14500912
<b>Landing Gear Type:</b>	Retractable - Tricycle	<b>Seats:</b>	53
<b>Date/Type of Last Inspection:</b>	Continuous airworthiness	<b>Certified Max Gross Wt.:</b>	
<b>Time Since Last Inspection:</b>		<b>Engines:</b>	2 Turbo fan
<b>Airframe Total Time:</b>		<b>Engine Manufacturer:</b>	ROLLS-ROYC
<b>ELT:</b>	Installed, not activated	<b>Engine Model/Series:</b>	AE3007 SER
<b>Registered Owner:</b>	AMERICAN EAGLE AIRLINES INC	<b>Rated Power:</b>	7200 Horsepower
<b>Operator:</b>	AMERICAN EAGLE AIRLINES INC	<b>Operating Certificate(s) Held:</b>	Flag carrier (121)
<b>Operator Does Business As:</b>		<b>Operator Designator Code:</b>	SIMA

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual (VMC)	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	MCI,1026 ft msl	<b>Distance from Accident Site:</b>	98 Nautical Miles
<b>Observation Time:</b>	07:01 Local	<b>Direction from Accident Site:</b>	328°
<b>Lowest Cloud Condition:</b>		<b>Visibility</b>	9 miles
<b>Lowest Ceiling:</b>	Overcast / 1500 ft AGL	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	14 knots /	<b>Turbulence Type Forecast/Actual:</b>	/
<b>Wind Direction:</b>	70°	<b>Turbulence Severity Forecast/Actual:</b>	/
<b>Altimeter Setting:</b>	29.87 inches Hg	<b>Temperature/Dew Point:</b>	2°C / -1°C
<b>Precipitation and Obscuration:</b>	No Obscuration; No Precipitation		
<b>Departure Point:</b>	Oklahoma City, OK (OKC )	<b>Type of Flight Plan Filed:</b>	IFR
<b>Destination:</b>	Chicago, IL (ORD )	<b>Type of Clearance:</b>	IFR
<b>Departure Time:</b>	07:05 Local	<b>Type of Airspace:</b>	

## Airport Information

<b>Airport:</b>	Kansas City IAP MCI	<b>Runway Surface Type:</b>	
<b>Airport Elevation:</b>	1026 ft msl	<b>Runway Surface Condition:</b>	
<b>Runway Used:</b>		<b>IFR Approach:</b>	Unknown
<b>Runway Length/Width:</b>		<b>VFR Approach/Landing:</b>	Full stop

## Wreckage and Impact Information

<b>Crew Injuries:</b>	1 Serious, 2 None	<b>Aircraft Damage:</b>	None
<b>Passenger Injuries:</b>	49 None	<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	1 Serious, 51 None	<b>Latitude, Longitude:</b>	37.912498,-93.590278(est)

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Malinowski, Edward
<b>Additional Participating Persons:</b>	Vanessa Jamison; Federal Aviation Administration; Fort Worth, TX
<b>Original Publish Date:</b>	April 20, 2012
<b>Last Revision Date:</b>	
<b>Investigation Class:</b>	<a href="#">Class</a>
<b>Note:</b>	
<b>Investigation Docket:</b>	<a href="https://data.ntsb.gov/Docket?ProjectID=78703">https://data.ntsb.gov/Docket?ProjectID=78703</a>

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).