



Aviation Investigation Final Report

Location:	Akron, Ohio	Incident Number:	CEN111A234
Date & Time:	March 18, 2011, 00:09 Local	Registration:	N11187
Aircraft:	Embraer EMB-145XR	Aircraft Damage:	Minor
Defining Event:	Loss of control on ground	Injuries:	46 None
Flight Conducted Under:	Part 121: Air carrier - Scheduled		

Analysis

The flight crew reported that the flight was uneventful until the nosewheel touched down, at which time, the airplane made an uncommanded left turn and then veered off the runway. Examination of the runway revealed a witness mark from the right nosewheel tire chine consistent with a left deflection of the nosewheel steering. Testing of the nosewheel steering system and its components did not reveal any anomalies that would have precluded normal operation.

The pilot reported that he used a bracket to support his approach plate book and that, during the event, the book slid off of the bracket and onto his lap. He then tossed the book out of the way. He stated that, at some point, the book may have been in the area of the nosewheel tiller but that it was not on the tiller and that it was clear of the tiller before the airplane exited the runway. Although it is possible that the weight of a book engaged the tiller, it could not be determined if the tiller was engaged during the event.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this incident to be:

The uncommanded left deflection of the airplane's nosewheel for reasons that could not be determined because postincident examination of the nosewheel steering system did not reveal any anomalies that would have precluded normal operation.

Findings

Not determined	(general) - Unknown/Not determined
Aircraft	Directional control - Not attained/maintained

Factual Information

History of Flight

Landing-landing roll	Loss of control on ground (Defining event)
Landing-flare/touchdown	Runway excursion

On March 18, 2011, about 0009 eastern daylight time, an Embraer EMB-145XR, N11187, veered off of the left side of runway 23 while landing at the Akron-Canton Regional Airport, Akron, Ohio. The 3 crewmembers and 43 passengers on board reported no injuries. The airplane sustained minor damage. The airplane was operated by ExpressJet Airlines as United Express flight 5916 as a 14 Code of Federal Regulations Part 121 scheduled domestic passenger flight. Visual meteorological conditions prevailed for the flight which operated on an instrument flight rules flight plan. The flight originated from the Chicago O'Hare International Airport (ORD), Chicago, Illinois, at 2222.

The flight crew reported to a Federal Aviation Administration inspector that the flight was uneventful until the nose landing gear touched down on the runway during landing. At that point, the airplane made an uncommanded left turn that the pilots were unable to correct. The airplane veered off the runway pavement before coming to a stop. The passengers were deplaned through the main boarding door of the airplane.

During a telephone interview of the flight crew, the captain reported that they made a visual approach that was backed up using the instrument landing system and that the glideslope was captured at the outer marker of the published approach. He reported that the approach was normal and that there were no warnings or messages from the airplane's systems prior to touchdown. During the landing, once the nose landing gear touched down, the airplane veered to the left and he estimated that it was about 3 seconds from the time the nosewheel touched down to the time that the airplane exited the runway onto the grass. He said that during the event, the first officer attempted to manually disengage nosewheel steering using the switch provided on his control wheel, but this action did not prevent the airplane from veering to the side.

The captain stated that the approach plate book used during the approach slid off of the side of the bracket and onto his lap during the event. He said that he took the book and tossed it out of the way and that it came to rest on the flight bag behind and to the left of his seat. He said that at some point it may have been in the area of the nosewheel tiller control but was not on the tiller, and that it was clear of the tiller before the airplane exited the runway.

The first officer reported that after touchdown, the captain lowered the nosewheel slowly and the airplane started to go to the left immediately. He immediately got on the controls with the captain and applied hard right rudder, right brake, and activated the nosewheel steering disconnect. He stated that when engaging the nosewheel steering disconnect, a chime is usually heard, but he did not remember hearing it during the event. He stated that he did not feel the nosewheel steering disengage, as expected, when the switch was activated.

The nosewheel steering system of the airplane was an electro-hydraulic system that used inputs from either the rudder pedals, or the captain's tiller. The nose wheel steering can be commanded to a maximum angle of 71 degrees when using the tiller, 5 degrees when using the rudder pedals, or 76 degrees using both tiller and rudder pedals. A proximity sensor connected to the feedback unit sensor disengages the system if the nose wheel is rotated beyond 7 +/- 1 degrees when the tiller is not engaged. If the nosewheel steering system disengages in this manner, the system can be reengaged by engaging the tiller when speed is below 25 knots. The steering system may also be manually disengaged through switches located on either control wheel, provided the tiller is not engaged. If the nosewheel steering system is disengaged for any reason while the aircraft is on the ground a caution oral alert will sound, the master caution light will illuminate, and the message "STEER INOP" will display on the EICAS. The system allows for the nose wheel to free caster any time the nose landing gear is on the ground and the nosewheel steering system is disengaged. Manual disengagement of the nosewheel steering system using the flight crew switches would place the nosewheel into this free casting mode.

An on-scene examination revealed skid marks on the runway leading to the resting position of the airplane. There was a distinct witness mark that was made by the right nose wheel tire chine on the runway that was consistent with a deflection of the nosewheel steering to the left. Examination of the airplane was conducted which included on-airplane testing of the nosewheel steering system in accordance with the airplane manufacturer's maintenance manual. No faults were found during the ground testing. Several components of the nosewheel steering and braking system were removed from the airplane for testing at the respective manufacturer facilities. Although testing of the individual components did reveal some parameters that were not within manufacturer specifications, the anomalies would not have resulted in the behavior described by the flight crew. No anomalies were found that would have precluded normal operation.

Recorded data from the airplane's flight data recorder showed that at 0008, the aircraft descended through 1,700 ft pressure altitude, while on a magnetic heading of approximately 233 degrees. The Air/Ground Switch moved to 'Grnd' at 0008:45, and was followed by symmetric spoiler and thrust reverser deployment. The data showed activity on the pilot brake pedals began at this time. Four seconds later, at 0008:49, the copilot's right brake pedal began to show activity. At 0008:52, the recorded magnetic heading began to swing to the left as the indicated airspeed fell below 100 knots. At 0008:53, the rudder reached its maximum right deflection of 12.7 degrees. At 0008:55, the left and right ailerons reached their maximum deflection of 16.5 degrees TED (trailing edge down) and 24.4 degrees TEU (trailing edge up) respectively. The aircraft came to rest at approximately 0009:04 on a magnetic heading of 199 degrees. Tiller engagement and nosewheel deflection were not recorded parameters.

Pilot Information

Certificate:	Airline transport	Age:	32
Airplane Rating(s):	Multi-engine land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	4-point
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 1 Unknown	Last FAA Medical Exam:	April 19, 2010
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	December 19, 2010
Flight Time:	3829 hours (Total, all aircraft), 154 hours (Last 90 days, all aircraft), 8 hours (Last 24 hours, all aircraft)		

Co-pilot Information

Certificate:	Commercial	Age:	36
Airplane Rating(s):	Multi-engine land	Seat Occupied:	Right
Other Aircraft Rating(s):	None	Restraint Used:	4-point
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 1 Unknown	Last FAA Medical Exam:	July 9, 2010
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	
Flight Time:	2646 hours (Total, all aircraft), 177 hours (Last 90 days, all aircraft), 8 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Embraer	Registration:	N11187
Model/Series:	EMB-145XR	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	
Airworthiness Certificate:	Transport	Serial Number:	14500927
Landing Gear Type:	Retractable - Tricycle	Seats:	55
Date/Type of Last Inspection:	May 25, 2011 Continuous airworthiness	Certified Max Gross Wt.:	
Time Since Last Inspection:		Engines:	2 Turbo fan
Airframe Total Time:	11686 Hrs at time of accident	Engine Manufacturer:	ROLLS-ROYC
ELT:	C126 installed, not activated	Engine Model/Series:	AE3007 SER
Registered Owner:	WELLS FARGO BANK NORTHWEST NA TRUSTEE	Rated Power:	7200 Horsepower
Operator:	Express Jet	Operating Certificate(s) Held:	Commuter air carrier (135)
Operator Does Business As:	United Express	Operator Designator Code:	C2XA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Night
Observation Facility, Elevation:	CAK,1226 ft msl	Distance from Accident Site:	0 Nautical Miles
Observation Time:	23:51 Local	Direction from Accident Site:	0°
Lowest Cloud Condition:		Visibility	10 miles
Lowest Ceiling:	Broken / 6000 ft AGL	Visibility (RVR):	
Wind Speed/Gusts:	14 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	210°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	29.93 inches Hg	Temperature/Dew Point:	14°C / 6°C
Precipitation and Obscuration:			
Departure Point:	Chicago, IL (ORD)	Type of Flight Plan Filed:	IFR
Destination:	Akron, OH (CAK)	Type of Clearance:	IFR
Departure Time:	22:22 Local	Type of Airspace:	

Airport Information

Airport:	Akron-Canton Regional Airport CAK	Runway Surface Type:	Asphalt
Airport Elevation:	1226 ft msl	Runway Surface Condition:	Dry
Runway Used:	23	IFR Approach:	ILS;Visual
Runway Length/Width:	8205 ft / 150 ft	VFR Approach/Landing:	

Wreckage and Impact Information

Crew Injuries:	3 None	Aircraft Damage:	Minor
Passenger Injuries:	43 None	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	46 None	Latitude, Longitude:	40.915,-81.443611

Administrative Information

Investigator In Charge (IIC):	Brannen, John
Additional Participating Persons:	Thomas J Leahy; FAA-Cleveland FSDO; Cleveland, OH Trey Ables; Express Jet Airlines; Atlanta, GA
Original Publish Date:	January 14, 2015
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=78574

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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](#).