



AVIATION



HIGHWAY



MARINE



RAILROAD



PIPELINE

# Aviation Investigation Final Report

<b>Location:</b>	Vineyard Haven, Massachusetts	<b>Accident Number:</b>	ERA09LA538
<b>Date &amp; Time:</b>	September 27, 2009, 15:50 Local	<b>Registration:</b>	N190MP
<b>Aircraft:</b>	Bombardier CL-600-2B16	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Hard landing	<b>Injuries:</b>	4 None
<b>Flight Conducted Under:</b>	Part 91: General aviation - Personal		

## Analysis

The pilot-in-command (PIC) was performing an instrument-landing-system approach and elected to use a flap setting of 30 degrees based on the landing conditions, with an approach speed of 135 knots. The flight crew reported that when the airplane was about 15 to 20 feet above the runway, it encountered windshear, which resulted in a loss of airspeed and a hard landing. The airplane departed the airport about 15 minutes later. After takeoff, when the landing gear was selected to the up position, the nose landing gear door open light remained illuminated and the PIC diverted to another airport, where the airplane landed without incident. Subsequent inspection revealed substantial damage to the nose section of the airplane, which included wrinkling at the forward pressure bulkhead. Data obtained from the airplane's enhanced ground proximity warning system revealed a sink rate warning when the airplane was about 50 feet above the ground. The airplane touched down at an airspeed of about 150 knots. The airplane was certified for normal landings with the flap system at 45 degrees only, and the manufacturer did not provide for a flap setting of 30 degrees except in the event of a flap system malfunction. A weather observation taken at the airport, about the time of the accident, included wind from 120 degrees at 16 knots, gusting to 23 knots, with a visibility of 1 1/4 statute miles in heavy rain and mist and a ceiling of 400 feet broken. The PIC reported that he did not experience any mechanical malfunctions with the airplane during the accident flight.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's improper flare while landing in gusting wind, which resulted in a hard landing.

## Findings

<b>Aircraft</b>	Landing flare - Not attained/maintained
<b>Aircraft</b>	TE flap control system - Incorrect use/operation
<b>Environmental issues</b>	Gusts - Effect on operation

# Factual Information

## History of Flight

Landing-flare/touchdown	Hard landing (Defining event)
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On September 27, 2009, about 1550 eastern daylight time, a Bombardier CL-600-2B16, N190MP, was substantially damaged while landing at the Martha's Vineyard Airport (MVY), Vineyard Haven, Massachusetts. The two certificated airline transport pilots and two passengers were not injured. Instrument meteorological conditions prevailed and an instrument flight rules flight plan had been filed for the flight that originated in Denver, Colorado. The personal flight was conducted under the provisions of 14 Code of Federal Regulations Part 91.

The airplane was being flown by the pilot-in-command (PIC) and was cleared for the instrument landing system (ILS) approach to runway 24, a 5,504-foot-long, 100-foot-wide, asphalt runway.

The flight crew reported that the landing was performed utilizing a flap setting of 30 degrees based on the landing conditions, with a landing approach speed of 135 knots.

The PIC reported that he experienced a left to right crosswind of 24 knots, while the airplane descended on the ILS. The approach was stable, "all the way down to the flare;" however, when airplane was about 15 feet above the runway, "the aircraft suddenly lost airspeed and landed hard." The airplane bounced approximately 15 to 20 feet back into the air, before it contacted the ground, and bounced about 5 to 10 feet. The airplane subsequently landed and rolled out on the runway without further incident.

In a written statement, the copilot reported, "...We broke out about 500 feet above the ground. All operations were normal and we had briefed the approach and to be aware of the possibility of windshear due to the conditions. At about 20 feet, the PIC reduced the throttles to idle for the landing flare and just as he did so, there was a loss of about 25 knots of airspeed. The aircraft landed on the main landing gear and bounced. The aircraft then settled on the nose gear and bounced, then landed on the mains...."

An airport operations supervisor witnessed the accident and stated that the airplane landed hard, about 1,500 feet down the runway. He further stated that the airplane appeared to be traveling at a high rate of speed, when he observed the airplane's spoilers deploy, with the airplane about 3,000 feet down the runway.

The PIC reported that the airplane was visually inspected after the hard landing without any abnormalities noted, and the flight crew departed MVY about 15 minutes later. After takeoff,

when landing gear was selected to the up position, the nose landing gear door open light remained illuminated. The PIC elected to divert to Bradley International Airport, Windsor Locks, Connecticut, where the airplane landed without incident.

Subsequent inspection of the airplane by a Federal Aviation Administration inspector revealed substantial damage to the nose section of the airplane, which included wrinkling at the forward pressure bulkhead. The airplane was equipped with a cockpit voice recorder (CVR) and an enhanced ground proximity warning system (EGPWS), which were retained for further examination. The airplane was not equipped; nor was it required to be equipped with a flight data recorder (FDR).

The CVR was sent to the Safety Board's Vehicle Recorder Laboratory, Washington, DC, for readout. The CVR recorded four channels of audio information for 30 minutes; however, none of the audio was pertinent to the accident. The audio captured was consistent with the CVR being overwritten or recorded over by subsequent events.

The EGPWS was downloaded at Honeywell, Inc, Redmond, Washington, under the supervision of an NTSB investigator. Review of the data recorded by the EGPWS revealed a "too low flaps" warning activated when the airplane was about 300 feet above the ground, followed approximately 14 seconds later by a sink rate warning, when the airplane was about 50 feet above the ground. The airplane touched down at airspeed about 150 knots. There were no windshear alerts generated by the EGPWS for the accident flight.

The PIC reported 7,220 hours of total flight experience, which included about 710 hours in the same make and model as the accident airplane. He further reported that he did not experience any mechanical malfunctions with the airplane during the accident flight.

The airplane operating manual, Supplemental Procedures Section 3, Precautionary Actions, "when windshear activity is known or suspected at arrival..." included the instruction, "Select the minimum flap setting acceptable for the runway length to be used."

According to the manufacturer, the airplane was certified for normal landings with the flap system at 45 degrees only, and there was no flight test data to certify the airplane to land with the flap system not at 45 degrees during normal operations. At the time of certification, the airplane was tested for abnormal conditions, including wing flap system malfunctions, with landings at flap settings other than 45 degrees, and corresponding abnormal procedures were published in the airplane flight manual; however, the abnormal procedures and the use of flaps at a setting other than 45 degrees for landing were to be used only in the event of the specific abnormal conditions, and as specified by the appropriate procedure.

After the accident, the manufacturer revised the airplane operating manual Supplemental Procedures Section 3, Precautionary Actions, "when windshear activity is known or suspected at arrival..." by deleting the sentence "Select the minimum flap setting acceptable for the runway length to be used."

A weather observation taken at MVY, about the time of the accident, reported, wind from 120 degrees at 16 knots, gusting to 23 knots; visibility 1 1/4 statute miles in heavy rain and mist; ceiling 400 feet broken, 900 feet broken, and 1,900 feet overcast; temperature 18 degrees Celsius (C), dew point 17 degrees C; altimeter 29.61 inches of mercury.

### Pilot Information

<b>Certificate:</b>	Airline transport	<b>Age:</b>	46, Male
<b>Airplane Rating(s):</b>	Single-engine land; 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>	None	<b>Toxicology Performed:</b>	No
<b>Medical Certification:</b>	Class 1 Without waivers/limitations	<b>Last FAA Medical Exam:</b>	June 4, 2009
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	February 7, 2009
<b>Flight Time:</b>	7220 hours (Total, all aircraft), 710 hours (Total, this make and model), 4632 hours (Pilot In Command, all aircraft), 11 hours (Last 90 days, all aircraft), 8 hours (Last 30 days, all aircraft), 4 hours (Last 24 hours, all aircraft)		

### Co-pilot Information

<b>Certificate:</b>	Airline transport	<b>Age:</b>	53, Male
<b>Airplane Rating(s):</b>	Single-engine land; 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>	None	<b>Toxicology Performed:</b>	No
<b>Medical Certification:</b>	Class 1 Without waivers/limitations	<b>Last FAA Medical Exam:</b>	May 21, 2009
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	September 21, 2009
<b>Flight Time:</b>	8934 hours (Total, all aircraft), 475 hours (Total, this make and model), 7543 hours (Pilot In Command, all aircraft), 22 hours (Last 90 days, all aircraft), 20 hours (Last 30 days, all aircraft), 4 hours (Last 24 hours, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Bombardier	<b>Registration:</b>	N190MP
<b>Model/Series:</b>	CL-600-2B16	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>		<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	5161
<b>Landing Gear Type:</b>	Retractable - Tricycle	<b>Seats:</b>	12
<b>Date/Type of Last Inspection:</b>	September 18, 2009 Annual	<b>Certified Max Gross Wt.:</b>	45250 lbs
<b>Time Since Last Inspection:</b>	11 Hrs	<b>Engines:</b>	2 Turbo fan
<b>Airframe Total Time:</b>	7914 Hrs as of last inspection	<b>Engine Manufacturer:</b>	GE
<b>ELT:</b>	Installed, not activated	<b>Engine Model/Series:</b>	CF-34-3A1
<b>Registered Owner:</b>	On file	<b>Rated Power:</b>	8729 Lbs thrust
<b>Operator:</b>	On file	<b>Operating Certificate(s) Held:</b>	None

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Instrument (IMC)	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	MVY, 59 ft msl	<b>Distance from Accident Site:</b>	
<b>Observation Time:</b>	15:53 Local	<b>Direction from Accident Site:</b>	
<b>Lowest Cloud Condition:</b>		<b>Visibility</b>	1 miles
<b>Lowest Ceiling:</b>	Broken / 400 ft AGL	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	16 knots / 23 knots	<b>Turbulence Type Forecast/Actual:</b>	/
<b>Wind Direction:</b>	120°	<b>Turbulence Severity Forecast/Actual:</b>	/
<b>Altimeter Setting:</b>	29.61 inches Hg	<b>Temperature/Dew Point:</b>	18°C / 17°C
<b>Precipitation and Obscuration:</b>	N/A - None - Mist		
<b>Departure Point:</b>	Denver, CO (APA )	<b>Type of Flight Plan Filed:</b>	IFR
<b>Destination:</b>	Vineyard Haven, MA (MVY )	<b>Type of Clearance:</b>	IFR
<b>Departure Time:</b>	10:15 Local	<b>Type of Airspace:</b>	

## Airport Information

<b>Airport:</b>	Martha's Vineyard MVY	<b>Runway Surface Type:</b>	Asphalt
<b>Airport Elevation:</b>	67 ft msl	<b>Runway Surface Condition:</b>	Wet
<b>Runway Used:</b>	24	<b>IFR Approach:</b>	ILS
<b>Runway Length/Width:</b>	5504 ft / 100 ft	<b>VFR Approach/Landing:</b>	Full stop

## Wreckage and Impact Information

<b>Crew Injuries:</b>	2 None	<b>Aircraft Damage:</b>	Substantial
<b>Passenger Injuries:</b>	2 None	<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	4 None	<b>Latitude, Longitude:</b>	41.393054,-70.61444(est)

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Schiada, Luke
<b>Additional Participating Persons:</b>	John Donahue; FAA/FSDO; Lexington, MA Beverly Harvey; Transportation Safety Board of Canada; Quebec, Canada Jimmy Avgoustis; Bombardier Aerospace; Quebec, Canada
<b>Original Publish Date:</b>	March 16, 2011
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<b>Investigation Class:</b>	<a href="#">Class</a>
<b>Note:</b>	
<b>Investigation Docket:</b>	<a href="https://data.nts.gov/Docket?ProjectID=74820">https://data.nts.gov/Docket?ProjectID=74820</a>

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