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## Elevator control problems, Boeing - Canada (de Havilland) DHC-8-102, March 12, 2000

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**Micro-summary:** This DHC-8-102 experienced flight control difficulties.

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**Event Date:** 2000-03-12 at 1854 EST


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

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

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  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!***
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		NTSB ID: IAD00IA026		Aircraft Registration Number: N838EX	
		Occurrence Date: 03/12/2000		Most Critical Injury: None	
		Occurrence Type: Incident		Investigated By: NTSB	
Location/Time					
Nearest City/Place BALTIMORE		State MD	Zip Code 21063	Local Time 1854	Time Zone EST
Airport Proximity: On Airport		Distance From Landing Facility:		Direction From Airport:	
Aircraft Information Summary					
Aircraft Manufacturer Boeing - Canada (de Havilland)		Model/Series DHC-8-102		Type of Aircraft Airplane	
Sightseeing Flight: No			Air Medical Transport Flight: No		
Narrative					
<p>Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:</p> <p>On March 12, 2000, at 1854 Eastern Standard Time, a Boeing/de Havilland DHC-8-102, N838EX, operated by Allegheny Airlines, Inc., revealed sheet metal damage to the elevator and rudder during an inspection by maintenance personnel at the Baltimore/Washington International Airport (BWI) Baltimore, Maryland. The certificated airline transport pilot captain and first officer, the cabin attendant, and 29 passengers were not injured during the flight. Visual meteorological conditions prevailed and an instrument flight rules flight plan was filed for the flight conducted under 14 CFR Part 121.</p> <p>The maintenance personnel were troubleshooting a logbook entry by the flight crew of US Airways Express flight 3678 that departed LaGuardia Airport (LGA), New York, New York, at 1630, and arrived BWI, at 1803. According to the write-up in the maintenance log, during the flight from LGA to BWI, the captain required "...Elevator trim at max nose down in climb, cruise, [and] landing attitude."</p> <p>Examination of the elevator revealed damage to the inboard trailing edge fairing, inboard lower fairing, and right elevator spring tab. The rudder revealed damage on the top right forward edge.</p> <p>In a telephone interview, the chief pilot of Allegheny Airlines said the airplane had experienced three crew changes during the day, and that the flight from LGA to BWI was the first flight of the day for that crew.</p> <p>In a telephone interview, the captain said the preflight at LGA was divided between the first officer and himself. He said he performed preflight duties in the cockpit while the first officer examined the exterior of the airplane.</p> <p>The captain said the flight experienced delays waiting for a ground power unit for engine start and while taxiing to the active runway. He said, "...the winds were strong and gusts were a little over 30 knots." The captain said that taxi, takeoff, and initial climb were "normal".</p> <p>The captain said the airplane required a "significant amount" of nose down trim after climbing above 2,000 feet and 140 knots. He said that after level off, the elevator was trimmed fully nose down and the yoke still required slight forward pressure to maintain straight and level flight.</p> <p>The captain was asked to describe the procedure that was used for release of the elevator gust lock on the ground. He said:</p> <p>"The first officer released the gust lock. Normally, the first officer would release the gust lock taking the runway, but because of the winds, I asked him to release the gust lock on the runway centerline. There was no banging on release. The controls pretty much stayed where they were; there was no full travel of the controls."</p>					
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National Transportation Safety Board

## FACTUAL REPORT

AVIATION

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Occurrence Type: Incident

## Narrative (Continued)

In a telephone interview, the first officer said his exterior check of the airplane during preflight revealed no anomalies, and his account of the flight was consistent with the captain's. When asked to review release of the gust lock, he said:

"I take hold of the yoke with my right hand, and release the gust lock with the left. I didn't feel anything different."

Both pilots described the exchange of the flight controls, the pressure required to maintain level flight, and the discussion about a possible return to LGA. Both pilots said they felt they were in no danger and that they had full control authority with the airplane, so they decided to continue to BWI.

Data from the Flight Data Recorder revealed the airplane taxied into position for departure from runway 04 at LGA. Graphed lines depicting left hand (LH) and right hand (RH) elevator surface positions were superimposed over each other during taxi. At the point where the airplane aligned with the runway heading, during an approximate one-second duration, a 50 degree deflection of the elevator control surfaces and the control yoke was noted.

At the point where the control yoke returned to its nominal position, the LH and RH elevator graph lines were approximately 4 degrees apart. These lines remained separated by approximately 4 degrees throughout the remainder of the flight.

Examination of previous flights revealed the elevator control surface graph lines were superimposed in all modes of flight.

Examination of the elevator trim graph line revealed that full nose down trim was programmed during an approximate 6 second duration after the airplane accelerated above 120 knots indicated airspeed (IAS).

Examination of previous flights revealed application of approximately neutral pitch trim through all flight modes.

After removal of an inspection panel, examination of the elevator gust lock mechanism revealed that only three of four elevator stop bumpers were installed. The upper right bumper was missing, but the mount bolt was still in place. The upper left bumper was cracked, chipped, crazed, and displayed a longitudinal crack that ran its entire length.

The chief inspector for Allegheny Airlines prepared an Incident Report regarding the damage to N838EX. In the summary section, he stated:

"Initial inspection revealed the upper right elevator stop bumper missing, which in turn caused the damage to the elevator and rudder. While inspecting the mechanism in the horizontal stabilizer, we engaged the gust lock for the elevators, and inspected for play in the gust lock bracket attach plates. No defects were noted."

In a telephone interview, a product safety representative from de Havilland was asked if the damage could have been prevented had the upper right hand bumper been in place. He said, "I guarantee it. You wouldn't see the damage at all."

As a result of the investigation, maintenance and operational procedures for Allegheny Airlines and the Dash 8 fleet were changed by direct input from parties to the investigation and recommendations from the FAA.

In an electronic mail message dated May 8, 2000, Allegheny's Chief Inspector stated:

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**AVIATION**

SAFETY BOARD

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**Narrative** (Continued)


"...We are 100% complete in the inspection of our fleet for serviceability of the elevator bumpers and associated gust lock bracket. This inspection was prompted by the events that occurred on aircraft N838EX on Mar 13, 2000.

"We had no findings that I am aware of with the bumpers, however, several gust lock plates were found loose and repaired as necessary. The [Allegheny] C check is being revised to clearly state to inspect and replace these items as necessary..."

The de Havilland Dash 8 Flight Manual was revised on September 1, 2000 for "Introduction of Control Lock release Caution statement." According to the manual, "To prevent unrestrained elevator travel with the aircraft headed downwind, hold the control wheel firmly prior to releasing the gust lock."

The winds at LaGuardia Airport, at 1551, were from 300 degrees at 22 knots, gusting to 27 knots.

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		Occurrence Date: 03/12/2000				
		Occurrence Type: Incident				
<b>Landing Facility/Approach Information</b>						
Airport Name BALTIMORE-WASHINGTON INT		Airport ID: BWI	Airport Elevation 146 Ft. MSL	Runway Used 0	Runway Length	Runway Width
Runway Surface Type: Asphalt						
Runway Surface Condition: Dry						
Type Instrument Approach: NONE						
VFR Approach/Landing: None						
<b>Aircraft Information</b>						
Aircraft Manufacturer Boeing - Canada (de Havilland)		Model/Series DHC-8-102		Serial Number 220		
Airworthiness Certificate(s): Transport						
Landing Gear Type: Retractable - Tricycle						
Homebuilt Aircraft? No		Number of Seats: 40	Certified Max Gross Wt. 34700 LBS		Number of Engines: 2	
Engine Type: Turbo Prop		Engine Manufacturer: P&W		Model/Series: PW 120A	Rated Power: 1800 HP	
<b>- Aircraft Inspection Information</b>						
Type of Last Inspection Continuous Airworthiness		Date of Last Inspection 02/2000	Time Since Last Inspection 241 Hours		Airframe Total Time 25347 Hours	
<b>- Emergency Locator Transmitter (ELT) Information</b>						
ELT Installed? Yes		ELT Operated?		ELT Aided in Locating Accident Site?		
<b>Owner/Operator Information</b>						
Registered Aircraft Owner ALLEGHENY AIRLINES, INC		Street Address 2345 CRYSTAL DRIVE				
		City ARLINGTON		State VA	Zip Code 22227	
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: US AIRWAYS EXPRESS				Operator Designator Code:		
<b>- Type of U.S. Certificate(s) Held:</b>						
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; Domestic; Passenger Only						
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	Occurrence Date: 03/12/2000
	Occurrence Type: Incident

**First Pilot Information**

Name On File	City On File	State On File	Date of Birth	Age 34
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Sex: M	Seat Occupied: Left	Principal Profession: Civilian Pilot	Certificate Number:
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Certificate(s): Airline Transport

Airplane Rating(s): Multi-engine Land; Single-engine Land

Rotorcraft/Glider/LTA: None

Instrument Rating(s): Airplane

Instructor Rating(s): Instrument Airplane

Type Rating/Endorsement for Accident/Incident Aircraft? Yes	Current Biennial Flight Review?
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Medical Cert.: Class 1	Medical Cert. Status: Valid Medical--w/ waivers/lim.	Date of Last Medical Exam: 12/1999
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- 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	11990	7200	1290	10700	6000	2000				
Pilot In Command(PIC)	10000	7200	1000	8700						
Instructor										
Last 90 Days	175									
Last 30 Days	80									
Last 24 Hours	4									

Seatbelt Used? Yes	Shoulder Harness Used? Yes	Toxicology Performed? No	Second Pilot? Yes
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**Flight Plan/Itinerary**

Type of Flight Plan Filed: IFR

Departure Point NEW YORK	State NY	Airport Identifier LGA	Departure Time 1630	Time Zone EST
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Destination Same as Accident/Incident Location	State	Airport Identifier BWI	
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Type of Clearance: IFR

Type of Airspace: Class B

**Weather Information**

Source of Briefing: National Weather Service

Method of Briefing:

 <p><b>National Transportation Safety Board</b> <b>FACTUAL REPORT</b> <b>AVIATION</b></p>	NTSB ID: IAD00IA026
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<b>Weather Information</b>					
WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
BWI	1854	EST	146 Ft. MSL	0 NM	0 Deg. Mag.
Sky/Lowest Cloud Condition: Scattered			4900 Ft. AGL	Condition of Light: Day	
Lowest Ceiling: None		0 Ft. AGL		Visibility: 10 SM	Altimeter: 30.00 "Hg
Temperature: 4 °C	Dew Point: -4 °C	Wind Direction: 310		Density Altitude: Ft.	
Wind Speed: 14	Gusts: 22	Weather Conditions at Accident Site: Visual Conditions			
Visibility (RVR): 0 Ft.	Visibility (RVV) 0 SM	Intensity of Precipitation: Unknown			
Restrictions to Visibility: None					
Type of Precipitation: None					

<b>Accident Information</b>		
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				1	1
Other Crew					
Passengers				29	29
- TOTAL ABOARD -				32	32
Other Ground	0	0	0		0
- GRAND TOTAL -	0	0	0	32	32

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**FACTUAL REPORT**

**AVIATION**



NTSB ID: IAD001A026

Occurrence Date: 03/12/2000

Occurrence Type: Incident

Administrative Information

Investigator-In-Charge (IIC)

BRIAN C. RAYNER

Additional Persons Participating in This Accident/Incident Investigation:

THOMAS V TOLBERT

FAA FSDO # 07

BALTIMORE, MD

SCOTT ALEXANDER

ALLEGHENY AIRLINES

MIDDLETOWN, PA 17057