Aviation Investigation Final Report

Location:	Rockland, Maine	**Incident Number:**	NYC05IA128
Date & Time:	August 2, 2005, 17:09 Local	**Registration:**	N136MJ
Aircraft:	Beech 1900D	**Aircraft Damage:**	None
Defining Event:		**Injuries:**	9 None
Flight Conducted Under:	Part 121: Air carrier - Scheduled		

Analysis

During the takeoff rotation, the captain pulled the yoke with both hands, but it did not move. The captain then pulled significantly harder, and the yoke moved quickly aft. The airplane jumped into the air, but the captain was able to maintain controlled flight, and continue to the destination airport. During cruise flight, everything was normal except that the elevator trim moved slowly nose up, which required an input of 1/2-unit nose down trim every 1 to 2 minutes. Subsequent examination of the airplane revealed that the left elevator could be moved around by hand. Further examination revealed that seven rivets were loose, and one rivet was missing in the vicinity of the left side elevator outer hinge-point attach bracket. Ground tests were unable to duplicate the elevator anomaly as reported by the captain. However, a fleet inspection of the operator's aircraft revealed that five of the eleven airplanes had loose rivets on the elevator hinge-point attach brackets. In addition, fleet inspections of other operators' same make and model aircraft revealed that some of the airplanes had loose rivets on the elevator hinge-point attach brackets. The suspect rivets and elevator were replaced on the incident airplane, and the anomaly did not reoccur.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this incident to be: A loose elevator attachment, which resulted in a partial elevator binding during takeoff and uncommanded elevator movement during cruise.

Findings

Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation: TAKEOFF

Findings
1. (C) FLIGHT CONTROL,ELEVATOR ATTACHMENT - LOOSE
2. FLIGHT CONTROL,ELEVATOR - BINDING(MECHANICAL)

Occurrence #2: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation: CRUISE

Findings
3. FLIGHT CONTROL,ELEVATOR - UNCOMMANDED

Factual Information

On August 2, 2005, at 1709 eastern daylight time, a Beech 1900D, N136MJ, operated by Colgan Air Inc. as flight 4972 (d.b.a. US Airways Express), was not damaged during takeoff from Knox County Regional Airport (RKD), Rockland, Maine. The certificated airline transport pilot, certificated commercial pilot, and seven passengers were not injured. Visual meteorological conditions prevailed for the flight destined to Augusta State Airport (AUG), Augusta, Maine. An instrument flight rules flight plan was filed for the air carrier flight conducted under 14 CFR Part 121.

The captain stated that during the takeoff roll, the first officer called "V1 rotate" at 100 knots. The captain pulled the yoke with both hands, and it did not move. The captain then pulled significantly harder, and the yoke moved quickly aft. The airplane "jumped" into the air, but the captain was able to maintain controlled flight, and elected to continue to AUG. The captain noted that during cruise flight everything was normal except that the elevator trim moved slowly nose up, which required an input of 1/2-unit nose down trim every 1 to 2 minutes. The flight landed uneventfully at AUG about 28 minutes after takeoff.

After landing at AUG, the airplane was initially examined by Colgan maintenance personnel. The maintenance personnel noted that the outer portion of the left elevator could be "moved around" by hand. They also noted that transponder wires were contacting the flight control column, and they moved the wires. However, the maintenance personnel could not determine if the transponder wires were related to the anomaly as reported by the captain. The maintenance personnel subsequently removed the left elevator before a Federal Aviation Administration (FAA) inspector or Raytheon Aircraft Company technical representative had an opportunity to examine the elevator on the incident airplane. A Raytheon technical representative subsequently examined the left elevator at Colgan Air's maintenance facility in Hyannis, Massachusetts.

Although the incident was not initially reported to the Safety Board, an FAA inspector was conducting routine surveillance at AUG on August 4, 2005, and observed the airplane without a left elevator. The inspector began to investigate further, and learned of the elevator anomaly. He subsequently arranged for another FAA inspector to examine the suspect elevator at Colgan Air's headquarters, in Manassas, Virginia.

The re-examination in Manassas occurred on August 22, 2005, and was also attended by representatives of Raytheon Aircraft Company. The re-examination revealed that seven rivets were loose, and one rivet was missing in the vicinity of the left side elevator outer hinge-point attach bracket. During ground tests with an exemplar aircraft, the FAA inspector was unable to duplicate the elevator anomaly as reported by the captain, and could not positively relate the loose rivets to the elevator anomaly. However, a fleet inspection of Colgan Air's Beech 1900s

revealed that five of the eleven airplanes had loose rivets on the elevator hinge-point attach brackets. In addition, fleet inspections of other operators' Beech 1900s revealed that some of the airplanes had loose rivets on the elevator hinge-point attach brackets.

The airplane was maintained under a continuous airworthiness maintenance program. The airplane's last inspection was performed on July 29, 2005. The airplane had accumulated about 10 hours of operation from the time of the last inspection, until the time of the incident.

As a result of the investigation, the FAA issued Airworthiness Directive (AD) 2005-18-21, effective September 13, 2005. The AD pertained to all Beech 1900, 1900C, and 1900D model airplanes. The AD required operators to: inspect all elevator hinge support attachments on both left and right elevators for loose and missing rivets; replace rivets if loose or missing rivets are found; inspect the elevator hinge joints for looseness and clearance of each elevator to its stabilizer; correct looseness and clearance if incorrect; and report results of the required inspections.

The suspect rivets and elevator were replaced on the incident airplane, and as of the publication of this report, the anomaly did not reoccur.

Pilot Information

Certificate:	Airline transport	**Age:**	33,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane single-engine; Instrument airplane	**Toxicology Performed:**	No
Medical Certification:	Class 1 With waivers/limitations	**Last FAA Medical Exam:**	February 1, 2005
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	February 1, 2005
Flight Time:	3604 hours (Total, all aircraft), 2450 hours (Total, this make and model), 2103 hours (Pilot In Command, all aircraft), 175 hours (Last 90 days, all aircraft), 61 hours (Last 30 days, all aircraft), 6 hours (Last 24 hours, all aircraft)		

Co-pilot Information

Certificate:	Commercial	**Age:**	33,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine; Instrument airplane	**Toxicology Performed:**	No
Medical Certification:	Class 1 With waivers/limitations	**Last FAA Medical Exam:**	November 1, 2004
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	March 1, 2005
Flight Time:	1320 hours (Total, all aircraft), 270 hours (Total, this make and model), 972 hours (Pilot In Command, all aircraft), 250 hours (Last 90 days, all aircraft), 70 hours (Last 30 days, all aircraft), 4 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N136MJ
Model/Series:	1900D	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Transport	**Serial Number:**	UE-36
Landing Gear Type:	Retractable - Tricycle	**Seats:**	21
Date/Type of Last Inspection:	July 1, 2005 Continuous airworthiness	**Certified Max Gross Wt.:**	17120 lbs
Time Since Last Inspection:	10 Hrs	**Engines:**	2 Turbo prop
Airframe Total Time:	20535 Hrs at time of accident	**Engine Manufacturer:**	Pratt & Whitney
ELT:	Installed, not activated	**Engine Model/Series:**	PT6A-67D
Registered Owner:	Raytheon Aircraft Credit Corp	**Rated Power:**	1214 Horsepower
Operator:	Colgan Air. Inc	**Operating Certificate(s) Held:**	Flag carrier (121)
Operator Does Business As:	US Airways Express	**Operator Designator Code:**	NSVA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	RKD,56 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	17:15 Local	**Direction from Accident Site:**	0°
Lowest Cloud Condition:	Few / 12000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	9 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	240°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.84 inches Hg	**Temperature/Dew Point:**	23°C / 18°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Rockland, ME (RKD)	**Type of Flight Plan Filed:**	IFR
Destination:	Augusta, ME (AUG)	**Type of Clearance:**	IFR
Departure Time:	17:09 Local	**Type of Airspace:**	

Airport Information

Airport:	Knox County Regional Airport RKD	**Runway Surface Type:**	Asphalt
Airport Elevation:	56 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	21	**IFR Approach:**	Visual
Runway Length/Width:	3900 ft / 100 ft	**VFR Approach/Landing:**	Full stop;Traffic pattern

Wreckage and Impact Information

Crew Injuries:	2 None	**Aircraft Damage:**	None
Passenger Injuries:	7 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	9 None	**Latitude, Longitude:**	44.060276,-69.099166

Administrative Information

Investigator In Charge (IIC):	Gretz, Robert
Additional Participating Persons:	Stephen A McMorrow; FAA FSDO-05; Portland, ME Rob Ramey; Raytheon Aircraft Company; Wichita, KS Dave Vance; Colgan Air Inc. ; Manassas, VA
Original Publish Date:	June 28, 2006
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=62141