



# National Transportation Safety Board Aviation Accident Final Report

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<b>Location:</b>	Kayenta, AZ	<b>Accident Number:</b>	SEA07LA118
<b>Date &amp; Time:</b>	05/02/2007, 1455 MDT	<b>Registration:</b>	N3210L
<b>Aircraft:</b>	Beech V35B	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>		<b>Injuries:</b>	1 Serious
<b>Flight Conducted Under:</b>	Part 91: General Aviation - Personal		

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## Analysis

The pilot reported that the airplane was at a cruise altitude of 12,500 feet msl on a cross-country flight when he experienced a sudden and complete loss of ruddervator control. The pilot said that control of the airplane was regained after reducing engine power to 1,500 rpm, and stabilizing the airspeed at 100-knots. He added that subsequent airplane control was accomplished via aileron and power inputs. The pilot flew to an airport about 75 miles from where the loss of control occurred. On short final for the intended runway, he lowered the landing gear. The airplane entered a dive and collided with terrain about 300 yards short of the runway in a nose-low attitude, which resulted in structural damage to the airframe. According to first responders to the accident, the pilot told them that he encountered severe turbulence, and momentarily lost control of the airplane. Examination of the airplane revealed that both ruddervators had separated from their respective stabilizer attach points at some earlier time during the flight. The ruddervators were not found at the accident site, and only remnants remained attached to the hinge points on the stabilizers. The remaining pieces of ruddervator were examined. The examination revealed no evidence of preexisting cracks, fatigue, or corrosion damage, and all fracture features were consistent with overstress separations. For the portions of the flight documented by radar coverage, the data indicated calculated true airspeeds routinely above design maneuvering speed (VA-132-kts), with two sustained periods at design cruising speed (VC-165-kts), and occasional periods 5 to 12-knots above VC. There's no evidence indicating that the airplane's never-exceed speed (VNE-195-kts) was exceeded. An AIRMET (Airman's Meteorological Information) for moderate turbulence was issued during the timeframe of the accident, and included the route of flight.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The overstress separation of both ruddervators during cruise flight. Contributing to the accident was the flight's encounter with turbulence.

## Findings

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Occurrence #1: IN FLIGHT ENCOUNTER WITH WEATHER  
Phase of Operation: CRUISE - NORMAL

### Findings

1. (F) WEATHER CONDITION - TURBULENCE  
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Occurrence #2: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION  
Phase of Operation: CRUISE

### Findings

2. (C) FLT CONTROL SYST, RUDDERVATOR - OVERLOAD  
3. (C) FLT CONTROL SYST, RUDDERVATOR - SEPARATION  
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Occurrence #3: LOSS OF CONTROL - IN FLIGHT  
Phase of Operation: APPROACH - VFR PATTERN - FINAL APPROACH

### Findings

4. (C) RUDDERVATOR - NOT AVAILABLE  
5. (C) AIRCRAFT CONTROL - NOT POSSIBLE - PILOT IN COMMAND  
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Occurrence #4: IN FLIGHT COLLISION WITH TERRAIN/WATER  
Phase of Operation: DESCENT - UNCONTROLLED

### Findings

6. TERRAIN CONDITION - OPEN FIELD

## Factual Information

### HISTORY OF FLIGHT

On May 2, 2007, about 1455 mountain daylight time, a Beech V35B, N3210L, sustained substantial damage when it collided with terrain approximately 300 yards from the threshold of runway 23 at the Kayenta Airport (OV7), Kayenta, Arizona. The private pilot, who was the owner and operator of the airplane, and sole occupant, was seriously injured. The airplane was being operated as a visual flight rules (VFR) cross-county flight under Title 14, Code of Federal Regulations (CFR) Part 91, when the accident occurred. Visual meteorological conditions prevailed, and no flight plan was filed. The flight originated from Walker Field Airport, Grand Junction Colorado, about 1300 with an intended destination of Tucson, Arizona.

In a written statement the pilot reported that about 30 minutes after takeoff, at a cruise altitude of 12,500 feet mean sea level (msl), there was a "...complete loss of ruddervator control" that developed into a spin "...with my artificial horizon tumbling and vertical airspeed fluctuating from 3,000 feet up and down" and the airspeed indicator "stuck" in the yellow zone. The pilot stated the forces associated with the "violent" loss of control "resulted in me being thrown free of [my] seatbelt and harness." The pilot further reported that control of the airplane was regained after reducing engine power to 1,500 RPM and stabilizing airspeed at 100-knots. He added that subsequent airplane control was accomplished via aileron and power inputs.

After regaining control of the airplane the pilot maneuvered toward Kayenta, about 75 miles southwest from where the loss of control occurred. After identifying the airport the pilot descended to 1,500 feet above ground level (agl) and circled the airport. After circling, the pilot prepared for a straight in final approach and lowered the landing gear. The pilot stated that when he lowered the gear, the airplane rapidly pitched to a nose low attitude. The pilot raised the landing gear and completed a go-around maneuver. He circled the airport a second time and reestablished himself on final for the landing runway. On short final, about 200 feet agl, the pilot again lowered the landing gear. The airplane entered a "dive" and collided with terrain about 300 yards short of the intended runway.

The pilot stated that prior to the loss of control the airplane was in a level cruise at 12,500 msl. The engine power was set at 27 inches of manifold pressure with a propeller RPM of 2,450. The airplane's airspeed was reported, by the pilot, to be about 160-knots (ground speed). The pilot stated he was utilizing the onboard Global Positioning System (GPS [Garmin 530]) as his primary reference for airspeed.

First responders stated that when they arrived at the site the pilot was ambulatory and bleeding "profusely" from a gash on his forehead. One of the first responders stated the pilot reported to him that he "encountered severe turbulence and lost control of the aircraft approximately 40 miles east of Kayenta."

First responders reported that a cursory inspection of the airplane revealed that both ruddervators were missing with the exception of small pieces of the control surfaces still attached to their respective attachment hinges. The remaining ruddervator pieces/sections were not located.

### AIRCRAFT INFORMATION

The single engine, low-wing, v-tail airplane, serial number D9953, was manufactured in 1976. It originally was powered by a Continental IO-520-BA engine rated at 285-hp (continuous) and equipped with a controllable pitch propeller.

Review of copies of maintenance records showed that on April 23, 2007, the airplanes naturally aspirated engine, (Continental IO-520-BA) was retrofitted with a Garrett turbocharger (turbo normalizing) in accordance with Western Skyways Supplemental Type Certificates (STC) SE8677SW, SA8676SW and SA71GL. Maintenance records showed that a 100-hour inspection of the airframe, engine and propeller, was completed on April 23, 2007. The airframe total time at inspection was 1,097 hours.

#### METEOROLOGICAL INFORMATION

The pilot stated in the Pilot/Operator Aircraft Accident Report (NTSB Form 6120.1/2) that he received a full weather briefing from Denver Flight Service Station. The pilot reported no restrictions to visibility and a broken ceiling at 10,000 feet, with scattered clouds at 4,300 feet.

An AIRMET (Airman's Meteorological Information) for turbulence (TANGO) was updated at 1345 and warned of moderate turbulence below 15,000 feet for areas in California, New Mexico, Utah, Nevada and Arizona, including the accident airplanes route of flight.

#### TESTS AND RESEARCH

Post accident examination of the airframe was completed at a storage facility in Phoenix, Arizona, on May 8, 2008.

The examination revealed the following: The right stabilizer was intact. There was a small crease noted on the lower leading edge skin about 19" outboard of the root and 12" forward of the forward spar. The stabilizer reinforcement cuff was installed at the leading edge root of the stabilizer. The outboard ruddervator hinge was deformed outboard and up and twisted in a counter-clockwise direction. The hinge was intact with a small piece of the ruddervator attached to the aft hinge half. The hinge was disassembled and examined. The grease was dry and the bearing surface exhibited scoring and flaked plating. The middle hinge was intact and twisted clockwise. The hinge was disassembled and examined. The grease was dry and the bearing surface exhibited scoring and roller impressions. A 17" section of the ruddervator from the hinge inboard was still attached. The right ruddervator fitting hinge was not recovered. The right leg of the ruddervator support fitting was fractured through the bearing bore. The bushing was not recovered. The trim cable was intact from the actuator through the stabilizer, through the rear spar and remained attached to the tab control arms. The arms were fractured from the tab. All of the fractures on the right stabilizer exhibited a matte, angled, grainy appearance.

The left stabilizer was intact. A dent in the lower skin about 50" outboard of the root and 4" forward of the rear spar was noted. The stabilizer reinforcement cuff was installed at the leading edge root of the stabilizer. The outboard hinge was in place and deformed outboard and downward and appeared twisted counter-clockwise. The outboard hinge was intact with a small section of ruddervator attached to the aft hinge half. The hinge was disassembled and examined. The grease was dry and dirty and the bearing surface exhibited scoring, corrosion and roller impressions. The middle hinge, forward half was deformed outboard and fractured through the bearing bore. The aft half was not recovered. The left ruddervator fitting remained attached to the differential tail control rod, but was separated from the ruddervator. The ruddervator fitting hinge was separated from the bearing in the ruddervator support fitting.

The grease on the bearing was dry and dirty and the bearing did not exhibit any notable scoring. The inboard 15" of the left ruddervator remained attached to the trim control cables and was impaled on the left leg of the ruddervator support fitting. The trim cable was intact from the actuator through the stabilizer, through the rear spar, and remained attached to the remaining section of left ruddervator. The cable was twisted along its length. The upper and lower trim tab attachments were bent, but free to rotate.

Control continuity was established from the landing gear lower actuator access panel to the aft ends of the differential tail control rods. All cables remained attached to their control arms and were free to move.

The cockpit flight controls were intact to the front carry through structure. The nose keel deformation prevented the cockpit flight control sub assembly, forward of the front carry through from being visually examined.

The bulkheads in the aft fuselage at stations 272, 256.9 and 246.3 were intact and undamaged. The skin of the aft fuselage was intact and did not exhibit wrinkling or twisting. Small impact marks on the right side with flaked paint and gouges was noted.

The recovered pieces of ruddervator were examined at the NTSB Materials Laboratory. The examination revealed no evidence of preexisting cracks, fatigue, or corrosion damage and all fracture features were consistent with overstress separations.

#### ADDITIONAL DATA/INFORMATION

The NTSB Office of Research and Engineering completed a performance study using radar data recordings associated with the accident flight.

The radar data showed that the airplane departed Grand Junction, Colorado, about 1300, proceeded south toward Brush Mountain, Colorado, turned southwest and crossed the Colorado-Utah border near Ucolo, Utah, and continued southwest toward Bluff, Utah. Radar coverage terminated at 1344. The airplanes last recorded position was about 75 miles northeast of Kayenta, at an altitude of about 13,000 feet msl.

For the portions of the flight documented by radar coverage, the data indicated calculated true airspeeds routinely above  $V_a$  (132-kts), with two sustained periods at  $V_c$  (165-kts) and evidence of occasional exceedances 5 to 12-knots above  $V_c$ . There's no evidence indicating that the airplanes  $V_{ne}$  limit (195-kts) was exceeded.

A copy of the radar study and performance data is included in the public docket of this accident.

#### Airspeed information:

The limitations section of the Pilot Operating Handbook (POH) for the accident airplane lists the following airspeed limitations (for an airplane at gross weight) and definitions: Maneuvering ( $V_a$ ) speed is 132- knots indicated, Maximum Structural Cruising speed ( $V_c$ ) is 165 knots indicated and Never Exceed ( $V_{ne}$ ) speed is 195-knots indicated. The POH limitation section states the following:

" $V_a$ : Do not make full or abrupt control movements above this airspeed."

" $V_c$ : Do not exceed this airspeed except in smooth air and then only with caution."

"Vne: Do not exceed this airspeed in any operation."

### Pilot Information

<b>Certificate:</b>	Private	<b>Age:</b>	71, Male
<b>Airplane Rating(s):</b>	Single-engine Land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	Seatbelt, Shoulder harness
<b>Instrument Rating(s):</b>	None	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>	None	<b>Toxicology Performed:</b>	No
<b>Medical Certification:</b>	Class 3 With Waivers/Limitations	<b>Last FAA Medical Exam:</b>	01/01/2007
<b>Occupational Pilot:</b>		<b>Last Flight Review or Equivalent:</b>	04/01/2007
<b>Flight Time:</b>	1200 hours (Total, all aircraft), 1200 hours (Total, this make and model)		

### Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Beech	<b>Registration:</b>	N3210L
<b>Model/Series:</b>	V35B	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>		<b>Amateur Built:</b>	No
<b>Airworthiness Certificate:</b>	Normal; Utility	<b>Serial Number:</b>	D9953
<b>Landing Gear Type:</b>	Retractable - Tricycle	<b>Seats:</b>	4
<b>Date/Type of Last Inspection:</b>	04/01/2007, Annual	<b>Certified Max Gross Wt.:</b>	2700 lbs
<b>Time Since Last Inspection:</b>	2 Hours	<b>Engines:</b>	1 Reciprocating
<b>Airframe Total Time:</b>	1097 Hours as of last inspection	<b>Engine Manufacturer:</b>	Teledyne Continental
<b>ELT:</b>	Installed, not activated	<b>Engine Model/Series:</b>	IO-520
<b>Registered Owner:</b>	Don C. Debelle	<b>Rated Power:</b>	285 hp
<b>Operator:</b>	Don C. Debelle	<b>Operating Certificate(s) Held:</b>	None

## Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:		Distance from Accident Site:	
Observation Time:		Direction from Accident Site:	
Lowest Cloud Condition:	Scattered / 4300 ft agl	Visibility	10 Miles
Lowest Ceiling:	Broken / 10000 ft agl	Visibility (RVR):	
Wind Speed/Gusts:	Light and Variable /	Turbulence Type Forecast/Actual:	/
Wind Direction:		Turbulence Severity Forecast/Actual:	/
Altimeter Setting:		Temperature/Dew Point:	16 °C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	GRAND JUNCTION, CO (GJT)	Type of Flight Plan Filed:	None
Destination:	Kayenta, AZ (0V7)	Type of Clearance:	None
Departure Time:	1300 MDT	Type of Airspace:	

## Airport Information

Airport:	Kayenta Airport (0V7)	Runway Surface Type:	Asphalt
Airport Elevation:	5710 ft	Runway Surface Condition:	Dry
Runway Used:	23	IFR Approach:	None
Runway Length/Width:	7140 ft / 75 ft	VFR Approach/Landing:	Forced Landing; Straight-in

## Wreckage and Impact Information

Crew Injuries:	1 Serious	Aircraft Damage:	Substantial
Passenger Injuries:	N/A	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Serious	Latitude, Longitude:	36.709444, -110.236667

## Administrative Information

Investigator In Charge (IIC):	Dennis J Hogenson	Report Date:	08/28/2008
Additional Participating Persons:	Eddie Ochoa; Federal Aviation Administration; Scottsdale, AZ Paul Yoos; Hawker Beechcraft; Wichita, KS		
Publish Date:			
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at <a href="mailto:pubinq@ntsb.gov">pubinq@ntsb.gov</a> , or at 800-877-6799. Dockets released after this date are available at <a href="http://dms.nts.gov/pubdms/">http://dms.nts.gov/pubdms/</a> .		

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).