



# National Transportation Safety Board Aviation Accident Final Report

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<b>Location:</b>	Hampton, GA	<b>Accident Number:</b>	ERA11FA183
<b>Date &amp; Time:</b>	03/08/2011, 1140 EST	<b>Registration:</b>	N157KM
<b>Aircraft:</b>	DEHAVILLAND DHC-6-100	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Loss of control in flight	<b>Injuries:</b>	2 Fatal
<b>Flight Conducted Under:</b>	Part 91: General Aviation - Flight Test		

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## Analysis

The airplane had not been flown for about 5 months and the purpose of the accident flight was a maintenance test flight after both engines had been replaced with higher horsepower models. Witnesses observed the airplane depart and complete two uneventful touch-and-go landings. The airplane was then observed to be struggling to gain altitude and airspeed while maneuvering in the traffic pattern. One witness, who was an aircraft mechanic, reported that he observed the airplane yawing to the left and heard noises associated with propeller pitch changes, which he believed were consistent with the "Beta" range. The airplane stalled and impacted trees in a wooded marsh area, about 1 mile from the airport. It came to rest about 80-degrees vertically. Examination of the wreckage did not reveal any preimpact malfunctions; however, the lack of flight recorders and the condition of the wreckage precluded the gathering of additional relevant information. Damage observed to both engines and both propellers revealed they were likely operating at symmetrical power settings and blade angles at the time of the impact, with any differences in scoring signatures likely the result of impact damage. The reason for the yawing and the noise associated with propeller pitch changes that were reported prior to the stall could not be determined.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot did not maintain airspeed while maneuvering, which resulted in an aerodynamic stall.

## Findings

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<b>Aircraft</b>	Airspeed - Not attained/maintained (Cause)
<b>Personnel issues</b>	Aircraft control - Pilot (Cause)

## Factual Information

### HISTORY OF FLIGHT

On March 8, 2011, about 1140 eastern standard time, a DeHavilland DHC-6-100, N157KM, operated by Desert Sand Aircraft Leasing Company Inc., was substantially damaged when it impacted terrain while on approach to Clayton County Airport (4A7), Hampton, Georgia. The certificated commercial pilot and a pilot-rated mechanic were fatally injured. Visual meteorological conditions prevailed and no flight plan had been filed for the local maintenance test flight, which was conducted under the provisions of Title 14 Code of Federal Regulations Part 91.

According to witnesses, the accident flight was the first flight after both of the airplane's Pratt & Whitney Canada PT6A-20, 550-horsepower engines, were replaced with PT6A-27, 680-horsepower engines. The same Hartzell propellers utilized on the -20 engines, were reinstalled on the -27 engines.

One witness, who was a mechanic, observed the pilot conduct engine and propeller checks prior to takeoff. The airplane then departed, and completed two uneventful touch-and-go landings before the witness went inside.

Another witness, near the airport, observed the airplane flying in the traffic pattern for runway 6, a 4,503-foot-long, 75-foot-wide, asphalt runway. He stated the airplane's engine noise was fluctuating from low to high, without stopping completely. He further stated the airplane was "struggling to gain altitude and airspeed." As the airplane turned to line-up with the runway, it "stalled" and descended nose first toward the ground.

A third witness, who was also a mechanic, reported that he observed the airplane yawing to the left with noise associated with propeller pitch changes, which he believed were consistent with the "Beta" range. He stated the airplane was flying away from the approach end of runway 6, when it made a "very adverse" and "very fast" roll to the left, which was followed by a nose down spin, until it disappeared behind trees.

The airplane impacted trees in a wooded marsh area, about .8 miles prior to the threshold, near the extended centerline of runway 6.

### PERSONNEL INFORMATION

The pilot, age 38, held a commercial pilot certificate, with ratings for airplane single-engine land, airplane multiengine land, and instrument airplane. He also held a certified flight instructor certificate, with ratings for airplane single-engine land, airplane multiengine land, and instrument airplane.

The pilot's most recent Federal Aviation Administration (FAA) first-class medical certificate was issued on May 25, 2010. At that time he reported 901.5 hours of total flight experience, which included 127.3 hours in the previous 6 months.

Review of the pilot's logbook revealed that at the time of the accident, he had accumulated about 1,255 hours of total flight experience, which included 670 hours in multiengine airplanes. He had also accumulated about 500 total hours in DeHavilland DHC-6-100/200 series airplanes, which included about 275 hours during the 12 months prior to the accident.

The pilot rated mechanic, age 48, held a mechanic certificate with ratings for airframe and

powerplant, and a private pilot certificate, with a rating for airplane single-engine land. He reported 190 hours of total flight experience, on his most recent application for an FAA first-class medical certificate, which was issued on February 22, 2011.

#### AIRCRAFT INFORMATION

The all-metal, high-wing multiengine monoplane, serial number 057, was manufactured in 1967. It was configured for skydiving operations to accommodate 1 pilot and 23 skydivers. Only the two flight crew seats were installed. The airplane was powered by two Pratt & Whitney Canada PT6A-27, 680-horsepower engines.

According to maintenance records, the PT6A-27 engines were installed per a Supplemental Type Certificate (STC) SA96-123, held by Rocky Mountain Aircraft, Calgary, Alberta, Canada. According to a representative of the STC holder, there was no record that STC SA96-123 had been purchased for the accident airplane.

It was noted at the accident site that both engine data plates were observed with a "-27" stamped next to a lined-out "-28." There was no documentation located pertaining to the changed engine designation. According to the engine manufacturer, there were no changes in hardware between PT6A -28 and -27 designated engines. The PT6A-28 differed from the PT6A-27 by having coated small and large exit ducts, which allowed for a higher cruise power rating.

Both engines were equipped with Hartzell HC-B3TN-3, three-bladed, hydraulically operated constant-speed propellers with feathering and reversing capabilities. Oil pressure from their respective propeller governors was used to move the propeller blades to the low pitch (blade angle) direction. Propeller blade mounted counterweights and feathering springs actuated the blades toward the high pitch direction in the absence of governor oil pressure. The propellers incorporated a Beta mechanism that was designed to actuate when blade angles were lower than the flight idle position.

According to FAA records, the airplane had been purchased by its current owner on January 8, 2010.

According to maintenance records and interviews with maintenance personnel, the airplane was maintained under a DeHavilland Equalized Maintenance for Maximum Availability (EMMA) controlled inspection and maintenance program.

The airplane's most recent EMMA inspection (#16) was performed on July 30, 2010, at a total airframe time of 16,487.3 hours and 20,873 cycles. The airplane had been flown to 4A7 for winter maintenance and storage. As of October 2010, and the time of the accident flight, the airplane had accumulated about 16,541 hours, and 20,927 cycles.

At the time of the accident, both engines had accumulated approximately 3,780 total hours since new, and about 120 hours since their respective power sections were reinstalled on July 9, 2008, after maintenance related to a lightning strike inspection. The right and left propellers had been operated from about 2,760, and 2464 hours since overhaul; respectively.

A witness reported 100 gallons of fuel was added to the airplane prior to engine ground run-up checks, which were performed on March 6, 2011. In addition, fueling records revealed that 100 gallons of Jet-A aviation fuel was added prior to the accident flight. The airplane's total fuel capacity was 378 gallons.

## METEOROLOGICAL INFORMATION

The weather reported at an airport located about 10 miles west of the accident site at 1153, was: wind 100 degrees at 10 knots, gusting to 21 knots; visibility 10 statute miles; clear skies; temperature 14 degrees Celsius (C); dew point 2 degrees C; altimeter 30.28 inches of mercury.

## FLIGHT RECORDERS

The airplane was not equipped, nor was it required to be equipped with a cockpit voice recorder or flight data recorder.

## WRECKAGE INFORMATION

All major components of the airplane were accounted for at the scene, and no debris path was noted. The airplane came to rest about 80-degrees vertically and canted about 25-degrees on the right wing.

The front end of the fuselage forward of station 110, which included the cockpit, was destroyed. The right wing remained attached to the fuselage, while the left wing was separated. A 21-foot-long portion of the outboard left wing was located suspended in a tree about 15 to 20 feet above the ground, 33 feet northwest of the main wreckage. The inboard section of the left wing, to about 1 foot outboard of the engine nacelle, was separated and located adjacent to the main wreckage. The left and right wing aileron cables remained attached at the control surface actuators and were continuous to their respective wing root, where they were separated, consistent with overload.

The empennage was partially separated. The left horizontal stabilizer was separated, and the right side remained attached. The lower third of the rudder remained attached. The rudder and vertical stabilizer above the horizontal stabilizer was separated. The elevator control quadrant remained intact. The torque tube remained attached to the right elevator. The left elevator torque tube separated and was located with the separated left stabilizer torque tube assembly. Flight control continuity was confirmed from right elevator through the empennage. The rudder control quadrant remained attached to the rudder and continuity was confirmed from the rudder control surface to the empennage.

The rudder, aileron, and elevator trims were observed at or near a neutral position, and the fuselage flap actuator was consistent with an approach flap setting. Both engines were buried in mud. The left propeller assembly separated at the flange. The right propeller assembly remained attached.

An undetermined amount of fuel was observed leaking from the airplane's main fuel tank.

The power quadrant was impact damaged. All levers were seized except for the No. 2 power lever which was found about 1 inch aft of the full forward position, and could be moved about 1.5 inches. The No. 1 power lever was full forward. The No. 1 propeller lever was 2.25 inches aft of full forward, and the No. 2 propeller lever was full forward. The No. 1 fuel lever was full forward and the No. 2 fuel lever was 2 inches aft of full forward. The forward stop bar was displaced forward, and the aft stop bar was separated.

Examination of the left and right engines revealed that left engine sustained minimal impact deformation to its external housing, while the right engine sustained moderate deformation. Both engines displayed circumferential rubbing and scoring signatures; however, the

signatures observed on the right engine were more pronounced. In addition, their respective chip detectors, and fuel and oil filters were absent of contamination. Both engines displayed no evidence of any preimpact anomalies that would have precluded normal engine operation. According to the engine manufacturer, damage displayed to both engines was characteristic of the engines developing symmetrical power at the time of the impact, likely in a mid-power range.

The power control and reversing linkage on the left engine was continuous with impact deformation from the forward linkage, to the controls cambox, to the fuel control input lever. The power control and reversing linkage on the right engine was continuous with impact deformation from the forward linkage, to the controls cambox. The fuel control input lever was fractured. The cambox pin on both engines was found at the start of the reverse thrust ramp; however, their preimpact position could not be confirmed. The cambox was part of the engine control system and its purpose was to schedule gas generator speed and propeller angle.

The high pressure fuel pump, fuel control unit, propeller governor, propeller overspeed governor, and compressor bleed valve for both engines were retained for further examination and functional testing as able. The examinations did not reveal any preimpact malfunctions.

Examination of the left and right propeller assemblies revealed similar degrees of bending and twisting damage. In addition, all six propeller blade tips were separated. Both propellers displayed indications consistent with being driven toward extreme low/reverse pitch during impact. According to a representative from Hartzell, the propeller blade damage was consistent with both propellers being operated at similar moderate to high power settings, at the time of the impact.

#### MEDICAL AND PATHOLOGICAL INFORMATION

Autopsies were performed on the pilot and passenger by the Office of Medical Examiner at the DeKalb County Forensic Science Center, DeKalb County, Georgia.

Toxicological testing was performed on the pilot by the FAA Bioaeronautical Science Research Laboratory, Oklahoma City, Oklahoma with no anomalies noted.

#### History of Flight

Approach	Loss of control in flight (Defining event) Aerodynamic stall/spin
Uncontrolled descent	Collision with terr/obj (non-CFIT)

## Pilot Information

<b>Certificate:</b>	Flight Instructor; Commercial	<b>Age:</b>	38, Male
<b>Airplane Rating(s):</b>	Multi-engine Land; 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>	Airplane	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>	Airplane Multi-engine; Airplane Single-engine; Instrument Airplane	<b>Toxicology Performed:</b>	Yes
<b>Medical Certification:</b>	Class 1 Without Waivers/Limitations	<b>Last Medical Exam:</b>	05/25/2010
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	12/20/2010
<b>Flight Time:</b>	1255 hours (Total, all aircraft), 492 hours (Total, this make and model), 1150 hours (Pilot In Command, all aircraft), 66 hours (Last 90 days, all aircraft), 32 hours (Last 30 days, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Manufacturer:</b>	DEHAVILLAND	<b>Registration:</b>	N157KM
<b>Model/Series:</b>	DHC-6-100	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>		<b>Amateur Built:</b>	No
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	057
<b>Landing Gear Type:</b>	Tricycle	<b>Seats:</b>	
<b>Date/Type of Last Inspection:</b>	07/30/2010, Continuous Airworthiness	<b>Certified Max Gross Wt.:</b>	11579 lbs
<b>Time Since Last Inspection:</b>	54 Hours	<b>Engines:</b>	2 Turbo Prop
<b>Airframe Total Time:</b>	16541 Hours	<b>Engine Manufacturer:</b>	P&WC
<b>ELT:</b>	Not installed	<b>Engine Model/Series:</b>	PT6A-27
<b>Registered Owner:</b>	Desert Sand Aircraft Leasing Company Inc.	<b>Rated Power:</b>	680 hp
<b>Operator:</b>	Desert Sand Aircraft Leasing Company Inc.	<b>Air Carrier Operating Certificate:</b>	None

## Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	FFC, 808 ft msl	Observation Time:	1153 EST
Distance from Accident Site:	10 Nautical Miles	Direction from Accident Site:	260°
Lowest Cloud Condition:	Clear	Temperature/Dew Point:	14° C / 2° C
Lowest Ceiling:	None	Visibility	10 Miles
Wind Speed/Gusts, Direction:	10 knots/ 21 knots, 100°	Visibility (RVR):	
Altimeter Setting:	30.28 inches Hg	Visibility (RVV):	
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Hampton, GA (4A7)	Type of Flight Plan Filed:	None
Destination:	Hampton, GA (4A7)	Type of Clearance:	None
Departure Time:	EST	Type of Airspace:	

## Airport Information

Airport:	Clayton County (4A7)	Runway Surface Type:	Asphalt
Airport Elevation:	874 ft	Runway Surface Condition:	Dry
Runway Used:	06	IFR Approach:	Unknown
Runway Length/Width:	4503 ft / 75 ft	VFR Approach/Landing:	Traffic Pattern

## Wreckage and Impact Information

Crew Injuries:	2 Fatal	Aircraft Damage:	Substantial
Passenger Injuries:	N/A	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	2 Fatal	Latitude, Longitude:	33.379167, -84.350556 (est)

## Administrative Information

Investigator In Charge (IIC):	Luke Schiada	Adopted Date:	06/28/2012
Additional Participating Persons:	James A Jones; FAA/FSDO; Atlanta, GA John Britten; TSB Canada; Quebec, Canada, Dave Rees; Viking Air; Sidney, BC Canada, Thomas A Berthe; Pratt & Whitney Canada; Quebec, Canada, Tom McCreary; Hartzell; Piqua, OH		
Publish Date:	06/28/2012		
Investigation Docket:	<a href="http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=78514">http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=78514</a>		

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