National Transportation Safety Board
Aviation Accident Final Report

Location:	Hyannis, MA	**Accident Number:**	NYC08FA218
Date & Time:	06/18/2008, 1001 EDT	**Registration:**	N656WA
Aircraft:	DEHAVILLAND DHC6	**Aircraft Damage:**	Substantial
Defining Event:	Loss of control in flight	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 135: Air Taxi & Commuter - Non-scheduled		

Analysis

The pilot contacted air traffic control and requested clearance to taxi for departure approximately an hour after the scheduled departure time. About 4 minutes later, the flight was cleared for takeoff. A witness observed the airplane as it taxied, and found it strange that the airplane did not stop and "rev up" its engines before takeoff. Instead, the airplane taxied onto the runway and proceeded with the takeoff without stopping. The airplane took off quickly, within 100 yards of beginning the takeoff roll, became airborne, and entered a steep left bank. The bank steepened, and the airplane descended and impacted the ground. Postaccident examination of the wreckage revealed that the pilot's four-point restraint was not fastened and that at least a portion of the cockpit flight control lock remained installed on the control column. One of the pretakeoff checklist items was, "Flight controls - Unlocked - Full travel." The airplane was not equipped with a control lock design, which, according to the airframe manufacturer's previously issued service bulletins, would "minimize the possibility of the aircraft becoming airborne when take off is attempted with flight control locks inadvertently installed." In 1990, Transport Canada issued an airworthiness directive to ensure mandatory compliance with the service bulletins; however, the Federal Aviation Administration did not follow with a similar airworthiness directive until after the accident.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's failure to remove the flight control lock prior to takeoff. Contributing to the accident was the Federal Aviation Administration's failure to issue an airworthiness directive making the manufacturer's previously-issued flight control lock service bulletins mandatory.

Findings

Aircraft	Gust lock or damper - Incorrect use/operation (Cause)
Personnel issues	Use of equip/system - Pilot (Cause)
Organizational issues	Policy/procedure development - FAA/Regulator (Factor)

Factual Information

HISTORY OF FLIGHT

On June 18, 2008, at 1001 eastern daylight time, a DeHavilland DHC-6, N656WA, operated by Wiggins Airways, was substantially damaged when it impacted terrain during a takeoff attempt from Barnstable Municipal Airport (HYA), Hyannis, Massachusetts. The certificated airline transport pilot was fatally injured. Visual meteorological conditions prevailed, and an instrument flight rules flight plan was filed for the flight, destined for Nantucket Memorial Airport (ACK), Nantucket, Massachusetts. The cargo flight was conducted under the provisions of 14 Code of Federal Regulations (CFR) Part 135.

According to the operator, the airline was based in Manchester, New Hampshire, while the accident airplane and pilot were based at Hyannis. The accident flight was scheduled to depart Hyannis at 0900, but was often late in departing due to the cargo's delayed arrival to the airport. About 0800, the pilot contacted the operator via telephone in order to provide the flight's fuel and alternate destination information. At 0956, the pilot contacted air traffic control and requested clearance to taxi for departure, and was later cleared to take off from runway 24 at 1000.

A witness located just outside the airport perimeter fence, and near the arrival end of runway 24, observed the airplane as it taxied. According to the witness, he found it strange that the airplane did not stop and "rev up" its engines as he thought airplanes normally did, but instead taxied on the taxiway parallel to the runway and then made a 180-degree turn onto the runway without stopping. The airplane then initiated a takeoff roll, and the witness noted that the engine sound did not seem to increase. The witness also thought that the airplane "must have been empty," since it took off quickly, and was airborne within 100 yards of the start of the takeoff roll. As soon as the airplane became airborne, it began a steep left bank. The witness initially thought the airplane was turning for a normal departure, but because the turn was initiated so low and the bank became so steep, he then thought that the airplane might "catch a wing" on the ground. The airplane disappeared from his view behind trees, and shortly thereafter, the witness heard the sounds of impact.

METEOROLOGICAL INFORMATION

The 0956 reported weather conditions at HYA included winds from 260 degrees true at 9 knots, 10 statute miles visibility, clear skies, temperature 21 degrees Celsius (C), dew point 7 degrees C, and an altimeter setting of 29.74 inches of mercury.

PERSONNEL INFORMATION

The pilot held an airline transport pilot certificate with a rating for airplane multiengine land, and a commercial pilot certificate with a rating for airplane single engine land. According to the operator, the pilot had accumulated 3,607 total hours of flight experience, 1,927 hours of multiengine flight experience, and 99 hours of flight experience in the accident airplane make and model.

AIRCRAFT INFORMATION

Review of the load manifest provided by the operator revealed that the airplane was loaded with 208 pounds of cargo. Examination of the cargo recovered from the wreckage, confirmed that the load manifest was accurate. Post accident calculations revealed that, at the time of the

accident, the airplane was within the weight and balance limits prescribed by the airframe manufacturer.

According to the DHC-6 Flight Manual, one of the items included in the pre takeoff checklist was, "Flight controls - Unlocked - Full travel."

WRECKAGE AND IMPACT INFORMATION

The wreckage, which was located at 41 degrees, 40.31 minutes north latitude, 70 degrees, 16.23 minutes west longitude, was examined at the accident scene on June 19, 2008. There was a strong odor of fuel, and all major components of the airplane were accounted for at the scene.

The initial impact point was a ground scar located about 1,100 feet from the threshold, and to the southeast side, of runway 24. The ground scar was 14 feet long, 2 feet wide, and oriented 165 degrees magnetic, which was approximately the same direction as the remainder of the wreckage path. Another ground scar, approximately 5 feet long, and 2 feet wide, was located about 27 feet beyond the initial impact point. Just beyond the second ground scar was a debris field, comprised primarily of components from the forward area of the fuselage, and various items from the cockpit area.

The remainder of the wreckage came to rest 53 feet beyond the initial impact point, with the fuselage oriented 350 degrees magnetic. The nose and cockpit area exhibited significant crush damage, but the remainder of the fuselage aft of the cockpit bulkhead remained largely intact. Both wings were separated from the fuselage at their respective roots, while the empennage was separated just forward of the horizontal stabilizer. Both wings and the empennage remained attached to the fuselage by control cables. The right wing exhibited leading edge crush damage along the outermost 1/3 of its span, while the left wing exhibited leading edge crush damage along the outermost 1/5 of its span.

Control continuity was established from the ailerons, elevator, elevator trim tab, rudder, and rudder trim tab to the cockpit area. No evidence of corrosion or fatigue failure was observed on any of the primary or secondary control cables. Both wing flaps were found in the fully extended position; however, the drive and actuation mechanisms were separated from each other, and the flaps were free to move.

Examination of the cockpit control column, which had separated from its mount and was found in the debris area, revealed that the upper flight control lock was still attached to the column by its removable pin. The pin attaching the upper control lock to the control column remained tethered to upper flight control lock by a steel cable. However, the pins from the two other flight control lock cables were missing, and the cables exhibited pin retaining end failures consistent with overstress. The instrument panel-mounted attach tab for the upper control lock was fractured, and the portion of the tab that attached to the control lock was not located. Red tape, similar to the tape that was wrapped around the flight control lock, was deposited onto the broken face of the left fuel quantity indicator, and the lower portion of the instrument panel. The lower flight control lock was found inside an unsecured metal tube that was lying next to the right seat track of the pilot's seat.

The pilot's four-point restraint was found unfastened, and no deformation of the buckles, mounts, retraction mechanism, or belt webbing was noted.

Both engines were dislocated from their mounts, but the right engine remained attached to its nacelle by oil lines. One blade from the right propeller was separated at the hub, and was found

about 275 feet beyond the main wreckage, along the wreckage path. That blade exhibited severe tip curling and burnishing of the blade face. All three blades from the right propeller exhibited s-bending, chordwise scratching, and leading edge gouging. One blade from the left propeller exhibited slight forward bending, while the remaining two were bent at a point about 1/4 of their span.

Disassembly and internal examination of the engines revealed that they both exhibited similar circumferential rubbing and machining of their respective compressor turbines, compressor turbine shrouds, power turbine guide vane rings, interstage baffles, power turbines, and power turbine shrouds. No indications of any pre-impact distress or operational dysfunction of any of the components examined was observed.

A Garmin 295 handheld global positioning system receiver was recovered from the wreckage and examined in the Safety Board Vehicle Recorders Laboratory. Examination of the unit revealed that it was not recording track log information at the time of the accident.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on the pilot by the Commonwealth of Massachusetts, Office of the Chief Medical Examiner. The autopsy report noted the cause of death as "blunt impact."

The FAA's Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed toxicological testing on the pilot. No traces of carbon monoxide, cyanide, ethanol, or drugs were detected.

ADDITIONAL INFORMATION

The Safety Board investigated an accident that occurred on March 26, 1973 involving a DHC-6 (see Safety Board report CHI73AC078), and noted that the probable cause of the accident was the pilot's inadequate preflight preparation (failure to remove gust/flight control locks).

On July 13, 1979, the airframe manufacturer released a service bulletin (number 6/383, modification number 6/1676, revised March 7, 1980) that required a modification of the flight control locks. The stated reason for the service bulletin was, "To minimize the possibility of the aircraft becoming airborne when a take off is attempted with the flight control locks inadvertently installed, a control lock configuration has been introduced which ensures downward deflection on elevators when locks are engaged." The new configuration reduced the length of the upper portion of the control lock, and operators could either modify their existing hardware, or purchase new control locks from the manufacturer.

An additional service bulletin (number 6/391, modification number 6/1726) was issued on March 28, 1980 (revised September 12, 1980) that required the addition of a warning flag to the upper portion of the flight control lock. The stated reason for the service bulletin was, "...to further minimize the possibility of the aircraft becoming airborne when take off is attempted with flight control locks inadvertently installed. A large visual warning flag is introduced which masks essential flight instruments on the pilot's flight panel." The service bulletin further stated that incorporation of the modification, as well as modification number 6/1676, was "at the operator's discretion and convenience, unless determined otherwise by their relevant Airworthiness Authority."

The Safety Board investigated an accident that occurred on September 21, 1980 involving another DHC-6 (see Safety Board report FTW80DA120), and concluded that the probable cause of the accident was the same as the accident that occurred in 1973.

The Safety Board investigated a third accident involving a DHC-6 that attempted to depart with the flight control locks installed on July 20, 1988 (see Safety Board report BFO88FA067).

On January 31, 1990, the airframe manufacturer released a revised service bulletin (number 6/508), which superseded service bulletins 6/383 and 6/391. This service bulletin revised the methods for accomplishing the previous service bulletins, but did not change their intended outcome. Transport Canada also issued an airworthiness directive (number CF-90-01), which became effective on January 31, 1990. The airworthiness directive required that service bulletin 6/508 be accomplished. The purpose of the airworthiness directive was, "To minimize the possibility of an attempted take-off with the [flight control] locks inadvertently installed, and to reduce the possibility of the aircraft becoming airborne should such a take-off be attempted..." The FAA did not issue any similar airworthiness directives for the DHC-6 at that time.

The flight control lock found in the wreckage of the accident airplane had not been modified in accordance with any of the previously referenced service bulletins.

Following the June 2008 accident, the FAA issued an airworthiness directive (2008-CE-046-AD), which required compliance with service bulletin 6/508 within 6 months of December 30, 2008.

History of Flight

Takeoff	Loss of control in flight (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

Pilot Information

Certificate:	Airline Transport	**Age:**	43, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 Without Waivers/Limitations	**Last Medical Exam:**	07/03/2007
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	05/02/2008
Flight Time:	3607 hours (Total, all aircraft), 99 hours (Total, this make and model), 3469 hours (Pilot In Command, all aircraft), 63 hours (Last 90 days, all aircraft), 16 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	DEHAVILLAND	**Registration:**	N656WA
Model/Series:	DHC6	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	47
Landing Gear Type:	Tricycle	**Seats:**	2
Date/Type of Last Inspection:	06/12/2008, AAIP	**Certified Max Gross Wt.:**	11579 lbs
Time Since Last Inspection:		**Engines:**	2 Turbo Prop
Airframe Total Time:	38185 Hours	**Engine Manufacturer:**	Pratt and Whitney Canada
ELT:	Installed, not activated	**Engine Model/Series:**	PT6A-20
Registered Owner:	Piper East, Inc.	**Rated Power:**	550 hp
Operator:	WIGGINS AIRWAYS INC	**Air Carrier Operating Certificate:**	On-demand Air Taxi (135)
Operator Does Business As:	Wiggins Airways	**Operator Designator Code:**	AXSA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	**Condition of Light:**	Day
Observation Facility, Elevation:	HYA, 54 ft msl	**Observation Time:**	0956 EDT
Distance from Accident Site:	1 Nautical Miles	**Direction from Accident Site:**	60°
Lowest Cloud Condition:	Clear	**Temperature/Dew Point:**	21°C / 7°C
Lowest Ceiling:	None	**Visibility**	10 Miles
Wind Speed/Gusts, Direction:	9 knots, 260°	**Visibility (RVR):**	
Altimeter Setting:	30 inches Hg	**Visibility (RVV):**	
Precipitation and Obscuration:			
Departure Point:	Hyannis, MA (HYA)	**Type of Flight Plan Filed:**	IFR
Destination:	Nantucket, MA (ACK)	**Type of Clearance:**	VFR
Departure Time:	1001 EDT	**Type of Airspace:**	

Airport Information

Airport:	Barnstable Municipal Airport (HYA)	**Runway Surface Type:**	Asphalt
Airport Elevation:	55 ft	**Runway Surface Condition:**	Dry
Runway Used:	24	**IFR Approach:**	None
Runway Length/Width:	5425 ft / 150 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	N/A	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	41.671944, -70.270556

Administrative Information

Investigator In Charge (IIC):	Dennis Diaz	**Adopted Date:**	06/11/2009
Additional Participating Persons:	Eduard Stalzer; FAA/FSDO; Lexington, MA Rodney Slone; Wiggins Airways; Manchester, NH Thomas Berthe; Pratt and Whitney Canada; South Burlington, VT Richard I Bunker; Massachusetts Aeronautics Commission; Boston, MA		
Publish Date:	11/17/2009		
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 pubinq@ntsb.gov, or at 800-877-6799. Dockets released after this date are available at http://dms.ntsb.gov/pubdms/.		