



National Transportation Safety Board Aviation Accident Final Report

Location:	Deer Isle, ME	Accident Number:	ERA09LA436
Date & Time:	08/01/2009, 1656 EDT	Registration:	M-BOAT
Aircraft:	EUROCOPTER EC130	Aircraft Damage:	Substantial
Defining Event:	Loss of control in flight	Injuries:	4 Minor
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

The helicopter departed a private yacht and was flying along an island shoreline at approximately 400 feet above mean sea level when the pilot entered an out-of-ground effect hover and initiated a left-pedal turn. The helicopter started turning faster than commanded, and the pilot was unable to regain control. The helicopter subsequently lost altitude and impacted the water. Prior to impacting the water, the pilot deployed the emergency skid-mounted floats to prevent sinking. According to the pilot, "the accident was totally pilot error with no mechanical malfunction." Examination of the wreckage confirmed no evidence of any mechanical malfunction or failure.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's loss of directional control during an out-of-ground-effect hover.

Findings

Personnel issues	Task performance - Pilot (Cause)
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Factual Information

HISTORY OF FLIGHT

On August 1, 2009, about 1656 eastern daylight time, a Eurocopter EC 130B4, Isle of Man registration M-BOAT, was substantially damaged during a forced landing on the water near Deer Isle, Maine. Visual meteorological conditions prevailed, and no flight plan was filed for the local personal flight which departed a privately owned motor yacht. The certificated private pilot and the three passengers sustained minor injuries. The personal flight was conducted under the provisions of Title 14 Code of Federal Regulations Part 91.

According to a representative of the pilot, the flight departed the motor yacht about 1650. It was flown to, and along a shoreline approximately 400 feet above mean sea level. The pilot began maneuvering the helicopter, and it then began losing altitude. Prior to impacting the water, the pilot deployed the emergency skid-mounted floats in order to prevent the helicopter from sinking.

According to an eyewitness, the helicopter appeared "to just hover, pointing roughly east, then suddenly spin and face west... then it tilted and spun around while losing altitude."

In a written statement, the pilot reported that he had entered an out of ground effect hover and initiated a left pedal turn. He further stated that the helicopter started turning faster than commanded, that he was unable to regain authority, and "that the accident was totally pilot error with no mechanical malfunction."

PERSONNEL INFORMATION

The pilot, age 66, held a private pilot certificate, with a rating for airplane single-engine land and rotorcraft-helicopter. His most recent Federal Aviation Administration (FAA) third-class medical certificate was issued on June 4, 2009. The pilot reported 1,180 total flight hours, 680 flight hours in rotorcraft, and 55 flight hours in the accident helicopter make and model.

AIRCRAFT INFORMATION

A review of copies of the helicopter's maintenance logbooks revealed that the helicopter was manufactured in October 2005, and the aircraft logbook was established on October 25, 2005. On August 26, 2008, the helicopter had undergone a 50/100/annual/star inspection with an aircraft total time of 77.1 hours. A six month phase inspection was completed on January 22, 2009, and at that time, the helicopter had accumulated 83.4 total hours of service and 101 cycles. The helicopter was equipped with a Turbomeca Arriel 2B1 turbo shaft engine, and the flight time log for the engine revealed that as of June 30, 2009, it had accrued 113.1 hours since new and 137 cycles since new. The helicopter was equipped with a three-bladed, clockwise-rotating main rotor system.

METEOROLOGICAL INFORMATION

The 1655 recorded weather observation at Knox County Regional Airport (RKD), Rockland, Maine, located approximately 22 miles to the southwest of the accident location, included winds from 220 degrees at 8 knots; visibility 10 miles, a few clouds at 7,000 feet above ground level (agl), temperature 25 C; dew point 17 degrees C, altimeter 30.03 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

The helicopter was examined by personnel from the FAA Rotorcraft Directorate at the

manufacturer's facility on November 12, 2009. The tail boom exhibited damage consistent with impact damage and main rotor blade strikes. The right horizontal stabilizer, fenestron, and fin had damage consistent with main rotor blade impact. The left horizontal stabilizer damage was consistent with impact damage. The drive system, which consisted of the drive shafts, couplings, fenestron gearbox and blades, hub, and starflex assembly, exhibited signature marks similar to impact damage.

Flight control continuity was confirmed from the cockpit through the tail rotor system and from the cockpit cyclic and collective controls to the point where the controls would have been connected to the actuators mounted to the main transmission. The transmission had been removed prior to the examination. The flight control actuators remained attached to the transmission and the swashplate assembly. Control tubes connecting the swashplate to the hub were removed and exhibited fractures consistent with an overload condition from impact. The transmission deck, mounting points, and mounting struts were severely damaged.

On scene photographs of the helicopter revealed that the engine had been displaced from its normal mounted position. During the follow-on investigation the engine was removed from the helicopter. The engine gas producer and power turbine rotated freely; however, the leading edges of the blades on the gas producer were damaged. The lower section of the engine exhaust duct was dented inward and had paint transfer marks from the helicopter structure. The module 1 and 5 magnetic plugs were removed, and no metallic particles were found. The engine chip detector was also free of metallic particles. The fuel and oil filters were removed and inspected and no debris was found.

The cabin structure exhibited impact damage, and the doors were restricted from moving or properly latching. The seats did not show signs of being attenuated from vertical impact forces. No evidence of any pre-impact mechanical failures or malfunctions was noted during the examination.

ADDITIONAL INFORMATION

According to the Rotorcraft Flying Handbook (FAA-H-8083-21), "Unanticipated yaw is the occurrence of an uncommanded yaw rate that does not subside of its own accord and, which, if not corrected can result in the loss of helicopter control. This uncommanded yaw rate is referred to as loss of tail rotor effectiveness (LTE) and occurs to the right in helicopters with counterclockwise rotation main rotor and to the left in helicopters with a clockwise main rotor rotation."

The FAA issued Advisory Circular (AC) 90-95, Unanticipated Right Yaw in Helicopters, in February 1995. The AC stated that the loss of tail rotor effectiveness (LTE) was a critical, low-speed aerodynamic flight characteristic which could result in an uncommanded rapid yaw rate which does not subside of its own accord and, if not corrected, could result in the loss of aircraft control. It also stated, "LTE is not related to a maintenance malfunction and many occur in varying degrees in all single main rotor helicopters at airspeeds less than 30 knots."

Paragraph 6 of the AC covered conditions under which LTE may occur. It stated [all references to a right were changed to a left and vice versa]:

"Any maneuver which requires the pilot to operate in a high-power, low-air-speed environment with a right crosswind or tailwind creates an environment where unanticipated left yaw may occur."

Paragraph 8 of the AC stated:

"OTHER FACTORS...Low Indicated Airspeed. At Airspeeds below translational lift, the tail rotor is required to produce nearly 100 percent of the directional control. If the required amount of tail rotor thrust is not available for any reason, the aircraft will yaw to the left."

Paragraph 9 of the AC stated:

"When maneuvering between hover and 30 knots: (1) Avoid tailwinds. If loss of translational lift occurs, it will result in an increase high power demand and an additional anti-torque requirement. (2) Avoid out of ground effect (OGE) hover and high power demand situations, such as low-speed downwind turns. (3) Be especially aware of wind direction and velocity when hovering in winds of about 8-12 knots (especially OGE). There are no strong indicators to the pilot of a reduction of translation lift... (6) Stay vigilant to power and wind conditions."

According to a Service Letter provided by Eurocopter to all pilots (No. 1673-67-04), "...the Pilot initiates a left turn a few meters above the ground by applying yaw pedals towards the neutral position: the aircraft starts its rotation which increases until the Pilot attempts to stop it by applying the RH [right hand] yaw pedal. In the various cases which resulted in the loss of yaw axis control, the action applied to the RH yaw pedal was not enough (amplitude/duration) to stop rotation as quickly as the pilot wished. As the aircraft continues its rotation, the pilot generally suspects a (total or partial) tail rotor failure and decides either to climb to gain speed or to get closer to the ground... increasing the collective pitch results in increasing the main rotor torque and consequently further speeds up the leftward rotation. This results in the loss of aircraft control...sharp decrease in collective pitch can make the aircraft tilt to the side whilst rotating..."

History of Flight

Maneuvering-hover	Loss of control in flight (Defining event)
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Pilot Information

Certificate:	Private	Age:	66, Male
Airplane Rating(s):	Single-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):	Helicopter	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	None	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 3 With Waivers/Limitations	Last Medical Exam:	06/04/2009
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:	1180 hours (Total, all aircraft), 55 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	EUROCOPTER	Registration:	M-BOAT
Model/Series:	EC130 B4	Aircraft Category:	Helicopter
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:		Serial Number:	
Landing Gear Type:	Emergency Float; Skid	Seats:	7
Date/Type of Last Inspection:	08/26/2008, Annual	Certified Max Gross Wt.:	5350 lbs
Time Since Last Inspection:		Engines:	1 Turbo Shaft
Airframe Total Time:	77 Hours	Engine Manufacturer:	TURBOMECA
ELT:	Installed, not activated	Engine Model/Series:	ARRIEL2
Registered Owner:	Highland Helicopter (Isle of Man) Limited	Rated Power:	
Operator:	Highland Helicopter (Isle of Man) Limited	Air Carrier Operating Certificate:	None

Meteorological Information and Flight Plan

Observation Facility, Elevation:	rkd, 56 ft msl	Observation Time:	1659 EDT
Distance from Accident Site:	22 Nautical Miles	Condition of Light:	Day
Direction from Accident Site:	228°	Conditions at Accident Site:	Visual Conditions
Lowest Cloud Condition:	Few / 3100 ft agl	Temperature/Dew Point:	24° C / 19° C
Lowest Ceiling:	None	Visibility	10 Miles
Wind Speed/Gusts, Direction:	7 knots, 170°	Visibility (RVR):	
Altimeter Setting:	30.02 inches Hg	Visibility (RVV):	
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Deer Island, ME	Type of Flight Plan Filed:	None
Destination:	Deer Island, ME	Type of Clearance:	None
Departure Time:	1650 EDT	Type of Airspace:	

Wreckage and Impact Information

Crew Injuries:	1 Minor	Aircraft Damage:	Substantial
Passenger Injuries:	3 Minor	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	4 Minor		

Administrative Information

Investigator In Charge (IIC):	Shawn Etcher	Adopted Date:	08/12/2010
Additional Participating Persons:	Gary Readio; FAA/FSDO; Portland, ME Lindsay Cunningham; American Eurocopter; Grand Prairie, TX Archie Whitten; Turbomeca USA; Grand Prairie, TX		
Publish Date:	08/12/2010		
Investigation Docket:	http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=74426		

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