



Aviation Investigation Final Report

Location:	Midland, Michigan	Accident Number:	CEN18FA001
Date & Time:	October 1, 2017, 14:47 Local	Registration:	N2284U
Aircraft:	Brantly B 2B	Aircraft Damage:	Substantial
Defining Event:	Loss of tail rotor effectiveness	Injuries:	1 Fatal, 1 Minor
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The private pilot was conducting a local flight in the helicopter with a passenger. After departing from an open field, the pilot flew along the perimeter of the field, and the passenger recalled that about halfway around the perimeter of the field, the helicopter began descending, slowly at first and then more rapidly. According to the passenger, the rotor speed increased, but the helicopter continued to descend.

Ground-based video footage revealed that before it began descending, the helicopter was moving forward slowly when it yawed about 270° to the right. As it neared the ground, the helicopter again yawed to the right, completing nearly a 360° turn either immediately before or just after it contacted the ground. The helicopter came to rest on its left side. The engine continued to run after the helicopter came to rest, and the passenger shut it off.

Airframe and engine examinations did not reveal evidence of any anomalies consistent with a pre-impact failure or malfunction. Surface wind conditions recorded at nearby airports were light and variable.

Federal Aviation Administration publications regarding a loss of tail rotor effectiveness (LTE) state that in the event of a sudden, unanticipated right yaw, a pilot should apply full left pedal, simultaneously move the cyclic control forward to increase airspeed, and if altitude permits, reduce engine power. Factors that contribute to LTE are a high-power setting, which induces considerable main rotor downwash and more turbulence relative to a low power setting, and a slow forward speed, which may create variations in airflow around the tail rotor. The video footage showing a right yaw followed by a descent suggests that the pilot encountered LTE, which resulted in the 270° right yaw before the pilot was able to regain control. The additional power required by the tail rotor during the recovery reduced the power available to the main rotor and resulted in a descent that could not be arrested with the engine power available. It appeared that the pilot did not attempt to increase airspeed during the recovery, which reduced his ability to avoid impacting the ground.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's failure to maintain control of the helicopter, which resulted in a loss of tail rotor effectiveness, and his failure to promptly initiate the proper recovery technique, which resulted in a descent that could not be arrested before impacting the terrain.

Findings

Personnel issues	Identification/recognition - Pilot
Personnel issues	Use of policy/procedure - Pilot
Personnel issues	Aircraft control - Pilot
Aircraft	(general) - Not attained/maintained

Factual Information

History of Flight

Maneuvering	Loss of tail rotor effectiveness (Defining event)
Landing-flare/touchdown	Loss of control in flight
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On October 1, 2017, at 1447 eastern daylight time, a Brantly B-2B helicopter, N2284U, was substantially damaged when it impacted terrain in an open field near Midland, Michigan. The private pilot sustained fatal injuries, and the passenger sustained minor injuries. The helicopter was registered to Attitude Toys, Inc., and was operated by the pilot as a Title 14 Code of Federal Regulations Part 91 personal flight. Day visual meteorological conditions prevailed, and no flight plan was filed. The local flight originated from the open field shortly before the accident.

Earlier in the day, the pilot flew the helicopter with a passenger from the Jack Barstow Airport (IKW), about 10 miles east-northeast of the accident site, to the open field to attend a family gathering that was taking place at a home adjacent to the field. The passenger on this flight stated that some minor turbulence was encountered, but the flight was otherwise uneventful.

Ground-based video footage depicted the helicopter as it arrived at the family gathering. As the helicopter initially approached from the east, it began a gradual descent after it cleared the tree line east of the field. As the pilot brought the helicopter to a hover near the southwest corner of the field, it yawed to the right about 45°. The helicopter then hovered momentarily before yawing to the left about 90° to a southwesterly heading. It entered a gradual descent and began to move to the left, touched down momentarily, bounced, moved aft, and touched down again. After several seconds, the pilot lifted off again and relocated the helicopter closer to the southwest corner of the field before shutting down the helicopter.

The passenger on the accident flight stated that during the family gathering, he decided to take a flight around the field with the pilot. He recalled that the helicopter "shook" a little on takeoff. He noted that the tail of the helicopter started to "sway" as they flew over the house located along the east edge of the field, but the pilot steadied the helicopter. Near the northeast corner of the field, the helicopter began descending, slowly at first and then more rapidly. The rotor speed increased, but the helicopter impacted the ground and rolled onto its left side before coming to rest. He added that the engine did not quit and that he turned it off with the ignition/magneto key after the accident.

Ground-based video footage of the accident flight showed the helicopter parked on a west heading at the southwest corner of the grass field. Immediately after lifting off, the helicopter turned to the left toward the southwest and translated aft in a 4-ft hover. The helicopter became stationary in the hover for a few seconds. It then turned to a southeast heading and began to climb toward the east-northeast. As it reached the east edge of the field, the helicopter turned north to fly parallel to the perimeter road and adjacent tree line. About mid-field, the helicopter yawed to the right momentarily while the ground track appeared to continue north paralleling the road. As the helicopter reached the northeast corner of the

field, it was moving forward slowly when it yawed about 270° to the right to a westerly heading. The helicopter then began a gradual descent. As it neared the ground, the helicopter yawed to the right, completing nearly a 360° turn either immediately before or just after it contacted the ground.

Pilot Information

Certificate:	Private	Age:	76, Male
Airplane Rating(s):	Single-engine land	Seat Occupied:	Right
Other Aircraft Rating(s):	Helicopter	Restraint Used:	Lap only
Instrument Rating(s):	None	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 3 With waivers/limitations	Last FAA Medical Exam:	June 30, 2016
Occupational Pilot:	No	Last Flight Review or Equivalent:	December 9, 2015
Flight Time:	469.3 hours (Total, all aircraft), 16.7 hours (Total, this make and model), 335.8 hours (Pilot In Command, all aircraft), 10.6 hours (Last 90 days, all aircraft), 3.9 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

A review of the pilot's logbook revealed that he had logged a total of 99.6 hours of flight experience in helicopters, 9.8 hours in gyrocopters, and 360.0 hours in single-engine airplanes. Of that flight time, 16.8 hours were in a Brantley B-2B helicopter with 11.5 hours as pilot-in-command. Additionally, he had logged 3.7 hours and 2.9 hours flight time in the accident helicopter within the 90-day and 30-day periods preceding the accident, respectively.

Aircraft and Owner/Operator Information

Aircraft Make:	Brantly	Registration:	N2284U
Model/Series:	B 2B B	Aircraft Category:	Helicopter
Year of Manufacture:	1965	Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	454
Landing Gear Type:	Skid	Seats:	2
Date/Type of Last Inspection:	October 1, 2016 Annual	Certified Max Gross Wt.:	1670 lbs
Time Since Last Inspection:	16 Hrs	Engines:	1 Reciprocating
Airframe Total Time:	2074.4 Hrs at time of accident	Engine Manufacturer:	Lycoming
ELT:	Installed, activated, did not aid in locating accident	Engine Model/Series:	IVO-360-A1A
Registered Owner:	On file	Rated Power:	180 Horsepower
Operator:	On file	Operating Certificate(s) Held:	None

The Federal Aviation Administration (FAA) issued an airworthiness certificate for the helicopter in October 1965. It was purchased by the current owner in September 2015. Helicopter maintenance records revealed that the most recent annual inspection was completed on October 1, 2016, at an airframe total time of 2,058.7 hours. At the time of the accident, the helicopter had accumulated 15.7 hours since the annual inspection.

A receipt for 15.0 gallons of 100LL aviation fuel was found in the helicopter. The receipt indicated that the pilot purchased the fuel at IKW at 1218 on the day of the accident.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:	IKW,635 ft msl	Distance from Accident Site:	10 Nautical Miles
Observation Time:	14:53 Local	Direction from Accident Site:	75°
Lowest Cloud Condition:	Clear	Visibility	10 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	3 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	170°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30.27 inches Hg	Temperature/Dew Point:	19°C / 1°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Midland, MI (N/A)	Type of Flight Plan Filed:	None
Destination:	Midland, MI (N/A)	Type of Clearance:	None
Departure Time:	14:46 Local	Type of Airspace:	Class G

The surface wind at IKW was from 160°; at 5 knots at 1432 and from 170°; at 3 knots at 1453. The surface wind at the Mt. Pleasant Municipal Airport (MOP), Mount Pleasant, Michigan, located 11.5 miles west of the accident site, was from 160°; at 5 knots at 1433 and from 100°; at 5 knots at 1454.

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Substantial
Passenger Injuries:	1 Minor	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Fatal, 1 Minor	Latitude, Longitude:	43.623889,-84.470558

The field was about 900 ft (north to south) by 800 ft (east to west). The accident site was located at the north boundary of the field adjacent to a shallow ravine. The helicopter came to rest on its left side and was oriented on a northwesterly heading.

Airframe and engine examinations did not reveal evidence of any anomalies consistent with a pre-impact failure or malfunction. A detailed summary of the examinations is included in the docket associated with the investigation.

Medical and Pathological Information

The Midland County Medical Examiner's Office, Midland, Michigan, conducted an autopsy of the pilot and determined that the pilot's death was due to blunt force trauma sustained in the accident. The FAA's Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed toxicology testing that identified atorvastatin at levels too low to quantify in blood and urine specimens. Atorvastatin is prescription medication used to reduce high cholesterol and is not considered to be impairing.

Additional Information

FAA Advisory Circular 90-95, Unanticipated Right Yaw in Helicopters, states that loss of tail rotor effectiveness (LTE) is a critical, low-speed aerodynamic flight characteristic that can result in an uncommanded rapid yaw rate and, if not corrected, can result in a loss of control. In order to reduce the onset of LTE, a pilot should avoid out-of-ground effect (OGE) hover and high-power demand situations. In the event of a sudden, unanticipated right yaw, a pilot should apply full left pedal, simultaneously move the cyclic control forward to increase airspeed, and if altitude permits, reduce engine power. A reduction in collective pitch will aid in arresting the yaw rate, but it may cause an increase in the descent rate.

The FAA Helicopter Flying Handbook (FAA-H-8083-21A) states that factors that contribute to LTE are a high-power setting, which induces considerable main rotor downwash and more turbulence relative to a low power setting, and a slow forward speed, which may create variations in airflow around the tail rotor. Early detection of LTE followed by immediate corrective action is key to a safe recovery. Pilots should always set themselves up when conducting any maneuver to have enough height and space available to recover in the event that LTE is encountered.

Administrative Information

Investigator In Charge (IIC):	Sorensen, Timothy
Additional Participating Persons:	Steven D Betzer; FAA Flight Standards; Grand Rapids, MI J. Mike Childers; Lycoming Engines; Williamsport, PA
Original Publish Date:	July 8, 2019
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=96118

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).