



National Transportation Safety Board Aviation Accident Final Report

Location:	Alexander City, AL	Accident Number:	ERA13LA045
Date & Time:	11/01/2012, 1546 CDT	Registration:	N231TM
Aircraft:	ROBINSON HELICOPTER COMPANY R22	Aircraft Damage:	Substantial
Defining Event:	Hard landing	Injuries:	1 Serious, 1 Minor
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

After departure, the helicopter began to vibrate at an altitude of about 300 feet above ground level (agl). The pilot chose to return to the airport to perform a precautionary landing. The pilot initiated an autorotation about 100 feet agl at an airspeed of between 45 to 50 knots but could not control the helicopter. The pilot applied aft cyclic to flare the helicopter; however, it did not lose airspeed. The low rotor rpm aural warning activated during the maneuver, and the helicopter subsequently landed hard and rolled over on its right side. Postaccident examinations of the engine and airframe did not reveal any anomalies that would have caused the vibration the helicopter experienced after takeoff. If the pilot had initiated the autorotation sooner, she may have had adequate airspeed to establish the glide and a sufficient amount of rotor rpm to cushion the landing and retain positive control of the helicopter.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's delayed decision to initiate an autorotation and her subsequent improper conduct of the autorotation, which resulted in a hard landing, after the helicopter started vibrating for reasons that could not be determined because postaccident examinations revealed no anomalies that would have precluded normal operation.

Findings

Aircraft	Landing flare - Not attained/maintained (Cause)
Personnel issues	Delayed action - Pilot (Cause) Aircraft control - Pilot (Cause)

Factual Information

On November 1, 2012, at 1546 central daylight time, a Robinson R22, N231TM, sustained substantial damage during a precautionary landing at Thomas C. Russell Field Airport (ALX), Alexander City, Alabama. The commercial pilot was seriously injured, and the commercial pilot-rated passenger received minor injuries. Visual meteorological conditions prevailed, and no flight plan was filed for the personal flight, which was conducted under the provisions of Title 14 Code of Federal Regulations Part 91. The flight was originating at the time of the accident.

According to the pilot, she and her co-worker were en route to Sarasota, Florida and were departing ALX after stopping for lunch. The pilot rated passenger was conducting the takeoff when, shortly after departure while turning crosswind, the helicopter started to shake. The pilot assumed control of the helicopter and elected to return to the airport to perform a precautionary landing in the grass. The pilot did not observe any abnormal indications on the flight instruments, but stated that she did not look at the manifold pressure gauge.

About 100 feet above ground level and approximately 45 to 50 knots, the pilot initiated an autorotation, but "could not control" the helicopter. She then reduced the collective pitch and applied forward pressure on the cyclic control to gain airspeed for landing. As the helicopter approached the landing site, the pilot applied aft cyclic to flare the helicopter. The low rotor rpm horn activated, and the helicopter impacted the ground and came to rest on its right side, resulting in substantial damage to the main rotor blades and fuselage.

The pilot-rated passenger stated that, about one minute after takeoff at an altitude of 300 feet, the flight controls began to "vibrate." The pilot assumed control of the helicopter, and the passenger declared an emergency over the radio. The passenger reported that the pilot "appeared to have difficulty" controlling the helicopter during the return to the airport, and "may have" entered an autorotation. He stated that the helicopter did not lose airspeed and did not appear to flare prior to impact, contacting the ground at an airspeed of 40 to 50 knots with the low rotor rpm horn activated. The helicopter rolled to its right side after impact, and the pilots egressed.

The pilot held a commercial pilot certificate and flight instructor certificate with a rating for rotorcraft-helicopter. Her most recent Federal Aviation Administration (FAA) second-class medical certificate was issued on May 21, 2012. At the time of the accident, the pilot reported 1,165 total hours of flight experience, all of which were in the accident helicopter make and model.

The 1555 automated weather observation at ALX included winds from 300 degrees at 7 knots with gusts to 14 knots; 10 statute miles visibility; sky clear; temperature 21 degrees Celsius (C); dew point -4 degrees C, and an altimeter setting of 29.97 inches of mercury.

According to FAA airworthiness records, the helicopter was manufactured in 1993 and was equipped with a Lycoming O-320-B2C, 160-hp, reciprocating engine and float-type landing gear. Review of the helicopter's maintenance records revealed that its most recent annual inspection was completed on September 14, 2012, at a total airframe time of 1684.2 hours, and a time since engine overhaul of 531.6 hours. Records also indicated that the governor had been replaced on October 31, 2012.

The main wreckage came to rest east of the runway prior to the threshold of runway 18,

oriented on a heading of about 180 degrees magnetic.

A postaccident examination conducted by an FAA inspector revealed impact damage to the flight control tubes and rods. Flight control continuity was established from the cockpit area to the main rotor and to the tail rotor gearbox. The main rotor driveshaft and mast were separated from the gearbox and located near the main wreckage. The swashplate system displayed minor impact damage.. One main rotor blade was separated at the hub, exhibited significant impact damage and was located approximately 500 feet away from the main wreckage. The other blade remained attached to the hub and also exhibited impact damage. No foreign objects or debris were observed in the vicinity of the engine cooling fan, and the fan remained on its shaft. The V-belts and alternator belt were examined and found to be intact. The strap connecting the floats to the skids remained attached.

A postaccident examination of the engine by an overhaul facility revealed normal wear of the engine components, including the crankshaft, camshaft, lifters, rods, gears, cylinders and crankcase. Bench testing of the magnetos revealed no anomalies, and examination of the carburetor revealed no evidence of fuel contamination.

Examination of the main rotor blades was conducted by the NTSB materials laboratory and revealed no evidence of corrosion, leading edge paint erosion, or debonding between the blade spar and skin. Examination of the fracture surfaces revealed signatures consistent with separation due to overstress.

The manufacturer's pilots operating handbook (POH) stated that autorotations should be conducted at an airspeed between 60-70 knots while maintaining rotor rpm within the green arc. The POH further cautioned, "The R22 has a light, low-inertia rotor system. Most of the energy required for an autorotation is stored in the forward momentum of the aircraft, not in the rotor. Therefore, a well-timed cyclic flare is required and rotor rpm must be kept in the green until just before ground contact."

History of Flight

Initial climb	Unknown or undetermined
Emergency descent	Off-field or emergency landing
Autorotation	Hard landing (Defining event)

Pilot Information

Certificate:	Flight Instructor; Commercial	Age:	39
Airplane Rating(s):	None	Seat Occupied:	Left
Other Aircraft Rating(s):	Helicopter	Restraint Used:	Seatbelt
Instrument Rating(s):	None	Second Pilot Present:	Yes
Instructor Rating(s):	Helicopter	Toxicology Performed:	No
Medical Certification:	Class 2 With Waivers/Limitations	Last Medical Exam:	05/21/2012
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	10/29/2012
Flight Time:	1165 hours (Total, all aircraft), 1165 hours (Total, this make and model), 994 hours (Pilot In Command, all aircraft), 163 hours (Last 90 days, all aircraft), 17 hours (Last 30 days, all aircraft), 9 hours (Last 24 hours, all aircraft)		

Other Flight Crew Information

Certificate:	Flight Instructor; Commercial	Age:	28
Airplane Rating(s):	None	Seat Occupied:	Right
Other Aircraft Rating(s):	Helicopter	Restraint Used:	Seatbelt
Instrument Rating(s):	Helicopter	Second Pilot Present:	Yes
Instructor Rating(s):	Helicopter; Instrument Helicopter	Toxicology Performed:	No
Medical Certification:	Class 2 Without Waivers/Limitations	Last Medical Exam:	05/02/2012
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	05/15/2012
Flight Time:	300 hours (Total, all aircraft), 270 hours (Total, this make and model), 200 hours (Pilot In Command, all aircraft), 80 hours (Last 90 days, all aircraft), 40 hours (Last 30 days, all aircraft), 8 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	ROBINSON HELICOPTER COMPANY	Registration:	N231TM
Model/Series:	R22	Aircraft Category:	Helicopter
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	2317M
Landing Gear Type:	Float; Skid	Seats:	2
Date/Type of Last Inspection:	09/14/2012, Annual	Certified Max Gross Wt.:	1370 lbs
Time Since Last Inspection:	50 Hours	Engines:	1 Reciprocating
Airframe Total Time:	788 Hours	Engine Manufacturer:	LYCOMING
ELT:	Not installed	Engine Model/Series:	O-320-B2C
Registered Owner:	CASABLANCA HELICOPTER LLC	Rated Power:	160 hp
Operator:	Helicopter Academy	Air Carrier Operating Certificate:	None

Meteorological Information and Flight Plan

Observation Facility, Elevation:	ALX, 686 ft msl	Observation Time:	1555 CDT
Distance from Accident Site:	0 Nautical Miles	Condition of Light:	Day
Direction from Accident Site:		Conditions at Accident Site:	Visual Conditions
Lowest Cloud Condition:	Clear	Temperature/Dew Point:	21° C / -4° C
Lowest Ceiling:	None	Visibility	10 Miles
Wind Speed/Gusts, Direction:	7 knots/ 14 knots, 300°	Visibility (RVR):	
Altimeter Setting:	29.97 inches Hg	Visibility (RVV):	
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Alexander City, AL (ALX)	Type of Flight Plan Filed:	None
Destination:	Dawson, GA (K16J)	Type of Clearance:	None
Departure Time:	1543 CDT	Type of Airspace:	

Airport Information

Airport:	Thomas C. Russel Field Airport (ALX)	Runway Surface Type:	
Airport Elevation:	686 ft	Runway Surface Condition:	
Runway Used:	N/A	IFR Approach:	None
Runway Length/Width:		VFR Approach/Landing:	Forced Landing

Wreckage and Impact Information

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

Administrative Information

Investigator In Charge (IIC):	Jose Obregon	Adopted Date:	04/23/2014
Additional Participating Persons:	Warren Green; FAA/FSDO; Vestavia Hills, AL Thom Webster; Robinson Helicopter Company; Torrance, CA		
Publish Date:	04/23/2014		
Investigation Docket:	http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=85492		

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