



National Transportation Safety Board Aviation Accident Final Report

Location:	Houston, TX	Accident Number:	CEN12FA621
Date & Time:	09/10/2012, 1545 CDT	Registration:	N281RG
Aircraft:	ROBINSON HELICOPTER R22 BETA	Aircraft Damage:	Substantial
Defining Event:	Loss of control in flight	Injuries:	2 Fatal
Flight Conducted Under:	Part 91: General Aviation - Aerial Observation		

Analysis

The commercial pilot and his passenger were conducting a low-level aerial photography operation in a helicopter when the engine stopped producing power. Several witnesses observed the helicopter descend vertically to the ground as the body of the helicopter spun to the left around the main rotor blades. A postimpact fire consumed most of the helicopter. A postaccident examination of the airframe and engine revealed no evidence of mechanical malfunctions or failures that would have precluded normal operation. Although the weather conditions at the time of the accident were conducive to the formation of carburetor icing at cruise and glide power settings, the investigation could not conclusively determine that carburetor ice caused the loss of engine power. The cause of the power loss 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's failure to maintain control of the helicopter after a loss of engine power. The reason for the loss of engine power could not be determined because examination did not reveal any anomalies that would have precluded operation.

Findings

Personnel issues	Aircraft control - Pilot (Cause)
Not determined	Not determined - Unknown/Not determined (Cause)

Factual Information

HISTORY OF FLIGHT

On September 10, 2012, about 1545 central daylight time, N281RG, a Robinson R22 Beta helicopter, was substantially damaged when it impacted terrain during a low-altitude maneuvering flight in Houston, Texas. The commercial pilot and the passenger were fatally injured. The helicopter was registered to and operated by Helicopter Services, Incorporated, Spring, Texas. Day visual meteorological conditions (VMC) prevailed at the time of the accident. No flight plan had been filed for the 14 Code of Federal Regulations Part 91 aerial photography flight. The helicopter had departed Baytown Airport (HPY), Baytown, Texas, approximately 1500.

The helicopter originally departed David Wayne Hooks Memorial Airport (DWH), Houston, Texas, about 1200, and flew in the local area before landing at HPY around 1425. Fueling records indicate the helicopter was serviced with 22.9 gallons of 100LL fuel at 1429. Around 1500, the Baytown Airport manager saw the pilot and the passenger depart toward the southwest. Approximately 45 minutes later, the helicopter was observed by several witnesses maneuvering over the steel pipe yard near the accident location.

A witness was driving west on Highway 90 toward the beltway when he first observed the helicopter. He said it was about a mile away and at first he thought it was a remote controlled helicopter. The witness said the helicopter was "way up there" and estimated that it was about 400-500 feet above the ground. The helicopter was spinning slowly (he did not recall what direction it was turning) around the main rotor shaft and was descending vertically about 70-80 miles per hour as if it had "lost power." There was no smoke or parts coming off the helicopter as it descended. The main rotor blades were turning "slower than expected" and were not deflected upward. The witness said that the tail rotor did not appear to be turning. The helicopter then impacted the ground, which resulted in a large dust cloud. The witness stopped his vehicle and ran towards the helicopter. After he negotiated a chain link fence, he and another witness used fire extinguishers to contain the post-impact fire, which he described being more intense on the right side of the helicopter, until the fire department arrived.

Another witness was driving east on Highway 90 toward the beltway when he first observed the helicopter about a mile away. It was 70 to 100 feet-high above the ground and was slowly spinning counter-clockwise around the main rotor shaft and was in a slow vertical descent. The witness said the helicopter seemed to move in "slow-motion." When it was approximately 40 to 50 feet above the ground, the helicopter's descent rate increased rapidly before it impacted the ground. The witness thought the pilot was trying to land and he did not observe any smoke coming from the helicopter prior to impact. He noted that the main rotor blades were turning "pretty slow" and it seemed "like he lost power." The body of the helicopter was level and the main rotor blades were not deflected upward. The witness could not hear the helicopter prior to the impact, which occurred just as he was stepping out of his vehicle. After the impact, he observed a large dust plume as he was running to the steel yard. Seconds later, as he was trying to crawl under a chain link fence, he saw a fireball coming from the helicopter. He and another responder used fire extinguishers to contain the post-impact fire until the fire department arrived.

Two witnesses, who were driving together westbound on Highway 90, stated they first observed the helicopter when it was about 1 to 1.5 miles away. They said the helicopter was

spinning counter-clockwise and was approximately 75-feet-high above the ground. One of the witnesses thought the pilot was attempting to avoid the highway and drifted over toward the steel pipe storage yard. Neither witness saw any smoke or debris trailing the helicopter and did not hear the helicopter prior to impact. One of the witnesses said the helicopter descended quickly (about 30 seconds). The nose of the helicopter was pointed down toward the ground and the main rotor blades did not look like they were moving.

Another witness was working on a construction site located about a 1/4-mile from where he first observed the helicopter. He said the helicopter was hovering over a building near the accident site "real low." All appeared to be normal. The witness lost sight of the helicopter for about 10 minutes due to work related reasons before he saw the helicopter a second time. This time, the helicopter was hovering around 100 to 150-feet-high above the ground over the steel pipe yard. The nose of the helicopter was pointed toward the north. He could not hear the helicopter from his location. The witness said that the helicopter hovered for approximately 1 to 1.5 minutes before it "leaned sideways" to the east and the "tail came around on him." The helicopter then began to turn to the right slowly as it began a slow vertical descent in a slight nose-down and to-the-right attitude. The witness said the helicopter spun 4 to 4.5 times in a "wide-motion" as it descended "straight down" at a speed of 10-15 mph, as if the pilot was trying to correct for the situation. He said the main rotor blades were turning and deflected slightly upward, but he could not estimate how fast. He never looked at the tail rotor. The witness said from the time the helicopter entered the right turn to the time it impacted the ground it was about 10-15 seconds. Once on the ground, he could still see the main rotor blades. Approximately 30 seconds later, he saw that the helicopter had caught on fire and called 9-1-1 emergency. He did not respond to the scene.

PILOT INFORMATION

The pilot held a commercial pilot certificate for rotorcraft-helicopter. His last Federal Aviation Administration (FAA) first class medical was issued on December 16, 2011. According to the operator, the pilot had accrued a total of 757 flight hours, of which, 619 hours were in the R22B.

The pilot had not attended the Robinson Pilot Safety Course prior to the accident, but was scheduled to attend a future class.

METEOROLOGICAL INFORMATION

Weather reported at Ellington Field (EFD), Houston, Texas, approximately 16 miles southwest of the accident site, at 1550, was wind 130 degrees at 8 knots, visibility 10 miles, scattered clouds at 8,000 feet, temperature 93 degrees F, dewpoint 62 degrees F, and an altimeter setting of 30.02 inches of Mercury.

The carburetor icing probability chart from Federal Aviation Administration (FAA) Special Airworthiness Information Bulletin (SAIB): CE-09-35 Carburetor Icing Prevention, June 30, 2009, shows a possibility of icing at cruise/glide power at the temperature and dew point reported at the time of the accident.

WRECKAGE INFORMATION

The helicopter came to rest upright on a heading of 195 degrees on a dirt road located inside a steel pipe storage yard. The entire helicopter was accounted for at the site and sustained extensive post-impact fire damage. The skids were spread and level with the belly of the

fuselage. The body of the helicopter was listed to the right.

A postaccident examination was conducted by the National Transportation Safety Board (NTSB) Investigator-in-Charge (IIC) on September 12-13, 2013.

Examination of the helicopter revealed that the cockpit area was consumed by fire. The remains of a camera bag, along with several lenses, and several unidentified electronic devices were found in the area near the collective. These devices were sent to the NTSB Recorders Laboratory in Washington DC, and no data was able to be retrieved due to thermal damage.

The removable controls were not installed at the co-pilot's station on the left side. The pilot's left anti-torque pedal was positioned forward and the collective was mid travel. Both seat structures were fully collapsed.

Flight control continuity was established for all flight controls to the cockpit.

The main fuel tank was partially consumed by fire and the rear exterior skins were bulged and slightly deformed. A puncture hole was observed in the fuel tank and also through the firewall that sat below the tank. The puncture came from the bottom up. The #2 spark plug that sat directly underneath the puncture hole exhibited damage to the top of its ignition lead. The tank's fuel cap was secure to the filler neck and the fuel finger-screen was absent of debris.

The auxiliary fuel tank was mostly consumed by fire. The crossover line was disconnected and exhibited thermal damage at both ends of the fuel disconnect. The fuel cap was secure to the filler neck and the fuel finger-screen was absent of debris.

The gascolator was thermally damaged. When the unit was disassembled, the gasket was found dry and brittle consistent with heat exposure. There was a small amount of debris on the fuel-screen.

The fuel system's vent lines, hoses and tubes were all consumed by fire. No blockages or fuel were found in any of the remaining fuel lines. All of the B-nuts for the fuel supply lines were finger tight.

The fuel control located in the cockpit was observed to be in the "ON" position and the fuel-mixture control was in the full rich position. The carburetor-heat control was unlocked and raised approximately 1-inch. The governor switch was in the "ON" position and the throttle connecting rod on the collective was in the full open position.

The clutch annunciator light and the low rotor RPM warning light were examined by an NTSB Materials Engineer. Examination of the clutch light revealed that the light bulb filament heat coil stretching, indicative of the light being on at the time of impact. The low rotor RPM warning light had heat damage to the extent the bulb melted on to itself and the filament. The filament was broken but exhibited no hot coil stretching.

The skids remained attached to the fuselage and were spread apart and even with the belly of the fuselage. Both cross tubes were bent up at the ends. The aft cross tube was separated at both ends due to impact. The forward right strut was slightly bowed. The heel of the right skid tube was consumed by fire. The toe of the left skid had separated at the forward strut mount.

The V-belts sustained extensive thermal damage. Small sections of V-belt remnants were found on the horizontal firewall; in the grooves of the sheaves, and on the ground below the sheaves at the accident site. The upper sheave was partially consumed by fire. The sprag-bearing moved freely when manually rotated opposite the direction of drive and locked onto the driveshaft

when rotated in the direction of drive.

The main rotor gearbox rotated freely by hand. The intermediate flex coupling was bent and twisted. There was rotational scoring on the frame adjacent to the intermediate flex coupling.

The inboard section of the main rotor blades sustained thermal damage. No damage was noted to the remaining portion of the blades.

The tail rotor blades were separated at the root and exhibited rotational scoring at the tips. The tail rotor driveshaft damper bearing sustained thermal damage but rotated freely. The tail rotor gearbox rotated freely and smoothly.

The engine remained attached to the airframe during the impact sequence and sustained varying degrees of thermal damage. Impact damage was observed on the exhaust system, air box, carburetor, fan and scroll. The scroll was completely consumed by fire. The outer edge of the cooling fan was dented at the 6 o'clock position. There were no indications of any rotational scoring. The starter ring gear did not contact any other engine accessories or components and the upper sheave did not exhibit any rotational scoring.

The air-box was pushed up into and around the carburetor. The filter was thermally damaged. The carburetor float bowl was separated from the carburetor and the brass floats were crushed. The fuel inlet fitting was disconnected from the carburetor due to impact and the carburetor inlet finger screen was dislodged and absent of debris. The fuel mixture arm on the carburetor was disconnected from its shaft due to impact. However, the control-wire hardware was secure and the wire appeared to be in a full rich position. The carburetor heat slider valve was open .400-inch, which corresponded to a carburetor heat selection of about 13 percent of full heat.

The spark plugs were removed and each displayed a low service life and a color consistent with normal combustion when compared to the Champion Spark Plug Wear Guide P/N AV-27.

Each cylinder was then examined using a lighted bore-scope and no defects were noted.

Both magnetos sustained extensive thermal damage and were observed on their respective mounts; however, the right magneto's upper mount was not fully secure to the magneto clamp. The upper right clamping nut was partially backed away from the magneto clamp. The left magneto was then removed from the engine.

The oil sump was intact; however, all oil carrying lines were consumed by fire. The oil suction screen was removed and absent of debris. The oil filter was removed and the element was thermally damaged. An unmeasured amount of oil was observed in the oil sump. The oil cooler exhibited thermal damage and the oil pump rotated freely by hand.

The engine could not be manually rotated by the front sheave. The accessory housing and right magneto were then removed and another attempt was made to rotate the engine by hand. This attempt was successful and compression was obtained on #1, #3, and #4 cylinders. Continuity was also established for the valve train, crankshaft, and accessory gears. The #2 cylinder sustained extensive thermal damage around the valve springs. Each of the springs had diminished tensile strength. The #2 cylinder was removed and examined. The piston and piston pin were unremarkable. The intake and exhaust valves and push rods were undamaged, but the exhaust valve's rocker arm bushing was loose.

MEDICAL AND PATHOLOGICAL

An autopsy was conducted on the pilot by the Harris County Medical Examiner's Office,

Houston, Texas, on September 11, 2012. According to the autopsy report, the cause of death was "blunt force and thermal injuries."

Toxicological testing was conducted by the FAA Toxicology Accident Research Laboratory, Oklahoma City, Oklahoma. The tests were negative for all items tested.

ADDITIONAL INFORMATION

According to the Robinson R22B Pilot Operating Handbook, page 3-2, the emergency procedures for a power failure (autorotation) between 8 feet and 500 feet above ground level (agl) are:

- 1) Takeoff operation should be conducted per the Height-Velocity diagram in Section 5
- 2) If power failure occurs, lower collective immediately to maintain rotor RPM
- 3) Adjust collective to keep RPM in green arc or apply full down collective if light weight prevents attaining above 97%
- 4) Maintain airspeed until the ground is approached, then begin cyclic flare to reduce rate of descent and forward speed.
- 5) At about 8 feet agl, apply forward cyclic to level ship and raise collective just before touchdown to cushion landing. Touch down with skids level and nose straight ahead.

History of Flight

Maneuvering	Loss of engine power (total)
Emergency descent	Loss of control in flight (Defining event)

Pilot Information

Certificate:	Commercial	Age:	40, Male
Airplane Rating(s):	None	Seat Occupied:	Right
Other Aircraft Rating(s):	Helicopter	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	None	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 1 With Waivers/Limitations	Last Medical Exam:	12/16/2011
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	10/29/2011
Flight Time:	(Estimated) 757 hours (Total, all aircraft), 619 hours (Total, this make and model), 640 hours (Pilot In Command, all aircraft), 141 hours (Last 90 days, all aircraft), 40 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	ROBINSON HELICOPTER	Registration:	N281RG
Model/Series:	R22 BETA	Aircraft Category:	Helicopter
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	4250
Landing Gear Type:	Skid	Seats:	2
Date/Type of Last Inspection:	08/31/2012, Annual	Certified Max Gross Wt.:	1370 lbs
Time Since Last Inspection:		Engines:	1 Reciprocating
Airframe Total Time:	2004 Hours	Engine Manufacturer:	LYCOMING
ELT:	Installed, not activated	Engine Model/Series:	O-360-J2A
Registered Owner:	HELICOPTER SERVICES INC	Rated Power:	145 hp
Operator:	HELICOPTER SERVICES INC	Air Carrier Operating Certificate:	On-demand Air Taxi (135)

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	IAH, 96 ft msl	Observation Time:	1353 CDT
Distance from Accident Site:	13 Nautical Miles	Direction from Accident Site:	127°
Lowest Cloud Condition:	Few / 15000 ft agl	Temperature/Dew Point:	31 °C / 11 °C
Lowest Ceiling:	None	Visibility	10 Miles
Wind Speed/Gusts, Direction:	Calm	Visibility (RVR):	
Altimeter Setting:	30.04 inches Hg	Visibility (RVV):	
Precipitation and Obscuration:			
Departure Point:	Baytown, TX (HPY)	Type of Flight Plan Filed:	Company VFR
Destination:	Baytown, TX (HPY)	Type of Clearance:	None
Departure Time:	1500 CDT	Type of Airspace:	

Airport Information

Airport:	None	Runway Surface Type:	
Airport Elevation:		Runway Surface Condition:	
Runway Used:	N/A	IFR Approach:	None
Runway Length/Width:		VFR Approach/Landing:	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Substantial
Passenger Injuries:	1 Fatal	Aircraft Fire:	On-Ground
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	2 Fatal	Latitude, Longitude:	29.784722, -94.951389 (est)

Administrative Information

Investigator In Charge (IIC):	Leah D Yeager	Adopted Date:	11/06/2013
Additional Participating Persons:	Glenn Longion; FAA/FSDO; Houston, TX John Butler; Lycoming; Arlington, TX Thomas Webster; Robinson Helicopters; Torrance, CA		
Publish Date:	11/06/2013		
Investigation Docket:	http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=84993		

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