Aviation Investigation Final Report

Location:	Spanish Fork, Utah	**Accident Number:**	DEN04LA142
Date & Time:	September 14, 2004, 16:20 Local	**Registration:**	N777UH
Aircraft:	Robinson R22	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	1 Minor, 1 None
Flight Conducted Under:	Part 91: General aviation - Instructional		

Analysis

The helicopter was at 6,000 feet, flying at 70 knots, and exiting a canyon about 5 miles east of the airport. It was on a long final approach to runway 30. After performing pre-landing checks that included warning lights extinguished, rotor and engine tachometers and other pertinent instruments in the green arc, and carburetor heat outside the yellow arc, the instructor "pulled the carb[uretor heat] up a little, and then...pushed the trim in to prepare for landing." Shortly thereafter, the engine lost power. The collective control was lowered and the instructor took control of the helicopter. The LOW RPM light illuminated and the warning horn sounded. The instructor noticed the tachometer was "in the green" and manifold pressure (MAP) was in the red (25 inches) arc. He attempted an autorotation into an open field. He flared and the helicopter landed hard "with a slight nose right yaw." The helicopter bounced once, and then rolled over on its right side. The tail boom and tail rotor were severed. The engine was later functionally tested to full power. Nothing was found that would have been causal to the power loss. Temperature and dew point conditions were not conducive to carburetor icing.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: the instructor's premature flare, resulting in a hard landing, and his failure to align the helicopter with the direction of travel, resulting in a rollover.Contributing factors were the low rotor RPM and inadequate airspeed. The reason for the loss of engine power was not determined.

Findings

Occurrence #1: LOSS OF ENGINE POWER
Phase of Operation: APPROACH - VFR PATTERN - FINAL APPROACH

Findings
1. REASON FOR OCCURRENCE UNDETERMINED

Occurrence #2: FORCED LANDING
Phase of Operation: DESCENT - EMERGENCY

Findings
2. AUTOROTATION

Occurrence #3: HARD LANDING
Phase of Operation: LANDING - FLARE/TOUCHDOWN

Findings
3. (F) ROTOR RPM - INADEQUATE - DUAL STUDENT
4. (F) AIRSPEED - INADEQUATE - DUAL STUDENT
5. (C) FLARE - NOT MAINTAINED - PILOT IN COMMAND(CFI)
6. (C) PROPER ALIGNMENT - NOT MAINTAINED - PILOT IN COMMAND(CFI)

Factual Information

On September 14, 2004, approximately 1620 mountain daylight time, a Robinson R22, N777UH, piloted by a private pilot, sustained substantial damage during an autorotation to an open field following a loss of engine power near Spanish Fork, Utah. Visual meteorological conditions prevailed at the time of the accident. The local instructional flight was being conducted under the provisions of Title 14 CFR Part 91 without a flight plan. The flight instructor sustained minor injuries, and the pilot receiving instruction was not injured. The flight originated at Mt. Pleasant (43U), Utah, approximately 1615.

According to the flight instructor's written statement and telephone interview, the helicopter was at 6,000 feet, flying at 70 knots, and exiting Spanish Fork Canyon. The helicopter was about 5 miles east of the Spanish Fork-Springville Airport (U77) on a long final approach to runway 30. After performing pre-landing checks that included warning lights extinguished, rotor and engine tachometers and other pertinent instruments in the green arc, and carburetor heat outside the yellow arc, the instructor "pulled the carb[uretor heat] up a little, and then...pushed the trim in to prepare for landing." Shortly thereafter, the engine lost power. The collective control was lowered and the instructor took control of the helicopter. The LOW RPM light illuminated and the warning horn sounded. The instructor noticed the tachometer was "in the green" and manifold pressure (MAP) was in the red (25 inches) arc. He attempted an autorotation into an open field. He flared and the helicopter landed hard "with a slight nose right yaw." The helicopter bounced once, and then rolled over on its right side. The tail boom and tail rotor were severed.

According to the pilot's written statement, the helicopter yawed "hard to the left" when the engine lost power. He also noticed MAP was in the red arc, approximately 25-26 inches, and "there was no engine sound whatsoever." When the instructor flared for landing, the helicopter yawed slightly to the left. Forward speed and ground contact angle, however, caused the helicopter to roll over on its right side.

The next day, the helicopter was trucked to the Robinson factory in Torrance, California, where, on October 1, 2004, the engine was functionally tested to full power. According to Robinson Helicopter and Textron Lycoming, nothing was found that would have been causal to the power loss.

In an electronic mailing between NTSB's investigator-in-charge and the FAA Long Beach office, the question as to whether carburetor ice was raised. Robinson Helicopter's accident investigator didn't think so, citing the large temperature-dew point spread.

The following are excerpts from the Robinson R22 "Pilot's Operating Handbook:

"CAUTION. 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.

"CAUTION. During simulated engine failures, a rapid decrease in rotor RPM will occur, requiring immediate lowering of collective control to avoid dangerously low rotor RPM. Catastrophic rotor stall could occur if the rotor RPM ever drops below 80 percent plus 1 percent per 1000 feet of altitude."

Flight instructor Information

Certificate:	Commercial; Flight instructor	**Age:**	34,Male
Airplane Rating(s):	None	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	
Instrument Rating(s):	Helicopter	**Second Pilot Present:**	Yes
Instructor Rating(s):	Helicopter; Instrument helicopter	**Toxicology Performed:**	No
Medical Certification:	Class 2 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	November 10, 2003
Occupational Pilot:	UNK	**Last Flight Review or Equivalent:**	July 31, 2004
Flight Time:	167 hours (Total, this make and model)		

Pilot Information

Certificate:	Private	**Age:**	31,Male
Airplane Rating(s):	None	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	April 17, 2004
Occupational Pilot:	UNK	**Last Flight Review or Equivalent:**	June 30, 2003
Flight Time:	99 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	Robinson	**Registration:**	N777UH
Model/Series:	R22	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	3548
Landing Gear Type:	Skid	**Seats:**	2
Date/Type of Last Inspection:	100 hour	**Certified Max Gross Wt.:**	1370 lbs
Time Since Last Inspection:	5 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	647 Hrs as of last inspection	**Engine Manufacturer:**	Lycoming
ELT:	Not installed	**Engine Model/Series:**	O-360-J2A
Registered Owner:	Universal Helicopters, Inc.	**Rated Power:**	145 Horsepower
Operator:		**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	PVU,4494 ft msl	**Distance from Accident Site:**	6 Nautical Miles
Observation Time:	16:15 Local	**Direction from Accident Site:**	310°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	19 knots / 24 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	330°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.98 inches Hg	**Temperature/Dew Point:**	18°C / 1°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Mt. Pleasant, UT (43U)	**Type of Flight Plan Filed:**	None
Destination:	Spanish Fork, UT (U77)	**Type of Clearance:**	None
Departure Time:	16:15 Local	**Type of Airspace:**	Class E

Wreckage and Impact Information

Crew Injuries:	1 Minor, 1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Minor, 1 None	**Latitude, Longitude:**	40.02074,-111.550361(est)

Administrative Information

Investigator In Charge (IIC):	Scott, Arnold
Additional Participating Persons:	FAA Flight Standards District Office; Salt Lake City, UT
Original Publish Date:	February 24, 2005
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=60159