Aviation Investigation Final Report

Location:	ARDMORE, Oklahoma	**Accident Number:**	FTW99LA224
Date & Time:	August 16, 1999, 20:00 Local	**Registration:**	N1774
Aircraft:	Bell 47G2	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	2 None
Flight Conducted Under:	Part 91: General aviation - Instructional		

Analysis

The flight instructor heard 'a banging noise accompanied with an increase of engine rpm and a decrease of rotor rpm' during takeoff from a high hover. The helicopter entered a left turn and the pilot rolled the throttle off to enter an autorotation. The helicopter landed hard with low rotor rpm. The main rotor blades contacted the tailboom, and the skid landing gear collapsed. Examination of the engine, main transmission, and free wheeling clutch revealed no discrepancies that would have prevented normal flight operations. Prior to commencing the planned dual cross country flight, the helicopter's fuel system had been filled. The density altitude was calculated at 3,040 feet. The operator stated that the accident could have been prevented by 'not hovering out of ground effect at maximum gross weight with a density altitude of 3,000 foot, and better RPM control.'

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 rotor rpm which resulted in a hard landing. A factor was the high density altitude.

Findings

Occurrence #1: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: HOVER - OUT OF GROUND EFFECT

Findings

1. (F) WEATHER CONDITION - HIGH DENSITY ALTITUDE
2. OUT OF GROUND EFFECT - PERFORMED - PILOT IN COMMAND(CFI)
3. (C) ROTOR RPM - NOT MAINTAINED - PILOT IN COMMAND(CFI)

Occurrence #2: HARD LANDING
Phase of Operation: DESCENT - UNCONTROLLED

Factual Information

On August 16, 1999, at 2000 central daylight time, a Bell 47G2 helicopter, N1774, was substantially damaged during a hard landing at the Ardmore Downtown Executive Airport, near Ardmore, Oklahoma. The flight instructor and the commercial pilot receiving instruction were not injured. The helicopter was owned and operated by Versatile Helicopters, Inc., of Ardmore, Oklahoma. Visual meteorological conditions prevailed for the Title 14 CFR Part 91 instructional flight for which an IFR flight plan was filed. The planned destination was the Will Rogers Airport, near Oklahoma City. The flight was preparing to depart when the accident occurred.

The operator reported that the instructional flight was scheduled as a dual night instrument cross country flight to satisfy the requirements for a helicopter instrument rating. The operator added that prior to commencing the flight, the flight instructor, who held an A & P mechanic certificate, elected to adjust the trim tabs on the main rotor blades to "smooth out a slight vertical vibration in the rotor system." After adjusting a trim tab, the flight instructor hovered the helicopter at an estimated height of 5 to 8 feet above the ground to check if the vertical vibration had been reduced or eliminated.

The 870-hour flight instructor told the FAA inspector that upon completion of the high hover check, he elected to take the helicopter around the pattern to check the smoothness of the ride in forward flight. During the takeoff sequence, at an estimated height of 25 to 30 feet, the flight instructor heard "a banging noise accompanied with an increase of engine rpm and a decrease of rotor rpm." The helicopter entered a left turn and the pilot rolled the throttle off to enter an autorotation. The helicopter descended and landed hard with low rotor rpm. The main rotor blades contacted the tailboom, and the skid landing gear collapsed.

Examination of the helicopter by the operator revealed that the tailboom was severed and both main rotor blades were destroyed. The operator added that the engine continued to run after the hard landing. The helicopter's fuel system had been serviced to 43 gallons of 100LL fuel for the anticipated 78-nautical mile cross country flight.

An FAA inspector and the operator conducted a detailed inspection of the engine, main transmission, and free wheeling clutch. No discrepancies were found that could have prevented normal flight operations.

In the recommendation block of the enclosed NTSB Form 6120.1/2, the operator recommends "not hovering out of ground effect at maximum gross weight with a density altitude of 3,000 foot, and better RPM control."

The winds at the airport were reported from 130 degrees at 3 knots. The temperature and dew

point were reported as 91 and 55 degrees Fahrenheit respectively. The NTSB investigator-in-charge calculated the density altitude at 3,040 feet.

Pilot Information

Certificate:	Commercial; Flight instructor	**Age:**	33,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
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:**	January 22, 1999
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	870 hours (Total, all aircraft), 675 hours (Total, this make and model), 800 hours (Pilot In Command, all aircraft), 200 hours (Last 90 days, all aircraft), 60 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Bell	**Registration:**	N1774
Model/Series:	47G2 47G2	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	SA52
Landing Gear Type:	Skid	**Seats:**	2
Date/Type of Last Inspection:	September 9, 1999 100 hour	**Certified Max Gross Wt.:**	2450 lbs
Time Since Last Inspection:	10 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	9030 Hrs	**Engine Manufacturer:**	Lycoming
ELT:	Not installed	**Engine Model/Series:**	VO-435-A1D
Registered Owner:	VERSATILE HELICOPTERS INC.	**Rated Power:**	240 Horsepower
Operator:		**Operating Certificate(s) Held:**	None
Operator Does Business As:		**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Dusk
Observation Facility, Elevation:	1F0 ,844 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	19:55 Local	**Direction from Accident Site:**	360°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	3 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	130°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	33°C / 13°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	(1F0)	**Type of Flight Plan Filed:**	IFR
Destination:	OKLAHOMA CITY , OK (OKC)	**Type of Clearance:**	None
Departure Time:	20:00 Local	**Type of Airspace:**	Class G

Airport Information

Airport:	DOWNTOWN EXECUTIVE 1F0	**Runway Surface Type:**	Asphalt
Airport Elevation:	844 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	11	**IFR Approach:**	None
Runway Length/Width:	5000 ft / 75 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	2 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 None	**Latitude, Longitude:**	34.190624,-97.110153(est)

Administrative Information

Investigator In Charge (IIC):	Casanova, Hector
Additional Participating Persons:	GARY V BURNS; OKLAHOMA CITY , OK
Original Publish Date:	December 4, 2000
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=47060