Aviation Investigation Final Report

Location:	Walkerville, Michigan	**Accident Number:**	CEN13LA086
Date & Time:	December 1, 2012, 14:20 Local	**Registration:**	N3755Z
Aircraft:	Bell 47G-2	**Aircraft Damage:**	Substantial
Defining Event:	Low altitude operation/event	**Injuries:**	1 Fatal, 1 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The passenger reported that the pilot was maneuvering the helicopter over an area of tree-covered marsh at a low altitude when the helicopter entered a descent, collided with trees, and impacted the ground on its left side. An examination of the wreckage found damage consistent with the main rotor blades being driven by the engine when they contacted the trees. Although the passenger reported hearing a loud sound before the helicopter started descending, postaccident examination of the helicopter revealed no evidence of preimpact mechanical malfunction or failure that would have precluded normal operation. The circumstances of the accident are consistent with the pilot failing to maintain altitude while maneuvering at low airspeed and low altitude, which resulted in the helicopter descending into trees.

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 altitude while maneuvering, which resulted in a collision with trees. Contributing to the accident was the pilot's decision to fly at a low altitude, which did not provide enough margin to recover from the descent.

Findings

Personnel issues	Aircraft control - Pilot
Aircraft	Altitude - Not attained/maintained
Personnel issues	Decision making/judgment - Pilot

Factual Information

History of Flight

Maneuvering-low-alt flying	Low altitude operation/event (Defining event)
Maneuvering-low-alt flying	Collision with terr/obj (non-CFIT)

HISTORY OF FLIGHT

On December 1, 2012, about 1420 central standard time, a Bell 47G-2 helicopter, N3755Z, collided with trees and impacted terrain near Walkerville, Michigan. The commercial pilot was fatally injured and the passenger was seriously injured. The helicopter was substantially damaged. The helicopter was owned and operated by a private individual under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Visual meteorological conditions prevailed for the flight, which operated without a flight plan. The flight originated from private property at an undetermined time.

According to information provided by local law enforcement and the responding Federal Aviation Administration inspectors, the helicopter travelled at a low altitude when a loud noise was heard by the passenger. The helicopter descended and impacted trees and a marsh.

PERSONNEL INFORMATION

The pilot, age 49, held a commercial helicopter pilot certificate. On May 2, 2000, the pilot was issued an unrestricted second class medical certificate. On the medical application, the pilot reported having accumulated 4,000 hours of total time. The pilot's logbook was not available for review during the investigation. It is unknown when the pilot accomplished his most recent flight review.

AIRCRAFT INFORMATION

The single engine, low skid, full bubble canopy, three-seat helicopter, serial number 1698, was manufactured in 1957. It was powered by a 200-horsepower Lycoming VO-435-A1 engine. The log books were not available for review and the helicopter's last annual inspection is unknown.

METEOROLOGICAL INFORMATION

At 1414, an automated weather reporting facility at Fremont Municipal Airport, located 17 nautical miles to the south-southeast of the accident location, reported wind from 110 degrees at 7 knots, visibility 4 miles, haze, ceiling broken at 1,000 feet, broken at 1,600 feet, temperature 43 degrees Fahrenheit (F), dew point 37 F, and a barometric pressure of 30.03 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

The wreckage was located in a wooded marsh in the Manistee National Forest, also known as Tanner's Swamp. Only the trees within about a rotor disk circumference of the helicopter exhibited blade strikes.

The helicopter came to rest on its left side. All parts of the helicopter were accounted for at the accident site and the helicopter was recovered and transported to a hanger for an examination.

Inspectors from the Federal Aviation Administration and representatives from Scott's Bell 47 attended the examination. The main rotors were fractured a few feet from the rotor mast with corresponding impact damage to the leading edge of the blades. The flight controls were fractured in several locations, but exhibited no preimpact malfunctions. Several of the engine cooling fan blades had leading edge damage with signatures consistent with the fan being driven at the time of impact. Engine control continuity was established from the controls to the carburetor throttle shaft. The main fuel strainer and carburetor fuel inlet finger screen contained an unmeasured amount of fuel.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was conducted on the pilot by Spectrum Health, Grand Rapids, Michigan. The cause of death was blunt force injuries of the chest and abdomen. The manner of death was ruled an accident.

Forensic toxicology was performed on specimens from the pilot by the FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma. The specimens tested negative for carbon monoxide, ethanol, and drugs.

ADDITIONAL INFORMATION

Bell 47 Flight Characteristics

Scott's Bell 47 representatives reported the following concerning turns in a Bell 47:

A characteristic of the Bell 47 is a best power to airspeed combination encountered in level flight at 45 miles per hour (MPH), indicated airspeed (IAS.) This characteristic is often demonstrated in flight training and may be validated when in level flight at 45 MPH IAS increasing or decreasing airspeed by cyclic input alone results in loss of altitude. For this reason pilots must always be mindful of airspeed and power when maneuvering at low level and reduced airspeed. As 45 MPH is the best power / airspeed combination and also the target airspeed for best autorotational descent, this is also the best and safest airspeed selected for low level observation and reconnaissance flight. When turning downwind from stabilized flight into wind at 45 MPH IAS, if no control input is made, the turn into downwind will result in reduced airspeed and the aircraft will tend to settle. The settling tendency is avoided by a coordinated management of increased power and airspeed control to maintain the desired altitude.

Pilot Information

Certificate:	Commercial	**Age:**	49
Airplane Rating(s):	None	**Seat Occupied:**	
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 Without waivers/limitations	**Last FAA Medical Exam:**	May 3, 2000
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	4000 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Bell	**Registration:**	N3755Z
Model/Series:	47G-2	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	1698
Landing Gear Type:	Skid	**Seats:**	3
Date/Type of Last Inspection:		**Certified Max Gross Wt.:**	2450 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:		**Engine Manufacturer:**	Lycoming
ELT:		**Engine Model/Series:**	VO-435-A1
Registered Owner:	On file	**Rated Power:**	200 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KFFX	**Distance from Accident Site:**	17 Nautical Miles
Observation Time:	14:14 Local	**Direction from Accident Site:**	345°
Lowest Cloud Condition:	1000 ft AGL	**Visibility**	4 miles
Lowest Ceiling:	Broken / 1000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	110°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.03 inches Hg	**Temperature/Dew Point:**	6°C / 3°C
Precipitation and Obscuration:	N/A - None - Haze		
Departure Point:	Hart, MI	**Type of Flight Plan Filed:**	None
Destination:	Hart, MI	**Type of Clearance:**	None
Departure Time:		**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal, 1 None	**Latitude, Longitude:**	43.674999,-86.107223(est)

Administrative Information

Investigator In Charge (IIC):	Aguilera, Jason
Additional Participating Persons:	John Miller; FAA FSDO; Rapid City, MI Don Maguire; Scott's-Bell 47; Le Sueur, MN
Original Publish Date:	January 30, 2014
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=85720