Aviation Investigation Final Report

Location:	Myerstown, Pennsylvania	**Accident Number:**	ERA16LA167
Date & Time:	April 20, 2016, 11:30 Local	**Registration:**	N202CH
Aircraft:	Bell 47D1	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (partial)	**Injuries:**	2 None
Flight Conducted Under:	Part 91: General aviation - Instructional		

Analysis

The flight instructor reported that she was providing a flight review to the pilot and was demonstrating an autorotation that would terminate with power. She entered the maneuver about 1,500 ft above ground level (agl) by reducing the throttle to idle and lowering the collective to the "full-down" position. The carburetor heat was off. The instructor stabilized the approach at 45 mph but noted that the engine's idle speed was about 100 rpm higher than normal. The instructor was not satisfied with the needle split between the engine and rotor rpm, so she advanced the throttle to the "full-open" position. However, the engine did not respond. The instructor entered a flare about 50 ft agl, and the helicopter impacted the ground with little-to-no forward speed, bounced, and then rolled over to the left. The pilot confirmed that the throttle was full open and that there was no engine power.

Postaccident examination of the helicopter and engine revealed no preimpact mechanical anomalies that would have precluded normal operation. Weather conditions at the time of the accident were not conducive to the accumulation of carburetor icing. The reason for the loss of engine power could not be determined.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: A total loss of engine power for reasons that could not be determined because examination of the engine revealed no mechanical anomalies that would have precluded normal operation.

Findings

Not determined	(general) - Unknown/Not determined

Factual Information

History of Flight

Maneuvering	Simulated/training event
Autorotation	Attempted remediation/recovery
Autorotation	Loss of engine power (partial) (Defining event)
Landing-flare/touchdown	Hard landing
Landing-flare/touchdown	Roll over

On April 20, 2016, about 1130 eastern daylight time, a Bell 47D1, N202CH, was substantially damaged during practice autorotation landings at Deck Airport (9D4), Myerstown, Pennsylvania. The flight instructor and airline transport pilot were not injured. The helicopter was registered to and operated by a private company. Visual meteorological conditions prevailed and no flight plan was filed for the local flight conducted as a 14 Code of Federal Regulations Part 91 instructional flight.

The flight instructor, who was seated in the right seat, was performing a flight review for the pilot. She stated that she was demonstrating an autorotation that would terminate with power. The instructor entered the maneuver about 1,500 feet above ground level (agl) by reducing throttle to idle and lowering the collective to the full down position. The carburetor heat was off. She stabilized the approach at 45 miles per hour (mph), but noted the engine's idle speed was about 100 rpm higher than normal. The instructor said she was not satisfied with the needle split between the engine and rotor rpm, so she advanced the throttle to the full open position. When she did this, there was no response from the engine. The instructor entered a flare about 50 ft agl and the helicopter impacted the ground with little to no forward speed, bounced and rolled over to the left.

The pilot stated he was receiving a flight review and was monitoring the instructor's demonstration of an autorotation that would terminate with power. They entered the maneuver about 1,200 ft agl and all appeared normal. The pilot was scanning the engine rpm, rotor rpm, and "ball" throughout the demonstration. When the helicopter reached an altitude of 50 ft agl, he noticed the rotor and engine speed needles were still split so he reached over and confirmed that the throttle was indeed full open.

A postaccident examination of the helicopter and engine revealed the throttle linkage moved freely from the idle to the full-open position. The engine remained attached to the airframe but had sustained impact damage to several engine mounts and could not be rotated. The ring gear cover at the magneto mount was also broken/cracked. All of the spark plugs were removed and examined, with the exception of the No. 6 cylinder top plug, which was broken off in the cylinder. The spark plugs were bench-tested and each produced a spark. No other mechanical anomalies were noted that would have precluded normal operation of the engine.

The flight instructor held an airline transport pilot certificate for airplane single and multi-engine land. She also held a flight instructor certificate for single and multi-engine airplane, rotorcraft helicopter, and instrument airplane and helicopter. The instructor reported a total flight time of 2,024 hours, of which,

590 hours were in helicopters and 31 hours were in the accident helicopter. Her last Federal Aviation Administration (FAA) first-class medical was issued on March 13, 2015.

The pilot held an airline transport pilot certificate for airplane single and multi-engine land, rotorcraft-helicopter, and instrument helicopter. His last FAA second-class medical was issued on May 4, 2015. At that time, he reported a total flight time of 14,710 hours.

Weather at Muir Army Airfield (KMUI), about 12 miles east of the accident site, at 1208, was wind 200 degrees at 6 knots, visibility 7 miles, clear skies, temperature 64 degrees F, 25 degrees F, and a barometric pressure setting of 30.26 inches of mercury. A review of the carburetor icing probability chart from FAA Special Airworthiness Information Bulletin (SAIB): CE-09-35 Carburetor Icing Prevention, June 30, 2009, revealed the temperature and dew point reported at the time of the accident were not conducive for the formation of carburetor icing.

Flight instructor Information

Certificate:	Airline transport; Flight instructor	**Age:**	25,Female
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	Lap only
Instrument Rating(s):	Airplane; Helicopter	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine; Helicopter; Instrument airplane; Instrument helicopter	**Toxicology Performed:**	No
Medical Certification:	Class 1 With waivers/limitations	**Last FAA Medical Exam:**	May 13, 2015
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 2034 hours (Total, all aircraft), 31 hours (Total, this make and model), 1777 hours (Pilot In Command, all aircraft), 134 hours (Last 90 days, all aircraft), 62 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Pilot Information

Certificate:	Airline transport; Flight engineer	**Age:**	70,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	Lap only
Instrument Rating(s):	Airplane; Helicopter	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	May 4, 2015
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	18941 hours (Total, all aircraft), 21 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	Bell	**Registration:**	N202CH
Model/Series:	47D1	**Aircraft Category:**	Helicopter
Year of Manufacture:	1951	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	301
Landing Gear Type:	N/A; Skid	**Seats:**	2
Date/Type of Last Inspection:	October 8, 2015 Annual	**Certified Max Gross Wt.:**	2350 lbs
Time Since Last Inspection:	35 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	12279.8 Hrs at time of accident	**Engine Manufacturer:**	Franklin
ELT:	Not installed	**Engine Model/Series:**	6V-335A
Registered Owner:	On file	**Rated Power:**	210 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:	MUI,487 ft msl	**Distance from Accident Site:**	12 Nautical Miles
Observation Time:	11:08 Local	**Direction from Accident Site:**	90°
Lowest Cloud Condition:	Clear	**Visibility**	7 miles
Lowest Ceiling:		**Visibility (RVR):**	
Wind Speed/Gusts:	6 knots /	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	200°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.26 inches Hg	**Temperature/Dew Point:**	18°C / -4°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Myerstown, PA (9D4)	**Type of Flight Plan Filed:**	None
Destination:	Myerstown, PA (9D4)	**Type of Clearance:**	None
Departure Time:	10:15 Local	**Type of Airspace:**	Unknown

Airport Information

Airport:	Deck Airport 9D4	**Runway Surface Type:**	Asphalt
Airport Elevation:	523 ft msl	**Runway Surface Condition:**	Dry
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Forced landing;Simulated forced landing

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:**	40,-76(est)

Administrative Information

Investigator In Charge (IIC):	Read, Leah
Additional Participating Persons:	Michael McEvers; FAA/FSDO; Harrisburg , PA
Original Publish Date:	October 2, 2017
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=93044