Aviation Investigation Final Report

Location:	New Carlisle, Ohio	**Accident Number:**	CEN18LA362
Date & Time:	August 31, 2018, 14:00 Local	**Registration:**	N2305K
Aircraft:	Luscombe 8	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (total)	**Injuries:**	1 Serious
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot reported that the airplane exhibited reduced climb performance during takeoff and that the engine began running rough when the airplane had climbed to about 150 ft above the ground. The pilot turned on the carburetor heat, but then removed carburetor heat when he perceived an increase in engine roughness. The engine subsequently lost total power and the pilot performed a forced landing, resulting in substantial damage to the forward fuselage and right wing.

Examination of the airplane and engine did not reveal any evidence of mechanical malfunctions that would have precluded normal operation. Both fuel tanks contained fuel, the vented fuel caps were not obstructed, and there was uncontaminated fuel found in the carburetor fuel bowl.

The weather conditions at the time of the accident were conducive to the formation of carburetor icing at a descent engine power setting. Although the pilot did not observe any evidence of carburetor ice when he verified function of the carburetor heat control before takeoff, given the lack of engine anomalies, the pilot's description of reduced climb performance and the rough-running engine was consistent with the accumulation of carburetor ice. The reported increase in engine roughness after carburetor heat was applied is further evidence of carburetor ice, but the pilot’s momentary application of carburetor heat would have been ineffective in removing the ice and restoring engine power. Additionally, the low altitude at which the loss of engine power occurred significantly reduced the amount of time available to the pilot to troubleshoot and restore engine power before the forced landing.

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 shortly after takeoff due to carburetor ice.

Findings

Environmental issues	Conducive to carburetor icing - Effect on equipment

Factual Information

History of Flight

Takeoff	Loss of engine power (total) (Defining event)
Landing	Off-field or emergency landing
Landing	Hard landing

On August 31, 2018, about 1400 eastern daylight time, a Luscombe 8E airplane, N2305K, was substantially damaged when it was involved in an accident near New Carlisle, Ohio. The pilot sustained serious injuries. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The pilot reported that his preflight inspection did not reveal any anomalies with the airplane. He visually confirmed that the right wing fuel tank was full and the left fuel tank was about 1/2 full. After starting the engine, he taxied the airplane to the runway and completed an engine runup, which revealed no anomalies. The pilot reported that he verified the proper function of the carburetor heat control and that he did not observe any indication of carburetor ice.

The pilot initiated takeoff and the airplane became airborne about one-half to two-thirds down the 2,000-ft-long runway. The pilot reported that airplane had reduced climb performance after liftoff and that the engine began running rough about 150 ft above the ground. The pilot turned the carburetor heat on, but then removed it when he perceived an increase in engine roughness. The engine subsequently lost total power. The pilot entered a right turn toward a nearby nursery, where he completed a forced landing. The airplane landed hard on uneven terrain and the main landing gear collapsed.

The airplane came to rest about 1/2 mile west-northwest of the departure end of runway 27. The forward fuselage and the right wing sustained substantial damage during the hard landing. Flight control continuity was confirmed from the cockpit controls to all flight control surfaces. First responders reported a strong fuel smell and observed fuel leaking from the engine compartment, and a mechanic from the airport subsequently turned off the right fuel tank valve to stop the fuel leak. The left fuel tank valve was found turned off. The right and left fuel tanks contained about 5 gallons and 6.75 gallons of fuel, respectively. Samples from the fuel tanks were blue in color, had the odor of 100 low-lead aviation fuel, and exhibited minor particulate contamination. Examination of the vented fuel tank caps did not reveal any anomalies or obstructions. The fuel gascolator bowl shattered during impact. The engine remained attached to the firewall through its mounts, but the carburetor separated from the engine crankcase. Engine control continuity was confirmed from the cockpit to the carburetor. Movement of the throttle arm discharged fuel from the accelerator pump into the carburetor venturi. The carburetor bowl remained intact and contained uncontaminated fuel. The carburetor heat valve position could not be determined due to impact damage.

Internal engine and valve train continuity were confirmed as the engine crankshaft was rotated, and compression and suction were noted on all cylinders in conjunction with crankshaft rotation. Compression measurements were above 70 psi for all four cylinders. A borescope inspection of each cylinder did not reveal any evidence of a mechanical failure of the pistons or valves. The spark plugs exhibited features consistent with normal engine operation. Both magnetos produced spark as the engine crankshaft was rotated. The propeller remained attached to the engine crankshaft flange; one propeller blade was bent aft about midspan, and the other blade remained straight with no evidence of rotational damage. Examination of the airplane and engine did not reveal any evidence of mechanical malfunction that would have precluded normal operation.

According to a carburetor icing probability chart contained in FAA Special Airworthiness Information Bulletin CE-09-35, entitled "Carburetor Icing Prevention", the recorded temperature and dew point about the time of the accident were conducive to the formation of carburetor icing at a descent engine power setting. The bulletin notes that if ice forms in the carburetor of a fixed-pitch propeller aircraft, the restriction to the induction airflow will result in decreased power output and a drop in engine rpm, which might be accompanied or followed by a rough running engine. The bulletin also notes that a pilot should respond to carburetor icing by applying full carburetor heat immediately and that the engine may run rough initially for a short time while the ice melts.

Pilot Information

Certificate:	Private	**Age:**	75,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Lap only
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	July 21, 2017
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	June 11, 2017
Flight Time:	497.9 hours (Total, all aircraft), 29.3 hours (Total, this make and model), 1.3 hours (Last 90 days, all aircraft), 1.3 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Luscombe	**Registration:**	N2305K
Model/Series:	8 E	**Aircraft Category:**	Airplane
Year of Manufacture:	1947	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	5032
Landing Gear Type:	Tailwheel	**Seats:**	2
Date/Type of Last Inspection:	August 10, 2018 Annual	**Certified Max Gross Wt.:**	1400 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	2529.8 Hrs as of last inspection	**Engine Manufacturer:**	Continental
ELT:	Installed, not activated	**Engine Model/Series:**	C-85-12F
Registered Owner:		**Rated Power:**	100 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:	FFO,823 ft msl	**Distance from Accident Site:**	6.5 Nautical Miles
Observation Time:	13:56 Local	**Direction from Accident Site:**	193°
Lowest Cloud Condition:	Few / 3800 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	3 knots /	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:	230°	**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	30.14 inches Hg	**Temperature/Dew Point:**	29°C / 20°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	New Carlisle, OH (3OH0)	**Type of Flight Plan Filed:**	None
Destination:	Versailles, OH (VES)	**Type of Clearance:**	None
Departure Time:	14:00 Local	**Type of Airspace:**	Class G

Airport Information

Airport:	Andy Barnhart Memorial Airport 3OH0	**Runway Surface Type:**	Asphalt
Airport Elevation:	895 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	27	**IFR Approach:**	None
Runway Length/Width:	2000 ft / 30 ft	**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	1 Serious	**Latitude, Longitude:**	39.931661,-84.024778

Administrative Information

Investigator In Charge (IIC):	Fox, Andrew		
Additional Participating Persons:	Benjamin Roller; Federal Aviation Administration - Cincinnati FSDO; Cincinnati, OH Randall Brewer; Federal Aviation Administration - Cincinnati FSDO; Cincinnati, OH Andrew Porter; Federal Aviation Administration - Cincinnati FSDO; Cincinnati , OH		
Original Publish Date:	May 27, 2021	**Investigation Class:**	3
Note:	The NTSB did not travel to the scene of this accident.		
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=98211		