Aviation Investigation Final Report

Location:	Columbia, South Carolina	**Accident Number:**	ERA21LA125
Date & Time:	February 7, 2021, 16:15 Local	**Registration:**	N24476
Aircraft:	Taylorcraft BC-65	**Aircraft Damage:**	Substantial
Defining Event:	Fuel related	**Injuries:**	1 Minor
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The student pilot was making a solo flight in the airplane. The airplane was in cruise flight at 2,000 ft mean sea level (msl) when the engine began to gradually lose power. The pilot applied full carburetor heat but turned it back off as it resulted in a loss of engine rpm. The engine eventually stopped producing power, and the pilot made a forced landing to a road located in a subdivision that was under construction. The airplane sustained substantial damage when it collided with construction equipment during the landing roll. Examination of the engine and airplane revealed no mechanical issues that would have precluded normal operation.

Weather modeling for the accident time and location indicated that at 1,752 ft msl the temperature was about 44°F; the dew point was about 33°F; and the relative humidity was about 66%. At 2,351 ft msl, the temperature was about 41°F; the dew point was about 33°F; and the relative humidity was about 72%. Review of the icing probability chart contained within Federal Aviation Administration (FAA) Special Airworthiness Information Bulletin (SAIB) CE-09-35 revealed the atmospheric conditions at those altitudes at the time of the accident were conducive to “serious icing at cruise power.” Therefore, it is likely that the loss of engine power was due to the accumulation of carburetor ice. When the pilot applied carburetor heat, the drop in engine rpm that occurred was likely due to the ice beginning to melt, which introduced water into the fuel/air mixture. If the pilot had left the carburetor heat full on, it is likely engine power would have been restored.

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 due to carburetor icing, which resulted from the student pilot's failure to use carburetor heat.

Findings

Environmental issues	Conducive to carburetor icing - Effect on equipment
Personnel issues	Identification/recognition - Pilot
Aircraft	Intake anti-ice, deice - Not used/operated

Factual Information

History of Flight

Enroute	Fuel related (Defining event)
Emergency descent	Off-field or emergency landing
Landing-landing roll	Collision during takeoff/land

On February 7, 2021, about 1615 eastern standard time, a Taylorcraft BC-65, N24476, was substantially damaged when it was involved in an accident near Columbia, South Carolina. The pilot sustained minor injuries. The airplane was operating as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The student pilot, who was the owner of the airplane, stated he departed Columbia Airport (CUB), Columbia, South Carolina, about 1605 and was in cruise flight at an altitude of 2,000 ft mean seal level (msl) when the engine began to lose power "as if something was blocking fuel from getting to the engine." The student pilot reported that he applied carburetor heat "which was no help and only made for a greater loss of much needed rpms." When interviewed, the student pilot explained that he applied full carburetor heat but turned it back off about 30 seconds later when there was no improvement to the loss of engine rpm. The student pilot said the engine eventually stopped producing power, and he made a forced landing to a road located in a subdivision that was under construction. The airplane sustained substantial damage to the left wing when it collided with construction equipment during the landing roll.

A postaccident examination of the engine revealed that when the engine was manually rotated, spark was produced to each ignition lead, and compression and valve train continuity were established on all four cylinders; however, compression was lower on the No. 1 cylinder than the other cylinders. The spark plugs exhibited normal wear with some black soot on the electrodes. The engine was approved to use auto fuel, which was observed in both fuel tanks. Examination of the fuel system revealed the fuel lines to the carburetor were clear. The air filter was also clean. Examination of the airframe and engine revealed no mechanical malfunctions or anomalies that would have precluded normal operation.

At 1553, the weather reported at CUB, about 9.5 nautical miles northeast of the accident site, included a temperature of 55°F and a dew point of 36°F. The calculated relative humidity at this temperature and dewpoint was about 48%.

A high-resolution rapid refresh (HRRR) model sounding was created for the accident time and location with a surface elevation of 335 ft mean sea level (msl). At 1,752 ft msl, the HRRR sounding indicated a temperature of about 44°F, a dew point of about 33°F, and a relative humidity of 66%. At 2,351 ft msl, the HRRR sounding indicated a temperature of about 41°F, a dew point of about 33°F, and a relative humidity of 72%. Review of the icing probability chart contained within Federal Aviation Administration (FAA) Special Airworthiness Information

Bulletin (SAIB) CE-09-35 revealed the atmospheric conditions at those altitudes at the time of the accident were conducive to “serious icing at cruise power.”

According to FAA Advisory Circular 20-113, "to prevent accidents due to induction system icing, the pilot should regularly use [carburetor] heat under conditions known to be conducive to atmospheric icing and be alert at all times for indications of icing in the fuel system." The circular recommended that when operating in conditions where the relative humidity is greater than 50% and the temperature is below 70°F, the pilot should "apply carburetor heat briefly immediately before takeoff, particularly with float type carburetors, to remove any ice which may have been accumulated during taxi and runup." It also stated, "Remain alert for indications of induction system icing during takeoff and climb-out, especially when the relative humidity is above 50 percent, or when visible moisture is present in the atmosphere."

Pilot Information

Certificate:	Student	**Age:**	50,Male
Airplane Rating(s):	None	**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:**	
Medical Certification:	Sport pilot	**Last FAA Medical Exam:**	
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	88 hours (Total, all aircraft), 64.2 hours (Total, this make and model), 33 hours (Last 90 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Taylorcraft	**Registration:**	N24476
Model/Series:	BC-65	**Aircraft Category:**	Airplane
Year of Manufacture:	1940	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	1816
Landing Gear Type:	Tailwheel	**Seats:**	2
Date/Type of Last Inspection:	Annual	**Certified Max Gross Wt.:**	
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:		**Engine Manufacturer:**	CONT MOTOR
ELT:		**Engine Model/Series:**	A&C65 SERIES
Registered Owner:	DUNN WARD A	**Rated Power:**	65 Horsepower
Operator:	DUNN WARD A	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	CUB,193 ft msl	**Distance from Accident Site:**	9.5 Nautical Miles
Observation Time:	15:53 Local	**Direction from Accident Site:**	50°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	6 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	30°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.01 inches Hg	**Temperature/Dew Point:**	13°C / 2°C
Precipitation and Obscuration:			
Departure Point:	Columbia, SC (CUB)	**Type of Flight Plan Filed:**	None
Destination:	Camden, SC (CDN)	**Type of Clearance:**	VFR;None
Departure Time:	16:05 Local	**Type of Airspace:**	Unknown

Wreckage and Impact Information

Crew Injuries:	1 Minor	**Aircraft Damage:**	Substantial
Passenger Injuries:	N/A	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Minor	**Latitude, Longitude:**	34,-80(est)

Administrative Information

Investigator In Charge (IIC):	Read, Leah
Additional Participating Persons:	Todd Clamp; FAA/FSDSO; Columbia, SC
Original Publish Date:	July 19, 2022
Last Revision Date:	
Investigation Class:	Class 3
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=102610