



Aviation Investigation Final Report

Location:	Winchester, Virginia	Accident Number:	ERA21LA137
Date & Time:	February 24, 2021, 14:00 Local	Registration:	N7832X
Aircraft:	Cessna 172B	Aircraft Damage:	Substantial
Defining Event:	Fuel related	Injuries:	1 Minor
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

After a delay while he waited for several other airplanes to land and take off, the pilot departed and was climbing to cruise altitude when the engine began to lose power. Shortly thereafter, the engine lost power completely. The pilot then attempted to restore engine power and did not activate the carburetor heat until after the power loss. He was able to briefly restart the engine, but it ultimately lost power again after a brief period of rough running. During the subsequent off-airport landing, the nose landing gear separated from the airplane and it nosed over, substantially damaging both wings and the vertical stabilizer. The engine was successfully test run following the accident, and no mechanical deficiencies were found that would have precluded normal operation. The temperature and dewpoint at the departure airport around the time of the accident were conducive to the formation of carburetor icing. It is likely that, during the delay while the pilot was waiting to depart, the carburetor began to accumulate ice, that the ice accumulation continued during the subsequent takeoff and climb, and that the engine slowly lost power throughout. Because the pilot did not activate the carburetor heat until after the engine had lost power completely, the carburetor heat was ineffective at restoring engine power.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The pilot's delayed use of carburetor heat, which resulted in carburetor icing and a subsequent total loss of engine power.

Findings

Personnel issues	Delayed action - Pilot
Environmental issues	Conducive to carburetor icing - Contributed to outcome

Factual Information

History of Flight

Enroute-climb to cruise	Fuel related (Defining event)
Emergency descent	Off-field or emergency landing

On February 24, 2021, about 1400 eastern standard time, a Cessna 172B, N7832X, was substantially damaged when it was involved in an accident near Winchester, Virginia. The pilot incurred minor injuries. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

According to the pilot, after his preflight inspection he started up the airplane and taxied to runway 14 at Winchester Regional Airport (OKV), Winchester, Virginia for departure. He performed a magneto check and noted no anomalies. After waiting for 3 other airplanes to land and another airplane to depart, he took off around 1330. Shortly after departing, the pilot felt as if the airplane wasn't climbing as well as he thought it should. Being too far away from the departure airport, he located a field for a possible emergency landing. The pilot executed a mental emergency checklist as the airplane descended and the engine continued to lose rpm. Around 1,700 feet, the engine stopped running completely. The pilot attempted to troubleshoot by ensuring that the fuel selector was on both tanks, the magnetos were on, the mixture was rich, and he turned on the carburetor heat. He then primed the engine and attempted to restart it. The engine started but was running roughly. The pilot left the carburetor heat on and then turned back toward the departure airport. The airplane would not climb with the available power, and shortly thereafter, the engine again lost total power. The pilot then established a best glide speed and guided the airplane toward a field for a forced landing. During the landing, the nose landing gear separated, and the airplane nosed over. Following the accident, the pilot stated that he felt the loss of engine power was due to the formation of carburetor ice.

Examination of photos taken of the airplane following the accident showed that the vertical stabilizer and both wings were substantially damaged. A Federal Aviation Administration inspector examined the airplane and engine after it was recovered from the accident site. The inspector found that the carburetor float bowl contained fuel and that the intake was impacted with dirt from the accident site. After cleaning out the dirt from the intake, the inspector performed a successful test run of the engine and noted no anomalies.

At 1415, the weather conditions at OKV, about 9 miles east of the accident site, included a temperature of 17°C and a dew point 01°C. Review of the icing probability chart contained within Federal Aviation Administration Special Airworthiness Information Bulletin CE-09-35 revealed that the atmospheric conditions at the time of the accident were conducive to the formation of carburetor icing at glide and cruise engine power settings.

According to FAA Advisory Circular 20-113, "To prevent accident 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 percent, "...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:	Private	Age:	42, Male
Airplane Rating(s):	Single-engine land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	3-point
Instrument Rating(s):	None	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	
Medical Certification:	Class 3 With waivers/limitations	Last FAA Medical Exam:	September 7, 2016
Occupational Pilot:	No	Last Flight Review or Equivalent:	February 3, 2020
Flight Time:	630 hours (Total, all aircraft), 50 hours (Total, this make and model), 630 hours (Pilot In Command, all aircraft), 52 hours (Last 90 days, all aircraft), 8 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	Registration:	N7832X
Model/Series:	172B	Aircraft Category:	Airplane
Year of Manufacture:	1960	Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	17248332
Landing Gear Type:	Tricycle	Seats:	4
Date/Type of Last Inspection:	July 4, 2020 Annual	Certified Max Gross Wt.:	2200 lbs
Time Since Last Inspection:	902 Hrs	Engines:	1
Airframe Total Time:	5078 Hrs as of last inspection	Engine Manufacturer:	
ELT:	C91 installed, activated, did not aid in locating accident	Engine Model/Series:	
Registered Owner:	On file	Rated Power:	
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:	OKV, 726 ft msl	Distance from Accident Site:	9 Nautical Miles
Observation Time:	14:15 Local	Direction from Accident Site:	98°
Lowest Cloud Condition:	Clear	Visibility	10 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	5 knots / None	Turbulence Type Forecast/Actual:	None / None
Wind Direction:	220°	Turbulence Severity Forecast/Actual:	N/A / N/A
Altimeter Setting:	29.87 inches Hg	Temperature/Dew Point:	17°C / 0°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Winchester, MD (OKV)	Type of Flight Plan Filed:	None
Destination:	Westminster, MD (DMW)	Type of Clearance:	None
Departure Time:	13:30 Local	Type of Airspace:	Class E

Wreckage and Impact Information

Crew Injuries:	1 Minor	Aircraft Damage:	Substantial
Passenger Injuries:		Aircraft Fire:	None
Ground Injuries:		Aircraft Explosion:	None
Total Injuries:	1 Minor	Latitude, Longitude:	39.168343,-78.356481(est)

Preventing Similar Accidents

Preventing Carburetor Icing (SA-029)

The Problem

According to NTSB aircraft accident data, from 2000 to 2011, carburetor icing was a cause or factor in about 250 accidents. On average, carburetor icing causes or contributes to two fatal accidents per year. Accident evidence shows that some pilots do not recognize weather conditions favorable to carburetor icing and inaccurately believe that carburetor icing is only a cold- or wet-weather problem. Pilots may also have not used the carburetor heat according to the aircraft's approved procedures to prevent carburetor ice formation. In addition, some pilots may not recognize and promptly act upon the signs of carburetor icing.

What can you do?

- Check the temperature and dew point for your flight to determine whether the conditions are favorable for carburetor icing. Remember, serious carburetor icing can occur in ambient temperatures as high as 90° F or in relative humidity conditions as low as 35 percent at glide power.
- Refer to your approved aircraft flight manual or operating handbook to ensure that you are using carburetor heat according to the approved procedures and properly perform the following actions:
 - Check the functionality of the carburetor heat before your flight.

- Use carburetor heat to prevent the formation of carburetor ice when operating in conditions and at power settings in which carburetor icing is probable. Remember, ground idling or taxiing time can allow carburetor ice to accumulate before takeoff.
- Immediately apply carburetor heat at the first sign of carburetor icing, which typically includes a drop in rpm or manifold pressure (depending upon how your airplane is equipped). Engine roughness may follow.
- Consider installing a carburetor temperature gauge, if available.
- Remember that aircraft engines that run on automotive gas may be more susceptible to carburetor icing than engines that run on Avgas.

See <https://www.nts.gov/Advocacy/safety-alerts/Documents/SA-029.pdf> for additional resources.

The NTSB presents this information to prevent recurrence of similar accidents. Note that this should not be considered guidance from the regulator, nor does this supersede existing FAA Regulations (FARs).

Administrative Information

Investigator In Charge (IIC):	Alleyne, Eric
Additional Participating Persons:	Bill Dusold; FAA/FSDO; Herndon, VA
Original Publish Date:	October 15, 2021
Last Revision Date:	
Investigation Class:	Class 3
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=102670

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).