



Aviation Investigation Final Report

Location:	Kingsport, Tennessee	Accident Number:	ERA18TA255
Date & Time:	September 19, 2018, 20:10 Local	Registration:	N67WR
Aircraft:	CALVIN NATE H VELOCITY STD RG E	Aircraft Damage:	Substantial
Defining Event:	Fuel related	Injuries:	2 Serious
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The private pilot reported that, during a low power visual approach to land, the experimental, amateur-built airplane became low and slow on final approach. When he increased power to arrest the descent, the engine did not respond, and the airplane continued to descend, stalled, and impacted the approach lighting system and terrain before coming to rest about 400 ft short of the runway threshold. The fuselage, canard, and both wings sustained substantial damage. Postaccident examination of the airplane did not reveal any evidence of a preimpact mechanical malfunction or failure that would have precluded normal operation.

Weather conditions at the time were conducive to the formation of serious carburetor icing at glide power. The carburetor heat lever was found in the off position, and the pilot reported that he did not use carburetor heat for the approach to landing; thus, carburetor ice likely formed and reduced the power available to stop the descent into the approach lights and terrain.

Probable Cause and Findings

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

The pilot's failure to use carburetor heat in conditions conducive to serious carburetor icing at glide power, which resulted in a partial loss of power and an aerodynamic stall.

Findings

Environmental issues	Conducive to carburetor icing - Effect on equipment
Aircraft	Intake anti-ice, deice - Not used/operated
Personnel issues	Lack of action - Pilot
Personnel issues	Identification/recognition - Pilot
Aircraft	Angle of attack - Capability exceeded
Environmental issues	Runway/taxi/approach light - Contributed to outcome

Factual Information

History of Flight

Approach-IFR final approach	Fuel related (Defining event)
Approach-IFR final approach	Loss of engine power (partial)
Approach-IFR final approach	Aerodynamic stall/spin
Approach-IFR final approach	Collision with terr/obj (non-CFIT)

On September 19, 2018, at 2010 eastern daylight time, an experimental amateur-built Velocity STD RG E, N67WR, was substantially damaged when it impacted an approach lighting system and terrain while landing at the Tri-Cities Airport (TRI), Kingsport, Tennessee. The private pilot and passenger were seriously injured. The airplane was privately owned and operated as a personal flight under the provisions of Title 14 *Code of Federal Regulations* Part 91. Night visual meteorological conditions prevailed, and an instrument flight rules flight plan was filed for the flight, which originated from Columbus Airport (CSG), Columbus, Georgia, at 1817.

According to the pilot, the enroute portion of the cross-country flight was uneventful. He reported that when he was cleared for a visual approach to runway 23, the airplane was higher than usual. Subsequently, he reduced power nearly to idle, and applied the speed brake to increase the descent rate. Once on final approach, the pilot noticed that the airplane "began to be slow and was low," and while over the approach lights, he increased the throttle, but the engine "did not respond at all." The airplane continued sinking and began to stall. Shortly thereafter, the airplane impacted approach lights and terrain.

A witness located on the airport's ramp reported that he "heard a high revving engine noise and turned towards the approach end of the runway and saw [a] small plane strike the [approach] lights."

According to a Federal Aviation Administration (FAA) inspector who examined the airplane at the accident site, damage to the approach lighting system began with the elevated approach lights about 900 ft from runway 23 and continued to where the airplane came to rest about 400 ft short of the runway threshold. All major flight control surfaces were located along the debris path. All three propeller blades fragmented at the propeller hub. The mixture and propeller control levers were found full forward and the throttle was found 3/4 of the way forward. The carburetor heat lever was found in the off position. The fuselage, canard, and both wings sustained substantial damage.

Examination of the engine revealed crankshaft continuity when rotating the propeller flange by hand. All cylinders remained attached to the engine and thumb compression was attained on all cylinders when rotated by hand. All spark plugs were examined, and no anomalies were noted. The oil screen was free of debris. The carburetor was examined, and no anomalies were noted. The throttle, mixture, and propeller control cables remained attached to their respective attach points, and each moved freely. There was no damage observed to the induction system.

According to the FAA Air Traffic Control Tower Manager at TRI, the approach lighting system and precision approach path indicator (PAPI) were on at the time of the accident. A functional test of the PAPI was conducted the following morning after the accident, and no malfunctions were noted.

According to FAA airman records, the pilot held a private pilot certificate with ratings for airplane single-engine land and instrument airplane. He was issued a third-class medical certificate in October 2017. He reported a total of 451 flight hours, 61 hours of which were in the accident airplane make and model.

According to FAA airworthiness records, the canard design airplane was powered by a Franklin 6A-350-C1R, 205-horsepower engine. It was equipped with retractable landing gear in the tricycle configuration and had 4-seats. The most recent annual inspection was completed in July 2018.

The weather conditions reported at 1953 at TRI, included calm wind, few clouds at 4,500 ft, visibility 10 miles, temperature 24°C, and dew point 20°C.

Review of a Carburetor Icing Probability Chart for the given temperature and dew point revealed that the conditions were conducive to serious icing at glide power. The pilot reported that he did not use carburetor heat during the low power descent because "it was not cold." He reported that he did not use carburetor heat in this airplane but was taught to use carburetor heat in a different airplane he had flown in the past as a student pilot.

According to the FAA Pilot's Handbook of Aeronautical Knowledge, carburetor ice occurs due to the effect of fuel vaporization and the decrease in air pressure in the venturi, which causes a sharp temperature drop in the carburetor. If water vapor in the air condenses when the carburetor temperature is at or below freezing, ice may form on internal surfaces of the carburetor, including the throttle valve.

The reduced air pressure, as well as the vaporization of fuel, contributes to the temperature decrease in the carburetor. Ice generally forms in the vicinity of the throttle valve and in the venturi throat. This restricts the flow of the fuel-air mixture and reduces power. If enough ice builds up, the engine may cease to operate. Carburetor ice is most likely to occur when temperatures are below 70°F (21°C) and the relative humidity is above 80 percent. Due to the sudden cooling that takes place in the carburetor, icing can occur even in outside air temperatures as high as 100°F (38 °C) and humidity as low as 50 percent.

Pilot Information

Certificate:	Private	Age:	61,Male
Airplane Rating(s):	Single-engine land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	3-point
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 3 Without waivers/limitations	Last FAA Medical Exam:	October 23, 2017
Occupational Pilot:	No	Last Flight Review or Equivalent:	May 11, 2017
Flight Time:	451 hours (Total, all aircraft), 61 hours (Total, this make and model), 392 hours (Pilot In Command, all aircraft), 31 hours (Last 90 days, all aircraft), 4 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	CALVIN NATE H	Registration:	N67WR
Model/Series:	VELOCITY STD RG E	Aircraft Category:	Airplane
Year of Manufacture:	1998	Amateur Built:	Yes
Airworthiness Certificate:	Experimental (Special)	Serial Number:	422109601
Landing Gear Type:	Retractable - Tricycle	Seats:	4
Date/Type of Last Inspection:	July 5, 2018 Annual	Certified Max Gross Wt.:	2450 lbs
Time Since Last Inspection:		Engines:	1 Reciprocating
Airframe Total Time:	181.6 Hrs at time of accident	Engine Manufacturer:	Franklin
ELT:	Installed	Engine Model/Series:	6A-350-C1R
Registered Owner:		Rated Power:	205 Horsepower
Operator:	On file	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Night
Observation Facility, Elevation:	KTRI,1497 ft msl	Distance from Accident Site:	0 Nautical Miles
Observation Time:	19:53 Local	Direction from Accident Site:	165°
Lowest Cloud Condition:	Few / 4500 ft AGL	Visibility	10 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	/	Turbulence Type Forecast/Actual:	None / None
Wind Direction:		Turbulence Severity Forecast/Actual:	N/A / N/A
Altimeter Setting:	30.04 inches Hg	Temperature/Dew Point:	24°C / 20°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Columbus, GA (CSG)	Type of Flight Plan Filed:	IFR
Destination:	Kingsport, TN (TRI)	Type of Clearance:	IFR
Departure Time:	18:17 Local	Type of Airspace:	Class D

Airport Information

Airport:	Tri-Cities TRI	Runway Surface Type:	Asphalt
Airport Elevation:	1518 ft msl	Runway Surface Condition:	Dry
Runway Used:	23	IFR Approach:	Visual
Runway Length/Width:	8000 ft / 150 ft	VFR Approach/Landing:	Full stop

Wreckage and Impact Information

Crew Injuries:	1 Serious	Aircraft Damage:	Substantial
Passenger Injuries:	1 Serious	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	2 Serious	Latitude, Longitude:	36.482223,-82.399719(est)

Preventing Similar Accidents

Preventing Carburetor Icing

Accident involving carburetor ice stem for pilots not recognizing when weather conditions are favorable to carburetor icing and inaccurately believing that carburetor icing is only a cold- or wet-weather

problem. Pilots also may not use the carburetor heat according the aircraft's approved procedures to prevent carburetor ice formation. Carburetor icing accident can occur when pilots do not recognize and promptly act upon the signs of carburetor icing.

Be sure to check the temperature and dew point 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. Consider installing a carburetor temperature gauge, if available.

Refer to the approved aircraft flight manual or operating handbook to ensure that carburetor heat is used according to the approved procedures and properly perform the following actions: 1) Check the functionality of the carburetor heat before flight. 2) 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. 3) 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.

Engines that run on automobile gas may be more susceptible to carburetor icing than engines that run on Avgas.

See http://www.nts.gov/safety/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):	Gerhardt, Adam
Additional Participating Persons:	Michael Miles; FAA/ FSDO; Nashville, TN
Original Publish Date:	November 19, 2019
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=98327

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).