



National Transportation Safety Board Aviation Accident Final Report

Location:	Shipshewana, IN	Accident Number:	CEN15LA106
Date & Time:	01/19/2015, 1700 EST	Registration:	N979DC
Aircraft:	DIAMOND AIRCRAFT IND INC DA 20 C1	Aircraft Damage:	Substantial
Defining Event:	Loss of engine power (total)	Injuries:	1 None
Flight Conducted Under:	Part 91: General Aviation - Instructional		

Analysis

The student pilot reported that he was practicing solo ground reference maneuvers about 1,600 ft above ground level when the engine began operating erratically. He further stated that the airplane might have entered an aerodynamic stall. He advanced the throttle to full forward, but the engine did not respond and subsequently experienced a total loss of power. He attempted to restart the engine by completing the emergency procedures that he remembered. The engine “turned over” but did not restart. He then prepared for a forced landing to a nearby field. During the base-to-final turn, he lost control of the airplane, and it descended to the ground. The airplane impacted the field and continued into a propane tank and then a house where it came to rest.

A postaccident examination of the airplane revealed that most of the induction air filter was obstructed by ice; no other anomalies were noted. The engine was test run with and without the ice in the air filter, and the engine produced full power under both conditions. The alternate air lever, which selects a second induction air intake in case the primary air intake (air filter) becomes restricted, was found in the “off” position. The aircraft flight manual states that, in the event of an in-flight engine failure, the alternate air control should be opened (or “on”). A Federal Aviation Administration advisory circular warns pilots of induction system icing known as “impact ice,” which can build up on components like the air filter when moisture-laden air is near freezing. Based on the near-freezing outside air temperature and clouds in the area in which the flight was operating and the lack of any apparent engine malfunctions, it is likely that the primary air induction system became obstructed with impact ice during the flight.

When asked about the airplane’s alternate air lever, the student pilot indicated that he was unfamiliar with the lever and did not know its intended use. If the student pilot had opened the alternate air control during the initial power loss, it is likely that 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: The total loss of engine power due to impact ice obstructing the primary air induction system, which resulted from the student pilot's failure to operate the alternate air control. Contributing to the accident was the student pilot's lack of knowledge about using the alternate air control during an engine power loss.

Findings

Aircraft	Air intake - Incorrect use/operation (Cause)
Personnel issues	Knowledge of equipment - Student pilot (Factor) Training with equipment - Student pilot Lack of action - Student pilot (Cause) Use of equip/system - Student pilot (Cause)
Environmental issues	Conditions/weather/phenomena - Effect on equipment (Cause)

Factual Information

On January 19, 2015, about 1700 eastern standard time, a Diamond Aircraft Inc. DA 20 C1 airplane, N979DC, made a forced landing into a field near Shipshewana, Indiana. The solo student pilot was not injured and the airplane sustained substantial damage. The airplane was registered to and operated by New Horizons Aviation Inc. under the provisions of 14 Code of Federal Regulations Part 91 as a solo instructional flight. Visual meteorological conditions prevailed and no flight plan was filed. The local flight departed from the Goshen Municipal Airport (GSH), Goshen, Indiana about 1645.

According to the student pilot, he was about 1,600 feet above ground level practicing ground reference maneuvers. He reported that the engine operation became erratic and the airplane might have entered an aerodynamic stall. He advanced the throttle to full forward, but the engine did not respond and experienced a total loss of power. He attempted to restart the engine by completing the emergency procedures that he remembered. The engine "turned over" but did not restart. He then prepared for a forced landing into a nearby field. During the base to final turn, he lost control of the airplane and descended to the ground. The airplane impacted the field and continued into a propane tank and then a house where it came to rest.

The student pilot reported having accumulated 12 total flight hours, all of which were logged in the preceding 30 days, and in the same make and model airplane.

The airplane was a two seat, low wing, tricycle landing gear, training airplane which was manufactured in 2005. It was powered by a 125-horsepower Continental Motors Inc. IO-240 engine, which drove a Sensenich two-bladed, fixed pitched, wooden propeller.

On January 22, 2015, the airplane was examined after the accident by a Federal Aviation Administration (FAA) Inspector and a representative from Continental Motors Inc. The examination revealed that the majority of the induction air filter was covered with ice. The alternate air lever in the airplane was OFF. The engine cylinders each displayed normal operating signatures. The spark plugs displayed normal wear signatures when compared to a Champion Aviation Service Manual No. AV6-R. Internal crankshaft continuity was established by rotating the propeller. Additionally, all four cylinders displayed thumb suction and compression. The top spark plugs and ignition leads were reinstalled for an engine operational test run. The air filter remained impacted with ice during the first engine run; the engine was capable of running with the throttle full forward and produced about 2,200 RPM which is normal for a fixed pitch propeller. The alternate air lever was moved to ON and the engine was still capable of producing about 2,200 RPM. The engine was then shut down and the ice removed from the air filter. The engine was subjected to a second test run; the engine produced 2,200 RPM with the throttle advanced to full forward. The ignition switch was actuated to test both magnetos and the decreases in RPM were normal and the engine indications displayed normal operating parameters. Other than the ice in the air induction filter there were no anomalies noted that would have precluded normal operation. The airplane sustained substantial damage to the fuselage and empennage.

During the postaccident investigation, the pilot was asked about the airplane's alternate air lever. He reported that he was unfamiliar with the lever and did not know its intended use. He also stated that he flew through some low clouds during the flight, but they did not obstruct his view of the ground and he was able to maintain visual flight rules (VFR) the entire time.

At 1653 the weather observation station at GSH, which was located 13 miles southwest, reported the following conditions: wind from 200 degrees at 3 knots, visibility 10 miles, few clouds at 12,000 feet, temperature 36° Fahrenheit (F), dew point 30° F, altimeter setting 29.94 inches of mercury.

Using the average temperature lapse rate, 3.5° F per 1,000 feet, the temperature at 1,600 feet would have been about 30° F.

The Diamond Aircraft Airplane Flight Manual (AFM) stated in Chapter 7.9.2 Engine Controls: The alternate air control selects a second induction air intake in case of restriction of the primary air intake (air filter).

AFM Chapter 3.3.1 (c) Engine Failure during Flight – ENGINE RUNNING ROUGHLY – the pilot should perform the following checklist:

1. Mixture – FULL RICH
2. Alternate Air – OPEN
3. Fuel Shut-off – OPEN
4. Fuel Pump – ON
5. Ignition Switch – cycle L – BOTH – R – BOTH
6. Throttle – at present position
7. No Improvement – reduce throttle to minimum required power, land as soon as possible.

FAA Advisory Circular 20-113. The Advisory Circular states that one form of induction system icing is impact ice and states in part:

"Impact ice is formed by moisture-laden air at temperatures below freezing, striking and freezing on elements of the induction system which are at temperatures of 32° F or below. Under these conditions, ice may build up on such components as the air scoops, heat or alternate air valves, intake screens, and protrusions in the carburetor. Pilots should be particularly alert for such icing when flying in snow, sleet, rain, or clouds, especially when they see ice forming on the windshield or leading edge of the wings. The ambient temperature at which impact ice can be expected to build most rapidly is about 25° F, when the super cooled moisture in the air is still in a semi liquid state. This type of icing affects an engine with fuel injection, as well as carbureted engines. It is usually preferable to use carburetor heat or alternate air as an ice prevention means..."

History of Flight

Maneuvering-low-alt flying	Loss of engine power (total) (Defining event) Other weather encounter
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Student Pilot Information

Certificate:	Student	Age:	18
Airplane Rating(s):	None	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	
Instrument Rating(s):	None	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 2 Without Waivers/Limitations	Last FAA Medical Exam:	01/13/2015
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:	12 hours (Total, all aircraft), 12 hours (Total, this make and model), 2 hours (Pilot In Command, all aircraft), 12 hours (Last 90 days, all aircraft), 12 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	DIAMOND AIRCRAFT IND INC	Registration:	N979DC
Model/Series:	DA 20 C1	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Utility	Serial Number:	C0314
Landing Gear Type:	Tricycle	Seats:	2
Date/Type of Last Inspection:	100 Hour	Certified Max Gross Wt.:	
Time Since Last Inspection:		Engines:	1 Reciprocating
Airframe Total Time:	3195 Hours at time of accident	Engine Manufacturer:	Continental Motors Inc
ELT:	Installed, not activated	Engine Model/Series:	IO-240
Registered Owner:	NEW HORIZONS AVIATION INC	Rated Power:	125 hp
Operator:	NEW HORIZONS AVIATION INC	Operating Certificate(s) Held:	Pilot School (141)

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	KGSH, 827 ft msl	Distance from Accident Site:	13 Nautical Miles
Observation Time:	1653 EST	Direction from Accident Site:	216°
Lowest Cloud Condition:	Few / 12000 ft agl	Visibility	10 Miles
Lowest Ceiling:	Unknown	Visibility (RVR):	
Wind Speed/Gusts:	3 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	200°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	29.94 inches Hg	Temperature/Dew Point:	2°C / -1°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	GOSHEN, IN (GSH)	Type of Flight Plan Filed:	None
Destination:	GOSHEN, IN (GSH)	Type of Clearance:	None
Departure Time:	1645 EST	Type of Airspace:	

Airport Information

Airport:	GOSHEN MUNI (GSH)	Runway Surface Type:	Grass/turf
Airport Elevation:	827 ft	Runway Surface Condition:	Vegetation
Runway Used:	N/A	IFR Approach:	None
Runway Length/Width:		VFR Approach/Landing:	Forced Landing

Wreckage and Impact Information

Crew Injuries:	1 None	Aircraft Damage:	Substantial
Passenger Injuries:	N/A	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 None	Latitude, Longitude:	41.705833, -85.613056 (est)

Administrative Information

Investigator In Charge (IIC):	Joshua D Lindberg	Report Date:	03/17/2015
Additional Participating Persons:	Dan Sedberry; FAA; South Bend, IN Kurt Gibson; Continental Motors Inc; Mobile, AL		
Publish Date:	03/17/2015		
Note:	The NTSB did not travel to the scene of this accident.		
Investigation Docket:	http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=90617		

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](#).