



AVIATION



HIGHWAY



MARINE



RAILROAD



PIPELINE

# Aviation Investigation Final Report

<b>Location:</b>	Smithfield, North Carolina	<b>Accident Number:</b>	ERA22LA169
<b>Date &amp; Time:</b>	March 25, 2022, 16:13 Local	<b>Registration:</b>	N471BL
<b>Aircraft:</b>	DIAMOND AIRCRAFT IND INC DA 40 NG	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Loss of engine power (total)	<b>Injuries:</b>	2 Serious
<b>Flight Conducted Under:</b>	Part 91: General aviation - Instructional		

## Analysis

According to the flight instructor, shortly after takeoff, she heard a “weird” noise coming from the engine and noted a drop in engine rpm. The flight instructor directed the pilot receiving instruction to turn back toward the airport; however, the engine lost all power, and the airplane impacted trees about 1 mile from the departure end of the runway. The airplane sustained substantial damage to the wings, fuselage, and empennage.

A postaccident examination of the engine revealed that the engine valvetrain was not timed correctly and that the misalignment resulted in a piston striking a valve. The valve head had separated and fallen into the cylinder, resulting in the total loss of engine power. Examination of the maintenance logbooks revealed that the cylinder head and exhaust camshaft had been replaced the day before the accident flight. Thus, it is likely that the engine’s timing was not set correctly after this maintenance.

## Probable Cause and Findings

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

Maintenance personnel's failure to set the correct engine timing after the replacement of a cylinder head and exhaust camshaft before the accident flight, which resulted in a total loss of engine power.

## Findings

Personnel issues	Incorrect action performance - Maintenance personnel
Aircraft	Recip eng cyl section - Incorrect service/maintenance
Aircraft	Recip eng cyl section - Failure

# Factual Information

## History of Flight

Initial climb	Loss of engine power (total) (Defining event)
Emergency descent	Off-field or emergency landing

On March 25, 2022, about 1613 eastern daylight time, a Diamond DA-40NG, N471BL, was substantially damaged when it was involved in an accident near Johnston Regional Airport (JNX), Smithfield, North Carolina. The flight instructor and pilot receiving instruction were seriously injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 instructional flight.

According to the flight instructor and pilot receiving instruction, they conducted a preflight inspection of the airplane, with no anomalies noted, before departing from runway 21 at JNX. Review of radar data revealed that the airplane climbed to an altitude of about 650 ft while turning left. The flight instructor stated that she “heard a weird noise come from the engine” and saw the rpm gauge drop. Shortly afterward, the flight instructor directed the pilot receiving instruction to turn back to the airport, and the engine lost total power while in the turn. The flight instructor attempted to restart the engine while the airplane descended but was unsuccessful. The airplane subsequently impacted trees about 1 mile from the departure end of the runway, resulting in substantial damage to the fuselage. In addition, both wings and the empennage were fractured from the impact.

A postaccident examination of the engine revealed that engine valvetrain was not timed correctly and that the resulting misalignment resulted in the piston striking the valve. The valve head had subsequently separated and fallen into the cylinder. Examination of the maintenance logbooks revealed that the cylinder head and exhaust camshaft had been replaced the day before the accident flight.

## Flight instructor Information

<b>Certificate:</b>	Flight instructor	<b>Age:</b>	20,Female
<b>Airplane Rating(s):</b>	Single-engine land; Multi-engine land	<b>Seat Occupied:</b>	Right
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	3-point
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>	Airplane multi-engine; Airplane single-engine; Instrument airplane	<b>Toxicology Performed:</b>	
<b>Medical Certification:</b>	Class 1	<b>Last FAA Medical Exam:</b>	November 1, 2022
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>			

## Pilot Information

<b>Certificate:</b>	Private	<b>Age:</b>	26,Male
<b>Airplane Rating(s):</b>	Single-engine land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	3-point
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>	None	<b>Toxicology Performed:</b>	
<b>Medical Certification:</b>	Class 1 None	<b>Last FAA Medical Exam:</b>	August 2, 2021
<b>Occupational Pilot:</b>	No	<b>Last Flight Review or Equivalent:</b>	March 22, 2022
<b>Flight Time:</b>			

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	DIAMOND AIRCRAFT IND INC	<b>Registration:</b>	N471BL
<b>Model/Series:</b>	DA 40 NG	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>	2020	<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	40.NC111
<b>Landing Gear Type:</b>	Tricycle	<b>Seats:</b>	4
<b>Date/Type of Last Inspection:</b>	March 24, 2022 Annual	<b>Certified Max Gross Wt.:</b>	2888 lbs
<b>Time Since Last Inspection:</b>	2.7 Hrs	<b>Engines:</b>	1 Reciprocating
<b>Airframe Total Time:</b>	895 Hrs at time of accident	<b>Engine Manufacturer:</b>	Austro
<b>ELT:</b>	C126 installed, activated, did not aid in locating accident	<b>Engine Model/Series:</b>	E4-A
<b>Registered Owner:</b>	BLUE LINE AVIATION LLC	<b>Rated Power:</b>	165 Horsepower
<b>Operator:</b>	BLUE LINE AVIATION LLC	<b>Operating Certificate(s) Held:</b>	Pilot school (141)

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual (VMC)	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	JNX,165 ft msl	<b>Distance from Accident Site:</b>	1 Nautical Miles
<b>Observation Time:</b>	16:15 Local	<b>Direction from Accident Site:</b>	342°
<b>Lowest Cloud Condition:</b>		<b>Visibility</b>	10 miles
<b>Lowest Ceiling:</b>	Broken / 10000 ft AGL	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	8 knots / 18 knots	<b>Turbulence Type Forecast/Actual:</b>	/
<b>Wind Direction:</b>	260°	<b>Turbulence Severity Forecast/Actual:</b>	/
<b>Altimeter Setting:</b>	29.7 inches Hg	<b>Temperature/Dew Point:</b>	20°C / 0°C
<b>Precipitation and Obscuration:</b>	No Obscuration; No Precipitation		
<b>Departure Point:</b>	Smithfield, NC	<b>Type of Flight Plan Filed:</b>	
<b>Destination:</b>	Smithfield, NC	<b>Type of Clearance:</b>	Unknown
<b>Departure Time:</b>		<b>Type of Airspace:</b>	Class G

## Airport Information

<b>Airport:</b>	Johnston Regional Airport JNX	<b>Runway Surface Type:</b>	
<b>Airport Elevation:</b>	164 ft msl	<b>Runway Surface Condition:</b>	
<b>Runway Used:</b>		<b>IFR Approach:</b>	None
<b>Runway Length/Width:</b>		<b>VFR Approach/Landing:</b>	Forced landing

## Wreckage and Impact Information

<b>Crew Injuries:</b>	2 Serious	<b>Aircraft Damage:</b>	Substantial
<b>Passenger Injuries:</b>	N/A	<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	2 Serious	<b>Latitude, Longitude:</b>	35.527596,-78.381851(est)

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Spencer, Lynn
<b>Additional Participating Persons:</b>	Mike Allen; FAA-FSDO; Greensboro, NC Beverly Harvey; Transportation Safety Board of Canada; Quebec Oliver Bruck; Federal Safety Investigation Authority; Vienna Neil Grant; Diamond Aircraft Industries; London Gennaro Arena ; Austro Engines; Wiener Neustadt
<b>Original Publish Date:</b>	October 19, 2023
<b>Last Revision Date:</b>	
<b>Investigation Class:</b>	<a href="#">Class 3</a>
<b>Note:</b>	The NTSB did not travel to the scene of this accident.
<b>Investigation Docket:</b>	<a href="https://data.nts.gov/Docket?ProjectID=104831">https://data.nts.gov/Docket?ProjectID=104831</a>

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](#).