



# Aviation Investigation Final Report

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<b>Location:</b>	Durant, Oklahoma	<b>Accident Number:</b>	CEN23LA370
<b>Date &amp; Time:</b>	August 21, 2023, 10:48 Local	<b>Registration:</b>	N3589X
<b>Aircraft:</b>	Piper PA31	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Powerplant sys/comp malf/fail	<b>Injuries:</b>	1 None
<b>Flight Conducted Under:</b>	Part 91: General aviation - Aerial observation		

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## Analysis

While in flight, the pilot heard and felt a bang from the right side of the airplane. He saw that the right engine nacelle had a hole in it and the engine was on fire. He secured the engine and diverted to a nearby airport. While on final approach for landing, the engine fire reignited. The pilot landed the airplane, taxied clear of the runway, shut down the left engine, and egressed. The engine fire continued to burn and consumed the right engine and a majority of the fuselage.

Examination revealed that the right engine's No. 2 cylinder was displaced from the engine case but remained attached via the injector manifold vent tube and injector lines. All eight of the No. 2 cylinder's attach bolts were broken off at the case. The connecting rod cap was found lodged in the bottom of the piston. One connecting rod bolt was found broken off flush in the connecting rod; the top portion was not located. The other connecting rod bolt remained in the connecting rod cap with the nut also not located. One side of the lower connecting rod flange was bent back towards the piston, capturing the nut and remaining portion of the broken bolt. Neither bearing half could be identified in the remaining material. Numerous impact marks were noted on the piston, cylinder, and case.

A review of maintenance records found that the engine was last overhauled about 4 ½ years before the accident and had accrued about 900 hours since the overhaul.

Based on the available information, it is likely that the nut that secured one side of the connecting rod cap became loose, resulting the separation of the cap and subsequent damage to the No. 2 cylinder. Since the nut could not be located, the reason it did not remain secure could not be determined.

## Probable Cause and Findings

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

The loosening of a connecting rod cap nut for reasons that could not be determined, which resulted in a mechanical failure of the engine and an in-flight fire.

### Findings

Aircraft	Recip eng cyl section - Failure
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## Factual Information

### History of Flight

<b>Enroute</b>	Powerplant sys/comp malf/fail (Defining event)
<b>Enroute</b>	Fire/smoke (non-impact)
<b>Landing</b>	Fire/smoke (non-impact)

On August 21, 2023, about 1048 central daylight time, a Piper PA-31-350 airplane, N3589X, was substantially damaged when it was involved in an accident near Durant, Oklahoma. The pilot was not injured. The airplane was operated under Title 14 *Code of Federal Regulations* Part 91 as an aerial observation flight.

The pilot reported that, while in flight, he heard and felt a bang from the right side of the airplane. He saw that the right engine nacelle had a hole in it and the engine was on fire. He then shut down and secured the engine, which appeared to stop the engine fire, and diverted to a nearby airport.

While on final approach for landing, the engine fire reignited. The pilot landed the airplane, taxied clear of the runway, shut down the left engine, and egressed. The engine fire continued to burn and consumed the right engine and a majority of the fuselage.

An engine examination revealed that the No. 2 cylinder was displaced from the engine case but remained attached via the injector manifold vent tube and injector lines. All eight of the No. 2 cylinder's attach bolts were broken off at the case. The connecting rod cap was found lodged in the bottom of the piston. One connecting rod bolt was found broken off flush in the connecting rod; the top portion was not located. The other connecting rod bolt remained in the connecting rod cap with the nut also not located. One side of the lower connecting rod flange was bent back towards the piston, capturing the nut and remaining portion of the broken bolt. Neither bearing half was identified. Numerous impact marks were noted on the piston, cylinder, and case.

A review of maintenance records found that the engine was last overhauled on March 20, 2019, and installed on the airplane on October 1, 2020. The airplane had accrued about 900 hours since the overhaul.

## Pilot Information

<b>Certificate:</b>	Commercial	<b>Age:</b>	36, Male
<b>Airplane Rating(s):</b>	Single-engine land; Multi-engine land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>	Airplane multi-engine; Instrument airplane	<b>Toxicology Performed:</b>	
<b>Medical Certification:</b>	Class 1 Without waivers/limitations	<b>Last FAA Medical Exam:</b>	August 10, 2023
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	October 7, 2022
<b>Flight Time:</b>	3300 hours (Total, all aircraft), 1400 hours (Total, this make and model), 3189 hours (Pilot In Command, all aircraft), 130 hours (Last 90 days, all aircraft), 49 hours (Last 30 days, all aircraft), 9 hours (Last 24 hours, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Piper	<b>Registration:</b>	N3589X
<b>Model/Series:</b>	PA31 350	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>	1980	<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	31-8052138
<b>Landing Gear Type:</b>	Retractable - Tricycle	<b>Seats:</b>	3
<b>Date/Type of Last Inspection:</b>	August 11, 2022 Annual	<b>Certified Max Gross Wt.:</b>	7000 lbs
<b>Time Since Last Inspection:</b>		<b>Engines:</b>	2 Reciprocating
<b>Airframe Total Time:</b>	22698.4 Hrs as of last inspection	<b>Engine Manufacturer:</b>	Lycoming
<b>ELT:</b>	C126 installed, not activated	<b>Engine Model/Series:</b>	TSIO-540
<b>Registered Owner:</b>	MARC INC	<b>Rated Power:</b>	350 Horsepower
<b>Operator:</b>	MARC INC	<b>Operating Certificate(s) Held:</b>	None

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual (VMC)	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	KDUA,699 ft msl	<b>Distance from Accident Site:</b>	0 Nautical Miles
<b>Observation Time:</b>	10:35 Local	<b>Direction from Accident Site:</b>	21°
<b>Lowest Cloud Condition:</b>	Clear	<b>Visibility</b>	10 miles
<b>Lowest Ceiling:</b>	None	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	7 knots /	<b>Turbulence Type Forecast/Actual:</b>	/
<b>Wind Direction:</b>	100°	<b>Turbulence Severity Forecast/Actual:</b>	/
<b>Altimeter Setting:</b>	30.12 inches Hg	<b>Temperature/Dew Point:</b>	34°C / 19°C
<b>Precipitation and Obscuration:</b>	No Obscuration; No Precipitation		
<b>Departure Point:</b>	Tulsa, OK (KRVS)	<b>Type of Flight Plan Filed:</b>	
<b>Destination:</b>	Durant, OK (KDUA)	<b>Type of Clearance:</b>	VFR
<b>Departure Time:</b>	08:04 Local	<b>Type of Airspace:</b>	Class G

## Airport Information

<b>Airport:</b>	DURANT RGNL/EAKER FLD DUA	<b>Runway Surface Type:</b>	Asphalt
<b>Airport Elevation:</b>	699 ft msl	<b>Runway Surface Condition:</b>	Dry
<b>Runway Used:</b>	17	<b>IFR Approach:</b>	None
<b>Runway Length/Width:</b>	6800 ft / 100 ft	<b>VFR Approach/Landing:</b>	Full stop

## Wreckage and Impact Information

<b>Crew Injuries:</b>	1 None	<b>Aircraft Damage:</b>	Substantial
<b>Passenger Injuries:</b>	N/A	<b>Aircraft Fire:</b>	Both in-flight and on-ground
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	1 None	<b>Latitude, Longitude:</b>	33.939698,-96.395057(est)

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Aguilera, Jason
<b>Additional Participating Persons:</b>	Thomas LaNou; FAA FSDO; Oklahoma City, OK
<b>Original Publish Date:</b>	May 14, 2024
<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.ntsb.gov/Docket?ProjectID=192908">https://data.ntsb.gov/Docket?ProjectID=192908</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](#).