Aviation Investigation Final Report

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

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

Factual Information

History of Flight

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

Certificate:	Commercial	**Age:**	36,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane multi-engine; Instrument airplane	**Toxicology Performed:**	
Medical Certification:	Class 1 Without waivers/limitations	**Last FAA Medical Exam:**	August 10, 2023
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	October 7, 2022
Flight Time:	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

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

Meteorological Information and Flight Plan

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

Airport Information

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

Wreckage and Impact Information

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

Administrative Information

Investigator In Charge (IIC):	Aguilera, Jason
Additional Participating Persons:	Thomas LaNou; FAA FSDO; Oklahoma City, OK
Original Publish Date:	May 14, 2024
Last Revision Date:	
Investigation Class:	Class 3
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=192908