# Aviation Investigation Final Report

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| **Location:** | Sullivan, Missouri | **Accident Number:** | CEN24LA155 |
| **Date & Time:** | April 11, 2024, 08:25 Local | **Registration:** | N651ED |
| **Aircraft:** | Piper PA-32-301 | **Aircraft Damage:** | Substantial |
| **Defining Event:** | Loss of engine power (total) | **Injuries:** | 1 Minor, 1 None |
| **Flight Conducted Under:** | Part 91: General aviation - Personal | | |

## Analysis

The pilot was conducting a cross-country flight when the engine rpm slightly decreased. He attempted to troubleshoot but the engine surged before it lost all power. The pilot then prepared for a forced landing to a field. During the landing roll, the airplane impacted trees at the edge of a down-sloping, wet field. The airplane came to rest upright and sustained substantial damage to the stabilator, fuselage, and both wings.

Postaccident examination of the engine revealed that the engine crankshaft had fractured in two locations due to fatigue. The fatigue crack initiation sites were located near rotational wear bands. The inner diameter surfaces and edge faces of two sets of the main bearing journals exhibited severe gouging, cracking, and material spalling, consistent with rotational abrasive wear. Based on the damage, the degraded bearings likely prevented sufficient lubrication, leading to excessive heating and scoring that helped initiate fatigue cracking of the crankshaft.

The engine was most recently overhauled about 28 years and 2,439 flight hours before the accident. The manufacturer’s recommended time between overhaul (TBO) interval was 2,000 flight hours or 12 years, whichever occurred first. Although not required for Part 91 operations, following the manufacturer’s recommended overhaul procedures likely would have prevented the bearing failure and subsequent loss of engine power.

## Probable Cause and Findings

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

A bearing failure that resulted in fatigue failure of the crankshaft and a subsequent total loss of engine power.

## Findings

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| **Aircraft** | (general) - Failure |

# Factual Information

## History of Flight

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| **Enroute** | Loss of engine power (total) (Defining event) |
| **Landing** | Off-field or emergency landing |
| **Landing-landing roll** | Collision with terr/obj (non-CFIT) |

On April 11, 2024, about 0825 central daylight time, a Piper PA-32, N651ED, was substantially damaged when it was involved in an accident near Sullivan, Missouri. The passenger sustained minor injuries and the pilot was not injured. The airplane was operated as a Title 14 *Code of Federal Regulations* (*CFR*) Part 91 personal flight.

According to the pilot, about 0600, the flight departed Rochester International Airport, Rochester, Minnesota, after a preflight check and normal engine runup. The flight then continued towards Kirk Field Airport (PGR), Paragould, Arkansas. About 2 hours after takeoff, the pilot noticed a slight drop in rpm and began troubleshooting the engine issue by turning on the auxiliary fuel pump, switching fuel tanks, and adjusting the fuel mixture. The pilot was unable to restore engine power and, about 2 minutes after the pilot noticed the initial drop in rpm, the engine surged and then lost all power.

The pilot told the air traffic controller that the airplane had a loss of engine power and prepared for a forced landing to a field. During the landing roll, the airplane impacted trees at the edge of a down-sloping, wet field. The airplane came to rest upright and sustained substantial damage to the stabilator, fuselage, and both wings.

A postaccident review of the airplane's engine monitor data revealed an increase in oil temperature and a decrease in oil pressure before the total loss of engine rpm, as shown in the figure below. An initial engine examination at the accident site revealed a bent No. 3 cylinder intake valve pushrod tube and a crack in the engine case.

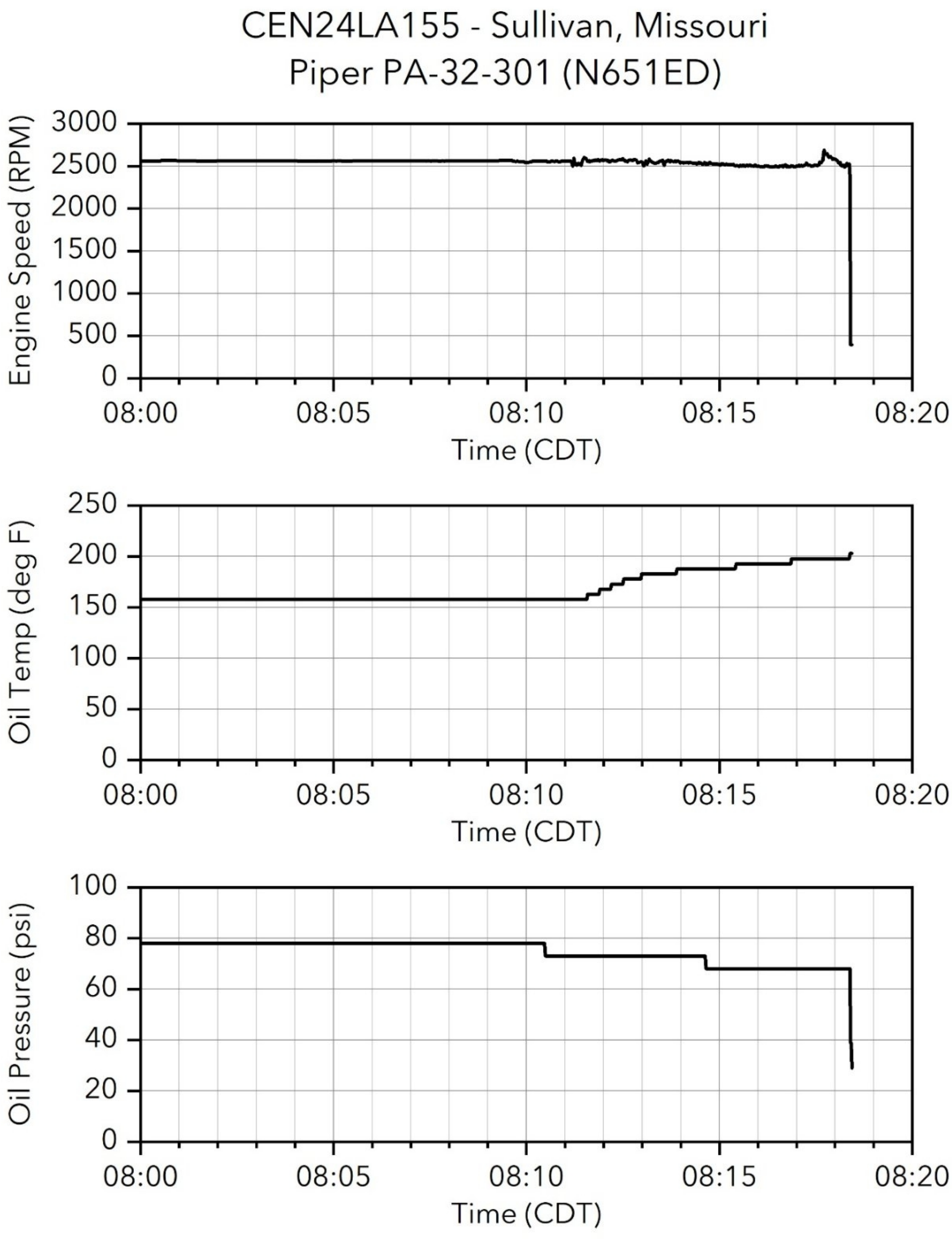


**Figure.** Plots of recorded engine data (engine speed, oil temperature, oil pressure)

Postaccident examination of the engine and its accessories revealed little to no impact damage except for a crack in the right engine case above the No. 3 cylinder and bent pushrods on cylinder No. 3. The engine mount exhibited minor impact damage consistent with damage from the nose gear during the accident sequence. The 3-bladed propeller was found attached to the engine crankshaft with one of the three blades having a small bend toward the tip. The other two blades remained undamaged.

The engine crankshaft was fractured in two areas. Examination of the crankshaft, a portion of a connecting rod, and the main bearing halves by the NTSB Materials Laboratory indicated that the crankshaft fractured through the webs between the second main (M2) and the third crankpin (C3) journals, and between the fourth crankpin (C4) and third main (M3) journal positions. The examination revealed that the fractures were from fatigue cracking that initiated at multiple sites along the radius between the bearing journals and the webs. The fatigue crack initiation sites were located near rotational wear bands. The bearings exhibited wear patterns consistent with rotational contact between the faying surfaces on both sides. The inner diameter surfaces and edge faces of two sets of the main bearing journals exhibited severe gouging, cracking, and material spalling, consistent with rotational abrasive wear. In addition, the cylinder No. 4 connecting rod exhibited a fracture from reverse-bending fatigue cracking that initiated at each flange face, and the associated bearing exhibited severe spalling and wear on the interior surface.

According to maintenance records, the engine was rebuilt in 1986, then later overhauled in 1997 due to a crack in the case. The bearing part numbers and build dates on the accident engine were consistent with having been replaced in the latter overhaul. Lycoming Service Instruction 1512, *Main and Connecting Rod Bearing Upgrade*, issued in 2004, lists those bearing part numbers as obsolete, superseded by improved bearings. The instruction, “requires the use of the upgraded bearing whenever new bearings are installed;” however, it was issued about 7 years after their installation. Lycoming Engine Service Instruction 1009BE, *Time Between Overhaul (TBO) Schedules*, stated that the TBO for the accident engine was 2,000 hours of operation or 12 years (whichever occurred first). Federal aviation regulations do not require 14 *CFR* Part 91 operations to follow manufacturer service instructions.

The airplane’s most recent annual inspection was completed on August 24, 2023, about 7 months before the accident. At the time of the inspection, the engine had accrued about 2353.7 hours of operation since the overhaul in 1997. An oil sample was sent for routine analysis as part of the inspection; the results of the analysis were normal.

## Pilot Information

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| **Certificate:** | Private | **Age:** | 44,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:** | |
| **Instructor Rating(s):** | None | **Toxicology Performed:** | |
| **Medical Certification:** | Class 3 Without waivers/limitations | **Last FAA Medical Exam:** | August 13, 2019 |
| **Occupational Pilot:** | No | **Last Flight Review or Equivalent:** | September 23, 2023 |
| **Flight Time:** | 523 hours (Total, all aircraft), 433 hours (Total, this make and model), 476 hours (Pilot In Command, all aircraft), 31 hours (Last 90 days, all aircraft), 19 hours (Last 30 days, all aircraft), 6 hours (Last 24 hours, all aircraft) | | |

## Aircraft and Owner/Operator Information

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| **Aircraft Make:** | Piper | **Registration:** | N651ED |
| **Model/Series:** | PA-32-301 | **Aircraft Category:** | Airplane |
| **Year of Manufacture:** | 1980 | **Amateur Built:** | |
| **Airworthiness Certificate:** | Normal | **Serial Number:** | 32-8106019 |
| **Landing Gear Type:** | Tricycle | **Seats:** | 7 |
| **Date/Type of Last Inspection:** | August 24, 2023 Annual | **Certified Max Gross Wt.:** | 3600 lbs |
| **Time Since Last Inspection:** | 85.4 Hrs | **Engines:** | 1 Reciprocating |
| **Airframe Total Time:** | 3514.1 Hrs at time of accident | **Engine Manufacturer:** | Lycoming |
| **ELT:** | Installed, activated, aided in locating accident | **Engine Model/Series:** | IO-540-K1G5 |
| **Registered Owner:** | On file | **Rated Power:** | |
| **Operator:** | On file | **Operating Certificate(s) Held:** | None |

## Meteorological Information and Flight Plan

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| **Conditions at Accident Site:** | Visual (VMC) | **Condition of Light:** | Day |
| **Observation Facility, Elevation:** | KUUV,933 ft msl | **Distance from Accident Site:** | 5 Nautical Miles |
| **Observation Time:** | 08:15 Local | **Direction from Accident Site:** | 317° |
| **Lowest Cloud Condition:** | Scattered / 12000 ft AGL | **Visibility** | 10 miles |
| **Lowest Ceiling:** | | **Visibility (RVR):** | |
| **Wind Speed/Gusts:** | 5 knots / None | **Turbulence Type Forecast/Actual:** | None / None |
| **Wind Direction:** | 310° | **Turbulence Severity Forecast/Actual:** | N/A / N/A |
| **Altimeter Setting:** | 29.7 inches Hg | **Temperature/Dew Point:** | 11°C / 8°C |
| **Precipitation and Obscuration:** | No Obscuration; No Precipitation | | |
| **Departure Point:** | Rochester, MN (RST) | **Type of Flight Plan Filed:** | IFR |
| **Destination:** | Paragould, AR (PGR) | **Type of Clearance:** | IFR |
| **Departure Time:** | 06:00 Local | **Type of Airspace:** | |

## Wreckage and Impact Information

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| **Crew Injuries:** | 1 None | **Aircraft Damage:** | Substantial |
| **Passenger Injuries:** | 1 Minor | **Aircraft Fire:** | None |
| **Ground Injuries:** | | **Aircraft Explosion:** | None |
| **Total Injuries:** | 1 Minor, 1 None | **Latitude, Longitude:** | 38.17642,-91.09664 |

## Administrative Information

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| **Investigator In Charge (IIC):** | Rutt, Brian |
| **Additional Participating Persons:** | Mark Jordan; FAA - St. Louis FSDO<br>David Harsanyi; Lycoming |
| **Original Publish Date:** | October 22, 2025 |
| **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=194074 |

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.