# Aviation Investigation Final Report

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| **Location:** | Hector, Arkansas | **Accident Number:** | CEN14LA030 |
| **Date & Time:** | October 14, 2013, 17:00 Local | **Registration:** | N5605V |
| **Aircraft:** | Piper PA 32R-300 | **Aircraft Damage:** | Substantial |
| **Defining Event:** | Loss of engine power (total) | **Injuries:** | 2 Minor, 2 None |
| **Flight Conducted Under:** | Part 91: General aviation - Personal | | |

## Analysis

The pilot reported that, during climbout, he noticed that the engine was vibrating. After leveling off the airplane, the vibration worsened, and the engine subsequently experienced a total loss of power. The pilot executed a forced landing onto a road, and the airplane impacted a fence post.

Examination of the engine revealed that the crankshaft was fractured through the No. 8 cheek position between the Nos. 5 and 6 pistons. Fatigue cracking emanated from the connecting rod journal where the No. 5 connecting rod mates. The No. 6 piston cooling nozzle was not found in its position, and its pieces were found in the bottom of the sump; the pieces were more intact than would be expected if they had been ground between the crankshaft and connecting rod for an appreciable amount of time. Also, there was no evidence of a gouge or other mechanical damage on the No. 5 connecting rod journal. Based on this evidence, it is unlikely that the fatigue cracking was initiated by the No. 6 cooling nozzle being lodged against the crankshaft after falling out of position.

About 18 months before the accident, the engine was repaired and overhauled due to a propeller strike. Further, about 4 months before the accident, maintenance personnel performed a top overhaul of the engine, and, about 1 month before the accident, maintenance personnel replaced the No. 2 cylinder. The timing of the failure suggests that an imbalance could have been introduced to the engine during one or both of the maintenance procedures, which could have resulted in the initiation of the fatigue cracking and the subsequent falling out of the No. 6 cooling nozzle; however, the exact cause of the crankshaft fatigue cracking could not be determined.

## Probable Cause and Findings

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

An engine failure due to crankshaft fatigue cracking for reasons that could not be determined based on the available evidence.

## Findings

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| **Aircraft** | Recip engine power section - Failure |
| **Aircraft** | Recip engine power section - Fatigue/wear/corrosion |
| **Aircraft** | Recip engine power section - Incorrect service/maintenance |

# Factual Information

## History of Flight

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| **Enroute-cruise** | Loss of engine power (total) (Defining event) |
| **Landing** | Collision with terr/obj (non-CFIT) |

On October 14, 2013, about 1700 central daylight time, a Piper PA-32R-300 airplane, N5605V, was substantially damaged during a forced landing near Hector, Arkansas. The two pilots received minor injuries and the two passengers were not injured. The airplane was registered to and operated by Baxter Flying Incorporated under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Day visual meteorological conditions prevailed for the flight, which operated on an instrument flight rules flight plan. The flight originated from Fayetteville Executive Airport (FYV), Fayetteville, Arkansas about 1615 and was destined for Tunica Municipal Airport (UTA), Tunica, Mississippi.

According to the pilot, the engine was vibrating during the initial climb. After leveling the airplane at 9,000 feet mean sea level (MSL), the vibration worsened and the engine experienced a total loss of power. The pilot executed a forced landing onto a rural road, during which the right wing contacted a fence post.

The airplane was recovered to the facilities of Dawson Aircraft, Inc., near Clinton, Arkansas. The engine was subsequently removed and shipped to Mena Aircraft Engine, near Mena, Arkansas, for examination. During engine teardown, the crankshaft was observed to be fractured through the #8 cheek position, between the #5 and #6 pistons. The fatigue cracking emanated from the connecting rod journal, where the #5 connecting rod mates.

The #5 cylinder skirt was damaged, which prevented removal of the cylinder from the crank case. The #6 cylinder skirt was damaged, which made it difficult to remove from the crank case. The #3 piston had multiple abrasions on the piston skirt. The #1, #2, #4 pistons were removed without difficulty and had no anomalies. Several of the cam shaft tappet bodies (mushroom shaped) were fractured. Ferrous shavings were present in the oil sump and oil filter and the oil suction screen was completely blocked with metal shavings.

The #6 piston cooling nozzle was not in position and the cooling nozzle pieces were found in the bottom of the sump. These pieces of the cooling nozzle were relatively intact. The #2 and the #4 cooling nozzles were measured below their specified torques. #1 and #3 cooling nozzles were torqued correctly. Torque for the #5 cooling nozzle was not measured, since the #5 piston could not be removed from the crank case.

The crankshaft, attached counterweight, connecting rod journal bearing, and #6 piston oil cooling nozzle pieces were shipped to the National Transportation Safety Board materials laboratory for examination. The crankshaft's fracture surface was observed to have repeated crack arrest marks consistent with fatigue cracking.

No gouges or wear were observed at the fatigue cracking initiation area and no evidence of thermal distress was visible on the #5 connecting rod journal. No evidence of a gouge or other mechanical damage from a wedged piece of metal wearing against the crankshaft was observed on the #5 connecting rod journal.

The #5 connecting rod bearing had a 'M03' code stamped on the sides that indicated it mated with a ground or reworked crankshaft connecting rod journal. The measured dimensions of the mating #5 connecting rod journal met the requirements for the diameter expected following rework.

On April 20, 2012, the engine was repaired and overhauled following a propeller strike. After magnetic particle inspection of steel parts, replacement of several components and a test run, the engine was returned to service with the original crankshaft. On June 22, 2013, a top overhaul was performed, based on owner comments of a rough running engine that was using oil. On September 18, 2013, the #2 cylinder was honed and a new piston was installed, after a compression check revealed zero compression and a broken #2 piston ring.

## Pilot Information

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| **Certificate:** | Private | **Age:** | 34 |
| **Airplane Rating(s):** | Single-engine land | **Seat Occupied:** | Left |
| **Other Aircraft Rating(s):** | None | **Restraint Used:** | 3-point |
| **Instrument Rating(s):** | None | **Second Pilot Present:** | Yes |
| **Instructor Rating(s):** | None | **Toxicology Performed:** | No |
| **Medical Certification:** | Class 3 Without waivers/limitations | **Last FAA Medical Exam:** | July 10, 2013 |
| **Occupational Pilot:** | No | **Last Flight Review or Equivalent:** | June 14, 2012 |
| **Flight Time:** | (Estimated) 610 hours (Total, all aircraft), 198 hours (Total, this make and model), 610 hours (Pilot In Command, all aircraft), 42 hours (Last 90 days, all aircraft), 18 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft) | | |

## Pilot Information

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| **Certificate:** | Private | **Age:** | 67 |
| **Airplane Rating(s):** | Single-engine land; Multi-engine land | **Seat Occupied:** | Right |
| **Other Aircraft Rating(s):** | None | **Restraint Used:** | 3-point |
| **Instrument Rating(s):** | Airplane | **Second Pilot Present:** | Yes |
| **Instructor Rating(s):** | None | **Toxicology Performed:** | No |
| **Medical Certification:** | Class 3 With waivers/limitations | **Last FAA Medical Exam:** | August 19, 2013 |
| **Occupational Pilot:** | No | **Last Flight Review or Equivalent:** | |
| **Flight Time:** | (Estimated) 3784 hours (Total, all aircraft), 1424 hours (Total, this make and model), 3784 hours (Pilot In Command, all aircraft) | | |

## Aircraft and Owner/Operator Information

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| **Aircraft Make:** | Piper | **Registration:** | N5605V |
| **Model/Series:** | PA 32R-300 | **Aircraft Category:** | Airplane |
| **Year of Manufacture:** | 1977 | **Amateur Built:** | |
| **Airworthiness Certificate:** | Normal | **Serial Number:** | 32R-7780346 |
| **Landing Gear Type:** | Retractable - Tricycle | **Seats:** | 6 |
| **Date/Type of Last Inspection:** | April 24, 2013 Annual | **Certified Max Gross Wt.:** | 3600 lbs |
| **Time Since Last Inspection:** | | **Engines:** | 1 Reciprocating |
| **Airframe Total Time:** | 6948 Hrs as of last inspection | **Engine Manufacturer:** | Lycoming |
| **ELT:** | Installed, not activated | **Engine Model/Series:** | IO-540 K1G5D |
| **Registered Owner:** | BAXTER FLYING INC | **Rated Power:** | 300 Horsepower |
| **Operator:** | BAXTER FLYING INC | **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:** | KRUE,404 ft msl | **Distance from Accident Site:** | 14 Nautical Miles |
| **Observation Time:** | 16:53 Local | **Direction from Accident Site:** | 204° |
| **Lowest Cloud Condition:** | 11000 ft AGL | **Visibility** | 10 miles |
| **Lowest Ceiling:** | Broken / 11000 ft AGL | **Visibility (RVR):** | |
| **Wind Speed/Gusts:** | 5 knots / | **Turbulence Type Forecast/Actual:** | / None |
| **Wind Direction:** | | **Turbulence Severity Forecast/Actual:** | / |
| **Altimeter Setting:** | 30.04 inches Hg | **Temperature/Dew Point:** | 22°C / 14°C |
| **Precipitation and Obscuration:** | No Obscuration; No Precipitation | | |
| **Departure Point:** | Fayetteville, AR (KFYV) | **Type of Flight Plan Filed:** | IFR |
| **Destination:** | Tunica, MS (KUTA) | **Type of Clearance:** | IFR |
| **Departure Time:** | 16:15 Local | **Type of Airspace:** | Class E |

## Wreckage and Impact Information

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| **Crew Injuries:** | 2 Minor | **Aircraft Damage:** | Substantial |
| **Passenger Injuries:** | 2 None | **Aircraft Fire:** | None |
| **Ground Injuries:** | N/A | **Aircraft Explosion:** | None |
| **Total Injuries:** | 2 Minor, 2 None | **Latitude, Longitude:** | 35.463054,-92.979164(est) |

## Administrative Information

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| **Investigator In Charge (IIC):** | Folkerts, Michael |
| **Additional Participating Persons:** | Bill Adrich; Little Rock FSDO; Little Rock, AR |
| **Original Publish Date:** | August 11, 2015 |
| **Last Revision Date:** | |
| **Investigation Class:** | Class |
| **Note:** | |
| **Investigation Docket:** | https://data.ntsb.gov/Docket?ProjectID=88357 |