Aviation Investigation Final Report

Location:	Kiowa, Colorado	**Accident Number:**	CEN12FA653
Date & Time:	September 18, 2012, 15:32 Local	**Registration:**	N188SR
Aircraft:	Piper PA-46-350P	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (total)	**Injuries:**	1 None
Flight Conducted Under:	Part 91: General aviation - Ferry		

Analysis

The pilot reported that as the airplane climbed to about 10,000 feet mean sea level after takeoff, the engine began a “moderate violent shaking.” The oil pressure then decreased rapidly, oil sprayed on the windshield, and the engine seized. The pilot made a forced landing in a hay field, during which the airplane’s nose gear collapsed and the left wing rear spar was bent. Examination of the engine revealed corrosion and pitting on the cylinder walls, camshaft, and lifters, which likely contributed to accelerated wear of engine components and the subsequent failure of the front crankshaft seal. The airplane had annual inspections in May 2011 and August 2012, but no records of maintenance could be located for about a 4 year period before the May 2011 inspection. The airplane had accumulated only about 38 hours in the previous 5 years, including less than 2 hours in the 1 year preceding the accident. The observed engine wear and damage was consistent with engine operations after an extended period of inactivity; however, the wear and damage could have been detected during at least the August 2012 inspection. The circumstances of the engine failure were consistent with a mechanical failure due to unrecognized or unrepaired corrosion in the engine.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: A catastrophic engine failure due to unrecognized and unrepaired corrosion within the engine, which was consistent with engine operations after an extended period of inactivity.

Findings

Aircraft	Recip engine power section - Failure
Aircraft	Recip eng oil sys - Damaged/degraded
Personnel issues	Aircraft/maintenance logs - Owner/builder

Factual Information

History of Flight

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

HISTORY OF FLIGHT

On September 18, 2012, about 1532 mountain daylight time, the pilot of a Piper PA-46-350P, N188SR, made a forced landing in a field near Kiowa, Colorado, after the engine lost power. The pilot, the sole occupant on board, was not injured. The airplane was substantially damaged. The airplane was registered to and operated by a private individual under the provisions of 14 Code of Federal Regulations Part 91 as a ferry flight. Visual meteorological conditions prevailed at the time of the accident, and no flight plan had been filed. The flight originated from Centennial Airport (KAPA), Englewood, Colorado, approximately 1515, and was destined for Pascagoula (KPQL), Mississippi.

According to a statement submitted by the pilot, he was conducting a ferry flight for a friend who had just purchased the airplane. Although the airplane had a current annual inspection, dated August 6, 2012, the bi-annual pitot static system test, transponder test, and the GPS databases had all expired, so the flight would be conducted under visual flight rules only. The pilot said all maintenance records, from 2006 to 2012, were missing. He became suspicious when the annual inspection noted that all AD's (airworthiness directives) had been complied with and were current.

The pilot said that as he conducted his preflight inspection, he noted the oil on the dipstick was at an acceptable level but appeared dirty. The engine would not start due to a low battery. A ground power unit was attached and the engine started. The pilot performed a pre-taxi check, followed by a pre-takeoff check. Both magnetos and alternators were checked. The propeller was cycled five times to verify a rise in manifold pressure, a decrease in oil pressure, and a drop in RPM. All engine instruments checked satisfactory.

The pilot said he had planned to depart KAPA to conduct a systems status check of the airplane. If all systems operated satisfactory he would proceed on a direct route to KPQL at a planned altitude of 17,500 feet. The pilot said that after takeoff and upon reaching 700 feet AGL, turbine inlet temperature never exceeded 1,550 degrees Fahrenheit, manifold pressure remained at 35 inches, and the fuel flow was greater than 32 gallons per hour. The pilot said that as he reached approached 10,000 feet, the engine began a "moderate violent shaking." He confirmed the mixture was full rich, the propeller was set to climb rpm, and power was set for climb. He then noticed the oil pressure falling rapidly and was in the yellow arc. He then saw oil

on the windshield. He declared an emergency and turned back towards KAPA, approximately 26 miles away. The engine then seized. With oil covering the windshield, the pilot side-slipped the airplane and made a forced landing in a hay field. During the landing roll, the nose gear struck a rut and collapsed and the airplane slid to a stop. The left wing rear spar was later found to be damaged.

CREW INFORMATION

The pilot, age 35, held a commercial pilot certificate with airplane single/multiengine, and instrument ratings, dated June 19, 2008. He also held a flight instructor certificate with airplane single/multiengine, and instrument ratings, dated June 24, 2011. His second class airman medical certificate, dated March 4, 2011, contained no restrictions or limitations. According to the pilot, he had logged a total of 1,470 flight hours, of which 86 hours had been logged in a Piper PA-46. His last flight review was on December 9, 2011.

AIRCRAFT INFORMATION

N188SR (serial number 4622052), a model PA-46-350P, was manufactured by the Piper Aircraft Corporation in 1989. It was powered by a Lycoming TIO-540-AE2A engine (serial number L-9008-61A), rated at 350 horsepower, driving a composite, 4-blade, MT propeller. Examination of the maintenance records made available revealed the most recent airframe annual inspection was performed on August 8, 2012, at a tachometer time of 1,931.6 hours. The previous annual inspection was made on May 22, 2011, at a Hobbs meter time of 1,929.89 hours. The previous annual inspection was dated December 14, 2006, at a Hobbs meter time of 1,893.4 hours.

A representative of Forced Aeromotive Technologies stated the airplane had been parked on the ramp at KAPA “for some time.” He said that in 2011, the airplane owner had contracted with an airframe and powerplant mechanic with inspector authorization to perform annual and 100-hour inspections on the airframe and engine. Maintenance records indicated these inspections were performed on May 22, 2011, at a Hobbs meter time of 1,929.89 hours. At that time, the engine had accrued 760.89 hours, and the propeller had accrued 442.49 since major overhaul. He further stated that in 2012, the airplane owner contracted with the same mechanic to perform the same inspections but the mechanic never completed the work. The owner brought the airplane to Forced Aeromotive Technologies, who contracted with a local A&P-IA to perform the work. Maintenance records indicate the work was accomplished on August 8, 2012, at a tachometer time of 1,931.6 hours. Engine and propeller times were not given.

The last documented engine overhaul was done by Teledyne Mattituck Engines, Mattituck, New York, and installed on the airplane on July 8, 1997. Engine time-in-service was noted as 1,168.7 hours. Approved Turbo Components, Visalia, California, overhauled the wastegate

controller and repaired the fuel pump on November 18, 1998, at a Hobbs meter time of 1,399.0 hours and 107.2 hours. The wastegate controller was exchanged for an overhauled controller, and the turbocharger was overhauled by Approved Turbo Components and installed on the airplane on November 9, 2005., at a Hobbs meter time of 1,916.6 hours.

No maintenance records were located from December 14, 2006, to May 22, 2011, although the purchaser provided logbook records to indicate the seller had been flying the airplane during that time.

METEOROLOGICAL INFORMATION

Weather observations recorded at APA before and after the accident are as follows:

1453 MDT: Wind, 010 degrees at 8 knots; visibility, 10 statute miles; sky condition, few clouds at 8,000 feet; temperature 25 degrees C. (Celsius); dew point, 2 degrees C.; altimeter, 30.18 inches of mercury.

1553 MDT: Wind, 030 degrees at 7 knots; visibility, 10 statute miles; sky condition, few clouds at 9,000 feet; temperature, 24 degrees C.; dew point, 2 degrees C.; altimeter, 30.20 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

According to the pilot and confirmed by FAA inspectors, the airplane touched down in an open field and struck two pivotal sprinkler tire trenches, measuring 18 inches wide and 12 to 18 inches deep. The ground roll measured 800 feet. Oil covered the windshield, engine cowling, and the bottom fuselage skin.

TESTS AND RESEARCH

The engine was disassembled and examined at Beegles Aircraft Service, Greeley, Colorado. The examination revealed that the front crankshaft seal, immediately behind the propeller flange, had blown out, allowing oil to escape. The engine was then completely disassembled and examined. When the oil pan was removed, metallic filings, similar to bearing journal material, were noted in the sludge. Removal of the rear accessory case revealed the oil pump was seized due to oil starvation. The no. 6 cylinder head was removed, and the piston connecting rod cap was broken in several pieces. Upon removal of the no. 5 cylinder head, all of the piston rings were found broken. There was a hole in the piston head and the piston head was eroded, consistent with detonation. After the other cylinder heads were removed, rust was noted in the cylinder domes and along the piston edges. The no. 3 connecting rod cap was missing. The engine case was split apart. Metal filings were noted throughout the case. The

no. 6 crankshaft journal showed evidence of high heat distress and scoring. There was also scoring of the crankshaft front bearing. Examination of the camshaft revealed worn lobes, the no. 1 exhaust valve lobe measuring .25-inch worn.

Because the fuel pump had been leaking and was replaced during the last annual inspection, it was bench checked at the facilities of Firewall Forward, Loveland, Colorado. It tested to manufacturer's specifications at both idle and full power.

ADDITIONAL INFORMATION

The mechanic who had performed the last annual and 100-hour inspections stated the engine teardown photographs indicated to him that the engine was running lean and blowing gases out the No. 5 piston. Exhaust gases and air were being pushed into the crankcase, causing the oil to burn and to heat up the No. 5 connecting rod. Increased internal pressure blew out the crankcase seal, causing oil to evacuate and the engine to quit.

He said the airplane was kept in a heated hanger and was not exposed to moisture. The airplane had two test flights and two ground runs after he changed the oil. The test pilot told him both flights were good and no leaks were noted. The mechanic said he was unaware of any oil pressure problems, as alleged by the purchaser, and since all cylinders had good compression, he saw no reason to borescope the cylinders. He said he did not clean the injectors because he thought the previous mechanic may have cleaned them. The leaking fuel pump was replaced, and fuel flow was good after it was installed. He did adjust the elevator trim tab.

Pilot Information

Certificate:	Commercial	**Age:**	35,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; Airplane single-engine; Instrument airplane	**Toxicology Performed:**	No
Medical Certification:	Class 2 Without waivers/limitations	**Last FAA Medical Exam:**	March 4, 2011
Occupational Pilot:	UNK	**Last Flight Review or Equivalent:**	December 9, 2011
Flight Time:	1470 hours (Total, all aircraft), 86 hours (Total, this make and model), 1401 hours (Pilot In Command, all aircraft), 42 hours (Last 90 days, all aircraft), 24 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N188SR
Model/Series:	PA-46-350P	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	4622052
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	August 8, 2012 Annual	**Certified Max Gross Wt.:**	4300 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	1932 Hrs as of last inspection	**Engine Manufacturer:**	Lycoming
ELT:	Installed, not activated	**Engine Model/Series:**	TIO--540-AE2A
Registered Owner:	Don Woroner	**Rated Power:**	350 Horsepower
Operator:	Don Woroner	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KAPA,5885 ft msl	**Distance from Accident Site:**	26 Nautical Miles
Observation Time:	15:53 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Few / 9000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	8 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	10°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.18 inches Hg	**Temperature/Dew Point:**	25°C / 2°C
Precipitation and Obscuration:			
Departure Point:	Englewood, CO (KAPA)	**Type of Flight Plan Filed:**	None
Destination:	Pascagoula, MS (KPQL)	**Type of Clearance:**	None
Departure Time:	15:15 Local	**Type of Airspace:**	Class E

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 None	**Latitude, Longitude:**	39.243888,-104.36972

Administrative Information

Investigator In Charge (IIC):	Scott, Arnold
Additional Participating Persons:	Ronald Budnick; FAA Flight Standards District Office; Denver, CO Jacky R Williams; FAA Flight Standards District Office; Denver, CO
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Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=85111