



National Transportation Safety Board Aviation Accident Final Report

Location:	Goleta, CA	Accident Number:	LAX07LA236
Date & Time:	08/01/2007, 1942 PDT	Registration:	N458BJ
Aircraft:	Cessna R172K	Aircraft Damage:	Substantial
Defining Event:		Injuries:	1 Minor, 1 None

Flight Conducted Under: Part 91: General Aviation - Personal

Analysis

The airplane was 15 miles east of the destination airport, at 1,500 feet msl, when the engine gauges started to indicate low oil pressure and high oil temperatures. About 8 miles east of the airport, the engine experienced a loss of power, and produced a puff of white-gray smoke combined with loud clanking sounds. The airplane was at 1,200 feet, and the pilot directed the airplane towards an open field above a stretch of beach. During the landing roll, the airplane came to the end of the field, nosed over the edge of a 50-foot cliff, and came to rest on the beach below. The engine had been factory rebuilt in 2002, and had accumulated 1441.5 hours since the last major overhaul. An examination of the engine revealed a 2.7-inch hole in the top of the engine case, shiny copper fragments from the number 2 main bearing in the oil sump, and one bearing fragment in the oil pickup screen. Additionally, the bearing material of the number 2 main bearing had partially displaced itself and extruded between the crankshaft journal and the crankcase. The bearing fragments were somewhat shiny or polished, indicating they received lubrication and were not exposed to extreme temperature. Numerous fragments from the number 2 main bearing were located in the oil sump. The sizes of the fragments were generally too large to enter the oil sump pickup tube but could obstruct the pickup tube orifice, restricting the oil flow. Engine oil analysis records indicate a sudden increased level of copper from 5.3 parts per million (ppm) to 61.2 ppm occurred sometime within the previous 63.1 hours of operation. Engine journal bearing material is the only material within the engine that has a significant copper component. This increase in copper levels is directly related to the gradual deformation and fragmentation of the number 2 main bearing. The number 1 connecting rod had failed under overload that resulted from extreme temperatures at the connecting rod bearing that were consistent with oil starvation. The number 1 connecting rod bearing receives oil pressure from the oil pump through the number 1 main bearing, and would be one of the first bearings to be effected by reduced oil flow.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The oil starvation and failure of the number one piston connecting rod and bearing that was due to the fragmentation of the number 2 main bearing, which then obstructed the engine oil

pickup tube and restricted the flow of oil through the engine.

Findings

Occurrence #1: LOSS OF ENGINE POWER(TOTAL) - MECH FAILURE/MALF

Phase of Operation: CRUISE - NORMAL

Findings

1. (C) LUBRICATING SYSTEM - RESTRICTED
2. (C) ENGINE ASSEMBLY,BEARING - OVERTEMPERATURE
3. (C) ENGINE ASSEMBLY,CONNECTING ROD - FRACTURED

Occurrence #2: FORCED LANDING

Phase of Operation: EMERGENCY DESCENT/LANDING

Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER

Phase of Operation: EMERGENCY LANDING

Findings

4. (F) TERRAIN CONDITION - CLIFF

Factual Information

HISTORY OF FLIGHT

On August 1, 2007, about 1942 Pacific daylight time, a Cessna R172K, N758BJ, executed a forced landing along a beach in Goleta, California. The forced landing was precipitated by a loss of engine power. The Santa Barbara Flying Club, Inc., operated the airplane under the provisions of 14 Code of Federal Regulations Part 91. The commercial pilot sustained a minor injury and the passenger was not injured. The airplane was substantially damaged. Visual meteorological conditions prevailed, and no flight plan had been filed. The flight originated at Lompac Airport, Lompoc, California, around 1930.

The pilot reported to a National Transportation Safety Board investigator that 15 miles east of the Santa Barbara Airport, at 1,500 feet msl, the engine gauges started to indicate low oil pressure and high oil temperatures. About 8 miles east of the Santa Barbara Airport, the pilot informed approach control that he was having engine problems. Immediately after making that radio call, the engine experienced a loss of engine power and produced a puff of white-gray smoke combined with loud clanking sounds. The airplane was at 1,200 feet msl, and the pilot directed the airplane towards an open field above the beach visible off the left wing. During the landing roll the airplane came to the end of the field, nosed over the edge of a 50-foot cliff, and came to rest on the beach below.

The airplane impacted on its right side collapsing the right wing, and imbedding the nose into the sand. In the hours following the accident the tide proceeded to rise, and submerged much of the airplane's engine and a portion of the cockpit under water.

The pilot stated that the engine oil dipstick indicated 8 quarts of oil in the engine when he performed his preflight.

AIRCRAFT INFORMATION

The high wing, four place, airplane was powered by a Teledyne Continental Motors (TCM) IO-360-KB8, 6-cylinder, 210-horsepower engine. The engine was last rebuilt at the factory on April 28, 2002. The engine logbook records show that the last annual inspection was performed on August 24, 2006, at 1,135.8 hours since major overhaul (TSMOH), and 38.3 hours tachometer time. The last oil change was performed on July 17, 2007, at 1,440.2 TSMOH (192.0 hours tach time). The engine was washed and a post maintenance run was performed on August 1, 2007, 1440.30 TSMOH (192.1 hours tach time).

The airframe maintenance logbook record showed that the last annual inspection was completed on August 24, 2006, at total airframe time of 6,490.00 hours (38.30 hours tach time).

The tach reading obtained during the wreckage examination was 193.2 hours.

The engine was subject to an oil analysis surveillance program. The mechanic who had performed most of the recent maintenance on the airplane told the Safety Board investigator that his shop sends oil samples to the analysis company once a week, usually on Fridays. The oil analysis company sends the analysis results to him via e-mail once the tests are completed. Unless he had a concern about a particular engine, he would review the oil analysis results as he had time to do so. The engine oil analysis results for the July 17, 2007, oil sample displayed abnormal values for iron (93.0 parts per million (ppm)) and copper (61.2 ppm). The next

previous oil analysis had been performed on a sample taken on March 26 (1378.27 TSMOH), which resulted in values marked as normal for iron (42.5 ppm) and copper (5.3 ppm). The mechanic received the e-mail with the abnormal results in his e-mail inbox on Saturday, July 28th, but did not view the e-mail until after the accident.

TESTS AND RESEARCH

The airplane was recovered and transported to the Aircraft Recovery Services (ARS) facility in Littlerock, California. ARS was instructed by the Safety Board investigator-in-charge (IIC) to make efforts to preserve the engine and prevent further corrosion from its exposure to salt water. On August 10, 2007, the airplane and engine were examined by representatives from the Federal Aviation Administration (FAA), TCM, and the Cessna Aircraft Company, under the supervision of the Safety Board IIC.

The engine compartment cowling and engine baffling was removed. Investigators identified a 2.7-inch hole in the upper left crankcase half, below the fuel manifold valve, and in line with the number two cylinder. The oil cap was secured and the oil dipstick was in place. The engine was disassembled. All gaskets and seals were present on engine components. Bluish fluid with a petroleum odor was identified in the throttle body. The oil filter was present, screwed on tight, and safety wired. The oil pan was removed; seventeen 0.25- to 2.0-inch-long shiny copper colored fragments were located in the oil pan sump just beyond the sump oil pickup tube inlet, along with black twisted 0.5-inch sized fragments, four 2-inch sized black metal chunks that were once a part of the number 1 piston connecting rod cap. The sump oil pickup tube is 6.43 inches long and has a internal diameter of 11/16-inch. The cylinder jugs were removed and the engine case split. The number 1 connecting rod had separated at the lower neck from the crankshaft throw. The number one crankshaft throw was dark black, including the connecting rod journal, and smeared at the base. The number one connecting rod cap was not attached to the connecting rod.

The crankcase number 1, 3, and 4 main bearings were in place, oil galleries were clear, and exhibited streaks of copper color, except the number 4 main bearing, which was all gray. The number 2 main bearing halves were deformed and appeared to have portions extruded between the crankshaft journal and the crankcase. The number 2 bearing surface was copper in color. Connecting rods 2 through 6 were present on the crankshaft. The oil sump pickup screen, located down stream from the oil sump pickup tube inlet, in the engine accessory case, contained one copper colored metal fragment lodged across the screen element. The oil filter was cut open and the paper element contained shiny silver colored sand like particles between all filter folds.

The engine was shipped to TCM for further examination. On December 11, 2007, representatives from TCM and Cessna examined the engine under the supervision of the Safety Board IIC. The engine manufacturer technicians determined that the number 1 crankshaft connecting rod failed in a manor consistent with oil starvation. The number two main bearing had fragmented, deformed, and shifted out of place, but appeared to receive lubrication throughout the process. The copper colored fragments that were located in the oil pan were identified as part of the number 2 main bearing, with serial number fragments that were consistent with the other bearings in the engine. According to TCM, the engine journal bearings are the only engine components that contain a significant amount of copper.

Per the Continental Aircraft Engine Series IO-360 Operators Manual, the engine is lubricated

by a forced-feed system. The oil pressure pump picks up oil from the sump and discharges it through a passage to the pressure oil screen, the engine oil galleries, oil cooler, and bearings. A pressure relief valve, in the crankcase cover, regulates the pressure in the main oil galleries. The oil pump outlet flows to the oil cooler, and from the oil cooler oil flows to the number 1 main bearing, the tappets for numbers 1 and 2 cylinders, the number 1 camshaft bearing, and moves on utilizing engine oil galleries to locations throughout the engine. The number 1 main bearing feeds oil to the number one connecting rod bearing.

Pilot Information

Certificate:	Flight Instructor; Commercial	Age:	53, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Right
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	Airplane Single-engine	Toxicology Performed:	No
Medical Certification:	Class 3	Last Medical Exam:	05/01/2007
Occupational Pilot:		Last Flight Review or Equivalent:	05/01/2007
Flight Time:	1750 hours (Total, all aircraft), 370 hours (Total, this make and model), 1660 hours (Pilot In Command, all aircraft), 35 hours (Last 90 days, all aircraft), 15 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	Cessna	Registration:	N458BJ
Model/Series:	R172K	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	R1722962
Landing Gear Type:	Tricycle	Seats:	4
Date/Type of Last Inspection:	08/01/2006, Annual	Certified Max Gross Wt.:	2550 lbs
Time Since Last Inspection:	154.9 Hours	Engines:	1 Reciprocating
Airframe Total Time:	6490 Hours	Engine Manufacturer:	Teledyne Continental
ELT:	Installed, not activated	Engine Model/Series:	IO-360-KB(8)
Registered Owner:	Santa Barbara Flying Club, Inc.	Rated Power:	210 hp
Operator:	Santa Barbara Flying Club, Inc.	Air Carrier Operating Certificate:	None

Meteorological Information and Flight Plan

Observation Facility, Elevation:	KSBA, 13 ft msl	Observation Time:	1953 PDT
Distance from Accident Site:	11 Nautical Miles	Condition of Light:	Day
Direction from Accident Site:	270°	Conditions at Accident Site:	Visual Conditions
Lowest Cloud Condition:	Clear	Temperature/Dew Point:	18° C / 14° C
Lowest Ceiling:	None	Visibility	10 Miles
Wind Speed/Gusts, Direction:	8 knots, 270°	Visibility (RVR):	
Altimeter Setting:	29.86 inches Hg	Visibility (RVV):	
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Lompoc, CA (KLPC)	Type of Flight Plan Filed:	None
Destination:	Santa Barbara, CA (KSBA)	Type of Clearance:	VFR
Departure Time:	1930 PDT	Type of Airspace:	

Wreckage and Impact Information

Crew Injuries:	1 Minor	Aircraft Damage:	Substantial
Passenger Injuries:	1 None	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Minor, 1 None		

Administrative Information

Investigator In Charge (IIC):	Van S McKenny	Adopted Date:	03/31/2008
Additional Participating Persons:	Frank Motter; Federal Aviation Administration; Van Nuys, CA Henry Soderlund; Cessna Aircraft Company; Wichita, KS Josh Cawthra; Teledyne Continental Motors; Mobile, AL Terry Horton; Teledyne Continental Motors; Mobile, AL		
Publish Date:			
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov , or at 800-877-6799. Dockets released after this date are available at http://dms.nts.gov/pubdms/ .		

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report.