



National Transportation Safety Board Aviation Accident Final Report

Location:	Madison, WI	Accident Number:	CHI04FA203
Date & Time:	08/01/2004, 1849 CDT	Registration:	N98SN
Aircraft:	Knoepflein Lancair Legacy 2000	Aircraft Damage:	Destroyed
Defining Event:		Injuries:	1 Fatal
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

The amateur-built airplane was destroyed when it impacted a light pole and terrain during an off airport landing following a loss of engine power. The airplane was at an altitude of 8,000 feet mean sea level (msl), 15 miles southeast of the airport, when the pilot informed air traffic control (ATC) that he was having an engine problem and he needed to land. The controller cleared the airplane to land on either runway 32 or runway 21. The pilot told the controller, "Alright uh if you don't mind I'm going to circle around up here and uh see if I can iron out the problem and then uh I'll try to let you know what I need to do." Two minutes later, the controller informed the pilot that he was now eight miles from the airport. The pilot responded that he had the airport in site. The controller informed the pilot that runway 32 was the closest runway to his present position to which the pilot responded that he would enter a left base for runway 21. Nineteen seconds later, the pilot reported he was "really having problems" and he was going to land on runway 32. The pilot then stated that he was losing altitude "really bad" and he did not think he was going to make it to the airport. The airplane contacted a light pole and the terrain along a 4-lane divided roadway. The pilot was also the aircraft builder. He installed a supercharger system on the Continental IO-550 engine. Acquaintances of the pilot reported he told them he was experiencing problems with high oil temperatures and high cylinder head temperatures on the number one and number three cylinders. One acquaintance stated the pilot mentioned the problem approximately 10 months prior to the accident and others stated the pilot talked about the continuing problem on the day prior to the accident. Post accident inspection of the engine revealed a hole in the top of the engine case near the number two cylinder. An engine teardown revealed the engine had suffered internal heat and impact damage. Metal debris was found throughout the engine. All of the pistons and cylinders sustained heat and/or impact damage. The number three piston head was burned through along an approximate 60 degree arc around the circumference and down the side of the head past the rings. The piston head was black in color. The piston rings were distorted and were out of their grooves. The airplane was equipped with an electronic flight instrument system (EFIS). The EFIS data showed the engine oil pressure was at its maximum of 69 pounds per square inch (psi) prior to takeoff and it decreased throughout the flight as the oil temperature increased. The data also indicated that after the pilot informed ATC of the engine problem, the airplane's rate of descent varied between 100 and 4,000 feet per minute.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: A loss of engine power due to high engine temperatures which resulted in a failure of the number three piston, the pilot's continued operation of the airplane with known high temperature problems, the pilot's poor inflight planning, and the pilot's failure to maintain a proper emergency descent rate. A factor associated with the accident was the light pole that the airplane contacted.

Findings

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

Phase of Operation: CRUISE

Findings

1. (C) ENGINE ASSEMBLY,CYLINDER - OVERTEMPERATURE
 2. (C) ENGINE ASSEMBLY,PISTON - FAILURE,TOTAL
 3. (C) OPERATION WITH KNOWN DEFICIENCIES IN EQUIPMENT - CONTINUED - PILOT IN COMMAND
-

Occurrence #2: FORCED LANDING

Phase of Operation: DESCENT - EMERGENCY

Occurrence #3: IN FLIGHT COLLISION WITH OBJECT

Phase of Operation: EMERGENCY DESCENT/LANDING

Findings

4. (F) OBJECT - POLE
 5. (C) IN-FLIGHT PLANNING/DECISION - POOR - PILOT IN COMMAND
 6. (C) CLEARANCE - NOT MAINTAINED - PILOT IN COMMAND
-

Occurrence #4: IN FLIGHT COLLISION WITH TERRAIN/WATER

Phase of Operation: DESCENT - UNCONTROLLED

Findings

7. TERRAIN CONDITION - ROADWAY/HIGHWAY

Factual Information

HISTORY OF FLIGHT

On August 1, 2004, at 1849 central daylight time, a Knoepflein Lancair Legacy 2000, N98SN, collided with a light post and terrain during an off airport landing in Madison, Wisconsin, following a loss of engine power. The private pilot was fatally injured. The airplane was destroyed by impact and post impact fire. The 14 CFR Part 91 personal flight was operating in visual meteorological conditions and no flight plan was filed for this leg of the cross country flight. The accident occurred as the pilot was returning home after attending AirVenture 2004 at the Wittman Regional Airport (OSH) Oshkosh, Wisconsin. The pilot departed OSH around 1823 with an intended destination of Rockford, Illinois.

At 1843, the pilot contacted the air traffic control tower at the Dane County Regional Airport (MSN), Madison, Wisconsin, stating that he was having an engine problem and he needed to land. The controller asked the pilot what his position was, and the pilot responded that he thought he was about 15 miles east of the airport. The controller issued a squawk code and asked the pilot what his altitude was. The pilot responded that he was at 8,000 feet.

At 1844, the controller identified N98SN on radar as being 15 miles southeast of MSN. The controller cleared the pilot to fly straight to the airport and to land on either runway 32 or runway 21. The pilot replied, "Alright uh if you don't mind I'm going to circle around up here and uh see if I can iron out the problem and then uh I'll try to let you know what I need to do." The controller instructed the pilot to keep him advised of his intentions.

At 1846, the controller informed the pilot that the airport was eleven o'clock and eight miles from his position. The pilot responded that he had the field in sight. The controller informed the pilot that runway 32 was the closest runway to his position and that the winds were from 225 degrees at 5 knots. The pilot then asked the controller what runway was being used as the active runway. The controller responded they were using runways 21, 18, and 14, but with the light winds the pilot could use runway 32.

At 1847, the pilot responded that he would enter a left base for runway 21. The controller cleared the pilot enter a left base to land on runway 21. Nineteen seconds later the pilot stated "alright eight sierra November is going to go straight in to three two we're really having problems." The controller responded by clearing the pilot to land on runway 32.

At 1848, the pilot stated, "and Madison eight sierra November I'm not sure that I'm going to make the runway." The controller informed the pilot that the airport was at eleven o'clock and two and a quarter miles. The pilot responded, "I have the field but I'm just losing altitude really bad I'm not sure I'm going to make it."

The last transmission from the pilot was at 1849, when he stated that he was not going to make it to the airport.

Several witnesses reported seeing the airplane flying at a low altitude prior to the accident. Some of these witnesses described the airplane as being out of control with the wings "wobbling" back and forth. One of these witnesses reported the propeller was not turning, and another witnesses reported hearing the engine running prior to impact. Witnesses reported the airplane contacted a light pole and burst into flames when it contacted the ground. One witness reported the airplane was inverted when it contacted the ground prior to sliding across

the road.

AIRCRAFT INFORMATION

N98SN was an amateur-built Knoepflein Lancair Legacy 2000, serial number L2K-189. The airplane was a two-place, low-wing airplane equipped with retractable tricycle landing gear. The accident pilot was the aircraft builder.

The Federal Aviation Administration issued an experimental airworthiness certificate for N98SN on June 17, 2003. The pilot's logbook indicates the airplane's first flight was on June 24, 2003. The pilot's logbook shows he had accumulated a total of 235 hours of flight time in N98SN.

According to the aircraft logbooks, the next condition inspection was due to be completed by June 17, 2004. There was no entry in the logbook to show that this inspection was accomplished. The last entry in the aircraft logbook was dated May 26, 2004, at which time the aircraft hobbs time was listed as 205.5 hours.

The airplane was fueled with 33.6 gallons of 100LL aviation fuel at OSH on July 30, 2004. According to a witness, the pilot also added 3 quarts of oil to the engine at the same time.

The airplane was equipped with a Continental IO-550-N17 engine. The engine was rated to 310 horsepower. The pilot modified the engine by adding an Aero Supercharger system. The system contained a belt driven centrifugal Vortech supercharger, model V-7 JT, with an altitude compensating relief valve. It is controlled by a butterfly valve on the inlet manifold in conjunction with the relief valve.

Several acquaintances of the pilot contacted the National Transportation Safety Board following the accident and reported the pilot had concerns regarding high engine temperatures on N98SN. One person stated the pilot discussed the high temperatures with him approximately 10 months prior to the accident. Two others stated they had conversations with the pilot on the day prior to the accident. The pilot mentioned his concern about high oil temperatures and high cylinder temperature on the number 1 and 3 cylinders.

N98SN was equipped with a Chelton electronic flight instrument system (EFIS) 2000 which monitors and logs the flight conditions and engine parameters. The system records data points once every second. This information is stored as non-volatile memory on the flash card.

PERSONNEL INFORMATION

The pilot held a commercial pilot certificate with airplane single-engine and instrument airplane ratings which was issued on June 4, 2004. The pilot received his private pilot certificate with a single engine land rating on May 16, 2002. The instrument rating was added to the certificate on October 1, 2002. The pilot held a third-class medical certificate which was issued on June 17, 2004. This certificate did not contain any limitations.

The pilot also held a Repairman Experimental Aircraft Builder certificate which was issued on May 21, 2004. The repairman certificate contained the following limitation: "Inspection certificated for experimental aircraft make Model Lancair Legacy 2000, serial number L2K-189, certification date : 17 Jun 2003."

According to the pilot's last logbook, he had a total flight time of 705.2 hours, of which 703.7 hours were in single-engine land airplanes. The pilot's logbook showed he had a total of 235 hours of flight time in the accident airplane. The last flight listed in the logbook was dated July

24, 2004. The pilot's last flight review was completed on March 5, 2003.

WRECKAGE INFORMATION

The accident site was located near the intersection of High Crossing Boulevard and Wayne Terrace in Madison, Wisconsin. High Crossing Boulevard is a 4-lane road with a grass median which contains light poles. The airplane impacted a street light at a point approximately 8 feet above the ground. Pieces of the outboard section of the left wing were located on the ground near the street light. The ground/pavement was burned in a triangular pattern starting just after the light pole and ending at the main wreckage. The airplane continued across the westbound lanes of High Crossing Boulevard coming to rest on the grass in front of the Capitol City Ford Dealership located at 5422 Wayne Terrace.

The wreckage was burned aft of the engine firewall. The fuselage and wings were destroyed by fire. The empennage separated from the airplane during the impact sequence and was located approximately 100 feet behind the main wreckage.

METEOROLOGICAL INFORMATION

MSN, located approximately 2 miles west of the accident site, reported the following weather conditions:

At 1853: Wind 230 degrees at 5 knots; 10 statute miles visibility; clear sky; temperature 28 degrees Celsius; dew point 19 degrees Celsius; altimeter 29.96 inches of mercury.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on the pilot for the Dane County Coroner's Office, at the Waukesha County Medical Examiner's Office, Waukesha, Wisconsin, on August 2, 2004.

A Forensic Toxicology Fatal Accident Report was prepared by the FAA Civil Aerospace Medical Institute, Oklahoma City, Oklahoma. Negative results were reported for all tests performed.

TESTS AND RESEARCH

Engine Teardown

The engine sustained impact damage to the crankcase, intake and exhaust pipes, magnetos, oil sump, and the number one cylinder ignition lead. The intake push rods for the number one and number six cylinders were bent. The number 2, number 4, and number 6 cylinders sustained external heat damage. A hole was present in the top of the crankcase at the number two cylinder. A belt driven supercharger and a belt driven alternator were mounted on the front of the engine. The inside of the exhaust pipes contained oil residue.

The oil sump was removed from the engine. The sump contained oil and pieces of metal. The oil pump contained pieces of metal debris. The pump drive shaft was sheared and rotational scratches were visible on the housing walls. The sheared surface of the shaft showed characteristics indicative of an overload failure. The oil filter was removed from the engine and opened. The filter contained metal particles.

The spark plugs were dark in color. The spark plugs for the number three cylinder were oil soaked and contained metal deposits. A portion of the porcelain core on the number three cylinder top plug was missing. Slick 6320 pressurized magnetos were installed on the engine. Both magneto cases had sustained impact damage and they were broken open.

The fuel pump drive coupling was intact and the pump rotated freely. The fuel manifold valve was opened. The manifold diaphragm was intact. The screen was clean and residual fuel was present. The fuel injector lines had sustained impact damage. The fuel injector nozzles for the number one, three, and five cylinders were broken. The nozzles for the remaining cylinders were clear.

The supercharger was intact and free to rotate. The inlet control butterfly valve was intact as was the pop-off valve.

The number one cylinder had sustained impact damage. The number one piston was jammed into the cylinder and could not be removed. Internal impact damage was visible on the piston skirt, cylinder wall, and crankcase. The connecting rod, piston rings, and piston pin were intact. The intake valve push rod was bent.

The number two cylinder sustained external heat damage. The piston was jammed into the cylinder and could not be removed. Internal impact damage was visible on the piston skirt, cylinder wall, and crankcase. The piston connecting rod was melted. The connecting rod cap was missing and the connecting rod sustained impact damage. The rod was dark in color. The piston rings and piston pin were intact.

The number three piston head was eroded along the entire outside edge and down the side of the head past the rings. The piston head was black in color. The piston rings were distorted and were out of their grooves. The piston head was burned through along an approximate 60 degree arc around the circumference. One of the aluminum caps on the piston pin was burned away. An arced shape impact mark which matched the shape of a valve was visible on the piston head. The connecting rod was intact and heat discolored with rod bearing material extruding from the rod cap.

The number four cylinder sustained external heat damage. The piston was jammed into the cylinder and could not be removed. Internal impact damage was visible on the piston skirt, cylinder wall, and crankcase. The piston rings, piston pin, and connecting rod were intact.

The number five piston head contained black deposits. An arced shape impact mark which matched the shape of a valve was visible on the piston head. The connecting rod was intact and heat discolored with rod bearing material extruding from the rod cap. The piston rings and piston pin were intact.

The number six cylinder sustained external heat damage. The piston head contained black deposits. An arced shape impact mark which matched the shape of a valve was visible on the piston head. The piston rings and piston pin were intact. The connecting rod was intact and heat discolored with rod bearing material extruding from the rod cap. The intake valve push rod was bent.

The camshaft and lifters were intact. The crankshaft was dry and heat discolored.

EFIS Data

The flash memory cards from the EFIS 2000 were removed from the airplane. The stored data was downloaded and a report was prepared by Regan Designs.

The data shows the maximum oil pressure during the flight was 69 pounds per square inch (psi) which was recorded prior to takeoff. The airplane departed OSH at 1823 and proceeded south-southwest. The oil pressure decreased during the flight and the oil temperature

increased. At 1830, the oil pressure was 35 psi and the oil temperature had increased to 220 degrees F. The pilot should have received an oil temperature CAUTION indication at this point since the caution limit was set to 220 degrees F.

At 1842, the airplane reached a maximum altitude of 12,408 feet above mean sea level (msl). At this time the oil pressure was 23 psi with an oil temperature of 227 degrees Fahrenheit (F). Seconds later, the airplane entered a descending right turn to a west-southwesterly heading. The oil temperature continued to rise. At 240 degrees F, the pilot should have received an oil temperature WARNING. The rate of descent increased. At 1843, the airplane was in a 4,000 foot per minute (fpm) descent after which time the descent rate began to decrease. The rate of descent fluctuated several times between 100 fpm and 3,000 fpm during the remainder of the flight.

At 1845, the airplane flew over the Blackhawk (87Y) airport at an altitude of 7,000 feet msl, while en route to MSN. The distance between 87Y and MSN is approximately 8 statute miles. At 1846, the engine was at 2,790 revolutions per minute (rpm) after which time it began to decrease until it reached 0 rpm at 1849. The last data entry occurred at 1849.

ADDITIONAL INFORMATION

Parties to the investigation were the FAA and Teledyne Continental Motors.

Pilot Information

Certificate:	Private	Age:	28, Male
Airplane Rating(s):	Single-engine Land	Seat Occupied:	
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 3 Valid Medical--no waivers/lim.	Last FAA Medical Exam:	06/17/2004
Occupational Pilot:		Last Flight Review or Equivalent:	10/01/2002
Flight Time:	705 hours (Total, all aircraft), 235 hours (Total, this make and model), 625 hours (Pilot In Command, all aircraft), 44 hours (Last 90 days, all aircraft), 11 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Knoepflein	Registration:	N98SN
Model/Series:	Lancair Legacy 2000	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	Yes
Airworthiness Certificate:	Experimental	Serial Number:	L2K-189
Landing Gear Type:	Retractable - Tricycle	Seats:	2
Date/Type of Last Inspection:	06/01/2003, Condition	Certified Max Gross Wt.:	2600 lbs
Time Since Last Inspection:		Engines:	1 Reciprocating
Airframe Total Time:	205 Hours as of last inspection	Engine Manufacturer:	Continental
ELT:		Engine Model/Series:	IO-550-N17
Registered Owner:	Shannon K. Knoepflein	Rated Power:	310 hp
Operator:	Shannon K. Knoepflein	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	MSN, 887 ft msl	Distance from Accident Site:	2 Nautical Miles
Observation Time:	1853 CDT	Direction from Accident Site:	270°
Lowest Cloud Condition:	Clear	Visibility	10 Miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	5 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	230°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	29.96 inches Hg	Temperature/Dew Point:	28° C / 19° C
Precipitation and Obscuration:			
Departure Point:	Oshkosh, WI (OSH)	Type of Flight Plan Filed:	IFR
Destination:	Lebanon, KY (6I2)	Type of Clearance:	IFR
Departure Time:	1823 CDT	Type of Airspace:	Class C

Airport Information

Airport:	Dane County Regional (MSN)	Runway Surface Type:	
Airport Elevation:	887 ft	Runway Surface Condition:	
Runway Used:		IFR Approach:	None
Runway Length/Width:		VFR Approach/Landing:	Forced Landing

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:	N/A	Aircraft Fire:	On-Ground
Ground Injuries:	N/A	Aircraft Explosion:	On-Ground
Total Injuries:	1 Fatal	Latitude, Longitude:	43.139722, -89.337500

Administrative Information

Investigator In Charge (IIC):	Pamela S Sullivan	Report Date:	07/07/2005
Additional Participating Persons:	Robert K Gessert; FAA, MKE FSDO; Milwaukee, WI Charles Ebert; FAA, MKE FSDO; Milwaukee, WI John Kent; Continental; Mobile, AL Timothy Anderson; FAA, MKE FSDO; Milwaukee, WI		
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/ .		

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