Aviation Investigation Final Report

Location:	FOND DU LAC, Wisconsin	**Accident Number:**	CHI96FA278
Date & Time:	August 8, 1996, 09:02 Local	**Registration:**	N320L
Aircraft:	LANCAIR 320	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The airplane experienced an inflight loss of its propeller assembly. A witness observed the airplane spiraling downward similar to that of a flat spin with smoke coming from it. Examination of the fractured propeller mounting flange revealed a separation of the propeller mounting flange from the remainder of the crankshaft which was the result of fatigue cracking that initiated between the lightening holes in the flange. There is an Airworthiness Directive and Service Bulletin that specifically addressed the subject engine when it is installed on the Piper PA-30 airplane. These inspection requirements arose because of cracking problems generated by bending of the mounting flange under certain aerobatic-type maneuvers, primarily maneuvers that add stresses from gyroscopic action. The weight and balance after the loss of the propeller was 1,531 pounds at 70.09 inches aft. The center of gravity envelope for the N320L is between 60.75 to 66.75 inches aft.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: the fatigue in the propeller flange with soft material and oversized lightening holes. A factor was the pilot's inability to maintain control of the aircraft due to the exceeded weight and balance which led to a stall/spin.

Findings

Occurrence #1: PROPELLER FAILURE/MALFUNCTION
Phase of Operation: CRUISE

Findings
1. (C) ENGINE ASSEMBLY,CRANKSHAFT - FATIGUE

Occurrence #2: LOSS OF ENGINE POWER(TOTAL) - MECH FAILURE/MALF
Phase of Operation: CRUISE

Occurrence #3: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: EMERGENCY DESCENT/LANDING

Findings
2. (C) AIRCRAFT CONTROL - NOT POSSIBLE - PILOT IN COMMAND
3. (F) STALL/SPIN - ENCOUNTERED - PILOT IN COMMAND
4. (F) AIRCRAFT WEIGHT AND BALANCE - EXCEEDED

Occurrence #4: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Factual Information

HISTORY OF FLIGHT

On August 8, 1996, at 0902 central daylight time (cdt), a Lancair 320, N320L, registered to Neico Aviation, of Redmond, Oregon, piloted by a Commercial rated pilot, departed controlled flight after the propeller came off inflight, and impacted terrain, approximately four miles south of Fond Du Lac County Airport, Fond Du Lac, Wisconsin. The airplane was destroyed and the pilot sustained fatal injuries. The 14 CFR Part 91 flight was not operating on a flight plan. Visual meteorological conditions prevailed at the time of the accident. The flight departed Wittman Regional Airport, Oshkosh, Wisconsin, at 0853 cdt.

Approximately 0902 cdt, a witness near the accident site said he saw a white airplane "...spiraling downward with smoke coming from it." The witness thought that he was performing an aerobatic maneuver which is very common in that area and didn't pay much attention to it.

Approximately 0905 cdt, a second witness who lives two houses away from the accident site, saw a white streak in the sky and heard an engine sputtering sound while he was on the phone. The witness then heard nothing and thought that was odd, so he went down the road and found the airplane wreckage. The airplane wreckage was discovered four miles south of Fond Du Lac Airport, by the witness who then reported it to the Fond Du Lac County Sheriff's Department at 0915 cdt.

PERSONNEL INFORMATION

The pilot was born April 29, 1960. He was the holder of a commercial certificate for single/multi engine land/sea rating. He held a second class medical issued on April 8, 1996. He had accumulated a total of 5,856 hours with 23 hours in this type of airplane at the time of the accident. All times are based on the last flight logbook entry made on September 23, 1995. In addition, his most recent biennial flight review is unknown.

AIRCRAFT INFORMATION

The airplane was a Lancair 320, serial number L 1987, N320L. The airplane had accumulated 1,501.7 hours time in service at the time of the accident. The engine had 265 hours since its last overhaul. The most recent inspection was conducted on May 11, 1995, 59 hours prior to the accident.

WRECKAGE AND IMPACT INFORMATION

The NTSB on-scene investigation began at 1230 on August 8, 1996. The wreckage was located four miles south of Fond Du Lac Airport, near the intersection of Lost Arrow Road and River Street. The airplane was found in a three foot high soy bean field. Examination of the accident site revealed no ground scars and an upright airplane. The engine was found in a two foot crater at a 38 degrees nose down angle and in a 9 degree left bank angle. The top of the engine cowling had oil residue running aft. The tail section also had oil residue on it. Just forward of the leading edge of the wings, there was a ground imprint similar to the shape of the leading edge of the wings that ran the full length of the wings. Pieces of the left wing position light were recovered at the end of the imprint.

Examination of the wreckage revealed the fuselage was partially intact aft of the crew compartment to just forward of the empennage. The fuselage, forward of the wings, and crew compartment were fragmented.

Both wings had remained attached to the fuselage. Both built-in wing tanks were ruptured. The main landing gear actuators were in the up position. The ailerons and parts from the wing sections were attached to the remaining cockpit by the aileron control cables and hydraulic lines to the main landing gear. Both leading edges of the wings had dirt residue on them and were fragmented spanwise. The left wing was fractured at a 45 degree angle from the leading edge to the aileron and flap assembly position.

The tail section fractured forward of the horizontal stabilizers. The tail section was located six feet to the left rear of the main wreckage. The control cables and wiring harness were still attached to the main wreckage. The empennage remained mostly intact. The left horizontal stabilizer was fractured at the base root. The left counter weight was missing, and was located three feet in front of the tail section. The right horizontal stabilizer and elevator were undamaged. The vertical stabilizer was undamaged and the rudder was attached at the lower hinge point. The push-pull rod to the elevator was bent in several places. The elevator idler arm assembly mount had sheared midway up from the floor of the fuselage. Rudder control cables showed continuity.

The propeller was not found in the engine crater nor recovered near the wreckage site. The crankshaft was sheared at the propeller flange. The crankshaft was retained for further testing.

On November 19, 1996, a farmer who lives near the accident site discovered the propeller located approximately 115 degrees at 3,000 feet from the accident site while harvesting his crops. Both propeller blades and hub assembly appeared undamaged with the crankshaft flange still attached to the hub.

MEDICAL AND PATHOLOGICAL INFORMATION

A post mortem examination of the pilot was conducted on August 9, 1996 at Milwaukee County Medical Examiner's Office, Milwaukee, Wisconsin. No pre-existent anomalies were

noted during this examination which contributed to the accident or the pilot's death.

The pilot's toxicological analysis was performed by the FAA's Civil Medical Institute in Oklahoma City, Oklahoma. The toxicological examination of specimens from the pilot were negative for those drugs screened.

TESTS AND RESEARCH

A complete engine teardown was conducted on August 9, 1996, at Myers Aviation, Inc., of Oshkosh, Wisconsin. The intake sump originally had a rear mounted fuel servo; however, this opening was welded closed. A hole was cut in front of the oil sump where a mount for the fuel servo was welded in place, then a duct was welded up to the intake spider. Work was performed and signed off by company employees who do not hold an approved FAA Airframe and Powerplant license.

The crankshaft flange was examined by the NTSB's Metallurgical Laboratory in Washington, D.C.. The NTSB metallurgist's factual report on the crankshaft flange stated "...examination of the propeller mounting flange showed that five of the six fracture areas between lightening holes contained evidence of fatigue cracking." Further examination of the fatigue cracking in the flange revealed no evidence of scratch marks, abusive machining damage, or other defects that may have contributed to the initiation of the cracking. The thickness of the propeller mounting flange was measured as 0.255 inches. A representative of Lycoming stated that the specified thickness of the propeller mounting flange on a P/N 74780 crankshaft is 0.26 inches to 0.28 inches. Hardness measurements on the flange averaged 30.4 HRC, below the specified range of 32 HRC to 36 HRC. Enclosed with this report is the Factual Metallurgist's report.

The propeller mounting flanges on the crankshaft from IO-320-B1A engines installed in Piper PA-30 airplanes are the subject of Airworthiness Directive (AD) 65-03-03 (referencing Lycoming Service Bulletin 300B). This AD requires visual or magnetic particle inspection of the propeller mounting flange before the next flight following certain aerobatic type maneuvers not approved for normal category aircraft. The compliance of this AD note is not required for experimental aircraft. The Pilot's Operating Handbook for the Lancair 320 allows for aerobatic maneuvers.

A radar plot displays the airplane traveling southward, south of the Fund Du Lac Airport at 3,200 feet. The airplane is observed turning back towards the north direction tracking towards the Fund Du Lac Airport. The last 10 seconds showed the airplane attitude at 2,500 feet with the last radar contact at 1,300 feet. The IIC calculated the vertical speed to have been approximately 7,200 feet per minute descent rate.

Neico Aviation, Inc., calculated the weight and balance after the loss of the propeller was 1,531 pounds at 70.09 inches aft. The center of gravity envelope is between 60.75 to 66.75 inches aft. The weight and balance sheet is enclosed with this report.

ADDITIONAL DATA

Parties to the investigation were the Federal Aviation Administration, Neico Aviation Incorporated, and Textron Lycoming.

Following the on-scene portion of the investigation, the wreckage was released to the general manager at Neico Aviation, Inc. on May 20, 1997.

Pilot Information

Certificate:	Commercial; Flight instructor	**Age:**	36,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land; Multi-engine sea	**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:**	Yes
Medical Certification:	Class 2 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	April 8, 1996
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	5856 hours (Total, all aircraft), 23 hours (Total, this make and model), 5666 hours (Pilot In Command, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	LANCAIR	**Registration:**	N320L
Model/Series:	320 320	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	Yes
Airworthiness Certificate:	Experimental (Special)	**Serial Number:**	L 1987
Landing Gear Type:	Retractable - Tricycle	**Seats:**	2
Date/Type of Last Inspection:	May 11, 1995 100 hour	**Certified Max Gross Wt.:**	1685 lbs
Time Since Last Inspection:	59 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	1502 Hrs	**Engine Manufacturer:**	Lycoming
ELT:	Installed, not activated	**Engine Model/Series:**	IO-320-B1A
Registered Owner:	LANCAIR INTERNATIONAL, INC.	**Rated Power:**	160 Horsepower
Operator:		**Operating Certificate(s) Held:**	None
Operator Does Business As:		**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	FLD ,807 ft msl	**Distance from Accident Site:**	4 Nautical Miles
Observation Time:	08:53 Local	**Direction from Accident Site:**	360°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	9 knots / None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	300°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	22°C / 17°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	OSHKOSH (OSH)	**Type of Flight Plan Filed:**	None
Destination:	AURORA (ARR)	**Type of Clearance:**	None
Departure Time:	08:53 Local	**Type of Airspace:**	Class E

Airport Information

Airport:		**Runway Surface Type:**	
Airport Elevation:		**Runway Surface Condition:**	
Runway Used:	0	**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	43.769882,-88.439865(est)

Administrative Information

Investigator In Charge (IIC):	Carlson, Todd
Additional Participating Persons:	TIM ANDERSON; MILWUAKEE , WI GREGORY A ERIKSON; WAYNE , IL LANCE A NEIBAUER; REDMOND , OR
Original Publish Date:	March 31, 1998
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=10096