Aviation Investigation Final Report

Location:	MILL HALL, Pennsylvania	**Accident Number:**	IAD02LA062
Date & Time:	June 22, 2002, 12:00 Local	**Registration:**	N676EC
Aircraft:	CASTLE GLASAIR II-SRG	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	1 Minor, 1 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

Shortly after take-off, the pilot reported that the engine began to run rough, backfire, and vibrate severely, along with an increase in oil temperature. Examination of the engine revealed that the crankshaft was fractured through the #3 main bearing journal. Fluorescent magnetic particle inspection of the crankshaft revealed over 50 axial cracks in the #3 main bearing journal. Examination of the three of the cracks revealed that each exhibited rehardening, rehardening and slight tempering, and tempering, consistent with a lack of lubrication. The engine was last overhauled in 1993, at which time, the crankshaft was replaced. The pilot reported that he bought the engine in 1993 from the individual who performed the overhaul. He said there were no maintenance logbooks for the engine, and the service history of the crankshaft was unknown.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The failure of the crankshaft due to a lack of lubrication.

Findings

Occurrence #1: LOSS OF ENGINE POWER
Phase of Operation: TAKEOFF - INITIAL CLIMB

Findings
1. IGNITION SYSTEM,IGNITION HARNESS - NOT SECURED
2. INDUCTION AIR CONTROL,INTAKE MANIFOLD - LOOSE
3. (C) ENGINE ASSEMBLY,CRANKSHAFT - FRACTURED
4. FLUID,OIL - LACK OF

Occurrence #2: IN FLIGHT COLLISION WITH OBJECT
Phase of Operation: EMERGENCY DESCENT/LANDING

Findings
5. OBJECT - TREE(S)

Factual Information

On June 22, 2002, about 1200 eastern daylight time, a homebuilt Glasair II-SRG, N676EC, was substantially damaged during a forced landing to a clearing in Mill Hall, Pennsylvania. The certificated private pilot/owner/builder was not injured and the passenger sustained minor injuries. Visual meteorological conditions prevailed, and no flight plan was filed for the flight that originated at William T. Piper Memorial Airport (LHV), Lock Haven, Pennsylvania, about 1150. The personal flight was conducted under 14 CFR Part 91.

According to the pilot, while the airplane was climbing through an altitude of 2,500 feet, the engine began to miss, vibrate severely, and backfire. When the pilot turned back toward Lock Haven, the oil temperature started to rise, and he was unable to maintain altitude. The pilot turned the magneto switch from the both position to the left position. When the left magneto was selected, engine roughness increased significantly. The pilot performed a forced landing to clearing and impacted trees.

A Federal Aviation Administration (FAA) inspector and representative of the engine manufacturer examined the airplane and engine. According to the engine representative, the wiring harness that attached to the back of the left magneto was found partially separated. Two of the four attachment screws were missing, and the other two screws were loose. Additionally, one of the engine's intake clamps was loose.

Engine continuity was partially established by manual rotation of the propeller, because the engine could not be turned more than 360 degrees.

The engine was examined at Textron Lycoming's teardown facility in Williamsport, Pennsylvania, under Safety Board supervision. Examination of the engine revealed that the crankshaft was fractured through the #3 main bearing journal. A crack was observed from the primary fracture surface through the lightening hole. Fluorescent magnetic particle inspection of the crankshaft revealed over 50 axial cracks in the #3 main bearing journal primarily in two rows.

Metallographic cross sections were prepared from three of the cracks. Examination of the cross sections revealed that each exhibited rehardening, rehardening and slight tempering, and tempering of varying depths of up to .06 inches along the entire section of the journal, consistent with a lack of lubrication. Numerous surface cracks were also observed along the journal surface.

The engine examination also revealed that the connecting rod bolts were too long for the make and model engine.

The engine was last overhauled in 1993, at a total time of 3,260 hours, at which time, the crankshaft was replaced. At the time of the accident, the engine had accrued 318 hours since being overhauled. According to the pilot, there were no maintenance logbooks for the engine, and he did not know the service history of the crankshaft.

The pilot purchased the engine in 1993 from the individual who performed the overhaul. The engine sat in the pilot's garage until he installed it on the airplane in 1997. The pilot stated that he preserved the engine with oil, but could not recall what type of oil. He also said that he had never run the engine without oil.

The pilot reported a total of 549 flight hours, of which, 351 hours were in make and model.

Weather at Williamsport Regional Airport, Williamsport, Pennsylvania, at 1154, included wind from 260 degrees at 7 knots, visibility 6 statute miles, haze and clear skies.

Pilot Information

Certificate:	Private	**Age:**	48,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):		**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	June 1, 2001
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	June 21, 2002
Flight Time:	549 hours (Total, all aircraft), 351 hours (Total, this make and model), 456 hours (Pilot In Command, all aircraft), 17 hours (Last 90 days, all aircraft), 6 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	CASTLE	**Registration:**	N676EC
Model/Series:	GLASAIR II-SRG	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	Yes
Airworthiness Certificate:	Experimental (Special)	**Serial Number:**	2163
Landing Gear Type:	Tricycle	**Seats:**	2
Date/Type of Last Inspection:	February 16, 2002 Annual	**Certified Max Gross Wt.:**	2200 lbs
Time Since Last Inspection:	15.2 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	318 Hrs as of last inspection	**Engine Manufacturer:**	Lycoming
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	IO-360-BIE
Registered Owner:	JOSEPH E. CASTLE	**Rated Power:**	180 Horsepower
Operator:		**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	IPT,529 ft msl	**Distance from Accident Site:**	23 Nautical Miles
Observation Time:	11:54 Local	**Direction from Accident Site:**	75°
Lowest Cloud Condition:	Clear	**Visibility**	6 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	260°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.2 inches Hg	**Temperature/Dew Point:**	28°C / 17°C
Precipitation and Obscuration:	N/A - None - Haze		
Departure Point:	LOCK HAVEN, PA (LHV)	**Type of Flight Plan Filed:**	None
Destination:	PARKERSBURG, WV (PKB)	**Type of Clearance:**	None
Departure Time:	11:45 Local	**Type of Airspace:**	Class E

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Minor	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Minor, 1 None	**Latitude, Longitude:**	41.137222,-77.418891

Administrative Information

Investigator In Charge (IIC):	Yeager, Leah
Additional Participating Persons:	JIM STEVENSON; HARRISBURG, PA
Original Publish Date:	August 26, 2003
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=55016