Aviation Investigation Final Report

Location:	Thomson, Georgia	**Accident Number:**	ERA18LA168
Date & Time:	June 14, 2018, 18:00 Local	**Registration:**	N45TX
Aircraft:	Stinson L 5	**Aircraft Damage:**	Substantial
Defining Event:	Powerplant sys/comp malf/fail	**Injuries:**	1 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

While in cruise flight, the pilot noticed an increase in oil temperature and loss of oil pressure. Shortly thereafter, the engine lost total power, and the propeller stopped rotating. The pilot performed a forced landing to a lake, which resulted in substantial damage. Examination revealed that the propeller could not be rotated by hand, and the crankshaft was fractured at the No. 2 crank pin. Review of maintenance logbooks revealed that the most recent engine overhaul was performed about 24 years and 711 flight hours before the accident. Since that time, the propeller had been removed and replaced on two separate occasions due to propeller strikes. There was no record of any crankshaft inspections following either of the propeller strikes, contrary to manufacturer guidance.

Additional damage found on the Nos. 1 and 2 cylinders was caused by the crankshaft failure and pistons that impacted their respective rods and skirts. In addition to the main fracture, a separate crack was discovered slightly aft of the No. 1 main bearing and had propagated nearly the width of the crankshaft, but had not fully failed. The thrust nut, which required 375 ft-lbs of torque, was easily removed without effort or special tools, indicating that it was torqued to a value significantly below specification. This could cause axial play along the crankshaft and contribute to the progression of the crankshaft failure that was likely initiated during the previous 2 propeller strikes. The crankshaft likely failed after its structural integrity was compromised during previous propeller strikes. The improper torque on the thrust nut likely exacerbated the failure of the crankshaft.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

Failure of maintenance personnel to inspect the crankshaft after two previous propeller strikes, which resulted in failure of the crankshaft and a total loss of engine power. Contributing to the crankshaft failure was insufficient torque applied to the thrust nut.

Findings

Aircraft	Recip engine power section - Damaged/degraded
Aircraft	Recip engine power section - Inadequate inspection
Personnel issues	Scheduled/routine maintenance - Maintenance personnel
Personnel issues	Scheduled/routine inspection - Pilot

Factual Information

History of Flight

Maneuvering	Powerplant sys/comp malf/fail (Defining event)
Maneuvering	Loss of engine power (total)
Landing-flare/touchdown	Ditching

On June 14, 2018, about 1800 eastern daylight time, a Stinson L-5, N45TX, was involved in an accident near Thomson, Georgia. The commercial pilot was not injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The pilot reported that the preflight inspection, engine runup, takeoff, and climb were normal. About 40 minutes into the flight, while flying at 2,200 ft mean sea level and 10 miles from the departure airport, he noticed the oil temperature "jumped" to the top of the green arc and the oil pressure was near the bottom of the green arc. He reduced engine power, adjusted the mixture to full rich, and turned toward the airport. Shortly thereafter, the engine lost total power and the pilot's attempts to restore power were unsuccessful; the propeller was stationary and did not move during attempts to restart the engine. The pilot performed a forced landing to a lake and the airplane sank after the pilot egressed.

The airplane was recovered and visually examined by a Federal Aviation Administration (FAA) inspector. The airplane's left wing was substantially damaged. The inspector attempted to rotate the propeller by hand, but the propeller would not move. Review of the maintenance logbooks revealed that the last engine overhaul was performed on March 29, 1994. On two separate occasions, June 8, 2002, and September 16, 2002, the propeller was replaced due to a propeller strike/damage. There was no record of crankshaft inspections found in the maintenance logbooks.

The last annual was performed on September 14, 2017, at 6,113.2 tachometer time. At the time of the accident, the airplane had flown 10.6 hours since the annual inspection and 711 hours since engine overhaul.

The airplane was recovered for detailed teardown and examination of the engine. Removal of the Nos. 1 and 2 cylinders revealed that the crankshaft fractured at the No. 2 crank pin. (see Figure 1.)

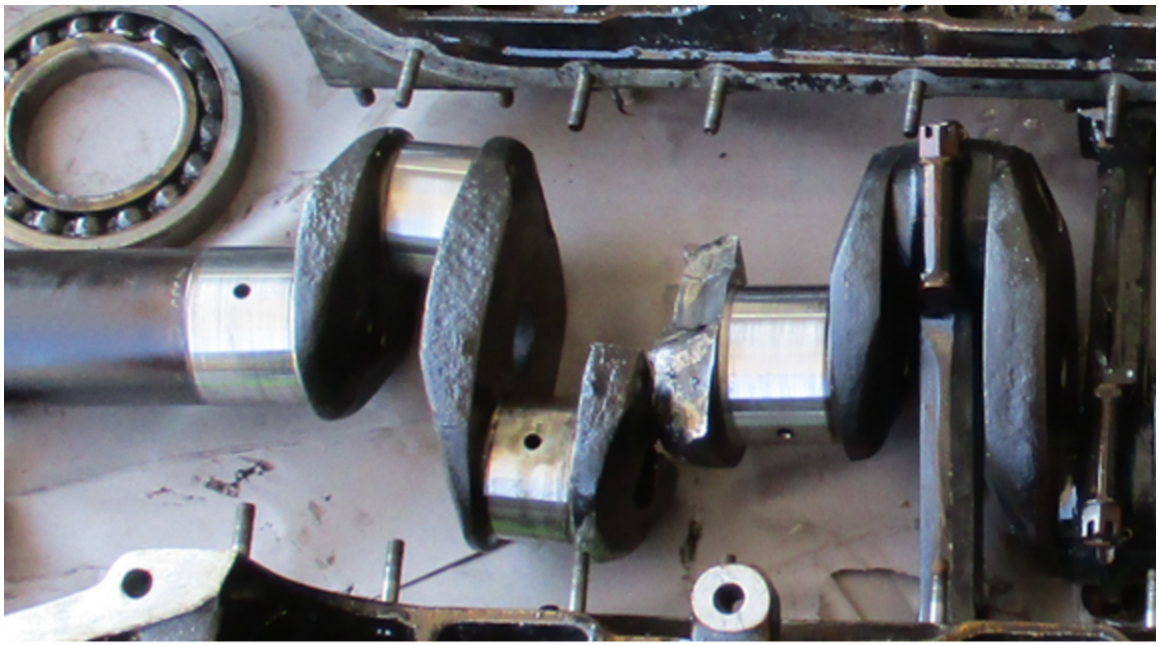

Figure 1 Crankshaft fracture

The thrust nut was removed in order to open the crankcase. The amount of torque required to loosen the thrust nut was not measured, but was significantly less than the 375 ft-lbs specified by the engine overhaul manual, as it required no special tools and little effort to remove. Upon opening the crankcase, it was confirmed that the crankshaft was fractured along with ancillary damage caused by the Nos. 1 and 2 pistons and connecting rods impacting their respective skirts. In addition to the main fracture, a separate crack was discovered slightly aft of the No. 1 main bearing that had propagated nearly the width of the crankshaft, but had not fully failed.

On October 18, 2016, Lycoming issued a Mandatory Service Bulletin No. 533C (Superseded 533B) with recommended action for sudden engine stoppage, propeller/rotor strike, or loss of propeller/rotor blade or tip for all Lycoming reciprocating aircraft engines. The SB included detailed checklists for the inspection.

Pilot Information

Certificate:	Commercial; Flight instructor; Private	**Age:**	47,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Front
Other Aircraft Rating(s):	None	**Restraint Used:**	4-point
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 Waiver time limited special	**Last FAA Medical Exam:**	March 19, 2018
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 528 hours (Total, all aircraft), 92 hours (Total, this make and model), 469 hours (Pilot In Command, all aircraft), 1 hours (Last 90 days, all aircraft), 0 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Stinson	**Registration:**	N45TX
Model/Series:	L 5 C	**Aircraft Category:**	Airplane
Year of Manufacture:	1944	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	44-17397
Landing Gear Type:	Tailwheel	**Seats:**	2
Date/Type of Last Inspection:	September 14, 2017 Annual	**Certified Max Gross Wt.:**	2251 lbs
Time Since Last Inspection:	10 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	1641 Hrs at time of accident	**Engine Manufacturer:**	Lycoming
ELT:	Installed	**Engine Model/Series:**	O-435
Registered Owner:		**Rated Power:**	185 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	HQU,501 ft msl	**Distance from Accident Site:**	6 Nautical Miles
Observation Time:	18:15 Local	**Direction from Accident Site:**	10°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	6 knots /	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:	290°	**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	31°C / 22°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Thomson, GA (HQU)	**Type of Flight Plan Filed:**	None
Destination:	Thomson, GA	**Type of Clearance:**	None
Departure Time:	17:00 Local	**Type of Airspace:**	Class G

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	1 None	**Latitude, Longitude:**	33.62611,-82.496109(est)

Administrative Information

Investigator In Charge (IIC):	Mccarter, Lawrence		
Additional Participating Persons:	Kevin Atkins; FAA FSDO; Vestavia Hills, AL Danny Cox; FAA FSDO; Atlanta, GA Zachary Andrade; FAA FSDO; Atlanta, GA		
Original Publish Date:	January 20, 2022	**Investigation Class:**	3
Note:	The NTSB did not travel to the scene of this accident.		
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=97483		

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. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available here.