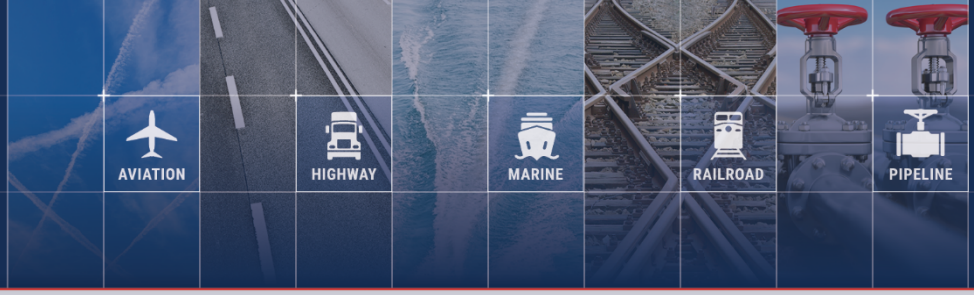

Aviation Investigation Final Report

Location:	Kenai, Alaska	**Accident Number:**	ANC12LA075
Date & Time:	July 14, 2012, 15:15 Local	**Registration:**	N7154Z
Aircraft:	Piper PA-18-150	**Aircraft Damage:**	Substantial
Defining Event:	Powerplant sys/comp malf/fail	**Injuries:**	2 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot, with one passenger aboard, departed in a float-equipped airplane from a remote lake. Shortly after takeoff, about 100 feet above the water, the airplane's engine began to vibrate violently. The pilot reduced engine power, turned the airplane left to avoid trees at the departure end of the lake, and attempted an emergency landing on the lake. The airplane continued to descend, and it subsequently collided with a shallow portion of the lake, sustaining substantial damage to the wings, fuselage, and empennage. A postaccident examination revealed that a 6-inch portion of one propeller blade separated, resulting in a severe imbalance.

An NTSB metallurgical examination of the fractured propeller blade revealed evidence of an unauthorized and undocumented repair of a nearly cylindrical hole, measuring about 0.3 inch in diameter. The examination also revealed areas where a white, opaque, plastic-like filler material, consistent with automotive body repair filler, was used to cover the hole before it was painted over, which subsequently made the unauthorized repair undetectable.

The airplane owner reported that the propeller was already installed when he recently purchased the airplane. In addition, no logbook entry was found that would have indicated any damage, repairs, modifications, or a propeller assembly installation.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The in-flight separation of a propeller tip due to an unauthorized and undocumented propeller repair.

Findings

Aircraft	Propeller assembly - Fatigue/wear/corrosion
Personnel issues	Incorrect action selection - Maintenance personnel

Factual Information

History of Flight

Initial climb	Powerplant sys/comp malf/fail (Defining event)
Maneuvering-low-alt flying	Loss of control in flight
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On July 14, 2012, about 1515 Alaska daylight time, a float-equipped Piper PA-18-150 airplane, N7154Z, sustained substantial damage during a forced landing shortly after takeoff from a remote lake about 6 miles north of Kenai, Alaska. The airplane was being operated as a visual flight rules (VFR) cross-country personal flight under Title 14, CFR Part 91, when the accident occurred. The pilot and the sole passenger were not injured. Visual meteorological conditions prevailed, and no flight plan had been filed. The flight was en route to the Lake Hood Seaplane Base, Anchorage, Alaska.

During a telephone conversation with the National Transportation Safety Board (NTSB) investigator-in-charge (IIC) on July 15, the pilot reported that just after takeoff, as the airplane climbed to 100 feet above the water, the engine began to vibrate so violently that he was concerned that the engine may possibly separate. He reduced engine power, turned the airplane left to avoid trees at the departure end of the lake, and attempted an emergency landing on the lake. During the turn, the airplane continued to descend, and it subsequently collided with a shallow portion of the lake. The airplane sustained substantial damage to the wings, fuselage, and empennage.

The pilot reported that a postaccident examination revealed that a 6-inch portion of the propeller appeared to be missing. The pilot added that the remaining portion of the fractured propeller blade had a semi-circular hole that was consistent with a high caliber bullet hole. The pilot reported that the tip portion of the blade was not recovered.

The airplane was equipped with a McCauley, two-bladed, fixed pitch, metal propeller, model number DES1A175.

On July 18, the NTSB IIC examined the airplane wreckage after it was recovered to the owner's hangar in Anchorage, and confirmed that a 6-inch portion of one propeller blade tip was missing.

The NTSB IIC's examination revealed a semi-circular hole located at about 1/3 of the chord width from the trailing edge. The semi-circular hole measured about 1/4 inch in diameter.

During an interview with the NTSB IIC on July 18, the owner of the airplane reported that the propeller was the original propeller installed when he purchased the airplane in September of 2011. He added that there was no preaccident damage to the propeller.

A review of the accident airplane's maintenance logs revealed that the serial number of the propeller reportedly installed on the accident airplane did not match the serial number of the one actually installed. In addition, no log book entry was found that would have indicated any damage, repairs,

modifications, or propeller assembly installations.

Pilot Information

Certificate:	Airline transport	**Age:**	42
Airplane Rating(s):	Single-engine land; Single-engine sea; 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):	None	**Toxicology Performed:**	No
Medical Certification:	Class 1 Without waivers/limitations	**Last FAA Medical Exam:**	December 22, 2011
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	January 6, 2012
Flight Time:	5837 hours (Total, all aircraft), 18.3 hours (Total, this make and model), 3597 hours (Pilot In Command, all aircraft), 76 hours (Last 90 days, all aircraft), 25 hours (Last 30 days, all aircraft), 0.6 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N7154Z
Model/Series:	PA-18-150	**Aircraft Category:**	Airplane
Year of Manufacture:	1965	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	18-8268
Landing Gear Type:	Float	**Seats:**	2
Date/Type of Last Inspection:	May 5, 2012 Annual	**Certified Max Gross Wt.:**	
Time Since Last Inspection:	36 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	9336 Hrs at time of accident	**Engine Manufacturer:**	LYCOMING
ELT:	C91 installed, not activated	**Engine Model/Series:**	IO 360 SER
Registered Owner:	MIDNIGHT SUN ADVENTURES	**Rated Power:**	150 Horsepower
Operator:	Tyler Renner	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:		**Distance from Accident Site:**	
Observation Time:		**Direction from Accident Site:**	
Lowest Cloud Condition:	Thin Overcast / 4000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Overcast / 5000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:		**Temperature/Dew Point:**	18°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Kenai, AK	**Type of Flight Plan Filed:**	None
Destination:	Anchorage, AK	**Type of Clearance:**	None
Departure Time:	15:15 Local	**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 None	**Latitude, Longitude:**	60.6525,-151.127777(est)

Tests and Research

A sectioned portion of the fractured propeller blade was sent to the NTSB's Materials Laboratory for examination.

A senior Safety Board metallurgist reported that a magnified examination of the fracture face revealed a relatively flat fracture surface, with features consistent with fatigue progression through the aluminum alloys. He added that there was a nearly cylindrical hole, measuring about 0.3 inch in diameter, and oriented about 20 degrees from perpendicular to the flat side of the blade.

A scanning electron microscope (SEM) examination revealed fracture traces indicating fatigue initiation in the vicinity of the corners formed by the intersection of the hole and the flat side of the propeller blade.

When the portion of the propeller blade was received at the NTSB's materials laboratory, both sides of the blade section were painted black. The paint was removed, which revealed shiny surface markings and abrasion patterns, on both the camber and flat sides of the propeller blade. These marking were consistent with local abrasive reworking around the hole. The flat side of the propeller blade had heavy deep scratches in addition to a finely sanded ring around the hole. The unabraded surfaces of the propeller blade had a dull greenish grey appearance consistent with green primer paint. A closer examination of the camber side revealed two areas with a white opaque plastic-like filler material, which is consistent with automotive body repair fillers.

A complete copy of the NTSB's materials laboratory factual report is included in the public docket of this report.

Additional Information

The accident sequence was recorded on the aft-seated passenger's iPhone, and a copy of that recording was sent to the NTSB vehicle recorder laboratory in Washington, DC for review. After a review of key events on the video recording, it was determined that neither the images, nor audio portion of the recording, offered any additional information that had not already been obtained from the pilot. No video group was convened, and no video transcript was created. A summary report of the video is included the public docket for this accident.

Administrative Information

Investigator In Charge (IIC):	Johnson, Clinton
Additional Participating Persons:	Randy S Smith; Federal Aviation Administration - Operations; Anchorage, AK
Original Publish Date:	February 3, 2014
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=84350