



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation
Safety Alaska Region

July 29, 2019

**Field, Airframe and Engine
Examinations Summary**

A. ACCIDENT

NTSB Number:	ANC19FA033
Location:	Ketchikan, Alaska
Date:	July 11, 2019
Aircraft:	N5840P PA-24-180
Investigator-in-Charge (IIC):	Noreen Price
Parties to the Investigation:	Lana Boler, FAA Aviation Safety Inspector IIC Kathryn Whitaker, Air Safety Investigator, Piper Aircraft Mark Platt, Sr Air Safety Investigator, Lycoming Engines

B. DETAILS OF THE INVESTIGATION

1.0 Background

On July 11, 2019, about 1419 Alaska daylight time, a Piper PA-24-180 airplane, N5840P, sustained substantial damage after impacting terrain during a visual approach about 4 miles south of Ketchikan International Airport, (KTN) Ketchikan, Alaska. The airline transport pilot sustained fatal injuries. The airplane was registered to the Law Offices of Michael P Nash PC and operated by the pilot, under the provisions of 14 *Code of Federal Regulations* Part 91 as a personal visual flight rules (VFR) flight. Marginal visual meteorological conditions prevailed at the destination. The flight departed Friday Harbor Airport (FHR), Friday Harbor, Washington, about 1010 Alaska daylight time. The KTN Flight Service Station attendant lost radio contact with the airplane after it arrived in the terminal area and a search and rescue mission was launched about 1430. The wreckage was located about 4 miles south of KTN about 1630.

A review of downloaded GPS data from airplane's Garmin GPSMap 396 revealed that the airplane flew a mostly direct route to the KTN terminal area. At 1418, north of Judy Hill, the airplane started turning left from a 322° track toward the southwest. The airplane descended from 775 ft to 447 ft GPS altitude during the left turn and the last groundspeed data was 118 knots. Refer to figure 1.



Figure 1. GPS track

2.0 Accident Site

GPS Coordinates: Main wreckage 55.30107, -131.65202

The NTSB and FAA IICs travelled to the scene of the accident on July 13, 2019. The wreckage was spread over 300 ft in a linear track of 193° at an elevation averaging 380 ft on the northwest side of Judy Hill. The hill is the highest terrain on the south side of the KTN and has a peak of 814 ft. The accident site consisted of relatively level marshy muskeg covered ground that was lightly treed and contained variable shrubs and large rocky outcroppings. All of the airplane's major components were located at the scene.



Figure 2. Judy Hill view to the east (left) and aerial view of wreckage.

An aerial view of the wreckage revealed initial impact of a group of trees that had tops knocked off in a southwest direction. A view from the southwest looking northward indicated a 28-degree angle cut in the treetops at the initial impact location. (55.3018, -131.6512) White paint flakes were observed at the base of the trees. Propeller cuts were observed on two broken tree sections. Refer to figures 2 and 3.



Figure 3. Photograph of tree top cuts



Figure 4. Southwest view of debris path

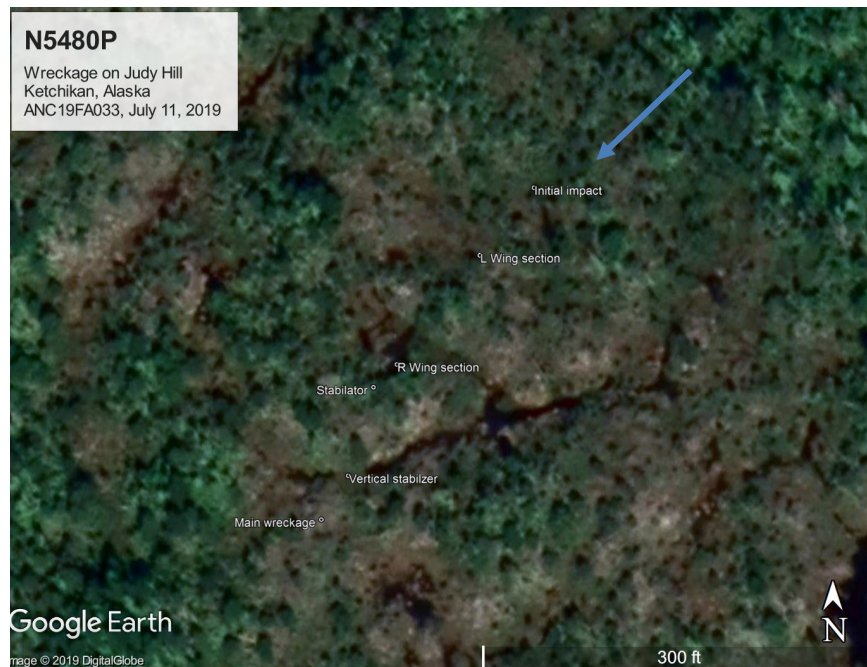


Figure 5. GPS wreckage plot on Google Earth

3.0 Wreckage

The first airplane section in the debris field nearest the initial impact, was the left outboard wing section, which had an indentation on the leading edge consistent with tree impact. The separation fractures indicated

rearward deformation of the spar. The aileron was attached and exhibited minor buckling throughout. A green engine cowling with crush damage was laying on the ground about 20 feet down the debris field.



Figure 6. Underside of left wing outboard section (left) and right wing section

The right outboard wing section was located about 45 ft from the left wing section. The wing tip was not present, and the aileron was attached. The aileron control rod was missing and fractured at connecting end. The aileron control cable nuts were broken at the bellcrank. A large tree like elliptical compression was evident at the leading edge. The fractured spar and torn skin were deformed in a rearward direction.

The stabilator was located inverted about 100 feet from the right wing section and had the anti-servo tab attached. The left side leading edge had semicircular indentation indicative of a tree strike and spanwise leading edge compression. The anti-servo tab was deformed with a 90 degree bend on the right side.



Figure 7. Stabilator and tail cone

The vertical stabilizer was located about 80 feet south of the stabilator with the rudder attached. The stabilizer and rudder each exhibited top down compression buckling on the right side at their mid spans.



Figure 8. Vertical stabilizer and rudder

A large hole with green paint chips was observed about 8 feet beyond the stabilator. The hole was about 3 feet by 3 feet and 2 feet deep.

The fuselage came to rest at the end of the debris path up against a rock outcropping and a large, toppled tree in a mostly inverted attitude heading 190°. The forward fuselage was resting in a level, inverted, slightly nose downward attitude on the ground, and the rear fuselage fractured behind the front seats and jutting upward. The right inboard wing and landing gear were attached to the fuselage and the left inboard wing section and landing gear was separated and held to the fuselage by control cables. The empennage was separated from the fuselage at the rear bulkhead and was hanging downward toward the ground. The engine and propeller were attached to the forward fuselage but displaced leftward and crushed into the surface.



Figure 9. Main wreckage, fuselage and cabin

The cockpit seats were in place and the pilot seat belts were intact and unfastened. The instrument panel was intact. The flap handle was in the retracted position.

4.0 Detailed Examinations

On August 26 detailed examinations of the airframe and engine were conducted by the Piper Aircraft and Lycoming Engines air safety investigators under the supervision of the NTSB and FAA IICs. According to the recovery crew, the empennage, left wing root and forward fuselage section with engine were separated

from the center fuselage section and placed on two pallets.

AIRFRAME

PA-24-180, S/N 24-921, Year 1959

Airframe total time: 4724 hours

Last inspection: 10 July, 2019

The forward fuselage section had the roof section separated at the bottom of the upright supports and the doors separated from their mounts. The wind screen and windows were not present. The cockpit flight instruments and controls were intact with minor buckling at the center section. The cockpit flight controls exhibited continuity from both control columns and rudders to the aileron, elevator and rudder control cables to recovery cuts in the cables aft of the front seats about FS 136. The aileron chains were observed in tact. The flap handle was in the down (retracted) position and the landing gear switch was up. The landing gear emergency extension handle was extended fully, which corresponded to the gear fully extended position.

The aft fuselage section consisted of the center wing spar, floor, right cabin wall and baggage door. The right inboard wing section was attached and the flaps were in the retracted position. The flap control cables were in place and attached to their respective bellcranks. Extensive impact crush damage was evident at the right aileron bellcrank area. The right wing main and rear wing spars were deformed in an aft direction with deep elliptical accordion crush areas, indicative of tree strike in forward flight. The right outboard wing section was separated about 4 feet outboard of wing root. The aileron remained attached. A semi-circular impact dent consistent with a tree strike was evident at the leading edge outboard of the separation.

The left wing separated from the fuselage at its attachment points and exhibited spar deformation in a rearward direction. The flap was separated at the connecting brackets. The left outboard wing section separated at WS 97 and exhibited a semi-circular crush indentation just outboard of the separation. The left aileron was attached and exhibited minor deformation.

The empennage was separated from the fuselage at FS 157 and exhibited minor buckling throughout and a large indentation on the right side forward of the stabilator. The stabilator section was separated from the empennage with the aft tail cone in place. The balance weight was intact and the anti-servo tab was attached. The stabilator trim barrel was extended 1.25 inches which correlates to nose up trim. The right side leading edge exhibited a large semi-circular dent indicative of a tree strike in forward flight. The stabilator left tip indicated impact crush damage and the outboard section was partially separated at the trailing edge with tension signatures at the rivet line. The vertical stabilizer was separated from the empennage at the lower rivet line and exhibited some bending deformation and crush damage at the leading edge and right side. The rudder was attached and rudder control horn was fractured at the cable attachment points with overload signatures.

Flight control continuity was established from the cockpit control cable ends to the stabilator, rudder and left and right ailerons, with the exception of the right rudder cable end at the rudder horn attachment, which was not located. The flaps were in the retracted position and the control cables and bellcrank were continuous. Various fractures in the control rod ends and bellcranks exhibited dull dimpled surfaces and deformation consistent with overload failure. Numerous control cable skin tears were evident in the empennage, indicative of flight control connectivity at the time of impact.

The nose and main landing gear were intact and indicated minor impact abrasions. The landing gear selector switch was in the up position.

The fuel selector was observed in the "Right Tank" and "To Engine" position. The right fuel tank cap was

secure in place and the right fuel tank contained no fuel. (Recovery crew stated 15 gallons were drained at the scene) The left fuel tank cap was secure in place and the tank was breached due to wing crush damage.

The primary attitude indicator/gyro unit was removed and disassembled. The instrument components were intact with no evidence of gyro rotor or case scoring.



Figure 10. Airframe wreckage examination

ENGINE

Lycoming O-360-A1A, S/N L-1646-36
Time since overhaul: 1558 hours
Last Inspection: 10 July, 2019

A The JPI engine data monitor EDM 700 was removed and evaluated to have had no recorded data due to the model type.

The engine remained attached to the airframe and mounts and the propeller remained attached to the flange. An external visual examination of the engine revealed packed dirt and organic matter throughout the engine and accessories. There was no evidence of pre mishap catastrophic mechanical malfunction or fire. The no. 2 cylinder exhibited impact damage and was missing a rocker box cover and push rods.

The accessory section exhibited impact damage. The carburetor, right magneto, engine driven fuel pump and propeller governor were displaced from their mounts with fractured attachment plates that exhibited overload deformation signatures.

The propeller was removed, and the engine crank shaft manually rotated through an accessory drive. The crank shaft rotated smoothly, and compression was obtained in the proper firing order. All rocker valves moved with normal lift action. The number two cylinder rocker lift action was verified at the tappet.

The upper spark plugs were removed and indicated normal wear with dark coloration indicative of possible oil settlement during storage.

The oil sump was intact, and the suction screen was clear of debris or metal contaminants.

The magnetos were removed, and spark was indicated on each unit at all terminals. The left magneto impulse coupler was functional. Magneto timing could not be determined due to a fractured flywheel.

The carburetor was removed and disassembled. The float pontoons were secure on the arm and mounting bracket. The bowl was compromised at impact and no fuel was present. The throttle control cable was attached to the control arm, and the mixture cable was pulled from arm attachment. The inlet screen was clean. The carburetor heat box was displaced, and the control rod was deformed and in the “hot” position. The foam air filter inlet was intact and free of any pre-impact obstruction to flow.

The engine driven fuel pump exhibited impact damage. The fuel pump mounting flange remained secure at the mounting pad. The separation signatures were consistent with overload. The internal diaphragm was torn, and no foreign debris was observed.

The engine driven vacuum pump was secure at the pad. It was disassembled and examined. The drive and vanes were intact with no foreign matter present.



Figure 11. Engine, propeller and forward fuselage

The propeller spinner exhibited impact crush damage. The propeller blades were loosely attached to the hub. The propeller hub had been fractured due to the absorption of impact energy. The flywheel was fractured, and the ring support had been displaced. The propeller blades were marked as A, B and C for narrative purposes. Propeller blade “A” was situated in the fractured hub socket and deformed forward in a 360° curl

at the outer half. Extensive chordwise scratches, deep leading edge cuts, and a minor trailing edge S bending was present. A section of propeller blade tip had been torn off. Blade “B” was loose in the hub and bent inward and forward at the mid span with significant impact damage on the leading edge. A section of propeller blade tip had been torn off. Blade “C” was deformed the least, with a forward span wise bend and leading-edge impact marks. The propeller blade signatures, together with tree cuts at the scene, are consistent with impact with engine power on.



Figure 12. Propeller

C. SUMMARY

There were no pre-impact anomalies discovered during the airframe and engine exam that would have resulted in a loss of control in flight. The engine exhibited crank shaft and valve continuity, as well as cockpit control continuity. Flight control continuity was established. The separation signatures of the wing and empennage sections were consistent with impact with trees during forward flight.