

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



ANC23FA074

ONSCENE EXAM REPORT

September 21, 2023

A. ACCIDENT

Location: St Marys, Alaska
Date: September 12, 2023
Time: 2047 LCL
Airplane: Piper PA18-150, Reg: N109T

B. PARTICIPANTS

IIC	Elliott Simpson NTSB
Party Coordinator	Mitch Mitchell FAA AVP-110
Party Coordinator	Kathryn Whitaker Piper Aircraft
Party Coordinator	Dave Harsanyi Lycoming Engines

C. SUMMARY

Initial examination at the accident site on September 15, 2023, indicated that the airplane appeared well maintained and in good overall condition. Flight surface and engine control continuity was established throughout, and the propeller displayed damage signatures consistent with rotational energy at impact. Fuel was found in both wing fuel tanks. Five hundred and twenty pounds of cargo, consisting primarily of moose meat was found distributed throughout the airplane, and an antler was mounted to the right wing strut.

D. DETAILS OF THE EXAMINATION

1.0 Accident Site

The airplane came to rest on a 30° slope, at an elevation of 1,210 ft, about 600 ft east of the departure end the north runway. The surrounding area consisted of rolling hills, covered in moss and grass, and distributed with low-lying shrubs and bushes (see figure 1).

The fuselage was on a north heading, and both wings were partially attached and generally in line, on a northwest-southeast heading. The first identified point of

impact was about 20 ft below the main wreckage and consisted of a divot in the soil that contained blue and white paint fragments. About 5 ft further uphill in a west direction was the right wing landing light assembly, and right window frame. A further 5 ft uphill was a large divot in the soil that matched the general dimensions of the main landing tire. Adjacent to this hole was the propeller (see figure 2).

2.0 Airframe

The airframe dataplate located on the lower left side of the footwell indicated a model number of PA-18-105 SP. The dataplate under the right horizontal stabilizer appeared to have been custom made and gave a model number of PA 18 150. Both plates showed a serial number of 18 2223.

The forward end of the fuselage was crushed through to the lift struts; the cabin had opened on the right side and the forward and roof windshield had shattered, leaving clear access to the instrument panel, front seat, and rear compartments. The tail section and most of the aft fuselage remained attached and was largely undamaged. The flap control handle position at the time of the accident could not be determined due to impact damage. The fore and aft throttle controls appeared to be $\frac{3}{4}$ short of the forward "OPEN" position. Both the fuel mixture and engine prime handle were in the full forward position; the prime handle was locked. The carburetor heat control was about $\frac{3}{4}$ inch short of full forward. The ignition key had broken off in its switch, which was in the "BOTH" position.

The front (pilots) seat remained attached to the floor structure but had tilted forward. The lap and shoulder harness were unlocked. The shoulder "Y" harness remained attached to the roof structure and was in the fully retracted position. It could be moved freely back and forth within its retraction mechanism, and locked when pulled rapidly.

The instrument panel had folded forward on the left side in the lower area next to the cabin heat controls, and the Garmin GPSMap 695 unit had been ejected from its housing in the panel and was located on the floor. The lower forward section of the cabin surrounding the foot pedals was intact and showed minimal aft deformation. The lower right instrument panel in the area of the circuit breakers appeared to have sustained damage due to impact with the pilot's upper body and face. All circuit breakers were in, except for the alternator breaker which had popped. The Master, NAV, AUX, and BEC combination circuit breakers/switches were in the down position. The forward control stick was installed at its base in the control column assembly.

The fuel selector valve was in the "BOTH" position, and movement resulted in a positive detent.

The left main landing gear remained attached and had folded outboard. The right main landing gear had partially detached and folded under the fuselage. Both main wheels remained attached to their hubs.

The belly pod remained attached and had not shifted. The rear loading door was closed and secure. The forward section of the pod appeared to have been breached and contained evidence of soil along with the meat cargo.

There was no evidence of bird matter or feathers to any of the airplane's structure.

The ELT remained attached to the airframe and its antenna; its remote switch was in the "armed" position, and during recovery, its integral switch was also found in the "armed" position.

2.1 Empennage

The vertical and horizontal stabilizer remained firmly attached to the tail section and did not appear to have sustained any damage. The vertical stabilizer pitch trim actuator jackscrew shaft showed 13 exposed threads below the control surface (see figure 3), which correlated to a partial nose down trim position. According to Piper, 17 visible threads would correlate to full nose down trim (4°), and no threads visible would correlate to full nose up trim (-2.5°).

The elevator was intact, and its control cables were continuous to the control sticks.

The rudder remained attached to the vertical stabilizer by its hinges and was undamaged. Its control cables were continuous from the rudder horn through to the foot pedals. The tailwheel assembly remained attached to the airframe and the control horn by its chains.

2.2 Wings

Left Wing

The left wing was largely intact and remained connected by its main spar and lift struts to the fuselage (see figure 4). The aft spar attachment fitting had pulled away from the fuselage and exhibited fresh and bright granular surface features at the fracture. Leading edge tip damage was present, and paint fragments had delaminated from most of the top wing skin surface.

The left aileron remained attached to the wing by its hinges. Its control cables were continuous to the control stick assembly. The flap remained attached by its hinges

but had folded underneath the wing surface. The flap pushrod had separated at its eye bolt, with bending damage and granular surface feature. The control cable had separated about 6 inches from the bellcrank and exhibited splayed and unravelling wire damage.

The fuel tank was intact and unbreeched, but all fuel vent and supply lines at the root had pulled away from the fuselage. The fuel cap was in place at its filler neck, and an undetermined quantity¹ of fuel was observed within the tank (the wing leading edge was pointing about 30° down at the time of examination, and at least 2 inches of fuel was observed through the filler neck).

Right Wing

The right wing sustained leading edge damage at the tip and had bent up about 20° at the outboard 1/3 of its span (see figure 5). It remained attached to the fuselage by both the main and aft spar along with the lift struts. Similar paint damage was observed. The antler rack remained attached in the same manner as observed in the pre-flight photo, and there was no evidence it was impinging on the aileron cables within the strut (see figure 11).

The right aileron remained attached to the wing by its hinges. Its control cables were continuous to the control stick assembly. The flap remained attached by its hinges, and the inboard 18-inch section was folded 90° up and against the side of the cabin wall. The flap cables were continuous from the bellcrank to the cabin control.

The right fuel tank was similarly intact and contained an undetermined quantity of fuel.

3.0 Engine

Model: O-320-B2B

Serial: L-19762-39A

Power: 160 HP @ 2,700 RPM. (per data plate)

The engine sustained minimal damage during the accident sequence and remained partially attached to the firewall by its bent and fractured mount (see figure 6).

All engine accessories remained in place, and the magnetos were still firmly attached to their respective pads. All engine controls were continuous from their respective

¹ The pilot stated to one of the hunters that that based on his calculations, the airplane should be "at reserves" upon arrival at Holy Cross, the destination airport.

control arms through to the cabin controls. The inlet air filter, although crushed, was free of obstruction. The oil sump contained about 7 quarts of oil when viewed utilizing the dipstick (with the engine in a right side-down position). The oil suction screen was unobstructed, and the oil filter remained firmly attached to its pad; there was no evidence of oil leaking anywhere on the engine. The oil filter was removed, and no debris was observed within its cavity, which contained residual quantities of oil.

All fuel and oil lines were secure and remained attached at their respective fittings. The fuel strainer contained residual quantities of fuel, and its screen was clear. The engine was not equipped with an engine-driven fuel pump.

The throttle butterfly valve was in the closed position, and movement of its control arm resulted in movement of the valve, along with a release of fuel from the accelerator pump nozzle. The fuel inlet screen was free of debris. The sump was removed, and there was clean fuel in the bowl which was negative for water when checked with water detecting paste. The floats were of the brass type and were free of damage. There was no evidence of float assembly-to-bowl contact.

All top spark plugs (and lower plugs for cylinder 2,3,4) were removed and examined. Their electrodes remained mechanically intact, coated in light grey deposits, and displayed normal wear signatures when compared with the Champion Spark Plugs AV-27 Check-A-Plug chart (see figure 7). The lower plugs for cylinders number 3 and 4 displayed evidence of lead deposits within the ceramic cavity, however the deposits did not appear to be fouling the electrode. The exhaust pipes exhibited light grey deposits and were free of oil residue.

The magnetos were removed, and sparks were observed at the termination of each top spark plug lead when the input shaft was rotated by hand.

The crankshaft turned freely when rotated by hand utilizing the crankshaft flange, and both cylinder compression and suction was noted on all cylinders. Mechanical continuity was established through to the accessory gears, and all rocker arms moved approximately equal distances. Visual inspection of the combustion chambers was accomplished through the spark plug bores utilizing a borescope; there was no evidence of catastrophic internal damage and all combustion surfaces exhibited light grey deposits consistent with normal operation.

4.0 Propeller

The propeller had detached from the crankshaft flange. Each blade exhibited similar damage including twist, leading edge nicks and dents (see figure 8), trailing edge S-bending, and chordwise scratches. One blade tip had torn away at an angle of about

30° relative to the chord (see figure 9) and exhibited granular and jagged surface fracture features.

5.0 Cargo

A total of 520 pounds of cargo, consisting of moose meat, antlers, a flight bag and clothing were located in the wreckage, distributed as follows:

Pod (forward end):

- Leg - 110 lbs
- Various cuts - 40 lbs

Rear seat area:

- Hind quarter - 150 lbs
- Ribs - 50 lbs
- Various cuts - 70 lbs

Undetermined location, (found outside of airplane):

- Flight bag and airplane tools/caps - 30 lbs

Right wing struts:

- Antlers - 70 lbs.

Review of video footage taken during the accident takeoff indicated that the hind quarter in the rear seat area was sitting upright behind the pilot. At the accident site, the hind quarter remained securely tied to the upper fuselage frame and secured with the aft seatbelts. The rib section was similarly secured with the seat belt. The meat appeared to have moved forward with the buckled airframe and was resting on top of the aft flight control stick base (the aft control stick was not installed) (see figure 10). The meat was not touching the pilot's seat.

The meat in the cargo pod was in the full forward position.

6.0 Photographs



Figure 1 - Accident site with runway and takeoff location indicated in red



Figure 2 - Airplane at accident site



Figure 3 - Pitch trim jackscrew



Figure 4 - Left wing



Figure 5 - Right wing



Figure 6 - Engine

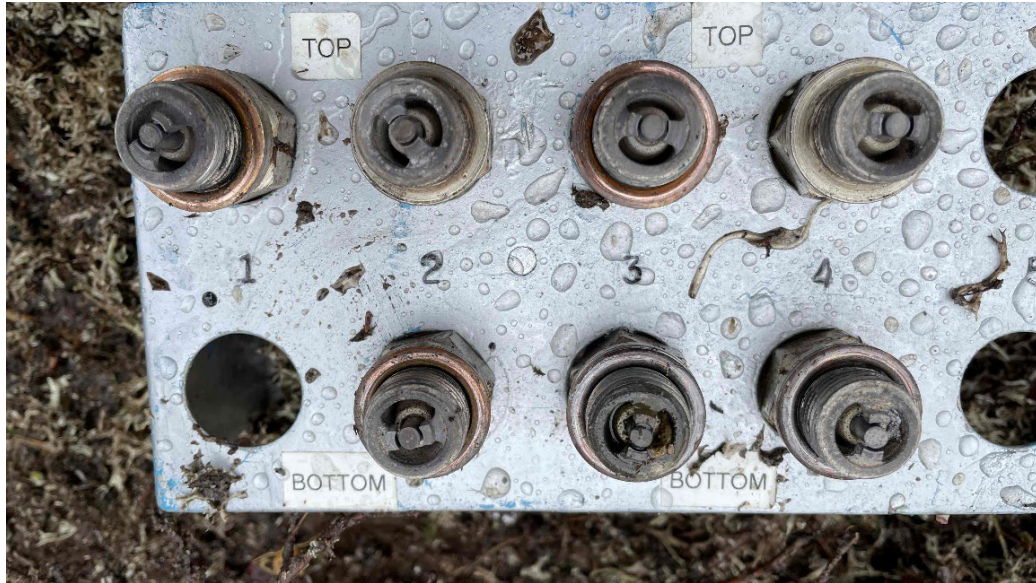


Figure 7 - Spark plugs



Figure 8 - Propeller tip



Figure 9 - Propeller tip

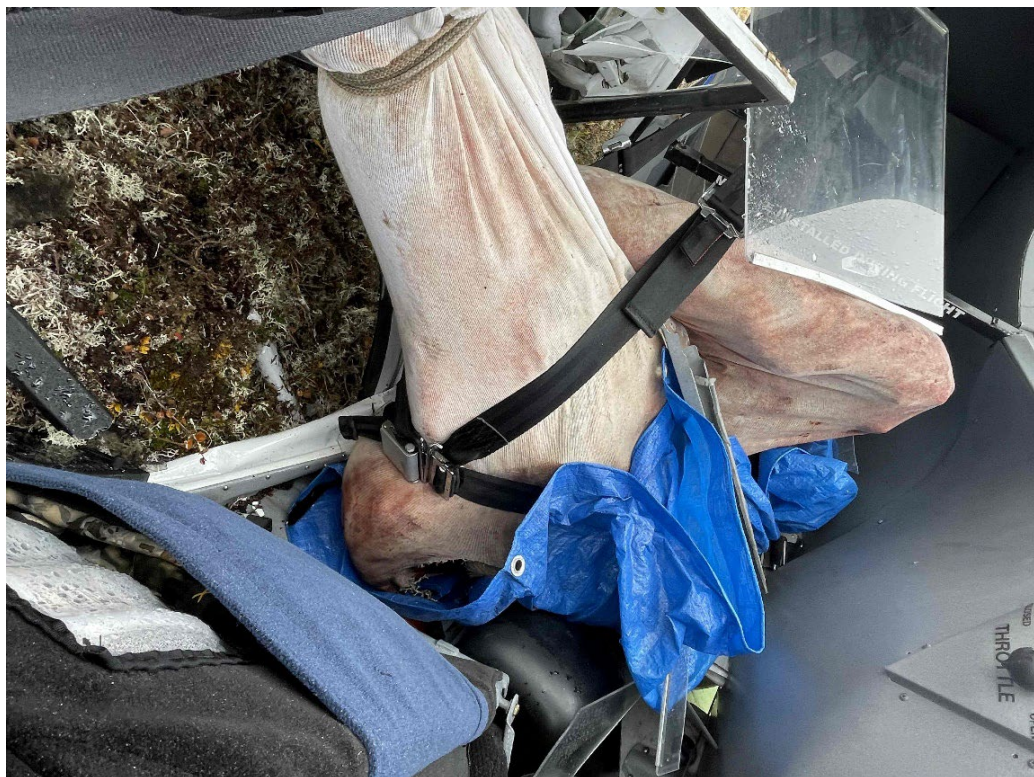


Figure 10 - meat in rear cabin



Figure 11 - Antler mounted to right wing

Submitted by:

Elliott Simpson
Senior Aviation Accident Investigator