

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



ANC24FA008

STRUCTURES

Group Chair's Factual Report

September 1, 2025

A. ACCIDENT

Location: Anchor Point, Alaska
Date: December 8, 2023
Time: 1315 Alaska Standard Time (AST)
2215 Coordinated Universal Time (UTC)
Airplane: Piper PA-18-150, N1880P

B. STRUCTURES GROUP

Group Chair	Clinton R. Crookshanks National Transportation Safety Board Aurora, Colorado
Group Member	Leani Benitez-Cardona National Transportation Safety Board Washington, District of Columbia
Group Member	Fred Adams Federal Aviation Administration Juneau, Alaska
Group Member	Eric Berg Federal Aviation Administration Anchorage, Alaska
Group Member	Jonathon Hirsch Piper Aircraft, Inc. Vero Beach, Florida

C. DETAILS OF THE INVESTIGATION

On December 8, 2023, about 1315 Alaska standard time (AKST), a Piper PA-18-150 airplane, N1880P was destroyed when it was involved in an accident near Anchor Point, Alaska. The airplane wreckage was recovered to the Alaska Claims Services facility in Wasilla, AK. The group examined the wreckage on February 27-28, 2024, and on May 13-14, 2025.

D. FACTUAL INFORMATION

1.0 Video Information

A vehicle dash-mounted camera recorded about 7 seconds of the airplane descent. The NTSB Recorders lab enhanced the video and produced a frame-by-frame flipbook. The video captured the airplane in an inverted flat spin as it

descended vertically before disappearing behind trees on the side of the road. Review of the video and flipbook showed the airplane was partially intact when it first came into view. The right wing appeared mostly intact and attached to the fuselage (Figure 1). The fuselage appeared mostly intact, but the aft fuselage was deformed left between the wing and tail. The empennage, landing gear, and wheel skis appeared intact and installed. The propeller did not appear to be turning during the descent. The left wing appeared to be fractured from the fuselage but remained attached to the fuselage by the wing struts. The left wing appeared deformed in a V-shape.



Figure 1. Cropped video frame of accident airplane during descent (NTSB photo)

2.0 Piper PA-18-150 Wing

All wing stations (WS) identified were measured in inches outboard of the wing root. The Piper PA-18-150 fabric covered wing is equipped with aluminum I-beam type forward and aft spars that run the length of each wing (Figure 2). The spars are connected together by 3 single element drag struts at WS 43, WS 83, and WS 178 and 1 three element N-brace drag strut at the wing strut attach point location between WS 116 and WS 123. There is a diagonal brace tube installed between the spars at the inboard end where the fuel tank is installed. Diagonal cross brace wires are installed in an 'X' configuration between the spars between drag strut locations. The wing aerodynamic shape between the spars is defined by lightweight aluminum truss-style ribs at 14 locations along the span. Lightweight truss style or stamped leading edge ribs are installed coincident with the wing ribs with additional leading edge ribs installed between each interspar rib location. The leading edge is covered

with aluminum skins. Additional aluminum upper wing skins about 10 inches wide were installed aft of the forward spar on the accident airplane. A fuel tank is installed between the two inboard wing ribs with the diagonal brace running through the tank.

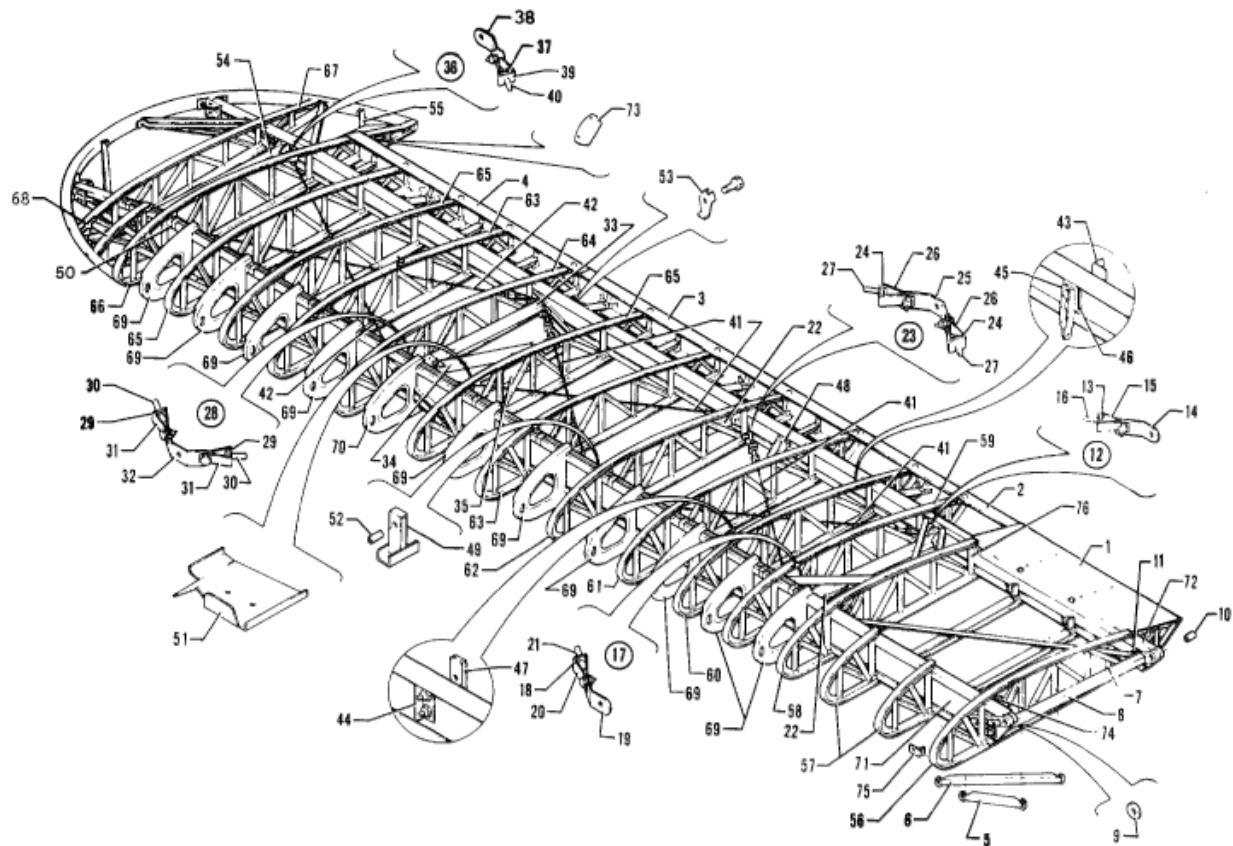


Figure 2. Piper PA-18-150 Internal wing structure (Piper diagram)

3.0 Wreckage Examination

The examination focused on the left wing and fuselage based on the video evidence. The airplane came to rest on its left side in an area of low brush and trees. The right wing was intact, mostly undamaged, and remained attached to the fuselage. The right wing lift struts were intact and remained attached to the right wing and fuselage but were cut near the lower ends and near the jury struts by first responders. The empennage remained attached to the fuselage but had sustained damage due to tree impact.

3.1 Left Wing

All major items of the left wing were recovered at the impact site.

The inboard left wing, about 40 inches long, was partially attached to the fuselage and was rotated down against the fuselage as recovered. The inboard left wing was rotated up to horizontal for the exam. The forward wing attach point was

intact with the bolt installed. The aft wing attach point was intact with the bolt installed but the wing fitting was fractured from the wing and the lug was jammed down against the fuselage. The forward spar upper cap was fractured near WS 46, and the lower cap was fractured near WS 40. The forward spar was deformed aft and twisted leading edge up near WS 34 (Figure 3). The outboard 2 inches of the forward spar upper cap was twisted leading edge down adjacent to the fracture. There was a diagonal crease in the forward spar web that ran from about WS 34 at the upper cap to about WS 40 at the lower cap. The left wing leading edge skin remained attached between the root and the joint near WS 34. The WS 34 leading edge rib was crushed aft against the forward spar.



Figure 3. Left wing forward spar fracture, looking down (Piper photo)

The aft spar was partially fractured near WS 46 and fully fractured near WS 56. The aft spar was deformed aft and twisted leading edge up between about WS 28 and WS 46 and deformed forward between about WS 46 and WS 56 (Figure 4).



Figure 4. Left wing aft spar fracture, looking down (Piper photo)

The drag strut normally installed between the spars near WS 43 was separated from the spars but remained attached to one of the cross-brace wires. The forward end was fractured near the aft end of the forward spar attach bracket and had witness marks consistent with rotation outboard. The aft end was attached to the aft spar attach bracket but the bolt was pulled through the aft spar web with the bolt intact. There was a lateral cable witness mark and dent about 5 inches from the forward end of the WS 43 drag strut consistent with the location of the aileron balance cable. The cross-brace wire normally attached between the forward end of the WS 43 drag strut and the aft end of the WS 83 drag strut was fractured through the threads at the forward spar attach point. The cross-brace wire remained attached to the aft spar at the WS 83 drag strut. The cross-brace wire remained attached to the aft end of the separated WS 43 drag strut and the forward end of the WS 83 drag strut but was cut during the examination.

The fuel tank remained installed in the inboard left wing. According to the FAA the fuel caps were incorrect per STC SA02040AK. The upper skin of the fuel tank was deformed down and there was diagonal buckling between the inboard, forward corner and the outboard, aft corner. The outboard weld on the fuel tank was

fractured and splayed open. There was a distinct impact impression on the forward outboard corner of the fuel tank consistent with impact with the forward spar upper cap. The diagonal brace tube between the spars through the tank was pushed aft where the forward spar was deformed aft, and the aft inboard end of the diagonal brace was buckled. The flap remained attached to the inboard wing and was bent down about 90° near WS 46. The forward rod end on the flap push rod was fractured. There was a tree branch punctured through the lower inboard wing skin and wing root.

The leading edge skin between the joints at WS 34 and WS 67 was separated and fractured into two pieces. The skin pieces were flattened and there was damage consistent with impact noted between WS 36 and WS 62 (Figure 5). The upper portion of the leading edge skin between WS 40 and WS 50 had mechanical tearing damage and the lower portion had an upward semi-circular impression. The leading edge fabric was torn and damaged coincident with the leading edge skin damage. There were diagonal witness marks on the upper leading edge fabric in an inboard and aft direction.



Figure 5. Left wing leading edge skin and fabric damage (NTSB photo)

The outboard wing was mostly intact with significant damage from WS 40 to the tip. The spars, ribs, drag struts, and cross brace wires were contained by the fabric wing skin and stitching. The forward and aft spars were separated from the

fabric during the examination. The forward spar was mostly intact and straight from the fracture near WS 46 to WS 110. There were cable witness marks on the forward spar outboard fracture faces near WS 46. The forward spar was bent aft about 90° near WS 110 and mostly intact and straight from WS 110 to the tip. The forward spar was partially fractured near the bend at WS 110. The forward spar was cut near WS 131 to aid in the examination. The leading edge skin and added upper skin remained mostly attached to the forward spar from the joint near WS 67 to the tip. The WS 83 drag strut was separated from the forward spar. The forward end of the WS 83 drag strut was fractured through the attach fitting and the aft end was fractured and bent about 12 inches forward of the aft spar. The WS 83 drag strut was also bent about 12 inches aft of the forward end. The WS 83 drag strut forward attach bolt remained installed through the forward spar web and retained a 1-inch long piece of the fitting. The aft end of the WS 83 drag strut remained attached to the aft spar. The N-brace drag strut normally installed near the lift strut attach points between WS 116 and WS 123 was separated. The forward fittings were pulled from the bolts in the strut fittings and the fitting threads were stripped. The N-brace attach bolts remained installed in the forward spar lift strut fitting with remnants of the fitting threads. The aft ends of the N-brace were fractured from the aft spar with the fittings still attached to the aft spar. The forward spar lift strut attach fittings remained attached to the forward spar and were deformed slightly down below the lower attach bolt. The cross-brace wires between the WS 83 and WS 123 drag struts were intact between the forward and aft spars but were cut during the examination. The WS 178 drag strut remained attached to the forward and aft spars but was fractured about 12 inches aft of the forward spar. The cross-brace wires between the WS 123 and WS 178 drag strut were intact but cut during the exam.

The aft spar was deformed forward in a large arc and twisted leading edge down between the fracture near WS 56 and a fracture between WS 133 on the upper cap and WS 136 on the lower cap (Figure 6). There was a fracture in the lower cap near WS 90 and a fracture in the upper cap near WS 97 coincident with chordwise bending deformation. The aft spar was mostly intact and straight from WS 136 to the tip. There was no reinforcement installed on the rear spar in the area of the lift strut attach fitting which would be consistent with the installation of an STC to increase the gross weight (STC SA00997CH). The original Piper style truss ribs were damaged and mostly separated from the spars and retained by the fabric stitching. The left aileron remained attached to the outboard aft spar section and was deformed spanwise aft and down about 90° near the mid-span point. The three aileron hinges were intact and free to move with the hangers attached to the aileron. The inboard aileron hanger was fractured about 1 inch aft of the aft spar and the center hanger was pulled from the rear spar. The center hanger bolt remained installed in the aft spar.



Figure 6. Left wing aft spar deformation (NTSB Photo)

The left forward and aft lift struts remained attached to the fuselage and the spars on scene but were cut during recovery. The leading edge of the forward lift strut was facing aft, and the leading edge of the aft lift strut was facing forward at the lower ends where they attached to the fuselage (Figure 7). There was hardened and crystalized linseed oil inside the lower ends of the lift struts where they were cut. The lower lift strut attach points were disassembled. There was no nut on the aft lower attach bolt but there was a cotter pin and washer installed. The low-profile castellated nut on the forward bolt was fractured through one side. The tangs of both lower strut fittings were spread apart and the bolts had mashed threads. The fuselage lugs were deformed down, and both holes were elongated.



Figure 7. Left lift struts, lower ends, attached to fuselage (NTSB Photo)

The forward lift strut was cut about 13 inches above the lower attach point and was bent and deformed about 6, 29, 61, 86, 101 and 106 inches from the lower attach point. The forward lift strut was also cut about 6 inches below the upper attach point. There was an impact impression with black transfer marks on the upper surface of the forward lift strut between about 9 and 13 inches from the lower attach point. There were black transfer marks on the leading edge and upper surface of the forward lift strut between the deformations at 29 and 61 inches above the lower attach point. The forward jury strut was intact and remained attached to the forward lift strut and the upper fitting was fractured from the forward spar. The forward jury strut was rotated about 30 degrees inboard about the lower attach point. There were black transfer marks on the leading edge of the forward jury strut. The spreader bar remained attached to the forward jury strut but was fractured from the aft jury strut.

The aft lift strut was cut about 8 inches above the lower attach point and was bent and deformed about 6, 42, 65, 78, 94 and 105 inches from the lower end. The aft lift strut was also cut about 3 inches below the upper end. The aft jury strut remained attached to the aft lift strut and the upper fitting was fractured from the aft spar. The aft jury strut was rotated about 30 degrees outboard about the lower attach point.

All the wing fracture surfaces examined exhibited an angled, dull, grainy appearance consistent with overstress separation. There was no appreciable corrosion or evidence of pre-existing fractures noted.

The wing fabric between about WS 33 and WS 67 that included the black leading edge and portions of the upper red and lower white painted fabric was

removed from the wing for further evaluation. The inboard piece of fabric was cut near WS 33 and was torn near WS 50 where the wing fractured. The outboard piece extended from the tear near WS 50 to about WS 67 where it was cut. The wing fabric was sent for bird residue testing. Swabs of two areas on the aluminum leading edge skin in the vicinity of WS 40 were also taken and sent for testing. Testing by the Smithsonian Institution's Feather Identification Lab did not find any trace of bird DNA on any items. Some small, microscopic feather fragments were recovered from the wing fabric that were consistent with the jacket filling from one of the occupants. The wing fabric was then sent to the NTSB Materials Lab for further examination.

3.2 Fuselage

The airplane impacted the tree and brush covered terrain in an inverted, nose low attitude. A tree had penetrated the aft fuselage from the upper to lower surfaces just forward of the vertical stabilizer. The left side of the aft fuselage appeared to be crushed inward in the vicinity of the N-number (Figure 8). The fabric was cut away and the tube truss structure was examined. Figure 9 identifies the individual truss elements that were bent and fractured.



Figure 8. Aft fuselage, left side (Piper photo)

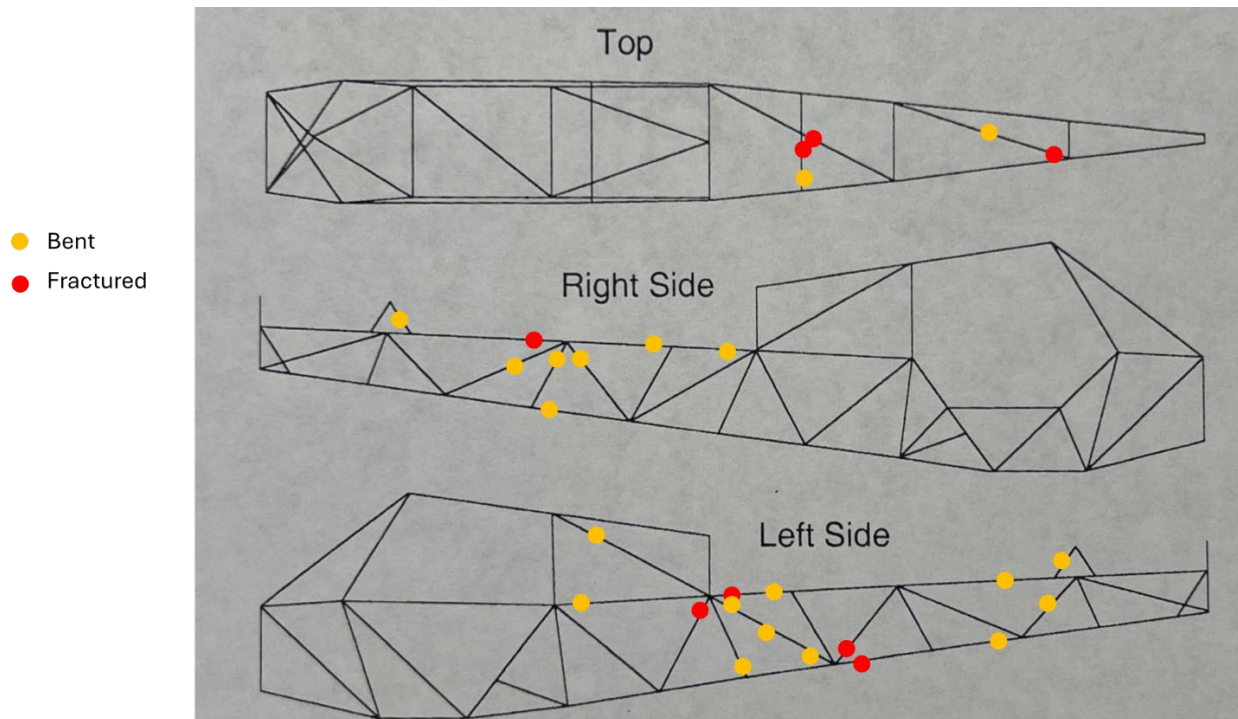


Figure 9. Fuselage truss structure damage (NTSB diagram)

3.3 Empennage

The empennage was mostly intact but damaged. The elevators and rudder remained attached. The right horizontal stabilizer was crushed, deformed, and the fabric was punctured along its length consistent with tree impact as noted in on scene photos. The leading edge tube was fractured from the forward attach point. The horn area on the right elevator was deformed upward consistent with tree impact as noted in on scene photos. The left horizontal stabilizer and elevator were intact and mostly undamaged on scene but were damaged during recovery. The upper half of the vertical stabilizer was crushed and deformed down and left consistent with tree and ground impact as noted in on scene photos. The rudder was mostly intact and installed.

3.4 Propeller

The airplane was equipped with a Hartzell two bladed, constant speed propeller with composite blades (HC-C2YR-1N/NG8301). The propeller hub remained attached to the engine with portions of the composite blades still installed and the spinner still attached (Figure 10). The spinner was crushed against the hub around half the circumference on the side that was facing down at the impact site. One of the propeller blades was fractured near the shank and was found beneath the nose of the airplane with the blade butt pointing down towards the fractured blade. This propeller blade exhibited a jagged fracture with damage to the leading and

trailing edges and camber and face sides around the fracture. The other propeller blade was missing about 7.5 inches of the blade tip. The blade tip was not recovered. The propeller blade with the missing tip had some chordwise scuffing on the camber side and had a transverse fracture from leading edge to trailing edge (Figure 11). The metallic leading edge erosion strip was deformed aft at the fracture location and the face side of the erosion strip was buckled (Figure 12). Swabs of the camber and face sides of the fractured propeller blade were taken for testing. Testing by the Smithsonian Institution's Feather Identification Lab did not find any trace of bird DNA. The fracture propeller blade was sent to the NTSB Materials Lab for further examination.



Figure 10. Propeller and spinner (NTSB photo)



Figure 11. Propeller blade with missing tip, camber side (NTSB photo)



Figure 12. Propeller blade with missing tip, face side (NTSB photo)

Submitted by:

Clinton R. Crookshanks
Aerospace Engineer (Structures)