



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

STRUCTURES GROUP CHAIRMAN'S FACTUAL REPORT

October 4, 2018

A. ACCIDENT WPR18FA091

Location: Minden, Nevada
Date: February 19, 2018
Time: 1130 Pacific Standard Time (PST)
Operator: Private Individual
Aircraft: Piper PA-34-200T Seneca II, N14GQ

B. STRUCTURES GROUP

Chairman: Clinton R. Crookshanks
 National Transportation Safety Board
 Denver, Colorado

IIC: Andrew Swick
 National Transportation Safety Board
 Phoenix, Arizona

Investigator: Noreen Price
 National Transportation Safety Board
 Anchorage, Alaska

Investigator: Maja Smith
 National Transportation Safety Board
 Seattle, Washington

Member: Jon Hirsch
 Piper Aircraft, Inc.
 Wichita, Kansas

C. SUMMARY

On February 19, 2018, about 1130 Pacific standard time, a Piper PA-34-200T, N14GQ, was

destroyed when it collided with the ground northwest of the Minden-Tahoe Airport (MEV), Minden, Nevada. The commercial pilot was fatally injured. The airplane was registered to the Stunad, LLC, and operated by the pilot under the provisions of Title 14 *Code of Federal Regulations Part 91* as a personal flight. Visual meteorological conditions prevailed and a flight plan was not filed. The flight originated from Meadows Field Airport (BFL), Bakersfield, California, about 0900 with an intended destination of MEV.

D. DETAILS OF THE INVESTIGATION

1.0 Airplane Overview

The Piper PA-34-200T Seneca II is a twin engine, low wing, all metal airplane with a conventional tail and retractable tricycle landing gear (Figure 1¹). The airplane is 28 feet, 7.47 inches long, 9 feet, 10.8 inches tall at the tail, and has a wingspan of 38 feet, 10.87 inches. The airplane is powered by two Continental TSIO-360E reciprocating 6-cylinder engines with Hartzell 2-blade tractor propellers. The accident airplane, S/N 34-7870455 was manufactured in 1978. The station reference line diagram is shown in Figure 2. The type certificate data sheet for the airplane lists a never exceed speed (V_{NE}) of 195 knots, a maximum structural cruising speed (V_{NO}) of 165 knots, and a maneuvering speed (V_A) of 122 knots. The airplane was certificated in the normal category and the Pilot's Operating Handbook (POH) lists limit load factors of -0 g and +3.8 g in the Limitations section.

The all metal wings are designed with a main spar located near the mid-chord point and an aft spar at the aft end of the main wing box. Wing ribs, stringers, and skin make up the interspar structure. The leading edge ribs and skins are cantilevered off the front side of the main spar. The wing main spar is a machined aluminum I-beam from the side of body to about wing station (WS) 143 and a stamped aluminum C-channel from about WS 143 to the tip near WS 221. Aluminum splice plates join the main spar sections near WS 143. The inboard ends of the wing main spars are installed in the center wing box and attached with 10 bolts on the upper spar cap and 12 bolts on the lower spar cap. The flaps are attached to the aft side of the rear spar. Two fuel tanks are installed in the leading edge of each wing forward of the main spar and outboard of the engine nacelles. The airplane had Supplemental Type Certificate (STC) SA154NW incorporated that removed the ailerons, installed full span flaps with a modified deployment route, installed spoilers above the flaps for roll control, and installed conical cambered wing tips.

The all metal stabilator is designed with a main spar located near the 1/3-chord point and an aft spar at the aft end of the main stabilator box. Corrugated stiffened upper and lower skins make up the stabilator interspar structure. A combination trim and anti-servo tab is installed on the stabilator rear spar between left buttock line (LBL) 60 and right buttock line (RBL) 60. The stabilator is attached to two hinges between the stabilator main spar and a bulkhead near fuselage station (FS) 285.

2.0 Wreckage Site Overview

The airplane impacted flat, brush covered terrain near Minden, Nevada, about 4.1 miles northwest of

¹ All Figures are presented in Appendix A.

the destination airport. The main wreckage site included the wreckage of the fuselage, center wing box, the inboard wings with attached engines, and most of the right outboard wing. The airplane impacted inverted and was crushed vertically. The left wing outboard of the nacelles, portions of the right wing, stabilator, vertical stabilizer and rudder, and nose cone assembly were separated from the airplane and recovered up to 1.0 mile south-southeast of the main wreckage.

3.0 Wreckage Examination

The group examined the airplane wreckage at the Air Transport facility in Phoenix, Arizona, October 2-4, 2018.

The stabilator was separated from the fuselage and recovered in 4 pieces in the debris field (Figure 3). The largest piece included the mostly intact center portion and right half of the stabilator spanning from about LBL 7 to the right tip at RBL 81.35. The right stabilator leading edge was deformed downward between about RBL 12 and RBL 33. The right upper leading edge skin was separated from the main spar between about RBL 7 and RBL 26. The right stabilator upper skin between the forward and rear spars was pillowed downward along the entire span. There was a buckle in the leading edge near RBL 58. The right stabilator tip was intact and remained attached. The stabilator tab was intact and attached to the stabilator from the right end at RBL 60 to about left buttock line (LBL) 5 with some buckling of the trailing edge. The two stabilator hinge fittings remained attached to the main spar and were attached to the fuselage pivot fittings through the intact hinge bolts. The fuselage hinge fittings were pulled from the fuselage. The upper stabilator stops on the fuselage hinge fittings were deformed up and right and the head of the left upper stop bolt was separated. There were corresponding impact impressions on the stabilator hinge fittings where the stops contacted the fittings. The left lower stabilator stop was deformed to the left and the right lower stabilator stop was intact with no apparent damage. The balance tube and weight were separated from the main spar and not identified in the recovered wreckage. The right lower stabilator skin was pillowed downward from the root to about RBL 60. The right lower stabilator skin was separated from the rear spar between RBL 35 and RBL 60. The stabilator trim actuator remained attached to the center portion of the stabilator. The stabilator trim jack had 14 threads exposed which corresponds to a partial nose down trim setting.

The left portion of the stabilator was separated into 3 smaller pieces and recovered in the debris field. The largest piece of the left stabilator included the main spar and leading edge outboard of about LBL 7 and the upper and lower skins outboard of about LBL 60. The left stabilator leading edge was deformed downward between LBL 12 and LBL 43 similar to the right stabilator leading edge. The stabilator main spar upper cap was fractured near LBL 7 and the lower cap was fractured near LBL 12. Matching of the stabilator main spar fracture surfaces and the surrounding deformation were indicative of the left portion of the stabilator separating in a downward and aft direction with some amount of leading edge down twist. The main spar fracture surfaces all had a dull, grainy appearance consistent with overstress separation. A portion of the left upper stabilizer skin between the spars from about LBL 8 to LBL 24 was separated and recovered in the debris field. A portion of the left stabilator upper skin between the spars from about LBL 24 to LBL 60 with the rear spar and left portion of the tab attached was separated and recovered in the debris field. The left stabilator upper skin pieces were pillowed downward along the entire span. A portion of the left stabilator lower skin between the spars from about LBL 7 to LBL 38 was not identified in the recovered wreckage. The recovered portions of

the left stabilator lower skin were pillowed downward along the entire span. The left stabilator tip was fractured and portions remained attached.

The vertical stabilizer was separated from the fuselage and recovered in the debris field. The vertical stabilizer was mostly intact and undamaged (Figure 4). The forward portion of the fiberglass fairing was torn. The rudder remained attached at all three hinges, but the upper portion of the rudder and counter weight were separated above about water line (WL) 108 and not identified in the recovered wreckage. The rudder rear spar above the top of the rudder trim tab about WL 95 and the trailing edge of the rudder between WL 95 and WL 108 was also separated and not identified in the recovered wreckage. There was some skin buckling damage on both sides of the rudder portion attached. The rudder trim tab was intact and attached. The rudder trim tab control rod remained attached to the bracket and the bracket was deformed down. The vertical stabilizer rear spar fitting was intact and attached to a portion of the FS 285.84 bulkhead. The FS 285.84 bulkhead deformation was consistent with the vertical stabilizer separating in a leading edge right direction. The forward vertical stabilizer attach hole was torn down and left. The rudder stops were intact and undamaged. The rudder cable remained installed on the bell crank with the swaged ball and cotter pins intact. The right side of the rudder cable was separated about 7 inches from the swaged ball and the left side of the rudder cable was separated about 16 inches from the swaged ball. Both ends of the rudder cable had a splayed, broomstraw appearance consistent with tension overload. The rudder trim measured about neutral.

The inboard portion of the right wing remained attached to the fuselage at the main wreckage site but was cut at the wing root for recovery. The right main landing gear was intact and attached. The right engine remained partially attached to the wing and there were some fractures of the mount structure. The right propeller remained attached to the crankshaft flange but the crankshaft was fractured aft of the flange. The right propeller was recovered adjacent to the engine at the main wreckage site. The right flap between WS 24 and WS 108 remained attached to the inboard right wing and was fractured near WS 108. There was an area of upward crushing damage to the lower wing skin with black rubber transfer, scratched paint and scored metal between the right nacelle and the right wing main spar between about WS 52 and WS 84. The right wing main spar was intact and undamaged from the wing root near WS 24 to about WS 70. The right wing main spar web was buckled and the upper and lower spar caps were deformed and fractured from the web from about WS 70 to the outboard wing separation point near WS 107. The upper spar cap was curled down about 90 degrees and twisted forward about 90 degrees outboard of about WS 86. The lower spar cap was deformed upward outboard of about WS 70. A portion of the right wing forward and aft lower skin between WS 86 and WS 107 was separated and not identified in the recovered wreckage.

The right outboard wing separated near WS 107 but remained attached to the airplane by the control cables and was recovered at the main wreckage site. There was an area with scratched paint, scored metal and black rubber transfer marks on the lower wing skin from WS 160 to WS 221 (Figure 5). The area began about 9 inches forward of the main spar and extended aft. The right wing main spar between WS 186 and WS 221 was separated and recovered in the debris field. The spar section was deformed and there were areas of black rubber transfer. The right wing structure aft of the main spar between WS 164 and WS 221 was also separated and recovered in the debris field. There were areas of black rubber transfer and the inboard portion of lower wing skin was deformed aftward in an accordion fashion. The WS 107 leading edge rib and the lower wing skin outboard of the rib were crushed and deformed consistent with a wing down separation. The right wing main spar lower spar

cap was fractured about WS 95 and the upper spar cap was fractured about WS 110. There was a section of the lower spar cap about 2 inches long near the fracture location that was not identified in the recovered wreckage. The lower spar cap was deformed upward between about WS 95 and WS 103 with localized downward deformation at the WS 95 fracture. The upper spar cap had no obvious deformation at the WS 110 fracture location and was matched to the inboard wing section fracture. The inboard portion of the right spoiler between about WS 94 and WS 146 remained attached to the outboard wing. The right spoiler from the center hinge near WS 146 to the outboard end near WS 221 was separated. Two sections of the right flap were separated, one section between about WS 108 and WS 132 and one section between about WS 132 and WS 221. There was no evidence of any pre-existing corrosion or cracking noted on any of the right wing fracture surfaces. The right wing fracture surfaces examined all had a dull, grainy appearance consistent with overstress separation.

The left inboard wing was recovered adjacent to the fuselage at the main wreckage site but had fractured from the airplane in the wing root area. The main spar upper and lower spar caps were fractured through the outboard wing attach bolt holes near WS 22. There was no evidence of pre-existing cracking noted on any of the spar fracture surfaces at WS 22. The left main landing gear was intact and attached. The left engine remained partially attached to the wing and there were some fractures of the mount structure. The left propeller remained attached to the crankshaft flange. The left flap between WS 24 and WS 56 remained attached to the inboard left wing and was fractured near WS 56. The left wing lower forward skin and heat shield was separated between about WS 51 and WS 83 from the nacelle to the main spar. A section of the left wing aft lower wing skin was separated between about WS 71 and WS 97 and not identified in the recovered wreckage. A section of the left wing forward lower wing skin was separated between about WS 84 and WS 107 and not identified in the recovered wreckage. The left wing main spar was intact and undamaged between the wing root area near WS 24 and about WS 72. The left wing main spar upper cap was fractured about WS 72 and about WS 92 and separated from the wing. The upper spar cap deformation near WS 72 was in a downward direction and near WS 92 was in an upward direction. The spar web was fractured from the upper spar cap between WS 72 and WS 92 and the web was buckled downward. The left wing main spar lower spar cap was deformed down near WS 76 and fractured about WS 96.

The left outboard wing separated near WS 107 and was recovered in the debris field. The left flap between WS 56 and WS 107 was separated from the wing and recovered in the debris field. The left flap between WS 107 and WS 221 was intact and remained attached to the outboard wing. The left wing main spar lower cap was deformed upward near WS 107 and fractured near WS 100. About 4 inches of the lower cap was separated between WS 96 and WS 100 and not identified in the recovered wreckage. The left wing upper cap was deformed down near WS 107 and fractured near WS 92. The rear spar was fractured near WS 93. A section of the left wing aft lower skin remained attached to the outboard wing between WS 92 and WS 107. There was white paint transfer and scoring on the upper half of the leading edge deice boot in an outboard diagonal direction from WS 156 to WS 221 (Figure 6). The upper wing skin aft of the deice boot exhibited scratched paint, black rubber transfer, and scoring in an outboard diagonal direction. The leading edge was deformed and crushed aft and down in several areas between WS 156 and WS 221. The leading edge between WS 193 and WS 221 was crushed and separated. The left wing tip was separated and not identified in the recovered wreckage. There was no evidence of any pre-existing corrosion or cracking noted on any of the left wing fracture surfaces. The left wing fracture surfaces examined all had a dull, grainy appearance consistent with overstress separation.

The lower fuselage had areas of damage and black rubber transfer between FS 130 and FS 176 (Figure 7). There was a dent in the right corner of the fuselage with black rubber transfer between FS 133 and FS 139 forward of the step. The step was deformed upward with the inboard attach point pulled from the fuselage. A portion of the step was cut for recovery. There was a dent on the lower right corner of the fuselage between FS 153 and FS 159 aft of the step and the paint was scratched. The right outboard external longeron had rubber transfer marks between FS 136 and FS144. The right inboard longeron had rubber transfer marks and deformation on the right side between FS 142 and FS 164. The left inboard longeron had rubber transfer marks between FS 157 and FS 170. The vent scoop on the lower fuselage aft of the external longerons was crushed between FS 171 and FS 176. There was black rubber transfer marks on the Collins antenna aft of the vent scoop and scratches in the paint aft and right of the antenna.