



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

March, 2016

AIRFRAME EXAMINATION

WPR16FA041

This document contains 22 embedded photos.

A. ACCIDENT

Location: Bakersfield, California
Date: December 19, 2015
Aircraft: Piper PA-32RT-300T, Registration Number: N36402
NTSB IIC: Elliott Simpson

B. EXAMINATION PARTICIPANTS:

Clinton R. Crookshanks
National Transportation Safety Board
Denver, Colorado

Maja Smith
National Transportation Safety Board
Seattle, Washington

Allison Diaz
National Transportation Safety Board
Seattle, Washington

Damian Galbraith
Piper Aircraft, Inc.
Vero Beach, Florida

Charles Little
Piper Aircraft, Inc.
Vero Beach, Florida

C. SUMMARY

Examination of the recovered airframe was conducted on March 30, 2016 at a hangar in Corona Airport, Corona, California.

D. DETAILS OF THE INVESTIGATION

1.0 Airframe Examination

S/N: 32R-7887041
TAT: 3840.38 hours

Right Wing

The right wing was completely separated from the airplane at its root, and came to rest largely intact at the accident site with the wingtip twisted approximately 90 degrees leading edge down with respect to the root (Photo 1). The wing twist was less pronounced during the exam since the wing had been flattened for transport. The aileron and flap remained attached at their respective hinge points (Photo 2), and the aileron balance weight was attached. The flap was free to move

about the hinges and the aileron was jammed in place. The outboard aft corner of the aileron was deformed up. The trailing edge of the flap was deformed near wing station (WS) 178. The wing leading edge between the wing root (WS 23) and WS 49 was deformed up, with the upper skin exhibiting a compression buckle forward of the main spar. The inboard 12 inches of leading edge exhibited green paint transfer consistent with fuselage contact (Photo 3). The inboard forward corner of the leading edge was crushed up and outboard. The leading edge rivet line at WS 49 was popped along both the upper and lower surface. The leading edge rivet line at WS 89 was popped along the upper surface but the lower surface rivet line was intact. The forward half of the leading edge rivet line at WS 116 was popped along the upper surface and the entire lower surface rivet line was popped. The leading edge between WS 116 and WS 147 exhibited an impact impression. The main spar was fractured at approximately WS 108 in the area of the main spar splice joint and was buckled and deformed between WS 101 and WS 116. The aft spar was fractured near WS 118. The upper and lower wing skins exhibited diagonal wrinkling between WS 106 and WS 171 and between the main and aft spars. There was pillowing of the upper skin between the wing root and WS 49 and between the main and aft spars. The forward wing attach point was intact and the fuselage fitting was pulled from the fuselage (Photo 4). The main spar upper and lower caps were fractured near WS22 (Photo 5,6). The upper spar cap exhibited upward deformation at the fracture locations and the upper horizontal leg of the T-shaped spar cap was separated from the vertical leg (Photo 5). The lower spar cap exhibited slight upward deformation (Photo 6). The upper tang of the forward spar web was fractured through some rivet holes in an upward and outboard direction and the upper tang of the aft spar web was intact. The lower tangs on the forward and aft spar webs were fractured about 1 inch inboard of the spar cap fracture. The center spar web was intact. The fractures exhibited a dull, grainy appearance consistent with overload separation. The aft wing attach lug on the wing was fractured in an inboard direction with evidence of hole elongation in the inboard direction (Photo 7). The right main landing gear was in the extended position at the impact site and the strut was fractured in the aft direction.

The aileron cable pass-throughs at the root rib exhibited cable tears in an upward direction. The aileron control and balance cables were attached to the right bellcrank. The aileron cables were broken about WS 32, with the ends exhibiting a splayed, broomstrawed appearance consistent with tension overload separation. The upper aileron control horn bracket was pulled from the upper skin. There was a single impact impression on the forward aileron stop, with no evidence of repeated impact on the forward and aft stops.

Left Wing

The left wing remained attached to the center fuselage section and was mostly intact (Photo 8). The flap was attached, jammed in the retracted position, and relatively undamaged. The majority of the left aileron was separated. The inboard and outboard aileron hinges were intact and remained attached to the wing, with small pieces of skin and the end ribs attached (Photo 9). The outboard half of the aileron skin was recovered in two pieces; the remainder of the aileron was not recovered. The recovered portion of the aileron skin was splayed open along the trailing edge. The aileron spar between the hinges was not recovered. The left aileron balance weight had pulled from the outboard end rib and not recovered. The left main landing gear was down and locked. The leading edge of the wing between WS 116 and WS 147 exhibited an impact

impression. There was no obvious deformation of the main or aft wing spars along their lengths. The forward and main wing attach points were intact. The aft wing attach lug on the fuselage was fractured in an outboard direction, with evidence of hole elongation in the outboard direction (Photo 10). The bolt remained attached to the wing lug. The lower wing skin was buckled near WS 107 beneath the main spar. There was buckling of the lower wing skin forward of the main spar, between WS 23 and WS 51. The aileron control and balance cables were intact from the center section to the control horn in the left wing. The aileron push-pull tube was intact between the control horn and the inboard aileron hinge. The cable ends exhibiting a splayed, broomstrawed appearance consistent with tension overload separation.

Center Section

The wing center section and lower fuselage was intact between the wing roots from fuselage station (STA) 72 to STA 128. The left side fuselage skin above the center section was attached and a portion of the right-side fuselage skin remained attached. The lower fuselage skin along the airplane centerline between the main and rear spars exhibited tear about 20 inches in length below the location of the rudder and stabilator flight control cables. The inner surface of the fuselage skin had parallel scrapes in the paint along the length of the tear consistent with a cable tear. The right wing upper spar cap was deformed upward (Photo 11). There was no obvious deformation of the right wing lower spar cap (Photo 12). The center section main spar fractures on the right side matched those observed on the right wing. The aft wing attach lug was intact and the bolt was installed (Photo 13). The flap handle was in the retracted/stowed position.

Empennage

The empennage was fragmented into multiple pieces (Photo 14). The vertical stabilizer remained attached to a portion of the upper fuselage. The lower half of the vertical stabilizer was undamaged. The upper half of the vertical stabilizer displayed damage and buckling consistent with torsion to the left (Photo 15). The stabilator fitting was torn from the upper end of the vertical stabilizer. The stabilator hinges remained intact and attached to the fitting. The stabilator stops exhibited no evidence of repeated contact. The stabilator balance weight remained attached in the tip of the vertical stabilizer. The upper 16 inches of the stabilator push-pull tube was attached to the fitting (Photo 15). The center 35 inches was separated, and the lower 8 inches remained attached to the separated bellcrank. The fracture locations in the push-pull tube were consistent with the damage to the rest of the vertical stabilizer and empennage.

The right stabilator main spar was fractured near the root rib at stabilator station (SS) 7 (Photo 16). The upper skin on the right stabilator and inboard face of the leading edge root rib exhibited green paint transfer (Photo 17). The inboard 10 inches of the forward spar was deformed aft. The right upper stabilator skin was separated from the rear spar, with the exception of the outboard 5 inches. The outboard trim tab hinge was intact at the outboard end of the rear spar. The right lower stabilator skin was separated from the rear spar, with the exception of the outboard 20 inches. About 32 inches of the rear spar remained attached to the right stabilator. About 29 inches of the right trim tab remained attached to the rear spar at the outboard and center hinges. No evidence of paint transfer was observed on the lower skin of the right stabilator. The right stabilator upper and lower skins exhibited significant damage and deformation.

The left stabilator main spar was fractured near SS 17. The entire left stabilator rear spar was separated (Photo 18). There was green paint transfer on the left stabilator upper leading edge skin (Photo 19). A section of the rear spar about 30 inches in length, with the center tab hinge and a portion of left upper stabilator skin attached was separated from the stabilator. The inboard half of the left lower stabilator skin was separated and not recovered. The outboard 25 inches of left trim tab was separated from the stabilator.

The stabilator spar fractures exhibited a dull, grainy appearance consistent with overload separation.

The inboard 30 inches of left trim tab and the inboard 29 inches of right trim tab remained fastened together at the center. The inboard left and right tab hinges were intact, and about 33 inches of stabilator rear spar was attached. The trim control rod was intact, and was pulled from the trim actuator at the forward end. The trim control horn on the tab was deformed to the left. Reconstruction of the trim tab showed deformation in a “W” shape.

The rudder remained attached to its fitting at the upper hinge point (Photo 20). The rudder torque tube was separated from the rudder along the rivet line. The upper 12 inches of rudder exhibited significant crushing and deformation. The lower 32 inches of rudder was mostly undamaged. The rudder counterweight remained attached to the leading edge. The aft vertical fin fairing was separated. The trailing edge of the fairing exhibited scraping damage consistent with the location of the inboard edges of the right and left stabilators.

Fuselage

The fuselage structure was highly fragmented and recovered in many pieces (Photo 21). The individual pieces were laid out and there was no obvious evidence of impact noted. The right forward cabin door was intact but separated with the hinges pulled from the fuselage structure. The right forward cargo door remained attached to the forward fuselage. The left cabin door was separated and fractured into several pieces. The left cargo door was intact and remained attached to a portion of the fuselage structure. The forward fuselage between the firewall at STA 33 to the forward edge of the wing at STA 73 was mostly intact but extensively crushed. The upper cockpit roof and center windshield post were separated. The nose landing gear trunnion remained attached to the forward fuselage but the wheel and oleo were separated.

Flight Controls

The primary flight control cables were traced from the cockpit to their respective flight control surfaces. All cables were broken at varying locations consistent with the breaks in the structure. About 10 feet of one of the rudder cables was not recovered. All the cable ends had a splayed, broomstrawed appearance consistent with tension overload separation (Photo 22).

2.0 Examination Photos



Photo 1 – Right Wing at Accident Site



Photo 2 – Right Wing Trailing Edge



Photo 3 – Inboard Leading Edge of Right Wing



Photo 4 – Right Wing Forward Attach Point

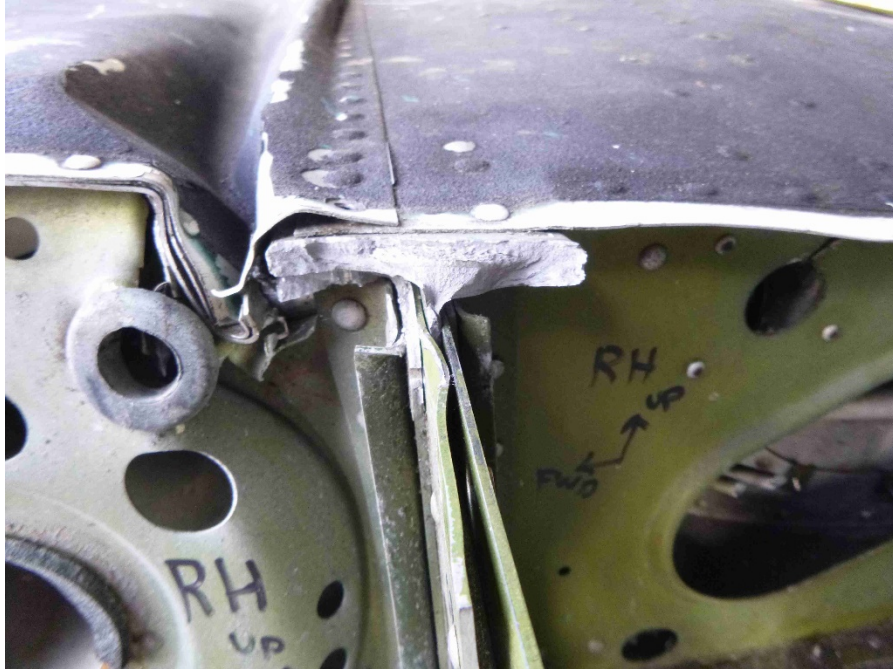


Photo 5 – Right Wing Upper Main Spar Cap



Photo 6 - Right Wing Lower Main Spar Cap



Photo 7 – Right Wing Aft Spar Attach Lug



Photo 8 – Left Wing



Photo 9 – Left Wing Outboard Trailing Edge



Photo 10 – Left Wing Aft Spar Attach Lug



Photo 11 – Right Wing Main Spar Upper Web

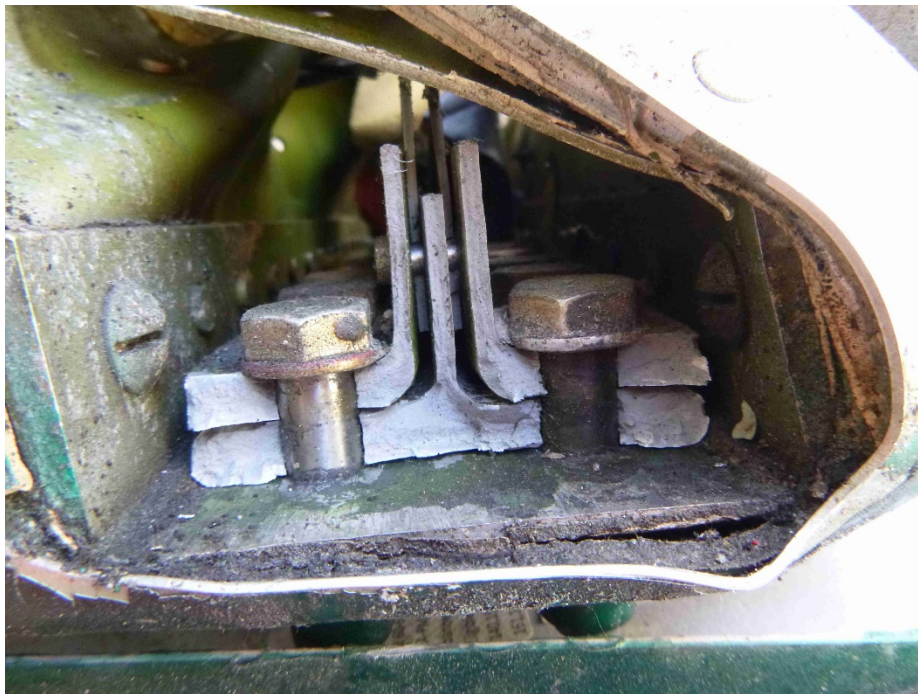


Photo 12 - Right Wing Main Spar Lower Web



Photo 13 – Right Wing Aft Attach Lug



Photo 14 - Empennage

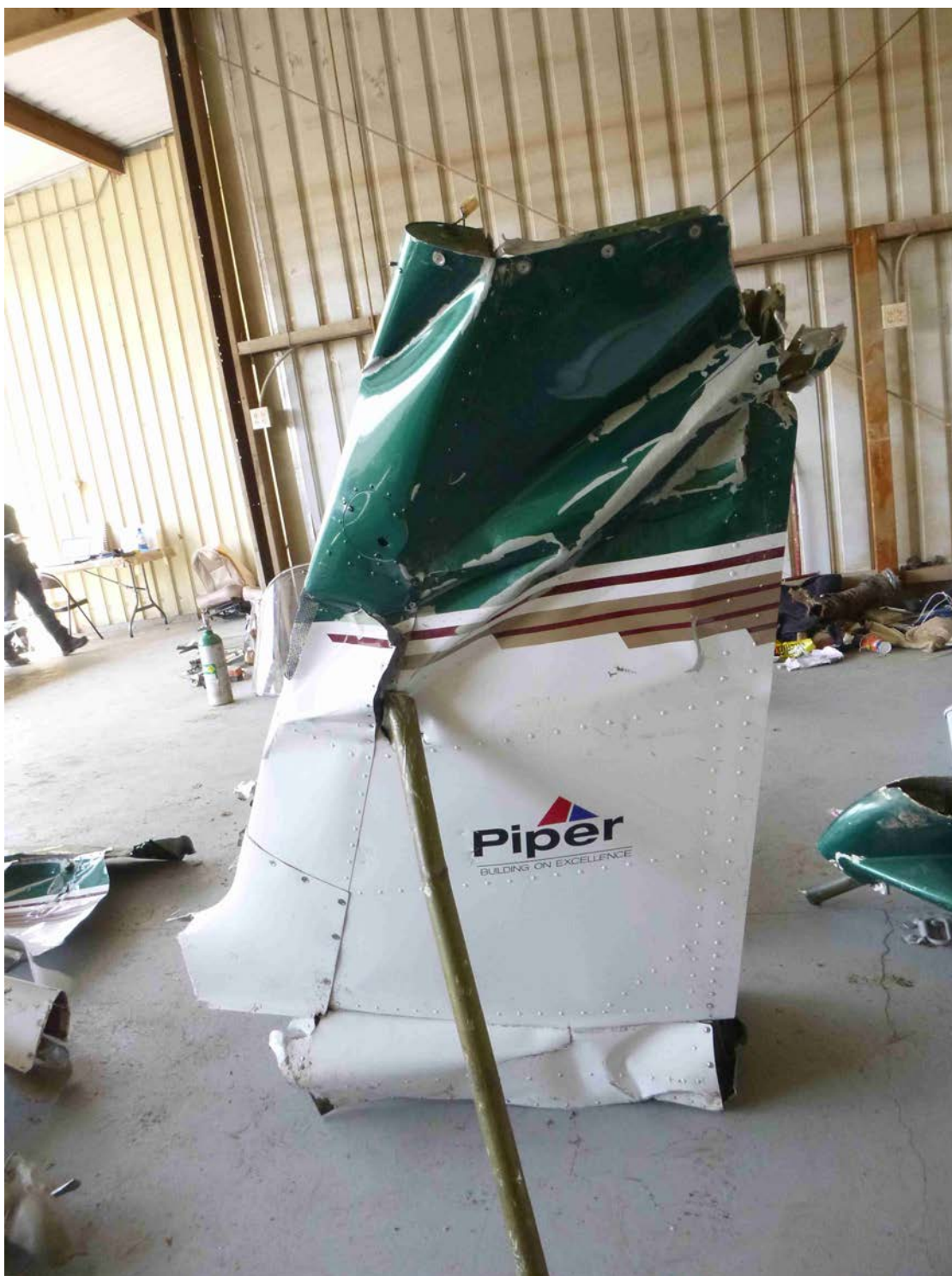


Photo 15 – Vertical Stabilizer



Photo 16 – Right Stabilator



Photo 17 – Green Paint Transfer Marks Upper Inboard Right Stabilator Skin



Photo 18 – Left Stabilator



Photo 19 - Green Paint Transfer on Left Stabilator Upper Leading Edge



Photo 20 – Rudder Upper Hinge



Photo 21 – Fuselage Structure



Photo 22 – Typical Cable Separation

LANCE II SERVICE MANUAL

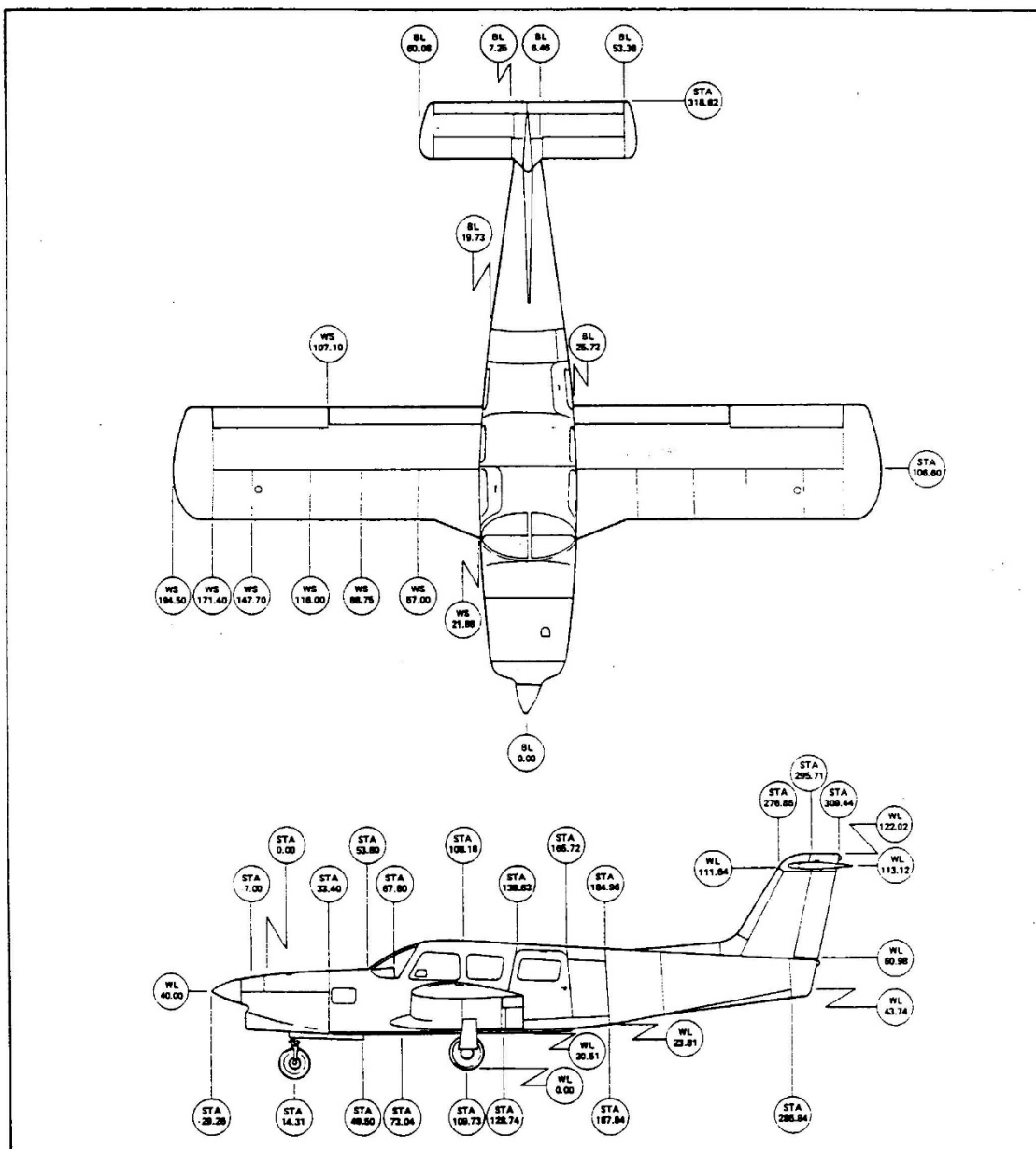


Figure 2-4. Station Reference Lines (PA-32RT-300T)

Issued: 1/3/78

HANDLING AND SERVICING

1A21

Figure 1 – Station Numbers