



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety

Western Pacific Region

July 30, 2022

AIRCRAFT EXAMINATION

WPR20LA216

This document contains 11 embedded photos.

(12 Pages)

A. ACCIDENT

Location: Ely, Nevada

Date: July 11, 2020

Aircraft: ASW 27-18

NTSB IIC: Tom Little

B. EXAMINATION PARTICIPANTS

Stephen Stein
Aviation Accident Investigator
National Transportation Safety Board
Federal Way, Washington

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Technical Advisor
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Camarillo, California

C. Aircraft Examination

C.1 Cockpit and Fuselage

The cockpit was fragmented and deformed from the accident sequence. The flight control stick remained attached to the elevator and flaperon (aileron) control bellcrank and portions of the control tubes, which were separated with evidence of overload failure. The aileron control system was continuous from a separation of the control tube at the flight control bell crank to the fuselage bell crank and funnel-type connectors. Elevator control was traced from a separation of the control tube at the flight control bell crank to the empennage bell crank through multiple fractures; one small segment of the elevator control tube was not recovered. Elevator trim control was continuous from the bottom of the shift lever, which was fractured at the mount, to the elevator control. The trim locking brake remained attached to the elevator bellcrank and was not damaged. Rudder control was traced from the rudder pedals to the empennage through two separations in the right and left control cables. The right rudder pedal displayed broomstrawing at both separations, while the left rudder pedal cable was cut by recovery personnel at the cockpit separation and the cable separation at the empennage exhibited evidence of broomstrawing. The airbrake and landing gear control levers were attached to their push rods and push housings on the left side of the cockpit and were partially separated from their plastic sliders. Both the airbrake control rod and landing gear control rod separated at the rod end aft of the cockpit. The airbrake control lever was in the stowed position and landing gear control lever was in the gear up position. The flap control lever had separated from the plastic slider, but remained attached to the push rod and housing. The flap lever was in position 1 (see photograph 3). The canopy was

destroyed during the impact sequence. The canopy control assembly was comprised of two levers, which were in the closed position that remained attached to the assembly push rod. The lever operated normally when actuated by hand (see photograph 4).

The water ballast control levers were attached to the cockpit with their bowden cables attached. The downstream ends of the wing (2 cables) and tail (1 cable) water ballast bowden cables had separated at the fuselage. One wing water ballast control cable exhibited broomstrawing and the other water ballast control cable end was undetermined (see photograph 5). The wing water ballast control cables normally move within sleeves and are connected to left and right swaged tubes that operate left and right wing levers, which move the push rods that open and close the wing water ballast valves. Both the left and right wing bowden cables had separated from their swaged tubes, which were both still connected to their levers. The tail water ballast control cable was traced from the cockpit lever to the tail water ballast tank through cable separations.

The fuselage water ballast tank control lever was also attached to the cockpit and the Bowden cable was continuous to the fuselage tank valve, which had separated at the elbow connector. Both fuselage water ballast tank hoses had separated from the valve. The hose that normally directs water to/from the fuselage tank had fractured and separated from the tank.

C.2 Tail

The vertical stabilizer was intact, but had separated from the fuselage. Both elevator control surfaces remained attached to the horizontal stabilizers, which had separated from the vertical stabilizer. Elevator control was traced from a control tube in the lower empennage to the elevator bell crank, which achieved its full range when actuated by hand. Rudder control was continuous from separations in the right and left rudder control cables to the rudder, which rotated through its full range.

The tail water ballast tank was intact and the tank release valve functioned normally when actuated by hand through a cable at the tail.

C.3 Wings

C.3.1 Left Wing

The left wing spar was intact about two-thirds of its full wingspan and the outboard wing was intact, but had separated at its spar connection. The lower skin had separated into several pieces. Most of the left wing top skin remained attached and was broken at 45° angles (see photograph 6). Control continuity of the flaperon (aileron and flap) was confirmed from the inboard and outboard push rods at the flaperon to separations in the control tubes at the wing root. The funnel-type connector at the left wing root was intact. The airbrake system was traced from a separation at the left wing root to the airbrake paddles, which functioned normally when actuated by hand.

The left wing water ballast tank was destroyed and the water ballast valve had separated from the wing (see photograph 7). The brass rod remained within the stainless steel tube, which had

separated at the valve lever. The valve lever assembly was mostly intact, except for the spring, which remained attached to a wing fragment.

C.3.2 Right Wing

The inboard right wing was mostly intact and the flaperon (flap and aileron) was attached with some fractures. The outboard right wing was fractured at the leading edge and separated from the inner wing along the top of the spar. Flight control continuity was confirmed from the funnel-type connector at the wing root to the push rod at the inboard flaperon and to the bell crank at the outboard flaperon. The outboard flaperon push rod separated from the bell crank. The right wing airbrake system functioned normally when actuated by hand.

The right wing water ballast tank was destroyed midspan; however, the ballast tank valve assembly was intact and operated normally when actuated by hand.

Summary of Findings

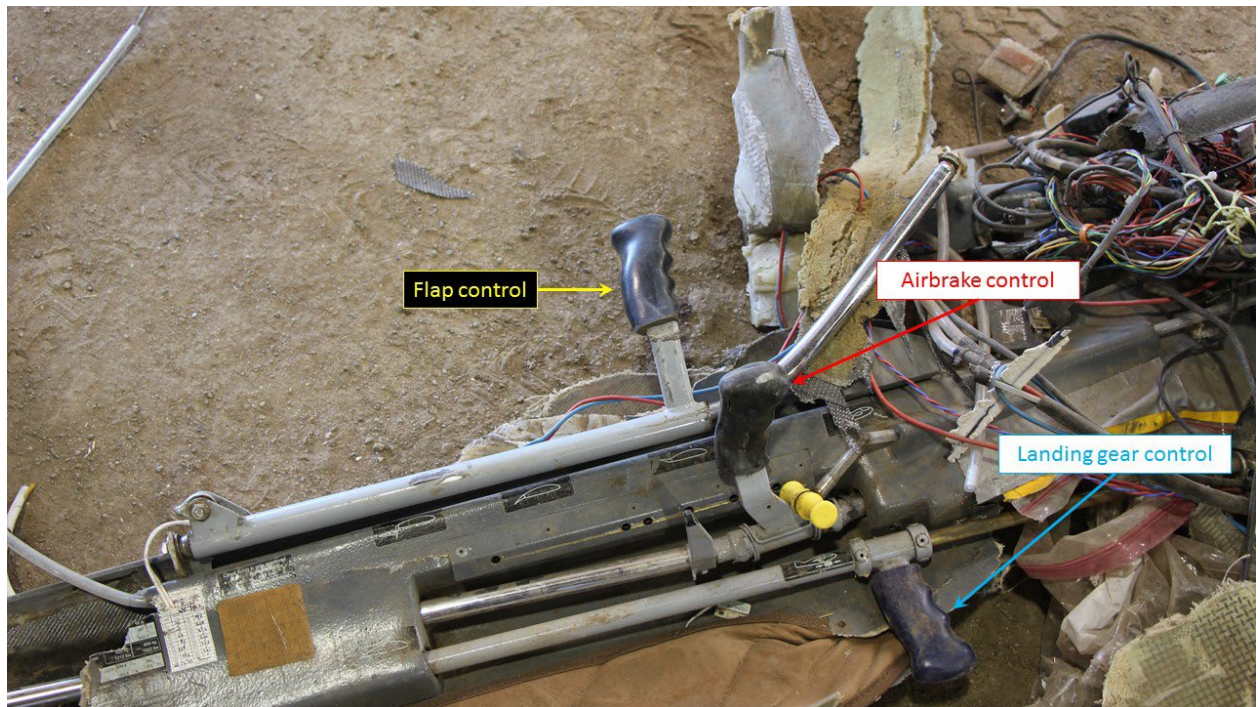
Flight control continuity was confirmed for aileron, elevator and rudder control authority from the cockpit to their respective control surfaces. A piece of intermediate control tube to the elevator control was not recovered; however, the recovered control tubes exhibited evidence consistent with overstress. Elevator trim was intact and unremarkable. The right and left wing airbrake systems were traced from the wings to the cockpit through separations that were consistent with overstress and both systems functioned normally at each wing. Both the tail and fuselage water ballast control systems were fractured in tension and the fuselage tank had broken, but was otherwise unremarkable. The right wing water ballast control system was traced from the cockpit to the right wing water tank, which functioned normally when tested. Both the left and right wing water ballast control cables were continuous from the control lever at the cockpit to separations at the left and right swaged tubes. The left wing water ballast tank valve was separated from the left wing during the accident sequence. The valve rod separated from the valve lever, which was intact.



Photograph 1: Wreckage layout



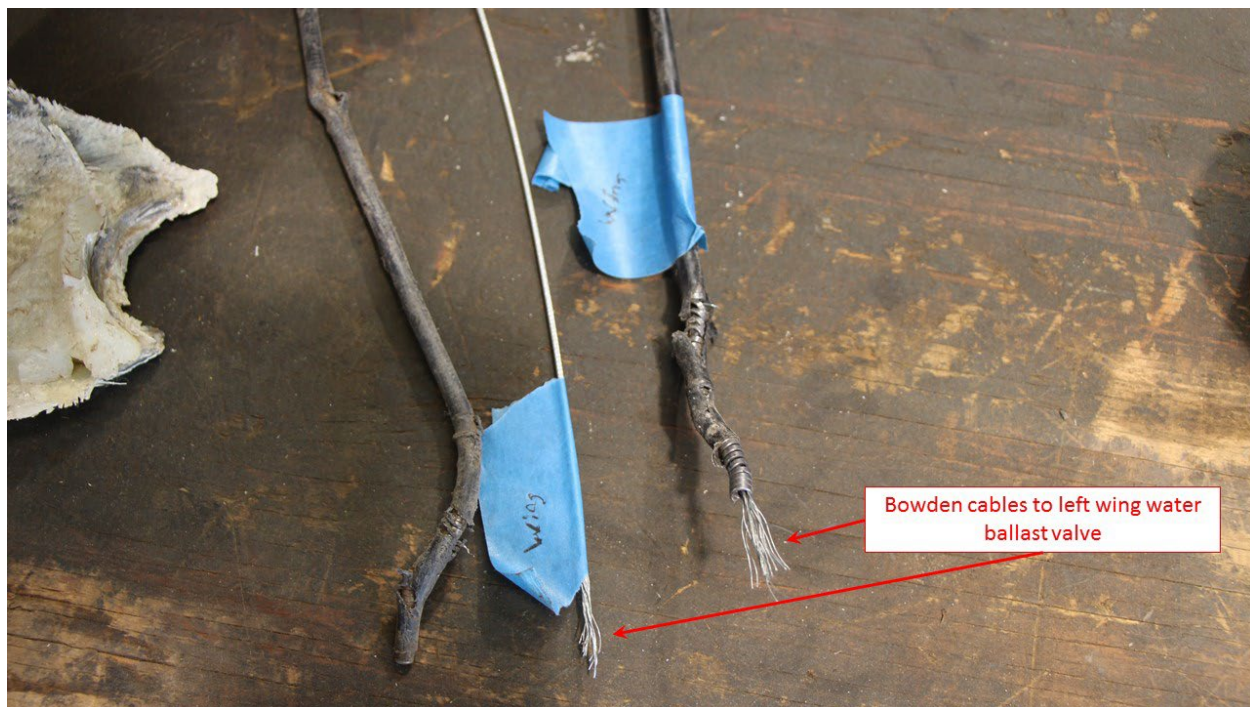
Photograph 2: Left wing



Photograph 3: Flap, airbrake, and landing gear controls



Photograph 4: Canopy control



Photograph 5: Bowden cables and sleeve to left wing water ballast valve control assembly



Photograph 6: Left wing top skin



Photograph 7: Left wing water ballast valve



Photograph 8: Right wing from wing root leading edge



Photograph 9: Right wing from outboard trailing edge



Photograph 10: Inboard left wing leading edge



Photograph 11: View of wreckage from left wing