

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



WPR24FA124

AIRFRAME & ENGINE EXAM SUMMARY REPORT

June 4 & 5, 2024

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A. ACCIDENT

Location: San Bernardino, CA
Date: April 13, 2024
Time: 20:41 Pacific daylight time
Airplane: N965BC, Gulfstream Corp 695A Twin Commander

B. AIRFRAME & ENGINE EXAM SUMMARY REPORT

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C. SUMMARY

Examination of the airframe and engines was conducted at the facilities of Air Transport Recovery, Phoenix, Arizona, on 06/04/24 and 06/05/24. No evidence of preaccident mechanical malfunction or failure was observed, that would have precluded normal operation.

1.0 Airframe

The fuselage was highly fragmented and displayed evidence of post impact fire. The instrument panel and cabin controls were destroyed by impact and thermal damage. (see figure 1)



Figure 1. Fragmented wreckage

Each landing gear assembly was separated from the airframe. There was no evidence that the landing gear was in the extended position, prior to impact.

The left wing separated at the engine nacelle. It displayed crushing and thermal damage along the length of its span, from the leading edge, aft, to its trailing edge. The pneumatic de-ice boot displayed thermal damage throughout the leading edge. The outboard section of the left flap remained partially attached. The left wing's aileron was separated at its wing attachment points. (see figure 2)

The right wing separated at the engine nacelle. It displayed crushing and thermal damage along the length of its span, from the leading edge, aft, to the trailing edge. The pneumatic de-ice boot displayed thermal damage throughout the leading edge. The outboard section of the right flap remained partially attached. The right wing's aileron was separated at its wing attachment points. (see figure 3)



Figure 2. Left wing, aileron, outboard flap



Figure 3. Right wing, aileron, outboard flap

The left horizontal stabilizer remained attached at the root, to the empennage and displayed crushing and denting along the leading edge. It was cut by wreckage recovery near the root. The pneumatic de-ice boot remained attached and displayed ripping and tearing. The left side of the elevator was separated at its attachment points, from the horizontal stabilizer. It had multiple punctures in the upper and lower skin. The left elevator trim tab remained attached at its hinge and control arm. (see figure 4)

The right horizontal stabilizer was observed in two sections, separated about mid span, but remained attached at the root, to the empennage and displayed crushing and denting along the leading edge. It was cut by wreckage recovery near the root. The pneumatic de-ice boot remained attached and displayed ripping and tearing. The right side of the elevator was separated at its attachment points, from the horizontal stabilizer. It had multiple punctures in the upper and lower skin. The right elevator trim tab remained attached at its hinge and control arm. (see figure 5)



Figure 4. Left horizontal stabilizer and elevator



Figure 5. Right horizontal stabilizer and elevator

The vertical stabilizer remained attached to the empennage and displayed crushing from the leading edge, aft, to the trailing edge. The upper portion of the vertical stabilizer was cut by wreckage recovery. The rudder horn anti-icer remained mounted to the vertical stabilizer. The rudder was separated from the vertical stabilizer at its attachment points and displayed crushing and thermal damage throughout. (see figure 6)



Figure 6. Rudder and upper section of vertical stabilizer

Flight control cable continuity was partially established from the control yolk through the lower fuselage to the empennage. Multiple separations were noted consistent with overstress and cuts by wreckage recovery personnel. Aileron control cable continuity was partially established from the wing roots to the aileron linkage locations. All aileron cable separations were noted to be consistent with overload or cuts by wreckage recovery personnel. Elevator trim control cable continuity through the fuselage could not be established due to impact damage. Elevator trim cable continuity was established from the empennage to the elevator trim tabs. All trim cable separations were noted to be consistent with overload or cuts by wreckage recovery personnel.

Anti-Icing and De-Ice System

The upper rudder horn anti-icer remained mounted to the vertical stabilizer. (see figure 7)

De-ice piping continuity was established from the empennage for the pneumatic de-ice boots mounted on the left and right horizontal stabilizers, and the vertical stabilizer.

One anti-ice shield on an engine inlet remained attached.

The tabs of one anti-ice shield on the other engine inlet remained attached.

De-ice boots on three of the six total propeller blades were intact and electrical wiring was noted and present. (see figure 8) The de-ice boots on the remaining three

total propeller blades displayed ripping and tearing damage. None of the associated electrical wiring for them was observed.



Figure 7. Rudder horn anti-icer



Figure 8. Wiring observed present with two propeller blade de-ice boots

Autopilot

The airplane was equipped with a Collins AP106 autopilot. All servos and actuators were destroyed and unusable/unreliable. Multiple electronic control modules from the autopilot flight control system were located within the wreckage. According to Collins Aerospace, none of the system components contain nonvolatile memory.

2.0 Engines

Records indicate that the following engines were installed on the airplane. Engine data plates were not located within the wreckage.

Left Engine

Engine Manufacturer: Honeywell

Engine Model Number: TPE 331-10

Engine Serial Number: P-38317

Right Engine

Engine Manufacturer: Honeywell

Engine Model Number: TPE 331-10

Engine Serial Number: P-38318

The power sections from each engine were separated from their accessory gear boxes, consistent with impact. (see figures 9 and 10) Both power sections were separated aft of the first stage impellers, which were located loose among the debris. The blades on both first stage impellers were missing at the hub lines. The aft curvics of the first stage impeller and the forward curvics of the second stage impeller were smeared, consistent with operation at the time of impact. Both power sections showed compression damage. The second and third stage turbine rotors were separated from one of the two power sections. Rotational scoring was present throughout both power sections. Both turbines showed evidence metal spray deposits on the third stage stator vanes.

Both accessory gear boxes were fragmented, with components located among the wreckage. Rotational scoring was noted on the rotating components of the accessory gear boxes.

Portions of both anti-ice valves and anti-ice shields were located among the wreckage.



Figure 9. Engine power section



Figure 10. Engine power section

3.0 Propellers

Left Propeller Assembly

Manufacturer: Dowty Rotol

Model Number: R306/3-82-F/7

Serial Number: DRI/DRG/5596/83

Right Propeller Assembly

Manufacturer: Dowty Rotol

Model Number: R306/3-82-F/7

Serial Number: DRI/DRG/275/83

The left engine's propeller assembly was a three bladed, constant speed assembly. One propeller blade remained attached to the propeller hub. The two remaining propeller blades were separated from the hub. Two of the three blades displayed bending or twisting, and each propeller blade displayed gouging and chordwise scuffing. (see figure 11)



Figure 11. Left propeller assembly

The right engine's propeller assembly was a three bladed, constant speed assembly. Two propeller blades remained attached to the hub. The third propeller blade

separated at the hub. Each propeller blade displayed varying amounts of bending, gouging and chordwise scuffing. (see figure 12)



Figure 12. Right propeller assembly

Submitted by:

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