

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



WPR21FA025

AIRFRAME AND ENGINE EXAMINATION

11/15/2021

A. ACCIDENT

Location: Cordes Lakes, Arizona
Date: October 25, 2020
Time: 1028 mountain daylight time
Airplane: Lancair 235, N25NL

B. AIRFRAME AND ENGINE EXAMINATION

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C. SUMMARY

Examination of the recovered wreckage was conducted on November 15, 2021, at the facilities of Air Transport, Phoenix, Arizona. The examination revealed no evidence of preexisting mechanical malfunction that would have precluded normal operation.

D. DETAILS OF THE INVESTIGATION

1.0 Airframe Examination

The fuselage was fragmented into multiple sections. The instrument panel, canopy frame, and fuselage structure were separated. The mixture lever was in the near full rich position. The throttle was in the extended, or idle position, and slightly bent. The airframe header tank was impact damaged. The screen was free of debris. The fuel shut off valve was in the “on” position.

The fuselage structure immediately forward of the empennage was mostly accounted for during the wreckage examination with the exception of 2 small portions (about 2-3 inches by 2-3 inches). On-scene photos showed the pieces immediately adjacent to the empennage. None of the electrical wires or rudder control cables were twisted.

The empennage was mostly intact and undamaged. The vertical stabilizer was undamaged. The rudder remained attached via its mounts and exhibited slight impact damage to the bottom.

The left horizontal remained intact and attached to the empennage with no apparent damage noted. The left elevator remained partially attached to the horizontal stabilizer. The outboard piano hinge rod was displaced inboard or pulled out about 4.5 inches. An approximate 2-inch section of hinge material that attached to the horizontal stabilizer remained attached to the elevator hinge. Additionally, the screw and nut plate remained attached to the horizontal side hinge material. The inboard hinge was intact and undamaged. The screws on the horizontal stabilizer had cup washers installed, however, those on the elevator did not.

The right horizontal stabilizer remained intact and attached to the empennage. A section of upper skin exhibited impact damage about 3.5 inches outboard from the root and extended outboard about 7 inches. The right elevator remained partially attached to the horizontal stabilizer. The outboard hinge material and associated 3 screws were pulled away from the elevator and remained attached to the horizontal. The inboard hinge was intact and undamaged.

Rudder control continuity was established from the rudder pedals aft to the rudder. All four rudder cables were separated in various locations and were cut by wreckage recovery personnel. Elevator flight control continuity was established from the cockpit controls to the elevator. The elevator torque tube exhibited an upward fracture about 20 inches forward of the rod end bearing. An additional right bend was observed about 14 inches forward of the fracture separation. The remainder of the elevator torque tube assembly exhibited a cut by recovery personnel. The elevator control horn exhibited 2 holes, one near the outboard of the control horn and one further inboard. The elevator control torque tube was connected to the inboard hole.

The left wing remained attached to the fuselage structure. The left aileron and flap remained attached via their respective mounts. The wing was partially separated about 29 inches outboard of the root. Numerous cracks, consistent with impact were observed throughout the wing on the upper and lower surfaces.

The right wing remained attached to the fuselage structure. The right flap remained attached to the wing via its mounts. The right aileron was separated from the wing, however, remained attached to its mounts and associated wing structure. The outboard section of upper and lower wing skin was separated from about 29 inches outboard of the wing root at the forward spar, and 64 inches outboard of the wing root at the aft spar. Impact damage was observed to the main wing spar between 29 inches and 74 inches outboard of the wing root.

Aileron flight control continuity was established from the cockpit controls outboard to the left aileron and outboard to the right aileron. The torque tube was fractured on the wing about 62 inches outboard of the wing root. The torque tube assembly was pulled away from the aileron, however, remained attached to its aileron mount. The left and right flap torque tubes were intact on scene (verified by photos), however, were subsequently during wreckage recovery.

No evidence of impact with birds was observed on either wing, vertical stabilizer, and horizontal stabilizers.

2.0 Engine Examination

The engine mount was cut by wreckage recovery personnel. Mechanical continuity was established throughout the engine and valve train. Some resistance was noted when the crankshaft was rotated. Holes were drilled into the crankcase and inspected internally using a lighted borescope. No evidence of any heat distress was noted. The camshaft lobes exhibited normal operational signatures. The connecting rods were intact and undamaged. A hole in the bottom of the oil sump was observed. The oil pickup screen was free of debris. The cylinder number 1 and 2 intake and exhaust pushrod tubes and pushrods were impact damaged.

All cylinder rocker box covers were removed. All intake and rocker arms were intact and oil coated. The number 1 cylinder rocker arm shaft boss exhibited impact damage. The crankshaft propeller flange was bent.

All four cylinders were examined internally using a lighted borescope and exhibited normal operational signatures. All intake and exhaust valves were intact and undamaged. All piston faces exhibited a normal amount of combustion deposits.

The carburetor was separated from its mount. The mixture lever arm was separated from the carburetor. The throttle arm was separated from the carburetor along with the butterfly valve. The carburetor was disassembled and examined internally. The metal floats were intact and exhibited some hydraulic deformation. No debris was noted in the float bowl. The carburetor finger screen was removed and exhibited a small amount of a pliable material that encompassed about 5% of the screen. No debris was noted in the mixture metering sleeve.

The engine driven fuel pump was separated from its mount. The pump was disassembled. The internal diaphragm was pliable and intact. No debris or visible contaminants were noted internally.

The magnetos (left and right) were separated. The drive shaft on either magneto was rotated by hand and produced spark on all 4 posts. The left magneto was equipped with an impulse coupling, and it functioned normally when the drive shaft was rotated.

The lower spark plugs were removed. The number 1, 2, and 4 bottom spark plugs exhibited a significant amount of carbon/lead build up within the electrode area. The number 3 bottom spark plug exhibited a slight amount of carbon/lead build up within the electrode area. All electrodes exhibited a circular appearance. All four bottom spark plugs exhibited a light tan to brown color appearance within the electrode area. The lower spark plugs exhibited a spark plug gap suitable for operation. The upper number 1 spark plug exhibited impact damage to the barrel. The upper 1, and 3 spark plugs exhibited a light gray color within the electrode area. The number four upper spark plug was oil soaked with lead / carbon build up within the electrode area. The electrode on then number 1, 3, and 4 spark plugs was circular in appearance. The number 1 upper spark plug post (1 of the 2) was pressed up against the electrode.

The exhaust system was intact and undamaged. No obstructions were noted on the exhaust. Light brown to gray coloration was observed inside the exhaust stacks. No oil residue was observed.

The induction system was mostly intact and exhibited some impact damage.

3.0 Propeller Examination

The wood propeller was separated from the engine. One propeller blade was fractured and slightly bent aft just outboard of the blade root. The opposing blade was intact and undamaged.

Submitted by:

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