



MEMORANDUM FOR RECORD

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Date: November 5, 2021
Subject: Wreckage Examinations
NTSB Case Number: ERA21LA183

On June 21, 2021, N7242F was examined at Anglin Aircraft Recovery Services in Clayton Delaware.

Examination of the engine revealed that it had remained attached to the engine mounts and firewall. The propeller remained attached to the engine with a slight bend to the crankshaft flange face. Except for the alternator, the accessories and base engine appeared to be in undamaged condition.

The No.1 and No.3 cylinders had markings consistent with chrome barrels and cylinders No.2 and No.4 had markings consistent with nitride barrels.

The propeller was rotated by hand and thumb compression and suction was established on all four cylinders via the top spark plug holes. Valve train movement was observed, and continuity was confirmed throughout the engine.

The exhaust stacks for all four cylinders displayed crush damage from the impact forces. The exhaust stack studs on cylinders 2 and 4 had pulled slightly away during the impact sequence.

No evidence of any preimpact malfunction or failure of the engine was discovered.

Examination of the airplane revealed that, the wings and firewall had been separated by the recovery team for transportation to the storage facility. The airplane was however relatively intact, and no evidence of an inflight structural failure was present.

Flight control continuity was able to be established from the control wheels in the cockpit to the breaks in the system, and from the breaks in the system to the left and right ailerons and the stabilator.

Flight control continuity could not however be established from the rudder pedals to the rudder, and during examination of the rudder pedal assembly for the right cockpit seat it was discovered, that the rudder bar arm (Part No. 63448-000) and rudder pedal tube (Part No. 65165-053) which were part of the rudder control assembly (Part No. 66661-000) had separated.

Visual examination of the separated rudder bar arm and rudder pedal tube revealed that they had separated near a weld, which displayed a crack where extensive corrosion was visible on the fracture surfaces.

On June 29, 2021, the fractured surfaces of the rudder bar arm and rudder pedal tube were examined under magnification at Piper Aircraft Corporation, Vero Beach, Florida.

Examination of the rudder bar arm and tube revealed a peak in the fracture surface which was indicative of where an initial overload sometime in the past had occurred that caused a crack to begin. To the left of the peak along the fracture surface corrosion products could be seen all along the fracture surface. This was indicative of the crack having been open for a while and the fracture surface reacting with oxygen to create iron oxide and other corrosion products as well as capture debris.

To the right of the peak along the fracture surface, pockets of corrosion as well as fresh substrate were visible which was indicative of gnashing of the right-hand fracture surface against the opposite surface through cyclic movements (such as the actuation of the control cable) continuously removing corrosion products and exposing fresh substrate.

Down along either side of the arm, two fresh substrate areas could also be observed. The right fracture surface at the base of the weld also exhibited porosity which was indicative of a cup-and-cone failure (tensile failure in a ductile material). Voids or contamination in the weld were also visible.