

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



ERA24FA217

EXAMINATION

May 15-18, 2024

A. ACCIDENT

Location: Franklin, TN
Date: May 15, 24
Time: 1201 Local 1701 Z
Airplane: N47WT, Beechcraft V35, SN: D-3217

B. Accident Team

IIC	Aaron McCarter National Transportation Safety Board Washington, D.C.
Participant	Ryan Enders National Transportation Safety Board Washington, D.C.
FAA	Angela Kachinski Federal Aviation Administration Nashville, TN
Textron	Ryan Roth Textron Aviation Wichita, KS
Continental	J. Ferrell Continental Aerospace Mobile, AL
Evidence/Observer	David Pereira NTSB Evidence Washington, DC

C. SUMMARY

While transitioning the area enroute to LOU from REG, while at 9,500 ft msl, the airplane descended, and a tight right turn developed as it passed through 7,500 ft mean sea level. During the descent, the airspeed and rate of decent rapidly increased before the target/radar contact was lost. The pilot was communicating with ATC at the time.

D. DETAILS OF THE INVESTIGATION

1.0 Accident Site

The accident site was located near interstate 840 and the Natchez Trace Parkway in Franklin, TN. The debris field began on the eastern side of I-840 and concluded at a lake where the engine was discovered about 3,800 ft west. Airplane and personal effects debris was found on the highway, in heavily wooded terrain, and across residential properties. The NTSB, FAA, Textron Aviation, Continental Aerospace, and numerous local agencies responded.

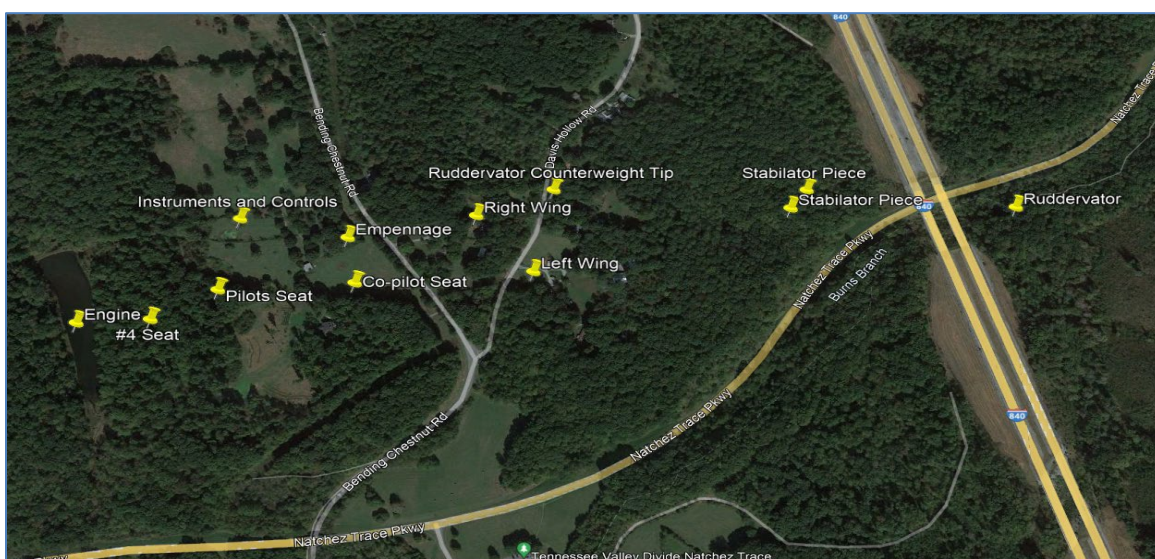


Figure 1 Incomplete map of wreckage path and location of wreckage.

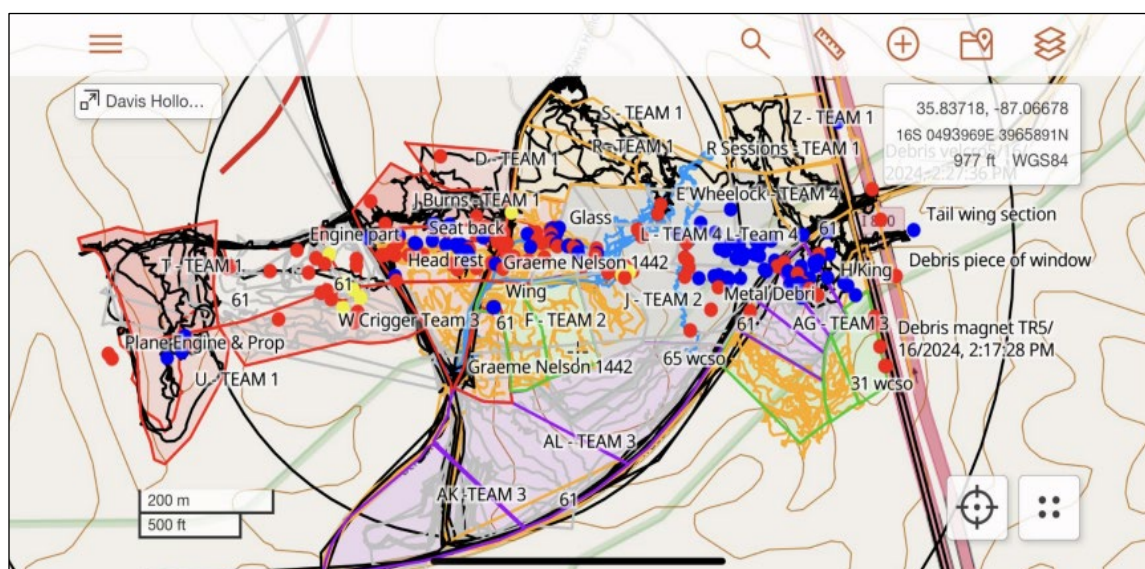


Figure 2 Local authorities search grid and wreckage locations.

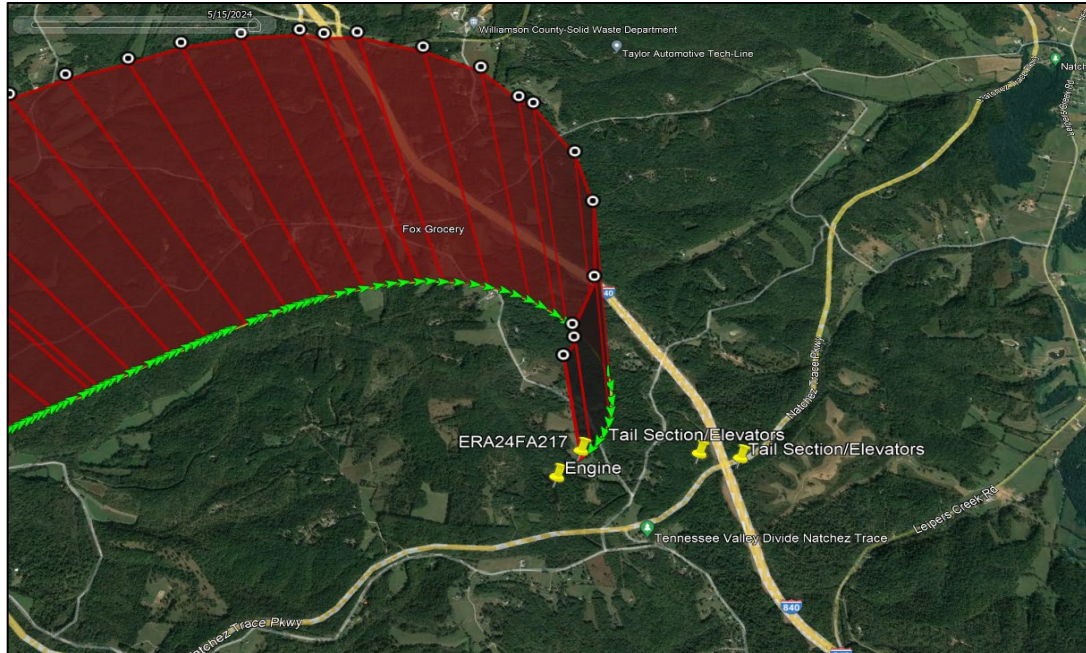


Figure 3 Preliminary ATC/ADS-B data indicating final moments of flight near wreckage site.

2.0 Airframe and Engine

The wreckage was transported to AMF Aviation in Springfield, TN where a partial wreckage reconstruction/layout was conducted on May 17, 2024, with the FAA, Textron, and Continental Aerospace present.



Figure 4 Partial wreckage reconstruction/layout on hanger floor.

2.1 Fuselage

The four forward facing seats were ejected from the cabin and found loose in the debris field. The pilot and co-pilot seats were equipped with 3-point, double over-shoulder harnesses. The pilot's shoulder harness had a tear consistent with overload failure and the lap belt was cut by first responders. The co-pilot seatbelt was found unbuckled with its latch bent. The pilot still occupied his seat in the debris field. The student pilot was located next to the forward right seat and the aft seat passenger was located immediately adjacent to a seat marked aft rear right in blue marker.

2.2 Empennage

The empennage was found in a grass field and had sheered from the aft spar carry through and aft. The stabilizers and ruddervators were separated from the fuselage. The top of the empennage was separated from at the cabin air inlet vent forward. Portions of the left and right ruddervators were recovered. Most of the right stabilizer was recovered but none of the left stabilizer was recovered.

The right stabilizer was separated and had more than half of the right ruddervator attached. The ruddervator trailing edge was separated and the skins were splayed open. The remaining portion of right ruddervator was recovered separately. Only a portion of the left inboard ruddervator was recovered from the left side of the empennage. The deformation of the stabilizer spars on both sides indicate failure in an aft and leading edge down direction.

The downward failure of the stabilizers and downward failure of the wings, combined with the location of the wreckage locations are indicative of a tail first breakup, and all indications point to overload. The airplane was equipped with stabilizer cuffs and updated control rods were installed so any flutter would likely occur well above V_{ne}. There were no signs of flutter on the tail.

There were no indications of preexisting damage (corrosion, cracks) observed on the fracture surfaces. Photographs sent to the Materials lab for examination of the fracture surfaces for confirmation. They concurred that there were no indications of preexisting damage. The stabilator spars had symmetrical deformation where the spars were bent aft and twisted leading edge down before fracture, and the fracture surfaces had slant angles consistent with ductile overstress fracture.



Figure 5 Empennage showing stab/ruddervators.



Figure 6 Closeup of stabilizer damage at the fuselage.

2.3 Wings.

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Both wings separated from the fuselage in flight and were found at separate locations within the debris path. The left wing separated in flight at the root and was found on the easterly side of the debris field against a fence. The wing was moved on-scene and aviation fuel began to spill from the main fuel tank outlet. The gas cap was removed, and the o-ring was unremarkable. The left wing tip tank was intact and unbreeched with no fuel remaining. The top, forward, wing mounting bolt. Photographs of wing damage signatures and their overall condition were sent to the materials lab for examination. The left wing main spar had a separation at the upper attachment bolt and a bending overstress fracture at the lower attachment fitting, consistent with a downward overload following failure of the stabilizers.

The lower wing mounting bolt pulled through the wing spar attach fitting. The aft two mounting bolts pulled through both wing spar attach fittings. The left wing forward spar separated at the wing attach point and the rear spar separated a couple of feet outboard of the attach point. The left forward upper bathtub fittings were intact with no obvious damage to the hole bores indicating a tension failure of the upper forward bolt. The forward lower bolt and wing bathtub fitting remained intact and installed with a fractured portion of the center section fitting retained. The forward lower center section bathtub fitting fractured in bending overload and the damage to the adjacent structure indicates downward bending. The left wing rear spar attach bolts remained intact. The lack of deformation on the rear spar upper cap at the fracture location and the buckling deformation on the rear spar lower cap indicate failure in a downward direction.



Figure 7 Left wing as observed on site.



Figure 8 Left wing top view at examination facility.



Figure 9 Left Wing Spar Shear Points



Figure 10 Left wing forward Upper Mounting Hole



Figure 11 Left wing lower aft Spar attach Point.

The right wing separated in flight from the fuselage. The aft spar carry through was not attached to either wing and was recovered separately. The right wing was found wedged between trees approximately in the middle of the debris field. The emergency gear handle remained attached. The fuel cap was removed, and the o- ring was unremarkable. The right-wing tip tank had separated from the wing and destroyed. The right wing forward spar attach point was intact and remained connected to the center section that was separated from the fuselage. The right wing rear spar was separated at the attach point. The rear center section was separated from the fuselage. The right rear upper attach bolt was intact and retained in the intact center section bathtub fitting and fractured right rear upper fitting. The right rear upper wing fitting was fractured and pulled from the right wing structure. The right rear lower attach bolt was intact and retained in the right rear lower wing fitting. There were no photos of the right rear lower center section fitting.



Figure 12 Right wing as discovered on the accident site.



Figure 13 Right wing spar and aft spar structure at examination site.



Figure 14 Right wing forward spar fracture surface.



Figure 16 Right wing overview.

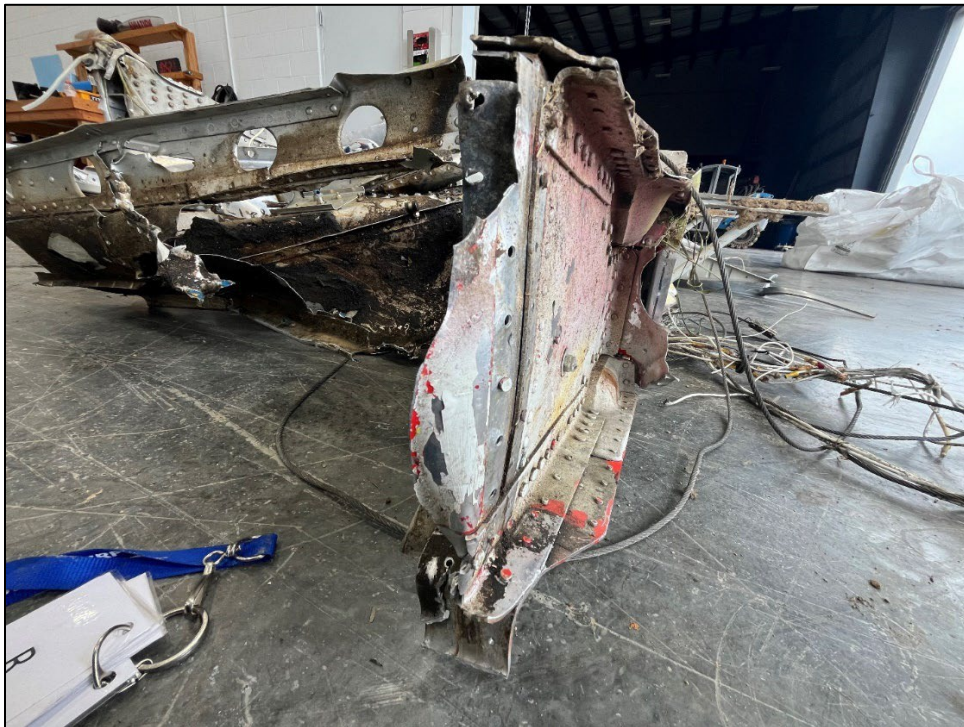


Figure 15 Right wing aft spar fracture surface.

2.4 Landing Gear

The landing gear actuator gearbox was found in the fully retracted position.

2.5 Cockpit and Instrument Panel

The instrument panel had an Aspen EFD-1000 installed on the pilot side and a Garmin 750 and 430 installed in the center rack. The aircraft had a Century III autopilot system. Many of the switches did not click through their detents when operated and moved freely. A switch marked "L Tip" and "R Tip" was in the "L Tip" position. A switch marked "Ldg Gear Safety" was in the "On" position. Data cards from the Garmin 750 and Aspen EFD-1000 were located and sent to the lab for analysis.

As found, the throttle, mixture, and propeller control levers were full forward. The boost pump was in the "off" position. The flap motor, RADAR RT, RADAR IND, JPI EMD711, and ACU circuit breakers were in the tripped positions. The landing gear lever was down. The JPI fuel flow indicator was damaged behind the panel from impact forces. Engine RPM gauge reading is 0. The tach hours meter reading was 2648.7. The altimeter reading is 4100 feet. The VOR OBS reads 080. The propeller de-ice switch was "on." The de-ice amps reading is 0. Suction is 0. The transponder and GNS400 were undamaged. Oxygen supply pressure reads 0.



Figure 17 Co-Pilot's Side Navigation and Communication Panels.



Figure 18 Circuit breakers.

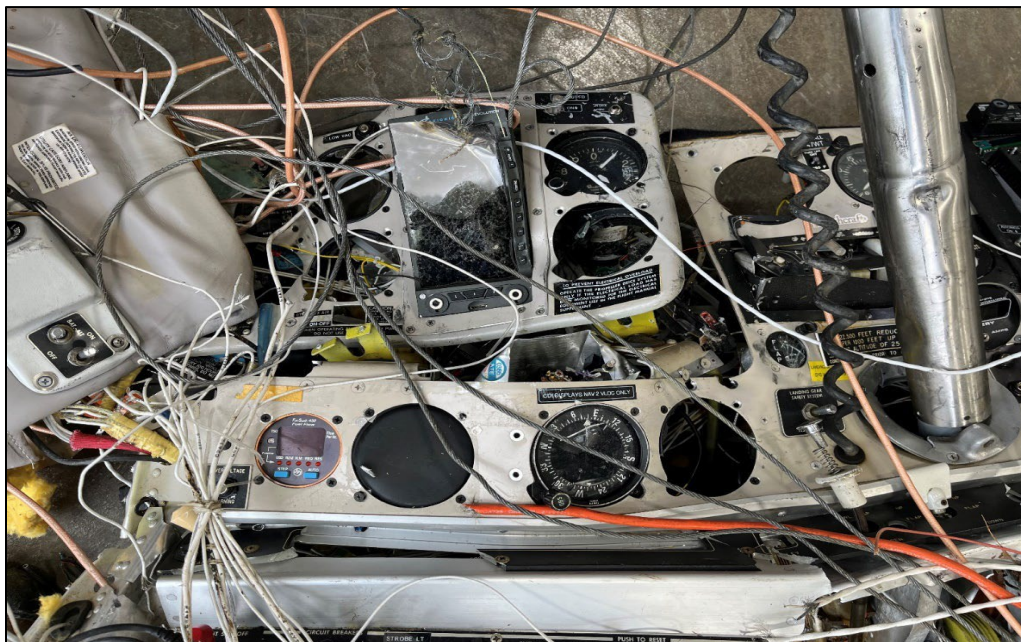


Figure 19 Instrument panel gauges and instruments.

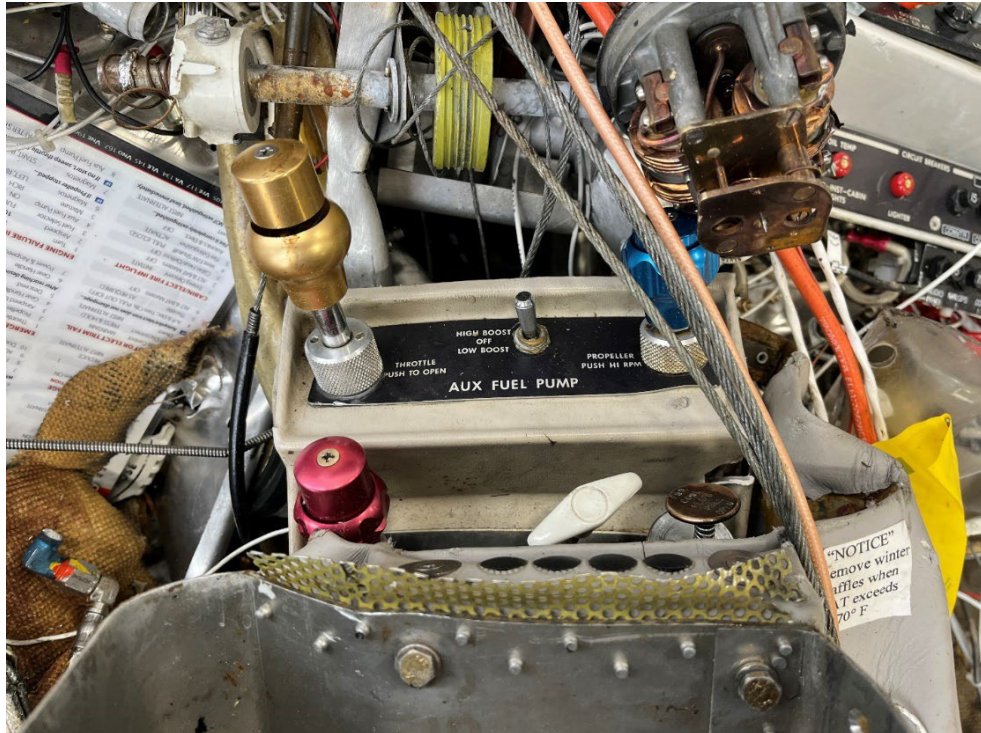


Figure 20 Engine and fuel controls.



Figure 21 Cockpit and instrument panel during hanger floor layout.

The rudder controls for the pilot were found in a field, centrally located in the debris path. The co-pilot rudder controls were found in the same field, approximately 100 feet away from the pilot rudder pedals.

2.6 Fuel/Fuel System

The aircraft was equipped with optional 40-gallon wing tanks and 2, 20-gallon STC wing tip tanks. About 8 gallons of fuel was drained/pumped out of the right and left wing fuel tanks which remained intact.

The engine driven fuel pump was removed, and the drive coupling was found intact. Due to impact forces, the fuel manifold was displaced, with broken fuel nozzle lines, completely missing upper deck pressure lines, and several broken fuel nozzles, 2 of which were recovered. The throttle body remained attached to the bottom aft of the engine near the absolute pressure controller.

2.7 Other Systems

All cable separations showed signs of a "broomstraw" appearance which is indicative of tensile overload failures. The rudder cables were continuous from the cockpit to the rudder mixers but separated from the forward bellcranks. Control cable continuity could not be accurately established for any of the other systems due to cable separations and impact damage however, during examination and layout on the hanger floor, cables were traced partially to their respective locations throughout the fuselage and controls. There is a singular elevator trim actuator, a measurement was taken but the cables leading to the actuator appeared to have pulled when the aircraft separated. Three autopilot servos were recovered, none of the servo cable loops were continuous.

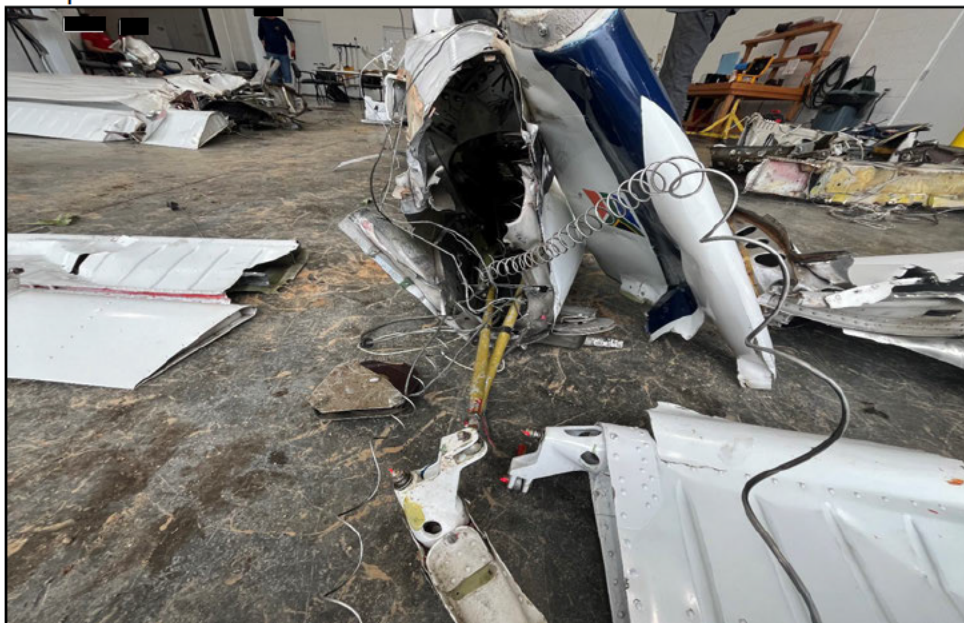


Figure 22 Empennage Control Cables Displaying Overload Damage.

3.0 Engine Examination

The engine came to rest in a small lake at the westerly end of the 3,800 ft debris field. The engine was submerged in murky fresh water prior to recovery. The top and left-hand side of the engine was heavily impact damaged; it impacted the pond and was submerged in 8 ft of water. All cylinders have extreme cylinder fin damage, the left-hand crankcase half was broken open measuring 12" long by 3.5" wide. Through this hole, crankshaft continuity could be confirmed. The alternator, starter and both magnetos were separated by impact damage and were not recovered. A portion of the ignition wire harness was still connected to engine, and some related spark plugs.

- Cylinder Nos. 2, 4, 5, and 6 rocker covers were not recovered.
- Cylinder Nos 1, 3, 5, had impact damage to their respective spark plugs, making them unable to be removed.
- Cylinder Nos 2, 4, 6, were successfully borescoped and they showed normal wear and operation. Cylinder Nos 1, 3, 5, were completely blocked with mud and silt.



Figure 23 Engine Overview

The induction system was found mostly complete except the No. 5 induction elbow was broken off and found in the debris field outside the lake/pond. The exhaust system was damaged as it detached from the airframe and surrounding structure. The turbo charger intake and exhaust turbine wheel were rotated

manually and there was no binding, limitations to movement or irregular noises from the system.

The oil system was breached as LH & RH engine mount legs remained attached to the airframe mounting structure, leaving holes in the LH & RH aft area of the oil sump. The Oil cooler was impact damaged from the top and LH side. Several oil and fuel lines were damaged as the components separated from each other exceeding the hoses length.

4.0 Propeller Examination

The 3 bladed, STC installed variable pitch propeller remained attached to the engine. Two of the blades were missing the outer portions of the tips. The third blade was curled forward. The spinner dome exhibited fore-aft crushing. The McCauley propeller governor remained attached to the forward-left side of the engine crankcase.

5.0 Pilot Information

A logbook and registration review was conducted during the examination and revealed that the pilot had owned a Piper PA-28R-201T (N38201) for about 3 years prior to purchasing the accident airplane. According to the pilot's logbook, he had accumulated 348.2 total hours and 22.2 hours of actual instrument time when he sold the airplane in September of 2023. The pilot then purchased the accident airplane (N47WT) in November of 2023. Note: Excellent logbook documentation; the logbook revealed that he had accumulated 366.4 total hours of flight experience with 18.2 total hours in the accident airplane make model and the same 22.2 hours of actual instrument time.

Submitted by:

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