



MEMORANDUM FOR RECORD

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Date: 01/17/2023
Subject: Wreckage Examinations
NTSB Case Number: ERA23FA108

On January 13 and 14, 2023, the wreckage of N43156 was examined at the accident site in the Maple Spring area of the Shenandoah Mountains. Further examination of the wreckage was then conducted on January 15, 2023, at the Clover Hill Volunteer Fire Company in Dayton, Virginia. The following information was gathered during the examinations.

Fuselage

The fuselage was fragmented. The cabin door and nose baggage door were impact separated. The cargo door was partially separated, and the aft cabin door was fragmented. The air-conditioning was off. The nose gear was impact separated, and its actuator was mid-travel. The cabin heat and defrost controls were off. The flap control lever was in the retracted (wing flaps 0°) position, and the induction alternate air was in the “off/filtered air” position. The magneto switch was in the both position. The landing gear switch was in the landing gear down position.

The stabilator, rudder, and aileron control cables had remained attached to their respective attach points and were separated by recovery and overload at various lengths.

The fuel selector was impact damaged and was noted to be in the off position. The gascolator bowl was impact fractured with no debris noted to it or the filter. The fuel selector valve was determined to functional during a field test. The fuel selector control lever and shaft were fragmented.

The ELT was separated from its mount and was noted to be in the “arm” position. The ELT did not activate.

Left Wing

The left wing was impact separated and fragmented. The fuel tanks were fragmented, and its filler cap remained attached to its receptacle. No anomalies were noted to the fuel system. The

inboard lift detector was determined to be functional during a field test; however, the outboard lift detector was separated and not located within the recovered wreckage. The pitot and static ports of the pitot mast were clear of obstructions. The main landing gear was impact separated from the wing and its actuator was extended, which was indicative of the gear being in the “down” position.

The wing flap was separated from the wing and separated in two sections; impact damage precluded verification of its position. The fuselage mounted flap control lever was in the retracted (0° wing flap position).

The aileron and its control rod remained attached to their respective attach points. The aileron cables remained attached to the bellcrank and were separated at the wing root area; the separated ends were consistent with tension overload separation. Flight control continuity was established from the aileron through the recovery and impact separations to the cockpit.

Right Wing

The right wing was separated at the root and separated about 3’ from the wingtip. Semi-circle impressions were noted to the leading-edge area near the separation. Both fuel tanks were breeched from impact forces; fuel cap remained attached to its receptacle and blue fuel stains were noted at the breeched areas. The main gear was impact damaged and separated from the wing; its actuator rod was not located within the recovered wreckage.

The wing flap was separated and impact damaged; impact damage precluded verification of its position. The fuselage mounted flap control lever was in the retracted (0° wing flap position). The aileron was separated in two sections and partially separated from the wing. The aileron control rod was separated from the aileron but remained attached to the bellcrank. The aileron control cables remained attached to their respective attach points of the bellcrank; however, the bellcrank’s control cables weldments were impact separated from the assembly and pulled inboard. The control cables in the fuselage centerboard area were separated consistent with tension overload separation. Aileron control continuity was established through impact and recovery separations from the aileron to the cockpit.

Empennage

The vertical stabilizer exhibited a semi-circle impression to its leading-edge and was separated from its supporting structure. The rudder remained attached to its mounts and its balance weight was separated from the rudder. The rudder bellcrank remained attached to its mounts and the attached rudder cables were recovery separated at various lengths. Rudder control continuity was established from the rudder to the cockpit through impact and recovery separations.

The stabilator remained attached to a separated section of empennage. The stabilator was fragmented and leading-edge semi-circle impressions were noted to its separated areas. The stabilator control cable clevises remained attached to the stabilator balance weight and were impact separated at various lengths; The control cables remained attached to the T-bar and flight control continuity was established from the stabilator to the T-bar through impact and recovery

separations. The left stabilator trim tab and trim control rod remained attached to their respective attach points; the right stabilator trim tab was impact separated from the stabilator. The stabilator trim barrel assembly exposed about 5 jackscrew threads or $\frac{3}{4}$ " from the top of the assembly, which was indicative of a neutral trim setting.

Propeller

The propeller had impact separated from the crankshaft flange and was found 15 to 20 yards ahead of the engine in the debris field. The propeller had rotational scoring signatures consistent with high engine RPM. The governor remained attached to the front of the engine crankcase and was undamaged. The control cable for the governor was attached. The governor gasket screen had minor organic matter on the screen, and the drive of the unit rotated. The governor produced oil when rotated by hand.

Engine

The engine had been partially impact separated from the engine mounts of the airplane. The airplane was heavily fragmented on an approximately 150-yard debris path with the engine and firewall concluding the path.

The engine sustained impact damage primarily to the lower front accessories and the bottom left-hand side of the engine. The No. 2 cylinder was substantially damaged in the rocker area around the intake valve.

The exhaust and intake pipes for cylinders No. 2, No. 4, and No. 6 were impact separated. The intake and exhaust pipes on cylinders No. 1, No. 3, and No. 5 remained attached to the cylinder heads. The intake pipes were secure in the air housing on the engine sump assembly. The exhaust stacks were had separated from the muffler assembly. The muffler and exhaust pipe were crushed from impact forces.

Fuel Injection System

The engine fuel injector servo was partially impact separated from the air housing of the engine. The throttle and mixture cables remained attached to the unit. The fuel inlet screen was clean. The diaphragms of the unit were intact and undamaged. Liquid consistent with aviation fuel was found in the unit and tested negative for water when a water finding paste was present.

The flow divider remained secured to the top of the engine and was undamaged. The fuel lines for each cylinder were secure. Fuel was present in the unit and the diaphragm was undamaged.

The fuel injector nozzles remained installed in their respective cylinder heads and were undamaged. The nozzles were unobstructed.

The engine driven fuel pump had remained secured to the accessory housing of the engine. Liquid consistent with aviation fuel was found in the unit. The liquid was tested with water

finding paste and the liquid tested negative for water. The fuel pump was capable of pumping air when actuated by hand. The diaphragms of the unit were undamaged.

Dual Magneto Ignition System

The dual magneto had remained secured to the engine accessory housing and was undamaged. The magneto produced spark at all leads when rotated by hand.

Spark Plugs

The top spark plugs remained installed in their respective cylinder heads and were undamaged. The bottom No. 2 and No. 6 spark plugs were impact damaged. The bottom No.1 spark plug was surrounded by the exhaust stack. The spark plugs electrodes for the spark plugs that were removed remained mechanically undamaged and the coloration was consistent with normal operations.

Drive Train

The crankshaft would rotate when force was applied to the crankshaft flange. Thumb compression was established on cylinders No. 1, No. 3, No. 4, No. 5, and No. 6. Valve action movement was observed on all valves except for the No. 2 intake valve, which was found to be wedged in an open position because of impact forces.

Starter

The starter was impact separated from the crankcase but remained attached to the engine by the starter cable. The starter housing had an impact mark consistent with engine crankshaft rotation.

Alternator

The alternator was impact separated and destroyed during the accident sequence.

Oil Filter

The oil filter was secure to the accessory housing and was undamaged. The filter element was clean.