



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

August 29, 2018

AIRFRAME AND ENGINE EXAMINATION

WPR18FA244

This document contains 17 embedded photos.

A. ACCIDENT

Location: Redding, CA
Date: August 29, 2018
Aircraft: Cessna 150F, N7990F
NTSB IIC: Fabian Salazar

B. EXAMINATION PARTICIPANTS:

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C. SUMMARY

Examination of the airframe and engine was conducted at the accident site in Redding, CA. on August 30, 2018. No evidence of preimpact mechanical malfunction was noted during the examination of the airframe. A preliminary examination was accomplished on the engine. It was decided that the engine would be transported to Continental Motors, Mobile, AL for a full teardown examination. After the full tear down examination, conducted on November 26, 2018, it was determined there was no evidence of preimpact mechanical malfunction on the engine.

D. DETAILS OF THE INVESTIGATION

Airframe Examination

Cockpit Documentation

Tach: 4,841.93 hours
Hobbs: 2,996.6 hours
DC Volt – 0
Left fuel gauge – Needle deflected to E
Right Fuel Gauge – Needle deflected to E
Oil Temperature – Needle deflected left side green arc
Oil Pressure – 0
Flap switch – neutral
Parking Brake – off
Primer – in and locked
Mixture control – full forward
Throttle control – full forward
Cabin heat – off
Master – off
Ignition – Key in positioned to both
Starter – full forward
Transponder – 1200 code
Attitude Indicator – face damaged. Instrument pushed into panel
VSI – face damaged, needle up 600 ft/min
Exhaust temperature – 14.2 face damaged
Altimeter – 30.04”, needle positioned to 400 feet
Airspeed – needle positioned above 180
DG – 175 degrees
Turn/bank – tumbled
Trim – neutral
Flap – measured between 10 – 20 degrees, but closer to 20 degrees
Fuel selector – positioned to ON
Control columns – cut by first responders
Pilot seat – removed by first responders. Seat bottom legs were flared when pulled from the tracks. Seat back was cut. Three point with two shoulder straps. First responders reported that the pilot was only wearing the lap belt. Belts were unbuckled and had been unclipped from the center mount.
Right seat – Seat bottom was still partially attached to the seat tracks but was easily removed. Back had been cut by first responders. Same seat belt configuration.
The medium sized dog was reported by first responders to be unrestrained and was in the right-side baggage compartment.

WRECKAGE AND IMPACT INFORMATION

The airplane and the engine were examined at the accident site. The engine was further examined again on November 26, 2018 at a secure facility.

AIRFRAME

Fuselage. Examination of the fuselage revealed the engine and cabin area were crushed from below, upwards and aft. The roof of the cabin had detached and moved forward, along with the left wing, pivoting near the root of the right wing. The fuselage buckled on the right side, just aft of the main landing gear and allowed the aft portion of the fuselage and the empennage to displace downward about 40°. The fuselage buckled on the left side then cracked open, just aft of the main landing gear, allowing the aft portion of the fuselage and the empennage to displace about 40° downward. The right door remained attached to the fuselage. The top hinge was damaged allowing the upper half to bend inwards. The door window was intact. The left door was removed as part of the recovery effort and was found near the left side of the airplane. The windshield was cracked and scattered in front of and to the right of the centerline of the airplane.

Right Wing. The wing is partially detached from the fuselage at the wing mounts and pivoted forward near the root of the wing. The control cables to the ailerons and flaps remained connected. The aileron control cables were attached at the bell crank and control column. The main control cable was under tension and continuous. The balance cable was under tension overload and broom straved. The aileron was positioned beyond the full-up limit. The push/pull tube was broken. The right flap was intact and positioned about 20° down. The flap control cables remained attached to the bell crank with overload separations at the root. The flap and aileron remained attached to their respective hinges. The fuel cap was intact. As a safety measure, the remaining fuel, about 6 gallons, was removed from the tank during the emergency response. The fuel was light blue in appearance consistent with aviation gasoline. There was damage to the leading edge near the wing root, which was cylindrical in shape, with traces of tree bark embedded in the aluminum, consistent with striking a tree. A tree, identified as tree “D”, with damage to its bark, was located immediately in front of this wing damage. There was damage to the leading edge at about 20” from wing tip which was cylindrical in shape with traces of tree bark embedded in the aluminum, consistent with striking a tree. A tree, identified as tree “C”, was found, with damage to the bark, aft of the right wing about 1ft from the wing. The lower side of the right wing displayed the following characteristics. There were wrinkles behind the cylindrical dent near the wing root. The fuel drain was connected and showed some reddish color staining. The right-wing strut remained connected to the wing and the fuselage with no damage.

Left Wing. The left wing detached from the fuselage, along with the cabin roof, and displaced forward about 15°; pivoting near the right-hand side of the fuselage. The entire wing assembly and cabin roof had collapsed down toward the cabin area. The aileron control cable remained attached to the bell crank. The push/pull tube was broken. The main control cable was continuous from the bell crank to the control column. The balance cable was observed in tension overload. Both the flap and aileron remained attached to their respective hinges. The left-wing tip and about 12 inches of wing were separated from the wing. The aileron had about a 12-inch bend to the trailing edge, the rest was undamaged. The leading edge, about 15” from the wing-tip, displayed a dent, cylindrical in shape, with traces of tree bark embedded in the aluminum,

consistent with striking a tree. A tree, identified as tree “B”, with damage to its bark was found about 2 ft aft of the left-wing. The separated portion of the left wing was found adjacent to tree B. A second cylindrical dent, with traces of tree bark embedded in the aluminum, consistent with striking a tree, was found about 30” outboard from the wing root directly in front of the fuel vent tube and wing strut. A tree, identified as tree “A”, with damage to its bark, was found about 7 ft aft of the left wing. The entire wing was buckled down; with a high point just above the wing strut. The left flap appeared undamaged and was in about a 10° to 20° down position. The landing light plexiglass, located on the leading edge of the left wing, was broken away entirely. One landing lamp was broken and one remained intact. The fuel cap was attached. The fuel tank was breached with fuel leaking to the ground. As a safety measure, the remaining 2 gallons of fuel was removed from the tank. These 2 gallons from the left wing were combined with the recovered fuel from the right wing and stored in a used fuel container. This fuel tested negative for water.

The lower side of the left wing displays the following characteristics. The fuel vent tube was bent downwards. The finger filter was clear of debris. There were wrinkles starting at the strut mount running about 45° aft and outboard. The wing strut was attached at both the wing and the fuselage. The strut had damage on the leading edge with traces of tree bark embedded in the aluminum, directly in line with the cylindrical dent about 30” from the wing root.

Empennage. Beginning just aft of the main landing gear, the empennage had deep wrinkles on the right side where the fuselage buckled. The aft portion of fuselage, on the left side just aft of the main landing gear, was cracked away from the forward portion of fuselage. The aft portion of fuselage, vertical fin, rudder and horizontal stabilizers had little to no damage. The center hinge of the elevator was broken.

Main Landing Gear (MLG). Both main landing gear remained attached to the fuselage. The right MLG was intact with no apparent damage. The right wheel and tire were intact with no damage. The right brake caliper was intact with no damage. The right brake line was secure with no damage. The right wheel fairing remained attached, with the first 12” broken away. The left MGL was attached to the fuselage with no apparent damage. The left wheel and tire were intact with no damage. The left brake caliper was intact with no damage. The left brake line was secure with no damage. The left wheel fairing was attached with the first 12” broken away. The nose wheel had separated and was found resting on the ground behind its mounting point.

Engine nacelle. The lower portion of the engine nacelle was crushed upward and aft. The top was found intact with minor wrinkles near the wind shield. The spinner remained attached to the propeller and displayed crush damage aft and up.

Propeller. The two-blade fixed-pitch McCauley propeller, serial number G3557, was found attached to the engine and damaged. The “A” blade had about 5” of the tip bent aft. There was minor damage beyond the first 5 inches in the form of scratches and scuffs. The “B” blade was

bent aft with the tip pointing about 90° away from the hub. There was about a 4” portion of the blade broken away at the tip. The B blade exhibited chordwise striations running about 45° to the chord line along the entire length. There was no leading-edge gouging found on either blade.

Flight Control Continuity. Flight control continuity for the ailerons was established from the ailerons to the control yoke. Flight control continuity for the elevator was established from the elevator to the control yoke. Flight control continuity for the ruder was established from the rudder to the rudder pedals. The flap switch was found in the down position, the flap actuator was at 3.25” and the flaps were at about 10°-20°.

The instrument panel exhibited damage but remained intact. The pilot’s control yoke was cut and removed during rescue operations. The fuel selector was found to be in the ON position.

The airplane was equipped with an Ameri-King Corp. ELT. Model AK-450, Type (AF) (AP), serial number 409762. The ELT was armed but did not activate. Batteries were found loose near the ELT and had a date of March 2023.

The engine was examined at the accident site. The engine remained attached to the fire wall. The rear of the engine is pushed up towards pilot’s glare shield. The engine sustained impact damage, which had fractured the intake manifold allowing the carburetor to separate. The mixture control arm and the throttle control arm moved freely throughout their full range. The carburetor bowl was removed to examine the floats. The float bowls were brass in appearance and moved through their full travel. The floats displayed hydraulic damage. The airframe fuel strainer was damaged and there was no presence of fuel. No contaminations were found on the carburetor fuel finger strainer. The accelerator pump functioned normally. A blue fluid with the appearance and smell of aviation gasoline was found in the carburetor bowl. This fluid tested negative for water and was free of debris. The upper spark plugs were removed at the scene and appeared undamaged. Spark plugs number 1, 2, and 3 appeared dark in color and dry. Sparkplug number 4, appeared darker in color and wet. Thumb compression was obtained on all four cylinders. All rocker arms moved freely when the engine was rotated. The carburetor had a red Precision Airmotive Corporation data tag riveted to it. The data tag displayed the following information: Model: MA-35PA, Part No.: 10-4894, Serial Number: 3E-0-231 or BE-0-231.

The vacuum pump had separated but remained attached via hoses. The oil filter was examined, and the filtering medium exhibited no foreign or metal material.

On November 26, 2018, the engine was further examined at Continental Motors, Mobile, AL. The findings are detailed below.

The engine could be rotated freely by turning the propeller mounting flange. All cylinders appeared intact without damage. The lower spark plugs were removed. Spark plugs number 1, 2, and 3 appeared dark in color, dry and undamaged. Spark plug number 4, appeared darker in color and wet. Various shields and non-system items were removed.

The Starter appeared normal. The oil filter attachment bracket had a mounting tab broken. The other tab was cracked. Deposits were found trapped in the oil screen but estimated to be less than

10% blockage. The oil pump attachment bolts did not have safety wire but appeared to retain their torque. The oil pump gears appeared normal. The engine was verified to be timed correctly at 24°. The left magneto, Left, S/N: A58836, was test run and verified to function correctly. The right magneto, S/N: A58837, was test run and verified to function correctly. The generator appeared normal. The exhaust mufflers appeared normal. The intake manifold was broken at the carburetor mount, otherwise it appeared normal. The number two cylinder had a chrome cylinder. The remaining three were not chrome. All the cylinders appeared normal. All valves appeared normal. All pistons appeared normal with a light to medium coat of carbon deposits on the tops. The pistons were a standard bore size. All piston rods appeared normal. All wrist pins appeared normal. All rod end bearings appeared normal. All lifter guides appeared normal. The number 2 intake and number 3 exhaust guides were pitting at the point where the cam lobes meet the guide. The cam appeared normal. All cam bearings appeared normal. The crank case appeared normal with all bearing surfaces appearing normal.

PHOTO EXHIBIT



Photo 1. Right view of airplane.



Photo 2. Left view of airplane.



Photo 3. Leading edge contact points and trees with damage.



Photo 4. Engine at the accident site.



Photo 5. Upper and lower spark plugs.

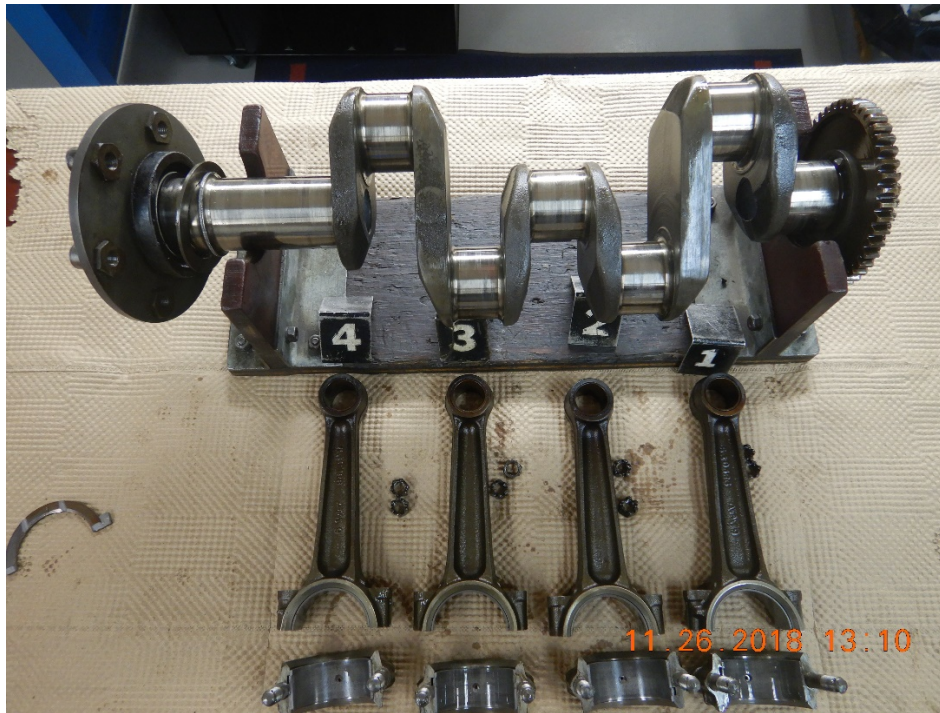


Photo 6. Crank Shaft, Connecting rods and bearings.



Photo 7. Engine cam.



Photos 8. thru 11. Cylinders.



Photos 12 thru 15. Pistons.



Photo 16. Right Engine Case.



Photo 17. Left Engine Case.