

**NATIONAL TRANSPORTATION SAFETY BOARD
Office of Aviation Safety
Washington, DC 20594**

SUMMARY OF AIRFRAME AND ENGINE EXAMINATION

CEN20LA309

A. ACCIDENT

Location: Corsica, SD
Date: 7/22/2020
Time: 1415 MDT
Aircraft: [Cessna A188B (S/N 18801655) N53163]

B. PARTICIPANTS

David Bowling
Senior Air Safety Investigator
National Transportation Safety Board

Peter Basile
Textron Aviation
Wichita, Kansas

David Beard
A&P Mechanic
Beegles Aircraft Service, LLC
Greeley, Colorado

C. ACCIDENT SUMMARY

On July 27, 2020, about 1045 central daylight time, a Cessna A188B airplane, N53153, was destroyed when it was involved in an accident in Corsica, South Dakota. The pilot was fatally injured. The airplane was operated as a Title 14 Code of Federal Regulations (CFR) Part 137 aerial application flight.

The flight originated at Corsica Municipal Airport (D65), Corsica, South Dakota, about 1025, and was destined to complete aerial applications over a field located 15 miles due east of D65.

According to witnesses, the pilot had just completed two passes over the field. After completing the second pass, and almost completing his turn for another pass, the airplane suddenly nosed over and impacted the ground. One of the witnesses, who was in his tractor about 1/8 mile away

from the accident site, described the airplane made a ¼ turn (in a spiral) before impact. Two witnesses hear a loud noise from the airplane prior to seeing it “nosedive ;” similar to a “backfire” or “an over-inflated tire bursting” and then heard the sound of the impact. All three witnesses stated the airplane appeared to be flying normally before the accident occurred.

According to the operator, the pilot had recently started with the company in early May 2020. He had been out flying for about 2.5 hours practicing spray operations and was on his third load of water.

D. DETAILS OF AIRFRAME AND ENGINE EXAMINATION

Following the accident, the airplane was recovered to a local facility and then taken to Beegles Aircraft Services, LLC, Greeley, Colorado for storage. On February 4, 2021, an examination of the airframe and engine was conducted. It was led by an NTSB senior air safety investigator, with assistance from an air safety investigator from Textron Aviation and an airframe and powerplant mechanic from Beegles Aircraft Services.

E. SUMMARY OF AIRFRAME EXAMINATION

Cessna A188B, serial number 18801655

The airplane was laid out in one of Beegles’ hangar facilities. The left and right wings and wing struts were separated from the fuselage. The landing gear, hopper, engine, and propeller were also separated and examined as separate components.



Figure 1, Airplane

Left Wing

The airplane's left wing leading edge wing tip was crushed up and aft. There was leading edge crushing along some of the wing. The fuel tank cap was secure. Examination showed the cap intact and the seal in good condition. An examination of the fuel tank showed it clean and intact.

The pitot tube was removed and found to be in good condition. There were no breaks in the line from the tube to the wing root.

The left aileron cables were located. Both cables displayed unraveling and appeared to be fractured in tensile overload. A close up look at the unraveled individual strands showed evidence of necking and cup/cone failure indicative of being pulled apart. The left aileron down cable was fractured near the pulley adjacent the control stick and the carry through cable was fractured near the right wing root. The cables were traced to the bellcrank and rod to the aileron. Everything was connected. When pulled the cables moved the aileron surface. The aileron itself was in good condition.



Figure 2. Left Wing Aileron Cables

The left flap was connected, in good condition, and in the fully retracted position. The left flap cables were fractured in tensile overload at the wing root and appeared unraveled. The cables remained attached to the bellcrank and the actuator arm was intact and continuous.

Right Wing

The airplane's right wing was crushed aft along the leading edge to the rear spar, from the wing tip to the root. The fuel tank cap was secure. Examination showed the cap intact and the seal in good condition. An examination of the fuel tank showed it clean and intact.

The right aileron cables were located. One cable had been cut and the other showed unraveling. A close up look at the individual strands showed evidence of necking and cup/cone failure indicative of being pulled apart. The cables were traced to the bellcrank and rod to the aileron. Everything was connected. When pulled, the cables moved the aileron surface. The aileron itself was in good condition.

The right flap was connected, in good condition, and in the fully retracted position. The right flap cables were fractured in tensile overload at the wing root and appeared unraveled. The cables remained attached to the bellcrank and the actuator arm was intact and continuous. The manually actuated flap handle was in the retracted position. The flap cables remained attached to the base of the flap handle.

Empennage

The elevator, rudder, and tail wheel cables were continuous from the surface actuators through the fuselage to the cockpit. The left horizontal stabilizer and left elevator had been cut longitudinally about 24 inches outboard of the fuselage by recovery personnel. The right horizontal stabilizer, right elevator and elevator trim tab, vertical stabilizer and rudder remained attached to the fuselage. The vertical stabilizer and rudder showed no damage. The tail wheel was also undamaged. The elevator trim tab actuator was extended 1.6 inches.



Figure 3, Empennage

Aft Fuselage

The aft fuselage was bent and buckled aft rearward, aft of the cockpit.

Cockpit and Instrument Panel

Elevator and rudder flight control cable ends in the cockpit were connected to their respective rudder pedals and the control stick. The cables from the rudder pedals were continuous beneath the pilot seat aft into the aft fuselage. There was slack in the cables when the pedals were moved. When the slack was removed and the cables manipulated, the rudder moved accordingly. Manipulation of the control stick when removing the slack from the elevator cables allowed the cables to move the elevator. The elevator trim chain was intact and the trim wheel undamaged. When turned, the trim wheel moved the elevator trim tab. Aileron cables from the control stick through the pullies showed one cable on each side fractured (frayed with the individual strands showing necking and cup/cone separation consistent with an overload failure).

The five-point restraint system was intact. All straps were undamaged save some minor fraying on the left shoulder strap and the right lap belt at the bayonets. Examination of the witness marks on the bayonets on the lap belt and shoulder harness restraints were consistent with the belts being fastened when the crash occurred.



Figure 4, Restraints

The pilot seat right front roller assembly had come off the right seat rail. The left front roller assembly was also loose from the rail. The pilot seat adjustment pin was found broken at the guide pin hole. Witness marks on top of the left seat rail indicated the seat was likely pinned in the 1st or second hole aft at the time of impact. The seat rails met all measurement tolerances.



Figure 5, Seat Roller Housing

The instrument panel was broken aft. Most of the radios and flight instruments were broken out. The throttle and propeller knobs were full forward. The mixture knob was leaned about an inch.

The hopper and front windscreen were not examined.

The main landing gear struts and wheels were intact. They were broken out at the forward fuselage frame.

Airframe Summary

Flight control continuity was confirmed. All structural damage to the airplane was consistent with ground impact.

F. SUMMARY OF ENGINE EXAMINATION

Continental IO-520-D [s/n 563671]

The exterior of the engine was photographed. The remaining firewall and baffling were removed from the engine. The fuel pump, oil filter, and magnetos were removed.

The wiring harness was removed from the top six spark plugs. The spark plugs were removed and photographed. The electrodes appeared new with minimal wear and were light gray with no combustion deposits.

The rocker box covers were removed, and the crankshaft was manually turned. Intake and exhaust valves on all six cylinders moved normally. The crankshaft and camshaft rotated smoothly and the camshaft gear drove the two magnetos drives. Push rods to the rocker arms moved smoothly. Thumb compression was conducted at the top spark plug holes. All cylinders showed good compression. Accessory drive gears all moved freely.



Figure 6, Engine Valves and Rockers, Left Side View



Figure 7, Engine Valves and Rockers, Right Side View

Left Magneto Slick Model 6310 [Serial No. 12041114]

The magneto was in good condition. The distributor cover was removed. The magneto coupling rotated normally. When rotated, spark was observed at all six points.

Right Magneto Slick Model 63-10 [Serial No. 12070247]

The magneto was in good condition. The distributor cover was removed. The magneto coupling rotated normally. When rotated, spark was observed at all six points.

Fuel Distributor and Injectors

The fuel distributor cap was removed, and the screen examined. There was no debris beneath the screen. The 6 fuel injectors were removed and examined. They were clean.



Figure 8, Fuel Distribution Manifold Screen



Figure 9, Fuel Injectors

Engine Examination Summary

Engine continuity was confirmed. All physical damage to the engine was consistent with ground impact.

G. SUMMARY OF PROPELLER EXAMINATION

McCauley D-3A34C401-C [s/n 120215]

The three-bladed McCauley propeller was separated from the flange. All three blades cuffs were broken at the hub. Part of the hub was broken out. The three blades were broken aft and in fair condition. One blade was bent aft 10 degrees approximately 2 inches outboard of the hub. The second blade showed forward bending at mid span. The third blade was straight and showed little damage. All three blades showed some leading edge polishing and chordwise scratches. Two blades showed trailing edge nicks.



Figure 10, Propeller

H. ADDITIONAL INFORMATION

A Garmin handheld GPS and a DynaNav computer satellite locator [Part No. PDX-057T-8A-512 Serial No. 57TS10020012] with SD cards were removed from the cockpit and

instrument panel; they were retained on behalf of the NTSB Investigator-in-Charge for download and read out.



Figure 11, DynaNav Flight Computer



Figure 12, Garmin Aera 510 Global Positioning Satellite Receiver