

NATIONAL TRANSPORTATIONS SAFETY BOARD
Office of Aviation Safety
Washington, DC 20594

SUMMARY OF AIRCRAFT EXAMINATION

-- CEN17FA072 --

A. ACCIDENT

Location: Cleveland, Ohio
Date: December 29, 2016
Time: 2257 eastern standard time
Aircraft: Cessna 525C (Citation CJ4) airplane (s/n 525C0072), N614SB

B. PARTICIPANTS

Timothy Sorensen
Senior Aviation Accident Investigator
National Transportation Safety Board

Vincent Yerace
Aviation Safety Inspector – Flight Standards
Federal Aviation Administration

Andrew Hall
Senior Air Safety Investigator
Textron Aviation

Jay Boyle
Senior Field Technical Advisor
Williams International

C. ACCIDENT SUMMARY

On December 29, 2016, at 2257 eastern standard time, a Cessna model 525C (Citation CJ4) airplane, N614SB, was destroyed during an in-flight collision with Lake Erie shortly after takeoff from runway 24R (6,604 feet by 150 feet, asphalt) at the Burke Lakefront Airport (BKL), Cleveland, Ohio. The pilot and five passengers were fatally injured. The airplane was registered to Maverick Air LLC and operated by the pilot under the provisions of Title 14 Code of Federal Regulations Part 91 as a personal flight. Night visual meteorological conditions prevailed for the flight, which was operated on an instrument flight rules (IFR) flight plan. The intended destination was the Ohio State University Airport (OSU), Columbus, Ohio.

Summary of Aircraft Examination

D. AIRCRAFT INFORMATION

The Cessna 525C Citation CJ4 airplane incorporated a low-wing, T-tail airframe arrangement, with a retractable tricycle landing gear. The cabin was pressurized, and the airplane was capable of operating at a maximum pressure altitude of 45,000 feet. It was configured for up to 10 occupants including the pilot(s). The airplane was approved for single-pilot operations provided the pilot-in-command held a CE525S (single-pilot) type rating, the airplane was configured for single-pilot operations in accordance with the operating limitations, and the pilot occupied the left pilot seat.

The airplane was powered by two Williams International FJ44-4A turbofan engines, serial numbers 211155 and 211156. Each engine was capable of developing up to 3,621 lbs. of thrust. The engine design incorporated a twin spool turbofan with a single-stage fan and three-stage axial compressor direct driven by a two-stage turbine, a single-stage centrifugal compressor driven by a single-stage turbine, an annular combustor, a full-length bypass duct and an exhaust mixer.

Federal Aviation Administration (FAA) records indicated that the accident airplane was a 2012 model year Cessna 525C, serial number 525C-0072. The airplane was initially issued a commuter category standard airworthiness certificate in January 2012 and was subsequently exported to Brazil. The airframe and engines had accumulated about 10 hours total time when exported. The airplane was imported to the United States and purchased by the owner in October 2016. An FAA standard airworthiness certificate was issued at that time.

According to the airplane maintenance records, the most recent inspection was completed on October 3, 2016, at 812.7 hours airframe total time. Compliance with all current airworthiness directives and mandatory service bulletins was confirmed at that time. Additional maintenance work was completed on October 14, 2016, at 814.1 hours total airframe time. The most recent maintenance work occurred on December 17, 2016, at 860.7 hours total airframe time.

E. DESCRIPTION OF ACCIDENT SITE

The accident site was located in Lake Erie about 2 miles northwest of BKL. The depth of the lake at that location was about 40 feet. Search and recovery efforts were hampered by weather and lake conditions. Airplane debris, including the cockpit voice recorder, was located beginning on January 5th. The recovery operations were conducted over the following 2 weeks as lake conditions permitted.

F. DETAILS OF AIRCRAFT EXAMINATIONS

The recovered wreckage was examined at BKL on January 17/18, 2017. The examination was completed by or under the direct supervision of the NTSB investigator-in-charge. Textron Aviation and Williams International provided on-scene technical support as parties to the investigation.

Summary of Aircraft Examination

G. SUMMARY OF AIRCRAFT EXAMINATIONS¹

The airplane was fragmented. The nose section was not recovered with the exception of the nose baggage compartment doors and the nose landing gear assembly which had separated from the airframe. The cockpit window assembly – pilot and co-pilot windshields and side windows – was structurally intact. The windows remained secured to the window frames. Each window was shattered but remained in place, except for portions of the co-pilot windshield outer pane which were missing. The co-pilot's windshield exhibited a red impact mark near the center of the windshield. (The mark was examined by ornithologists from the Smithsonian Institution – National Museum of Natural History. No evidence of bird feathers or DNA was present on the windshield.) The center pedestal assembly was separated and damaged. The right throttle lever, flap handle, engine run-stop switches, and friction adjustment handle were missing. No other portions of the cockpit controls or instrumentation were recovered.

A section of the left side fuselage structure from the aft cabin entry door frame, extending aft about 4 feet including the forward two cabin windows, was recovered. The entire section was deformed. A second section of the left side fuselage, including the remaining three cabin windows was also recovered. A fuselage section containing a portion of the forward cabin entry door frame was recovered. An approximate 8-foot long fuselage section comprised the lower and right portion of the fuselage. This included five forward right-side cabin windows and the forward (aft-facing) right side cabin seat. An approximate 3.5-foot long section of the upper and right-side fuselage which included the aft cabin window and the forward/upper portion of the emergency exit door frame was recovered. A section of the aft upper fuselage that included the left engine pylon, the engine mount carry-through spar, and a portion of the right engine mount was recovered. The entire section was deformed and damaged. Smaller sections of the airframe structure including wing carry-through spar sections and structural splice assemblies were recovered.

The aft canted bulkhead had separated from the mating fuselage structure. The lower portion of the vertical stabilizer spar remained attached to the bulkhead. The lower portion of the rudder torque tube remained attached to the pivot. The bellcrank was partially separated from the torque tube. The aft segments of the rudder control cables remained attached to the bellcrank. The forward rudder bias actuator remained in position; the aft bias actuator was separated. The aft portion of the actuator-to-rudder torque tube bellcrank was separated.

The aft pressure bulkhead with a portion of the fuselage skin attached was recovered. The bulkhead assembly was deformed but appeared to be structurally intact. The outflow valves remained attached to the bulkhead and appeared intact.

Portions of four cabin seat frames were recovered, all of which had separated from the floor structure. The aft, right-side cabin seat frame, and the pilot and co-pilot seat frames, were not recovered. Several seat cushions, including the pilot and co-pilot seatback cushions were recovered.

¹ Directions related to accident site placement and component damage/deformation are with respect to an intact airframe unless otherwise noted.

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G. SUMMARY OF AIRCRAFT EXAMINATIONS *(continued)*

The left wing had separated near the wing root. The inboard structure was deformed consistent with the separation. The aileron and flap had separated from the wing. The aileron was not recovered. The outboard and center aileron hinge brackets separated from the control surface and remained attached to the wing hinges; the inboard wing hinge failed consistent with overload. The aileron control cables were continuous to the wing root. The flap was deformed. The hinges remained attached to the flap. The actuator remained attached to the flap, but it had separated from the wing. The speed brake remained attached; however, it was deformed upward at the inboard end.

The right wing had separated near the wing root. The inboard structure was deformed consistent with the separation. The inboard portion of the aileron, including the trim tab, remained attached to the wing. The outboard portion of the aileron from the center hinge was separated. The outboard aileron hinge brackets separated from the control surface and remained attached to the wing hinge. A portion of the outboard aileron rib was recovered. The aileron control cables were continuous to the wing root. The aileron control push-pull tube was separated adjacent to the rod end consistent with overstress. The flap had separated from the wing and was not recovered. The speed brakes were damaged but remained attached to the wing.

The vertical stabilizer separated immediately above the aft fuselage. The upper portion of the stabilizer separated and remained attached to the right horizontal stabilizer. The aft spar was separated from the stabilizer. The lower portion of the rudder was separated from the vertical stabilizer; the trim tab was separated from the rudder section and not recovered. The stabilizer and rudder section were deformed over the entire assemblies. The rudder torque tube separated at the base of the rudder and appeared consistent with an overstress failure.

The left horizontal stabilizer had separated near the root. The inboard structure was deformed consistent with the separation. The outboard portion was deflected downward. The elevator had separated; it was not recovered. The hinge brackets separated from the elevator and remained attached to the stabilizer hinges. The push-pull tubes from the elevator actuators to the elevator mounting bracket. A portion of the elevator structure remained secured to the bracket.

The right horizontal stabilizer remained attached to the vertical stabilizer. The upper section of the vertical stabilizer was separated from the remainder of the assembly. The horizontal stabilizer exhibited leading edge deformation and crushing damage. The hinge brackets separated from the elevator and remained attached to the stabilizer hinges. The elevator control bellcrank remained attached to the spar section and appeared intact. Elevator control cable segments remained attached to the bellcrank; both elevator control push-pull tubes remained attached to the bellcrank.

The left engine was not recovered. The left exhaust assembly was recovered; it was deformed. The right engine, including the inlet and exhaust assemblies, were recovered. The right engine forward bypass duct and fan case assemblies had separated and were not recovered. The fan blades remained attached to the hub. Each blade exhibited gouges, scraping and deformation (curling) at the blade tips. Each fan stator blade was separated at the root. The first stage low pressure compressor blades remained attached; however, individual blades exhibited gouges and minor bending. The interstage housing was

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G. SUMMARY OF AIRCRAFT EXAMINATIONS *(concluded)*

fractured, and a portion was separated and not recovered. The rear housing assembly remained attached to the engine and was deformed. The rear bypass duct and exhaust duct assemblies were separated from the engine and recovered; both were deformed. The right fuel delivery unit was separated and recovered. The unit exhibited damage consistent with impact.

No anomalies consistent with a pre-impact failure or malfunction of the airframe structure, flight controls or engine was observed.

H. TESTS AND RESEARCH

The cockpit voice recorder was recovered and forwarded to the NTSB recorders lab for examination. The recorded data was downloaded and the recording quality was determined to be good to excellent. A group was convened and the relevant portions of the recording were transcribed. The transcript is available in the docket associated with this accident case.

The Aircraft Recording System II (ARes II) unit was recovered and forwarded to the NTSB recorders lab. The examination determined that the data chip was damaged and efforts to recover any data were not successful.

The engine Full Authority Digital Engine Control (FADEC) units were recovered and forwarded to Williams International. Data recovery was conducted under FAA oversight. A summary of the data recovery is available in the docket associated with this accident case.

No faults were recorded that pertained to the accident flight or the preceding flight. The FADECs record several engine parameters on each takeoff (as the airplane initially becomes airborne) in order to monitor engine performance. The engine trend data for the accident takeoff was recorded at 2256:48. At that time, the left engine fan (N1) and turbine (N2) speeds were 97.1% and 93.4%, respectively. The right engine fan (N1) and turbine (N2) speeds were 97.0% and 92.3%, respectively. The engine and wing anti-ice systems were active at the time.