

N836GW NARRATIVE

HISTORY OF FLIGHT

On September 13, 2017, about 0723 eastern daylight time, a Cessna 402B twin-engine airplane, N836GW, owned and operated by F/V Theresa Madeline, Inc. of Centerville, Massachusetts, sustained substantial damage upon impact with the ground following a loss of control on takeoff from runway 24 at Nantucket Memorial Airport (KACK), Nantucket, Massachusetts. The pilot, who was the sole occupant of the airplane, sustained minor injuries. Visual meteorological conditions prevailed, and no flight plan was filed for the personal flight, which was operated under the provisions of Title 14 Code of Federal Regulations Part 91.

Surveillance video recorded by KACK showed that on the takeoff leg, at approximately between 50 and 100 feet above the ground, the airplane entered a series of 3 pitch down and level off oscillations. During the last pitch down oscillation, the airplane impacted the runway at a shallow descent angle.

The accident pilot provided a written statement and wrote, in part: "I found myself fighting the flight controls to keep the aircraft from a nose down configuration. I used manual trim and rechecked that the auto pilot was disengaged. These remedies did not solve the problem and controlling the airplane was increasingly difficult along with maintaining altitude."

PERSONNEL INFORMATION

The 56-year old pilot holds a commercial pilot certificate with single, multi-engine, and instrument ratings. His first class medical certificate is dated August 12, 2017 and has a restriction to wear glasses for near/intermediate vision. The pilot estimated that he had approximately 3,800 hours of total flight experience with 3,500 hours in the Cessna 402 at the time of the accident. The pilot's last flight review was completed on July 15, 2017.

AIRCRAFT INFORMATION

The 1977 model Cessna 402B, serial number 402B1242, had accumulated a total of 4,986.3 airframe hours at the time of the accident. The airplane was equipped with two Teledyne Continental TSIO-520-E engines. The left engine serial number 182365-73-E-R, had accumulated 956.1 hours since its last overhaul, and the right engine, serial number 182957-R, had accumulated 1185.2 hours since its last overhaul. The left engine was equipped with McCauley model 3AF32C504-C three-blade propeller assembly and the right engine was equipped with McCauley model 3AF32C87-NR three-blade propeller assembly.

On March 30, 2016, Airworthiness Directive (AD) 2016-07-24 was issued by the FAA. The AD mandated replacement and repetitive inspections of the hardware securing the elevator trim push-pull rod. The AD applied to all Textron Aviation, Inc. Models 310 through 310R, E310H, E310J, T310R, 310J-1, 320 through 320F, 320-1, 335, 340, 340A, 401 through 401B, 402 through 402C, 411, 411A, 414A, and 421 through 421C. The AD was issued to prevent jamming of the elevator trim tab in a position outside the normal limits of travel due to the loss of attachment hardware connecting the elevator trim tab actuator to the elevator trim tab push-pull rod, which could result in loss of control.

On August 17, 2016, the FAA issued AD 2016-17-08, which superseded AD 2016-07-24. AD 2016-17-08 retained the airplane applicability and actions required by AD 2016-07-24 but revised the repetitive inspection intervals and allowed for a longer bolt for the attachment of the elevator trim tab actuator rod end to the push-pull tube connection and/or for the elevator trim tab horn end to the push-pull tube connection. AD 2016-17-08, f(1) through f(3) require the following actions as summarized below:

f(1): Within the next 90 days after September 12, 2016 (effective date of AD), replace the elevator trim tab push-pull rod attachment hardware on the elevator trim tab actuator and the trim tab ends of the push-pull rod using the instructions outlined in Textron Aviation, Inc. (Cessna) Multi-engine Service Bulletin (SB) No. MEB-27-02, Revision 1, dated June 15, 2016.

f(2) Repetitively conduct general visual inspections of the elevator trim tab push-pull rod attachment hardware on the elevator trim tab actuator and the trim tab ends of the push-pull rod at intervals not to exceed 110 hour TIS or 12 months, whichever occurs first.

f(3) After September 12, 2016 (effective date of AD), any time the elevator trim tab push-pull rod attachment hardware on the elevator trim tab actuator and/or trim tab ends of the push-pull rod is removed for any reason, discard the old hardware (bolt, nut, washer and cotter pin) and replace with new hardware.

Review of the aircraft maintenance records showed that the last annual inspection was conducted on February 06, 2017, at an airframe total time of 4,928.3 hours. Aircraft maintenance records showed that the right elevator assembly was removed and reinstalled during the last annual inspection in order to have the elevator painted and to replace the right elevator control tube assembly end fitting part number 5035005-4, which was found to have been cracked. The cracked end fitting was replaced with a serviceable, owner supplied, end fitting.

Separate interviews conducted with the technician that removed the right elevator and the technician that installed the right elevator indicate that when the right elevator was removed from the aircraft the elevator trim control pushrod assembly was disconnected from the elevator trim tab horn. The elevator trim control pushrod assembly was left connected to the elevator trim tab actuator assembly. The elevator trim control pushrod assembly was then safety wired to the aircraft structure in order to prevent someone from inadvertently spinning the manual trim wheel and mis-rigging the elevator trim system.

No proof of compliance with AD 2016-07-24, AD 2016-17-08, or Cessna SB No. MEB-27-02 original revision or revision 1 was found in the aircraft maintenance records or work order provided by the certified repair station that completed the annual inspection.

METEOROLOGICAL INFORMATION

At 0653 eastern daylight time, the KACK automated weather observation system reported the following weather conditions: Wind 280 degrees at 5 knots; sky clear; mist; temperature 17 degrees Celsius (C); dew point 17 degrees C; altimeter setting 29.90 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

Following impact with the runway, the airplane slid to a stop on the edge of the displaced threshold for runway 6. The aircraft impacted the runway approximately 4,530 feet from the departure end of runway 24 and 36 feet to the left of the runway centerline. The distance from initial runway impact to the main wreckage location was about 1,414 feet. Ground impressions, airframe deformation and video surveillance indicate that the impact angle was approximately 5 degrees nose down on a magnetic heading of 250 degrees.

Both the left and right propeller blades were significantly curled back. The skin around the nose of the aircraft buckled. The bottom skin of the nose of the aircraft has pronounced scrape marks and buckled skin.

Both the left and right main landing gear upper trunnion assemblies fractured on impact separating the left and right main landing gear wheel assemblies from the aircraft and exposing the barrel assemblies. The nose landing gear wheel was deformed and the fork and tube assembly fractured on impact separating the nose landing gear wheel assembly on impact. Markings and damage to the lower skin immediately aft of the nose landing gear assembly are consistent with the separated nose landing gear assembly being dragged under the aircraft as it impacted the runway surface and pushing up into the fuselage. The damaged area where the skin was pushed up houses flight control pulleys. Post-impact observations made of the damage revealed that at least one pulley was shifted.

The left wing deformed down on impact at approximately wing station 111.50. The bottom of the leading edge skin, an access panel, and the lower wing skin were folded as a result of the deformation. The right flap and lower skin of the right wing locker exhibit damage consistent with the right main landing gear wheel assembly pushing up on the right flap on impact after the right main landing gear separated from the aircraft.

The bottom of left main fuel tank was dented on impact resulting in a small fuel leak. A post-impact inspection of the aircraft on the day after the accident revealed no observable fuel within the left main, left auxiliary, or right auxiliary tanks. The right main tank had a significant amount of fuel. The first responder tasked with securing the airplane following the crash indicated that both fuel selector handles were set to the main tanks and were then subsequently placed in the off position.

Flight control continuity was established for the ailerons, elevators, and rudder. Attempted to measure cable tensions but cables were too slack to obtain a reading. The flaps were not operated. The elevator trim tab (located on the right elevator) was measured with a protractor and found to be in the 24 degrees tab-up position (aircraft nose down). According to the airplane manufacturer's specifications, the maximum tab-up travel limit (when connected) is 5 degrees. The trim tab would not move freely by hand forces and appeared to be jammed. The manual elevator trim wheel indicated that the trim was in the full nose-up trim position. Examination of the airplane's elevator trim system revealed that moving the elevator trim wheel in either direction had no effect on the trim tab position. Continuity was established between the manual trim wheel and the elevator trim actuator assembly. The right elevator skin was peeled back (top side) to observe the trim tab connecting hardware. It was observed that the clevis end of the elevator trim control push rod assembly was wedged against the front spar of the elevator's internal structure. Additionally, the bolt, which connected the clevis end of the elevator trim control push rod assembly to the elevator trim tab actuator assembly was missing. After further inspection, the bolt was found lodged within the outboard end of the right elevator control tube assembly. The nut, washer, and cotter pin were not found in the cavity of the elevator structure or the surrounding area. The loose bolt was confirmed to be a NAS464P3-8 bolt based on markings on the

head and the dimensions of the bolt (3/16 diameter, .500 Grip). A review of the airplane manufacturer's illustrated part catalog, Figure 123 confirms that the NAS464P3-8 bolt is the correct bolt part number used to connect the elevator trim control push rod assembly to the elevator trim tab actuator assembly. No impact damage was apparent on the trim tab.

