

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# CEN17FA170	04/28/2017 1300 CDT	Regis# N604RH	Hollis, OK	Apt: Hollis Municipal O35
Acft Mk/Mdl AIR TRACTOR INC AT 602-NO SERIES	Acft SN 602-1202	Acft Dmg: SUBSTANTIAL	Rpt Status: Prelim	Prob Caus: Pending
Eng Mk/Mdl PRATT & WHITNEY CANADA PT6A-65AG		Fatal 1 Ser Inj 0	Flt Conducted Under: FAR 137	
Opr Name: GRAY AG AIR	Opr dba:		Aircraft Fire: GRD	
			AW Cert: SPR	

Events

1. Approach-VFR pattern final - Loss of control in flight

Narrative

On April 28, 2017, about 1300 central daylight time, an Air Tractor AT-602 airplane, N604RH, impacted terrain while on final approach for runway 35 at the Hollis Municipal Airport (O35), Hollis, Oklahoma. The pilot was fatally injured. The airplane was substantially damaged. The airplane was registered to the pilot and operated by Gray Ag Air as a 14 Code of Federal Regulations Part 137 aerial application flight. Visual meteorological conditions prevailed at the time of the accident. The flight was not operated on a flight plan. The local flight originated from O35 about 1200.

According to the pilot's colleague, the pilot was returning from an application flight at the time of the accident. The pilot had treated a field about 4 miles northwest of the airport during the accident flight.

A witness reported hearing the airplane while he was working about three blocks south of the airport. He subsequently looked up and observed the airplane approaching the airport. Nothing looked unusual about the flight path, attitude, or appearance of the airplane at that time. However, he noted that an unusual noise came from the airplane. He was unsure of the exact nature of the noise, but thought that it was either associated with the engine itself or with the propeller changing pitch.

The airplane impacted a wheat field about 127 yards south of the runway 35 threshold. The main wreckage, which consisted of the fuselage, vertical stabilizer, and right horizontal stabilizer, came to rest about 27 yards north of the initial impact. The propeller had separated from the engine and was partially imbedded into the ground at the initial impact point. The engine had separated from the engine mount. The fuselage came to rest upright on a southwesterly heading. The wings were inverted and located adjacent to the fuselage. The forward fuselage and center wing section had been partially consumed by a postimpact fire. The empennage remained attached to the aft fuselage, with exception of the left horizontal stabilizer which had separated. The control surfaces remained attached to the airframe, with exception of the left elevator which had separated. The separated and fragmented components were located within the debris path. Examination of the flight control system did not reveal any anomalies consistent with a preimpact failure or malfunction.

Postaccident examinations of the engine and propeller are planned.

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Accident Rpt# GAA17CA164	02/28/2017 1345 CST	Regis# N422BR	Prentiss, MS	Apt: Prentiss-jefferson Davis Count M43
Acft Mk/Mdl AIR TRACTOR INC AT 802		Acft SN 802A-0362	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl P&W CANADA PT6A-67AG		Acft TT 2880	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 137
Opr Name: AIRBOURN AVIATION LLC.		Opr dba:		Aircraft Fire: GRD
				AW Cert: SPR

Events

2. Takeoff - Loss of control on ground

Narrative

The pilot of a tailwheel-equipped airplane reported that during takeoff in gusting tailwind conditions, as the tailwheel lifted, the airplane drifted to the left and off the runway. He aborted the takeoff and applied "maximum braking" and reverse thrust. During the runway excursion, the airplane impacted a ditch and spun 180°.

The pilot added that as he exited the cockpit, he observed "dark smoke coming from the exhaust and cowling with smoldering burning grass." He reported that he discharged the onboard fire extinguisher into engine exhaust, main landing gear, and grass. He added that hydraulic fluid leaking from a severed brake line and fuel leaking from the cowl and lower right wing were feeding the post-impact fire. Shortly thereafter, the local volunteer fire department arrived and extinguished the fire.

The fuselage and both wings sustained substantial damage.

The pilot reported that there were no preaccident mechanical malfunctions or failures with the airplane that would have precluded normal operation.

The pilot reported the wind was 180° at 15 knots with gusts to 28 knots. The closest automated weather observation station, about 38 nautical miles from the accident location, recorded a wind of 180° at 14 knots, gusting to 22 knots. The airplane took off runway 30.

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Accident Rpt# CEN17LA174	05/02/2017	635 CDT	Regis# N457PH	Boothville, LA		
Acft Mk/Mdl BELL 407			Acft SN 53121	Acft Dmg: SUBSTANTIAL	Rpt Status: Prelim	Prob Caus: Pending
				Fatal 0	Ser Inj 0	Fit Conducted Under: FAR 135
Opr Name: PHI, INC.			Opr dba:		Aircraft Fire: NONE	
					AW Cert: STN	

Events

1. Enroute-cruise - Part(s) separation from AC
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Narrative

On May 2, 2017, about 0635 central daylight time, a Bell 407 helicopter, N457PH, registered to and operated by PHI Helicopters, Inc., Lafayette, Louisiana, made a precautionary landing at Grand Bay receiving station in the Gulf of Mexico, near Boothville, Louisiana, after the pilot noticed a vibration in-flight. Visual meteorological conditions prevailed at the time of the accident. The non-scheduled domestic passenger flight was being conducted under the provisions of Title 14 CFR Part 135, and a company VFR flight plan had been filed and activated. The pilot and four passengers on board the helicopter were not injured. The cross-country flight originated from Boothville (LS08), Louisiana, at 0629, and was en route to Main Pass 311A in the Gulf of Mexico when the accident occurred.

The pilot had noticed a vibration in-flight and landed the helicopter on the oil platform. As he was shutting down the engine, the vibration worsened and he completed the shutdown using the rotor brake. Post-accident inspection revealed a tip cap had separated from one of the tail rotor blades, and cracks were noted on the tail rotor gear box, mounting hardware, and tail boom, all considered to be substantial damage.

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Accident Rpt# CEN15LA395 08/21/2015 1530 CDT Regis# N429AR Port O'connor, TX Apt: N/a
Acft Mk/Mdl BELL HELICOPTER TEXTRON CANADA Acft SN 57035 Acft Dmg: SUBSTANTIAL Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl PRATT & WHITNEY 207D1 Acft TT 1169 Fatal 0 Ser Inj 0 Flt Conducted Under: FAR 091
Opr Name: ROBERTS RANCH & INVESTMENTS LLC Opr dba: Aircraft Fire: NONE
AW Cert: STN

Summary

The commercial pilot reported that, during cruise flight in the helicopter, he felt a "slight vibration" and heard a "very faint bumping sound." A flight control check revealed no anomalies, and the pilot continued the flight to the destination heliport. While in a 4-ft hover, just before touching down, the helicopter began a slow, uncommanded right turn. The pilot applied full left anti-torque pedal, and the turn stopped. He then lowered the collective and landed without incident. A post-flight inspection of the helicopter revealed that one of the tail rotor outboard pitch change links (PCL) was broken. An examination of the failed PCL revealed fatigue fractures due to pitting corrosion between the spherical bearing and the bearing housing. The fatigue fractures propagated during operation until the PCL bearing housing fractured, separating the PCL from the blade pitch horn end spherical bearing, resulting in a loss of pitch control to the affected blade. The PCL was installed on the helicopter 12 days before the manufacturer issued an alert service bulletin (ASB) introducing a 50-hour recurrent inspection of the tail rotor PCLs for axial and radial bearing play. About 6 months later, the Federal Aviation Administration (FAA) subsequently issued an emergency airworthiness directive (EAD) based on the ASB. The tail rotor PCLs on the accident helicopter were inspected in accordance with the ASB and the EAD 9 days after the EAD was issued. The PCL failed 6.6 flight hours after the inspection. The EAD did not require an inspection of the bearing housing portion of the PCL for corrosion, and it could not be determined if the fatigue cracks were present when the inspection was performed. Following the accident, the manufacturer updated the original ASB to include inspections for bearing cracks, corrosion, and anti-corrosion sealant. The FAA also updated the airworthiness directive to reflect the additional inspections.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The fatigue failure of the tail rotor pitch change link spherical bearing housing as a result of corrosion pitting.

Events

1. Enroute-cruise - Flight control sys malff/fail

Findings - Cause/Factor

1. Aircraft-Aircraft systems-Flight control system-(general)-Failure - C

Narrative

On August 21, 2015, at 1530 central daylight time, a Bell Helicopter 429, N429AR, experienced a tail rotor pitch change link (PCL) failure during flight and landed uneventfully at a private heliport in Port O'Connor, Texas. The pilot and two passengers were not injured. The helicopter sustained substantial damage that was limited to the PCL. The helicopter was registered to and operated by Roberts Ranch & Investments LLC, under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Visual flight rules conditions prevailed for the flight, which was not operated on a flight plan. The flight originated from Giddings, Texas, at 1450.

The pilot reported that during cruise flight he felt a "slight vibration" and heard a "very faint bumping sound." He checked the flight controls and they functioned normally so he continued the flight. While in a four-foot hover, just before touching down, the helicopter began a slow, uncommanded right turn. The pilot applied full left anti-torque pedal and the turn stopped. He then lowered the collective and landed without incident. A post flight inspection of the helicopter revealed that one of the tail rotor PCLs was broken.

The helicopter's tail rotor system was comprised of a four-bladed stacked teetering tail rotor that provided main rotor anti-torque and directional control. The tail rotor PCL, part number 429-012-112-103, assembly had a single-pieced forged aluminum body with two circular ends, each contained a spherical bearing. One end of the PCL attached to the pitch change crosshead; the other PCL end attached to its respective tail rotor pitch change horn. The tail rotor assembly contained four PCL's, one for each blade; two short-length "outboard" PCL's and two long-length "inboard" PCL's.

The fractured inboard tail rotor PCL, serial number TE-0168, was examined at Bell Helicopter under the supervision of a Federal Aviation Administration (FAA) inspector. The pitch horn-side of the PCL contained two fractures, which were about 180 degrees, opposed to each other. The fractures were through the circular end, which houses the spherical bearing. The primary fracture exhibited fatigue signatures through most of the cross-section of the circular end. The secondary fracture exhibited fatigue signatures through about half of the cross-section, with the remaining portion of the exhibiting overload signatures. Both of the fatigue cracks were located on the same chamfer, which is used to stake the spherical bearing into the circular end of the PCL. Pitting corrosion was visible at the fatigue fracture origins. The separated circular end of the PCL and the pitch change horn bushing showed evidence of mechanical contact wear. The

pitch horn-side spherical bearing exhibited wear though a portion of the outer ring and on the surface of the ball. Although the spherical bearing was damaged, an axial and radial bearing play inspection was conducted. The axial play was measured to be 0.100 inches, which exceeded the published limit of 0.010 inches. The radial play was within limits.

The intact cross-head side of the PCL showed corrosion on the staking chamfer. Removal of the spherical bearing revealed fretting and wear on both the bearing outer ring and adjacent to the staking chamfer. An axial and radial bearing play inspection of the cross-head side revealed the amount of play was within limits. The spherical bearing was removed and evidence of corrosion and fretting was visible on the inner diameter surfaces.

A material composition analysis of the PCL revealed the material was within specifications.

The remaining PCLs were examined and all showed evidence of corrosion on the bearing staking chamfer surfaces. The axial and radial bearing play inspection revealed all but one bearing was within limits.

On February 18, 2015, Bell Helicopter issued Alert Service Bulletin (ASB) 429-15-16 affecting PCL part numbers 429-012-112-101/-103. The ASB introduced a 50-hour recurrent inspection of the tail rotor PCLs for axial and radial bearing play. On July 2, 2015, Transport Canada issue Emergency Airworthiness Directive (EAD) CF-2015-16, referencing the Bell Helicopter ASB. The AD required compliance with the ASB within 10 hours of airtime from the date of the AD. The AD also called for repeated inspections, as outlined in the ASB, not to exceed 50-hour airtime intervals. On August 6, 2015, the FAA issued EAD 2015-16-51. This EAD referenced the Transport Canada EAD and the Bell Helicopter ASB. The difference between the FAA EAD and the Transport Canada EAD was that the FAA EAD required the inspection before further flight instead of within 10 hours. On August 6, 2015, Transport Canada revised their EAD. The revision called for the inspection as outlined in Bell Helicopter ASB to be conducted within 10 hours air time of the EAD date, or before 60 hours air time if new, whichever occurred first. The EAD also stated that the corrective actions specified in paragraph 1 of the ASB were to be complied with at intervals not to exceed 50 hours airtime.

Maintenance records showed the fractured PCL was installed on the helicopter on February 6, 2015, at an aircraft total time of 1,062.9 hours. The tail rotor PCLs were inspected on August 15, 2015, at a total PCL time of 1,235.3 hours, in accordance with EAD 2015-16-51. The helicopter had 1,241.9 hours total time at the time of the accident. The tail rotor PCLs had a total airtime of 179 hours and had been inspected 6.6 hours before the accident.

Post-Accident Corrective Actions

On December 7, 2015, Bell Helicopter issued ASB 429-15-26, affecting tail rotor PCL part number 429-012-112-101/-103. The ASB called for an inspection of the PCL for corrosion and the application of a corrosion preventative sealant along with a repetitive 50-hour inspection of the sealant. If corrosion was present, the PCL needed to be replaced.

On February 2, 2016, the FAA issued Airworthiness Directive (AD) 2016-02-06. The AD required inspection of the tail rotor PCLs, part numbers 429-012-112-101, -101FM, -103, and -103FM, for corrosion. The AD also required the application of a corrosion preventative sealant.

On June 18, 2016, Bell Helicopter updated ASB 429-15-16 with Revision B. The ASB contained two parts. Part 1 called to inspect the PCL assembly and bearing for wear, cracks, and adequate sealant. If outside of specified limits, the PCL was to be replaced. Part 2 advised to replace any bearing manufactured before January 13, 2015, that reached 250 flight hours in service.

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Accident Rpt# ERA15LA288 07/22/2015 1410 EDT Regis# N613PJ West Palm Beach, FL Apt: Palm Beach International PBI
Acft Mk/Mdl CANADAIR CL-600-2B16 Acft SN 5123 Acft Dmg: SUBSTANTIAL Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl GE CF34-3A Fatal 0 Ser Inj 0 Flt Conducted Under: FAR 091
Opr Name: PARAGON TRANSPORT MANAGEMENT LLC Opr dba: PARAGON JETS Aircraft Fire: NONE
AW Cert: STT

Summary

According to the captain, the pilots were "rushed" as they performed their preflight preparations of the jet and forgot to close the baggage door. Ground personnel noticed the discrepancy and drove an all-terrain vehicle (ATV) out to the airplane so that they could advise the crew. After dismounting from the ATV, which they had parked about 10 ft in front of the airplane's left wing, they warned the captain, who left the cockpit to close the baggage door. Once the door was closed, he returned to the cockpit. The captain then looked out the side window and noticed that the airplane was rolling forward, and he asked the first officer what she was doing. About that time, the airplane struck the ATV. The flight crew stated that once they realized the airplane was moving, they attempted to apply the brakes, but it was not until they shut down the engines and re-applied the parking brake that the airplane came to a stop. A postaccident functional check of the airplane's hydraulic and braking systems did not reveal any anomalies. Review of the airplane's cockpit voice recorder revealed that the crew did not verbally follow the airplane's before start checklist, which required them to verify hydraulic system pressure, and that the parking brake was set before starting the engines. Had the flight crew followed this procedure, monitored the airplane's motion during and immediately after the engine start, and been more cognizant of the objects surrounding the airplane, it is likely that the ground collision would have been avoided.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The flight crew's failure to properly use the before start checklist, to monitor the airplane's motion, and to see and avoid objects around the airplane, which resulted in an inadvertent roll into a ground vehicle.

Events

1. Taxi - Ground collision

Findings - Cause/Factor

1. Personnel issues-Task performance-Use of equip/info-Use of checklist-Flight crew - C
2. Personnel issues-Psychological-Attention/monitoring-Task monitoring/vigilance-Flight crew - C
3. Personnel issues-Psychological-Attention/monitoring-Monitoring environment-Flight crew - C

Narrative

On July 22, 2015, about 1410 eastern daylight time, a Canadair CL-600-2B16, N613PJ, registered to Paragon Transport Management LLC, and operated by USAC Airways 691 LLC, doing business as Paragon Jets, was substantially damaged when it struck an all-terrain ground vehicle (ATV) while taxiing at Palm Beach International Airport (PBI), West Palm Beach, Florida. Both airline transport pilots were not injured. Visual meteorological conditions prevailed and an instrument flight rules flight plan was filed for the flight, which was destined for Opa-Locka Executive Airport (OPF), Miami, Florida. The positioning flight was operated under the provisions of Title 14 Code of Federal Regulations Part 91.

According to the captain, the flight crew was under pressure from the operations department to continue to southern Florida to complete their flight and pick up customers that were waiting. The flight crew forgot to close the baggage door; they began the prestart checklist and started both engines. The flightcrew then noticed that ground personnel drove up in an ATV and were waving their arms to get their attention. The captain then remembered that he forgot to close the baggage door and got up to go back and close the door. Once closed, he returned to his seat, on the right side, buckled his seat belt and resumed reviewing the checklist. The captain then looked out the side window and noticed the airplane was rolling forward and he asked the first officer what she was doing. At that time, they heard a noise and bounce in the airplane and thought they travelled over a wheel chock. The captain further stated that he was pushing very hard on the brakes and the airplane would not stop. They both made several attempts to stop the airplane and applied maximum brake pressure, but it would not stop. The captain then reached over with both hands and shut down the engines at the same time the first officer released and re-applied the parking brake. The airplane then came to a stop. The captain added that he heard no alarms or sounds during this event.

According to ground service personnel at OPF, they observed the accident airplane as it prepared to taxi and noticed that its baggage door was open. Two of the ground handlers subsequently boarded an ATV and drove out to the airplane, parking about 10 feet in front of the left wing. One of the ground handlers then dismounted the ATV and proceeded in front of the airplane while motioning to the flightcrew in the cockpit that the baggage door was open. The pilot seated in the right seat then stood up and proceeded into the cabin. Shortly after, the airplane began moving forward. The ground handler then attempted to gain the attention of the pilot seated in the left seat, but was unsuccessful as that pilot never looked up. The airplane's left wing then struck the ATV before it came to a stop.

About 1 week after the accident, the operator's director of maintenance completed a preflight inspection and check of the airplane's hydraulic and braking systems under the supervision of a Federal Aviation Administration inspector, with no anomalies noted.

The airplane's cockpit voice recorder (CVR) and flight data recorder (FDR) were forwarded to the NTSB Vehicle Recorders Laboratory, Washington, DC for data download. Review of the CVR data did not reveal any tasks associated with the formal prestart checklist being completed. The CVR recorded a conversation about programming the flight management system and then it recorded the captain asking the first officer if she wanted to fly from the left seat. One minute later the first officer replied that she did want to fly from the left seat. The recorder then captured a conversation of an informal checklist usage along with a departure briefing. Two minutes later the recorder captured sounds consistent with both engines starting and then the captain stated, "baggage door. I'll get it." Then sounds consistent with switch manipulation and shortly after the captain asked "what are you doing" with an immediate sound of a warning or alert tone as the captain stated, "no brakes..what are you doing?" the first officer responded, "ah I didn't do anything. What's going on? What is going on? Stop." The captain replied, "I don't know." Then the CVR recorded sounds of engines shutting down, followed by one second later a sound consistent with a collision.

Review of the plotted data from the FDR revealed that it only recorded in-flight parameters and that it did not record any on-ground parameters.

Review of the Challenger 601-3A/3R pilot checklist manual, before shut down, the crew was to verify the parking brake was set and check the hydraulic pressure. If this was the last flight of the day, once the airplane wheels were chocked, the parking brake should be released. The before starting checklist stated the wheel chocks must be removed, hydraulic pressure verified, and the parking brakes set before engine start.

The 13-seat airplane was manufactured in 1992, and was equipped with two GE, CF34-3A, turbine engines. The aircraft maintenance records indicated that airplane was maintained on a continuous airworthiness inspection program, and the brake accumulators test was last performed on May 1, 2015, with an airframe total time recorded of 9,649.3 hours. The total time on the airframe at the time of the accident was 9,770.9 hours.

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Accident Rpt# WPR16IA031	11/19/2015 1400 PST	Regis# N9824G	Coalinga, CA	Apt: Harris Ranch Airport 308
Acft Mk/Mdl CESSNA 210-N		Acft SN P21000348	Acft Dmg: MINOR	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl ROLLS ROYCE B 250-B17F/2			Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: TD WHITTON CONTRUCTION INC.		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

Summary

The private pilot was departing in the turboprop-equipped airplane when, between 200 and 300 ft above ground level, the airplane experienced a partial loss of engine power, with no abnormal fuel indications observed. After he advanced the throttle and condition levers, the pilot realized that there was not sufficient power to maintain altitude, so he elected to make a forced landing to an open dirt field. During the approach, the airplane impacted multiple power lines before landing gear-up. A postaccident examination of the engine and fuel system did not reveal any anomalies that would have precluded normal engine operation. The reason for the partial loss of engine power was not determined.

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Accident Rpt# WPR16LA031 11/19/2015 1400 PST Regis# N9824G Coalinga, CA Apt: Harris Ranch Airport 308
Acft Mk/Mdl CESSNA 210-N Acft SN P21000348 Acft Dmg: SUBSTANTIAL Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl ROLLS ROYCE B 250-B17F/2 Acft TT 3535 Fatal 0 Ser Inj 0 Flt Conducted Under: FAR 091
Opr Name: MARTY D. WHITTON Opr dba: Aircraft Fire: NONE
AW Cert: STN

Summary

The private pilot was departing in the turboprop-equipped airplane when, between 200 and 300 ft above ground level, the airplane experienced a partial loss of engine power, with no abnormal fuel indications observed. After he advanced the throttle and condition levers, the pilot realized that there was not sufficient power to maintain altitude, so he elected to make a forced landing to an open dirt field. During the approach, the airplane impacted multiple power lines before landing gear-up. A postaccident examination of the engine and fuel system did not reveal any anomalies that would have precluded normal engine operation. The reason for the partial loss of engine power was not determined.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: A partial loss of engine power during takeoff for reasons that could not be determined, because postaccident examination revealed no mechanical malfunctions or failures that would have precluded normal operation.

Events

1. Initial climb - Loss of engine power (partial)
2. Emergency descent - Collision with terr/obj (non-CFIT)

Findings - Cause/Factor

1. Not determined-Not determined-(general)-(general)-Unknown/Not determined - C

Narrative

On November 19, 2015, about 1400 Pacific standard time, a Cessna P210N, N9824G, experienced a partial loss of engine power and was substantially damaged during a forced landing near the Harris Ranch Airport (308), Coalinga, California. The airplane was registered to and operated by the private pilot as a 14 Code of Federal Regulations (CFR) Part 91 personal flight. The pilot and two passengers were not injured. Visual meteorological conditions prevailed at the time and a flight plan was not filed. The proposed cross-country flight, which was originating at the time of the accident, was destined for Shafter-Minter Field (MIT), Shafter, California.

In a written report submitted to the National Transportation Safety Board (NTSB) investigator-in-charge (IIC), the pilot reported that during the takeoff roll he advanced the power to 70 psi torque, and rotated at 70 knots (kts); he then lowered the nose to maintain his target climb speed. The pilot stated that when the airplane reached about 200 to 300 feet above ground level the engine experienced a partial loss of power; he did not observe any abnormal fuel system indications. The pilot then advanced the throttle and condition levers, however, there was not sufficient power to climb and maintain altitude. During the forced landing, the airplane impacted multiple power lines, before making a gear up, soft field landing to an open dirt field. The airplane came to rest in an upright position, with substantial damage to its undercarriage and left wing.

On January 7, 2016, under the supervision of the NTSB IIC, accompanied by two Federal Aviation Administration (FAA) airworthiness aviation safety inspectors, a Rolls-Royce field technician performed an examination on the subject engine, a Rolls-Royce model 250-B17F/2. The technician's examination revealed that the compressor intake exhibited crushing damage to the compressor front support, however, the compressor could still be rotated by hand. Rotational continuity from the compressor to the gas-generator turbine and starter/generator was confirmed. There was no evidence of rotational damage to the compressor blades. Soil was present around the front of the engine and compressor intake, but there was no evidence of foreign object ingestion by the compressor. The compressor bleed valve was operated manually. The poppet valve cycled easily by hand and exhibited radial movement. Additionally, N2 drive continuity was established from the power turbine to the sun gearshaft. Rotation by hand was smooth and quiet. Visual examination of the 4th stage power turbine revealed no evidence of damage to the turbine blades.

A visual examination of the gas-generator turbine revealed no evidence of abnormal combustion, turbine failure or thermal degradation of the turbine. Rotational continuity was verified from the compressor to the turbine.

Compressed air was applied to the engine control pneumatic system via the Pc air fitting. A soapy water solution was liberally applied to the pneumatic system's tubes and fittings in order to check for air leaks. A minor air leak was noted at the Pc air filter, and a larger air leak was found on the propeller overspeed governor Py air inlet B-nut. This leak produced an approximate 1" bubble every ten seconds. As observed, according to the technician, this leak was

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not significant enough to affect engine performance. A similar leak was also discovered on the impact-damaged Py line connecting the propeller overspeed governor to the propeller/power turbine governor.

Fuel was present in the fuel spray nozzle supply line, fuel pump filter bowl, and the fuel supply line fitting at the firewall. The fuel spray nozzle was disassembled and examined. The internal filter screen was free of debris.

Compressed air was applied to the aircraft's fuel system, which resulted in a flow of clean fuel from the fuel supply line to the engine-driven fuel pump.

The airframe oil tank contained ample clean oil. The #1 magnetic chip detector was removed and examined, and found free of any ferrous debris.

The technician concluded that based on his examination, there was no evidence of a mechanical engine failure. (Refer to the Rolls-Royce Field Observation report, which is appended to the docket for this investigation.)

On February 18, 2016, under the supervision of an FAA airworthiness aviation safety inspector, the airplane's propeller governor (serial number 16251527), was examined and functionally bench tested by a Woodward Inc. technician at the Woodward facility in Rockford, Illinois. The technician reported that the unit was test run in accordance with a production Acceptance Test Plan. The results revealed that there were no anomalies during the testing of the unit that would have caused the reported loss of engine power.

On February 18, 2016, under the supervision of an FAA airworthiness aviation safety inspector, the airplane's overspeed governor (serial number 16222036), was examined and functionally bench tested by a Woodward Inc. technician at the Woodward facility in Rockford, Illinois. The technician reported that the unit was installed on a test stand and run to production acceptance test limits. Tests revealed that the pressure for the set point of the overspeed limiter was 3.0 psid, approximately 0.2 psid below the minimum range of the manufacturer's test specifications. The test point was run at a nominal differential pressure of 4.0 psid, and the speed was 4,769 rpm, which indicated that overspeed occurred at 113.60% instead of 113.58%. All other data points were within acceptance test point limits. Woodward stated that none of the shifts in data support a conclusion that the overspeed governor could cause a loss of power. (For both of the above tests, refer to the Woodward Inc. Investigation Report, which is appended to the docket for this investigation.)

The investigation failed to reveal what precipitated the reported loss of engine power.

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Accident Rpt# CEN15FA136	02/04/2015 2109 CST	Regis# N441TG	Argyle, TX	Apt: Denton Municipal Airport DTO
Acft Mk/Mdl CESSNA 441		Acft SN 441-0200	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl HONEYWELL TPE331-10N		Acft TT 3830	Fatal 1 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: DEL AIR ENTERPRISES II, LLC		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

Events

2. Approach-IFR initial approach - Loss of control in flight

Narrative

HISTORY OF FLIGHT

On February 4, 2015, about 2109 central standard time, a Cessna 441 (Conquest II) twin turbo-prop airplane, N441TG, was substantially damaged when it collided with terrain following a loss of control during an instrument approach to Denton Municipal Airport (DTO), Denton, Texas. The commercial pilot was fatally injured. The airplane was registered to Del Air Enterprises II, LLC, and was operated by the pilot under the provisions of 14 Code of Federal Regulations Part 91 while on an instrument flight rules (IFR) flight plan. Night instrument meteorological conditions prevailed for the cross-country flight that departed Willmar Municipal Airport (BDH), Willmar, Minnesota, about 1828.

According to Federal Aviation Administration (FAA) air traffic control data, at 2050:46, the pilot established contact with Dallas-Fort Worth Terminal Radar Approach Control and reported being level at 4,000 ft mean sea level (msl). According to radar data, the flight was about 35 miles northwest of DTO and was established on a southbound course. The approach controller issued the current weather conditions at DTO and told the pilot to expect the GPS runway 36 approach. At 2052:54, the approach controller told the pilot to fly direct to WOBOS, an intermediate fix associated with the instrument approach. The plotted radar data showed that the flight turned to the south-southeast to a direct course toward WOBOS. At 2059:35, the flight was cleared to descend to and maintain 3,000 ft msl, and the pilot acknowledged the altitude clearance.

At 2101:24, the DTO tower controller advised the approach controller that a Cessna 172 had just landed at DTO and that the Cessna's pilot reported light-to-moderate turbulence during approach and an in-flight visibility of about 1.5 miles. The approach controller subsequently advised the accident pilot of the light-to-moderate turbulence. At 2103:08, the flight was cleared to descend to and maintain 2,500 ft msl, and the pilot acknowledged the altitude clearance.

At 2103:24, the approach controller told the pilot to turn to a south heading. The pilot acknowledged the heading change and subsequently turned southbound. According to radar data, at 2104:09, the airplane descended below 2,500 ft msl. At 2104:27, the approach controller told the pilot to turn to an east heading. The pilot acknowledged the heading change, but, according to radar data, did not initiate the turn as requested. The airplane continued to descend while on a southbound course until reaching 2,100 ft msl at 2104:46 when it began to climb. At 2104:59, after noticing that the flight had not turned to the assigned heading, the approach controller told the pilot to turn to a heading of 080°. The pilot acknowledged the assigned heading, and radar data showed the flight entering a climbing left turn toward the east.

At 2105:39, when the flight was 8 miles from the final approach fix (NULUX), the approach controller told the pilot to turn to a heading of 030° to intersect the final approach course, to maintain 2,500 ft msl until established on the final approach course, and that the flight was cleared for the GPS runway 36 approach. The pilot responded, "Okay, 030 maintain 2.5 until established on the approach." According to radar data, the flight turned to a north heading instead of the assigned heading of 030°.

At 2106:16, the approach controller told the pilot to contact the DTO tower controller, and the pilot replied with the correct frequency change. The flight continued due north until 2106:38, when it turned to a 030° course and subsequently descended through 2,500 ft msl at 2107:01. At 2107:16, the pilot established communications with the DTO tower controller. The tower controller told the pilot that the surface wind was 360° at 19 knots with 25 knot gusts and then cleared the flight to land on runway 36. The tower controller also asked the pilot if he had received the pilot report (PIREP) that had been issued by the preceding Cessna 172. The pilot confirmed that he had received the PIREP from the approach controller. According to radar data, the airplane continued to descend as it intersected the final approach course and continued northbound toward NULUX.

At 2108:44, the automated air traffic control system issued a low altitude alert for the accident flight. The system presented the low altitude alert on both the control tower and the approach control radar displays. According to radar data, at the time of the low altitude alert, the airplane had descended to about 1,500 ft msl. At 2108:47, the tower controller told the pilot to "... check your altitude, you are still a couple of miles from the marker [NULUX], and uh believe your

National Transportation Safety Board - Aircraft Accident/Incident Database

altitude should be about 2,100 there." At 2108:54, the pilot replied, "Okay, going back to (unintelligible)." According to radar data, following the altitude alert, the airplane continued to descend until the final radar return, recorded at 2109:11, about 2.5 miles south of NULUX at 1,000 ft msl (about 300 ft above the ground). At 2109:12, the tower controller transmitted again that the airplane was lower than the specified minimum altitude (2,000 ft msl) for that segment of the instrument approach. There was no response from the accident pilot.

The flight path of the airplane was captured by a security video camera installed on the exterior of a building that was located about 1/2 mile southeast of the accident site. The video camera, which was facing west, captured the accident airplane's wingtip navigation and strobe lights as the airplane crossed from left to right in the upper portion of the camera's field of view. The airplane entered the camera's field of view at 2108:48 and appeared to be in a wings level descent as it continued across the first half of the camera's lateral field of view. At 2109:00, the descent angle increased substantially before the airplane entered a near-vertical spiraling descent. The airplane's navigational lights and strobes were not visible after 2109:09.

According to 911 emergency calls received following the accident, several individuals reported hearing an airplane overfly their position at a low altitude followed by the sound of a large ground impact. One witness, who was located about 1 mile from the accident site, reported that he saw an airplane's navigation lights and rotating beacon as it flew north below an overcast ceiling toward DTO. The witness stated that the airplane abruptly transitioned from a straight-and-level flight attitude to a nose-down, steep left bank, vertical descent towards the ground. He also heard a momentary increase and then decrease in engine power before the airplane entered the descent. The witness lost sight of the airplane as it descended behind trees shortly before he heard a sound consistent with a ground impact.

PERSONNEL INFORMATION

According to FAA records, the 52-year-old pilot held a commercial pilot certificate with single-engine land, multi-engine land, and instrument airplane ratings. The pilot's last aviation medical examination was completed on January 13, 2014, when he was issued a second-class medical certificate with a limitation for corrective lenses. On the application for his current medical certificate, the pilot reported having accumulated 3,900 hours of total flight experience of which 120 hours were flown within the previous 6 months. A search of FAA records showed no previous accidents, incidents, or enforcement proceedings.

A comprehensive pilot logbook was not located during the investigation. A pilot journal was found in the accident airplane; however, the final journal entry was for simulator-based training for a Socata TBM 700 airplane that was completed on an unspecified date during 2014. The final journal entry indicated that the pilot had a total flight experience of 4,935 hours of which 4,899 hours were flown as pilot-in-command and that he had flown 4,834 hours in single-engine airplanes and 101 hours in multiengine airplanes. The journal also contained a flight instructor's endorsement for a flight review and instrument proficiency check dated August 13, 2013. The pilot's estate provided an airplane utilization spreadsheet that the pilot used to log his recent flight experience. The spreadsheet did not document the pilot's instrument proficiency, night currency, or his accumulated total flight experience. According to the spreadsheet, the pilot had flown 56 hours during the previous 6 months, 23.6 hours during the previous 90 days, and 9.7 hours during the previous 30 days. The pilot's first flight in the accident airplane was on January 23, 2015. As of the final spreadsheet entry, dated January 25, 2015, the pilot had flown the accident airplane 9.7 hours.

The pilot completed simulator-based training for the Cessna 441 on March 27, 2014, at SimCom Training Centers, located in Grapevine, Texas. On January 4, 2015, the pilot completed additional Cessna 441 training provided by Executive Flight Training, Beaufort, South Carolina.

AIRCRAFT INFORMATION

The accident airplane was a 1981 Cessna 441 (Conquest II), serial number 441-0200. Two Honeywell TPE331-10N-512S turbine engines provided thrust through constant-speed, full-feathering, four-blade, McCauley 4HFR34C661/90LNA-2 propellers. The low-wing airplane was of conventional aluminum construction and was equipped with a retractable tricycle landing gear and a pressurized cabin that was configured to seat seven individuals. The airplane was approved for night operations in instrument meteorological conditions and for flight in known icing conditions. On April 5, 1984, the airplane was issued a standard airworthiness certificate and a registration number when it was imported back to the United States of America after being based and operated in France. The pilot purchased the airplane on January 22, 2015.

According to the current weight-and-balance record, dated January 3, 2011, the airplane had an empty weight of 5,855 pounds (lbs), a maximum takeoff weight of 9,850 lbs, and a useful load at takeoff of 3,995 lbs. The airplane had a total fuel capacity of 481.5 gallons (475 gallons usable) distributed between two wing fuel tanks. According to fueling documentation, the airplane departed on the accident flight with a full fuel load after being topped-off with Jet-A fuel premixed

with an icing inhibitor.

The airplane had been maintained under the provisions of an approved manufacturer inspection program. The recording hour (Hobbs) meter indicated 2,070.2 hours at the accident site. The airplane had accumulated 3,830.2 hours since new. The airplane had accumulated 62.4 hours since the last phase inspection that was completed on August 22, 2014, at 3,767.8 total airframe hours. The engines had accumulated 35.4 hours since their last 100-hour inspections that were completed on October 22, 2014. The engines, serial numbers P-77413 and P-77421, had accumulated a total service time of 3,830.2 hours since new and 2,303.5 hours since being overhauled. The propellers, serial numbers 972373 and 972370, had accumulated a total service time of 2,303.5 hours since new and 284.6 hours since being overhauled. A postaccident review of the maintenance records found no history of unresolved airworthiness issues.

METEOROLOGICAL INFORMATION

At 2103, the DTO automated surface observing system reported: wind 350ø at 17 knots, gusting 25 knots; an overcast ceiling at 900 ft above ground level (agl); 2 miles surface visibility with light rain and mist; temperature 3øC; dew point 3øC; and an altimeter setting of 30.26 inches of mercury.

The pilot of a Cessna 172 that landed at DTO about 8 minutes before the accident issued a pilot report (PIREP) for light-to-moderate turbulence and an inflight visibility of 1.5 miles during his approach.

The United States Naval Observatory data indicated that the sunset and end of civil twilight at the accident site were at 1803 and 1829, respectively. The moon was in a waxing gibbous phase, with 99% of the moon's visible disk illuminated; however, the moonlight would have been obscured by the overcast ceiling.

AIDS TO NAVIGATION

The published inbound course for the GPS runway 36 approach was 357ø magnetic; the crossing altitude for the final approach fix (NULUX) was 2,000 ft msl; and the distance between NULUX and the runway threshold was 4.2 nautical miles (nm). After crossing NULUX, lateral-navigation (LNAV)-equipped aircraft descended to 1,300 ft msl until crossing the stepdown fix (SHIEV) that is located 2 nm from the end of runway 36. After crossing SHIEV, LNAV-equipped aircraft descended to the minimum descent altitude of 1,040 ft msl (413 feet agl). The instrument approach minimums required a 1-mile inflight visibility at the missed approach point to continue the landing. The missed approach instructions were to climb on runway heading to 4,000 ft msl, proceed direct to the ZITAG waypoint, then turn left and proceed direct to the CRAFF waypoint and hold.

COMMUNICATIONS

A review of available air traffic control information indicated that the accident flight received normal services and handling. Transcripts of the voice communications recorded between the accident pilot, the approach controller, and the tower controller are included in the docket materials associated with the investigation.

AIRPORT INFORMATION

Denton Municipal Airport (DTO), a public airport located about 3 miles west-southwest of Denton, Texas, was owned and operated by the City of Denton. The airport field elevation was 642 ft msl. The airport had a single asphalt runway, runway 18/36 (7,002 ft by 150 ft). Runway 36 had a displaced threshold that reduced the available runway landing length by 100 ft. Runway 36 was equipped with medium intensity runway lights and a four-light precision approach path indicator. The airport was equipped with an air traffic control tower that was operational at the time of the accident.

WRECKAGE AND IMPACT INFORMATION

The airplane wreckage was found in a grass-covered industrial storage yard located about 6.4 nm south of the runway 36 threshold. The accident site was about 400 ft northeast of the final radar return and about 207 ft right of the final approach course. The main wreckage consisted of the entire airplane, which was orientated on a west-northwest heading. The elevation of the accident site was 679 ft msl. The wreckage was in an upright position, and there was no appreciable wreckage debris path. There was no evidence of an inflight or postimpact fire. All observed airframe structural separations were consistent with impact-related damage. The entire lower fuselage surface was crushed upward, consistent with a vertical impact while in a near level pitch attitude. The airplane's tail section was found partially separated immediately aft of the aft pressure bulkhead. The vertical stabilizer, rudder, horizontal stabilizers, and

elevators remained relatively undamaged. The leading edges of both wings, the propeller spinners, and the airframe radome did not exhibit evidence of a ground impact.

Aileron control cable continuity was established through an overstress separation of the aileron sector drive cable in the mid-cabin area and a separation of the balance cable near the right wing root. All other flight control cables were continuous from the cockpit control inputs to their respective flight control surfaces. The elevator trim actuators measured 1.6 inches, which corresponded to the trailing-edge of the elevator trim tab being deflected up about 5°. The aileron trim actuator measured 1.1 inches, which corresponded to the trailing-edge of the aileron trim tab being deflected down about 5°. The rudder trim actuator measured 2.4 inches, which corresponded to the trailing-edge of the rudder trim tab being deflected right about 5°. The landing gear were found extended. The landing gear selector handle was damaged during impact. The flap actuator measured 5.7 inches, which was consistent with a 10° flap extension. The flap selector handle and indicator were damaged during impact. The stall warning horn and landing gear warning horn were extracted from the cockpit, and both horns produced an aural tone when electrical power was applied. Switch continuity for the wing-mounted lift sensor was confirmed with an ohmmeter. The left-side altimeter's Kollsman window was centered on 30.24 inches-of-mercury. The right-side altimeter's Kollsman window was centered on 30.09 inches-of-mercury.

Both engines remained attached to their respective wing nacelle structures. The first stage compressor impeller of each engine exhibited blade tip bends that were opposite the direction of rotation and visible scoring as a result of the rotating compressor impeller contacting its respective shroud. The third axial turbine stage of each engine exhibited re-solidified metallic splatter on the stator vanes and turbine blades. The observed damage to the first compressor stage and third turbine stage was consistent with each engine operating at the time of impact. Both propeller assemblies remained attached to their respective engines. There were two approximately 12-inch deep holes observed aside and slightly behind the engines where the rotating propellers had dug into the soil during impact. Both propellers exhibited significant bending of their blades opposite the direction of rotation. Additionally, all propeller blades exhibited leading edge gouges, chordwise scratches, and burnishing of the cambered side.

The postaccident wreckage examination did not reveal any anomalies that would have precluded normal operation of the airplane during the accident flight.

MEDICAL AND PATHOLOGICAL INFORMATION

The Tarrant County Medical Examiner's Office, located in Fort Worth, Texas, performed an autopsy on the pilot. The cause of death was attributed to multiple blunt-force injuries sustained during the accident. The FAA's Bioaeronautical Sciences Research Laboratory located in Oklahoma City, Oklahoma, performed toxicology tests on samples obtained during the autopsy. The test results were negative for carbon monoxide, ethanol, and all tested drugs and medications.

The pilot had monocular vision following a childhood injury that resulted in very limited vision in his left eye. On June 18, 1991, after a review by an ophthalmologist and passing a medical flight test, the pilot was issued a Statement of Demonstrated Ability (SODA) that authorized a third-class medical certificate. On June 24, 1995, the pilot was issued an updated SODA after he passed another medical flight test and was authorized for a second-class medical certificate. The pilot continued to routinely receive second-class medical certificates with a limitation for corrective lenses.

TESTS AND RESEARCH

The airplane was equipped with a Honeywell KMH-820 Multi-Hazard Awareness System, serial number 1340. With the assistance of the manufacturer, the non-volatile memory was downloaded from the damaged device. The recovered data identified two alerts that had been issued during the accident flight. The first alert was issued when the airplane's flight path came near a tower during the final seconds of the flight. The airplane was located about 361 ft south of the accident site and about 700 ft west of the tower when the obstacle pull-up (OBPU) alert was issued. The airplane was at a GPS altitude of 1,030 ft (about 330 ft agl) and 46.7 knots groundspeed. The OBPU would have resulted in an audible alert "Obstacle, Obstacle, Pull-Up." The second alert was for an excessive sink rate; however, additional data was not recorded to non-volatile memory before there was a loss of electrical power to the device during impact.

The pilot's Apple iPhone, Apple iPad, and Appareo Stratus II were recovered at the accident site and sent to the National Transportation Safety Board (NTSB) Vehicle Recorders Laboratory to be examined. The content of the Apple iPhone and Apple iPad were examined using forensic software, and there was no data found that was associated with the accident flight. The Appareo Stratus II was an automatic dependent surveillance broadcast (ADS-B) device with GPS capability. The device had been configured to interface with the pilot's iPad ForeFlight application. An external examination of the device revealed minor impact damage; however, an internal examination revealed additional damage to the Wi-Fi module. The device was repaired and examined using laboratory hardware and software. The device contained flight parameter data for the accident flight.

The recovered Appareo Stratus II flight parameters and recorded ATC radar track data were used to develop an aircraft performance study. According to the study, at 2106:38, during the approach, the pilot made an engine power reduction that resulted in a 1,500 ft per minute descent and a 25 knot per minute airspeed deceleration. Between 2106:38 and 2109:00, the airplane's airspeed decreased from 162 to 75 knots calibrated airspeed (KCAS), and the angle of attack increased from 2.7° to 14°. At 2108:52, 5 seconds after the tower controller told the pilot to check his altitude, the pilot made an abrupt elevator-up input that increased the airspeed deceleration to 168 knots per minute. At 2109:00, the airplane entered an aerodynamic stall after it decelerated to 75 KCAS.

ADDITIONAL DATA/INFORMATION

According to first responders with the Argyle Fire Department, upon their arrival at the accident site, there was no evidence of ice or frost accumulation on the airplane's fuselage, wings, or tail. Additionally, the first responders reported that there was a substantial smell of Jet-A fuel at the accident site; however, there was no evidence of an explosion or postimpact fire. The pilot was seated in the left cockpit seat and was secured by a lap belt. The available shoulder harness did not appear to have been used.

According to the FAA Airplane Flying Handbook (FAA-H-8083-3B), "Night flying is very different from day flying and demands more attention of the pilot. The most noticeable difference is the limited availability of outside visual references. Therefore, flight instruments should be used to a greater degree in controlling the airplane." The handbook further states, "Distance may be deceptive at night due to limited lighting conditions. A lack of intervening references on the ground and the inability to compare the size and location of different ground objects cause this. This also applies to the estimation of altitude and speed. Consequently, more dependence must be placed on flight instruments, particularly the altimeter and the airspeed indicator."

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# GAA17CA207	03/24/2017 1247	Regis# N551BC	Salt Lake City, UT	Apt: Salt Lake City Intl SLC
Acft Mk/Mdl CESSNA 550-CITATION I		Acft SN 550-242	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl PRATT & WHITNEY CANADA JT15D-4		Acft TT 8575	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: BOULDER CAPITAL INC		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

Events

1. Approach - Birdstrike

Narrative

The pilot reported that during approach a goose struck the airplane's left horizontal stabilizer. The airplane continued the approach and landed without further incident.

A post-accident examination revealed the airplane had sustained substantial damage to the left horizontal stabilizer.

The pilot reported that there were no pre-accident mechanical failures or malfunctions with the airplane that would have precluded normal operation.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# SUR15CA002 02/11/2015 1900 LCL Regis# N266JB White Plains, NY
Acft Mk/Mdl EMBRAER ERJ 190 100 IGW-NO S Acft SN 19000054 Acft Dmg: NONE Rpt Status: Prelim Prob Caus: Pending
Fatal 0 Ser Inj 1 Flt Conducted Under: FAR 121
Opr Name: JETBLUE AIRWAYS Opr dba: Aircraft Fire: NONE

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# WPR15TA027 10/27/2014 1604 MST Regis# N5204X Bisbee, AZ Apt: N/a
Acft Mk/Mdl EUROCOPTER AS 350-B2 Acft SN 3099 Acft Dmg: SUBSTANTIAL Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl TURBOMECA ARRIEL 1D1 Acft TT 5781 Fatal 0 Ser Inj 1 Flt Conducted Under: FAR PUBU
Opr Name: US DEPT OF HOMELAND SECURITY Opr dba: Aircraft Fire: NONE
AW Cert: NON

Summary

The commercial pilot was maneuvering the turbine engine-equipped helicopter about 25 ft above ground level when the engine suddenly experienced a total loss of power. The pilot performed an autorotation, and the helicopter touched down hard and rolled over, coming to rest inverted. Examination of the engine revealed that the pneumatic control pipe (P2), which delivers air pressure from the centrifugal compressor on the engine to the fuel control unit (FCU), was disconnected at the engine fitting. The loss of P2 pressure to the FCU resulted in the FCU commanding the engine to spool down to ground idle speed by limiting the fuel flow. There was no evidence of malfunctions or anomalies on the pipe, threads, and union fastener. There was no evidence of torque stripe residue on the disconnected fitting, consistent with the likely scenario that, during past maintenance, the B-nut was not properly torqued and gradually vibrated off its attach fitting while in flight. The engine manufacturer had several caution notifications within multiple maintenance task documents to prevent removal of the P2 pipe during washing and the risk of an engine failure due to insufficient torque.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: Failure of maintenance personnel to ensure adequate torque of a pneumatic control pipe (P2) fitting, which resulted in a loss of engine power during low altitude flight maneuvers.

Events

1. Maneuvering - Loss of engine power (total)

Findings - Cause/Factor

1. Personnel issues-Task performance-Maintenance-(general)-Maintenance personnel - C
2. Aircraft-Aircraft power plant-Engine fuel and control-(general)-Incorrect service/maintenance - C

Narrative

HISTORY OF FLIGHT

On October 27, 2014, at 1604 mountain standard time, a Eurocopter AS350B2, N5204X, experienced a sudden loss of engine power while maneuvering near Bisbee, Arizona. The Department of Homeland Security Customs and Border Protection (CBP) was operating the helicopter as a public aircraft flight. The certified flight instructor, the sole occupant, was seriously injured; the helicopter sustained substantial damage. The pilot departed from Sierra Vista Municipal Airport-Libby Army Airfield, Fort Huachuca, Arizona about 1530 for a local area border patrol flight. Visual meteorological conditions prevailed and no flight plan had been filed.

In a written statement, the pilot reported that he was maneuvering the helicopter up a small valley in an effort to aid Border Patrol Agents on the ground. As he completed a second pass, with the helicopter maneuvering about 25 feet above ground level (agl), the pilot could audibly detect that the engine was shutting down. He immediately decided on the best suitable landing site and began an autorotation toward that location. The helicopter touched down hard and the tail impacted the ground separating from the airframe. The helicopter came to rest inverted in a shallow canyon about 8 miles southeast of Bisbee.

AIRCRAFT INFORMATION

The helicopter, manufactured in 1998, was equipped with a Turbomeca Arriel 1D1 engine (serial number 9580). The operator reported that the most recent inspection was a 100-hour inspection that was completed on October 7, 2014. At that time the airframe had accumulated a total of 5,781 hours and the engine accumulated about 8,290 hours.

TESTS AND RESEARCH

Under the auspice of a Federal Aviation Administration (FAA) inspector, representatives from Airbus Helicopters and Turbomeca performed an examination of the airframe and engine both at the accident location and then later at a facility in Tucson, Arizona.

Engine Examination

Examination of the engine revealed that the B-nut fitting of the pneumatic control pipe (P2) from the engine to the fuel control unit (FCU), was disconnected at the compressor fitting. The union nut on that side contained no evidence of a torque stripe, whereas the union nut and fitting on the FCU side had a torque stripe. A visual inspection of the B-nut, pipe, and union fastener further revealed no evidence of an anomaly that would have precluded the ability of being connected or properly torqued.

The P2 pipe is designed to deliver P2 air pressure from the discharge of the centrifugal compressor to the FCU. Within the FCU, P2 pressure regulates the acceleration capsule, which allows a lever mechanism to adjust the position of the fuel metering needle. If the P2 pipe fails, ambient air pressure will enter resulting in the FCU commanding the engine to spool down to ground idle speed. Magnification of the P2 pipe disclosed that there was no evidence of cracks or malfunctions. The threads and union fastener appeared normal. Proper alignment and installation was checked by attaching the P2 pipe and no anomalies were noted.

Maintenance Instructions

The last recorded removal of the FCU occurred in April 2014, equating to about 300 flight hours prior to the accident, at which time an overhauled unit was installed, and the P2 pipe and fittings would have been adjusted.

Review of the maintenance logbooks revealed that three days prior to the accident (equating to about six flight hours), a 25-hour engine wash, Turbomeca Task #71-01-02-110-801-A01, was recorded as having been accomplished. In the manual for conducting that work task there is a caution in part B. (2), which states: "CAUTION: DO NOT REMOVE THE F.C.U. P2 AIR TAPPING PIPE (OR ANY OTHER ENGINE P2 AIR TAPPING PIPE). IT HAS BEEN PROVED THAT THE ENGINE WASHING OPERATION, WHEN IT PERFORMED IN COMPLIANCE WITH THIS PROCEDURE, DOES NOT LEAD TO POLLUTION OR WATER INGESTION IN THE F.C.U. P2 CHAMBER."

The mechanics that performed the engine wash were interviewed and both were aware of and correctly recited the correct procedure. According to a statement from the US Customs and Border Protection Safety Officer they reviewed hangar surveillance video during the last engine wash and noted that no maintenance manual documentation being used by maintenance personnel.

According to Turbomeca in the same work task in Table 1, there is a directive that a 6mm diameter pipe would require a tightening torque of 115.06 to 132.76 inch-pounds. There is also a note that: "CAUTION: AN INSUFFICIENT TIGHTENING TORQUE CAN CAUSE THE UNION TO WORK LOOSE DURING OPERATION. AN EXCESSIVE TIGHTENING TORQUE CAN GENERATE A RISK OF LEAKAGE OR FAILURE OF THE UNION." It also stated that a painted torque stripe is required to be applied following the application of torque to the union nut.

In addition, there is a caution in the Turbomeca Task #75-29-00-900-802-B01 part D. stating that: "IF THE INSPECTION BEFORE ASSEMBLY IS NOT SUFFICIENT OR IF THE ASSEMBLY OF THE F.C.U. P2 PIPE IS NOT COMPLIANT (INCORRECT TIGHTENING, STRESSING, DISTORTION, SHOCKS, ETC.), THIS MAY CAUSE CRACKS OR BREAKS AND THUS LEAD TO A POWER LOSS OF THE ENGINE."

Turbomeca released Service Letter No. 1807/98/ARRIEL1/40, on October 16, 2003 which described examples of incorrect pneumatic system pipe maintenance, such as improper torque of air system unions, and the variable consequences. The service letter also addressed two Service Bulletins which recommended that the pipe wall thickness be upgraded to 0.8mm and details on installation for the reinforced P2 pipe. The accident helicopter did have the thicker pipe.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# GAA17CA167	02/26/2017 1000 PST	Regis# N864MH	Las Vegas, NV	Apt: Mc Carran Intl LAS
Acft Mk/Mdl EUROCOPTER EC130-B4		Acft SN 4616	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl TURBOMECA ARRIEL 2B1		Acft TT 9339	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 135
Opr Name: MAVERICK HELICOPTERS INC.		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

Events

1. Taxi-to runway - Abrupt maneuver
-

Narrative

The pilot of the helicopter reported that during the hover taxi for departure in the ramp area, he was monitoring another helicopter that had just departed and then "brought [his] eyes inside [the helicopter]" to switch a radio frequency. As the pilot looked back outside, he observed "the nose of a big plane taxiing" from behind another parked airplane to his left. Subsequently, the pilot abruptly applied aft cyclic to stop the helicopter's forward momentum and the Fenestron struck the ramp. The pilot returned to the ramp area without further incident.

The Fenestron sustained substantial damage.

The pilot reported that there were no preaccident mechanical malfunctions or failures with the helicopter that would have precluded normal operation.