

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# ERA16LA322	09/23/2016 1215 EDT	Regis# N139AJ	Norfolk, VA	Apt: Hampton Roads Executive PVG
Acft Mk/Mdl AERO VODOCHODY L 39-ZO		Acft SN 330214	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl IVCHENKO AL-25SERIES		Acft TT 3017	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: WARBIRDS LLC		Opr dba:		Aircraft Fire: NONE
				AW Cert: SPE

Summary

According to the private pilot of the jet trainer airplane, the airplane was on final approach for landing about 100 ft above ground level and 60 ft from the runway threshold, when there was an "uncommanded" retraction of the flaps. He adjusted the airplane's pitch and advanced the throttle in order to compensate for the flap retraction, increasing the airspeed from 90 knots to 130 knots. The airplane touched down on the runway and the pilot applied the brake pedals, followed by the emergency brake. As the airplane began to veer toward the side of the runway, the pilot released the emergency brake and continued to apply brakes using the brake pedals. The airplane continued off the departure end of the runway, struck trees, and came to rest about 1,050 ft from the end of the 5,350ft-long runway. While impact-related damage prevented a functional test of the airplane's normal and emergency flap extension systems, an examination of the flap system components revealed no evidence of any preimpact mechanical malfunctions or failures that would have precluded normal operation. It is likely that the airplane's increased speed at the time of touchdown resulted in the runway excursion.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: An uncommanded flap retraction for reasons that could not be determined, as a postaccident examination of the flap system did not reveal evidence of any preaccident anomalies.

Events

1. Approach-VFR pattern final - Flight control sys malff/fail
2. Landing-landing roll - Runway excursion
3. Landing-landing roll - Collision during takeoff/land

Findings - Cause/Factor

1. Aircraft-Aircraft structures-Wing structure-Trailing edge flaps-Malfunction - C

Narrative

On September 23, 2016, at 1215 eastern daylight time, an Aero Vodochody L39, N139AJ, was substantially damaged after it impacted trees during a runway excursion while landing at Hampton Roads Executive Airport (PVG), Norfolk, Virginia. The private pilot was not injured. Visual meteorological conditions prevailed, and no flight plan had been filed for the personal flight that was operated under the provisions of 14 Code of Federal Regulations Part 91.

According to the pilot, the airplane was on final approach to runway 28, about 100 ft above ground level and 60 ft from the runway threshold, when there was an "uncommanded" retraction of the flaps. He adjusted the pitch of the airplane and advanced the throttle in order to compensate for the flap retraction. The airplane touched down on the paved surface of the runway, the pilot applied the brakes, and then he applied the emergency brake. As the airplane began to veer toward the side of the runway, the pilot released the emergency brake, and continued to apply the brakes utilizing the brake pedals. The pilot stated that the "normal" braking action was insufficient to keep the airplane from over-running the runway. The airplane continued off the departure end of the runway, struck trees, and came to rest about 1,050 feet from the end of runway 28, which was a 5,350-ft-long runway.

An examination of the runway revealed that skid marks from the airplane began around 1,000 ft prior to the departure end of the runway and continued into the area where the airplane came to rest.

According to Federal Aviation Administration (FAA) records, the airplane was issued an experimental exhibition airworthiness certificate on December 12, 2007. It was powered by a Ivchenko, AI-25TL engine. According to the pilot, the most recent condition inspection was performed on September 1, 2016, at an airframe total time of 3,016.9 total hours. According to the emergency checklist located in the airplane, it was equipped with an emergency flap extension system. The pilot did not mention using the emergency flap extension system during the accident sequence.

An examination of the flap system, under the oversight of an FAA inspector, revealed that there were no disconnects or abnormalities in the flap mechanical actuation system besides the impact damage, which prevented a test of the flap system. The flap actuator was intact and no evidence of hydraulic leakage was noted. The emergency flap extension handle located to the right of the pilot's seat was moved without anomaly.

A review of the accident airplane's flight manual revealed, under the conditions that existed at the time of the accident, that the landing ground roll distance was approximately 2,000 feet, and was based on the circumstances of idle engine power, full flaps, and the speedbrakes retracted.

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Accident Rpt# GAA17CA385	07/02/2017 1040 CDT	Regis# N6135P	Edna, TX	Apt: N/a
Acft Mk/Mdl AIR TRACTOR INC AT 502-B		Acft SN 502B-0286	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl PRATT & WHITNEY PT6A-34		Acft TT 9429	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 137
Opr Name: COASTAL FLYING SERVICE INC		Opr dba:		Aircraft Fire: NONE
				AW Cert: SPR

Summary

The pilot reported that, while maneuvering at low altitude over a field during an agricultural application flight, he was focused on the top of electrical poles that paralleled the field. He added that he crossed between the electrical poles and was focused on the pole to the right of the airplane. Once he crossed the top wire, he focused his attention forward, but added that he "was staring at a 30-ft tower just to the left of the nose" of the airplane. The airplane struck the tower and then impacted the ground.

The airplane sustained substantial damage to the empennage.

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

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The pilot's failure to see and avoid a tower during an agricultural application flight.

Events

1. Maneuvering - Controlled flight into terr/obj (CFIT)

Findings - Cause/Factor

1. Personnel issues-Psychological-Attention/monitoring-Monitoring environment-Pilot - C
2. Environmental issues-Physical environment-Object/animal/substance-Tower/antenna (incl guy wires)-Effect on operation - C
3. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Altitude-Not attained/maintained - C

Narrative

The pilot reported that, while maneuvering at low altitude over a field during an aerial application flight, he was focused on the top of the electrical poles that paralleled the field. He added that he crossed between the electrical poles and was focused on the pole to the right of the airplane. Once he crossed the top wire he focused his attention forward, but added that he "was staring at a 30-ft tower just to the left of the nose" of the airplane. The airplane struck the tower and then impacted the ground.

The airplane sustained substantial damage to the empennage.

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

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Accident Rpt# CEN17LA165	04/21/2017 1300 CDT	Regis# N653LA	Vidrine, LA	Apt: N/a
Acft Mk/Mdl AIR TRACTOR INC AT 602-NO SERIES	Acft SN 602-0653	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual	Prob Caus: Pending
Eng Mk/Mdl P&W PT6A	Acft TT 8636	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 137	
Opr Name: CENTRAL FARMERS FLYING SERVICE	Opr dba:	Aircraft Fire: NONE		
		AW Cert: SPR		

Summary

The pilot was conducting agricultural spray operations in a turbinepowered airplane. During turns, he noticed that the fuel pressure varied between 19 and 20 lbs per square inch, but otherwise it appeared normal. During a subsequent turn, the engine lost power. The pilot turned on the fuel boost pump and engine ignitor, but the engine did not respond, so he conducted a force landing to a rice field. During the landing, the airplane impacted several levees, and the main landing gear were torn off; the airplane subsequently came to a stop on its belly.

The pilot reported that he looked into each wing fuel tank and that fuel was visible in each tank. Two witnesses also looked into each tank and reported seeing between about 3 and 4 inches of fuel in each tank. They added that the tanks were breached and leaking fuel. The responding Federal Aviation Administration inspector reported that the tanks were empty when he arrived on scene, but it appeared that the tanks had been breached, and fuel had leaked onto the ground.

The airplane was disassembled and transported to a repair facility. An examination of the airplane revealed fuel in the airframe filter and engine high-pressure canisters. About 1 quart of fuel was drained from the header tank. No contaminants were found in the fuel.

The fuel flow meter displayed 52.1 gallons for fuel remaining and 157 gallons used. The flow meter does not have a fuel level sensing capability but subtracts the fuel used from what the user (pilot) input into the meter. The flow meter was programmed to 209 gallons at the last refueling or instrument reset. Given the pilot may have reset the meter during the last refuel, the meter would have registered a full fuel load even if the airplane had not received a full fuel load; thus, the 52.1 gallons remaining would not have been accurate.

The engine was separated from the airframe and sent to overhaul/repair facility. The engine was placed in a test cell and started and ran with no anomalies noted. The reason for the loss of power was not determined.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The total loss of engine power for reasons that could not be determined because an examination of the engine and a test run did not reveal any mechanical malfunctions or failures that would have precluded normal operation.

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Events

1. Maneuvering-low-alt flying - Loss of engine power (total)
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 April 21, 2017, about 1300 central daylight time, an Air Tractor AT602 agricultural airplane, N653LA, conducted a forced landing near Vidrine, Louisiana. The pilot was not injured and the airplane was substantially damaged during the landing. The airplane was registered to and operated by Central Farmers Cooperative dba Central Farmers Flying Service under the provisions of 14 Code of Federal Regulations Part 137 as an aerial application flight. Visual meteorological conditions prevailed at the time.

The pilot reported that he was conducting spray operations, adding that during turns, the fuel pressure would vary from 19 to 20 psi. Even though he hadn't seen the variance before, he thought the it appeared normal. Then during a turn, the engine lost power. He turned on the [fuel] boost pump, and engine ignitor, but the engine did not restart. The pilot then conducted a forced landing in a rice field.

During the landing, the airplane impacted several levees. The airplane's main landing gear were torn off during the landing, and the airplane came to a stop on its belly. The pilot then looked in the fuel tanks and reported that fuel was visible in both left and right fuel tanks. Two other people who were assisting the pilot, who arrived on scene, reported there was 3 to 4 inches of fuel in each tank, and fuel was leaking from the tanks.

The responding Federal Aviation Administration (FAA) inspector noted substantial damage to the airplane's left and right wings. He added that the fuel tanks were empty when he arrived, but it appeared that both tanks had been breached and leaked their contents on the ground.

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The airplane was partially dismantled, including removal of the wings, for recovery and then transported to a repair facility. An examination was then conducted by the NTSB Investigator-in-Charge and a technical representative from the airframe manufacturer.

The engine fuel lines, including the Py line, were checked and there were no apparent damage or leaks in the lines. The airframe fuel filter, located on the firewall, was opened; the filter/canister was full of fuel. The engine high pressure fuel pump filter bowl was opened, and the fuel level was about one inch below the top; no debris or contaminants were found. Approximately 1 quart of fuel was drained from the airplane's fuel header tank; the fuel appeared clean.

Without electrical power, (and the wings removed from the airplane) the left and right fuel gauges read about 1/16 inch and 1/8 inch above empty, respectively. Electrical power was applied to the airplane, and a self-test was successful on the Shadin fuel flowmeter. The unit displayed 52.1 for fuel remaining, and 157 for fuel used. The airplane was equipped with a 210-gallon fuel system. The flowmeter does not have a fuel level sensing capability, but subtracts fuel from what the user (pilot) input into the meter. The flowmeter was programmed to 209, at the last refueling or instrument reset.

The engine was separated from the airframe and sent to overhaul/repair facility. Prior to overhaul, the engine was placed in an engine test cell. Under the supervision of an FAA inspector, an engine test run was conducted. The engine started and ran, with no abnormalities noted.

A reason for the loss of engine power was not found.

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Incident Rpt# ENG16IA037 09/19/2016 824 EDT Regis# P4AAA Miami, FL Apt: Miami Intl MIA
Acft Mk/Mdl AIRBUS A320-232 Acft SN 0582 Acft Dmg: MINOR Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl V2527 Fatal 0 Ser Inj 0 Flt Conducted Under: FAR 129
Opr Name: ARUBA AIRLINES Opr dba: Aircraft Fire: NONE
AW Cert: STT

Summary

The examination of the No. 2 Engine Fan Cowl Components showed no evidence of preexisting damage on the latches/cowls prior to the event. Further, there was no evidence of latch design failures due to the previous nights routine maintenance work. Manufactures and Regulatory Agencies have released Service Bulletins/Regulatory Actions to prevent further loss of Fan Cowl Doors. At the time of the incident, Aruba Airlines had not incorporated (due to time in service) any of the modifications proposed by the Manufacturer/Regulatory Agencies.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: the incorrect latching of the #2 Engine Fan Cowl following a routine maintenance check that resulted in separation of the cowl during takeoff.

Events

1. Takeoff - Part(s) separation from AC

Findings - Cause/Factor

1. Aircraft-Aircraft handling/service-Maintenance/inspections-Return to service-Incorrect service/maintenance
2. Personnel issues-Task performance-Maintenance-Scheduled/routine maintenance-Maintenance personnel - C

Narrative

HISTORY OF FLIGHT:

On September 19, 2016, at approximately 0824 EDT, an Aruba Airlines Airbus A320-200, registration P4-AAA, flight AG-820, from Miami International Airport (KMIA), Miami, FL (USA), to Queen Beatrix International Airport (AUA), Oranjestad, Aruba (Aruba), powered by two International Aero Engines (IAE) V2527 turbofan engines experienced a separation of the outboard fan cowl from the right-hand engine during takeoff. The flight crew was unaware of any anomalies until a passenger alerted the cabin crew of what he saw and the cabin crew relayed the message to the flight crew. The flight crew leveled off at FL220 to assess the damage to the airplane. The crew was not sure if the panel had detached completely or was not visible from inside the airplane. All systems appeared normal in the cockpit but as a precaution the crew elected to return to Miami. The flight had an uneventful landing on runway 09 at KMIA about 40 minutes after departure. The incident flight was 14 Code of Federal Regulations (CFR) Part 129 Foreign Passenger Air Carrier from Miami to Aruba. There were no injuries. The aircraft sustained damage to the engine, engine pylon, right main landing gear, right main landing gear door and right fuselage.

The night prior to the incident the airplane was in maintenance where mechanics were completing a routine weekly check. Part of the weekly check was to open the fan cowl doors to inspect the IDG. Following the maintenance check, the cowl doors were closed and latched. Because the gate area where the maintenance was being performed was dark, the mechanic who completed the work used a flashlight to verify the latches were flush and made sure he heard a click. A second mechanic who was assisting, also verified that the latches were flush but did not use a flashlight; he stated in a post-incident interview that he could see they were flush. The task was then signed off in the logbook as complete but did not specify that the cowls had been opened and closed. The morning of the incident, about 0430, the supervisor in charge of maintenance for Aruba Airlines performed a walkaround (although not required) using a flashlight and did not notice anything unusual about the cowl. According to the Aruba Airlines A318/A319/A320/A321 Flight Crew Operating Manual, section "Procedures - Normal - Standard Operating Procedures - Exterior Walkaround," the fan cowl doors were to be checked that they were "closed/latched." The first officer conducted an exterior walkaround prior to departure and did not notice any abnormalities. He stated that to check the cowl he bent down and checked that it was flush and latched.

FAN COWL DAMAGE/MATERIALS EXAMINATION:

Examination of the inboard (left side) and outboard (right side) halves of the No. 2 engine fan cowl was conducted. The cowls were of a composite construction consisting of aluminum honeycomb core and carbon fiber composite skins adhesively bonded to the inner and outer faces of the core. The fan cowls were held together by four latch/catch mechanisms on the structure.

Visual inspection of the outboard No. 2 engine cowl half revealed fractures and delamination of the honeycomb core, outer skin and inner skin. The fracture and

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delamination patterns were used to reconstruct the cowl where possible and to determine its fracture sequence. The patterns were consistent with the initial fracture occurring in the bottom and aft portion of the cowl and were also consistent with the two aft latches not being properly latched.

Visual examination of the inboard No.2 engine cowl revealed cracks in the outer skin at the aft root end of a chine attached to the cowl approximately one-third of the way from the top. The latches and keepers were numbered 1 through 4 starting at the forward end of the cowl. The keepers were examined for indications of wear or deformation but no apparent indication of either were found. All the keepers exhibited some play when moved by hand. There were alignment pins on the left side of the cowl that mated with guide holes on the right side. All the pins were present and there were no apparent signs of damage.

More detailed findings of the No. 2 engine fan cowl and latches can be found in the NTSB Materials Laboratory Factual Report No. 17-002.

ADDITIONAL INFORMATION:

Exemplar Airplane Observation:

Following the incident, the investigative team observed the opening and closing of the #2 engine fan cowl on an exemplar airplane at the Miami maintenance facility to understand the procedure. There were no issues identified. In addition, the team attempted to replicate a false or incorrect latching of the cowl but was unsuccessful.

Interview Summary:

Interview statements were taken from maintenance personnel that had contact with the incident airplane prior to its departure from MIA and the Aruba Airlines Director of Maintenance. Additionally, the investigative team interviewed the Aruba Airlines flight crew that flew the incident airplane.

Details of the interviews can be seen in Aruba Airlines Interview Field Notes.

Manufacturer and Regulatory Actions:

In March 2016, EASA released Airworthiness Directive (AD) 2016-0053 to improve the latch and keeper assemblies on Fan Cowl Doors for Airbus A319/A320/A321 airplanes. At the time of the incident Aruba Airlines was tracking and scheduling the modification within the requirements of the EASA AD.

Fan Cowl Door (FCD) losses during take-off were reported on airplanes equipped with IAE V2500 engines. Prompted by these occurrences, DGAC France issued AD 2000-444-156(B), mandating FCD latch improvements. This AD was later superseded by AD 2001-381(B), requiring installation of additional fan cowl latch improvement by installing a hold open device.

Since that AD was issued, further FCD in flight losses were experienced in service. Investigations confirmed that in all cases, the fan cowls were opened prior to the flight and were not correctly re-secured. During the pre-flight inspection, it was then not detected that the FCD were not properly latched.

Prompted by these recent events, new FCD front latch and keeper assembly were developed, having a specific key necessary to un-latch the FCD. This key cannot be removed unless the FCD front latch is safely closed. The key, after removal, must be stowed in the flight deck at a specific location, as instructed in the applicable Aircraft Maintenance Manual. Applicable Flight Crew Operating Manual has been amended accordingly. After modification, the FCD is identified with a different Part Number (P/N).

For the reasons described above, this AD retains the requirements of DGAC AD 2001-381(B), which is superseded, and requires modification and re-identification of FCD.

The FAA has since released AD 2017-13-10 effective August 3, 2017 to address the same issue as EASA AD2016-0053.

Operator Action:

After the incident, Aruba Airlines took the following actions to alleviate further Fan Cowl Door losses:

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1. Aruba Airlines embodied a modification by Goodrich Service Bulletin V2500-NAC-71-0325 to alert maintenance and flight crew personnel that fan cowl doors are open.
2. Maintenance personnel ensures that an entry is made in the aircraft log to notify flight crews that the fan cowl doors were opened and closed to perform maintenance
3. Flight crews are required to perform a close inspection of the latches when they see the log book entry and sign their compliance on the log book.

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Accident Rpt# ERA16LA320 09/21/2016 1620 CDT Regis# N66804 Jackson, TN Apt: Mc Kellar-sipes Rgnl MKL
Acft Mk/Mdl BEECH B100 Acft SN BE-82 Acft Dmg: SUBSTANTIAL Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl GARRETT TPE-331-6-251 Acft TT 4013 Fatal 0 Ser Inj 0 Flt Conducted Under: FAR 091
Opr Name: BILLY DOUGLAS Opr dba: Aircraft Fire: NONE
AW Cert: STN

Summary

The commercial pilot reported that he had completed several uneventful flights in the multiengine airplane earlier on the day of the accident. He subsequently took off for a return flight to his home airport. He reported that the en route portion of the flight was uneventful, and on final approach for the traffic pattern for landing, all instruments were indicating normal. He stated that the airplane landed "firmly," that the right wing dropped, and that the right engine propeller blades contacted the runway. He pulled back on the yoke, and the airplane became airborne again momentarily before settling back on the runway. The right main landing gear (MLG) collapsed, and the airplane then veered off the right side of the runway and struck a runway sign and weather antenna. Witness reports corroborated the pilot's report.

Postaccident examination revealed that the right MLG actuator was fractured and that the landing gear was inside the wheel well, which likely resulted from the hard landing. The pilot reported that there were no preimpact mechanical failures or malfunctions with the airframe or engine that would have precluded normal operation. Based on the pilot and witness statements and the wreckage examination, it is likely that the pilot improperly flared the airplane, which resulted in the hard landing and the collapse of the MLG.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The pilot's improper landing flare, which resulted in a hard landing.

Events

1. Landing-flare/touchdown - Hard landing
2. Landing-flare/touchdown - Landing gear collapse
3. Landing - Collision with terr/obj (non-CFIT)

Findings - Cause/Factor

1. Personnel issues-Task performance-Use of equip/info-Aircraft control-Pilot - C
2. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Landing flare-Incorrect use/operation - C
3. Environmental issues-Physical environment-Object/animal/substance-Sign/marker-Contributed to outcome

Narrative

On September 21, 2016, about 1620 central daylight time, a Beech B100, N66804, was substantially damaged when the right main landing gear collapsed during landing at the Mc Kellar-Sipes Regional Airport (MKL), Jackson, Tennessee. The commercial pilot was not injured. Visual meteorological conditions prevailed and an instrument flight rules flight plan was filed for the business flight that originated from Memphis International Airport (MEM), Memphis, Tennessee. The airplane was registered to OIA Enterprises LLC, and operated by a private individual under the provisions of 14 Code of Federal Regulations Part 91.

According to the pilot, he was flying businessmen to different airports all day and was returning from MEM to his home airport. The en route portion of the flight was uneventful, and on the final approach leg of the traffic pattern for landing at MKL, he verified that the three green landing gear indicator lights were illuminated, and all instruments were indicating normal. He further stated that the airplane landed "firmly" and the right wing dropped down far enough that the right engine propeller blades contacted the runway. The pilot then pulled back on the control yoke and the airplane became airborne again momentarily, before settling back down on the runway. The right main landing gear collapsed. The airplane then veered off the right side of the runway, struck a runway sign and contacted a weather antenna.

According to witnesses, they watched the airplane land hard on the runway, then the airplane flew back up in the air and landed hard again on the runway. The right landing gear folded-up under the airplane and the airplane slid off the right side of the runway.

Examination of the wreckage by a Federal Aviation Administration inspector revealed that the airplane was resting on its right wing, against the airport's weather service antenna. The right landing gear was inside the wheel-well. The left engine was hanging loose from the motor mounts. After the airplane was raised, the inspector noticed that the right main landing gear actuator was fractured in half.

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Accident Rpt# WPR16LA020	11/02/2015 1424 PST	Regis# N22743	Dallas, OR	Apt: N/a
Acft Mk/Mdl BELL 206B-B		Acft SN 3624	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl ROLLS ROYCE 250-C20B		Acft TT 18443	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 133
Opr Name: APPLEBEE AVIATION INC		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

Summary

The commercial pilot of the helicopter reported that, after he released the external load of trees in the loading zone and about 50 ft above ground level, it seemed like the engine experienced a partial loss of power. The pilot stated that he heard an abnormal noise as the helicopter began to spin to the right, and the low rotor rpm warning light illuminated. The pilot jettisoned the external load line and rolled the throttle toward a closed position in order to counteract the yawing motion, with no response noted. The pilot then initiated an autorotation; during the landing sequence, the helicopter impacted a tree and came to rest upright in a nose-high position. The pilot further stated that, after the helicopter came to rest, he noted that the engine was at a "very slow idle" and he had to shut down the engine. Postaccident examination of the helicopter revealed no evidence of any preexisting mechanical anomalies that would have precluded normal operation. The engine was removed and installed in an engine test cell and ran throughout various power settings.

The airframe fuel filter was removed. The filter element was almost black. The fuel removed was dark, and debris was observed within the fuel filter bowl. The fuel sample from the filter housing was tested and found to be within Jet A specifications. The debris noted within the sample contained various metals, the source of which could not be determined. Given that fuel was found throughout the fuel system, it is unlikely that the debris in the filter resulted in a blockage and restriction of fuel flow; however, the reason for the partial loss of engine power could not be determined.

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Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: A loss of engine power for reasons that could not be determined based on the available information.

Events

1. Maneuvering-low-alt flying - Loss of engine power (partial)
2. Autorotation - Collision with terr/obj (non-CFIT)

Findings - Cause/Factor

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

Narrative

On November 2, 2015, about 1424 Pacific standard time, a Bell 206B, N22743, was substantially damaged during an autorotation landing following a partial loss of engine power near Dallas, Oregon. The helicopter was registered to and operated by Applebee Aviation under the provisions of 14 Code of Federal Regulations Part 133. The commercial pilot, sole occupant of the helicopter, sustained minor injuries. Visual meteorological conditions prevailed, and no flight plan was filed for the external load flight. The local flight originated from a staging area about 15 minutes prior to the accident.

The pilot reported that prior to the accident flight, the helicopter was refueled with 30 gallons of Jet-A fuel. The pilot departed from a staging area and began lifting Christmas trees from a field to a nearby loading zone. The pilot stated that after about 5 or 10 loads, he released a load of trees in the loading zone and shortly after, it seemed like the engine went to a reduced power setting at an altitude of about 50 feet above ground level. He further stated that he heard an abnormal noise originate from the helicopter as the helicopter began to spin to the right along with an illumination of a low rotor RPM light. The pilot jettisoned the external load line and rolled the throttle towards a closed position in order to counteract the yawing motion, with no response noted. The pilot initiated an autorotation and during the landing sequence, the helicopter impacted a tree. Subsequently, the helicopter came to rest upright in a nose high position. The pilot further stated that after the helicopter came to rest, he noted that the engine was at a "very slow idle" and he had to shut off the engine.

Postaccident examination of the helicopter by a Federal Aviation Administration inspector revealed that the tailboom forward of the tailrotor gearbox was twisted about 90°. The helicopter was recovered to a secure location for further examination.

On December 2, 2015, the recovered helicopter was examined at the facilities of AvTech Inc., Auburn, Washington, by the National Transportation Safety Board (NTSB) investigator-in-charge and representatives from Rolls Royce and Bell Helicopters. The examination revealed that the skids were removed to facilitate wreckage transport. Flight control continuity was established throughout the airframe to the main rotor head and aft to the tailrotor. An area of impact damage was observed just forward of the tailrotor gearbox. Continuity of the engine controls was established from the cockpit controls to the engine. The airframe fuel filter was removed. The filter element was dark, almost black in color. The fuel removed was dark in color (charcoal looking). Debris was observed within the fuel filter bowl. Samples of the debris and fuel were retained. Power was applied to the helicopter, and the fuel boost pumps were turned on. Fuel

expelled out of the engine supply fuel lines. A sample was taken, and the fuel appeared to be fairly clear in color with no debris noted. Visual inspection of the fuel tanks revealed that about 10 to 20 gallons of fuel was present.

The engine was visually intact and all fuel and air lines appeared to be secure. N1 and N2 rotated freely and continuity was established throughout the engine to the gearbox. The engine fuel filter was removed from its housing, and a fuel sample was collected. The fuel was dark in color and contained an unknown sediment inside. The filter was dark in color. The fuel from the fuel nozzle supply line was captured and was found clear in color.

The engine was removed and subsequently shipped to Rolls Royce for further inspection. Fuel samples were retained and sent for subsequent testing.

On April 6, 2016, the engine was further examined at the facilities of Rolls Royce, Indianapolis, Indiana. The engine was placed on an engine stand, and visually examined. Compressed air was applied to the port where the PC Line connects to the compressor scroll. Air was found leaking from the PC line that connects to the fuel control unit. The engine was subsequently installed in an engine test cell and run for about 90 minutes throughout various power settings. During a governor droop test, when the load was removed from the engine to test the governor's ability to maintain RPM, N2 RPM increased to the limit for the test cell. Throughout the engine run, the engine produced rated power at cruise flight and takeoff power settings.

The power turbine governor and fuel control unit were removed and subsequently examined at the facilities of Honeywell, Inc., South Bend, Indiana, under the supervision of an NTSB investigator. The investigator reported that the bench tests of the power turbine governor revealed the unit was "sluggish" however, would not result in a loss of engine power. The fuel control unit was placed on a test bench and functioned normally.

The fuel sample from the fuel filter housing from the accident helicopter was submitted to a third-party laboratory for analysis. There was a small amount of unknown debris visible in the sample. Three tests, including Freezing Point; Flashpoint and Distillation were performed on the fuel sample. All tests were found to be within specification for Jet A fuel. The debris was retained and sent to the NTSB Materials Laboratory for further examination. The testing results for the debris found higher elemental levels of calcium (Ca), copper (Cu), iron (Fe), magnesium (Mg), nickel (Ni), potassium (K), silver (Ag) and zinc (Zn). The source of the debris could not be determined.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# GAA17CA390	07/07/2017 34 CDT	Regis# N650HP	Topeka, KS	Apt: Philip Billard Muni TOP
Acft Mk/Mdl BELL 407-NO SERIES		Acft SN 53665	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl ROLLS ROYCE 250-C47B		Acft TT 2752	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR PUBU
Opr Name: KANSAS HIGHWAY PATROL		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

Summary

The pilot of the helicopter reported that, during a hover taxi while using night vision goggles, he "pedal turned facing the west to line up with [the] landing lines painted on the ramp." He added that he looked under his goggles and observed the right painted mark under the right skid and noted that he estimated that the helicopter was about 6 ft above the ground. He then looked back through his goggles to land the helicopter. The tactical field officer that was on board the helicopter advised the pilot that they needed to move forward. The pilot further reported that he "tried to move forward but nothing happened at which time [he] felt a sudden jolt and then [heard] the noise of the tail rotor strike." The helicopter struck a building and then impacted the ground.

The helicopter sustained substantial damage to the fuselage.

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

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The pilot's failure to maintain clearance from a building during landing.

Events

1. Maneuvering-hover - Miscellaneous/other
2. Landing - Collision with terr/obj (non-CFIT)

Findings - Cause/Factor

1. Personnel issues-Psychological-Attention/monitoring-Monitoring environment-Pilot - C
2. Environmental issues-Physical environment-Object/animal/substance-Airport structure-Effect on operation - C
3. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Altitude-Not attained/maintained - C

Narrative

The pilot of the helicopter reported that, during a hover taxi under night vision goggles, he "pedal turned facing the west to line up with [the] landing lines painted on the ramp". He added that, he looked under his goggles and observed the right painted mark under the right skid, and noted that he estimated that they were about 6 ft above the ground. He then looked back into his goggles to land the helicopter. The tactical field officer that was on board the helicopter advised the pilot that they needed to move forward. The pilot further reported that he "tried to move forward but nothing happened at which time [he] felt a sudden jolt and then [heard] the noise of the tail rotor strike". The helicopter impacted a building then impacted the ground.

The helicopter sustained substantial damage to the fuselage.

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

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# CEN18CA072	01/04/2018 1900 CST	Regis# N214AM	Norfolk, NE	Apt: N/a
Acft Mk/Mdl BELL HELICOPTER TEXTRON CANADA	Acft SN 54485	Acft Dmg: SUBSTANTIAL	Fatal 0	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl ROLLS-ROYC 250-C47B		Ser Inj 0	Flt Conducted Under: FAR 091	
Opr Name: AIR METHODS CORP	Opr dba:		Aircraft Fire: NONE	
			AW Cert: STN	

Events

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

Narrative

The pilot and two medical crewmembers were on a return flight to a hospital helipad. During the approach to the helipad, the crew heard a noise outside the helicopter. The medical crewmembers reported they felt a slight "shudder" on the helicopter but attributed it to the wind as they approached the helipad. The pilot heard the noise, but there was no effect on the controls or flight characteristics, so he continued the landing without further incident. After engine shutdown, the on-coming pilot noticed the helicopter's tail rotor drive shaft cover missing. A search of the surrounding area near the helicopter's approach path, located the missing cover.

An examination of the helicopter noted substantial damage to the tail rotor drive shaft.

The day prior to the accident, scheduled maintenance was performed on the helicopter's tail rotor pitch change mechanism, which required removal of the drive shaft cover. The cover was reinstalled, and no problems were reported during a subsequent pre-flight inspection.

It is likely the cover fasteners were not properly secured, after the cover was re-installed.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# GAA17CA332	05/24/2017	830 ADT	Regis# N1265U	Elfin Cove, AK	Apt: Elfin Cove ELV
Acft Mk/Mdl CESSNA 208-A			Acft SN 20800375	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl HONEYWELL TPE 331-12-JR			Acft TT 2338	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 135
Opr Name: KALININ PARTNERS LLC.			Opr dba: ALASKA SEAPLANES		Aircraft Fire: NONE
					AW Cert: STN

Summary

The pilot of the float-equipped airplane reported that, during a water landing, he "misread the size of the swell." He added that, immediately after touchdown, the airplane jumped a swell, which resulted in a tail-low hard landing.

The airplane sustained substantial damage to the fuselage.

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

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The pilot's failure to recognize the magnitude of the swell size during landing, which resulted in a tail-low hard water landing.

Events

1. Landing - Hard landing

Findings - Cause/Factor

1. Personnel issues-Action/decision-Info processing/decision-Identification/recognition-Pilot - C
2. Environmental issues-Physical environment-Runway/land/takeoff/taxi surface-Choppy surface-Effect on operation - C

Narrative

The pilot of the float-equipped airplane reported that, during a water landing, he "misread the size of the swell". He added that, immediately after touchdown the airplane jumped a swell, which resulted in a tail low hard landing.

The airplane sustained substantial damage to the fuselage.

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

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# WPR16LA181 09/16/2016 1715 PDT Regis# N4861K Reno, NV Apt: Reno/stead RTS
Acft Mk/Mdl DEHAVILLAND DH115 VAMPIRE-55 Acft SN 186 Acft Dmg: SUBSTANTIAL Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl AMA/EXPR UNKNOWN ENG Fatal 0 Ser Inj 0 Flt Conducted Under: FAR 091
Opr Name: PETE ZACCAGNINO Opr dba: Aircraft Fire: NONE
AW Cert: SPE

Summary

The airline transport pilot reported that, during an air race flight, he heard a "loud bang," followed by wind noise and wind entering the cockpit. The pilot immediately aborted the race by pitching the airplane up and reducing power to idle, at which point he noticed that the right side of the canopy was fractured. The pilot added that he noted throughout the climb and orbit that all engine gauges displayed normal indications as he set up for landing. As the pilot established on the downwind leg for his intended runway, he advanced the power lever and realized the engine had lost power. The pilot realized that the airplane was not going to be able to reach any of the runways, so he chose to land in the open desert north of the airport. He conducted an engine restart procedure without success. Subsequently, the pilot initiated a forced landing with the landing gear and flaps in the retracted position.

A majority of the right canopy window was fractured from the frame. The aft canopy frame had deformation damage as did the airplane structure above and aft of the upper portion of the right seat. Postaccident examination of the canopy and the reconstructed right window (about 79% of the window was identified and reconstructed) revealed no evidence of any preexisting crazing, scratching, or other anomalies that would have contributed to the fracture of the right canopy. Postaccident examination of the engine revealed no evidence of any preexisting malfunctions that would have precluded normal operation. Neither the reason for the fractured canopy nor the engine failure could be determined.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The in-flight failure of the canopy and subsequent loss of engine power for reasons that could not be determined because postaccident examination of the airframe and engine revealed no anomalies that would have precluded normal operation.

Events

1. Maneuvering-low-alt flying - Part(s) separation from AC
2. Maneuvering-low-alt flying - Powerplant sys/comp malff/fail
3. Maneuvering-low-alt flying - Off-field or emergency landing

Findings - Cause/Factor

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

Narrative

On September 16, 2016, about 1715 Pacific daylight time, a De Havilland DH115 Vampire, N4861K, sustained substantial damage during an off-airport landing near the Reno-Stead Airport (RTS), Reno, Nevada. The airplane was registered to CB Aviation Inc., Ogden, Utah, and operated by the pilot under the provisions of 14 Code of Federal Regulations Part 91. The airline transport pilot, sole occupant of the airplane, was not injured. Visual meteorological conditions prevailed, and no flight plan was filed for the local air race flight, which originated from RTS about 9 minutes prior to the accident.

The pilot reported in both written and verbal statements that he was participating in a Jet Class Gold Race at the National Championship Air Races, which consisted of 6 laps around a closed race course. About 3.5 laps into the race, while approaching pylon 4, the pilot heard a "loud bang" followed by wind noise and wind within the cockpit. The pilot immediately aborted the race, pitched up, and reduced power to idle, trading airspeed for altitude. The pilot stated that he assessed all primary flight controls and trim, noting no anomalies except for the trim wheel, which was jammed. The pilot also observed a crack in the right side of the canopy. Throughout the climb, the pilot noted that all engine gauges displayed a normal indication.

The pilot further reported that while orbiting the airport at best glide speed, he was able to free the jammed trim wheel and continued to enter downwind for runway 08. Upon turning onto downwind, he advanced the power lever and realized the engine had lost power. The pilot said he evaluated his option for landing, realizing he was unable to reach runway 14 or runway 08, and elected to land in the open desert north of the airport as he conducted an engine restart procedure. Subsequently, the pilot initiated a forced landing with the landing gear and flaps in the retracted position.

Examination of the accident site revealed that the airplane came to rest up right about 7,741 feet north, northwest of the approach end of runway 08. The wreckage debris path was oriented on a heading of about 345o and was about 756 feet in length. Portions of plexiglass from the airplane's canopy structure were located about 1.57 miles southwest of the accident site. The wreckage was recovered to a secure location for further examination.

The accident airplane was powered by a single jet engine mounted on the airplane centerline aft of the cockpit and has a twin tailboom tail arrangement. The

cockpit is set up with side-by-side seating for two pilots. The canopy consisted of a metal frame with acrylic windows installed on the left and right sides. The acrylic windows wrap from above the pilot's heads around the left and right sides with complex curvatures. The edges of the acrylic windows are reinforced with fiberglass where the frame screws pass through to secure the window to the frame. The canopy is hinged at the aft, upper edge to open upward.

Examination of the recovered wreckage revealed that the lower fuselage of the airplane was crushed and deformed upward consistent with damage from the forced landing. The left canopy window had a small hole and cracks emanating from the hole coincident with the location of the upper portion of the left seat. A majority of the right canopy window was fractured from the frame. There was damage and deformation to the aft canopy frame and airplane structure above and aft of the upper portion of the right seat.

The right canopy window was reconstructed in the canopy frame by matching the fracture surfaces of the individual pieces utilizing tape to hold the fragments in place. About 70% of the right canopy window was conclusively identified and placed on the reconstruction. The recovered fragments from the aft half of the window were smaller than those from the forward half. Seven small pieces of canopy could not be conclusively placed on the reconstruction. None of the fractures intersected the screw holes around the periphery of the window. There was no evidence of crazing, scratching, or other pre-existing anomalies on the window fragments examined.

Examination of the engine revealed that all fuel lines were intact. The lower portion of the burner ring was impact damaged. All of the environmental control system was intact. The fuel control unit lever linkage was impact damaged. The power lever moved by hand from stop to stop. Dirt debris was observed throughout the engine from the inlet to the exhaust tailpipe.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# CEN17LA350	09/12/2017 2045	Regis# N121CZ	Greeley, CO	Apt: Greeley-weld County GXY
Acft Mk/Mdl EMBRAER EMB 120ER-RT		Acft SN 120350	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl PRATT & WHITNEY PW118B		Acft TT 33531	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 135
Opr Name: FREIGHT RUNNERS EXPRESS INC		Opr dba:		Aircraft Fire: NONE
				AW Cert: STT

Summary

The airplane, which was operating as a nonscheduled domestic passenger flight, was standing on a ramp during dark night conditions waiting for the flight's passengers to arrive by bus; the flight crew was onboard the airplane. The only airport employee on duty opened the gate, told the bus driver to drop the passengers next to the airplane, and then returned to previous duties. The bus driver reported that there was no lighting on the ramp when he drove the bus onto it. He added that he made a right turn around the back of the airplane and "didn't see the wing." At that point, he was unable to stop the bus before it hit the wing. Although the bus driver reported that there was no light on the back of the wing, a video of the ramp area showed that the vertical portion of the T-tail was illuminated and that the airplane position lights were illuminated.

The bus driver possessed current commercial passenger-carrying vehicle operational and medical certifications. The driver did not have vision problems. The driver stated that he was not using his cell phone at the time of the crash. A review of the driver's 72-hour activity history did not reveal any irregularities. The driver's postaccident toxicological testing results were negative for the tests performed. Given these facts, it is likely that the unescorted driver failed to maintain clearance from the airplane during the planeside delivery of passengers in dark night conditions. The lack of an airport employee to escort the bus to the side of the airplane likely contributed to the accident. After the accident, the operator stated that it would make a policy that drivers be guided to airplanes by a ground guide. If a ground guide was not available, the drivers would not be permitted to drop passengers planeside.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The bus driver's failure to maintain clearance from the standing airplane during dark night conditions. Contributing to the accident was the airport's lack of an escort for the bus.

Events

1. Standing - Aircraft loading event

Findings - Cause/Factor

1. Personnel issues-Psychological-Attention/monitoring-Attention-Other/unknown - C
2. Environmental issues-Physical environment-Object/animal/substance-Aircraft-Effect on operation - C
3. Environmental issues-Conditions/weather/phenomena-Light condition-Dark-Effect on personnel - C
4. Organizational issues-Support/oversight/monitoring-Oversight-Oversight of operation-Airport - F

Narrative

HISTORY OF FLIGHT

On September 12, 2017, about 2045 mountain daylight time, an Embraer EMB 120ER airplane, N121CZ, while standing on a ramp at the Greeley-Weld County Airport (GXY), near Greeley, Colorado, was struck by a bus. The airline transport pilot and two crewmembers on board the airplane were uninjured and the bus driver and 23 passengers on board the bus were uninjured. The airplane sustained substantial damage to its left aileron. The airplane was registered to and operated by Freight Runners Express, Inc. as a 14 Code of Federal Regulations Part 135 non-scheduled domestic passenger flight. Night visual meteorological conditions prevailed in the area about the time of the accident, and an unactivated instrument flight rules flight plan was on file. The flight was originating from GXY and was destined for the University-Oxford Airport, near Oxford, Mississippi.

The airplane was waiting for passenger arrival with the intent for flight. About 2040, an employee of a fixed base operator (FBO) at GXY was attending to another airplane when he opened the gate and told the bus driver to drop the passengers next to the airplane. The driver said that the "place is dark" and no lighting was present and drove the bus onto the airport ramp. After letting the bus onto the ramp, the employee returned to attend to the other airplane. The driver drove the bus to the airplane and he made a right turn around the back of the airplane and "didn't see the wing." The driver said that the wing was above his vision level and he didn't see the wing until he made the complete turn. At that point, he was unable to stop in time. He said that there is no light on the back of the wing.

National Transportation Safety Board - Aircraft Accident/Incident Database

According to a ramp video, the airplane was standing on a ramp in the left portion of the camera's field of view. A 3/4 view of the airplane was present under night conditions where its right wing, right side fuselage, and right side of its empennage are visible. The vertical portion of the T-tail was illuminated by airplane mounted lights and the airplane position lights were illuminated. A bus transporting the passengers can be seen traveling on the ramp behind the airplane. The bus's headlights were illuminated. The bus can be seen making a right turn behind the airplane and came to a stop. The bus then backed away from the airplane.

PERSONNEL INFORMATION

The 28-year-old captain, held a Federal Aviation Administration (FAA) airline transport pilot (ATP) certificate with an airplane multiengine land rating and commercial pilot privileges with airplane single-engine land and sea ratings. He held a flight instructor certificate with airplane single engine land and instrument ratings. He held type ratings in the Beechcraft 1900 and EMB-120 airplanes. The captain's most recent first-class medical certificate was issued on October 24, 2016, with no restrictions or limitations. According to the operator's accident report, the captain had accumulated 3,365.5 hours of total flight time, including 755.7 hours as pilot-in-command in the EMB-120.

The 23-year-old first officer, held an FAA commercial pilot certificate with airplane single and multiengine land and instrument ratings. He also held a flight instructor certificate with airplane single engine land and instrument ratings. The first officer's most recent first-class medical certificate was issued on May 23, 2017, with no restrictions or limitations. According to operator's accident report, the first officer had accumulated 1,153.1 hours of total flight time, including 61.6 hours of total flight time in the EMB-120.

The 48-year-old bus driver possessed a Colorado class B commercial driver's license (CDL) with a passenger endorsement and an "M" restriction which allows him to operate a Class B or Class C passenger carrying vehicle. The driver has held a commercial driver's license since 2001; his license was renewed on July 20, 2016 and expires on August 15, 2020. The driver's motor vehicle record did not list any violations or crashes in a commercial motor vehicle. He had one ticket in his personal vehicle in the past 10 years.

According to the bus operator, the bus driver joined the company in April of 2014; he completed initial training on April 23, 2014, which included classroom training and a minimum of 5 days of on-the-road training. All company drivers participate in on-going/remedial training minimally twice per year, and on an "as-needed" basis. The driver had a current medical certificate issued in June 26, 2016, with an expiration date of January 2018. The driver passed the visual and perceptual tests with a visual acuity of 20/20 in both eyes. The driver does not have vision problems and does not wear glasses or contacts. The driver was 5 ft 4 in tall and his "straight forward" vision level when sitting in the driver's seat is approximately 7 ft from the ground. The driver provided his 72-hour activity history to include activities on the day of the crash and a review of his history did not reveal any irregularities.

AIRCRAFT INFORMATION

N121CZ, was an Embraer EMB 120ER, 34-seat, low wing, T-tail airplane, equipped with two Pratt & Whitney Canada PW118 turboprop engines and Hamilton Standard 4-bladed propellers. The airplane was maintained under an approved continuous maintenance inspection program. The airplane had wing span of 64.9 ft and an aileron span of 10.83 ft. The wing's height above can vary from about 7.2 ft to 7.7 ft above ground level. The airplane was equipped with position lights for flight during night conditions and with lights that illuminate the vertical portion of the T-tail.

METEOROLOGICAL INFORMATION

At 1956, the recorded weather at GXY was: Wind 220ø at 3 kts; visibility 10 statute miles; sky condition clear; temperature 24ø C; dew point 10ø C; altimeter 29.97 inches of mercury.

According to U.S. Naval Observatory Sun and Moon Data, the end of local civil twilight was 1940 and local moonrise was at 2343.

AIRPORT INFORMATION

GXY was a public, non-towered airport, which was owned by the Greeley-Weld County Airport Authority. It was located three miles east of Greeley, Colorado. The airport had two runways and a surveyed elevation of 4,696.8 ft above mean sea level. Runway 17/35 was a 10,000 ft by 100 ft runway with an asphalt surface. Runway 10/28 was a 5,801 ft by 100 ft runway with an asphalt surface. The airport listed 122.8 megahertz as its common traffic advisory frequency.

WRECKAGE AND IMPACT INFORMATION

The airplane operator reported that the left-hand aileron and aileron tab were damaged beyond repair. Images of the control surfaces confirmed the substantial damage. Images of the bus showed the right-side mirror and right-side windshield exhibited linear witness marks. The bus operator estimated the impact point of the witness marks was about 7 ft above ground level.

MEDICAL AND PATHOLOGICAL INFORMATION

The airplane operator reported that they did not perform post-accident drug screening on the flightcrew due to the fact that Part 120.109(c) only requires it if "that employee's performance either contributed to an accident or cannot be completely discounted as a contributing factor to the accident." Alcohol testing was not conducted due to the fact that 120.217(b) only requires it if "that employee's performance of a safety-sensitive function either contributed to the accident or cannot be completely discounted as a contributing factor to the accident." The airplane operator determined that none of the flight crew's performance contributed to the accident and could be completely discounted as a contributing factor.

Following the accident, driver toxicological testing was performed by the bus operator on September 13, 2017 and testing results were negative for the tests performed.

ORGANIZATIONAL AND MANAGEMENT INFORMATION

Ramblin Express is a ground transportation company that has been providing service since 1993, with operations in Colorado Springs and Denver. Their fleet consists of motorcoaches, 21 and 32-passenger minibuses, as well as event shuttle buses. Ramblin's fleet of MCJ J4500, and Van Hool CX45 motorcoaches had 56 seats. Ramblin indicated that about 1/3 of their fleet is less than 4 years old, with 1-3 brand new motorcoaches being introduced into the fleet every year.

ADDITIONAL DATA/INFORMATION

The accident vehicle was a 2015 model MCI J-4500 motorcoach. The bus operator reported that it has a stringent preventative maintenance program and that there were no safety defects with the vehicle at the time of the accident. Additionally, the driver stated that he was not using his cell phone at the time of the crash. The bus operator received a satisfactory safety rating during a Federal Motor Carrier Safety Administration review dated August 4, 2016. The review indicated that the operator had two recordable accidents and a 0.78 recordable accident per million mile rate.

At the time of the accident, the FBO at GXY had one employee on duty. Subsequent to the accident, the FBO indicated that they now ask if vehicles would like an escort and will be more vigilant in the future to escorting busses, limos, etc. to the aircraft.

Subsequent to the accident, the bus operator reported, "Going forward, we will make policy that a driver must be guided onto the tarmac, to the plane, by a ground guide (representative from the airport). If/when a ground guide is not present, they will not be permitted to drop plane-side."

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# GAA18CA070	12/06/2017 900 MST	Regis# N790AM	Santa Rosa, AZ	Apt: N/a
Acft Mk/Mdl EUROCOPTER AS 350		Acft SN 4298	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
			Fatal 0 Ser Inj 0	Flt Conducted Under: FAR PUBU
Opr Name: US DEPARTMENT OF HOMELAND SECURITY		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

Events

1. Landing - Hard landing
-

Narrative

The pilot reported that, while landing off-airport, the helicopter landed slightly harder than normal. The helicopter was flown back to the airport without further incident.

A post-accident examination revealed the helicopter had sustained substantial damage to the tail-boom.

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

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# ERA17LA126 02/21/2017 1015 AST Regis# N413LP San Juan, PR Apt: Fernando Luis Ribas Dominicci TJIG
Acft Mk/Mdl EUROCOPTER AS 350-B3 Acft SN 3228 Acft Dmg: SUBSTANTIAL Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl TURBOMECA ARRIEL 2B Acft TT 1846 Fatal 0 Ser Inj 0 Flt Conducted Under: FAR 091
Opr Name: PEDRO FELICIANO Opr dba: Aircraft Fire: IFLT
AW Cert: STN

Summary

The pilot/owner of the turbine helicopter was practicing autorotations with a flight instructor. After completing several autorotations uneventfully, the instructor asked if he could perform one, and the pilot agreed. Near the flare at the end of the maneuver, the pilot heard the engine overrev, followed by an Nr (rotor speed) aural warning, followed by a fire warning light illumination on the instrument panel. After landing, the pilot exited the helicopter with a fire extinguisher and attempted to extinguish an engine fire. Review of data downloaded from a vehicle-engine multifunction display and digital engine control unit revealed that the first failure recorded during the flight indicated that the gas generator rotation speed (N1) reached an out-of-limit value. At that time, the fuel regulation was in mixed mode, as the collective twist grip throttle control was out of the "flight" detent and the pilot was manually controlling the throttle. A second failure was recorded 2 seconds later, which indicated that the free turbine rotation speed (N2) reached an out-of-limit value. The failure was triggered by the maximum recorded value of 545 rpm, which equated to a turbine speed (Nr) of 140%. The engine's freewheeling turbine was designed to separate turbine blades at 150% Nr in order to prevent the turbine disc separating at 170% Nr. It is likely that the flight instructor excessively opened the fuel metering unit via the twist grip throttle manual control, which resulted in an engine overspeed, turbine blade separation, and subsequent engine fire.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The flight instructor's incorrect manipulations of the twist grip throttle control during a practice autorotation, which resulted in an engine overspeed and subsequent fire.

Events

1. Autorotation - Miscellaneous/other
2. Autorotation - Fire/smoke (non-impact)

Findings - Cause/Factor

1. Aircraft-Aircraft power plant-Engine fuel and control-Fuel controlling system-Incorrect use/operation - C
2. Personnel issues-Action/decision-Action-Incorrect action performance-Instructor/check pilot - C

Narrative

On February 21, 2017, about 1015 Atlantic standard time, an Airbus Helicopters (Eurocopter) AS 350 B3, N413LP, operated by the commercial pilot, was substantially damaged during a practice autorotation at Fernando Luis Ribas Dominicci Airport (TJIG), San Juan, Puerto Rico. The flight instructor and commercial pilot were not injured. The instructional flight was conducted under the provisions of 14 Code of Federal Regulations Part 91. Visual meteorological conditions prevailed and no flight plan was filed for the flight that originated from TJIG about 0900.

According to the flight instructor's written statement, he was the pilot-in-command for the flight and the commercial pilot/owner of the helicopter was practicing autorotations. During recovery from the last 180° autorotation, the flight instructor noticed that the engine rpm continued to increase and exceeded limitations, followed by a vibration in the helicopter. He then immediately landed on a grass area near a runway. After the landing, a mechanic told him that the helicopter's engine was on fire. The flight instructor completed the engine fire procedure and exited the helicopter.

According to the commercial pilot's written statement, he had completed several training maneuvers and autorotations uneventfully. The flight instructor then asked if he could perform an autorotation and the commercial pilot agreed. During the flare at the end of the autorotation, the commercial pilot heard the engine overrev, followed by an Nr (rotor speed) aural warning, followed by a fire warning light illumination on the instrument panel. After landing, the commercial pilot exited the helicopter with a fire extinguisher and attempted to extinguish an engine fire.

Review of airport security video revealed that the helicopter was descending to a grass area adjacent to the runway. About 30 feet above ground level, smoke began emitting from the helicopter and it climbed out of the video frame. It then descended back into the video frame and landed on the grass while smoke continued to emit from the helicopter.

Examination of the helicopter by a Federal Aviation Administration inspector revealed that the fire resulted in damage to the engine deck support structure and a portion of the tail rotor drive shaft. A vehicle and engine multifunction display (VEMD), digital engine control unit (DECU), hydromechanical unit (HMU), and assembly valve were retained for examination and data download at the manufacturers' facilities under the supervision of the Bureau d'Enquetes et d'Analyses (BEA) in France. Examination and testing of the HMU and assembly valve did not reveal any anomalies that would have precluded normal engine operation.

Review of data downloaded from the VEMD and DECU revealed that during the accident flight, the first failure recorded by both computers was an NG/N1 failure, respectively. The failure was recorded at 1 hour, 13 minutes, 18 seconds (1:13:18) into the 1-hour, 14-minute flight by the VEMD and 1:13:27 by the DECU. The recorded failure indicated that the gas generator rotation speed (N1) reached an out of limit value. At that time, the fuel regulation was in mixed mode as the collective twist grip throttle control was out of the "flight" detent and the pilot was manually controlling the throttle. A second failure was recorded 2 seconds later, which indicated that the free turbine rotation speed (N2) reached an out of limit value. The failure was triggered by the maximum recorded value of 545 rpm, which equated to an Nr of 140%.

According to a representative from the engine manufacturer, the engine's freewheeling turbine was designed for its turbine blades to separate at 150% turbine speed. The design was to prevent the turbine disc from separating at a turbine speed of 170%. During his examination of the engine, the representative observed evidence consistent with the turbine blades separating, resulting in an engine fire.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# GAA18CA012	10/12/2017 2335 CDT	Regis# N140SF	Canton, IL	Apt: Ingersoll CTK
Acft Mk/Mdl EUROCOPTER DEUTSCHLAND GMBH	Acft SN 9389	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual	Prob Caus: Pending
Eng Mk/Mdl TURBOMECA/ SAFRAN ARRIEL 1E2	Acft TT 3157	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091	
Opr Name: OSF AVIATION LLC.	Opr dba:		Aircraft Fire: NONE	
			AW Cert: STT	

Events

1. Maneuvering-hover - Loss of control in flight

Narrative

The helicopter flight instructor reported that he was training a new company pilot at night, and they were using night vision goggles. He added that, while in a hover, he attempted to demonstrate the use of the controllable search light to the pilot in the right seat.

The flight instructor added that, "to adjust the light, I took the [left] cyclic in my left hand which would normally be holding the left collective and attempted to reach the control switch for the light and grabbed the throttles of the right collective with my right hand. My right hand would normally be on the left cyclic." He further added that, he then inadvertently pushed down on the collective and the helicopter began to settle on the runway. He reported in response "my reflex was to pull up with my left hand (which would normally be on the collective)," and when he did so the helicopter moved rearward. Subsequently, he "pushed the cyclic forward to correct" the rearward movement, but in doing so, the helicopter touched down hard and the main rotor impacted the upper wire strike protection unit.

The main rotor sustained substantial damage.

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

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# ERA15LA292 07/23/2015 2045 EDT Regis# N765A Baltimore, MD Apt: Baltimore/washington Intl Thur BWI
Acft Mk/Mdl ISRAEL AIRCRAFT INDUSTRIES 1125 Acft SN 011 Acft Dmg: SUBSTANTIAL Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl HONEYWELL TFE-731-3C-20 Acft TT 8669 Fatal 0 Ser Inj 0 Flt Conducted Under: FAR 091
Opr Name: MOUNTAIN AIR SERVICES LLC Opr dba: Aircraft Fire: NONE
AW Cert: STT

Summary

After the passengers boarded the airplane, the pilot monitoring closed the cabin door and stated that he visually checked that the main entry door was secure and locked. Throughout the start, taxi, and takeoff procedures the CABIN DOOR and CABIN DOOR SEAL lights were not illuminated. Then, immediately after takeoff, the flight crew identified that the CABIN DOOR, CABIN DOOR SEAL, and MASTER CAUTION lights were illuminated. During the return to the airport for landing, the main entry door opened. The crew subsequently declared an emergency and landed uneventfully. The airplane incurred substantial damage to the door and airframe during the landing; the passengers and crew were not injured. Examination of the door and the locking mechanisms revealed that when the door was latched with the locking pin in the stirrup, the door was secured. However, when the locking pin was resting on the stirrup, and not in the stirrup, the CABIN DOOR warning light would not illuminate. The light would illuminate on the warning annunciator when the locking mechanism was pulled away from and not in contact with the stirrup. Furthermore, the self-locking air springs on the door did not function. Without the self-locking feature, the door lacked a secondary safety feature that could have prevented the accident. It is likely that when the pilot monitoring closed the cabin door, the locking pin rested on the stirrup and did not fully engage, and the pilot monitoring did not visually check that the locking mechanism was secure in the stirrup. Since the CABIN DOOR light would not illuminate if the locking pin was resting on the stirrup, the crew was not alerted to the unsecured position of the main entry door. According to maintenance records, the most recent inspection of the door and its locking mechanism was completed about one month before the accident. It could not be determined whether the failure of the air springs occurred before the most recent inspection and was not identified, or if the failure occurred after the inspection.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The flight crew's failure to visually ensure that the cabin door locking pin was in place before takeoff.

Events

1. Initial climb - Cabin safety event
2. Landing - Off-field or emergency landing
3. Landing-landing roll - Dragged wing/rotor/float/other

Findings - Cause/Factor

1. Aircraft-Aircraft structures-Doors-Passenger/crew doors-Incorrect service/maintenance - F
2. Aircraft-Aircraft structures-Doors-Passenger/crew doors-Inadequate inspection - F
3. Aircraft-Aircraft structures-Doors-Passenger/crew doors-Not inspected - C
4. Personnel issues-Action/decision-Action-Lack of action-Flight crew - C

Narrative

HISTORY OF FLIGHT

On July 23, 2015, about 2045 eastern daylight time, an Israel Aircraft Industries 1125 Westwind Astra, N765A, returned to land at Baltimore-Washington International Thurgood Marshall Airport (BWI), Baltimore, Maryland, after the main entry door (MED) opened in flight. Both airline transport pilots and the five passengers were not injured. The airplane was registered to GMH Capital, LLC, and operated under the provisions of Title 14 Code of Federal Regulations Part 91, as a business flight. Visual meteorological conditions prevailed and an instrument flight rules flight plan was filed for the flight destined for Chicago Executive Airport (PWK), Chicago, Illinois. The flight was originating at the time of the accident.

According to the pilot monitoring (PM), after the passengers boarded the airplane he closed, locked, and visually checked to verify that the MED handle pin was engaged in the handle lock. He then proceeded to the cockpit in order to begin the flight. During the starting procedures, the red warning CABIN DOOR annunciator light remained extinguished. Furthermore, throughout the engine start, taxi, and takeoff, the red warning CABIN DOOR light, the amber CABIN DOOR SEAL caution light, and the MASTER CAUTION light remained off. Then, immediately after the airplane departed, the flight crew identified that the red CABIN DOOR light, amber CABIN DOOR SEAL, and MASTER CAUTION lights were illuminated. The PM requested to return to the airport. The pilot flying (PF) began to maneuver the airplane in order to return to the airport when the MED opened in flight. The flight crew declared an emergency; however, could not hear the air traffic controller's response due to the noise resulting from the open door. They were contacted through light gun signals and given clearance to land. Upon landing, the open MED contacted the runway, but remained attached to the door frame.

National Transportation Safety Board - Aircraft Accident/Incident Database

Examination of the airframe revealed that both the MED and the airframe structure surrounding it were substantially damaged during the accident sequence.

AIRPLANE INFORMATION

According to Federal Aviation Administration records, the airplane was manufactured in 1986 and was registered to a corporation in 2013. The most recent continuous airworthiness inspection was a 1000-hour inspection, or "C" inspection, which was performed on June 22, 2015, at a total time of 8668.6 hours. During that inspection, a mechanic initialed that the "Passenger/Crew Door - Check" was performed.

According to the airplane maintenance manual, the MED was located on the left forward side of the airplane. The door was a semi-plug-type door, which was composed of 10 stop pins, locking cams, a mechanical stirrup, and a handle to secure it in place. The door rotated around two lower hinges and incorporated fixed boarding steps for access to cabin level. Door locking was achieved by superimposing a vertical translation in addition to the rotating movement of the hinges, thereby inserting 10 stop pins rigidly mounted on the door, 5 pins on each side of the door, into stop pads firmly anchored to the machined side frames of the airplane structure. The locking movement also rotated two locking cams and would bring them against pads incorporated in the door frame. The cams prevented the door from being raised (unless the handle was rotated) and thus eliminated inadvertent opening of the door in case of mechanical failure of the door mechanism.

As the door was transitioned into the closed position, the pin on the handle would contact and displace the spring-loaded stirrup and as the pin slid by, it would release the stirrup allowing it to spring back into position, securing the handle in the closed position. Locking the handle in a "safe guarded" position protected against inadvertent raising of the handle and subsequent opening of the door. The spring-loaded stirrup mechanism had to be manually displaced before being capable of rotating the handle upward and subsequently unlocking the door. Once the airplane was pressurized, the stirrup mechanism could only be actuated when cabin pressurization fell, due to the pressure interlock mechanism. An additional safety measure of the MED handle locking mechanism was a set of air springs that provided a "self-locking" feature. The internal door handle was assisted to the locked position with the air springs. The air springs, as an over-centering device, would move the door handle into the locked position with the stirrup if it was released 10 to 15 degrees prior to contacting the stirrup. Furthermore, the air-springs were a maintenance item when performing the Passenger/Crew Door check.

There were 3 micro-switches that monitored the door's closed and locked position; the "seal pressure switch" which provided feedback to the amber DOOR SEAL annunciator, as well as the "door switch" and "door lock switch," which provided feedback to the red CABIN DOOR annunciator panel light. Should either switch toggle from locked to unlocked, the CABIN DOOR annunciator would illuminate.

The cockpit annunciator panel, located on the center of the instrument panel and consisted of 60 different notification lights arranged in 4 columns and 15 rows. The panel provided numerous system notifications to the crew. The CABIN DOOR annunciator light (colored red) was located in the second column of annunciator lights, in third row from the bottom. The CABIN DOOR SEAL annunciator light (colored amber) was located in the third column of lights, in the fourth row from the bottom.

PERSONNEL INFORMATION

The pilot flying held an airline transport pilot certificate with ratings for airplane single and multi-engine land, and type ratings for G-100, IA-1125, and IA-JET. The pilot's most recent first-class medical certificate was issued in September 2014. He reported 3,265 hours of total flight experience, 273 hours of which were in the accident airplane make and model.

The pilot monitoring held an airline transport pilot certificate for airplane single and multi-engine land, and type ratings for EMB-505, G-100, and an IA-1125. His most recent first-class medical certificate was issued in June 2015. He reported 5,724 hours of total flight experience, 182 hours of which were in the accident airplane make and model.

METEOROLOGICAL INFORMATION

At 2054, the recorded weather at BWI included calm wind, a few clouds at 6,000 feet, scattered clouds at 25,000 feet, 10 miles visibility, temperature 23 degrees C, dew point 13 degrees C, and an altimeter setting of 29.95 inches of mercury.

FLIGHT RECORDERS

The airplane was equipped with a cockpit voice recorder, which was retained and auditioned in the NTSB Vehicle Recorders Laboratory. Audition of the recorder revealed a series of events, consistent with the flight crews' statements. While taxiing, the pilot flying noted "cabin door is closed." Then while waiting to depart, the flight crew completed the before departure checklist and did not note any anomalies.

TESTS AND RESEARCH

The door was removed from the airplane and shipped to the manufacturer for further examination. A detailed examination of the door revealed that the when the locking mechanism was engaged into the stirrup, the door remained secured and locked. However, the locking mechanism air-springs "self-locking" feature did not function when tested. The door locking handle could be released at any point in its travel and the handle would remain in place. The handle could be moved without effort, but the air-springs did not force the handle into the inner stirrup position. The air-springs were removed and exhibited no output forces or "spring" action that would contribute to "self-locking" feature of the door locking mechanism was noted. Furthermore, the original air-springs were replaced with mock-up air-springs and the "self-locking" feature of the door operated without anomaly.

In addition, the CABIN DOOR annunciator light switch and internal wiring were tested. There were no anomalies with the internal wiring that would have precluded normal operation prior to the accident. Operational checks of the switch found that the switch would deactivate, allowing the CABIN DOOR annunciator light to extinguish, when the locking mechanism was resting on the stirrup, however, was not fully engaged and locked. The switch would activate, illuminating the CABIN DOOR annunciator light, when the locking mechanism handle was pulled away from, and not in contact with the stirrup.

There were no anomalies with the door securing mechanism that would have precluded normal operation prior to the accident.

ADDITIONAL INFORMATION

According to the Airplane Flight Manual, in the Normal Procedures, the Before Taxiing checklist indicated that the pilots were to perform the following actions:

CABIN DOOR - CLOSED; "physically verify that two door locks and stops are in place and handle pin is latched and locked."

CABIN DOOR (red) light - OUT

According to the Quick Reference Handbook, it stated in the Before Taxiing Checklist:

CABIN DOORCLOSED

(Physically verify that two door locks and stops are in place and handle pin is latched and locked. Verify CABIN DOOR amber annunciator is out.)

According to the airplane Maintenance Manual, a 1000-hour inspection included the following items to be checked:

"Passenger/Crew Door - Check:"

Lock door from inside.

- Slowly release internal MED handle 10 - 15 degrees before locking position.
- Verify inner air-springs lock door automatically (self-locking).
- Ensure inner locking handle is locked and cannot be rotated unless stirrup is depressed.

"Door Warning System - Operational Test:"

- Verifies cabin door annunciation light extinguishes.
- Verifies cabin door seal annunciation light extinguishes.

"Passenger/Crew Door Microswitch - Adjustment/Test:"

- This procedure adjusts the microswitch with door closed but not locked down and latched.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# WPR17LA005	10/04/2016 910 HST	Regis# N311VT	Waimea, HI	Apt: N/a
Acft Mk/Mdl MCDONNELL DOUGLAS HELICOPTER	Acft SN 0229E	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual	Prob Caus: Pending
Eng Mk/Mdl ROLLS ROYCE 250 C20R/2	Acft TT 17334	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 135	
Opr Name: VOLCANO HELICOPTERS INC	Opr dba:		Aircraft Fire: NONE	
			AW Cert: STN	

Summary

The commercial pilot reported that, after completing an external cargo lift operation, he landed at a remote location to jettison the lift cable and to board the two ground workers for a ferry flight back to their home base. Shortly after liftoff, the pilot felt a moderate aberration in the cyclic flight control, followed by a significant vertical vibration. The pilot subsequently observed that the main rotor (MR) blade track had a substantial blade spread. Subsequently, the pilot conducted a forced emergency landing to a nearby suitable area.

A postaccident examination of the helicopter revealed that one MR blade was missing about 9 inches of its blade tip, consistent with impact with an object of substantial mass, possibly a cable; the damage was not consistent with separation of the blade end due to a preexisting condition. Two other MR blades exhibited scuff marks and scratches along their leading edges with areas that had defined parallel scratches, consistent with cable impact.

The pilot reported that he released the lift cable before the flight, and it was not recovered. The pilot added that, after he released the cable, the ground crew placed the coiled cable in the rear compartment that had no doors. Examination of the lift cable release mechanism revealed no damage to the component, and additional testing revealed no anomalies that would have precluded normal operation of the lift cable mechanism.

There is no evidence that the lift cable remained attached to the hook during the accident flight; therefore, it was likely in the passenger compartment at liftoff as reported by the pilot. Therefore, based on the damage to the MR blades, it is likely that the cable exited the helicopter during liftoff and subsequently impacted the MR, which resulted in the separation of an MR blade tip and the vertical vibration of the helicopter.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: Impact of the lift cable after it exited the helicopter during liftoff with the main rotor (MR) blades, which resulted in the separation of an MR blade tip and the vertical vibration of the helicopter.

Events

1. Initial climb - Unknown or undetermined

Findings - Cause/Factor

1. Environmental issues-Physical environment-Object/animal/substance-(general)-Effect on operation - C

Narrative

On October 4, 2016, about 0910 Hawaiian standard time, a McDonnell Douglas Helicopter (MDHI), 369E N311VT, sustained substantial damage to the main rotor during initial climb from a remote location at Kohala Mountains near Waimea, Hawaii. The commercial pilot and 2 passengers were not injured. The helicopter was registered to, and operated by Volcano Helicopters Inc., under the provision of 14 Code of Federal Regulations Part 135. Visual meteorological conditions prevailed for the flight, which operated on a company flight plan.

In his initial statement, the pilot reported that the purpose of the flight was to provide multiple external cargo lift deliveries between a construction project site located on the Kohala Mountain and various locations within the project boundary.

At 0745, the helicopter took off from Hilo International Airport (ITO), Hilo, Hawaii with only the pilot on board and no cargo. Enroute to the Kohala Mountain project site, the pilot landed at the Hawaii Board of Water Supply's Kamuela reservoir to board two ground workers who manned a ground procedure of the external cargo tasks (connect, disconnect and handling of the cargo), and then flew to the construction site. Two passengers disembarked, after which the helicopter successfully completed an external cargo lift assignment. The helicopter then returned to a cargo platform at the construction site to jettison the 20-foot lift cable and to board the two ground workers and their accompanying baggage for the return ferry flight. The pilot reported that he pressed an electrical "Release" switch located on the cyclic to jettison the lift cable prior to takeoff. After the ground workers loaded their equipment and boarded the helicopter, they conveyed to the pilot via the helicopter's intercom system the completion of the loading, boarding and secure seating.

The lift-off and departure into forward flight (climb and acceleration of speed) proceeded within instrument parameters specified in the operating manuals, with no indication of malfunction. The helicopter was established in stable departure on the enroute course and heading for the cruise altitude and speed.

During the initial climb, about 75 feet above ground level, and speed of about 20-25 knots, the pilot experienced a moderate aberration in the cyclic flight

control, followed by a significant vertical vibration, and observed that the main rotor blade track had a substantial blade spread. The pilot performed a forced emergency landing to a nearby suitable area.

The Federal Aviation Administration (FAA) Inspector conducted an examination and noted that one main rotor blade was missing about 6 inches of the blade tip, two other blades exhibited small impact serrations on their respective leading edges, and the remaining two blades were not damaged. No organic bird material was observed on the blades, but the inspector reported that it appeared as if "something metallic-like had struck the blades, however that object was not located." Other damages appeared to be post-impact, which included a cracked instrument panel at the bottom edge on both sides, left and right side of the fuselage above the engine area, tail rotor blades, vertical stabilizer damage at the upper end, and horizontal stabilizer damage on the right side, to include the vertical winglet. He also stated that the lift cable was not found in the helicopter or at the site. Furthermore, the inspector tested and confirmed no malfunction of the jettison switch used to release the cable.

After the helicopter was released to the insurance company, the pilot conducted an examination of the wreckage, and submitted a written addendum to the initial report of his finding. The addendum is appended to the docket.

In the addendum, the pilot confirmed that the lift cable and the main rotor blade tip were missing. The pilot again stated that after the completion of the airlift operation, he used the "Eject" switch to jettison the cable, and added that the ground crew of the external load operation coiled and loaded the cable on the floor of the rear cabin of the helicopter for the return ferry flight to base. Due to a necessity to continuously remain on the flight controls during the final loading, the pilot did not personally conduct an exterior preflight check. In addition, the helicopter was configured without the left and right rear cabin doors. The pilot inspected and tested the electric cargo hook system, and found no anomalies or malfunctions.

The National Transportation Safety Board structural engineer examined the photos and concluded that one of the main rotor blades suffered extensive damage. The outboard 9 inches was separated, the blade spar was deformed aft, and the trailing edge was buckled along about half its length. Two other main rotor blades were scuffed/scratched in localized areas. The aft fuselage around the tailboom attach point was buckled and fractured. The horizontal stabilizer and vertical stabilizer also sustained impact damage.

In the addendum report, the pilot reported that debriefing of procedures of the operation and emergency landing identified three additions to the current Pilot's Standard Operating Procedures.

1. Pre-flight Aircraft Exterior Check: The check of the tail and main rotor blade's leading edge protection tape shall be a requirement of the preflight checklist as an individual and separate listing.
2. Flight in "rear Doors Off" Configuration: All material or item loaded on the floor for a flight in the 'Rear door off' configuration shall be required to be physically secured to a tie-down fixture to prevent movement and loss from the cabin.
3. Unimproved field loading and departure procedures: In operations that require the pilot to continually remain at the flight controls, clearance is an advisory of the ground crew. The pilot shall validate the advisory with routine signal or voice communications reports on individual item, function or procedure.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# CEN18FA074	01/15/2018 1140 EST	Regis# N4QX	Perrysburg, OH	Apt: N/a
Acft Mk/Mdl MD HELICOPTERS INC 369HM		Acft SN 610209M	Acft Dmg: SUBSTANTIAL	Rpt Status: Prelim Prob Caus: Pending
Eng Mk/Mdl ROLLS-ROYCE M250-C20B			Fatal 2 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: VISTA I INC		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

Events

1. Maneuvering-hover - Loss of engine power (partial)
-

Narrative

On January 15, 2018, about 1140 eastern standard time, a MD Helicopters Inc. 369HM helicopter, N4QX, was substantially damaged when it impacted terrain near Perrysburg, Ohio. The commercial pilot and crew member were fatally injured. The helicopter was owned and operated by Vista One Inc. The aerial observation flight was conducted under the provisions of 14 Code of Federal Regulations Part 91. Instrument meteorological conditions prevailed and no Federal Aviation Administration (FAA) flight plan had been filed for the flight. The local flight departed Wood County Airport (1G0), Bowling Green, Ohio, at an undetermined time.

According to Vista One Inc., the pilot departed in the accident helicopter from the company base at the Wayne County Airport (KBJJ), Wooster, Ohio, on the morning of the accident. The pilot flew to 1G0 to pick up the crew member, fueled the helicopter, and then departed on the accident flight. The accident flight was the first leg of aerial inspections on the transmission towers for the Toledo Edison power grid. The team was scheduled to conduct aerial inspections for the next four weeks.

A witness, located just south of the accident site, observed the helicopter descend "at an angle" before it impacted terrain. The wreckage came to rest about 120 feet west of the power lines. There was no evidence that the helicopter impacted either the power lines or the transmission towers. Ground scars and damage to the helicopter were consistent with the helicopter impacting terrain in a near vertical attitude. The helicopter rolled during the impact and came to rest on its left side. The main wreckage included the fuselage, tailboom, and main rotor system.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# CEN18LA086	01/19/2018 1600 CST	Regis# N6UP	Houston, TX	Apt: Ellington Airport EFD
Acft Mk/Mdl SWEARINGEN SA227 TT-TT		Acft SN TT-441	Acft Dmg: SUBSTANTIAL	Rpt Status: Prelim Prob Caus: Pending
Eng Mk/Mdl AIRESEARCH TPE331 SERIES			Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: AIRCO JN LLC		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

Events

1. Enroute-cruise - Electrical system malf/failure

Narrative

On January 19, 2018, about 1600 central standard time, a Swearingen SA227-TT airplane, N6UP, experienced an electrical malfunction during cruise flight and executed a forced landing to Ellington Airport (EFD), Houston, Texas. The two pilots and two passengers were not injured, and the airplane sustained substantial damage to both engines during landing. The airplane was registered to and operated by AIRCO JN LLC, Freedom, Oklahoma, as a 14 Code of Federal Regulations Part 91 business flight. Instrument meteorological conditions prevailed at the time of the accident, and an instrument flight rules flight plan had been filed. The flight departed Beaumont, Texas, and was destined for Uvalde, Texas.

According to one of the pilots, while in cruise flight maneuvering around thunderstorm activity, the airplane lost electrical power. The pilots attempted to troubleshoot the problem and could not regain electrical power. The pilots declared an emergency and diverted to EFD. Due to the loss of electrical power, the pilots manually extended the landing gear and could not verify if all the landing gear were down and locked. During the forced landing, the nose landing gear was retracted, and the airplane skidded on the forward fuselage after touchdown. Due to the nose gear being retracted during landing, both propeller assemblies and engines sustained substantial damage.

The airplane was recovered from the runway for further examination.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# GAA17CA333	03/12/2017 1224 PDT	Regis# N53DA	Santa Monica, CA	Apt: Santa Monica Muni SMO
Acft Mk/Mdl SWEARINGEN SA227 TT-TT		Acft SN TT-438	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl AIRESEARCH TPE331			Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: GREGORY L. MCADOO		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

Summary

The pilot reported that, while on short final following a jet airplane, the airplane "encountered turbulence that induced significant rolling." He added that the airplane "was not able to completely re-establish a stabilized approach prior to touching down." Subsequently, the airplane touched down "more firm than usual." The pilot taxied the airplane to the ramp without further incident.

The airplane sustained substantial damage to the fuselage.

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

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The pilot's unstabilized approach after encountering wake turbulence, which resulted in a hard landing.

Events

1. Approach - Aircraft wake turb encounter
2. Landing - Hard landing

Findings - Cause/Factor

1. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Descent/approach/glide path-Not attained/maintained - C
2. Personnel issues-Task performance-Use of equip/info-Aircraft control-Pilot - C
3. Environmental issues-Conditions/weather/phenomena-Turbulence-Wake turbulence-Effect on operation

Narrative

The pilot reported that, while on short final following a jet airplane, the airplane "encountered turbulence that induced significant rolling". He added that the airplane "was not able to completely re-establish a stabilized approach prior to touching down". Subsequently, the airplane touched down "more firm than usual". The pilot taxied the airplane to the ramp without further incident.

The airplane sustained substantial damage to the fuselage.

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