
National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# GAA17CA323	06/04/2017 700 PDT	Regis# N802NB	Prosser, WA	Apt: Sun Heaven Airstrip PVT
Acft Mk/Mdl AIR TRACTOR INC AT 802		Acft SN 802A-0640	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl PRATT & WHITNEY PT6A-65AG		Acft TT 917	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 137
Opr Name: AIR-TRAC INC		Opr dba:		Aircraft Fire: NONE
				AW Cert: SPR

Events

2. Takeoff - Loss of control on ground

Narrative

The pilot of the tailwheel-equipped airplane reported that, during an aerial application flight, approximately 800 ft. into the takeoff roll on a gravel airstrip, he veered the airplane to the right to avoid hay bales that were stacked on the left side of the runway. He added that as the airplane veered right, the right-wing spray boom encountered tall wheat, and the airplane exited the right side of the runway. Subsequently, the airplane came to rest nose down.

The airplane sustained substantial damage to the left wing.

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

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Accident Rpt# ERA16FA248 07/11/2016 1123 CDT Regis# N427TV Hickory, KY Apt: Gravel Lot NONE
Acft Mk/Mdl BELL HELICOPTER TEXTRON CANADA Acft SN 54106 Acft Dmg: SUBSTANTIAL Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl ROLLS-ROYC 250-C47B Acft TT 1390 Fatal 1 Ser Inj 0 Flt Conducted Under: FAR 091
Opr Name: TENNESSEE VALLEY AUTHORITY Opr dba: Aircraft Fire: NONE
AW Cert: STN

Summary

The pilot was performing a visual approach to a landing zone to board an additional crewmember. A witness reported that there were no abnormalities in the helicopter's sound or position, until it was approximately 75 to 100 feet above the ground. Suddenly, the main rotor tilted to the right. Immediately after, the entire helicopter banked to its right and fell to the ground on its right side, where it came to rest. The main rotor blades broke apart during the impact sequence. The engine continued to run after the accident, and was subsequently shut down by responding personnel.

An examination of the wreckage revealed that the collective lever, located at the front and bottom of the swashplate support, was disconnected from the pivot sleeve. The collective lever was designed to move the pivot sleeve vertically on the swashplate support, via direct linkage from the cockpit collective control, to change the pitch on all the main rotor blades simultaneously. The collective lever pins and screws that attached the collective lever to the pivot sleeve were missing; they were later found loose, near the main rotor area. The safety wires intended to secure the screws to the pins were missing. Examination of the hardware at the NTSB Materials Laboratory revealed that the safety wires not present, and the screws backed out over time, resulting in the complete loss of collective control in flight.

Maintenance on the helicopter was performed about 38 flight hours prior to the accident. The maintenance included a 24-month inspection that required examination of the flight control bolts and nuts. The collective lever pins were not specifically included in that inspection. Two mechanics and a maintenance foreman, all employees of the operator, performed the maintenance, and all reported during postaccident interviews that they did not recall removing the safety wire or examining the pins. However, the foreman added, "I could see why it [examination of the collective lever pins] could have been done. The 24-month flight control bolt inspection was being performed, why not pull them and look at them too. I've done it before." Two of the mechanics reported that they would occasionally be "pulled off" one aircraft to work on another, and there was no work interruption policy in place. Thus, given that the safety wires were missing, it is likely that they were removed and not replaced during the most recent maintenance and that maintenance personnel did not recall taking that action due to possible work interruptions.

Subsequent to the accident, the operator implemented numerous safety initiatives to prevent recurrence, including two independent safety audits, a formal fatigue risk management program, a Safety Management System, a formal tool/material accountability program, new work interruption policies, creation of a formally-trained Safety Officer position, and a formal process for the communication of safety-critical information.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: Company maintenance personnel's inappropriate removal without replacement of the safety wires on the collective lever pin screws during a recent maintenance inspection, which resulted in the screws backing out and led to a loss of collective control in flight.

Events

1. Prior to flight - Aircraft maintenance event
2. Approach-VFR pattern final - Flight control sys malf/fail
3. Approach-VFR pattern final - Loss of control in flight
4. Uncontrolled descent - Collision with terr/obj (non-CFIT)

Findings - Cause/Factor

1. Aircraft-Aircraft propeller/rotor-Rotorcraft flight control-Main rotor control-Incorrect service/maintenance - C
2. Aircraft-Fluids/misc hardware-Misc hardware-Fasteners-Incorrect service/maintenance - C
3. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Prop/rotor parameters-Attain/maintain not possible - C
4. Personnel issues-Task performance-Inspection-Scheduled/routine inspection-Maintenance personnel - C

Narrative

HISTORY OF FLIGHT

On July 11, 2016, at 1123 central daylight time, a Bell 407, N427TV, collided with terrain during the approach to landing at the Tennessee Valley Authority

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(TVA) Mayfield Customer Service Center, Hickory, Kentucky. The commercial pilot was fatally injured, and the helicopter was substantially damaged by impact forces. The helicopter was registered to and operated by the TVA under the provisions of 14 Code of Federal Regulations Part 91 as a business flight. Day visual meteorological conditions prevailed, and no flight plan was filed. The flight originated from Outlaw Field Airport (CKV), Clarksville, Tennessee at 1048.

According to TVA personnel, the pilot flew the helicopter from Knoxville, Tennessee, to CKV, refueled, and then flew to the TVA Customer Service Center to pick up a maintenance lineman for the purpose of inspecting power lines and equipment.

According to a TVA lineman who witnessed the accident, there was a light wind from the south/southeast, and the helicopter appeared to be making its final approach from the north. The witness stated that there were no abnormalities in the helicopter's sound or position, until the helicopter was about 75 to 100 ft above the ground. He then observed the main rotor abruptly tilt to the right. Immediately after, the helicopter banked right, fell to the ground, and came to rest on its right side. The witness stated that he never lost sight of the helicopter and described the impact as very hard with no sliding or bouncing. He saw the rotor blades break apart. The witness then ran into the building to get help. The helicopter's engine continued to run after the accident and was subsequently shut down by responding personnel.

Initial examination of the wreckage revealed that the collective lever, which connected the cockpit collective controls to the main rotor, was disconnected from the pivot sleeve. The attaching hardware for the lever was subsequently found loose in the wreckage near the main rotor hub.

PERSONNEL INFORMATION

The pilot, who was seated in the right cockpit seat, held a Federal Aviation Administration (FAA) commercial pilot certificate with airplane single-engine land, rotorcraft-helicopter, instrument airplane, and instrument helicopter ratings. He held an FAA second-class medical certificate with a restriction to wear corrective lenses.

The pilot reported 18,430 total hours of flying experience on his latest medical certificate application, which was dated March 31, 2016. TVA personnel reported that his flight experience in the Bell 407 was about 850 hours. He completed a flight review in a MD Helicopters MD530 helicopter on February 12, 2016, and a flight review in the Bell 407 on January 5, 2016.

AIRCRAFT INFORMATION

The helicopter was a Bell Helicopter model 407, serial number 54106, built in 2012 and purchased new by the TVA. It was a single-engine helicopter of conventional construction and equipped with a four-blade, soft-in-plane design, composite hub, main rotor system, a full monocoque aluminum-skinned tail boom, and a conventional two-blade tail rotor system.

The helicopter was powered by a Rolls-Royce model 250-C47B turboshaft engine, serial number CAE-848434, with maximum takeoff and maximum continuous power ratings of 650 and 600 shaft horsepower, respectively.

The helicopter was issued a normal category standard airworthiness certificate and was maintained under an approved aircraft inspection program. Between May 31, 2016, and June 20, 2016, the helicopter was at the TVA maintenance facility at Muscle Shoals, Alabama, and the following inspections were accomplished: annual/50hr/100 hr, 150hr, 300 hr, 300hr/12 month, 600hr/12 month, 1200 hr/2 year, 12-month and 24-month inspections. From June 20, 2016, until the time of the accident, the helicopter was operated about 38.4 hours.

The collective lever was located at the front and bottom of the swashplate support. The collective lever and collective control link were designed to move the pivot sleeve vertically on the swashplate support to change the pitch on all the main rotor blades simultaneously. The collective lever was attached to the pivot sleeve with screws, washers, and pivot pins (see figure 1). Once attached, the and the specified torque was applied, locking wire would typically be affixed to the screw.

Figure 1 - Swashplate support assembly, with collective pitch lever attaching hardware outlined in red.

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The maintenance tasks performed during the inspections between May 31, 2016, and June 20, 2016, did not require the removal of the collective lever or the disconnection or inspection of the collective lever pins or screws. Although an inspection of the condition of the flight control bolts and nuts was one of the maintenance tasks performed, an inspection of the collective lever pins, screws, and corresponding lockwire was not included in that inspection.

The maintenance and inspections of the helicopter's flight controls, including the collective control, were performed by two TVA airframe and powerplant mechanics and one TVA foreman, who assisted in the work and supervised the operation. All three employees were interviewed by FAA inspectors following the accident.

One of the mechanics re-installed an anti-drive lever assembly. He did not recall removing the lockwire on the collective lever pin screws or removing the pins. He stated that the other mechanic performed the 24-month inspection of the flight control bolts and nuts. He further stated that the collective lever pins were not part of that inspection.

The other mechanic performed the 24-month inspection of the flight control bolts and nuts. When asked if he removed the collective lever pins, he responded, "No, I don't remember doing it. If anyone would have done it, it would have been me, but I don't remember doing it."

The foreman inspected the work performed in the area of the flight controls. He reported that the removal of the collective lever pins ".was not part of the required maintenance performed." He was not aware that the pins were removed or that any lockwire was removed. He added further, "I could see why it could have been done. The 24-month flight control bolt inspection was being performed, why not pull them and look at them too. I've done it before."

Both mechanics reported that they would occasionally be "pulled off" an aircraft to perform work on another project. One mechanic stated that there was a lack of documentation of what parts were removed, such as a continuation sheet.

METEOROLOGICAL INFORMATION

Mayfield - Graves County Airport (M25), Mayfield, Kentucky, was the closest official weather station, which was 8 miles from the accident location. The M25 weather at 1135 included wind from 120° at 5 knots, visibility 10 statute miles, scattered clouds at 1,000 and 2,200 ft, overcast ceiling at 10,000 ft, temperature 26°C, dew point 22°C, and altimeter setting 30.06 inches of Mercury.

WRECKAGE AND IMPACT INFORMATION

General

The helicopter came to rest on its right side, about 220 ft west of the intended landing zone (LZ). The LZ was a level, open, gravel-covered storage area for power transmission equipment. All four main rotor blades separated from the main rotor hub during the impact sequence. The aft section of the tail boom severed from the fuselage, and the tail rotor assembly remained attached to the aft section of the tail boom.

Fuel and Hydraulic Systems

The helicopter's fuel system was not compromised and contained about 695 pounds of fuel. No fuel leaks were observed, and all fuel hoses and lines were secure. The airframe-mounted fuel filter was clean, and the fuel inside was clear with no particulates noted. Hydraulic fluid was observed in the hydraulic system reservoir. All lines and hoses were secure, and there were no leaks noted.

Landing Gear

The right skid of the landing gear was fractured fore and aft, above the saddle. The right step was separated due to fractured brackets. There was an impact mark on the aft portion of the right skid that matched the general size and shape of a ground scar at the point of initial ground impact. The front cross tube remained attached to the fuselage by one bracket, and the rear cross tube was not attached to the fuselage due to fractures at the support brackets.

Fuselage

The forward fuselage exhibited crushing damage on its right side along the bottom of the fuselage. The center post of the windscreen was fractured at the bottom. The battery cover on the nose was damaged near the hinged area near the bottom of the center post. The transmission deck exhibited minor damage to its right side.

Main and Tail Rotor Systems

Examination of the main rotor blades revealed that all four rotor blades were fractured. The yoke exhibited fracturing near all four inner elastomeric shear bearings with "strawing" signatures on the flexures. The blue pitch link was bent outward towards the top with all pitch link hardware present and all cotter keys installed. The red and orange pitch change links were undamaged with pitch link hardware present and all cotter keys installed. The green pitch change link was bent and fractured from impact forces and was found near the main wreckage. Each blade exhibited bending and delamination. All blades exhibited ground impact marks on the leading edges.

Main rotor continuity was confirmed by rotating the drive shaft by hand. Movement was confirmed from the drive shaft through the transmission to the mast. The transmission was visually inspected and no pre-impact anomalies were observed. The chip detectors were removed and visually inspected with no ferrous particulate matter observed. No abnormal sounds were heard when the transmission was rotated by hand. The transmission was not disassembled.

The tail boom was fractured near the aft bulkhead, just aft of the intercostal support and the fracture surfaces were consistent with a counter-clockwise main rotor strike to the ground. The vertical fin displayed scraping damage on its lower, outboard side, and the anti-collision light remained intact. The tailskid remained attached. Both the left and right finlets on the horizontal stabilizer were fractured and missing from the stabilizer from impact forces.

Both tail rotor blades exhibited minor ground impact damage; however, no rotational scoring was observed on either blade. The tail rotor was easily rotated in both directions with no abnormal binding or noises. The pitch of the tail rotor blades was manipulated by hand with appropriate control movement noted forward to the aft end of the fractured control tube. The flapping stops exhibited compression signatures with corresponding impact marks on the yoke.

The forward end of the forward short shaft remained attached to the output end of the freewheel unit. The aft end of the forward short shaft remained attached to the forward end of the oil cooler blower shaft. The oil cooler blower shaft was rotated by hand with slight binding due to shifting of the forward end of the aft short shaft. The forward end of the aft short shaft remained coupled with the aft end of the oil cooler blower shaft. The aft end of the aft short shaft remained connected to the hanger bearing. Rotational scoring was observed on the aft short shaft with signatures indicative of contact with the engine oil tank bracket. The forward end of the #4 tail rotor drive shaft segment was separated. The #3 and #2 tail rotor drive shaft segments were separated from the tail boom and were found adjacent to the main wreckage. The forward end of the #1 tail rotor drive shaft segment was connected to the hanger bearing with the aft end of the #1 tail rotor drive shaft segment connected to the input shaft of the tail rotor gear box at the Thomas coupling. Oil was evident in the tail rotor gear box. No chips were observed on the gear box chip detector.

Flight Controls

The left collective control was not installed. Collective control continuity was confirmed through the right collective and up through the servo actuators to the disconnected collective lever. The two collective lever pivot pins and screws that attached the collective lever to the pivot sleeve were not installed. The pivot pins and screws were found on the transmission deck and on the ground underneath the right side of the helicopter. The flat washers and lockwire were missing; the washers were later found during a subsequent examination of the wreckage.

The left cyclic control was not installed. Cyclic control continuity was confirmed through the right cyclic and up through the servo actuators to the inner, non-rotating swashplate.

The left anti-torque pedals were intentionally locked in place by the operator before the accident flight. The right anti-torque pedals were fractured at the outboard bell crank of the pedal control tube; however, directional control was confirmed when the tail rotor control tube, located near the tail rotor servo, was manipulated by hand. During manipulation, there was corresponding movement of the fractured pedal control tube and the fractured control tube aft of the tail rotor servo.

Engine

The engine remained in place, and all mounts were secure. No external engine damage was noted during the inspection. The hydromechanical unit linkage was intact, and its rigging appeared normal. The helicopter was equipped with an engine inlet barrier filter, which was normal in appearance and did not appear to be obstructed.

The engine-mounted fuel filter bowl from the combined engine filter assembly (CEFA) was full of clean, normal-appearing fuel. The CEFA fuel filter element was free of debris, and the pending bypass button was not extended. The fuel nozzle exhibited no anomalies, and some carbon formation was noted on the air shroud.

The engine-mounted scavenge oil filter on the CEFA was free of debris, and the pending bypass indicator button was not extended. The oil reservoir, which was mounted on the helicopter, was compromised, which precluded determination of the oil level. Both the upper and lower magnetic chip detectors were free of ferrous particulate matter. The engine gearbox oil was not drained.

No foreign object damage was noted on the compressor inlet guide vanes or on the impeller blade leading edges. The N1 rotor turned with some resistance and was mechanically coupled from the compressor to the starter generator. The N2 system turned when manipulated by hand and was continuous to the main rotor head. Due to deformation of the exhaust stack, the fourth-stage turbine wheel could not be inspected.

All of the external air, oil, electrical, and fuel lines were secure when checked by hand. None of the b-nut connectors were loose, and torque paint was present on the connections. No red indicators were visible on the electrical connectors.

The engine was controlled by a full authority digital electronic control (FADEC), which contained non-volatile memory in the electronic control unit (ECU). By design, when one of the predetermined parameter trip points is exceeded, the ECU begins recording incident data at a rate of one record per 1.2 seconds. The initial trigger for this event was low rotor speed (less than 92%).

The ECU was downloaded by a Rolls-Royce technical representative. A review of the data revealed no engine anomalies that would have precluded the engine from performing to specification before impact.

The ECU also retained engine maintenance history data in the maintenance terminal section. There were no pre-event faults or abnormalities noted in the maintenance terminal data. There were multiple faults recorded during the event, which corresponded to the impact sequence.

MEDICAL AND PATHOLOGICAL INFORMATION

The Office of the Chief Medical Examiner, Commonwealth of Kentucky, Louisville, Kentucky, performed an autopsy of the pilot. The cause of death was blunt impact injuries of the head, neck, and torso with traumatic/positional asphyxia, and the manner of death was accident.

The FAA's Bioaeronautical Research Sciences Laboratory performed toxicology testing on specimens from the pilot. The specimens tested negative for carbon monoxide, ethanol, and major drugs of abuse.

SURVIVAL ASPECTS

The helicopter's front seats were equipped with 4-point restraints. The outboard (right side) restraint attachment point for the pilot's lap belt was separated from the airframe wall. The rivets were pulled through and attached on one side, and the rivets were sheared on the other side. The sheared rivets were not located; however, the rivet holes were elongated from shear forces.

The pilot was not wearing a helmet at the time of the accident, nor were helmets required or provided for helicopter operations at the TVA.

TESTS AND RESEARCH

The collective lever and attachment hardware were sent to the NTSB Materials Laboratory for further examination. The collective lever, collective lever pins, collective lever pin screws, and washers were examined visually and by optical microscopy. All components were intact. Threads on the collective lever pin

screws and the mating threaded holes in the collective lever were intact with no evidence of stripping. Holes for attaching lockwire were present in the heads of the screws and at an adjacent area on the collective lever, but no lockwire was observed attached at either location. Deformation at the edges of the lockwire holes was noted. Circumferential scoring was present across the entire face on one side of one of the washers. On one of the screws, thread peaks were flattened near the middle of the shank on one side of the screw consistent with contact with the collective lever pin hole bore with the screw partially threaded into place.

ADDITIONAL INFORMATION

Subsequent to the accident, the operator implemented numerous safety initiatives to prevent recurrence, including two independent safety audits, a formal fatigue risk management program, a safety management system, a formal tool/material accountability program, new work interruption policies, creation of a formally-trained safety officer position, and a formal process for the communication of safety-critical information.

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Accident Rpt# GAA17CA311	05/22/2017	845 AKD	Regis# N754KP	Skagway, AK	Apt: N/a
Acft Mk/Mdl CESSNA 208-B			Acft SN 208B1264	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl HONEYWELL TPE331-12JR			Acft TT 2423	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 reported that, while en route, about 1,500 ft, he saw a goose approaching the airplane. He added that he attempted to turn and avoid the goose, but the goose impacted the windscreen. The pilot landed the airplane at a nearby airport without further incident.

The airplane sustained substantial damage to the windscreen and fuselage.

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

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: An in-flight collision with a goose.

Events

1. Enroute - Birdstrike

Findings - Cause/Factor

1. Environmental issues-Physical environment-Object/animal/substance-Animal(s)/bird(s)-Ability to respond/compensate - C

Narrative

The pilot reported that while en route, about 1,500 ft., he saw a goose approaching the airplane. He added that he attempted to turn and avoid the goose, but the goose impacted the windscreen. The pilot landed the airplane at a nearby airport without further incident.

The airplane sustained substantial damage to the windscreen and fuselage.

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

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# CEN16LA274	07/19/2016 1120 CDT	Regis# N179PT	East Troy, WI	Apt: East Troy Muni 57C
Acft Mk/Mdl CHANCE VOUGHT F4U 5-5		Acft SN 122179	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl PRATT & WHITNEY R2800		Acft TT 2490	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: PRIVATE INDIVIDUAL		Opr dba:		Aircraft Fire: NONE
				AW Cert: SPE

Events

2. Landing-landing roll - Loss of control on ground

Narrative

On July 19, 2016, about 1120 central daylight time, a Vought F4U-5 Corsair airplane, N179PT, departed the runway surface after landing at the East Troy Municipal Airport (57C), East Troy, Wisconsin. The pilot was not injured and the airplane was substantially damaged. The airplane was registered to Fighters & Legends LLC and operated by a private individual under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Visual meteorological conditions prevailed for the flight. The local flight departed 57C about 1115.

The pilot departed from 57C on a maintenance flight, in order to test the airplane brakes. He reported that the brake tested normal during the taxi. He applied the brakes several times in flight, and received positive pressure of the brake pedals. On the full stop landing to runway 8, the pilot applied the brakes and received normal braking action. As the airplane slowed, it slowly drifted to the right. The pilot applied a small amount of left brake to correct the drift and the pedal went to the floor; pumping the pedal did not correct the problem. In order to avoid a ditch, the pilot applied the right brake; however, the airplane's wing collided with the airfield's windsock. Substantial damage was sustained to the airplane's right wing.

Prior to the accident, the airplane's brakes were replaced with a custom brake system using Grove master cylinders. Testing of the brake system after installation resulted in a failure of the right master cylinder. The cylinder was disassembled and the O-ring was found cut. The mechanic could not find any reason for the cut O-ring, so the O-rings on both master cylinders were replaced with Viton O-rings and care was given to carefully place them into the cylinders. The next brake test resulted in a brake fluid boil, so the brake builder informed the mechanic to change the hydraulic fluid from MIL-PRF 5606 to MIL-PRF-83282. A subsequent ground brake test produced "no issues or hesitation with the brakes at all" to include "a full pressure pedal push to simulate a full locked brake to pressure test [the] system prior to taxi test."

After the accident, the mechanic contacted the master cylinder manufacturer (not the brake builder) for guidance. The company replaced the master cylinders with an upgraded model. The new cylinders were installed on the accident airplane and the mechanic, with guidance from the custom brake manufacturer, conducted more testing.

On February 6, 2017, a second Corsair flew with the newer brake system without issue.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# CEN17LA252 07/01/2017 2036 CDT Regis# N238BK Perryville, MO Apt: N/a
Acft Mk/Mdl MESSERSCHMITT-BOLKOW-BLOHM BK Acft SN 7238 Acft Dmg: SUBSTANTIAL Rpt Status: Prelim Prob Caus: Pending
Fatal 0 Ser Inj 0 Flt Conducted Under: FAR 135
Opr Name: AIR METHODS CORP Opr dba: KIDS FLIGHT Aircraft Fire: NONE

Events

1. Enroute - Loss of engine power (total)

Narrative

On July 1, 2017, about 2036 central daylight time, a Messerschmitt-Bolkow-Blohm BK 117 B2, N238BK, helicopter, landed hard and rolled over during an emergency landing to a field near Perryville, Missouri. The pilot, three crew members, and a passenger received minor injuries, and the helicopter sustained substantial damage. The helicopter was owned and operated by Air Methods Corporation, doing business as Kids Flight, as a 14 Code of Federal Regulations Part 135 medical flight. Visual meteorological conditions prevailed at the time of the accident, and a company visual flight rules flight plan was filed. The flight originated from the St. Francis Medical Center (MO50), Cape Girardeau, Missouri, about 2019 and was en route to the St. Louis Children's Hospital (2MU1), St. Louis, Missouri.

The pilot reported that at 1901, he was notified by the Air Methods Communication Center (AirCom) concerning a flight request. The pilot accepted the flight and after ensuring all necessary requirements were completed, the flight departed at 1922 for MO50, which was approximately 50 nautical miles (nm) to the southeast. The pilot reported that the helicopter departed with 140 gallons of fuel in the main fuel tanks. The flight arrived at MO50 about 1949.

About 2015, the medical crew arrived at the helicopter pad and loaded the patient on board the helicopter. About 2019, the helicopter departed for 2MU1, which was approximately 85 nm on a 338-degrees heading. The pilot reported that there was 110 gallons in the main fuel tanks.

The pilot reported that after 15 minutes of flight, he scanned the instruments and gauges "noting that all systems were in the normal range and fuel was transferring from the main tank." He reported that the fuel level indication was approximately 95 gallons in the main tanks and the supply tanks were "just below the full indication," and that there were no illuminated lights on the warning/caution panel. The airspeed was 120 kts at an altitude of 1,600 ft above mean sea level - about 1,200 ft above ground level (agl).

The pilot reported that when the flight was about 5 miles north of Perryville, Missouri, the helicopter "experienced a sharp change in attitude yawing to the left with a hard-upward bump," followed by a change in the engine noise. He observed the N1 gauges both indicating below 40 per cent and decreasing. The No. 1 engine low warning light, the No. 1 generator light, and the battery discharge warning lights were illuminated. He stated, "Suddenly the aircraft pitched nose up and rolled to the right. I could hear the rotor begin to deteriorate." He entered an autorotation by applying right forward cyclic and lowering the collective to full down.

During the autorotative descent, he saw a power lines and a ditch which required him to change his flight path to land on the far side of the ditch. He flared the helicopter about 100 ft agl and the rotor rpm began to decay rapidly. He attempted to level the helicopter "as it began to fall through." The helicopter landed right skid low and the helicopter skidded for about 100 ft. The main rotor blades hit the ground as the helicopter rolled onto its right side. Once the helicopter came to a rest, he pulled the power levers to the stop position.

The pilot and flight crew, with the patient on a stretcher, egressed the helicopter. The pilot reported that he observed fuel draining in a solid stream from one of the drains on the belly of the helicopter. He re-entered the cockpit and turned off all electrical and fuel switches to minimize the risk of fire.

At 1955, the surface weather observation at Hunter Field (SAR), Sparta, Illinois, located 15 nm northeast of the accident site, was: wind light and variable; 10 miles visibility; sky clear; temperature 26 degrees C; dew point 17 degrees C; altimeter 30.05 inches of mercury.

The National Transportation Safety Board is investigating the accident. Parties to the investigation include the Federal Aviation Administration, Air Methods Corporation, Honeywell, and the German Federal Bureau of Aircraft Accident Investigation, with Airbus as its technical advisor.

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Accident Rpt# CEN17FA266	07/13/2017	810 CDT	Regis# N47GW	Tyler, TX	Apt: Tyler-pounds Regional KTYR
Acft Mk/Mdl PIPER PA 31T1-1			Acft SN 31T-8104030	Acft Dmg: SUBSTANTIAL	Rpt Status: Prelim Prob Caus: Pending
Eng Mk/Mdl P&W CANADA PT6A-60A				Fatal 2 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: T-210 HOLDINGS LLC			Opr dba:		Aircraft Fire: UNK
					AW Cert: STN

Events

2. Initial climb - Loss of control in flight

Narrative

On July 13, 2017 about 0810 central daylight time, a Piper Cheyenne, PA-31T airplane, N47GW, impacted terrain near Tyler, Texas. The airline transport rated pilot and sole passenger were fatally injured, and the airplane was destroyed. The airplane was registered to and operated by T-210 Holdings, LLC, Dover, Delaware under the provisions of 14 Code of Federal Regulations Part 91 as a business flight. Visual meteorological conditions prevailed and the airplane was an instrument flight plan. The cross-country flight was originating at the time of the accident, and was enroute to Midland, Texas.

Preliminary information indicates that shortly after departure, the airplane descended into terrain.

The on-site examination of the wreckage revealed the airplane impacted an open field surrounded by trees. The wreckage was located on the edge of a small pond about one-half mile from the end of runway 17. There was not a post-crash fire; however, fuel was found at the site.

After the initial on-site documentation of the wreckage, the airplane was recovered to a secure facility, for further examination.

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Accident Rpt# WPR15FA195	06/22/2015 930 PDT	Regis# N206PZ	Maricopa, CA	Apt: Camarillo CMA
Acft Mk/Mdl SHORT BROTHERS PLC S312 TUCANO T	Acft SN T31	Acft Dmg: DESTROYED	Rpt Status: Factual	Prob Caus: Pending
Eng Mk/Mdl GARRETT TPE331-12B	Acft TT 3358	Fatal 1 Ser Inj 0	Flt Conducted Under: FAR 091	
Opr Name: JAMES HORNER	Opr dba:		Aircraft Fire: GRD	
			AW Cert: SPE	

Summary

The private pilot was performing airwork and was in contact with an air traffic controller. The pilot informed the controller that he would be performing airwork between 2,500 and 10,000 ft mean sea level (msl). The controller explained that he would probably lose radio contact and would not be able to provide flight following below 7,000 ft msl. About 1 hour later, the pilot advised the controller that he would be descending, then would climb to 9,000 ft msl and return to the airport, and the controller acknowledged. Subsequently, the controller made several attempts to contact the pilot, but no further response was received from him. Shortly thereafter, an airplane flying in the area of the accident site reported to air traffic control that a small fire was located in a river bed. Local authorities responded to the fire and confirmed that it was the accident site.

A review of Federal Aviation Administration radar data showed the airplane performing multiple turns and rapidly changing altitude and airspeed while performing the airwork. At one point, the airplane descended to less than 100 ft above a mountain ridgeline. The last radar targets showed the airplane heading eastbound about 1,600 ft agl while approaching the area of the accident site. Two witnesses located near the accident site stated that, as the airplane flew overhead, they noted no engine anomalies.

Postaccident examination of the wreckage did not reveal any preimpact malfunctions that would have precluded normal operation. Wreckage and impact signatures were consistent with a high-energy high-angle impact with terrain. It is likely that as the pilot continued to perform low level airwork, he did not properly gauge the airplane's distance from terrain and failed to control the airplane in time to avoid impacting terrain.

The pilot's high cholesterol and the medications he was using to treat it likely did not cause any acute symptoms. Limited samples were available for toxicology testing; therefore, it could not be determined whether the ethanol detected in the pilot's muscle tissue was due to ingestion or postmortem production nor whether impairment due to ethanol contributed to the accident. The testing also detected butalbital and codeine, both of which are impairing. The butalbital was within the therapeutic level, indicating that he was likely impaired by it. The presence of both codeine and butalbital indicates that the pilot had likely recently used a combination product that contained at least these two medications. Therefore, it is likely that the pilot's mental and/or physical abilities required for the duration of the high workload flight performance was impaired by the combined effects of butalbital and codeine and that this impairment contributed to the accident.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The pilot's failure to maintain clearance from terrain during low-level airwork, which resulted in uncontrolled collision with terrain. Contributing to the accident was the pilot's impairment from the combined effects of butalbital and codeine.

Events

1. Maneuvering-low-alt flying - Loss of control in flight
2. Maneuvering-low-alt flying - 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-Altitude-Not attained/maintained - C
3. Personnel issues-Physical-Impairment/incapacitation-Prescription medication-Pilot - F

Narrative

HISTORY OF FLIGHT

On June 22, 2015, about 0930 Pacific daylight time, an experimental, exhibition-category Short Brothers PLC S312 Tucano T MK 1 airplane, N206PZ, impacted terrain about 16 miles south of Maricopa, California. The private pilot was fatally injured, and the airplane was destroyed. The airplane was registered to Tucano Flyer LLC and was being operated as a 14 Code of Federal Regulations Part 91 personal flight. Visual meteorological conditions existed near the accident site about the time of the accident, and a flight plan had not been filed. The flight originated from Camarillo Airport (CMA), Camarillo, California, at 0810.

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According to the air traffic control (ATC) communications, the pilot was in contact with the Southern California Air Route Traffic Control Center and was receiving advisories while performing airwork. At 0823, the pilot informed the controller that he would be performing airwork between 2,500 and 10,000 ft mean sea level (msl). The controller explained that he would probably lose radio contact and would not be able to provide flight following below 7,000 ft msl. The pilot replied that he understood and would be performing airwork for about 1 hour before returning to CMA. The controller continued to monitor the airplane during the flight. At 0924, the pilot advised the controller that he would be descending and that he may lose him for a few minutes. He added that he would then climb to 9,000 ft msl and return to CMA, and the controller acknowledged. Subsequently, the controller made several attempts to contact the pilot, but no further response was received from him.

Review of radar data provided by the Federal Aviation Administration (FAA) revealed a primary target, consistent with the accident airplane, performing multiple turns and rapidly changing altitude and airspeed. At 0845, the airplane was traveling on an eastbound heading at 3,400 ft above ground level (agl), and during the next 2 minutes, it climbed over rising terrain. Over the next 8 minutes, the airplane's speed varied and reached 325 knots and continued to make multiple turns and rapid changes in altitude and descended to within less than 100 ft above a mountain ridgeline. The airplane then continued to the northwest over lower terrain before turning southbound. During the next 18 minutes, the airplane performed multiple turns at altitudes between 2,000 and 3,000 ft agl. During the last 6 minutes of the flight, the airplane performed a 360° descending right turn near a residence at the lower entrance of Quatal Canyon at an altitude of about 3,600 ft, descending to 1,600 ft agl. The airplane headed westbound for 3 minutes and then returned to the lower entrance of Quatal Canyon. At 0924, the last radar targets showed the airplane heading eastbound above the canyon's dry river bed about 1,600 ft agl.

At 0925 radar contact was lost. Shortly after, an airplane in the area of the accident site reported to ATC that a small fire was located in a river bed. Local authorities responded to the fire and confirmed that it was the accident site.

A witness, located about 1 1/2 miles west of the accident site, reported seeing the airplane circle near her house about 500 to 800 ft agl. She stated that the engine sound was "loud and consistent." She added that she last saw the airplane fly eastbound, parallel to Quatal Canyon Road, and that shortly after saw dust and smoke rise high above a nearby mountain.

Another witness, located about 2 3/4 miles west-southwest of the accident site, reported seeing the airplane fly directly over his house in straight-and-level flight between 500 and 750 ft agl. He added that the engine sounded different than other airplanes that fly in the area but that it did not sound like anything was wrong. The airplane continued to fly straight and level in an easterly direction toward Quatal Canyon Road.

PERSONNEL INFORMATION

The pilot held a private pilot certificate with airplane single-engine land and rotorcraft ratings. He held an FAA second-class airman medical certificate, issued on June 19, 2015, with the limitation that he must wear corrective lenses.

According to the pilot's logbooks, he had accumulated 891.2 total flight hours in fixed wing aircraft and rotorcraft. He had accumulated 76.9 hours in the accident airplane make and model, 27.8 hours of which were in the previous 6 months. The pilot successfully completed his most recent flight review on January 14, 2015, in the accident airplane.

AIRCRAFT INFORMATION

The two-seat, low-wing airplane, serial number (S/N) T31, was manufactured in 1989. It was powered by a Honeywell (Garrett) TPE331-12B-703A engine, S/N P-65617, rated at 1,100 shaft horsepower at a propeller speed of 2,000 rpm. The airplane was equipped with a Hartzell propeller, model HC-D4N-5C. Review of the maintenance records showed that an annual inspection was completed on October 20, 2014. The airplane was produced to meet stringent military requirements and was designed for high-g landing loads; advanced fatigue testing; and spin tests, including inverted spins, at all altitude.

METEOROLOGICAL INFORMATION

Data recorded by the Meadows Field Airport, Bakersfield, California, automated weather observation station, located about 41 miles northeast of the accident site, included winds from 180° at 4 knots, visibility clear, temperature 24°C, dew point 3°C, and an altimeter setting of 30.01 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

Examination of the accident site revealed that the airplane was destroyed by high-impact forces and postimpact fire, which was observed along the debris path; the fire burned about 1 acre of land surrounding the accident site. The wreckage, including all major structural airplane components and primary flight controls, was located in a dry creek bed and was contained within a debris path that was about 641 ft long and 355 ft wide.

The first identified point of contact (FIPC) was a trough of disturbed ground about 2 ft wide, 20 ft long, and 1 ft deep, consistent with an airplane attitude of 45-degrees nose down and right wing downward about 90-degrees from level flight. The wreckage debris path was oriented along a magnetic heading of about 360° from the FIPC to the main wreckage. A green light emitting diode navigation light was found near the FIPC. At the end of the trough was a crater, about 11 ft in diameter and 5 ft deep. Two separated propeller blades, a landing gear strut with the wheel attached, and distorted pieces of sheet metal were found in and near the crater. The dirt in the crater was discolored and smelled of fuel. A third propeller blade, the wing and fuselage sections, and the engine bull gear assembly were found between the crater and the main wreckage.

The main wreckage was located about 180 ft from the FIPC and included the empennage, aft fuselage, firewall, and engine, and the wreckage was twisted and distorted. Wire bundles and cabin instrumentation were found with the main wreckage, and all of it was burned and crushed. The fourth propeller blade was located about 80 ft past the main wreckage. All four propeller blades revealed S-type bending, chordwise scoring, and leading-edge gouging near the tips.

The attached parachute and canopy were found in several sections past the main wreckage and in line with the center of the debris field. A single-point refueling port was found 641 ft from the FIPC and was the last piece of wreckage found along the debris path.

The aft fuselage and tail section structure were partially intact, and cable control continuity was confirmed to the midsection of the fuselage. The aileron control cables were found with the main wreckage. All primary flight controls were found in the debris field.

The engine exhibited thermal discoloration and impact damage. The first stage of the compressor section was visible, and all of the blades exhibited rotational signatures. The third stage was also visible from the damaged housing and exhibited rotational signatures.

Follow-up Examination

The wreckage was relocated to a secure facility where a layout examination took place. The examination of the wreckage revealed no evidence of any preimpact mechanical malfunctions or failures that would have precluded normal operation. The wing sections exhibited leading edge crush damage. The main spar was found in several sections with bending near the midsection. Each of the ailerons were found in two 3-ft sections. The wing flaps exhibited signatures suggesting that they were in the retracted position during impact. Both elevators and horizontal stabilizers were impact damaged and crushed. The trim actuator shaft had separated midspan, and 45° shear lips were observed on the separation surfaces. The trim actuator shaft was measured from the shaft bolt to the rubber seal and was 3.845 inches long, which equated to about a 0.5° (near neutral) pitch trim position. The rudder and vertical stabilizer sustained impact damage and remained attached via the rudder control cables. The vertical stabilizer and aft fuselage remained secure at all the attachment points.

The propeller assembly, which had separated from the engine during the accident sequence, was impact damaged. The cylinder, piston, feathering spring, and hub were found separated into numerous sections. Hub sections were removed from two of the four blade shanks. The blades revealed leading edge gouging and chordwise scoring from the shank areas to the tips. Two of the blades were bent rearward from the midsection to the tip and had a decreased pitch twist from the midsection to the tip. Another blade had a slight rearward bend, and the last blade was bent forward from the midsection to the tip. For further information, refer to the Hartzell Propeller Teardown Report in the public docket for this accident.

The engine was found separated in three major sections: the bull gear, second-stage compressor housing and impeller, and the turbine stator outer vane support housing. Other loose engine parts were found in the debris field. The engine exhibited damage signatures consistent with the engine operating during impact. For further information, refer to the Honeywell Aerospace Engine Wreckage Examination Notes in the public docket for this accident.

The cabin instruments had separated from the instrument panel and were impact damaged. The rpm gauge face had separated from the instrument housing and was bent; white paint transfer marks were visible near the '100' displayed on the face. The torque gauge face had white paint transfer marks between the '80' and '100' displayed on the face.

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MEDICAL AND PATHOLOGICAL INFORMATION

The pilot was ejected from the airplane during the accident sequence. The Ventura County Coroner's Office did not conduct an autopsy on the pilot because of the condition of the body. The pilot had reported high cholesterol and the use of the prescription drugs rosuvastatin and fenofibrate to treat it to the FAA.

The FAA's Bioaeronautical Sciences Research Laboratory performed toxicology testing of the pilot's muscle tissue. The testing detected 0.046 gm/dl of ethanol, 2.033 ug/g of butalbital (the therapeutic range is between 1 and 10 ug/ml), and 0.033 ug/g of codeine.

Ethanol may be detected due to ingestion, or it may also be produced by postmortem microbial activity in the body. Ethanol significantly impairs pilots' performance even at low levels. FAA regulations prohibit any person from acting or attempting to act as a crewmember of a civil aircraft while having 0.040 gm/dl or more ethanol in the blood.

Butalbital and codeine are frequently combined with acetaminophen, aspirin, and/or caffeine in prescription medications to treat pain or headaches. The combination of the two drugs carries the following warning: "Butalbital, Acetaminophen, Caffeine, and Codeine Phosphate Capsules may impair mental and/or physical abilities required for the performance of potentially hazardous tasks such as driving a car or operating machinery. Such tasks should be avoided while taking this combination product. Alcohol and other CNS [central nervous system] depressants may produce an additive CNS depression when taken with this combination product and should be avoided."