

# National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# CEN16LA292	07/29/2016 914 CDT	Regis# N1016G	Sac City, IA	Apt: Sac City Muni SKI
Acft Mk/Mdl AIR TRACTOR INC AT 402		Acft SN 402-0720	Acft Dmg: DESTROYED	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl PRATT & WITNEY CANADA PT6A-27		Acft TT 7008	Fatal 1 Ser Inj 0	Flt Conducted Under: FAR 137
Opr Name: WATSON AG AVIATION LLC		Opr dba:		Aircraft Fire: NONE
				AW Cert: SPR

## Events

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

## Narrative

### HISTORY OF FLIGHT

On July 29, 2016, at 0914 central daylight time, an Air Tractor AT-402 airplane, N1016G, collided with power lines and impacted terrain near Sac City, Iowa. The commercial rated pilot was fatally injured and the airplane was destroyed. The airplane was registered to and operated by a private individual under the provisions of 14 Code of Federal Regulations Part 137 as an aerial application flight. Visual meteorological conditions prevailed at the time of the accident and no flight plan had been filed. The airplane departed Arthur N Neu Airport (CIN), Carroll, Iowa, at 0902 and was spraying in the area of Sac City Municipal Airport, (SKI), Sac City, Iowa.

The pilot's ground crewman stated that he met the pilot at CIN about 0830 and loaded the airplane with 375 gallons of liquid applicant and 130 gallons of fuel and noted that the airplane was almost fully loaded and was within the specified limitations. He added that the pilot did not seem concerned about him running late that morning. The pilot did not seem rushed or nervous, which was unusual for him, and he also seemed complacent about the flight. He has always known the pilot to circle above a field and scan for hazards before starting an aerial application flight. He described the area near the accident site as a "wire farm" because of the amount of power lines present.

The responding Federal Aviation Administration (FAA) inspector reported that the airplane impacted a corn field one-mile south of SKI. Power lines were found downed near the accident site.

### PERSONNEL INFORMATION

A review of the pilot's logbooks and flight data revealed that he had accumulated 1,746.2 total flight hours and 414.1 hours the Air Tractor AT-402. The pilot had flown 114.5 hours in the preceding 30 days, all of which were in the accident airplane.

### AIRCRAFT INFORMATION

### METEOROLOGICAL INFORMATION

### WRECKAGE AND IMPACT INFORMATION

The main wreckage was located in a corn field about one mile south of SKI. The field being treated was north of the accident site. A large set of power transmission lines ran east to west along the southern border of the target field (figure 1). The power lines and supporting tower structures were 80 to 90 ft tall and the power lines sagged in between each tower. A farm house and several farm buildings were located south of the power lines.

The wreckage debris path was oriented north to south and featured a swath cut through the mature corn, which continued to the main wreckage. The main wreckage was about 900 ft south of the power lines and 75 ft south of the initial impact area. There was a smell consistent with jet fuel and agricultural chemical around the site and the ground was damp. There was no evidence of fire. The debris path was relatively straight and began with the entire rudder on a gravel road underneath the power lines. A portion of the vertical stabilizer was found next in the debris path on the north side of the farm house. Next was the swath of cut corn and the initial ground impact point, which included debris from the bottom of the airplane (figure 2).

The forward wall of the cockpit was part of the hopper structure and was laying adjacent to the fuselage. The instrument panel remained mostly intact and undamaged. The Hobbs meter mounted in the instrument panel showed 7,008.3 hours. The center fuselage between the firewall and the cockpit was crushed. The fuselage was bent, twisted left, and came to rest next to the left wing. The horizontal stabilizers and elevators exhibited minimal damage and remained attached to the aft fuselage. The lower portion of the vertical stabilizer remained attached to the empennage and exhibited a jagged horizontal cut at the top (figure 3).

The right and left wings remained connected at the center splice joint. There were no prominent impact marks on the leading edge or upper surface of the wings. The bottom of the wings exhibited impact damage. The outboard section of the right flap was bent under the inboard half of the flap. The left and right ailerons and flaps remained installed in their respective positions. Both wing fuel tanks were breached at the inboard ends. The fuel caps were in place and secure.

The elevator controls were impact damaged, but continuous from the control stick to the elevators. The elevators were attached to the horizontal stabilizers at the hinge points. The rudder pedals remained attached to their pivot points with the rudder cables and adjustment brackets in place. The rudder cables were continuous to the aft fuselage where they were found separated and exhibited signs of tension overload. About 15 inches of the aft end of the rudder cables remained attached to the rudder and exhibited signs of tension overload. The horn plate remained installed on the bottom of the rudder, but was bent into a "U" shape.

The control stick remained attached to the floor-mounted torque tube which remained attached to the left aileron control tube through the upper pushrod and fuselage bellcrank. The trailing edge push rod was bent and separated near the inboard end and the rod end bearing remained attached to the bellcrank. From the push rod separation, the controls were continuous to the left aileron control horn. From the cockpit torque tube, the right aileron controls were continuous through the upper pushrod and fuselage bellcrank. From the fuselage bellcrank, the controls were continuous to the right aileron, except the inboard end of the pushrod that was separated where the wing was pulled away from the fuselage. The flap actuator was found in the retracted position. The trim system sustained impact damage but remained continuous and attached at all connections.

The main landing gear separated from the fuselage. The left wheel and gear spring were found near the initial impact point in the debris path. The right gear spring was found near the left wingtip of and the right wheel on the right side of the fuselage. The tailwheel assembly separated from the tail spring.

The four-point pilot restraint system remained fastened and the lap belt had been cut by first responders on the left side of the buckle. The shoulder harness straps had separated from the attachment points at the lap belt. Slight fraying of the shoulder harnesses was noted near the top of the seatback with no evidence of overstress failure.

The engine sustained impact damage and remained attached to the respective engine mounts. The engine exhaust housing was impact damaged. The engine had separated at the "C" flange, revealing the interstage baffle and the power turbine wheel. The power turbine had damage to all blades and the interior of the engine showed significant rotational scoring signatures. The propeller hub and spinner remained attached to the engine flange. Only one propeller blade remained attached to the propeller hub. The two other blades were not found at the scene. The FAA Inspector stated that the two missing blades had been present in the debris field on his previous visit to the scene on the day of the accident.

The airplane was equipped with a single curved acrylic wind screen. There was an aluminum bar in front of the wind screen and a deflector cable connected the top of the canopy to the top of the vertical stabilizer, which were installed to add protection against wire strikes.

The aluminum bar was found separated from its lower base in the debris field and was bent to the left into a rough V-shape with an inside angle about 45°. At the upper end, the tubular support structure had separated from the cockpit structure and remained attached to the bar. A 6 ft piece of the deflector cable remained attached to the top of the bar. The bar had a chamfered edge on the right side that ran the entire length of the bar. The cable that was attached to the bar exhibited abrasion and damage (figure 4).

The upper right corner of the cockpit structure exhibited cylindrical abrasions and damage. Scratches and front to back damage was noted on the top of the canopy where the aftermarket GPS antenna had separated. The top 15 inches of the vertical stabilizer was separated and exhibited a jagged horizontal cut from front to back with impact damage on the leading edge near the cut; a portion of the deflector cable remained attached to the top. The rudder exhibited a 4-inch gouge into the vertical hinge line, which lined up with the cut of the horizontal stabilizer. The rudder horn remained attached to the rudder and was distorted about 90° down, and the aft ends of the rudder control cables remained attached.

## MEDICAL AND PATHOLOGICAL INFORMATION

The Iowa Office of the State Medical Examiner, Ankeny, Iowa, completed an autopsy on the pilot and the cause of death was multiple blunt force injuries. The FAA's Bioaeronautical Sciences Research Laboratory conducted toxicology testing, which was negative for ethanol and drugs.

## ADDITIONAL INFORMATION

### GPS Device Downloads

A Satloc M3 Bantam GPS and a Garmin aera 510 GPS were found in the wreckage and were sent to the NTSB Recorders Laboratory for download. The combined data from the two devices was plotted on Google Earth (figure 1 and 5). The red flight path originates from the southeast and continues directly to the target field without any evidence of an initial circling pass. The areas of green represent the flight path when the airplanes spray function was on. The white lines represent the power lines that cross the flight path west to east.

### Power Line Markers

A few round, orange objects, similar to high visibility power line markers, were observed on the road near the accident site by a nearby landowner. The power company reported that no markers were installed on the power lines. The power company could not find any documentation to prove there were high visibility power line markers installed prior to the accident. As a result of the accident, the power company installed several high visibility power line markers on the new power lines.

# National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# WPR16FA029	11/18/2015 1623 PST	Regis# N711BE	Carlsbad, CA	Apt: Mc Clellan-palomar CRQ
Acft Mk/Mdl AIRBUS HELICOPTERS AS350B3E		Acft SN 7934	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl TURBOMECA ARRIEL 2D		Acft TT 35	Fatal 2 Ser Inj 0	Fit Conducted Under: FAR 091
Opr Name: BRUCE A ERICKSON		Opr dba:		Aircraft Fire: GRD
				AW Cert: STN

## Events

1. Landing-flare/touchdown - Loss of control in flight

## Narrative

### HISTORY OF FLIGHT

On November 18, 2015, at 1623 Pacific standard time, an Airbus Helicopters AS350B3E, N711BE, departed controlled flight while landing on a dolly at Mc Clellan-Palomar Airport, Carlsbad, California. The private pilot and the pilot-rated passenger were fatally injured; the helicopter sustained substantial damage. The pilot, who was the owner, was operating the helicopter under the provisions of 14 Code of Federal Regulations Part 91. The local personal flight departed Carlsbad at 1412. Visual meteorological conditions prevailed, and no flight plan had been filed.

The purpose of the flight was for the pilot to gain familiarity with the helicopter, which he had recently purchased. The entire accident sequence was captured on a series of airport security cameras and the mobile phone cameras of multiple witnesses.

About 2 hours before the accident, the helicopter departed from its dolly on the east end of the Premier Jet fixed base operator (FBO) ramp, which was located midfield on the south side of runway 6/24. After departure, line crew moved the dolly to the west end of the ramp.

Upon returning, the helicopter approached the airport from the northeast and was cleared to land on runway 24. It descended to midfield, turned left at taxiway A3, and approached the ramp in a low hover via the parallel taxiway A. The helicopter then began an approach to the dolly from the east, directly toward the sun. The helicopter landed short of, and partially on, the dolly with the center of its skids contacting the dolly's aft edge. The helicopter immediately rocked back, pitching nose up, and its tailskid struck the ground. The helicopter then began a series of fore and aft oscillations, and the dolly broke free from its front left chock, rotated to the right, and pivoted around its rear right wheel. The helicopter spun rapidly with the dolly for the first quarter of the turn and then quickly spiraled upward 270° to the right. The dolly came to rest to the north, having rotated 180°. The pilot repositioned the helicopter and landed it on the ground, straddling the ramp and taxiway A. Just before landing, the pilot was queried by the air traffic control tower controller and responded, "yeah, they didn't chock my cart, and I was like a skateboard out here." The tower controller then requested that the pilot switch to the ground control frequency.

During the next 2 1/2 minutes, the line crew re-secured the dolly, installing chocks on three of the four wheels. The pilot then took off and climbed the helicopter to about 20 ft while it yawed to the left, and he repositioned it for an approach to the dolly now from the west. During the next 4 1/2 minutes, the pilot made three landing attempts, getting the helicopter to within about 5 ft vertically of the dolly on the first two attempts. After the first attempt, the pilot repositioned the helicopter by circling back around the dolly. After the second attempt, the pilot performed a hovering climb and backed the helicopter into position. A video of the third and final landing attempt was captured by a witness, who was located about 130 ft to the south. The witness was initially watching the helicopter from his airplane on the ramp, but he was concerned that the helicopter might crash, so he exited the airplane and positioned himself behind a car at the corner of the FBO's hangar.

The video revealed that the helicopter hovered over the dolly for about 60 seconds and then landed short, teetering on the aft edge of the dolly (Image 1). The tailskid almost struck the ground, and the helicopter then rapidly pitched forward (Image 2) and then aft again. The tailskid then struck the ground (Image 3), and the helicopter pitched forward, rolled right (Images 4 and 5), and climbed out of view behind the hangar. Security cameras revealed that the helicopter then spun 180° to the left, and the nose pitched up to a 45° attitude. The tail rotor and vertical stabilizer assembly then struck the ground and separated, and the helicopter hit the ground left side low, bounced, and rotated another 360° before landing hard on its belly. Once on the ground, the main rotor blades continued to spin, while the helicopter started spinning on its belly, as the engine continued to operate (Image 6).

The helicopter continued spinning at a rate of about one revolution per second for the next 5 minutes while incrementally sliding about 530 ft east along the ramp. The tailboom and horizontal stabilizer then separated, and the helicopter rolled onto its side, shedding the main rotor blades. The engine continued operating for another 30 seconds while the fire crew doused the helicopter. White smoke billowed from the engine's exhaust after the helicopter came to rest, but there was no fire.

## PERSONNEL INFORMATION

The pilot was seated in the front right seat, and the pilot-rated passenger was seated in the front left seat.

### Pilot

The pilot held a private pilot certificate with ratings for airplane single-engine land and sea, multiengine land, instrument airplane, and rotorcraft-helicopter. He also held a type rating for the Cessna Citation Jet (CE-525S).

The pilot held a third-class medical certificate issued on January 19, 2015, with the limitation that he must have available glasses for near vision.

No personal flight records were located for the pilot. At the time of his last medical application, he reported a total flight time of 25,000 hours, with 200 hours logged in the last 6 months. The pilot reported the same numbers on three other applications over the 5-year period preceding the accident, and 25,400 hours total time on his application dated January 18, 2011. His helicopter rating was issued in May 2001, at which time he reported on his rating application a total flight time of 14,000 hours in airplanes.

The pilot had previously owned and flown a Cessna Citation business jet airplane and a Bell 407 helicopter. His 2001 helicopter checkride flight took place in a Bell 206B3. At the time of the accident, he was receiving recurrent training for the Citation, with the most recent flight 2 days before the accident. The pilot purchased the accident helicopter on October 29, 2015, and had flown demonstration and familiarization flights in it since September 20. According to the helicopter's flight logs, those flights totaled about 8.8 hours and were all conducted with a flight instructor present. The pilot then flew the helicopter with another instructor for an additional 2 hours on November 13.

According to the two instructors who had flown with the pilot for the familiarization flights and the flight instructor who provided training in the Citation, the accident flight was the first time the pilot had flown in an AS350 without an instructor present. All had recommended that the pilot gain further instruction before flying without an instructor, and the pilot had concurred.

The three instructors shared similar insights into the pilot's flying skills, reporting that, while he appeared to have extensive flying experience, he was anxious about the handling characteristics of the AS350 compared to the Bell 407, particularly during landing. The pilot said that he was having difficulty anticipating flight control forces because the helicopter controls felt "backwards" due to the opposing rotor direction of the AS350 compared to the Bell 407. Furthermore, he was having trouble landing on the dolly partly because the tips of the skids were just behind his seating location in the AS350, as opposed to the Bell 407, where he could see the skids just forward and below. Both helicopter instructors reported performing multiple dolly and simulated dolly landings with the pilot, stating that, although the pilot was not completely at ease, he was able to ultimately land on the dolly unaided. The pilot told the Citation instructor that, although he had practiced many landings in the helicopter, he still did not feel proficient and thought that the helicopter was very unstable close to the ground, especially when it was close to the dolly.

One of the helicopter instructors reported that the pilot wanted to enable the helicopter's stability augmentation system (SAS) for landings because he had been told it would help his landings. The instructor stated that he wanted the pilot to be able to fly the helicopter proficiently without the use of the SAS. However, for demonstration purposes, they did two landings with the SAS enabled. During those attempts, the pilot appeared to be "fighting" against the SAS control inputs,

with unsatisfactory results, and he did not understand how to use the SAS release button on the cyclic to override the SAS control inputs. Therefore, the pilot and instructor decided to turn the system off.

Both helicopter instructors reported that the pilot appeared to have suffered an injury that restricted movement of his left arm. He could use his left arm to operate the flight controls and reach the lower sections of the flight panel, but he could not reach the upper controls, including the engine start selector panel, without the supportive aid of his right arm. One instructor stated that because of the injury, the pilot was unable to climb up onto the helicopter to perform preflight examinations of the rotor head. One helicopter instructor and the Citation instructor stated that the pilot's hands often shook and that it was particularly obvious when he held a pen, although once he grasped the flight controls the shaking stopped.

Both helicopter instructors suggested that the pilot take formal factory-approved flight training, and one instructor stated that he had declined to provide any further instruction until the pilot had taken training at the Airbus Helicopters flight school. According to Airbus Helicopters, in early October, the pilot had signed up for a "B3 Pilot Transition Class" scheduled for November 2, but 2 days before the class he called to defer the training. No further communication from the pilot was received by Airbus Helicopters.

The Citation instructor, who had known the pilot for 6 years, reported that the pilot was becoming concerned that age was starting to affect his reaction time when flying. The instructor had observed the pilot's degrading flight performance and had conversations with him about how maintaining proficiency through regular flying could help. He stated that the pilot was no longer fully proficient in the Citation, that his reaction times were becoming slower, and that he would often let the airplane get ahead of him. As such, the instructor recommended that the pilot always fly with him. He stated that the pilot mentioned that he was going to fly the helicopter for practice with a friend on the day of the accident.

The pilot confided in all three instructors that, due to the difficulties he was having mastering the AS350, he was most likely going to sell it and buy another Bell 407. All three instructors stated that they had never seen the pilot's logbooks and had, therefore, never made any entries.

## Pilot-Rated Passenger

The pilot-rated passenger held a private pilot certificate with ratings for airplane single-engine land and rotorcraft-helicopter. His first rating was for rotorcraft-helicopter, and it was issued in December 2004 following a checkride in a Bell 206B3. He was issued his airplane single-engine land rating in December 2014, and, at that time, he reported on his rating application a total rotorcraft flight time of 179.6 hours, including 163 solo hours.

He held a third-class medical certificate issued on May 29, 2014 with no limitations.

No personal flight records for the pilot-rated passenger were located, and his currency or recent flight experience could not be determined. At the times of issuance of his two prior FAA medical examinations in 2008 and 2012, he reported total flight times of 185 and 200 hours respectively, with no flight time in the preceding 6 months on both occasions.

## HELICOPTER INFORMATION

The helicopter was manufactured in 2014 and equipped with a Turbomeca Arriel 2D engine. The helicopter had dual collective, cyclic, and foot pedal controls, with primary flight control intended from the right seat.

The helicopter was maintained under a continuous airworthiness program and had accrued 35.2 hours of total time since new when the accident occurred. The last inspection took place 20.6 flight hours before the accident on August 15, 2015.

The helicopter had undergone a series of twenty-three upgrades in May 2015, including the installation of an auxiliary side locker fuel tank, full length skid shoes, a radar altimeter, and a Genesys Aerosystems HeliSAS stability augmentation system and two-axis (pitch and roll) autopilot.

The HeliSAS system provided attitude stabilization and force feedback to the cyclic control, via electro-mechanical servo actuators connected in parallel to the flight controls. The systems technical overview documentation stated:

"The HeliSAS system is designed to be engaged at all times: "SAS" on before takeoff, and "SAS" off after landing. The "force feel" (force trim) feature

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# National Transportation Safety Board - Aircraft Accident/Incident Database

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enhances handling characteristics and mitigates inadvertent cyclic control inputs that could result in dangerous attitudes. The pilot may override the HeliSAS at any time with manual cyclic inputs. Only 3.5 lbs of pilot force in the pitch axis, and 3.0 lbs in the roll axis, at the cyclic control is required to override the system for pilot desired maneuvering when either the SAS or autopilot modes are engaged."

The helicopter was serviced with the addition of 70 gallons of Jet A fuel on the morning of the accident.

## METEOROLOGICAL INFORMATION

According to the U.S. Naval Observatory's Astronomical Applications Department, the altitude of the sun when viewed from Carlsbad at 1620 would have been 4.3°, with an azimuth (E of N) of 243.7°.

## FLIGHT RECORDERS

The helicopter was equipped with an Appareo Vision 1000 flight data monitor. The unit was capable of recording video, audio, GPS coordinates, and pitch, roll, yaw and acceleration data. The unit was mounted in the aft center ceiling of the cockpit.

The unit was sent to the NTSB Vehicle Recorders Division for data extraction, and a video group consisting of the NTSB investigator-in-charge and technical representatives from Turbomeca and Airbus Helicopters was convened to review the data.

The unit had recorded video and audio data, along with GPS coordinates for the entire flight. The field of view included over-the-shoulder video images of the forward cockpit, which included both cyclic controls and the right-seat collective and foot pedal controls, along with most of the instrument panel and a view out the lower forward portion of the windscreen. The unit did not record any radio or microphone audio. Only loud engine and transmission noises could be heard for the duration of the recording.

The video recording began at 1406:52 and depicted the helicopter stationary on the dolly at the east end of the FBO's ramp, with the engine running and the pilot configuring the avionics system. Six minutes later, the helicopter departed.

GPS data indicated that for the next 27 minutes the helicopter flew generally to the east and approached an open field at an elevation of about 4,500 ft mean sea level (msl), 4.5 miles south of the peak of Palomar Mountain. The helicopter then performed a left downwind landing approach into the field, lined up on final from the south, and landed at the far end of the field just short of the tree line. Twenty seconds after landing, the pilot turned on the SAS system. The pilot then initiated a hover, and the helicopter lifted off the ground and immediately yawed about 25° to the left, before setting back onto the ground. Thirty seconds later, the pilot began another hovering maneuver, and, after lifting off the ground, the helicopter immediately spun about 150° to the right before setting back onto the ground.

About 40 seconds later, at 1443:09, the helicopter lifted off the ground up uneventfully, and departed toward the southeast. For the next hour, the helicopter took a route toward the Salton Sea, then north along the coastline toward La Quinta, where it turned inland and began to track back to Carlsbad. During the period after departing from the field, the pilot turned the SAS system from active to standby mode multiple times and occasionally engaged the autopilot. Helicopter control was handed back and forth between the two pilots as they performed various tasks including activating the auxiliary fuel tank transfer pump, viewing their personal electronic devices, and referencing the helicopter's flight manual.

About 1610, the helicopter approached the airport from the east, conducted a straight-in approach, and crossed the threshold of runway 24 at 1612:05. The SAS system was in standby mode, and, as the helicopter approached the runway, the passenger lifted his right hand over his face in an apparent effort to shield himself from sun glare. The pilot appeared to be wearing sunglasses. The helicopter flew along the runway and then turned left, crossed the runway 6-24 hold short line, and entered taxiway A3 while in a low hover. The helicopter proceeded along taxiway A, approaching the landing dolly, which, having been relocated, was now at the west end of the FBO's ramp.

The helicopter approached the dolly, but, due to sun glare, minimal outside references were visible in the recording. Over the next 30 seconds, the occupants appeared to have been jostled in their seats, the helicopter pitched nose down, and the cockpit instruments registered a right roll of about 25°. The helicopter then yawed to the right and began maneuvering toward taxiway A and the ramp. It landed straddling the ramp and taxiway, and the pilot then entered the ground control frequency in the avionics system. About that time, an incoming call was received on the pilot's phone; he picked up the phone, ignored the call,

and put the phone back down again.

After about 2 minutes, the pilot initiated a hover, and, as soon as the helicopter broke ground, it immediately yawed about 30° to the left. The pilot maneuvered the helicopter west along taxiway A and performed a left turn, toward the east, bringing the helicopter in line with the dolly. During the following three landing attempts, the dolly passed in and out of view in the left side of the lower portion of the helicopter's chin bubble. The pilot's cyclic control inputs were pronounced as the dolly came in and out of view. On the second attempt, as the dolly disappeared from view, both occupants appeared to rock forward. The pilot then backed up the helicopter in a low hover, and the dolly came back into view.

With the dolly still visible, the helicopter again rocked back and forth and slowly descended, while both occupants again rocked forward. The needle displayed on the first limit indicator on the instrument panel dropped rapidly as the pilot quickly lowered the collective control. Comparison of the onboard video with the security camera video indicated that, about this time, the tailskid struck the ground, and the helicopter pitched up and rotated 180° before the tail again struck the ground. During this time, the pilot was still holding the cyclic and collective controls, and his feet were on the foot pedals. Both occupants then moved aggressively back and forth and from side to side, until the helicopter landed hard on its nose, and both occupants violently rocked to the right. The pilot slumped over to the right and remained motionless, and the helicopter began to spin.

As the spin progressed, the pilot-rated passenger reached down to the throttle control on the pilot's collective with his right hand. His hand remained on the control for about 3 seconds, but the control did not move out of the "FLIGHT" detent position. The passenger then moved his right hand to the glare shield lip where it remained for about the next 2 minutes. The passenger then appeared to loosen his grip on the glare shield, and he remained motionless, while the helicopter continued to spin. Eventually a loud "bang" was recorded, and the helicopter stopped violently and came to rest on its right side. Neither occupant moved as first responder personnel arrived and began the process of entering the cabin.

## MEDICAL AND PATHOLOGICAL INFORMATION

### Pilot

At the time of his most recent FAA medical examination, the pilot reported hypertension and the use of medications including nebivolol (blood pressure medication), pantoprazole (heartburn medication), and rosuvastatin (cholesterol lowering medication).

According to the autopsy performed by the County of San Diego Office of the Medical Examiner, the pilot's cause of death was multiple injuries, and the manner of death was accident.

The autopsy report noted significant intracranial injuries with bilateral subdural and subarachnoid hemorrhage more pronounced on the right side and the base of the brain extending into the foramen magnum and cervical canal. Intraventricular hemorrhage without parenchymal contusions was also noted. In addition, hemorrhage of the anterior cervical ligament associated with fractures of the body of C6 (and possibly C7) with associated subdural hemorrhage surrounding the cervical spinal cord was identified.

The pilot's heart was enlarged, and mild coronary artery disease with 50% stenosis was also described.

Toxicology testing by the medical examiner detected amlodipine (0.34 mg/l) and alprazolam (less than 0.05 mg/l) in peripheral blood.

Toxicology testing by the FAA's Bioaeronautical Sciences Research Laboratory, identified amlodipine, valsartan, rosuvastatin, and diphenhydramine (0.538 ug/ml) in heart blood. In addition, the FAA laboratory found alpha-hydroxyalprazolam (0.044 ug/ml) and salicylate in urine.

Amlodipine and valsartan are blood pressure medications and, along with rosuvastatin, are generally considered non-impairing. Alpha-hydroxyalprazolam is a metabolite of alprazolam, a potentially impairing anxiety medication. Alprazolam is commonly marketed under the name Xanax, and it carries the warning: "Because of its CNS (central nervous system) depressant effects, patients receiving alprazolam tablets should be cautioned against engaging in hazardous occupations or activities requiring complete mental alertness such as operating machinery or driving a motor vehicle. For the same reason, patients should be cautioned about the simultaneous ingestion of alcohol and other CNS depressant drugs during treatment with alprazolam tablets." Diphenhydramine is a sedating antihistamine that has been shown to significantly impair performance at routine doses.



## Pilot-Rated Passenger

The pilot-rated passenger reported no chronic medical problems and no medications at the time of his most recent FAA medical examination.

According to the autopsy performed by the County of San Diego Office of the Medical Examiner, the pilot-rated passenger's cause of death was multiple injuries, and the manner of death was accident.

His injuries included bilateral subdural and subarachnoid hemorrhages, ligamentous instability at C1/C2, and fracture at C6/C7 with associated subdural hemorrhage but without obvious spinal cord injury. In the torso, there was a fracture of the sternum along with multiple rib fractures, some associated with retroperitoneal hemorrhage. There were widely open fractures of both bones of the lower left leg. He was found to have an enlarged heart with thickened walls and minimal coronary artery disease.

Toxicology testing by the FAA's Bioaeronautical Sciences Research Laboratory identified ranitidine (a non-impairing heartburn medication) in the pilot-rated passenger's urine.

## WRECKAGE AND IMPACT INFORMATION

Postaccident examination of the helicopter did not reveal any anomalies with the airframe or engine that would have precluded normal operation. The throttle was found in the "FLIGHT" detent, and the left and right throttle controls could both be moved in concert with each other smoothly between the control detents.

## Dolly

The primary structure of the dolly was composed of a 14-ft-wide and 12-ft-long red-painted steel frame, with two castoring wheels at the front, and two fixed wheels at the rear. A steel, V-shaped hinged tow bar was attached to the front of the dolly. The landing deck surface was about 12 inches off the ground and made of wood planks coated with light-grey non-slip paint. No manufacturer's label or data plate could be found on the dolly. Standard operating procedures dictated that the helicopter approach the dolly from the rear and land with the tow bar at the front of the helicopter, thereby allowing clearance from the towing vehicle.

Examination revealed two indentations on the rear side of the dolly frame spaced 7 ft 3 inches apart or about the width separating the helicopter's left and right landing skids. The indentations contained freshly detached paint chips that exposed shiny uncorroded steel. Crush marks were present on the wood planks adjacent to the indentations.

Security camera video footage and statements provided by the FBO line crew indicated that, for the first landing approach, the dolly's rear right and front left wheels were chocked. In the video footage, a line crewmember could be seen checking the security of the chocks after initially setting both wheels. For the accident approach, the rear right and both front wheels were chocked. The chocks were standard triangular-shaped rubber aviation chock pairs that were attached to one another with a short length of rope.

The slope of the ramp at the dolly location for the final landing attempts was about 3ø down from right to left when viewed from the approach direction. The helicopter's flight manual indicated a maximum sideways landing slope of 8ø.

## Seats

Both front seats were of the energy attenuating type designed to absorb vertical impact loads. The seats were equipped with four-point belt harnesses.

The front left seat did not exhibit evidence of vertical displacement (stroking). The left side of the front right seat did not exhibit evidence of stroking; the right side of the seat exhibited a vertical stroke of about 1 inch downward.

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# National Transportation Safety Board - Aircraft Accident/Incident Database

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Accident Rpt# GAA18CA034    10/26/2017 840 CDT    Regis# N22TZ    La Paloma, TX    Apt: N/a  
Acft Mk/Mdl AIRBUS HELICOPTERS EC 130-T2    Acft SN 8016    Acft Dmg: SUBSTANTIAL    Rpt Status: Prelim    Prob Caus: Pending  
Fatal 0    Ser Inj 0    Flt Conducted Under: FAR 091  
Opr Name: KESTREL HOLDINGS LLC    Opr dba:    Aircraft Fire: NONE

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# National Transportation Safety Board - Aircraft Accident/Incident Database

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Accident Rpt# GAA17CA393	07/06/2017 1600 EST	Regis# N8159J	Dixon, KY	Apt: N/a
Acft Mk/Mdl BELL 206-B		Acft SN 512	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl ROLLS-ROYC 250-C20		Acft TT 15775	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 137
Opr Name: FORMING AGROTORS INC		Opr dba:		Aircraft Fire: NONE
				AW Cert: SPR

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## Events

2. Maneuvering-low-alt flying - Loss of tail rotor effectiveness

## Narrative

The helicopter pilot reported that he was maneuvering at low altitude during an agricultural application flight.

While in a left turn he did not see the power line wires until they were very close. He increased the collective to climb and he banked right to avoid impact. However, the tail rotor struck the power line wires and the helicopter lost tail rotor effectiveness.

The pilot autorotated and the helicopter landed, but the tailboom impacted trees. The helicopter sustained substantial damage to the tail rotor gear box, the tail rotor blades and the vertical stabilizer.

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# ERA15LA138	02/15/2015 1500 EST	Regis# N3176L	Sevierville, TN	Apt: Sixty Six 6TN3
Acft Mk/Mdl BELL 206-L1		Acft SN 45648	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl ALLISON 250-C28B		Acft TT 8586	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: GREAT SMOKY MOUNTAIN HELICOPTER INC		Opr dba:		Aircraft Fire: GRD
				AW Cert: STN

## Summary

The commercial pilot was departing in the helicopter for a local aerial sightseeing flight with five passengers. The engine was operating during the boarding process. After the passengers were seated and had fastened their seat belts, the pilot increased the engine power to 100%, raised the collective, and felt the helicopter shudder. He lowered the collective and looked to make sure all passengers were seated. He raised the collective a second time, again felt the shudder, lowered the collective, and then heard "a loud bang." He subsequently turned off the fuel to shut down the engine. A fire began in the engine compartment, and ground personnel helped evacuate the passengers and extinguish the fire. Multiple fragments of engine turbine section components were found resting in the engine bay, on the ground around the helicopter, and embedded in the bottom surfaces of the main rotor blades.

Postaccident examination of the engine revealed that the power turbine shaft had decoupled due to a No. 4 bearing failure. Carbon buildup was found on the filter screen of the No. 4 bearing's oil supply nozzle that partially obstructed oil flow to the bearing and likely resulted in insufficient lubrication of the bearing. The No. 4 bearing inner race spun on the bearing journal instead of remaining stationary as designed. The turbine rotates at extremely high speeds, and the resistance from the failed bearing caused the power turbine pinion splines to decouple, leading to an instantaneous power turbine overspeed. The overspeed led to a third stage turbine disk burst and radial uncontainment of fragmented power turbine components through the exhaust support and airframe. All turbine component fractures were due to overload failure, and there was no evidence of fatigue. Therefore, it is likely that the uncontained engine failure was the result of insufficient lubrication of the No. 4 bearing due to carbon buildup on the oil supply nozzle's filter screen.

## Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: An uncontained engine failure, which resulted from insufficient lubrication of the No. 4 bearing due to carbon buildup on the filter screen of the bearing's oil supply nozzle.

## Events

1. Takeoff - Part(s) separation from AC
2. Takeoff - Uncontained engine failure
3. Other - Fire/smoke (non-impact)

## Findings - Cause/Factor

1. Aircraft-Aircraft power plant-Engine (turbine/turboprop)-Turbine section-Failure - C
2. Aircraft-Aircraft power plant-Engine (turbine/turboprop)-Oil system-Damaged/degraded - C
3. Personnel issues-Task performance-Maintenance-Scheduled/routine maintenance-Maintenance personnel

## Narrative

### HISTORY OF FLIGHT

On February 15, 2015, about 1500 eastern standard time, a Bell 206 L-1, N3176L, was substantially damaged by an uncontained engine failure and fire during takeoff from the Sixty Six Heliport (6TN3), Sevierville, Tennessee. The commercial pilot and five passengers were not injured. Visual meteorological conditions prevailed, and no flight plan was filed. The helicopter was registered to a private individual and was operated by Great Smoky Mountains Helicopter, Inc., for the local aerial sightseeing flight, which was conducted under the provisions of 14 Code of Federal Regulations Part 91.

According to the pilot, the helicopter had been operating since about 0830, and the engine was operating during the boarding of the five passengers. After the passengers were seated and had fastened their seat belts, he increased the engine power to 100%, raised the collective, and felt a shudder through the airframe. He immediately lowered the collective, verified that the passengers were in their seats, and again raised the collective. Immediately, he again felt a shudder, lowered the collective, subsequently heard "a loud bang followed by a loud whine" and saw smoke. He attempted to roll off the throttle, but it would not move. He subsequently turned off the fuel to shutdown the engine. Ground personnel helped evacuate the passengers and extinguish the fire.

According to photographs provided by a Federal Aviation Administration inspector who examined the helicopter, the upper deck and engine had substantial thermal and impact damage. The main rotor blades exhibited dents, score marks, and punctures on their bottom surfaces. Multiple fragments of engine turbine section components were found resting in the engine bay, on the ground around the helicopter, and embedded in the rotor blades.

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# National Transportation Safety Board - Aircraft Accident/Incident Database

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## PERSONNEL INFORMATION

The pilot, age 34, held a commercial pilot certificate with ratings for rotorcraft-helicopter and instrument helicopter; he also held a second-class medical certificate issued January 26, 2015, with no limitations. The pilot reported 1,385 total flight hours with 859 hours in the accident helicopter make and model.

## AIRCRAFT INFORMATION

The seven-seat helicopter, serial number 45648, was manufactured in 1983. It was powered by a 500-shaft-horsepower Allison 250-C28B engine. According to maintenance records and pilot-provided information, the most recent 100-hour inspection was completed on February 2, 2015, at a recorded airframe total time of 8,586.1 hours and an engine time since major overhaul of 854.9 hours. At the time of the accident, the engine had accumulated 12.5 hours since the most recent inspection, 867.4 hours since major overhaul, 8,204.4 hours since new, and 6,633 cycles since new.

## METEOROLOGICAL INFORMATION

The 1455 recorded weather observation at Gatlinburg-Pigeon Forge Airport, Sevierville, Tennessee, located about 3 miles from 6TN3, included wind from 020° at 7 knots, 10 miles visibility, clear skies, temperature minus 4°C, dew point minus 22°C, and an altimeter setting of 30.32 inches of mercury.

## AIRPORT INFORMATION

The private helipad was owned by the operator and did not have an operating control tower. The turf helipad was 200 ft long by 200 ft wide and was about 1,010 ft above mean sea level.

## TEST AND RESEARCH

Postaccident examination of the engine revealed that a majority of the exhaust collector support was missing along the top half of the engine, and the remaining sections exhibited punctures and tears. The compressor air discharge tubes had multiple penetrations and were missing material. The power turbine 3rd and 4th stage disks (wheels) and nozzles as well as the power turbine shaft and coupling had separated from the engine. All the 4th stage turbine blades were separated at the blade roots, and the disk hub had substantial impact damage. The 4th stage nozzle was fractured into three 120° sections. One 120° section of the 3rd stage disk was recovered near the helicopter, and all blades were separated at the blade roots. The remainder of the 3rd stage disk was not located. The 3rd stage nozzle was fractured into two pieces. The power turbine coupling splines exhibited thermal damage and spline deformation. The No. 4 bearing race surfaces and rollers were plastically deformed and thermally damaged. The aft end of the power turbine pinion gear exhibited rub wear 360° around, consistent with the No. 4 bearing inner race spinning on the pinion surface that functions as a bearing journal. Multiple components exhibited carbon buildup including the filter screen of the oil supply nozzle that supplied lubricating oil to the Nos. 4 and 5 bearings, the No. 8 bearing sump in the gas producer support, and the power turbine shafting.

The turbine components were examined by the Rolls Royce Materials Lab under NTSB supervision. The examination indicated that the turbine components that separated from the engine during the failure sequence failed due to overload, and there was no evidence found of fatigue.

# National Transportation Safety Board - Aircraft Accident/Incident Database

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Incident Rpt# ENG17IA027	06/03/2017 855 EDT	Regis# N765SW	Washington, DC	Apt: Washington Dulles Intl IAD
Acft Mk/Mdl BOEING 737 7H4-7H4		Acft SN 29805	Acft Dmg: MINOR	Rpt Status: Prelim Prob Caus: Pending
Eng Mk/Mdl CFM INTL. CFM56-7B24			Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 121
Opr Name: SOUTHWEST AIRLINES		Opr dba:		Aircraft Fire: NONE
				AW Cert: STT

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## Events

1. Enroute - Uncontained engine failure
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## Narrative

On June 3, 2017, at about 0855 eastern daylight time, a Boeing 737-7H4 airplane, registration number N765SW, powered by two CFMI CFM56-7B24 turbofan engines, operated by Southwest Airlines (SWA) as flight number 4635, experienced a right-hand engine (No. 2) accessory gearbox (AGB) failure while enroute from Tampa Florida to Rochester New York. The airplane was diverted to Washington Dulles International Airport (IAD) where an uneventful single engine landing was performed and no injuries were reported to any of the occupants. Examination of the airplane and engine after landing revealed that the No. 2 engine left fan inlet cowl exhibited a slice and the ABG exhibited an approximate 3-inch by 2-inch hole in the vicinity of the line 3 gear assembly. The incident flight was conducted under instrument flight rules (IFR) under 14 Code of Federal Regulations (CFR) Part 121 from the Tampa International Airport (TPA) to the Greater Rochester International Airport (ROC). There were 62 passengers and 5 crewmembers on board the incident flight.

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# National Transportation Safety Board - Aircraft Accident/Incident Database

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Incident Rpt# ENG16IA027	07/07/2016 1307 UTC	Regis# N706TW	New York, NY	Apt: John F Kennedy Intl JFK
Acft Mk/Mdl BOEING 757-2Q8		Acft SN 28165	Acft Dmg: MINOR	Rpt Status: Prelim Prob Caus: Pending
Eng Mk/Mdl P & W PW2037			Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 121
Opr Name: DELTA AIR LINES INC		Opr dba:		Aircraft Fire: IFLT
				AW Cert: STT

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## Events

4. Initial climb - Fire/smoke (non-impact)

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## Narrative

On July 07, 2016, about 1307 UTC, a Delta Air Lines (DAL) Boeing B757, N706TW, experienced a No. 2 (right) engine undercowl fire shortly after takeoff from John F Kennedy International Airport at Jamaica, NY (JFK). The flight crew reported receiving a right engine fire warning at approximately 300 feet agl. An emergency was declared and the flight returned to JFK and landed without incident. No injuries were reported to the six crew members and 151 passengers. The airplane sustained minor damage. The flight was conducted under the provisions of 14 Code of Federal Regulations Part 121. Night visual meteorological conditions prevailed and a Federal Aviation Administration instrument flight rules flight plan was filed for the flight.

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# National Transportation Safety Board - Aircraft Accident/Incident Database

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Accident Rpt# GAA17CA520	09/03/2017 1804 EDT	Regis# N378QS	Wilmington, DE	Apt: New Castle ILG
Acft Mk/Mdl CESSNA 680-NO SERIES		Acft SN 680-0103	Acft Dmg: NONE	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl P&W CANADA PW-306C		Acft TT 9410	Fatal 0 Ser Inj 1	Flt Conducted Under: FAR 091K
Opr Name: NETJETS AVIATION INC		Opr dba:		Aircraft Fire: NONE
				AW Cert: STT

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## Events

1. After landing - Ground handling event
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## Narrative

The director of aviation safety for the operator reported that after landing, while parked at the ramp, the pilot in command exited the flight deck to open the cabin door. He added that the pilot "found the lead passenger standing in front of the main cabin door waiting to exit the aircraft." He further added that, "he [the pilot] was able to open the door from this position, but did not have room to exit the aircraft ahead of the passenger," and as the passenger started down the airplane's air stairs, her foot slipped, she landed on her knees, and caught her balance by grabbing onto the hand rails.

A subsequent medical examination revealed the passenger broke her ankle.

The director of aviation safety did not report that there were any preaccident mechanical malfunctions or failures with the airplane that would have precluded normal operation.



# National Transportation Safety Board - Aircraft Accident/Incident Database

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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	Fatal 0	Ser Inj 0	Rpt Status: Factual	Prob Caus: Pending
Eng Mk/Mdl AMA/EXPR UNKNOWN ENG	Opr Name: PETE ZACCAGNINO	Opr dba:	Flt Conducted Under: FAR 091			
			Aircraft Fire: NONE			
			AW Cert: SPE			

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## Events

1. Maneuvering-low-alt flying - Part(s) separation from AC
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## 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.

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# National Transportation Safety Board - Aircraft Accident/Incident Database

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Incident Rpt# DCA17IA202A    09/21/2017 1920 EDT    Regis# NONE    Staten Island, NY  
Acft Mk/Mdl DJI PHANTOM-4    Acft Dmg: DESTROYED    Rpt Status: Prelim    Prob Caus: Pending  
Fatal 0    Ser Inj 0    Flt Conducted Under: FAR UNK  
Opr Name:    Opr dba:    Aircraft Fire: UNK  
AW Cert: NON

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## Events

1. Enroute - Midair collision
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## Narrative

On September 21, 2017, at 1920 eastern daylight time, a Sikorsky UH-60M Black Hawk helicopter, R20087, operated by the U.S. Army as CAVM087 ("Caveman 87"), collided with a D...-Jiang Innovations (DJI) Phantom 4 small unmanned aircraft system (sUAS, commonly known as a drone) operated by an individual. The collision occurred at about 300 feet above mean sea level, 1 mile east of Midland Beach, Staten Island, NY, in the vicinity of Hoffman Island. The helicopter experienced minor damage, the drone was destroyed. There were no injuries or ground damage.

# 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

## Events

1. Standing - Aircraft loading event

## 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.

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.

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# National Transportation Safety Board - Aircraft Accident/Incident Database

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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.

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# National Transportation Safety Board - Aircraft Accident/Incident Database

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## 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# ERA15LA328 04/10/2015 1845 EDT Regis# N450KK Caribbean Sea, CB UN Apt: N/a  
Acft Mk/Mdl GULFSTREAM AEROSPACE G Acft SN 1225 Acft Dmg: SUBSTANTIAL Rpt Status: Factual Prob Caus: Pending  
Eng Mk/Mdl ROLLS-ROYC TAY 611SER Acft TT 7473 Fatal 0 Ser Inj 0 Flt Conducted Under: FAR 091  
Opr Name: LA VENEZOLANA DE SEGUROS CA Opr dba: Aircraft Fire: NONE  
AW Cert: STT

## Summary

The pilot and copilot were conducting a repositioning flight. According to the pilot, during cruise at flight level 430, they observed a red "9.8 CABIN DFRN" warning message, indicating a maximum cabin differential pressure of 9.8 pounds per square inch differential or greater, followed by a red "DOOR MAIN" indication. The pilots donned oxygen masks and referenced the airplane's emergency checklist. They then heard a loud "bam" sound in the cabin and immediately initiated a descent. The pilots opened the cabin pressure outflow valve manually and leveled the airplane at 12,000 ft mean sea level. The pilots continued the flight unpressurized and landed without further incident.

The day after the accident, the airplane was flown for a short and uneventful repositioning flight, after which it was examined and structural airframe damage, including a cracked floor beam, dimpled areas in the floor boards, damaged structure between ribs, and damaged wing links, was found. An examination of the outer fuselage revealed that the cabin pressurization relief/safety valve (CPRV) static port, located above the CPRV, was completely plugged with a foreign material resembling dried dirt from a mud dauber. According to the airplane manufacturer, a blocked CPRV static port would render the CPRV inoperative due to its inability to measure the cabin-to-atmosphere pressure differential. The cockpit aural warning speaker was also found inoperative, which may have delayed the pilots' ability to recognize the overpressurization condition. The airplane's digital flight data recorder indicated that the crew acknowledged the initial warning message 89 seconds after its illumination. No other mechanical anomalies were found with the airplane's pressurization system. The airplane's structural damage was not repaired after the accident; therefore, the reason for the overpressurization condition could not be determined.

## Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The in-flight failure of the cabin pressurization relief/safety valve (CPRV) due to an obstruction of the CPRV static port, which allowed the airplane to overpressurize. The reason for the initial overpressurization condition could not be determined.

## Events

1. Enroute-cruise - Pressure/environ sys mal/fail
2. Enroute-cruise - Aircraft structural failure

## Findings - Cause/Factor

1. Aircraft-Aircraft systems-Air conditioning system-Pressure sensor-Damaged/degraded - C
2. Not determined-Not determined-(general)-(general)-Unknown/Not determined - C

## Narrative

### HISTORY OF FLIGHT

On April 10, 2015, about 1845 eastern daylight time, a Gulfstream Aerospace G-IV airplane, N450KK, experienced a cabin overpressurization event over the Caribbean Sea. The airline transport pilot and copilot were not injured, and the airplane sustained substantial damage. The airplane was being operated by a private company as a 14 Code of Federal Regulations Part 91 positioning flight. Day, visual meteorological conditions prevailed, and an instrument flight rules flight plan was filed. The flight originated at Simón Bolívar International Airport (SVM), Maiquetia, Venezuela, about 1645 and was destined for Fort Lauderdale Executive Airport (FXE), Fort Lauderdale, Florida.

The pilot reported that the purpose of the flight was to fly the airplane to Boca Raton Airport (BCT), Boca Raton, Florida, for scheduled maintenance with a planned stop at FXE to clear US Customs. While approaching to start the descent to FXE, at flight level 430, the pilots observed a red "9.8 CABIN DFRN" warning message on the crew advisory system (CAS), indicating a maximum cabin differential pressure of 9.8 pounds per square inch differential (psid) or greater, followed by a red "DOOR MAIN" warning message. According to the digital flight data recorder (DFDR), this was preceded 21 seconds by the illumination of the amber Master Caution switch. The pilots then donned oxygen masks and referenced the airplane's quick reference handbook (QRH) for the emergency checklist. The pilots then heard a loud "bam" sound in the cabin and immediately initiated a descent in accordance with the QRH. The pilots manually opened the cabin pressure outflow valve and leveled the airplane at 12,000 ft mean sea level. The DFDR also showed that the 9.8 CABIN DFRN warning illuminated a second time, at 1858:38, and remained illuminated until 1904:14. This was not reported by the flight crew. The pilots continued the flight to FXE unpressurized and landed without further incident. Examination of the airplane the next day revealed structural airframe damage.

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# National Transportation Safety Board - Aircraft Accident/Incident Database

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## AIRPLANE INFORMATION

According to Gulfstream, "The pressurization system controls, regulates and monitors the amount of conditioned air within the pressure vessel to achieve and maintain a safe and comfortable cabin pressure (cabin altitude), up to the airplane's maximum operating altitude. While normally preprogrammed, cabin altitude can also be controlled manually. Cabin conditioned air is also exchanged at regular intervals for occupant comfort."

Normally, the cabin pressurization system limits the cabin pressurization differential to 9.55 +0.1 psid. As differential pressure reaches 9.55 psid, an amber "CABIN DFRN 9.6" caution message is displayed on the CAS. If the pressurization system malfunctions and cannot limit the maximum cabin pressurization differential to 9.55 +0.1 psid, the cabin pressurization relief/safety valve (CPRV) limits pressure differential to 9.7 +0.1 psid. As differential pressure reaches 9.8 psid, a red "CABIN DFRN 9.8" warning message is displayed on the CAS.

## FLIGHT RECORDERS

The airplane was equipped with a digital flight data recorder (DFDR), and the entire accident flight was captured on the DFDR. The DFDR was not designed to record cabin pressure or cabin altitude; however, it recorded CAS messages associated with cabin differential pressure anomalies.

The following is a chronological sequence of events based on the DFDR data with estimated times:

1645:00 - Flight took off from SVMI.

1844:41 - Amber Master Caution switch illuminated (the DFDR did not record the type of message).

1845:02 - A red "9.8 CABIN DFRN" CAS warning message and red Master Warning switch illuminated; the CAS message remained on for 11 minutes 44 seconds.

1846:10 - Pilots acknowledged the amber and red CAS messages (89 seconds after the first CAS illumination).

1847:17 - The airplane began to descend.

1848:28 - Amber Master Caution switch illuminated (the DFDR did not record the type of message); pilots extinguished 5 seconds later.

1853:50 - Red Master Warning switch illuminated (the DFDR did not record the type of message); pilots extinguished 10 seconds later.

1855:18 - Amber Master Caution switch illuminated (the DFDR did not record the type of message); pilots extinguished 24 seconds later.

1856:46 - Red "9.8 CABIN DFRN" message extinguished. Airplane was level at 20,000 ft.

1857:55 - Amber Master Caution switch illuminated (the DFDR did not record the type of message); pilots extinguished 1 second later.

1858:38 - Red "9.8 CABIN DFRN" CAS warning message and red Master Warning switch illuminated.

1904:14 - Red "9.8 CABIN DFRN" extinguished and remained off for the remainder of flight.

1905:52 - "Cabin Pressure Low" CAS message illuminated and remained on for 27 minutes; airplane descended through 13,000 ft.

1905:53 - Red Master Warning switch illuminated (the DFDR did not record the type of message); pilots extinguished 45 seconds later.

1905:59 - Emergency checklist activated for Cabin Pressure Low.

1932:53 - Cabin Pressure Low message extinguished and stayed off for the remainder of flight.

1947:27 - Airplane landed at FXE, 62.7 minutes after the first amber CAS message illuminated in the cockpit.

## POSTACCIDENT EXAMINATION

The day after the accident, the airplane was repositioned to BCT, about 20 miles from FXE, for scheduled maintenance. During the scheduled maintenance, several damaged floor beams on the left side of the fuselage and a damaged frame under the right galley door were noted. Gulfstream maintenance and engineering personnel then examined the airplane and found structural airframe damage, including a cracked floor beam, dimpled areas in the floor boards, damaged structure between ribs, and damaged wing links.

An examination of the outer fuselage revealed that the CPRV static port, located above the CPRV, was completely plugged with a foreign material resembling dried dirt from a mud dauber. According to Gulfstream, a blocked CPRV static port would render the CPRV inoperative due to its inability to measure the cabin-to-atmosphere pressure differential. However, the cabin pressure could still be controlled independently by manual operation of the outflow valve. The cabin could also be depressurized by using ram air, which would shut off bleed air for pressurization. No other mechanical anomalies were found with the pressurization system. The airplane was not repaired and returned to service.; therefore, the reason for the initial overpressurization event could not be determined. According to Gulfstream, an obstructed CPRV static port would be difficult to detect on a preflight walk-around inspection.

Examination of the aural warning system speaker showed evidence of deterioration, and the speaker volume was not functioning properly. An aural caution (double chime) and an aural warning (triple chime) should have accompanied the amber and red cabin differential pressure messages on the CAS. There was no evidence that the flight crew received any aural cautions or warnings.

## Abnormal Procedures

The abnormal procedures in the G-IV QRH addressed both the 9.6- and 9.8-psid scenarios. The 9.6-psid procedure instructed the crew to raise cabin altitude and increase cabin climb rate, if required, and to switch to manual pressurization control in the event that automatic pressurization control was lost. The procedure cautioned the crew to closely monitor the cabin differential pressure and not allow it to exceed 9.8 psid. If cabin psid exceeded 9.8, then the ram air switch should be placed to "RAM" to use ram air, and air from both air conditioning packs should be shut off for pressurization.



# 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	

## Events

1. Initial climb - Unknown or undetermined

## 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# CEN17LA250 07/02/2017 1800 CDT Regis# N9103F Moorhead, MN Apt: Moorhead Municipal JKJ  
Acft Mk/Mdl NORTH AMERICAN T-28A Acft SN 51-7606 Acft Dmg: DESTROYED Rpt Status: Factual Prob Caus: Pending  
Eng Mk/Mdl WRIGHT R-1820 SER Fatal 1 Ser Inj 0 Flt Conducted Under: FAR 091  
Opr Name: TROJAN CORPORATION Opr dba: Aircraft Fire: NONE

## Events

1. Approach-VFR pattern final - Controlled flight into terr/obj (CFIT)
2. Approach-VFR pattern final - Loss of control in flight

## Narrative

### HISTORY OF FLIGHT

On July 02, 2015, about 1800 central daylight time, a North American T-28A airplane, N9103F, registered to and operated by the Trojan Corporation, Grand Forks, North Dakota, clipped a light pole and impacted terrain while on landing approach to Moorhead Municipal Airport (JKJ), Moorhead, Minnesota. The private pilot, the sole occupant on board, was fatally injured, and the airplane was destroyed. The flight was being operated as a 14 Code of Federal Regulations Part 91 personal flight, and no flight plan had been filed. Day visual meteorological conditions existed at the accident site at the time of the accident. The flight originated from Hector International Airport (FAR), Fargo, North Dakota, at 1750, and was originally en route to Lyons Field (47Y), Pelican Rapids, Minnesota.

According to the Federal Aviation Administration (FAA) inspector's statement, the airplane took off from runway 31 at FAR and climbed to 1,800 feet mean sea level (msl), about 900 feet above ground level (agl), at 160 knots. Shortly after reaching 1,800 feet, the pilot radioed FAR departure control and told them he was landing at JKJ. The controller asked the pilot if he needed any assistance and the pilot replied, "I don't think so." The pilot was given clearance to land at JKJ and when asked again if he needed any assistance, he replied "No." The controller told the pilot that a frequency change was approved and squawk VFR (transponder code 1200). There was no reply from the pilot. The controller advised the pilot that radar services were terminated. Again, there was no acknowledgement from the pilot. No further communications were made with the pilot. Radar showed the airplane in a controlled descent on a southerly heading towards JKJ. The descent distance from 1,800 feet msl to the point of impact was approximately 7.5 statute miles (an average descent rate of 120 feet per mile). Field elevation at JKJ was 918 feet.

One witness, located 2 miles north of the accident site, saw the airplane fly over in a southerly direction at an estimated altitude of 150 to 200 feet agl with the landing gear extended. It was "obviously in distress." He said there was a "terrible racket" and sounded like "a gearbox or engine that was failing or out of oil." This witness submitted a written statement to FAA, which is included in this report's docket.,

FAA telephonically interviewed two other witnesses who were in public park 2 miles north of the accident site. The first witness said they airplane flew over at an altitude of about 100 feet agl and that he could clearly see the pilot. He said the engine was missing and popping. The landing gear was down, but he did not notice the flap position. He watched the airplane all the way to impact. The second witness said the airplane was flying "very low" and "sounded like it was in trouble." He also watched the airplane impact the ground.

Clay County Sheriff's deputies interviewed 8 other witnesses, who corroborated what the other witnesses had reported. One noted that the airplane appeared to be flying slow and its wings were "rocking" before it clipped the light pole with its right wing. The light was destroyed but the pole was undamaged.

These witnesses and other passerby went the accident site to assist the pilot, who was conscious, coherent, and talking. A shirt was placed against a large laceration on the pilot's forehead. Shortly thereafter, the pilot succumbed to his injuries. He had to be extricated by emergency personnel.

The accident location was in a corn field, 600 feet south of the Moorhead DOT (Department of Transportation) weigh station, about 2 miles east of Moorhead, Minnesota, along I-94, and «-mile from the approach end of JKJ's runway 12. According to the FAA inspector, there were two open fields and 4 roads between the public park and accident site. The pilot made no attempt to make an emergency landing in either field.

## PERSONNEL INFORMATION

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# National Transportation Safety Board - Aircraft Accident/Incident Database

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The pilot held a private pilot certificate with an airplane single-engine land rating. According to FAA documents, when he applied for medical certification in March 2017, he estimated his total flight time to be 791 hours. His flight time in the T-28A could not be determined.

## AIRCRAFT INFORMATION

N9103F, serial number 51-7606, was manufactured by the North American Aircraft Corporation in 1951, and certificated in the experimental category. It was powered by a Wright R-1820 engine, rated at 1,475 horsepower.

## METEOROLOGICAL INFORMATION

According to the weather observation recorded at KKJK at 1814, the wind was from 030ø at 6 knots, visibility was 10 miles, and the sky was clear. The temperature was 23øC., the dew point was 1øC., and the altimeter setting was 30.07 inches of mercury.

The weather observation recorded at KFAR at about the same time was wind 020ø at 8 knots, visibility 10 miles, and there were a few clouds at 4,800 feet. The temperature was 24øC., the dew point was 12øC., and the altimeter setting was 30.07 inches of mercury.

## WRECKAGE AND IMPACT INFORMATION

According to the FAA inspector's report, the right main landing gear struck the ground first, followed by the nose of the airplane. The impact caused the propeller and gear case to separate from the engine, and were located 20 feet from the impact crater. The fuselage rotated clockwise 180ø and came to rest facing north. The engine separated from the fuselage and was found 60 feet to the south. The right wing separated from the fuselage and was lying inverted slightly behind the aircraft. The right-wing flap was torn off and the outboard end was pointed away from fuselage. The landing gear was extended and the strut was broken off at the axle attachment. The FAA inspector noted paint transfer marks from the light to the right wing of the accident airplane.

The tail section was mostly intact and the right elevator had only tip damage. The horizontal stabilizer was deflected upward at the root. The intact left horizontal stabilizer had impact damage from debris. Flight control continuity could not be conclusively determined due to the extent of aircraft damage. The FAA inspector said the pilot was wearing a lap belt and shoulder harness, but the shoulder harness had failed. The radio was found set to the FAR departure frequency.

First responders placed absorbent pads under the wings to capture leaking fuel. The fuel tanks were drained. The right wing contained 25 gallons and the left wing contained 7 gallons (a total of 12 gallons useable). This fuel total does not include fuel that was in the ruptured header tank or fuel leakage after impact. Hydraulic fluid from severed lines was also leaking on the ground.

## MEDICAL AND PATHOLOGICAL INFORMATION

The Ramsey County Medical Examiner's Office conducted an autopsy on the pilot. Death was attributed to "multiple traumatic injuries."

FAA's Bioaeronautical Sciences Research Laboratory in Oklahoma City, Oklahoma, conducted toxicology tests on samples from the pilot. According to the toxicology report, no carbon monoxide was detected in cavity blood, and no ethanol was detected in vitreous. Diphenhydramine was detected in urine and cavity blood. Diphenhydramine is an antihistamine used in the treatment of sneezing, runny nose, watery eyes, and motion sickness.

## TESTS AND RESEARCH

On July 5, using the operator's mechanics, the engine was disassembled and examined under FAA auspices at Tri-State Aviation, Wahpeton, North Dakota. According to the FAA inspector's statement, the engine -- a Curtis Wright R1820-86B, SN: W507436 -- was running as reported by witnesses. Damage to the

propeller and gear case was consistent with the engine developing power. The engine had no visible signs of failure. The oil filter was free from contamination, and no metal or carbon deposits were visible. Oil specimens were sent to Aviation Laboratories for analysis. According to its report, the specimens were within normal ranges.

The FAA inspector removed the airspeed indicator, manifold pressure gauge, and tachometer. Examination of these instruments revealed no transfer marks to indicate the power setting at the time of impact. After consulting with other T-28 pilots, the inspector learned that the engine would have to be developing power for the airplane to remain airborne in the landing configuration. The inspector calculated the airplane flew 1.6 miles in landing configuration before it impacted terrain.

# National Transportation Safety Board - Aircraft Accident/Incident Database

Incident Rpt# DCA17IA202B 09/21/2017 1920 EDT Regis# R20087

Staten Island, NY

Acft Mk/Mdl SIKORSKY UH60

Acft Dmg: MINOR

Rpt Status: Prelim Prob Caus: Pending

Fatal 0 Ser Inj 0

Flt Conducted Under: FAR ARMF

Opr Name: US ARMY

Opr dba:

Aircraft Fire: NONE

AW Cert: NON

## Events

1. Enroute - Midair collision

## Narrative

On September 21, 2017, at 1920 eastern daylight time, a Sikorsky UH-60M Black Hawk helicopter, R20087, operated by the U.S. Army as CAVM087 ("Caveman 87"), collided with a D...-Jiang Innovations (DJI) Phantom 4 small unmanned aircraft system (sUAS, commonly known as a drone) operated by an individual. The collision occurred at about 300 feet above mean sea level, 1 mile east of Midland Beach, Staten Island, NY, in the vicinity of Hoffman Island. The helicopter experienced minor damage, the drone was destroyed. There were no injuries or ground damage.

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# National Transportation Safety Board - Aircraft Accident/Incident Database

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Accident Rpt# GAA18CA036 11/05/2017 1830 UTC Regis# N893CA Las Vegas, NM Apt: Las Vegas Muni LVS  
Acft Mk/Mdl SOCATA TBM 700-NO SERIES Acft SN 393 Acft Dmg: SUBSTANTIAL Rpt Status: Prelim Prob Caus: Pending  
Fatal 0 Ser Inj 0 Flt Conducted Under: FAR 091  
Opr Name: Opr dba: Aircraft Fire: NONE

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