

# National Transportation Safety Board - Aircraft Accident/Incident Database

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Accident Rpt# CEN17LA234	06/17/2017 1330 EDT	Regis# N33778	Mount Vernon, OH	Apt: Wynkoop Airport 6G4
Acft Mk/Mdl AERONCA 65 CA-NO SERIES		Acft SN C13421	Acft Dmg: MINOR	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl CONT MOTOR A&C65 SERIES			Fatal 1 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: HOOVER LARRY L		Opr dba:		Aircraft Fire: NONE

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## Events

1. Prior to flight - AC/prop/rotor contact w person

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## Narrative

On June 17, 2017, about 1330 eastern daylight time, an Aeronca 65-CA airplane, N33778, experienced a propeller blade strike during an attempted hand prop of the engine at the Wynkoop Airport (6G4), Mount Vernon, Ohio. The pilot, and intended sole occupant, was fatally injured and the airplane sustained minor damage. The airplane was registered to and operated by a private individual under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Visual meteorological conditions prevailed for the planned flight.

Information collected by the responding Federal Aviation Administration (FAA) inspector and an Ohio State Patrol officer, indicate the pilot attempted to start the engine by hand-propping the airplane.

According to a person located at 6G4, the pilot had flown in arrived at 6G4 earlier and was to depart. The person added that the pilot tied the tail of the airplane off with a nylon rope that he had brought with him. The airplane wheels were not chocked and the pilot was having difficulties starting the engine. The witness was in the hangar when he heard the airplane start at a high rpm, so he quickly stepped outside. The witness reported the airplane had broken the rope and was taxiing around in circles while the pilot attempted to stop the airplane. The witness joined the pilot in trying to stop the airplane; however, the propeller struck the pilot, knocking him down.

The airplane eventually came to stop further down the runway.

The vintage airplane was not equipped with an electrical system or an electric starter.

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Accident Rpt# WPR16FA046 01/04/2016 1615 MST Regis# N912EB Alpine, WY Apt: N/a  
Acft Mk/Mdl AEROSTAR S A YAK 52-NO SERIES Acft SN 832912 Acft Dmg: DESTROYED Rpt Status: Factual Prob Caus: Pending  
Eng Mk/Mdl VENDENYEV M14P Fatal 2 Ser Inj 0 Flt Conducted Under: FAR 091  
Opr Name: WYOMING WINGS LLC Opr dba: Aircraft Fire: NONE  
AW Cert: SPE

## Summary

The pilot was conducting a local aerobatic flight with a pilot-rated passenger occupying the rear seat (which was equipped with flight controls). The pilot's son was flying another airplane, returning to the home airport after a local sightseeing flight. The airport was at the southeast corner of a reservoir, which surrounded the airport on three sides (all but the east side). The accident site was located on flat, featureless, snow-covered terrain northwest of the airport. The son reported that, as he was flying north away from the airport over the west side of the reservoir, it was frozen over, and covered with snow. He stated that the surface was flat with no cracks, and the lighting was flat as well so that he had difficulty judging his height above the ground. As he continued north, the surface showed some cracks, which helped him with height visualization. About 7 miles north of the airport, he transitioned to the east side of the reservoir, and headed south toward the airport. The son's airplane was about 200 ft above ground level and several miles from the runway on final approach, when an exchange of radio transmissions led the son to believe that his father was going to pass by him. He never saw his father's airplane. An airplane witness had just taken off from the airport in another airplane; he saw the son's airplane on a 2-mile final approach and then saw a debris field forming as the accident airplane impacted the ground behind the son's airplane.

Examination of the accident site and the wreckage indicated that the airplane impacted the ground at high speed in a near level attitude, consistent with controlled flight into terrain. No evidence of any preimpact mechanical malfunctions or anomalies was found. It is likely that, as a result of the flat light conditions described by the pilot's son, the pilot did not realize he was descending over the featureless, snow-covered terrain.

The pilot had undiagnosed heart disease, which placed him at significant risk for sudden severe impairment/incapacitation from an acute cardiovascular event such as a heart attack, arrhythmia, or stroke. However, the operational evidence indicated that this crash was controlled flight into terrain with a pilot rated passenger in the rear seat who could have taken over in the event the pilot became severely impaired or incapacitated. As a result, it is unlikely the pilot's heart disease contributed to the accident.

## Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The pilot's failure to maintain clearance from snow-covered terrain in flat light conditions.

## Events

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

## Findings - Cause/Factor

1. Personnel issues-Psychological-Attention/monitoring-Monitoring environment-Pilot - C
2. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Altitude-Not attained/maintained - C
3. Environmental issues-Conditions/weather/phenomena-Light condition-Flat light-Decision related to condition - C
4. Environmental issues-Physical environment-Terrain-Snowy/icy terrain-Awareness of condition

## Narrative

### HISTORY OF FLIGHT

On January 4, 2016, about 1615 mountain standard time, an experimental Aerostar SA YAK-52, N912EB, collided with terrain while maneuvering near Alpine Airport, Alpine, Wyoming. The private pilot and the pilot-rated passenger sustained fatal injuries; the airplane was destroyed. The airplane was registered to and operated by Wyoming Wings LLC under the provisions of 14 Code of Federal Regulations Part 91. The local personal flight departed Alpine Airport about 1530. Visual meteorological conditions prevailed, and no flight plan had been filed.

Family members reported that the accident airplane departed, and went to an area northwest of the airport where the pilot planned to perform aerobatic maneuvers. Two other airplanes, one flown by the accident passenger's father, and the other by the accident pilot's son, then departed on local sightseeing flights. The passenger's father returned to the airport, landed on runway 13, and turned the airplane toward the southwest on a taxiway as he prepared to depart on runway 31, which was standard practice at the airport when winds permitted. He saw the YAK performing aerobatics west of the airport and heard the accident pilot's son report on a 3-mile final straight in for runway 13. He departed runway 31, and immediately turned 90° to the west to clear the area for the landing traffic. As he reached pattern altitude, he saw the debris field forming on the snow-covered ground behind the accident pilot's son's airplane, which was

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on a 2-mile final approach. He flew over the site, and broadcast that the YAK was down. He made a couple of passes over the site before landing. He noted that the sky was slightly cloudy, and low light conditions were present.

The accident pilot's son stated that he departed after his father, and flew along the east side of a reservoir before turning south to overfly the family's home. He returned to the north and maneuvered to the west side of the reservoir. As he proceeded north, he descended over the reservoir, which was frozen over and covered with snow. He stated that the surface had no cracks, and the lighting was flat so that he had difficulty judging his height above the ground. As he continued north, the surface showed some cracks, which helped him with height visualization. About 7 miles north of the airport, he transitioned to the east side of the reservoir, and headed south toward the airport. He was about 5 miles from the airport, and made a radio call that he was going to land on runway 13. He saw the accident passenger's father's airplane take off and turn to the west. He was about 100 to 200 ft above the ground and over the reservoir about 3 miles from the airport when he heard his father in the YAK make a radio call indicating that the YAK was either going to join up or do a flyby. Because of that transmission, he decided to do a go-around and fly over the airport rather than land. He reported that he and his father had done formation flying, join ups, and flybys previously, and typically his father would break the maneuver off after the join up and low approach. He looked over his shoulder for the join up at his 4- and 7-o'clock positions, and listened for a radio call from his father. The call did not come, and he never saw the YAK. He then heard the accident passenger's father radio him, and realized that something was wrong. He proceeded to the area where the other airplane was circling, and saw a disturbance in the snow. He flew above the other airplane until it departed to land.

An airport resident, who had heard the radio transmissions, went to his window, and was looking for the YAK to fly over. After hearing the conversations, he contacted the pilots in the air and notified the local emergency authorities.

## PERSONNEL INFORMATION

## AIRCRAFT INFORMATION

## METEOROLOGICAL CONDITIONS

## WRECKAGE AND IMPACT INFORMATION

The airport was at the southeast corner of the reservoir, which surrounded the airport on three sides (all but the east side). The accident site was located on flat, featureless, snow-covered terrain about 2 miles northwest of the airport, and near the extended centerline for the final approach to runway 13. The debris field was 578 ft long on a magnetic heading of 122ø. The first identified point of contact was a crater, which measured about 15 ft long, 6 ft wide, and 2 ft deep. On the left side of the beginning of the crater was a piece of the left wing-tip and the pitot tube with about 1 ft buried in the soft dirt; a few feet farther into the crater was a piece of the left aileron. At the end of the crater was a separated propeller blade. The left wing fragmented into several pieces, and most of them were in the first half of the debris field. The inverted right wing was about 400 ft into the debris field along the debris path centerline. The main wreckage consisting of the fuselage and empennage was 500 ft into the debris field. The last major component was the separated engine, which was at the end of the debris field.

The airplane was highly fragmented. All control surfaces and major components of the airplane were identified in the debris field. The airplane had flight controls for both the front and rear seat pilots. All identified disconnects in flight control push-pull tubes were angular and jagged; all identified disconnects in flight control cables were splayed.

The propeller was separated from the engine crankshaft along with the crankshaft propeller flange. The spinner was crushed and exhibited thermal damage. Two of the three blades were separated from the propeller hub. The remaining propeller blade was melted outboard of the mid span point. The remaining portion of crankshaft exposed from the front of the engine case exhibited extensive spiral cracking throughout half of its respective circumference.

## MEDICAL AND PATHOLOGICAL INFORMATION

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The Booneville County Coroner's Office, Idaho Falls, Idaho, completed an autopsy of the pilot, and the cause of death was reported as the effect of blunt force injuries. Examination of the body for natural disease during the autopsy was limited by the severity of the pilot's injuries but identified evidence of severe coronary artery disease with areas of up to 80% stenosis and microscopic evidence of damage to the heart muscle from previous ischemia.

The FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed toxicological testing of specimens from the pilot, which were negative for performance enhancing drugs or alcohol. The laboratory did not perform tests for carbon monoxide or cyanide.

The drug valsartan was detected in liver and kidney.

A review of medical records indicated that the 61-year-old male pilot, who was seated in the front seat, had reported to the FAA that he had high blood pressure, high cholesterol, and a recent diagnosis of diabetes. At time of his last medical exam, on May 24, 2014, he reported using valsartan for blood pressure, ezetimibe and simvastatin in combination as well as fenofibrate for high cholesterol, and metformin for diabetes. None of these medications carry warnings about performance impairment. His treating physician reported excellent control of his diabetes on his treatment regimen with a hemoglobin A1C of 6.6%.

The 17-year-old female passenger, who was seated in the rear seat, had reported no medical conditions and no medications to the FAA during her only medical exam, dated May 21, 2014. No autopsy was performed and no specimens for toxicology analysis were obtained.

## ADDITIONAL INFORMATION

The FAA pamphlet "Flying in Flat Light and White Out Conditions" states in part:

Flat light is an optical illusion, also known as "sector or partial white out." It is not as severe as "white out" but the condition causes pilots to lose their depth-of-field and contrast in vision. Flat light conditions are usually accompanied by overcast skies inhibiting any good visual clues. Such conditions can occur anywhere in the world, primarily in snow covered areas but can occur in dust, sand, mud flats, or on glassy water. Flat light can completely obscure features of the terrain, creating an inability to distinguish distances and closure rates. As a result of this reflected light, it can give pilots the illusion of ascending or descending when actually flying level.

Chapter 17 page 10 of the FAA's Pilot's Handbook of Aeronautical Knowledge discusses featureless terrain illusions. It states that an absence of surrounding ground features, as in an overwater approach, over darkened areas, or terrain made featureless by snow, can create an illusion that an aircraft is at a higher altitude than it actually is during a landing approach. This illusion, sometimes referred to as the "black hole approach," causes pilots to fly a lower approach than is desired.

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Accident Rpt# WPR17LA202	09/12/2017 1337	Regis# N9798L	Roy, UT	Apt: Ogden-hinckley Airport OGD
Acft Mk/Mdl BEECH A24R		Acft SN MC-117	Acft Dmg: SUBSTANTIAL	Rpt Status: Prelim Prob Caus: Pending
Eng Mk/Mdl LYCOMING IO-360-A1B			Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: LAWRENCE ERICK		Opr dba:		Aircraft Fire: GRD
				AW Cert: STN

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## Events

1. Initial climb - Loss of engine power (partial)
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## Narrative

On September 12, 2017, about 1337 mountain daylight time, a Beechcraft A24R, N9798L, experienced a partial loss of engine power shortly after takeoff from the Ogden-Hinckley Airport (OGD), Ogden, Utah and landed onto a roadway about one mile southwest of the airport. The pilot (sole occupant) and one person in a vehicle (sole occupant) sustained minor injuries. The airplane was registered to, and operated by, the pilot as a 14 Code of Federal Regulations Part 91, personal flight. Visual meteorological conditions prevailed at the time of the accident, and no flight plan was filed. The flight originated from OGD about 1336.

The pilot reported the airplane recently came out of inspection. After a few engine runs on the ground, the pilot took off to practice touch and go landings. During the takeoff sequence, all instruments indicated normal. The airplane climbed to about 200 feet and he observed the engine was not producing power. The pilot turned on the fuel boost pump, checked the magnetos, changed fuel tanks, and enriched the mixture, but the airplane still would not climb. He executed a landing onto the road; during which, the airplane impacted a car before impacting the ground and sliding to stop. The pilot evacuated the airplane as it was consumed by fire.

The airplane has been recovered for further examination.

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Accident Rpt# CEN17LA357	09/15/2017 1620 CDT	Regis# N18403	Mcalister, OK	Apt: McAlester Regional Airport MLC
Acft Mk/Mdl BEECH A36		Acft SN E-1120	Acft Dmg: SUBSTANTIAL	Rpt Status: Prelim Prob Caus: Pending
Eng Mk/Mdl CONTINENTAL IO-520-BB		Acft TT 2515	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: GRANT HUMPHREYS		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

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## Events

1. Approach - Loss of engine power (total)
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## Narrative

On September 15, 2017, at 1620 central daylight time, a Beech A36, N18403, collided with a haybale during a forced landing following a loss of engine power while on approach to the McAlester Regional Airport (MLC), McAlester, Oklahoma. The private pilot received minor injuries. The airplane was substantially damaged. The airplane was registered to Travel Air LLC and was being operated by the pilot as a 14 Code of Federal Regulations Part 91 personal flight. Visual flight rules conditions existed near the accident site at the time of the accident. The pilot had canceled his instrument flight rules flight plan when he had MLC in sight. The flight departed from the Garner file Airport (UVA), Uvalde, Texas, at 1357.

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Accident Rpt# ERA17LA325	09/14/2017 1130 EDT	Regis# N2120W	Machias, ME	Apt: Machias Valley Airport MVM
Acft Mk/Mdl BEECH C23-NO SERIES		Acft SN M-1492	Acft Dmg: SUBSTANTIAL	Rpt Status: Prelim Prob Caus: Pending
Eng Mk/Mdl LYCOMING O-360		Acft TT 2550	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: MAINE INSTRUMENT FLIGHT		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

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## Events

1. Approach-VFR pattern base - Loss of engine power (total)

## Narrative

On September 14, 2017, about 1130 eastern daylight time, a Beech C23, N2120W, operated by Maine Instrument Flight, was substantially damaged during a forced landing, following a total loss of engine power while on approach to Machias Valley Airport (MVM), Machias, Maine. The private pilot was not injured. The instructional flight was conducted under the provisions of 14 Code of Federal Regulations Part 91. Visual meteorological conditions prevailed and a visual flight rules flight plan was filed for the flight that departed Augusta State Airport (AUG), Augusta, Maine, about 1015.

The pilot was accruing cross-country flight experience for his commercial license. The pilot reported that he and his flight instructor reviewed his flight planning for a three-leg cross-country flight and he departed with full fuel. During the first leg, about 10 miles from MVM, the pilot descended the airplane to the airport traffic pattern altitude. While in the traffic pattern, as the airplane was turning on to a left base leg for the runway, the engine began to run rough. The pilot verified that the mixture was full rich and the fuel boost pump was on. He also applied carburetor heat, but the engine lost all power about 15 to 20 seconds later.

The pilot then turned the airplane directly toward the runway, which resulted in a 45° angle to the runway threshold. The pilot realized that the airplane was not going to glide all the way to the runway threshold and prepared to land in a grass area just prior to the runway. During the landing, the landing gears sank into soft ground and the nosewheel touched down hard, which collapsed the nosegear. The airplane spun 180° and came to rest upright in the grass area.

Examination of the airplane by a Federal Aviation Administration inspector revealed damage to the right wing spar. The inspector noted that 20 gallons of fuel per wing were removed from the airplane. The magnetos, fuel boost pump and engine driven fuel pump tested satisfactorily. The carburetor was intact and its screens were absent of debris. The fuel bowl was also absent of debris. The inspector rotated the propeller by hand and noted camshaft, crankshaft, and valve train continuity to the rear accessory section of the engine. The engine was retained for a possible test run.

Hancock County-Bar Harbor Airport (BHB), Bar Harbor, Maine was located about 40 miles west of the accident site. The recorded weather at BHB, at 1156, was: wind from 180° at 5 knots; visibility 10 miles; sky clear; temperature 24° C; dew point 17° C; altimeter 29.83 inches of mercury.

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Accident Rpt# CEN17LA348	09/12/2017 1300 CDT	Regis# N9368Y	South Bend, IN	Apt: South Bend International Airpo SBN
Acft Mk/Mdl BEECH N35-NO SERIES		Acft SN D-6569	Acft Dmg: SUBSTANTIAL	Rpt Status: Prelim Prob Caus: Pending
Eng Mk/Mdl CONTINENTAL IO-470			Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: JAMES LEE POSTLEWAIT		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

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## Events

1. Approach - Loss of engine power (partial)
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## Narrative

On September 12, 2017, about 1300 central daylight time, a Beech N35 airplane, N9368Y, was substantially damaged during a forced landing near South Bend International Airport (SBN), South Bend, Indiana. The commercial pilot and passenger were not injured. The personal flight was conducted under the provisions of 14 Code of Federal Regulations Part 91. Visual meteorological conditions prevailed and no Federal Aviation Administration (FAA) flight plan had been filed for the flight. The flight departed Johnson County Executive Airport (OJC), Olathe, Kansas, about 0930, and was en route to SBN.

According to the pilot, while on final approach for runway 9R, the engine "missed". The pilot attempted to increase engine power by advancing the engine throttle control forward. There was no response from the engine. During the forced landing the main landing gear clipped the elevated island between two oncoming lanes of traffic. The airplane bounced and struck a car before coming to rest in the grass adjacent to the road. The left wing was bent and buckled during the forced landing.



# National Transportation Safety Board - Aircraft Accident/Incident Database

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Accident Rpt# ERA17LA285	08/20/2017 1200 EDT	Regis# N9526	St Marys, PA	Apt: N/a
Acft Mk/Mdl BELL 47G-2A		Acft SN 1288-16	Acft Dmg: SUBSTANTIAL	Rpt Status: Prelim Prob Caus: Pending
Eng Mk/Mdl LYCOMING VO-540 SERIES			Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name:		Opr dba:		Aircraft Fire: NONE
				AW Cert: SPR

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## Events

1. Enroute-cruise - Loss of engine power (total)
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## Narrative

On August 20, 2017, at 1200 eastern daylight time, a Bell 47G-2A, N9526, was substantially damaged during a hard landing at St Marys, Pennsylvania. The student pilot was not injured. The helicopter was registered to and operated by the pilot under the provisions of 14 Code of Federal Regulations Part 91 as a local, solo-instructional flight. Day, visual meteorological conditions prevailed at the time, and no flight plan was filed. The flight originated at St Marys Municipal Airport (OYM), St Marys, Pennsylvania about 1030.

The pilot reported that he had been flying in the local area for about 90 minutes when the engine abruptly stopped running. He selected a small, grass lot to perform an autorotation. During the touchdown, the helicopter landed hard. He egressed from the helicopter and was assisted by first responders.

An inspector with the Federal Aviation Administration reported that the helicopter came to rest upright in a grassy lot, about 2.6 miles west of OYM. The fuselage was structurally damaged. The landing gear skids were spread and forced up, against the fuselage. The main rotor blades were bent. There was no fire.

The wreckage was retained for further examination.

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Accident Rpt# GAA17CA455	07/28/2017	1530 CDT	Regis# N6368K	Mckinney, TX	Apt: Mckinney National TKI
Acft Mk/Mdl CESSNA 150-M			Acft SN 15077669	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl CONT MOTOR O-200 SERIES				Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: ASHLEY HURT			Opr dba:		Aircraft Fire: NONE
					AW Cert: STN

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## Events

1. Landing - Abnormal runway contact

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## Narrative

The student pilot reported that, during landing, the airplane bounced. She added that, upon the second touchdown, the airplane landed on the nose landing gear and it collapsed.

The airplane sustained substantial damage to the firewall.

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

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Accident Rpt# GAA17CA540    09/15/2017 2000 EDT    Regis# N5396D    Lynchburg, VA    Apt: Falwell W24  
Acft Mk/Mdl CESSNA 172-N    Acft SN 17272562    Acft Dmg: SUBSTANTIAL    Rpt Status: Prelim    Prob Caus: Pending  
Fatal 0    Ser Inj 0    Flt Conducted Under: FAR 091  
Opr Name: ETHAN COCKERHAM    Opr dba:    Aircraft Fire: NONE

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# National Transportation Safety Board - Aircraft Accident/Incident Database

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Accident Rpt# ERA17CA250	07/19/2017 2027 EDT	Regis# N4876F	Factoryville, PA	Apt: Factoryville-seamans 9N3
Acft Mk/Mdl CESSNA 172-N		Acft SN 17273094	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl LYCOMING O-320 SERIES		Acft TT 15424	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: ENDLESS MOUNTAINS AIR INC		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

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## Events

1. Landing-landing roll - Runway excursion
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## Narrative

The private pilot reported that he had recently returned to flying after a lengthy period of inactivity, and this was his first solo flight after completing a comprehensive flight review. According to the pilot, after completing the traffic pattern, he landed the airplane at the midpoint of the 2,400-foot runway with 10 knots of excess airspeed and a slight tailwind. Despite maximum braking, the airplane overran the departure end of the runway and struck dense brush, which resulted in substantial damage to the engine firewall. The pilot further reported that there were no preimpact 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# ERA17LA319	08/23/2017 2030 CDT	Regis# N97116	Gulf Shores, AL	Apt: Jack Edwards JKA
Acft Mk/Mdl CESSNA 172-P		Acft SN 17276155	Acft Dmg: SUBSTANTIAL	Rpt Status: Prelim Prob Caus: Pending
Eng Mk/Mdl LYCOMING O-320 SERIES			Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: SKYWARRIOR FLIGHT TRAINING		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

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## Events

1. Landing-flare/touchdown - Hard landing

## Narrative

On August 23, 2017, about 2030 central daylight time, a Cessna 172P, N97116, was substantially damaged during landing at the Jack Edwards Airport (JKA), Gulf Shores, Alabama. The commercial pilot was not injured. Visual meteorological conditions prevailed for the personal flight conducted under the provisions of 14 Code of Federal Regulations Part 91. No flight plan was filed for the flight that departed the Pensacola International Airport (PNS), Pensacola, Florida.

The pilot stated that before he departed PNS, he noted that the elevator trim was in the full nose-up position. He reset it to the "takeoff" position and completed his before-takeoff checklist and engine run-up procedures. He said that during takeoff, he needed more back pressure on the control yoke than he was used to, so he trimmed the elevator trim tab up to reduce pressure. The flight to JKA was uneventful and he made a normal approach to runway 17. The pilot said that he reduced engine power to idle and began the landing flare. However, when he pulled back on the control yoke, the nose of the airplane did not come up as expected. The airplane landed hard and bounced four or five times before the pilot could stop the airplane on the runway. He said he tried to taxi off the runway onto a taxiway, but he was unable to steer the airplane.

A Federal Aviation Administration (FAA) maintenance inspector conducted a postaccident examination of the airplane. The examination revealed the firewall was wrinkled, the nose wheel was bent, and both propeller blades were damaged from contact with the ground. The control yoke had minimal movement due to the upper yoke control tubes at the chain sprocket binding against the aluminum channel brace due to the bent firewall. The inspector also noted that the elevator trim tab cable had slack and was not rigged correctly. When the trim tab wheel was moved, the cable's center travel block was catching on the aft tail cone bulkhead.

The pilot held a commercial pilot certificate for rotorcraft with an instrument rating for rotorcraft-helicopter. He was enrolled in a Rotorcraft Transition Program, where he would earn his private pilot certificate for airplane single-engine land, then obtain a commercial pilot certificate for airplane multiengine land, and then attend a new-hire class for PSA airlines. His last FAA first class medical certificate was issued on June 30, 2017. The pilot reported he had accrued about 30 hours of fixed-wing, airplane single-engine land, flight time.

Weather reported at JKA, about the time of the accident, included calm wind, visibility 10 miles and clear skies.

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Accident Rpt# CEN15FA378	08/21/2015 730 CST	Regis# N8265B	Martinville, IL	Apt: N/a
Acft Mk/Mdl CESSNA 172-UNDESIGNAT		Acft SN 36065	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl CONT MOTOR 0-300 SER		Acft TT 3751	Fatal 1 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: GOODWIN DAVID S		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

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## Summary

The non-certificated pilot departed in the airplane for a personal flight. The airplane crashed in a soybean field about 11 miles from the departure airport. There were no witnesses, no recorded radar data, and no recorded radio transmissions from the pilot. Ground scars indicated that the airplane impacted the ground in about a 30° nose-down attitude. Two tracks correlating to the dimensions of the left main and nose landing gears extended about 294 ft on the tops of the soybean crop before the initial ground impact. All ground scars and damage to the airplane correlated to ground impact with high momentum. No evidence of pre-impact anomalies was found during postaccident examination of the airframe, engine, and propeller.

Although the pilot was being treated for metastatic colon cancer there is no evidence that the cancer or its treatment impaired his ability to operate the airplane and it is unlikely that it contributed directly to the accident. Toxicology testing found the impairing medications; alprazolam, codeine, fentanyl, and oxycodone.

Given the pilot's lack of certification, his limited recent experience, and his operation of the airplane while taking disqualifying and potentially impairing medications, it is likely that the pilot failed to maintain adequate clearance from terrain while intentionally flying at low altitude. Although the pilot was likely impaired by the combination of multiple medications, the investigation could not determine to what degree the pilot's lack flight skills and experience or impairment from multiple medications contributed to the loss of control of the airplane.

## Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The non-certificated pilot's failure to maintain clearance from terrain.

## Events

1. Maneuvering - Low altitude operation/event
2. Maneuvering-low-alt flying - Loss of control in flight

## Findings - Cause/Factor

1. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Altitude-Not attained/maintained - C
2. Personnel issues-Action/decision-Action-Incorrect action performance-Pilot - C
3. Personnel issues-Experience/knowledge-Experience/qualifications-Qualification/certification-Pilot
4. Personnel issues-Experience/knowledge-Experience/qualifications-Total experience-Pilot
5. Personnel issues-Experience/knowledge-Experience/qualifications-Recent experience-Pilot
6. Personnel issues-Physical-Impairment/incapacitation-Prescription medication-Pilot

## Narrative

### HISTORY OF FLIGHT

On August 21, 2015, about 0730 central standard time, a Cessna 172 airplane, N8265B, was substantially damaged when it collided with terrain under unknown circumstances near Martinsville, Illinois. The non-certificated pilot, who was the sole occupant and owner of the airplane, sustained fatal injuries. The flight was being conducted under the provisions of 14 Code of Federal Regulations Part 91. Visual meteorological conditions prevailed throughout the area at the time of the accident, and no flight plan was filed for the personal flight that originated from the Casey Municipal Airport (1H8), Casey, Illinois, about 0700.

There were no witnesses to the accident, and no radio or distress calls were heard from the pilot. There was no available radar information for the flight.

A person who was at 1H8 on the morning of the accident was interviewed. He reported that he saw a grey pickup truck near the center of the taxiway that he usually used. He did not see any aircraft or activity, but he noticed that a hangar door on the south end of the center row of hangars was open. During the investigation, it was determined that the grey truck belonged to the pilot and that the open hangar was the pilot's hangar where he stored the airplane.

The pilot's nephew stated that the pilot would normally fly early in the morning from Casey Airport to check on his fields. The pilot owned property near the accident site, and he liked to fly over the property because of the openness and lack of power lines. She had been in contact with the pilot on the evening before the flight. She also stated that the pilot was taking prescription medications for an ongoing illness. Neither family member knew the reason for the flight;

both said that the pilot was preparing to sell the airplane.

## PERSONNEL INFORMATION

According to information provided by the FAA, the pilot did not hold a pilot certificate. The records showed that the pilot had been issued a third-class medical/student pilot certificate on March 24, 2003, that expired on March 31, 2005. The flight time reported on his medical certificate application was 80 hours. No recent flight time records or logbooks for the pilot were found. There were no records found of anyone other than the pilot flying the airplane. Based on the airplane's tachometer time, the pilot had flown the accident airplane about 0.8 hours in the previous 4 months.

## AIRCRAFT INFORMATION

According to FAA records, the 1957 Cessna 172, powered by a Continental O-300 engine, was last registered by the pilot on April 30, 2015. Review of available logbooks for the airplane indicated that the most recent annual inspection of the airframe and engine was completed on March 11, 2015. No outstanding items or uncorrected defects were noted. At the time of the inspection, the engine time was 832.5 hours since major overhaul, and the airframe total time was 3,750.1 hours. The previous annual inspection was completed in 2006. According to the logbooks, the airplane was flown about 6.3 hours between the 2006 and 2015 annual inspections and 0.8 hours between the last annual inspection and the accident.

During an interview, the certified mechanic who completed the most recent annual inspection stated that he rarely saw the airplane fly over the years but, on a few occasions, saw the airplane returning to the airport in the morning when he reported to work. He stated that he flew with the accident pilot after the 2006 annual inspection was completed and that the pilot asked him to take the left seat but never mentioned that he was a student pilot.

On February 25, 2015, 5.5 gallons of 100LL fuel was added to the airplane and then drained out to flush/clean the fuel systems/tanks during maintenance. On March 11, 2015, 36.1 gallons of 100LL fuel was added to the airplane. The airplane total fuel capacity was 42 gallons with 5 gallons total unusable.

## METEOROLOGICAL INFORMATION

The nearest weather reporting facility was located at the Coles County Memorial Airport, Mattoon, Illinois, about 35 miles west of the accident site. At 0753, the facility reported clear skies, temperature 72øF, dew point 68øF, visibility 10 miles, and altimeter setting 30.12 inches of mercury.

## WRECKAGE AND IMPACT INFORMATION

Local authorities found the wreckage in a mature bean field about 11.5 miles southeast of 1H8 the day following the accident.

The initial ground scar and the damaged mature bean crop (3-4-ft tall crop) were consistent with the airplane impacting the flat, soft soil in about a 30ø nose-down attitude. Ground scars were consistent with the airplane skidding forward about 20 ft, bouncing, impacting the ground again, and coming to rest inverted. Two tracks correlating to the dimensions of the left main and nose landing gears, extended about 294 ft on the tops of the soybean crop before the initial ground impact. All ground scars correlated to ground impact with high momentum. The engine, with attached propeller assembly, was found separated from the airframe (except for tachometer cables). The empennage of the airplane was found partially detached from the airframe due to impact forces, except for the rudder and elevator control cables.

Detailed examinations of the airframe and engine were conducted on August 23 and 24, 2015, at the facilities of Casey Municipal Airport.

## Cockpit/Cabin/Fuselage

The cockpit roof section was crushed downward into the instrument panel. The engine firewall was crushed aft into the instrument panel. The cockpit floor from the engine firewall aft to the rudder pedals was crushed upward. The throttle, mixture, and carburetor heat knobs were found in the full forward positions. The pilot seat was found locked in the last seat rail hole. The seat rail exhibited no gouge marks forward of the lock hole. The pilot's seat exhibited deformation consistent with impact damage. The airplane was equipped with a 2-point (lap belt) safety restraint system. The lap belt had been cut by first responders. The airspeed indicator needle was found at the 80-mph position.

## Aft Fuselage/Empennage

The empennage aft of the rear cabin window was separated, except for the rudder and elevator flight control cables and the elevator trim control cables. The separation exhibited signatures consistent with impact damage. The vertical stabilizer remained partially attached to the empennage. The rudder remained attached to the vertical stabilizer. Both horizontal stabilizers remained attached to the empennage. The right horizontal stabilizer was bent up and aft. The right elevator with attached trim tab remained attached to the right horizontal stabilizer.

## Wings

Both wings remained attached to the fuselage. The left wing leading edge, about midsection outboard to the wing tip, exhibited an aft diagonal buckle. The left wing leading edge, about midsection inboard to the wing root, exhibited aft crushing. The right wing leading edge exhibited aft crushing. Both ailerons remained attached to their respective wing attachment points. Both wing flaps remained attached to their respective wing attachment points.

## Flight Controls

Flight control cable continuity was confirmed from the cockpit to each flight control surface. All the cable separations exhibited signatures consistent with cable cuts made during airplane retrieval from the accident site. The right aileron push/pull rod was separated, and the separation surfaces exhibited signatures consistent with tension overload and impact forces. The right elevator trim actuator extension was measured to be about 1 and 1/8 inches, which corresponded to about a 5ø trim tab trailing edge down (airplane nose up) deflection. The elevator trim cockpit indicator was impact damaged. The wing flaps were found in the full retracted position. The mechanical flap lever was found in the full retract position/detent.

## Fuel

The fuel selector valve handle was found in the "BOTH" position. The fuel selector valve was removed from the airplane, and it was verified that the valve ported to the wing fuel tank ports. The fuel selector valve was rotated by hand to the left, right, both, and off detents with normal operation. Both wing fuel filler caps were found installed on the airplane. Both fuel caps were removed, and no fuel was noted in the fuel tanks, which were compromised by impact damage. It was noted that the airplane had been resting inverted for about 24-hours after the accident. A smell consistent with aviation gasoline 100LL was evident in each wing fuel tank and at the accident site.

## Engine - Continental O-300

Examination of the engine revealed a 3x4 inch hole in the bottom portion of the engine case, behind the throttle body mount, which was separated from the case. The case damage correlated to impact forces. Valve train continuity and engine compression at each cylinder was confirmed by rotating the engine crankshaft propeller flange. All spark plugs were removed and examined. All spark plugs exhibited normal wear according to the Champion Check-A-Plug Card. Both magnetos remained attached to the engine. Both magnetos were removed from the engine and rotated by a battery power screw gun. Spark was noted at all leads on both magnetos.

The engine oil filter screen was removed and was found free of debris. The throttle body/carburetor was separated from the engine and exhibited postimpact damage. The carburetor was disassembled, and the float exhibited no binding. The carburetor float bowl exhibited no scoring marks. The carburetor inlet fuel filter screen was found free of debris.

## Propeller - McCauley 1A170/DM

The 2-blade metal propeller assembly remained attached to the engine. Both propeller blades exhibited no significant twisting. One blade was bent aft (toward the non-camber side) about 6 inches from the base. Both blades exhibited chord-wise scratches and were polished on their respective leading edges. Torsional stress signatures were noted behind the engine crankshaft propeller flange, and the propeller flange was canted to the left.

## MEDICAL AND PATHOLOGICAL INFORMATION

The 63-year-old male pilot did not have a valid medical certificate at the time of the accident although one was required to fly the airplane involved. He had a



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# National Transportation Safety Board - Aircraft Accident/Incident Database

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history of multiple medical conditions including: metastatic colon cancer treated with chemotherapy, hypothyroidism, high blood pressure, diabetes controlled with oral medications, chronic pain treated with impairing opioid pain medications, and anxiety treated with an impairing benzodiazepine. Examinations within a month of the accident did not identify any significant abnormal neurologic or psychiatric findings.

The autopsy performed by the Terre Haute Indiana Regional Hospital Department of Pathology documented the pilot died from blunt force injuries but did not identify any evidence of metastatic cancer or significant natural disease.

Toxicology testing by the FAA's Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, found impairing medications alprazolam at 129 ng/ml, codeine at 26.4 ng/ml, diphenhydramine at 159 ng/ml, fentanyl at 3.6 ng/ml, oxycodone at 428 ng/ml and its active metabolite oxymorphone at 19.3 ng/ml and ethanol at 0.047%. Urine was negative for ethanol indicating it was from postmortem production. However, urine was positive for the impairing medications: alprazolam, fentanyl and its metabolite norfentanyl, codeine and its active metabolite morphine, oxycodone and its active metabolite oxymorphone. Additionally, the non-impairing prescription blood pressure medicine metoprolol was detected in liver.

# National Transportation Safety Board - Aircraft Accident/Incident Database

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Accident Rpt# WPR17FA196	09/07/2017 1400 PDT	Regis# N737QQ	Bolinas, CA	Apt: N/a
Acft Mk/Mdl CESSNA 172N-N		Acft SN 17269595	Acft Dmg: SUBSTANTIAL	Rpt Status: Prelim Prob Caus: Pending
Eng Mk/Mdl LYCOMING 0-320 SERIES			Fatal 1 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: JOHN R WILSON		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

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## Events

1. Enroute-cruise - Unknown or undetermined

## Narrative

On September 7, 2017, about 1400 Pacific daylight time, a Cessna 172N, N737QQ impacted trees near the Point Reyes Bird Observatory, Bolinas, California. The airplane was operated under the provisions of 14 Code of Federal Regulations Part 91 as a personal cross-country flight. The private pilot, the sole occupant, rented the airplane from SunWest Aviation, Santa Ynez, California. The pilot was fatally injured, and the airplane sustained substantial damage. Visual meteorological conditions prevailed for the flight that departed from Santa Ynez Airport (IZA) about 1130, and a visual flight rules (VFR) flight plan had been filed for a portion of the flight. The flight was destined for the Charles M. Schulz - Sonoma County Airport (STS), Santa Rosa, California.

The flight was the subject of an Alert Notification (ALNOT), that was issued by Oakland Air Route Traffic Control Center (ARTCC) on September 7, 2017, when radar contact with the airplane was lost.

The airplane was located in a densely forested area by officers of the Point Reyes National Park Service on September 8, 2017. The entire airplane came to rest at the accident site on a northerly heading. The first identified point of impact (FIPC) was the left wing that impacted near the top of a 60-foot Douglas fir tree. The main wreckage was about 50 feet forward of the FIPC at the base of a tree, and came to rest inverted. To the north of the main wreckage was the roof of the cockpit followed by the engine. While the fuselage was north of the FIPC, it came to rest on a southerly heading.

At the time of the accident a fog layer was present over the Point Reyes National Park, that encompassed the accident site.

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# National Transportation Safety Board - Aircraft Accident/Incident Database

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Accident Rpt# CEN17LA358	09/17/2017 1600 EDT	Regis# N35170	London, OH	Apt: Madison County UYF
Acft Mk/Mdl CESSNA 177B-B		Acft SN 17702245	Acft Dmg: SUBSTANTIAL	Rpt Status: Prelim Prob Caus: Pending
Eng Mk/Mdl LYCOMING O&VO-360 SER			Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: DAVID GINGERICH		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

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## Events

1. Enroute-cruise - Fuel exhaustion
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## Narrative

On September 17, 2017, about 1600 eastern daylight time, a Cessna 177B airplane, N35170, Sustained substantial damage during a forced landing following a complete loss of engine power near London, Ohio. The flight instructor and student pilot were not injured. The airplane's right wing spar was bent and the fuselage wrinkled aft of the cabin. The aircraft was registered to an individual and operated by an the pilot under the provisions of 14 Code of Federal Regulations Part 91 as an instructional flight. Visual meteorological conditions prevailed for the flight, which was not on a flight plan. The local flight originated from the Madison County Airport (UYF), London, Ohio, about 1415, performed a landing at the Lima Allen County Airport (AOH), Lima, Ohio, and was returning to UYF when the accident occurred.

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# National Transportation Safety Board - Aircraft Accident/Incident Database

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Accident Rpt# ERA17CA245	07/04/2017 903 EDT	Regis# N9961N	Nashua, NH	Apt: Boire Field ASH
Acft Mk/Mdl CESSNA 180-J		Acft SN 18052616	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl CONT MOTOR O-470		Acft TT 1700	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: ERIK POTTS		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

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## Events

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

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## Narrative

The pilot of the airplane reported that the en route portion of the cross-country flight was uneventful and conditions were "good." Following a normal approach and landing, he lost directional control of the airplane. The airplane ground-looped and came to rest at the right edge of the runway, in the grass. The left main landing gear separated from the fuselage and the left wing and propeller contacted the ground during the accident sequence.

A Federal Aviation Administration inspector examined the wreckage and reported that the airplane sustained substantial damage to the fuselage and left wing. The pilot reported there were no preimpact mechanical malfunctions or anomalies that would have precluded normal operation of the airplane.

# National Transportation Safety Board - Aircraft Accident/Incident Database

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Accident Rpt# ERA17LA290	08/20/2017 1700 EDT	Regis# N1585C	Newport, NH	Apt: Parin Field Airport 2B3
Acft Mk/Mdl CESSNA 180-UNDESIGNAT		Acft SN 30285	Acft Dmg: SUBSTANTIAL	Rpt Status: Prelim Prob Caus: Pending
Eng Mk/Mdl CONT MOTOR O-470 SERIES			Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: HAMILTON MARK W		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

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## Events

1. Taxi-to runway - Miscellaneous/other
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## Narrative

On August 20, 2017, about 1700 eastern daylight time, a Cessna 180, N1585C, was substantially damaged while taxiing for takeoff at Parlin Field Airport (2B3), Newport, New Hampshire. The commercial pilot was not injured. The airplane was being operated under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Visual meteorological conditions prevailed at the time and no flight plan was filed for the flight that was originating at the time of the accident, and was destined for Rutland-Southern Vermont Regional Airport (RUT), Rutland, Vermont.

The pilot stated that prior to the flight, he performed a preflight inspection of the airplane with no discrepancies noted. After engine start he performed an engine run-up, and reported no issues with the brakes during the initial taxi or engine run-up. He then back-taxied to the approach end of runway 36. While taxiing, he noted the left brake pedal did not line-up exactly with the right brake pedal; however, he noted that the difference in brake pedal position had been that way for a while. He continued to taxi, steering with the tailwheel. When near the approach end of the runway he started to slow down; the left brake was normal, but the right brake pedal traveled completely to the floor. In an effort to avoid trees off the side of the runway, he intentionally ground-looped the airplane. He believed the airplane ground-looped twice, and on the second turn, he added power to get some rudder authority which only exacerbated the turn. The right wing impacted the ground, and was substantially damaged, before the airplane came to rest.

The airplane was recovered for further examination of the right brake.

# National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# CEN16FA042	11/16/2015 1300 MST	Regis# N2440R	Sandia Park, NM	Apt: N/a
Acft Mk/Mdl CESSNA 182G		Acft SN 18255540	Acft Dmg: DESTROYED	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl CONTINENTAL/P. PONK O-470-50			Fatal 3 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: MOORE AVIATION, LLC		Opr dba:		Aircraft Fire: UNK
				AW Cert: STN

## Events

1. Enroute-cruise - VFR encounter with IMC

## Narrative

### HISTORY OF FLIGHT

On November 16, 2015, at 1259 mountain standard time (mst), a Cessna 182G, N2440R, impacted wooded mountainous terrain in Sandia Park, New Mexico. The commercial pilot and the two passengers were fatally injured. The airplane was destroyed. The airplane was registered to and operated by Moore Aviation, LLC, Wichita Falls, Texas, under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Instrument meteorological conditions (IMC) prevailed at time of the accident, and no flight plan had been filed. The cross-country flight originated from Kickapoo Airport (KCWC), Wichita Falls, Texas, at 0937 central standard time, and was en route to Double Eagle II Airport (KAEG), Albuquerque

There was no record that the pilot received a weather briefing before his departure from KCWC. Radar data showed that the airplane proceeded on course after departing KCWC. The radar data indicated that the airplane's transponder was set on mode A instead of mode C, and no altitude information was transmitted. Ground speeds during the en route portion of the flight were consistent with normal cruise speeds. As the airplane neared the Sandia Mountains, a north/south-oriented mountain range, it deviated from the direct course to its destination, turning to the southwest and then to the north.

According to Federal Aviation Administration (FAA) transcripts, at 1252:01, as the airplane flew north parallel to the eastern edge of the mountain range, the pilot contacted KAEG air traffic control tower (ATCT) and reported that he was "descending out of 13,000 feet, trying to get over weather but we couldn't get high enough to make it work," and that he was "kind of in between layers." The pilot said that he wanted to "shoot the I-L-S (instrument landing system)" and that he was "east, probably less than 5 miles" from KAEG. The pilot was given the KAEG localizer frequency and told to contact Albuquerque (KABQ) ATCT for a "short range I-F-R (instrument flight rules) clearance."

The pilot contacted KABQ ATCT at 1252:45 mst and reported that he was 5 miles east of KAEG and wanted "to shoot the I-L-S [because] we got caught up in some weather unintentionally." The controller assigned the airplane a beacon code but was unable to locate the airplane on radar.

KABQ ATCT coordinated with KABQ air route traffic control center (ZAB) in an attempt to locate the airplane. ZAB reported that they had received radar returns from the airplane, but that the airplane was on the east side of the Sandia Mountains, 25 miles east of KAEG. The minimum en route altitude in that area was 11,500 feet.

At 1254:24, the pilot said it was getting "pretty hairy. . . I can see the ground . . . I'm just trying to maintain visibility right now." Communications with the pilot intermittent, and ZAB requested an overflying air carrier, Envoy Air flight 3058, to relay messages. At 1257:35, in response to receiving the KABQ altimeter setting (29.61 inches of mercury) provided by the Envoy Air pilot, the accident pilot said, "We are really having a tough time trying to get out of this [\*mess]." This was the last radio transmission from the pilot.

Radar data showed that during the last 4 minutes of flight, the airplane's flight path was erratic and its ground speed varied. During the last minute of flight, two computed ground speeds were 17 and 42 knots, which were below the airplane's stall speed of 48 knots. The last radar contact was about 1259.

An alert notice was issued by ZAB, and the wreckage was located about 1330 the following afternoon. The accident site was at an elevation of 7,634 ft., about 23 nautical miles east of KAEG, and 464 ft west of the last radar contact.

## PERSONNEL INFORMATION

The pilot held a commercial pilot certificate with airplane single-engine land, airplane multiengine land, and instrument ratings, and a second class airman medical certificate with no restriction or limitations. He also held a mechanic's certificate with airplane and powerplants ratings and an inspector authorization. The pilot was a former U.S. Marine Corps aviation mechanic.

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# National Transportation Safety Board - Aircraft Accident/Incident Database

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A review of the pilot's logbook revealed entries from October 8, 2008, to September 28, 2015. According to the logbook, the pilot had logged the following flight hours:

Total Time: 700.1  
Pilot-in-Command: 648.8  
Dual Instruction: 60.5  
Cessna 182G: 33.3  
Airplane Single Engine Land: 498.3  
Airplane Multiengine Land: 205.2  
Cross-country: 577.4  
Night: 95.6  
Actual Instruments: 45.0  
Simulated Instruments: 75.6  
Instrument Approaches: 79

The pilot had logged only one biennial flight review, which occurred on February 16, 2011. Between May 13, 2015, and the day of the accident, in addition to 45 hours of flight in actual instrument conditions, the pilot had logged 11 instrument approaches.

## AIRCRAFT INFORMATION

The airplane, serial number 182-55540, was manufactured by the Cessna Aircraft Company (now Textron Aviation) in 1964. It was equipped with a 275-horsepower Continental/P. Ponk O-470-50 engine, driving a 3-blade, all metal, constant speed Hartzell PHC-G3YF-1RF propeller.

According to the bill of sale, the airplane was purchased by Moore Aviation on August 1, 2013. Aircraft maintenance records revealed that the last annual inspection was completed on June 19, 2015, at a tachometer and airframe total time of 4,926.76 hours. On that date, the engine, which had accrued 3,145 total hours, was overhauled and converted from a Continental IO-520-E to a Continental/P. Ponk O-470-50. At the accident site, the tachometer read 4,969.98 hours. The last pitot-static system, altimeter, and transponder-encoder checks were conducted on September 6, 2012, at a tachometer reading of 4,870.13 hours.

## METEOROLOGICAL INFORMATION

The following Meteorological Terminal Aviation Routine Weather Report (METAR) was recorded at KABQ at 1252:

Wind, 290@ at 21 knots, gusts to 27 knots; visibility, 10 miles; sky condition, few clouds at 500 ft, 4,100 ft broken, 11,000 ft overcast; temperature, 4@ C.; dew point, -1@ C.; altimeter setting, 29.62 inches of mercury; remarks: site is automated and has a precipitation sensor, peak wind 260@ at 36 knots at 1200, rain ended at 1223, sea level pressure 1010 millibars, mountains obscured northeast through southeast.

The following METAR was recorded at KAEG at 1235:

Wind, 260@ at 20 knots, gusts to 32 knots; visibility, 2-1/2 miles, snow; sky condition, few clouds at 1,500 ft, 4,200 ft scattered, 5,000 ft broken; temperature, 3@ C.; dew point, -2@ C.; altimeter setting, 29.61 inches of mercury.

Geostationary Operational Environmental Satellite (GOES)-15 visible and infrared imagery from 1300 was reviewed. The GOES-15 visible imagery identified cloudy conditions over the accident location, and the infrared cloud-top temperatures were about -39@C over the accident site, which corresponded to a cloud-top height of about 28,000 ft. The cloud-top temperatures varied in the region, with some satellite-derived temperatures reaching 0@C, suggesting cloud top heights from near ground level to 28,000 ft (or possibly below higher tops of terrain in the Albuquerque region).

A regional weather radar composite reflectivity mosaic at 1300 showed a wide area of light precipitation over the accident region. Overlaying the airplane's flight

path on a weather radar image from 1259:22 showed that the airplane began to deviate from its west course as it approached the area of precipitation.

The rear seat passenger took cell phone photos while en route, and sent them to friends in Wichita Falls before the accident. Two of those photos were obtained from KOB-TV, Albuquerque. It could not be determined where the airplane was when the photographs were taken. The first photo showed the airplane flying in VFR conditions but there were clouds in the distance. The second photo showed the airplane flying over a solid overcast.

## WRECKAGE AND IMPACT INFORMATION

The on-scene wreckage examination was conducted on November 17, 2015. The airplane had impacted heavily wooded mountainous terrain intact. Ground scars and damage to the airplane were consistent with an acute nose-down (about 90°) impact attitude, and the airplane came to rest in a near vertical attitude. The top of a nearby tree was severed, and branches were scattered around on the ground. Between the rear cabin and the empennage, the fuselage was buckled forward about 30°. All major airplane components were located and identified. Flight control continuity was established. Both the left and right wing leading edges displayed accordion-type crush damage. The fuel selector faceplate indicated that the right main tank had been selected. Due to the position of the airplane and the snow, the engine was not examined on site.

Examination of the flight instruments revealed the following:

Altimeter: 1,980 ft  
Kollsman window: 29.90 inches of mercury  
Tachometer: 850 rpm  
Recorder: 4,969.98 hours  
Directional gyro: 074°  
Clock: 1023

Examination of the lower left switch panel revealed the following:

Master switch: On  
Ignition switch: Left magneto  
Standby vacuum: Off  
Pitot heat: Off  
Navigation lights: Off  
Rotating beacon: On

## MEDICAL AND PATHOLOGICAL INFORMATION

The Office of the Medical Examiner, University of New Mexico Health Sciences Center, in Albuquerque performed an autopsy on the pilot. According to the autopsy report, the pilot's cause of death was blunt trauma. No significant natural disease was identified by autopsy.

The 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. Cyanide testing was not performed. An unknown quantity of sertraline was detected in the liver, and 0.326 (ug/ml, ug/g) sertraline was detected in heart blood. Desmethylsertraline was detected in the liver and heart blood. According to FAA's forensic toxicology drug web page, sertraline (Zoloft) is a prescription antidepressant used for a variety of conditions including depression, obsessive compulsive disorder, panic attacks, posttraumatic stress disorder, and social anxiety disorder. Sertraline is not generally considered to be impairing, although it carries a warning about performance. Desmethylsertraline is the predominant active metabolite of sertraline, and is substantially less active than sertraline. It was learned that the Veterans Administration Hospital in Wichita Falls had prescribed the drug to the pilot for the treatment of his depression.

NTSB's medical officer reviewed the pilot's medical file. According to her report, "The 35 year old male pilot had reported no medical problems and no medications to the FAA. According to the autopsy performed by the University of New Mexico, Office of the Medical Investigator, the cause of death was blunt trauma and the manner of death was accident. No significant natural disease was identified by autopsy. The pilot's personal records revealed a history of



cervical spine surgery and major depression treated with sertraline around the time of the accident. Toxicology testing identified sertraline and its metabolite desmethylsertraline in liver and heart blood. The level of sertraline in the heart blood was 0.326 ug/ml. Sertraline is not generally considered to be impairing, although it carries a warning about performance. A few months before the accident, the pilot's health care provider felt his depression was well controlled."

## ADDITIONAL INFORMATION

According to FAA Advisory Circular AC 60-4A, "Pilot's Spatial Disorientation," tests conducted with qualified instrument pilots indicated that it can take as long as 35 seconds to establish full control by instruments after a loss of visual reference of the earth's surface. AC 60-4A further states that surface references and the natural horizon may become obscured even though visibility may be above visual flight rules minimums and that an inability to perceive the natural horizon or surface references is common during flights over water, at night, in sparsely populated areas, and in low-visibility conditions.

# National Transportation Safety Board - Aircraft Accident/Incident Database

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Accident Rpt# CEN17LA351	09/09/2017 1500 CDT	Regis# N5870M	Mckinney, TX	Apt: Mckinney National KTKI
Acft Mk/Mdl CESSNA 340-UNDESIGNAT		Acft SN 3400058	Acft Dmg: SUBSTANTIAL	Rpt Status: Prelim Prob Caus: Pending
Eng Mk/Mdl CONT MOTOR TSIO 520SER			Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: HOLUBAR PROPERTIES INC		Opr dba:		Aircraft Fire: NONE

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## Events

1. Landing-landing roll - Landing gear collapse
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## Narrative

On September 9, 2017, about 1500 central daylight time, a twin-engine Cessna 340 airplane, N5870M, experienced a gear collapse after landing at the McKinney National Airport (KTKI), McKinney, Texas. The commercial rated pilot and passenger were not injured and the airplane was substantially damaged. The airplane was registered to and operated by Holubar Properties, Inc., McKinney, Texas, under the provisions of 14 Code of Federal Regulations Part 91 as a cross-country flight. Visual meteorological conditions prevailed at the time.

Initial report to the Federal Aviation Administration (FAA) inspector, was that the airplane had landed on runway 36, and during the rollout, the left main landing gear collapsed. An examination of the airplane noted revealed substantial damage to the airplane's aileron, and the left gear down-lock was broken.

The airplane was retained for further examination.

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# National Transportation Safety Board - Aircraft Accident/Incident Database

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Accident Rpt# GAA17CA539 09/16/2017 1630 AKD Regis# N123LR Willow, AK  
Acft Mk/Mdl CESSNA A185-E Acft SN 185-1589 Acft Dmg: SUBSTANTIAL Rpt Status: Prelim Prob Caus: Pending  
Fatal 0 Ser Inj 0 Flt Conducted Under: FAR 091  
Opr Name: DAVID A. ALBORN Opr dba: Aircraft Fire: NONE

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# National Transportation Safety Board - Aircraft Accident/Incident Database

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Accident Rpt# ANC17LA052	08/18/2017	1630 AKD	Regis# N92DC	Aniak, AK	Apt: Aniak ANI
Acft Mk/Mdl CESSNA A185-F			Acft SN 18502828	Acft Dmg: SUBSTANTIAL	Rpt Status: Prelim Prob Caus: Pending
Eng Mk/Mdl CONTINENTAL IO-520 SERIES				Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: BOB L. ADAMS			Opr dba:		Aircraft Fire: NONE
					AW Cert: STN

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## Events

1. Taxi - Part(s) separation from AC

## Narrative

On August 18, 2017, about 1630 Alaska daylight time, a tailwheel-equipped Cessna A185F airplane, N92DC, sustained substantial damage from a propeller blade separation at the Aniak Airport, Aniak, Alaska. The commercial pilot and three passengers sustained no injury. The airplane was registered to and operated by the pilot as a visual flight rules business flight under the provisions of 14 Code of Federal Regulations (CFR) Part 91. Visual meteorological conditions prevailed at the time of the accident, and no flight plan was filed. The flight originated from the Aniak Airport, about 1625.

The pilot reported the purpose of the flight was to depart from Aniak and take the three passengers on a remote guided hunt south of Aniak. While the airplane was taxiing for takeoff at about 15 mph and about 2700 rpm, a blade from the metal 2 blade McCauley propeller separated about midspan. After the separation, the pilot was able to maintain control of the airplane and shutdown the airplane without further incident. No injuries to personnel on the ground occurred after the blade separation.

A postflight inspection by the pilot revealed that the engine mount system sustained substantial damage from excessive vibrations caused by the propeller blade separation.

The propeller, including the separated blade, were recovered and are pending transportation to the National Transportation Safety Board Materials Laboratory in Washington, District of Columbia for examination.

# National Transportation Safety Board - Aircraft Accident/Incident Database

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Accident Rpt# CEN15LA354	08/09/2015 925 MDT	Regis# N726JB	Clovis, NM	Apt: Clovis Municipal Airport CVN
Acft Mk/Mdl CESSNA C421B		Acft SN 421B0020	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl CONTINENTAL GTSIO-520-H			Fatal 0 Ser Inj 1	Flt Conducted Under: FAR 091
Opr Name: PILOT		Opr dba:		Aircraft Fire: GRD
				AW Cert: STN

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## Events

1. Approach - Fuel starvation
2. Approach-IFR final approach - Loss of control in flight

## Narrative

On August 9, 2015, at 0925 mountain daylight time, a Cessna 421B, N726JB, impacted terrain following a loss of left engine power during final approach for landing on runway 12 at Clovis Municipal Airport (CVN), Clovis, New Mexico. The pilot received serious injuries and the airplane sustained substantial damage. The airplane was registered to and operated by the pilot under 14 Code of Federal Regulations Part 91 personal flight that was not operating on a flight plan. Visual meteorological conditions prevailed at the time of accident. The flight originated from a private airstrip near Melrose, New Mexico, and was destined to CVN.

A completed National Transportation Safety Board (NTSB) Pilot/Operator Aircraft Accident/Incident Report Form 6120.1 was not received from the pilot, as required by Part 830.5, by either the NTSB Investigator-In-Charge or Federal Aviation Administration (FAA) Coordinator for the accident.

Witness stated that they heard the airplane engines "popping" as it approached and entered the traffic pattern. The airplane left wing contacted terrain short of runway 12 and the airplane cartwheeled. A post-impact fire occurred and the wings and fuselage were severely damaged.

The pilot provided a limited statement to the FAA Coordinator, in which he stated he had ample fuel for the short flight from a private ranch in Melrose, New Mexico to CVN (30 miles to the east), when both engines began to surge. The pilot stated he attempted to switch both tanks to Auxiliary but inadvertently switched the left fuel selector to Off. The left engine experienced a total loss of engine power. The pilot said he was too high to land on runway 22 and attempted to land on runway 12. However, the airplane impacted terrain approximately 1,000 feet southeast of the runway 12/22 intersection between runway 12 and the parallel taxiway. The aircraft was traveling southeast attempting to land on runway 12 before losing control.

An examination of the wreckage was conducted by an FAA inspector and the total amount of fuel onboard the airplane at the time of the accident could not be determined due to post impact damage and fire. No anomalies were noted with the airframe or engines that would have precluded normal operation.

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# National Transportation Safety Board - Aircraft Accident/Incident Database

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Accident Rpt# CEN17LA356	09/12/2017 1600	Regis# N1835R	Worland, WY	Apt: Worland Municipal WRL
Acft Mk/Mdl CESSNA R182		Acft SN R18200576	Acft Dmg: SUBSTANTIAL	Rpt Status: Prelim Prob Caus: Pending
Eng Mk/Mdl LYCOMING O-540-J3C5D			Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: MERIDIAN FLYING SERVICES INC.		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

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## Events

1. Enroute-cruise - Loss of engine power (total)
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## Narrative

On September 12, 2017, about 1600 mountain daylight time, a Cessna R182 airplane, N1835R, was substantially damaged during a forced landing following a loss of engine power near Worland, Wyoming. The pilot was not injured. The airplane was registered to and operated by Meridian Flying Service as a 14 Code of Federal Regulations Part 91 aerial observation flight. Day visual meteorological conditions prevailed. The flight was not operated on a flight plan. The flight originated from the Sloulin Field International Airport (ISN), Williston, North Dakota and was destined for the Worland Municipal Airport (WRL), Worland, Wyoming.

The pilot stated that the engine lost power during pipeline surveillance flight and he executed a forced landing to a dirt road. The airplane sustained damage to the fuselage.

# National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# ERA15FA312	08/15/2015 1002 EDT	Regis# N63TV	West Caldwell, NJ	Apt: Essex County CDW
Acft Mk/Mdl CESSNA T206H		Acft SN T20608925	Acft Dmg: DESTROYED	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl LYCOMING TIO-540-AJ1A		Acft TT 1155	Fatal 1 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: STALACTITE LLC		Opr dba:		Aircraft Fire: GRD
				AW Cert: STN

## Summary

The commercial pilot was departing in the turbocharged airplane to go to another airport and pick up the owner of the airplane. He contacted the air traffic control tower and received instructions from the controller to taxi to the active runway and hold short. The airplane taxied to the designated location and remained there for about 5 minutes. During this time, a student pilot heard the airplane's engine cycle from near idle to full power about five times and reported that the engine did not "sound right." The pilot requested and received clearance to takeoff, and, shortly after becoming airborne, advised that he had a "problem," declared an emergency, and requested to "return to the field immediately." The controller cleared the pilot to land on any runway, and the pilot reported that he was unable to maintain engine power. There were no other communications from the airplane.

Review of security camera video revealed that the airplane was slow to accelerate and did not rotate until about 1,800 ft down the 4,552-foot-long runway from the point where the pilot initiated the takeoff roll. Once airborne, the airplane began to pitch slightly up and down while remaining in ground effect. Considering that the pilot was the only occupant of the six-seat airplane, the airplane should have become airborne much sooner. Further, there was adequate runway remaining at the point of rotation for the pilot to abort the takeoff and stop on the remaining runway. However, the pilot elected to continue the takeoff.

The airplane climbed slowly, momentarily reaching an altitude that was just above the trees that surrounded the airport, then began to lose altitude, and turned left about 90°. The airplane then disappeared from view of the camera, and a smoke cloud was observed to rise from behind a tree line. Witnesses who observed the airplane just before impact saw the airplane gliding toward the ground "in slow motion" and heard no noise coming from the airplane. The witnesses reported that the airplane then rolled into a steep left bank, entered a nose dive, and exploded when it hit the ground. The witness observations were consistent with the pilot failing to maintain adequate airspeed, resulting in the airplane exceeding its critical angle of attack and an aerodynamic stall.

Examination of the wreckage revealed signatures indicating that the propeller and the turbocharger's turbine wheel were not rotating during the impact sequence, which is indicative of a loss of engine power. The spark plug electrodes displayed evidence of black sooty deposits indicative of carbon fouling. The carbon fouling could have been the result of failure of the turbocharging system, which can result in an overly rich mixture condition so severe as to cause a total power failure.

Examination of the turbocharging system revealed that it had been heavily damaged by the postcrash fire, and only the turbocharger and wastegate were recovered. Examination of the turbocharger revealed that the turbine and compressor wheels, which were interconnected by a shaft, could not be rotated by hand as the shaft had partially fused to the bearings likely as a result of exposure to the postcrash fire. The bearing radial holes were clear, and there were no excessive or abnormal scoring marks on the bearings as would be expected if they were contaminated, distressed, or subject to prolonged oil starvation. There was also no coking of oil in the turbocharger body that would have prevented lubrication of the bearings, and no definitive rotational rub marks that would have suggested excessive bearing wear or imbalance. Examination of the wastegate also did not reveal any anomalies, and the wastegate valve was free and could move through its full range of motion. The wastegate actuator body had been mostly consumed by the postcrash fire; only the valve housing assembly, actuator shaft assembly, springs, and retainer remained.

X-ray examination of the oil supply line check valve, which was located upstream from the turbocharger and regulated the supply of oil that it received, showed that instead of being straight, the internal spring was slightly cocked about 5°. Review of the manufacturer's specifications revealed that no check valve leakage was allowed below 8 psi of oil pressure. However, flow testing of the check valve revealed that oil leaked from the check valve exit hole before 1 psi of pressure was reached, which indicated that the check valve was likely not preventing oil from draining into the turbocharger after shutdown and was pooling in the turbocharger body. During further examination of the check valve using computed tomography scanning and radiography, a small gap was found between the ball and the internal channel along the neck. Sectioning of the check valve revealed that the angled spring and the small gap between the ball and the internal channel were due to the presence of contamination in the internal channel on the upstream (inlet) side of the check valve and the presence of foreign material between the ball and the internal channel along the neck. The presence of contamination in the check valve indicated that contamination was likely present in other components of the turbocharging system. Because the controller and the wastegate use engine oil and pressure for operation and control of the turbocharger, if either one is contaminated, system performance can be compromised.

Maintenance records indicated that two repairs requiring replacement of major components of the engine took place about 2 years before the accident. The first

repair occurred following a report by the owner of high oil consumption, and it entailed replacing a cracked air/oil separator, leaking oil dipstick gaskets, a leaking fitting on the turbocharger wastegate actuator, and the turbocharger "due to oil leaking past shaft seal intake system." The second repair occurred about 4 months later, when the owner again reported high oil consumption. This resulted in replacement of the Nos. 3, 5, and 6 cylinders because the oil control rings stuck in the pistons of these cylinders, which indicated debris had been deposited in the ring grooves. Although these repairs provided evidence that suggested the oil system was contaminated, the maintenance records did not show that any reused oil lines, the turbocharger oil supply line check valve, or turbocharger system components such as the controller and wastegate were flushed. Further, review of the engine manufacturer's guidance revealed that it did not include instructions for checking or replacing the check valve during inspections, flushing of any reused oil lines, the check valve, and components such as the turbocharger, controller, and wastegate whenever a turbocharger leak was detected, following an engine test run after cylinder replacement, after replacing lubrication system components, or when doing any type of maintenance where contamination or foreign debris could be introduced into the system. If the engine manufacturer had included these instructions and the mechanics had performed actions such as flushing the check valve and turbocharger system components following either of the two engine repairs, it is likely the contamination found in the check valve (and likely present in other components of the turbocharging system) would have been removed. The presence of contamination in the check valve, the airplane's maintenance history, and the carbon fouling of the spark plugs, strongly suggest that the engine lost power due to contaminated oil compromising the performance of the turbocharger system.

The National Transportation Safety Board asked the Federal Aviation Administration in 2008 to require manufacturers to amend their pilot operating handbooks (POHs) to include emergency procedures for turbocharger failures (Safety Recommendation A-08-21). However, the FAA did not take this action, and review of the POH for the airplane revealed that it did not include an emergency procedure for turbocharger failure. Under the emergency procedure for an engine failure, the POH called for advancing the mixture control to the rich position if restart does not occur, but review of the airplane manufacturer's supplementary information revealed that a failure of the turbocharger system would cause either an overboost condition or some degree of power loss and that, if a turbocharger system failure resulted in power loss, it may be further complicated by an overly rich mixture. According to the supplementary information, this rich mixture condition may be so severe as to cause a total power failure. It could not be determined whether the total loss of engine power in this case was due solely to failure of the turbocharger system or whether it was the result of a partial loss of power due to failure of the turbocharger system that was exacerbated by an overly rich mixture.

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## Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: A loss of engine power due to a malfunction of the turbocharging system likely due to contaminated oil. Also causal were the pilot's decision to continue the takeoff although the airplane was not performing normally and his failure to maintain adequate airspeed following the loss of engine power, which resulted in the airplane exceeding its critical angle of attack and an aerodynamic stall. Contributing to the accident was the engine manufacturer's inadequate guidance regarding inspection and maintenance of its turbocharged engines.

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## Events

1. Prior to flight - Powerplant sys/comp malf/fail
2. Initial climb - Loss of engine power (total)
3. Emergency descent - Loss of control in flight
4. Emergency descent - Aerodynamic stall/spin
5. Post-impact - Fire/smoke (post-impact)

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## Findings - Cause/Factor

1. Aircraft-Aircraft power plant-Turbocharging (recip only)-Turbocharger-Malfunction - C
2. Aircraft-Fluids/misc hardware-Fluids-Oil-Fluid condition - C
3. Personnel issues-Action/decision-Info processing/decision-Decision making/judgment-Pilot - C
4. Personnel issues-Task performance-Use of equip/info-Aircraft control-Pilot - C
5. Organizational issues-Management-Policy/procedure-Adequacy of policy/proc-Manufacturer - F
6. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Airspeed-Not attained/maintained - C

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## Narrative

### HISTORY OF FLIGHT

On August 15, 2015, at 1002 eastern daylight time, a Cessna T206H, N63TV, impacted trees and terrain after a loss of engine power during initial climb at Essex County Airport (CDW), Caldwell, New Jersey. The commercial pilot was fatally injured, and the airplane was destroyed. The airplane was registered to Stalactite, LLC, and operated by the pilot under the provisions of 14 Code of Federal Regulations Part 91. Visual meteorological conditions prevailed, and no flight plan was filed for the positioning flight, destined for Teterboro Airport (TEB), Teterboro, New Jersey.



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# National Transportation Safety Board - Aircraft Accident/Incident Database

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According to a friend of the pilot, the pilot planned to fly to TEB, pick up the owner of the airplane and fly with him to South Hampton, where the owner had a residence. The friend owned a Cessna 182 and was interested in purchasing a Cessna 206 like the one the pilot was flying, so the pilot invited him to come to CDW before the flight and see the airplane.

The friend arrived at the airport about 0930 and noticed that the pilot had already completed the preflight inspection of the airplane. The pilot appeared to be "fine, his usual self, and doing good that morning." The pilot's friend was in the fixed base operator's (FBO) lobby when he heard the airplane's engine start. The airplane stayed on the ramp for a few minutes and then taxied out. About 10 minutes later, the pilot's friend saw the airplane as it passed by a window in the FBO. The airplane seemed quieter than it should have to him, and he thought that it did not seem to be moving very fast. About 10 minutes later, a line service agent entered the FBO and said that there had been an airplane accident.

According to information provided by the Federal Aviation Administration (FAA), the pilot contacted the CDW air traffic control tower, requested to taxi, and advised the controller that he had the current weather that was being transmitted by CDW's automatic terminal information service. The controller subsequently instructed the pilot to taxi to runway 22 and to hold short of the runway at intersection "November," which was normally used for airplanes departing on runway 22. The airplane taxied to the designated location and remained there for about 5 minutes. According to FAA inspectors, during the time that the airplane remained stationary, a student pilot heard the airplane's engine go from near idle to full power about five times and reported that the engine did not "sound right."

The air traffic controller cleared the pilot for takeoff with a left turnout. Shortly after becoming airborne, the pilot advised that he had a "problem," declared an emergency, and requested to "return to the field immediately." The controller cleared the pilot to land on any runway, and the pilot reported that he was unable to maintain engine power. There were no other communications from the pilot.

Review of security camera video revealed that, during the takeoff, the airplane appeared to accelerate slowly and rotated about 1,800 ft. after the pilot initiated the takeoff roll." Once airborne, the airplane began to pitch slightly up and down while remaining in ground effect and then slowly climbed. The airplane momentarily reached an altitude that was just above the trees that surrounded the airport, then began to lose altitude, and turned left about 90°. The airplane disappeared from view of the camera, and a smoke cloud then rose from behind a tree line.

According to witnesses who saw the airplane just before impact, the airplane was at the same height as the trees and appeared to be gliding toward the ground. One witness stated that the airplane appeared to be "in slow motion," it then banked sharply to the left and pitched steeply down. Another witness reported that the airplane made "a hard-left turn, went into a nose dive, and exploded when it hit the ground." Three additional witnesses reported similar observations. The witnesses heard no noise coming from the airplane before the impact.

## PERSONNEL INFORMATION

According to FAA and pilot records, the pilot held a commercial pilot certificate with ratings for airplane single-engine land and instrument airplane, a flight instructor certificate with a rating for airplane single-engine, and a ground instructor certificate with an advanced ground instructor rating. His most recent FAA third-class medical certificate was issued on March 30, 2015. He had accrued about 1,941 total hours of flight experience, 16 hours of which were in the accident airplane make and model.

## AIRCRAFT INFORMATION

The airplane was a 6-place, single-engine, high-wing monoplane of conventional metal construction. It was equipped with fixed-tricycle-type landing gear and was powered by a turbocharged, 310-horsepower, Lycoming TIO-540-AJ1A engine, driving a three-blade, McCauley, controllable pitch propeller.

According to FAA and maintenance records, the airplane was manufactured in 2009. Its most recent annual inspection was completed on April 17, 2015. At the time of the inspection, the airplane and engine had accrued 1,155.4 total hours of operation.

According to the maintenance provider who had maintained the airplane since December 2011, anything that bothered the owner about the airplane would get fixed. Most of the items that were addressed by the maintenance provider were cosmetic or routine maintenance, such as oil and filter changes, gauges, starter replacement, lights, accessories, battery replacement, and compliance with airworthiness directives and service bulletins. The maintenance provider reported that the owner's landings could be a little rough, so they had also replaced some tires as he had experienced a few flat tires, and, as a result, the owner would

keep a spare set in the airplane in case he blew a tire on landing.

Review of maintenance records revealed that the airplane's engine had been receiving regular oil changes since new as well as spectrometric oil analysis. Review of oil analysis reports provided by the maintenance repair organization indicated that a sample of the engine's oil that was taken on March 5, 2012, contained elevated levels of iron, nickel and chromium. Another sample taken on December 19, 2013, contained elevated levels of aluminum, chromium, iron, and nickel. In a report dated March 9, 2015, the laboratory commented about an oil sample that had been taken on March 4, 2015, stating that:

"These numbers are a lot easier to take than the high aluminum, chrome, iron, and nickel we saw last time. The shorter oil run obviously helped, but most of the metals are lower on a ppm/hour basis too, meaning that the engine really did wear better. If anything, nickel could still stand to be lower. 13 ppm is almost high enough to get a mark, so that's one we'll be monitoring next time. There's a trace of fuel to report this time, but that's not anything to worry about. It's likely just from normal use. Much better at 1,151.6 hours S[ince ]New."

In a report dated August 12, 2015, for an oil sample that was taken on August 4, 2015 (11 days before the accident), the laboratory commented that:

"Steady as she goes for this sample out of N63TV. If we're being picky you could say that iron should have come down as a result of the shorter oil run, but 39 ppm isn't bad at all for one of these engines after 20 hours on the oil. Everything else is in good shape, so we'd be surprised if the extra iron on a per-hour basis turned out to be an issue. No problems with the oil itself were found, making for a very nice report overall."

Maintenance records indicated that two repairs requiring replacement of major components of the engine had been accomplished. The first repair followed a report from the owner that the engine was experiencing high oil consumption. According to a maintenance entry dated January 21, 2013, and the associated work order, this resulted in the maintenance provider inspecting for the cause of the oil leaks by first washing down the engine, and then after a test flight, tightening loose rocker box return line coupling clamps, replacing a cracked air/oil separator, replacing leaking oil dipstick gaskets, and replacing a leaking fitting on the turbocharger wastegate actuator. During this inspection and maintenance action, maintenance personnel noticed oil on the inlet scroll of the turbocharger and oil on the belly of the airplane, so they replaced the turbocharger "due to oil leaking past shaft seal intake system."

The second repair occurred about 4 months later, when the owner again reported high oil consumption. According to a maintenance entry dated May 22, 2013, and the associated work order, this resulted in the maintenance provider checking the compressions and borescoping the cylinders.

During this inspection and maintenance action, maintenance personnel found pooled oil in the Nos. 3, 5, and 6 cylinders. Per guidance from a Lycoming representative, they attached an airspeed indicator to a modified oil dipstick cap and then ran the engine. No excessive crankcase pressure was found. Next, they ran the engine to get the temperature up and shut down the engine at 1,300 rpm. Then they borescoped the cylinders again and found that all of the pistons were damp, all of the spark plugs were dry, and there was pooled oil in the Nos. 3, 5, and 6 cylinders. After these tests, maintenance personnel removed the Nos. 3, 5, and 6 cylinders and found the oil control rings stuck in the pistons. They installed new Nos. 3, 5, and 6, cylinder assemblies.

The maintenance records did not indicate that the check valve on the turbocharger oil supply line was cleaned or replaced following either of these engine repairs.

## Turbocharger System Information

The airplane was equipped with a turbocharging system manufactured by Hartzell Engine Technologies (HET) that forced air into the engine's combustion chamber, allowing the engine to maintain sea-level manifold pressure as altitude increased. The turbocharging system consisted of a turbocharger, controller, wastegate, and pressure relief valve.

The turbocharger converted wasted energy, in the form of hot exhaust gases from the engine exhaust, into increased manifold pressure to increase power available from the engine. After air and fuel were burned in the cylinders, the exhaust gases from combustion were used to spin a turbine wheel at high speeds. The turbine wheel was connected to a compressor wheel that compressed induction air supplied through an opening in the lower cowl, that was ducted through a filter and into the compressor, increasing its density. The pressurized induction air would then pass through the throttle body and induction manifold into the engine cylinders, completing the cycle.

The controller sensed manifold pressure to maintain sea level horsepower at altitude, without over-speeding the turbocharger or over-boosting the aircraft's

engine. It did this by controlling pressurized engine oil to hydraulically actuate the wastegate. The wastegate (exhaust bypass valve), used speed or compressor discharge pressure (boost) during certain conditions of a flight. Managed through the controller, the wastegate opened to allow exhaust gas to bypass the turbocharger, limiting speed and boost.

The pressure relief valve acted as a supplementary safety device in the airplane turbocharger system. The valve was set to open at a pressure slightly above the maximum turbocharger discharge pressure, should the controller or wastegate not adequately limit the boost pressure.

According to HET, the turbocharger operates at speeds over 100,000 rpm and at temperatures exceeding 1,650°F, and oil is required at the correct flow rate and pressure to lubricate the bearings, stabilize the rotating shaft and bearings, and act as a coolant. The system's lubricating oil comes directly from the engine's oil system, so shutting down the engine immediately stops the flow of oil to the turbocharger. If the turbocharger is still turning at a high rate of speed when oil flow is cut off, the turbocharger bearings can be damaged. In addition, any stagnant oil remaining around the extremely hot turbine shaft will overheat and "coke" or burn.

The controller and the wastegate also use engine oil and pressure for operation and control of the turbocharger. If either one is contaminated by oil, does not receive the correct oil flow rate, or lacks sufficient oil pressure to function, system performance is compromised. In the event of malfunction of a turbocharged engine, HETs experience is that maintenance personnel assume that the turbocharger is at fault and replace it. Frequently the replacement unit fails, which prompts an investigation into the real cause of the initial failure. According to HET, the major cause of turbocharger failures is faulty lubrication systems.

The accident airplane was equipped with a check valve on the turbocharger oil supply line, which was located upstream from the turbocharger and regulated the supply of oil that it received. HET does not require the use of check valves, and the check valve installed on the airplane was supplied by the engine manufacturer. The check valve was used to prevent oil from draining into the turbocharger after shutdown and pooling in the turbocharger body. According to HET, this pooling can result in stagnant oil remaining around the extremely hot turbine shaft and coking or burning. Along with coking, bearing damage can occur that causes the bearings to orbit instead of spin, which can lead to turbine and/or compressor rub, wear, and failure.

If a check valve sticks in an open or partially open position, this allows the turbocharger's center body to fill with oil; the oil then leaks past the seals because the oil cannot drain and is not being scavenged. The absence of turbo air pressure (both in the compressor and turbine housings) also does not assist in preventing oil leakage past the piston rings, which can result in the presence of oil in the compressor/induction system (evidence of oil in the combustion chambers) and/or the turbine/exhaust system (resulting in smoking during engine start).

## METEOROLOGICAL INFORMATION

The recorded weather at CDW, at 1012, about 10 minutes after the accident, included: variable winds at 3 knots, 10 miles visibility, clear skies, temperature 28°C, dew point -17°C, and an altimeter setting of 30.13 inches of mercury.

## AIRPORT INFORMATION

CDW was owned by the Essex County Improvement Authority and was located 2 miles north of Caldwell, New Jersey. It was classified by the FAA as a publicly owned, tower controlled, public use airport.

The airport elevation was 172 ft above mean sea level and was oriented in a 10/28 and 4/22 runway configuration. Runway 22 was asphalt, in good condition, and measured 4,552 ft long by 80 ft wide with a 0.2% gradient. The threshold was displaced 134 ft. The runway was equipped with high intensity runway edge lights and runway end identifier lights and was marked with nonprecision markings in good condition.

## WRECKAGE AND IMPACT INFORMATION

The accident site was located in a wooded area about 0.3 nautical mile from the departure end of runway 22 on a magnetic heading of 156°. Examination of the accident site revealed that the airplane impacted terrain on a 20° magnetic heading after striking several trees. Further examination revealed that the airplane impacted in a nose-down, inverted attitude. During the impact sequence, the engine separated from its mounting location. The empennage was displaced about 20° to the left of the fuselage centerline and was partially separated from the aft fuselage. The wings were separated from their mounting locations. The fuselage came to rest upright on a 100° magnetic heading against the base of a tree. The majority of the fuselage was consumed by a

postimpact fire.

The wing flaps were found in the up position. The elevator trim was near neutral. The fuel selector valve was in the "BOTH" position, and there was no evidence of fuel blockage. Control continuity was established from the ailerons, elevator, and rudder to the flight controls in the cockpit. There was no evidence of any inflight structural failure.

Examination of the propeller revealed that one of the three blades separated during the impact sequence and came to rest about 30 ft from the rest of the propeller assembly. The propeller blades did not display evidence of propeller rotation during the impact sequence.

Examination of the engine revealed that the rear of the engine had been heavily damaged by the postcrash fire, and the magnesium oil sump was destroyed by fire.

The engine's fuel system was heavily damaged by the postcrash fire. The engine-driven fuel pump was destroyed by the postcrash fire. The fuel servo inlet fuel screen was free of contaminants, and the diaphragm displayed thermal damage. The fuel flow divider was thermally damaged.

The left magneto's internal windings were found in the molten metal beneath the engine. The right magneto was found loosely attached to the rear accessory housing and was thermally damaged.

Attempts to rotate the engine drive train by hand were unsuccessful. There was no evidence of any type of blockage in the intake or exhaust systems. The spark plug electrodes displayed evidence of black sooty deposits indicative of carbon fouling. A portion of the No. 3 piston's skirt was missing; metal fragments were present in the crankcase, and metal was found extruded from the edges of the No. 3 main engine bearing.

The turbocharger system was partially destroyed by the postimpact fire; a majority of the damage was to the compressor housing and compressor wheel. The turbine housing exhaust port did not display evidence of turbine wheel rotation during the impact sequence. The turbocharger was secured to its mount with the exhaust pipes separated from the exhaust bypass valve on both ends. The slope controller and the pressure relief valve were destroyed by the post impact fire, and the exhaust bypass valve was partially destroyed but remained attached to the turbocharger.

## MEDICAL AND PATHOLOGICAL INFORMATION

The Office of the State Medical Examiner, State of New Jersey, performed an autopsy on the pilot. The listed cause of death was blunt impact injuries.

The FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma conducted toxicological testing of the pilot. The specimens were negative for carbon monoxide.

Carvedilol, which is used to treat high blood pressure, was detected in urine and blood, and quinapril, which is used to treat hypertension, was detected in urine. Use of these two non-impairing drugs was previously reported by the pilot to the FAA. Salicylate (aspirin) was detected in urine.

Review of FAA medical certificates and supporting documentation indicated that the pilot had a history of high blood pressure and a myocardial infarction with stent placement in 2007. Based on clinical reports, his conditions were stable, and no significant conditions were identified during his FAA physical examinations.

## TESTS AND RESEARCH

At the request of the NTSB, Lycoming analyzed the metal fragments found in the engine crankcase and the metal extruded from the No. 3 main bearing. Lycoming determined that the metal fragments found in the engine crankcase were cast aluminum material. Chips recovered from the sludge in the crankcase were also made of the same material. The material was not from the No.3 piston and was most likely from the crankcase or other housing. The metal that was bulged or extruded out from the edges of the No. 3 main bearing (both halves) was made primarily of lead, with some tin and copper, indicating that it came from the bearing overlay material. It also indicated that the bearings experienced some localized melting and flow of the overlay material from the postcrash fire.

The turbocharger and wastegate were examined at Lycoming Engines by HET under the supervision of the NTSB. Examination of the turbocharger revealed that the compressor housing and mounting surfaces had been consumed by fire. The compressor wheel had been heavily damaged by fire. The compressor wheel nut was tight, and the compressor oil film journal bearing's radial holes were clear.

The compressor thrust collar radial holes were clear; there was no evidence of scratches, scoring, or galling of the end surfaces and no evidence of rubbing on the compressor backplate seal bore. There was no scoring or worn face areas on the compressor inboard thrust bearing.

The compressor back plate was corroded from heat and water exposure. No damage was observed to the attachment surfaces, and the seal bore inside diameter spacer was not damaged or scored. The compressor back plate oil squirt holes were also clear.

The turbocharger's turbine wheel could not be turned by hand. The turbine oil film journal bearing's radial holes were clear. No evidence of turbine wheel rub was present, and clearance existed between the turbine wheel blades and the turbine housing. The turbine wheel did not display evidence of foreign object damage or bent blades.

Examination of the center bearing housing revealed that there was no evidence of residual oil, and extreme corrosion was present. The oil squirt holes were clear, and no evidence of the outlet port being restricted by coking was discovered. The outlet and inlet gaskets were heat damaged.

The anti-rotation pins were of the split type, and they were secure and properly oriented.

The wastegate valve was free and could move through its full range of motion. The wastegate actuator body had been completely consumed by the postcrash fire; only the valve housing assembly, actuator shaft assembly, springs and retainer remained

At the request of the NTSB, Lycoming radiographically inspected the oil supply line check valve, which was located upstream from the turbocharger and regulated the supply of oil that it received. Review of the low-resolution x-ray images by Lycoming personnel indicated that the internal components appeared to be in sound condition, there was no obvious foreign object damage, and the ball was resting on the seat. The x-ray film also showed that the internal spring was slightly cocked about 5°.

The check valve assembly was then tested by installing it in a flow testing fixture, and the oil pressure was monitored while observing the check valve for flow. The engineering drawing specified the performance as follows: "No leakage allowed below 8 [pounds per square inch] psi; and check valve must open at 13 psi ñ2 psi oil pressure". Leakage was observed from the check valve exit hole before 1 psi of pressure was reached. The oil stream flowing from the check valve steadily increased, and the vertical level of the stream rose higher until about 5 to 6 psi pressure was reached. At that point, the stream was nearly a straight jet of oil.

The turbocharger and oil supply line check valve were submitted to the NTSB Materials Laboratory for further examination. Examination of the turbocharger components revealed that they exhibited surface oxidation (rusting) and evidence of coking with soot residue. These conditions were consistent with exposure to fire, as well as exposure to water. The center bearing housing of the turbocharger had rusted to a degree that the iron oxide was starting to spall. No other visible damage, such as distortion, wear, or cracking, was present on the component exterior. The center housing was radiographed and inspected using computed tomography (CT) scanning. There were no discernable features noted on the center housing using these techniques.

The center housing was sectioned using a band saw with a water-based emulsion-coolant. The location of the sectioning was along the position of the turbine wheel. The housing bearing on the turbine side exhibited longitudinal score marks that were consistent with removal of the shaft, which had partially fused to the bearing. It also displayed circumferential wear, with relatively less rust and other surface contamination compared to the bearing on the compressor side. Gouging was also present on the interior surface of the turbine side bearing. There was no evidence of damage to, or blockage of, the oil holes.

The center housing bearing on the compressor side exhibited primarily circumferential wear. The longitudinal marks on the bearing were consistent with machine marks or sliding. There was internal surface rusting on this bearing. There was no evidence of blockage or damage to the oil holes or channels in this section of the housing. No other indications of internal mechanical malfunctions were found inside the center housing.

The turbine wheel blade fins did not exhibit any mechanical damage consistent with foreign object impacts, overheating, or distortion. There was no chipping or

cracking observed.

The tapered stub shaft of the compressor side had fractured away from the threaded portions of the shaft during removal for examination. The features on the fracture surface had been entirely obliterated by smearing, consistent with post-fracture damage, and the area adjacent to fracture exhibited a jog on one side, with a general flat surface. This pattern was consistent with overstress failure in shear of a ductile material.

Gouge marks were present on the hexagonal cap on the turbine side of the wheel and most probably occurred during removal. These marks were consistent with an impact with an adjacent component or tool, in a clockwise rotation. The turbine side bearing surface of the turbine wheel also exhibited longitudinal gouging marks, in addition to the circumferential wear marks. These gouge marks matched those of the bearing surface of the sectioned center housing. These marks were consistent with the wheel assembly shifting forward while positioned in the housing.

The turbocharger oil supply line check valve and an exemplar check valve were inspected by radiography and CT scanning. The accident check valve exhibited a small gap between the ball and the internal channel along the neck. The spring that held the ball was angled. Neither the ball nor the spring in the exemplar check valve exhibited the features noted in the accident valve.

Sectioning of the accident check valve revealed the presence of contamination in the internal channel on the upstream (inlet) side of the check valve and the presence of foreign material between the ball and the internal channel along the neck. Fourier transform infrared spectroscopy revealed that the spectra of the foreign material was similar to lubricating oil.

## ADDITIONAL INFORMATION

### Lycoming Maintenance Guidance

A review of Lycoming's maintenance guidance revealed that the direct drive engine overhaul manual did not explicitly address the turbocharger system, nor was there guidance for checking or replacing the check valve, flushing of any reused oil lines, or flushing of other components such as the turbocharger, controller, wastegate, or air-oil separator. Further review also revealed that for maintenance personnel to maintain, repair, or replace the turbocharging system on the TIO-540-AJ1A model engine, a mechanic would have to rely on multiple documents including the Illustrated Parts Manual for the parts needed, the Service Table of Limits for applicable torques, and Service Bulletins, Service Letters, and Service Instructions applicable to that model or individual component for replacement.

### Pilot Operating Handbook

Review of the Cessna T206H Pilot Operating Handbook (POH) short field takeoff performance charts revealed that when configured to a 20-degree flap setting, and assuming a 30°C temperature at sea level, the airplane's expected ground roll would be between 670 and 1015 feet, at a gross weight of 3,000 and 3,600 pounds respectively. The short field landing distance performance chart showed that under similar conditions, and a gross weight of 3,600 pounds, the airplane's expected ground roll was 775 feet.

Further review of the POH also revealed that it did not list emergency procedures for turbocharger failures, under "ENGINE FAILURES," in Section 3 (Emergency Procedures). Under "ENGINE FAILURE DURING FLIGHT (Restart Procedures), in the POH, it also called for advancing the mixture control to the rich position if restart does not occur.

Cessna's "Pilot Safety and Warning Supplements," which was reissued in 1998 to incorporate turbocharger failures, stated, in part: "A failure of the turbocharger system will cause either an overboost condition or some degree of power loss. An overboost can be determined on the manifold pressure instrument and can be controlled by a throttle reduction. If turbocharger failure results in power loss, it may be further complicated by an overly rich mixture. This rich mixture condition may be so severe as to cause a total power failure. Leaning the mixture may restore partial power. Partial or total power loss could also be caused by an exhaust leak. A landing should be made as soon as practical for either an overboost or partial/total power loss."

### Continental TSIO-520-C Engine

Some earlier models of the Cessna 206 were equipped with a turbocharged Continental TSIO-520-C engine, which was rated at 300 horsepower. Both the

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Continental TSIO-520-C and the Lycoming TSIO-540-AJ1A engines use turbochargers manufactured by HET. Review of system information for the Continental TSIO-520-C revealed that it also used a spring-loaded check valve to control oil flow through the turbocharging system and prevent oil flow from the engine oil cooler to the turbocharger when the engine was shut down.

Published guidance was issued by Continental Motors in a service bulletin (Service Bulletin SB16-3), which advised that if the check valve did not close properly or became blocked with foreign matter, the check valve may remain open, allowing oil to continuously flow to the turbocharger (after the engine is shut down and the oil scavenger pump is no longer actively returning oil to the engine oil sump).

The service bulletin also advised that characteristic symptoms associated with a blocked check valve are turbocharger oil leakage and oil leakage through the tailpipe or induction system.

It also included the following statement: "NOTE: Do not assume an oil leak from the turbocharger is simply an incorrectly operating check valve - thoroughly troubleshoot for causes of all turbocharger oil leaks."

The service bulletin also required that the check valve be checked:

- At each 50-hour inspection.
- Whenever a turbocharger oil leak was detected.
- Immediately following an engine test run after cylinder(s) replacement.
- After replacing lubrication system components.

## NTSB Recommendation A-94-81

On April 11, 1994, the NTSB issued Safety Recommendation A-94-81 as a result of its investigation of a January 13, 1992, accident (NTSB Case No. LAX92FA092) involving a Cessna T210L, N22592, that occurred at the Temple Bar Airport, Temple Bar, Arizona, as the pilot attempted to execute an emergency landing. Two of the five persons aboard were killed, and three were seriously injured when the airplane struck the ground short of the runway. The pilot reported that the airplane had sustained a partial loss of engine power during cruise, but that he could not determine the nature of the problem. While descending to the airport, he turned the fuel boost pump on, and the engine lost additional power. Just before arriving over the airport, the cockpit and cabin areas filled with smoke, and the pilot secured the engine.

The NTSB determined that the probable causes of this accident were fatigue failure of the turbocharger's turbine shaft due to inadequate maintenance and the pilot's improper in-flight planning/decision after experiencing a turbocharger failure. Additionally, the lack of written instructions or an emergency procedure in the Cessna T210L Pilot's Operating Handbook (POH) relating to turbocharger malfunctions or failures contributed to the accident.

The NTSB's safety recommendation letter stated, in part:

From January 1, 1988, to May 4, 1993, there were 88 accidents and incidents involving aircraft engine turbochargers, resulting in 6 fatalities and 35 injuries. Many of these occurrences, in both single and twin-engine airplanes, involved loss of engine power, fire in flight, or smoke in the cockpit. Moreover, from January 1, 1986, to May 4, 1993, the Federal Aviation Administration (FAA) received 580 Service Difficulty Reports (SDRs) regarding aircraft turbocharging systems. The reports contained detailed system malfunctions that, in many cases, were attributed to inadequate installation, inspection, maintenance, service, or overhaul. The Safety Board noted, in connection with a significant number of the accidents, that improper pilot remedial actions following the turbocharger malfunction or failure may have contributed to these occurrences. For example, because compressed air to the engine normally produced by the turbocharger was no longer available, use of the boost pump, as evidenced in the accident with N22592, aggravated an already overly rich fuel mixture condition. This resulted in a further reduction in engine power and subsequent inability to sustain flight. Other inappropriate pilot actions or responses cited in accident reports that may also have exacerbated the loss of engine power or caused an in-flight fire because of turbocharger failure include the following: use of an inadequate emergency procedure, improper adjustment of the fuel mixture, improper use of the throttle control, and operating with known deficiencies in equipment."

Safety Recommendation A-94-81 asked the FAA to "require the amendment of pilot operating handbooks and airplane flight manuals applicable to aircraft equipped with engine turbochargers by including in the "Emergency Procedures" section information regarding turbocharger failure. The information should include procedures to minimize potential hazards relating to fire in flight and/or loss of engine power."

In a July 3, 1995, response, the FAA stated that it agreed with the intent of Safety Recommendation A-94-81 but did not believe that there was sufficient basis to issue an airworthiness directive applicable to all aircraft flight manuals (AFMs) or POHs with turbocharger installations. The FAA indicated, however, that it would take the following actions: 1) revise the AFM policy regarding minimum safe operating procedures following turbocharger failures during the next revision of Advisory Circular (AC) 23-8A "Flight Test Guide for Certification of Part 23 Airplanes;" 2) provide copies of Safety Recommendation A-94-81 to all aircraft certification offices and direct each office to provide the recommendation to each holder of a type certificate or supplemental type certificate having a turbocharged engine installation; 3) request type certificate or supplemental type certificate holders to revise their AFMs, POHs, or AFM supplements, as appropriate, to comply with Safety Recommendation A-94-81; and 4) provide the Safety Board a copy of the revised General Aviation Manufacturers Association (GAMA) Specification No. 1, "Specification for Pilots Operating Handbook," to address safe operating procedures following turbocharger failures.

Until the next revision to AC 23-8A was accomplished, the FAA issued a policy letter dated February 16, 1995, which added turbocharger failure procedures to the established list of systems that should be considered when evaluating the emergency procedures section of the AFM. In an August 15, 1997, response, the NTSB classified Safety Recommendation A-94-81 "Closed-Acceptable Alternate Action" based on the FAA's issuance of the policy letter, as well as the FAA's agreement to revise AC 23-8A.

## NTSB Recommendation A-08-21

On May 13, 2008, the NTSB issued Safety Recommendation A-08-21 as a result of its investigation of a May 28, 2004, accident (NTSB Case No. CHI04GA130) involving a Cessna T206H, N9548D, that impacted terrain following a loss of engine power during cruise flight near Homer Glen, Illinois. The pilot was fatally injured, and the airplane was destroyed. Witnesses reported that they heard several attempted engine restarts as the airplane descended, and a witness reported that black smoke emanated from the airplane during each start attempt. The black smoke was indicative of a mixture that was too rich. Postcrash examination revealed that the turbocharger had seized. The oil supply line check valve was tested, and it would not hold 8 psi of oil pressure. Oil and debris were seen being expelled from the check valve assembly when it was placed under oil pressure. Examination of the airplane's POH revealed that the in-flight emergency procedures lacked information to assess the difference between an engine and a turbocharger failure and did not provide any clear guidance or instructions on how to handle a turbocharger failure once a pilot identified the problem.

The NTSB determined that the probable causes of this accident were:

The seized turbocharger, the altitude/clearance not maintained/obtained during approach to a forced landing on an agricultural field, and the unsuitable landing area encountered by the pilot. Contributing factors were the inadequate emergency procedures by the manufacturer, the trees, and the residential area.

The NTSB's safety recommendation letter stated, in part:

The Safety Board notes, however, that the intent of Safety Recommendation A-94-81 has still not been fully realized. In connection with its investigation of the May 28, 2004, accident in Homer Glen, Illinois, the Safety Board also reviewed a representative sampling of POHs for other airplane makes and models and determined that procedures addressing turbocharger failures have either not been incorporated in the emergency procedures section or, if included, are incomplete, potentially leading to an incorrect identification and response to a turbocharger failure that could result in a total loss of engine power. A query of the Safety Board's accident database revealed that from May 1, 1993, to the present, 23 accident/incidents have occurred involving aircraft engine turbochargers, resulting in 23 fatalities and 3 injuries; 15 of these accidents/incidents have occurred (resulting in 9 fatalities) since 1997, when Safety Recommendation A-94-81 was closed.

Safety Recommendation A-08-21 asked the FAA to "require manufacturers of aircraft equipped with engine turbochargers to amend their pilot operating handbooks and airplane flight manuals to include in the "Emergency Procedures" section information regarding turbocharger failure and, specifically, procedures to minimize potential hazards relating to fire in flight and/or loss of engine power."

On June 11, 2012, the NTSB classified Safety Recommendation A-08-21 "Closed-Unacceptable Action" based on the FAA's decision not to take the recommended action. In its classification letter, the NTSB stated it "remains concerned that, without the establishment of an FAA requirement, manufacturers of aircraft equipped with turbochargers still have not voluntarily included emergency procedures for turbocharger failures, and as a result, accidents and incidents continue to occur."



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# National Transportation Safety Board - Aircraft Accident/Incident Database

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Accident Rpt# GAA17CA543	09/20/2017 800 PDT	Regis# N22650	St George, UT	Apt: St George Rgnl SGU
Acft Mk/Mdl CESSNA T210-L		Acft SN 21059767	Acft Dmg: SUBSTANTIAL	Rpt Status: Prelim Prob Caus: Pending
			Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: PRO AIR INC		Opr dba:		Aircraft Fire: NONE

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# National Transportation Safety Board - Aircraft Accident/Incident Database

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Accident Rpt# ERA17FA313	09/05/2017 1148 EDT	Regis# N135CD	Jacksonburg, WV	Apt: N/a		
Acft Mk/Mdl CIRRUS DESIGN CORP SR20-NO SERIES	Acft SN 1022	Acft Dmg: DESTROYED	Fatal 2	Ser Inj 0	Rpt Status: Prelim	Prob Caus: Pending
Eng Mk/Mdl LYCOMING IO360 SER					Flt Conducted Under: FAR 091	
Opr Name: SGLJ INC	Opr dba:				Aircraft Fire: NONE	
					AW Cert: STN	

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## Events

1. Enroute-cruise - Loss of control in flight
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## Narrative

On September 5, 2017, about 1148 eastern daylight time, a Cirrus SR20, N135CD, was destroyed when it collided with terrain in Jacksonburg, West Virginia. The private pilot and passenger were fatally injured. Instrument meteorological conditions prevailed at the time and an instrument flight rules flight plan was filed. The flight originated at Delaware Coastal Airport (GED), Georgetown, Delaware and was destined for Fleming-Mason Airport (FGX), Flemingsburg, Kentucky. The personal flight was conducted under the provisions of 14 Code of Federal Regulations Part 91.

According to information obtained from the Federal Aviation Administration (FAA), the flight was receiving radar services, and was in communication with air traffic control (ATC). The pilot reported entering an area of moderate to heavy precipitation. He deviated course, reported clear of the precipitation, and then requested to return on course via the Parkersburg (JPU) VOR. The controller issued a clearance for the pilot to fly direct to JPU. Shortly thereafter, the airplane entered a rapid descent from 8,000 ft mean sea level (msl) until radar contact was lost at 3,000 ft msl. There were no further radio communications with the airplane and the Cleveland ATC sector controller subsequently issued an alert notice (ALNOT).

The airplane was located on September 8, in a densely wooded area about 1,500 ft from its last known radar position.

Examination of the wreckage site revealed that the airplane was completely fragmented. The debris path was approximately 50 ft in length, and contained freshly cut tree branches. All flight controls and flight control instruments were destroyed. The Cirrus Airplane Parachute System (CAPS) parachute was not deployed; however, the rocket motor was expended, consistent with impact damage. The propeller was separated from the engine crankshaft and found along the debris path; all engine and propeller controls were destroyed. All three propeller blades remained attached to the hub and contained S-bending and chordwise scratches.

The single-engine airplane was manufactured in 2000, and was powered by a Continental IO-360ES engine, which showed signs of heavy external impact damage. All accessory components were separated from the engine, and the ignition system wires were damaged. The magnetos and vacuum pumps were separated and impact damaged. The crankshaft could not be rotated due to impact damage. The fuel system was separated from the engine and examination of the flow divider noted trace amounts of fuel within the divider.

The pilot held a private pilot certificate with ratings for airplane single-engine land, and instrument airplane. His most recent FAA third-class medical certificate was issued on February 24, 2016. In addition, he reported a total of 952 flight hours at that time. A review of the pilot's logbooks revealed that the pilot accumulated 1,077 total flight hours, which included 92 hours in the SR20, as of July 29, 2017. In addition, the pilot accumulated a 37.6 total hours of actual instrument time, of which 24.9 hours were logged in the SR20.

The closest surface weather observation to the accident site was North Central West Virginia Airport (CKB), Clarksburg, West Virginia, around 20 miles southeast of the accident site. The weather reported CKB at 1153 was, wind from 210ø at 12 knots, 10 miles visibility, thunderstorms in the vicinity, broken ceiling at 1,800 ft, broken skies at 2,300 ft, broken skies at 9,500 ft, temperature 22ø C, dew point 18ø C, and altimeter 29.82 inches of mercury.

# National Transportation Safety Board - Aircraft Accident/Incident Database

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Accident Rpt# CEN15FA388	08/30/2015 918 CST	Regis# N765CD	Kewanee, IL	Apt: N/a
Acft Mk/Mdl CIRRUS DESIGN CORP SR22-NO SERIES	Acft SN 0065	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual	Prob Caus: Pending
Eng Mk/Mdl CONT MOTOR IO-550 SERIES	Acft TT 1635	Fatal 2	Ser Inj 1	Flt Conducted Under: FAR 091
Opr Name: STEVE MURRAY	Opr dba:		Aircraft Fire: NONE	AW Cert: STN

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## Summary

The instrument-rated private pilot and two passengers departed on an instrument flight rules flight plan in low instrument meteorological conditions (IMC), including fog and cloud ceilings at 200 ft above ground level. Before takeoff, the pilot announced on the airport's common traffic advisory frequency that the airplane was departing runway 19; however, the airplane departed runway 27. Radar data indicated that the airplane made 3 nearly 360° left turns in close succession just before ground impact. The airplane's altitude during the turns varied between 1,200 ft and 1,800 ft msl. Examination of the airframe and engine did not reveal any anomalies that would have precluded normal operation, and data retrieved from onboard engine monitoring equipment indicated that the engine was operating normally throughout the flight.

Conditions conducive to the development of spatial disorientation existed at the time of the accident, including restricted visibility, entry into IMC, and maneuvering for an assigned course after takeoff. It could not be determined whether the pilot recognized his error in departing from the incorrect runway, but it is possible that this error presented the pilot with an operational distraction about the time the airplane was entering IMC, and could have precipitated the pilot's spatial disorientation. Additionally, the pilot had reported to the airplane's co-owner the day before the accident that the airplane's autopilot was inoperative and that he did not plan to use it. Thus, the pilot did not have the autopilot available to help manage his workload during the flight. The radar depiction of the accident flight path was consistent with the known effects of spatial disorientation, and it is likely that the pilot became disoriented shortly after entering IMC after takeoff.

## Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The pilot's loss of control due to spatial disorientation shortly after takeoff into low instrument meteorological conditions.

## Events

1. Initial climb - Loss of control in flight

## Findings - Cause/Factor

1. Personnel issues-Psychological-Perception/orientation/illusion-Spatial disorientation-Pilot - C
2. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-(general)-Not attained/maintained - C
3. Environmental issues-Conditions/weather/phenomena-Ceiling/visibility/precip-Below VFR minima-Effect on operation - C

## Narrative

### HISTORY OF FLIGHT

On August 30, 2015, about 0918 central standard time, a Cirrus SR22 airplane, N765CD, was destroyed when it collided with terrain shortly after takeoff from Kewanee Municipal Airport (EZI), Kewanee, Illinois. The private pilot and one passenger were fatally injured; the second passenger sustained serious injuries. The airplane was privately owned, and the personal flight was operated under the provisions of 14 Code of Federal Regulations Part 91. Instrument meteorological conditions prevailed throughout the area, and an instrument flight rules (IFR) flight plan was filed for the cross-country flight, with an intended destination of Hot Springs, Arkansas.

A family member drove the pilot and passengers to EZI at 0745. During the short drive, the pilot discussed the fact that the airplane's autopilot had stopped working during the flight to EZI a few days before. The pilot thought that this would make the trip a little harder but that it was not a critical system preventing his departure. The pilot said that he initially planned to fly under the clouds then climb above the clouds to his desired cruise altitude of 11,000 ft. Upon arriving at the airport, the pilot decided to delay the flight due to the amount of fog in the area. The pilot and passengers subsequently returned to the airport about 0900 for departure.

There were no witnesses to the accident and no distress calls were broadcast via radio. According to Flight Service, the pilot called before takeoff to file an IFR flight plan. He was given clearance to take off with a void time of ten minutes to activate the flight plan. The airport manager reported that the pilot taxied for takeoff on runway 27; however, the pilot's radio calls indicated that he thought he was using runway 19. After an aborted takeoff, the pilot completed a back-taxi on runway 27, but again his radio calls were for runway 19. The airplane subsequently departed runway 27.

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# National Transportation Safety Board - Aircraft Accident/Incident Database

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The surviving passenger, who was seated in the left rear seat, stated that the aborted takeoff was due to an open door. After securing the door, the airplane subsequently departed. She stated that when the airplane took off, it went quickly into the clouds. She stated that it did not feel as if the airplane was "going up." She stated that she heard a discussion between the pilot and then passenger seated in the front seat: the front seat passenger had reached for the activation handle for the airframe parachute system, and the pilot stated that the airplane was "too low." She then saw the ground approaching, and the impact occurred.

According to radar data obtained from the Federal Aviation Administration (FAA) Quad City Terminal Radar Approach Control facility, identified targets corresponded with the accident airplane's assigned transponder code. Additionally, five subsequent primary targets were consistent with the track of the accident airplane. There were no other aircraft operating in the immediate vicinity. The radar data corresponding to the airplane's transponder code began at 0914:53 at a Mode C reported altitude of 1,500 ft after the airplane departed EZI. The target continued in a left turn to the west and south and climbed to an altitude of 1,800 ft before beginning a descent to 1,200 ft. That data ended, and the primary radar returns consistent with the accident airplane begin at 0915:37 and continued until the last associated target at 0916:35 and an altitude of 1,600 ft. EZI airport elevation was 858 ft. A flight path superimposed between the primary targets suggested that the pilot made three nearly 360° left turns in close succession before impacting the ground. See figure 1.

## PERSONNEL INFORMATION

The pilot held a private pilot certificate with ratings for airplane single-engine land and instrument airplane. His most recent FAA third-class medical certificate was issued on August 14, 2014. Review of the pilot's logbooks indicated a total flight experience of 922 hours of which 37 hours were in the accident airplane make and model. The pilot completed a Cirrus Advanced Transitional Instrument Training Course in May 2015. The pilot had logged 130 hours of actual instrument flight experience and 94.1 hours of simulated instrument experience. In the 90 days before the accident, the pilot logged 3.1 hours simulated instrument experience and 4.8 hours actual instrument experience, all of which were in the accident airplane make and model.

## AIRCRAFT INFORMATION

The airplane's most recent annual inspection was completed on March 5, 2015, at a Hobbs meter time of 1,635.1 hours. On June 25, 2015, at a Hobbs time of 1,635.2 hours, a new Engine Data Management System was installed. The aircraft logbook included an entry stating that the Cirrus Airframe Parachute System (CAPS) was replaced on October 4, 2011, at a Hobbs time of 1,134.2 hours. At the time of the accident, the Hobbs time was 1,734.8 hours.

The co-owner of the airplane reported that he had flown the airplane 9 days before the accident. He reported that there were no problems with the aileron trim or the autopilot. He flew using GPS navigation and with the autopilot engaged for the entire flight. The 5.4-hour flight had 3 occupants onboard with 50 pounds of baggage. He also stated that he had talked to the accident pilot the morning before the accident. The pilot told him that the autopilot would hold altitude, but it would not hold the horizontal situation indicator (HSI) heading bug or the GPS. The pilot also told him that the trim on the sidestick was not working and that he could hold straight and level flight with a bit of right aileron. The co-owner and pilot agreed to have the trim looked at upon his return flight.

A family member reported that he and the pilot had flown the airplane on a local flight from EZI for about 15-20 minutes on the morning before the accident. He reported that the flight was normal and that they did not experience any problems.

## METEOROLOGICAL INFORMATION

First responders reported foggy conditions and low cloud ceilings about the time of the accident.

EZI listed no official weather reporting capability; however, an unofficial weather station was collocated at EZI and reported the following conditions at 0910: wind from 090° at 1 knot, temperature 18.9°C, dew point 18°C, relative humidity 99%, altimeter 30.11 inches of mercury (Hg). Visibility and sky conditions were not reported.

The closest reporting station to the accident site was from Galesburg Municipal Airport (GBG), Galesburg, Illinois, located 28 miles southwest of the accident site at an elevation of 764 ft. The airport had an Automated Weather Observation System (AWOS), which issued observations every 20 minutes. The 0915 observation included: calm wind, visibility 1 miles in mist, ceiling overcast at 200 ft, temperature and dew point 19°C, altimeter 30.09 inches of Hg.

A review of the observations for the day indicated that IFR conditions were reported as early as 2215 the previous evening, with low ceilings and visibility in fog and mist continuing through the time of the accident, and clearing by 1115. A weather study was completed by a NTSB staff meteorologist and is referenced in the public docket to this report.

## WRECKAGE AND IMPACT INFORMATION

Examinations of the airframe and engine were accomplished at the accident site and a secured hangar located at the Kewanee Airport.

The accident occurred in a planted soybean field, about 1.5 miles west of the Kewanee airport. The airplane impacted terrain in an approximate 45° nose-down, right-wing-low attitude on a heading of about 130-140°. The debris field extended to the east about 260 ft from the initial point of impact on a headings from 080 to 110°. The main wreckage came to rest on a heading about 190°.

An examination of the ground impact scars and debris path showed that the tip of the right wing struck the ground at the western end of the debris field. The scar from the right wing tip was the initial point of impact. Propeller cuts, dirt clumps, and an impact depression were noted in the soft soil about 38 to 45 ft from the initial impact point. The separated propeller was located at 55 ft, and the right cabin door was located at 65 ft. The tip of the right wing and aileron were at 67 ft. The upper engine cowling was at 72 ft and the lower engine cowling was at 78 ft. The CAPS enclosure cover was at 75 ft. The left cabin door was at 120 ft, the main wreckage was at 160 ft, and the engine was at 185 ft. The parachute was stretched out on a heading of 110° to about 240 ft. The CAPS D-Bag and rocket motor were at 260 ft.

### Fuselage

The fuselage was mostly destroyed by impact forces. The lower forward fuselage was crushed up and aft. The firewall was separated from the fuselage and the upper engine cowling was separated from the fuselage. The right forward corner of the upper engine cowling was crushed aft about 25°. The lower left and right engine cowlings were fractured into several pieces. The forward fuselage was fractured and crushed aft. The spar cover was separated from the fuselage. Both front seats remained attached to the spar cover. The rear section of the cabin floor was separated from the fuselage and the rear seats remained attached to it.

### Wing

The wing was mostly destroyed by impact forces, and the wing spar was fractured in multiple places. All upper and lower wing skins were separated from the wing spar. The left and right flaps were separated from the wing. The right aileron was separated from the wing, and the left aileron remained attached to the wing. Aileron control cable continuity was confirmed. The roll trim motor shaft was found fractured. The fractured end of the roll trim motor shaft remained attached to the roll trim cartridge. The roll trim cartridge remained attached to the left aileron actuation pulley. Two rub marks were located adjacent to the roll trim motor mounting location. One rub mark was on the roll trim motor access panel, and one rub mark was on the lower wing skin. It could not be determined when the rub marks occurred. The flap actuator was separated from the flap torque tube. The flap actuator shaft was located in a position extending approximately 2 inches, consistent with a "Flaps 50" position.

### Empennage/Stabilizers

The empennage was separated from the fuselage about 1 ft forward of the leading edge of the horizontal stabilizer. The rudder remained attached to the vertical stabilizer and rudder control cable continuity was confirmed. The right elevator remained attached to the horizontal stabilizer and the right elevator tip exhibited impact damage. The left elevator remained attached to the horizontal stabilizer and the left elevator tip was separated from the elevator. Elevator control cable continuity was confirmed. The pitch trim motor was in an approximate neutral position.

### Landing Gear

The nose landing gear assembly was buckled aft under the engine. The nose landing gear upper weldment remained attached to the engine mount. The nose landing gear leg, tire and wheel assembly was separated from the nose landing gear upper weldment. Both the left and right main landing gear assemblies exhibited impact damage. Both main landing gear assemblies remained attached to the wing.

## Doors

The right and left cabin doors were separated from the fuselage. Both door's upper and lower pins exhibited impact damage. The baggage door remained attached to the fuselage.

## Cockpit

The instrument panel exhibited impact damage and was separated into two sections. The center console exhibited impact damage. The center console was equipped with a Garmin GMA 340 Nav/Com, dual Garmin GNS 430's, S-TEC 55X autopilot, and a Garmin GTX 327 transponder. The ignition key remained in the ignition switch and the ignition switch was in the "Both" position. The bolster panel in front of the left crew seat was modified with a JPI Engine Data Management System. The instrument panel in front of the right crew seat was modified to accept a Garmin GPS map 696, which was installed.

The following settings, indications and switch positions were noted:

- Hobbs meter indicated 1,734.8 hours.
- Altimeter's Kollsman window indicated a setting of 30.01.
- Flap switch was in the flaps "100" position.
- GPS #2 circuit breaker was in the "open" position.
- Encoder/transponder circuit breaker was in the open position.
- MFD circuit breaker was "zip-tied" in the "open" position.
- Strobe and landing light switches were in the "on" position.
- Strobe lights circuit breaker was in the "open" position.
- Battery #2 circuit breaker was in the open position.
- Battery #1, Alternator #1 and Alternator #2 master switches were in the "on" position.

## Seats and Restraints

Both front seats remained attached to the spar cover. First responders cut the left seat belt webbing to aid in the extraction of the left seat occupant. The separated left seat belt remained buckled together. The right seat belt was found unbuckled. The right seat belt webbing exhibited load damage. The right seat belt webbing was torn and partially pulled through the load bar. The left rear seat belt remained buckled together. The left rear seat belt webbing exhibited load damage and was crushed and gathered against the load bar.

## Cirrus Airframe Parachute System (CAPS)

The forward section of the roof and the windscreen were separated from the fuselage. Impact damage was noted on the roof structure directly above and adjacent to the mounting location of the CAPS activation handle and holder. The CAPS activation handle was found out of the activation handle holder. The activation handle holder bracket was bent aft. Impact damage was noted on the activation handle and on the exposed activation cable. The CAPS safety pin was located on the ground under the main wreckage.

The CAPS was found deployed and the CAPS rocket motor propellant was expended. The CAPS rocket motor, rocket lanyards, incremental bridle, D-Bag, suspension lines, riser, rear harnesses and both front harnesses had been extracted from the airplane. The rear harness remained snubbed. Both reefing line cutters remained in place and both had been activated. The parachute was separated from the D-Bag and was found stretched out from the main wreckage on a heading about 110°. The slider was at the base of the canopy. Packing folds were present on the canopy.

The rocket motor, lanyards, incremental bridle and D-Bag were located approximately 20 ft beyond the end the parachute. The CAPS launch tube, rocket igniter, exhaust shield, and base remained attached to the bulkhead. The retention straps for the D-Bag remained in the enclosure compartment. The CAPS access panel (#CB7) exhibited impact transfer marks from the left front harness 3-point link. The CAPS enclosure cover was located approximately 20 ft south of the debris path at a point about 75 ft from the right wing tip ground scar. An impact transfer mark, consistent in size and dimension with the top of the CAPS rocket motor, was noted on the inside surface of the cover, on the "strike plate."

On-site observations of the CAPS system showed that the system was not activated in flight. All evidence correlated to a CAPS deployment as the result of

impact forces.

## Engine

The crankshaft propeller flange was fractured and remained attached to the propeller hub. All of the cylinders remained attached to the crankcase and exhibited impact damage. All damage observed was consistent with impact. The fractured crankshaft propeller flange and radii exhibited 45° shear lips and spiral cracking. The exhaust and induction systems exhibited impact damage.

Both magnetos remained attached to the engine. Rotation of the engine by hand through the accessory drive produced impulse coupling engagement from both magnetos. The magnetos produced spark on the top spark plug leads for cylinder Nos. 2, 4, 5 and 6. The ignition harness was severed at the magneto due to impact damage, which contributed to the lack of spark from the top leads of cylinder Nos. 1 and 3. The ignition harness exhibited impact and thermal damage, and some leads were found cut and severed. The top spark plugs exhibited light- and dark-colored combustion deposits and the electrodes exhibited normal wear. The bottom spark plugs were inspected using a lighted borescope and exhibited normal operating signatures.

The fuel pump remained attached to the engine and was removed. The drive coupling was intact and the pump turned freely by hand. The mixture control arm moved freely by hand from stop to stop. The fuel pump was disassembled with no anomalies noted. The fuel manifold valve was removed from the engine and disassembled. The screen was free of debris. A small amount of fuel was observed in the manifold valve cavity. The diaphragm and plunger were intact and the retaining nut was tight. The fuel injector lines exhibited impact damage. The fuel injector nozzles from all cylinders except cylinder No. 2 were removed and free of obstructions. The No. 1 cylinder fuel nozzle was slightly bent. The fuel nozzle for cylinder No. 2 could not be removed due to impact damage.

The throttle body remained attached to the engine and exhibited impact damage. The control arm moved freely by hand from stop to stop.

The oil sump was crushed upward into the crankcase and breached. The oil pump was disassembled and the drive and driven gears showed no anomalies and were coated with oil. The oil pump cavity contained oil and exhibited no hard particle passage. The oil cooler remained attached to the engine and exhibited impact damage.

The cylinders exhibited impact damage to their respective fins and some valve covers. The top spark plugs were removed and the cylinders were examined with a lighted borescope. The combustion chambers contained light-colored combustion deposits. The engine was rotated by hand through the accessory drive, and thumb compression was obtained on all cylinders except cylinder No. 1. A second borescope inspection of cylinder No. 1 revealed dirt and debris from impact located around the exhaust valve seat, preventing full closure of the exhaust valve. The engine was rotated again and proper operation of the No. 1 cylinder valve was visually observed with the borescope. The starter was found in the debris field, fractured and free of the starter adaptor.

## Propeller Assembly

The three-blade propeller was separated from the engine and located in the wreckage debris field. The spinner exhibited rotational crushing. Two blades were relatively straight and displayed chordwise scratching. The third blade was bent aft approximately midway from the hub to the tip and exhibited chordwise scratches and nicks in the leading edge. Several propeller slash marks were noted in the debris field. The propeller governor remained attached and was removed for inspection. The control arm moved freely by hand from stop to stop. The drive rotated freely by hand and oil discharged from the governor. The governor's gasket screen was free of debris.

## MEDICAL AND PATHOLOGICAL INFORMATION

The Henry County Coroner Office, Cambridge, Illinois, performed an autopsy of the pilot. The cause of death was listed as "Multiple Blunt Injuries."

Toxicological testing on specimens of the pilot was performed by the FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma. Testing for carbon monoxide, ethanol, and drugs were all negative.

## TESTS AND RESEARCH

### Recorded Data

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# National Transportation Safety Board - Aircraft Accident/Incident Database

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The airplane was equipped with a Garmin 696 GPS MAP and a JPI EDM 900 Engine Monitoring System. The Garmin 696 was impact damaged and no data was extracted.

The JPI EDM 900 was viable and data were downloaded. The data extracted included 71 logs from June 26, 2015 through August 30, 2015. The log for the accident flight began at 09:12:38 CDT and ended at 09:14:43 CDT. Additionally, data from four previous flights were reviewed. All recorded logs showed normal engine operation.



# National Transportation Safety Board - Aircraft Accident/Incident Database

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Accident Rpt# WPR17LA201	09/05/2017 1430 PDT	Regis# N523CA	Atwater, CA	Apt: Castle MER
Acft Mk/Mdl COBALT AIRCRAFT INDUSTRIES INC	Acft SN P04	Acft Dmg: SUBSTANTIAL	Rpt Status: Prelim	Prob Caus: Pending
Eng Mk/Mdl CONTINENTAL MOTORS TSIOF550-D	Acft TT 1	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091	
Opr Name: COBALT AIRCRAFT INDUSTRIES INC	Opr dba:	Aircraft Fire: NONE		AW Cert: SPE

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## Events

1. Initial climb - Flight control sys malf/fail
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## Narrative

On September 05, 2017, about 1430 Pacific daylight time, a Cobalt Co50 Valkyrie, N523CA, landed hard following an in-flight loss of controllability at the Castle Airport, Atwater, California. Cobalt Aircraft Industries, Inc., was the registered owner and was operating the airplane under the provisions of 14 Code of Federal Regulations (CFR) Part 91. The airline transport pilot, the sole occupant, was not injured; the airplane sustained substantial damage. The local-area test flight originated from Atwater about 1410. Visual meteorological conditions prevailed and no flight plan was filed.

The airplane, serial number PX-04, was manufactured in October 2016 and registered under an Experimental Research and Development airworthiness certificate. The airplane had undergone four previous flights and the accident flight was the pilot's first flight in a Cobalt aircraft. The purpose of the flight was for the pilot to perform an evaluation of handling qualities at various configurations specified in the test card.

The pilot stated that immediately after rotation, he experienced extreme difficulty controlling the airplane. As the airspeed increased, he began to attain some controllability and climbed to about 1,000 feet above ground level. He determined that the ailerons were ineffective but was able to use the rudder for directional control. The pitch stability was sporadic with him experiencing intermittent pitch up and down movements. After about 20 minutes of manipulating the flight controls and practicing climbing and descending using the trim, he managed to stabilize the airplane around 90 kts. He reasoned that he would be able to land the airplane while configured at an increased airspeed using steady thrust control and the rudder for directional control. During landing, with the airplane about 10 feet above the runway surface, the airplane experienced a loss of lift and landed hard. The impact resulted in the right landing-gear leg separating and the airplane subsequently made a 180-degree; the right-wing spar sustained damage.

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# National Transportation Safety Board - Aircraft Accident/Incident Database

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Accident Rpt# GAA17CA538    09/11/2017 1600 PDT    Regis# N4465F    Santa Ynez, CA    Apt: Santa Ynez IZA  
Acft Mk/Mdl CZECH AIRCRAFT WORKS SPOL SRO    Acft SN 08SC142    Acft Dmg: SUBSTANTIAL    Rpt Status: Prelim    Prob Caus: Pending  
Fatal 0    Ser Inj 0    Flt Conducted Under: FAR 091  
Opr Name: SANTA MONICA FLYERS INC    Opr dba:    Aircraft Fire: NONE

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# National Transportation Safety Board - Aircraft Accident/Incident Database

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Incident Rpt# WPR17IA198	08/22/2017 904 MST	Regis# N52PD	Glendale, AZ	Apt: Glendale Muncial Airport GEU
Acft Mk/Mdl ENSTROM F 28F		Acft SN 807	Acft Dmg: NONE	Rpt Status: Prelim Prob Caus: Pending
			Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: AIRWEST AVIATION ACADEMY LLC	Opr dba:			Aircraft Fire: NONE
				AW Cert: STN

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## Events

1. After landing - Fire/smoke (non-impact)
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## Narrative

On August 22, 2017, about 0904 mountain standard time, an Enstrom F-28F helicopter, N52PD, experienced smoke emanating from the engine cowling area while the flight instructor and student pilot were practicing hovering auto-rotations at the Glendale Municipal Airport (GEU) Glendale, Arizona. The helicopter had just touched down and therefore an immediate engine shutdown was accomplished. The flight instructor and student pilot were not injured. The helicopter was not damaged. The helicopter was registered to and operated by Airwest Aviation Academy LLC as a 14 Code of Federal Regulations Part 91 instructional flight. Visual meteorological conditions prevailed, and no flight plan had been filed. The local flight departed GEU about 0750.

The helicopter was recovered to a secure facility for further examination.

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# National Transportation Safety Board - Aircraft Accident/Incident Database

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Accident Rpt# CEN17LA338	09/03/2017 1615 CDT	Regis# NC68N	Mt. Zion, IL	Apt: N/a
Acft Mk/Mdl GOLDEN EAGLE CHIEF		Acft SN 803	Acft Dmg: SUBSTANTIAL	Rpt Status: Prelim Prob Caus: Pending
Eng Mk/Mdl KEN ROYCE 7 SERIES			Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: WILLIAM J. RASSMUSSEN III		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

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## Events

1. Enroute-cruise - Loss of engine power (total)
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## Narrative

On September 3, 2017, about 1615 central daylight time, a Golden Eagle Chief, NC68N, piloted by a private pilot, was substantially damaged when it nosed over in a bean field near Mt. Zion, Illinois. The pilot and passenger on board the airplane were not injured. The personal flight was being conducted under the provisions of Title 14 Code of Federal Regulations Part 91 without a flight plan. Visual meteorological conditions prevailed at the time of the accident. The cross-country flight originated from Macomb (MQB), Illinois, and was en route to Mattoon, (MTO), Illinois.

The pilot told Federal Aviation Administration (FAA) inspectors that the engine lost power. His first thought was that it was a fuel issue. He made a forced landing in a bean field and the airplane nosed over on its back. There was fuel in the tanks at the accident site.

# National Transportation Safety Board - Aircraft Accident/Incident Database

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Accident Rpt# CEN16LA330	08/23/2016 745 MDT	Regis# N97TH	Cokeville, WY	Apt: N/a
Acft Mk/Mdl HILLER UH 12D-NO SERIES		Acft SN 1165	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
		Acft TT 14494	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 137
Opr Name: WYOMING HELICOPTERS INC DBA		Opr dba:		Aircraft Fire: NONE

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## Events

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

On August 23, 2016, about 0745 mountain daylight time, a Hiller UH-12D helicopter, N97TH, impacted terrain near Cokeville, Wyoming. The pilot received minor injuries and the helicopter was substantially damaged during the accident. The helicopter was registered to and operated by Wyoming Helicopters, Inc., Boulder, Wyoming, under the provisions of 14 Code of Federal Regulations Part 137 as an agricultural flight. Visual meteorological conditions prevailed at the time.

The pilot reported that he started a spray application run and was about 15 ft agl (above ground level) and at 50 mph when he felt a "bump" in the cyclic control. The helicopter began to shake violently and the pilot tried to slow the helicopter down for a landing. However, the helicopter's skid caught on some bushes, and the helicopter rolled over, coming to rest on its side. During the accident, the tail boom and right skid tube were torn from the fuselage and the rotor head separated from the mast. An outboard section of the rotor cuff/paddle was located about 150 ft from the helicopter wreckage. The rotor cuff's spar had separated near a bolted part of a joint.

The separated section of the rotor cuff was sent to the NTSB materials laboratory in Washington D.C. for examination. The examination found fatigue cracks, starting at a bolt hole, that progressed around the rotor cuff spar tube.

The specialist's full materials laboratory factual report is located in the docket for this accident.

A review of the Federal Aviation Administration (FAA) airworthiness directives (AD) notes AD 97-10-16 applicable to the Hiller UH-12 helicopter. The AD requires (in part) that the control rotor blade spar tube be inspected ". for corrosion or cracks, or elongation, corrosion, burrs, pitting or fretting of the bolts holes." "During the annual inspection, not to exceed 100 hours and every 100-hours, thereafter."

The AD also specifies for helicopters with cuff part number 36124:

(d) For cuffs, P/N 36124, without a complete prior service history, within the next 25 hours TIS, unless already accomplished within the last 25 hours TIS prior to the effective date of this AD, and at intervals not to exceed 50 hours TIS, perform a dye penetrant inspection of the cuff in accordance with paragraph G of the Accomplishment Instructions of Hiller Aviation Service Bulletin, No. 36-1, Revision 3, dated October 24, 1979. If a crack is discovered, remove the cracked cuff from service prior to further flight. A cuff for which the prior service history cannot be documented cannot be used as a replacement part. Remove from service all cuffs prior to the accumulation of 225 hours total TIS since April 7, 1977.

A review of the helicopter's maintenance records indicated that a rotor cuff (part number 36124) was installed on February 11, 2013 with a component total time of 988.7 hours, and 0 since overhaul. A component listing dated September 28, 2015, noted the helicopter's Hobbs time of 1,093.3 hours. At the time of the accident, the Hobbs meter read 1,225.2 hours; 131.9 hours had accumulated on the part since the September 2015 listing. The pilot reported that the helicopter was on an annual inspection program, and its last 100-hour inspection was done on August 5, 2016.



# National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# CEN16FA315	08/09/2016 2035 CDT	Regis# N9277R	Howe, TX	Apt: N/a
Acft Mk/Mdl HUGHES 269C		Acft SN 790809	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl LYCOMING HIO-360-D1A		Acft TT 5663	Fatal 1 Ser Inj 1	Flt Conducted Under: FAR 091
Opr Name: ON FILE		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

## Events

1. Maneuvering - Loss of engine power (total)
2. Autorotation - Loss of control in flight

## Narrative

### HISTORY OF THE FLIGHT

On August 9, 2016, at 2035 central daylight time, a Hughes 269C helicopter, N9277R, impacted terrain following an autorotation near Howe, Texas. The flight instructor was fatally injured, the student pilot sustained serious injuries, and the helicopter sustained substantial damage. The helicopter was privately owned and operated under the provisions of 14 Code of Federal Regulations Part 91. Visual meteorological conditions prevailed at the time of the accident, and no flight plan was filed. The local instructional flight departed the Sherman Municipal Airport (SWI), Sherman, Texas, at an unknown time.

The student pilot reported to a law enforcement officer who responded to the accident that he and the flight instructor were flying about 1,100 ft above ground level (agl) when the instructor initiated a practice autorotation which included reducing the throttle to idle to simulate an engine failure. When the engine power was reduced, the engine experienced a total loss of power. The flight instructor attempted to restart the engine, but was unsuccessful. The student stated that the autorotation was initially controlled, but then the helicopter impacted terrain in a high-speed descent. During the impact, the tail boom partially separated, and the helicopter rolled over, coming to rest on its right side.

In a written statement, the student reported that he and the instructor had completed some landings and other operations at SWI, and were returning to his residence at an altitude about 1,200 ft agl. While en route, the instructor "slowly rolled down the throttle to simulate [an] engine failure." After noticing the throttle reduction, the student lowered the collective and looked for an appropriate place to land. The student and instructor then noticed the engine rpm gauge was reading zero. The student stated that both he and the instructor were "on the controls" during the autorotation. The student recalled starting to flare about 25 ft agl, and did not recall any details after the flare. The student reported, "I feel we didn't slow the descent enough before contacting the ground..." The student exited the helicopter and attempted, unsuccessfully, to extricate the instructor. He then went to search for assistance.

According to a Federal Aviation Administration (FAA) inspector, who spoke with the student after the accident, the student stated that the instructor never touched or manipulated the flight controls during the flight and during the accident sequence.

### PERSONNEL INFORMATION

According to the FAA inspector who spoke with the student, the student had accumulated 25 flight hours with a local helicopter flight school before flying with the accident instructor. He'd stopped flying with the local flight school in October 2012. Since October 2015, the student had flown several flights with the instructor and had accumulated 63.7 total flight hours at the time of the accident.

According to law enforcement, on July 12, 2014, the student had been involved in a previous accident in the same make/model helicopter. The student stated to the FAA inspector that he was moving the helicopter when the helicopter "got away from him." The accident was not reported to the NTSB.

### AIRCRAFT INFORMATION

The helicopter's most recent annual inspection (which included an annual, 100, 200, 400 and 24-month inspections) was completed on August 10, 2015, at a total airframe time of 5,624 hours and a Hobbs meter time of 13.0 hours. At the time of the inspection, the engine had accumulated 3,664.6 total hours and 392.6 hours since overhaul. The Hobbs meter time at the accident site was 52.7 hours.

Review of maintenance records revealed no entries or comments related to idle/mixture adjustments or settings.

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# National Transportation Safety Board - Aircraft Accident/Incident Database

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## METEOROLOGICAL INFORMATION

Review of sun and moon data from the U.S. Naval Observatory revealed that, on the day of the accident, sunrise was at 0644, sunset was 2018, and the end of civil twilight was 2045.

## WRECKAGE AND IMPACT INFORMATION

The helicopter impacted down sloping grassy terrain adjacent to wooded areas and residential structures. The main wreckage consisted of the fuselage, a portion of the tail boom, and the main rotor system. The landing gear skids were spread apart and bent up into the fuselage. The instrument panel was partially separated from the fuselage. The fuel boost pump switch was found in the OFF position. The right seat anti-torque pedals were separated from the pedal supports. Both the left and right seat bottom panels were crushed downward about 4 inches. Flight control continuity was established from the cockpit to all flight controls in the main rotor and tail rotor systems. The three main rotor blades were bent and deformed, and remained attached to the rotor head.

Upon their arrival to the accident site, first responders noted that fuel was draining from the fuel tanks.

The helicopter was recovered to a secure storage facility for further examination.

On August 30, 2016, the helicopter was examined by the NTSB investigator-in-charge, a representative from the FAA rotorcraft directorate, representatives from Sikorsky Aircraft, and a representative from Lycoming Engines.

Examination of the airframe revealed the mast was intact and three support struts were straight and attached. The transmission was intact and remained attached to the steel center frame. The steel tube support frame exhibited bending, buckling, and fractures. The two forward cockpit floor support struts were fractured. The cockpit floor was separated from the base of the seat deck. The door frames were fractured and separated. The aft cabin wall was distorted and wrinkled at bottom attach area to the seat deck. The canopy frame was fractured and separated with all Plexiglas broken and separated.

The main rotor blades remained attached to the rotor head, and the blades were intact. The yellow blade was bent up at the root end doubler, bowed down at mid-span, and upward at the blade tip. Chordwise crushing and trailing edge wrinkles were noted about mid-span. White paint transfer, consistent with contact with the airframe, was noted on the bottom leading edge. The blue blade was bent downward at the root end doubler, bowed upward near mid-span, and downward at the tip. White paint transfer was present near the blade tip. The red blade was bent downward at the root end doubler. The blade was relatively straight.

The main rotor head was intact and attached to the drive shaft. The rotor head turned freely in the mast bearing with continuity through the main gear box. The three upper main rotor hub attach bolts exhibited compression damage. The compression damage was consistent with contact from the pitch bearing shaft from a high upward blade movement. The blade up-flapping/coning was consistent with blade to ground contact. The droop stop ring was not present.

The tail boom was fractured at the center bulkhead rivet line, and the forward section was separated from the steel tube frame and strut at the forward bulkhead. Both tail boom support struts were fractured at the lower tabs in a downward direction. A main rotor blade contact dent was noted aft of the center attach fitting, at the internal damper location. The left support strut remained attached to the tail boom and exhibited a long black mark on the outside lower portion of the tube, consistent with main rotor blade contact. The horizontal stabilizer displayed downward bending damage and skin buckling at the forward attachment to the tail boom. The lower vertical stabilizer sustained crush damage consistent with ground contact.

The tail rotor blades remained attached to the hub. Both blades displayed minor airfoil damage. One blade was intact and straight, and one blade was fractured at the end of the hub. The tail rotor driveshaft was separated at the forward end from the main gear box pinion drive spline. The driveshaft remained in one piece, but was buckled and folded aft at the boom separation point. The driveshaft exhibited torsional twisting near the forward end with twisting in the direction of rotation, consistent with tail rotor contact prior to separation.

The left landing gear skid remained attached to the forward cross beam at the strut and damper. The left aft skid was separated at the strut to cross beam, with the fracture consistent with overload failure. The right landing gear skid forward strut remained attached to the crossbeam, and the aft strut separated at the crossbeam. The skid was bent between the forward and aft strut attach points, and fractured forward of the forward strut.



The engine remained partially attached to the airframe. The exhaust pipes were crushed, deformed, and displaced, consistent with ground contact. The fuel injector body exhibited impact marks consistent with forward landing gear crossbeam contact. The throttle bellcrank linkage was fractured and separated from the bottom of inlet adapter mount.

Engine control continuity was established from the cockpit controls to the engine components; however, full motion was restricted due to airframe deformation. Thumb compression and valve motion was noted on all cylinders. The magnetos were removed and rotated with a portable drill, and all eight spark plug leads produced spark. The fuel injector nozzles were removed and all nozzles exhibited some carbon on the orifice tips. The fuel injector body bore exhibited carbon deposits. The drained oil from the crankcase was black in color. The engine could not be functionally tested due to damage.

Blue fuel stains were noted from the filler caps on both the main (left) and auxiliary (right) fuel tanks. A puncture was noted in the bottom of the auxiliary tank, and no fuel was present in the fuel tanks. Fuel was found in the fuel injector and fuel pump.

## MEDICAL AND PATHOLOGICAL INFORMATION

The instructor died in the hospital on August 10, 2016.

The Dallas County Office of the Medical Examiner, Dallas, Texas, performed an autopsy on the instructor. The autopsy report stated that the cause of death was blunt force injuries.

The FAA's Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed forensic toxicology on specimens from the flight instructor. The results were negative for carbon monoxide and ethanol. Testing identified Acetaminophen (31.2 (ug/ml) in the urine, glucose (160 mg/dl) in vitreous, glucose (18 mg/dl) in urine, and the blood sample was unsuitable for analysis of Hemoglobin A1C.

Acetaminophen is a pain and fever reliever commonly sold under the trade name Tylenol.

## ADDITIONAL INFORMATION

The Pilot's Flight Manual found at the accident site was last updated in June 2000. According to the manufacturer, there had been nine revisions since that date, with the latest revision November 19, 2014. A complete re-issue was published December 7, 2012, which included new warnings on practice autorotations and throttle management.

According to the Pilot's Flight Manual (revised July 5, 1996) that was located at the accident site, Emergency Procedures, page 3-1, Section 3-1 Engine Failure - Altitude Above 450 Feet, stated in part:

"Lower collective pitch. Enter normal autorotation.

Establish a steady glide of 52 knots (60 mph) IAS approximately.

At an altitude of 50 feet, begin steadily to apply back cyclic stick to decreased forward airspeed.

At approximately 10 feet, coordinate collective pitch with forward movement of cyclic stick to level ship and cushion landing. Make ground contact with ship level."

The Pilot's Flight Manual (revised July 5, 1996) Emergency Procedures, page 3-7, Section 3-11 Air Restart stated in part:

"Pick out landing spot. If less than 2000 feet above terrain, proceed with autorotation landing. Pull mixture control to IDLE CUTOFF when time permits to stop flow of fuel from nozzles."

The Pilot's Flight Manual (revised June 15, 1994) Normal Procedures pages, 4-20 to 4-22, Pilot's Check of Idle Mixture, Idle Speed, and Fuel Boost Pump, stated in part:

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"NOTE: This check of idle mixture, idle speed, and fuel boost pump shall be accomplished at the end of the last flight each day, prior to engine shutdown.

Accomplish the engine idle mixture check as follows:

Land from a hover with engine cylinder head temperature and oil temperature as near to in-flight conditions as possible, friction on the collective and cyclic controls, governor disengaged, and engine speed at operational rpm.

Ensure MIXTURE is set to FULL RICH.

Rapidly rotate throttle to CLOSED position. (Set at normal idle stop, do not override.)

NOTE: Engine speed with immediately decrease to idle level. Rotor speed, however, will decline gradually. The next step must be performed before rotor tachometer needle superimposes with engine tachometer needle.

Observe engine tachometer need and smoothly move mixture control toward IDLE CUTOFF position.

Return mixture control to FULL RICH before the rpm decreases to a point where the engine will stop.

NOTE: Engine rpm rise is required to be between 25 and 100 rpm for this check.

If rpm rise is not within the required limits, notify the appropriate maintenance personnel to perform proper idle speed and mixture adjustments.

Accomplish an idle speed check as follows:

Operate helicopter at operational rpm with rotor system engaged, friction on the collective and cyclic controls, and governor disengaged.

Rapidly rotate throttle closed and into full override position.

Read and record engine idle rpm to engine and rotor tachometer needles superimposing.

With engine head temperature near 300 degrees F, but not above, repeat the three preceding steps, without going into full override (set throttle at normal idle stop).

NOTE: The first check (throttle into full override) should produce an idle speed no less than 1400 rpm. The second check (throttle at normal idle stop) should produce an idle speed no greater than 1600 rpm.

If engine idle speed is not within the required limits, notify the appropriate maintenance personnel to perform adjustments in accordance with the Basic HMI."

The November 2014 revision of the Pilot's Flight Manual Normal and Emergency Procedures sections included the following warnings and instructions:

"Engine idle speeds at high density altitude may be less than those set at sea level conditions. Do not rapidly reduce throttle to idle stop in flight.

WARNING - To minimize possibility of engine stoppage, rapid throttle reductions to full idle during flight shall not be conducted at any altitude."

"WARNING - During power recovery from practice autorotations, airspeed and altitude combinations that are inside the height velocity curve shall be avoided. High rates of descent may develop from which recovery may be difficult or not possible.

WARNING - Practice autorotations shall be conducted in an area with a suitable landing site available to minimize hazards associated with inadvertent engine stoppage.

WARNING - To reduce the chance of engine stoppage when initiating practice autorotations or simulated forced landing training the throttle shall not be abruptly retarded to the idle position.

CAUTION - At high power settings an overspeed might occur if throttle is not reduced slightly when collective is lowered.

Ensure fuel boost pump is activated prior to commencing autorotation training. Split the needles by reducing throttle slightly and lowering the collective. The throttle correlation will establish a high idle rpm (approximately 2500 rpm) which will aid in preventing the engine from loading up or stalling during recovery. Conversely, for recovery, increase throttle slightly when the collective is raised, the correlation is such that only minor throttle adjustments will be required to perform a smooth recovery without exceeding 3200 rpm.

If engine stops make a touchdown auto landing."

# National Transportation Safety Board - Aircraft Accident/Incident Database

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Accident Rpt# ERA17CA244	07/14/2017 1030 EDT	Regis# N57GX	Venice, FL	Apt: Venice Muni VNC
Acft Mk/Mdl MOONEY M20R		Acft SN 29-0357	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl CONT MOTOR IO-550 SERIES		Acft TT 987	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: WILLIAM M POWELL INC		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

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## Events

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

## Narrative

The pilot of the single-engine airplane reported that during landing to the southeast, a gust of wind contacted the airplane's tail from the left side, causing the airplane to veer to the left. The airplane departed the runway, crossed a taxiway, and impacted a ditch. The pilot reported there were no preimpact mechanical malfunctions or anomalies that would have precluded normal operation of the airplane. Examination of the wreckage by a Federal Aviation Administration inspector revealed the nose gear collapsed and the propeller was bent aft. The engine firewall was wrinkled below the left engine mount. The recorded weather at the airport, about the time of the accident, included wind from 080ø at 10 knots.

# National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# WPR16FA112 05/17/2016 1842 MST Regis# N3198G Mesa, AZ Apt: Falcon Fld FFZ  
Acft Mk/Mdl NORTH AMERICAN AT 6 Acft SN 84-7721 Acft Dmg: DESTROYED Rpt Status: Factual Prob Caus: Pending  
Eng Mk/Mdl P&W R1340 SERIES Acft TT 8693 Fatal 2 Ser Inj 0 Flt Conducted Under: FAR 091  
Opr Name: CHURCHILL DALE L Opr dba: Aircraft Fire: GRD

## Summary

The airline transport pilot and a passenger departed on a local flight as part of a flight of two airplanes in daytime visual meteorological conditions. Shortly after takeoff, witnesses heard the engine popping; another witness reported a possible loss of power. The airplane entered a right turn and appeared to slow. It subsequently impacted the ground and a postimpact fire ensued. Recorded communication obtained from the air traffic control tower revealed that the pilot transmitted a mayday call before the accident; however, he did not state the nature of the emergency. Postaccident examination of the airframe, flight control system, and the engine revealed no evidence of mechanical malfunctions or failures that would have precluded normal operation.

The airplane was originally equipped with left- and right-wing fuel tanks, as well as a reserve tank located within the left tank. Maintenance records revealed that the fuel system was modified from its original configuration to remove the reserve tank and interconnect the left and right tanks, therefore allowing for an "On/Off" selection and eliminating the need to switch tanks in flight. The fuel system was again reconfigured; however, no entries in the maintenance records were found regarding this modification. Postaccident examination of the airplane and interviews with the operator revealed that the tank interconnect had been removed, and that the reserve port on the fuel selector valve had been plugged with a blanking cap. The fuel selector valve face displayed four quadrants, one each for the Left, Right, and Off positions, and a blank quadrant where the Reserve position had been previously. Although the Reserve position was not marked, the selector could still be moved to that position, which would result in a loss of fuel flow to the engine. During the wreckage examination, the fuel selector valve was found in a position consistent with the reserve position; however, the fuel selector valve position at the time of the accident could not be determined.

It is possible that, if the airplane experienced a momentary loss of power, and in accordance with the practice most commonly used by T-6 pilots, the pilot would have selected what was the "reserve" position (although not marked), even though that port was plugged. This would have led to a total loss of engine power due to fuel starvation.

## Events

1. Maneuvering-low-alt flying - Loss of control in flight
2. Post-impact - Collision with terr/obj (non-CFIT)

## Findings - Cause/Factor

1. Not determined-Not determined-(general)-(general)-Unknown/Not determined - C
2. Personnel issues-Task performance-Use of equip/info-Aircraft control-Pilot - C
3. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-(general)-Attain/maintain not possible - C

## Narrative

### HISTORY OF FLIGHT

On May 17, 2016, about 1842 mountain standard time, a North American AT-6, N3198G, was destroyed when it impacted terrain shortly after departure from Falcon Field Airport (FFZ), Mesa, Arizona. The airline transport pilot and the passenger were fatally injured. The airplane was registered to Wings of Flight Foundation and operated by the pilot as a 14 Code of Federal Regulations Part 91 air tour flight. Visual meteorological conditions prevailed in the area and no flight plan was filed for the local flight, which originated from FFZ about 1840.

Company personnel reported that the accident airplane was in the trail position behind another company airplane of the same make. The purpose of the flight was to depart FFZ and conduct a tour of the area north of the airport before returning. Witnesses located at the airport saw the airplane depart runway 22L and heard the engine producing "popping" sounds then a loud "bang." One of the witnesses stated that it appeared as though the engine was either not producing any power or not producing enough power. The witnesses further reported that they saw the airplane turning to the right and slowing down. The airplane subsequently impacted the ground and a postcrash fire ensued.

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# National Transportation Safety Board - Aircraft Accident/Incident Database

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Review of recorded radio transmissions from the air traffic control tower at FFZ revealed that, about 2 minutes after the flight of two was cleared for takeoff, the accident pilot transmitted "Dash 2 Mayday." The pilot did not state the nature of the emergency.

## PERSONNEL INFORMATION

The pilot, age 43, held an airline transport pilot certificate with airplane single-engine land and multi-engine land ratings. The pilot was issued a first-class Federal Aviation Administration (FAA) medical certificate on July 22, 2015, with no limitations. On the application for that medical certificate, the pilot reported 11,950 total hours of flight experience of which 465 hours were in the previous six months. The pilot's digital logbook, with entries from January 1, 2013, through April 24, 2016, revealed that during that period, the pilot accumulated a total of 2,744.1 flight hours. The pilot had about 50 hours of flight experience in the accident airplane make and model, including about 11 hours in the accident airplane.

## AIRCRAFT INFORMATION

The two-seat, single-engine, low-wing, retractable landing gear airplane, serial number 84-7721, was manufactured in 1942. It was powered by a Pratt & Whitney R1340-AN, 550-hp, reciprocating engine, serial number 2D700, which drove a Hamilton Standard two-bladed, controllable pitch propeller. A review of maintenance records showed that the most recent annual inspection was completed February 13, 2016, at a total aircraft time of 8,746.9 hours.

## METEOROLOGICAL CONDITIONS

The nearest automated weather report was from Phoenix-Mesa Gateway Airport (IWA), located 10 miles south of the accident site. The 1859 observation included wind from 290° at 9 knots, 20 statute miles visibility, scattered clouds at 12,000 ft above ground level (agl), ceiling broken at 15,000 ft, temperature 29°C, dew point 4°C, and an altimeter setting of 29.77 inches of mercury (inHg).

The 1851 observation at Sky Harbor International Airport (PHX), located 14 miles from the accident site, included wind from 310° degrees at 26 knots gusting to 37 knots, 9 miles visibility, scattered clouds at 2,100 ft and 11,000 ft, ceiling broken at 21,000 ft and 25,000 feet, temperature 27°C, dew point 6°C, and an altimeter setting of 29.75 inHg. A peak wind of 320° at 37 knots was recorded at 1844.

The complete weather report is appended to this accident in the public docket.

## AIRPORT INFORMATION

FFZ is a tower-controlled airport located at an elevation of 1,394 ft mean sea level (msl). The airport is equipped with two asphalt runways: 4R/22L, which is 5,101 ft long, and 4L/22R, which is 3,799 ft long.

## WRECKAGE AND IMPACT INFORMATION

The accident site was located about 1,400 ft from the departure end of runway 22L. The airplane impacted terrain and came to rest on a road on a heading about 37° degrees magnetic. All major structural components of the airplane were located within the wreckage debris path. The wreckage path was oriented on a heading about 12° magnetic and was about 380 ft in length. The first identified point of contact (FIPC) was a 15-ft-tall orange tree. About 20 ft from the tree strike was a section of disturbed ground, about 12 ft in length and 1 ft in width, consistent with a wing strike. The left wing separated from the fuselage and was inverted. The left wing tank, near the inboard separation, was visible and exhibited impact signatures. The remaining debris was contained on the road, with the exception of a separated propeller blade tip. The left aileron and wing tip were separated from the wing and found on the east side of the debris field. About 100 ft to the south-west of the debris field was the separated oil cooler. The oil cooler had impact damage and was surrounded by a pool of oil.

The main wreckage was about 170 ft from the FIPC and consisted of the fuselage, empennage, right wing, and engine. The right wing remained attached to the airplane by one control cable. The right wing came to rest upright on a heading about 120°. The wing was mostly consumed by post impact fire. The fuselage came to rest on its left side on a heading about 310°. The fuselage sustained thermal damage to the lower and left side, revealing the internal structure. The instrument panels for both positions had minor damage. The pilot's seatbelt buckle was secured and thermally damaged; the passenger seat restraint was not located. The engine separated from the airframe and exhibited impact damage to the propeller assembly. The engine mounting structure exhibited impact damage. The oil sump remained attached to the firewall and was leaking oil. The empennage exhibited thermal and impact damage and came to rest on its

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# National Transportation Safety Board - Aircraft Accident/Incident Database

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right side. A fracture-separated propeller blade tip was located about 210 feet from the FIPC.

The top portion of the forward crew station instrument panel was mostly intact. The bottom portion of the instrument panel, which included all switches, circuit breakers, and radios, exhibited thermal damage. The throttle, mixture, and propeller quadrant was separated with the linkages intact and disconnected from the aft seat controls, consistent with impact. The aft crew station instrument panel exhibited thermal damage and the instruments were charred and unreadable. Both canopies were found in the open position. The fuel selector handle in the forward crew station rotated freely and its position at the time of impact could not be determined. The fuel selector handle in the aft crew station was found detached from the airframe. Both fuel selectors were placarded with "Left", "Right", and "Off" positions. The fuel selector valve was found separated from the center section and subsequently disassembled. The valve was observed in a position consistent with the reserve fuel port, which was capped off with a blanking cap. Both left and right fuel line ports contained melted nylon from the fuel selector valve cone.

Flight control cable continuity was confirmed from each cockpit control to the associated flight control surface through either tension overload separations or cable cuts made during recovery.

All engine accessories remained attached to the engine via their respective mounts, except for the generator and hydraulic pump. The forward spark plugs exhibited normal operational signatures. The propeller was manually rotated and rotational continuity was established throughout the engine to the rear accessory case. Thumb compression and suction was obtained on all cylinders with the exception of the No. 6 cylinder, which exhibited impact damage. The carburetor was disassembled and examined. Both floats remained intact and undamaged. The needle valve was intact. No debris was noted on the fuel screen or in the float bowl.

The propeller remained attached to the crankshaft flange. Both propeller blades were found secure within the propeller hub. The counterweights were found intact and undamaged. One propeller blade exhibited "S" bending with leading edge gouging and chordwise striations on the forward side of the propeller blade. The opposing propeller blade was curled aft from about mid span, and the outboard tip was separated. The forward side of the propeller blade exhibited chordwise striations.

The engine driven fuel pump was removed and examined. The fuel pump remained intact and the drive shaft rotated freely by hand. A hand drill was attached to the drive shaft and the fuel inlet line was submerged in water. When the hand drill was actuated, water flowed throughout the fuel pump and was observed expelling from the fuel outlet line.

Both magnetos were removed for further examination and tested on August 8, 2016 at the facility of Precision Engines LLC., Everett, WA. Bench testing on both magnetos was successful. For further information, see Bendix Magneto Bench Test Report within the public docket for this accident.

No evidence of any preexisting mechanical malfunction was found that would have precluded normal operation of the airframe or engine.

For further information, see the Accident Site Summary Report, and Engine and Airframe Exam Summary Report appended to this accident in the public docket.

## MEDICAL AND PATHOLOGICAL INFORMATION

The Maricopa County Office of the Medical Examiner, Phoenix, Arizona, performed an autopsy of the pilot. The cause of death was determined to be "multiple blunt force injuries."

The FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed toxicology testing on specimens from the pilot. Specimens tested negative for carbon monoxide in blood and ethanol in urine. No presence of amphetamines, opiates, marijuana, cocaine, phencyclidine, benzodiazepines, barbiturates, antidepressants, or antihistamines was detected in urine.

## ADDITIONAL INFORMATION

An entry in the aircraft maintenance records indicated that the airplane was completed by North American Aviation on December 15, 1942, under Type Certificate A-2-575, and shipped directly to the South African Air Force (SAAF). The airplane was originally equipped with left- and right-wing fuel tanks, as well

as a reserve tank located within the left tank. The SAAF modified the fuel system as outlined in the supplemental type certificate (STC) SA00636CH (The STC is in the public docket). The modification allowed fuel in the right fuel tank to flow directly to the left fuel tank (from which the reserve fuel tank had been removed) through an interconnecting fuel pipe between the two tanks, and then from the left tank through an "ON/OFF" valve to the engine, thus making fuel tank selection during flight unnecessary.

No maintenance records were recovered for the period between 1989 and 1995. In 1996, the airplane returned to and was registered in the United States. On April 11, 1997, the airplane was issued a Special Airworthiness Certificate in the experimental category. On May 3, 1997, a Standard Airworthiness Certificate was issued, which indicated that the airplane conformed to Type Certificate Data Sheet (TCDS) A-2-575 Revision 13. However, a postaccident review of the TCDS indicated that, based on its S/N, the accident airplane was not eligible for a standard type certification.

The airplane's fuel system was reconfigured at an unknown time and no entries in the maintenance records were found regarding the fuel system modification. The postaccident examination of the fuel system indicated that the interconnecting fuel pipe between the left and right tanks had been removed and that the reserve port on the fuel selector valve was capped. The left fuel tank reserve port stand pipe was also removed. The fuel selector valve face displayed four quadrants, one each for the Left, Right, and Off positions, and a blank quadrant where the Reserve position had previously been located. Although the Reserve position was not marked, the selector could still be moved to that position and would result in a loss of fuel flow to the engine since that port had been capped. During the wreckage examination, the fuel selector valve was found in a position consistent with the Reserve position; however, the position of the valve at the time of the accident could not be determined.

In an interview with an FAA inspector, the operator stated that the fuel selector was made of cork and that excessive manipulation of it could lead to damage or internal wear. The fuel selector was rarely moved and normally stayed on the left tank position, as most flights were short and did not necessitate the use of both fuel tanks. The selector would only be moved during flights of extended duration or if the pilot perceived a fuel-related issue. The operator indicated that the last time the airplane flew before the day of the accident was on the weekend of April 12, 2016 from FFZ to Phoenix-Mesa Gateway Airport (IWA), Mesa, Arizona, and back, which was about 20-minute flight each way. The airplane was topped off at IWA. The operator stated that the accident flight was the second flight of the day; the first flight lasted about 30 minutes or less. The FAA inspector estimated that the airplane would have flown about 50 minutes to an hour since it was refueled on the left fuel tank. When the FAA inspector queried the operator regarding their leaning procedures, they stated that on most of their flights, which were 20-30 minutes in length around the area, they would lean very little if at all. However, they would lean on the rare longer cross-country flights or if it was at a high-altitude airport.

The FAA inspector also interviewed a few T-6 pilots, and the common practice amongst them was that, in case of a fuel interruption, a pilot should select a "reserve" position for those airplanes that were equipped with the reserve position.



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# National Transportation Safety Board - Aircraft Accident/Incident Database

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Accident Rpt# GAA17CA544 09/13/2017 1730 AKS Regis# N4741M Petersville, AK Apt: N/a  
Acft Mk/Mdl PIPER PA 11-NO SERIES Acft SN 11-254 Acft Dmg: SUBSTANTIAL Rpt Status: Prelim Prob Caus: Pending  
Fatal 0 Ser Inj 0 Flt Conducted Under: FAR 091  
Opr Name: NICHOLAS M. LARSON Opr dba: Aircraft Fire: NONE

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# National Transportation Safety Board - Aircraft Accident/Incident Database

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Accident Rpt# CEN16LA382	09/21/2016 1236 EDT	Regis# N4470X	Wooster, OH	Apt: N/a
Acft Mk/Mdl PIPER PA 28-140		Acft SN 28-7625040	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl LYCOMING O-320-E3D		Acft TT 3744	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: CHARLES MARCUM		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

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## Events

1. Enroute - Loss of engine power (total)
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## Narrative

On September 21, 2016 at 1236 eastern daylight time, a Piper PA-28-140, N4470X, nosed over during an off-airport landing in near Wooster, Ohio, following a loss of engine power. The private pilot received a minor injury and the passenger was not injured. The airplane was substantially damaged. The aircraft was registered to and operated by a private individual under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Visual meteorological conditions prevailed for the flight, which was not operating on a flight plan. The flight originated from the Norwalk-Huron County Airport (5A1), Norwalk, Ohio, with an intended destination of the Carrol County-Tolson Airport (TSO), Carrollton, Ohio.

The pilot reported the airplane operated normally during the first part of the flight. About 30 to 40 minutes into the flight, at an altitude of 3,500 ft, the engine suddenly lost all power. The pilot turned on the fuel boost pump, adjusted the mixture, and switched fuel tank to restart the engine. The propeller rotated, but the engine did not start. The pilot subsequently landed the airplane in a soybean field. Upon touching down, the nose gear dug into the dirt and the airplane nosed over. The pilot and passenger kicked out the windscreen and exited the airplane.

A postaccident examination of the airplane was conducted by a Federal Aviation Administration inspector. The inspector reported he verified there was fuel going to the engine, the magnetos sparked, compression on all cylinders, and continuity throughout the engine. The inspector reported the air intake duct was crushed, which most likely occurred during the accident sequence. The examination did not reveal any preimpact anomalies that would have resulted in the loss of engine power. The temperature and dewpoint were not conducive to carburetor icing at cruise power.

# National Transportation Safety Board - Aircraft Accident/Incident Database

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Accident Rpt# CEN17LA341	05/27/2017 1135 EDT	Regis# N5584U	Ray, MI	Apt: Ray Community Airport 57D
Acft Mk/Mdl PIPER PA 28-140-140		Acft SN 28-26314	Acft Dmg: SUBSTANTIAL	Rpt Status: Prelim Prob Caus: Pending
Eng Mk/Mdl LYCOMING 0-320 SERIES			Fatal 0 Ser Inj 1	Flt Conducted Under: FAR 091
Opr Name: LYNN CURTIS W		Opr dba:		Aircraft Fire: NONE

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## Events

1. Landing-flare/touchdown - Hard landing
- 

## Narrative

On May 27, 2017, about 1135 eastern daylight time, a Piper PA-28-140, N5584U, impacted trees, terrain, and a tractor near Ray Township, Michigan. The private pilot on board sustained serious injuries and the airplane was substantially damaged. The airplane was owned and operated by the pilot under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. No flight plan was filed and visual meteorological conditions prevailed at the time of the accident.

The pilot was landing at the airport following a 20 minute local flight. Witnesses reported that he made several landing attempts, but each time was too fast or too high to land. On the last attempt, the pilot touched down fast about midway down the 2,495' runway. The airplane skipped and floated impacting the runway nose gear first about 1/4 the distance from the end. The airplane bounced and departed the runway going off the end of the prepared surface. The airplane continued across a gravel road, through a field, and then struck several small trees and a farm tractor before coming to a stop. The airplane sustained substantial damage to both wings, the engine and propeller, the engine cowling, and forward fuselage. The nose landing gear was broken aft and the left main landing gear was bent inboard. Flight control continuity was confirmed. An examination of the airplane's engine, and other systems revealed no pre-impact anomalies that contributed to the accident.

# National Transportation Safety Board - Aircraft Accident/Incident Database

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Accident Rpt# ERA17CA208	06/16/2017 1330 EDT	Regis# N4317Y	Cedar Key, FL	Apt: George T Lewis CDK
Acft Mk/Mdl PIPER PA23-160		Acft SN 23-2041	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl LYCOMING O-320-B3B		Acft TT 3291	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: THOMAS MALLORY		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

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## Events

1. Landing-landing roll - Landing area overshoot
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## Narrative

The pilot reported that the takeoff, climb, and en route portions of the cross-country flight were uneventful. He checked the wind sock prior to landing and it was "flaccid," indicating calm wind. He slowed the airplane to 80 mph on final approach and landed near the approach end of runway 5, which was 2,355 feet-long. He estimated that the airplane should have rolled to a stop; however, it continued down the runway despite heavy braking. The airplane departed the end of the runway, traveled across a small road, and down an embankment, coming to rest in the water at the edge of the airport boundary.

A Federal Aviation Administration inspector examined the wreckage and reported that the airplane sustained substantial damage to the forward fuselage and submersion in salt water. There were tire skid marks on the runway leading to the wreckage. A weather buoy, located about 1 mile east of the airport, recorded wind out of the west about the time of the accident, which would have resulted in a tail wind of up to 8 knots. The pilot reported there were no preimpact mechanical malfunctions or anomalies that would have precluded normal operation of the airplane.

# National Transportation Safety Board - Aircraft Accident/Incident Database

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Accident Rpt# ERA17LA277	08/15/2017 1635 EDT	Regis# N2804T	Canton, GA	Apt: Cherokee County CNI
Acft Mk/Mdl PIPER PA28-140		Acft SN 28-7225235	Acft Dmg: SUBSTANTIAL	Rpt Status: Prelim Prob Caus: Pending
Eng Mk/Mdl LYCOMING O-320-E3D		Acft TT 7976	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: PARRIS AVIATION LLC		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

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## Events

1. Initial climb - Loss of engine power (partial)
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## Narrative

On August 15, 2017, about 1635 eastern daylight time, a Piper PA-28-140, N2804T, was substantially damaged during a forced landing following a loss of engine power during the initial climb after takeoff from the Cherokee County Airport (CNI), Canton, Georgia. The flight instructor and student pilot sustained minor injuries. The instructional flight was conducted under the provisions of 14 Code of Federal Regulations Part 91. Visual meteorological conditions prevailed and no flight plan was filed for the local flight.

According to the flight instructor, after an uneventful engine run-up they taxied to the active runway for takeoff. As the takeoff roll commenced, he noted that the airplane felt "sluggish." He asked the student pilot if he had his foot on the brakes, and the student pilot replied "no." The flight instructor checked the throttle and airspeed and noted that the throttle was full forward and the airspeed was increasing slowly. Once the airplane reached 75 knots, the airplane lifted off the runway and began to climb. The climb appeared normal for approximately the first 200 ft. Then, the flight instructor noticed that the airspeed was decreasing but the engine never stopped. He took over the flight controls and elected to perform an emergency landing in a wooded area.

Examination of the airplane by a Federal Aviation Administration (FAA) inspector revealed that both wings separated from the fuselage and the fuselage was buckled. The airplane was retained for further examination.

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# National Transportation Safety Board - Aircraft Accident/Incident Database

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Accident Rpt# GAA17CA438	07/19/2017 1645 EDT	Regis# N55EM	New Market, VA	Apt: New Market 8W2
Acft Mk/Mdl PIPER PA28-151		Acft SN 28-7415328	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl LYCOMING O-320 SERIES		Acft TT 15010	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: MICHAEL ZAPATA		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

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## Events

1. Landing - Miscellaneous/other

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## Narrative

The pilot of the airplane reported that, during the landing roll, two deer ran onto the runway and one impacted the left side of the airplane.

The airplane sustained substantial damage to the left wing and fuselage.

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

The Federal Aviation Administration Chart Supplement airport page for the destination airport in part states: "Deer and birds on and [in the vicinity of the runway]".

# National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# WPR15FA256	09/03/2015 917 PDT	Regis# N8441B	Santee, CA	Apt: Gillespie Field SEE
Acft Mk/Mdl PIPER PA28-161		Acft SN 28-8216005	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl LYCOMING O-320-D3G		Acft TT 14989	Fatal 2 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: GOLDEN STATE FLYING CLUB		Opr dba:		Aircraft Fire: GRD
				AW Cert: STN

## Events

1. Initial climb - Loss of engine power (total)

## Narrative

### HISTORY OF FLIGHT

On September 3, 2015, about 0917 Pacific daylight time, a Piper PA-28-161 airplane, N8441B, impacted a residential area in Santee, California, shortly after takeoff from Gillespie Field Airport (SEE), San Diego/El Cajon, California. The flight instructor and student pilot were fatally injured, and the airplane was substantially damaged. The instructional flight was operated by Golden State Flying Club, El Cajon, California, under the provisions of 14 Code of Federal Regulations Part 91. Visual meteorological conditions prevailed, and no flight plan had been filed for the local flight.

According to the Federal Aviation Administration (FAA), air traffic tower personnel at SEE reported that the airplane had been conducting touch-and-go takeoffs and landings on runway 27R. The controller stated that after completion of the second touch-and-go, he expected that the airplane would turn right onto the crosswind leg of the traffic pattern. However, the airplane turned left and descended rapidly toward terrain west of the field. There were no mayday calls received from the accident airplane.

A witness in a vehicle watched the airplane take off and follow a normal climb path. Then he saw the left-wing dip, which initially he thought was a normal traffic pattern turn. He realized that the left wing continued to dip "more severely than normal," and the left bank increased as the airplane flew toward an open field at the west end of the runway. As the airplane continued in a tight left turn, it lost altitude "very quickly," and subsequently impacted the ground.

A witness located near the accident site reported that he heard the airplane's engine "shut off," and stated that it sounded as if the engine was "trying to restart." The airplane then impacted three vehicles, and came to rest inverted in a driveway; a postaccident fire ensued.

## PERSONNEL INFORMATION

## AIRCRAFT INFORMATION

According to the engine logbooks, the engine was overhauled by Ly-Con Rebuilding company in Visalia, California, and installed on the accident airplane June 25, 2014. At that time, new Slick Champion Aerospace magnetos were installed. A review of the flight schools squawk sheets revealed no identified issues with the magnetos.

## WRECKAGE AND IMPACT INFORMATION

The entirety of the airplane was located at the accident site; and sustained thermal damage during a postcrash fire. The left wing had separated from the airplane, and came to rest on top of the right wing.

The fuselage and cockpit area sustained ground impact damage. The flap handle was in between the zero detent and the 10ø detent. The ignition switch was found with the key broken inside and the switch was positioned to the "left mag." The fuel selector was positioned to the right fuel tank position. The left-wing fuel tank was breached, but contained 13 gallons of blue-colored liquid consistent with 100-LL aviation fuel. About 23 gallons of fuel was retrieved from the right wing.

The engine remained attached to its mount; the mount was separated from the firewall. The engine assembly came to rest adjacent to the airplane. Several of the rear case accessories separated from their respective mounting pads. The left magneto separated from its mounting pad and was not located.

The propeller remained attached to the engine crankshaft with the spinner exhibiting aft crush damage. One blade was bent forward and the other blade was

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# National Transportation Safety Board - Aircraft Accident/Incident Database

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bent aft. Both propeller blades had minor leading edge and chordwise damage, and remained intact.

## MEDICAL AND PATHOLOGICAL INFORMATION

### Flight Instructor

The County of San Diego, Office of the Medical Examiner, San Diego, California, performed the autopsy of the flight instructor. The cause of death was reported as multiple blunt force injuries, with a contributing cause of traumatic asphyxia. The manner of death was listed as an accident.

The FAA's Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma performed toxicology testing on submitted specimens from the pilot. The test results yielded negative findings for carbon monoxide, cyanide, ethanol, and drugs of abuse.

### Student Pilot

The County of San Diego, Office of the Medical Examiner performed the autopsy of the student pilot. The cause of death was reported as blunt force head injuries. The manner of death was listed as an accident.

The FAA's Bioaeronautical Sciences Research Laboratory performed toxicology testing on submitted specimens from the student pilot. The test results yielded negative findings for carbon monoxide, cyanide, and ethanol. The results for tested drugs of abuse were positive for the following:

Anhydroecgonine Methyl Ester detected in urine  
Anhydroecgonine Methyl Ester not detected in blood  
0.101 (ug/ml, ug/g) Benzoyllecgonine detected in urine  
Benzoyllecgonine not detected in blood  
Ecgonine Methyl Ester detected in urine  
Ecgonine Methyl Ester detected in blood  
2.047 (ug/ml, ug/g) Phentermine detected in urine  
0.1 (ug/ml, ug/g) Phentermine detected in blood (Iliac)  
0.099 (ug/ml, ug/g) Phentermine detected in serum

According to the FAA, Benzoyllecgonine is the predominate metabolite of cocaine, and is used as an indicator of cocaine use. Anhydroecgonine methyl ester is a unique pyrolysis product that is formed when cocaine is smoked, and is a possible indicator of "crack cocaine" use. Ecognine methyl ester is an inactive minor metabolite of cocaine. Phentermine is a schedule IV, short-term use, prescription appetite suppressant. The FAA reported that phentermine is not an acceptable medication for use while performing airman duties.

The toxicological findings indicated that although the student had used cocaine hours to a few days before the accident, there was no parent (active) drug detected.

## TEST AND RESEARCH INFORMATION

The examination of the airframe revealed no preimpact failures were noted with any flight control surface or flight control system components.

The engine was manually rotated using a drive tool at the vacuum pump drive.

The engine rotated freely, and compression was produced in all four cylinders, which also established valve and gear train continuity. The right magneto (non-impulse coupled magneto) remained attached to the engine at its mounting pad. The magneto was removed and visually examined. During manual rotation of the magneto drive, internal friction was detected and audible grinding was heard.

Further examination of the right magneto revealed no obvious signs of damage. Maintenance personnel were not able to manually rotate the magneto; however, the top gear rotated freely. When the magneto was opened, the distributor gear electrode was not seated properly, and the distributor drive gear was stuck



inside the magneto. Once disassembled, the cam follower appeared to be in good condition and the points appeared to be brand new. The rotor drive lower ball bearing was frozen; however, the upper bearing rotated freely with no binding. There was rust present in the rotor drive, but it could not be determined whether it was present before the accident or formed after the accident. The internal components were all in good condition and each individual test of the capacitor, electrodes, and coil were within manufacturer specifications; and the components were in good condition.

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Accident Rpt# WPR17FA200 09/09/2017 1413 PDT Regis# N7215J Benicia, CA Apt: N/a  
Acft Mk/Mdl RAYTHEON AIRCRAFT COMPANY G36-NOAcft SN E-3715 Acft Dmg: SUBSTANTIAL Rpt Status: Prelim Prob Caus: Pending  
Fatal 2 Ser Inj 0 Flt Conducted Under: FAR 091  
Opr Name: VALLEE DEVELOPMENT CORP Opr dba: Aircraft Fire: NONE

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## Events

1. Enroute-climb to cruise - Unknown or undetermined
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## Narrative

On September 9, 2017, about 1413 Pacific daylight time, a Raytheon Aircraft Company G36, N7215J, sustained substantial damage when it impacted terrain about 9 miles northwest of the Buchanan Field Airport (CCR) Concord, California. The private pilot and passenger were fatally injured. The airplane was registered to Vallee Development Corporation and operated by the pilot under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Visual meteorological conditions prevailed, and no flight plan had been filed for the cross-country flight. The flight departed CCR about 1408, and was destined for Arcata Airport, Arcata/Eureka, California.

The Federal Aviation Administration (FAA) issued an Alert Notice (ALNOT) for the missing airplane after a family member reported that the flight was overdue. A search ensued and the wreckage was located near the top of a hillside by the Civil Air Patrol the following morning.

Examination of the accident site by the National Transportation Safety Board, investigator-in-charge, revealed that all the major components of the airplane were contained within a confined area. The airplane was recovered to a secure facility for further examination.

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Accident Rpt# FTW92FA224	09/05/1992 1630 CDT	Regis# N4073S	Alpine, TX	Apt: N/a
Acft Mk/Mdl ROBINSON R22-BETA		Acft SN 1889	Acft Dmg: DESTROYED	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl LYCOMING O-320-B2C		Acft TT 1094	Fatal 1 Ser Inj 1	Flt Conducted Under: FAR 091
Opr Name: HELICOPTERS INTERNATIONAL		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

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## Summary

While on a cross-country flight over mountainous terrain, the helicopter impacted the side of a mountain at 6,800 feet, about 90 feet below the crest. The investigation revealed that the tail rotor hit the side of the mountain first. Wreckage was distributed down the side of the mountain to about the 6,500-foot level. Density altitude, calculated using a pressure altitude of 6,800 feet and an estimated temperature of 85 degrees, was 9,900 feet. The helicopter's gross weight was calculated to be 1,229 pounds. Maximum gross weight for out-of-ground effect hover performance at 9,900 density altitude was 1,210 pounds. Examination of the wreckage revealed no evidence of pre-impact flight control malfunction or airframe or system failure. The engine performed within manufacturer specifications and certification standards during a postaccident test run. The pilot had no memory of the accident, there were no witnesses, and the phase of operation was unknown.

## Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: Failure by the pilot-in-command, for unknown reasons, to maintain sufficient altitude to clear surrounding terrain. Factors were mountainous terrain and high density altitude.

## Events

1. Unknown - Unknown or undetermined
2. Enroute-cruise - Controlled flight into terr/obj (CFIT)

## Findings - Cause/Factor

1. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Altitude-Not attained/maintained - C
2. Personnel issues-Task performance-Use of equip/info-(general)-Pilot - C
3. Environmental issues-Physical environment-Terrain-Mountainous/hilly terrain-Not specified - F
4. Environmental issues-Conditions/weather/phenomena-Temp/humidity/pressure-High density altitude-Not specified - F

## Sequence of Events

### Type of Occurrence - Phase of Flight

#### Cause/Factor - Text

IN FLIGHT COLLISION WITH TERRAIN/WATER - UNKNOWN  
---- WEATHER CONDITION - HIGH DENSITY ALTITUDE -  
---- CLEARANCE - NOT MAINTAINED - PILOT IN COMMAND  
---- TERRAIN CONDITIONS - MOUNTAINOUS/HILLY -

## Narrative

### HISTORY OF FLIGHT

On September 5, 1992, at approximately 1630 central daylight time, a Robinson R22 Beta helicopter, N4073S, was destroyed when it collided with mountainous terrain near Alpine, Texas. The helicopter departed David Wayne Hooks Airport, Houston, Texas, at approximately 1009 with a final destination of Marfa, Texas. A company flight plan had been filed. The pilot sustained serious injuries and the rated passenger received fatal injuries. Visual meteorological conditions prevailed for the personal flight.

Interviews with the pilot and followup investigations conducted by the investigator in charge (IIC) and a Federal Aviation Administration (FAA) inspector revealed the facts in this paragraph. The pilot weighed about 160 pounds, and the passenger weighed about 190 pounds. Usable fuel was 29.7 gallons with a basic empty weight of 856.2 pounds. About 5 pounds of baggage were on board. One enroute fuel stop was made at Sonora, Texas, at approximately 1315 and 28.9 gallons of fuel was purchased. The helicopter departed Sonora, Texas, at approximately 1345 with a computed takeoff weight of approximately 1,409 pounds.

Interviews conducted by the FAA inspector and the IIC with the company and the pilot revealed the facts in this paragraph. The pilot remembered the original departure clearance and the takeoff. He recalled awakening on the mountain during the night time and setting several "fires to attract attention and the fires getting out of control." Upon seeing the lights of a city, he traveled on foot in that direction and remembered two sunrises and locating a pool of water from which he drank and then bathed. Eventually, he heard a car and upon "shouting" for help was rescued and taken to the hospital.

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During an interview conducted by the FAA inspector with the Sheriff Departments in the area, the facts in this paragraph were reported. The pilot had been located in an apple orchard near the sunny Glen Subdivision of Alpine, Texas, at approximately 1900 on September 7, 1992. The pilot was disoriented; however, the pilot mentioned the helicopter and starting the fires on the mountain. At approximately 2345, the CAP and DPS found the accident site at 30 degrees 23 minutes North and 103 degrees 47 minutes West.

Fire departments in the site area who were interviewed by the FAA inspector, stated that they had received reports of fires in the mountains at approximately 0100 during the morning of September 6, 1992. However, the fires had been reported on a different mountain.

## PERSONNEL INFORMATION

The pilot held a French medical certificate which had been issued on October 4, 1992. On August 3, 1992, the pilot had been issued a United States Department of Transportation (USDOT) commercial pilot certificate with the helicopter rating on the basis of French pilot license #13667. The pilot rated passenger had been issued a USDOT commercial pilot certificate with the helicopter rating on the basis of his Canadian pilot license #171939 on June 12, 1992. According to relatives in the enclosed statement, the pilot and passenger had flown together more than one hundred hours and both were accustomed to mountainous conditions in several foreign countries.

## AIRCRAFT INFORMATION

A review of the maintenance records, manufacturer data, and interviews with the operator by the IIC, revealed the facts in this paragraph. The helicopter date of manufacture was May 7, 1991. The 160 horsepower engine was derated to 131 horsepower for the helicopter. The basic empty weight had been established on July 17, 1991, and the certificate of airworthiness issued. The helicopter had been maintained under a one hundred hour inspection program. A registration certification was issued to the company on September 16, 1991. The altimeter and encoder had been certified to 16,000 feet on July 2, 1991. The helicopter had been flown 5.5 hours on the date of the accident. Maximum gross weight for the helicopter was 1,370 pounds. Calculations indicate that the center of gravity at the time of the accident was 96.7 inches, which was within the maximum allowable range of 95.9 to 100.00 inches. Calculations also indicate that the helicopter's gross weight was about 1,229 pounds at the time of the accident. Maximum gross weight for out-of-ground effect hover performance at a density altitude of 9,900 feet (6,800 feet pressure altitude at a temperature of 85 degrees) was 1,210 pounds, according to the Robinson R22 Pilot's Operating Handbook.

## METEOROLOGICAL INFORMATION

The closest weather observation to the accident site was the AWOS reporting equipment at Marfa, Texas. The 1635 observation reported a temperature of 90 degrees Fahrenheit. The accident site was approximate 11 miles east of the reporting airport, and the temperature was estimated as 85 degrees Fahrenheit. The initial impact point was at an elevation of 6,800 feet. Density altitude at the site was calculated at 9,900 feet. The density altitude chart is included as a part of this report.

## WRECKAGE AND IMPACT INFORMATION

The top of the mountain was 6,895 feet. There was no physical evidence that the helicopter had landed on the mountain top. A portion of a tail rotor blade tip, which was painted white, was located on the downslope at approximately 6,800 feet on the south side of the mountain. The slope to the first impact point was approximately 28 degrees. The wreckage distribution magnetic heading was measured as 180 degrees. White paint transfer was found on a rock approximately 48 feet from the tail rotor tip. The remainder of the wreckage distribution was on a downslope of approximately 35 degrees. Numerous pieces of the tailboom were found and exhibited striations. The tailrotor push pull tubes and the tailrotor driveshaft were not located. Skids, doors, and the instrument panel were found as the distribution path continued to the south. The closing bolt was secure on the doors. The tailrotor gearbox was located at approximately 6,675 feet. The gear box rotated and the push pull parts were present and the push pull tube fractured. One main rotor blade was located at approximately 6,552 feet. The blade exhibited striations near the tip. The main wreckage came to rest at an elevation of approximately 6,515 feet. The total distance from the initial impact point to the final resting place was approximately 285 feet. The mast, transmission, and engine remained attached. One main rotor blade was attached to the mast. Flight control continuity was established. Approximately three gallons of fuel was siphoned from the fuel tanks. The engine representative examined the engine and reported impact damage of various components. The powerplant report is included as a part of this report.

## MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy and toxicological testing were not ordered by the IIC for the rated passenger. The pilot suffers amnesia and to date has not remembered the flight.

## TESTS AND RESEARCH

An engine ground test run was conducted by the Lycoming factory on December 3, 1992. Engine operation was conducted on the factory test cell and operation was normal through full power range. The engine representative report and the engine test log are included as a part of this report.

## ADDITIONAL INFORMATION

The helicopter was released to the owner's representative following the investigation.

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Accident Rpt# ERA17LA288	08/19/2017 1642 EDT	Regis# N7108	Marietta, PA	Apt: Donegal Springs Airpark N71
Acft Mk/Mdl SMITH AEROSTAR601-P		Acft SN 61P-0405-142	Acft Dmg: SUBSTANTIAL	Rpt Status: Prelim Prob Caus: Pending
Eng Mk/Mdl LYCOMING IO540S1A5		Acft TT 3957	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: HEITMEIER KURT		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

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## Events

1. Takeoff-rejected takeoff - Loss of control on ground
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## Narrative

On August 19, 2017, about 1642 eastern daylight time, a Smith Aerostar 601P, N7108, was substantially damaged during takeoff from the Donegal Springs Airpark (N71), Marietta, Pennsylvania. The commercial pilot was not injured. The personal flight was conducted under the provisions of 14 Code of Federal Regulations Part 91. Visual meteorological conditions prevailed and no flight plan was filed for the local flight.

According to the pilot, after completing a preflight inspection and engine run-up, he taxied the airplane to the active runway for takeoff. On takeoff roll, the airplane swerved to the right, the pilot corrected to the left and aborted the takeoff; however, the airplane departed the left side of the runway and collided with an embankment.

According to an aircraft mechanic, who was hired by the airplane owner to conduct a pre-purchase inspection of the airplane, the pilot was planning to deliver the airplane and had not previously flown the make and model of the accident airplane. He reviewed the operation of the airplane's steering and braking systems with the pilot, and then left the airport. The mechanic later received a call from the pilot who informed him about the accident and indicated that the airplane "got away from him."

Examination of the airplane by a Federal Aviation administration (FAA) inspector revealed that the right wing was buckled, and the right main landing gear separated from the trunnion mount. A review of the maintenance records and examination of the airplane did not reveal any anomalies that would precluded normal operation.

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Accident Rpt# GAA17CA433	07/22/2017 1600 CDT	Regis# N83K	Bode, IA	Apt: N/a
Acft Mk/Mdl STINSON SR9-E		Acft SN 5405	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl WRIGHT R-760E-2		Acft TT 3702	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: JEROME R. KOHLHAAS		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

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## Events

1. Takeoff - Dragged wing/rotor/float/other

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## Narrative

The pilot of the tailwheel-equipped airplane reported that, he performed a precautionary landing in a bean field due to a rough running engine. The pilot then had an Airframe & Powerplant mechanic look at the airplane and perform multiple engine runups. The rough running engine was determined to be caused by carburetor ice.

The pilot then loaded his two passengers into the airplane and attempted to takeoff from the bean field. He added that, as the airplane began to gain altitude, the airplane approached the end of the open bean field. Subsequently, the landing gear encountered corn stalks in an adjacent field, descended into the corn field and came to rest inverted.

The airplane sustained substantial damage to both wings, the fuselage and empennage.

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

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Accident Rpt# ERA17CA251	07/19/2017 1845 EDT	Regis# N9270W	Pemberton Twp, NJ	Apt: Ag Air Strip - Rake Pond Farms PVT
Acft Mk/Mdl WEATHERLY 620-UNDESIGNAT		Acft SN 1505	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl PRATT & WHITNEY R-985 SERIES		Acft TT 6698	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 137
Opr Name: JERSEY DEVIL DUSTERS LLC		Opr dba:		Aircraft Fire: NONE
				AW Cert: SPR

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## Events

3. Landing - Collision during takeoff/land

## Narrative

According to the pilot, during takeoff, when the aerial application airplane was about 15 feet above ground level, he noticed a decrease in engine performance, verified that the engine controls were full forward and turned the fuel boost pump ON. He dropped the hopper load, however the airplane performance continued to decrease. The pilot elected to land the airplane straight-ahead and the airplane impacted trees prior to coming to rest inverted in a bog. Postaccident examination of the airplane revealed substantial damage to the fuselage and wings. Furthermore, after the airplane was removed from the bog, the Federal Aviation Administration inspector who responded to the accident found feathers associated with a Canadian goose in the vicinity of the engine and damaged propeller. According to the pilot there were no preimpact mechanical failures or malfunctions with the airframe or engine that would have precluded normal operation.