

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# ERA15FA348	09/08/2015 2048 EDT	Regis# N1401P	Somerset, NJ	Apt: Somerset Airport SMQ
Acft Mk/Mdl AEROFAB INC. LAKE LA-4-250		Acft SN 12	Acft Dmg: DESTROYED	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl LYCOMING IO-540-C4B5		Acft TT 1633	Fatal 1 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: CLEMENTS PHILIP J		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

Summary

The pilot departed in dark night conditions without performing a preflight inspection and with an unknown quantity of fuel on board. Surveillance video captured the takeoff, and, about 30 seconds later, a bright light travelled the opposite direction, and descended approximately parallel to the runway into the wooded area of the accident site. There was no fuel, no odor of fuel, and no evidence of fuel spillage at the scene. Examination of the wreckage revealed no mechanical anomalies that would have prevented normal operation, and propeller signatures and angularly-cut wood at the accident site suggested the engine was producing power when it entered the trees. The engine was later placed in a test cell, where it started immediately, accelerated smoothly, and ran continuously without interruption at all power settings.

The pilot's most recent logbook entry was for a round trip, 7.45-hour flight 3 weeks before the accident flight. Fuel receipts, performance data, and a partial radar track suggested a 3-hour flight away from his home base where he purchased 45 gallons of fuel to replace the fuel consumed. The return flight was about 4.4 hours in duration, but the pilot's route of flight and the number of takeoffs and landings performed en route could not be determined. Further, the fuel totals found programmed in the digital fuel flow indicator did not correlate to the actual usage of the airplane but rather to a partial fuel-load setting at an interim point of the flight, which could not be explained.

The video evidence indicates that the pilot did not complete a preflight inspection before the accident flight. Thus, it is likely that he discovered the airplane's low fuel state at takeoff and performed a turn back to the airport immediately. It is likely that the airplane lost power on takeoff or in the turn, then engine power was restored when the wings were leveled; however, this scenario could not be definitively determined. Further, the pilot was not instrument-rated, and a rapid, steep turn at low altitude in dark night conditions with little or no visual reference greatly reduced the likelihood of a safe return to the runway.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The pilot's attempted 180-degree return to the runway immediately after takeoff in dark night conditions, which resulted in collision with trees and terrain. Also causal was the pilot's inadequate preflight inspection, which resulted in a takeoff with little-to-no fuel on board the airplane.

Events

1. Prior to flight - Miscellaneous/other
2. Initial climb - Abrupt maneuver

Findings - Cause/Factor

1. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Descent rate-Attain/maintain not possible - C
2. Personnel issues-Task performance-Use of equip/info-Aircraft control-Pilot - C
3. Environmental issues-Conditions/weather/phenomena-Light condition-Dark-Effect on personnel - C
4. Personnel issues-Action/decision-Info processing/decision-Decision making/judgment-Pilot - C
5. Personnel issues-Task performance-Planning/preparation-Fuel planning-Pilot - C
6. Aircraft-Fluids/misc hardware-Fluids-Fuel-Fluid level - C
7. Environmental issues-Physical environment-Object/animal/substance-Tree(s)-Contributed to outcome

Narrative

HISTORY OF FLIGHT

On September 8, 2015, about 2048 eastern daylight time (EDT), an Aerofab Inc. Lake LA-4-250 amphibious airplane, N1401P, was destroyed when it impacted trees and terrain during a forced landing after takeoff from Somerset Airport (SMQ), Bedminster, New Jersey. The private pilot was fatally injured. Night visual meteorological conditions prevailed, and no flight plan was filed for the personal flight, which was conducted under the provisions of 14 Code of Federal Regulations Part 91.

The pilot was reported missing September 10, 2015, by coworkers, and a search by air and ground discovered the wreckage on the SMQ property about 1300.

According to the pilot's wife and his coworkers, he departed his office at 1700 on the day of the accident to recover his boat from a repair shop and return it to

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SMQ, where it shared hangar space with the accident airplane. A coworker estimated that, based on the time he departed the office, he would not reach SMQ until after 2000.

Multiple surveillance cameras around the terminal building and mounted on the pilot's hangar captured video on the night of the accident. Review of the video revealed that the pilot arrived at SMQ at 2022 (after sunset). He towed his airplane from its hangar, parked the boat inside, disconnected his vehicle from the boat trailer, and parked the vehicle outside the hangar at 2032.

The pilot then boarded his airplane, taxied away from the hangar at 2039, and departed runway 30 at 2048. Video from a camera located on the airport terminal captured a bright light travelling the opposite direction about 30 seconds after the takeoff. The light was seen descending approximately parallel to the runway in the wooded area that surrounded the accident site. The video faced toward the departure end of the runway and the wood line where the airplane came to rest. There were bright lights in the foreground, and the view beyond displayed very dark night conditions with little to no ambient lighting.

The NTSB Recorders Laboratory completed a day/night video overlay of the airport and the accident flight. The composite video product allowed for a comparison of the path of the airplane's light and the runway orientation.

PILOT INFORMATION

According to Federal Aviation Administration (FAA) records, the pilot held a private pilot certificate with ratings for airplane single engine land and sea. He did not possess an instrument rating.

The pilot's most recent FAA third-class medical certificate was issued on September 8, 2015, and he reported 900 total hours of flight experience on that date. A pilot logbook was recovered, and entries began with 625 total hours of flight experience carried forward from a previous logbook. The pilot's total flight experience could not be reconciled due to incomplete entries; however, all entries appeared to reflect flight experience in the accident airplane.

AIRCRAFT INFORMATION

The four-seat, single-engine, high-wing, retractable-gear, amphibious airplane was manufactured in 1984 and was equipped with a pylon-mounted Lycoming 250-horsepower reciprocating engine. According to the airplane's maintenance records, the most recent annual inspection was completed on April 27, 2015, at 1,612 total aircraft hours. The tachometer indicated 1,633 total aircraft hours at the accident site.

The airplane was configured with one main fuselage tank (40 gallons useable), two wing tanks (17 gallons each useable), and two wing-mounted auxiliary tanks (7 gallons each useable). Fuel was supplied to the engine from the main tank only. Fuel from the auxiliary tanks was supplied to the main tank by auxiliary fuel pumps. Fuel from the wing tanks to the main tank was gravity-fed through one-way valves.

The normal procedures checklist for the Supplemental Type Certificate (Installation of Wing Fuel Tanks) directs the pilot to check each tank for quantity and contamination:

2a. CHECK VISUALLY (DIPSTICK) FOR FUEL LEVEL. ANGLE DIPSTICK THROUGH AFT LIGHTNING HOLES INSIDE TANK.

2c. Fuel tank sump drain - DRAIN AND CHECK FOR CONTAMINATION

A fuel boost pump was actuated for takeoff and landing only. The engine-driven fuel pump provided fuel pressure to the engine in all other modes of flight.

According to airport and maintenance personnel, the pilot did not service the auxiliary tanks with fuel whenever he serviced the airplane.

METEOROLOGICAL INFORMATION

The 2053 weather observation at SMQ included clear skies, calm winds, and 10 statute miles visibility. The temperature was 23ø C, the dew point was 18ø C, and the altimeter setting was 29.96 inches of mercury.

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At the time of the accident, the moon was below the horizon with 19 percent of the visible disk illuminated.

AIRPORT INFORMATION

The field elevation at SMQ was 106 ft mean sea level (msl) and the pattern altitude was 1,101 ft msl. The airport was equipped with one asphalt runway oriented 12/30, which was 2,739 ft long and 65 ft wide, and an intersecting turf runway oriented 08/26, which was 1,923 ft long and 100 ft wide.

The area off the departure end of runway 30 and surrounding the airport was rural farmland, with very little man-made ambient light.

WRECKAGE INFORMATION

The wreckage was examined at the accident site on September 11, 2015, and all major components were accounted for at the scene. There was no odor of fuel and no evidence of fuel spillage. The wreckage came to rest upright on flat wooded terrain. The wreckage path was 93 ft long, and oriented about 090 degrees magnetic. The initial impact was in trees about 50 ft above the ground, and the left wing and right wing auxiliary tanks were found between the first tree strike and the main wreckage. Several pieces of angularly-cut wood were found along the wreckage path.

The nose of the airplane faced approximately opposite the direction of travel. The cabin roof was separated to the aft cabin. The aft cabin, wing box structure, empennage, and tail section were collapsed and wrapped in a "U" shape such that the tail section rested immediately adjacent to the nose section. The empennage lay atop the right wing, while the engine pylon was fractured at its base, and lay adjacent to the left wing. The left and right wing tanks were both breached on impact, contained no residual fuel, and there was no evidence of fuel blighting of the vegetation surrounding the wreckage. Both auxiliary tanks were intact and contained no fuel.

The engine remained inside the nacelle, and the nacelle appeared intact and undamaged. The 3-bladed propeller displayed similar twisting, bending, leading-edge gouging, and chordwise scratching. Two blades displayed similar curling at the tips, and one blade tip was separated. The fracture surface displayed features consistent with overload.

During recovery of the airplane, flight control continuity was confirmed from the flight controls in the cockpit to all flight control surfaces. The aft fuselage, which contained the main fuel tank, was inverted for transport, and trace amounts of fuel drained from the vent lines. The main fuel tank was intact and contained no fuel.

Engine Examination

The engine was examined and placed in a test cell at the manufacturer's facility in Williamsport, Pennsylvania.

The top spark plugs were removed to visually inspect the cylinder condition and provide a thumb compression check. All cylinders were unremarkable, and all produced thumb compression. Mechanical continuity of the valve train was confirmed with hand rotation of the crankshaft via the crankshaft propeller flange. Magneto-to-engine timing was confirmed to be 25 degrees before top dead center in accordance with the data plate specification. All accessories not needed in the production test cell were removed, including the starter, alternator, vacuum pump, and oil cooler. The original fuel servo was installed and used for the test run.

The engine started immediately, accelerated smoothly, and ran continuously without interruption at all power settings.

MEDICAL AND PATHOLOGICAL INFORMATION

The Office of the State Medical Examiner, Newark, New Jersey, performed the autopsy on the pilot and noted the cause of death as blunt traumatic injuries.

Toxicological testing was performed on the pilot by the FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma. The results were negative for any tested-for substances.

ADDITIONAL INFORMATION

Previous Flight Activity

A portable Garmin GPS unit was recovered from the wreckage and was forwarded to the NTSB Recorders Laboratory for examination and download. The batteries removed from the device were corroded, and no useful flight history data was recovered.

Based on a pilot logbook entry, fuel receipts, and data stored on a commercial flight-following website, the airplane completed a flight from SMQ to Yeager Airport (CRW), Charleston, West Virginia on August 16, 2015.

Before departing SMQ, the pilot purchased 51 gallons of fuel. It could not be determined if that fuel service filled all of the fuel tanks. The pilot purchased 45.5 gallons of fuel at CRW before the return flight. No fuel purchase was purchased at SMQ after the return flight, and the usage of the airplane between August 16, 2015 and the day of the accident could not be determined.

The commercial flight-following website captured only a portion of the flight between SMQ and CRW and did not capture the return flight. Interpolation of the radar data, performance data, and the fuel purchase at CRW revealed an approximate fuel consumption rate of 15 gallons per hour (gph), which was consistent with available performance data for the airplane.

A Shadin fuel flow indicator was removed from the airplane and sent to the NTSB Recorders Laboratory for examination. The panel-mounted gauge acted as a digital fuel management system, and had capabilities to interface with other devices via a RS-232 serial connection. It provided endurance (time), fuel flow (gph), fuel used (gallons), and fuel remaining (gallons) when the operator set the initial fuel level correctly before starting the engine. The system included a non-volatile memory that retained fuel remaining and fuel used information when power to the unit was removed.

Power was applied, the self-test report was "good," and the gallons-used display showed 44.7 gallons, and the gallons-remaining display showed 21.0 gallons, for an approximate total of 66 gallons. The fuel values displayed could not be directly attributed to a specific flight before the accident flight..

A review of the pilot's logbook revealed that the pilot recorded the flight to CRW, and the return flight to SMQ, as a single entry of 7.45 hours.

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Accident Rpt# GAA17CA113	01/15/2017 1530 PST	Regis# N1659E	Compton, CA	Apt: Compton/woodley CPM
Acft Mk/Mdl AERONCA 7AC		Acft SN 7AC-5225	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl CONT MOTOR O-200			Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: FRANK A. BROWN		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

Summary

The pilot of a tailwheel-equipped airplane reported that, during short final approach in gusting wind conditions, the airplane drifted left. The airplane landed left of the runway in soft dirt and nosed over.

The airplane sustained substantial damage to the right wing lift struts.

The pilot reported that, about 10 minutes before the accident, the wind was reported as light and variable at the airport. The airplane was landing on runway 7R.

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

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The pilot's failure to maintain runway alignment during landing in gusting crosswind conditions, which resulted in an off-runway landing in soft dirt and a nose-over.

Events

1. Landing - Miscellaneous/other
2. Landing - Loss of control in flight
3. Landing - Runway excursion
4. Landing - Nose over/nose down

Findings - Cause/Factor

1. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Lateral/bank control-Not attained/maintained - C
2. Personnel issues-Task performance-Use of equip/info-Aircraft control-Pilot - C
3. Environmental issues-Physical environment-Runway/land/takeoff/taxi surface-Soft surface-Contributed to outcome
4. Environmental issues-Conditions/weather/phenomena-Wind-Gusts-Response/compensation
5. Environmental issues-Conditions/weather/phenomena-Wind-Crosswind-Response/compensation

Narrative

The pilot of a tailwheel equipped airplane reported that during short final approach in gusting wind conditions, the airplane drifted left. He further reported that the airplane landed to the left of the runway in soft dirt and nosed over.

The airplane sustained substantial damage to the right wing lift struts.

The pilot reported that about 10 minutes prior to the accident the wind was reported as light and variable at the airport. The airplane was landing on runway 7R.

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

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Accident Rpt# GAA17CA062	11/08/2016 1045 EST	Regis# N46893	Fitchburg, MA	Apt: Fitchburg KFIT
Acft Mk/Mdl AERONCA L 3B-NO SERIES		Acft SN 058B2692	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl CONTINENTAL O-200		Acft TT 3871	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: LEE G. KRAUS JR.		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

Summary

The pilot of a tailwheel-equipped airplane reported that, during the landing roll after his fifth landing, the airplane veered hard left. He corrected to the right, but as the airplane straightened out, the left main landing gear impacted a runway light, spinning the airplane around. Subsequently, the left main landing gear collapsed, and the airplane came to rest on the left side.

The airplane sustained substantial damage to the elevator.

The pilot reported that there were no preaccident mechanical malfunctions or failures with the airplane that would have precluded normal operation. The pilot further reported that he received his tailwheel endorsement 3 months before the accident.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The pilot's failure to maintain directional control during the landing roll.

Events

1. Landing-landing roll - Loss of control on ground
2. Landing-landing roll - Attempted remediation/recovery
3. Landing-landing roll - Collision with terr/obj (non-CFIT)
4. Landing-landing roll - Landing gear collapse
5. Landing-landing roll - Dragged wing/rotor/float/other

Findings - Cause/Factor

1. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Directional control-Not attained/maintained - C
2. Personnel issues-Task performance-Use of equip/info-Aircraft control-Pilot - C
3. Environmental issues-Physical environment-Object/animal/substance-Runway/taxi/approach light-Contributed to outcome

Narrative

The pilot of a tailwheel-equipped airplane reported that during the landing roll after his fifth landing, the airplane veered hard left. He further reported that he corrected to the right, but as the airplane straightened out, the left main landing gear impacted a runway light, spinning the airplane around. Subsequently, the left main landing gear collapsed and the airplane came to rest on the left side.

The airplane sustained substantial damage to the elevator.

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

The pilot further reported that he received his tailwheel endorsement 3 months prior to the accident.

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Accident Rpt# GAA16CA500	09/17/2016 1145 PDT	Regis# N91JW	Reno, NV	Apt: Reno/stead RTS
Acft Mk/Mdl AEROTEK PITTS SPECIAL-S-1S		Acft SN 1-0023	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl AERO SPORT POWER AEIO-360-B4A	Acft TT 1226	Fatal 0	Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: DASH MARILYN E	Opr dba:		Aircraft Fire: NONE	AW Cert: SPE

Summary

According to the pilot of the tailwheel-equipped biplane, during the landing roll, the tailwheel became "stuck" in an expansion joint that runs down the centerline of the runway. She reported that when the tailwheel became unstuck, the biplane "swung wildly to the left," the bottom right wing struck the ground, and the airplane came to a stop on the runway after turning 180° to the left.

A video of the accident, taken by a camera mounted on the accident biplane and posted on social media, revealed that the biplane touched down on the runway to the left of the centerline. During the landing roll and after crossing the taxiway A2 intersection, the biplane began drifting right. The tailwheel is seen crossing the centerline expansion joint about 30° to the joint and then rolling over the joint without hesitation. The tail is then seen swinging to the right at an increasing rate. The biplane ground looped to the left, and the bottom right wing sustained substantial damage.

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

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The pilot's failure to maintain directional control during the landing roll, which resulted in a ground loop.

Events

1. Landing-landing roll - Abnormal runway contact
2. Landing-landing roll - Loss of control on ground
3. Landing-landing roll - Collision with terr/obj (non-CFIT)

Findings - Cause/Factor

1. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Directional control-Not attained/maintained - C
2. Personnel issues-Task performance-Use of equip/info-Aircraft control-Pilot - C

Narrative

According to the pilot of the tailwheel-equipped biplane, during the landing roll the tailwheel became "stuck" in an expansion joint that runs down the centerline of the runway. She reported that when the tailwheel came unstuck, the biplane "swung wildly to the left", the bottom right wing struck the ground, and the airplane came to a stop on the runway after turning 180° to the left.

A video of the accident, taken by a camera mounted on the accident biplane and posted on social media revealed that the biplane touched down on the runway to the left of the centerline. During the landing roll, after crossing the taxiway A2 intersection, the biplane began drifting to the right. The tailwheel is seen crossing the centerline expansion joint about 30° to the joint, and rolls over the joint without hesitation. The tail is then seen swinging to the right at an increasing rate. The biplane ground looped to the left and the bottom right wing sustained substantial damage.

The pilot reported that there were no mechanical failures or anomalies that would have prevented normal operation.

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Accident Rpt# GAA17CA115 01/16/2017 900 EST Regis# N2540F Bainbridge, GA Apt: Decatur County Industrial Air BGE
Acraft Mk/Mdl AMERICAN CHAMPION AIRCRAFT Acft SN 96 Acft Dmg: SUBSTANTIAL Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl LYCOMING O-320 Fatal 0 Ser Inj 0 Flt Conducted Under: FAR 091
Opr Name: AG FLIGHT PILOT TRAINING Opr dba: Aircraft Fire: NONE
AW Cert: STN

Summary

The solo student pilot in a tailwheel-equipped airplane reported that he had completed five touch-and-go landings and maneuvers in the local area before returning for a full-stop landing. While on final approach about 50 ft above ground, he reduced throttle to idle and allowed the airspeed to slow, and the left wing dropped abruptly. The left main landing gear touched down on the runway, the airplane veered to the left into grass, and it then nosed over.

The left wing lift strut and the rudder sustained substantial damage.

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

The student pilot failed to submit the National Transportation Safety Board Form 6120.1 Pilot/ Operator Aircraft Accident/ Incident Report.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The student pilot's exceedance of the airplane's critical angle of attack during final approach, which resulted in an aerodynamic stall, and his subsequent loss of directional control after touchdown.

Events

1. Landing-flare/touchdown - Aerodynamic stall/spin
2. Landing-flare/touchdown - Abnormal runway contact
3. Landing-landing roll - Loss of control on ground
4. Landing-landing roll - Runway excursion
5. Landing-landing roll - Nose over/nose down
6. Landing-landing roll - Collision with terr/obj (non-CFIT)

Findings - Cause/Factor

1. Personnel issues-Task performance-Use of equip/info-Aircraft control-Student/instructed pilot - C
2. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Angle of attack-Capability exceeded - C
3. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Directional control-Not attained/maintained - C

Narrative

The solo student pilot in a tailwheel-equipped airplane reported that he had completed five touch-and-go landings and maneuvers in the local area before returning for a full stop landing. He reported that while on final approach about 50 feet above ground, he reduced throttle to idle, allowed the airspeed to slow, and the left wing dropped abruptly. The left main landing gear touched down on the runway, the airplane veered to the left into grass, and nosed over.

The left wing lift strut and the rudder sustained substantial damage.

The student pilot did not report any preaccident mechanical malfunctions or failures with the airplane that would have precluded normal operation.

The student pilot failed to submit the National Transportation Safety Board Form 6120.1 Pilot/ Operator Aircraft Accident/ Incident Report.

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Accident Rpt# ERA17FA140	03/28/2017 1200 CDT	Regis# N8169Y	Dadeville, AL	Apt: N/a
Acft Mk/Mdl BEECH A36-UNDESIGNAT		Acft SN E-2598	Acft Dmg: DESTROYED	Rpt Status: Prelim Prob Caus: Pending
Eng Mk/Mdl CONTINENTAL IO-550B			Fatal 1 Ser Inj 1	Flt Conducted Under: FAR 091
Opr Name: CURRIER DAVID		Opr dba:		Aircraft Fire: GRD
				AW Cert: STN

Events

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

Narrative

On March 28, 2017, about 1200 central daylight time, a Beech A36, N8169Y, was destroyed by impact and a postcrash fire following a forced landing near Dadeville, Alabama. The commercial pilot, who was also the owner of the airplane was seriously injured, and the passenger was fatally injured. Visual meteorological conditions prevailed, and an instrument flight rules flight plan was filed for the personal flight which was conducted under the provisions of 14 Code of Federal Regulations Part 91. The flight departed from Enterprise Municipal Airport (EDN), Enterprise, Alabama at 1118, and was destined for Upper Cumberland Regional Airport (SRB), Sparta, Tennessee.

According to preliminary air traffic control (ATC) and radar data obtained from the Federal Aviation Administration (FAA), the airplane was in cruise flight about 5,000 feet msl when it began a descent about 1156. At 1157:11, the airplane had descended to 4,025 feet msl when the pilot contacted ATC and declared, "N8169Y I have a. it appears to be an engine failure. declare an emergency at this time."

Over the next 1 minute, the airplane continued on a northerly track before it began a turn to the west as the controller identified the closest public airport, private strip, state highway, and open areas for potential forced landing sites, which the pilot acknowledged.

At 1158:59, the airplane was tracking westbound at 1,500 feet msl and 86 knots groundspeed when the pilot announced, "Atlanta 69Y it looks like I'm coming down." and that he did not have a runway in sight. There were no further communications from the accident airplane. At 1159:34, the last radar target was observed on a westerly track over densely wooded terrain at 874 feet msl and 77 knots groundspeed.

According to FAA airman records, the pilot held a commercial pilot and flight instructor certificates with ratings for rotorcraft-helicopter and instrument helicopter. He held a private pilot certificate with ratings for airplane single engine, and instrument airplane. The pilot's most recent FAA second-class medical certificate was issued November 3, 2016. He declared 11,500 total hours of flight experience on that date. In July of 2016, the pilot declared to his insurance company that he had 11,000 total hours of flight experience, of which 1,000 hours was in airplanes.

The six-seat, single-engine, low-wing, retractable-gear airplane was manufactured in 1977 and was equipped with a Continental Motors 300-horsepower reciprocating engine.

The 1155 automated weather observation at Thomas C. Russel Field (ALX), 14 nautical miles northwest of the accident site, included scattered clouds at 2,500 feet agl, 10 statute miles visibility, and wind from 270Ø at 6 knots. The temperature was 24Ø C, the dew point was 18Ø C, and the altimeter setting was 30.03 inches of mercury.

The airplane was examined at the accident site, about 650 feet elevation, and all major components were accounted for at the scene. The wreckage path was about 140 feet in length, and oriented about 320Ø.

The initial impact point was in trees about 30 feet above the ground. Most tree trunks displayed blunt fractures, but some displayed clean angular cuts. Tree trunk and branch sections displaying angular cuts were scattered along the wreckage path. The main wreckage was inverted, faced opposite the direction of travel, and was consumed by postcrash fire. Control cable continuity was established from the cockpit area to the flight control surface attachment points. The flap actuator position was consistent with flaps set at 0Ø. The elevator trim actuator position was consistent with a 10Ø tab down position. The landing gear was retracted.

The fuel selector was in the right-tank position.

Examination of the engine revealed that all accessories were destroyed by fire except for the engine-driven fuel pump. The three-bladed propeller was attached

at the hub, but damaged by impact and fire. One propeller blade was loose in its hub.

The engine-driven fuel pump was removed and its driveshaft was intact and rotated freely. The fuel inlet screen was removed, and was absent of debris. The spark plugs were removed and showed normal wear and coloration. The engine could not be rotated by hand, and was retained for further examination.

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Accident Rpt# WPR16LA119	05/23/2016 1137 HST	Regis# N6697Y	Waianae, HI	Apt: N/a
Acft Mk/Mdl BEECH C23-NO SERIES		Acft SN M-2224	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl LYCOMING O&VO-360 SER		Acft TT 649	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: KAWAMOTO ERIC I		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

Events

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

On May 23, 2016, about 1137 Hawaiian standard time, A Beech C23, N6697Y, sustained substantial damage following a loss of engine power and subsequent ditching within the open waters of the Pacific Ocean near Waianae, Hawaii. The airplane was registered to and operated by the pilot under the provisions of Title 14 Code of Federal Regulations Part 91. The private pilot and his passenger sustained minor injuries. Visual meteorological conditions prevailed and no flight plan was filed for the personal flight. The cross-country flight originated from the Lihue Airport, Lihue, Hawaii, about 20 minutes prior to the accident, with an intended destination of Kalaeloa Airport, Kapolei, Hawaii.

The pilot reported that during the climb to cruise portion of the flight, the engine began to run rough. The pilot applied carburetor heat, which resolved the roughness, and he continued his climb to 5,500 feet mean sea level. As the flight was approaching the shores of Oahu Island, the engine began running rough in addition to a reduction of engine rpm to about 1,700. The pilot applied carburetor heat and adjusted the mixture, however, was unsuccessful at restoring engine power. The pilot initiated a forced landing into the ocean waters just off shore of the island of Oahu.

The airplane came to rest nose low partially submerged within about 20 feet of water, about 50 to 75 feet from the shoreline. Initial examination of the wreckage revealed that the forward portion of the fuselage was damaged. The wreckage was recovered from the water three days after the accident. Following removal from the water, the engine was rinsed with fresh water and subsequently filled with diesel fuel in an attempt to preserve the engine.

Examination of the recovered airplane on June 30, 2016, revealed that it was mostly fragmented into multiple pieces from the ocean tidal action. The engine remained attached to the firewall structure. Corrosion was observed throughout the engine and firewall. The carburetor was separated from its mounts. The magnetos and fuel pump remained secured to their mounting pads. The bottom spark plugs were removed and exhibited corrosion and debris consistent with ocean water and salt. The magnetos were removed. Partial rotational continuity was obtained when the propeller was rotated about $\frac{1}{4}$ of a turn and mechanical continuity was obtained at the rear of the engine. The right magneto drive shaft rotated however did not produce spark at the lead terminals. Disassembly of the magneto was not performed due to the corrosion on the cap bolts. The left magneto drive shaft would not rotate by hand. Disassembly of the magneto was not performed due to the corrosion on the cap bolts.

The carburetor was removed and disassembled for inspection. The internal float was intact and the needle valve was intact. A significant amount of salt and other ocean vegetation debris was observed throughout the float bowl and screen.

The right side exhaust remained partially attached to cylinders one and three. No nuts were observed on the cylinder number one exhaust mount and only one nut remained attached to the cylinder number three cylinder exhaust mount. It could not be determined if the missing nuts were displaced prior to the accident or during salvage and subsequent engine preservation methods. No evidence of any preexisting anomalies that would have precluded normal operation and production of power was observed.

The Federal Aviation Administration (FAA) published Special Airworthiness Information Bulletin (SAIB) CE-09-35 on June 30, 2009, regarding carburetor ice prevention. The conditions encountered in this accident (ambient temperature 84 degrees F, dew point 63 degrees F) were in the area of icing at glide and cruise power, and in the area of serious icing at glide power.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# WPR15FA222 07/26/2015 1704 PDT Regis# N988RH Riverside, CA Apt: Riverside Muni RAL
Acft Mk/Mdl BEECH F35-NO SERIES Acft SN D-4131 Acft Dmg: DESTROYED Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl CONTINENTAL MOTORS E225-8 Acft TT 609 Fatal 1 Ser Inj 0 Flt Conducted Under: FAR 091
Opr Name: DAVIS KEITH C Opr dba: Aircraft Fire: NONE
AW Cert: STN

Summary

The private pilot was receiving vectors for an instrument landing system approach during daytime visual flight rules conditions when he advised the controller that the engine had lost power and that he needed to land at a nearby airport located northeast of his position. The controller responded with the distance and direction from the airport and asked the pilot if he had the airport in sight, which he acknowledged. The controller advised the pilot to proceed inbound to the airport, told him that he could land on the runway of his discretion, and asked him to tell him which runway he was going to use; however, the pilot only responded that he was going to land into the wind. The controller repeated that the runway was at his discretion and the pilot repeated that he was going to land into the wind. Shortly after, the controller provided the pilot with the current weather conditions at the airport, which included wind from 280° at 12 knots gusting to 18 knots, and he then cleared the pilot to land on runway 27. Subsequently, the pilot responded that he was not going to make it to the airport. No further radio communications were received from the pilot.

Review of recorded radar data revealed that, when the pilot initially reported the loss of engine power, the airplane was about 1,644 ft above ground level; traveling on a heading of about 094°; and about 1.65 nautical miles (nm) west-southwest from the approach end of runway 34, 1.74 nm southwest of the approach end of runway 9, and 2.3 miles southwest of the approach end of runway 27. The radar data showed the flight track of the airplane continued on an easterly heading until it was about 0.96 nm south of runway 27 and about 653 ft above ground level. The airplane then turned left to a northerly heading while continuing to descend until radar contact was lost.

Postaccident examination of the airplane revealed that the landing gear were in the extended position and that the wing flaps were extended to about 20°. A postimpact fire and impact damage precluded a determination of the fuel quantities in all three fuel tanks. The engine test run did not reveal evidence of any preexisting anomalies that would have precluded normal operation. The reason for the loss of engine power could not be determined.

The Pilot's Operating Handbook for the accident airplane states that the maximum glide configuration includes landing gear and flaps up, cowl flaps closed, propeller low rpm, with an airspeed of 105 knots. With this configuration, the glide distance is about 1.7 nm per 1,000 ft of altitude above the terrain. It is likely that, if the airplane had been properly configured for a maximum glide distance and if the pilot decided to turn directly toward runway 34 or runway 9, for a downwind or crosswind landing, the airplane would have been able to reach either of those runways.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The total loss of engine power for reasons that could not be determined during postaccident examination of the airplane and engine. Also causal to the accident was the pilot's decision to attempt to reach the farthest runway and land into the wind instead of conducting a crosswind or downwind landing at a closer runway following the loss of engine power.

Events

1. Maneuvering - Loss of engine power (total)
2. Maneuvering - Off-field or emergency landing
3. Maneuvering - Collision with terr/obj (non-CFIT)

Findings - Cause/Factor

1. Not determined-Not determined-(general)-(general)-Unknown/Not determined - C
2. Personnel issues-Action/decision-Info processing/decision-Decision making/judgment-Pilot - C

Narrative

HISTORY OF FLIGHT

On July 26, 2015, about 1704 Pacific daylight time, a Beech F35, N988RH, was destroyed when it impacted a power pole and terrain during a forced landing following a loss of engine power near Riverside Municipal Airport (RAL), Riverside, California. The private pilot, the sole occupant, was fatally injured. The airplane sustained substantial damage. The airplane was registered to and operated by the pilot as a 14 Code of Federal Regulations Part 91 personal flight. Visual meteorological conditions were reported at the airport about the time of the accident, and no flight plan was filed. The local flight originated from Brackett Field Airport, La Verne, California, about 1619.

National Transportation Safety Board - Aircraft Accident/Incident Database

Review of air traffic control (ATC) audio recordings and transcripts provided by the Federal Aviation Administration (FAA) revealed that a Southern California Terminal Radar Approach Control (SoCal TRACON) controller was providing the pilot vectors for the instrument landing system 26R instrument approach at the Chino Municipal Airport, Chino, California. The SoCal TRACON controller issued the pilot a heading change from 070ø to 350ø. Shortly after, the pilot responded that he had lost engine power and needed to land at RAL. The controller responded with the distance and direction to RAL and asked the pilot if he had the airport in sight, which the pilot acknowledged. The controller advised the pilot to proceed inbound to RAL, told him that he could land on the runway of his discretion, and asked him to tell him which runway he was going to use. The pilot responded that he was going to land into the wind, and the controller repeated that the runway was at his discretion and asked how many people were on board. The pilot responded that he was the only person onboard and repeated that he was going to land into the wind.

Shortly after, the controller relayed the current weather conditions at RAL, which included wind from 280ø at 12 knots gusting to 18 knots, and cleared the pilot to land on runway 27. Subsequently, the pilot responded that he was "not going to make it." No further radio communications were received from the pilot.

PERSONNEL INFORMATION

The pilot, age 52, held a private pilot certificate with an airplane single-engine land rating, which was issued February 2, 2013. He was issued a first-class airman medical certificate on April 1, 2014, with the limitation that he "must have available glasses for near vision."

Review of the pilot's personal logbook revealed that, as of the most recent entry, dated June 19, 2015, he had accumulated a total flight time of 443.9 hours.

AIRCRAFT INFORMATION

The four-seat, low-wing, retractable-gear airplane, serial number D-4131, was manufactured in 1955. It was powered by a 225-horsepower Continental Motors E225-8 engine, serial number 30406-D-4-8. The airplane was equipped with a Hartzell model HC-A2V20-4A1, 2-bladed, constant-speed propeller, serial number AK1334.

Review of the airframe and engine maintenance logbook records revealed that the most recent annual and 100-hour inspections were completed on October 5, 2014, at a tachometer time of 609.40 hours and total time since major overhaul of 606.4 hours. The engine was overhauled on April 5, 1999, at a total engine time of 4,428.6 hours and subsequently installed on the airframe on May 12, 1999, at a tachometer time of 3 hours. The most recent maintenance performed on the engine was the replacement of a carburetor valve door assembly, alternate air door spring, and induction filter on May 29, 2015, at a tachometer time of 729.9 hours.

The pilot operating handbook for the F35, section III, Emergency Procedures, page 3-6 states in part:

"MAXIMUM GLIDE CONFIGURATION

Landing Gear - UP

Flaps - UP

Cowl Flaps - CLOSED

Propeller - LO RPM

Airspeed - 105 Knots/121 MPH

Glide distance is approximately 1.7 nautical miles (2 statute miles) per 1,000 feet of altitude above terrain."

METEOROLOGICAL INFORMATION

At 1653, the RAL automated weather observation station, located about 0.50 mile north of the accident site, reported wind from 290ø at 12 knots, gusts to 19 knots, visibility 10 statute miles, clear sky, temperature 30ø C, dew point 16ø C, and an altimeter setting of 29.87 inches of Mercury.

WRECKAGE AND IMPACT INFORMATION

National Transportation Safety Board - Aircraft Accident/Incident Database

Examination of the accident site revealed that the airplane struck a power pole and power lines about 0.50 mile south of the approach end of runway 27. The first identified point of impact was a power pole, which exhibited a downed wire and impact marks about 40 ft above ground level. Portions of the right flap and ruddervator were located immediately adjacent to the power pole. The right wing was located about 40 ft beyond the power pole in the middle of a residential street. The main wreckage, which consisted of the fuselage, left wing, engine, and left ruddervator, was located about 89 ft from the power pole. The wreckage debris path was oriented on a magnetic heading of about 045ø.

Examination of the airframe revealed that the right wing was separated outboard of the right main landing gear. The wing exhibited fire damage to both separated areas. The aileron remained attached via all its mounts. The right flap was separated into two sections, which were located near the first identified point of impact. The right main landing gear was observed in the extended position. The right main fuel tank was mostly intact. The fuel line fitting at the root of the fuel tank was separated. About 6 gallons of 100-low-lead fuel was drained from the fuel tank. The right auxiliary tank was consumed by fire.

The left wing remained attached to the fuselage and exhibited fire damage throughout. The inboard portion of the wing from the flap aileron junction was mostly consumed by fire. The outboard portion of the left flap remained attached to the wing; however, the inboard portion was consumed by fire. Both the left main and auxiliary fuel tanks were consumed by fire. The aileron remained attached via all of its mounts and exhibited fire damage. The left main landing gear was observed in the extended position.

The flap actuator was measured and was found to be in a position consistent with 20ø flaps.

The fuselage came to rest inverted and exhibited extensive fire damage. A majority of the bottom of the fuselage forward of the baggage compartment was consumed by fire. Oil residue was observed on the aft area of the fuselage structure. The instrument panel was consumed by fire and exhibited multiple instrument displacement. The radio panel was fire damaged. The throttle, mixture, and propeller controls were found in the full-forward position and were fire damaged. The fuel selector valve was heavily fire damaged. The fuel screen was free of debris, and the selector valve was found in a position consistent with the auxiliary position.

The empennage was mostly intact. The right ruddervator was separated and severed into two pieces. A circular impact mark, consistent with the size of the power pole, was observed and extended to the spar.

Both propeller blades remained attached to the propeller hub. One propeller blade was bent aft about 90ø midspan. The opposing propeller blade was bent aft slightly midspan and exhibited a slight forward bend about 5 inches inboard from the blade tip.

The engine remained attached to the engine mount via all its mounts. All of the engine accessories remained attached to the engine. The propeller remained attached to the crankshaft. The propeller was moved by hand and rotated about 1/2 inch. Throttle, mixture, and propeller control continuity was established from the cockpit to the engine. The throttle and mixture control cables were separated from their respective control arms, consistent with impact damage. The engine was removed from the airframe and was shipped to the Continental Motors Inc., facility for further examination.

The engine was examined on November 16 and 17, 2015. To facilitate an engine run, the propeller governor was removed, and a blanking plate was installed. The oil sump was impact damaged with multiple holes noted. The oil cooler exhibited impact marks, consistent with striking the left magneto.

Engine-to-magneto timing was 30ø for the right magneto and 19ø for the left magneto. Scrape marks were observed on the mounting flange of the left magneto, consistent with impact from the oil cooler. The left magneto was adjusted to an area where the scrape marks originated, and timing was verified at 25ø. A test propeller was installed along with various fuel lines and control cables to facilitate an engine test run. The engine was installed on an engine test stand and run at various power settings uneventfully until being shut off using the mixture.

MEDICAL AND PATHOLOGICAL INFORMATION

The Riverside County Coroner conducted an autopsy on the pilot. The medical examiner determined that the cause of death was "massive blunt force injuries to torso."

The FAA Civil Aerospace Medical Institute (CAMI) performed toxicology tests on specimens from the pilot. According to CAMI's report, the results were negative for carbon monoxide, volatiles, and all screened drugs.

TESTS AND RESEARCH

Review of FAA radar data and ATC transcripts revealed that, when the pilot initially reported the loss of engine power, the airplane was about 2,425 ft mean sea level (msl), or about 1,644 ft above ground level (agl); traveling on a heading of about 094ø; and about 1.65 nm west southwest from the approach end of runway 34 at RAL, 1.74 nm southwest of the approach end of runway 9, and 2.3 nm from the approach end of runway 27. The radar data depicted the flight track of the airplane continuing on an easterly heading until it was about 0.96 nm south of runway 27 at an altitude of about 1,400 ft msl or about 653 ft agl. The airplane then turned left to a northerly heading while continuing to descend. The last radar target was located about 0.1 nm west of the accident site at an altitude of 775 ft msl.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# CEN17LA145	03/19/2017	955 CDT	Regis# N1915N	Columbia, IL	Apt: Sackman Field H49
Acft Mk/Mdl CESSNA 120-NO SERIES			Acft SN 12159	Acft Dmg: SUBSTANTIAL	Rpt Status: Prelim Prob Caus: Pending
Eng Mk/Mdl CONT MOTOR C85 SERIES				Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: PRIVATE INDIVIDUAL			Opr dba:		Aircraft Fire: NONE

Events

1. Takeoff-rejected takeoff - Runway excursion

Narrative

On March 19, 2017, at 0955 central daylight time, a Cessna 120 airplane, N1915N, was substantially damaged during a runway excursion at Sackman Field Airport (H49), Columbia, Illinois. The pilot receiving instruction and the flight instructor were not injured. The airplane was registered to Aeronca Champ Club LLC and operated by a private individual under the provisions of 14 Code of Federal Regulations Part 91 as an instructional flight. Visual meteorological conditions prevailed for the flight that operated without a flight plan. The local flight was originating at the time of the accident.

According to information obtained by the Federal Aviation Administration, while taking off from runway 21, the pilots reported that the engine was not producing sufficient power. The pilot attempted to abort of takeoff, but insufficient runway remained for the airplane to stop on the turf strip. The airplane overran the strip, collided with a ditch, and nosed over in a field.

The airplane was retained for further examination.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# GAA17CA121	01/23/2017 1030 CDT	Regis# N3545L	Denton, TX	Apt: Denton Enterprise DTO
Acft Mk/Mdl CESSNA 150-F		Acft SN 15062345	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl CONT MOTOR O-200 SERIES		Acft TT 4710	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: RICHARD G. EMERY		Opr dba:		Aircraft Fire: NONE
				AW Cert: STU

Summary

The pilot reported that, while on base to final, the engine "quit." He added that the airplane could not reach the runway, so he conducted a forced landed in a small field 1/2 mile from the airport.

The airplane impacted a tree during landing, which resulted in substantial damage to the airplane's fuselage and wings.

The pilot reported that there were no preaccident mechanical failures or malfunctions with the airframe or engine that would have precluded normal operation. The Federal Aviation Administration inspector who responded to the accident stated that, when he arrived, he only observed a few drops of fuel remaining in the airplane's undamaged fuel system. He further stated that, before removal of the wings from the airplane for transport, about 1.5 gallons of total fuel was drained from the fuel tanks.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The pilot's improper fuel planning, which resulted in a total loss of engine power due to fuel exhaustion.

Events

1. Enroute - Fuel exhaustion
2. Emergency descent - Fuel exhaustion
3. Landing - Off-field or emergency landing
4. Landing - Collision with terr/obj (non-CFIT)

Findings - Cause/Factor

1. Aircraft-Fluids/misc hardware-Fluids-Fuel-Fluid level - C
2. Personnel issues-Task performance-Planning/preparation-Fuel planning-Pilot - C
3. Environmental issues-Physical environment-Object/animal/substance-Tree(s)-Contributed to outcome

Narrative

The pilot reported that while on base to final, the engine quit. He further reported that the airplane could not make it to the runway and force landed in a small field a half mile from the airport.

The airplane impacted a tree during landing, which resulted in substantial damage to the airplane's fuselage and wings.

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

The Federal Aviation Administration (FAA) Inspector who responded to the accident stated, that when he arrived he only observed a few drops of fuel remaining in the airplane's undamaged fuel system. He further stated that prior to removal of the wings from the airplane for transport, all the fuel was drained from the fuel tanks, totaling approximately 1.5 gallons of fuel.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# GAA17CA160	02/25/2017 2130 CST	Regis# N6132Q	Madill, OK	Apt: Madill Muni 1F4
Acft Mk/Mdl CESSNA 152-NO SERIES		Acft SN 15285156	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl LYCOMING O-235-L2C		Acft TT 16706	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: ZHENYI LIN		Opr dba:		Aircraft Fire: NONE
				AW Cert: STU

Events

1. Taxi - Ground collision
-

Narrative

The pilot reported that during a solo night flight, he "landed long" and was unable to complete a touch-and-go as planned. The airport did not have a parallel taxiway leading to the departure end of the runway, so the pilot taxied onto the ramp area to turn around. During the taxi on the ramp the lighting was "poor" and the right wingtip struck a hangar. He reported that he "did not realize" the right wing struck the hangar and continued the flight back to his home airport.

After landing and securing the airplane, he noticed the right wing was damaged and told the flight school maintenance personnel.

A post-accident review revealed the airplane had sustained substantial damage to its right-wing rear spar.

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

According to the flight school's flight operations manual, flight operations were not permitted at the accident airport due to the requirement for the runway to be at least 4000 ft. long. The accident airport runway was 3,005 ft. long. In addition, the manual prohibited touch-and-go landings at night.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# GAA16CA492	09/10/2016 1300	Regis# N8335A	Sidney, MT	Apt: Sidney-richland Municipal Airp SDY
Acft Mk/Mdl CESSNA 170-B		Acft SN 25187	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl CONTINENTAL C-145-2		Acft TT 3089	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: FRONTIER HEATING REFRIGERATION AND AIR CONDITIONIN		Opr dba:		Aircraft Fire: NONE AW Cert: STN

Summary

The flight instructor reported that, during the instructional flight in a tailwheel-equipped airplane, the student pilot bounced the landing. The airplane bounced off the grass airstrip, and the flight instructor took the flight controls, but the airplane drifted to the left and into a drainage ditch. The flight instructor reported that he corrected with right rudder application to ease the airplane out of the ditch, but the left landing gear tire deflated, and the left wing and the tail struck the ground. The airplane yawed to the left, the instructor corrected the yaw, and the airplane rolled onto the runway and stopped. The left wing, left aileron, and the elevator sustained substantial damage.

The flight instructor reported that there were no preaccident mechanical malfunctions or anomalies with the airplane that would have prevented normal operation.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The student pilot's improper landing flare, which resulted in a bounced landing, and the flight instructor's inability to recover the airplane, which resulted in a runway excursion.

Events

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

Findings - Cause/Factor

1. Personnel issues-Task performance-Use of equip/info-Aircraft control-Student/instructed pilot - C
2. Personnel issues-Task performance-Use of equip/info-Aircraft control-Instructor/check pilot - C
3. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Landing flare-Not attained/maintained - C
4. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Directional control-Not attained/maintained - C

Narrative

The flight instructor reported that during the instructional flight in a tailwheel equipped airplane, the student pilot bounced the landing. The airplane bounced off the grass airstrip and the flight instructor reported that he took the flight controls, but the airplane drifted to the left and into a drainage ditch. The flight instructor reported that he corrected with right rudder application to ease the airplane out of the ditch, but the left landing gear tire deflated and the left wing and the tail struck the ground. The airplane yawed to the left, the instructor corrected the yaw and the airplane rolled onto the runway and stopped. The left wing, left aileron and the elevator sustained substantial damage.

The flight instructor reported that there were no mechanical malfunctions or anomalies prior to landing in the ditch that would have prevented normal flight operation.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# GAA17CA111	01/07/2017 900 EST	Regis# N907WA	Hollywood, FL	Apt: North Perry HWO
Acft Mk/Mdl CESSNA 172-N		Acft SN 17267907	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl LYCOMING O-320-D2J		Acft TT 16317	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: AMERICAN FLIGHT TRAINING LLC		Opr dba: WAYMAN FLIGHT TRAINING, LLC.		Aircraft Fire: NONE
				AW Cert: STN

Summary

The solo student pilot reported that, during his ninth landing of the day, the nose gear collapsed, and the left wing dipped down striking the runway. Subsequently, the airplane exited the runway to the right.

The Federal Aviation Administration inspector who responded to the accident reported that the distance from the first point of impact to the final stopping point was about 320 ft. He added there were indications that the right aileron and wing tip contacted the runway first. There was also a sheared nose gear hub pin/bolt found 35 ft from the initial point of impact.

There were multiple impact points along the debris path, and the second point of impact was the left wing tip, indicated by the blue-and-white paint markings from the wing tip on the runway.

The third impact was the airplane's nosewheel assembly. The runway showed markings left by the tire on the surface for about 20 ft. The markings also indicated an extreme side load on the tire. The wheel/tire hub assembly was found at the end of the tire mark with one of the nose strut forks.

Additionally, there were seven gouges in the runway surface from the propeller striking the ground.

The airplane sustained substantial damage to both wings and the firewall.

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

The weather observation station at the accident airport reported that, about the time of the accident, the wind was 220ø at 14 knots, gusting to 20 knots. The student pilot landed on runway 28L.

Cause Narrative

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

Events

1. Landing - Hard landing
2. Landing - Loss of control on ground
3. Landing - Dragged wing/rotor/float/other
4. Landing - Landing gear collapse
5. Landing - Nose over/nose down
6. Landing - Runway excursion

Findings - Cause/Factor

1. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Landing flare-Not attained/maintained - C
2. Personnel issues-Task performance-Use of equip/info-Aircraft control-Student/instructed pilot - C
3. Environmental issues-Conditions/weather/phenomena-Wind-Crosswind-Effect on operation
4. Environmental issues-Conditions/weather/phenomena-Wind-Gusts-Effect on operation
5. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Crosswind correction-Not attained/maintained

Narrative

The solo student pilot reported that during his 9th landing of the day, the nose gear collapsed, and the left wing dipped down striking the runway. Subsequently, the airplane exited the runway to the right.

The Federal Aviation Administration (FAA) Inspector who responded to the accident reported that the distance from the first point of impact to the final stopping point was approximately 320 ft. He further reported there were indications that the right aileron and wing tip contacted the runway first. There was also a sheared nose gear hub pin/bolt found 35 ft. from the initial point of impact.

There were multiple impact points along the debris path, and the second point of impact was the left-wing tip, indicated by the blue and white paint markings from the wing tip on the runway.

The third impact was the airplane's nose wheel assembly. The runway showed markings left by the tire on the surface for about 20 ft. The markings also indicated an extreme side load on the tire. The wheel/tire hub assembly was found at the end of the tire mark with one of the nose strut forks.

Additionally, there were 7 gouges in the runway surface from the propeller striking the ground.

The airplane sustained substantial damage to both wings and the firewall.

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

The weather observation station at the accident airport, about the time of the accident, reported the wind at 220 degrees (true) at 14 knots, gusting to 20 knots. The student pilot landed runway 28L.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# GAA17CA104	12/24/2016 930 EST	Regis# N1289Y	Palm Coast, FL	Apt: Flagler Executive FIN
Acft Mk/Mdl CESSNA 172-S		Acft SN 172S9851	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl LYCOMING IO-360-L2A		Acft TT 10585	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: PHOENIX EAST AVIATION		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

Summary

According to the flight instructor who observed the student pilot's first solo flight from the ground, the airplane landed hard and porpoised due to the student pilot's improper flare.

A postaccident examination revealed the airplane had sustained substantial damage to the aileron and elevator systems and the firewall.

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

Cause Narrative

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

Events

1. Landing-flare/touchdown - Abnormal runway contact
2. Landing - Hard landing

Findings - Cause/Factor

1. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Landing flare-Not attained/maintained - C
2. Personnel issues-Task performance-Use of equip/info-Aircraft control-Student/instructed pilot - C

Narrative

According to the flight instructor who observed the student pilot's first solo flight from the ground, the airplane landed hard and porpoised due to the student pilots improper flare.

A post-accident examination showed the airplane had received substantial damage to the aileron and elevator systems, as well as the firewall of the airplane.

The flight instructor reported that there were no pre-accident mechanical failures or malfunctions with the airframe or engine that would have precluded normal operation.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# WPR15FA070 12/24/2014 1225 PST Regis# N8518B Sutter Creek, CA Apt: Westover Field Amador County JAQ
Acft Mk/Mdl CESSNA 172-UNDESIGNAT Acft SN 36218 Acft Dmg: SUBSTANTIAL Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl CONT MOTOR O-300 SER Acft TT 3929 Fatal 2 Ser Inj 0 Flt Conducted Under: FAR 091
Opr Name: FAILLERS PHILLIP J Opr dba: Aircraft Fire: NONE
AW Cert: STN

Summary

The noninstrument-rated private pilot was conducting a personal cross-country flight. Upon return to his home airport, the pilot encountered forecast low ceilings and poor visibility; based on radar data, he was likely maneuvering in an attempt to locate the airport to land. The airplane impacted near the top of a hill at an elevation of 1,590 ft. A couple reported hearing a low-flying airplane with an engine that seemed like it was "struggling" or not producing power. Another witness in the area stated that she heard, but did not see, a low-flying airplane circling overhead and that the engine sounded like it was cutting out. The airplane then descended below a cloud layer, and she saw it heading in an eastbound direction. Although the weather conditions were conducive to the accumulation of carburetor and structural icing, based on the available evidence, the investigation could not determine whether this occurred. Examination of the airplane and engine revealed no evidence of a mechanical anomaly that would have precluded normal operation.

Instrument flight rule conditions with ceilings below 1,000 ft above ground level (agl), visibility below 3 miles in precipitation and mist, and mountain obscuration were forecast in the area at the time of the accident. However, a search of official weather sources revealed that the pilot had obtained no weather briefings. Reported observations at the destination airport (about 2 miles from the accident site) showed overcast ceilings of about 100 ft agl with a visibility of 1/4 mile about the time of the accident. Radar data showed that the accident airplane approached the area from the southwest (from the departure airport), overflew the destination airport about 4,000 ft agl, and continued tracking to the northeast for about 6 miles before descending and turning back toward the airport. In the minutes before the accident, radar data showed the airplane circling near the accident area at a low altitude. It is likely that the pilot encountered instrument meteorological conditions while maneuvering, which would have been conducive to spatial disorientation, and that the pilot subsequently lost airplane control due to spatial disorientation.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The noninstrument-rated pilot's encounter with instrument meteorological conditions (IMC) while maneuvering, which resulted in a loss of airplane control due to spatial disorientation. Contributing to the accident was the pilot's decision to attempt to descend into an area of widespread IMC.

Events

1. Maneuvering - VFR encounter with IMC
2. Maneuvering - Collision with terr/obj (non-CFIT)

Findings - Cause/Factor

1. Environmental issues-Conditions/weather/phenomena-Ceiling/visibility/precip-Below VFR minima-Effect on operation - C
2. Personnel issues-Psychological-Perception/orientation/illusion-Spatial disorientation-Pilot - C
3. Personnel issues-Task performance-Use of equip/info-Aircraft control-Pilot - C
4. Personnel issues-Experience/knowledge-Experience/qualifications-Qualification/certification-Pilot - C
5. Personnel issues-Action/decision-Info processing/decision-Decision making/judgment-Pilot - F
6. Environmental issues-Physical environment-Terrain-Mountainous/hilly terrain-Contributed to outcome

Narrative

HISTORY OF FLIGHT

On December 24, 2014, about 1225 Pacific standard time, a Cessna 172, N8518B, impacted an access road in hilly terrain in Sutter Creek, California, about 2 miles north of Westover Field Amador County Airport (JAQ), Jackson, California. The private pilot and one passenger were fatally injured, and the airplane sustained substantial damage. The pilot/owner was operating the airplane as a Title 14 Code of Federal Regulations Part 91 personal flight. Visual meteorological conditions prevailed along the flight route for most of the flight, and instrument flight rules (IFR) conditions existed at the destination airport at the time of the accident. No flight plan had been filed. The flight departed from San Martin, California, at an undetermined time and was destined for JAQ.

A couple in a valley near the accident site reported hearing a low-flying airplane with an engine that seemed like it was "struggling" or not producing power. They then heard a loud "boom," and one of the witnesses went to search for the airplane. Once he found the wreckage, he called his wife, who called 911. Another witness in the area stated that she heard, but did not see, a low-flying airplane circling overhead and that the engine sounded like it was cutting out. The airplane then descended below a cloud layer, and she saw it heading in an eastbound direction.

National Transportation Safety Board - Aircraft Accident/Incident Database

Local law enforcement reported that, upon arrival at the accident site, heavy fog was present with light rain and that the visibility was about 100 to 200 ft; there was no fire.

PERSONNEL INFORMATION

The pilot, age 52, held a private pilot certificate with an airplane single-engine land rating that was issued on February 23, 2010. The pilot was issued a third-class medical certificate on September 26, 2014, with the limitation that he must have available glasses for near vision. At his last medical examination, the pilot reported 900 hours of total flight time with 20 hours accrued in the past 6 months. According to the pilot's personal flight logbook, he completed a flight review on May 10, 2013.

AIRCRAFT INFORMATION

The four-seat, high-wing, fixed-gear Cessna 172 airplane, N8518B, serial number 36218, was manufactured in 1958. It was powered by a Continental Motors Inc., O-300-A 145-horsepower engine and was equipped with a McCauley model M74DR-0-56, serial number 41996m, two-bladed metal propeller.

Review of maintenance logbook records showed an annual inspection had been completed on June 12, 2014, at a recorded tachometer reading of 168.4 hours, airframe total time of 3,929.3 hours, and an engine total time of 2,999.3 hours with 1,591.3 hours accrued since major overhaul. The tachometer and the Hobbs meter were observed at the accident site; however, damage precluded determination of the current readings.

METEOROLOGICAL CONDITIONS

AIRMETs Sierra, Tango, and Zulu were issued at 0645 for the accident time and site. They forecast IFR conditions with ceilings below 1,000 ft agl and visibility below 3 miles in precipitation and mist, mountains obscured by clouds, and precipitation and mist, with moderate turbulence below flight level (FL) 180, and moderate icing between the freezing level (between the surface and 8,000 ft) and FL200. (Altitudes 18,000 ft and above are indicated in FL. FL200 is an altitude of 20,000 ft msl.) No record was found that indicated that the accident pilot received an official weather briefing from Lockheed Martin Flight Service or any other official source.

During the time surrounding the time of the accident (from 1224 to 1240), JAQ reported wind from 340° at 6 to 9 knots, visibility 1/4 mile with an overcast ceiling at 100 ft agl, temperature 10° C, dew point 9° C, and an altimeter setting of 30.01 that declined to 29.99 inches of Mercury between 1224 and 1240.

The weather observations from JAQ indicated that both low instrument flight rules (LIFR) ceilings and visibilities existed at the time of the accident. (LIFR refers to general weather conditions of a ceiling below 500 ft and/or less than 1-mile visibility that pilots can expect at the surface.) These conditions were present at JAQ as early as 1200 with IFR ceilings and visibilities as early as 1110. Conditions improved above IFR conditions by 1400 with ceilings lifting to 1,200 ft agl.

There were no SIGMETs or Center Weather Service Unit advisory or meteorological impact statements valid at the time of the accident or for the accident site.

A review of the Federal Aviation Administration (FAA) carburetor icing probability chart indicated that conditions were conducive to moderate icing at cruise power settings or serious icing at glide power settings.

WRECKAGE AND IMPACT INFORMATION

The entire airplane was located about 2 miles from the intended destination at an elevation of 1,590 ft mean sea level (msl). The airplane impacted near the top of a hill on a dirt access road; the surrounding area was open land with rolling hills. The airplane had come to rest upright in a nose-down, right-wing low attitude on a magnetic heading of 180°. A large crater was identified just below the lower edge of the road with imprints of the landing gear, the airplane's belly, and the right wing. Wreckage debris from the left and right main landing gear and right wing were identified at the initial impact site. The airplane came to rest a couple of feet forward of the initial impact site. The empennage and tail sections were folded forward and to the right.

Flight control continuity was established from the cockpit to all flight control surfaces, which remained attached at their respective attachment points. Both fuel tanks had ruptured, and no fuel was found onboard the airplane; however, the smell of fuel was present at the accident site. The propeller and engine were

pushed aft into the cockpit. The engine sustained impact-related crushing damage from the bottom up. See the section of this report, "Engine Examination," for more information about damage to the engine and propellers.

Both wings exhibited crush damage from the leading edge to the trailing edge. The lower portion of the wings were damaged with the top of the wings open at the rivet line, exposing the inside of the wing. The right wing and tail section remained attached to the airframe. The left wing had impacted uphill from the main wreckage, and a red lens fragment was found at the impact point.

The emergency locator transmitter was in the "armed position," but it did not activate. It remained mounted inside the empennage.

MEDICAL AND PATHOLOGICAL INFORMATION

The Amador County Office of the Coroner conducted an autopsy of the pilot. The cause of death was reported as "multiple traumatic injuries."

The FAA's Civil Aerospace Medical Institute performed forensic toxicology on specimens from the pilot. Carbon monoxide and cyanide testing was not performed; no volatiles or drugs of abuse were detected.

TEST AND RESEARCH

Engine Examination

Visual examination of the engine revealed that the accessory housing plate had partially separated from the engine case, exposing the accessory gears. Due to the displacement of the Nos. 5 and 6 cylinders, their associated pistons and connecting rods, and the No. 4 main bearing, which had shifted aft during the accident sequence, the engine crankshaft could not be manually rotated. However, visual examination of the engine's internal components, which were visible through the bottom of the crankcase, revealed no preaccident anomalies or signs of operational distress.

All the valve train components (camshaft, lifters, pushrods, rockers, and valve springs), except for the Nos. 5 and 6 intake pushrods, were in place with no preaccident anomalies noted.

The No. 5 cylinder deck studs, located at the 4-, 5-, and 6-o'clock positions, had exposed threads. The cylinder retaining nuts for the three studs remained in place. The remainder of the No. 5 cylinder's retaining nut and stud bolts remained secured at the mounting pad. The exhaust area of the No. 6 cylinder head was partially separated. The remainder of the cylinders were unremarkable.

The top and bottom spark plugs were removed. The side electrodes on the Nos. 3 and 5 bottom sparkplugs were fractured and offset from their normal positions, and the copper washers from the No. 3 top and bottom spark plugs and the No. 5 bottom spark plug had multiple crimping marks. The No. 1 top spark plug's central electrode and insulator were missing. The remainder of the spark plug electrodes exhibited normal patterns per the Champion Aviation Check-A-Plug Chart AV-27.

The propeller remained connected to the crankshaft flange. The spinner had separated from the propeller assembly. Both propeller blades exhibited chordwise scratching along the length of the blades. Leading and trailing edge nicks and gouges were evident on the outboard half of one of the propeller blades that was twisted toward low pitch. One of the propeller blades also exhibited S-bending.

The starter armature had separated from the starter housing. The generator had separated from the engine and was unremarkable.

The carburetor had separated from the oil sump mount, and the carburetor bowl had fractured into multiple pieces. The throttle plate and floats were not identified. The oil pan had separated/fractured, exposing the camshaft, which remained intact.

Both magnetos had separated from their respective mounting flanges on the engine. Additionally, both magnetos had impulse couplings. The left magneto remained connected to the ignition harness P-leads, which remained attached to the spark plugs. Manual rotation of the left magneto drive shaft produced spark at all posts. The right magneto was located in the wreckage and had sustained impact damage to the housing. Investigators could achieve spark at two of the six posts. The right magneto was disassembled, and the internal gears were intact, secure, and undamaged.

Radar Data Information

Radar data for the accident area was obtained from the FAA Northern California Terminal Radar Approach Control (NCT). According to the FAA, the accident airplane had not received air traffic control services from NCT and was not under radar contact. The National Transportation Safety Board Air Traffic Specialist identified an airplane squawking 1200 near the accident area; there were no additional aircraft in the area at the time of the accident. At 1215:00, a radar target was identified traveling to the northeast at a Mode C reported altitude of 4,900 ft msl. The radar target continued to the northeast and ascended to 5,200 ft before it turned toward Sutter Creek and began a westbound descent that ended at 1227:14.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# WPR16LA083 03/13/2016 800 MDT Regis# N4696B Boulder, UT Apt: Private Dirt Airstrip NA
Acft Mk/Mdl CESSNA 180 Acft SN 31594 Acft Dmg: SUBSTANTIAL Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl CONTINENTAL O-470-R Acft TT 8554 Fatal 0 Ser Inj 0 Flt Conducted Under: FAR 091
Opr Name: MICHAEL COLLIER Opr dba: Aircraft Fire: NONE

Events

1. Takeoff - Runway excursion

Narrative

On March 13, 2016, about 0800 mountain daylight time, N4696B, a taiwheel equipped Cessna 180, was substantially damaged when the airplane failed to accelerate and overran the end of the runway surface while attempting to take off from a private airstrip about 2 nautical miles west of Boulder, Utah. The commercial pilot, who was the owner of the airplane, and his two passengers were not injured. Visual meteorological conditions prevailed for the planned local flight, which was being operated in accordance with 14 Code of Federal Regulations Part 91, and a flight plan was not filed. The flight was originating at the time of the accident.

In a report submitted to the National Transportation Safety Board (NTSB) investigator-in-charge (IIC), the pilot reported that prior to departing, he allowed the engine to warm up for about 15 minutes. He also rechecked the magnetos, listened to the engine at higher power settings, and due to the airstrip being dirt, did not check the carburetor heat; normal oil pressure was observed. The pilot stated that after he applied full power and started the takeoff roll [to the west] on the 2,100 foot unimproved dirt airstrip, he observed the acceleration to be "ok", but felt a little slow. The pilot added that he thought the dirt might have been soft, or that the vegetation was slowing the airplane down, but when he glanced at the tachometer it was reading right at the redline, 2,600 rpm; he did not remember looking at the manifold pressure gauge, nor did he report the engine running rough or backfiring. The pilot opined that about one-half to two-thirds of the way down the runway the tail lifted off the runway's surface, at which point he added one notch of flaps as the airplane continued to roll on its main landing gear. The pilot reported that as the end of the airstrip approached he pulled back on the control yoke, which resulted in an increase in the angle-of-attack. The airplane subsequently lifted about two feet off the runway surface before settling into the sagebrush. The pilot stated that when he attempted to reduce power by retarding the throttle, the engine continued to run at the same high-output level. As the airplane continued to roll it was slowed by the vegetation, and subsequently impacted a 10-foot diameter tree before coming to rest upright about 50 yards from the tree stump. The pilot stated that he suspected that the engine was not generating full power, and that he could have aborted the takeoff at that time. The pilot reported that winds were from the northwest at 5 knots. A postaccident examination of the airplane revealed substantial damage to both wings and the elevator. The airplane was recovered to a secure location for further examination.

On April 27, 2016, under the supervision of the NTSB IIC, a Continental Motors Inc. field technician performed an examination of the engine at the facilities of Air Transport, Phoenix, Arizona.

The engine remained attached to the airframe via the engine mount legs. No external damage was noted. The top spark plugs were removed and exhibited grey combustion deposits. The electrodes had normal, worn out signatures. The cylinder combustion chambers were examined with a lighted borescope, with no anomalies noted. The crankshaft was rotated by hand using the propeller, with thumb compression confirmed on all six cylinders. The magneto impulse couplings were audible, and spark was produced on all six top spark plug leads.

In preparation for a test run of the engine, an external fuel supply was plumbed into the right wing root fuel line. The fuel selector was placed in the right hand position for the first engine run.

After the engine was started and allowed to warm up, the throttle was advanced to 1,600 rpm and a magneto check performed; each magneto dropped about 75 rpm. When the throttle was advanced full forward, the engine obtained 2,600 rpm and 22 inches of manifold pressure. The throttle was then reduced to idle to allow the engine to cool down before it was secured using the mixture control. No binding of the throttle or mixture controls was noted during the engine run.

The fuel supply was then plumbed into the left wing root fuel line to verify proper operation of the fuel selector in the left hand position. The engine was then restarted and ran normally. When the selector was placed in the "both" position, the engine continued to run normally. The fuel selector was then moved to the "off" position, and after several seconds it began to run rough. The fuel selector was subsequently positioned to the left tank position, from which it ran smoothly. The engine was allowed to cool down at idle before a normal shut down was accomplished using the mixture control lever.

National Transportation Safety Board - Aircraft Accident/Incident Database

On April 27, 2017, at the facilities of Air Transport, Phoenix, Arizona, the NTSB IIC performed an examination of the airframe. No anomalies were noted during the examination.

The postaccident examination of the engine and airframe failed to reveal any anomalies that would have precluded normal operation.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# GAA17CA134	01/29/2017	1500 AKS	Regis# N5222E	Tyonek, AK	Apt: N/a
Acft Mk/Mdl CESSNA 180-B			Acft SN 50522	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl CONT MOTOR O-470-R-13			Acft TT 7327	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: JOSH B. SMITH			Opr dba:		Aircraft Fire: NONE
					AW Cert: STN

Summary

The pilot of the tundra tire- and tailwheel-equipped airplane reported that, while on the flight back to his home airport, he decided to land on a snow-covered airstrip. He flew over the landing area three times before deciding on the fourth pass to attempt a full-stop landing. During the touchdown of the three-point landing, he realized the snow was deeper than he had expected, and the airplane decelerated rapidly. The pilot increased power, but the airplane continued to sink in the snow. Subsequently, the airplane nosed over and slid to a stop inverted.

The airplane sustained substantial damage to its empennage.

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

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The pilot's improper decision to land on a snow-covered airstrip with a tundra tire-equipped airplane, which resulted in a nose-over.

Events

1. Landing - Miscellaneous/other
2. Landing - Loss of control on ground
3. Landing - Nose over/nose down

Findings - Cause/Factor

1. Aircraft-Aircraft systems-Landing gear system-Wheel/ski/float-Capability exceeded - C
2. Personnel issues-Action/decision-Info processing/decision-Decision making/judgment-Pilot - C
3. Personnel issues-Task performance-Use of equip/info-Aircraft control-Pilot - C
4. Environmental issues-Physical environment-Runway/land/takeoff/taxi surface-Snow/slush/ice covered surface-Effect on operation - C
5. Environmental issues-Physical environment-Runway/land/takeoff/taxi surface-Snow/slush/ice covered surface-Decision related to condition - C
6. Environmental issues-Physical environment-Runway/land/takeoff/taxi surface-Snow/slush/ice covered surface-Ability to respond/compensate

Narrative

The pilot of the tundra tire and tailwheel-equipped airplane reported that while on the flight back to his home airport, he decided to land on a snow-covered airstrip. The pilot further reported that he flew over the landing area three times before deciding on the fourth pass to attempt a full stop landing. During the touchdown of the 3-point landing, he realized the snow was deeper than he had expected and the airplane decelerated rapidly. The pilot reported that he increased power, but the airplane continued to sink in the snow. Subsequently, the airplane nosed over and slid to a stop inverted.

The airplane sustained substantial damage to its empennage.

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

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# WPR16LA108	05/13/2016 1315 PDT	Regis# N9370C	California City, CA	Apt: California City L71
Acft Mk/Mdl CESSNA 180-UNDESIGNAT		Acft SN 31768	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl CONT MOTOR O-470 SERIES		Acft TT 2271	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: DAVID W. WHITNEY		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

Events

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

Narrative

HISTORY OF FLIGHT

On May 13, 2016, about 1315 Pacific daylight time, a Cessna 180, N9370C, was substantially damaged when it nosed over onto its back following a landing at California City airport (L71), California City, California. The private pilot and his passenger received minor injuries. The personal flight was conducted under the provisions of Title 14 Code of Federal Regulations Part 91. Visual meteorological conditions prevailed.

According to the pilot/owner, the airplane had just been approved for a return to service via an annual inspection the day prior to the accident. Subsequent to that, the pilot conducted one uneventful flight in the airplane. The following day, the pilot and his passenger flew from Shafter Minter field (MIT), Shafter California, to L71, in order to have another maintenance facility provide a cost estimate for some sheet metal work. The flight was uneventful until the landing on runway 24. The airplane touched down in the three-point attitude, bounced once, and then touched down again. Immediately after touchdown, the airplane began veering to the left, but the pilot was unable to correct the veer, despite control inputs and right brake application. When the airplane had slowed to a speed between 15 and 10 mph, it exited the south edge of the paved runway surface, and nosed over onto its back.

Personnel from two separate airport maintenance facilities were summoned to right the airplane, and clear it from the runway environment. The individual who was to conduct the sheet metal work was an aircraft mechanic with an Inspection Authorization, and he assisted in the recovery. He reported that prior to righting the airplane, he manually rotated both main wheels in both directions; they rotated freely, and offered only normal resistance. The airplane was then righted, and towed backwards on its main gear to his facility. On-scene documentation indicated the presence of a skid mark that terminated at the edge of the pavement, and aligned with the right main gear. The skid mark was estimated to be about 300 feet long. The airplane was retained undisturbed for subsequent examination by Federal Aviation Administration (FAA) and NTSB personnel.

PERSONNEL INFORMATION

The pilot held a private pilot certificate with an instrument rating. He reported that he had about 1,430 total hours of flight experience, including over 1,000 hours in taildragger airplanes, and 105 hours in the accident airplane make and model. His most recent flight review was completed in April 2015, and his most recent FAA third-class medical certificate was also issued in April 2015.

AIRCRAFT INFORMATION

FAA information indicated that the airplane was manufactured in 1955, and was equipped with a Continental O-470 series engine. The airplane was involved in a landing accident in 1974 but was repaired and returned to service.

The pilot purchased the airplane in May 2015. According to the pilot, the airplane and engine had a total time in service of about 2,271 hours.

The most recent annual inspection included some brake maintenance. Both brake discs, and the left brake pads, had been replaced with new components; the previous/used brake pads were retained on the right brake caliper. Comparison of the maintenance entry writeup and the airplane manufacturer's maintenance guidance indicated that the components that were replaced were the correct part numbers. No other potentially relevant activity was noted in that annual entry.

National Transportation Safety Board - Aircraft Accident/Incident Database

METEOROLOGICAL INFORMATION

The 1320 automated weather observation at Mohave Air and Space Port (MHV), Mohave, California, located about 9 miles southwest of L71, included winds from 200 degrees at 15 knots, visibility 10 miles, clear skies, temperature 32 degrees C, dew point minus 4 degrees C, and an altimeter setting of 30.00 inches of mercury.

AIRPORT INFORMATION

L71 is located in the Mojave Desert, near California City California. The airport is situated at an elevation of 2,454 feet above mean sea level (msl). The single paved asphalt runway, designated 6/24, measures 60 by 6,027 feet. The airport was not equipped with an air traffic control tower or any automated weather detection or reporting equipment. Three windsocks, one midfield, and one near each threshold, were located north of the runway.

WRECKAGE AND IMPACT INFORMATION

The airplane came to rest inverted, on a magnetic heading of approximately 025 degrees, in the desert soil just off the south edge of the runway. The outboard end of the left wing extended onto the paved surface. The stopping point was located about 1,800 feet from the 24 threshold. A tire skid mark began near the runway centerline, approximately 150 feet prior to the airplane stopping point. The first 15 to 20 feet of the skid mark was light and was oriented approximately parallel to the runway. The mark then began to turn to the left, and became darker. About halfway (laterally) between the initiation point and the runway edge, the skid mark became very pronounced, and then sequentially exhibited a cusp to the right, an interruption, and an 'S' bend. It then continued nearly straight, oriented about 45 degrees to the runway edge, before curving right, and terminated about 2 feet prior to the runway edge. The soil was disturbed between the skid mark and the airplane just beyond it. The alignment of the skid mark and airplane was consistent with it having been made by the right main tire.

The airplane sustained damage to both wings, vertical stabilizer and rudder, cowl, firewall, engine mounts, and propeller. There was no fire, and there was negligible leakage of fuel or other fluids.

ADDITIONAL INFORMATION

Airplane Examination

A few days after the accident, an FAA airworthiness inspector examined the recovered airplane. His examination did not reveal any apparent anomalies or pre-impact deficiencies. About one month later, the FAA inspector and the NTSB investigator examined the airplane in detail, in a hangar of the L71 facility that the pilot was planning to visit for his pre-accident sheet metal repair cost estimate.

Some interior and exterior components and panels were removed to enable access to the entire rudder/tailwheel control system. A 'Leatherman' type multi-tool (in its case) was found on the right cockpit floor, forward of the copilot's right rudder pedal. When found, it was not in a position/location that impeded rudder pedal travel, but its original (pre-accident) position/location was not able to be determined. The pilot/owner identified the tool as his. He noted that many cockpit/cabin items were displaced during the accident, and that at least one item had not been located. That item was not recovered by the investigators during their examination.

All control cables were found to be properly routed, and no components (pulleys, bellcranks, etc) displayed any unusual wear, corrosion, damage, or other anomalies that could be associated with previous or potential control interference.

Because the rudder & vertical stabilizer damage precluded full and free travel of the rudder, the deformed sections were cut away just below the upper rudder hinge, in order to free the rudder for normal travel for the examination. The aft fuselage was hoisted to lift the tailwheel off the ground. The bottom end of the rudder and the tailwheel appeared centered/neutral when the rudder pedals were set to the 'neutral' (left and right pedals 'even' with one another) position; this was confirmed for both the pilot's & copilot's pedal sets.

Both sets of cockpit rudder pedals were then exercised to their travel limits, and the system operation, and rudder and tailwheel deflections, were noted. The rudder and tailwheel responded similarly, irrespective of which pedal set (pilot vs copilot) was exercised. The rudder travel was bounded in both directions by the rudder stops, which were properly safetied. No binding, unusual noises, or other anomalies were noted when the pedals were exercised. Cable tensions were measured, and found to be within the proper range.

Rudder deflections (from neutral/0°) in the plane parallel to the airplane longitudinal and lateral axes were measured to be as follows:

- Left: 13°
- Right: 16°

The tailwheel was a Scott fully castering model, capable of swiveling 360° in either direction, with a centering detent. All cables, springs, and other components were properly routed, connected, and safetied. Manual manipulation of the tailwheel indicated that it operated normally.

Refer to the NTSB public docket for this accident for additional examination details.

Cessna Rudder Travel Limit Values

Per the Cessna Maintenance Manual (MM), the proper rudder travel limits, measured in the plane parallel to the airplane "waterline" and lateral axes, were 24° either side of the neutral/0° position. Those same values were published in the FAA Type Certificate Data Sheet (TCDS) for the airplane.

Previous Airplane Condition and Maintenance

The pilot arrived at the examination hangar towards the end of the examination. After the examination was completed, as the investigators were preparing to depart, the pilot mentioned that the reason that he had flown the airplane to L71 was to get a cost estimate to have his rudder "re-skinned." He explained that the re-skinning was intended to correct an improper top-to-bottom curvature (bowing) of the rudder, which was apparently the result of a previous accident.

The pilot did not know whether the rudder was deformed during that accident, or as a result of improper repair. He discovered the bowing problem shortly before the subject accident, when he attempted to have the airplane re-rigged, because it flew "left wing-heavy." At that time, he was advised by his mechanic that any effort to re-rig the airplane without first repairing/straightening the rudder would be unsuccessful and futile.

The pilot reported, and provided substantiating photographic evidence, that the curvature was such that when the top of the rudder was aligned with the fin, the bottom was deflected about 1.5 inches to the airplane right. Thus, with the bottom of the rudder centered (and the rudder pedals aligned with one another), the rudder curvature would result in the trailing edge of the upper portion of the rudder to be deflected to the airplane left. Because the rudder had been damaged in the subject accident, the curvature profile could not be measured and quantified.

Review of the NTSB database indicated that the airplane struck a horse during landing in 1974.

The airplane maintenance records contained entries or documentation for six separate maintenance activities/events regarding the rudder or rudder control or tailwheel steering systems, as follows:

- October 1973 Rudder and vertical stabilizer "replaced due to hangar damage"
- September 1979 Replaced right rudder cable
- May 1992 Airplane stripped and repainted; control surfaces removed and reinstalled
- September 1994 "Rudder reskinned"
- August 1999 Tailwheel "spring mount bracket" replaced, and new (accident) tailwheel installed
- April 2014 Annual inspection; "Check & adjust cable tensions"

Annual Inspection Guidance and Requirements

Aircraft operated in the United States under FAR Part 91 rules are required to be inspected on an annual basis; that inspection is formally designated the "Annual Inspection." The FAA delineates guidance regarding the scope and detail of such inspections; the guidance specifies that the person conducting the inspection must use a checklist while performing the inspection. The guidance states that the checklist "may be of the inspector's own design, one provided by the manufacturer of the equipment being inspected or one obtained from another source," and elaborates that the checklist must include the scope and detail of the items contained Appendix D of FAR Part 43.

The manufacturer's published inspection guidance for the accident airplane make and model contained a comprehensive enumeration of items to be checked. Under the subheading "Rudder control system" the final line item was "Rudder system for correct rigging and proper travel."

The Annual Inspection affirms that the aircraft meets all applicable airworthiness requirements, which in part signifies that the airplane is in compliance with its type design, much of which is specifically cited in the TCDS. The TCDS for the accident make and model airplane specified the rudder travel ranges. Therefore, satisfactory completion of an Annual Inspection requires that the flight control surface travel ranges are in accordance with the type design and TCDS-specified ranges.

May 2016 Annual Inspection Information

The airframe maintenance record entry stated that the inspection was completed "per 43 Appendix D," and was followed by "checked cables and tension Inspected Pulleys; Rod Ends, Bellcranks; P/P tubes, Bearings, Hinges checked Flight control travels." NTSB communications with the mechanic who conducted the annual inspection revealed that he was the one who advised the pilot about the rudder bow. The mechanic reported that contrary to the pilot's statements, he (the mechanic) did not conduct any re-rigging or travel adjustments of any flight controls, including the rudder.

In a subsequent conversation between the FAA inspector and the mechanic, the mechanic reported that:

- He used the Cessna "100-180 Series" checklist as his guidance for the subject annual inspection
- He did not retain a copy of the checklist and findings from that inspection, but agreed to send the inspector an exemplar copy
- He checked the travel/deflection of the rudder with a protractor, while manually manipulating the rudder (by hand, not via the rudder pedals) to its respective left and right stops
- He also checked the cable tensions and "rigging"
- He determined that "no adjustments were necessary"

Attempted Follow-up Activity

As a result of the discrepancies between the inspection mechanic's rudder travel findings and those of the FAA/NTSB subsequent to the accident, the NTSB attempted to arrange for a third-party mechanic to conduct yet another measurement of the rudder travel. Although the third-party mechanic agreed to conduct the re-measurement, he instead purchased and disassembled the wreckage without conducting the agreed-upon re-measurements. Therefore, the discrepancy between the two existing sets of measurements could not be reconciled.

Desert Wind Characteristics

L71 was situated in the Mojave Desert. According to multiple articles, including *Journal of Climate* (Influence of Albedo Variability in Complex Terrain on Mesoscale Systems) and *Journal of Applied Meteorology* (General Characteristics of Dust Devils), low level desert atmospheric conditions have several unique characteristics.

During all times of the year, daily solar insolation can be intense, with the spring and summer months the most likely times of year for greatest solar insolation. Solar insolation results in significant ground heating, especially in desert terrain, which in turn results in low-level atmospheric heating and thermally-induced, localized, small-scale turbulence. Excluding mesoscale or frontal activity, the typical daily cycle begins with calm, stable air at sunrise. The air remains relatively calm for a few hours, until the surface temperature rises, and heating rates reach the point where the air below approximately 150 feet becomes

destabilized. With the air below 150 feet destabilized, strong, localized, short-duration, thermally induced wind disturbances are generated. These thermally induced wind disturbances manifest themselves as disorganized, random gusts, and as better organized, but still unpredictable and sometimes undetectable 'dust devils'. Powered by insolation, their occurrence, strength, location, and direction are influenced by multiple factors, including local surface topography, albedo, and structures, as well as small- and larger-scale air disturbances, all of which result in significant unpredictability. Durations of the thermally induced wind disturbances typically range between less than 1 minute to about 3 minutes. These thermally-induced wind disturbances increase in frequency as the day progresses, tending to peak an hour or two after local noon, and then diminish as the sun elevation decreases in the afternoon.

The repair facility owner, who had significant experience flying at L71 and MHV, stated that the winds could be very transient and unpredictable, particularly from late morning to early afternoon, during the hotter months. He also noted that in his experience, although L71 and MHV were only 9 miles apart, the concurrent wind conditions, speeds, and directions at the two airports could differ significantly from one another.

The pilot stated that the initial swerve to the left did not seem to him to be wind-induced, but that he could not completely discount wind as the cause for the initial swerve.

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Accident Rpt# CEN17CA114 02/24/2017 1815 CST Regis# N255BC Waukesha, WI Apt: Waukesha County Airport UES
Acft Mk/Mdl CESSNA 340A-A Acft SN 340A0908 Acft Dmg: SUBSTANTIAL Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl CONT MOTOR TSIO-520 NB Acft TT 5644 Fatal 0 Ser Inj 0 Flt Conducted Under: FAR 091
Opr Name: SIGNICAST LLC Opr dba: Aircraft Fire: NONE
AW Cert: STN

Summary

Before the positioning flight, the airline transport pilot monitored the weather and noticed the weather conditions were deteriorating near the time of the planned departure. The weather conditions included low visibility, freezing drizzle, and mist. In an effort to reduce the time in the deteriorating weather conditions, the pilot performed some before takeoff checks while the airplane was in the hangar. During the pilot's "haste" to preflight and take off, she inadvertently selected the wrong switch for windshield heat. While on the instrument approach to the runway in night conditions, the pilot had no forward visibility due to ice accumulation on the windshield. The pilot executed a missed approach and contacted an instructor pilot at the departure airport to confirm the location of the windshield heat switch. The pilot then activated the windshield heat switch and enough ice had melted for the pilot to conduct another approach. During the approach, the pilot increased the airspeed due to "carrying a lot of ice." On short final approach, the airplane descended below the glidepath due to the ice accumulation. Subsequently, the airplane contacted the terrain short of the runway and then "skipped" onto the runway. The airplane came to rest upright and off the runway surface. Examination of the airplane revealed substantial damage to the left wing. The pilot reported that there were no preaccident mechanical failures or malfunctions with the airframe or engine that would have precluded normal operation.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The pilot's decision to fly in conditions conducive to structural icing and her subsequent failure to maintain airplane control during the instrument approach.

Events

1. Approach-IFR final approach - Loss of control in flight
2. Approach-IFR final approach - Collision with terr/obj (non-CFIT)

Findings - Cause/Factor

1. Environmental issues-Conditions/weather/phenomena-Ceiling/visibility/precip-Freezing rain/sleet-Effect on equipment - C
2. Personnel issues-Task performance-Use of equip/info-Aircraft control-Pilot - C
3. Environmental issues-Conditions/weather/phenomena-Temp/humidity/pressure-Conducive to structural icing-Effect on equipment - C
4. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-(general)-Not attained/maintained - C
5. Personnel issues-Action/decision-Info processing/decision-Decision making/judgment-Pilot - C
6. Personnel issues-Task performance-Use of equip/info-Use of equip/system-Pilot

Narrative

Prior to the positioning flight, the pilot monitored the weather and noticed the weather conditions were deteriorating near the time of the planned departure. The weather conditions included low visibility, freezing drizzle, and mist. In an effort to reduce the time in the deteriorating weather conditions, the pilot performed some before takeoff checks while the airplane was in the hangar. During the pilot's "haste" to preflight and takeoff, she inadvertently selected the wrong switch for windshield heat. While on the instrument approach to the runway in night conditions, the pilot had no forward visibility due to ice accumulation on the windshield. The pilot executed a missed approach and contacted an instructor pilot at the departure airport to confirm the location of the windshield heat switch. The pilot then activated the windshield heat switch and enough ice had melted for the pilot to conduct another approach. During the approach, the pilot increased the airspeed due to "carrying a lot of ice." On short final approach, the airplane descended below the glide path due to the ice accumulation. Subsequently, the airplane contacted the terrain short of the runway, and "skipped" onto the runway. The airplane came to rest upright and off the runway surface. Examination of the airplane revealed substantial damage to the left wing. The pilot reported that there were no preaccident mechanical failures or malfunctions with the airframe or engine that would have precluded normal operation.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# CEN15FA190	04/07/2015 6 CDT	Regis# N789UP	Bloomington, IL	Apt: Central Illinois Regional BMI
Acft Mk/Mdl CESSNA 414A		Acft SN 414A0495	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl CONTINENTAL MOTORS TSIO-520-NB		Acft TT 8390	Fatal 7 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: MAKE IT HAPPEN AVIATION, LLC		Opr dba:		Aircraft Fire: GRD
				AW Cert: STN

Events

1. Approach-IFR missed approach - Loss of control in flight
2. Approach-IFR missed approach - Loss of control in flight

Narrative

HISTORY OF FLIGHT

The is an INTERIM FACTUAL SUMMARY of this accident investigation. A final report that includes all pertinent facts, conditions, and circumstances of the accident will be issued upon completion, along with the Safety Board's analysis and probable cause of the accident.

On April 7, 2015, about 0006 central daylight time (all referenced times will reflect central daylight time), a Cessna model 414A twin-engine airplane, N789UP, was substantially damaged when it collided with terrain following a loss of control during an instrument approach to Central Illinois Regional Airport (BMI), Bloomington, Illinois. The airline transport pilot and six passengers were fatally injured. The airplane was owned by and registered to Make It Happen Aviation, LLC, and was operated by the pilot under the provisions of 14 Code of Federal Regulations Part 91 while on an instrument flight rules (IFR) flight plan. Night instrument meteorological conditions prevailed for the cross-country flight that departed Indianapolis International Airport (IND), Indianapolis, Indiana, at 2307 central daylight time.

According to Federal Aviation Administration (FAA) Air Traffic Control (ATC) data, after departure the flight proceeded direct to BMI and climbed to a final cruise altitude of 8,000 feet mean sea level (msl). At 2344:38 (hhmm:ss), about 42 nautical miles (nm) south-southeast of BMI, the flight entered a cruise descent to 4,000 feet msl. At 2352:06, the pilot established contact with Peoria Terminal Radar Approach Control, reported being level at 4,000 feet mean sea level (msl), and requested the Instrument Landing System (ILS) Runway 20 instrument approach to BMI. According to radar data, the flight was located about 21 nm south-southeast of BMI and was established on a direct course to BMI at 4,000 feet msl. The controller told the pilot to expect radar vectors for the ILS Runway 20 approach. At 2354:18, the controller told the pilot to make a right turn to a 330 degree heading. The pilot acknowledged the heading change. At 2359:16, the controller cleared the flight to descend to maintain 2,500 feet msl. At 2359:20, the pilot acknowledged the descent clearance.

At 0000:01, the controller told the pilot to turn left to a 290 heading and the pilot acknowledged the heading change. At 0000:39, the controller told the pilot that the flight was 5 nm from EGROW intersection, cleared the flight for the ILS Runway 20 instrument approach, issued a heading change to 230 degrees to intercept the final approach course, and told the pilot to maintain 2,500 feet until established on the inbound course. The pilot correctly read-back the instrument approach clearance, the heading to intercept the localizer, and the altitude restriction.

At 0001:26, the flight crossed through the final approach course while on the assigned 230 degree heading before turning to a southerly heading. The plotted radar data showed the flight made course corrections on both sides of the localizer centerline as it proceeded inbound toward EGROW. At 0001:47, the controller told the pilot to cancel his IFR flight plan on the approach control radio frequency, that radar services were terminated, and authorized a change to the airport's common traffic advisory frequency (CTAF). According to radar data, the flight was 3.4 nm outside of EGROW, established inbound on the localizer, at 2,400 feet msl. At 0002:00, the pilot transmitted over the unmonitored airport CTAF, "twin Cessna seven eight nine uniform pop is coming up on EGROW, ILS Runway 20, full stop." No additional transmissions from the pilot were recorded on the airport CTAF or by Peoria Approach Control.

At 0003:12, the flight crossed the locator outer marker (EGROW) at 2,100 feet msl and continued to descend while right of the localizer centerline. At 0003:46, the airplane descended below available radar coverage at 1,500 feet msl. The flight was about 3.5 nm from the end of the runway when it descended below radar coverage. Subsequently, at 0004:34, radar coverage was reestablished with the flight about 1.7 nm north of the runway threshold at 1,400 feet msl. The plotted radar data showed that, between 0004:34 and 0005:08, the flight climbed from 1,400 feet msl to 2,000 feet msl while maintaining a southerly course. At 0005:08, the flight began a descending left turn to an easterly course. The airplane continued to descend on the easterly course until reaching 1,500 feet msl at 0005:27. The airplane then began a climb while maintaining an easterly course. At 0005:42, the airplane had flown 0.75 nm east of the localizer centerline and had climbed to 2,000 feet msl. At 0005:47, the flight descended below available radar coverage at 1,800 feet msl. Subsequently, at 0006:11, radar coverage was reestablished at 1,600 feet msl about 0.7 nm southeast of the previous radar return. The next two radar returns, recorded at 0006:16 and 0006:20, were at

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1,900 feet msl and were consistent with the airplane on an easterly course. The final radar return was recorded at 0006:25 at 1,600 feet msl about 2 nm east-northeast of the runway 20 threshold, and was approximately coincident with the accident site location.

There were numerous individuals who reported being awoken shortly after midnight by the sound of a low-flying airplane over their respective residences. Additionally, several of these witnesses observed dense fog and/or rain after the airplane had overflown their position.

PERSONNEL INFORMATION

According to Federal Aviation Administration (FAA) records, the 51-year-old pilot held an airline transport pilot certificate with single engine land, multiengine land, and instrument airplane ratings. The single engine land rating was limited to commercial privileges. The pilot was type-rated for the Cessna Citation, Learjet 35, Rockwell Sabreliner, Dassault Falcon 10, and Embraer Phenom business jets. He also held a flight instructor certificate with single engine, multiengine, and instrument airplane ratings. The pilot's last aviation medical examination was on February 2, 2015, when he was issued a second-class medical certificate with a limitation for corrective lenses. On the application for his current medical certificate, the pilot reported having accumulated 12,000 hours of total flight experience, of which 500 hours were flown within the previous 6 months. A search of FAA records showed no previous accidents, incidents, or enforcement proceedings.

A current pilot logbook was not located during the investigation; the pilot's most recent logbook entry was dated February 15, 2005. A portfolio was found in the airplane wreckage that contained numerous pilot training certificates, fleet management documents, and airplane insurance applications. According to an insurance application that was submitted for the operation of the accident airplane, dated May 12, 2014, the pilot reported having a total flight experience of 12,100 hours, 9,850 hours in multiengine airplanes, 8,575 hours in turbine-powered airplanes, and 1,150 hours in Cessna 414A airplanes. The portfolio also contained documentation for simulator-based proficiency training in the Cessna 414A that was completed on August 14, 2013, at Recurrent Training Center, Inc., located in Savoy, Illinois. According to available information, the pilot's last flight review and instrument proficiency check was completed on March 11, 2015, in conjunction with simulator-based recurrent training for a Dassault Falcon 10 business jet at FlightSafety International, located in Dallas, Texas.

AIRCRAFT INFORMATION

The accident airplane was a 1980 Cessna model 414A (Chancellor), serial number 414A0495. Two turbo-charged Continental model TSIO-520-NB reciprocating engines provided thrust through constant-speed, full-feathering, three blade, Hartzell model PHC-C3YF-2UF/FC7663DB-2Q propellers. The low-wing airplane was of conventional aluminum construction, equipped with a retractable tricycle landing gear, and a pressurized cabin that was configured to seat seven individuals. The airplane was equipped for night operations in instrument meteorological conditions. The airplane had been modified by supplemental type certificates (STC) to include winglets, vortex generators, and wing spoilers. Additionally, the maximum continuous horsepower of each engine had been increased to 325-horsepower after a STC modification. The airplane had a total fuel capacity of 213.4 gallons (206 gallons usable) distributed between two wing fuel tanks. A review of prior flights, fueling records, and fuel consumption calculations established that the airplane departed on the accident flight with about 133.4 gallons of usable fuel.

According to the current weight-and-balance record, dated November 27, 2013, the airplane had an empty weight of 5,226.6 lbs and a useful load of 1,860.4 lbs. The empty weight center-of-gravity (CG) was 156.52 inches aft of the datum. At maximum takeoff weight, 7,087 lbs, the forward and aft CG limits were 152.2 inches and 159.04 inches, respectively. At maximum landing weight, 6,750 lbs, the forward and aft CG limits were 151.2 inches and 160.04 inches, respectively.

The airplane was originally issued an export certificate of airworthiness on May 22, 1980. The airplane was issued a Canadian registration number, C-GFJT, and was based in Canada until September 1986 when it was imported back into the United States of America and issued a standard airworthiness certificate and a new registration number (N144PC) on October 1, 1986. On April 12, 1993, the registration number was changed to N789UP.

According to an airplane utilization log found in the wreckage, the airplane's hour meter indicated 2,109.7 hours before the previous flight leg (BMI to IND). The airplane's hour meter was not located during the accident investigation; however, postaccident calculations indicated that the airplane had accumulated about 1.9 hours during the final two flights (BMI to IND and IND to BMI).

According to available maintenance documentation, the airframe had accumulated a total service time of 8,390.2 hours since new. The last annual inspection of the airplane was completed on October 1, 2014, at 8,346.9 total airframe hours. The airplane had accumulated 43.3 hours since the annual inspection. The

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static system, altimeter system, automatic pressure altitude reporting system, and transponder were last tested on December 2, 2013. A postaccident review of the maintenance records found no history of unresolved airworthiness issues.

The left engine, serial number 503140, had accumulated a total service time of 4,881.5 hours since new and 556.7 hours since being overhauled on March 20, 2008. The left propeller, serial number EB1994, had accumulated a total service time of 6,936.4 hours since new and 165.3 hours since being overhauled on November 23, 2010.

The right engine, serial number 519303, had accumulated a total service time of 5,591 hours since new and 1,699.9 hours since being overhauled on June 13, 2000. The right propeller, serial number EB1993, had accumulated a total service time of 6,936.4 hours since new and 691.3 hours since being overhauled on February 10, 2006.

METEOROLOGICAL INFORMATION

A National Weather Service (NWS) Surface Analysis Chart, issued at 0100 central daylight time (CDT) depicted a stationary front extending across central Iowa, northern Illinois and Indiana, and immediately north of Bloomington, Illinois. A second stationary front was depicted extending over Kansas, into Missouri, and turning southeastward into Tennessee and Alabama. The station models on the chart indicated northeasterly winds at 10 to 15 knots north of the stationary front located across Illinois, and from the east-southeast at 5 knots or less south of the frontal boundary. The station models also depicted an extensive area of overcast clouds over the region, and with most stations along and south of the front reporting light continuous rain, drizzle, and/or mist. The station model for Bloomington indicated wind from the east-southeast at about 5 knots, surface visibility restricted in mist, overcast cloud cover, temperature and dew point at 13 degrees Celsius, and a sea level pressure of 29.98 inches of mercury. The station models surrounding Bloomington indicated similar conditions with overcast clouds, light continuous rain and/or mist.

A review of weather radar data recorded at 0004 CDT revealed no significant radar echoes greater than 15 dBZ over the greater Bloomington-Normal area. The observed radar echoes were consistent with light rain. The observed radar echoes along the recorded flight track were consistent with the accident airplane operating in instrument meteorological conditions (IMC) during the approach and at the time of the accident.

At 2156 CDT, about an hour before the accident flight departed, the BMI automated surface observing system (ASOS) reported: wind 150 degrees at 4 knots, an overcast ceiling at 1,200 feet above ground level (agl), 10 mile surface visibility, temperature 14 degrees Celsius, dew point 12 degrees Celsius, and an altimeter setting of 29.98 inches of mercury.

At 2303 CDT, about four minutes before the accident flight departed, the BMI ASOS reported: wind 140 degrees at 6 knots, scattered clouds at 100 feet agl and an overcast ceiling at 800 feet agl, 2 mile surface visibility with light rain and mist, temperature 13 degrees Celsius, dew point 13 degrees Celsius, and an altimeter setting of 29.99 inches of mercury.

At 0005 CDT, about a minute before the accident, the BMI ASOS reported: wind 060 degrees at 6 knots, an overcast ceiling at 200 feet above ground level (agl), 1/2 mile surface visibility with light rain and fog, the runway visibility range (RVR) for runway 29 was variable 4,000-6,000 feet, temperature 13 degrees Celsius, dew point 13 degrees Celsius, and an altimeter setting of 29.98 inches of mercury.

The terminal aerodrome forecast (TAF) issued at 1826 CDT for BMI expected marginal visual flight rules (MVFR) conditions to prevail during the forecast period with a surface visibility greater than 6 miles, an overcast ceiling at 2,500 feet agl, and with rain showers in the vicinity after 0100 CDT. The terminal forecast was amended at 2048 CDT, lowering the overcast ceiling to 1,200 feet agl. At 0038 CDT, an updated terminal forecast indicated that low instrument meteorological (LIFR) conditions were expected, including an overcast ceiling at 200 feet agl, and a 1/2 mile surface visibility with light drizzle and fog.

According to available information, the pilot utilized a commercial weather vendor (FlightPlan.com) to obtain his preflight weather briefing. The vendor logged weather briefings at 1614, 1957, 2117, and 2228 CDT. The briefings included weather reports, forecast, and notice to airmen for the departure, destination, alternate, and selected nearby airports and pilot reports. The final weather briefing, obtained at 2228 CDT, included the TAF for Bloomington that had been issued at 2048 CDT, which forecasted MVFR conditions. The 2228 CDT briefing also provided weather conditions for nearby airports that were reporting LIFR conditions with overcast ceilings ranging between 200 and 300 feet agl. The 2228 CDT briefing did not include the Area Forecast or any in-flight weather advisories. The pilot filed an IFR flight plan from IND to BMI and designated Lambert-St Louis International Airport (STL) as his alternate airport.

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AIDS TO NAVIGATION

The published inbound course for ILS runway 20 approach was 198 degrees magnetic, the crossing altitude for the final approach fix (EGROW) was 2,459 feet msl, and the distance between EGROW and the runway threshold was 4.8 nautical miles. The touchdown zone elevation was 871 feet msl. The published decision altitude was 1,071 feet msl (200 feet agl) and required 1,800 feet runway visibility range (RVR). The published missed approach procedure was to climb on runway heading to 1,500 feet msl, then make a right turn to a 270 degree magnetic heading and climb to 3,000 feet msl, then join the 214 degree radial from the Pontiac VOR and hold at MCLEN intersection.

In the event of a loss of vertical guidance from the glideslope during an approach, or if a pilot was cleared for the non-precision localizer approach, the missed approach point (MAP) was located 4.8 nm from the final approach fix (EGROW) while established on the localizer. The non-precision localizer approach minimum descent altitude (MDA) was 1,260 feet msl (389 feet agl) and required 2,400 feet RVR. The MDA for a circling approach was 1,340 feet msl (468 feet agl) and required 1 mile surface visibility.

According to air traffic control documentation, at the time of the accident, all components of the ILS were functional, with no recorded errors, and the localizer was radiating a front-course to runway 20. Additionally, a postaccident flight check further confirmed that there were no anomalies with the instrument approach.

AIRPORT INFORMATION

Central Illinois Regional Airport (BMI), a public airport located about 3 miles east of Bloomington, Illinois, was owned and operated by the Bloomington-Normal Airport Authority. The airport field elevation was 871 feet msl. The airport had two runways: runway 2/20 (8,000 feet by 150 feet, concrete) and runway 11/29 (6,525 feet by 150 feet, asphalt/concrete). Although airport was equipped with an air traffic control tower, the control tower was closed at the time of the accident.

Runway 20 incorporated a dual-mode Approach Lighting System II (ALSF-2) and Simplified Short Approach Lighting System with Runway Alignment Indicator Lights (SSALR). The SSALR system was active when the control tower was closed. The runway was also equipped with runway touchdown zone and centerline lighting, and high intensity runway edge lighting.

FLIGHT RECORDERS

The accident airplane was not equipped, nor was it required to be equipped, with a cockpit voice recorder or flight data recorder.

WRECKAGE AND IMPACT INFORMATION

The accident site was located in an open harvested corn field, about 2.2 miles east-northeast of the runway 20 threshold and about 1.75 miles east of the localizer centerline. The GPS altitude of the accident site was 854 feet. The main wreckage consisted of the entire airplane, which was orientated on a 074-degree magnetic heading. The wreckage was in an upright position and there was no appreciable wreckage debris path. All observed airframe structural separations were consistent with impact-related damage. The forward fuselage and cockpit were crushed upward and displaced aft. Flight control cable continuity was traced from the cockpit to the individual flight control surfaces. All observed flight control cable separations were consistent with overstress or were cut to facilitate recovery of the wreckage. There was no evidence of fire damage inside the cockpit, main cabin, aft fuselage, or empennage. Both wings remained attached to the fuselage and exhibited postimpact fire damage of their respective engine nacelle/locker. Both ailerons were found partially separated from their respective hinge attachments. The aileron trim actuator extension measured 11/16 inch, which corresponded to the trailing-edge of the aileron trim tab being deflected up about 15-degrees. The aileron trim indicator was damaged during impact. The right wing leading edge outboard of the engine nacelle was crushed upward and displaced aft. The right wing deice boot and winglet were damaged by the postimpact fire. The left wing aft structural attachment exhibited features consistent with an overstress separation. The left winglet had separated and was found laying adjacent to the wing. The left wing leading edge outboard of the engine nacelle was crushed upward and displaced aft. The tail section was found separated immediately aft of the aft pressure bulkhead and remained attached through control cables. Both elevators remained attached to their respective horizontal stabilizer. The elevator trim actuator extension measured 1-11/16 inch, which corresponded to the trailing-edge of the elevator trim tab being deflected up about 5-degrees. The elevator trim indicator was damaged during impact. The rudder remained attached to the vertical stabilizer. The rudder trim actuator extension measured 2-1/4 inch, which was consistent with a neutral rudder trim position. The rudder trim indicator was damaged during impact. The nose and main landing gear were found fully retracted and the

cockpit selector handle was found in the GEAR UP position. A measurement of the wing flap control chain corresponded with a fully-retracted flap position. The flap selector handle and indicator were damaged during impact. An operational test of the wing spoiler actuators did not reveal any anomalies. The cockpit instrument panel sustained considerable damage during impact. The throttle quadrant was buckled and displaced to the right. Both throttles levers were found in the idle position and bent to the right. Both propeller levers were found full forward and bent to the right. Both mixture levers were found in an intermediate position and bent to the right. The cockpit altimeters had a Kollsman window setting between 29.98 and 29.99 inches of mercury. The stall warning horn and landing gear warning horn were extracted from the cockpit and both horns produced an aural tone when electrical power was applied. Switch continuity for the wing-mounted lift sensor was confirmed. Both engine-mounted vacuum pumps exhibited impact and thermal damage. Disassembly of both vacuum pumps did not reveal any anomalies attributable to a preimpact malfunction.

Both integral wing fuel tanks were breached at their respective wingtips. Fuel was observed to drain from the left wing during wreckage recovery. Both fuel tank caps were found in the secured position. The airplane was equipped with cable-operated fuel selector valves, one for each engine, that were installed inboard of each engine nacelle. Both fuel selector valves were found in the OFF position; however, a reliable determination of the preimpact position was not possible due to impact-related damage to the selector handles. The structure supporting the selector handles, located between the cockpit seats, had been displaced forward into a vertical position during impact. Both auxiliary fuel pumps exhibited thermal damage from the postimpact fire that precluded further testing.

Both engines remained partially attached to their respective nacelles and exhibited impact and postimpact fire damage. The observed thermal damage was concentrated between the airframe firewalls and the rear accessory section of each engine. Both propellers had separated from their respective engine and were found in front of each engine, buried at a depth of about 18 inches. Both propellers retained their respective propeller flange and a fractured portion of their respective engine crankshaft. Both crankshafts displayed a bend in one direction with circumferential cracks observed on the tension side of the bend, a 45-degree shear lip fracture on the tension side, and an irregular/jagged fracture on the compression side. Mechanical continuity from the engine components to their respective cockpit controls could not be determined due to impact and fire damage. Internal engine and valve train continuity was confirmed when each engine was rotated through the accessory section. Compression and suction were noted on all cylinders in conjunction with crankshaft rotation. Teardown examinations of both engines and their respective turbochargers did not reveal any anomalies attributable to a preimpact malfunction. Additional documentation for each engine and turbocharger examination is included with the docket materials associated with the investigation.

Each propeller had one blade that was bent aft, one blade that appeared straight, and one blade that exhibited forward bending near the tip. Both propellers had their spinner domes formed around the propeller hub and counterweights. The spinner domes also exhibited a spiral/twisting deformation pattern. The observed blade and spinner dome damage was consistent with both propellers rotating at impact. Neither propeller was found in a feathered position. Both propellers were found on their respective start locks. According to the propeller manufacturer, for the propellers to be found on the start locks, the propeller blade angle at impact was either at or below the start lock angle when engine speed decreased below 700-900 RPM, or the blade forces during impact had moved the blade angle into a start lock position after engine speed decreased below 700-900 RPM. A teardown examination of each propeller did not reveal any anomalies that would have precluded normal operation. Additional documentation for each propeller examination is included with the docket materials associated with the investigation.

MEDICAL AND PATHOLOGICAL INFORMATION

On April 7, 2015, the McLean County Coroner Office, located in Bloomington, Illinois, performed an autopsy on the pilot. The cause of death was attributed to multiple blunt-force injuries sustained during the accident. The autopsy also identified an enlarged heart with wall thickening and dilation of the chambers, 60-75 percent stenosis of the proximal left anterior descending artery, extensive interstitial myocardial fibrosis within the left ventricle, and severe atherosclerosis of the basal septum nodal artery. The FAA's Civil Aerospace Medical Institute located in Oklahoma City, Oklahoma, performed toxicology tests on samples obtained during the autopsy. The testing identified 0.010 gm/dl of ethanol in cavity blood; however, no ethanol was detected in liver or brain samples. Ethanol can be produced by microbial activity after death. Additional toxicology testing did not identify any drugs and medications in cavity blood.

The pilot's wife reported that the pilot had not experienced any major life events or stressors in the days or weeks preceding the accident. She stated that the pilot would typically sleep about 8 hours each night and that he never mentioned having any sleep-related issues. Additionally, she could not recall him being fatigued in the days preceding the accident. She reported that he had no serious health related issues and that he regularly exercised by running. She indicated that the pilot had recently seen a chiropractor for back pain and that he would take Aleve for pain management.

An acquaintance of the pilot reported that he and the pilot had a lengthy conversation during the hours before the accident flight as they waited for their respective passengers to return to the fixed based operator. According to the acquaintance, the pilot appeared very relaxed throughout their conversation and

did not appear to be fatigued or ill.

TESTS AND RESEARCH

Glideslope Validity

A laboratory examination of the Garmin GNS 530W NAV/COM/GPS receiver, serial number 78410737, established that the active communication (COM) frequency was set to the BMI control tower frequency (124.6 MHz), which also served as the airport's common traffic advisory frequency (CTAF) when the control tower was closed. The standby COM frequency was set to Peoria Approach Control (128.725 MHz). The active navigation (NAV) frequency was for the BMI ILS Runway 20 instrument approach (111.9 MHz). The standby NAV frequency was set to the BMI VOR/DME frequency (108.2 MHz). The course deviation indicator (CDI) mode was selected to VOR/Localizer (VLOC). The Garmin GNS 530W did not record any historical flight parameter or navigational data.

A laboratory examination of the Garmin GNS 430W NAV/COM/GPS receiver, serial number 971103703, established that the active COM frequency was set to the BMI control tower frequency (124.6 MHz). The standby COM frequency was set to the BMI automatic terminal information service (ATIS) frequency (135.35 MHz). The active NAV frequency was for the BMI ILS Runway 20 approach (111.9 MHz). The standby NAV frequency was set to the BMI VOR/DME frequency (108.2 MHz). The CDI mode was selected to VLOC. The Garmin GNS 430W did not record any historical flight parameter or navigational data.

The airplane was equipped with a Sandel Avionics SN3500 electronic horizontal situation indicator (EHSI), serial number 1058. The device performed the basic functions of a traditional horizontal situation indicator (HSI) and radio magnetic indicator (RMI). Additionally, depending on installation, the device can provide RMI navigation to GPS waypoints, weather information, and traffic information. The device was configured to receive navigational data from the Garmin 530W and Garmin 430W as NAV Channel 1 and 2, respectively. The device recorded the incoming navigation data once per second to a 24-megabyte circular buffer. The intended purpose of the recorded data was for diagnostic purposes by the manufacturer. The device was sent to the manufacturer to be downloaded and decoded. The recovered dataset included, but was not limited to, the following historic flight parameters: latitude, longitude, ground speed, magnetic heading, ground track, VOR/ILS mode status, localizer and glideslope validity, and localizer and glideslope deviation. The device did not record an altitude data parameter.

A review of the data recorded by the Sandel Avionics SN3500 during the previous flight leg (BMI to IND) established that despite being in ILS mode during the approach phase and having achieved a valid localizer state on both NAV channels, the device did not achieve a valid glideslope state until about 0.6 nm from the approach end of runway 23L at IND. A postaccident review of available weather documentation established that the airplane had landed at IND in day visual meteorological conditions, which consisted of a 10 sm surface visibility and an overcast cloud ceiling at 2,400 feet agl (about 3,200 feet msl).

A review of the recovered data for the accident flight revealed that the Sandel Avionics SN3500 was in the ILS mode during the instrument approach phase and that it had achieved a valid localizer state on both NAV channels; however, the device never achieved a valid glideslope state on either NAV channel during the accident flight.

With the assistance of the manufacturer, the recorded data for the accident flight was replayed back through the Sandel Avionics SN3500 to document the navigational information that was displayed by the device. The replay confirmed that the glideslope did not achieve a valid state on either NAV channel during the accident flight. The device displayed a large "X" through the glideslope scale and did not display a glideslope deviation pointer. According to the Sandel Avionics SN3500 pilot's guide, an "X" through the glideslope scale and the absence of a glideslope pointer indicated a lack of a valid glideslope. According to the manufacturer, the glideslope deviation and validity state are independently determined by the NAV/COM/GPS devices (Garmin 530W and Garmin 430W) before being transmitted, along with other navigational data, to the SN3500 device as NAV Channel 1 and NAV Channel 2 data via a standard avionics data transfer protocol (ARINC 429).

According to the FAA Instrument Flying Handbook, a glideslope signal consists of two intersecting radio signals that are modulated at 90 Hz and 150 Hz. According to Garmin, the operating conditions that would result in an invalid glideslope state include any of the following conditions:

- (a) In the absence of a glideslope radio frequency signal.
- (b) In the absence of 150 Hz modulation.
- (c) In the absence of 90 Hz modulation.

(d) In the absence of both 90 Hz and 150 Hz modulation.

(e) When the level of a standard deviation test signal, as generated during ground maintenance/testing, produces 50-percent or less of standard deflection of the deviation indicator.

A follow-up examination of the airplane wreckage located the glideslope antenna on a small portion of radome structure. The radome had fragmented during the impact sequence. One of the solid wire antennas had separated from the antenna body and was not located during the investigation. The other solid wire antenna remained attached to the antenna body and exhibited minor damage. As found, the glideslope antenna was not connected to the coaxial cable that provided signal to the glideslope signal diplexer. Additionally, the coaxial cable was found crimped around a fuselage bulkhead stiffener. The observed crimp was consistent with damage sustained during the accident. The glideslope signal diplexer remained attached to the fuselage bulkhead and its single coaxial input connector and two coaxial output connectors were found intact and properly secured. The remaining coaxial cable paths were continuous to the cockpit where the Garmin 530W and Garmin 430W had been previously removed during the investigation.

The glideslope antenna design incorporated a quarter-turn twist-lock BNC-type connector with the female portion of the connector installed on the glideslope antenna body. The male portion of the connector was attached to the coaxial cable that connected to the glideslope signal diplexer. A laboratory examination of the female portion of the connector revealed that it was intact with some minor deformation and light debris found on the interior and exterior surfaces. The locking pins of the female connector were intact and no corrosion was observed. The male portion of the connector was intact and undamaged except for one of the six shielding/ground fingers. The damaged finger was folded and bent into the connector. The central conductor pin was undamaged and no corrosion was apparent. Although initially found disconnected from the glideslope antenna, the coaxial cable could be reconnected and twist locked with minimal difficulty.

The electrical properties of the glideslope signal diplexer were subsequently evaluated at an avionics repair station. No repairs were made to the crimped portion of the coaxial cable that normally connected the glideslope antenna to the glideslope signal diplexer. A glideslope source signal of 92 decibels (dbm) was transmitted by the test bench through the coaxial cable that was connected to the diplexer. The signal level was measured after it passed through the diplexer at the two output connectors. During the bench test, the diplexer split the original source signal into two signal paths which measured 89.8 dbm and 88.8 dbm for glideslope 1 and 2, respectively. According to the bench technician, the observed differences between the source and output signals was normal and would not have affected glideslope signal transmission to the Garmin 530W and Garmin 430W that were located downstream of the diplexer. The operational bench test revealed no anomalies with the glideslope signal diplexer and, although damaged during impact, the coaxial cable remained capable of transmitting a strong glideslope signal to the diplexer.

Weight and Balance

The airplane weight and balance for the accident flight and the preceding flight (BMI to IND) were calculated using the reported weights and seat position for the pilot and the six passengers, maintenance records that established the airplane basic empty weight and moment, fueling receipts/invoices, and recent flight tracking data.

The average fuel consumption rate was estimated to be 47.36 gallons per hour based on the accumulated flight time between known fuel tank top-offs. Based on this estimated fuel consumption rate and fuel receipts/invoices, the accident airplane departed BMI for IND with about 114.5 gallons of usable fuel. After landing at IND, the airplane was fueled with 60 gallons of fuel, and subsequently departed on the accident flight with 133.4 gallons of usable fuel.

Postaccident weight and balance calculations estimated that the preceding flight (BMI to IND) departed 160 lbs over the maximum takeoff weight (7,087 lbs) and aft of the permitted weight and balance envelope. The same calculations estimated that airplane landed 287 lbs over the maximum landing weight (6,750 lbs) and remained aft of the permitted weight and balance envelope.

The weight and balance calculations estimated that the accident flight departed 271 lbs over the maximum takeoff weight and about 4.37 inches aft of the permitted weight and balance envelope. The calculations estimated that at the time of the accident the airplane was 366 lbs over the maximum landing weight and about 3.71 inches aft of the permitted weight and balance envelope.

ADDITIONAL DATA/INFORMATION

During an ILS approach, the localizer provides lateral guidance for the final approach course and the glideslope provides vertical guidance as the aircraft

descends towards the runway. For a precision approach, such as an ILS approach, the missed approach point (MAP) is where the aircraft reaches the decision altitude while on the glideslope. If a pilot observes an invalid glideslope indication, such as an "X" displayed through the glideslope scale of an electronic horizontal situation indicator (EHSI) or a warning flag on an analog course deviation indicator (CDI), they may continue the instrument approach using the lateral guidance of the localizer; however, without the vertical guidance of a glideslope, a higher minimum descent altitude (MDA) is stipulated for the non-precision localizer instrument approach. Further, the location of the MAP for a non-precision approach will be a DME distance from a navigational aid, or a fixed distance (from the final approach fix to the MAP) with an associated elapsed time that is based on the groundspeed of the aircraft, or a specific intersection/waypoint.

According to the FAA Aircraft Weight and Balance Handbook, if the center of gravity (CG) is maintained within the allowable limits for its weight, an airplane has adequate longitudinal stability and control. However, if the loaded airplane results in a CG that is aft of the allowable limits, the airplane can become unstable and difficult to recover from an aerodynamic stall. Additionally, if the unstable airplane should enter an aerodynamic spin, the spin could become flat making recovery difficult or impossible.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# GAA17CA142	02/19/2017 1530 EST	Regis# N11344	Three Rivers, MI	Apt: Private Airstrip N/A
Acft Mk/Mdl CESSNA T182		Acft SN T18208645	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl LYCOMING TIO-540-AK1A		Acft TT 812	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: TIMOTHY ROUCH		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

Summary

The pilot reported that, after clearing some electrical wires on final approach, he reduced the throttle to idle. He further reported that the airspeed became low, the airplane landed hard and bounced twice, and the nose landing gear collapsed. The airplane nosed over and came to rest inverted.

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

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

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The pilot's failure to maintain sufficient airspeed during the landing flare, which resulted in a hard landing and a nose-over.

Events

1. Landing-flare/touchdown - Abnormal runway contact
2. Landing-landing roll - Landing gear collapse
3. Landing-landing roll - Nose over/nose down

Findings - Cause/Factor

1. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Landing flare-Not attained/maintained - C
2. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Airspeed-Not attained/maintained - C
3. Personnel issues-Task performance-Use of equip/info-Aircraft control-Pilot - C
4. Environmental issues-Physical environment-Runway/land/takeoff/taxi surface-Soft surface-Contributed to outcome

Narrative

The pilot reported that after clearing some electrical wires on final approach, he reduced the throttle to idle. He further reported that the airspeed became low, the airplane landed hard, bounced twice, and the nose landing gear collapsed. The airplane nosed over and came to rest inverted.

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

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

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# GAA17CA131	02/05/2017 1555 MST	Regis# N4853U	Loveland, CO	Apt: Fort Collins-loveland Muni FNL
Acft Mk/Mdl CESSNA T210-N		Acft SN 21064824	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl CONTINENTAL TSIO-520-R		Acft TT 5505	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: FROHBIETER, ALAN R.		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

Summary

The pilot reported that the airplane was low and that he felt "rushed" during final approach. He added that, during the landing roll, the airplane "started to veer off the runway," so he applied power to abort the landing and that, during the aborted landing, he "pulled back" on the yoke. The airplane then aerodynamically stalled and impacted grass left of the runway and then nosed over.

The fuselage, left wing, and vertical stabilizer sustained substantial damage.

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

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The pilot's exceedance of the airplane's critical angle of attack during an attempted go-around, which resulted in an aerodynamic stall.

Events

1. Landing-landing roll - Loss of control on ground
2. Landing-aborted after touchdown - Runway excursion
3. Approach-VFR go-around - Aerodynamic stall/spin
4. Approach-VFR go-around - Loss of control in flight
5. Approach-VFR go-around - Collision with terr/obj (non-CFIT)

Findings - Cause/Factor

1. Personnel issues-Task performance-Use of equip/info-Aircraft control-Pilot - C
2. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Angle of attack-Capability exceeded - C
3. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Directional control-Not attained/maintained

Narrative

The pilot reported that the airplane was low and he felt "rushed" during final approach. He further reported that during the landing roll the airplane "started to veer off the runway," so he applied power to abort the landing. During the aborted landing, the pilot reported that he "pulled back" on the yoke; the airplane aerodynamically stalled and impacted on the grass to the left of the runway and nosed over.

The fuselage, left wing, and vertical stabilizer sustained substantial damage.

The pilot did not report any preaccident mechanical malfunctions or failures with the airplane that would have precluded normal operation.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# GAA16CA486	09/03/2016	1630 AKD	Regis# N4831E	Palmer, AK	Apt: N/a
Acft Mk/Mdl CHAMPION 7GC-NO SERIES			Acft SN 7GC-39	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl LYCOMING O-320-D2B				Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: NARDIN LEO D			Opr dba:		Aircraft Fire: NONE
					AW Cert: STN

Summary

According to the pilot of the single-engine airplane, shortly after takeoff and about 500 ft above ground level, the engine lost power. He reported that he attempted to restart the engine but was unsuccessful. The pilot made a forced landing in a hay field; the airplane landed hard and struck a telephone pole. The pilot reported to the Federal Aviation Administration (FAA) Aviation Safety Inspector (ASI) that he did not preflight the airplane or check the fuel level before departure and that there should have been fuel in the tanks from the last flight in June 2016, 3 months before the accident.

The pilot reported to the National Transportation Safety Board (NTSB) Investigator-In-Charge (IIC) who received the initial notification that "he ran the airplane out of gas." He further reported that there were no mechanical malfunctions or anomalies with the airframe or engine that would have prevented normal operation.

The airplane sustained substantial damage to both wings.

The NTSB IIC attempted to contact the pilot on multiple occasions but was informed by the FAA ASI that the pilot was out of the country for the winter.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The pilot's inadequate preflight inspection and failure to assess the airplane's fuel quantity before departure, which resulted in fuel exhaustion.

Events

1. Takeoff - Fuel exhaustion
2. Emergency descent - Off-field or emergency landing

Findings - Cause/Factor

1. Aircraft-Fluids/misc hardware-Fluids-Fuel-Fluid level - C
2. Aircraft-Fluids/misc hardware-Fluids-Fuel-Not inspected - C
3. Personnel issues-Task performance-Inspection-Preflight inspection-Pilot - C
4. Environmental issues-Physical environment-Object/animal/substance-Pole-Contributed to outcome

Narrative

According to the pilot of the single engine airplane, shortly after takeoff and about 500 feet above ground level the engine lost power. He reported that he attempted to restart the engine but was unsuccessful. The pilot made a forced landing in a hay field; the airplane landed hard and struck a telephone pole.

The pilot reported to the Federal Aviation Administration (FAA) Aviation Safety Inspector (ASI) that he did not preflight the airplane or check the fuel level before departure, and that there should have been fuel in the tanks from the last flight in June 2016, three months prior.

The pilot reported to the NTSB Investigator who received the initial notification that, "he ran the airplane out of gas." He further reported that there were no mechanical malfunctions or anomalies with the airframe or engine that would have prevented normal flight operations.

The airplane sustained substantial damage to both wings.

The National Transportation Safety Board Investigator-in-charge attempted to contact the pilot on multiple occasions, but was informed by the FAA Inspector that the pilot was out of the country for the winter.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# GAA17CA125	01/28/2017 1445 MST	Regis# N16GL	Canon City, CO	Apt: Fremont County 1V6
Acft Mk/Mdl GREAT LAKES 2T1A		Acft SN 0772	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl LYCOMING AEIO-360-B1G6		Acft TT 1124	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: GAIL M. SCHMIDT		Opr dba:		Aircraft Fire: NONE
				AW Cert: STA

Summary

The pilot of the tailwheel-equipped biplane reported that she extended the downwind leg due to other aircraft in the traffic pattern and that, while on the extended final, she put the biplane in a "slip." During the slip, the windssock was out of view. She further reported that, during the landing flare, she noticed that the "ground-speed" was higher than normal and that "about 800 ft" after touchdown, the biplane "violently swerved to the right." She attempted to recover with rudder inputs; however, the biplane veered off the runway and came to rest inverted.

The biplane sustained substantial damage to the empennage.

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

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The pilot's failure to maintain directional control during the landing roll. Contributing to the accident was the pilot's unstabilized approach.

Events

1. Landing - Loss of control on ground
2. Landing - Attempted remediation/recovery
3. Landing - Runway excursion
4. Landing - Nose over/nose down

Findings - Cause/Factor

1. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Directional control-Not attained/maintained - C
2. Personnel issues-Task performance-Use of equip/info-Aircraft control-Pilot - C
3. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Descent/approach/glide path-Not attained/maintained - F

Narrative

The pilot of the tailwheel equipped biplane reported that she extended her downwind due to other aircraft in the traffic pattern, and that while on the extended final she put the biplane in a "slip". During the slip, she reported that the windssock was out of view. She further reported that during the landing flare she noticed her "ground-speed" was higher than normal, and that "about 800 ft." after touchdown, the biplane "violently swerved to the right". She attempted to recover with rudder inputs, however the biplane veered off the runway and came to rest inverted.

The biplane sustained substantial damage to the empennage.

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

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# WPR16LA082	03/11/2016 1725 PST	Regis# N6894Q	Juliaetta, ID	Apt: N/a
Acft Mk/Mdl GRUMMAN G164-A		Acft SN 1730	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl PRATT AND WHITNEY R985-AN13B	Acft TT 5402	Fatal 0	Ser Inj 0	Flt Conducted Under: FAR 137
Opr Name: HEIMGARTNER AVIATION LLC	Opr dba:		Aircraft Fire: NONE	AW Cert: SPR

Events

1. Maneuvering-low-alt flying - Loss of engine power (partial)

Narrative

HISTORY OF FLIGHT

On March 11, 2016, about 1725 Pacific standard time, an Grumman G-164A, N6894Q, experienced a partial loss of power and collided with terrain during an off airport landing in Juliaetta, Idaho. Heimgartner Aviation LLC., was operating the airplane under the provisions of 14 Code of Federal Regulations (CFR) Part 137. The commercial pilot, the sole occupant, was not injured; the airplane sustained substantial damage. The local aerial application flight departed from a private road in Juliaetta about 1720. Visual meteorological conditions prevailed and the pilot did not file a visual flight rules (VFR) flight plan.

The pilot stated that the purpose of the flight was to apply 1,600 pounds of (dry) fertilizer to wheat fields. He had completed around 20 loads earlier in the day which equated to about 4 hours of flight time. The airplane departed with a half-full fuel tank and climbed to about 500 feet above ground level (agl). After configuring the airplane to the appropriate manifold pressure and turning the carburetor heat on, the pilot maneuvered the airplane toward the field he intended to spray. While in level flight, about 300 feet agl, the engine began to violently shudder and make loud backfiring noises. The engine experienced a partial loss of power. The airplane continued to descend, unable to maintain level altitude. The airplane landed hard and nosed over, coming to rest inverted.

AIRPLANE INFORMATION

The airplane, a Grumman G-164A, serial number 1730, was equipped with a Pratt and Whitney R985-AN14B engine, serial number P225620. The operator provided excerpts from the engine logbooks that included the AD lists and the last maintenance performed. The records indicated that the last annual inspection was recorded as being completed in April 2015 at a tachometer time of 5,402 hours; the tachometer time at the time of the accident was 5,435, or about 35 hours after the maintenance.

In May 1978 the Federal Aviation Administration (FAA) issued an Airworthiness Directive (AD) 78-08-07 applicable to Pratt & Whitney R-985 series engines. The AD required periodic visual inspections for cracks in the cylinder heads at specified intervals of time in service. According to the AD, visual inspections of the cylinder heads are required at intervals not to exceed 100 or 150 hours of time in service, depending on whether they have been ultrasonically inspected.

The logbook excerpts contained a document listing AD 78-08-07, which showed that the most recent compliances occurred in April 2007 and April 2015 (during which time about 1,970 flight hours accrued). The entirety of the AD list only showed 78-08-07 as being complied with in May 2001. On that list, the only AD that showed compliance thereafter was in April 2015 for the cylinder hold-down nuts as per AD 56-06-02.

TESTS AND RESEARCH

A post accident examination revealed that cylinder no. 2 was cracked around almost the entire circumference of the barrel in between cooling fins.

The carburetor, part number 391598, was examined at Precision Engines. The bench test revealed no anomalies that would have precluded normal operation. Upon disassembly investigators found no debris in the main metering nozzle, float needle seat, idle metering tube, and accelerator pump; no debris was noted in the metering jets.

ADDITIONAL INFORMATION

According to the NTSB aviation accident database, after AD 78-08-07 became effective there were a total of 3 accidents involving Pratt and Whitney R-985 engines that had a cylinder failure.

National Transportation Safety Board - Aircraft Accident/Incident Database

A similar query was conducted of the FAA's Service Difficulty Report (SDR) database. Among the results, 34 of the reports documented a cylinder crack or separation as the cause of the service difficulty.

According to a representative at Covington Aircraft Engines, an aircraft engine maintenance, repair and overhaul facility that specializes in R-985 engines, they seen many cracks in cylinders. He stated that the reasons for the cracks are predominantly twofold: the carburetor is worn, resulting in the engine running too lean (creating hotspots in the cylinder); and thermal fatigue cracks from the pilot shock cooling the engine (an excessively rapid descent going from a high temperature differences within the metal and not the absolute temperature of the metal).

The Transport Canada Civil Aviation issued a Service Difficulty Advisory No. AV-2007-2 regarding R-985 cylinder heads. In pertinent part it stated, "It is very important that operators properly warm-up and cool-down the engine before and after flight. This will significantly minimize distress to the engine. It is essential that the cylinder assembly be adequately warmed up in order to "heat stretch" the cold cylinder, especially before applying high power. Failure to do so can lead to fatigue cracks and cause distress to the cylinder head and other rotating parts of the engine. Problems associated with cylinder head separation and cylinder barrel flange cracks can be minimized if attention to cylinder head temperature limitations is closely followed."

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# WPR17LA018	11/10/2016 1135 PST	Regis# N9556U	Hemet, CA	Apt: Hemet-ryan Airport HMT
Acft Mk/Mdl GRUMMAN AMERICAN AVN. CORP. AA 1CAcft SN AA1C0054			Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl LYCOMING O-320 SERIES		Acft TT 3885	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: PELHAM DAVID		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

Events

1. Enroute-cruise - Fuel exhaustion
-

Narrative

On November 10, 2016, about 1135 Pacific standard time, a Grumman American AA-1C airplane, N9556U, experienced a complete loss of engine power and landed on a field east of Hemet, California. The private pilot and pilot-rated passenger were not injured; the airplane sustained substantial damage. The airplane was registered to, and operated by, the pilot under the provisions of 14 Code of Federal Regulations Part 91 as a local personal flight. Visual meteorological conditions prevailed and no flight plan was filed for the flight that originated from Hemet-Ryan Airport (HMT), at 1043.

The pilot reported that the airplane was last refueled, and operated, about one month prior to the day of the accident. The morning of the accident, he believed the airplane still had about 17-18 gallons of fuel for the flight. The pilot mentioned that the airplane's fuel float gauges are not accurate; therefore, he peered inside of the left fuel tank from the filler cap and observed fuel. He did not check the right fuel tank because the style of tank would restrict his view of any fuel. They departed the airport with the left fuel tank selected and practiced a few standard maneuvers; during which, the engine hesitated for a brief second. The pilot switched to the right fuel tank and they turned back towards the airport; about one minute later he switched to the left fuel tank and continued to fly at full power. After feeling confident there was fuel in the left tank, the pilot switched back to the right fuel tank and climbed to 8,000 feet, continuing the flight as normal. Shortly after, they proceeded back towards the airport when the engine suddenly lost power. The pilot attempted emergency procedures and troubleshooting, but to no avail. The pilot located a suitable field for the emergency landing, however, during the landing roll on the soft, dry, and rocky terrain, the airplane nosed over, coming to rest inverted.

Recovery personnel reported that during the recovery process he removed very little fuel from the left auxiliary fuel tank, otherwise, the right auxiliary fuel tank and the main fuel tanks were empty. In addition, he mentioned that he did not observe any breaches in the fuel tanks, nor did he smell any fuel at the accident site.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# WPR16LA141	07/17/2016 850 PDT	Regis# N2759K	Minden, NV	Apt: Minden MEV
Acft Mk/Mdl LUSCOMBE 8A		Acft SN 5486	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl CONTINENTAL C85		Acft TT 3008	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: BOURBEAU GABE J		Opr dba:		Aircraft Fire: NONE

Events

1. Takeoff - Aircraft structural failure

Narrative

On July 17, 2016, about 0850 Pacific daylight time, a Luscombe 8A, N2759K, nosed over during a precautionary landing at Minden-Tahoe Airport (MEV), Minden, Nevada. The pilot/owner was operating the airplane under the provisions of Title 14 Code of Federal Regulations (CFR) Part 91. The airline transport pilot and the passenger sustained minor injuries. The airplane sustained substantial damage to the empennage as a result of the nose over. The local area flight originated from MEV at 0810. Visual meteorological conditions prevailed, and no flight plan had been filed.

The pilot reported that during the takeoff rotation, he heard a noise that seemed to be coming from the landing gear. Once airborne, the passenger observed the right wheel, including the axle assembly, hanging sideways from the brake cable.

The pilot made a low pass for ground personnel to confirm the problem, and requested emergency equipment. The pilot flew around the airport for approximately 40 minutes until the emergency equipment was in place. The pilot elected to land on a grassy area between runway 34 and taxiway alpha. The pilot landed on the left wheel first, holding the right side of the airplane off the ground as long as possible. The right gear leg skidded for approximately 50 feet before digging in and causing the airplane to cartwheel onto its back.

Post-crash investigation by a Federal Aviation Administration inspector revealed that the right main gear leg failed at the axle cluster. The inspector observed internal corrosion within the axle cluster of the main gear leg. He noted that the upper portion of the leg was not sealed.

The information provided indicated that the failed cluster had current Univair aircraft corporation part numbers and nomenclature.

The Type Certificate holder provided a copy of a Service Recommendation (SR) #4 issued on January 22, 1996. The purpose of the SR was to facilitate the annual inspection of the Luscombe landing gear. It noted that corrosion damage within the 2 inches above the axle weldment had led to failure of the main landing gear legs. The SR provided instructions to examine for compromised structure. It also provided a solution by drilling a hole in the metal to allow moisture to drain out, and let drying air flow in to keep corrosion to a minimum. The owner stated that this SR had not been accomplished on this airplane. Compliance with the SR was not required by federal regulations for this type of operation.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# CEN17LA119	03/03/2017 1830 CST	Regis# N381LB	Hebron, NE	Apt: Hebron Muni HJH
Acft Mk/Mdl MOONEY M20F-NO SERIES		Acft SN 700045	Acft Dmg: SUBSTANTIAL	Rpt Status: Prelim Prob Caus: Pending
Eng Mk/Mdl LYCOMING I0360 SER			Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: PRIVATE INDIVIDUAL		Opr dba:		Aircraft Fire: NONE

Events

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

Narrative

On March 3, 2017, about 1830 central standard time, a Mooney M20F airplane, N381LB, was substantially damaged during landing at Hebron Municipal Airport (HJH), Hebron, Nebraska. The pilot was not injured. The airplane was registered to Intelligent Quality Solutions Inc. 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 local flight that operated without a flight plan.

According to information received by the Federal Aviation Administration, while the pilot was conducting a touch-and-go landing, the airplane became uncontrollable and departed the side of the runway.

The airplane was retained for further examination.

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Accident Rpt# ERA17FA139	03/28/2017 615 CDT	Regis# N643RJ	Aberdeen, MS	Apt: Monroe County M40
Acft Mk/Mdl MOONEY M20J		Acft SN 24-1003	Acft Dmg: SUBSTANTIAL	Rpt Status: Prelim Prob Caus: Pending
Eng Mk/Mdl LYCOMING IO-360-A3B6D		Acft TT 2873	Fatal 2 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: JUSTICE RICHARD A		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

Events

1. Initial climb - Unknown or undetermined

Narrative

On March 28, 2017, at 0615 central daylight time, a Mooney M20J, N643RJ, was substantially damaged when it collided with trees and terrain shortly after takeoff from Monroe County Airport (M40), Aberdeen, Mississippi. The airline transport pilot, who was also the owner of the airplane, and one passenger were fatally injured. The airplane was operated under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Night visual meteorological conditions prevailed near the accident site at the time of the accident, and an instrument flight rules flight plan was filed for the flight destined to Bruce Campbell Field Airport (MBO), Madison, Mississippi.

The pilot and passenger departed M40 at 0614 for the approximate 1-hour flight to MBO. Weather conditions at the time of the takeoff included a broken ceiling at 1,800 feet above ground level (agl) and an overcast ceiling at 2,400 feet agl. The temperature was 18ø C and the dew point was 18ø C.

Video recorded by the M40 airport security system showed dark light conditions at the time of the accident, but it did not show the airplane takeoff; however, audio captured the airplane on the takeoff roll, during initial climb and through the accident sequence. The sound of the engine remained constant through the 1-minute flight, until sound consistent with the airplane impacting with trees was heard.

Review of radar data from Columbus Air Force Base (CBM), Columbus, Mississippi, located 15 miles south of M40, revealed four targets associated with the accident airplane. The first target indicated that the airplane was 400 feet mean sea level (msl) at a ground speed of 70 knots. The next two targets indicated that the airplane climbed to 600 feet msl at 70 knots, before the last target corresponded with a descending right turn at 500 feet msl.

The wreckage was located 2,500 feet west-southwest of the departure end of runway 18, in heavily wooded terrain. The wreckage path was oriented in a southeast to northwest direction and was approximately 400 feet long. Initial examination of the wreckage revealed that the airplane struck the tops of the trees in a right wing low attitude. The right wing was separated and discovered at the initial point of impact. Trees near the impact site were progressively cut lower as the airplane continued forward. Several trees and branches near the final ground impact point displayed cuts consistent with contact with propeller blades. One propeller blade was found 50 feet north of the wreckage. The wings and tail were separated and the top one-third of the cockpit area was removed. The fuselage came to rest inverted against a tree in a 45ø angle. The engine remained attached to the firewall and the propeller flange and one propeller blade remained attached to the engine.

The pilot held an airline transport pilot certificate with a rating for airplane multiengine land. He also held a commercial pilot certificate with ratings for airplane single-engine land, airplane single-engine sea and glider. Additionally, he held a flight instructor certificate with ratings for airplane single-engine, airplane multiengine and instrument airplane. His most recent second-class medical certificate was issued on March 9, 2017. At that time, the pilot reported a total flight experience of 20,000 hours.

The airplane was a single-engine, low-wing, four-place airplane with a 200-horsepower fuel injected four-cylinder engine and two blade constant-speed propeller. The airframe and engine had accumulated a total time of 2,873 hours and 908 hours since major overhaul, respectively. The airplane's most recent annual inspection was performed on March 23, 2017.

The airplane was retained for further examination.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# GAA17CA188	03/13/2017	1940 AKD	Regis# N3654M	Anchorage, AK	Apt: Merrill Field MRI
Acft Mk/Mdl PIPER PA 12-NO SERIES			Acft SN 12-2526	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl LYCOMING O-320 SERIES			Acft TT 2500	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: FINN LUNOE			Opr dba:		Aircraft Fire: NONE
					AW Cert: STN

Events

1. After landing - Loss of control on ground
-

Narrative

The pilot of the wheel-ski equipped airplane reported that after landing on skis, during the taxi on hard packed snow, a gust of wind pushed the airplane and the left wing impacted a parked, unoccupied airplane.

The airplane sustained substantial damage to the left wing and left wing lift strut.

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

A review of recorded data from the automated weather observation station located on the airport reported that about 13 minutes after the accident the wind was 360° at 12 knots, gusting 20 knots.

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Accident Rpt# CEN16FA087	01/14/2016 1610 CST	Regis# N4751Z	Garden City, TX	Apt: Midland Airpark MDD
Acft Mk/Mdl PIPER PA 22-108-108		Acft SN 22-8307	Acft Dmg: DESTROYED	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl LYCOMING O-235-C1B		Acft TT 3518	Fatal 1 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: DALLAS LEE SMITH JR.		Opr dba:		Aircraft Fire: NONE

Events

1. Enroute - Low altitude operation/event
2. Maneuvering - Loss of control in flight

Narrative

HISTORY OF FLIGHT

On January 14, 2016, about 1610 central standard time, a Piper PA-22-108 airplane, N4751Z, impacted terrain near Garden City, Texas. The airline transport rated pilot was fatally injured, and the airplane was destroyed. The pilot was operating the airplane under the provisions of 14 Code of Federal Regulations (CFR) Part 91 as a personal flight. Visual meteorological conditions prevailed, and no flight plan was filed. The airplane departed from the Midland Airpark (MDD), Midland, Texas, about 1545 and was en route to the Edwards Lucian Wells Ranch Airport (TX31), a private airport near Big Spring, Texas.

An employee of the pilot stated that the pilot planned to fly from MDD to TX31 to show the airplane to a friend, who was the owner of TX31. The employee reported that the pilot left the shop about 1400 and went to the airport. A witness at the airport, who spoke with the pilot before the airplane departed, confirmed that the pilot intended to fly the airplane to TX31. The witness saw the pilot start the engine about 1530, but he did not see the airplane take off. TX31 was located about 27 nautical miles east of MDD.

Family members reported the pilot missing the following day, and an alert notice was issued. The airplane was found by law enforcement via cell phone ping and a Civil Air Patrol pilot. The accident site was located about 8 nautical miles southwest of the intended destination, TX31, and about 6 nautical miles south of the direct route of flight. There were no known witnesses to the accident.

Radar coverage was available and detected other airplanes in the accident area using a transponder code of 1200. No radar data were found for the accident flight.

PERSONNEL INFORMATION

The pilot, age 73, held an airline transport pilot certificate with ratings for airplane multi-engine land, airplane single engine land, and rotorcraft-helicopter. The pilot also held a type rating for Learjet airplanes. Additionally, he held a flight instructor certificate with a single engine airplane rating, which had expired on December 31, 1987. On June 1, 2015, he was issued a third class medical certificate with the following limitation: must have available glasses for near vision. On the medical certificate application, the pilot reported his flight experience included 5,342 total hours and 0 hours in the preceding six months.

A review of the pilot's logbook revealed 5,345.8 total hours of which 3.2 hours were in the accident airplane. The pilot logged 5 flights in 2011 totaling 6.2 hours. There were no logbook entries from 2012 to 2014. The pilot logged 5 flights in 2015 totaling 4.4 hours. On October 25, 2015, the pilot completed a flight review with a flight instructor in a Cessna 206 airplane. On December 13, 2015, the pilot flew the accident airplane with a flight instructor, and the remarks section noted that the pilot completed stalls, steep turns, and landings.

AIRCRAFT INFORMATION

The Piper PA-22-108 Colt, serial number 22-8307, was a two-place, high-wing, tricycle landing gear airplane, manufactured in 1961. The airplane was constructed of metal tube and fabric and was equipped with one 18-gallon fuel tank located near the inboard portion of the left wing. The airplane was powered by a Lycoming O-235-C1B engine, serial number L-7020-15, rated at 108 horsepower at 2,600 rpm, which drove a two blade, fixed pitch, metal Sensenich propeller.

The airplane was sold to the pilot on November 30, 2015. On January 5, 2016, the FAA suspended the airplane's registration because the paperwork had not been submitted properly.

A review of the airplane's maintenance logbooks revealed that, on January 23, 2015, at a tachometer time of 3,501.92 hours, an airframe annual inspection and an engine 100-hour inspection were completed. The tachometer time at the accident site was 3,517.59 hours.

METEOROLOGICAL INFORMATION

At 1615, the automated weather observation station, located at the Big Spring McMahon-Wrinkle Airport (BPG), Big Spring, Texas, about 16 miles northeast of the accident site, recorded wind from 230° at 15 knots, visibility 10 miles, clear sky, temperature 63° F, dew point 23° F, and altimeter setting 29.74 inches of mercury. The reported weather conditions at other stations near the accident site included clear skies, visibility of 10 miles, and wind from the west at less than 20 knots.

There was no evidence of the pilot receiving a weather briefing. A review of weather information found no applicable pilot reports and no evidence of convective activity, a significant surface wind condition, or a low-level wind shear hazard in the accident area. There was an active airmen's meteorological information (AIRMET) for moderate turbulence below 10,000 ft.

WRECKAGE AND IMPACT INFORMATION

The main wreckage came to rest in an area of mostly flat terrain with mesquite trees and shrubs immediately adjacent to a caliche pit, which was surrounded on three sides by large dirt piles. The dirt piles were a brownish color, similar to the color of the flat terrain surrounding the pit, and the pit was a contrasting whitish color. The caliche pit measured about 35 ft from the bottom to the top of the dirt piles. The initial impact point was on the west side of a large dirt pile that defined the eastern boundary of the caliche pit. The debris field and main wreckage were located on top of and to the east of the dirt pile. The debris field extended 100 yards to the east on a heading of 065° magnetic. The engine was found about 30 yards from the initial impact point, and the main wreckage was 10 yards beyond that. The farthest extent of the debris path was defined by a piece of broken windscreen.

The initial impact area on the side of the dirt pile was defined by several areas of disturbed dirt and airplane debris. The first impact marks were toward the bottom of the dirt pile and were spaced similar to the airplane's landing gear. A horizontal line of debris and white paint chips, about 26 ft in length, was noted near the top of the dirt pile. On the left side of the line were pieces of broken red lens, and on the far right side were pieces of green lens. The propeller was found detached from the engine and partially embedded near the top of the dirt pile. The propeller blades exhibited chordwise scratches, leading edge gouges and polishing, and S-shape bending. The propeller spinner was crushed inward. The propeller mounting bolt holes were elongated.

The engine was found inverted in the middle of the debris path and sustained impact damage. The carburetor, starter, generator, and one magneto had separated during impact and were found near the engine. The other magneto remained attached to the engine and was impact damaged. When rotated by hand, neither magneto was able to produce a spark due to internal damage. The carburetor air box, all intake piping, and all fluid carrying lines were impact damaged. The pushrods and rocker arms appeared in place and secure. The engine oil appeared clean. The crankshaft could not be rotated due to impact damage and rearward bending of the propeller flange. To the extent that the engine could be examined, there was no evidence of preimpact anomalies.

The main wreckage was found upright and consisted of the left and right wings, fuselage and empennage. The fuselage was impact damaged and had been cut open to facilitate the pilot's extraction. The pilot seat was impact damaged and partially separated from the fuselage. The left wing was partially separated from the fuselage and exhibited impact damage. The left aileron remained attached and sustained impact damage. The right wing was partially separated from the fuselage. The empennage remained attached to the rear fuselage, and the vertical stabilizer and rudder were in place, but the lower rudder hinge point was impact separated. The horizontal stabilizer and elevator remained attached and were impact damaged. The rudder cables remained attached to the rudder bar and were continuous to the rudder bellcrank. The elevator control cables were attached to the elevator control horn and to the elevator bellcrank; both cables had been cut to facilitate the pilot's extraction. The elevator bellcrank rod was impact separated. The pitch trim jackscrew was found in a neutral setting. The left and right aileron control cables remained attached and were continuous from the control wheel chain to their respective bellcranks. The airplane was not equipped with flaps. The right landing gear remained attached, the nose gear was separated and found in the debris path about 15 yards beyond the initial impact, and the left main gear was separated and found beyond the main wreckage. There was no evidence of preimpact anomalies with the airframe that would have precluded normal operation.

The fuel selector was found in the "ON" position. The investigation was unable to determine the amount of fuel onboard before departure or the last time the airplane had been fueled. The emergency locator transmitter (ELT) was found separated from the airplane, and the switch was in the "ON" position; the ELT

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transmission was detected by the US Air Force. The cockpit instruments were impact damaged; the tachometer showed 3,517.59 hours, and the altimeter's Kollsman window was set to 29.92. The communication radio was set to 122.8 Megahertz (MHz), a popular common traffic advisory frequency. The navigation radio was set to 114.8 MHz, which was the same frequency as the Midland Very High Frequency Omni Directional Radio Range navigation aid.

A damaged cell phone was found in cockpit area, and its battery had separated from the phone. Law enforcement used the ping of this cell phone to locate the wreckage. An unfolded San Antonio Visual Flight Rules Sectional Aeronautical Chart was found next to the wreckage. The chart showed the area encompassing the direct route of flight and the accident location.

MEDICAL AND PATHOLOGICAL INFORMATION

South Plains Forensic Pathology, P.A., Lubbock, Texas, completed an autopsy of the pilot, and the cause of death was attributed to visceral injuries due to blunt impact trauma. The Bioaeronautical Research Laboratory at the FAA's Civil Aerospace Medical Institute conducted toxicological testing, which revealed the presence of amlodipine and was negative for other substances.

Amlodipine (generic and brand name Norvasc) was a prescription medication used to treat high blood pressure. The pilot had previously reported this medication to the FAA.

ADDITIONAL INFORMATION

Title 14 CFR Part 91.119 Minimum Safe Altitudes

Except when necessary for takeoff or landing, no person may operate an aircraft below the following altitudes: (c) Over other than congested areas. An altitude of 500 feet above the surface, except over open water or sparsely populated areas. In those cases, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure.

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Accident Rpt# WPR16LA079	03/02/2016 1600 MST	Regis# N4356A	Fountain Hills, AZ	Apt: N/a
Acft Mk/Mdl PIPER PA 22-150		Acft SN 22-3712	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl LYCOMING O-320 SERIES		Acft TT 3480	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: CHRISTOPHER HUEY		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

Events

1. Maneuvering-low-alt flying - Loss of engine power (partial)
-

Narrative

On March 2, 2016, about 1600 mountain standard time, a Piper PA-22-150 airplane, N4356A, executed a precautionary landing onto a sandy wash following a partial loss of engine power near Fountain Hills, Arizona. The private pilot and passenger were not injured; and the airplane sustained substantial damage to the wings. The airplane was registered to, and operated by, a private party 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 local flight originated from Phoenix-Mesa Gateway Airport (IWA), Phoenix, Arizona at about 1540.

The pilot reported that after a normal preflight and run-up, he took off and circled a nearby mountain before descending to about 750 feet above the ground at a 2,400 RPM. As they followed a nearby river, the engine started to sputter and decrease to about 900 RPM; the pilot increased and decreased the throttle several times, but the engine never went above 1,200 RPM before it decreased again. He observed that the oil pressure was low; therefore, he attempted to switch fuel tanks, turned on carb heat, ensured the mixture was full rich, but the engine never responded. The pilot elected to land the airplane onto a dry wash. When the airplane touched down, the right main landing gear sunk into the dirt and the airplane made a sharp turn to the right. The airplane rolled along the dirt, impacted a tree, and came to rest nose down.

During a postaccident examination by a Federal Aviation Administration Inspector, the engine cowling was removed and no visual anomalies were noted with the engine. The propeller and spinner were removed; and a test run propeller and temporary fuel tank were installed. The engine was started and operated normally; slowly, the power was increased to 2,400 RPM and the oil pressure was normal. After operating for a short time, the power was decreased and the engine was shutdown. There were no anomalies noted that would have precluded normal operation.

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Accident Rpt# WPR15LA266	09/23/2015 1328 PDT	Regis# N56897	Elko, NV	Apt: Elko Rgnl EKO
Acft Mk/Mdl PIPER PA 28-140		Acft SN 28-7425060	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl LYCOMING O-320-E3D		Acft TT 2937	Fatal 0 Ser Inj 1	Flt Conducted Under: FAR 091
Opr Name: HILL RICHARD R		Opr dba:		Aircraft Fire: GRD
				AW Cert: STN

Events

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

Narrative

HISTORY OF FLIGHT

On September 23, 2015, about 1328 Pacific daylight time, a Piper PA 28/140, N56897, collided with terrain shortly after takeoff from Elko Regional Airport, Elko, Nevada. The airplane was registered to and operated by the pilot under the provisions of 14 Code of Federal Regulations Part 91. The private pilot sustained minor injuries, the passenger sustained serious injuries, and the airplane was substantially damaged. The cross-country flight departed Elko about 1326, with a planned destination of Nampa Municipal Airport, Nampa, Idaho. Visual meteorological conditions prevailed, and no flight plan had been filed.

The pilot stated that he and the passenger had departed from their home field of Kidwell Airport, Cal-Nev-Ari, Nevada, about 0715 that morning. He intended to start the day early, due to the hot weather conditions en route. They stopped at Perkins Field Airport, Overton, Nevada, where they serviced the airplane to capacity with fuel, and then flew north towards Ely, Nevada. Having reached Ely and passed through Ruby Ridge Pass at an altitude of 8,800 ft mean sea level (msl), the engine began to run slightly "rough"; this had never happened before. The pilot adjusted the fuel mixture towards the lean position, the engine smoothed out, and an increase of 200 rpm was observed. He reported that he typically operated the engine at full rich fuel mixture during takeoff and cruise.

Having reached Elko, the pilot serviced the airplane with the addition of 15 gallons of fuel in the left tank, and 10 gallons in the right tank. He specifically did not want to fill the tanks to capacity as they were close to their destination, and he was concerned about performance degradation in the high temperature and elevations. The passenger was in the front right seat, and there were two bags in the back seats, both less than 10 pounds in weight.

He then started the engine about 1320, and the run-up was uneventful. The engine was operating normally and he began the takeoff roll on runway 12, as the other runway (6/24) was closed for construction. He had flown in and out of Elko before, and surmised that the length of runway 12 (3,012 ft), while adequate for takeoff, left him with minimal options should an emergency occur.

The airplane accelerated normally, and shortly after rotation, the controls began to feel "mushy"; He had experienced this before in hot weather conditions. He continued the initial climb, and gently applied control inputs, and anticipated that the airplane would regain a positive climb rate like it had in the past. However, the airplane would not climb more than 200 ft above ground level (agl). Having crossed the street at the end of the runway the airplane began to descend. As the descent continued he flew over warehouses, and he decided to retard the throttle and land straight ahead in a field. Just prior to impact he pulled the yoke aft to reduce airspeed and resultant energy forces. The airplane landed hard in the field, shearing off both main landing gear, and crumpling the fuselage just aft of the cabin.

The pilot reported that at no time did the engine make any coughing or sputtering sounds, and that it kept operating normally throughout.

Witnesses who observed the airplane takeoff all recounted similar observations, as it appeared to be flying slowly after rotation, and did not gain significant altitude. One witness stated that the nose of the airplane was unusually high as it began to descend out of view behind buildings. None of the witnesses observed smoke or vapors emitting from the airplane during flight.

METEOROLOGICAL INFORMATION

At 1356, the automated surface weather facility at Elko Airport reported wind variable at 5 knots, gusting to 18 knots, 10 miles visibility, temperature at 27 \circ C, dew point -6 \circ C, and an altimeter setting at 30.13 inches of mercury.

AIRPORT INFORMATION

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The airport was located at an elevation of 5,139.8 ft msl. The closed runway, 6/24, was 7,455 ft long.

Runway 12/30 had a limitation that takeoffs were only permitted on runway 12, and landings only on runway 30. The Federal Aviation Administration (FAA) Airport Facilities Directory reported that runway 30 sloped steeply upwards.

The density altitude at field elevation about the time of the accident was about 7,400 ft.

TESTS AND RESEARCH

The airplane was recovered, and examined by the NTSB Investigator-in-Charge, and representatives from the FAA and Piper Aircraft.

The examination revealed that the engine fuel mixture control was in the full-forward (full rich) position. The top spark plugs were removed and examined. All electrodes exhibited "normal", to "normal-worn" out wear signatures, indicative of normal service life when compared to the Champion Aviation AV-27 Check-a-Plug chart. Plugs 1, 3, and 4 exhibited dark grey discoloration and sooting, and plug 2 was coated in black soot consistent with "carbon fouled" when compared to the Champion chart.

No mechanical malfunctions or failures were observed during the examination. A full examination report is contained within the accident docket.

Airplane Performance

The airplane performance chart located in the Piper Pilot's Operating Manual, defined that at a gross weight of 1,950 pounds, with zero wind, flaps 0, on a paved level and dry runway, and a density altitude of 7,000 ft, the takeoff distance would be about 1,550 ft; with a distance to clear a 50 ft obstacle of about 3,300 ft. At the maximum gross weight of 2,150 pounds, the takeoff and clearance distances increased to 1,700 and 3,600 ft respectively. A notation on the chart stated, "EXTRAPOLATION OF CHART ABOVE 7,000 FT IS INVALID".

The "Operating Instructions/TAKEOFF" section of the operating manual was found in the airplane, and made the following recommendation,

"NOTE: Mixture full rich except a minimum amount of leaning is permitted for smooth engine operation when taking off at high elevation."

Lycoming Engines Service Instruction No. 1094D "Fuel Mixture Leaning Procedures", dated March 25, 1994, made the following recommendations,

"For 5,000 ft density altitude and above or high ambient temperatures, roughness or reduction of power may occur at full rich mixture. The mixture may be adjusted to obtain smooth engine operation. For fixed pitch propeller, lean to maximum RPM at full throttle prior to take-off where airports are 5,000 ft density altitude or higher. Limit operation at full throttle on the ground to a minimum."

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Accident Rpt# GAA16CA377 07/07/2016 1200 EDT Regis# N190ND Keene, NH Apt: Dillant-hopkins EEN
Acft Mk/Mdl PIPER PA 44-180 Acft SN 4495002 Acft Dmg: SUBSTANTIAL Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl LYCOMING LO-360-A1H6 Acft TT 9927 Fatal 0 Ser Inj 0 Flt Conducted Under: FAR 091
Opr Name: PLANE NONSENSE INC Opr dba: Aircraft Fire: NONE
AW Cert: STN

Summary

The flight instructor in the multiengine airplane reported that, during a simulated single-engine instrument approach to runway 2, the right engine was configured for the simulated failure. The instructor added that the goal was to perform a missed approach on one engine and note the airplane's performance. The pilot under instruction descended to the decision height and executed the missed approach procedure, but the airplane would not climb. The flight instructor told the pilot to go to full power on both engines. According to the flight instructor, "mixtures, props and throttles were all full forward and the fuel flow levers were both at the ON position," and he took control of the airplane.

The flight instructor reported that there were trees and buildings to the north and that he made a left turn about 400 ft above ground level with the intent to land on runway 14. He extended the landing gear but realized that he would not reach the runway. He executed a forced landing to the southwest on taxiway Sierra, the airplane crossed over runway 32/14, and although heavy braking was applied, the airplane exited the taxiway and impacted a drainage culvert. The airplane sustained substantial damage to the aft fuselage stringers and longerons.

The airport elevation was 488 ft, the density altitude was 2,120 ft, the temperature was 81ø, the dew point was 66ø F, and the wind was calm, and the flight instructor stated that carburetor heat was not used during the approach on either engine.

The relative humidity was about 60 percent, and the weather conditions were conducive to serious icing probability when operating in a gliding flight profile.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The flight instructor's failure to use carburetor heat during the approach while operating in atmospheric conditions that were conducive to carburetor icing, which resulted in a loss of engine power due to carburetor icing.

Events

1. Approach-IFR missed approach - Powerplant sys/comp malf/fail
2. Approach-IFR missed approach - Attempted remediation/recovery
3. Emergency descent - Landing area undershoot
4. Landing-landing roll - Loss of control on ground

Findings - Cause/Factor

1. Personnel issues-Action/decision-Info processing/decision-Identification/recognition-Instructor/check pilot - C
2. Environmental issues-Conditions/weather/phenomena-Temp/humidity/pressure-Conducive to carburetor icing-Effect on operation - C
3. Aircraft-Aircraft systems-Ice/rain protection system-Intake anti-ice, deice-Not used/operated - C
4. Personnel issues-Action/decision-Action-Lack of action-Instructor/check pilot - C
5. Environmental issues-Physical environment-Object/animal/substance-Airport structure-Contributed to outcome

Narrative

The flight instructor in the multi-engine airplane reported that during a simulated single-engine instrument approach to runway 2, the right engine was configured for the simulated failure. The instructor reported that the goal was to perform a missed approach on one engine and note the airplane's performance. The pilot under instruction descended to the decision height and executed the missed approach procedure, but the airplane would not climb. The flight instructor told the pilot to go to full power on both engines. "Mixtures, props and throttles were all full forward and the fuel flow levers were both at the ON position," according to the flight instructor, and he took control of the airplane.

The flight instructor reported that there were trees and buildings to the north and he made a left turn about 400 feet above ground level with the intent to land on runway 14. He extended the landing gear; but realized that he would not make the runway. He executed a forced landing to the southwest on taxiway Sierra, the airplane crossed over runway 32-14, and although heavy braking was applied, the airplane exited the taxiway and impacted a drainage culvert. The airplane sustained substantial damage to the aft fuselage stringers and longerons.

The airport elevation was 488 feet, the density altitude was 2,120 feet, the temperature was 81ø and the dew point was 66ø F, the wind was calm, and the flight instructor stated that carburetor heat was not used during the approach on either engine.

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Per the AOPA Carburetor Ice Probability Chart, the relative humidity was about 60 percent and there was serious icing probability when operating in a gliding flight profile.

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Accident Rpt# CEN17FA139	03/25/2017 1530 CDT	Regis# N4329T	Stonewall, TX	Apt: Burg Lake Aero Airport 30TX
Acft Mk/Mdl PIPER PA-28-140		Acft SN 28-7225146	Acft Dmg: SUBSTANTIAL	Rpt Status: Prelim Prob Caus: Pending
			Fatal 1 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: PILOT		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

Events

2. Landing-landing roll - Landing area overshoot

Narrative

On March 25, 2017, about 1530 central daylight time, a Piper PA-28-140, N4329T, impacted a fence and pond during a landing overrun on runway 18 (2,200 feet by 160 feet, turf) at Burg Lake Aero Airport (30TX), Stonewall, Texas. The airplane sustained substantial damage. The commercial pilot received fatal injuries. The airplane was operated by the pilot under 14 Code of Federal Regulations Part 91 as a personal flight that was not operating on a flight plan. Visual meteorological conditions prevailed at the time of the accident. The flight originated from 30TX about 1525 and returned to 30TX.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# WPR16LA045	01/01/2016 1530 PST	Regis# N2684A	Newman Lake, WA	Apt: Warners Airstrip N/A
Acft Mk/Mdl PIPER PA18-150		Acft SN 18-2190	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl LYCOMING O-320 A2B		Acft TT 4346	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: SCOTT E. MCKINLEY		Opr dba:		Aircraft Fire: NONE
				AW Cert: SPR

Events

1. Maneuvering-low-alt flying - Loss of engine power (partial)

Narrative

On January 1, 2016, about 1530 Pacific standard time, a Piper PA18-150, N2684A, was substantially damaged during a precautionary landing to a private dirt airstrip following a partial loss of engine power near Newman Lake, Washington. The private pilot, the sole occupant of the airplane, was not injured. Visual meteorological conditions prevailed for the local flight, which was being operated in accordance with 14 Code of Federal Regulation Part 91, and a flight plan was not filed. The local flight departed Felts Field (SFF), Spokane, Washington, about 1500, with the destination being a private airstrip about 13 nautical miles northeast of SFF.

In a statement submitted to the National Transportation Safety Board investigator-in-charge, the pilot reported that after departing SFF, his intention was to make several slow, low passes over the private airstrip, which was located about 13 nautical miles northeast of SFF. He initially climbed to 6,000 ft mean sea level, cycled the carburetor heat while on descent to the airstrip, then made an initial low pass with full flaps and carburetor heat applied, followed by a go-around with carburetor heat off. The pilot opined that he subsequently made a second low pass in the same configuration, but during the go-around experienced engine roughness, a loss of power, the engine backfiring, and a loss of engine rpm from 2,400 to 2,200. He then applied carburetor heat, but there was no increase in rpm. Unable to maintain altitude, the pilot elected to make a precautionary landing on the private airstrip, which was covered with what the pilot described as covered with snow. Upon touchdown the airplane nosed over, which resulted in substantial damage to both wing struts and the rudder.

A postaccident examination of the airplane and engine overseen by a Federal Aviation Administration aviation safety inspector, which included an engine run, revealed no preimpact malfunctions or failures that would have precluded normal operation. During the examination the inspector noted that the carburetor heat/air box had full continuity, the butterfly valve reached full travel, and full continuity of control was confirmed from the throttle and mixture controls in the cockpit to the carburetor.

At 1450, the weather reporting facility located at SFF reported wind calm, visibility 10 miles, sky clear, temperature -7 C, dew point -9 C, and altimeter reading of 30.52 inches of mercury.

The carburetor icing probability chart from the FAA Special Airworthiness Information Bulletin (SAIB), CE-09-35 Carburetor Icing Prevention, indicated that the airplane was operating in an area associated with a serious risk of carburetor ice accumulation at descent power.

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Accident Rpt# WPR16FA103	05/08/2016 1640 PDT	Regis# N5046W	Pomona, CA	Apt: Brackett Field POC
Acft Mk/Mdl PIPER PA28		Acft SN 28-48	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl LYCOMING O-320		Acft TT 4110	Fatal 0 Ser Inj 1	Flt Conducted Under: FAR 091
Opr Name: DONALD J BACH		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

Events

1. Approach - Unknown or undetermined
2. Enroute - Fuel exhaustion

Narrative

On May 8, 2016, about 1640 Pacific daylight time, a Piper PA-28, N5046W, sustained substantial damage during a forced landing on top of an office/industrial building complex in Pomona, California. The private pilot, who was the registered owner and sole occupant of the airplane, sustained serious injuries. Visual meteorological conditions prevailed for the 16 nautical mile (nm) local flight, which was being operated in accordance with 14 Code of Federal Regulations Part 91, and a flight plan was not filed. The flight departed from the Fullerton Municipal Airport (FUL), Fullerton, California, about 1630, and the intended destination was Brackett Field (POC), La Verne, California.

In a telephone conversation with the National Transportation Safety Board (NTSB) investigator-in-charge (IIC) about 6 weeks after the accident, the pilot reported that before departing on the 10-minute flight, he estimated that one fuel tank was about one-half full and the other fuel tank was about one-quarter full; he did not recall which tank contained what amount of fuel or which tank the fuel selector was positioned to use. The pilot stated that the pre-takeoff run up was "ok", and that the carburetor heat worked well. The pilot further stated that, after departing FUL, he climbed to 2,200 ft. mean sea level (msl), was cleared for a left downwind to runway 26L at POC, and contacted the POC tower over Diamond Bar, a small town just west of POC. He then descended to 2,000 ft. msl, and during the descent he observed the engine rpm decrease to between 500 and 600 rpm, at which time he radioed "MAYDAY, MAYDAY." The pilot stated that he then switched fuel tanks but was not sure which one he selected. He further stated that he was not sure if the engine had completely lost power or not. The pilot said that he was looking for a field to land in but could not find one. The pilot added that the only thing he saw was a rooftop, which he aimed for, and he subsequently "belly flopped" the airplane onto the roof of the building. The pilot concluded by saying that he did not remember when he had last refueled the airplane.

The building the airplane landed on was located about 2 nm southwest of the destination airport. An initial survey of the accident site was performed on the evening of May 8, 2016, by NTSB and Federal Aviation Administration (FAA) investigators. The wreckage was located on the top of a building, which measured about 200 ft. in length, and about 100 ft. in width; the roof was about 30 ft. above ground level. The airplane came to rest nose down with the building's roof collapsed around the engine cowling to the top of the propeller spinner. The left main landing gear collapsed aft, and the left wheel separated and was found on the roof. The nose wheel separated and was found inside the building. Some blue staining was observed on the roof.

On the day after the accident, the wreckage was examined in more detail after it was lowered from the roof of the building. During the examination, investigators drained about 7.5 gallons of fluid from the left wing tank's fuel drain; it was a light blue fluid, which looked and smelled like aviation gasoline. There was no visible contamination. Additionally, investigators drained about 1 quart of fluid from the right wing tank's fuel drain; it was a light blue fluid, which looked and smelled like aviation gasoline. There was no visible contamination. Investigators also drained a few ounces of fluid from the carburetor; it was amber in color, and smelled like aviation gasoline. The gascolator was displaced from its position; the screen appeared clean. The fuel selector was observed positioned to the right fuel tank.

The propeller remained attached to the crankshaft flange, and the spinner remained attached to the propeller. One propeller blade was bent aft, and the other propeller blade did not appear to be bent. Neither blade displayed leading edge gouging or S-bending.

On June 14, 2016, a detailed examination of the engine and airframe, performed under the supervision of the NTSB IIC, revealed no evidence of preimpact mechanical anomalies that would have precluded normal operation of the engine. For details of the examination, refer to the Summary of Airplane Examination report, which is available in the public docket for this accident.

PERSONNEL INFORMATION

The pilot, age 61, possessed an FAA private pilot certificate with an airplane single-engine land rating. The pilot reported to the NTSB that he had a total flight

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time of 900 hours of which 300 hours were in the same make and model as the accident airplane. He also reported that he had accumulated a total of 5 hours flight time in the last 90 days and 2 hours in the last 30 days, all in the same make and model as the accident airplane.

The pilot completed his most recent flight review on February 27, 2016. He was issued a third-class FAA airman medical certificate on December 4, 2015, with the limitation that he must wear corrective lenses.

AIRCRAFT INFORMATION

The airplane was a Piper PA-28, serial number 28-48. It was a single-engine, low-wing airplane with a fixed tricycle landing gear.

Examination of the airplane's airframe logbook indicated that the airplane's last two annual inspections revealed several discrepancies, and the airplane was not signed off as airworthy. The annual inspection performed on October 4, 2014, at a tachometer time of 1,249.97 hours and 4,098.97 hours total time, revealed the following discrepancies: needs an engine data plate (missing); needs Right side exhaust shroud for carb heat replace; needs compass correction card entries legible/replaced. The most recent annual inspection, which was performed on November 1, 2015, at a tachometer time of 1,261.0 hours and 4,110.27 hours, revealed the following discrepancies: needs an engine data plate (missing); needs Right side exhaust shroud for carb heat replaced; needs engine front crankshaft seal replaced; left wing fuel sump drain weeping.

METEOROLOGICAL INFORMATION

At 1547, the weather reporting facility at POC reported: wind from 260ø at 8 knots, 10 miles visibility, overcast ceiling at 3,100 ft. above ground level, temperature 17ø C, dew point 10ø C, and an altimeter setting of 29.98 inches of mercury. According to the carburetor icing probability chart, conditions were conducive to moderate icing at cruise power, and serious icing at descent power. The carburetor icing probability chart included in Federal Aviation Administration Special Airworthiness Information Bulletin No. CE-09-35, Carburetor Icing Prevention, indicated that the airplane was operating in an area that was associated with moderate icing at cruise power, and serious icing at descent power.

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Accident Rpt# ERA16LA230	06/25/2016 1745 EDT	Regis# N9836W	Hollywood, FL	Apt: North Perry HWO
Acft Mk/Mdl PIPER PA28-140		Acft SN 28-23342	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl LYCOMMING O-320-E2A		Acft TT 2557	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: NICOLAS LONDONO		Opr dba:		Aircraft Fire: NONE

Events

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

Narrative

On June 25, 2016, about 1745 eastern daylight time, a Piper PA-28-140, N9836W, was substantially damaged during a forced landing shortly after takeoff from North Perry Airport (HWO), Hollywood, Florida. The private pilot sustained minor injuries. Visual meteorological conditions prevailed, and no flight plan was filed for the local personal flight conducted under the provisions of 14 Code of Federal Regulations Part 91.

According to a written statement provided by the pilot, several weeks before the accident, a family member noted that the airplane's right fuel tank cap was missing. The pilot ordered a new fuel cap that was installed and remained in place until his return. On June 18, the pilot added 3 gallons of fuel to the right fuel tank, drained it, and then repeated this process several times. He then started the engine with the left fuel tank selected, and switched to the right fuel tank to perform an extended engine run-up and taxi check; he did not fly the airplane that day. When the pilot arrived at HWO on the day of the accident, he sampled both fuel tanks, performed a prolonged engine run-up and taxied for about 30 to 45 minutes. During the subsequent takeoff, when the airplane was about 80 to 100 feet above ground level (agl), the engine started to "tremble," and then lost all power.

The airplane impacted terrain about 1,000 feet beyond the departure end of the runway.

A Federal Aviation Administration (FAA) inspector responded to the accident site and examined the wreckage. The airplane's nose and main landing gear were sheared off, and the left wing forward spar was separated at the wing root. One propeller blade was bent aft, the other blade was not damaged. Fuel sampled from the firewall-mounted fuel strainer contained mostly water.

The airplane was equipped with a Lycoming O-320 series, 140-horsepower engine. The airplane had been operated for about 333 hours since its most recent annual inspection, which was performed on September 19, 2015.

The pilot reported 262 hours of total flight experience, of which 98 hours were in the accident airplane make and model.

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Accident Rpt# GAA17CA120	11/27/2016 1130 CST	Regis# N56809	St. Louis, MO	Apt: Creve Coeur 1H0
Acft Mk/Mdl PIPER PA28-140		Acft SN 28-7425041	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl LYCOMING O-320		Acft TT 8418	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: GATEWAY FLIGHT TRAINING LLC.		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

Summary

The solo student pilot reported that, during landing, "the airplane bounced a couple times," and the propeller struck the runway. He then taxied to the ramp without further incident.

During a postaccident examination, substantial damage was found to the engine mounts and fuselage.

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

Cause Narrative

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

Events

1. Landing-flare/touchdown - Abnormal runway contact

Findings - Cause/Factor

1. Personnel issues-Task performance-Use of equip/info-Aircraft control-Student/instructed pilot - C
2. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Landing flare-Not attained/maintained - C

Narrative

The solo student pilot reported that during landing "the airplane bounced a couple times" and the propeller struck the runway. The student pilot further reported that he taxied to the ramp without further incident.

During a postaccident examination, substantial damage was found to the engine mounts and fuselage.

The student pilot did not report any preaccident mechanical malfunctions or failures with the airplane that would have precluded normal operation.

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Accident Rpt# GAA17CA166	02/27/2017 1330 MST	Regis# N309PA	Phoenix, AZ	Apt: Phoenix Deer Valley DVT
Acft Mk/Mdl PIPER PA28-181		Acft SN 2843508	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl LYCOMING O-360 SERIES		Acft TT 17720	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: BIRD ACQUISITION LLC		Opr dba: TRANSPAC AVIATION ACADEMY		Aircraft Fire: NONE
				AW Cert: STN

Events

2. Takeoff - Loss of control in flight

Narrative

The flight instructor reported that during an introduction to soft field takeoffs lesson, upon switching to the tower frequency, he and his student received the updated wind and altimeter setting. He noted that the wind was a "rear quartering crosswind", and reported "I have done these before so thought I would be fine, though in retrospect [it's] been a long time since I have done [a takeoff] with similar conditions". During the takeoff, he held the yoke back with right aileron, and as the airplane began to lift off he reduced back pressure on the yoke. After becoming airborne, the airplane drifted to the right and then settled back on the runway. He added more right aileron, rudder, and more "back elevator" which reduced his forward visibility. The airplane became airborne again, about 45 knots, and drifted to the right of the runway centerline. He reduced power, landed, and came to a stop off the right side of the runway. The airplane was taxied back to parking with no further incident.

A post-accident examination revealed the airplane sustained substantial damage to the rear carry through wing spar.

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

The flight instructor reported that about the time of the accident the wind was 300ø at 10 knots. The airplane was departing on runway 7R.

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Accident Rpt# GAA17CA126	01/26/2017 1100 MST	Regis# N6885F	Fort Mohave, AZ	Apt: Sun Valley A20
Acft Mk/Mdl PIPER PA32R-300		Acft SN 32R-7780048	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl LYCOMING IO-540-KIG5D		Acft TT 3767	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: JAMES E. OTT		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

Summary

The pilot reported that, during the initial climb, he retracted the landing gear normally and then "a few minutes later the radios went blank." He believed he had a radio problem, so he decided to return to the airport. During the return, the pilot moved the landing gear selector to the down position, but the three gear down indicator lights did not illuminate. Subsequently, the pilot circled a few miles east of the airport to troubleshoot the issue.

The pilot reported that, during the circling, he "cycled the master switch and the radio master a couple times with no results." The pilot added that the airplane was equipped with an "automatic gear extension system," so he verified that the override switch was not engaged, fully extended the flaps, and slowed the airplane to 85 knots. Subsequently, the pilot believed the landing gear was down, so he returned to the airport for landing. During touchdown, the left main landing gear and nose gear collapsed (or were not extended), and the airplane veered off the runway into dirt, which resulted in substantial damage to the left wing. During a postaccident interview, the pilot reported that he believed he had "a total electrical failure."

According to a witness who owns a house on the airport property, he observed the airplane depart and about 5 minutes later, saw that the airplane had returned for landing. The witness reported that the airplane's landing gear were retracted until the point at which the pilot began the landing flare over the runway. When the airplane was about 5 ft above the runway, each landing gear began to extend, but the airplane touched down before the nose gear and left main landing gear could extend fully.

According to a Federal Aviation Administration (FAA) aviation safety inspector (ASI) who arrived at the accident site about 2 to 3 hours after the event, when he "switched the master switch on," he observed electrical equipment turn on and heard the landing gear extension motor running. During a subsequent postaccident examination, the FAA ASI reported that he found no abnormalities with the electrical system. He also extended the landing gear to the down-and-locked position with the electric/hydraulic system and observed three green indicator lights illuminate.

According to the Pilot's Operating Handbook (POH) for the accident airplane, a "pressure sensing device" in the landing gear system will lower the gear "regardless of the gear selection position," pending that the override switch is not engaged. The POH further stated, in part, "The gear is designed to extend at airspeeds below approximately 103 KIAS [knots indicated airspeed] with power off even if the selector is in the up position. The extension speeds will vary from approximately 81 KTS [knots] to approximately 103 KIAS depending on power settings and altitude."

It is likely that the pilot failed to extend the landing gear for landing and that, as the airspeed slowed during the landing flare, the pressure sensing device automatically deployed the landing gear. However, due to the insufficient altitude and time, the landing gear were unable to fully extend and lock.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The pilot's failure to extend the landing gear for landing.

Events

1. Landing - Landing gear not configured
2. Landing-flare/touchdown - Abnormal runway contact
3. Landing-flare/touchdown - Runway excursion
4. Landing-flare/touchdown - Landing gear collapse
5. Landing-flare/touchdown - Collision with terr/obj (non-CFIT)

Findings - Cause/Factor

1. Personnel issues-Action/decision-Action-Forgotten action/omission-Pilot - C
2. Aircraft-Aircraft systems-Landing gear system-Gear extension and retract sys-Not used/operated - C
3. Aircraft-Aircraft systems-Landing gear system-(general)-Incorrect use/operation

Narrative

The pilot reported that during the initial climb he retracted the landing gear normally and then "a few minutes later the radios went blank." The pilot further reported that he believed he had a radio problem, so he decided to return to the airport. During the return, the pilot reported that he moved the landing gear selector to the down position, but the three gear down indicator lights did not illuminate. Subsequently, the pilot reported that he circled a few miles east of the airport to troubleshoot the issue.

During the circling, the pilot reported that he "cycled the master switch and the radio master a couple times with no results." The pilot further reported that the airplane was equipped with an "automatic gear extension system," so he verified that the override switch was not engaged, fully extended the flaps, and slowed

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the airplane to 85 knots. Subsequently, the pilot believed the landing gear was down, so he returned to the airport for landing. During touchdown, the left main landing gear and nose gear collapsed (or were not extended) and the airplane veered off the runway into dirt, which resulted in substantial damage to the left wing. During a postaccident interview, the pilot reported that he believed he had "a total electrical failure."

According to a witness who owns a house on the airport property, he observed the airplane depart and about 5 minutes later saw that the airplane had returned for landing. The witness reported that the airplane's landing gear were retracted until the point at which the pilot began the landing flare over the runway. The witness further reported, when the airplane was about 5 feet above the runway, each landing gear began to extend, but the airplane touched down before the nose gear and left main landing gear could extend fully.

According to a Federal Aviation Administration (FAA) Aviation Safety Inspector (ASI) who arrived at the accident site about two to three hours after the event, when he "switched the master switch on," he observed electrical equipment turn on and heard the landing gear extension motor running. During a subsequent postaccident examination, the FAA ASI reported that he found no abnormalities with the electrical system. He also extended the landing gear to the down and locked position with the electric/ hydraulic system and observed three green indicator lights illuminated.

According to the Pilot's Operating Handbook (POH) for the accident airplane, a "pressure sensing device" in the landing gear system will lower the gear "regardless of the gear selection position," pending that the override switch is not engaged. The POH further stated in part: "The gear is designed to extend at airspeeds below approximately 103 KIAS [Knots Indicated Airspeed] with power off even if the selector is in the up position. The extension speeds will vary from approximately 81 KTS [Knots] to approximately 103 KIAS depending on power settings and altitude."

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Accident Rpt# WPR17LA068	02/18/2017 800 MST	Regis# N7095A	Holbrook, AZ	Apt: N/a
Acft Mk/Mdl ROBINSON HELICOPTER R22 BETA-BETA	Acft SN 2900	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual	Prob Caus: Pending
Eng Mk/Mdl LYCOMING O-3660-J2A	Acft TT 1948	Fatal 0	Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: REIDHEAD KAMRON	Opr dba:	Aircraft Fire: NONE		

Events

1. Maneuvering-low-alt flying - Low altitude operation/event
2. Uncontrolled descent - Miscellaneous/other

Narrative

On February 18, 2017, about 0800 mountain standard time, the pilot of a Robinson R22 Beta, N7095A, experienced a loss of helicopter control while maneuvering in a turn and landed hard in an open field near Holbrook, Arizona. The private pilot/owner operated the helicopter under the provisions of 14 Code of Federal Regulations Part 91, as a personal flight. The pilot and one passenger were not injured. The helicopter was substantially damaged. Visual meteorological conditions prevailed for the local area flight and no flight plan had been filed. The flight departed from a private residence about 0715 the morning of the accident.

According to the pilot's written statement, he departed from his brother's residence about 0715 with the intent of flying around Holbrook on a personal flight. They over flew a cow pasture, and descended to look at the cows. The pilot reported his airspeed was about 10 knots with a 7-knot headwind. He maneuvered the helicopter in a 180-degree turn and the helicopter started an un-commanded descent. He pulled cyclic control, which responded by lowering engine and main rotor blade rpm; he tried to lower and increase throttle, and flared to land; however, the helicopter landed hard. The main rotor blades contacted and subsequently severed the tail boom.

The pilot stated that there were no mechanical anomalies that would have precluded normal operation of the helicopter.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# GAA17CA130	01/31/2017 930 CST	Regis# N883KC	Armstrong, TX	Apt: N/a
Acft Mk/Mdl ROBINSON HELICOPTER R22-BETA	Acft SN 4354	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual	Prob Caus: Pending
Eng Mk/Mdl LYCOMING O-360-J2A	Acft TT 2182	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091	
Opr Name: BENJAMIN A. ELLIS	Opr dba:		Aircraft Fire: NONE	
			AW Cert: STN	

Summary

The helicopter pilot reported that, during takeoff from a trailer, the tie-down remained attached to the left skid and that the helicopter experienced a dynamic roll-over. The helicopter rolled off the trailer to the left and impacted the ground.

The helicopter sustained substantial damage to the fuselage, tailboom, and firewall.

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

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The pilot's failure to remove the left helicopter skid tie-down before takeoff, which resulted in dynamic roll-over.

Events

1. Takeoff - Dynamic rollover

Findings - Cause/Factor

1. Personnel issues-Task performance-Use of equip/info-Aircraft control-Pilot - C
2. Personnel issues-Action/decision-Action-Forgotten action/omission-Pilot - C
3. Personnel issues-Psychological-Attention/monitoring-Monitoring equip/instruments-Pilot

Narrative

The pilot of the helicopter reported that during takeoff from a trailer, the tie-down remained attached to the left skid and the helicopter experienced dynamic rollover. The helicopter rolled off the trailer to the left and impacted the ground.

The helicopter sustained substantial damage to the fuselage, tailboom, and firewall.

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

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Accident Rpt# GAA17CA112 01/18/2017 1335 CST Regis# N8042B Champaign, IL Apt: University Of Illinois-willard CMI
Acft Mk/Mdl ROBINSON HELICOPTER R22-BETA Acft SN 1110 Acft Dmg: SUBSTANTIAL Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl LYCOMING O-320-B2C Acft TT 10338 Fatal 0 Ser Inj 0 Flt Conducted Under: FAR 091
Opr Name: SUMMERSKYZ INC Opr dba: Aircraft Fire: NONE
AW Cert: STN

Summary

The student pilot reported that, while practicing 180° autorotations about 500 ft above ground level, the flight instructor reduced the throttle, and the student pilot lowered the collective while simultaneously applying aft cyclic and right pedal. He added that the helicopter began to "dive," and the flight instructor took control of the helicopter.

The flight instructor reported that he initiated a go-around by applying aft cyclic and raising the collective, but they "continued in a rapid descent." The flight instructor added that at "roughly fifty feet, [he] flared harder to attempt a next-to-final arrest." The helicopter landed hard, the skids collapsed, and the main rotor blades severed the tailboom. The helicopter slid about 300 ft down the runway toward the right; the right skid stuck into the grass, and the helicopter rotated clockwise about the right skid, tipped onto the nose, and rolled to the left.

The flight instructor reported that he and the student pilot had performed about 10 to 12 practice autorotations before the accident.

The helicopter sustained substantial damage to the fuselage.

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

Robinson Helicopter Company published Safety Notice, SN-38, dated July 2003 and revised in October 2004, which addressed training accidents caused by practice autorotations and stated, in part:

A high percentage of training accidents occur after many consecutive autorotations. To maintain instructor focus and minimize student fatigue, limit practice to no more than 3 or 4 consecutive autorotations.

The Federal Aviation Administration's (FAA) Helicopter Flying Handbook, FAA-H-8083-21A, dated 2012, addressed tailboom strikes during autorotations and stated, in part:

A power recovery can be made during training in lieu of a full touchdown landing. Refer to the section on power recovery for the correct technique. After the helicopter has come to a complete stop after touchdown, lower the collective pitch to the full-down position. Do not try to stop the forward ground run with aft cyclic, as the main rotor blades can strike the tail boom. Rather, by lowering the collective slightly during the ground run, more weight is placed on the undercarriage, slowing the helicopter. One common error is holding the helicopter off the surface versus cushioning the helicopter on to the surface during an autorotation. Holding the helicopter in the air by using all of the rotor rpm potential energy usually causes the helicopter to have a hard landing, which results in the blades flexing down and contacting the tail boom. The rotor rpm should be used to cushion the helicopter on to the surface for a controlled, smooth landing instead of allowing the helicopter to drop the last few inches.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The flight instructor's failure to arrest the descent rate during the practice autorotation, which resulted in a hard landing.

Events

1. Autorotation - Miscellaneous/other
2. Autorotation - Attempted remediation/recovery
3. Landing-flare/touchdown - Hard landing

Findings - Cause/Factor

1. Personnel issues-Task performance-Use of equip/info-Aircraft control-Instructor/check pilot - C
2. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Descent rate-Not attained/maintained - C
3. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Landing flare-Not attained/maintained - C

Narrative

The student pilot reported that while practicing 180 degree autorotations, about 500 feet above ground level (agl), the flight instructor reduced the throttle and the student pilot lowered the collective while simultaneously applying aft cyclic and right peddle. He further reported that the helicopter began to "dive" and the flight instructor took control of the helicopter.

The flight instructor reported that he initiated a go-around by applying aft cyclic and raising the collective, but they "continued in a rapid descent." The flight instructor further reported that "roughly fifty feet [he] flared harder to attempt a next-to-final arrest". The helicopter landed hard, the skids collapsed, and the main rotor blades severed the tailboom. The helicopter slid about 300 feet down the runway toward the right; the right skid stuck into the grass and the

helicopter rotated clockwise about the right skid, tipped onto the nose, and rolled to the left.

The flight instructor reported that he and the student pilot had performed about 10-12 practice autorotations prior to the accident.

The helicopter sustained substantial damage to the fuselage.

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

Robinson Helicopter Company published a safety notice, SN-38, dated July 2003, and revised in October 2004, addresses training accidents caused by practice autorotations. It states, in part:

A high percentage of training accidents occur after many consecutive autorotations. To maintain instructor focus and minimize student fatigue, limit practice to no more than 3 or 4 consecutive autorotations.

The Federal Aviation Administration (FAA) published the Helicopter Flying Handbook, FAA-H-8083-21A, dated 2012, addresses tailboom strikes during autorotations. The handbook states, in part:

A power recovery can be made during training in lieu of a full touchdown landing. Refer to the section on power recovery for the correct technique. After the helicopter has come to a complete stop after touchdown, lower the collective pitch to the full-down position. Do not try to stop the forward ground run with aft cyclic, as the main rotor blades can strike the tail boom. Rather, by lowering the collective slightly during the ground run, more weight is placed on the undercarriage, slowing the helicopter.

One common error is holding the helicopter off the surface versus cushioning the helicopter on to the surface during an autorotation. Holding the helicopter in the air by using all of the rotor rpm potential energy usually causes the helicopter to have a hard landing, which results in the blades flexing down and contacting the tail boom. The rotor rpm should be used to cushion the helicopter on to the surface for a controlled, smooth landing instead of allowing the helicopter to drop the last few inches.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# GAA16CA488	09/14/2016 1330	Regis# N46HF	Cedar City, UT	Apt: Cedar City Rgnl CDC
Acft Mk/Mdl ROBINSON HELICOPTER COMPANY R44	Acft SN 10494	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual	Prob Caus: Pending
Eng Mk/Mdl LYCOMING IO-540-AE1A5	Acft TT 3797	Fatal 0	Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: SOUTHERN UTAH UNIVERSITY	Opr dba:	Aircraft Fire: NONE		AW Cert: STN

Summary

According to the flight instructor in the skid-equipped helicopter, he was teaching the student to hover over an asphalt helipad. He reported that he transferred the flight controls to the student and directed the student to maintain a stable hover. The nose pitched down, and a right lateral drift occurred. The flight instructor immediately grabbed the flight controls, but the front of the right skid contacted the ground. The main rotor blades then struck the ground, and the helicopter rolled onto its right side. The helicopter sustained substantial damage to the tailboom, fuselage, and the main rotor blades. The instructor reported that there were no preaccident mechanical malfunctions or anomalies with the helicopter that would have prevented normal operation. The meteorological aerodrome report at the airport where the accident occurred reported that the wind was 200ø at 9 knots, gusting to 18 knots.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The flight instructor's delayed remedial action while providing hover instruction in gusting wind conditions, which resulted in dynamic roll-over.

Events

1. Maneuvering-hover - Low altitude operation/event
2. Maneuvering-hover - Loss of control in flight
3. Maneuvering-hover - Other weather encounter

Findings - Cause/Factor

1. Personnel issues-Task performance-Use of equip/info-Aircraft control-Instructor/check pilot - C
2. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Pitch control-Not attained/maintained - C
3. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Lateral/bank control-Not attained/maintained - C
4. Environmental issues-Conditions/weather/phenomena-Wind-Gusts-Effect on operation

Narrative

According to the flight instructor in the skid-equipped helicopter, he was teaching the student to hover over an asphalt helipad. He reported that he transferred the flight controls to the student, directing the student to maintain a stable hover. The flight instructor reported that the nose pitched down and a right lateral drift occurred. He reported that he immediately grabbed the flight controls but the front of the right skid contacted the ground. The main rotor blades then struck the ground and the helicopter rolled onto its right side. The helicopter sustained substantial damage to the tailboom, fuselage, and the main rotor blades.

The instructor reported that there were no mechanical malfunctions or anomalies with the helicopter during the flight that would have prevented normal flight operation.

The meteorological aerodrome report at the airport where the accident occurred reported that the wind was out of 200ø true at 9 knots, gusting to 18 knots.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# GAA17CA070	11/12/2016 1100 CST	Regis# N744JS	Stone Lake, WI	Apt: N/a
Acft Mk/Mdl ROBINSON HELICOPTER COMPANY	Acft SN 13086	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual	Prob Caus: Pending
Eng Mk/Mdl LYCOMING IO-540-AE1A5	Acft TT 280	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091	
Opr Name: S. M. HENTGES & SONS INC.	Opr dba:	Aircraft Fire: NONE		AW Cert: STN

Events

1. Takeoff - Loss of control in flight

Narrative

The helicopter pilot reported that during a hover taxi for takeoff, about three ft above the ground, he thought that he saw a person at the corner of his drive way. He added that he stopped and the helicopter drifted to the left. Subsequently the main rotor blade impacted a tree, which resulted in substantial damage to the fuselage.

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

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# WPR15FA051 12/02/2014 1400 MST Regis# N3234U Bountiful, UT Apt: Skypark BTF
Acft Mk/Mdl ROBINSON HELICOPTER COMPANY Acft SN 11654 Acft Dmg: SUBSTANTIAL Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl LYCOMING IO-540-AE1A5 Acft TT 582 Fatal 2 Ser Inj 0 Flt Conducted Under: FAR 091
Opr Name: NATIVE RANGE INC. Opr dba: Aircraft Fire: GRD
AW Cert: STN

Summary

Before the accident flight, the commercial helicopter pilot, who was also a mechanic, had re-installed the main rotor blades, which had just been reworked, on the helicopter. The accident flight was a test flight to adjust the track and balance of the rotor blades. A mechanic, who spoke with the pilot a few weeks before the accident, stated that they had a discussion about an elongated pitch change link attachment hole on the accident helicopter and how to address it. On the night before the accident flight, they spoke again; the pilot was having trouble tracking the blades on the accident helicopter. The pilot stated that he could not get the blades to track any better, and that he was trying to change the track with the trim tabs.

Witnesses in the area of the accident site heard "popping" or "banging" sounds, then saw the main rotor and empennage separate from the helicopter. Several of the witnesses then saw the helicopter tumble in flight and impact the roof of a building. The main rotor and empennage came to rest on the ground a few hundred feet from the building. Witness statements and wreckage documentation were consistent with a main rotor blade striking the tail and subsequently, a mast bump, which resulted in the helicopter descending uncontrollably.

The damage observed on the components of the main rotor system was consistent with an in-flight separation of the pitch change link for the red blade, with separation occurring at the location where the pitch change link attached to the swashplate. The swashplate was free of contact marks corresponding to contact with the red pitch change link, which contrasted with the area around the blue blade pitch change link attachment, where multiple contact marks corresponding to contact with the blue pitch change link were observed. Also, the red pitch change link was intact and relatively straight, indicating that separation occurred under loads less than that required to buckle or fracture the pitch change link. The slight bending in the red pitch change links was likely secondary to the separation of the attachment at the lower end as evidenced by the location of the corresponding thread contact marks on the pitch horn. Finally, a series of impressions corresponding to contact with threads on the red blade pitch change link attachment bolt were observed on the attachment hole bore through the swashplate in an area that should have only contacted the grip portion of the bolt. Thus, it is likely that the intact bolt separated from the attachment due to loss of the lock nut and palnut.

Torque measurements were obtained on the locknuts installed on the three recovered pitch change link attachment bolts. All measured torque values were lower than that specified in the helicopter's maintenance manual, indicating that the fasteners were improperly torqued before the accident. While torque for the missing attachment bolt could not be measured, the torque measured on the remaining pitch change link attachment bolts and witness marks on the attachment hole bore in the swashplate suggest that the bolt likely separated due to insufficient torque applied at the time of installation, which led to the loss of the locknut and palnut due to vibrational loads under normal operation.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The pilot/mechanic's failure to properly secure the pitch link hardware of one main rotor blade to the rotating swash plate, which resulted in the pitch link separating in flight and a subsequent loss of control.

Events

1. Maneuvering-low-alt flying - Flight control sys malf/fail
2. Maneuvering-low-alt flying - Mast bumping

Findings - Cause/Factor

1. Aircraft-Aircraft propeller/rotor-Main rotor system-Main rotor mast/swashplate-Incorrect service/maintenance - C
2. Personnel issues-Task performance-Maintenance-Replacement-Maintenance personnel - C
3. Personnel issues-Action/decision-Action-Incorrect action performance-Maintenance personnel - C

Narrative

HISTORY OF FLIGHT

On December 2, 2014, about 1400 mountain standard time, a Robinson R44 II helicopter, N3234U, impacted a two-story building while maneuvering near Skypark Airport (BTF), Bountiful, Utah. The commercial pilot/mechanic and passenger were fatally injured, and the helicopter was substantially damaged. The helicopter was registered to Native Range Capture Services, Inc., Elko, Nevada, and operated by Native Range, Inc, Ventura, California. Visual meteorological

National Transportation Safety Board - Aircraft Accident/Incident Database

conditions prevailed for the area, and no flight plan was filed for the local, post-maintenance test flight, which was conducted under the provisions of 14 Code of Federal Regulations Part 91. The flight departed from BTF shortly before the accident.

According to the owner of the helicopter, the pilot/mechanic was performing maintenance on the main rotor assembly and the purpose of the post-maintenance flight was part of the procedure to "track and balance" the main rotor blades. This maintenance spanned over several days.

Several witnesses in the area of the accident site heard "popping" or "banging" sounds then saw the main rotor and empennage separate from the helicopter. Some of the witnesses then saw the helicopter tumble in flight and impact the top of a building. The main rotor and empennage came to rest on the ground a few hundred feet from the impacted building. Security camera video footage from a nearby business captured the helicopter in the air shortly after the separation of the main rotor and empennage.

PERSONNEL INFORMATION

The pilot, age 65, held a commercial pilot certificate with rotorcraft, airplane single-engine land, multi-engine land, and instrument ratings. The pilot held a Federal Aviation Administration (FAA) second-class medical certificate, which was issued on April 1, 2014, with no limitations. The pilot reported on his most recent medical certificate application that he had accumulated 5,500 total hours of flight experience. The pilot was issued a mechanic certificate on August 17, 2012, with ratings for airframe and powerplant. He attended the Robinson Helicopter Company's maintenance course in December 2008.

The passenger, age 63, held a private pilot certificate with a rating for airplane single-engine land. He held an FAA third-class medical certificate, issued on October 26, 2006, with the limitations that he must have available glasses for near vision, and not valid for any class after. The pilot reported on his most recent medical certificate application that he had accumulated 250 total hours of flight experience. He was issued a mechanic certificate on September 9, 2008, with ratings for airframe and powerplant. He had not attended the Robinson Helicopter Company's maintenance course.

AIRCRAFT INFORMATION

The four-seat helicopter was manufactured in February 2007. It was powered by a Lycoming IO-540-AE1A5 reciprocating engine rated at 205 horsepower.

The helicopter's owner stated that, during a flight in the accident helicopter the month before the accident, the helicopter "had a bit of a vertical [vertical vibrations]". The blades also had noticeable slop and movement in the pitch change link bolt attachment to the swashplate. During a 100-hour inspection, on November 2, 2014, at 582 hours of helicopter total time, the owner and pilot/mechanic recommended sending the blades out for rework. According to airframe records, the [red] main rotor blade pitch horn was replaced, and the pilot-rated mechanic declined repainting of the blades. When the blades returned, the owner hired the pilot-rated mechanic to install the blades and track them in a heavier configuration.

According to a mechanic who spoke with the pilot a few weeks before the accident, they discussed an elongated pitch change link attachment hole on the accident helicopter and how to address it. On the night before the accident flight, they spoke again, and the pilot said he was having trouble tracking the blades on the accident helicopter. He reported that the blades could not track any better than a 1/2-inch separation, and that he was using the trim tabs to change the track. The mechanic suggested that the pilot use the fine adjustments on the pitch change links, then fly through all flight regimes, and fine tune with the trim tabs. He recommended to the pilot to look at the entire rotor system and thought that something was amiss.

Review of the helicopter's maintenance records showed that on September 12, 2007, at 87.3 hours total time, the hub and blades were rebuilt by Robinson Helicopter Company. The spindles, which include the pitch horns, were reused during the rebuild.

METEOROLOGICAL INFORMATION

The 1353 weather observation at Salt Lake City International Airport (SLC), Salt Lake City, Utah, located 5 miles south of the accident site, reported wind from 320 degrees at 3 knots, visibility 10 statute miles, scattered clouds at 15,000 feet above ground level, broken clouds at 19,000 above ground level, temperature 8 degrees C, dew point 2 degrees C, and an altimeter setting of 30.05 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

National Transportation Safety Board - Aircraft Accident/Incident Database

Examination of the accident site by the National Transportation Safety Board (NTSB) investigator-in-charge (IIC) revealed a wreckage debris field about 880 ft in length, about 400 ft in width, and oriented on a 277° magnetic heading. The main rotor and empennage separated from the main wreckage before impact and were found within the wreckage debris field. The main rotor assembly was found near a parking lot about 188 ft from the main wreckage. The empennage separated from the main wreckage and was found near a parking lot about 430 ft from the main wreckage. Several sections of the tail rotor drive shaft were found throughout the debris field. A large section of the tail rotor drive shaft pierced the roof about 90 ft from where the fuselage entered the roof. Both pitch change links and transmission housing material were found throughout the debris field. Plexiglas sections were found throughout the debris field. A 4-ft section of the main rotor blade tip was found in a retention pond and was furthest from the main wreckage.

The main wreckage impacted and penetrated the roof of a two-story building about 2,000 ft southwest of the approach end of runway 34 at BTF. A postimpact fire occurred; however, the building's sprinkler system was activated, and an overhead sprinkler pressure line was separated near the main wreckage, releasing water and limiting the postimpact fire to the main wreckage. The main wreckage displayed impact damage and was partially damaged by the fire.

The wreckage was recovered to a secure facility for further examination. The main wreckage, consisting of the cabin area and a 5-ft section of the tailboom, exhibited impact and thermal damage. The left side of the cabin was crushed inward towards the center, and the right side near the firewall was crushed inward. The rear seat area had minor thermal damage.

The cabin area was crushed and distorted. Both forward seat structures were crushed inward and slightly forward. The front of the fuselage was crushed inward and the windshield was shattered. First responders cut the left forward seat belts. The right forward seat belts were unbuckled.

The top side of the airframe had several disconnects and separations, and was bent to the right side. The tail cone separated aft of the number seven bay, and bay numbers 4, 5 and 6 separated into several sections, consistent with a main rotor strike. The left side of the number 1, 2 and 3 tail cone bays were flattened inward.

The flight controls had several disconnects between the cyclic/collective and swashplate. All fractures exhibited signatures consistent with overload. The tail rotor flight controls had several disconnects from the pedals to the tail rotor, and all separations exhibited overload signatures.

The fuel tanks remained attached to the airframe. The crossover hose fitting at the main tank was separated. The fuel vent hoses pulled apart from vent line fittings. The hoses and lines were clear of debris. Both fuel tank skins sustained impact damage, and the bladders remained intact. Both fuel caps remained secured to the filler neck.

The empennage was fractured about 32 inches from the tail rotor gearbox mount. The tail rotor blades sustained minor impact damage. The tail rotor driveshaft exhibited an impact about 4 inches from the empennage separation. The curvature of the impact mark was consistent with the curvature of the main rotor blade leading edge. The tail rotor drive shaft separated in four places. The tail rotor blades exhibited signatures consistent with low rotor RPM at ground impact.

The v-belts remained attached to the upper sheave and were split between the vees. The belts had thermal damage. The intermediate flex plate was distorted.

The upper sheave forward and aft faces had rotational scoring around the entire circumference. The upper frame tubes adjacent to the forward face had scoring running in the direction of rotation of the upper sheave. The clutch centering strut had rotational scoring on its forward face adjacent to the aft face of the upper sheave running in the direction of rotation. The oil cooler had rotational scoring adjacent to the starter ring gear. The alternator cooling fan was distorted around its entire circumference.

The main rotor gearbox (MRGB) separated at the gearbox housing. The MRGB mast tube fractured near its midsection. The MRGB drive shaft was bent below the swashplate and bent and separated at the teeter stop.

The red blade remained attached to the main rotor hub. The separated sections of the outboard end were found in the debris field. The tip cap was broken, with the attachment bolts still integral to the main rotor blade. The blade tip and about 43 inches of the leading edge spar were found near the beginning of the debris field. Two afterbody sections measuring about 45 inches in length separated the tip. Gray paint transfer marks, about 2 inches wide and 4 inches long, were observed on the upper surface about 25 inches from the tip. The blade spar was bent forward about 15° beginning about 54 inches from the tip. The leading edge was damaged about 4 ft from the hub. Red transfer marks on the leading edge were found about 42 inches from the center of rotation of the blade. The pitch horn separated from the blade grip and the fractured surface was consistent with overload. Thread imprints were observed above the pitch change link

upper rod end. The pitch change link remained attached to the pitch change horn and had multiple bends. The counterweights and hardware for the lower red blade pitch change link to swashplate attachment was not found. The blade droop stop was bent downward and remained attached to the grip.

The blue blade remained attached to the main rotor hub. The tip cap separated from the blade and was found in the main wreckage. The blade spar was continuous from the inboard to the outboard end. The blade afterbody was fractured from the spar to the tip end to about 72 inches inboard. The spar was bent opposite the direction of rotation about 72 inches from the tip end, bent about 15° aft. The blade afterbody wrinkled aft of the spar attachment area from the tip end to 96 inches inboard of the tip end. The blue blade had impact marks on the leading edge, about 20 inches from the center of rotation. The curvature of the impact marks was consistent with the curvature of damage on the blue blade's pitch horn. The pitch horn was fractured at the blade grip, and the fracture surface was consistent with overload. Thread imprints were observed on the pitch horn above the pitch change link upper rod end. The droop stop was bent downward but remained integral to the grip. The pitch change horn was recovered in the debris field. The upper rod end remained attached to the pitch change horn but was fractured at the threads beneath the upper rod end bearing. The midsection of the pitch change link was recovered loose but was fractured at the pitch change link barrel. The lower section of the pitch change link remained attached to the swashplate. The threads adjacent to the lower rod end were bent.

The main rotor hub hardware, including the bolts, shims, nuts, and safeties, remained intact. The hub exhibited impact marks of the blue blade grip contacting the hub, consistent with flapping exceedance. Similar impact marks of less severity were observed on the red blade grip side. A small upper section of the main rotor drive shaft remained attached to the hub via the teetering bolt. The small upper section separated a few inches below the hub, and was severely bent inward on the side of the red blade spindle. Coarse thread imprints were found on the lower edge of the hub immediately beneath the red blade coning bolt, consistent with a pitch change link. On the upper surface of the hub, adjacent to the teetering bolt on the red blade side, an impact mark was consistent with the impact from a pitch change rod link end bearing.

The swashplate red blade pitch change link bolt hole exhibited dark surface markings on the outboard edge and about midway down the bore. Thread impact marks were found on the swashplate adjacent to the lower rod end bearing of the blue blade pitch change link attachment location.

The landing skids were fractured in multiple locations. The aft crosstube separated from the main wreckage. The forward crosstube remained attached to the cabin. Both the forward left and aft left struts were bent aft.

The engine remained attached to the fuselage. Thermal damage was noted to the wiring harness and ignition leads. The engine was covered in a sooty residue. The firewall and fuel pump housing exhibited impact damage. The magneto ignition leads exhibited impact damage near the distributor cap, and thermal damage near the cylinders. The lower sparkplugs were removed and revealed normal wear conditions with light gray deposits. Two of the spark plugs were saturated in oil. The crankshaft was rotated by hand, and cylinder compression was obtained. The ignition leads were cut near the thermal damage, and spark was obtained from all leads during crankshaft rotation. The magnetos were not removed during the examination. Rotational scoring was evident on the fan wheel assembly. The starter ring gear separated from the flywheel. The oil pickup screen was removed and was clear of debris. The exhaust assembly was crushed upwards.

A detailed report of a follow-up examination is contained in the NTSB public docket.

MEDICAL AND PATHOLOGICAL INFORMATION

Postmortem examinations were performed on the pilot and passenger by the Utah Department of Health, Medical Examiner's office. The cause of death for each was reported as total body blunt force injuries.

The FAA's Civil Aerospace Medical Institute performed forensic toxicology on specimens from the pilot. The tests were negative for carbon monoxide, cyanide, volatiles and tested-for drugs.

TEST AND RESEARCH

The main rotor blades (both inboard sections), hub, upper mast section, upper drive shaft section, droop stops (2), yoke, pitch change links (2), main rotor blade pitch change horns (2), and swashplate were sent to the NTSB Materials Laboratory for further examination. The examination revealed that all fractures were consistent with overstress failure, and no preexisting cracking was noted. The examination also revealed that the pitch change link attachment hole for the red blade appeared intact and free of damage. The red blade pitch link was intact and relatively straight. The counterweights and the lower red blade pitch

change link attachment hardware were missing. Torque measurements were taken on nuts installed on the three recovered pitch change link attachment bolts. The torque values for all three nuts were lower than that required by the manufacturer's maintenance manual. A detailed report of the examination is contained in the NTSB public docket.

ADDITIONAL INFORMATION

According to manufacturer's maintenance instructions, the attachment bolts used at the upper and lower ends of the pitch change links are NAS6605 series bolts. The locknuts for the NAS6605 series bolts should be fastened to a dry torque value of 240 lb-in ñ 24 lb-in, and palnuts used on NAS6605 series bolts should be applied with a dry torque of 20 lb-in to 40 lb-in. During installation, the palnuts are installed over the top of the locking nut.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# GAA17CA178	02/21/2017 1237 EST	Regis# N614TA	Ormond Beach, FL	Apt: Ormond Beach Muni OMN
Acft Mk/Mdl SCHWEIZER 269C-1		Acft SN 0080	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl LYCOMING HO-360		Acft TT 5655	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: TOMLINSON AVIATION INC.		Opr dba: TOMLINSON AVIATION INC.		Aircraft Fire: NONE
				AW Cert: STN

Events

1. Enroute - Flight control sys malf/fail

Narrative

The flight instructor of the helicopter reported that about halfway through the flight he "discovered that the throttle control was inoperative" and stuck in the high RPM setting. He turned the helicopter back to the departure airport and briefed his student on the situation. Upon being cleared to land, he executed a "running landing" and performed a go around on the first try. On the second try, the skids made hard contact with the runway and the helicopter came to a stop.

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

The flight instructor reported that the throttle cable outer housing separated from the inner solid housing at the throttle linkage, and that the internal wire could now flex outside of the housing.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# GAA17CA033 10/19/2016 1144 PDT Regis# N818C Boulder City, NV Apt: Boulder City Muni BVU
Acft Mk/Mdl STINSON 108 3-UNDESIGNAT Acft SN 108-3818 Acft Dmg: SUBSTANTIAL Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl LYCOMING O-540-E4B5 Fatal 0 Ser Inj 0 Flt Conducted Under: FAR 091
Opr Name: ROBERT L. SCOTT IV Opr dba: Aircraft Fire: NONE
AW Cert: SPR

Summary

In a telephone interview with the National Transportation Safety Board (NTSB) Investigator-in-Charge, the pilot stated that, during the initial climb after an aerial pickup of a banner, the towline became entangled with the right horizontal stabilizer and the right elevator. Subsequently the airplane pitched down, impacted the ground, and nosed over.

A postaccident examination revealed substantial damage to the right-wing lift strut and the empennage.

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

After multiple requests, the pilot did not return the NTSB Form 6120.1 Pilot/Operator Aircraft Accident/Incident Report.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The pilot's failure to ensure that the aerial pickup towline was not entangled around the horizontal stabilizer after the banner pickup.

Events

1. Takeoff - Unknown or undetermined
2. Takeoff - Loss of control in flight
3. Takeoff - Collision with terr/obj (non-CFIT)
4. Takeoff - Nose over/nose down

Findings - Cause/Factor

1. Personnel issues-Task performance-Planning/preparation-(general)-Pilot - C
2. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-(general)-Attain/maintain not possible - C
3. Environmental issues-Physical environment-Object/animal/substance-(general)-Effect on operation - C

Narrative

In a telephone interview with the National Transportation Safety Board (NTSB) Investigator-in-Charge (IIC), the pilot stated that during the initial climb after an aerial pickup of a banner, the towline cable became entangled with the right horizontal stabilizer and the right elevator. Subsequently the airplane pitched down, impacted the ground, and nosed over.

A postaccident examination revealed substantial damage to the right-wing lift strut and the empennage.

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

After multiple requests, the pilot did not return the NTSB Form 6120.1 Pilot/Operator Aircraft Accident/Incident Report.

National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# WPR15LA246	08/16/2015 1915	Regis# N43616	Libby, MT	Apt: Libby S59
Acft Mk/Mdl TAYLORCRAFT BC12 D-D		Acft SN 7275	Acft Dmg: SUBSTANTIAL	Rpt Status: Factual Prob Caus: Pending
Eng Mk/Mdl CONTINENTAL MOTORS C85-8F		Acft TT 1241	Fatal 0 Ser Inj 0	Flt Conducted Under: FAR 091
Opr Name: STANLEY MCELDERRY		Opr dba:		Aircraft Fire: NONE
				AW Cert: STN

Events

1. Landing-landing roll - Loss of control on ground
2. Landing-landing roll - Flight control sys malf/fail

Narrative

On August 16, 2015, about 1915 mountain daylight time, a Taylorcraft BC-12D, N43616, experienced a brake system malfunction during the landing roll at the Libby Airport, Libby, Montana. A private individual owned the airplane and the pilot was operating it under the provisions of 14 Code of Federal Regulations (CFR) Part 91. The private pilot and passenger were not injured; the airplane sustained substantial damage. The cross-country personal flight departed from a remote grass airstrip in Yaak, Montana about 1845 with a planned destination of Libby. Visual meteorological conditions prevailed and the pilot had not filed a visual flight rules (VFR) flight plan.

The pilot stated that after completing the approximate 20 minute flight, he configured the airplane to land on runway 33 at the Libby Airport. Upon touchdown, the airplane began to veer to the left. The pilot used both the brake and rudder inputs in an effort to return to the runway center. Despite the pilot's attempts to regain directional control, the airplane continued off the left side of the runway and ground looped. The airplane incurred substantial damage to the wing spar.

The pilot further stated that the loss of directional control was precipitated by a landing gear malfunction. He opined that the left brake likely seized after touchdown, which was evident from the skidmark on the runway surface. The brake system was the original cable-operated drum brake. The left landing gear was locked immediately after the accident, but after several hours was free to turn again. A Federal Aviation Administration (FAA) certified airframe and powerplant mechanic examined and disassembled the left landing gear. He stated the examination of the braking system revealed no evidence of mechanical malfunction or failure that would have precluded normal operation. He further stated that he could smell a burned odor from the brake, but they functioned normally.