National Transportation Safety Board - Aircraft Accident/Incident Database

Accident Rpt# WPR14CA067	**12/09/2013 0**	**Regis# N53MT**	**Kalispell, MT**		
Acft Mk/Mdl BEECH 58P			**Acft Dmg:**	**Rpt Status: Prelim**	**Prob Caus: Pending**
			Fatal 0	**Ser Inj 0**	
Opr Name:		**Opr dba:**		**Aircraft Fire:**	

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Accident Rpt# CEN12LA649 09/19/2012 910 CDT	**Regis# N3629Q**	**Tell City, IN**	**Apt: Perry County Municpal Airport TEL**
Acft Mk/Mdl BEECHCRAFT A23-24	**Acft SN MA-224**	**Acft Dmg: SUBSTANTIAL**	**Rpt Status: Factual Prob Caus: Pending**
Eng Mk/Mdl LYCOMING IO-360-A2B	**Acft TT 1615**	**Fatal 0 Ser Inj 0**	**Flt Conducted Under: FAR 091**
Opr Name: ROBERT E. THAYER	**Opr dba:**		**Aircraft Fire: NONE**

Summary

The pilot reported that he made a straight-in approach to the runway after about a 10-minute flight. He stated that there was no appreciable wind during the landing attempt, for which he had fully extended the wing flaps. He reported the airplane landed about one-third of the way down the runway and that after touchdown he retracted the wing flaps and applied brake pressure to slow the airplane. He stated that the airplane did not seem to decelerate normally during the landing roll, likely because of the downslope of the runway, so he elected to abort the landing. The pilot estimated that he increased engine power for the aborted landing as the airplane passed midfield and the airplane accelerated to liftoff speed while still on the runway; however, it did not clear a 10-foot high airport security fence that was located about 340 feet from the departure end of the runway. The pilot reported no preaccident mechanical malfunctions or failures with the airplane that would have precluded normal operation.

A postaccident examination of the runway overrun area showed tire tracks consistent with the tire width of the accident airplane. The postaccident examination did not reveal any anomalies with the airplane brake system that would have prevented normal operation. Landing performance calculations indicated that the airplane should have been able to stop within 1,000 feet of touchdown. Considering that the runway was 4,400 feet long, and given the existing calm wind and dry runway conditions, the pilot should have been able to stop the airplane on the available runway; thus it is likely that the airplane landed long on the runway.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The pilot's improper touchdown point during landing and the resultant runway excursion during the aborted landing.

Events

1. Landing-flare/touchdown - Landing area overshoot
2. Landing-aborted after touchdown - Runway excursion
3. Landing-aborted after touchdown - Collision during takeoff/land

Findings - Cause/Factor

1. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Descent/approach/glide path-Incorrect use/operation - C
2. Personnel issues-Task performance-Use of equip/info-(general)-Pilot - C

Narrative

On September 19, 2012, about 0910 central daylight time, a Beechcraft model A23-24 airplane, N3629Q, was substantially damaged during an aborted landing at Perry County Municipal Airport (TEL), Tell City, Indiana. The commercial pilot and two passengers were not injured. The airplane was registered to and operated by the pilot, under the provisions of 14 Code of Federal Regulations Part 91, without a flight plan. Day visual meteorological conditions prevailed for the personal flight that originated from Breckinridge County Airport (I93), Hardinsburg, Kentucky, about 0900.

The pilot reported that he made a straight-in approach to runway 31 (4,400 feet by 75 feet, asphalt) after a short flight of about 10 minutes. He stated that there was no appreciable wind during the landing attempt with the wing flaps fully extended. He reported the airplane landed about 1/3 down the runway. After touchdown he retracted the wing flaps and applied brake pressure in an attempt to slow the airplane. He reported that the airplane did not seem to decelerate normally during the landing roll because of the downslope of the runway. The pilot stated that although there were no anomalies with the airplane's brake system he elected to abort the landing. His intention was to return and land on runway 13 in order to take advantage of the runway's upslope. He reported that as the airplane passed midfield he increased engine power for the aborted landing and that the engine was operating normally at takeoff power. He stated that although the airplane accelerated to liftoff speed while still on the runway, it did not clear a 10-foot high airport security fence located off the end of the runway. Both wings were substantially damaged during the accident sequence.

The pilot reported no preimpact mechanical malfunctions or failures with the airplane that would have precluded normal operation. Additionally, although he did not use maximum braking during the landing attempt, the brakes had functioned normally while taxiing and during an engine run-up at the departure airport.

A Federal Aviation Administration (FAA) inspector performed an on-site investigation. Examination of the runway overrun area showed tire tracks consistent with the tire width of the accident airplane. The airplane had impacted a chain-link fence located about 340 feet off the end of the runway. The airplane continued then another 30 feet before coming to rest with the chain-link fence entangled around the nose landing gear. The postaccident examination did not

reveal any anomalies with the airplane brake system that would have prevented normal operation.

The closest weather observing station was located at the Huntingburg Airport (HNB), about 21 miles northwest of the accident site. At 0915, the HNB automated surface observing system reported: wind 160 degrees at 4 knots, visibility 10 miles, sky clear, temperature 14 degrees Celsius, dew point 7 degrees Celsius, and an altimeter setting of 30.19 inches of mercury.

According to the Pilot's Operating Handbook (POH) for the Beechcraft model A23-24 airplane, the landing ground roll at maximum gross weight on a paved, level, and dry runway with no headwind and using maximum braking is about 750 feet. The POH does not provide landing distances for runways that have a downslope; however, Civil Aviation Authority (CAA) research indicated that ground roll increases 10-percent with a 2-percent downslope. According to available runway survey data, runway 31 at KTEL has a 1.3-percent downslope. Therefore, the landing roll distance without a headwind and using maximum braking would be expected to be less than 825 feet. CAA research also indicated that ground roll increases 20-percent with a tailwind of 10-percent of the airplane takeoff speed. The POH listed a liftoff speed of 65 knots. A tailwind of 6.5 knots would be expected to increase the landing distance by about 165 feet. Therefore, the calculated landing ground roll on a 2-percent runway downslope, with a 6.5 knot tailwind, and using maximum braking would be expected to be less than 1,000 feet.

Accident Rpt# ERA14LA083 01/01/2014 1400 CDT	**Regis# N351AE**	**Alabaster, AL**	**Apt: N/a**	
Acft Mk/Mdl BELLANCA 17-30A	**Acft SN 73-30577**	**Acft Dmg: SUBSTANTIAL**	**Rpt Status: Prelim**	**Prob Caus: Pending**
Eng Mk/Mdl CONT MOTOR IO 520 SERIES		**Fatal 0 Ser Inj 0**	**Flt Conducted Under: FAR 091**	
Opr Name: ELOM ANTHONY W	**Opr dba:**		**Aircraft Fire: NONE**	

Narrative

On January 1, 2014, approximately 1420 central standard time, a Bellanca 17-30A, N351AE, was substantially damaged during a forced landing following a total loss of engine power in Alabaster, Alabama. The private pilot incurred minor injuries. Visual meteorological conditions prevailed, and no flight plan was filed for the flight, which departed Bessemer Airport (EKY), Bessemer, Alabama, at approximately 1405, and was destined for Shelby County Municipal Airport (EET), Alabaster, Alabama. The personal flight was conducted under the provisions of 14 Code of Federal Regulations Part 91.

The pilot stated that the engine began to run rough while enroute at an altitude of 2,600 feet, and he responded by activating the fuel boost pump. The engine continued to run rough, and shortly after, experienced a total loss of power. The pilot maneuvered the airplane toward a row of trees in the backyard of a residence, and the airplane came to rest inverted, resulting in substantial damage.

Examination of the airplane by a Federal Aviation Administration inspector who responded to the scene revealed that the airplane's fuel selector was set to the right wing tank position, and that the right wing tank contained approximately 8 gallons of fuel. A sample taken from the tank was absent of contamination. Further examination of the engine was scheduled for a later date.

Accident Rpt# CEN13LA068	**11/20/2012 1700 CST**	**Regis# N56226**	**San Antonio, TX**	**Apt: Horizon 74R**
Acft Mk/Mdl BOEING A75L3		**Acft SN 75-888**	**Acft Dmg: SUBSTANTIAL**	**Rpt Status: Factual Prob Caus: Pending**
Eng Mk/Mdl LYCOMING R680			**Fatal 0 Ser Inj 0**	**Flt Conducted Under: FAR 091**
Opr Name: ROSS A. MILES		**Opr dba:**		**Aircraft Fire: NONE**

Summary

The pilot stated that he landed the airplane uneventfully on the grass runway and turned the airplane around at the end of the runway for a takeoff in the opposite direction. The pilot reported that the wind was calm at this time. After liftoff, about 15 feet above the ground, the pilot recognized that the airplane was not producing adequate power or accelerating as expected, so he landed the airplane. The airplane touched down near the departure end of runway, went off the end of the runway, and struck trees. A witness stated that he saw the airplane take off, but when it was about 20 to 30 feet above the ground, the airplane leveled off and appeared to lose power. On-scene examination of the airplane did not reveal any anomalies that would account for the loss of engine power. The weather conditions at the time of the accident were favorable for moderate carburetor icing at cruise power setting and serious icing at descent power setting. It is not known if the pilot used carburetor heat before the accident; however, the carburetor heat control was found in the off position during postaccident examination. Descent power settings yield a throttle angle similar to the low power settings used for taxi operations, and that angle is conducive to the formation of carburetor ice. It is likely that pilot did not apply carburetor heat during the airplane's descent, landing, or ground operations, and did not detect any carburetor ice accumulated during those operations before the ensuing takeoff. Based on the available information, it is likely that an accumulation of carburetor ice resulted in the partial loss of engine power during takeoff.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: A partial loss of engine power during takeoff, likely due to the accumulation of carburetor ice.

Events

1. Takeoff - Loss of engine power (partial)
2. Takeoff-rejected takeoff - Collision with terr/obj (non-CFIT)

Findings - Cause/Factor

1. Environmental issues-Conditions/weather/phenomena-Temp/humidity/pressure-Conducive to carburetor icing-Contributed to outcome - C

Narrative

On November 20, 2012, about 1700 central standard time, a Boeing A75L3, N56226, was damaged when it overran the end of the runway and struck trees after an aborted takeoff from runway 35 at the Horizon Airport (74R), San Antonio, Texas. The pilot reported a loss of engine power which precipitated the aborted takeoff. The pilot and passenger were not injured. The airplane sustained substantial damage to the upper left wing spars. The aircraft was registered to an individual and operated by the commercial pilot under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Visual meteorological conditions prevailed for the flight, which was not operated on a flight plan. The flight originated from the Stinson Municipal Airport (SSF) about 1650.

The pilot stated that the flight began at SSF and an uneventful landing was performed on runway 16 at 74R. The airplane was turned around at the end of the runway for a takeoff from runway 34. The pilot reported that the winds were calm at this time. After liftoff, at about 15 feet above the ground, the pilot recognized that the airplane was not producing adequate power and was not accelerating and he landed the airplane. The airplane touched down near the departure end of runway, went off the end of the runway and struck trees.

A witness stated that the airplane landed on runway 16, made a 180 degree turn at the end of the runway and departed from runway 34. The witness said that he saw the airplane become airborne and when it was about 20 to 30 feet above the ground it leveled off and appeared to lose power.

On-scene examination of the airplane by a Federal Aviation Administration Airworthiness Inspector did not reveal any anomalies that would account for the loss of engine power. The engine was able to be rotated by hand and the intake and exhaust valves functioned normally. The engine oil level was normal and no oil was found in the engine's exhaust. Fuel was present in the fuel tank. The fuel shutoff valve was found in a partially closed position but fuel flowed freely through the fuel strainer and the flow did not decrease until the valve was turned much closer to the off position. The throttle control was found at idle, the mixture control in the full rich position, and the carburetor heat control in the off position.

The temperature an dew point recorded at a station about 3 miles from the accident site were 24 degrees Celsius, and 14 degrees Celsius, respectively. According to a carburetor icing probability chart, the recorded temperature and dew point were in the range of susceptibility for moderate carburetor icing at

cruise power setting and serious icing at descent power setting. The pilot's statement did not mention if carburetor heat was used during the previous landing, or during the accident takeoff.

Accident Rpt# ERA13LA054B 11/10/2012 1055 EST	**Regis# N1370V**	**Williamson, GA**	**Apt: Peach State GA2**
Acft Mk/Mdl BOEING E75	**Acft SN 75-5185**	**Acft Dmg: SUBSTANTIAL**	**Rpt Status: Factual Prob Caus: Pending**
Eng Mk/Mdl CONTINENTAL W670-6N	**Acft TT 928**	**Fatal 0 Ser Inj 0**	**Flt Conducted Under: FAR 091**
Opr Name: JAMES G. RATLIFF	**Opr dba:**		**Aircraft Fire: NONE**

Summary

The pilot of an amateur-built RV-12 intended to land at the non-towered airport, while a Boeing E75 (Stearman), which was the lead airplane in a flight of three Stearman airplanes, planned to fly over the airport at traffic pattern altitude as part of a fly-in event being held at the airport. The pilot of the RV-12 overflew the airport at an altitude of about 600 feet above the traffic pattern altitude and entered a right downwind leg of the traffic pattern for a landing on runway 13. Both pilots stated that they communicated their respective positions and intentions over the airport's common traffic advisory frequency. In addition, they stated that they were looking for each other when the two airplanes collided. The pilots were subsequently able to land their respective airplanes without further incident.

Examination of the airplanes revealed substantial damage to the lower left side of the RV-12's fuselage aft of the engine cowling and to the Stearman's rudder. The damage was consistent with the RV-12 flying on a northwest heading and the Stearman flying on a northerly heading at the time of the collision. Visual meteorological conditions (VMC) prevailed at the time of the accident. While operating in VMC, pilots are required to maintain vigilance and to see and avoid other aircraft.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The inadequate visual lookout by the pilots of both airplanes, which resulted in a midair collision.

Events

1. Approach - Midair collision

Findings - Cause/Factor

1. Personnel issues-Psychological-Attention/monitoring-Monitoring other aircraft-Pilot - C
2. Personnel issues-Psychological-Attention/monitoring-Monitoring other aircraft-Pilot of other aircraft - C

Narrative

On November 10, 2012, about 1055 eastern standard time, an experimental amateur-built Vans RV-12 (RV-12), N678AD, and a Boeing E75 (Stearman), N1370V, both operated by private individuals, collided in midair while on approach to the Peach State Airport (GA2), Williamson, Georgia. The private pilot in the RV-12 and the airline transport pilot in the Stearman were not injured. Visual meteorological conditions prevailed and no flight plans were filed for either flight. The RV-12 departed the Covington Municipal Airport (CVC), Atlanta, Georgia. The Stearman departed Seven Lakes Airport (62GA), Jackson, Georgia. Both airplanes were operated as personal flights in accordance with 14 Code of Federal Regulations Part 91.

Peach State airport was a privately owned, non-towered airport with an elevation of about 930 feet mean sea level (msl) and a traffic pattern attitude of 1,800 feet msl.

According to a Federal Aviation Administration (FAA) inspector, a Veteran's Day celebration was being held at the airport, and the Stearman was the lead airplane in a flight of three Stearmans that planned to over-fly the airport at an altitude of 1,800 feet mean sea level (msl). The pilot of the RV-12 reported that he overflew the airport at an altitude of about 2,000 feet msl and planned to enter a right downwind for runway 13. The Stearman reported that he was flying from south to north and planned to enter a right downwind for runway 13, continue to the northwest, and maneuver back for a 360 degree turn over the runway. Both pilots stated that they communicated their respective positions and intentions over the airport's common traffic advisory frequency (CTAF). In addition, they were attempting to visually acquire each other when the two airplanes collided. Both pilots were subsequently able to land their respective airplanes without further incident.

Examination of the airplanes by an FAA inspector revealed that the lower left side of the RV-12's fuselage, just aft of the cowling, and the Stearman's rudder sustained substantial damage. In addition, the RV-12's nose gear fairing also contained damage consistent with contact with the Stearman's rudder. An approximate 20-inch portion of the top of the Stearman's rudder was folded to the left about 90 degrees.

A witness, who was operating the Unicom/CTAF frequency at GA2, stated that the pilot of the RV-12 reported inbound via an overhead to the right downwind for runway 13. He advised the pilot of the RV-12 of two other aircraft entering the downwind for runway 13, who then stated that he would execute a 360 and re-enter the traffic pattern. The witness was observing an airplane clear the runway after landing, when heard the pilot of the Stearman report inbound from the

southeast for a practice fly-by. About 1 minute later, the pilot of the RV-12 reported entering the downwind for runway 13. He subsequently observed the Stearman approaching from the south, and the RV-12 approaching from the southeast. He asked the Stearman if they had the RV-12 insight; however, just as he released the microphone key, the two airplanes overlapped. He could not tell the approximate position of the two airplanes to each other from his vantage point, and initially believed they experienced a near-miss.

The accident was not captured on radar; however, both pilots reported that they were utilizing handheld Garmin global positioning system (GPS) receivers, which were forwarded to the NTSB Vehicle Recorders Laboratory, Washington, D.C., for data download.

The Stearman pilot was utilizing a Garmin GPSMAP 96C; however, flight information for the Stearman could not be extracted due to the record function having been disabled.

The RV-12 pilot was utilizing a Garmin GPSMAP 496, which captured the accident flight and revealed that the RV-12 overflew the airport at a GPS altitude of about 2,400 feet and entered the downwind leg of the traffic pattern for runway 13 about 1054. The RV-12 was at a GPS altitude of about 1,800 feet, a heading of about 310 degrees, and an airspeed of about 85 knots, at the time of the collision.

FAA FAR 91.113, Right-of-way rules: Except water operations, stated in part:

".(b) General. When weather conditions permit, regardless of whether an operation is conducted under instrument flight rules or visual flight rules, vigilance shall be maintained by each person operating an aircraft so as to see and avoid other aircraft.."

Accident Rpt# WPR14CA063 12/07/2013 0	**Regis# N3981C**	**Bryon, CA**		
Acft Mk/Mdl BURKHART GROB G 103 TWIN II		**Acft Dmg:**	**Rpt Status: Prelim**	**Prob Caus: Pending**
		Fatal 0 **Ser Inj 0**		
Opr Name:	**Opr dba:**		**Aircraft Fire:**	

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Accident Rpt# WPR13FA095	**01/19/2013 1501 MST**	**Regis# N2341N**	**Boulder, UT**	**Apt: N/a**
Acft Mk/Mdl CESSNA 140		**Acft SN 12587**	**Acft Dmg: SUBSTANTIAL**	**Rpt Status: Factual Prob Caus: Pending**
Eng Mk/Mdl LYCOMING O-290D2			**Fatal 2 Ser Inj 0**	**Flt Conducted Under: FAR 091**
Opr Name: BOWMAR PAUL		**Opr dba:**		**Aircraft Fire: NONE**

Narrative

HISTORY OF FLIGHT

On January 19, 2013, about 1501 mountain standard time, a Cessna 140, N2341N, sustained substantial damage when it struck power lines while maneuvering near Boulder, Utah. The airplane was registered and operated by the pilot under the provisions of Title 14 Code of Federal Regulations Part 91. The commercial pilot and passenger were fatally injured. Visual meteorological conditions prevailed and no flight plan was filed for the personal flight. The local flight departed from Escalante Municipal Airport (1L7) Escalante, Utah at an undetermined time.

According to a local power company official, the power line service between Boulder and Escalante were interrupted at 1501 when an automatic breaker tripped. He immediately responded to the power outage and noticed the power lines near mile marker 78 on Utah State Route (SR) 12 were tangled. He stated that a portion of the airplane's wing was lying on the highway and was necessary to move it off the road. He further stated that two power line poles were damaged and the attached power lines were lying near the ground. Power company personnel were able to estimate the height of the power lines at the approximate point of impact to be about 100 feet.

A witness located on the west side of Utah SR 12 near the accident site reported that he observed the airplane fly over his position on an easterly heading. He stated that the engine sounded loud and startled him. He estimated the airplane to be about 200 to 300 feet above ground level (agl) and shortly afterwards; he observed the airplane strike the power lines. He further stated that the airplane's engine sounded loud until it struck the power lines. Another witness, observed the airplane's engine stop and sparks coming from the power lines, after impact.

Several local residents of Escalante witnessed the pilot flying at low altitude on previous flights.

PERSONNEL INFORMATION

The pilot, age 56, held a commercial pilot certificate. He had a commercial and instructor rating for gliders, and private privileges for airplane single-engine land. A third-class airman medical certificate was issued on January 17, 2011, with a limitation stated "must wear corrective lenses." The pilot reported on his most recent medical certificate application; that he had accumulated 2,500 total flight hours. No pilot or airplane logbooks could be located.

AIRCRAFT INFORMATION

The two-seat, high-wing, fixed gear airplane, serial number (S/N) 12587, was manufactured in 1947. It was powered by a Lycoming O-290D2 engine, serial number 6108-21, rated at 135 horse power. The airplane was also equipped with a McCauley fixed pitch propeller, model M74DM, serial number 30761.

METEOROLOGICAL INFORMATION

A review of recorded data from the Bryce Canyon airport (weather reporting facility that is about 40 miles west of the accident site) revealed that the weather conditions at 1553 mountain standard time, were: winds calm, clear, visibility 10 statute miles, temperature 1 degree Celsius, dew point -7 degrees Celsius, and a barometric setting of 30.47 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

Examination of the accident site revealed broken power poles and tangled high power lines about 30 feet east of Utah highway SR-12. The power lines were about 100 feet in height. The first identified point of contact (FIPC) was one of the top power wires, of a group of 5 power lines. Two grounding wires smaller in diameter were on top and three wires carrying about 69,000 volts were about 8 feet lower. There was a small discoloration on the top (west side) wire.

The main wreckage was located about 200 feet down a slope off the east side of the highway. The right wing was detached and located on the highway near the FIPC. The wreckage debris path originated near the area of the wire strike and extended to where the main wreckage was located. The wreckage debris was located within 300 feet from the point of impact. The fuselage, left wing and engine were located down the hill. The wreckage came to rest inverted on a heading of about 310 degrees magnetic. The measured elevation for the accident site was about 6,217 feet, mean sea level.

The right wing was separated from the fuselage at the wing root area. The wing exhibited a large impact compression in the middle portion of the leading edge of the wing, which crushed most of the wing. Rub marks nearly perpendicular to the wing and arcing were observed. Two arcing holes, with black color around them, were observed on the wing skin bottom.

The fuselage came to rest inverted and the left wing remained attached. The left wing exhibited leading edge and wing tip damage.

The left and right stabilizers, rudder, and vertical stabilizer were separated from the fuselage but still attached by their respective flight control cables. The elevator trim tab cable was severed.

Flight control continuity with the attached control cables was established to the cockpit controls.

The engine remained partially attached to the fuselage and several mounts were found fractured. All engine accessories remained attached to the engine via their respective mounts with the exception of the carburetor, which was separated.

A postaccident examination of the airframe and engine revealed no evidence of mechanical anomaly or failures that would have precluded normal operation.

MEDICAL AND PATHOLOGICAL INFORMATION

The Utah county coroner conducted an autopsy on the pilot on January 20, 2013. The medical examiner determined that the cause of death was blunt force injuries.

The FAA's Civil Aeromedical Institute (CAMI) in Oklahoma City, Oklahoma, performed toxicology tests on the pilot. According to CAMI's report, carbon monoxide, cyanide, volatiles, and drugs were tested, and had negative results.

TESTS AND RESEARCH

A Lowrance Airmap 1000, portable navigation device, was located at the accident site and sent to the National Transportation Safety Board Vehicle Recorder Laboratory for examination. No data relating to the accident flight was found on this device.

ADDITIONAL INFORMATION

An examination of the recovered airframe and engine was conducted on February 6, 2013, at the facilities of Air Transport in Phoenix, Arizona. No evidence of preimpact mechanical malfunction was noted during the examination of the recovered airframe and engine. Reference the examination report filed in the public docket, for additional details.

Accident Rpt# WPR14CA090	**01/04/2014 0**	**Regis# N76463**	**Marana, AZ**		
Acft Mk/Mdl CESSNA 140			**Acft Dmg:**	**Rpt Status: Prelim**	**Prob Caus: Pending**
			Fatal 0	**Ser Inj 0**	
Opr Name:		**Opr dba:**		**Aircraft Fire:**	

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Accident Rpt# WPR14CA069	**12/13/2013 0**	**Regis# N7015F**	**Henderson, NV**		
Acft Mk/Mdl CESSNA 150F			**Acft Dmg:**	**Rpt Status: Prelim**	**Prob Caus: Pending**
			Fatal 0	**Ser Inj 0**	
Opr Name:		**Opr dba:**		**Aircraft Fire:**	

Accident Rpt# WPR13LA101	**01/24/2013 1545 PST**	**Regis# N18690**	**Matlock, WA**	**Apt: Sanderson Field Airport SHN**
Acft Mk/Mdl CESSNA 150L		**Acft SN 15074044**	**Acft Dmg: SUBSTANTIAL**	**Rpt Status: Factual Prob Caus: Pending**
Eng Mk/Mdl CONT MOTOR O-200 SERIES		**Acft TT 5574**	**Fatal 0 Ser Inj 0**	**Flt Conducted Under: FAR 091**
Opr Name: ANDREW HANSEN		**Opr dba:**		**Aircraft Fire: NONE**

Summary

The student pilot reported that during his first solo cross-country flight, the weather started to deteriorate. He descended to a lower altitude to avoid clouds and proceeded toward the nearest airport. However, when he tried to level off at the lower altitude, the airplane continued to descend at a rate of about 700 feet per minute. The pilot applied full engine power and ensured that the throttle was positioned for full power, the mixture was full rich, and the fuel selector was on both fuel tanks. The airplane continued to descend, so the pilot elected to land on a nearby road. While on the base leg for the landing, the pilot applied carburetor heat. During the landing flare, the left wing struck a road sign; the airplane departed the road and came to rest inverted about 20 feet from the road. A postaccident examination and engine run revealed no mechanical failures or malfunctions that would have precluded normal operation. The weather conditions at the time of the accident were conducive for serious icing at cruise power settings. It is likely that the student pilot's delayed action in applying carburetor heat resulted in a partial loss of engine power due to carburetor icing.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: A partial loss of engine power after a descent to a lower altitude due to the student pilot's delayed action in applying carburetor heat while operating in conditions conducive to carburetor icing.

Events

1. Enroute-cruise - Loss of engine power (partial)
2. Enroute-cruise - Off-field or emergency landing
3. Landing-flare/touchdown - Collision with terr/obj (non-CFIT)
4. Landing-flare/touchdown - Nose over/nose down

Findings - Cause/Factor

1. Environmental issues-Conditions/weather/phenomena-Temp/humidity/pressure-Conducive to carburetor icing-Contributed to outcome - C
2. Personnel issues-Action/decision-Action-Delayed action-Student pilot - C

Narrative

On January 24, 2013, about 1545 Pacific standard time, a Cessna 150L, N18690, experienced a partial loss of engine power during cruise flight near Matlock, Washington. The pilot subsequently made an off airport forced landing onto a road. The student pilot was uninjured and the airplane sustained substantial damage to the right wing. The airplane was registered to and operated by the pilot under the provisions of 14 Code of Federal Regulations Part 91 as a solo cross country flight. Visual meteorological conditions prevailed and a visual flight rules flight plan had been filed, but was unopened for the flight destined for the Bremerton National Airport (PWT), Bremerton, Washington.

The student pilot reported that he was on the return leg of his first solo cross country flight. About 20 minutes into the flight, he was flying at an altitude of about 3,500 feet above ground level (agl) when the weather started to deteriorate. He descended to an altitude of about 2,500 feet agl and proceeded to the nearest airport that was reporting better weather. En route, he observed that the vertical speed indicator indicated a descent of 700 feet per minute. The pilot applied full power, but the airplane continued to descend; he elected to land onto a nearby road. During the descent he ensured that the mixture was full rich, the fuel selector was on both fuel tanks, and the throttle was at full power. The pilot made a left traffic pattern around the road and just before he turned base he turned on the carburetor heat. As he turned final he observed that the airplane was too high, he idled the throttle and initiated a slip to lose altitude. During the landing flare, the airplane struck a sign along the left side of the road, departed the roadway and came to rest inverted about 20 feet from the road surface. During the accident sequence, the left wing and empennage were substantially damaged.

A post-accident visual inspection of the engine revealed no visual anomalies. The cylinder rocker covers and spark plugs were removed; when compared to the Champion AV-27 chart, the spark plug electrode areas were consistent with 'normal' wear. The valves were undamaged and contained no abnormal thermal discoloration. Cylinder compression and valve continuity was obtained from all cylinders. The removed engine components were reinstalled and the engine was prepared for an engine test run. The airplane was started and idled temporarily before it was operated at various RPMs. There were no noted mechanical failures or malfunctions with the airplane's engine.

The nearest weather reporting station, Sanderson Field Airport in Shelton, Washington, was located at about 11 miles to the east of the accident scene. At

2353, weather was reported as few clouds at 1,700 feet agl, broken clouds at 4,200 feet agl, and overcast clouds at 5,500 feet agl, light rain, 10 miles of visibility, temperature 4 degrees C, dewpoint 4 degrees C, and an altimeter setting of 30.07 inches of mercury.

The temperature and dewpoint were graphed on the Carburetor Icing Probability Chart provided in the Federal Aviation Administration Special Airworthiness Carburetor Icing Prevention Information Bulletin and the conditions were conducive for serious icing at cruise power.

Accident Rpt# WPR14FA078	**12/26/2013 1821 PST**	**Regis# N251JM**	**Fresno, CA**	**Apt: Fresno Chandler Executive FCH**
Acft Mk/Mdl CESSNA 172K-P		**Acft SN 17259188**	**Acft Dmg: DESTROYED**	**Rpt Status: Prelim** **Prob Caus: Pending**
Eng Mk/Mdl LYCOMING O-320 SERIES			**Fatal 2** **Ser Inj 0**	**Flt Conducted Under: FAR 091**
Opr Name: TIMOTHY FARMER		**Opr dba:**		**Aircraft Fire: NONE**

Narrative

On December 26, 2013, about 1821 Pacific standard time, a Cessna 172K, N251JM, was destroyed when it impacted terrain while maneuvering near the Fresno Chandler Executive Airport (FCH), Fresno, California. The airplane was registered to private individuals and operated by the pilot under the provisions of 14 Code of Federal Regulations Part 91. The private pilot and his passenger sustained fatal injuries. Dark night visual meteorological conditions prevailed and no flight plan was filed for the personal flight. The cross-country flight originated from Tehachapi, California at 1643 with an intended destination of FCH.

Preliminary information provided by the Federal Aviation Administration (FAA) revealed that the pilot was receiving Visual Flight Rules (VFR) flight following with Air Traffic Control (ATC). When the flight was about 10 miles south of the airport, the pilot notified ATC that he had the airport in sight. Subsequently, ATC cancelled flight following and approved the pilot to change frequencies.

Multiple witnesses located adjacent to the accident site and airport reported observing the accident airplane enter the airport traffic pattern for runway 30. A witness located on the ramp area of the airport stated that the airplane initially captured his attention when it landed hard about midway down the runway then proceeded to takeoff. Witnesses observed the airplane continue on a northwesterly heading and maneuver for landing on runway 12, where they observed the airplane fly at a high rate of speed about 10 to 15 feet above ground level (agl). The witnesses stated that the airplane entered a climb about three-quarters down the runway and continued to the southwest where a series of turns were performed. Witnesses further stated that they then observed the airplane approach runway 30. Two witnesses located about mid-field of the airport reported observing the airplane fly along the runway about 100 feet agl, and noted that the left wing navigation light appeared to be inoperative. The witnesses stated that as the airplane neared the departure end of runway 30 at an altitude of about 400 feet agl, it rolled to the left and descended in a vertical attitude below their line of site behind a row of hangars.

Examination of the accident site revealed that the airplane impacted terrain about 490 feet southwest of the departure end of runway 30. All major structural items of the airplane were located within about 50 feet of the main wreckage, except for a portion of the outboard left fiberglass wingtip. Numerous white paint chips, landing light lens cover fragments, and a portion of the left fiberglass wingtip was located about 1,406 feet southeast of the threshold of runway 30. A tree about 62 feet in height exhibited numerous broken branches about 40 to 45 feet above the ground. The wreckage was recovered to a secure location for further examination.

Accident Rpt# WPR14CA074	**12/23/2013 0**	**Regis# N80238**	**Fullerton, CA**		
Acft Mk/Mdl CESSNA 172M			**Acft Dmg:**	**Rpt Status: Prelim**	**Prob Caus: Pending**
			Fatal 0	**Ser Inj 0**	
Opr Name:		**Opr dba:**		**Aircraft Fire:**	

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Accident Rpt# WPR13LA402 09/09/2013 1328 PDT	**Regis# N42EP**	**Long Beach, CA**	**Apt: Long Beach /daugherty Field/ LGB**	
Acft Mk/Mdl CESSNA 172N	**Acft SN 17269777**	**Acft Dmg: SUBSTANTIAL**	**Rpt Status: Factual**	**Prob Caus: Pending**
Eng Mk/Mdl LYCOMING O-320 SERIES	**Acft TT 9486**	**Fatal 0 Ser Inj 0**	**Flt Conducted Under: FAR 091**	
Opr Name: WERNTZ DAVID G	**Opr dba:**		**Aircraft Fire: NONE**	

Narrative

On September 9, 2013, about 1328 Pacific daylight time, a Cessna 172N, N42EP, was substantially damaged during a forced landing following a reported loss of engine power at the Long Beach Airport, Long Beach, California. The airplane was registered to and operated by the pilot under the provisions of Title 14 Code of Federal Regulations Part 91. The commercial pilot, sole occupant of the airplane, was not injured. Visual meteorological conditions prevailed and no flight plan was filed for the local personal flight which originated from the El Monte Airport, El Monte, California, about 1130.

The pilot reported that following a touch-and-go landing on runway 25L, he began a normal climb out. Shortly after, the engine "sputtered" and lost engine power. The pilot initiated a forced landing to the remaining runway while verifying the carburetor heat and mixture control positions. Subsequently, the airplane landed hard and came to rest upright.

Examination of the airplane by a Federal Aviation Administration (FAA) inspector revealed that the right wing was structurally damaged. The wreckage was recovered to a secure location for further examination.

Examination of the recovered engine, a Lycoming O-360-A4M, serial number L-29230-36A, revealed that the engine remained attached to the airframe via all its mounts. All engine accessories remained attached to their respective mounts. The engine crankcase and cylinder bases appeared to be coated with oil film. All oil and fuel lines appeared to be intact and secure. The exhaust and induction system was intact. One propeller blade was bent aft about 20 degrees from midspan. The carburetor was intact. The throttle and mixture control cables remained attached to their respective control arms. When actuated using the cockpit controls, the throttle and mixture moved from stop to stop.

The top spark plugs and ignition leads were reinstalled. The propeller was removed from the engine, straightened, and reinstalled on the engine. The engine was started 3 times utilizing the magneto starter switch. The engine ran at an idle power setting for approximately 5 to 10 seconds before shutting off. The carburetor was removed and disassembled. The plastic floats and needle were intact and appeared to be undamaged. No debris was observed within the float bowl. Air was applied to the venturi nozzle and air movement was noticed throughout the fuel passages. Pliable debris, similar to silicone, was observed within the mixture metering sleeve. The debris was removed and the carburetor was reassembled and subsequently reinstalled on the engine. Silicone was also observed on the carburetor airbox assembly. The source of the debris inside the carburetor was not determined.

The engine was started and ran without incident throughout various power settings before being shut down by utilizing the mixture cut off.

Review of the airplane maintenance logbooks revealed that on August 22, 2013, at a tachometer time of 1,037.4 hours, the carburetor was removed, cleaned, and the needle valve and seat were checked. The carburetor was reinstalled on the engine and subsequently returned to service. The engine had accumulated 1.5 hours tachometer time since the carburetor maintenance was performed.

Accident Rpt# CEN14CA055	**11/02/2013 0**	**Regis# N6303E**	**Loveland, CO**		
Acft Mk/Mdl CESSNA 172N			**Acft Dmg:**	**Rpt Status: Prelim**	**Prob Caus: Pending**
			Fatal 0	**Ser Inj 0**	
Opr Name:		**Opr dba:**		**Aircraft Fire:**	

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Accident Rpt# WPR12LA325	**07/10/2012 930 MDT**	**Regis# N30753**	**Gooding, ID**	**Apt: Gooding Municipal Airport GNG**
Acft Mk/Mdl CESSNA 177-B		**Acft SN 17701443**	**Acft Dmg: SUBSTANTIAL**	**Rpt Status: Factual Prob Caus: Pending**
Eng Mk/Mdl LYCOMING O360		**Acft TT 4694**	**Fatal 0 Ser Inj 1**	**Flt Conducted Under: FAR 091**
Opr Name: PAMELA G WILLIAMS		**Opr dba:**		**Aircraft Fire: NONE**
				AW Cert: STN

Summary

The pilot reported that the airplane did not initially encounter turbulence during the approach to the runway. However, after the airplane crossed the approach end of the runway and the pilot reduced the engine power for the landing flare, the airplane's left wing was "abruptly" pushed upward. The pilot was unable to maintain control; the right main landing gear and the nose wheel touched down first, and then the left main landing gear hit the runway hard. The airplane exited the right side of the runway into weeds and proceeded into a small ditch. The pilot added power and taxied the airplane back to the runway and then subsequently taxied to the ramp. The pilot reported no preimpact mechanical malfunctions or failures with the airplane that would have precluded normal operation.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The pilot's failure to maintain airplane control after encountering an unexpected wind gust during landing.

Events

1. Landing-flare/touchdown - Loss of control on ground
2. Landing-landing roll - Runway excursion
3. Landing-landing roll - Collision with terr/obj (non-CFIT)

Findings - Cause/Factor

1. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-(general)-Not attained/maintained - C
2. Personnel issues-Task performance-Use of equip/info-Aircraft control-Pilot - C
3. Environmental issues-Conditions/weather/phenomena-Wind-Gusts-Awareness of condition

Narrative

On July 10, 2012, about 0930 mountain daylight time (MDT), N30753, a Cessna 177B airplane, was substantially damaged while landing at the Gooding Municipal Airport (GNG), Gooding, Idaho. The certified private pilot sustained serious injuries and the sole passenger was not injured. Visual meteorological conditions prevailed at the time of the accident. The personal cross-country flight was being operated in accordance with 14 Code of Federal Regulations Part 91, and a visual flight rules (VFR) flight plan had been filed and was active at the time of the accident. The flight departed the Yakima Air Terminal/McAllister Field (YKM), Yakima, Washington, about 0630 MDT, with GNG as its destination.

In a postaccident conversation, as well as in a report submitted to the National Transportation Safety Board investigator-in-charge, the pilot reported that no adverse winds were reported as she monitored the UNICOM frequency about 10 miles out while proceeding inbound to GNG. The pilot stated that when she reported 3 miles and 2 miles from the airport, no turbulence was encountered, and that the approach was on the center line [of the runway] and the glide path, and that the approach was normal. The pilot further stated that after crossing over the approach end of the runway she pulled the power to idle and began to flare, at which time the airplane's left wing was abruptly pushed upward. This was followed by the right main tire contacting the runway, the nose wheel hitting the runway, and the left main landing gear hitting [the runway] hard. The pilot reported that the airplane then bounced into the weeds off the right side of the runway before going into a small ditch. The pilot added that she was able to add power and managed to get the airplane back up on the runway and taxi to a fixed based operator's facility where she inspected the airplane. The pilot reported that the firewall was bent and the left side of the fuselage was wrinkled. The pilot further reported that there were no mechanical anomalies with either the airplane or the engine prior to or during the flight that would have precluded normal operation.

At 0953, the weather reporting facility at the Jerome County Airport Idaho (JER), Jerome, Idaho, which is located about 18 nautical miles southeast of the accident site, reported wind 100 degrees at 9 knots, with no gusts reported.

Accident Rpt# ERA13LA410	**09/04/2013 1835 EDT**	**Regis# N59JK**	**Woodrow, SC**	**Apt: Hopkins Air Field NONE**
Acft Mk/Mdl CESSNA 188B		**Acft SN 18801041**	**Acft Dmg: SUBSTANTIAL**	**Rpt Status: Factual Prob Caus: Pending**
Eng Mk/Mdl CONT MOTOR O-470-R		**Acft TT 5393**	**Fatal 0 Ser Inj 0**	**Flt Conducted Under: FAR 137**
Opr Name: ROBERT E. HOPKINS JR.		**Opr dba: HOPKINS FLYING SERVICE**		**Aircraft Fire: NONE**

Narrative

HISTORY OF FLIGHT

On September 4, 2013, about 1835 eastern daylight time, a Cessna 188B, N59JK, operated by Hopkins Flying Service was substantially damaged during landing roll, after a flight control malfunction, at a private airport in Woodrow, South Carolina. The commercial pilot received minor injuries. Visual meteorological conditions prevailed for the aerial application flight conducted under the provisions of Title 14 Code of Federal Regulations Part 137.

According to the pilot, he was spraying a cotton field near Lydia, South Carolina when he completed a pass and at the end of the field, pulled up to turn to the right. During the climb he applied right rudder as usual but this time, the right rudder pedal assembly broke off, and went up against the back of the hopper tank.

The pilot then decided to return to a private airport where the airplane was based in Woodrow, South Carolina as it was larger than the other spray strips in the area. Upon arrival at the airport, he flew over the top and used his cell phone to call and let personnel at the field know he would be landing without rudder control.

The landing was uneventful, but during the landing roll, the airplane began to turn left. The pilot however had no way to correct for the left turn. The airplane then exited the left side of the runway and entered a soybean field. The right main landing gear then collapsed, and the the right wing impacted the ground.

PERSONNEL INFORMATION

According to Federal Aviation Administration (FAA) and pilot records, the pilot held a commercial pilot certificate with a rating for airplane single-engine land. His most recent FAA second-class medical certificate was issued on January 30, 2013. He reported that he had accrued 2,249 total hours of flight experience, of which, 1,392 hours were in the accident airplane make and model.

AIRCRAFT INFORMATION

The accident aircraft was a single seat, strut braced, low wing monoplane specifically designed by the manufacturer for aerial application use. The tail cone and empennage assemblies were of semi-monocoque construction. From the tailcone forward, a welded, tubular-steel structure was incorporated, which was covered with aluminum skin panels. It was equipped with a liquid dispersal system, which included a fiber glass reinforced plastic hopper which was located immediately forward of the cockpit, and a conventionally configured heavy duty landing gear system, which consisted of chrome-vanadium steel main landing gear springs, and a spring-steel tubular tail wheel spring, with a steerable tailwheel. It was powered by a normal aspirated, 230 horsepower, six-cylinder, horizontally opposed, air cooled, engine.

The interior of the airplane was internally corrosion-proofed, and the external finish was acid resistant.

According to FAA and maintenance records the airplane was manufactured in 1973.

On April 27, 1973, the airplane was sold by the Cessna Aircraft Company to an operator in Montana and was registered as N21796.

On July 24 1973, the airplane was sold to an operator in Canada, and was removed from the United States Civil Aircraft Registry and registered in Canada as C-FFZI.

On July 12, 1982 the airplane was involved in an accident during landing which damaged the landing gear, one of the wings, and the vertical stabilizer.

On March 24, 1994 it was sold to an operator in Colorado, and reinstated on the United States Civil Registry as N59JK.

On July 16, 1997, the airplane was modified by the installation of Aeronautical Testing Service, Inc. vortex generators on the wings and "Split Flaps" on the lower trailing edge of the inboard stub wing.

On April 2, 2008, it was sold by the operator in Colorado and over the next year was operated by a succession of operators.

On September 14, 2009, it was purchased by Hopkins Flying Service.

On April 7, 2013 a Knisley Welding aftermarket modified exhaust system was installed.

On April 7, 2013, the airplane received its most recent annual inspection.

At the time of the accident, the airplane had accrued 5,393.2 total hours of operation.

METEOROLOGICAL INFORMATION

The recorded weather at Shaw Air Force Base (SSC), Sumter, South Carolina, located 8 nautical miles southwest of the accident site, at 1858, included: winds 330 at 4 knots, 10 miles visibility, few clouds at 5,500 feet, broken clouds at 10,000 feet, temperature 31 degrees C, dew point 19 degrees C, and an altimeter setting of 29.99 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

Examination of the wreckage revealed that the right wing and landing gear structure was substantially damaged.

Examination of the right rudder pedal arm and right rudder bar were constructed of steel tubing. Further examination revealed the presence of a plug in the top of the tubing which made up the right rudder pedal arm. This plug appeared to be made of a flexible material similar to silicone sealant. The left rudder pedal arm also contained a plug of this same silicone like material. Both the right rudder pedal arm, and the right rudder bar exhibited significant amounts of corrosion, and it was discovered that, the right rudder pedal arm had fractured just above its mounting location on the right rudder bar.

SURVIVAL FACTORS

The pilot who was not wearing a helmet received minor injuries during the accident when his shoulder came into contact with the right side of the cockpit.

The cockpit was surrounded by a welded tubular steel structure and featured an emergency door release system to aid in egress, and a fire extinguisher. Cockpit seals and two cockpit pressurization scoops helped to lessen the possibility of contamination of the pilot by chemicals. The instrument panel crash pad was covered in ¬ inch black Ensolite, and urethane bumper pads were bonded to the tubular steel structure above the cockpit door, down the corner doorposts, across the tubular structure behind the pilots head, and across the lower door seal.

Wire cutter blades were installed on the landing gear struts and in front of the cockpit windshield. A steel deflector cable was installed between the top of the cockpit canopy and the top of the vertical tail.

The pilot restraint system consisted of seat belts and a double-strap shoulder harness. The lower ends of the harness were permanently attached to the seatbelt.

According to Cessna Single Engine Service Bulletin SEB96-9, Service experience indicated that the seat belt and shoulder harness assembly could become worn, frayed and/or deteriorated. To assist in maintaining optimum seat belt and shoulder harness performance and to minimize the potential for failure of the pilot restraint system, the service bulletin required that the seat belt and shoulder harness assembly should be inspected and replaced at specific intervals.

This service bulletin required that some seat belt and shoulder harnesses be replaced before flight and some within 100 hours or six months, however, ultimately all the existing seat belt and shoulder harness restraint systems should have been replaced within one year.

For airplanes equipped with a four point seat belt and shoulder harness restraint system such as the accident airplane, an initial inspection was required and then an operational inspection was to be accomplished within the next 50 hours of operation or 3 months whichever occurred first.

Repetitive inspections were then required which included an operational inspection 50 hours of operation after the initial inspection or a seat belt and shoulder harness replacement.

The replacement of the seat belt and shoulder harness with a five point restraint system was then required before the next flight, for harnesses that failed an operational inspection, or within the next 12 months, for seat belt and shoulder harnesses that passed the initial operational inspection.

Examination of the seat belts and double strap shoulder harness in the airplane revealed however, that they were manufactured in 1972. They displayed areas of broken stitching, wear, fading, and furthermore, graying, which indicated that they were also deteriorating due to exposure to sunlight and ultra violet rays.

TESTS AND RESEARCH

Rudder, Brakes, and Tail Wheel

The primary flight control surfaces (ailerons, elevator, and rudder) were controlled by a conventional control stick and rudder pedal arrangement.

The rudder system consisted of individual rudder pedal assemblies, with return springs, rudder, rudder bellcrank, cables, and pulleys.

The hydraulic brakes on the main wheels were conventionally operated by applying toe pressure to the top of the rudder pedals, with the rotation of the pedals actuating the brake master cylinders, which would result in braking action on the main wheels.

The tailwheel steering was controlled through the tailwheel steering arms by cables and bellcranks attached to the rudder control cables. Tailwheel steering of 24 degrees left and right was available, and for tighter turns, application of toe pressure on either rudder pedal would cause the tailwheel to free swivel, enabling the airplane to be pivoted around the wheel being braked. The tailwheel was also equipped with an anti-swivel locking system which could be engaged by the pilot to limit steering to 2.5 degrees left and right.

Examination of the rudder system, brake system, and tailwheel steering systems revealed that with the right rudder pedal arm separated from the right rudder pedal bar, that right rudder, right brake, and right tailwheel steering, would not have been available.

Interior Care

According to the Cessna 188 Owner's Manual, care of the interior of the airplane was as important as the care of the exterior. The primary factors to be considered being cleanliness of the cockpit area and freedom from dirt and corrosion throughout the entire airframe, advising that "Some dirt and toxic chemicals will find its way into the fuselage through long periods of use; these hazards must be minimized if the pilot is to operate the airplane with safety and if the airplane is to give the long service it was designed to give. It was also good practice, before cleaning, to check the interior for signs of leaking fittings and corrosion and to note any areas where further investigation is needed; however, to not make any repairs until the airplane was thoroughly cleaned to prevent contamination from toxic chemicals.

To facilitate cleaning and inspection of the interior, the fuselage was equipped with removal panels. Two large panels on each side of the fuselage were completely removable for access to the interior structure, hopper, and cockpit area. A large door which was hinged at the top, was also located just aft of the firewall on each side of the airplane for access to the forward fuselage components. Smaller removal panels on the sides of the fuselage tailcone provided access to the control system cables and fuselage structure. The engine cowling was also completely removable for access to the engine. In general, the entire fuselage structure could be exposed for cleaning and inspection.

The Owner's Manual also advised that in order to thoroughly clean the fuselage or hopper interior to first hose it down with water, and then wash with warm soapy water. A hose rinse should then follow to flush away the soapy water. It further went on to say that, when hosing down the interior it was best to remove the pilot's seat and precautions should be made to keep water away from the instrument panel, radio, heater outlets, and map compartment, and that a

protective waterproof covering for these items was recommended.

Service Manual and Illustrated Parts Catalog

Review of the Cessna 188 and 188T Service Manual, and Cessna Model 188 Series Illustrated Parts Catalog (IPC), revealed that the manufacturer had published inspection criteria for the airplane based on operating usage and operating environment, that provided mandatory time and inspection time intervals for components and airplane structures, as well as information on disassembly, overhaul, and parts breakdowns.

The manufacturer had also enacted a Corrosion Prevention and Control Program (CPCP) to help prevent or control corrosion in the airplane's primary structure so that it did not cause a risk to continued airworthiness as the airplane aged.

Further review of the Service Manual also revealed that the manufacturer had included expanded maintenance inspection items that were to be examined after the first 100 hours of operation. The inspection was then to be repeated every 600 hours of operation, or 12 months, whichever occurred first, after the initial inspection had been accomplished, and then every 600 hours of operation.

A Supplemental Inspection Document (SID) was also included in the Service Manual that listed items that were to be examined after 12,000 hours or 20 years, whichever occurred first, after the initial inspection had been accomplished, for airplanes operating in a typical usage environment. Furthermore, the Service Manual included items for airplanes that were operated in a severe usage environment (including aerial application) that were to be examined after the first 6,000 hours of operation or 10 years, whichever occurred first, with the inspection to be repeated every 1,000 hours of operation or 5 years, whichever occurred first.

Examination of the Service Manual, IPC, CPCP, and SID also revealed that guidance regarding corrosion inspection and corrosion control of the rudder system was included which contained information regarding rudder attachment (hinge brackets, hinge bolts, and hinge bearings), the rudder structure (rudder skins, ribs, forward and aft spars, and torque tube), the "rudder pedal torque tube", and cable attachments, and the rudder cable system (control cables and pulleys).

Materials Laboratory Examination

Examination of the rudder pedal assemblies by the NTSB Materials Laboratory revealed that on the outboard side of the right rudder pedal, the right rudder pedal arm was affixed to the pedal arm cross shaft using a cotter pin, and modified fender washer and bolt/nut assembly which was not specified in either the Service Manual or IPC. When the fender washer was removed from the right rudder pedal, an elongated hole due to adhesive wear was discovered.

The inboard side of the right rudder pedal was also discovered to be affixed to the pedal arm cross shaft using a cotter pin and bronze bushing. Neither of which was specified in either the Service Manual or IPC. Further examination also revealed that the bushing was not part of the originally manufactured rudder pedal assembly, and it had been inserted through a hole which had been drilled into the inboard side of the right rudder pedal.

Examination of the silicone plugs which had been applied and cured as a thixotropic paste in the top of the left and right rudder pedal arms revealed that, remnants of corrosion product had adhered to the silicone plugs indicating, that corrosion product was present before the application of the silicone resin occurred.

Examination of the right rudder pedal arm for corrosion also revealed that the external surfaces of the right rudder pedal arm exhibited areas with disbonded topcoat paint, and exposed steel with minor surface corrosion. Internally however, the right rudder pedal arm exhibited heavy rust scaling over all surfaces and rust scale which had sloughed from the surfaces had collected at the base of the right rudder pedal arm where it attached to the right rudder bar. Also though Measurements of the tube wall thickness at the top of the rudder pedal arm appeared to be full thickness with measurements of 0.054 inch, 0.053 inch, 0.056 inch, and 0.055 inch, measured at 90 degree intervals around the circumference, measurements of the tube wall thickness at the point of the fracture were only 0.030 inch at the thickest point, and 0.013 at the thinnest point.

Maintenance Records

Review of the maintenance records revealed no record of when the right rudder pedal had been modified by addition of the fender washer and bolt/nut assembly on the outboard side or of the bronze bushing assembly on the inboard side. Nor was any record discovered as to when the rudder pedal arms had

the silicon sealant plugs added to them. Furthermore, no record of Supplemental Inspection Number: 27-20-01 being accomplished was discovered.

Accident Rpt# WPR14CA083	**12/31/2013 0**	**Regis# N369JJ**	**Salinas, CA**		
Acft Mk/Mdl CESSNA 195A			**Acft Dmg:**	**Rpt Status: Prelim**	**Prob Caus: Pending**
			Fatal 0	**Ser Inj 0**	
Opr Name:		**Opr dba:**		**Aircraft Fire:**	

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Accident Rpt# WPR13CA409 09/14/2013 1545	**Regis# N4324N**	**Meadow Creek, MT**	**Apt: Meadow Creek Usfs 0S1**
Acft Mk/Mdl CESSNA 195A-UNDESIGNAT	**Acft SN 7085**	**Acft Dmg: SUBSTANTIAL**	**Rpt Status: Factual Prob Caus: Pending**
Eng Mk/Mdl JACOBS L4 /R755-7	**Acft TT 5139**	**Fatal 0 Ser Inj 0**	**Flt Conducted Under: FAR 091**
Opr Name: LEIGHTON ALEXANDER C	**Opr dba:**		**Aircraft Fire: NONE**

Narrative

The pilot reported that during the takeoff roll on a rough turf runway the airplane bounced and swerved to the right. The pilot corrected for the swerve when the airplane bounced a second time and despite his inputs, the airplane departed the left side of the runway. The right wheel encountered a depression and collapsed; subsequently the right wing struck the ground and sustained substantial damage. The pilot reported no preimpact mechanical failures or malfunctions with the airframe or engine that would have precluded normal operation.

Accident Rpt# ERA14LA076	**12/19/2013 2351 EST**	**Regis# N5307A**	**Tampa, FL**	**Apt: Tampa International Airport TPA**
Acft Mk/Mdl CESSNA 210N		**Acft SN 21063360**	**Acft Dmg: SUBSTANTIAL**	**Rpt Status: Prelim** **Prob Caus: Pending**
Eng Mk/Mdl CONTINENTAL MOTORS IO-520L		**Acft TT 21788**	**Fatal 0** **Ser Inj 1**	**Flt Conducted Under: FAR 135**
Opr Name: AIRNET SYSTEMS, INC.		**Opr dba:**		**Aircraft Fire: GRD**

Narrative

On December 19, 2013, at 2351 eastern standard time, a Cessna 210N, N5307A, was substantially damaged during a forced landing following a total loss of engine power while on approach to Tampa International Airport (TPA), Tampa, Florida. The commercial pilot was seriously injured. Visual meteorological conditions prevailed and the airplane was operating on an instrument flight rules flight plan. The flight had originated from Valdosta Regional Airport (VLD), about 2307, and was destined for TPA. The on-demand air cargo flight was conducted under the provisions of Title 14 Code of Federal Regulations Part 135.

According to preliminary air traffic control (ATC) radar and voice communication information provided by the Federal Aviation Administration, while approaching TPA, the pilot advised ATC that the airplane's engine was experiencing difficulties and that he needed to land the airplane on an alternate runway. The pilot was subsequently cleared to land on runway 19R. The crew of a helicopter operated by the Tampa Police Department observed the airplane as it approached and impacted a berm short of the runway, on the airport property. The helicopter crew then landed adjacent to the accident site, and one of the crewmembers successfully extracted the pilot from the wreckage.

An examination of the airframe and engine were scheduled for a later date.

Accident Rpt# ERA13LA005 10/02/2012 900 EDT	**Regis# N8025M**	**Burlington, VT**	**Apt: Burlington BTV**	
Acft Mk/Mdl CESSNA 310I	**Acft SN 310I0025**	**Acft Dmg: SUBSTANTIAL**	**Rpt Status: Factual**	**Prob Caus: Pending**
Eng Mk/Mdl CONTINENTAL MOTORS INC. IO-470U	**Acft TT 3675**	**Fatal 0 Ser Inj 0**	**Flt Conducted Under: FAR 091**	
Opr Name: KYLE B. CLARK	**Opr dba:**		**Aircraft Fire: NONE**	

Summary

The pilot reported that he landed the multiengine airplane without incident; however, while taxiing after landing, the left main landing gear collapsed, which resulted in substantial damage to the left wing and left horizontal stabilizer. Subsequent examination of the airplane revealed that the left main landing gear bellcrank pin had separated from its bushing. The pin was not located; however, metallurgical examination of the left main landing gear bellcrank and retraction link revealed significant deformation and fracturing of the bellcrank bushing, which was consistent with a very large force applied along the axis of the link. The deformations on the link suggested that the pin fractured inside the hole and exited the bore as two separate pieces. Although an overstress failure seems probable, other failure modes, such as a significant fatigue crack cannot be ruled out because the fractured pin fragments were not located. The airplane was manufactured about 38 years before the accident. It had been operated for about 3,675 total hours, about 25 hours of which occurred since its most recent annual inspection, which was performed about 2 months earlier.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The collapse of the left main landing gear due to a failure of the left main gear bellcrank pin for reasons that could not be determined because the pieces of the fractured bellcrank pin were not located.

Events

1. Taxi-from runway - Landing gear collapse

Findings - Cause/Factor

1. Aircraft-Aircraft systems-Landing gear system-Gear extension and retract sys-Failure - C
2. Not determined-Not determined-(general)-(general)-Unknown/Not determined - C

Narrative

On October 2, 2012, about 0900 eastern daylight time, a Cessna 310I, N8025M, operated by a private individual, was substantially damaged while taxiing after landing at the Burlington International Airport (BTV), Burlington, Vermont. The private pilot and a passenger were not injured. Visual meteorological conditions prevailed and no flight plan had been filed for the local personal flight that was conducted under the provisions of 14 Code of Federal Regulations Part 91.

According to the pilot, the airplane landed on runway 15, an 8,320-foot-long, asphalt and concrete runway without incident. He taxied toward the end of the runway and was making a right turn onto taxiway "C" when the left landing gear began to collapse. The left side of the airplane struck the ground, which resulted in substantial damage to the left wing and left horizontal stabilizer.

Subsequent examination of the airplane by a Federal Aviation Administration (FAA) inspector revealed that the left main gear bellcrank pin separated from its bushing. The pin was not located; however, the left main gear bellcrank and retraction link were removed and forwarded to the NTSB Materials Laboratory, Washington, D.C., for examination.

The airplane was manufactured in 1964. According to an FAA inspector, at the time of the accident, the airplane had been operated for about 3,675 total hours and 25 hours since its most recent annual inspection, which was performed on August 8, 2012.

Metallurgical examination revealed that the bellcrank and retraction link were connected by a pin inserted through a clevis on the long arm of the bellcrank and a pivot hole on the retraction link. One of the clevis tangs was bent outward and contained a small crack. Both flange bushings were fractured in similar manners on the inside of the clevis and the liberated halves of the bushings displayed features consistent with overstress, with no evidence of progressive cracking. The edges of the inner bore of the pivot hole in the retraction link were locally deformed radially outward in one direction on each side of the link, consistent with pin contact. [Additional information can be found in the Materials Laboratory Factual Report located in the public docket.]

According to a representative from Cessna Aircraft Company, Cessna was not aware of any previous failures or separations involving only the main landing gear bellcrank pin on Cessna 310 series airplanes.

Accident Rpt# CEN14FA110	**01/10/2014 1948 EST**	**Regis# N3829G**	**Waterford, MI**	**Apt: Oakland County International A PTK**
Acft Mk/Mdl CESSNA 310R		**Acft SN 924**	**Acft Dmg: DESTROYED**	**Rpt Status: Prelim**	**Prob Caus: Pending**
			Fatal 1	**Ser Inj 0**	**Flt Conducted Under: FAR 091**
Opr Name: ROYAL AIR FREIGHT, INC		**Opr dba:**		**Aircraft Fire: GRD**

Narrative

On January 10, 2014, about 1948 eastern standard time, a Cessna 310R, N3829G, impacted trees and terrain about 1,500 feet west of the approach end of runway 9R (6,521 feet by 150 feet, asphalt) at Oakland County International Airport (PTK), Pontiac, Michigan, during an instrument landing system approach to the runway. Night instrument meteorological conditions prevailed at the time of the accident. The airplane was destroyed by impact forces and post impact fire. The commercial pilot sustained fatal injuries. The airplane was registered to and operated by Royal Air Freight, Inc. as Flight 907 under 14 Code of Federal Regulations Part 91. The positioning flight was operating on an instrument rules flight plan and departed from Fulton County Airport-Brown Field (FTY), Atlanta, Georgia, about 1701, and was destined to PTK.

Accident Rpt# ERA13FA082	**12/08/2012 1334 EST**	**Regis# N297DB**	**Lake Worth, FL**	**Apt: Palm Beach County Park Airport LNA**
Acft Mk/Mdl CESSNA 421C		**Acft SN 421C0826**	**Acft Dmg: SUBSTANTIAL**	**Rpt Status: Factual Prob Caus: Pending**
Eng Mk/Mdl TELEDYNE CONTINENTAL MOTORS		**Acft TT 7040**	**Fatal 1 Ser Inj 0**	**Flt Conducted Under: FAR 091**
Opr Name: SUBWAY DEVELOPMENT OF SOUTHEAST FLORIDA, INC.		**Opr dba:**		**Aircraft Fire: GRD**
				AW Cert: STN

Summary

The twin-engine airplane was released to the pilot (who was also the airplane owner) after an annual inspection and repainting of the airplane had been completed. Before the accident flight, which was the second flight after maintenance, the pilot performed an engine run-up for several minutes before taxiing to the end of the departure runway for takeoff. According to witnesses, the airplane lifted off about halfway down the runway and initially climbed at a normal rate. Several witnesses then observed the airplane suddenly yaw to the left for 1 or 2 seconds, and the airplane's nose continued to pitch up before the airplane rolled left and descended vertically, nose-down, until it disappeared from view. One witness, a flight instructor, said, "The airplane just kept pitching up, and then it looked like a VMC [the airplane's minimum controllable airspeed with only one engine operating] roll."

Examination of the left engine revealed signatures consistent with contact between the piston domes and the valves. The crankcase halves were separated and the No. 1 cylinder main bearing was rotated, and damaged and distorted severely, with bearing fragments located in the oil sump. Bearing material was also extruded from its steel backing. The No. 3 cylinder main bearing showed accelerated wear and wiping of the bearing material. Damage and signatures consistent with excessive heat due to oil starvation were observed on the No. 1 and No. 3 cylinder main bearing journals as well as the No. 1 and No. 2 cylinder connecting rod journals. The camshaft gear was also damaged, with five gear teeth sheared from the gear. A review of engine maintenance records revealed that no maintenance had been performed on the engine that would have required breaking of crankcase thru-bolt torques (such as cylinder removal) since its most recent overhaul, which was completed more than 3 years and 314 flight hours before the accident flight. The reason for the engine failure could not be determined because of the impact and postaccident fire damage.

Examination of the wreckage revealed that the landing gear was in the down and locked position, the left engine propeller blades were in the feathered position, and the left fuel selector valve was in the off position. Examination of the manufacturer's Pilot Operating Handbook revealed that if properly configured, with the landing gear retracted, the airplane would have been capable of a 500 foot-per-minute rate of climb with only one operating engine on the day of the accident. As found, the airplane was not configured in accordance with the after-takeoff checklist or the engine failure after takeoff checklist.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The pilot's failure to follow established engine-out procedures and to maintain a proper airspeed after the total loss of engine power on one of the airplane's two engines during the initial climb. Contributing to the accident was the total loss of engine power due to a loss of torque on the crankcase bolts for reasons that could not be determined because of impact- and fire-related damage to the engine.

Events

1. Initial climb - Loss of engine power (partial)
2. Initial climb - Loss of control in flight
3. Uncontrolled descent - Collision with terr/obj (non-CFIT)
4. Post-impact - Fire/smoke (post-impact)

Findings - Cause/Factor

1. Personnel issues-Task performance-Use of equip/info-Use of checklist-Pilot - C
2. Aircraft-Aircraft systems-Landing gear system-Gear extension and retract sys-Incorrect use/operation - C
3. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Engine out control-Incorrect use/operation - C
4. Personnel issues-Action/decision-Action-Incorrect action performance-Pilot - C
5. Aircraft-Aircraft power plant-Engine (reciprocating)-Recip eng front section-Damaged/degraded - F
6. Not determined-Not determined-(general)-(general)-Unknown/Not determined

Narrative

HISTORY OF FLIGHT

On December 8, 2012, at 1334 eastern standard time, a Cessna 421C, N297DB, operated by a private individual, was destroyed when it collided with trees and terrain following a loss of control after takeoff from North Palm Beach County Airpark (LNA), Lantana, Florida. The commercial pilot was fatally injured. Visual meteorological conditions prevailed, and no flight plan was filed for the personal flight, which was conducted under the provisions of Title 14 Code of Federal

Regulations Part 91.

The pilot took delivery of the airplane from a maintenance facility that had just completed an annual inspection and repainting of the airplane. According to the owner of the facility, who was a certificated pilot and an airframe and powerplant mechanic, the pilot completed the preflight inspection and the airplane was towed outside. The pilot started the airplane, but then shutdown to resolve an alternator charging light. Afterwards, the pilot stated that he planned to fly to Okeechobee, Florida, complete a few landings, and then continue to Miami.

According to the mechanic, the pilot performed a ground run of the airplane for several minutes before taxiing to the approach end of Runway 3 for takeoff. The airplane lifted off about halfway down the runway and climbed at a "normal" rate. The mechanic then observed the airplane suddenly yaw to the left "for a second or two" and the airplane's nose continued to pitch up before rolling left and descending vertically, nose-down, until it disappeared from view.

Several witnesses provided similar accounts to a Federal Aviation Administration (FAA) inspector and the local sheriff's department. One witness, a certificated flight instructor said, "The airplane just kept pitching up, and then it looked like a VMC roll."

PERSONNEL INFORMATION

The pilot held a commercial pilot certificate with ratings for airplane single-engine land and sea, airplane multiengine land and instrument airplane. His most recent FAA third-class medical certificate was issued on February 27, 2008. An examination of the pilot's logbook revealed that he had logged 1,217 total hours of flight experience, of which 175 hours were in multiengine airplanes.

AIRCRAFT INFORMATION

According to FAA and maintenance records, the airplane was manufactured in 1980. Its most recent annual inspection was completed December 3, 2012, at 7,039.9 aircraft hours. The airplane had accrued 2.2 hours of flight time after the inspection.The No 2 (right) engine was overhauled at RAM Aircraft, Waco, Texas, on September 13, 2006. At the time of its most recent annual inspection, the engine had accrued 966.3 hours since major overhaul (SMOH).The No. 1 (left) engine was overhauled at RAM Aircraft, Waco, Texas, on October 16, 2009. At the time of its most recent annual inspection, the engine had accrued 312.6 hours SMOH.Oil samples were taken from each engine at the most recent annual inspection, and sample testing was completed at Aviation Oil Analysis, Phoenix, Arizona, on October 29, 2012. According to the report, for metals and contaminants content, "All values appear normal." The owner of the maintenance facility where the annual inspection was completed held FAA commercial pilot, flight instructor, and airframe and powerplant certificates. In an interview, he said he performed a test flight with the accident pilot at the completion of the annual inspection. Prior to takeoff on the test flight, the propeller rpm was matched on both engines on the ground, but after takeoff the left engine showed 100 rpm above maximum when the right engine was at maximum.

Once the rpm was matched manually by the pilot, the fuel flow on the left engine was about 1.5 to 2.0 gallons per hour below that of the right engine. The fuel flow rate on the left engine was also below that prescribed in the engine maintenance guidance. (SID 97-3).

The airplane was flown for 1.2 hours, and during the flight cabin pressurization, prop synchronization, flight controls, and the autopilot were tested. About mid-flight, the left alternator segment light illuminated, and the ampmeter/voltmeter showed a drop in voltage. About 5 minutes later, the light extinguished, and the ampmeter/voltmeter showed normal voltage for the remainder of the flight.

After landing, the airplane was shut down, and the accident pilot was told that the propeller rpm and the fuel flow needed adjustment on the left engine only. There were also some cosmetic corrections that needed to be made.

After the corrections were made and prior to delivery of the airplane to the pilot, a complete run-up was performed, and the maintenance records were reviewed to confirm all the work that was done during the annual inspection.

The airplane was equipped with two hydraulic pumps, and therefore the hydraulic system would remain pressurized with only one engine operating.

METEOROLOGICAL INFORMATION

At 1332, the weather reported at Palm Beach International Airport (PBI), 5 miles north of LNA included a scattered cloud layer at 2,600 feet and a broken

ceiling at 3,500 feet. The wind was from 110 degrees at 11 knots. The temperature was 27 degrees C, the dew point was 20 degrees C, and the altimeter setting was 29.97 inches of mercury.

WRECKAGE INFORMATION

The wreckage was examined at the accident site on December 9, 2012, and all major components were accounted for at the scene. The airplane was consumed by postimpact fire back to the aft pressure bulkhead. The wing spars were intact, and control cable continuity was established from the cockpit to the flight control surfaces. Examination of the main landing gear actuators revealed positions consistent with a down-and-locked configuration.

Both engines were significantly damaged by postcrash fire. All three propeller blades of the left engine were attached at the hub, and in the "feathered" position. The right engine's propeller blades were destroyed by impact and fire. One blade was separated and not recovered. The remaining blades showed positions consistent with low pitch.Examination of the right fuel selector valve revealed that it was in the "main" position. Examination of the left fuel selector valve revealed that it was in the "off" position.

Preliminary external and borescope examinations of both engines revealed continuity throughout and no mechanical anomalies. The engines were retained for detailed examination at a later date.

MEDICAL AND PATHOLOGICAL INFORMATION

The Office of the District Medical Examiner, West Palm Beach, Florida, performed the autopsy on the pilot. The autopsy revealed the pilot died from blunt force and thermal injuries. The FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed forensic toxicology on specimens from the pilot. Thirty percent (30%) carbon monoxide, and 3.86 (ug/ml) cyanide were detected in the specimens tested. These levels are consistent with exposure to products of combustion.

TESTS AND RESEARCH

The engines were examined in Mobile, Alabama from February 19 to 22, 2013 under the supervision of an FAA inspector. Each was a 520 cubic-inch, six-cylinder, horizontally-opposed, air-cooled, fuel-injected, turbo-charged, geared engine that produced 375 horsepower at 3,350 rpm.Examination of the No. 2 (right) engine revealed no preimpact mechanical anomalies.Examination of the No. 1 (left) engine revealed signatures consistent with contact made between the piston domes and the valves. The crankcase halves were separated and the No. 1 cylinder main bearing was "rotated," and "damaged and distorted severely," with bearing fragments located in the oil sump. Bearing material was extruded from its steel backing. The No. 3 main bearing displayed signatures consistent with accelerated wear and "wiping" of the Babbitt material.Damage and signatures consistent with excessive heat due to oil starvation were displayed on the No. 1 and No. 3 main bearing journals, as well as the No. 1 and No. 2 connecting rod journals. The camshaft gear was damaged, with five gear teeth found sheared from the gear.Examination of maintenance records revealed that the manufacturer's main bearings and rod bearings were installed in the engine during overhaul. Further examination of the records revealed that no maintenance was performed on the engine that would have required breaking of crankcase thru-bolt torques (such as cylinder removal) since overhaulThe item 98 write-up on the most recent annual inspection invoice stated, "Investigate no oil pressure on left engine; reprime left oil pump, filter, standpipe."When interviewed, the proprietors at the maintenance facility said that the airplane's engines sat idle for an extended period (weeks) due to the annual inspection and the painting of the airplane. Because engine oil has a tendency to "settle" in the sump, and cause the oil pump to lose its prime, the engines were motored. When motored, the left engine showed no oil pressure. The oil system was then primed, and oil pressure was restored prior to engine start.

Examination of maintenance records revealed that as of the most recent inspection, all Airworthiness Directives were complied with and up to date.

ADDITIONAL INFORMATION

The manufacturer's normal procedure for "TAKEOFF:1. Power - SET FOR TAKEOFF2. Mixtures - CHECK fuel flows in the white arc3. Engine Instruments - CHECK4. Air Minimum Control Speed - 80 KIAS5. Takeoff and climb to 50 feet - 100 KIAS at 7450 pounds"The manufacturer's normal procedure for "AFTER TAKEOFF:1. Landing Gear - RETRACT2. Best Angle-of-Climb Speed - 86 KIAS at sea level to 92 KIAS at 20,000 feet with obstacle3. Best Rate-of-Climb Speed With Wing Flaps Up - 111 KIAS at sea level and 7450 pounds"The manufacturer's emergency procedure for "ENGINE FAILURE DURING TAKEOFF (Speed below 100 KIAS or Gear Down):1. Throttles - CLOSE IMMEDIATELY2. Brake or Land and Brake - AS REQUIRED"The manufacturer's emergency

procedure for "ENGINE FAILURE AFTER TAKEOFF (Speed above 100 KIAS with Gear Up or In Transit):1. Mixtures - FULL RICH2. Propellers - FULL FORWARD3. Throttles - FULL FORWARD4. Landing Gear - CHECK UP5. Inoperative Engine:a. Throttle - CLOSEb. Mixture - IDLE CUT-OFFc. Propeller - Feather6. Establish Bank - 5 [degrees] toward operative engine7. Climb to Clear 50-Foot Obstacle - 100 KIAS8. Climb at One Engine Inoperative Best Rate-of-Climb Speed - 111 KIAS9. Trim Tabs - ADJUST 5 [degrees] toward operative engine.10. Inoperative Engine - SECURE as follows:a. Fuel Selector - OFF (Feel for Detent)"A WARNING at the end of the procedure stated: "The propeller on the inoperative engine must be feathered, landing gear retracted and wing flaps up or continued flight may be impossible."Using weather conditions that were current at the time of the accident, interpolation of the airplane manufacturer's "RATE-OF-CLIMB - ONE ENGINE INOPERATIVE" chart revealed that with the landing gear retracted, and the propeller on the inoperative engine feathered, the airplane was capable of an approximate climb rate of 400 feet per minute. With the landing gear down and locked, as found, the airplane was capable of an approximate climb rate of 50 feet per minute.The FAA Airplane Flying Handbook defined VMC as: "Minimum control speed. The minimum flight speed at which the airplane is controllable with a bank of not more than 5 [degrees] into the operating engine when one engine suddenly becomes inoperative and the remaining engine is operating at takeoff power. At low airspeed and high-power conditions, the downward moving propeller blade of each engine develops more thrust than the upward moving blade.When the right engine is operative and the left engine is inoperative, the turning force is greater. In other words, directional control is more difficult when the left engine (the critical engine) is suddenly made inoperative."

Accident Rpt# WPR14CA073	**12/22/2013 0**	**Regis# N185CY**	**Carson City, NV**		
Acft Mk/Mdl CESSNA A185F			**Acft Dmg:**	**Rpt Status: Prelim**	**Prob Caus: Pending**
			Fatal 0	**Ser Inj 0**	
Opr Name:		**Opr dba:**		**Aircraft Fire:**	

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Prepared From Official Records of the NTSB By:
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Accident Rpt# WPR13CA425 09/12/2013 1430	**Regis# N87653**	**Spanish Fork, UT**	**Apt: Spanish Fork Airport U77**
Acft Mk/Mdl CESSNA M337B	**Acft SN 337M0222**	**Acft Dmg: SUBSTANTIAL**	**Rpt Status: Factual Prob Caus: Pending**
Eng Mk/Mdl CONTINENTAL IO-360	**Acft TT 5514**	**Fatal 0 Ser Inj 0**	**Flt Conducted Under: FAR 091**
Opr Name: ARTEMIS INC	**Opr dba:**		**Aircraft Fire: NONE**

Narrative

The pilot reported that on the day of the accident, he elected to fly with a light, and slightly uneven, load of fuel to accommodate for the extra equipment and people onboard. During the low altitude flight, the pilot was not transferring fuel from the right wing fuel tanks to the left wing fuel tanks. Subsequently, the left wing fuel tanks ran empty and the forward engine lost power. The pilot elected to land in a nearby corn field. During the landing, the airplane's forward engine firewall sustained substantial damage. The pilot reported no preimpact mechanical failures or malfunctions with the airframe or engines that would have precluded normal operation.

Accident Rpt# WPR13CA413	**09/15/2013 1951 PDT**	**Regis# N712SB**	**San Luis Obispo, CA**	**Apt: San Luis County Rgnl SBP**
Acft Mk/Mdl CESSNA T310R		**Acft SN 310R0122**	**Acft Dmg: SUBSTANTIAL**	**Rpt Status: Factual Prob Caus: Pending**
Eng Mk/Mdl CONTINENTAL TSIO-520 SERI		**Acft TT 4795**	**Fatal 0 Ser Inj 0**	**Flt Conducted Under: FAR 091**
Opr Name: SINGER NATHAN		**Opr dba:**		**Aircraft Fire: UNK**

Narrative

The pilot reported that during the landing roll of his second uneventful landing, the right main landing gear started to shimmy. He slowed the airplane and proceeded towards the nearest taxiway. Before exiting the runway, the pilot went to retract the flaps when he inadvertently raised the landing gear handle. He quickly re-lowered the landing gear handle; however, the right main landing gear had already started to retract. The airplane veered to the right, exited the runway surface, and came to rest on the grass. The airplane's right wing was substantially damaged. The pilot reported no preimpact mechanical failures or malfunctions with the airframe or engine that would have precluded normal operation.

Accident Rpt# WPR13LA011 10/15/2012 1131 MST	**Regis# N499SF**	**Parker, AZ**	**Apt: Parker P20**	
Acft Mk/Mdl CIRRUS DESIGN CORP SR20	**Acft SN 1540**	**Acft Dmg: SUBSTANTIAL**	**Rpt Status: Factual**	**Prob Caus: Pending**
Eng Mk/Mdl CONT MOTOR IO-360 SER	**Acft TT 1714**	**Fatal 0 Ser Inj 0**	**Flt Conducted Under: FAR 091**	
Opr Name: ROBERT A LIPSON	**Opr dba:**		**Aircraft Fire: NONE**	

Summary

Before the first flight of the day, the pilot visually checked the airplane's fuel quantity through the fuel tank filler necks, observing what he believed to be full tanks. He subsequently checked the fuel gauges, which indicated that both wing tanks were less than half full. Surmising that the gauges were faulty, the pilot departed on a short flight to a local airport to pick up a passenger. After picking up the passenger, they departed for a cross-country flight. He did not refuel the airplane before that departure, and after travelling for about 90 minutes the engine lost total power. The pilot made a forced landing in mountainous terrain.

Subsequent examination of the airframe revealed that both fuel tanks were empty, and neither the engine nor airframe exhibited indications of a fuel leak. Examination of recorded data recovered from the airplane's flight displays revealed that its fuel consumption was appropriate for the flight profile. The data further revealed that the airplane was approaching an airport as one of the tanks ran out of fuel. The engine lost power; however, rather than landing, the pilot continued the flight after switching to the other fuel tank. The other tank ran out of fuel a short time later, and the pilot performed a forced landing to a rocky outcropping, where the airplane sustained substantial damage.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The pilot's failure to perform an adequate preflight inspection, which resulted in inadequate fuel for the flight and the subsequent fuel exhaustion and a total loss of engine power. Contributing to the accident was the pilot's failure to land the airplane at the first indication of low fuel.

Events

1. Enroute-cruise - Fuel exhaustion
2. Enroute - Loss of engine power (total)
3. Landing-landing roll - Collision with terr/obj (non-CFIT)

Findings - Cause/Factor

1. Aircraft-Fluids/misc hardware-Fluids-Fuel-Fluid level - C
2. Personnel issues-Task performance-Inspection-Preflight inspection-Pilot - C
3. Personnel issues-Action/decision-Info processing/decision-Decision making/judgment-Pilot - F

Narrative

HISTORY OF FLIGHT

On October 15, 2012, at 1131 mountain standard time, a Cirrus Design Corp SR20, N499SF, landed hard during a forced landing in mountainous desert terrain near Suquilla Airport, Parker, Arizona. The pilot was operating the airplane 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 to the lower fuselage and both wings during the accident sequence. The cross-country flight departed John Wayne-Orange County Airport, Santa Ana, California, at 0959, with a planned destination of Ernest A. Love Field Airport, Prescott, Arizona. Visual meteorological conditions prevailed, and no flight plan had been filed.

The pilot stated that the first leg of the flight was from Santa Monica Municipal Airport earlier that morning, and that prior to departure he visually established the fuel quantity through the filler necks, observing what he believed to be full tanks. He subsequently checked the fuel gauges, which indicated that the wing tanks were each under half full. He surmised that the gauges were faulty, basing this assumption on the fact that the gauges of an airplane he had previously owned were inaccurate. He subsequently departed for Santa Ana, where he picked up a passenger. Without refueling the airplane, the flight departed for Prescott.

The pilot stated that the airplane subsequently ran out of fuel as they approached the Parker very high frequency omnidirectional radio range transmitter (VOR), about 200 miles west of Santa Ana. He performed a forced landing into a rocky outcropping, about 13 miles northeast of Avi Suquilla Airport.

TESTS AND RESEARCH

Recovery personnel drained about 6 ounces of fuel from the fuel tanks during recovery of the airplane, and a subsequent examination of the airframe and

engine by an FAA inspector did not reveal any fuel leaks.

The airplane was equipped with both an Avidyne Entegra Primary (PFD), and Multifunction (MFD) Flight Display, and two Garmin GNS 430 GPS/Navigation/Communication transceivers. The Avidyne units were capable of recording the airplane's GPS position, as well as engine and fuel flow parameters. The units were sent to the NTSB Office of Research and Engineering for data extraction. The data for both flights had been recorded.

The flight from Santa Monica to Santa Ana lasted about 23 minutes, and included an initial climb from about sea level to 3,500 feet pressure altitude.

Following departure from Santa Ana, the airplane initiated a climb to 7,500 feet, while on an east-northeast track. Twelve minutes later, at 1011, the engine power reduced with its speed decreasing from 2,650 to 2,540 rpm, and fuel flow falling from just under 17 gallons per hour (gph) to about 10.5 gph.

At 1114:54, the fuel flow decreased from 10.6 to 1.5 gph, with a corresponding engine exhaust gas temperature (EGT) reduction of approximately 400 degrees F, and a drop in engine speed of 250 rpm. Over the course of the next 80 seconds, the parameters recovered, with the fuel flow rising to 16.6 gph before settling back to about 10 gph at 1117. Five minutes later, the EGT, fuel flow, and engine rpm values all began oscillating, and at 1123:30, the aircraft began a 1,000-feet-per-minute descent. For the remainder of the flight, the fuel flow dropped below 4 gph, and the EGT fell below the recording limit of 500 degrees F.

Fuel consumption computed by the MFD for the accident flight was 17.4 gallons, with the prior flight consumption computed as 5.5 gallons.

The airplane was equipped with two 28-gallon usable wet-wing fuel storage tanks, and a three-position selector valve, configured for the left tank, right tank, and OFF position.

The SR20 Pilot's Operating Handbook and FAA Approved Airplane Flight Manual defined the range/endurance profile under the "Performance Data" section. The data revealed that at a gross weight of 3,000 pounds, standard temperature, with the engine producing 65 percent power, and the mixture set to "best power," fuel would be consumed at the rate of 10.5 gph at all altitudes up to 12,000 feet. Fuel used to climb from sea level to 4,000 feet and sea level to 8,000 feet, was 1.3 and 2.9 gallons, respectively.

GPS data revealed that about the time of the initial fuel flow drop, the airplane was about 17 miles west of Gene Wash Reservoir Airport, Parker Dam, California, and 15 miles northwest of Avi Suquilla Airport. The airplane continued on the same track, flying directly over Gene Wash Reservoir Airport, about 6 minutes later. Two minutes after overflying the airport, the engine parameters dropped, and the airplane began a descending right turn towards Avi Suquilla.

ADDITIONAL INFORMATION

Gene Wash Reservoir was a private airport comprised of a single 2,200-foot-long, 30-foot-wide asphalt airstrip. Its presence was documented on the FAA Phoenix Sectional Aeronautical Chart.

The 77-year-old pilot held a private pilot certificate, and reported a total flight experience of 2,480 hours, 50 of which were in the SR20.

Accident Rpt# WPR14CA082 12/29/2013 0	**Regis# N924JS**	**Roberts, MT**	
Acft Mk/Mdl CUBCRAFTERS INC CC11-160		**Acft Dmg:**	**Rpt Status: Prelim** **Prob Caus: Pending**
		Fatal 0 **Ser Inj 0**	
Opr Name:	**Opr dba:**		**Aircraft Fire:**

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Accident Rpt# WPR14CA086 01/03/2014 0	**Regis# N5484U**	**Shaw Island, WA**	
Acft Mk/Mdl DEHAVILLAND BEAVER DHC 2 MK.1		**Acft Dmg:**	**Rpt Status: Prelim** **Prob Caus: Pending**
		Fatal 0 **Ser Inj 0**	
Opr Name:	**Opr dba:**		**Aircraft Fire:**

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Accident Rpt# WPR14CA043 **11/03/2013 0** **Regis# N1550R** **Avalon, CA**

Acft Mk/Mdl GRUMMAN AMERICAN AVN. CORP. AA 5B **Acft Dmg:** **Rpt Status: Prelim** **Prob Caus: Pending**

Fatal 0 **Ser Inj 0**

Opr Name: **Opr dba:** **Aircraft Fire:**

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Accident Rpt# WPR12FA191	**05/02/2012 1140 MST**	**Regis# N350TL**	**Phoenix, AZ**	**Apt: N/a**
Acft Mk/Mdl HUGHES 269C-UNDESIGNAT		**Acft SN 680694**	**Acft Dmg: SUBSTANTIAL**	**Rpt Status: Factual Prob Caus: Pending**
Eng Mk/Mdl LYCOMING HIO-360-DIA		**Acft TT 1582**	**Fatal 0 Ser Inj 1**	**Flt Conducted Under: FAR 091**
Opr Name: CANYON STATE AERO		**Opr dba:**		**Aircraft Fire: NONE**
				AW Cert: STN

Summary

When the pilot was about 2 minutes from his destination at an altitude of about 500 feet above ground level, he sensed a vibration through the back of his seat and in the anti-torque pedals. The vibration was followed by a right yaw that the pilot could not correct with a pedal input. As the pilot attempted to maintain level flight, he heard a "metallic clunking" behind him. He looked back and saw what he described as the tail rotor losing rotor speed. The pilot maintained forward flight by countering the right yaw with left cyclic input while he located a cul-de-sac in a residential neighborhood in which to land. The pilot entered an autorotation, and during the descent, the helicopter impacted the roof of a house and an adjacent brick wall. Witnesses reported that the helicopter didn't "sound right," that the engine was sputtering, and that the engine power appeared to be increasing and decreasing. The helicopter was observed rocking and teetering before nose-diving toward the ground. After the helicopter impacted the ground, the engine continued to run, and the tail rotor continued to spin.

A postaccident investigation revealed that the main transmission pinion had fractured and separated through the threads that retained the aft pinion nut. Because the aft pinion nut maintained the position of the splined sleeve that drove the tail rotor drive shaft, the separation of the pinion allowed the sleeve to wobble as it turned and to move aft, partially disengaging its external splines from the internal splines in the tail rotor drive shaft. The sleeve's splines began to grind against the drive shaft's splines, and the resulting material loss on the splines reduced the engagement between the parts to the point where a loss of tail rotor drive occurred. It is likely that enough residual contact between the damaged splines remained to keep the tail rotor spinning (as observed after impact) but was not sufficient to deliver power to the tail rotor.

Examination of the pinion fracture surfaces determined that the pinion failure was due to a fatigue crack that initiated in a thread root and propagated through about 75 percent of the pinion's cross-section before the remaining material succumbed to overstress conditions. No indication of material deficiencies, such as inclusions, voids, or pits, were found at the crack initiation site. According to the helicopter's maintenance records, the pinion had been in service for 1,584.4 hours, and on the day before the accident, a 100-hour inspection had been performed in accordance with the helicopter manufacturer's instructions. These instructions included a procedure for checking the torque of the aft pinion nut, and a co-owner of the helicopter reported that he observed the mechanic perform the torque check. It is likely that the fatigue crack was not large enough to be detected during the inspection and then propagated to the point of failure during the accident flight.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: A loss of tail rotor drive due to a fatigue failure of the main transmission pinion, which resulted in a loss of directional control during cruise flight.

Events

1. Enroute-cruise - Sys/Comp malf/fail (non-power)
2. Maneuvering - Loss of control in flight
3. Autorotation - Collision with terr/obj (non-CFIT)

Findings - Cause/Factor

1. Aircraft-Aircraft propeller/rotor-Main rotor drive-(general)-Not specified - C
2. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Directional control-Attain/maintain not possible - C
3. Personnel issues-Task performance-Use of equip/info-Aircraft control-Pilot - C

Narrative

HISTORY OF FLIGHT

On May 2, 2012, about 1140 mountain standard time, a Hughes 269C helicopter, N350TL, sustained substantial damage after colliding with a residential home near Phoenix, Arizona. The helicopter was owned and operated by Canyon State Aero of Mesa, Arizona. The certified commercial pilot sustained serious injuries, and the passenger sustained minor injuries. Visual meteorological conditions prevailed, and no flight plan was filed. The reported photo flight was being operated in accordance with 14 Code of Federal Regulations Part 91, and a flight plan was not filed. The local flight departed Deer Valley Airport (DVT), Phoenix, Arizona, about 1115.

In a telephone conversation with the pilot, as well as in a statement submitted to the National Transportation Safety Board (NTSB) investigator-in-charge (IIC),

the pilot reported that after picking up his passenger/photographer, he departed DVT for the construction site the photographer had been hired to photograph. The pilot stated that after taking off he proceeded southwest toward the construction site about 500 feet above ground level (agl) and at an airspeed of between 70 to 75 knots. The pilot stated that about 2 minutes prior to reaching the construction site he detected a vibration in the back of his seat, as well as in the anti-torque pedals. This was followed immediately by a right yaw that was not correctable with pedal input. The pilot opined that he attempted to maintain level flight, then heard a "metallic clunking" sound behind him. He then looked over his left shoulder and thought he observed the tail rotor slowing down. He said he was still maintaining forward flight at about 70 knots and was maintaining his forward track by countering the yaw with left cyclic input. The pilot stated that he picked out a residential area with a cul-de-sac street, and elected to autorotate to the street. He reported that he lowered collective, rolled off the throttle to the idle detent, and made a slight right turn toward the cul-de-sac, maintaining about 55 knots during the autorotation. The helicopter initially impacted the roof of a house and a brick wall that separated the house from the adjoining residence. He said the helicopter came to rest in the backyard of the adjacent house in a slightly nose down, upright attitude. The pilot reported that the main and tail rotor blades were intact, and that in his view this was a mechanical failure rather than a loss of tail rotor effectiveness event. He also stated that [during the descent] the helicopter did not rotate about its vertical axis, that it did not spin, and that it was gusty with respect to the winds.

Local law enforcement provided the IIC with statements of 3 witnesses who observed the accident.

Witness #1, who was located at his residence about 1 block north of the accident site, reported that he heard the helicopter overhead, and that it "didn't sound right." The witness stated that the engine was sputtering and "sounded wrong," and as he watched it, it was "rocking" and "teetering." The witness added that it then lost altitude and nose-dived toward the ground south of his location.

Witness #2 reported that he was in an alley south of the street where the helicopter crash landed, and when he [first] heard the helicopter "it did not sound right." The witness stated that the engine was "sputtering", the rpms were increasing and decreasing, and that the main rotor blade was also increasing and decreasing in speed. The witness opined that the helicopter made a U-turn overhead while losing altitude, and that he lost sight of it due to trees and houses in the area. He then proceeded to the accident site and began turning all switches which were labeled ON and OFF to the OFF position, but the engine kept running. He also stated that the tail rotor blades were moving very fast.

Witness #3, who was a co-worker of witness #2 and at the same relative location during the initial sighting of the helicopter, reported that he noticed the helicopter turning around and going lower, and that the engine didn't sound right, like it was just barely idling. He stated that the helicopter continued to lose altitude, and it became apparent that it was either going to land or crash. The witness added that after arriving at the accident site the engine continued to run for some time. He added that the tail rotor blades were spinning rapidly.

PERSONNEL INFORMATION

The pilot, age 40, possessed a commercial pilot certificate for rotorcraft-helicopter, and ratings for instrument helicopter and helicopter instructor. The pilot completed his most recent flight review on March 29, 2012. He was issued a second-class Federal Aviation Administration (FAA) airman medical certificate without waivers or limitations dated December 31, 2011.

The pilot reported a total flight time of 1,460 hours, all in helicopters, with 1,030 hours in make and model, 1,410 hours as pilot in command, and 980 hours as pilot in command in make and model. Additionally, the pilot reported having given 950 hours of dual instruction, with 800 hours of dual instruction given in the accident make and model helicopter. The pilot revealed that he had flown a total of 90 hours, 30 hours, and 1 hour in the preceding 90 days, 30 days, and 24 hours respectively.

AIRCRAFT INFORMATION

The accident helicopter was a Hughes Model 269C, serial number 0694C, manufactured in 1978. Its most current airworthiness certificate was issued on April 1, 2009. At the time of the accident the helicopter had accumulated about 1,584 hours total airframe time, with a Hobbs Meter time of 899 hours. The most recent periodic 100-hour/annual inspection was performed on May 1, 2012. The previous periodic inspection encompassed 25-50-100-200-400 hour inspections, which were completed on March 29, 2012, at a total airframe time of 1,481.4 hours, with a Hobbs Meter time of 796.4 hours. The maintenance records revealed that the last annual inspection was completed on May 6, 2011, at a total airframe time of 981.6 hours.

It was revealed during the investigation that during the periodic inspection conducted on May 1, 2012, which was the day prior to the accident, that a 25-50-100

hour inspection had been performed in accordance with the manufacturer's Helicopter Maintenance Instructions (HMI), which included the procedure for checking the proper torque of the aft pinion nut. The co-owner of Canyon State Aero reported to the IIC that he had personally observed the mechanic performed the torque check of the aft pinion nut. The aircraft maintenance logbook revealed no entry for this specific check, nor was one required under Federal Aviation Regulation (FAR) Part 91. Additionally, and while checklist sheets are available to follow and track such checks, they are not required to be completed or maintained under FAR Part 91.

A maintenance logbook entry dated March 9, 2012 at 1,481.4 hours (100 hours prior to the accident) revealed that a replacement H-frame was installed in conjunction with a 100/400-hour inspection. A Sikorsky engineer reported that as a result of this inspection the pinion splines would have been exposed and that a torque check of the aft pinion nut would have been required.

METERROROLOGICAL INFORMATION

At 1151, the weather reporting facility at the Phoenix-Sky Harbor International Airport (PHX), Phoenix, Arizona, located about 4 nm south of the accident site, reported wind 140 degrees at 9 knots, visibility 10 miles, few clouds at 20,000 feet, scattered clouds at 25,000 feet, temperature 31 degrees Celsius (C), dew point 1 degree C, and an altimeter setting of 29.83 inches of mercury.

At 1153, the weather reporting facility at the Deer Valley Airport (DVT), Phoenix, Arizona, located about 11 nm north of the accident site, reported wind 170 degrees at 8 knots, gusts to 20 knots, variable 130 degrees to 200 degrees, 10 miles visibility, sky clear, temperature 28 degrees C, dew point -2 degrees C, and an altimeter of 29.85 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

A damage assessment of the helicopter was conducted at the operator's facility on May 24, 2012.

The airframe remained generally intact. The steel main frame tubes were broken, distorted and bent in various locations. The aft cabin wall was distorted aft on the left side. The main rotor mast support tube on the left side of the aircraft exhibited a mid-span compression fold. The aft support tube fractured and was separated at the mast and the tailboom support fitting.

The right landing gear was observed entirely separated from the helicopter. The left side landing gear dampers remained attached to the aircraft, and the strut was attached to the skid tube. Both landing gear skid tubes were fractured at the forward strut attach points. The forward cross beam was fractured near its mid-point, while the aft cross beam was intact but bent down near the right side cluster fitting.

The tailboom was intact but observed separated at the forward bulkhead by a compression fracture. The tailboom tube appeared straight, with minor denting on the top near the forward end. The horizontal stabilizer was intact and remained attached, with minor denting noted. The vertical fin was crushed from contact to the bottom and was bent to the right. The left side support strut was intact with the right side support strut separated forward of mid-span by a folding fracture. Both support tubes exhibited scratches and markings on the bottom, consistent with asphalt shingle material.

Impact damage was consistent with a high vertical velocity wings-level, nose-low impact attitude with the roof of the house, followed by a nose over into the yard and impact with the wall.

All 3 main rotor blades remained attached to the main rotor head and basically intact.

The green dot tail rotor blade was fractured at the outer end of the hub spline. The blade was retained by the tail rotor strap pack and remained connected to the pitch change link. There were fractures and distortion of the fiberglass airfoil inboard of the leading edge abrasion strip, the spar was bent from impact forces on the outboard side, and the aft portion of the tip cap was missing.

The blue dot tail rotor blade was observed intact from the root to the tipcap; the tipcap was intact. There was an area of damage to the airfoil near the inboard end of the abrasion strip. The pitch change link remained attached and appeared straight.

The main rotor head (MRH) was intact and attached to the main drive shaft.

The tail rotor hub (TRH)/tail rotor assembly remained attached to the tail rotor gearbox (TGB) output shaft. Both pitch change links were observed intact. The swashplate rotated freely and moved in and out on the shaft when activated by the control rod and bellcrank.

The tail rotor gearbox (TGB) remained on the tail boom adapter. The tail rotor drive shaft was rotated, and resulted in rotation of the tail rotor head. This indicated that continuity existed from the drive shaft fracture at the MGB to the TGB output. The chip detector was not examined.

The tail rotor drive shaft (TRDS) was fractured about 6 inches behind the main gear box (MGB) attach spline; a minor torsional indication was observed. The TRDS was bent at the forward tail boom bulkhead with minor indications of rotation. The forward portion of the TRDS was extracted with no tools required and included the aft pinion nut, a portion of the pinion, and the driving spline.

The TRDS appeared intact and straight, back to the TGB attach spline. The aft bump stop was damaged and compressed from impact with the 269A6029 retention nut. Minor wear was observed on the aluminum bumper and the nut.

The main gearbox remained attached to the airframe. When the gearbox input was rotated the MR drive and rotor head turned appropriately. The upper pulley overrunning clutch rotated and engaged appropriately when turned by hand. The input pinion was observed to have been fractured and separated through the threads of the aft thread area. The fractured pinion remained in the aft pinion nut and was secured by a cotter pin. The phenolic spacer was not secured by the cotter pin, was present but out of position, and observed pressed into the pinion's hollow interior just forward of the fracture. The 269A5430 driving spline moved aft in the TRDS far enough to disengage from the internal splines of the TRDS.

The engine was intact and observed to have sustained minimal damage due to impact forces. The engine mounts and engine basket tubing remained attached, however, some visible damage was observed. The lower section of the engine, inclusive of the intake and exhaust manifolds, fuel servo control, throttle linkage, impeller assembly, impeller shroud, and the Bendix gear and housing, experienced minimal visual damage as a result of impact forces to the undercarriage of the helicopter.

A Lycoming Engines representative was present during the examination. Only an external examination of the engine was performed. Due to local law enforcement personnel reporting that the engine remained running at the accident, and secured only after first responders had arrived, a more detailed examination of the engine was not performed by the Lycoming representative.

TESTS AND RESEARCH

Examination of components parts

Under the supervision of the IIC, the following components were shipped to the NTSB Materials Laboratory in Washington, D.C., for examination and analysis by a materials research engineer: the main transmission pinion, the aft pinion nut, a section of the tail rotor drive shaft, the driving spline, the phenolic plug, and the forward bump stop.

Driving Spline and Section of Tail Rotor Drive Shaft

The engineer reported fretting wear scars and material removal were observed on the outer teeth of the driving spline, along with chatter and circumferential gouging on the outer forward surface. The chatter marks were located where a roller bearing is normally in contact with the driving spline. The engineer's report revealed that the splines exhibited some loss of material; the amount varied from negligible to almost 50 percent of the cross-sectional area, and the largest difference in loss was 180 degrees apart. In contrast, the interior splines of the part were relatively undamaged, and exhibited no appreciable loss of material. Some rubbing was observed on the forward interior of the part mirroring the exterior shape of the pinion.

The engineer further reported that the angle of material removed on the drive spline outer splines mirrored that of the wear and material loss on the mating interior splines of the forward sections of the tail rotor drive shaft. The damage on the interior splines was rotational in nature, but was not as severe as on the driving spline; the material loss was confined to an approximately 90 degree area. The engineer also noted that the forward faces of the splines exhibited some smearing and material loss in a counterclockwise direction, forward looking aft.

Main Transmission Pinion and Aft Pinion Nut

The material research engineer reported that approximately 0.3 inches of the aft portion of the main transmission pinion fractured transversely while fastened inside the aft pinion nut, with the cotter pin still in place.

According to the engineer the exterior of the pinion possesses a series of splines that contact the interior splines of the drive spline. The aft 2 inches of the exterior faces of the splines exhibited a shiny luster indicative of the outer surface having been worn off. The drive faces of the exterior pinion splines showed fretting wear scars and material loss. Upwards of 0.015 inches of material had been removed on the aft most 0.5 inches of the splines on the contact surfaces. Chatter marks were visible on the pinion exterior just forward of where the splines taper off.

The engineer further reported that an examination of the mating fracture surfaces of the pinion revealed a small jog present on the fracture, indicative of torsional failure. The fracture surface was flat, relatively smooth, and perpendicular to the long axis of the part. The surface exhibited fine crack arrest and ratchet marks indicative of progressive cracking. He stated that a closer examination using a scanning electron microscope (SEM) revealed an oxidized surface with a pattern consistent with underlying fatigue striations.

The engineer reported that the pinion fracture surface displayed a variety of ratchet marks, indicative of multiple fatigue crack initiations. The fatigue crack initiated at a thread root, consistent with the area of highest stress concentration on the part. No material deficiencies such as inclusions, pits, or voids were found at the crack initiation site.

The engineer opined that the features of the fracture surface suggest that after initiation, the fatigue crack progressed rotationally, while other cracks initiated ahead of the crack on the outer surface of the pinion in the thread root. Once the crack grew to sufficient size, the remaining cross-section succumbed to overstress. Approximately 0.25 inches of the fracture surface exhibited dimple rupture, indicative of overstress. No indications of other failure mechanisms, such as intergranular cracking, were observed.

The forward faces of the pinion threads were relatively undamaged and showed no indications of contact wear with the adjacent nut. The aft faces of the threads displayed rotational wear to approximately half of the depth of the thread root. The aft thread tips showed indications of fretting wear and minor material loss. No indication of mechanical damage or contact was found in the valleys of the pinion threads. (Refer to the Material Laboratory Factual Report No. 13-023, which is appended to the docket.)

During the investigation a Sikorsky accident investigator for light helicopters reported that an improper assembly of parts was observed on the accident helicopter. The investigator revealed that the accident helicopter was not in compliance with the maintenance manual instructions in three areas: the phenolic pinion plug 269A5441 was not properly installed, the split bushing 269A5595-001 was missing, and an incorrect longer 269A6030 BSC Spline Adapter was installed on the tail transmission.

Examination of Global Positioning equipment

Under the supervision of the NTSB IIC, the aircraft's Lowrance AIRMAP 2000C Global Positioning System unit was shipped to the NTSB Vehicle Recorder Laboratory in Washington, D.C., for examination and analysis.

The specialist concluded that the recorded points did not conclusively capture the accident flight. As such, it was determined that the information on the device was not pertinent to the investigation. (Refer to the Vehicle Specialist's Factual Report, which is appended to the docket.)

Accident Rpt# WPR14CA057 11/23/2013 0	**Regis# N3151G**	**Salt Lake City, UT**		
Acft Mk/Mdl NEW PIPER PA46 350P		**Acft Dmg:**	**Rpt Status: Prelim**	**Prob Caus: Pending**
		Fatal 0 Ser Inj 0		
Opr Name:	**Opr dba:**		**Aircraft Fire:**	

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Accident Rpt# CEN13LA111	**12/19/2012 1700 CST**	**Regis# N3134G**	**Graham, TX**	**Apt: Graham Municipal KRPH**
Acft Mk/Mdl PIPER L-18C		**Acft SN 52-2419**	**Acft Dmg: SUBSTANTIAL**	**Rpt Status: Factual Prob Caus: Pending**
Eng Mk/Mdl CONT MOTOR C90-12F		**Acft TT 2987**	**Fatal 0 Ser Inj 0**	**Flt Conducted Under: FAR 091**
Opr Name: PIERCE CHRISTOPHER G		**Opr dba:**		**Aircraft Fire: GRD**
				AW Cert: STN

Summary

The pilot was returning to the airport when the engine experienced a total loss of power. As the pilot maneuvered to perform a forced landing, the engine seized and the propeller stopped. The airplane landed hard, bounced, and nosed over, coming to rest inverted. The airplane sustained substantial damage to the wings and rudder. An examination of the engine revealed that a connecting rod failed and broke through the crankcase, which resulted in a loss of oil and the subsequent loss of engine power. The reason for the failure of the connecting rod could not be determined.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The failure of an engine connecting rod and the subsequent loss of oil pressure, which resulted in a total loss of engine power.

Events

1. Enroute - Loss of engine power (total)
2. Landing-landing roll - Collision with terr/obj (non-CFIT)

Findings - Cause/Factor

1. Aircraft-Aircraft power plant-Engine (reciprocating)-Recip eng cyl section-Failure - C
2. Aircraft-Aircraft power plant-Engine (reciprocating)-Recip eng oil sys-Failure - C

Narrative

On December 19, 2012, about 1700 central standard time, a Piper L-18C airplane, N3134G, was substantially damaged during a forced landing near Graham, Texas. The private pilot and passenger were not injured. The airplane was registered to and operated by a private individual under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Visual meteorological conditions prevailed for the flight, which operated without a flight plan. The local flight originated from the Graham Municipal Airport (KRPH), Graham, Texas, about 1600.

According to a statement provided by the pilot, when returning to the airport, he noted that the engine's oil pressure went to zero, the rpms began to reduce, and the engine power decreased. As the pilot maneuvered to perform a forced landing, the engine seized and the propeller stopped. The airplane landed hard, bounced, and nosed over, coming to rest in the inverted position. The airplane sustained substantial damage to the wings and rudder. An examination of the engine revealed a broken connecting rod and damage to the engine case. The reason for the failure of the connecting rod could not be determined.

Accident Rpt# WPR14CA064	**12/08/2013 0**	**Regis# N6913**	**San Carlos, CA**		
Acft Mk/Mdl PIPER PA 16			**Acft Dmg:**	**Rpt Status: Prelim**	**Prob Caus: Pending**
			Fatal 0	**Ser Inj 0**	
Opr Name:		**Opr dba:**		**Aircraft Fire:**	

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Accident Rpt# CEN12FA628	**09/12/2012 1455 CDT**	**Regis# N4842P**	**Bullard, TX**	**Apt: N/a**
Acft Mk/Mdl PIPER PA-23-250		**Acft SN 27-413**	**Acft Dmg: SUBSTANTIAL**	**Rpt Status: Factual Prob Caus: Pending**
Eng Mk/Mdl LYCOMING O-540 SERIES		**Acft TT 6085**	**Fatal 1 Ser Inj 0**	**Flt Conducted Under: FAR 091**
Opr Name: INDIVIDUAL		**Opr dba:**		**Aircraft Fire: NONE**

Summary

The airplane was en route to its destination when witnesses observed it making several turns before it pitched nose-up, climbed, rolled to the right, and then descended nose-down to the ground. Several witnesses observed airplane components floating to the ground behind the airplane. All witnesses reported hearing loud engine noises throughout the event. Impact signatures were consistent with a nose-down attitude with a near-vertical descent angle. Distribution of the airplane wreckage supported the observation by eyewitnesses of an in-flight breakup. An examination found that both wings failed in overload with positive wing loading. In addition, there was no evidence of flight control over-travel or flutter. It could not be determined whether the pilot intended to perform the abnormal maneuver that resulted in an overload of the airplane or if it was the result of a physiological issue.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The pilot's maneuver, which exceeded the airplane's structural limit and resulted in an in-flight breakup.

Events

1. Maneuvering - Unknown or undetermined
2. Maneuvering - Loss of control in flight
3. Maneuvering - Aircraft structural failure

Findings - Cause/Factor

1. Aircraft-Aircraft oper/perf/capability-(general)-(general)-Not specified - C
2. Aircraft-Aircraft structures-Wing structure-(general)-Capability exceeded - C
3. Personnel issues-Action/decision-Action-(general)-Pilot - C

Narrative

HISTORY OF FLIGHT

On September 12, 2012, about 1455 central daylight time, a Piper PA-23-250 airplane, N4842P, impacted terrain following an in-flight break-up near Bullard, Texas. The commercial pilot was fatally injured and the airplane was substantially damaged. The airplane was registered to X Aviation LLC, Houston, Texas, and operated by a private individual under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Visual meteorological conditions prevailed for the flight. The flight originated from the David Wayne Hooks Memorial Airport (KDWH), Houston, Texas, about 1355, and was en route to the Tyler Pounds Regional Airport (KTYR), Tyler, Texas.

According to eyewitness statements, the airplane approached Lake Palestine, near Bullard, while flying several thousand feet above the ground. The airplane was observed to make several turns, pitched nose up, and climbed. The airplane then rolled to the right and headed toward the ground nose first. Several witnesses observed airplane components floating down after the airplane. All witnesses reported hearing loud engine noises throughout the event.

PERSONNEL INFORMATION

The pilot, age 51, held a commercial pilot certificate for airplane single engine land, multi-engine land, and instrument airplane. He was previously issued a flight instructor certificate for airplane single engine which expired on August 31, 1983. On April 5, 2012, the pilot was issued a first class special authorization, interim issuance medical certificate due to hyperthyroidism. A review of the pilot's log book revealed that the pilot had accumulated a total of 937.7 hours, 39.4 hours of multiengine time, and 24.4 hours in the make and model of the accident airplane. He obtained his multiengine land rating on April 28, 2012.

AIRCRAFT INFORMATION

The twin-engine, low wing, six seat, retractable landing gear airplane was manufactured in 1961 with the serial number 27-413. It was powered by two 250-horsepower Lycoming O-540-A1D5 engines driving metal, two-blade, constant speed, Hartzell HC-A2VK-2 propellers. The airplane's last annual inspection was conducted on August 31, 2012, at a total airframe time of 6,076.35 hours. The left engine's starter cable was replaced on the day of the accident. There was no record of any other recent maintenance performed on the airplane.

METEOROLOGICAL CONDITIONS

At 1453, an automated weather reporting facility at KTYR reported wind from 130 degrees at 11 knots, 10 miles visibility, few clouds at 5,000 feet, temperature 90 degrees Fahrenheit (F), dew point 64 degrees F, and a barometric pressure of 30.03 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

The accident site was located on a road near a wooded, residential area. Damage to trees surrounding the accident site was consistent with a steep descent angle. Airplane components were located in several directions from the accident site at distances up to one-half mile. The largest concentration was within a 40 yard radius of the main wreckage, however wing components were scattered to the north and east of the accident site. Ground impact signatures consisted of two impact craters, one for left engine and one for the fuselage. The main wreckage consisted of the fuselage, empennage, rudder, elevators, both engines, and portions of both wings. The odor of fuel was detected at the accident site.

The left wing was fragmented outboard of the left engine. The left flap was found at the accident site along with a portion of the left aileron. The left wing tip was found near a lake shore about 175 yards north of the accident site and the inboard portion of the aileron located about 500 yards north of the accident site. The right wing was fragmented outboard of the right engine. The right flap was found 40 yards east of the accident site along with the right aileron. A large section of the right wing was recovered from a lake about 175 yards north of the accident site, with the right wing tip was located 380 yard east of the accident site. Both engines remained attached to the wing mounts. The left engine was fractured in multiple places. The left propeller fractured at the first crankshaft web. One blade displayed leading edge polishing, deep nicks, gouges, and chordwise scratches. The opposite blade had leading edge polishing and chordwise scratches from the blade root to near mid span where it was displayed aft. The right engine's crankcase was fractured in multiple locations. The right propeller hub remained attached to the engine and one blade had fractured from the hub. Both blades displayed curling, leading edges nicks and gouges, and chordwise scratches. Flight control continuity was established from the flight controls to the rudder and elevators, and to the aileron bellcranks. The cockpit section was fragmented, torn, and displaced. The left engine's tachometer displayed 1,650 rpm with a Hobbs time of 315.4 hours and the right engine's tachometer displayed 1,450 rpm with a Hobbs time of 313.8 hours. Most of the other cockpit instruments were unreadable or destroyed.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on the pilot by Forensic Medical Management Services of Texas as authorized by the Justice of the Peace, Precinct 2, Smith County, Texas. The cause of death was blunt force injuries and the manner of death was ruled an accident.

Forensic toxicology was performed on specimens from the pilot by the FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma. The specimens provided were negative for ethanol and drugs.

TESTS AND RESEARCH

A layout of the airplane's wings and fuselage was conducted. Both wings displayed near symmetric damage and deformation with signatures that both wings failed in overload with positive wing loading. Examination of the empennage did not reveal any signatures of over travel or flutter.

Accident Rpt# ERA14LA085	**01/04/2014 1520 EST**	**Regis# N9409J**	**Bronx, NY**	**Apt: N/a**	
Acft Mk/Mdl PIPER PA-28-180		**Acft SN 28-3516**	**Acft Dmg: SUBSTANTIAL**	**Rpt Status: Prelim**	**Prob Caus: Pending**
Eng Mk/Mdl LYCOMING O-360-A3A		**Acft TT 2516**	**Fatal 0** **Ser Inj 0**	**Flt Conducted Under: FAR 091**	
Opr Name: SCHWARTZ MICHAEL		**Opr dba:**		**Aircraft Fire: NONE**	

Narrative

On January 4, 2014, about 1520 eastern standard time, a Piper PA-28-180, N9409J, was substantially damaged during a forced landing on an expressway in Bronx, New York. The private pilot and two passengers were not injured. The airplane was registered to and operated by a private individual, under the provisions of 14 Code of Federal Regulations (CFR) Part 91, as a personal flight. Visual meteorological conditions prevailed at the time and no flight plan was filed; VFR flight following was obtained. The flight originated from Danbury Municipal Airport, Danbury, CT, about 1440.

The pilot stated that the flight departed with full fuel tanks and after takeoff proceeded to the Statue of Liberty which he orbited twice. He then climbed to 1,500 feet and while in contact with the FAA LaGuardia control tower, he noticed the engine was not developing power. Because he had switched fuel tanks 30 minutes into the flight while at the Statue of Liberty, he turned on the auxiliary fuel pump, and switched the fuel selector to the fuel tank selected for takeoff. He stated that he could not recall the tank selected for takeoff. In attempt to restore engine power he also richened the mixture, and pushed the throttle full in, but with no affect. He declared a mayday, established best glide airspeed, and was vectored to a nearby airport but realized he would be unable to land there. He observed an expressway with 2 closed lanes and maneuvered the airplane for landing. He did not make contact with any trees or light poles on approach to the expressway. In preparation for the forced landing he shut off the fuel and magnetos and "cracked the [cabin entry door]." After coming to rest, all occupants exited the airplane.

Accident Rpt# ERA13LA111	**01/13/2013 1845 EST**	**Regis# N4975S**	**Dover, DE**	**Apt: Dover Air Force Base DOV**
Acft Mk/Mdl PIPER PA-28R-200		**Acft SN 28R-35693**	**Acft Dmg: SUBSTANTIAL**	**Rpt Status: Factual Prob Caus: Pending**
Eng Mk/Mdl LYCOMING IO-360		**Acft TT 5613**	**Fatal 1 Ser Inj 0**	**Flt Conducted Under: FAR 091**
Opr Name: TUREN CLIFFORD H		**Opr dba:**		**Aircraft Fire: NONE**

Summary

The pilot had planned a night instrument cross-country flight of 3 hours 45 minutes, with 5 hours 30 minutes of fuel onboard. About 3 hours 20 minutes into the flight, when the airplane was about 15 miles from the intended destination airport, the pilot diverted after the airplane ahead of him performed a missed approach due to the low cloud ceiling. The pilot diverted to a nearby airport where the wind was calm and the ceiling was overcast at 400 feet above ground level (agl). The airport was equipped with a precision (instrument landing system [ILS]) approach, which the pilot did not attempt; instead, he attempted two GPS approaches to the opposite end of the runway. During both GPS approaches, the pilot performed missed approaches before the airplane reached the decision altitude of 306 feet agl.

Then, about 4 hours 20 minutes into the flight, the pilot diverted again, this time to an airport that was not equipped with an ILS approach and had a reported overcast layer of clouds at 300 feet agl. He performed a GPS approach to that airport, during which he descended the airplane below the approach's published minimum descent altitude of 310 feel agl, to about 250 feet agl, before he performed a missed approach. After the missed approach, about 5 hours into the flight, the pilot advised the air traffic controller that he was low on fuel and diverted to another airport with no ILS approach to attempt a very high frequency omnidirectional range (VOR) approach. The pilot was in contact with air traffic control and could have declared an emergency and performed an ILS approach to a military airport that he overflew en route to the airport with the VOR approach; however, he did not. The pilot was cleared for the VOR approach about 5 hours 5 minutes into the flight and declared an emergency 6 minutes later, reporting fuel exhaustion. Air traffic control personnel provided the pilot with radar vectors to the military airport he had overflown, but the airplane impacted wooded terrain about 2 miles before it reached the runway at that airport.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The pilot's failure to land the airplane at multiple airports that were equipped with adequate instrument approach procedures while operating in low instrument meteorological conditions and his delay in declaring a fuel-related emergency, which resulted in a loss of engine power due to fuel exhaustion.

Events

1. Approach-IFR final approach - Fuel exhaustion
2. Approach-IFR final approach - Loss of engine power (total)
3. Emergency descent - Off-field or emergency landing
4. Emergency descent - Collision with terr/obj (non-CFIT)

Findings - Cause/Factor

1. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-Descent/approach/glide path-Not attained/maintained - C
2. Personnel issues-Action/decision-Action-Incorrect action performance-Pilot - C
3. Personnel issues-Action/decision-Info processing/decision-Decision making/judgment-Pilot - C
4. Personnel issues-Action/decision-Action-Delayed action-Pilot - C

Narrative

HISTORY OF FLIGHT

On January 13, 2013, about 1845 eastern standard time, a Piper PA-28R-200, N4975S, operated by a private individual, was substantially damaged during a forced landing, following a total loss of engine power while on approach to Dover Air Force Base (DOV), Dover, Delaware. The private pilot was fatally injured. Night instrument meteorological conditions prevailed and an instrument flight rules flight plan was filed for the planned flight to Summit Airport (EVY), Middletown, Delaware. The personal flight was conducted under the provisions of 14 Code of Federal Regulations Part 91 and originated from Kaolin Field (OKZ), Sandersville, Georgia, about 1330.

Review of the pilot's flight plan revealed an estimated time enroute of 3 hours 45 minutes, with 5 hours 30 minutes of fuel onboard. The pilot filed for a cruising altitude of 5,000 feet mean sea level (msl) and listed an alternate airport of Baltimore/Washington International Airport (BWI), Baltimore, Maryland. Review of fueling records revealed that the pilot completely fueled the airplane before departing on the accident flight. According to information provided by the U.S. Air Force, Federal Aviation Administration (FAA) and obtained from a handheld GPS, the airplane was in radio and radar contact with Dover Approach at 1647, while descending for a GPS approach to EVY.

The controller advised the pilot that a previous airplane had to fly a missed approach at EVY due to weather, then flew another missed approach at Wilmington, Delaware, before diverting again. At 1649, the pilot asked the controller what the weather was at Salisbury Regional Airport (SBY), Salisbury, Maryland. The controller replied that the 1629-recording included a ceiling that was 400 foot overcast and a visibility of 8 miles. The pilot replied that he wanted to try an approach at SBY. The controller cleared the flight direct to SBY and the airplane reversed direction to south, about 15 miles south of EVY, at 1650.

The pilot then attempted two GPS approaches to runway 14 at SBY and performed a missed approach both times. The descent altitude for the approach, utilizing localizer performance with vertical guidance (LPV), was 355 feet msl, or 306 feet above ground level (agl); however the pilot discontinued the first approach at a GPS altitude of 581 feet, when the airplane was aligned with the runway, about 1.7 miles from the runway. During the second approach, the airplane descended to 928 feet GPS altitude while aligned with the runway, but then veered right and continued to descend to 529 feet, before performing another missed approach. At that time, the pilot advised air traffic control that his GPS was not working right and he was going to try it again.

The wind was reported as calm and runway 32 (6,400 feet long) at SBY was equipped with an instrument landing system (ILS) approach; however, the pilot did not request that approach and did not attempt another GPS approach to SBY. After the second missed approach, the pilot requested to divert to Sussex Country Airport (GED), Georgetown, Delaware at 1753. At that time, the controller reported the last recorded ceiling at GED, which was 700 feet overcast. At 1801, when the pilot was cleared for the GPS runway 22 approach to GED, the controller advised that the updated weather recording, which was 7 minutes old, included an overcast ceiling of 300 feet. The pilot thanked the controller for the information and continued to fly to GED. At 1816, the pilot reported that he was established on the approach. The published minimum for the GPS approach to runway 22 at GED, with LPV, was 360 feet msl (310 agl). The pilot flew that approach to a GPS altitude of 250 feet and at 1826, reported that he was on a missed approach, requested the same approach again, and advised that he was running low on fuel.

The controller then asked the pilot if he was going to need an alternate airport and the pilot asked if there was anything easier than the approach at GED. The controller replied that he could try Delaware Airpark (33N), Dover, Delaware. The controller added that 33N used DOV weather recording, which was currently visibility 10 miles and ceiling 500 feet overcast. At 1830, while being vectored for an approach at 33N, the pilot asked if there was any chance he could land at DOV. The controller replied, ".negative sir, unless it's an emergency, there is no way you can land here."

At 1835, the pilot was cleared for the VOR RWY 27 approach at 33N. At 1841, the pilot declared an emergency and reported that he was out of fuel. At that time, the controller provided vectors for the ILS runway 19 approach at DOV; however, the airplane was about 2,000 feet msl, 7 miles north of DOV, and had to reverse course as it was flying north, away from the airport. After completing the turn, the airplane was flying toward DOV, between the final approach courses for runways 14 and 19. At 1843, the controller advised that DOV was at the pilot's 12 o'clock position and 6 miles, which the pilot acknowledged. At 1844, the controller reported that the airplane was heading in the right direction and the pilot could expect to land on runway 14. The pilot replied that he was "on to tower right now," and no further communications were received from the accident airplane. A GPS target was recorded at 1845:33, indicating the airplane was at 500 feet, on an approximate 3-mile final for runway 14.

PILOT INFORMATION

The pilot held a private pilot certificate, with ratings for airplane single-engine land and instrument airplane. The pilot received his instrument rating on June 9, 2010. His most recent FAA third-class medical certificate was issued on July 28, 2011. Review of the pilot's logbook revealed that he had accumulated a total flight experience of approximately 598 hours; of which, about 77 hours and 35 hours were actual instrument and simulated instrument experience, respectively. The pilot had flown about 31 hours and 15 hours during the 90-day and 30-day periods preceding the accident, respectively. He flew 2.2 hours and 0.8 hours in actual instrument meteorological conditions during the 90-day and 30-day period, respectively. The pilot flew four instrument approaches and one instrument approach during the 90-day and 30-day period, respectively.

The pilot was a surgeon and was scheduled to perform surgery during the morning following the accident.

AIRCRAFT INFORMATION

The four-seat, low-wing, retractable tricycle-gear airplane, serial number 28R-35693, was manufactured in 1970. It was powered by a Lycoming IO-360, 200-horsepower engine, equipped with a McCauley constant-speed propeller. Review of the airplane's logbooks revealed that its most recent annual inspection was completed on June 2, 2012. At that time, the airplane had accumulated 5,613 total hours of operation. The engine had accumulated approximately 953

hours since major overhaul. The airplane was IFR equipped and had a Garmin 430 GPS that was wide area augmentation system (WAAS) enabled. The airplane was also equipped with an STEC 30 autopilot that would fly the lateral portion of a GPS approach, but not the vertical. Additionally, the pilot had a handheld Garmin Area 796 GPS.

METEOROLOGICAL INFORMATION

The pilot obtained weather information and filed a flight plan with direct user access terminals about 1016. The weather the pilot obtained included the terminal forecast for New Castle Airport (ILG), Wilmington, Delaware. From 1300 to 1600, the forecast weather included visibility 2 miles in mist and an overcast ceiling at 400 feet; however, from 1600 to 1900, the forecast weather at ILG included visibility 6 miles in mist and a broken ceiling at 1,200 feet. From 1100 to 1700, the forecast weather at BWI included visibility 2 miles in light drizzle and mist and a broken ceiling at 300 feet. From 1700 to 2200, the forecast weather at BWI included visibility greater than 6 miles and a broken ceiling at 3,000 feet.

The recorded weather at SBY, at 1629, was: wind from 150 degrees at 8 knots; visibility 8 miles; overcast ceiling at 400 feet; temperature 13 degrees C; dew point 11 degrees C; altimeter 30.06 inches Hg. The recorded weather at SBY, at 1654, included visibility 7 miles and an overcast ceiling at 400 feet.

The recorded weather at BWI, at 1654, included visibility 1/2 mile in light drizzle and fog, and an overcast ceiling at 200 feet.

The recorded weather at GED, at 1654, was: wind from 190 degrees at 7 knots; visibility 10 miles; overcast ceiling at 700 feet; temperature 13 degrees C; dew point 11 degrees C; altimeter 30.07 inches Hg. The recorded weather at GED, at 1751, included visibility 6 miles in mist and overcast ceiling at 300 feet.

The recorded weather at DOV, at 1842, was: wind from 330 degrees at 3 knots; visibility 4 miles in mist; overcast ceiling at 400 feet; temperature 8 degrees; dew point 8 degrees; altimeter 30.04 inches Hg.

AERODROME INFORMATION

In addition to a decision altitude of 355 feet msl for the GPS approach to runway 14 at SBY, the decision height for the ILS approach to runway 32 was 253 feet msl (200 feet agl).

The decision altitude for the GPS approach to runway 22 at GED, with LPV, was 360 feet msl (310 feet agl). GED was not equipped with an ILS approach.

The minimum descent altitude for the "VOR RWY 27" approach at 33N was 520 feet msl (477 feet agl). Further review of the published procedure revealed, "Procedure NA at night."

In addition to SBY, both DOV and BWI were equipped with ILS approaches.

WRECKAGE INFORMATION

Examination of the wreckage by an FAA inspector revealed that the airplane impacted several trees and came to rest inverted in a wooded area, about 2 miles from DOV. The inspector observed an approximate 150-foot debris path, extending on a course about 190 degrees magnetic, from the first tree branch separation, to the main wreckage. The right wingtip and right flap were observed at the beginning of the debris path. The right wing and a section of vertical stabilator were located about 100 feet along the debris path, with the remainder of the fuselage and engine at the end of the debris path.

The wings and fuselage were substantially damaged, exhibited several tree strikes, and there was no postcrash fire. Both main fuel tanks were compromised. The inspector observed no fuel in the right main fuel tank and approximately 1/2 gallon in the left main fuel tank. The inspector did not observe any preimpact mechanical malfunctions with the airframe or engine.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on the pilot by the State of Delaware, Office of the Chief Medical Examiner, Wilmington, Delaware, on January 14, 2013. Toxicological

testing was performed on the pilot by the FAA Bioaeronautical Science Research Laboratory, Oklahoma City, Oklahoma. Review of the toxicological report revealed:

"10 (ug/ml, ug/g) Acetaminophen detected in Urine
0.081 (ug/mL, ug/g) Dihydrocodeine detected in Urine
Dihydrocodeine NOT detected in Blood (Heart)
Hydrocodone detected in Urine
Hydrocodone NOT detected in Blood (Heart)
0.194 (ug/mL, ug/g) Hydromorphone detected in Urine
Hydromorphone NOT detected in Blood (Heart)
Naproxen detected in Urine"

TESTS AND RESEARCH

A handheld GPS receiver was recovered from the wreckage and data were successfully downloaded at the NTSB Vehicle Recorders Laboratory, Washington, DC (for more information, see GPS Device Factual Report in the public docket).

Review of a make and model pilot operator handbook revealed that the airplane held 48 gallons of usable (and 2 gallons unusable) fuel and burned 9.16 gallons per hour at 65 percent power, which would consume 48.09 gallons over a 5 hour 15 minute period. The calculations did not include fuel used for takeoff and climbs (missed approaches).

Accident Rpt# ERA13FA096 12/24/2012 1435 EST	**Regis# N78WM**	**Leesburg, FL**	**Apt: N/a**	
Acft Mk/Mdl PIPER PA-31-350	**Acft SN 31-7952047**	**Acft Dmg: SUBSTANTIAL**	**Rpt Status: Factual**	**Prob Caus: Pending**
Eng Mk/Mdl LYCOMING LTIO-540-J2BD		**Fatal 1 Ser Inj 1**	**Flt Conducted Under: FAR 091**	
Opr Name: FETCKO JOHN THOMAS	**Opr dba:**		**Aircraft Fire: NONE**	

Summary

The pilot and the pilot-rated passenger were flying from their home, which was located at a residential airpark where no fuel services were available, to an airport located about 37 miles away. According to the passenger, shortly after departure, she queried the pilot about the airplane's apparent low fuel state. The pilot responded that one of the fuel gauges always indicated more available fuel than the other, and that if necessary they could use fuel from that tank. However, about 15 minutes after departure, the pilot advised air traffic control that the airplane was critically low on fuel. About 5 minutes later, both engines lost total power, and the airplane descended into trees and terrain.

Examination of the airframe and engines after the accident confirmed that all of the airplane's fuel tanks were essentially empty, and that the trace amounts of fuel recovered were absent of contamination.

Based on the autopsy and toxicology results, the pilot had emphysema, hypertension, dilated cardiomyopathy, and severe coronary artery disease; however, given that the passenger did not report any signs of acute incapacitation, and that the pilot did not communicate any medical issues to air traffic control, it does not appear that these conditions affected his performance on the day of the accident.

The pilot did not report any chronically painful conditions to the FAA in his most recent medical certificate applications; however, postaccident toxicology tests indicated that the pilot was taking several pain medications (diclofenac, gabapentin, and oxycodone) and one illegal substance (marijuana). Based on the medications' Food and Drug Administration warnings, gabapentin and oxycodone may be individually impairing and sedating; their combined effect may be additive. The effects of the underlying conditions that necessitated the medication could not be determined. It is impossible to determine from the available information what direct effect the marijuana alone may have had on the pilot's judgment and psychomotor functioning; however, the combination of marijuana, oxycodone, and gabapentin likely significantly impaired the pilot's judgment and contributed to his failure to ensure the airplane had sufficient fuel to complete the planned flight.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The pilot's inadequate preflight planning, which resulted in fuel exhaustion and a subsequent total loss of power in both engines during cruise flight. Contributing to the accident was the pilot's use of prescription and illicit drugs, which likely impaired his judgment.

Events

1. Prior to flight - Preflight or dispatch event
2. Enroute-cruise - Loss of engine power (total)
3. Emergency descent - Off-field or emergency landing
4. Emergency descent - Collision with terr/obj (non-CFIT)

Findings - Cause/Factor

1. Personnel issues-Task performance-Planning/preparation-Fuel planning-Pilot - C
2. Personnel issues-Physical-Impairment/incapacitation-Prescription medication-Pilot - F
3. Personnel issues-Physical-Impairment/incapacitation-Illicit drug-Pilot - F

Narrative

On December 24, 2012, about 1435 eastern standard time, a Piper PA-31-350, N78WM, was substantially damaged when it collided with terrain during a forced landing following a loss of power in both engines near Leesburg, Florida. The private pilot was fatally injured and the pilot-rated passenger was seriously injured. Visual meteorological conditions prevailed, and no flight plan was filed for the flight, which departed Eagles Nest Aerodrome (FD44), Crescent City, Florida, at 1405, and was destined for Leesburg International Airport (LEE), Leesburg, Florida. The personal flight was conducted under the provisions of Title 14 Code of Federal Regulations Part 91.

According to the pilot-rated passenger, who was also the pilot's wife, the pilot completed the preflight inspection of the airplane and prepared for their departure while she was shopping. Upon returning home, she boarded the airplane, secured the aft cabin door, and prepared the cabin for departure as she would normally do prior to any other flight. She then sat down in the front right seat of the airplane about the time the pilot had taxied onto the runway. Shortly after

takeoff, and while reading through the after takeoff checklist, she noticed that the fuel quantity in the left and right fuel tanks appeared to be low, with the left gauge reading slightly above 1/4-tank of fuel and the right gauge reading slightly below 1/4 tank of fuel.

When the passenger queried the pilot about the fuel quantities, the pilot replied that the left fuel gauge always indicated a greater quantity of fuel than the right gauge, and that if the fuel quantity in the right tank became too low, they could always use fuel from the left fuel tank. She continued to closely monitor the fuel quantity state and fuel flow to both engines for the next 10 minutes. About that time, and about 6 miles north of LEE, the right engine began to surge. The pilot responded by repositioning the right engine's fuel selector from the inboard to the outboard fuel tank. He then contacted the air traffic control tower at LEE, requested to land, and advised the controller that the airplane was running low on fuel. Shortly after making that transmission, the left engine began to surge, and the pilot again responded by repositioning the fuel selector from the inboard to the outboard fuel tank.

The pilot then began searching for an off-airport landing site, and during the descent both engines operated intermittently. The pilot later advised air traffic control that the airplane was "going down," prepared for a forced landing to a field below, and extended the airplane's landing gear. The airplane subsequently struck trees short of the pilot's intended landing area.

According air traffic control voice communication information provided by the Federal Aviation Administration (FAA), the pilot initially contacted the LEE air traffic control tower at 1930 and advised the controller that the airplane was about 12 nautical miles north of the airport, that the airplane was "bingo fuel," and that he would like a straight-in approach to the runway. The controller subsequently instructed the pilot to advise him when he was 1 mile from the runway on final approach. When the airplane was about 6 nautical miles from the airport, the pilot advised the controller that one of the airplane's fuel tanks was empty and that he was attempting to make it to the airport "on one." The controller then cleared the pilot to land on runway 13, but shortly thereafter the pilot advised the controller that the airplane was out of fuel and that they were "going in." No further transmissions were received from the pilot.

PERSONNEL INFORMATION

According to airman records maintained by the FAA, the pilot, age 53, held a private pilot certificate with numerous ratings including airplane multi-engine land. Pilot logs recovered from the wreckage documented flight experience accumulated between 1987 and February 2005. During that time, the pilot logged about 3,000 total hours of flight experience, 1,400 hours of which were in multi-engine land airplanes and 500 hours of which were in multi-engine seaplanes. The logs also contained endorsements for flight reviews completed in April 2008 and January 2012.

AIRCRAFT INFORMATION

The twin-engine, low wing, retractable landing gear airplane was manufactured in 1978, and was powered by two Lycoming TIO-540, 350-hp engines. Review of maintenance records showed that the airplane's most recent annual inspection was completed on September 9, 2011 at 4,895 total hours of operation. At the time of the accident, the airplane had accumulated 4,912 total hours of operation.

According to the passenger, the pilot had most recently serviced the airplane with fuel prior to flying from Gatlinburg Pigeon-Forge Airport (GKT), Gatlinburg, Tennessee, to their home at FD44. Review of fueling records from a fixed based operator at GKT revealed that on October 19, 2012, the airplane's inboard fuel tanks were filled to capacity with 32 gallons of aviation gasoline.

METEOROLOGICAL INFORMATION

The weather conditions reported at LEE, at 1453, located about 2 nautical miles south of the accident site included wind from 220 degrees at 11 knots, gusting to 16 knots, 10 statute miles visibility, clear skies below 12,000 feet, temperature 21 degrees Celsius (C), dew point 9 degrees C, and an altimeter setting of 30.00 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

The initial impact point (IIP) was identified as a tree with broken limbs, with various components of wreckage extending from that point on a heading of 135 degrees magnetic. A ground scar approximately 6 feet wide by 100 feet long, began about 50 feet from the IIP, and was oriented along the wreckage path. The fuselage came to rest upright oriented roughly 350 degrees magnetic. First responders reported that no fuel or fuel odor was present at the scene and that all of the airplane's fuel tanks appeared to be absent of fuel.

The airplane was subsequently recovered from the scene and examined at an aircraft recovery facility. Control continuity was traced from the cockpit area, through overload separations and cable cuts performed by recovery personnel to each of the flight control surfaces. Measurement of the stabilator trim tab actuator revealed a position consistent with a slight deflection in the nose-up direction. The flaps were in the retracted position, and the position of the left main landing gear door was consistent with the landing gear being extended at impact.

Trace amounts of fuel were observed in two of the airplane's six fuel tanks and within both fuel strainer bowls. The fuel had an odor consistent with 100 low-lead aviation gasoline and was absent of debris or water. Each of the fuel filler port caps was intact and secure. The fuel quantity float sensors were recovered from the left and right inboard and outboard fuel tanks for functional testing.

Continuity of both engine's crankshaft and valvetrain was confirmed through rotation of the propeller, and thumb compression was confirmed on all cylinders. The top spark splugs from both engines were removed, and all exhibited normal wear and were grey to black in color. Both propellers remained attached to their respective crankshaft flanges and both propeller spinners exhibited non-torsional crush damage. All of the propeller blades were bent aft about the mid span, and each of the blades exhibited spanwise and chordwise scraping.

MEDICAL AND PATHOLOGICAL INFORMATION

FAA Medical Records

According to the pilot's FAA medical record, he first received a third-class medical certification in 1987, with a restriction for corrective lenses. From that time forward until 2006, the pilot did not report use of any medications, any medical problems or procedures, or any traffic or non-traffic convictions. The single exception was a report of a physician visit and use of Axid (nizatidine, a proton pump inhibitor used to treat ulcers) for heartburn in 1997. In 2006, the FAA received a safety hotline report that the pilot had previously had several convictions for drug possession and two convictions for driving while intoxicated. Investigation revealed that the pilot had been convicted of misdemeanor charges for possession of marijuana in 1977 and 1978, and marijuana and hydrocodone (a prescription narcotic and controlled substance) in 1980. In addition, he had been convicted of driving while intoxicated in 1980 and 1981. During correspondence with the FAA regarding these events in 2006, the pilot reported social drinking, "two or three drinks with dinner" and stated, "I do not use illegal substances." After this process, the pilot reported on subsequent applications for medical certification his previous convictions by checking "yes" to the relevant historical questions and then "previously reported, no change".

Also in 2006, the pilot reported using Advair to treat hay fever (an inhaled, prescription medication used to treat asthma that combines fluticasone propionate [a steroid] and salmeterol [a long acting beta-agonist]), and Prevacid for heartburn (lansoprazole, a proton pump inhibitor used to treat gastroesophageal reflux disease). He was awarded his medical certificate without further investigation. In 2008, he reported an injury to his Achilles' tendon and Motrin (ibuprofen, a non-steroidal anti-inflammatory analgesic) in addition to his previous medications. In 2010, he reported the same medications and was awarded a third class medical certificate.

In August, 2011, the FAA requested more information regarding the pilot's use of Advair. The pilot supplied it with a letter from his physician who noted the Advair was being used to treat chronic obstructive pulmonary disease (also known as emphysema) with symptoms of bronchospasm and mentioned the pilot was trying to quit smoking. No other information was offered. The FAA subsequently provided the pilot with a special issuance medical certificate with the limitation "not valid for any class after 5/31/2012". The pilot was not examined and had not obtained any subsequent medical certificates following the expiration of the special issuance medical certificate.

Post-Accident Findings and Toxicology

An autopsy was performed on the pilot by the Medical Examiner District 5, Leesburg, Florida. According to the autopsy report, the cause of death was "multiple blunt force injuries." Significant natural disease was identified, particularly in the heart, which was markedly enlarged and weighed 750 grams (normal for a man of his weight is between 305 and 531 grams [1]). In addition, the coronary arteries displayed severe atherosclerosis, with greater than 95% narrowing of the proximal left anterior descending coronary artery. Both ventricles were dilated, but the walls were of normal thickness. No histology of the cardiac tissue was performed. The autopsy also noted severe pulmonary anthracosis and emphysema with scarring.

The FAA's Civil Aerospace Medical Institute performed forensic toxicological testing on specimens from the pilot. The testing identified a number of

medications in liver tissue and urine samples including: valsartan and metoprolol (both blood pressure medications marketed under the trade names Diovan and Lopressor respectively); and gabapentin (a medication whose mechanism is not known, used to treat chronic or neuropathic pain or to help prevent seizures and marketed under the trade name Neurontin). Gabapentin carries the following FDA warning: "Warning may cause dizziness, somnolence and other symptoms and signs of CNS depression. Accordingly, they should be advised neither to drive a car nor to operate other complex machinery until they have gained sufficient experience on Neurontin to gauge whether or not it affects their mental and/or motor performance adversely." The urine samples also tested positive for diclofenac, a prescription non-steroidal anti-inflammatory and analgesic marketed under the trade name Voltaren, and oxymetolazine, an over-the-counter intranasal medication used to treat runny nose.

In addition, testing found 0.043 ug/mL of oxycodone in heart blood and 0.767 ug/mL in urine. Oxycodone's primary metabolite, oxymorphone, was identified in urine (2.328 ug/mL). Oxycodone is a semi-synthetic narcotic pain medication prescribed as a schedule II controlled substance; it is the narcotic portion of the medication marketed under the trade name Percocet. Oxycodone's therapeutic dose is considered 0.0130 to 0.0990 ug/mL and it carries the following FDA warning: may impair mental and/or physical ability required for the performance of potentially hazardous tasks (e.g., driving, operating heavy machinery).

Finally, toxicology testing revealed the pilot's use of marijuana including identifying the parent drug, tetrahydrocannabinol, in liver (0.1628 ug/ml), lung (0.1921 ug/ml), and heart blood (0.0139 ug/ml); and the primary metabolite, tetrahydrocannabinol carboxylic acid, in liver (0.3417 ug/ml), lung (0.0454 ug/ml), and heart blood (0.0239 ug/ml).

TESTS AND RESEARCH

According to the Piper Navajo Chieftain Service Manual, the float-type resistance fuel senders could be tested by measuring the resistance at the float's full and empty positions. The published electrical resistance limits at the empty and full positions for the inboard fuel tanks was between 0.0 to 0.5 ohms, while the resistance at the full position was between 48 and 52 ohms. The left inboard fuel tank fuel sender displayed a resistance of 0.38 ohms in the empty position and 59 ohms in the full position, while the right inboard fuel tank sender displayed a resistance of 0.9 ohms in the empty position and 40.5 ohms in the full position.

The published resistance limits at the empty and full positions for outboard fuel tanks was between 0.0 to 0.5 ohms, while the resistance at the full position was between 38 and 42 ohms. The outboard fuel tank fuel sender displayed a resistance of 1.2 ohms in the empty position and 45 ohms in the full position, while the right outboard fuel tank sender displayed a resistance of 60.3 ohms in the empty position and 69 ohms in the full position.

The service manual stated that if any of the resistance tolerances could not be maintained, the fuel sender unit must be replaced.

ADDITIONAL INFORMATION

Fuel Availability

The airplane was based at the pilot's home, which was located on the grounds of a residential airpark, FD44. There were no fueling facilities available at the airpark. Review of a sectional aeronautical chart and the FAA Airport/Facility Directory showed that the nearest airport that provided fuel services was Palatka Municipal Airport (28J), Palatka, Florida, which was located about 15 nautical miles north of FD44.

GPS Data

A hand-held GPS receiver was recovered from the wreckage and forwarded to the NTSB Vehicle Recorder Laboratory, where its contents were successfully downloaded. Review of the data showed that the unit had recorded the entirety of the accident flight, beginning at 1409. The track data showed that the airplane subsequently departed FD44 at 1415 and climbed to a GPS-measured cruise altitude of about 3,200 feet by 1422. During the climb, the airplane flew generally southwest, before it turned south and began heading toward LEE, about 1423.

At 1429:50, the pilot initially advised air traffic control that he was concerned about the airplane's fuel state when the airplane was located about 13 nautical miles north of LEE. At that time, the closest paved runway was located about 6 nautical miles northwest of the airplane's position. The Woods and Lakes Airpark (FA38), Oklawaha, Florida was equipped with a single 2,565-foot-long by 36-foot-wide asphalt runway. No fuel services were available at FA38.

The airplane then began a gradual descent, and when the pilot advised air traffic control that one of the airplane's fuel tanks was completely empty, the airplane had traveled an additional 7 nautical miles south toward LEE, but was still 6 nautical miles from the airport. Data from the GPS ceased recording at 1435:38, about 1,100 feet northwest of the accident site, and about 2 nautical miles north of LEE.

Accident Rpt# WPR13FA054	**11/25/2012 2308 PST**	**Regis# N4204A**	**Corona, CA**	**Apt: Corona AJO**
Acft Mk/Mdl ROBINSON HELICOPTER COMPANY R44		**Acft SN 12634**	**Acft Dmg: SUBSTANTIAL**	**Rpt Status: Factual** **Prob Caus: Pending**
Eng Mk/Mdl LYCOMING IO-540-AE1A5		**Acft TT 133**	**Fatal 1** **Ser Inj 0**	**Flt Conducted Under: FAR 091**
Opr Name: LAW OFFICES OF JAMES C BECHLER PC		**Opr dba:**		**Aircraft Fire: GRD**

Narrative

HISTORY OF FLIGHT

On November 25, 2012, at 2308 Pacific standard time, a Robinson R44 II, N4204A, collided with a fueling structure at Corona Municipal Airport, Corona, California. The pilot/owner was operating the helicopter under the provisions of 14 Code of Federal Regulations (CFR) Part 91. The commercial pilot sustained fatal injuries; the helicopter sustained substantial damage from impact forces and post-crash fire. The cross-country personal flight was departing Corona for Fullerton, California. Instrument meteorological conditions prevailed, and no flight plan had been filed.

A friend stated that he picked the pilot up at French Valley Airport in Temecula, California, about 1630, and they had attended an event in Temecula. He dropped the pilot back off at the airport about 2200.

Witnesses at Corona reported to first responders that they heard the helicopter, and then a bang followed by an explosion. They went outside and observed the helicopter on fire.

Fueling records indicated that the pilot added 40.6 gallons of 100LL about 15 minutes before the accident.

A review of a security video showed that the helicopter was facing towards a fuel island, and the cabin was partially under a circular metal canopy that covered the island. The helicopter lifted off, and made an immediate pedal turn nose right. Nearing 180 degrees of turn, the helicopter pitched forward; the tail and main rotor blades came up, and contacted the metal canopy. The helicopter then began to flail while turning, and came to rest, after it turned 180 degrees right, back in the original direction. Several seconds later, a fire began that was followed a few seconds later by an explosion.

PERSONNEL INFORMATION

A review of Federal Aviation Administration (FAA) airman records revealed that the 61-year-old pilot held a commercial pilot certificate with ratings for airplane single-engine land, rotorcraft-helicopter, and instrument airplane. The pilot held a certified flight instructor (CFI) certificate with a rating for airplane single-engine land.

The pilot possessed a third-class medical certificate issued on October 23, 2012; it had no limitations or waivers.

No personal flight records were located for the pilot. The NTSB investigator-in-charge (IIC) obtained the aeronautical experience listed in this report from a review of FAA records on file in the Airman and Medical Records Center located in Oklahoma City. The pilot reported on his medical application that he had a total time of 1,500 hours with 50 hours logged in the previous 6 months.

AIRCRAFT INFORMATION

The helicopter was a Robinson R44-II, serial number 12634. A review of the maintenance logbooks revealed that it had a total airframe time of 133.4 hours at the last annual inspection on February 2, 2012.

The engine was a Lycoming IO-540-AE1A5, serial number L33351-48E. Total time recorded on the engine at the last annual inspection was 133.4 hours.

Examination of the maintenance records revealed no unresolved maintenance discrepancies against the helicopter prior to departure.

METEOROLOGICAL CONDITIONS

An aviation routine weather report (METAR) for Corona (KAJO, elevation 533 feet) was issued at 2256 PDT. It stated: wind calm; visibility 2 1/2 miles mist; sky 300 feet overcast; temperature 12/54 degrees Celsius/Fahrenheit; altimeter 29.98 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

Investigators examined the wreckage at the accident scene on November 26, 2012. Detailed site examination notes are in the public docket.

The helicopter came to rest partially under the metal canopy of the fuel island, which had a gash in it with torn metal sheets hanging down. The height of the top of the mast of the R44 was 129 inches (10.75 feet); the rotor radius was 198 inches (16.5 feet). The canopy was 14 feet above the ground.

The helicopter sustained severe fire damage from the mid tail boom forward. Fire consumed most of the cabin area.

The main rotor blades sustained impact and thermal damage. One main rotor blade spar separated; investigators located it in a hangar several hundred feet from the main wreckage.

The main rotor gearbox separated from the airframe with deformation and separation in the frame tubes. Fracture surfaces were jagged and angular.

The tail rotor driveshaft had disconnected aft of the intermediate flex plate, and exhibited damage that was associated with severe thermal damage to the tail cone.

The tail rotor blades sustained minor impact damage. There was rotational scoring at the tip of both tail rotor blades. There was a semi-circular ground scar with red paint transfer that arched counter-clockwise toward the tail section.

MEDICAL AND PATHOLOGICAL INFORMATION

The Riverside County Coroner completed an autopsy. They ruled that diffuse thermal injury and inhalation of products of combustion were the causes of death.

The FAA Forensic Toxicology Research Team, Oklahoma City, Oklahoma, performed toxicological testing of specimens of the pilot.

Analysis of the specimens contained no findings for carbon monoxide, cyanide, volatiles, and tested drugs.

TESTS AND RESEARCH

Investigators from the NTSB, FAA, Robinson Helicopter Company, and Lycoming examined the wreckage at Aircraft Recovery Service, Littlerock, California, on November 27, 2012. Detailed examination notes are in the public docket.

Airframe

Investigators examined the elements of the surviving warning light bulbs on the annunciator panel. All of the surviving elements were tight except for the "clutch" light, which was stretched.

The main rotor gearbox chip detector was clean, and the gearbox rotated freely by hand.

Rotational scuff marks were on the upper sheave; there was rotational scoring on the cooling fan wheel.

The sprag clutch operated properly.

Flight controls

All rod ends were accounted for, and all separations appeared to be thermal damage; investigators noted no indication of preimpact failure of the flight control system.

Fuel System

The main tank remained attached to the fuselage with the upper half consumed by fire.

The auxiliary fuel tank separated from the fuselage, and was partially consumed by fire.

Fire consumed the gascolator housing; the gascolator cup and screen were recovered, and both were charred.

The fuel valve was in the "ON" position. Fire partially consumed the manual and auxiliary fuel pumps.

Engine

A borescope inspection revealed no mechanical deformation to the valves, cylinder walls, or internal cylinder head.

Investigators manually rotated the crankshaft with the cooling fan, and obtained thumb compression on all cylinders in firing order.

Investigators identified no mechanical anomalies with the airframe or engine during the wreckage examination.

ADDITIONAL INFORMATION

Fuel Tanks

Robinson Helicopters are equipped with either one or two metal all-aluminum main and auxiliary fuel tanks, which are installed above the engine firewall and on each side of the main rotor gearbox. In numerous instances, the fuel tanks have been breached during accidents, leaked fuel, and a post-crash fire occurred. In a number of cases, occupants have survived the initial accident, only to sustain serious or fatal injuries in the post-crash fire.

On December 20, 2010, RHC issued R44 Service Bulletin SB-78 recommending the installation of fuel bladders. Robinson R44 SB-67 and SB-68 address other fuel system crashworthiness components (fuel hose supports and flexible fuel lines) designed to minimize the possibility of a post-crash fire in the R44 series. Although not required, the design changes detailed in this service bulletin demonstrated compliance to a portion of the fuel system crashworthiness regulations in Title 14 CFR Part 27.952.

On September 28, 2012, RHC issued revision B to SB78. The revision directed an accelerated compliance date of April 30, 2013.

All R44 helicopters overhauled at the factory as of July 21, 2009, had the bladder kit installed automatically.

All new R44 Raven I models produced beginning with serial number 2066 (manufactured in October 2009) were equipped with the bladder tanks.

All new R44 Raven II models produced beginning with serial number 12891 (manufactured in August 2009) were equipped with the bladder tanks.

Due to several similar low-energy accidents with fatalities resulting from a post-crash fire, the Australian Civil Aviation Safety Authority (CASA) issued airworthiness directive AD/R44/23 on April 29, 2013, requiring installation of the bladders on all R44 helicopters by April 30, 2013.

Accident Rpt# WPR13FA264	**06/06/2013 1417 PDT**	**Regis# N915BW**	**Los Angeles, CA**	**Apt: N/a**	
Acft Mk/Mdl ROBINSON HELICOPTER COMPANY R44		**Acft SN 11428**	**Acft Dmg: SUBSTANTIAL**	**Rpt Status: Factual**	**Prob Caus: Pending**
Eng Mk/Mdl LYCOMING IO-540-AE1A5		**Acft TT 1546**	**Fatal 0**	**Ser Inj 0**	**Flt Conducted Under: FAR 091**
Opr Name: SOUTHERN CALIFORNIA HELICOPTERS		**Opr dba:**			**Aircraft Fire: NONE**

Narrative

HISTORY OF FLIGHT

On June 6, 2013, at 1417 Pacific daylight time, a Robinson R44 II, N915BW, rolled over following a precautionary landing in Griffith Park, Los Angeles, California. The helicopter was registered to Southern California Helicopters, and operated as a personal flight by the pilot under the provisions of 14 Code of Federal Regulations Part 91. The flight instructor and private pilot sustained minor injuries; the two passengers were not injured. The helicopter sustained substantial damage during the accident sequence. The local flight departed Brackett Field Airport, La Verne, California, about 1315. Visual meteorological conditions prevailed, and no flight plan had been filed.

According to the flight instructor, the primary purpose of the flight was to return the helicopter to Southern California Helicopters Flight School, at Long Beach Airport, following maintenance at a facility at Redlands Municipal Airport, Redlands, California. The private pilot rated passenger's experience was limited to the Robinson R22 helicopter, so the flight instructor invited him along to gain familiarity with the operation of the R44. From Redlands, they flew to Bracket Field to pick up the two passengers, one of whom was related to the flight instructor. His intension was to give the passengers a tour of the Los Angeles area before returning them to Bracket Field and the helicopter back to Long Beach.

The flight instructor serviced the helicopter with fuel, departed, and flew towards Hollywood. The flight then continued west to Santa Monica and back inland over the Universal Studios Theme Park, Forest Lawn Cemetery, and the "HOLLYWOOD" sign. From there they transitioned past the Griffith Observatory, flying east about 1,700 feet msl (mean sea level). The flight instructor stated that a few seconds later, the Main Rotor Gearbox Chip (MR Chip) warning light illuminated. The helicopter continued to operate normally without any unusual sounds, and he immediately began looking for an area to land.

The flight instructor observed a potential landing site to the left, adjacent to a trail on the southern slopes of Griffith Park. As he approached, the helicopter began making a "whining" sound that he had never heard before. He could see people on the intended landing spot, so he turned the helicopter left towards the north, following a ridgeline in an effort to find an alternate landing site. He followed the ridge back around to the southwest, and spotted a small clearing on a pinnacle at the end of a trail. He initiated a descent while maneuvering the helicopter onto a west heading. They landed on the clearing, and before he had a chance to fully lower the collective control, he felt the helicopter slip. He then raised the collective, and the helicopter immediately spun to the right and rolled over.

HELICOPTER INFORMATION

The helicopter was manufactured in September 2006, and was equipped with its original Lycoming fuel injected IO-540-AE1A5 engine. It was involved in a hard landing in Broomfield, Colorado, on July 23, 2011, where it sustained substantial damage to the firewall and tail rotor assembly (See NTSB accident report CEN11CA511). Following the accident, the helicopter was disassembled and transported to the repair facility in Redlands where it was repaired, fuel tank bladders were installed, and an annual inspection was performed. The original main rotor gearbox was utilized for the repair, and serviced with new gearbox oil after completion of a "500 hour flush and drain".

The maintenance logbooks revealed that the annual inspection was completed on April 15, 2013, at which time the helicopter had accrued a total flight time of 1,541.4 flight hours, and an hour meter time of 1,143.4 hours. The hour meter indicated 1,145.6 hours at the accident site.

WRECKAGE AND IMPACT INFORMATION

The helicopter came to rest at an elevation of 1,189 feet msl, on the west slope of the ridge, about 5 feet downhill from the landing site. The general area overlooked the Roosevelt Municipal Golf Course, and Vermont Canyon Tennis Courts, about 300 feet below. The main cabin remained largely intact, with the tailboom bent 45 degrees upwards at the bulkhead seam.

One of the main rotor blades remained attached to the teeter hinge, and sustained bending damage midspan. The second blade exhibited downward curling damage along its entire length, had separated about 2-feet from the teeter hinge, and came to rest against the tailboom. The outboard leading edge sustained chordwise abrasions, with the adjacent trailing edge skin and honeycomb core separating from the spar. The tip cap mounting bolt remained attached to the spar with remnants of the tip cap still attached, but the bulk of the cap was not present. The immediate area surrounding the wreckage was searched, but the tip cap was not located.

Examination of the landing spot revealed multiple ground disruptions consistent with main rotor blade contact, as well as a 4-foot-long ground disturbance just below the crown of the peak on the opposite side of the main wreckage. A growth of dry grass and brush bordered the disturbance; additionally, the left landing skid's toe exhibited longitudinal abrasions to its forward and upper surfaces.

TESTS AND RESEARCH

The helicopter was removed from the accident site, and examined at a remote storage facility. The flight control system was examined, and was intact through to the horizontal firewall. All remaining flight controls exhibited varying degrees of bending damage and separation, consistent with ground impact.

Main Rotor Gearbox

The main rotor gearbox, instrument panel, along with the drive sheave and sprag clutch assembly were removed and examined at the facilities of Robinson Helicopter, Inc. (RHC) in the presence of the NTSB investigator-in-charge.

Both forward gearbox mounting lugs had separated from the casting during the accident sequence, and remained attached to the airframe. Their separation resulted in two 4-inch-wide holes in the gearbox case, and the expulsion of most of the gearbox oil onto the airframe. The gearbox case was disassembled, and the drive gears along with all bearings were examined, with no defects noted. About 5 teaspoons of blue-colored oil was recovered from the sump, and no debris or fragments were observed within the sump area or gear surfaces. No anomalies were noted with the gearbox that would have precluded normal operation; a full examination report is included within the public docket.

The main rotor gearbox chip detector appeared undamaged and free of debris. Closer examination revealed the presence of fine "fuzz" particles in the area adjacent to the contact surfaces. The electrical resistance of the chip detector was tested, with an open circuit detected.

The Clutch, MR Temp, MR Chip, Carbon Dioxide, Starter On, TR Chip, Low Fuel, Low rpm, Fuel Filter, Aux Fuel Pump, and ALT lamps were removed, and their filaments were examined. All filaments were intact, with no stretching observed.

Fuel Tanks

Maintenance records indicated that in April 2013 the helicopter had been retrofitted in accordance with RHC R44 Service Bulletin SB-78B (inclusion of fuel tank bladders), and both SB-67 and SB-68 (replacement of rigid fuel lines and clamps with flexible hardware).

Examination of both fuel tanks revealed that their outer skin surfaces had buckled and been breached during the accident sequence, however, the inner bladders remained intact. For the main fuel tank, the fuel tank supply line and aux-to-main line fittings remained attached to the bladder, with their flexible hose portions broken away at the fitting. Additionally, the flexible portion of the vent interconnecting line was severed at its junction with the tank skin. For the auxiliary fuel tank, the flexible portion of the vent interconnecting line had pulled away from its fitting nipple.

ADDITIONAL INFORMATION

Main Rotor Gearbox Chip Light Indicator

The RHC Maintenance Manual for the R44 series recommends draining and straining the gearbox oil and inspecting the chip detector following a chip light indication. In particular, it recommends the following corrective action if no significant debris is found on the chip detector,

"For fuzz particles: Clean chip detector with compressed air or toothbrush (do not use magnet) and reinstall. Normal wear, especially new gearboxes, will

produce fine fuzz."

Emergency Procedures

The emergency procedures section of the RHC Pilot's Operating Handbook (POH) for the R44 series recommends the following action in the event of a main rotor gearbox chip light indication,

"Indicates metallic particles in main rotor gearbox.... NOTE: If light is accompanied by any indication of a problem such as noise, vibration, or temperature rise, land immediately. If there is no other indication of a problem, land as soon as practical."

Dynamic Rollover

RHC Safety Notice SN-9 issued in June 1994 was included in the POH and stated the following regarding dynamic rollover,

"A dynamic rollover can occur whenever the landing gear contacts a fixed object, forcing the aircraft to pivot about the object instead of about its own center of gravity. The fixed object can be any obstacle or surface which prevents the skid from moving sideways."

Accident Rpt# CEN11FA358	**05/28/2011 2044 CDT**	**Regis# N1041J**	**Bryan, TX**	**Apt: Easterwood Field Airport CLL**
Acft Mk/Mdl ROCKWELL 112		**Acft SN 41**	**Acft Dmg: SUBSTANTIAL**	**Rpt Status: Factual Prob Caus: Pending**
Eng Mk/Mdl LYCOMING IO 360-C1D6		**Acft TT 2937**	**Fatal 2 Ser Inj 0**	**Flt Conducted Under: FAR 091**
Opr Name: JOHN T HOLMSTROM		**Opr dba:**		**Aircraft Fire: NONE**

Narrative

HISTORY OF FLIGHT

On May 28, 2011, at 2044 central daylight time, a Rockwell 112, single engine airplane, N1041J, impacted terrain during a forced landing at Bryan, Texas. The pilot and passenger were fatally injured. No persons on the ground were injured. The airplane sustained substantial damage. The airplane was registered to a private individual and was being operated by another private individual for the 14 Code of Federal Regulations Part 91 personal flight. Dusk visual meteorological conditions prevailed and a flight plan had not been filed. The flight had originated from Fort Worth Spinks Airport (FWS), Fort Worth, Texas, about 1922 and was en route to Scholes International Airport (GLS), Galveston, Texas.

A witness statement and fueling records show that the airplane was last refueled on May 25, 2011. Other records showed that the pilot made two flights of 1.4 hours each, totaling 2.8 hours, on May 26, 2011. Another witness reported the pilot may have made two other local flights on either May 26, or May 27, 2011, and records show the airplane was not refueled after any of those flights.

On the day of the accident the airplane was in cruise flight about 9,500 feet mean sea level (msl) when the pilot advised the controller that he wanted to make a fuel stop at Easterwood Field Airport (CLL), College Station, Texas. The airplane then made a right turn of about 90 degrees and began descending toward CLL.

Several minutes later the pilot reported that he was "running out of fuel". When the airplane was at 600 feet msl the pilot reported that he would not make the airport.

A witness at an apartment complex reported seeing the airplane flying "extremely low" and parallel to the road when he saw it suddenly turn right and head toward the witness's location.

The airplane struck terrain and an unoccupied automobile in the parking lot of the apartment complex and came to rest upright; 47 feet from the initial impact point.

PERSONNEL INFORMATION

The 57-year old pilot held a private pilot certificate issued by the Federal Aviation Administration (FAA) with ratings for airplane single engine land and instrument airplane. The pilot's flight review requirement was successfully completed on May 18, 2010. A third class medical certificate was issued by the FAA on July 1, 2010.

As of May 26, 2011, the pilot had logged a total of 460.6 hours of flight experience, with 259.6 of those hours in the accident airplane make and model; 18.2 of those hours were in actual instrument conditions, an additional 49.9 of those hours were in simulated instrument conditions, and a total of 18.8 hours of night flight time.

AIRCRAFT INFORMATION

The four-seat, low-wing, retractable gear airplane, serial number (s/n) 41, was manufactured in 1973. It was powered by a 200-hp Lycoming IO-360-C1D6 engine, serial number L-9193-51A, which drove a Hartzell 3-blade metal alloy controllable pitch propeller.

The engine was equipped with a pilot controlled manual waste gate turbo-normalized system manufactured by RCM Normalizing Inc., installed under FAA Supplemental Type Certificate Number SE5203NM.

The airplane had fuel tanks in each wing which had a total useful fuel capacity of 62 gallons.

The aircraft maintenance logbooks were not available for examination. However, the pilot's aircraft usage spreadsheet, pilot's personal logbook, and several individual flight planning documents were found in the wreckage. The investigator-in-charge (IIC) reviewed those documents and estimated that the most recent annual inspection was completed on May 24, 2011, at a tach time of 2,937.18 hours, which is the IIC's estimate of the aircraft total time.

METEOROLOGICAL INFORMATION

The closest official weather observation station was CLL, located 2 nautical miles south of the accident site. The elevation of the weather observation station was 320 feet msl. At 2053, the automated weather observing system at CLL reported wind from 170 degrees at 13 knots, visibility of 10 miles, clear of clouds, temperature 29 degrees C, dew point 21 degrees C, with an altimeter setting of 29.71 inches of Mercury.

Data from the U. S. Naval Observatory showed that moonset occurred at 1648, sunset occurred at 2021, and the end of civil twilight occurred at 2048.

COMMUNICATIONS AND RADAR

The airplane was in cruise flight about 9,500 feet mean sea level (msl) and the pilot was receiving flight following from the Houston Air Route Traffic Control Center (ARTCC).

At 2029, when the airplane was about 25 miles northeast from CLL, the pilot advised the ARTCC controller that he wanted to make a fuel stop at CLL. The ARTCC controller instructed the pilot to contact the tower controller at CLL. The airplane then made a right turn of about 90 degrees and began descending toward CLL.

At 2035:30 the airplane was at 7,000 feet msl and about 11 miles from CLL when the pilot made his initial radio contact with the tower controller at CLL and he reported that he had to make a "fuel stop".

At 2036:40 the pilot advised the controller that he was "running out of fuel".

At 2037 the controller advised the aircraft rescue and firefighting (ARFF) unit of an Alert 2.

At 2040:32 the airplane was at 3,000 feet msl and about 4 and 1/2 miles from CLL when the pilot reported that he had the airport in sight and would be landing on runway 16.

At 2043:40 the airplane was at 600 feet msl when the pilot reported that he would not make the airport.

There were no further communications from the pilot and last radar return was at 2043:46.

WRECKAGE AND IMPACT INFORMATION

The airplane wreckage was located in the parking lot of a large apartment complex about 2 miles north of CLL. The area from the northwest through the southwest for a distance of over three miles was a congested urban area.

The initial impact crater was about 47 feet from the main wreckage final resting location. Debris and ground scars led from the crater on a direction of 235 degrees to the main wreckage which came to rest about 45 feet from the nearest building of the apartment complex.

The nose of the airplane's upright fuselage was oriented to 358 degrees. Aircraft debris and all portions of the airplane were found at the scene within a radius of about 100 feet from the final resting location.

There was impact damage to the leading edges of both wings and to the engine and forward fuselage. Both wings exhibited aft accordion crushing along their

leading edges with corresponding impact scars on the ground. The right wing was bent up and aft at mid-span. Both wings remained attached to the fuselage and no hydraulic deformation was observed to either wing. No fuel was detected in the fuel tank in either wing.

The left and right wing flaps remained attached. Both ailerons remained attached or partially attached. The left and right main landing gear were impact damaged, but observed to be retracted and still in the gear wells. The nose gear was impact damaged and was protruding slightly out of the nose gear well.

The rear empennage remained attached to the fuselage and was bent slightly over the top portion of the fuselage in scorpion tail fashion. The elevator trim tab was observed in the neutral position. The elevator and rudder remained attached with no significant damage noted.

The engine remained attached to the fuselage and the propeller remained attached to the engine. The bottom of the engine cowling displayed impact and crushing damage and the engine mount was bent slightly up. The upper engine cowling was detached and found with other debris near the main wreckage. The gascolator was examined and had a small amount of clean aviation gasoline. The fuel screen was clear. The flow divider was opened and examined and no fuel was seen.

The three-blade propeller displayed impact damage on the forward face of one blade which was bent aft about 90 degrees at mid-span. The other two propeller blades displayed superficial damage. The propeller spinner had crushing damage, but there was no evidence of rotation at impact.

The lower portion of the forward fuselage was crushed up and aft. The cockpit area had crushing damage that reduced the occupiable space for the front seat occupants. The fuel selector valve handle was observed in the BOTH position.

A J.T. Instruments EDM-700 engine data monitor and a Fujitsu Stylistic Tablet PC electronic flight bag computer were removed from the wreckage and sent to the National Transportation Safety Board's (NTSB) vehicle recorder division for examination.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on the pilot by the Travis County Office of the Medical Examiner in Austin, Texas. The cause of death was listed as blunt force injuries.

Forensic toxicology was performed on specimens from the pilot by the FAA, Aeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma.

The toxicology report stated: NO CARBON MONOXIDE detected in Blood; NO CYANIDE detected in Blood; NO ETHANOL detected in Vitreous; Fluoxetine detected in Blood and Urine; Norfluoxetine detected in Urine and Blood; Quinine detected in Urine.

The NTSB Chief Medical Officer reviewed the IIC's narrative, the autopsy report, the toxicology results, the pilot's FAA airman medical certification file, and the pilot's personal medical records.

The toxicology evaluation identified quinine, fluoxetine, and its primary metabolite, norfluoxetine, in urine, and fluoxetine (1.515 ug/ml), and norfluoxetine (1.036 ug/ml) in cavity blood. Therapeutic levels for fluoxetine are 0.09 to 0.40ug/ml but it can become concentrated in cavity blood post mortem. Quinine is an antimalarial drug which is also found in tonic water. At usual doses, it does not affect performance.

Fluoxetine, marketed under the trade name Prozac, is an atypical antidepressant in the class of selective serotonin reuptake inhibitors. Fluoxetine carries official FDA warnings: "Side effects of fluoxetine include insomnia, anxiety, and headache; manic behavior and suicidal ideation have also been reported. Warnings - may impair mental and/or physical ability required for the performance of potentially hazardous tasks (e.g., driving, operating heavy machinery)."

Prescription bottles were found in the wreckage. There were bottles with the pilot's name for fluoxetine, Abilify (aripiprazole), Tramadol (ultram), Lyrica (pregabalin), and simvastatin.

Aripiprazole is used to treat bipolar disease and as an adjunct in major depression which is non-responsive to first line treatments. It carries a specific FDA warning, "use caution when operating machinery."

Ultram is a synthetic opioid pain reliever used to treat moderate to severe pain. Concomitant administration of ultram and selective serotonin reuptake inhibitors has been demonstrated to increase the risk of seizure and serotonin syndrome. In addition, ultram carries a specific FDA warning, "may impair the mental and physical abilities required for the performance of potentially hazardous tasks such as driving a car or operating machinery".

Pregabalin is indicated as treatment for pain and to prevent partial complex seizures. It carries a specific FDA warning: "may cause dizziness and somnolence and impair patient's ability to drive or operate machinery". The FAA's toxicology lab does not test for pregabalin.

The ultram was an "as needed" medication and may not have been taken recently. The dosing regimen for the aripiprazole had been increased by the physician only a few weeks before the crash.

According to the pilot's personal medical records, the pain medications were prescribed for a nerve impingement syndrome in his neck and shoulder. Records show intermittent use of antidepressants and anxiety medications from 1989 forward. In January 2011, although he was already taking fluoxetine, the pilot suffered a recurrence of major depression and required escalating doses of fluoxetine and the addition of aripiprazole. At the time of the fatal crash the medical records showed the pilot's depression had improved, but not resolved, and his mediations were still being adjusted.

A review of the FAA airman medical certification file revealed the pilot's first medical certificate was issued in 1978 and was re-issued without limitations or deferment periodically until 1989 the pilot reported a DUI conviction and both a hospitalization and medication use for depression. His application was deferred and multiple documents were requested by the FAA. In November, 1990, the pilot's application for a medical certification was denied.

In 1992, the pilot reapplied and, after supplying documentation of resolution of his major depression and reporting that he was off all medications, he was issued a third class certificate. This contained a request that when he reapplied for a medical certificate, he include a current status report from the treating physician. The pilot failed to provide the status report on his re-examination in 1994 and his certificate was deferred.

By May 1995, the necessary report (demonstrating stability) had been provided and the medical certificate was issued. The pilot next applied for a medical certificate in 2008 and was issued a third class certificate after reporting he was taking Zocor and that all of his previous issues were "previously reported, no change".

The pilot's most recent medical certificate (third class) was issued on July 1, 2010, with a limitation "must have available glasses for near vision". The only medication then reported by the pilot was simvastatin (marketed under the trade name Zocor).

TESTS AND RESEARCH

Wreckage examination:

The wreckage was moved to another location and examined. The engine and cowling were still attached. The wings had been cut at the root and the tail section had been removed to facilitate transport. All components of the airplane were present.

Both wings were examined and neither wing had any blue fuel staining or displayed any hydraulic deformation. Both wing fuel tanks were opened and examined. Both fuel tank transmitters were examined and a resistance test was performed on the transmitters, it was noted that the left wing transmitter functioned nominally, the right wing transmitter was observed to indicate the aircraft right side fuel gauge would read "empty" when there were approximately five gallons remaining in the tank.

All three primary flight controls were examined. Control cable continuity was confirmed from the main wing spar aft for the Rudder and Elevator. Aileron flight control continuity was verified from the fuselage to wing mate cut lines to both the left and right ailerons.

The engine was removed from the airplane and the engine and all components were examined. Approximately one quarter of an ounce of aviation fuel was recovered from the inlet fuel screen housing of the fuel injector. The fuel sample tested negative for the presence of water. No other fuel was observed in the engine. An unmeasured amount of oil was observed in the oil sump and there was no evidence noted of thermal distress or lubrication distress.

The postaccident examination of the airframe and engine revealed no evidence of mechanical malfunctions or failures that would have precluded normal

operation.

Examination of devices containing non-volatile memory (NVM):

The airplane was equipped with a J. T. Instruments EDM-700 engine data monitor (EDM) which records several engine parameters including fuel flow, exhaust gas temperature (EGT). The EDM device was examined at the NTSB vehicle recorder division in Washington, D.C., and data was extracted.

EDM data for the accident flight showed that fuel flow increased to about 20 gallons per hour about nine minutes after the start of data at an estimated takeoff time of 1922. About 22 minutes later the fuel flow decreased, and for about the next 50 minutes it remained at an average of about 14.7 gallons per hour. During that time the EGT was operating at an average temperature above 1,200 degrees F.

At an estimated time of 2032, about one hour and 20 minutes after the start of data, the fuel flow decreased to about 13 gallons per hour, and the EGT then reduced about 200 degrees. Four minutes later, at an estimated time of 2036, the EGT reduced another 200 degrees and within the next 30 seconds the EGT had cooled to below 300 degrees. There were also corresponding significant reductions in other engine parameters.

Data from the EDM ended about one hour and 31 minutes after it began.

A Fujitsu Stylistic Tablet PC electronic flight bag (EFB), which had been removed from the wreckage, was also examined at the NTSB vehicle recorder division. Partial data from the hard disk drive was recovered; however no accident related information was found in the recovered data.

Accident Rpt# ERA13CA420 09/13/2013 0	**Regis# N650DP**	**Sussex, NJ**		
Acft Mk/Mdl ROLLADEN-SCHNEIDER LS 6		**Acft Dmg:**	**Rpt Status: Prelim**	**Prob Caus: Pending**
		Fatal 0	**Ser Inj 0**	
Opr Name:	**Opr dba:**		**Aircraft Fire:**	

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Accident Rpt# CEN13FA213	**03/30/2013 1600 CDT**	**Regis# N12053**	**Littlefield, TX**	**Apt: Littlefield Municipal Airport KLIU**
Acft Mk/Mdl SCHLEICHER ALEXANDER-K7		**Acft SN 7205**	**Acft Dmg: SUBSTANTIAL**	**Rpt Status: Factual Prob Caus: Pending**
			Fatal 2 Ser Inj 0	**Flt Conducted Under: FAR 091**
Opr Name: EDDIE HOGLAN		**Opr dba:**		**Aircraft Fire: NONE**

Narrative

HISTORY OF FLIGHT

On March 30, 2013, about 1600 central daylight time, a Schleicher Alexander Ka7 glider, N12053, impacted terrain following an inflight wing separation near the Littlefield Municipal Airport (KLIU), Littlefield, Texas. The commercial pilot and passenger were fatally injured. The glider was destroyed. The glider was registered to and operated by the pilot under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Visual meteorological conditions prevailed and no flight plan was filed. The local flight originated from KLIU about 1545.

According to witnesses of the accident, the glider was riding thermals when it appeared to come out of a thermal and execute a tight loop. They heard a loud sound and then saw the glider spinning to the ground. The glider made two rotations when a portion of the right wing separated and fell to the ground. The glider continued the spin into the ground.

The tow pilot stated that he towed the glider to an altitude of 2,800 feet above ground level (AGL) and then it released. He flew the tow plane back to the airport and landed about 5 minutes later. He went to join the other witnesses to watch the glider soar. After about 5 minutes, the glider was to the north at about 2,000 feet AGL in a nose low attitude and appeared to be in a spin. The right wing appeared to be broken but not completely separated. During the spin, about half of the right wing separated. The glider made about 4 rotations prior to impacting terrain.

PERSONNEL INFORMATION

The pilot, age 78, held a commercial pilot certificate for airplane single engine land, airplane multiengine land, and glider, issued on March 3, 2010. He was also issued a second class medical certificate on April 26, 2012 with limitations of having glasses available for near vision. The pilot's logbook has not recovered for examination. On the pilot's April 26, 2012 application for the medical certificate, he reported 12,695 total flight hours and 120 flight hours in the past 6 months.

The passenger, age 14, was seated in the rear seat.

AIRCRAFT INFORMATION

The two-seat, forward swept wing glider was manufactured in 1965 by Alexander Schleicher in Germany. A standard-normal airworthiness certificate was issued for the glider on May 12, 1965. The glider was not approved for aerobatic maneuvers. A review of the maintenance records revealed that the glider received major maintenance and repairs on May 30, 1997. The most recent annual inspection was competed on April 1, 2012.

METEOROLOGICAL INFORMATION

At 1553, an automated weather reporting station located at Lubbock International Airport (KLBB), Lubbock, Texas, which was 32 miles southeast of the accident site reported: wind variable at 4 knots, visibility 10 miles, few clouds at 9,000 feet, broken cloud layer at 30,000 feet, temperature 29 degrees Celsius (C), dew point minus 4 degrees C, and the barometric pressure was 29.94 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

The glider impacted terrain on the northeast side of airport. The main wreckage was located on flat terrain and situated on a southwesterly heading and was inverted. The wooden components were mostly shattered and the metal tubular components were bent and damaged. The empennage was twisted towards the cockpit and facing a southwesterly heading.

Portions of the right wing were located east and southeast of the main wreckage. The outboard section of the right wing separated near the inboard attachment

point of the aileron. The separated wing section was about 15 feet in length and remained mostly intact. The spar was fractured and splintered where it separated from the inboard section of the wing. The metal aileron controls were fractured in overload and bent downward toward the underside of the wing. The control tube tore through the wing fabric laterally from the connection point to the inboard most point.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on the pilot on April 1, 2013, by South Plains Forensic Pathology, P.A., Lubbock, Texas. The cause of death was determined to be blunt force injuries.

A toxicology report for the pilot was prepared by NMS Labs. The results of toxicology testing of specimens from the pilot revealed the following:

>> 23 (mg/dL, mg/hg) ETHANOL detected in muscle.
>> CAFFINE detected in muscle.

According to Federal Aviation Administration (FAA) Civil Aerospace Medical Institute, the presence of Ethanol is consistent with postmortem putrefaction.

No Tested-for-Drugs were detected in the liver.

ADDITIONAL INFORMATION

BGA Mandatory Aircraft Inspection 042/07/2004, Issue 3

As a result of a Ka7 glider wing failure in England in 2004, the United Kingdom Air Accidents Investigation Branch (AAIB) conducted an investigation and the British Gliding Association (BGA) issued a mandatory wing inspection for the Ka7, effective March 31, 2006, which was to be completed in five year intervals. This document defined the reason for inspection to be:

After an in-flight wing failure inspections were carried out on all BGA registered Schleicher wooden gliders. [Urea formaldehyde] adhesive had been used on all these gliders and had sometimes suffered from failure, apparently due to a combination of age and damp conditions. Glued joint deterioration has been found in sufficient numbers of these gliders to warrant an ongoing inspection program.

There were no records of the wing inspection being completed on the accident glider.

The FAA did not issue an Airworthiness Directive related to this issue.

TESTS AND RESEARCH

The outboard section of the right wing was sent to the National Transportation Safety Board (NTSB) Materials Laboratory in Washington, D.C., for further examination. The examination revealed the wood wing section was fractured and splintered in multiple places. Cracks were observed on many of the adhesive joints. The condition of the adhesives was degraded and poor.

The upper and lower spar caps were constructed of three and two layers of wood respectively. Both were covered in a urea formaldehyde adhesive and were

constructed using scarf joints. The fracture of the scarf joint in the upper layer of the lower spar cap was relatively flat with adhesive on the tapered surface. The fracture appeared to be mainly cohesive with varying amounts of adhesive remaining on the surface and no evidence of wood or smooth adhesive interface from the mating side of the fracture. The scarf joint fractures in both spar caps were similar. Overall, the fracture features were consistent with fracture under combined tension and torsion.

The adhesive holding the ribs was brittle, and pieces continued to separate from the structure as the components were handled during the examination. Markings on the ribs noted a date of 1959.

Pieces of the spar, ribs, and skin were disassembled by hand with varying amounts of effort.

All of the wood material appeared mostly dry with no staining from moisture on most of the structure. However, mold growth and stains from moisture were observed at the leading edge of the wing on the interior of the leading edge skin and adjacent structure.

Accident Rpt# ERA14CA080	**12/28/2013 0**	**Regis# N2056J**	**White Plains, NY**		
Acft Mk/Mdl SCHWEIZER 269C			**Acft Dmg:**	**Rpt Status: Prelim**	**Prob Caus: Pending**
			Fatal 0	**Ser Inj 0**	
Opr Name:		**Opr dba:**		**Aircraft Fire:**	

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Accident Rpt# CEN13LA218	**03/29/2013 1445 EDT**	**Regis# N2065P**	**Cleveland, OH**	**Apt: Burke Lakefront KBKL**
Acft Mk/Mdl SCHWEIZER 269C-1		**Acft SN 0140**	**Acft Dmg: SUBSTANTIAL**	**Rpt Status: Prelim** **Prob Caus: Pending**
Eng Mk/Mdl LYCOMING HIO-360-G1A			**Fatal 0** **Ser Inj 0**	**Flt Conducted Under: FAR 091**
Opr Name: JW HELICOPTER LLC		**Opr dba:**		**Aircraft Fire: NONE**

Narrative

On March 29, 2013, about 1445 eastern daylight time, a Schweizer 269C-1 helicopter, N2065P, experienced a hard landing at the Burke Lakefront Airport (KBKL), Cleveland, Ohio. The helicopter was substantially damaged. The private pilot was not injured. The helicopter was registered to and operated by JW Helicopter LLC under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. The local flight departed KBKL at an unknown time.

According to information collected by the responding Federal Aviation Administration inspector, while landing at the airport, the helicopter landed hard and was substantially damaged.

Accident Rpt# ERA12FA491 08/01/2012 1400 EDT	**Regis# N2761K**	**St. Petersburg, FL**	**Apt: Albert Whitted Airport KSPG**
Acft Mk/Mdl SILVAIRE LUSCOMBE 8A	**Acft SN 5488**	**Acft Dmg: SUBSTANTIAL**	**Rpt Status: Factual Prob Caus: Pending**
Eng Mk/Mdl CONT MOTOR A&C65 SERIES		**Fatal 1 Ser Inj 1**	**Flt Conducted Under: FAR 091**
Opr Name: JAMES A FINNEGAN	**Opr dba:**		**Aircraft Fire: NONE**

Summary

The sport pilot had recently purchased the accident airplane and was working with a flight instructor for familiarization because he had not flown during the past 30 years. The flight instructor stated that he and the pilot had flown seven or eight flights together before the accident flight and that the pilot had previously flown about 5 hours with another flight instructor. During the accident flight, the pilots took off from a runway intersection. The flight instructor stated that the engine seemed to be producing full power until the airplane reached an altitude of about 100 feet above the ground. At that point, the flight instructor noted an audible loss of rpm that was confirmed by the tachometer. The airplane began to descend, the pilot applied carburetor heat, and the flight instructor assumed control of the airplane. With insufficient runway remaining on which to land and obstacles at the end of the runway that made a straight-ahead off-airport landing hazardous, the flight instructor attempted to maneuver toward the ramp area adjacent to the runway. The airplane subsequently stalled, impacted the runway in a nose-down attitude, and came to rest inverted.

Postaccident examination of the airplane revealed no evidence of any preimpact mechanical failures or anomalies that would have precluded normal operation. The flight instructor stated that the takeoff was initiated with the carburetor heat off, despite a placard in the airplane requiring the use of carburetor heat during takeoff and landing. Although the weather conditions at the time of takeoff were conducive to the formation of carburetor ice at glide and cruise power at the time of the accident, it was not possible to determine whether carburetor ice was a factor in the accident. Weight and balance calculations revealed that the airplane was loaded about 68 pounds over its maximum allowable gross weight, and calculated density altitude at the airport about the time of the accident was more than 2,000 feet. Despite these factors, both of which would have adversely affected both the distance required for takeoff and the airplane's rate of climb once airborne, the pilots elected to conduct an intersection takeoff, which reduced the available runway takeoff distance by nearly 20% and also reduced the diversionary options available in the event of a loss of engine power.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The flight instructor's and the pilot's failure to maintain airspeed after a partial loss of engine power after takeoff for reasons that could not be determined during postaccident examination, which resulted in an aerodynamic stall and loss of airplane control. Contributing to the accident were the pilots' decisions to operate the airplane above its maximum allowable gross weight and to perform an intersection takeoff.

Events

1. Initial climb - Loss of engine power (partial)
2. Initial climb - Aerodynamic stall/spin
3. Initial climb - Loss of control in flight
4. Uncontrolled descent - Collision with terr/obj (non-CFIT)

Findings - Cause/Factor

1. Aircraft-Aircraft oper/perf/capability-Performance/control parameters-(general)-Not attained/maintained - C
2. Personnel issues-Action/decision-Action-Lack of action-Instructor/check pilot - C
3. Personnel issues-Action/decision-Info processing/decision-Decision making/judgment-Flight crew - F
4. Aircraft-Aircraft oper/perf/capability-Aircraft capability-Maximum weight-Capability exceeded - F
5. Environmental issues-Conditions/weather/phenomena-Temp/humidity/pressure-High density altitude-Effect on operation
6. Not determined-Not determined-(general)-(general)-Unknown/Not determined

Narrative

HISTORY OF FLIGHT

On August 1, 2012, approximately 1400 eastern daylight time, a Luscombe 8A, N2761K, was substantially damaged when it impacted the ground when control was lost during takeoff from Albert Whitted Airport (SPG), St. Petersburg, Florida. The private pilot/owner was fatally injured, and the flight instructor sustained serious injuries. Visual meteorological conditions prevailed, and no flight plan was filed for the flight, which was originating at the time of the accident. The instructional flight was conducted under the provisions of Title 14 Code of Federal Regulations Part 91.

The flight instructor was interviewed following the accident, and also provided a written statement recounting the events of the accident flight. He stated that a

preflight inspection of the airplane revealed no anomalies, and the engine start and pre-takeoff checks were performed with no discrepancies noted. The fuel tank was filled to capacity, containing 14 gallons of fuel. The flight was cleared for takeoff from runway 25 at the intersection with taxiway B, with the owner conducting the takeoff. The flight instructor reported that the carburetor heat control was in the off position for "maximum takeoff power," and that the engine was producing full power during the takeoff roll until it reached an altitude around 100 feet above ground level. Shortly thereafter, the flight instructor noted an audible loss of power that was confirmed by the tachometer, which varied from 1,800 to 2,100 rpm. He stated that the engine seemed to "roll back," and did not sputter or run rough. The airplane began to descend, the pilot/owner applied carburetor heat, and the flight instructor assumed control of the airplane. With insufficient runway remaining on which to land, and the presence of obstacles at the end of the runway straight ahead, the flight instructor attempted to maneuver the airplane towards the ramp to the south of the runway. The airplane subsequently impacted the runway in a nose-down attitude, and came to rest inverted. The flight instructor stated that he attempted to turn the fuel selector valve to the off position prior to egressing the airplane, but could not remember if he had successfully done so. The flight instructor then egressed, and assisted in extricating the pilot/owner from the wreckage.

Four witnesses observed the airplane as it was taking off. They all recounted that the airplane reached an altitude between 20-40 feet, before the engine began to "sputter" and "miss." One witness described the airplane rocking from side to side, at a slow airspeed, prior to making a "sharp" left turn, descending nose-first, and impacting the runway.

PERSONNEL INFORMATION

The pilot/owner held a private pilot certificate with ratings for airplane single-engine land and instrument airplane. The pilot's logbooks were not recovered, and no determination of the pilot's total or recent flight experience could be made. His most recent Federal Aviation Administration (FAA) third-class medical certificate was issued in June, 1978.

The flight instructor held a commercial pilot certificate with ratings for airplane single- and multiengine land and sea, and instrument airplane; and a flight instructor certificate with ratings for airplane single- and multiengine, and instrument airplane. His most recent FAA second-class medical certificate was issued in December, 2011. Review of the flight instructor's logbooks indicated that he had accumulated approximately 940 hours of flight time at that date.

The flight instructor stated that prior to purchasing the accident airplane, the pilot had not flown in over 30 years, and was in need of a flight review to obtain currency. He had completed "seven or eight" flights with the pilot in the weeks leading up to the accident. Prior to that, the pilot had flown around 5 hours with another flight instructor at SPG.

AIRPLANE INFORMATION

According to FAA airworthiness records, the airplane was manufactured in 1947, and registered to the owner in April 2012. The airplane was powered by a Continental A-65-8, 65-hp, reciprocating engine. Review of the airplane's maintenance logs revealed that its most recent annual inspection was completed on February 13, 2012, at a total time in service of 1135.6 hours. At the time of the accident, the airplane had accumulated approximately 19 hours since the most recent inspection.

Although the airplane held a standard airworthiness certificate, it met the definition of a Light Sport Aircraft as contained in Title 14 Code of Federal Regulations Part 1.1, making it eligible for operation by a pilot holding a valid drivers' license in lieu of an FAA-issued medical certificate.

According to weight and balance information contained in the airplane's maintenance logs, the airplane had an empty weight of 838 lbs, and a maximum allowable gross weight of 1,260 lbs. The autopsy report indicated that the pilot/owner's weight was 203 lbs. The weight of the flight instructor as reported on his most recent FAA medical certificate was also 203 lbs. The calculated total fuel weight was approximately 84 lbs at capacity, resulting in an estimated gross weight of 1,328 lbs at the time of the accident.

METEOROLOGICAL INFORMATION

The 1400 weather observation at SPG included winds from 260 degrees at 8 knots, 10 statute miles visibility, few clouds at 3,000 feet, temperature 30 degrees Celsius (C) dew point 25 degrees C, and an altimeter setting of 29.98 inches of mercury.

The icing probability chart indicates there was potential for carburetor icing at glide and cruise power at the time of the accident.

AIRPORT INFORMATION

Albert Whitted Airport was a tower-controlled, public-use airport equipped with two runways oriented in a 07/25 and 18/36 configuration. According to FAA records, runway 7/25 measured 3,677 feet in length and 75 feet in width. From the intersection with taxiway B, the point at which the flight instructor stated the takeoff was initiated, approximately 3,000 feet of runway takeoff distance available remained from runway 25. Obstructions included a 12-foot blast fence at the runway end, a street 5 feet from the runway end, and a 24-foot building 100 feet from the runway end.

WRECKAGE AND IMPACT INFORMATION

The airplane came to rest inverted approximately 100 feet from the blast fence at the departure end of runway 25. The initial impact point was identified by a ground scar approximately one and a half feet in length, located in the grass about one foot from the right edge of the runway. About 16 feet past the ground scar, on a heading of approximately 187 degrees magnetic, a small crater was observed in the runway surface. Two abrasions, dimensionally consistent with the diameter and chord of the propeller, extended out from the crater. The airplane came to rest about 20 feet past the crater. The engine was displaced aft into the firewall and the cockpit area exhibited significant crush damage. Fuel staining was observed on the runway surrounding the airplane.

The propeller remained attached to the engine, and exhibited scratching and gouging along its leading edge. One blade exhibited slight s-bending approximately four inches from its tip. The engine spark plugs were removed and exhibited normal wear. The crankshaft was rotated by hand, and powertrain continuity was confirmed from the propeller to the rear accessory gears and to the valve train. The carburetor remained attached to the engine, but was impact damaged and void of fuel. The carburetor float bowl was absent of fuel, water, and debris. The float was undamaged, and the fuel intake screen was clear.

Flight control continuity was established from all flight controls to the cockpit area. The instrument panel, engine controls, and flight controls exhibited significant impact damage. The fuel selector valve was found in the off position, and continuity of the fuel system was confirmed from the fuselage tank to the fuel selector valve. No fuel remained in the tank. The carburetor heat control was found extended aft approximately 1 inch. The mixture control was in the full rich position, and the throttle control was in the full power position.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on the pilot by the Medical Examiner District Six, Largo, Florida. According to the autopsy report, the cause of death was "blunt trauma."

Toxicological testing was performed on the pilot/owner by the FAA Bioaeronautical Science Research Laboratory, Oklahoma City, Oklahoma. Review of the toxicological report revealed that Carvedilol was detected in the liver and blood, Citalopram was detected in the liver and blood, N-Desmethylcitalopram was detected in the liver and blood, and Tamsulosin was detected in the urine and blood.

ADDITIONAL INFORMATION

Given the atmospheric conditions, the calculated density altitude at the time of the accident was approximately 2,070 feet. According to the airplane's Owner's Handbook of Operation, "Due to reduced air density at higher altitudes wing lift and engine power are reduced with resulting performance reduction. Take-off and landing distances are increased and the rate of climb reduced."

Airworthiness Maintenance Bulletin No. 40, issued by the Civil Aeronautics Administration in February 1941, addressed the issue of engine failures on takeoff in Luscombe 8A airplanes. It stated:

"The cause of these failures is believed to be attributable to insufficient fuel pressure resulting from the backward surge in the fuel lines due to the forward acceleration of the airplane on takeoff. Tests have shown that the cutting-out tendency of the engine on takeoff can be eliminated by installing a revised fuel tank cap and following certain precautions during the takeoff operation."

As a result of this maintenance bulletin, the airplane was required to be equipped with a placard reading, "Full carburetor air heat required for takeoff and

landing." This placard was installed on the accident airplane and found during postaccident examination to be in good condition. The TCDS also stated:

"The reason for this placard is that, during takeoff acceleration and initial high-angle-of-attack climb, the fuel flow may not be adequate for proper operation. Application of full carburetor heat in this case helps overcome the possible deficiency of fuel flow during takeoff. Carburetor ice is not a basic consideration in requiring this placard."

According to the Luscombe Endowment, which maintains a technical resource library and provides support to Luscombe owners and operators, the use of carburetor heat on takeoff and landing is required in 8A airplanes equipped with 65 or 75-hp engines and a single fuselage fuel tank. It states that, in low fuel conditions, (one-half tank or less), and on a cool day, it is possible to achieve an angle of climb wherein the engine fuel inlet is higher than the fuel tank outlet, resulting in a disruption of fuel flow to the engine. The use of carburetor heat effectively reduced the power output of the engine, thus prohibiting the airplane from achieving such an angle of climb.

Accident Rpt# WPR14LA079	**12/27/2013 1055 PST**	**Regis# N8848K**	**Lodi, CA**	**Apt: Kingdon Airpark O20**
Acft Mk/Mdl STINSON 108 1		**Acft SN 108-1848**	**Acft Dmg: SUBSTANTIAL**	**Rpt Status: Prelim** **Prob Caus: Pending**
Eng Mk/Mdl FRANKLIN 6A4150 SERIES			**Fatal 0** **Ser Inj 0**	**Flt Conducted Under: FAR 091**
Opr Name: BRYANT FLOYD H		**Opr dba:**		**Aircraft Fire: NONE**

Narrative

On December 27, 2013, about 1055 Pacific standard time, a Stinson 108-1 airplane, N8848K, experienced a loss of engine power and the pilot made a forced landing in an open field near Lodi, California. The owner/pilot operated the airplane under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. The pilot and one passenger were not injured. The airplane sustained substantial damage to its wings and fuselage when it struck a berm and nosed over during the landing roll out. The airplane had departed from the Kingdon Airpark (O20), Lodi, about 1030, and was destined for the Modesto City-County Airport-Harry Sham Field (MOD), Modesto, California. Visual meteorological conditions prevailed for the local area flight, and no flight plan had been filed.

According to a responding deputy from the San Joaquin Sheriff's Department, the pilot reported that shortly after takeoff the engine started to sputter. He turned back to the departure airport and attempted to restart the engine. After switching fuel tanks, the engine regained full power, then quit completely. The pilot made a forced landing to an open field, which appeared to be free of obstructions. However, during the landing rollout, the airplane struck a berm and nosed over, coming to rest inverted.

Accident Rpt# CEN12LA514 08/03/2012 919 CDT	**Regis# N2008S**	**Holcomb, KS**	**Apt: Private Airstrip PVT**
Acft Mk/Mdl WEATHERLY AVIATION CO INC 620B	**Acft SN 1559**	**Acft Dmg: SUBSTANTIAL**	**Rpt Status: Factual Prob Caus: Pending**
Eng Mk/Mdl P&W R-985 SERIES	**Acft TT 3353**	**Fatal 0 Ser Inj 0**	**Flt Conducted Under: FAR 137**
Opr Name: FARMERS AVIATION INC	**Opr dba:**		**Aircraft Fire: NONE**

Summary

The pilot noted that the engine rpm during the takeoff was about 30 rpm lower than normal but was still within the normal operating range. He reported that the airplane's engine then lost partial power as it climbed through about 50 feet above ground level after takeoff. After the airplane lost power, the pilot attempted to drop the chemical load to remain airborne; however, the airplane impacted an open field about 1 mile from the departure airstrip. Subsequent examinations of the airplane's engine and its systems did not reveal any anomalies that would explain the loss of engine power. The weather conditions at the time of the accident were conducive to carburetor icing at glide and cruise power and were within the range of susceptibility for serious icing at glide power. Glide power settings yield a throttle angle similar to low power settings used for taxi operations; therefore, it is likely that the airplane's carburetor accumulated ice after engine run-up and during taxi, which was not detected by the pilot. The pilot did not mention using carburetor heat during the pretakeoff engine run-up or during the power loss event; thus, based on the available information, it is likely that the airplane's engine lost power due to carburetor icing.

Cause Narrative

THE NATIONAL TRANSPORTATION SAFETY BOARD DETERMINED THAT THE CAUSE OF THIS OCCURRENCE WAS: The pilot's failure to use carburetor heat while operating in conditions conducive to carburetor icing, which resulted in a partial loss of engine power shortly after takeoff.

Events

1. Takeoff - Loss of engine power (partial)
2. Emergency descent - Collision with terr/obj (non-CFIT)

Findings - Cause/Factor

1. Environmental issues-Conditions/weather/phenomena-Temp/humidity/pressure-Conducive to carburetor icing-Contributed to outcome
2. Personnel issues-Task performance-Use of equip/info-Use of equip/system-Pilot - C

Narrative

On August 3, 2012, about 0919 central daylight time, a Weatherly 620B, N2008S, sustained substantial damage when it impacted the ground following a loss of engine power during takeoff from a field near Holcomb, Kansas. The pilot received minor injuries. The aircraft was owned and operated by Farmers Aviation, Inc., under the provisions of 14 Code of Federal Regulations Part 137 as an agricultural application flight. Visual meteorological conditions prevailed for the flight, which was not operated on a flight plan. The local flight was originating at the time of the accident.

The pilot reported that he completed a preflight examination and pre-takeoff run-up of the airplane with no anomalies noted. He stated that the takeoff roll was normal and the airplane lifted off in a reasonable distance. He did notice about a 30 rpm drop during takeoff compared to other takeoffs but the engine speed was still within the normal operating range. After gaining about 50 feet of altitude the airplane started losing power. The pilot attempted to drop the chemical load in an effort to stay airborne but the airplane impacted an open field about one mile north of the airstrip. The pilot stated that he thought the engine had lost almost all power by the time the airplane impacted the field. The pilot did not mention using carburetor heat during the pre-takeoff run-up or during the power loss event.

Examination of the airplane and engine revealed no preimpact anomalies that would explain the loss of engine power. Subsequent re-examination of the engine also revealed no anomalies. The carburetor and magnetos were sent to the NTSB investigator-in-charge for further examination. The carburetor was disassembled and no anomalies were noted. The right magneto was broken due to the impact; however, no anomalies were detected upon examination. The left magneto was intact and produced spark when rotated.

At 0854, the weather conditions recorded at the Garden City Regional Airport, Garden City, Kansas, about 15 miles east of the accident site included a temperature of 22 degrees Celsius and a dew point of 19 degrees Celsius.

According to the carburetor icing chart found in Federal Aviation Administration Special Airworthiness Information Bulletin CE-09-35, entitled "Carburetor Icing Prevention", the reported temperature and dew point fall in the range of susceptibility for icing during glide and cruise power settings, and within the range of susceptibility for serious icing during glide power.