National Transportation Safety Board
Aviation Accident Final Report

Location:	Greenville, Maine	**Accident Number:**	ERA18FA206
Date & Time:	July 30, 2018, 10:44 Local	**Registration:**	C-GRRS
Aircraft:	Piper PA60	**Aircraft Damage:**	Destroyed
Defining Event:	Aerodynamic stall/spin	**Injuries:**	3 Fatal
Flight Conducted Under:	Non-U.S., non-commercial		

Analysis

The private pilot of the multiengine airplane was in cruise flight at 23,000 ft mean sea level (msl) in day visual meteorological conditions when he reported to air traffic control that the airplane was losing altitude due to a loss of engine power. The controller provided vectors to a nearby airport; about 7 minutes later, the pilot reported the airport in sight and stated that he would enter a downwind leg for runway 14. By this time, the airplane had descended to about 3,200 ft above ground level. Radar data indicated that the airplane proceeded toward the runway but that it was about 400 ft above ground level on short final. The airplane flew directly over the airport at a low altitude before entering a left turn to a close downwind for runway 21. Witnesses stated that the airplane's propellers were turning, but they could not estimate engine power. When the airplane reached the approach end of runway 21, it entered a steep left turn and was flying slowly before the left wing suddenly "stalled" and the airplane pitched nose-down toward the ground.

Postaccident examination of the airplane and engines revealed no mechanical deficiencies that would have precluded normal operation at the time of impact. Examination of both propeller systems indicated power symmetry at the time of impact, with damage to both assemblies consistent with low or idle engine power. The onboard engine monitor recorded battery voltage, engine exhaust gas temperature, and cylinder head temperature for both engines. A review of the recorded data revealed that about 14 minutes before the accident, there was a jump followed by a decrease in exhaust gas temperature (EGT) and cylinder head temperature (CHT) for both engines. The temperatures decreased for about 9 minutes, during which time the right engine EGT data spiked twice. Both engines' EGT and CHT values then returned to normal, consistent with both engines producing power, for the remaining 5 minutes of data. It is possible that a fuel interruption may have caused the momentary increase in both engines' EGT and CHT values and prompted the pilot to report the engine power loss; however, the engine monitor did not record fuel pressure or fuel flow, and examination of the airplane's fuel system and engines did not reveal any mechanical anomalies. Therefore, the reason for the reported loss of engine power could not be determined.

It is likely that the pilot's initial approach for landing was too high, and he attempted to circle over the airport to lose altitude. While doing so, he exceeded the airplane's critical angle of attack while in a left turn and the airplane entered an aerodynamic stall at an altitude too low for recovery.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:
The pilot's exceedance of the airplane's critical angle of attack while maneuvering to land, which resulted in an aerodynamic stall.

Findings

Personnel issues	Aircraft control - Pilot
Aircraft	Airspeed - Not attained/maintained
Aircraft	Angle of attack - Not attained/maintained

Factual Information

History of Flight

Maneuvering	Aerodynamic stall/spin (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On July 30, 2018, about 1044 eastern daylight time (EDT), a Piper PA-60-602P, Canadian registration C-GRRS, was destroyed when it impacted terrain while attempting to land at Greenville Airport (3B1), Greenville, Maine. The foreign-certificated pilot and two passengers were fatally injured. The airplane was registered to and operated by the pilot under Canadian Aviation Regulations as a recreational flight. Visual meteorological conditions prevailed at 3B1 at the time of the accident, and an instrument flight rules flight plan was filed for the flight, which departed Pembroke Airport (CYTA), Pembroke, Ontario, Canada, about 0905, and was destined for Charlottetown Airport (CYYG), Prince Edward Island (PEI), Canada.

According to the CYTA airport manager, the pilot had been a regular customer at the airport for several years. The pilot flew the accident airplane into CYTA 3 days before the accident and purchased 117 gallons of 100LL fuel. The airport manager, who personally fueled the airplane that day, said that he topped off the wing tanks first, followed by the center tank. He did not fuel the auxiliary tank. The manager said that each of the fuel caps felt tight and he made sure they were properly fitted back onto each tank. The airplane was then placed in a hangar until the morning of the accident.

A review of air traffic control communications revealed that, after departure, the airplane climbed and leveled off at 23,000 ft mean sea level (msl) and the pilot contacted the Boston Air Route Traffic Control Center at 1019:39. About 13 minutes later, the pilot told the controller, "...we're losing altitude trying to figure out what's going on." The controller then began to vector the airplane toward 3B1, which was about 17 miles southeast. At 1033, the controller asked the pilot, "...are you producing power right now or have you lost power." The pilot responded, "I think I've lost power..." The controller asked the pilot if he could make Greenville Airport, and the pilot responded, "Ah I think so."

The controller continued to vector the pilot to 3B1 and declared an emergency on his behalf. At 1040:41, the pilot reported that he had the airport in sight and was going to join the downwind leg of the traffic pattern for runway 14. Radar data indicated that the airplane was at an altitude of about 4,600 ft msl at this time. The airplane continued to descend as it turned onto the base and final legs of the traffic pattern for runway 14. At 1043:32, said the pilot transmitted, without a call sign, "I gotta turn around and ahh we're a little high obviously." About this time, the airplane was on a short final for runway 14 at an altitude of about 1,800 ft msl (about 400 ft above ground level). The airplane then entered a left turn to the northwest and was over the airport when radar contact was lost at 1043:48.

A witness was standing on the airport's apron near the terminal building between runway 14 and 21 when he first saw the airplane approaching the airport from the south. The witness said the airplane was "low." It flew over the center of the airport and made what appeared to be a left downwind entry for runway 21. There was no smoke trailing the airplane and the landing gear was retracted. The witness said both propellers were turning, but he could not tell how fast they were turning or if one was turning faster than the other. He was standing next to active construction equipment at the time, which prevented him from fully hearing the engines. When the airplane reached the approach end of runway 21, it began a "shallow" left turn. The nose of the airplane was "high" and the airplane was "going so slow." He said, "It was like it almost stopped in the air" before the left wing suddenly dropped and the airplane dove toward the ground and disappeared behind an embankment. The witness saw a debris cloud and knew that the airplane had crashed.

A second witness, who was a commercial pilot, was standing in front of a hangar on the southeast side of runway 3/21 when he saw the airplane approaching the airport from the west. Instead of landing on runway 14, the airplane continued to fly over the center of the airport. The witness said that the airplane flew directly over him as it made a left turn and flew parallel to runway 3/21. He stated that both propellers were turning, and the engines were producing power; however, he could not estimate an engine speed. He said the airplane was not gliding because it maintained its altitude. The witness could not recall if the landing gear or flaps were extended but recalled that the belly of the airplane was painted black. When the airplane approached the end of the runway, it began a "shallow" left turn and was flying "really slow." The bank angle continued to increase to a point where he could see the entire top of the airplane. The airplane then pitched up and appeared to momentarily "stop" before the left wing "stalled" and the nose pitched down toward the ground. The witness did not hear any increase in engine noise before the impact. He also said that he did not believe the pilot was trying to land on runway 21 because he was positioned "way too close" to the runway.

Pilot Information

Certificate:	Private	**Age:**	58,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	None	**Last FAA Medical Exam:**	
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	590.2 hours (Total, all aircraft), 136 hours (Total, this make and model), 29.2 hours (Last 90 days, all aircraft), 13.3 hours (Last 30 days, all aircraft)		

The pilot held a Canadian private pilot certificate for single- and multi-engine land airplane and instrument airplane. A review of the pilot's logbook revealed that, as of July 27, 2018, he had a total of 590.3 hours of flight experience, of which 155.2 hours were in multi-engine airplanes. The pilot logged about 136 hours total in the accident airplane and about 82.6 of those hours were as pilot-in-command. In the 90 days before the accident, the pilot logged a total of 29.2 flight hours, with 13.4 hours in the previous 30 days; all of which was in the accident airplane. The pilot held a Transport Canada Category 3 medical certificate, which was issued on September 13, 2017, with no limitations.

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	C-GRRS
Model/Series:	PA60 602P	**Aircraft Category:**	Airplane
Year of Manufacture:	1982	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	60-8265026
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	May 9, 2018 Annual	**Certified Max Gross Wt.:**	5999 lbs
Time Since Last Inspection:	21 Hrs	**Engines:**	2 Reciprocating
Airframe Total Time:	4856.1 Hrs as of last inspection	**Engine Manufacturer:**	Lycoming
ELT:	C126 installed, activated, did not aid in locating accident	**Engine Model/Series:**	TSI-540-U2A
Registered Owner:		**Rated Power:**	350 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

The airplane was manufactured in 1982 and was equipped with two six-cylinder Lycoming TIO-540-U2A engines each rated at 350 horsepower at 2,500 rpm. The airplane's engines and propellers had been modified with a Machen conversion under supplemental type certificate (STC) SA1658NM.

A review of the airplane's Journey Log revealed that the last annual inspection was performed on May 9, 2018, at an airframe total time since new of 4,856.1 hours. The airplane had accrued 21.1 hours since the annual inspection. The left engine had 196.8 hours total time since overhaul (TTSO) and the right engine had 169 hours TTSO. The left and right propellers each had 92.2 hours TTSO.

The last logged entry in the Journey Log was on July 27, 2018, 3 days before the accident.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	3B1,1401 ft msl	**Distance from Accident Site:**	
Observation Time:	10:56 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	8 knots /	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:	310°	**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	30.09 inches Hg	**Temperature/Dew Point:**	23°C / 14°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Pembroke (CYTA)	**Type of Flight Plan Filed:**	IFR
Destination:	Charlottetown (CYYG)	**Type of Clearance:**	IFR
Departure Time:	09:05 Local	**Type of Airspace:**	Unknown

The 1056 weather conditions reported at 3B1 included wind from 310° at 8 knots variable between 260° and 360°, clear skies, temperature 23°C, dew point 14°C, and an altimeter setting of 30.09 inHg.

Airport Information

Airport:	Greenville Muni 3B1	**Runway Surface Type:**	
Airport Elevation:	1401 ft msl	**Runway Surface Condition:**	Dry;Vegetation
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Precautionary landing

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	2 Fatal	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	3 Fatal	**Latitude, Longitude:**	45,-69(est)

The airplane came to rest in field about 100 yards from the approach end of runway 21 on a magnetic heading of 220°. All major components of the airframe were accounted for at the site and there was no post-impact fire. The wreckage was contained to where it impacted the ground. The nose and forward fuselage area were compressed aft from impact; both engines were partially buried in the ground, and the empennage was compressed and twisted to the left. The tail section appeared undamaged and was twisted to the left. Both wings remained attached to the airframe at the wing root and sustained impact damage.

Both wing fuel tanks were breached, but the fuel finger screens in both tanks were absent of debris. The center fuel tank (bladder-type) was breached, and the auxiliary fuel tank remained in the airplane but was breached. According to first responders, about 20 gallons of fuel was recovered from the site. The vegetation forward of the wreckage displayed fuel blighting. The fuel selector handles were impact damaged and their position could not be determined. Continuity of the fuel system from the wings to the center fuel tank was established. The center sump was filled with 100LL fuel and the screen was absent of debris. The Nos. 1 and 4 fuel shutoff valves were in the "Open" position, and the Nos. 2 and 3 cross-feed valves were in the "Closed" position.

The left and right fuel boost pumps were located and the main fuel line to each pump was separated from impact. Fuel was observed draining from each pump. Each pump was tested on a 24-volt battery and both pumps were functional. The left and right main fuel tank filters were removed and disassembled. Both were absent of debris.

The flight controls were heavily fractured, but control continuity was established for the elevator and rudder to mid-fuselage. Both flight control wheels were broken off from impact; but the control column and linkages for the control yoke and rudder pedals were observed in the cockpit area. Both left and right seat rudder pedals, and the outboard rudder pedal for the right seat remained attached to their respective linkages. The right seat inboard rudder pedal had separated. Continuity to mid-cabin was established for the left- and right-wing flaps and ailerons. The left flap actuator appeared fully extended, and the right flap actuator was near the fully-retracted position.

The rudder trim was neutral, and the elevator trim was consistent with one-quarter nose-up trim. The landing gear selector handle in the cockpit was impact damaged but appeared to be in the retracted position. The left main gear remained attached to the left wing and the right main gear had separated. The nose wheel was under the fuselage and the tire had separated.

The cockpit area sustained extensive impact damage, with more of the damage occurring to the left (pilot) side area. The throttle levers were positioned between mid- and full power and bent to the left. Both propeller levels were full forward. Both mixture control handles were full forward and bent to the right. The flap selector handle was in the fully extended position.

The left engine remained attached to the airframe by the engine mount and sustained moderate impact damage. Visual examination of the engine revealed no obvious evidence of pre-impact mechanical malfunction or fire.

The propeller was removed to facilitate the examination. The top spark plugs and the vacuum pump were removed, and the crankshaft was rotated by hand via the vacuum pump drive spline. The crankshaft rotated freely, and compression and valve train continuity were established to each cylinder and to the accessory section. The combustion chamber of each cylinder was examined through the spark plug holes utilizing a lighted borescope; no anomalies were observed. The bottom spark plugs were removed and examined along with the top spark plugs. Each plug, except the No.2 top plug, which was oil-soaked, was gray in color consistent with normal wear as per the Champion Check-a-Plug chart.

The propeller governor was partially displaced from the mounting pad due to impact. The pitch control rod remained securely attached at the control arm and the drive rotated freely. The gasket screen was absent of contamination.

The left and right magnetos, along with their respective ignition harnesses (which were impact damaged), remained attached to the engine. The magneto-to-engine timing check found both magnetos beyond manufacturers limits; however, the magneto flanges (under each clamp) were displaced during impact. The magnetos and their damaged harnesses were removed and produced spark at each distributor tower when manually rotated.

All engine compartment fuel lines were found in place and secure at their respective fittings. Fuel was found during the removal of various fuel system components.

The fuel injection servo remained securely attached at the mounting pad of the plenum. The throttle/mixture controls were found securely attached at their respective control arm of the servo. The serrated engagement at each control arm was securely mated and secured by the locking nut. The plug on the side of the injector body was secure with the safety wire in place. The servo fuel inlet screen was free of contamination. The fuel injection servo and induction system were examined and observed to be free of obstruction.

The Shadin fuel flow transducer was examined. The transducer fuel lines remained attached at the inlet and outlet. The transducer was observed to flow when air was applied, and the vane could be heard spinning.

The fuel injection servo was disassembled. The ball/stem valve and internal diaphragms remained intact. There were no visible contaminants within the fuel cavities and passages of the servo.

The fuel flow divider remained secure at the mounting bracket situated at the top of the engine. The fuel lines remained secure at each flow divider fitting and fuel injector at each cylinder. The flow divider was disassembled. Fuel was found within the flow divider. There was no evidence of internal mechanical malfunction or obstruction to fuel flow. The diaphragm was intact and undamaged.

The fuel injection nozzles remained secure at each cylinder with the respective fuel line attached. The nozzles were removed and examined. The nozzles remained free of visible contamination or obstruction to flow.

The fuel pump was securely attached to the engine at the mounting pad. The fuel lines remained secure at their respective fittings. The fuel pump was removed for examination. The drive remained intact and rotated without binding.

The starter was securely attached at the mounting pad, with the electrical connection secure at the post.

The alternator was separated from the engine and destroyed.

The vacuum pump was disassembled, and the rotor/vane assembly was intact and undamaged.

The oil filter and suction screen were removed from the engine and disassembled. The oil filter and screen were absent of debris.

The turbocharger system components remained secure at their respective mountings. The turbocharger compressor and turbine impellers remained intact and undamaged. There was no evidence of foreign object ingestion. The turbine impeller was free to hand rotate. Each exhaust system clamp and pipe were secure at each cylinder location. The tail pipe remained secure at the turbocharger flange. The exhaust bypass valve (wastegate) remained secure at each turbocharger.
The wastegate linkage and cross bar remained intact and secure. The wastegate butterfly valve remained intact and undamaged.

The turbocharger and exhaust system components exhibited gas path coloration consistent with normal operation and were free of oil residue.

The turbo system control (oil pressure) and pressure sensing (manifold) lines remained secure at their respective components throughout the turbocharger system.

The compressor inlet and discharge scat tubes remained securely clamped at each turbocharger and airbox. The alternate air doors remained in the closed/off positions on each side of the induction system. The induction system remained free of visible obstruction to flow.

The manifold pressure relief valve remained intact and securely attached to the firewall mounted airbox. The valve seat remained undamaged and seated.

The mesh air filter within the airbox remained intact and free of visible contaminates. The automatic alternate air door remained intact and functioning.

The sonic nozzle and attaching hoses remained secure.

The slope controller was functionally tested at Machen, Inc., under the supervision of the Federal Aviation Administration (FAA). The controller functioned normally but was adjusted to a slightly higher setting that would have resulted in the engine producing more power versus less.

The right engine remained attached to the airframe by the engine mount and sustained extensive impact damage. The No. 2 cylinder head had been liberated from the engine. The alternator and starter were displaced. Visual examination of the engine revealed no evidence of pre-impact mechanical malfunction or fire.

The propeller was removed to facilitate the examination. The top spark plugs and the vacuum pump were removed, and the crankshaft was rotated by hand via the vacuum pump drive-spline. The crankshaft rotated freely, and compression and valve train continuity were established to each cylinder. Continuity was also established to the accessory section. The combustion chamber of each cylinder was examined through the spark plug holes utilizing a lighted borescope; no anomalies were noted. The bottom spark plugs were oil-soaked due to engine positioning post-impact.

The propeller governor was partially displaced from the mounting pad due to impact. The pitch control rod remained securely attached at the control arm and the drive rotated freely. The gasket screen was absent of contamination.

The left and right magnetos, along with their respective ignition harnesses, remained attached to the engine. The magneto to engine timing check was normal. The magnetos were removed and produced spark at each ignition lead when manually rotated.

All engine compartment fuel lines were found to be in place and secure at their respective fitting of each fuel system component. Fuel was found during the removal of various fuel system components.

The fuel injection servo remained securely attached at the mounting pad of the plenum. The throttle/mixture controls were found securely attached at their respective servo control arm. The servo fuel inlet screen was found properly installed and free of contamination. The fuel injection servo and induction system were free of obstruction.

The Shadin fuel flow transducer was examined. The transducer fuel lines remained attached at the inlet and outlet. The transducer was observed to free flow when air was applied, and the vane could be heard spinning.

The fuel flow divider remained secure at the mounting bracket situated at the top of the engine. The fuel lines remained secure at each flow divider fitting and fuel injector at each cylinder. Fuel was found within the flow divider. There was no evidence of internal mechanical malfunction or obstruction to fuel flow. The diaphragm was intact and undamaged.

The fuel injection nozzles remained secure at each cylinder with the respective fuel line attached. The nozzles were free of visible contamination or obstruction to flow.

The fuel pump was securely attached to the engine at the mounting pad. The fuel lines remained secure at their respective fittings. The fuel pump drive remained intact and rotated without binding.

The fuel injection nozzles remained secure at each cylinder with the respective fuel line attached. The No. 2 cylinder nozzle assembly and attached hose were liberated from the cylinder head during the impact with terrain. The nozzles remained free of visible contamination or obstruction to flow.

The starter and alternator were displaced from the engine and were destroyed. The vacuum pump was disassembled, and the rotor/vane assembly was intact and undamaged.

The oil filter and suction screen were removed from the engine and disassembled. The oil filter and screen were absent of debris.

The turbocharger system components remained secure at their respective mountings. The turbocharger compressor and turbine impellers remained intact and undamaged. There was no evidence of foreign object ingestion. The turbine impeller was free to hand rotate. Each exhaust system clamp and pipe were secure at each cylinder location. The tail pipe remained secure at the turbocharger flange. The exhaust bypass valve (wastegate) remained secure at each turbocharger. The wastegate linkage and cross bar remained intact and secure. The wastegate butterfly valve remained intact and undamaged.

The turbocharger turbine shroud casting exhibited pitting and missing material. The turbine impeller appeared undamaged and unaffected.

The turbocharger and exhaust system components exhibited gas path coloration consistent with normal operation and remained free of oil residue.

The turbo system control (oil pressure) and pressure sensing (manifold) lines remained secure at their respective components throughout the turbocharger system.

The compressor inlet scat tubes remained securely clamped at each turbocharger and airbox. The left turbocharger compressor discharge scat tube remained securely attached at the firewall-mounted airbox. The right turbocharger compressor discharge scat tube was displaced from the firewall mounted airbox due to impact. The alternate air doors remained in the closed/off positions on each side of the induction system. The induction system remained free of visible obstruction to flow.

The manifold pressure relief valve remained intact and securely attached to the firewall-mounted airbox, but the cover/housing was impact damaged. The valve seat remained undamaged and seated.

The sonic tube port at the airbox had been disabled utilizing a block-off plate.

The mesh air filter within the airbox remained intact and free of visible contaminants. The automatic alternate air door remained intact and functioning.

The slope controller was functionally tested at Machen, Inc., under the supervision of the FAA. The controller functioned normally.

Each engine was equipped with a Hartzell three-bladed propeller. Both propellers remained attached to their engine crankshaft mounting flanges during the impact sequence. Both propeller spinner domes were crushed, torn and partially formed around the hub area. Both propeller assemblies displayed packed dirt in the spinner and around the hub components.

Examination of the left propeller revealed that the left hydraulic unit separated from the hub unit and was crushed but remained attached to the propeller assembly via the pitch change rod. The pitch change rod was cut by a hacksaw to remove the feathering spring danger and facilitate propeller removal from the engine. One of the counterweights was also removed to facilitate cutting the pitch change rod. The left and right propeller blades had similar damage; two blades were bent aft and twisted towards low pitch. The bending on the third blade was slightly forward and twisting was unremarkable. The propeller mounting flange and hardware appeared intact. The blades appeared to be at a low pitch angle.

There was distinguishable chordwise/rotational scoring on the cambered side of the blade near the leading edges. There was also leading-edge gouging with material deformation toward low pitch. All three pitch change knobs were fractured, and the associated preload plates had damage indicating forceful rotation towards low pitch.

Examination of the right propeller revealed two blades were bent aft and twisted towards low pitch. The bending and twisting on the third blade appeared unremarkable. The hydraulic unit separated from the hub unit threads and the cylinder was buckled/bent to one side. The R2 blade retention pocket was fractured in a helical path direction suggesting rotation. The propeller mounting flange and hardware appeared intact. The blades appeared to be at a low pitch angle.

There was distinguishable chordwise/rotational scoring on the cambered side of the blade near the leading edges. There was also leading-edge gouging with material deformation towards low pitch. Two of the three pitch change knobs were fractured, and the associated preload plates had damage indicating forceful rotation toward low pitch. The low pitch stops also displayed an impact mark indicating the pitch change mechanism was forced in the low pitch direction during impact.

All propeller components were accounted for at the point of impact with terrain. There were no discrepancies noted that would prevent or degrade normal propeller operation prior to impact. All damage was consistent with high impact forces.

The damage observed to both propellers indicated power symmetry at the time of impact. Chordwise/rotational scoring on the cambered side of the blade and leading-edge gouging were consistent with rotation at the time of impact and suggested a low/idle power condition. Internal impact marks indicated that the propeller blade angle was in the low range of normal operation during the impact sequence and was forcefully rotated towards low pitch.

No mechanical discrepancies were noted with either engine or their respective propeller system that would have precluded normal operation at the time of impact.

The airplane was equipped with a JPI EDM-760 engine data monitor and a Shadin Fuel Flow Indicator. The Shadin unit sustained extensive impact damage. The non-volatile memory device was removed and installed in a laboratory surrogate indicator. Upon applying power, only error messages were displayed.

The JPI EDM-760 sustained extensive impact damage but contained data from the accident flight. The duration of the recording was about 1 hour and 50 minutes. The unit recorded time with the first data sample based on the unit's internal clock, which was set and updated by the operator. The time on this unit appeared to be EDT and was about 12 minutes ahead from the actual time of the accident. The downloaded parameters included battery voltage, engine exhaust gas temperature (EGT), and cylinder head temperature (CHT) for both engines. There were no parameters for fuel pressure or fuel flow. A review of the recorded data revealed that, about 1030, there was a jump followed by a decrease in EGT and CHT temperatures for both engines. The temperatures decreased for about 9 minutes, during which time the right engine EGT data spiked twice. Both engine's EGT and CHT temperatures returned to normal, consistent with both engines producing power, for the remaining 5 minutes of flight before the data ended about 1044.

Medical and Pathological Information

An autopsy of the pilot was conducted by the Office of Chief Medical Examiner, Augusta, Maine, on July 31, 2018. The cause of death was determined to be "extensive blunt force trauma."

Toxicological testing performed by the FAA's Forensic Sciences Laboratory was negative for ethanol and drugs.

Preventing Similar Accidents

Prevent Aerodynamic Stalls at Low Altitude

While maneuvering an airplane at low altitude in visual meteorological conditions, many pilots fail to avoid conditions that lead to an aerodynamic stall, recognize the warning signs of a stall onset, and apply appropriate recovery techniques. Many stall accidents result when a pilot is momentarily distracted from the primary task of flying, such as while maneuvering in the airport traffic pattern, during an emergency, or when fixating on ground objects.

An aerodynamic stall can happen at any airspeed, at any altitude, and with any engine power setting. Pilots need to be honest with themselves about their knowledge of stalls and preparedness to recognize and handle a stall situation. Training can help pilots fully understand the stall phenomenon, including angle-of-attack concepts and how weight, center of gravity, turbulence, maneuvering loads and other factors can affect an airplane's stall characteristics. The stall characteristics may be different in each type of plane, so learn them before you fly.

The stall airspeeds marked on the airspeed indicator (for example, the bottom of the green arc and the bottom of the white arc) typically represent steady flight speeds at 1G at the airplane's maximum gross weight in the specified configuration. Maneuvering loads and other factors can increase the airspeed at which the airplane will stall. For example, increasing bank angle can increase stall speed exponentially.

Reducing angle of attack by lowering the airplane's nose at the first indication of a stall is the most important immediate response for stall avoidance and stall recovery. This may seem counterintuitive at low altitudes, but is a necessary first step.

See http://www.ntsb.gov/safety/safety-alerts/documents/SA_019.pdf for additional resources.

The NTSB presents this information to prevent recurrence of similar accidents. Note that this should not be considered guidance from the regulator, nor does this supersede existing FAA Regulations (FARs).

Administrative Information

Investigator In Charge (IIC):	Read, Leah
Additional Participating Persons:	Daniel Kelman; FAA/FSDO; Portland, ME Mark Platt; Lycoming; Chandler, AZ Les Doud; Hartzell Propeller Inc; Piqua, OH
Original Publish Date:	April 20, 2020
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=97929