Aviation Investigation Final Report

Location:	Fairbanks, Alaska	**Accident Number:**	ANC17FA009
Date & Time:	December 7, 2016, 10:43 Local	**Registration:**	N88452
Aircraft:	Bellanca 7GCBC	**Aircraft Damage:**	Substantial
Defining Event:	Loss of control in flight	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The airline transport pilot was conducting a post-maintenance test flight following the installation of vortex generators (VGs) on the airplane's wings and horizontal stabilizers. The GPS track data were consistent with the performance of level turns, slow flight, and stalls. The last 2.5 minutes of the flight exhibited a decelerating, descending profile consistent with performance of a power off stall; during this time, the airplane descended from 1,033 ft above ground level (agl) to 469 ft agl and slowed from 81 knots to 26 knots. At 26 knots, an abrupt loss of control occurred as indicated by a sharp right turn and a rapid descent rate of about 2,000 ft per minute (fpm). During the 30 seconds before the rapid descent began, the airplane had a rate of descent of about 500 fpm. The last valid GPS data point showed an increasing groundspeed of 35 knots and an altitude of 75 ft agl. Examination of the accident site indicated that the airplane impacted trees and traveled about 350 ft before coming to rest upright.

Examination of the wreckage did not reveal evidence of any preimpact mechanical malfunctions or anomalies that would have precluded normal operation. The GPS data and site examination indicated that the pilot likely lost control of the airplane while performing a full flap aerodynamic stall and was recovering from the maneuver when the airplane impacted trees.

According to the GPS data, the pilot initiated the practice stall sequence about 500 ft below the FAA-recommended minimum practice stall recovery altitude of 1,500 ft agl. As a result, the pilot had insufficient altitude to safely recover from the maneuver before the airplane impacted terrain.

According to the manufacturer of the VGs, the airplane's expected full flap stall speed was about 33 knots, which was 7 knots higher than the speed at which the loss of control event occurred. Based on the GPS data, the airplane reached 33 knots about 30 seconds before the loss of control and likely entered a stalled condition at that time; however, the pilot apparently failed to recognize the stall and allowed the descent to continue. It is possible that the improved aileron authority at slow airspeeds, which the VG installation provided, allowed the pilot to maintain aileron control while the airplane was in a stalled condition. Further, according to the manufacturer's test data, the pre-modified airplane would have had a pronounced wing drop at the onset of stall. The stall characteristics of the modified airplane likely contributed to the pilot's failure to recognize that the airplane was stalled.

The supplemental type certificate (STC) for the VGs directed the installer to determine compatibility with other STCs, and the installation manual for the VGs stated that STC compatibility may be accomplished by a flight test consisting of a "subjective evaluation of aircraft handling to determine that no adverse characteristics exist." The pilot was conducting this flight test flight when the accident occurred. However, there was no guidance in the installation manual on what characteristics a pilot should expect from a modified airplane or how to conduct such a compatibility test. If such guidance had been available, the pilot may have selected an appropriate altitude for the test and may have recognized and recovered from the stall before losing excessive altitude.

The sun's azimuth at the time of the accident was 134° magnetic and slightly above the horizon. The final track of the airplane started at 133° and varied from 111° to 136°, which indicated that the pilot was looking into the sun during the final leg of the flight. The snow-covered ground would have reflected more sun rays into the pilot's eyes, which may have increased the effects of sun glare. It is likely that sun glare impaired the pilot's ability to see the flight instruments and the terrain.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The pilot's operation of the airplane at an altitude that was too low to allow for recovery from an intentional aerodynamic stall, which resulted in an impact with terrain. Contributing to the accident were the pilot's inability to recognize altitude deviations during slow flight due to the sun glare and the pilot's lack of knowledge of the stall performance characteristics of the airplane modified with vortex generators due to the lack of information from the manufacturer.

Findings

Personnel issues	Aircraft control - Pilot
Personnel issues	Decision making/judgment - Pilot
Aircraft	Altitude - Not attained/maintained
Personnel issues	Monitoring environment - Pilot
Environmental issues	Glare - Effect on personnel
Organizational issues	Document/info production - Manufacturer
Organizational issues	Document/info verification - FAA/Regulator

Factual Information

History of Flight

Maneuvering	Low altitude operation/event
Maneuvering	Loss of control in flight (Defining event)
Maneuvering	Loss of visual reference
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On December 7, 2016, about 1043 Alaska standard time, a tailwheel, ski-equipped Bellanca Citabria 7GCBC airplane, N88452, was substantially damaged when it impacted terrain about 17 miles southeast of Fairbanks, Alaska. The airline transport pilot was fatally injured. The airplane was registered to and operated by the pilot as a Title 14 *Code of Federal Regulations* Part 91 visual flight rules (VFR) personal flight. Visual meteorological conditions prevailed at the time of the accident, and a VFR flight plan was filed and activated. The local area flight departed Chena Marina Airport (AK28), Fairbanks, at 1026.

According to the Federal Aviation Administration (FAA) Fairbanks Flight Service Station records, the pilot filed a local flight plan for a 3-hour flight within a 50-mile area to the east, south and west of Fairbanks International Airport (FAI). The mechanic who had recently worked on the airplane stated that the purpose of the flight was to test the airplane's flight performance following the installation of vortex generators (VGs) on the wings and horizontal stabilizer. The airplane's engine ran rough after the first start, so the mechanic brought the airplane back into the hangar to warm up. He checked the fuel sumps for debris and found none. After warming, the airplane was pushed outside and operated normally after the second start.

A review of archived FAA radio communication recordings revealed that the pilot called the FAI air traffic control tower before departure and was provided the current wind of 350° at 5 knots and the altimeter setting of 30.64 inches of mercury. After departure, he requested that his VFR flight plan be activated. The last transmission from the pilot was at 1033 when he asked the FAI tower if the restricted airspace R-2211 was "hot"; the tower reported it was "cold."

A Garmin GPSMAP 296 portable GPS receiver was recovered from the wreckage and downloaded at the National Transportation Safety Board (NTSB) Vehicle Recorder Laboratory. The recorded data included time, location, and GPS altitude, as well as derived groundspeed and track information.

The airplane began its takeoff roll at Chena Marina Airport at 1026:14, climbed toward the southeast to a GPS altitude of 1,762 ft, and proceeded south over the Tanana Flats. Between 1033:11 and 1037:07, the airplane performed one right 360° turn and two 420° turns (one to the left and one to the right) while flying between GPS altitudes of 1,601 ft and 1,437 ft and maintaining groundspeeds of 44 to 100 knots.

At 1037:07, the airplane turned to a southwesterly track of 194° to 201° for about 3 minutes and performed slow flight maneuvers. During this period, the airplane slowed to 46 knots for a period of 19 seconds, accelerated, and then slowed to 40 knots for 14 seconds before accelerating to 68 knots; these changes in airspeed were consistent with the pilot practicing stalls.

At 1040:52, the airplane began a southeast track of 133° that lasted for 2 minutes 36 seconds. During this final track, the airplane descended from 1,545 ft to 981 ft, decelerated from 81 knots to 26 knots, and then entered a rapid descent at a rate of about 2,000 ft per minute (fpm) and a rapid turn to the south. About 30 seconds before the rapid descent began, the airplane had a rate of descent of 510 fpm as it decelerated below 40 knots. The last valid GPS data point indicated an increasing groundspeed of 35 knots, an altitude of 587 ft (75 ft above ground level), and a track of 144°.

According to FAA air traffic control recordings and documentation, at 1318, about 2.5 hours after the last GPS data point, two US Army CH-47F helicopter crews were flying through the area and located the airplane wreckage after hearing an emergency locator transmitter signal.

PERSONNEL INFORMATION

The pilot, age 74, held an airline transport pilot certificate with an airplane multi-engine land rating. Additionally, he held commercial privileges for airplane single-engine land and single-engine sea. He held a third-class medical certificate issued on January 22, 2016, with the limitation: must have available glasses for near vision. According to documentation provided by family members, the pilot was well rested and in good health the morning of the accident.

The pilot co-owned the airplane with his son. The pilot also owned a Cessna 180 and had been flying it at least monthly according to his logbook entries.

Examination of the pilot's logbook revealed that he had recorded about 3,171 hours of flight experience, of which 2,736 hours were in single-engine airplanes and 206 hours were in a Citabria 7GCBC. The pilot's most recent flight review was conducted on February 24, 2016, in his Cessna 180 airplane. The flight instructor who conducted the last flight review stated that he was not sure if stalls were performed during the most recent flight review, but he recalled performing stalls during other reviews with the pilot. He also stated that the pilot was a very competent and conservative pilot.

AIRCRAFT INFORMATION

The two-seat, high-wing, conventional-gear airplane was manufactured in 1974 and equipped with a 150-horsepower Lycoming O-320-A2D reciprocating engine and a fixed-pitch, two-bladed McCauley metal propeller. The airplane had been altered by the installation of metal wing spars in accordance with FAA Supplemental Type Certificate (STC) SA3829NM. During the week before the accident, the airplane was equipped with Landis L-2000A straight skis in accordance with FAA STC SA261AL and Micro Aerodynamics vortex generators in accordance with FAA STC SA00795SE. The optional stall warning horn was not installed.

A review of the maintenance logbooks revealed that the last annual inspection of the airplane was completed on April 4, 2016, at which time the airframe and engine total times were 2,882.24 hours, and the engine time since major overhaul was 875.24 hours. According to the mechanic who maintained the airplane and the logbook entries, the engine throttle cable was removed and replaced the week before the accident due to a stiff throttle. The alternator was removed and replaced the day before the accident due to electrical issues that the airplane had on December 2. The transponder was removed for maintenance before the flight. At the time of the accident, the tachometer indicated 2,889.34 hours and the recording hour meter indicated 1,229.0 hours.

Weight and Balance

The actual gross weight of the airplane at the time of the accident could not be determined as the fuel quantity could not be verified. According to the mechanic's recollection, the fuel tanks were about 3/4 full before engine start, which would have been about 27 gallons. The airplane's weight and balance condition at the time of takeoff was calculated based on the estimated fuel onboard (156 lbs), the estimated pilot weight based on his most recent medical application and winter clothing (215 lbs + 4 lbs), actual cargo weights (1 lb front seat + 2.5 lb rear seat + 94 lbs in rear baggage area), and the airplane weight and balance form for the Landis ski configuration (1218 lbs empty weight + 15 lbs oil).

Page 1-3 of the Bellanca Citabria Pilot Operation Manual (POM) lists the maximum allowable gross weight of 1,650 lbs and the center of gravity limits between 14.2 inches and 19.2 inches aft of datum. The calculated takeoff weight was 1,705 lbs, which was 55 lbs above the maximum allowable gross weight. The airplane's weight at the time of the accident, about 18 minutes later with an estimated 24 gallons of fuel remaining, was calculated at 1,687 lbs. The center of gravity at the time of the accident was calculated using figures 5-1, 5-2 and 5-5 from the Citabria POM and determined to be 17.18 inches.

METEOROLOGICAL INFORMATION

The closest weather reporting facility to the accident site was at FAI, which was located about 16 miles north of the accident site at an elevation of 432 ft. At 1053, the recorded weather at FAI was wind from 010° at 5 knots, visibility 10 miles, sky clear below 12,000 ft, temperature -33°C, dew point temperature -36°C, and altimeter setting 30.63 inches of mercury.

On the day of the accident, sunrise in Fairbanks was at 1037. According to the National Oceanographic and Atmospheric Administration solar calculator, the sun was at an elevation angle of 0.1° above the horizon at an azimuth of 153° true at 1043.

On December 9, 2016, the NTSB investigator-in-charge (IIC) noted that while flying to the accident site via helicopter about 1100, sun glare was present in the direction of the rising sun, which made viewing the terrain details difficult.

For further weather information, see the weather study located in the public docket for this accident.

WRECKAGE AND IMPACT INFORMATION

The wreckage was located within the southern border of the Fort Wainwright US Army base, about 7 miles south of Clear Creek Butte, in an open level area of snow-covered tundra and small groves of black spruce trees. All major components of the airplane were located at the accident site, which was contained within an area about 60 ft long and 20 ft wide at an elevation of about 512 ft. The airplane came to rest intact with the fuselage resting on the ground in a right 30° bank, in a slightly nose-down attitude, and on a heading of 220°. The initial impact point was indicated by three freshly fractured spruce tree tops about 350 ft northwest of the wreckage. The tallest tree was estimated to be 55 ft high. Red and white paint chips matching the airplane were located on the ground among broken limbs as thick as 4 inches in diameter. Initial ground impact was evident at two parallel ski marks in the snow and grass on a bearing of 140° from the damaged spruce trees. The tracks were about 30 ft long and were followed by about another 30 ft of disturbed snow patterns northwest of the wreckage.

The right wing sustained significant fore to aft crush damage to the inboard 8 ft of the wing structure with numerous main and rear spar fractures. An elliptical compression in the wing leading edge was about 1.5 ft deep and 6 inches wide, and tree bark and spruce needles were present in the damaged area. The wing was twisted upward and rotated rearward about 75° from the lateral axis. The right flap and aileron remained attached, and the flap was crushed. The left wing separated from the airframe at the lower lift strut bracket and folded up inverted over the top of the fuselage and came to rest with the wing root intruding downward into the cabin space. The left aileron and flap remained intact and attached. The fuel tanks were ruptured; however, fuel was present in the left wing, and samples were consistent with clear, bright, 100LL aviation gasoline.

The empennage remained attached to the fuselage with crush damage evident to the right horizontal stabilizer leading edge and a partially detached and torn right elevator. The outer portion of the right elevator was separated at a fracture in the torque tube and located at the initial ground impact point. The vertical stabilizer, rudder, and left horizontal stabilizer and elevator sustained minimal damage. Two of the rear fuselage wooden bulkheads sustained fractures and exhibited dark gray areas that indicated the presence of previous water damage.

Control continuity in the elevator, rudder, and ailerons was established from the cockpit to the control surfaces. The left flap control system was fractured at the torque tube at the wing root and the control rod. The right flap system was continuous out to the damaged wing section. The mechanical flap handle was secure in the full up notch, which was the flaps full down position.

The right forward fuselage exhibited downward crush damage which included buckled and separated right door and sidewall structure. The left fuselage upright support frames were separated and bent right which exposed the top front cabin area. The front windscreen, supports, and all glass were fragmented and scattered throughout the wreckage field. The throttle and propeller controls were full forward, and the mixture was out slightly. The carburetor heat lever was slightly aft of full forward. The electrical master switch was off, and the magneto switch was in the both position. The fuel valve handle was down. The elevator trim control was 2/3 forward. The altimeter indicated 620 ft with a Kollsman window setting of 30.68, and the vertical speed indicator had an indication of 175 fpm. The accelerometer indicated -2, 2, and a maximum load factor of 12 Gs.

The pilot's lap belt was latched around the pilot and attached to the seat frame, which was partially attached to the cabin floor. The pilot's shoulder harness was disconnected from the lap belt, and the inertial reel and harness remained attached to the cabin overhead tubing, which was torn away from the main structure. A detailed examination of the pilot's seat revealed that the left forward and aft support legs were separated from the airframe mounting structure, which had been altered with the addition of 15-inch-long thin metal brackets at each side that allowed for the fixed pilot seat to be installed further aft on the floor.

The right landing ski was located about 30 ft northwest of the wreckage with springs and cable attached. The landing gear leg was fractured at the airframe mount, and the ski exhibited a transverse fracture at the midspan. The left landing ski and the tail wheel and ski remained attached to the airframe with cables and springs intact.

The Micro VGs on the wings and horizontal stabilizer were examined, measured, and determined to be installed in accordance with the Micro Vortex Generator Kit Installation Manual MA2132 rev B. Some VGs were absent in areas of impact damage.

The engine remained attached to the airframe and exhibited impact damage to the right lower side. Examination of the engine revealed no evidence of anomalies, contamination, or malfunctions in any of the engine accessories. The cylinders, pistons, valve train, crankshaft, and other internal components showed no evidence of anomalies or malfunctions that would have precluded normal operation. Control continuity from the cockpit to the engine was established. Throttle cable binding was observed where an airframe mount had fractured at the weld due to impact forces. The fuel lines from the wing roots to the gascolator were clear of debris.

The propeller remained attached to the crankshaft, and one propeller blade exhibited a complete fracture through the mid-section about 1.6 ft from the blade butt. The fractured propeller tip was not located. The other propeller blade exhibited a span-wise torsional twist with a trailing edge "S" bending signature, indicative of rotational force during impact.

A senior metallurgist at the NTSB Materials Laboratory conducted examinations of the left-wing strut fracture and the throttle cable fuselage mount fracture. Magnified examinations of the throttle cable mounting bracket revealed fracture features and overall deformation patterns consistent with a twisting overstress fracture and separation after significant displacement of the bracket and no evidence of preexisting cracking or corrosion. The fractured left lift strut attachment was separated near the attaching bolt hole and displayed features and deformation patterns indicating a bending overstress separation with no corrosion or preexisting cracking noted.

MEDICAL AND PATHOLOGICAL INFORMATION

The Alaska State Medical Examiner, Anchorage, Alaska, performed an autopsy of the pilot. The report attributed the pilot's cause of death to multiple blunt force injuries.

The FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed forensic toxicology on specimens from the pilot with negative results for carbon monoxide, cyanide, ethanol, and listed drugs.

ADDITIONAL INFORMATION

Air Traffic Control

An NTSB air traffic control specialist reviewed recorded Fairbanks radar data for the time and location of the accident flight but found no associated primary or mode C targets. The specialist reported that radar coverage in the accident area is limited due to terrain interference.

According to a statement and memorandum provided by the US Army Alaska command, there were no military aircraft flights, including Gray Eagle MQ-1C unmanned aircraft system flights, operating near the accident site on the morning of December 7, 2016.

Performance

The Bellanca POM lists on page 4-3 the power off stall speed for the 7GCBC as 50 mph (43 knots) calibrated airspeed (CAS) with flaps up (Vs), and 45 mph (39 knots) CAS with flaps extended (Vso) at 0° angle of bank.

The POM states on page 2-7 the following information.

The Citabria stall characteristics are conventional. The stall warning horn, if installed, will precede the actual stall by 5-10 MPH depending on the amount of power used. There is sufficient aerodynamic buffeting preceding the stall to provide the pilot with an adequate warning.

To recover from a stall, proceed as follows:

1. *Nose attitude - LOWER with forward movement of control stick.*

2. *Throttle - FULL OPEN simultaneously with control stick movement.*

3. *Use rudder to maintain lateral control.*

Stalls

The FAA Airplane Flying Handbook (FAA-H-8083-3A), chapter 4, states the following concerning stalls.

A stall is an aerodynamic condition which occurs when smooth airflow over the airplane's wings is disrupted resulting in loss of lift. Specifically, a stall occurs when the AOA-the angle between the chord line of the wing and the relative wind-exceeds the wing's critical AOA. It is possible to exceed the critical AOA at any airspeed, at any attitude, and any power setting.

A pilot must recognize the flight conditions that are conductive to stalls and know how to apply the necessary corrective action. This level of proficiency requires learning to recognize an impending stall by sight, sound, and feel.

The FAA Advisory Circular AC 61-65C, Stall and Spin Awareness Training, Change 2, provides the following information.

Stall demonstrations and practice, including maneuvering during slow flight and other maneuvers with distractions that can lead to inadvertent stalls, should be conducted at a sufficient altitude to enable recovery above 1,500 feet above ground level (agl) in single-engine airplanes.

Micro Vortex Generators

According to the Micro AeroDynamics Inc. website, the company's vortex generators create tiny vortices in the airstream over an airfoil. The vortices energize the boundary layer of air on the wing and tail surfaces, resulting in airflow that "sticks" to the wing and control surfaces better, improving airplane control at slow speeds.

The Micro VG Kit sales flyer for the Citabria 7GCBC states the following.

This jet age technology provides an 8% reduction in stall speed, improved aileron response, reduced landing and takeoff roll.

The kit consists of 84 Vortex Generators mounted on the wings, just aft of the leading edge, and 28 Vortex Generators mounted under the horizontal stabilizer.

The Micro AeroDynamics Installation Manual MA2132 rev B states the following in chapter 6.0.

COMPATIBILITY WITH OTHER STCs: As stated in the "Limitations and Conditions" section of the STC, the installer must determine compatibility of the Micro VG Kit with other STCs. This may be accomplished by a flight test of the aircraft. Any rated pilot may fly this test, which need only consist of a subjective evaluation of aircraft handling to determine that no adverse characteristics exist. Make a logbook entry of the flight test indication that this modification has not introduced any adverse effects upon the airworthiness of this aircraft.

The FAA STC SA00795SE states the following.

This approval shall not be extended…unless it is determined that the relationship between this change and any of those other previously approved modifications, will introduce no adverse effect upon the airworthiness of that aircraft.

There was no guidance provided by Micro AeroDynamics on how to determine adverse effect or how to conduct a subjective evaluation flight test. The manufacturer provided no information on how the slow flight characteristics would change what is published in the POM.

Flight test data that was used for the FAA STC Type Inspection Application test flight submitted by Micro AeroDynamics for the 8GCBC airplane, which has similar flight characteristics to the 7GCBC, included a notation by the FAA-designated flight test pilot that, before the VG installation, a definite left-wing drop was noted at aerodynamic stall; however, after VG installation, none was noted.

Decreasing the published stall speeds of the 7GCBC by 8% results in a stall speed of 40 knots CAS with the flaps up and 36 knots CAS with the flaps down. The POM does not provide tables for indicated airspeed (IAS) conversions at these slow speeds. The calculated true airspeeds (TAS) are 37 knots and 33 knots, respectively, based on an altitude of 1,000 ft, altimeter setting of 30.64 inches of mercury, and a temperature of -33°C.

GPS

The last GPS data point of the flight, which was captured about the time of impact, was not considered valid due to its geographical coordinates in relationship to the wreckage and the other pre and post impact GPS data. The derived groundspeed of 63 knots and track of 153° were also discounted.

Pilot Information

Certificate:	Airline transport; Commercial	**Age:**	74,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land	**Seat Occupied:**	Front
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:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	January 22, 2016
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	February 24, 2016
Flight Time:	3171 hours (Total, all aircraft), 206 hours (Total, this make and model), 2667 hours (Pilot In Command, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Bellanca	**Registration:**	N88452
Model/Series:	7GCBC Citabria	**Aircraft Category:**	Airplane
Year of Manufacture:	1974	**Amateur Built:**	
Airworthiness Certificate:	Aerobatic; Normal	**Serial Number:**	787-75
Landing Gear Type:	Tailwheel; Ski	**Seats:**	2
Date/Type of Last Inspection:	April 4, 2016 Annual	**Certified Max Gross Wt.:**	1650 lbs
Time Since Last Inspection:	7 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	2889.39 Hrs at time of accident	**Engine Manufacturer:**	Lycoming
ELT:	C91 installed, activated, aided in locating accident	**Engine Model/Series:**	O-320-A2D
Registered Owner:	On file	**Rated Power:**	150 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	PAFA,432 ft msl	**Distance from Accident Site:**	16 Nautical Miles
Observation Time:	19:53 Local	**Direction from Accident Site:**	350°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	5 knots /	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	10°	**Turbulence Severity Forecast/Actual:**	/ N/A
Altimeter Setting:	30.62 inches Hg	**Temperature/Dew Point:**	-33°C / -36°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Fairbanks, AK (AK28)	**Type of Flight Plan Filed:**	VFR
Destination:	Fairbanks, AK (AK28)	**Type of Clearance:**	VFR
Departure Time:		**Type of Airspace:**	Class G

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	64.541946,-147.757781(est)

Preventing Similar Accidents

Prevent Aerodynamic Stalls at Low Altitude (SA-019)

The Problem

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.

What can you do?

- Be honest with yourself about your knowledge of stalls and your preparedness to recognize and handle a stall situation in your airplane. Seek training to ensure that you fully understand the stall phenomenon, including angle-of attack (AOA) concepts and how elements such as weight, center of gravity, turbulence, maneuvering loads, and other factors affect an airplane's stall characteristics.
- Remember that an aerodynamic stall can occur at any airspeed, at any attitude, and with any engine power setting.
- Remember that 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. Check your airplane's handbook for information.
- Reducing AOA 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.
- Manage distractions when maneuvering at low altitude so that they do not interfere with the primary task of flying.
- Resist the temptation to perform maneuvers in an effort to impress people, including passengers, other pilots, persons on the ground, or others via an onboard camera. "Showing off" can be a deadly distraction because it diverts your attention away from the primary task of safe flying.
- Understand that the stall characteristics of an unfamiliar airplane may differ substantially from those of airplanes with which you have more flight experience.

See https://www.ntsb.gov/Advocacy/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):	Price, Noreen
Additional Participating Persons:	Clark Miller; FAA Fairbanks FSDO; Fairbanks, AK Scott Brown; FAA Fairbanks FSDO; Fairbanks, AK Mark Platt; Lycoming Engines; Williamsport, PA
Original Publish Date:	August 15, 2018
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=94474