



National Transportation Safety Board Aviation Accident Final Report

Location:	Sheboygan Falls, WI	Accident Number:	CEN17FA197
Date & Time:	05/26/2017, 1230 CDT	Registration:	N67PN
Aircraft:	AEROTEK PITTS S 2A	Aircraft Damage:	Substantial
Defining Event:	Loss of control in flight	Injuries:	2 Fatal
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

The airline transport pilot and a private pilot-rated passenger departed in an aerobatic airplane to perform a fly-by over a local raceway. About 10 minutes after the fly-by, one witness saw the airplane flying level when its engine stopped producing sound. The airplane continued level flight for several seconds before it suddenly entered a nose-down, descending spiral and impacted the ground. However, two other witnesses saw the airplane conduct a vertical climb before entering what they described as a "corkscrew" and a "fast spin." Both of these witnesses described engine sound anomalies and that they thought the pilot was trying to restart the engine.

The airplane came to rest inverted on plowed terrain. Signatures on the propeller were consistent with the engine not producing significant power at the time of impact; however, examination of the wreckage did not reveal any preimpact anomalies that would have precluded operation of the airplane and engine.

Weight and balance calculations were produced using occupant weights at various fuel loads. Even at minimum fuel, the airplane was operating above its maximum gross weight of 1,500 lbs for approved flight in the acrobatic category at the time of the accident. Additionally, the airplane's calculated center of gravity was outside the envelope for the acrobatic category. It is likely the airplane's gross weight exceedance and operation outside the weight and balance envelope for aerobatic flight contributed to the pilot's difficulty in adequately controlling the airplane.

The investigation could not determine which occupant was manipulating the controls at the time of the accident. Regardless, the pilot was responsible for maintaining flight control.

Probable Cause and Findings

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

The pilot's failure to maintain airplane control following a partial loss of engine power during a low-level aerobatic maneuver; the reason for the loss of engine power could not be determined during postaccident examination of the engine. Contributing to the accident was the pilot's exceedance of the airplane's published maximum gross weight and center of gravity limits for the acrobatic category.

Findings

Aircraft	Performance/control parameters - Not attained/maintained (Cause)
Personnel issues	Aircraft control - Pilot (Cause) Weight/balance calculations - Pilot (Factor)

Factual Information

History of Flight

Maneuvering-aerobatics	Loss of engine power (partial) Loss of control in flight (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On May 26, 2017, about 1230 central daylight time, an Aerotek Pitts S 2A biplane, N67PN, impacted terrain during a descent near Sheboygan Falls, Wisconsin. The pilot and pilot rated passenger were fatally injured. The airplane sustained substantial damage. The airplane was registered to and operated by the pilot as a Title 14 *Code of Federal Regulations* Part 91 personal flight. Day visual meteorological conditions prevailed in the area about the time of the accident, and no flight plan was filed for the local flight, which originated from the Sheboygan County Memorial Airport (SBM), near Sheboygan, Wisconsin, about 1210.

The purpose of the flight was to perform a fly-by over a nearby racetrack. The pilot rated passenger in the front seat reportedly sent a text about 1220 during the fly-by.

According to a flight instructor at SBM, about 1210, he and some students were listening to the common traffic advisory frequency and heard the pilot report that the Bonanza was on a straight in final for runway 13. The flight instructor observed a red biplane (the accident airplane) depart runway 13 and make a "sharp" left turn to the north. The instructor reported that the turn was low to the ground and that the airplane cleared the trees by 50 to 100 ft. The airplane then departed to the west/southwest at a "lower than normal" altitude.

A witness near the racetrack reported that she heard the sound of an airplane about 1230 and that, seconds later, the sound "abruptly ceased." She observed the airplane traveling eastbound in a level attitude for several seconds before it entered a nose-down, vertical attitude and spiraled clockwise to the ground.

Another witness reported they heard the airplane flying in the area and his friend pointed the airplane out when it came into sight. The witness observed the airplane climb rapidly and then enter a "90° angle". As it reached the apex of its climb, "it sounded like the plane's engine stalled." The airplane then entered a nose-down, "corkscrewing" descent toward the ground. He reported that it sounded like the pilots were trying to start the engine but were unable. He said they did not see the crash because of some trees, but did hear "a loud thump" which the witness described as the sound of the airplane impacting the ground.

A third witness reported that the airplane entered a "straight up climb until it stalled. The plane proceeded to roll upside down in a flat manner" and that's when he heard the engine stall. The airplane then entered a nose-down spin. During the spin, the rate of rotation slowed, and as the airplane got closer to the ground, the witness heard the engine "sputter, but not fire up." The airplane then disappeared behind trees on top of a hill. A couple of seconds later, the witness heard the sound of the airplane impacting the ground.

Pilot Information

Certificate:	Airline Transport	Age:	66, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Rear
Other Aircraft Rating(s):	None	Restraint Used:	5-point
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 1 With Waivers/Limitations	Last FAA Medical Exam:	04/20/2017
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	
Flight Time:	(Estimated) 16300 hours (Total, all aircraft)		

Pilot-Rated Passenger Information

Certificate:	Private	Age:	19, Male
Airplane Rating(s):	Single-engine Land	Seat Occupied:	Front
Other Aircraft Rating(s):	None	Restraint Used:	5-point
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 3 Without Waivers/Limitations	Last FAA Medical Exam:	06/15/2015
Occupational Pilot:	No	Last Flight Review or Equivalent:	03/23/2017
Flight Time:	(Estimated)		

The 66-year-old pilot, who was seated in the aft seat, held a Federal Aviation Administration (FAA) airline transport pilot certificate with an airplane multi-engine land rating. He also held commercial pilot privileges in single-engine land and sea airplanes and type ratings for the McDonnell Douglas DC-9 and Boeing 757, 767, and 777 airplanes. The pilot was issued an FAA first-class medical certificate on April 20, 2017, with a limitation to wear corrective lenses. The pilot reported on the application for that medical certificate that he had accumulated 16,300 hours total flight experience and 150 hours in six months before the application. The pilot attended a recurrent King Air course in October, 2016. In connection with the course, the course instructor gave the pilot FAA Wings credit on October 6, 2016, through the Wings website. This recurrent course was in addition to the King Air initial course that the pilot previously attended.

A flight instructor, that sold the accident airplane to the pilot in August, 2013 reported that the pilot's Pitts S 2A check out training consisted of ground and flight instruction in the accident airplane. The instruction, in part, included Lycoming engine operation with Bendix fuel injection, fuel system operation, management of fuel from the top tank, range and endurance

planning, start-up procedures, leaning procedures, weight and balance, normal and aerobatic loading, proper trimming of the airplane, P factor, torque and gyroscopic forces, slow flight, angle of attack control, stall recognition, stall prevention, stall recovery power on and off, how to recognize the incipient spin, recovery from normal upright, inverted, accelerated, crossover, and flat spins by the normal recovery method, the power-on method, and the emergency maneuver recovery method, upset recovery, engine-out approach and landing, in-flight power loss recovery, and emergency landing field determination.

The 19-year-old pilot-rated passenger, who was seated in the front seat, held an FAA private pilot certificate with airplane single-engine land and instrument airplane ratings. He was issued an FAA third-class medical certificate on June 15, 2015, with no limitations. He did not report his flight experience on the application for that medical certificate.

Aircraft and Owner/Operator Information

Aircraft Make:	AEROTEK	Registration:	N67PN
Model/Series:	PITTS S 2A	Aircraft Category:	Airplane
Year of Manufacture:	1981	Amateur Built:	No
Airworthiness Certificate:	Aerobatic; Normal	Serial Number:	2219
Landing Gear Type:	Tailwheel	Seats:	2
Date/Type of Last Inspection:	03/23/2017, Annual	Certified Max Gross Wt.:	1575 lbs
Time Since Last Inspection:		Engines:	1 Reciprocating
Airframe Total Time:	2258.7 Hours as of last inspection	Engine Manufacturer:	Lycoming
ELT:	Installed, not activated	Engine Model/Series:	AEIO-360-A1E
Registered Owner:	On file	Rated Power:	200 hp
Operator:	On file	Operating Certificate(s) Held:	None

The accident airplane was a 1981 model Aerotek Pitts S 2A factory-built, tandem two-seat, single-engine, fixed-gear tailwheel biplane. It was equipped with a 200-horsepower aerobatic Lycoming AEIO-360-A1E engine, with serial No. L-20565-51A. A three-bladed MT propeller, model MTV-9-B-C/ C188-18b, serial No. 140237, was installed in accordance with supplemental type certificate No. SA00457DE. The airplane was equipped with a 24-gallon fuselage fuel tank with a usable fuel capacity of 23 gallons. A bill of sale showed the pilot purchased the airplane on August 20, 2013.

A mechanic reported that he recovered and repainted the airplane during January of 2016. The mechanic replaced fuel hoses and the fuel tank flop tube, and modified the airplane by installing an additional 5-gallon fuel tank. The mechanic flew the airplane through "all aerobatic" maneuvers and spins, during which the airplane recovered from the spins using

normal and emergency recovery methods. An endorsement in the airplane logbook stated that the airplane had an annual inspection completed on March 23, 2017, as of that date, it had accumulated 2,258.7 hours total time.

The airplane flight manual (AFM) listed the airplane's maximum gross weight in the normal category as 1,575 lbs and a maximum gross weight in the acrobatic category as 1,500 lbs. The airplane's most aft center of gravity at maximum gross weight in the normal category was 96.13 inches and most aft center of gravity at maximum gross weight in the acrobatic category was 96.50 inches. The airplane's most aft center of gravity in the normal category was 97.50 inches at 1,472 lbs and most aft center of gravity in the acrobatic category was 97.12 at 1,440 lbs.

The AFM In-Flight Engine Restart procedure, in, part stated:

- 1. Pull mixture control to: IDLE CUT-OFF*
- 2. Establish glide at: 100 MPH [Indicated Air Speed]*
- 3. Fuel selector: ON*
- 4. Master switch: ON*
- 5. Throttle: OPEN 1/4 FULL*
- 6. Engage starter to start propeller windmilling, if it is not turning.*
- 7. Advance mixture control to: FULL RICH*

Both the type certificate holder's test pilot and an aerobatic flight school that uses Pitts airplanes indicated that the recovery procedures must be started immediately upon engine failure.

The airplane was based at the Burlington Municipal Airport (BUU), near Burlington, Wisconsin. A fuel receipt showed that the owner purchased 11 gallons of 100LL aviation gasoline at BUU at 1535, the day before the accident. The distance from BUU to SBM was about 68 nautical miles. The airplane was observed departing from BUU with only the pilot on board about 1015 on the day of the accident.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	KSBM, 746 ft msl	Distance from Accident Site:	3 Nautical Miles
Observation Time:	1153 CDT	Direction from Accident Site:	86°
Lowest Cloud Condition:	Clear	Visibility	10 Miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	5 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	160°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	29.86 inches Hg	Temperature/Dew Point:	16° C / 13° C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	SHEBOYGAN, WI (SBM)	Type of Flight Plan Filed:	None
Destination:	SHEBOYGAN, WI (SBM)	Type of Clearance:	None
Departure Time:	1210 CDT	Type of Airspace:	

At 1153, the recorded weather at SBM included wind from 160° at 5 knots, visibility 10 statute miles, sky condition clear, temperature 16° C, dew point 13° C, and an altimeter setting of 29.86 inches of mercury.

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Substantial
Passenger Injuries:	1 Fatal	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	2 Fatal	Latitude, Longitude:	43.765278, -87.916944

The airplane came to rest inverted on plowed terrain about 3 nautical miles west of SBM on a magnetic heading about 300°. The airplane remained intact and there was no post-impact ground fire. There were depressions in the ground under the nose, upper wing, and rudder. The airplane remained intact. The engine compartment, fuselage, upper wings, and empennage exhibited crushing and buckling consistent with the ground impact. The engine compartment exhibited rearward crushing. The outboard sections of two propeller blades were visible outside of the lower engine cowling and one propeller blade was covered by the cowling. The leading edges of the upper wings exhibited rearward crushing. The right lower wing exhibited minor damage. However, about 3/4 of the outboard section of the left lower wing trailing edge was buckled. The canopy frame was found under the inverted fuselage and the canopy was fragmented. No baggage or ballast was found in the aft baggage area.

A postaccident examination of the wreckage was conducted. The fuselage fuel tank exhibited impact damage. Separations in flight control tubes were consistent with overload failure and first responder actions. Flight control continuity was established from all flight control surfaces to their respective cockpit controls. A fitting on the electric fuel pump was removed, power was applied to the pump, and the pump emitted a blue liquid consistent with the smell of 100LL aviation fuel. The other fitting on the electric fuel pump was removed, air pressure was applied to the fitting, and air was heard escaping from a broken valve fitting on the gascolator. The gascolator fitting was sealed with thumb pressure, air pressure was reapplied to the electric fuel pump fitting, and air was heard escaping from the inside of the fuselage fuel tank.

The airplane was lifted during its recovery and the propeller blades were found separated from their hub. The curved back of each propeller did not exhibit any chordwise abrasion. Sections of wooden ribs were found embedded in the ground scar under the upper wing leading edges. During the examination of the engine, a thumb compression was observed in all cylinders when the engine was rotated by hand. The propeller governor was separated from the engine case and its control cable remained attached. The engine control cables were traced from the cockpit to the engine. Three of the top sparkplugs were removed. The No. 1 top sparkplug was separated from its threaded base, its electrode was bent, and the electrode exhibited a normal appearance in reference to a Champion Check-A-Plug chart. Using the same chart, the No. 2 top sparkplug exhibited a normal appearance and the Nos. 3 and 4 top sparkplugs exhibited worn out-normal appearances. Sparkplug wires were cut to remove the magnetos for testing. Both magnetos produced a spark at the end of all leads when rotated. The fuel screen within the fuel servo was inspected and it did not exhibit any debris. The servo contained a blue-colored liquid consistent with the smell of 100LL fuel. The fuel distribution valve was disassembled and a liquid sheen consistent with the smell of 100LL fuel was observed within the valve. A liquid consistent with the smell of 100LL fuel exited a port on the engine-driven fuel pump when its lever arm was manipulated by hand.

Medical And Pathological Information

The Sheboygan County Medical Examiner's Office, Sheboygan, Wisconsin, performed an autopsy on the pilot and took toxicological samples. The autopsy listed multiple injuries as the cause of death.

The FAA Bioaeronautical Sciences Research Laboratory's Civil Aerospace Medical Institute (CAMI) performed toxicology testing on specimens from the pilot. The report, in part, indicated the specimens sustained putrefaction and further stated:

21.78 (ug/ml, ug/g) acetaminophen was detected in urine and salicylate detected in urine.

The CAMI description of acetaminophen, in part, stated that it is a common over the counter analgesic/antipyretic (Tylenol).

The CAMI description of salicylate, in part, stated that it is an over the counter analgesic used in the treatment of mild pain.

Tests And Research

The airplane manufacturer produced weight and balance calculations using weight and balance data, dated April 16, 2016, and occupant weights at various fuel loads. At full fuel the airplane weighed about 1,623 lbs with a center of gravity of 95.49 inches. At half fuel the airplane weighed about 1,554 lbs with a center of gravity of 96.15 inches. At minimum fuel the airplane weighed about 1,519.5 lbs with a center of gravity of 96.49 inches.

Administrative Information

Investigator In Charge (IIC):	Edward F Malinowski	Report Date:	03/18/2019
Additional Participating Persons:	Joseph Saunders; Federal Aviation Administration; Milwaukee, WI Stuart Horn; Aviat Aircraft, Inc.; Afton, WY David Harsanyi; Lycoming Engines; Williamsport, PA Peter Hupfer; Federal Aviation Administration; Milwaukee, WI		
Publish Date:	03/18/2019		
Note:	The NTSB traveled to the scene of this accident.		
Investigation Docket:	http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=95239		

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).