



National Transportation Safety Board Aviation Accident Final Report

Location:	Johns Island, SC	Accident Number:	ATL04FA090
Date & Time:	04/05/2004, 1526 EDT	Registration:	N869CC
Aircraft:	Smith Aerostar 601P	Aircraft Damage:	Substantial
Defining Event:		Injuries:	2 Fatal
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

A witness at a nearby maintenance facility stated the pilot telephoned him and told him that, during engine start, one engine sputtered and abruptly stopped. The witness stated the pilot told him he wanted to fly the airplane over to have the problem looked at. A witness, who was an airline transport-rated corporate pilot, observed the airplane on takeoff roll and stated the airplane rotated "really late," using approximately 4,000 feet of runway. He stated the airplane climbed to about 400 or 500 feet, then descended in a left spin into the trees. The airplane collided with the ground and caught fire. Examination of the right engine revealed external fire damage and no evidence of mechanical malfunction. Examination of the left engine revealed external fire damage. Disassembly examination of the left engine revealed the rear side of the No. 5 piston from top to bottom was eroded away with characteristics consistent with detonation. The spark plugs displayed "normal" deposits and wear, except the No. 5 bottom plug was contaminated with a fragment of piston ring material, the No. 5 top plug had a dark sooty appearance, and the nose core of the No. 2 bottom plug was fragmented. Flow bench examination of the left fuel servo revealed no abnormalities. The fuel flow manifold diaphragm was heat-damaged. Flow bench examination of the fuel injector lines and nozzles on a serviceable fuel flow manifold revealed the lines and nozzles were free of obstruction. A review of Emergency Operating Procedures for the Aerostar 601P revealed the following: "Normal procedures do not require operation below the single engine minimum control speed, however, should this condition inadvertently arise and engine failure occur, power on the operating engine should immediately be reduced and the nose lowered to attain a speed above ... the single engine minimum control speed."

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 airspeed during emergency descent, which resulted in an inadvertent stall/spin and uncontrolled descent into trees and terrain. A factor was the loss of engine power in one engine due to pre-ignition/detonation.

Findings

Occurrence #1: LOSS OF ENGINE POWER(TOTAL) - MECH FAILURE/MALF
Phase of Operation: TAKEOFF - INITIAL CLIMB

Findings

1. 1 ENGINE
 2. (C) MISC,ENGINE PRE-IGNITION AND/OR DETONATION
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Occurrence #2: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: EMERGENCY DESCENT/LANDING

Findings

3. (C) AIRSPEED - NOT MAINTAINED - PILOT IN COMMAND
 4. STALL/SPIN - INADVERTENT - PILOT IN COMMAND
-

Occurrence #3: IN FLIGHT COLLISION WITH OBJECT
Phase of Operation: DESCENT - UNCONTROLLED

Findings

5. OBJECT - TREE(S)
6. TERRAIN CONDITION - GROUND

Factual Information

HISTORY OF FLIGHT

On April 5, 2004, at 1526 eastern daylight time, a Smith Aerostar 601P, N869CC, registered to a pending applicant and operated by the commercial pilot, collided with the ground following a loss of power in one engine during initial climb after takeoff from Charleston Executive Airport, Johns Island, South Carolina. The personal flight was operated under the provisions of Title 14 CFR Part 91 with no flight plan filed. Visual meteorological conditions prevailed. The commercial pilot and the pilot-rated passenger received fatal injuries, and the airplane sustained substantial damage from impact and from post-impact fire. The flight departed Charleston Executive Airport, Johns Island, South Carolina, about 1524.

A witness at a maintenance facility at Charleston Executive Airport stated the pilot stopped in and requested maintenance on the airplane. The witness reported he was too busy to look at the airplane, and he suggested the pilot call a facility at Charleston International Airport, Charleston, South Carolina. A witness at a maintenance facility at Charleston International Airport stated the pilot telephoned him and told him that, during engine start, one engine sputtered and abruptly stopped. The witness stated the pilot told him he wanted to bring the airplane over to have the problem looked at before returning to Florida, but the airplane did not arrive.

A witness, who was an airline transport-rated corporate pilot, was standing on the ramp at Charleston Executive Airport and observed the airplane rolling for takeoff on runway 27. The witness stated the airplane appeared to rotate "really late," using approximately 4,000 feet of runway. He stated he and a fellow corporate pilot commented to each other about the long takeoff roll, wondering if the airplane was over gross weight and wondering why the pilot did not abort the takeoff. He stated he watched airplane climb to about 400 or 500 feet, then he saw it "enter a left-hand spin ... I counted three decreasing radius turns in the spin before I saw it disappear behind some trees." The witness then saw a large, smoky black-orange fireball and ran inside to telephone the 911 operator. Emergency response personnel located the airplane on the ground in flames in a wooded area approximately 5,500 feet from the departure end of runway 27.

PERSONNEL INFORMATION

The pilot held a commercial pilot certificate for airplane single-engine land, airplane multi-engine land, and instrument airplane; a flight instructor certificate for airplane single-engine land and instrument airplane, and an advanced ground instructor certificate. The pilot held a second class medical certificate dated June 19, 2003, with the limitation "holder shall wear corrective lenses." The pilot's log book was not recovered for examination. The pilot reported 2,007 total civilian flight hours on his application for the airman medical certificate. A past owner of the airplane stated the pilot had approximately 150 hours total multi-engine time, and the pilot entered Aerostar initial training in March 2004. The pilot's total time in make and model was not known; a representative from the company that insured the airplane reported the pilot experience requirements in make and model for insurance purposes would have included 25 hours dual instruction and 10 hours solo.

AIRCRAFT INFORMATION

The airplane was manufactured in 1975 and was certificated as a Smith Aerostar 601P, serial

number 61P-0235-035. It was subsequently modified with two Lycoming TIO-540-U2A 350-horsepower engines and two Hartzell HC-C3YR-2CUF constant-speed propellers. The maintenance logbooks were not recovered for examination. Work orders provided by a maintenance facility revealed an annual inspection was completed on July 29, 2003, at a Hobbs time of 3,805.9. The Hobbs meter reading at the accident site could not be determined. A past owner of the airplane reported the engines were installed about 1995 by Aerostar Aircraft Corporation. An online sales advertisement of the airplane by its previous owner described the airplane as a "Superstar 700 Pressurized Aerostar" and listed the aircraft time as 3820 hours since new, engine time 625 hours since new, and propeller time 625 hours since overhaul.

An Aviation Laboratories report dated March 11, 2004, recorded oil analysis results for samples from each engine. For each engine, the report stated, "Note increase in iron. Increased iron is typically caused by aircraft inactivity."

The airplane was topped off with 102.3 gallons 100LL fuel prior to departure.

WRECKAGE AND IMPACT INFORMATION

Examination of the wreckage revealed the airplane came to rest upright at the base of trees freshly broken and scraped approximately 30 to 40 feet above the ground. Charred trees and smoldering ground vegetation encircled the wreckage. The cockpit, instrument panel, and cabin were crushed and fire-damaged. The throttle quadrant was crushed and fire-damaged with the throttle, propeller, and mixture control levers bent and melted.

Both wings were crushed and fire-damaged, and the wings and engines remained attached to the main spar. The outboard section of the left wing was separated. The left aileron was crushed, fire-damaged, and partially attached. The left flap was attached. The right aileron was separated and fire-damaged on the ground adjacent to the trailing edge of the right wing. The right flap was crushed and fire-damaged with the middle section attached. The empennage was attached to the fuselage. The vertical stabilizer was in place with the rudder and rudder trim tab attached. The horizontal stabilizer was in place, and the left elevator and trim tab were attached; the right elevator was crushed and attached at the inboard attachment, and the right elevator trim tab was attached.

The right propeller was attached to the flange. Examination revealed two propeller blades displayed little damage with some chordwise scratches, and the counterweight and pitch change knob on each were intact. The third propeller blade was bent aft approximately 90 degrees and was twisted toward low pitch; the blade displayed chordwise scoring and areas absent of paint on the camber side, the counterweight was intact, and the pitch change knob was separated. The cylinder was separated from the hub and retained its air charge, the pitch change rod was separated and the mechanism could not be actuated, and the piston was intact. Examination of the right propeller governor revealed the unit was damaged and was leaking at the cover / body seal. Functional testing and disassembly examination of the right propeller governor revealed no evidence of pre-impact abnormality.

The left propeller was attached to the flange. Examination revealed two propeller blades displayed little damage, and the third blade was bent aft approximately 90 degrees; the counterweight and pitch change knob on each blade were intact. The cylinder retained its air charge, the pitch change mechanism could be actuated, and the piston was intact. Examination of the left propeller governor revealed the unit was fire-damaged, and damage precluded a

functional test of the unit. Disassembly examination revealed the non-metallic components were melted or damaged; the pump gears, gear pockets, and bearing surfaces showed no signs of damage or abnormal wear.

Examination of the right engine revealed fire damage to the engine and accessories. The magnetos and the ignition harness were fire-damaged, and the spark plugs displayed deposits and wear consistent with the "normal" condition on the Champion AV-27 comparison chart for fine-wire plugs. Both turbochargers were fire-damaged. The fuel servo was fire-damaged, the inlet screen was free of debris, the fuel pump was fire-damaged, the fuel flow manifold was fire-damaged, and the No. 1 fuel injector nozzle was clear with the other injector nozzles contaminated with debris. Crankshaft continuity was observed to the accessory drive gears when the crankshaft was turned at the flange, valve movement was observed, and compression developed on all six cylinders. The oil suction screen contained a few flakes of non-metallic debris, and the oil filter was fire-damaged.

Examination of the left engine revealed fire damage to the left side of the engine and to the accessories, and the propeller was attached. The magnetos and the ignition harness were damaged, and the magnetos produced ignition spark on all towers when rotated. The spark plugs displayed deposits and wear consistent with the "normal" condition on the Champion AV-27 comparison chart for fine-wire plugs, except the No. 5 bottom plug was contaminated with a fragment of piston ring material, the No. 5 top plug had a dark sooty appearance, and the nose core of the No. 2 bottom plug was fragmented. The left turbocharger was fire-damaged, rotated when turned, and the inlet hose was secure, fire-damaged, and collapsed at the elbow. The right turbocharger was damaged, would not rotate, and partial disassembly revealed dirt and soil debris inside. The debris was cleared, the unit rotated, and no abnormalities were observed on the compressor vanes. The fuel servo flange was fractured, and the inlet screen was free of debris; flow bench examination of the fuel servo revealed no abnormalities. The fuel flow manifold diaphragm was heat-damaged. Flow bench examination of the fuel injector lines and nozzles on a serviceable fuel flow manifold revealed the lines and nozzles were free of obstruction. The engine crankshaft could not be rotated. A hole was observed in the left forward bottom of the crankcase. Metallic debris was retrieved from the oil suction screen and oil filter, and oil was present in the oil cooler lines.

Disassembly examination of the left engine revealed the crankcase showed internal scrape and gouge damage, with the most pronounced damage in the areas under the Nos. 6, 5, and 4 cylinders. A counterweight was found separated in the crankcase. One roller and its two retaining rings and two washers were in place in the counterweight; the other roller was absent, its retaining rings were in place, one washer was fractured and separated, the other washer was cracked. Examination of the crankshaft revealed one ear of the separated counterweight's mounting pad was separated from the crankshaft and embedded in the crankcase. The camshaft showed damage marks and was separated aft of the second camshaft lobe from the rear; the location of the camshaft separation was consistent with the plane of rotation of the separated counterweight assembly. The inside of the No. 5 cylinder barrel and the No. 5 piston skirt displayed longitudinal scoring. The rear side of the No. 5 piston from top to bottom was eroded away, the rings for the corresponding area were eroded away, and ring material was embedded in the piston skirt.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on the pilot by the Medical University of South Carolina,

Department of Pathology, Charleston, South Carolina, on April 6, 2004. The report stated the cause of death was "... blunt force trauma" Forensic toxicology was performed on specimens from the pilot by the FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma. The report stated no ethanol was detected in the vitreous, and no drugs were detected in the urine.

TESTS AND RESEARCH

Metallurgical examination of the fracture surfaces of the counterweight washer revealed features consistent with overload. Core hardness and case hardness measurements of the washer were found to conform with the manufacturer's engineering specifications. The case depth measurement of the washer was found to be 0.001 to 0.003 inches more than the maximum limit of 0.016 inches specified in the engineering drawing.

Metallurgical examination of the fracture surfaces of the separated ear of the crankshaft's counterweight mounting pad revealed features consistent with high-stress, low-cycle fatigue. Crankshaft composition, core hardness, case hardness, and case depth measurements were found to conform with the manufacturer's engineering specifications.

ADDITIONAL INFORMATION

According to Federal Aviation Administration Advisory Circular AC65-12A, Chapter 10, Engine Maintenance and Operation, Basic Engine Operating Principles, Combustion Process, "... instantaneous and explosive burning of the fuel/air mixture ... is called detonation. ... [Detonation can] cause a "scrubbing" action on the cylinder and the piston. This can burn a hole completely through the piston. ... Severe detonation ... is indicated by ... broken ring lands, or eroded portions of valves, pistons, or cylinder heads."

An aircraft registration application on file with the FAA dated March 22, 2004, listed "Aero Dreams, LLC" as the applicant and was signed by the commercial pilot as "president."

A review of Emergency Operating Procedures for the Aerostar 601P revealed the following procedures: "Loss of Engine Before Liftoff: Close throttles and stop aircraft," and "Loss of Engine After Liftoff: If sufficient landing area is still ahead, pull throttles back and effect and immediate landing. Without sufficient landing area ahead, proceed as follows: ... 8. After obstacle clearance, establish best rate of climb speed" The procedures further state, "Normal procedures do not require operation below the single engine minimum control speed, however, should this condition inadvertently arise and engine failure occur, power on the operating engine should immediately be reduced and the nose lowered to attain a speed above ... the single engine minimum control speed."

The wreckage was released in part to a claims adjuster of Kern and Wooley LLP, Kennesaw, Georgia, on March 17, 2005; the remainder of the wreckage was released to the adjuster on May 2, 2005.

Pilot Information

Certificate:	Flight Instructor; Commercial	Age:	51, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	Airplane Single-engine; Instrument Airplane	Toxicology Performed:	Yes
Medical Certification:	Class 2 With Waivers/Limitations	Last FAA Medical Exam:	06/01/2003
Occupational Pilot:		Last Flight Review or Equivalent:	
Flight Time:	2007 hours (Total, all aircraft), 35 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	Smith	Registration:	N869CC
Model/Series:	Aerostar 601P	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	61P-0235-035
Landing Gear Type:	Retractable - Tricycle	Seats:	6
Date/Type of Last Inspection:	07/01/2003, Annual	Certified Max Gross Wt.:	6315 lbs
Time Since Last Inspection:		Engines:	2 Reciprocating
Airframe Total Time:	3805.9 Hours as of last inspection	Engine Manufacturer:	Lycoming
ELT:	Installed, not activated	Engine Model/Series:	TIO-540-U2A
Registered Owner:	Pending Applicant - Aero Dreams, LLC	Rated Power:	350 hp
Operator:	Paul C. Evans (president Aero Dreams, LLC)	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	KCHS, 46 ft msl	Distance from Accident Site:	12 Nautical Miles
Observation Time:	1456 EDT	Direction from Accident Site:	358°
Lowest Cloud Condition:	Clear	Visibility	10 Miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	10 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	320°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30 inches Hg	Temperature/Dew Point:	19° C / -3° C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Johns Island, SC (KJZI)	Type of Flight Plan Filed:	None
Destination:	Charleston, SC (KCHS)	Type of Clearance:	VFR
Departure Time:	1524 EDT	Type of Airspace:	

Airport Information

Airport:	Charleston Executive Airport (KJZI)	Runway Surface Type:	Concrete
Airport Elevation:	17 ft	Runway Surface Condition:	Dry
Runway Used:	27	IFR Approach:	None
Runway Length/Width:	5000 ft / 150 ft	VFR Approach/Landing:	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Substantial
Passenger Injuries:	1 Fatal	Aircraft Fire:	On-Ground
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	2 Fatal	Latitude, Longitude:	32.702778, -80.025000

Administrative Information

Investigator In Charge (IIC):	Catherine E Gagne	Report Date:	09/13/2005
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Additional Participating Persons:	Anthony G Finocchi; FAA Columbia FSDO - 13; Columbia, SC John Butler; Textron Lycoming; Arlington, TX Thomas J McCreary; Hartzell Propeller, Inc.; Piqua, OH Aaron L Spotts; Textron Lycoming; Williamsport, PA Steve Krugler; Woodward Governor; Rockford, IL George Hollingsworth; The New Piper Aircraft, Inc.; Reston, VA
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Publish Date:

Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov , or at 800-877-6799. Dockets released after this date are available at http://dms.nts.gov/pubdms/ .
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