Aviation Investigation Final Report

Location:	BETHANY, Oklahoma	**Accident Number:**	FTW99FA199
Date & Time:	July 23, 1999, 11:13 Local	**Registration:**	N345LS
Aircraft:	Smith, Ted Aerostar AEROSTAR 601P	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

During takeoff, the twin-engine airplane was observed to roll left, pitch nose down, and impact terrain shortly after the pilot reported to ATC that he had a problem. Witnesses reported that the left engine was producing black smoke during the takeoff roll. One witness stated that the airplane had slowed to approximately 60-70 mph prior to rolling to the left. A mechanic, who worked on the airplane prior to the accident, stated that the pilot reported being unable to maintain manifold pressure (MP) with the left engine. The mechanic found that the left engine's rubber interconnect boot, which routes induction air between the turbocharger controller elbow and the fuel servo, was 'gaping open.' The mechanic reseated the boot and tightened the clamp. The pilot flew the airplane and reported no problems. During a second flight, the pilot reported that the left engine was again unable to maintain MP. Prior to the accident flight, the pilot informed the mechanic that the 'hose had slid off again' and that it had been reinstalled and he 'felt sure it was o.k.' A witness stated that he saw the pilot working on the left engine the morning of the accident. At the accident site, the left engine's interconnect boot was found disconnected. The clamp securing the boot was not located. No other pre-impact anomalies were found with the engines, propellers, turbochargers, or fuel servos.

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 the minimum controllable airspeed. A factor was the disconnected rubber interconnect boot, which resulted in the partial loss of left engine power.

Findings

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

Findings
1. 1 ENGINE
2. (F) INDUCTION AIR DUCTING - DISCONNECTED
3. MAINTENANCE - IMPROPER - PILOT IN COMMAND

Occurrence #2: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: TAKEOFF - INITIAL CLIMB

Findings
4. (C) AIRSPEED(VMC) - NOT MAINTAINED - PILOT IN COMMAND
5. AIRCRAFT CONTROL - NOT POSSIBLE - PILOT IN COMMAND

Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Findings
6. TERRAIN CONDITION - GROUND

Factual Information

HISTORY OF FLIGHT

On July 23, 1999, at 1113 central daylight time, a Smith Aerostar 601P twin-engine airplane, N345LS, impacted terrain following a loss of engine power during the takeoff climb from the Wiley Post Airport, near Bethany, Oklahoma. The airplane was destroyed by impact forces and fire. The instrument rated private pilot and his pilot rated passenger were fatally injured. The airplane was owned and operated by the pilot under 14 Code of Federal Regulations Part 91. Visual meteorological conditions prevailed for the personal flight destined for San Angelo, Texas. The pilot had filed an instrument flight rules flight plan for the trip; however, he did not open the flight plan at the time of departure.

According to a pilot rated witness positioned behind the accident airplane on runway 17L, "the airplane's left engine was producing a black smoke during the takeoff roll." The witness stated that the airplane started to drift to the left after the takeoff roll. Shortly after takeoff, the witness heard the pilot transmit to the tower that "he had a problem." The witness stated that the pilot did not elaborate on the problem. Immediately after the radio call, the airplane appeared to "pitch nose high simultaneously yawing and rolling to the left." The witness reported that he saw the airplane roll over, nose down while turning and impact the ground.

According to a second witness driving south on a street parallel to the runway, "the airplane's left engine was producing puffs of black smoke." The witness stated that "the exhaust was not in a steady stream like normal." Instead, the exhaust produced by the left engine was intermittent as if the "engine was missing or surging."

Two witnesses, located north of the accident site/south of the departure runway, stated that they saw the airplane takeoff. Both witnesses reported that the airplane appeared "much lower and slower than the other twin-engine airplanes that departed that runway." One witness stated that the airplane slowed to approximately "60-70 mph" and lost about 150 feet of altitude after takeoff. Both witnesses stated that the engines sounded "normal." They observed the airplane roll left and pitch nose down. One witness stated that as the airplane did this, it appeared as if the "left propeller was slowing down." The airplane then disappeared behind a building, and the witnesses heard the sound of impact and saw a plume of smoke rise from behind the building.

PERSONNEL INFORMATION

The private pilot held airplane single engine land, airplane single engine sea, airplane multiengine land, and instrument airplane ratings. On December 10, 1997, he was issued a second class medical certificate with no limitations. The pilot's logbook was not located

during the investigation. According to an air race application dated June 27, 1999, the pilot had accumulated 1,500 hours of total flight time, of which approximately 100 hours were in the accident airplane. On the application, the pilot listed his last biennial flight review date as August 1998. The type of airplane used for the review was not listed. The pilot purchased the accident airplane in September 1998, and completed a 5-hour flight, 25-hour ground instruction course, which was required for insurance coverage. According to the company that performed the insurance checkout for the pilot, emergency procedures were covered in both the flight and ground instruction phases of his training.

AIRCRAFT INFORMATION

The accident airplane (serial number 61P-0315-085) was manufactured on May 18, 1976, and was originally equipped with two Lycoming IO-540-S1A5 engines. On April 24, 1984, at an airplane total time of 1,308.0 hours, the airplane was modified in accordance with Machen STC SA980NW and Machen STC SE978NW, by the installation of a Lycoming TIO-540-J2BD engine and a Lycoming LTIO-540-J2BD engine, along with a Hartzell HC-C3YR-2UF propeller and a HC-C3YR-2LUF propeller. The airplane was further modified at that time with an aerodynamic package, a sound reduction package, an air-conditioning system, an auxiliary fuel tank kit, and a Woodward Propeller Syncrophaser with unfeathering accumulators.

According to a mechanic and a friend of the pilot, on July 7, 1999, during a cross country flight, the airplane experienced a total loss of engine power on the right engine. Additionally, the left engine was unable to maintain manifold pressure, and therefore, the airplane was unable to maintain altitude. When the airplane descended, the pilot was still unable to regain the left engine's lost manifold pressure. According to the mechanic, the pilot landed the airplane in Brady, Texas, and contacted him. The mechanic flew to Brady to examine the airplane. Examination of the right engine revealed that a crack had developed in the turbocharger's exhaust casting, which resulted in the magneto's P-leads melting to the engine's firewall, grounding the magnetos.

On July 8, 1999, the mechanic flew back to Brady to remove the right turbocharger and make a list of required parts to be replaced. Additionally, the mechanic visually inspected and pressure checked the left engine and found the rubber interconnect boot, which routes the induction air between the turbocharger controller elbow and the fuel servo, "gaping open at the connection to the engine's throttle body (fuel servo)."

On July 19, 1999, the mechanic returned to Brady to replace hoses on the right engine and reinstall the left engine's rubber interconnect under its clamp and retighten. On July 20, 1999, the mechanic replaced the right turbocharger, transition assembly, and reinstalled the wastegate and its controller. He also installed new exhaust clamps on the right engine. He then performed a run-up check on both engines. The right engine was run at full power, with all instruments "checked good." The left engine was run at partial power. Both engines were examined visually and "checked good." On July 21, 1999, the pilot was told by the mechanic to do a full power run-up on both engines, and if everything appeared normal, to takeoff, fly

around the airport at Brady, and if everything looked good, to fly to San Angelo. The pilot arrived in San Angelo approximately 1730 and said, "it ran very good. Both engines had full power and [the left engine] was better than ever."

On July 22, 1999, the mechanic removed the engine cowlings and visually inspected the engines. He stated that they "checked o.k." The pilot flew the airplane to Oklahoma City, Oklahoma. He called the mechanic at 16:45 and said "he made the trip o.k." He added that the "right engine ran great, but the left engine lost manifold pressure at altitude, and during the descent into Oklahoma City, the manifold pressure started to increase as atmospheric pressure increased." The pilot asked the mechanic if he should fly the airplane back to San Angelo "as is," and the mechanic recommended that the pilot have a mechanic in Oklahoma City examine the airplane.

On July 23, 1999, the pilot called the mechanic at 0910 and said, "a mechanic found hose had slid off again. They reinstalled it and felt sure it was o.k." The pilot informed the mechanic that he was flying to San Angelo so that the mechanic could "look at it and double check everything."

Mechanics, located at the Wiley Post Airport, stated that they told the pilot that they would not be able to examine the airplane for a few weeks, but recommended to the pilot that he leave the airplane at their facility. One of the mechanics in Oklahoma stated that on the morning of the accident, he saw the pilot had the cowling off of the left engine and he appeared to be working on the engine, but did not know what he was working on.

Review of the maintenance records revealed that the last annual inspection was endorsed on April 1, 1999, at an aircraft total time of 2,906.0 hours, and a total time on the engines of 1,598 hours. On July 20, 1999, the left and right engines had accumulated 1,636.5 hours since new. On February 19, 1997, the density and differential controllers for the left engine were removed, repaired, and reinstalled. On March 20, 1997, the "turbo controllers and waste gate assembly" for the right engine were removed, reinstalled, and adjusted. On April 26, 1999, a static system check was completed on the aircraft.

METEOROLOGICAL INFORMATION

At 1015, the weather observation facility at the Wiley Post Airport reported the wind from 220 degrees at 12 knots, visibility 10 statute miles, a few clouds at 7,500 feet agl, temperature 32 degrees Celsius, dewpoint 20 degrees Celsius, and altimeter setting of 30.09 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

The airplane came to rest approximately 2,400 feet south southeast of the departure end of runway 17L on airport property in an open area alongside a steel I-beam storage area. The main wreckage area was along the west side of the I-beams, with the fuselage facing a

southerly direction and the empennage coming to rest upright. The aircraft was destroyed by a post impact fire, which consumed the fuselage and sections of both wings. There was a ground scar located near the edge of a shallow ditch, 36 feet to the west of the airplane's final resting area. A section of the right wing, the right propeller (separated from the right engine), and the nose tire were located adjacent to the ground scar. The left propeller was separated from the left engine and was resting in between the ground scar and the main wreckage area. Both the left and right engines came to rest inverted near the main wreckage, and were attached to the throttle quadrant via cables.

Flight control continuity could not be established due to fire damage and wing separation. The aircraft's upper and lower doors (located on the left side of the fuselage near the pilot's seat and adjacent to the left propeller) were separated and found southwest of the main wreckage. The doors were not fire damaged, but displayed near vertical slashes; one in the upper door section forward of the handle, and one in the lower door section. The upper door slash displayed metal that was deformed from the outside-in. The lower door slash displayed metal deformed outside-in on the bottom and inside-out on the top. The flaps and ailerons were not identified. The rudder and elevator remained attached to their stabilizers. The rudder trim appeared to be in the neutral position. The landing gear actuators were melted and their position could not be determined; however, witnesses to the accident stated that the airplane appeared as if the landing gear and flaps were retracted.

Both engines were fire damaged. The left engine's fuel servo was separated from the engine at the air inlet housing. The rubber interconnect to the fuel servo was torn in one section, fire damaged, and disconnected on the fuel servo end. The clamp which secured the boot to the fuel servo was missing and not located. The throttle and mixture cables were attached to the fuel servo. The left engine's dual magneto was in place and attached but was destroyed by the fire along with the ignition harness. The right engine's fuel servo remained attached to the engine and control cables. Its rubber interconnect remained attached to the fuel servo and the controller elbow. The right dual magneto was in place and attached but was damaged by the fire. Both propeller governors were found in place on the engines with the control cables attached. The speed levers on both propeller governors were found in the high RPM (low pitch) position. The throttle quadrant was located in the wreckage. The six throttle, propeller, and mixture controls were in the forward position and bent to the right. The only identifiable engine instrument was the tachometer. The right engine indicator needle (top needle) was found indicating 2700 RPM, while the left engine indicator needle (bottom needle) was indicating approximately 500 RPM.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy of the pilot was performed at the Office of the Chief Medical Examiner located in Oklahoma City, Oklahoma. Toxicological tests for alcohol and drugs were performed. Ethanol was detected in the pilot's muscles, but it was noted on the toxicology report that "the ethanol found was from postmortem ethanol formation and not from the ingestion of ethanol."

TESTS AND RESEARCH

On August 26 and 27, 1999, the NTSB investigator-in-charge (IIC) examined the engines, propellers, and turbochargers along with representatives from the component manufacturers at the Universal Loss Management facility near St. Louis, Missouri. The Lycoming TIO-540-J2BD(MA) left engine (serial number L-7292-61A) was examined. Crankshaft continuity to the engine's accessory section was verified by manually rotating the propeller flange. Thumb compression was achieved on all cylinders except the #3 cylinder. Valve action was verified on all cylinders except the #3 exhaust and the #6 intake valves. The #6 intake tappet body moved; however, its push rod was bent. The #3 cylinder was removed and examined. The #3 exhaust valve was free to rotate but was being held open by the heat damaged exhaust rocker arm. The exhaust rocker arm was removed and the #3 exhaust valve closed. The #1, #2, #5, and #6 bottom, and the #5 and #6 top spark plugs from the left engine were sooty. The #3 top and bottom spark plugs were rusted. The #4 top and bottom spark plugs appeared "normal." The left magneto was destroyed and could not be operationally checked. The Lycoming LTIO-540-J2BD(MA) right engine (serial number L-2196-68A) was examined. Crankshaft continuity to the engine's accessory section was verified by manually rotating the propeller flange. Thumb compression was achieved on all 6 cylinders. Valve action was verified on all cylinders except the #6 exhaust, whose push rod was bent. The #1 and #2 top spark plugs were sooty and lead fouled. The #4 top spark plug was lead fouled and the #1 bottom spark plug was broken from the cylinder. The remaining spark plugs appeared "normal."

The left turbocharger (part number LW13234, serial number KD0101) was examined and disassembled. The turbocharger was damaged by impact forces, which prevented the compressor and turbine wheels from being rotated until it was disassembled. Two turbine wheel inducer blades were bent in the direction opposite of wheel rotation. There were 4, 2-inch gouge marks in the turbine shroud. The center housing oil passages contained residual oil and were not blocked. The right turbocharger (part number 407800-9003, serial number CBN00358) was examined and disassembled. The turbocharger's turbine and compressor rotated freely prior to disassembly. The compressor and turbine housing displayed rotational scoring. The compressor and turbine wheels displayed rotational scoring. The center housing oil passages contained residual oil and were not obstructed. The left and right wastegate, density, and differential controllers were impact and fire damaged. No pre-impact conditions were found which would have prevented operation of either turbocharger.

The left Hartzell HC-C3YR-2UF Propeller (hub serial number CK3913A) was separated from the engine at its hub. Its blades were lightly impact damaged, and sustained some heat damage near the de-ice boots. Two of the three blades displayed some light chordwise scoring. Only one of the blades displayed aft bending near its shank. Examination of the propeller hub, by the propeller manufacturer's representative, indicated that the impact marks on the pre-load plates correlated with a low pitch/high RPM setting. The right Hartzell HC-C3YR-2UF Propeller (hub serial number CK3914A) was also separated from the engine at its hub. The right propeller blades displayed more bending and rotational scoring than the left propeller blades. Examination of the propeller hub indicated that the impact marks on the pre-load plates

correlated with a low pitch/high RPM setting.

The left and right fuel servos were sent to the NTSB office located in Seattle, Washington, and were then taken to the Precision Airmotive Corporation facility for examination. On September 13, 1999, the servos were examined by an NTSB investigator and the manufacturer's representative. According to their report, the servos were damaged and a flow test could not be performed. A tear down examination was performed on both servos. The left and right fuel screens were clean with the o-rings melted and deformed. The air and fuel diaphragms for both servos were melted and deformed. The center body bellows for both servos were broken into many pieces.

ADDITIONAL INFORMATION

The wreckage was released to the owner's representative upon completion of the investigation.

Pilot Information

Certificate:	Private	**Age:**	40,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	December 10, 1997
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	1500 hours (Total, all aircraft), 100 hours (Total, this make and model), 1400 hours (Pilot In Command, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Smith, Ted Aerostar	**Registration:**	N345LS
Model/Series:	AEROSTAR 601P AEROSTAR 6	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	61P-0315-085
Landing Gear Type:	Retractable - Tricycle	**Seats:**	5
Date/Type of Last Inspection:	April 1, 1999 Annual	**Certified Max Gross Wt.:**	5700 lbs
Time Since Last Inspection:	39 Hrs	**Engines:**	2 Reciprocating
Airframe Total Time:	2945 Hrs	**Engine Manufacturer:**	Lycoming
ELT:	Installed	**Engine Model/Series:**	TIO-540-J2BD
Registered Owner:	SONJO INC.	**Rated Power:**	340 Horsepower
Operator:	MARK H. JOHNSON	**Operating Certificate(s) Held:**	None
Operator Does Business As:		**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	PWA ,1299 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	11:15 Local	**Direction from Accident Site:**	360°
Lowest Cloud Condition:	Scattered / 7500 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	12 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	220°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	32°C / 20°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	(PWA)	**Type of Flight Plan Filed:**	IFR
Destination:	SAN ANGELO , TX (SJT)	**Type of Clearance:**	VFR
Departure Time:	11:13 Local	**Type of Airspace:**	Class D

Airport Information

Airport:	WILEY POST AIRPORT PWA	**Runway Surface Type:**	
Airport Elevation:		**Runway Surface Condition:**	
Runway Used:	0	**IFR Approach:**	
Runway Length/Width:		**VFR Approach/Landing:**	

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	1 Fatal	**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	On-ground
Total Injuries:	2 Fatal	**Latitude, Longitude:**	35.499408,-97.639602(est)

Administrative Information

Investigator In Charge (IIC):	Lupino, Nicole
Additional Participating Persons:	WAYNE COOK; OKLAHOMA CITY , OK
Original Publish Date:	November 22, 2000
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=46850