Aviation Investigation Final Report

Location:	Tappahannock, Virginia	**Accident Number:**	MIA08LA142
Date & Time:	July 15, 2008, 15:45 Local	**Registration:**	N27ED
Aircraft:	J. E. Douglas Starduster 2	**Aircraft Damage:**	Substantial
Defining Event:	Powerplant sys/comp malf/fail	**Injuries:**	2 Serious
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

A witness observed the airplane during takeoff. The nose of the airplane was pitched up about 20-to-25 degrees and the airplane climbed to between 800 to 1,000 feet with full power. The climb angle increased to about 60-degrees and the engine was heard to go silent. The airplane was observed to initiate a wing-over maneuver in a nose down attitude, turned 90 degrees to the left, and disappeared from view below the tree line. The witness then heard the sound of the airplane colliding with trees and the ground. The pilot stated the airplane had 30 gallons of 100 low-lead fuel at take off. The fuel tank was ruptured and the smell of fuel was present at the accident site. Examination of the airframe flight controls and engine assembly revealed no anomalies. Metallurgical examination of the fuel servo and induction air filter revealed they did not contribute to the loss of engine power.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: Loss of engine power for undetermined reasons.

Findings

Not determined	(general) - Unknown/Not determined
Aircraft	(general) - Not specified

Factual Information

History of Flight

Initial climb	Powerplant sys/comp malf/fail (Defining event)
Emergency descent	Collision with terr/obj (non-CFIT)

On July 15, 2008, at 1545 eastern daylight time, an amateur built Starduster 2, N27ED, registered to a private owner and operated as a Title 14 Code of Regulations (CFR) Part 91 personal flight, collided with trees and the ground while maneuvering in the vicinity of Tappahannock, Virginia. Visual meteorological conditions prevailed and no flight plan was filed. The airplane received substantial damage. The airline transport pilot and one passenger received serious injuries. The flight originated from Tappahannock-Essex County Airport (XSA), Tappahannock, Virginia, on July 15, 2008 at 1543.

A witness stated he was inside a hanger at XSA, when he heard the accident airplane taxing to runway 10 for takeoff. The engine sounded strong and he went outside to watch the airplane depart. The witness observed the airplane about 200 yards beyond the end of the runway between 200 to 300 feet in what appeared to be a Vx climb (short field takeoff climb). The nose of the airplane was pitched up about 20 to 25 degrees. The airplane climbed to between 800 to 1,000 feet with full power and the climb angle increased to about 60 degrees. The engine was heard to go silent and the airplane drifted about 100 to 120 yards to the right of runway centerline. The airplane was observed to initiate a wing-over maneuver into a nearly nose down attitude, with the top of the airplane pointing back towards the airport. The engine was heard to sputter five or six times. The airplane came out of the dive, and was nearly level before it entered a 90-degree left roll. The airplane turned 90-degrees to the left towards the south and disappeared from view below the tree line. The airplane was then heard colliding with trees and the ground.

The pilot stated he had no recollection of the events after he completed the preflight inspection, and the airplane had no history of back firing or an induction fire. In addition, the pilot stated in the National Transportation Safety Board Pilot Operator Aircraft Accident Report that the airplane had 30 gallons of 100 low-lead fuel on board at takeoff.

The airplane wreckage was located in a wooded area about 2,500 feet from the approach end of runway 28, about 150 feet right of runway centerline. The airplane had collided with trees and the ground in a descending nose down attitude on a southerly heading and came to rest upright on a heading of 055 degrees.

The wood propeller hub remained attached to the propeller crankshaft flange, and the propeller spinner was crushed. Both propeller blades separated about 12 to 16 inches from the propeller hub and the starter drive gear was engaged with the starter ring gear. The engine assembly

remained attached to the engine mounts and was displaced upward, aft and clockwise.

The aluminum fuel tank was ruptured. Emergency responders stated there was a smell of fuel at the accident site and the front seat passenger and emergency medical technician reported having skin irritations from fuel spillage.

The upper and lower wings were damaged and the flying wires were intact. The forward cockpit area was pushed aft into the rear cockpit. All flight control cables remained attached to their respective bell cranks. The empennage was intact. There was no evidence of a precrash mechanical failure or malfunction of the airframe or flight controls.

The airplane was recovered to the registered owner's hanger and Federal Aviation Administration (FAA) inspectors examined the engine assembly on July 17, 2008.

The engine turned freely by hand and thumb compression was obtained on cylinders No. 1, No. 2, and No. 3. Thumb compression was obtained on cylinder No. 4 after the damaged aft pushrod was removed. All rocker covers were removed, valve train continuity was confirmed and oil was present on the valve spring assemblies. The starter drive was found engaged. The air filter element was removed an examined. The center portion of the aft surface of the foam air filter media exhibited darkened coloration and thickening of the filaments. There was no evidence of a post crash fire. The induction air box was crushed around the fuel injector servo. The fuel injection servo air impact tubes appeared to have (sand size) particles of the filter in their opening, and it was not determined if their openings were completely obstructed. The throttle control and mixture control were connected to the servo. The fuel injector servo was separated at the mounting flange. All ignition leads were intact with the exception of the No. 3 top spark plug, which was broken off. All spark plugs were removed and exhibited normal wear except for the No. 3 lower spark plug which was found oil soaked. Both magnetos produced spark when rotated by hand. The exhaust assembly and muffler were intact and damaged. The oil screen housing broke off at the flange and the oil screen was free of contamination. The oil dipstick housing was broken off. All cylinders were intact. About 2 ounces of fuel was present in the fuel gascolator, and the fuel screen was free of contamination. There was no evidence of water found in the gascolator. The fuel injector flow divider cover was removed and fuel was present. The fuel injector nozzles were removed and free of obstruction. The engine driven fuel pump was removed and produced pressure at the outlet port when actuated by hand.

The FAA and the engine manufacture reexamined the engine on August 5, 2008. The engine was raised and partially disassembled to facilitate the examination. The examination revealed no new anomalies. The Bendix fuel servo and induction air filter were shipped to the Safety Board Materials Laboratory for examination. The Safety Board metallurgist stated the fuel servo housing had been disassembled before it was received in the Materials laboratory. The servo was reopened. The fuel-metering valve and diaphragms were attached to the valve and were intact. No blockages were observed in the fuel flow passages. The air filter housing was removed from the fuel servo. Black deposits were observed on the impact tubes and on the throttle valve. The deposits did not fully obstruct the tube openings, extending across

approximately 20 to 30 percent of the opening areas of the three tubes with interior deposits.

Pilot Information

Certificate:	Airline transport; Commercial; Private	**Age:**	62,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Rear
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	September 1, 2006
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	July 1, 2007
Flight Time:	3090 hours (Total, all aircraft), 80 hours (Total, this make and model), 2740 hours (Pilot In Command, all aircraft), 6 hours (Last 90 days, all aircraft), 2 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	J. E. Douglas	**Registration:**	N27ED
Model/Series:	Starduster 2	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	Yes
Airworthiness Certificate:	Experimental (Special)	**Serial Number:**	707-727
Landing Gear Type:	Tailwheel	**Seats:**	2
Date/Type of Last Inspection:	December 1, 2007 Condition	**Certified Max Gross Wt.:**	1800 lbs
Time Since Last Inspection:	8 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	461 Hrs as of last inspection	**Engine Manufacturer:**	LYCOMING
ELT:	Not installed	**Engine Model/Series:**	IO-360-A1A
Registered Owner:	David S. Harvey	**Rated Power:**	
Operator:		**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	XSA,135 ft msl	**Distance from Accident Site:**	
Observation Time:	16:29 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots / None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	10°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.05 inches Hg	**Temperature/Dew Point:**	31°C / 11°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Tappahannock, VA (XSA)	**Type of Flight Plan Filed:**	None
Destination:	(XSA)	**Type of Clearance:**	None
Departure Time:	15:44 Local	**Type of Airspace:**	

Airport Information

Airport:	Tappahannock-Essex County XSA	**Runway Surface Type:**	
Airport Elevation:		**Runway Surface Condition:**	
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Serious	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Serious	**Latitude, Longitude:**	37.859443,-76.89389(est)

Administrative Information

Investigator In Charge (IIC):	Smith, Carrol
Additional Participating Persons:	John Keymont; Richmond FAA/FSDO; Richmond, VA Mike Childers; Textron Lycoming; Elizabethton, TN
Original Publish Date:	January 29, 2009
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=68446