Aviation Investigation Final Report

Location:	Hilliard, Florida	**Accident Number:**	ERA20LA324
Date & Time:	September 21, 2020, 14:37 Local	**Registration:**	N800PB
Aircraft:	Vans RV 8	**Aircraft Damage:**	Destroyed
Defining Event:	Loss of engine power (total)	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot was on a cross-county flight back to his home airport. About an hour into the flight, a witness standing in her front yard, heard the airplane flying overhead and heard the engine "popping" like it was back firing. She looked up at the airplane and saw that it was "very low," at an estimated altitude of 500 ft above ground level. The airplane disappeared behind trees and she heard the airplane hitting tree branches shortly afterward.

Examination of the airplane revealed that the fuselage and instrument panel was consumed by fire. Smoke striations from the cowling into the cockpit were consistent with an in-flight fire that originated in the engine compartment. Flight control continuity was confirmed from the flight controls to the flight control surfaces. A large hole was observed at the No. 2 cylinder case half and all of the connecting rod bearings were worn and oil starved. The No. 2 connecting rod was the most worn and the rod and cap exhibited lubrication distress. The condition of the No. 2 connecting rod bearing indicated that it was closest to the initiation point of oil starvation. However, a reason for the oil starvation could not be determined. It is likely that the inflight fire was the result of the engine failure.

Autopsy of the pilot indicated that he had cardiomegaly and moderate atherosclerotic disease. While these conditions increase the risk for having a sudden cardiac event, there was no evidence of any acute processes on autopsy and the pilot was able to extricate himself from the plane. Thus, it is unlikely that the pilot's cardiovascular condition was a factor in this accident.

Carboxyhemoglobin was detected in the pilot's blood at 15-16% and soot material was found in his airways. Toxicology testing detected cyanide, which can be produced by combustion, in his blood. Inhalation of both elements would have occurred from the in-flight fire. That the pilot extricated himself from the airplane suggests that the carbon monoxide itself was not impairing. Thus, carbon monoxide exposure, as determined by the carboxyhemoglobin level, was not a contributing factor in the accident.

Probable Cause and Findings

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

A total loss of engine power due to oil starvation.

Findings

Aircraft	Recip engine power section - Failure
Aircraft	Oil - Unknown/Not determined

Factual Information

History of Flight

Enroute-cruise	Loss of engine power (total) (Defining event)
Enroute-cruise	Fire/smoke (non-impact)

On September 21, 2020, about 1437 eastern daylight time, an experimental amateur-built Vans RV8 airplane, N800PB, was substantially damaged when it was involved in an accident near Hilliard, Florida. The pilot was fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations (CFR)* Part 91 personal flight.

According to the accident pilot's son, they flew together in the airplane earlier during the day from Flagler Executive Airport (FIN), Palm Coast, Florida, to Polk County Airport (4A4), Cedartown, Georgia. They flew to 4A4 because the son purchased another airplane and was going to fly it back to New Jersey, and the accident pilot was going to fly back to FIN. They departed 4A4 around 1330, and the accident pilot flew towards FIN, while the son, in the other airplane, turned towards New Jersey. The son further stated that he flew the accident pilot's airplane often and it flew "great" with no anomalies noted.

A witness standing in her front yard heard an airplane flying overhead. She heard the engine "popping" like it was backfiring. She looked up and observed the airplane was "very low," at an estimated altitude of 500 ft above ground level. The airplane disappeared behind trees and shortly after she heard it hitting tree branches. She subsequently located the wreckage, called 911, and waited for the fire department to arrive.

Examination of the airplane revealed that the fuselage was consumed by fire and the instrument panel was destroyed in the fire. No useable instruments were identified. The wings remained attached to the fuselage and exhibited leading-edge damage on both sides. The aileron and flaps remained attached to the wings. Flight control continuity was established from all flight control surfaces through the torque tubes and cuts to the tubes made by recovery personnel.

Heavy black soot coated the entire engine compartment. Smoke striations from the cowling into the cockpit were consistent with an in-flight fire. The top spark plugs were removed, and the engine crankshaft was rotated by the propeller. Thumb compression was established on cylinders Nos. 1,3 and 4. Crankshaft continuity was established through the engine. The right magneto impulse coupling activated when the propeller was rotated. The left magneto was an electronic style magneto.

All the top spark plugs wires were destroyed in the fire. The fuel injection system was consumed by fire. A large hole was observed in the case half near the No. 2 cylinder. The No. 2 connecting rod remained attached to the piston and the piston was seized inside the cylinder.

The No. 2 rod end was distorted and damaged. The oil sump contained fragments of the No. 2 connecting rod bearing and other metallic debris. The oil pump and gears did not exhibit any scoring. The oil sump screen was free of debris. The oil lines were consumed by fire and a small amount of oil was noted in the system.

The engine was sent to the engine manufacturer for further examination. The examination revealed that the main journal bearings were worn, and no fretting was observed on the crankcase halves. The connecting rod bearings were worn. The No. 2 connecting rod bearing was the most damaged then, in order of most to least damaged, were the No. 3 connecting rod bearing, the No. 4 connecting rod bearing, and the No.1 connecting rod bearing. The No. 2 connecting rod and cap also exhibited lubrication distress.

According to maintenance records, September 1, 2005, the No. 2 cylinder was removed because there was no compression in the cylinder. It was repaired and then reinstalled on the engine on September 28, 2005, at a total time 101.2 hours. Then, on December 11, 2007, the engine was removed, inspected, and repaired due to a propeller strike at 198.7 total hours. At that time, the maintenance entry indicated that "One connecting rod…was replaced. All connecting rod bolts and nuts [were] replaced." In June of 2008, the engine had a 100 hr inspection performed, with no other information noted. The engine logbooks were not located for the dates between 2008 to 2016. From 2017 to 2020, the engine went through normal inspections in accordance with 14 CFR 43 Appendix D with no anomalies noted. At the last inspection, on June 29, 2020, the engine had a total time of 673.2 total hours.

According to the Officer of the Medical Examiner, Jacksonville, Florida autopsy report, the cause of the pilot's death was thermal (burn) injuries with contributory causes of smoke inhalation, blunt impact trauma, and hypertensive and arteriosclerotic heart disease; the manner of death was accident. The medical examiner reported that the pilot had an enlarged heart (540 grams), a right ventricle wall thickness of 0.5 centimeter, and 50-75% atherosclerotic narrowing of his left anterior descending coronary artery. The medical examiner detected soot in the pilot's airways.

FAA Forensic Sciences Laboratory toxicology testing detected carboxyhemoglobin at 15-16% and cyanide, which can be produced by combustion, at 420 and 650 nanograms per milliliter in the pilot's heart blood. The non-impairing high blood pressure and hair growth medication, minoxidil (commonly marketed as Rogaine) was detected in the pilot's blood and urine. Toxicology testing performed for the Office of the Medical Examiner on the pilot's blood detected carboxyhemoglobin at 15%; caffeine was also detected in his blood.

Carbon monoxide (CO) is an odorless, colorless gas that is a byproduct of combustion, such as from an exhaust system or fire. Carboxyhemoglobin is formed when CO binds to hemoglobin, the protein in red blood cells that carries oxygen.

Information

Certificate:	**Age:**
Airplane Rating(s):	**Seat Occupied:**
Other Aircraft Rating(s):	**Restraint Used:**
Instrument Rating(s):	**Second Pilot Present:**
Instructor Rating(s):	**Toxicology Performed:**
Medical Certification:	**Last FAA Medical Exam:**
Occupational Pilot:	**Last Flight Review or Equivalent:**
Flight Time:	

Aircraft and Owner/Operator Information

Aircraft Make:	Vans	**Registration:**	N800PB
Model/Series:	RV 8 Undesignat	**Aircraft Category:**	Airplane
Year of Manufacture:	2004	**Amateur Built:**	Yes
Airworthiness Certificate:	Experimental (Special)	**Serial Number:**	80838
Landing Gear Type:	Tailwheel	**Seats:**	2
Date/Type of Last Inspection:		**Certified Max Gross Wt.:**	
Time Since Last Inspection:		**Engines:**	1
Airframe Total Time:		**Engine Manufacturer:**	
ELT:		**Engine Model/Series:**	
Registered Owner:	On file	**Rated Power:**	
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:	KJAX,32 ft msl	**Distance from Accident Site:**	21 Nautical Miles
Observation Time:	14:56 Local	**Direction from Accident Site:**	136°
Lowest Cloud Condition:		**Visibility**	10 miles
Lowest Ceiling:	Broken / 2500 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	22 knots / 28 knots	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:	30°	**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	30.19 inches Hg	**Temperature/Dew Point:**	23°C / 18°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Cedartown, GA (4A4)	**Type of Flight Plan Filed:**	None
Destination:	Flagler, FL (FIN)	**Type of Clearance:**	None
Departure Time:	13:30 Local	**Type of Airspace:**	Class G

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	In-flight
Ground Injuries:		**Aircraft Explosion:**	On-ground
Total Injuries:	1 Fatal	**Latitude, Longitude:**	30.752777,-81.979164(est)

Administrative Information

Investigator In Charge (IIC):	Boggs, Daniel
Additional Participating Persons:	Ric Riccardi; FAA; Orlando, FL
Original Publish Date:	September 23, 2022
Last Revision Date:	
Investigation Class:	Class 3
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=102005