



National Transportation Safety Board Aviation Accident Final Report

Location:	Bowling Green, OH	Accident Number:	CEN17FA207
Date & Time:	06/01/2017, 1159 EDT	Registration:	N4635V
Aircraft:	VARGA AIRCRAFT CORP. 2150A	Aircraft Damage:	Substantial
Defining Event:	Powerplant sys/comp malf/fail	Injuries:	1 Fatal
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

The private pilot was performing a visual flight rules cross-country flight after purchasing the airplane. After flying for about 1 hr 20 minutes, the airplane suddenly entered a spiraling descent from cruise flight. Witnesses observed the airplane flying erratically at low altitude before it impacted an open field; they stated that the engine was running until impact.

Toxicological testing of specimens taken from the pilot found 55% carbon monoxide saturation of blood. At carbon monoxide levels above 40%, people typically experience incapacitating symptoms such as severe confusion, agitation, seizures, loss of consciousness, and death.

Examination of the airplane's heat exchanger showed that the outside casing had either previously been repaired or had been originally constructed of metals with different properties. About one-half of the casing was discolored and exhibited varying signs of corrosion (the other half did not). Small holes were found where corrosion had occurred in the casing material. The holes from the corrosion provided a means for carbon monoxide to enter the cockpit from the exhaust system.

Federal guidelines for annual aircraft inspections require an inspection of the exhaust systems for cracks, defects, and improper attachment during each 100-hour or annual aircraft inspection. Maintenance logbooks indicated that the airplane's most recent annual inspection was completed less than 1 month before the accident. The available maintenance logbooks did not contain any record of repairs or replacement of the heat exchanger. However, the condition of the heat exchanger is indicative of an insufficient annual inspection that did not detect and correct the corroded heat exchanger.

It is likely that impairment caused by acute carbon monoxide poisoning led to the pilot's loss of airplane control. The corrosion in the heat exchanger allowed carbon monoxide to enter the cabin.

Probable Cause and Findings

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

The pilot's loss of control due to impairment from carbon monoxide poisoning. Contributing to the accident was the corrosion of the heat exchanger and the failure of maintenance personnel to adequately inspect and repair or replace the exchanger during the most recent annual inspection.

Findings

Aircraft	Engine exhaust - Fatigue/wear/corrosion (Factor)
Personnel issues	Aircraft control - Pilot (Cause)
	Carbon monoxide - Pilot (Cause)
	Scheduled/routine maintenance - Maintenance personnel (Factor)

Factual Information

HISTORY OF FLIGHT

On June 1, 2017, at 1157 eastern daylight time, a Varga 2150A airplane, N4635V, was destroyed when it impacted terrain near Bowling Green, Ohio. The private pilot was fatally injured. The airplane was privately owned by the pilot, and he was operating it under the provisions of Title 14 *Code of Federal Regulations (CFR)* Part 91. Visual meteorological conditions prevailed for the personal flight, which originated from Tri-City Airport (3G6), Sebring, Ohio, and was en route to Conklin Airport (OI92), Bowling Green, Ohio.

The pilot had recently purchased the airplane and was relocating it to a private airstrip near his home. GPS data recovered from an onboard device showed that the airplane departed 3G6 about 1034 and flew northwest toward OI92. The airplane maintained consistent groundspeeds and headings until 1156, when it entered a left-turning spiral descent. (See figure.)



Figure: Final GPS Data (oriented Northeast up, times are depicted in UTC)

Witnesses observed the airplane flying erratically at low altitude before it impacted terrain. One witness stated, "the airplane was flying very low to the ground and turned to the east almost turning sideways and upside down. The plane flew south and then turned ... the plane was nose down, heading north." Each witness reported that the engine was running before impact. The accident location was about 6 miles southeast of the destination airport.

PERSONNEL INFORMATION

AIRCRAFT INFORMATION

The airplane was manufactured in 1977. The airframe maintenance logs located during the investigation were annotated "Logbook #2, 10/2/92." The first work documented in the engine log was an engine overhaul dated June 11, 1992. The first work documented in the propeller log was an annual inspection dated June 23, 2014. The aircraft log recorded 15 annual inspections between 1992 and 2017. The last annual inspection occurred on May 5, 2017.

METEOROLOGICAL INFORMATION

WRECKAGE AND IMPACT INFORMATION

Wreckage and impact signatures were consistent with the fixed-tricycle gear, tandem-seat airplane impacting terrain left-wing-low in an attitude that exceeded 70° nose-low. The impact point and wreckage debris field were contained within an area about 200 ft in diameter. All airplane and engine components were accounted for at the accident location. The propeller was found separated from the engine. Leading edge gouges and chordwise scratches were present on both propeller blades. The fuel selector was found in the "BOTH" position. The left wing and fuel tank were destroyed by impact forces. The right-wing fuel tank contained an undetermined amount of fuel and the tank displayed evidence of hydraulic deformation. Fuel was present in the fuel selector valve and inside the remnants of the engine-driven fuel pump. The flap selector was found at the second notch (extended) position and the flaps were also found in an extended position. No pre-impact anomalies were noted with the airframe or engine during examination at that time.

The NTSB investigator-in-charge conducted an additional examination of the engine on November 1, 2017. Portions of the engine exhaust system, heat exchanger, and associated scat tubing were removed and examined. No nonimpact-related anomalies were identified with the exhaust system or the scat tubing.

The heat exchanger was impact-damaged. The examination also revealed that the outside casing was comprised of metals with different properties. About one-half of the casing was constructed of a material similar to stainless steel that was discolored but showed no indications of corrosion. The remainder of the casing was discolored and exhibited varying signs of corrosion. Small holes were found where corrosion had occurred in the casing material. There were cracks in the casing in areas affected by impact damage. It could not be determined if the cracks were present before impact or resulted from impact forces.

Review of the maintenance logbooks revealed no entries regarding repairs or replacement of the heat exchanger.

MEDICAL AND PATHALOGICAL INFORMATION

The Lucas County Coroner's Office, Toledo, Ohio, conducted an autopsy of the pilot. The cause of death was blunt force trauma.

The FAA's Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed toxicology testing and identified 55% carbon monoxide in cavity blood. No other tested-for substances were identified.

Carbon monoxide (CO) is an odorless, tasteless, colorless, nonirritating gas formed by hydrocarbon combustion. CO binds to hemoglobin with much greater affinity than oxygen, forming carboxyhemoglobin; elevated levels result in impaired oxygen transport and utilization. Nonsmokers may normally have up to 3% carboxyhemoglobin in their blood; heavy smokers may have levels of 10 to 15%. Acutely, low levels of CO may cause vague symptoms like headache and nausea but increasing levels (40% and above) lead to confusion, seizures, loss of consciousness, and death.

ADDITIONAL INFORMATION

Title 14 *CFR* Part 43, Appendix D states, in part:

(d) Each person performing an annual or 100-hour inspection shall inspect (where applicable) components of the engine and nacelle group as follows:...

(8) Exhaust stacks - for cracks, defects, and improper attachment.

History of Flight

Prior to flight	Powerplant sys/comp malf/fail (Defining event) Aircraft maintenance event
Enroute	Medical event Loss of control in flight Collision with terr/obj (non-CFIT)

Pilot Information

Certificate:	Private	Age:	70, Male
Airplane Rating(s):	Single-engine Land	Seat Occupied:	Front
Other Aircraft Rating(s):	None	Restraint Used:	Unknown
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	BasicMed	Last FAA Medical Exam:	05/18/2015
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:	793 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	VARGA AIRCRAFT CORP.	Registration:	N4635V
Model/Series:	2150A A	Aircraft Category:	Airplane
Year of Manufacture:	1977	Amateur Built:	No
Airworthiness Certificate:	Normal; Utility	Serial Number:	VAC-91-78
Landing Gear Type:	Tricycle	Seats:	2
Date/Type of Last Inspection:	05/05/2017, Annual	Certified Max Gross Wt.:	4006 lbs
Time Since Last Inspection:	3 Hours	Engines:	1 Reciprocating
Airframe Total Time:	2410 Hours as of last inspection	Engine Manufacturer:	Lycoming
ELT:	Installed, not activated	Engine Model/Series:	O-320-A2C
Registered Owner:	On file	Rated Power:	
Operator:	On file	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:		Distance from Accident Site:	
Observation Time:		Direction from Accident Site:	
Lowest Cloud Condition:	Clear	Visibility	
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	/	Turbulence Type Forecast/Actual:	/
Wind Direction:		Turbulence Severity Forecast/Actual:	/
Altimeter Setting:		Temperature/Dew Point:	14° C / 9° C
Precipitation and Obscuration:			
Departure Point:	Sebring, OH (3G6)	Type of Flight Plan Filed:	None
Destination:	Bowling Green, OH (OI92)	Type of Clearance:	None
Departure Time:	1034 CDT	Type of Airspace:	

Airport Information

Airport:	CONKLIN (OI92)	Runway Surface Type:	N/A
Airport Elevation:	675 ft	Runway Surface Condition:	
Runway Used:	N/A	IFR Approach:	None
Runway Length/Width:		VFR Approach/Landing:	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Substantial
Passenger Injuries:	N/A	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Fatal	Latitude, Longitude:	41.339167, -83.598611

Administrative Information

Investigator In Charge (IIC):	Daniel Baker	Report Date:	03/18/2019
Additional Participating Persons:	Alex McAninch; FAA; Cleveland, OH		
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=95276		

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](#).