



# Aviation Investigation Final Report

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<b>Location:</b>	Galion, Ohio	<b>Accident Number:</b>	ERA22LA412
<b>Date &amp; Time:</b>	September 9, 2022, 18:45 Local	<b>Registration:</b>	N99209
<b>Aircraft:</b>	ENGINEERING & RESEARCH 415-C	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Loss of engine power (partial)	<b>Injuries:</b>	1 None
<b>Flight Conducted Under:</b>	Part 91: General aviation - Personal		

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## Analysis

The student pilot performed an engine run-up before departure that included a check of the magnetos and carburetor heat, noting normal rpm decreases for each. He initiated the takeoff, noting full rpm during the takeoff roll and normal takeoff distance. On the upwind leg of the airport traffic pattern, when the airplane was about 300 ft above ground level, the engine began to lose power. The pilot lowered the airplane's nose to maintain airspeed then made a left turn to return to the airport. When the airplane was close to the airport the engine sustained a total loss of power and he realized that the airplane was too high to land on the runway. He flew over and then north of the airport, where he intended to land on an east/west oriented road. The airplane subsequently impacted a powerline pole and came to rest on the road, resulting in substantial damage to the fuselage and aft empennage.

Postaccident examination of the engine revealed the loss of engine power was a result of the No. 2 cylinder exhaust valve being stuck in the open position. About 32 years before the accident, a reconditioned cylinder was installed at the No. 2 position, there were multiple maintenance record entries associated with the No. 2 cylinder citing either a stuck exhaust valve or work to the cylinder consistent valve problems, the most recent being nearly 3 years and about 63 engine hours earlier.

Guidance from the engine manufacturer related to a stuck exhaust valve cited a need to clean the cylinder components and perform dimensional checks of specified components. It did not cite what to do for a repetitive problem.

## Probable Cause and Findings

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

A partial loss of engine power due to an exhaust valve that was stuck in the open position.

## Findings

Aircraft	Recip eng cyl section - Malfunction
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## Factual Information

### History of Flight

<b>Initial climb</b>	Loss of engine power (partial) (Defining event)
<b>Maneuvering</b>	Collision with terr/obj (non-CFIT)

On September 9, 2022, about 1845 eastern daylight time, an Engineering & Research 415-C airplane, N99209, was substantially damaged when it was involved in an accident near Galion, Ohio. The student pilot was not injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The student pilot stated that before departure he performed an engine run-up that included a check of the magnetos and carburetor heat, noting normal rpm decrease for each. He initiated the takeoff noting full rpm during the takeoff roll and the airplane became airborne about the usual location along the length of the runway. On the upwind leg of the airport traffic pattern when the airplane was about 300 ft above ground level, the engine began to lose power. The pilot lowered the airplane's nose to maintain 65 knots then made a left turn to return to the airport. When the airplane was close to the airport the engine experienced a total loss of power and the student pilot realized that the airplane was too high to land on the runway. He flew over and then north of the airport where he intended to land on an east/west oriented road. The airplane subsequently impacted a powerline pole and came to rest on the road.

Postaccident examination of the airplane following recovery revealed structural damage to the fuselage and aft empennage. Examination of the engine revealed the exhaust valve of the No. 2 cylinder was stuck open.

Review of the engine maintenance records revealed that a reconditioned cylinder was installed at the No. 2 position in March 1990. About 6 ½ years and 79 hours later, the No. 2 cylinder was removed and the valves were ground. Although the engine was overhauled in January 1998, the only work done to the cylinders were that they were honed, and the valves were ground and lapped. Since the engine overhaul, the No. 2 cylinder was removed in 2005 and again in 2009. The entry in 2005 specified "stuck valves" while the reason for the valve removal in 2009 was not noted. Both entries specified cleaning and/or reaming of the valve guides. In September 2019, which was before the pilot owned the airplane, a "stuck open" exhaust valve of the No. 2 cylinder was reported, with a corrective action of reaming the guide and polishing the valve stem. The engine had accrued about 63 hours and nearly 3 years since the last exhaust valve incident was logged and over 32 years and about 628 hours since the reconditioned cylinder was installed on the engine.

According to the engine manufacturer Standard Practice Maintenance Manual, the expected repair for an engine experiencing a stuck valve included cleaning of the parts of the cylinder and dimensional checks of the components. The manual did not have any guidance for a repetitive issue.

### Pilot Information

<b>Certificate:</b>	Student	<b>Age:</b>	72, Male
<b>Airplane Rating(s):</b>	None	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	Lap only
<b>Instrument Rating(s):</b>	None	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>	None	<b>Toxicology Performed:</b>	
<b>Medical Certification:</b>	None	<b>Last FAA Medical Exam:</b>	
<b>Occupational Pilot:</b>	No	<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>	102 hours (Total, all aircraft), 45 hours (Total, this make and model)		

### Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	ENGINEERING & RESEARCH	<b>Registration:</b>	N99209
<b>Model/Series:</b>	415-C NO SERIES	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>	1946	<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	1832
<b>Landing Gear Type:</b>	Tricycle	<b>Seats:</b>	2
<b>Date/Type of Last Inspection:</b>	March 9, 2022 Annual	<b>Certified Max Gross Wt.:</b>	1320 lbs
<b>Time Since Last Inspection:</b>	29 Hrs	<b>Engines:</b>	1 Reciprocating
<b>Airframe Total Time:</b>	2883 Hrs as of last inspection	<b>Engine Manufacturer:</b>	CONT MOTOR
<b>ELT:</b>	Installed, not activated	<b>Engine Model/Series:</b>	C85-12
<b>Registered Owner:</b>	On file	<b>Rated Power:</b>	85 Horsepower
<b>Operator:</b>	On file	<b>Operating Certificate(s) Held:</b>	None

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual (VMC)	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	KMFD, 1297 ft msl	<b>Distance from Accident Site:</b>	10 Nautical Miles
<b>Observation Time:</b>	18:52 Local	<b>Direction from Accident Site:</b>	68°
<b>Lowest Cloud Condition:</b>	Clear	<b>Visibility</b>	10 miles
<b>Lowest Ceiling:</b>	None	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	7 knots /	<b>Turbulence Type Forecast/Actual:</b>	None / None
<b>Wind Direction:</b>	120°	<b>Turbulence Severity Forecast/Actual:</b>	N/A / N/A
<b>Altimeter Setting:</b>	30.02 inches Hg	<b>Temperature/Dew Point:</b>	26°C / 16°C
<b>Precipitation and Obscuration:</b>	No Obscuration; No Precipitation		
<b>Departure Point:</b>	Galion, OH	<b>Type of Flight Plan Filed:</b>	None
<b>Destination:</b>	Galion, OH	<b>Type of Clearance:</b>	None
<b>Departure Time:</b>		<b>Type of Airspace:</b>	

## Airport Information

<b>Airport:</b>	Galion Municipal Airport GQQ	<b>Runway Surface Type:</b>	Asphalt
<b>Airport Elevation:</b>	1224 ft msl	<b>Runway Surface Condition:</b>	
<b>Runway Used:</b>	23	<b>IFR Approach:</b>	None
<b>Runway Length/Width:</b>	3504 ft / 75 ft	<b>VFR Approach/Landing:</b>	Forced landing

## Wreckage and Impact Information

<b>Crew Injuries:</b>	1 None	<b>Aircraft Damage:</b>	Substantial
<b>Passenger Injuries:</b>		<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>		<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	1 None	<b>Latitude, Longitude:</b>	40.756198,-82.722024(est)

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Monville, Timothy
<b>Additional Participating Persons:</b>	Alexander R. McAninch; FAA/FSDO; Cleveland, OH
<b>Original Publish Date:</b>	January 30, 2024
<b>Last Revision Date:</b>	
<b>Investigation Class:</b>	<a href="#">Class 3</a>
<b>Note:</b>	The NTSB did not travel to the scene of this accident.
<b>Investigation Docket:</b>	<a href="https://data.ntsb.gov/Docket?ProjectID=105923">https://data.ntsb.gov/Docket?ProjectID=105923</a>

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).