Aviation Investigation Final Report

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

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

Factual Information

History of Flight

Initial climb	Loss of engine power (partial) (Defining event)
Maneuvering	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

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

Aircraft and Owner/Operator Information

Aircraft Make:	ENGINEERING & RESEARCH	**Registration:**	N99209
Model/Series:	415-C NO SERIES	**Aircraft Category:**	Airplane
Year of Manufacture:	1946	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	1832
Landing Gear Type:	Tricycle	**Seats:**	2
Date/Type of Last Inspection:	March 9, 2022 Annual	**Certified Max Gross Wt.:**	1320 lbs
Time Since Last Inspection:	29 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	2883 Hrs as of last inspection	**Engine Manufacturer:**	CONT MOTOR
ELT:	Installed, not activated	**Engine Model/Series:**	C85-12
Registered Owner:	On file	**Rated Power:**	85 Horsepower
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:	KMFD,1297 ft msl	**Distance from Accident Site:**	10 Nautical Miles
Observation Time:	18:52 Local	**Direction from Accident Site:**	68°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots /	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:	120°	**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	30.02 inches Hg	**Temperature/Dew Point:**	26°C / 16°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Galion, OH	**Type of Flight Plan Filed:**	None
Destination:	Galion, OH	**Type of Clearance:**	None
Departure Time:		**Type of Airspace:**	

Airport Information

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

Wreckage and Impact Information

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

Administrative Information

Investigator In Charge (IIC):	Monville, Timothy
Additional Participating Persons:	Alexander R. McAninch; FAA/FSDO; Cleveland, OH
Original Publish Date:	January 30, 2024
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=105923