Aviation Investigation Final Report

Location:	Sheldon, Missouri	**Accident Number:**	CEN19LA127
Date & Time:	April 26, 2019, 14:55 Local	**Registration:**	N29Y
Aircraft:	Beech 50	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (partial)	**Injuries:**	1 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot was returning the multiengine airplane to his home base following an annual inspection other maintenance; the accident flight was the airplane's first flight since the work was performed. After climbing to about 3,000 ft mean sea level (msl), the pilot configured the airplane for cruise flight. The pilot heard the right engine emit "sputtering" noises and backfire. The pilot advanced the throttle of the left engine and then noticed a "large smoke trail" emit from the left engine about 1 minute after the right engine began sputtering. The pilot concluded that the two engines were no longer producing adequate power to remain airborne and performed a forced landing to a tilled dirt field, during which the nose landing gear collapsed, resulting in substantial damage. Signatures consistent with detonation were documented on the left engine Nos. 4 and 6 cylinder assemblies, and the right engine No. 2 cylinder assembly. Oil-covered particles were found in the oil screens from both engines; the source of these particles could not be determined. The reason for the detonation in both engines could not be determined based on the available evidence.

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 on both engines due to detonation for undetermined reasons.

Findings

Aircraft	(general) - Malfunction
Aircraft	(general) - Damaged/degraded
Not determined	(general) - Unknown/Not determined

Factual Information

History of Flight

Prior to flight	Unknown or undetermined
Enroute-cruise	Loss of engine power (partial) (Defining event)
Enroute-cruise	Attempted remediation/recovery
Emergency descent	Off-field or emergency landing
Landing	Collision during takeoff/land

On April 26, 2019, about 1455 central daylight time, a Beechcraft E-50 airplane, N29Y, sustained substantial damage when it was involved in an accident near Sheldon, Missouri. The commercial pilot was not injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The purpose of the flight was to transport the airplane from the El Dorado Springs Memorial Airport (87K), El Dorado Springs, Missouri, to the pilot's home base at the Atkinson Municipal Airport (PTS), Pittsburg, Kansas. The pilot reported that this was the airplane's first flight since maintenance work was performed, including the annual inspection, which was completed on the day of the accident by an airplane mechanic.

After departure from 87K and climb to about 3,000 ft above mean sea level (msl), the pilot configured the airplane for cruise flight. About ten minutes into the flight, the pilot heard the right engine emit "sputtering" noises and backfired. The pilot advanced the throttle to the left engine and then noticed a "large smoke trail" emit from the left engine about one minute after the right engine problem started. The pilot recalled that the smoke was "pretty dark" and "mostly black." The pilot reported that he was familiar with the mixture system for the engines and that he always operates with the mixture in the full rich setting.

About 1,700 ft msl (800 ft agl) with the loss of power from both engines the pilot concluded that the two engines no longer produced adequate power to remain airborne and he decided to execute a forced landing to a dirt field that was tilled. The pilot stated that during the forced landing sequence he did not have adequate time to execute an emergency shutdown on both engines as the loss of engine power and loss of altitude sequence happened fast. The pilot configured the airplane for the forced landing and the main landing gear was fully extended. During the landing roll the nose landing gear wheel collapsed, which resulted in substantial damage to the fuselage. Once the nose landing gear wheel collapsed up into the fuselage, the nose of the fuselage and the two propellers impacted the dirt. The pilot was able to egress from the airplane without further incident.

The pilot purchased fuel from 87K and reported there was about 70 total gallons of 100 low lead fuel onboard at the time of the accident. A Federal Aviation Administration (FAA) inspector who traveled to

the accident site, reported there was about 60 total gallons of fuel onboard the airplane, with about 30 gallons in each main fuel tank.

An FAA inspector interviewed the mechanic who reported the airplane was transported to 87K for the annual inspection in December 2018 and the annual inspection was not started until early March 2019. No major discrepancies were noted during the annual inspection. During the inspection of the fuel sumps, a small amount of water was discovered, but the mechanic reported this was "nothing more than usual" as seen during an annual inspection. No work was performed on the fuel system outside of the inspection. It was discovered that the right engine had a "bad" exhaust valve on one cylinder, and the cylinder was replaced by the mechanic. The mechanic further reported that both engines were ground ran several times at various power settings (including the highest power setting that could be safely accomplished without the airplane moving) during the annual inspection and no discrepancies were noted.

During a postaccident examination of the airframe, it was difficult to manually manipulating the fuel tank selector to various positions and when manually manipulating the carburetor heat levers. While the airplane had a carburetor temperature gauge installed, no outside air temperature gauge was found. No anomalies were observed with fuel samples from the left side inboard and right side inboard sumps after testing. The fuel strainer screen for the left engine had about one teaspoon full of unknown debris.

The airplane was not equipped with a monitoring system for the engines, nor was it required to be. Engine control cable continuity was established for both engines. The crankshafts were able to rotate and drivetrain continuity was established for both engines. A hole was observed at the exhaust valve seating point for the number 6 cylinder. The number 4 cylinder had slight internal damage to the cylinder head. The number 4 piston had a hole along with damage along the piston head. For the right engine a hole was observed at the exhaust valve seating point for the number 2 cylinder. Both oil screens were full of unknown debris.

Per the Champion Aviation Check-A-Plug Card AV-27, the top left engine spark plug for cylinder 1, the bottom left engine spark plugs for cylinders 1 and 2, and the bottom right engine spark plug for cylinder number 3 were observed to be in a worn out (normal) condition. The bottom left engine spark plug for cylinder number 5 and the bottom right engine spark plug for cylinder number 1 were observed to be oil fouled.

An examination of the maintenance records revealed no evidence of any uncorrected mechanical discrepancies with the airplane.

The number 4 piston assembly from the left engine, the number 6 cylinder assembly from the left engine, the number 2 cylinder assembly from the right engine, and the oil screens from both engines were submitted to the NTSB Materials Laboratory for examination. The cylinder head on each of the submitted cylinder assemblies had similar damage with material fractured and missing from the head between the exhaust valve and one of the spark plug ports. The piston compression rings, and oil rings were also fractured, and pieces were missing. The damage to the piston and cylinder assemblies was consistent with detonation damage.

Oil-covered particles were observed in the grooves of the oil screens from the left and right engines. Particles were removed from each oil screen and were mostly oil-covered thin flakes with angular edges.

Particles from both oil screens had energy-dispersive x-ray spectroscopy spectra with high peaks of carbon, oxygen, bromine, and lead and a relatively small peak of iron. A peak of aluminum was also detected on the largest particle analyzed from the left engine. One of the particles from the right engine had relatively small peaks of chromium and nickel.

The right side propeller governor was removed for examination. A screen was not installed, and small metal particles were in the opening. The left side propeller governor was removed for examination. A screen was installed, and small metal particles were located on the screen.

Both engines were equipped with Bendix PSJH-78D pressure carburetors. The Beechcraft E-50 Flight Handbook discusses engine operations in flight and states in part:

Mixture control is automatic. The mixture controls must be placed in the full forward position for all operations. Never lean manually, except in an emergency.

The Lycoming Engines Operator's Manual for the GS-480 series engines discusses leaning and states in part:

Do not manually lean engines equipped with pressure carburetors or automatically controlled fuel systems.

Lycoming Engines published an online educational article, Knowledge Base – Detonation. This document discusses what detonation is, what causes detonation, how to prevent detonation.

Pilot Information

Certificate:	Commercial	**Age:**	41,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Lap only
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	April 5, 2019
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	October 11, 2018
Flight Time:	1288 hours (Total, all aircraft), 119 hours (Total, this make and model), 1174 hours (Pilot In Command, all aircraft), 1 hours (Last 90 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N29Y
Model/Series:	50 E50	**Aircraft Category:**	Airplane
Year of Manufacture:	1957	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	EH-16
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	April 26, 2019 Annual	**Certified Max Gross Wt.:**	7000 lbs
Time Since Last Inspection:		**Engines:**	2 Reciprocating
Airframe Total Time:	3000 Hrs at time of accident	**Engine Manufacturer:**	Lycoming Engines
ELT:	C91 installed, not activated	**Engine Model/Series:**	GS-480
Registered Owner:	On file	**Rated Power:**	340 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:	KPTS,952 ft msl	**Distance from Accident Site:**	24 Nautical Miles
Observation Time:	19:55 Local	**Direction from Accident Site:**	238°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:		**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	30.1 inches Hg	**Temperature/Dew Point:**	21°C / 4°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	El Dorado Springs, MO (87K)	**Type of Flight Plan Filed:**	None
Destination:	Pittsburg, KS (PTS)	**Type of Clearance:**	None
Departure Time:	14:45 Local	**Type of Airspace:**	Class G

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 None	**Latitude, Longitude:**	37.66611,-94.302223(est)

Administrative Information

Investigator In Charge (IIC):	Hodges, Michael
Additional Participating Persons:	James Seabolt; FAA Kansas City FSDO; Kansas City, MO Jennifer Barclay ; Textron Aviation; Wichita, KS Michael Caldera; Lycoming Engines; Williamsport, PA
Original Publish Date:	January 28, 2021
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=99327