

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



WPR24LA240

WRECKAGE EXAMINATION SUMMARY

May 20, 2025

A. ACCIDENT

Location: Soldier, ID
Date: July 13, 2024
Time: 07:50 MDT
13:50 UTC
Airplane: 1959 Cessna 182B (SN: 51917)

B. WRECKAGE EXAMINATION SUMMARY

IIC Michael Hicks
NTSB
Federal Way, WA

Subject Matter Expert Ryan Roth
Textron Aviation
Wichita, KS

C. SUMMARY

During a cursory overview of the engine after being separated from the airframe, about a 3-inch hole in the top of the crankcase was observed above the No. 2 cylinder. A lighted borescope was inserted into the spark plug orifice of each cylinder and revealed that the No. 1 cylinder piston was not present. Each of the cylinders were removed from the crankcase, and detonation signatures were observed throughout, in the form of cylinder head pitting, damage to the piston skirts, piston crown pitting, and shiny metallic fragments observed on the cylinder heads and piston crowns. Magenta to engine time was not confirmed due to impact damage to the left and right magneto.

D. DETAILS OF THE EXAMINATION

1.0 Accident Site

Lat/Long: N 43.42602, W -114.79896
Nearest Town: Soldier, Idaho
Site Description: Uneven terrain, sparse vegetation



Figure 1: View of inverted accident airplane at the accident site

2.0 Airframe Examination

The instrument panel was examined in the inverted position and showed a Kollsman window setting of 30.12 inHG. The panel was equipped with a Garmin G5 attitude indicator. The airspeed indicator showed 0 kts. The turn coordinator (airplane and ball) indicated a left position. The heading indicator and the transponder were digital. The navigation lighting switch positions indicated that the navigation lights and beacon were on, and the landing lights switch was in the off position. The ignition switch keys were not present, and the switch was in the off position.

The fuel selector was observed in the off position. The stem from the selector handle and the selector valve remained attached and intact. The fuel selector valve was removed from the aircraft, no anomalies were noted. The fuel strainer screen and glass bowl were removed, and no debris was observed. The wings were removed for recovery prior to the exam. The left and right tank finger screens remained attached to plumbing on the fuselage and were free of debris. Recovery personnel reported recovering fuel consistent in color with 100LL despite aircraft records showing modifications allowing the use of automotive gasoline.

The left and right wings sustained impact damage to the outboard sections and leading edges. The fuselage remained intact, with buckling observed about the door posts. The horizontal stabilizer, elevator, and pitch trim were present and unremarkable. The vertical stabilizer and rudder sustained impact damage, as observed from the accident site photographs.

3.0 Engine Examination

Continental Aerospace Technologies

O-470-R13

SN: 321234-R

Total Time SREM: 1,044.56

Last Inspection: April 26, 2024

Last Overhaul: January 27, 1992

TBO: 12 years or 1,500 hours whichever comes first



Figure 2: View of the accident engine separated from the airframe

Examination of the six cylinder, naturally aspirated piston engine, was observed with both propeller blades bent aft toward the fuselage, the spinner sustained impact damage, and the propeller hub remained attached to the propeller flange. The propeller could not be rotated through. Upon first appearance, each of the six cylinders were unremarkable with top and bottom spark plugs tight to touch, and primer lines secure. Intake and exhaust fittings were attached and secure to their respective cylinders. The exhaust manifold sustained impact damage and connected to the heat shield.



Figure 3: View of hole in the crankcase above the No. 2 cylinder, and right separated magneto

The accessory case remained attached to the crankcase, except for the left and right magnetos which sustained impact damage. The right magneto remained partially attached, while the left magneto was completely separated from the accessory case. The carburetor sustained impact damage and was separated from the intake manifold. The engine sump remained intact and attached to the lower crankcase. The top of the crankcase, above the No. 2 cylinder, was breached by the No. 2 piston connecting rod. The top spark plugs were removed from each of the six cylinders, and a lighted borescope was used to assess the condition of the piston crowns, cylinder head, exhaust and intake valves, and cylinder walls.

The top and bottom spark plugs were removed from each cylinder, and presented normal wear signatures, albeit the No. 1 cylinder top and bottom plugs contained melted, shiny metal fragments between the gaps. The engine oil sump was removed and contained multiple sections of the No.1 piston, and material from each of the damaged cylinder piston skirts. Each cylinder was removed, and the details are as follows:



Figure 4: View of the piston and cylinder material found in the engine oil sump

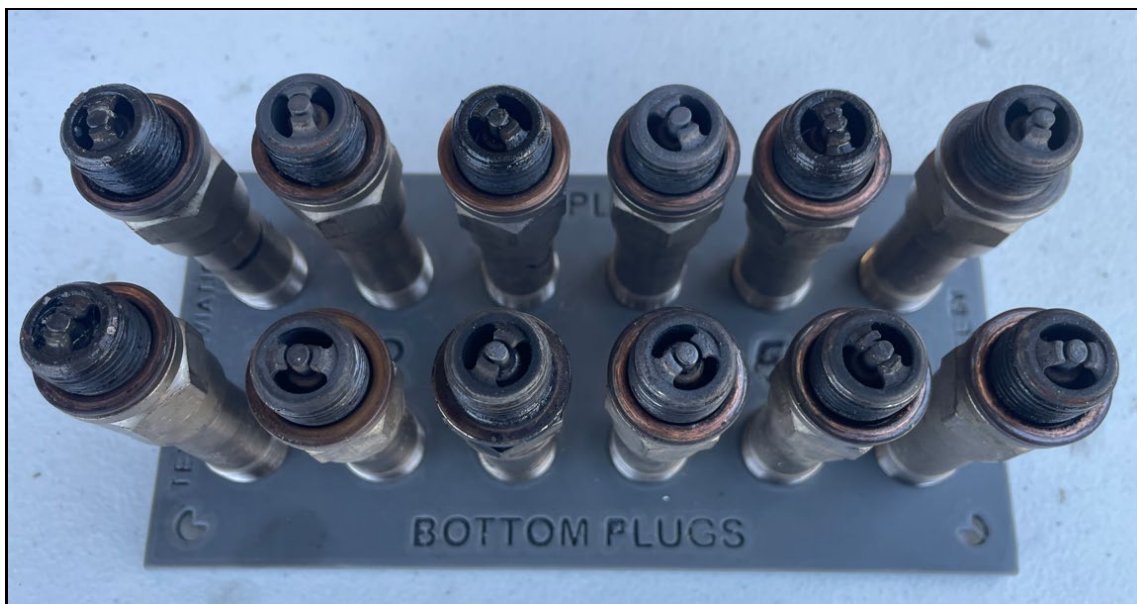


Figure 5: View of top and bottom spark plugs removed from each cylinder

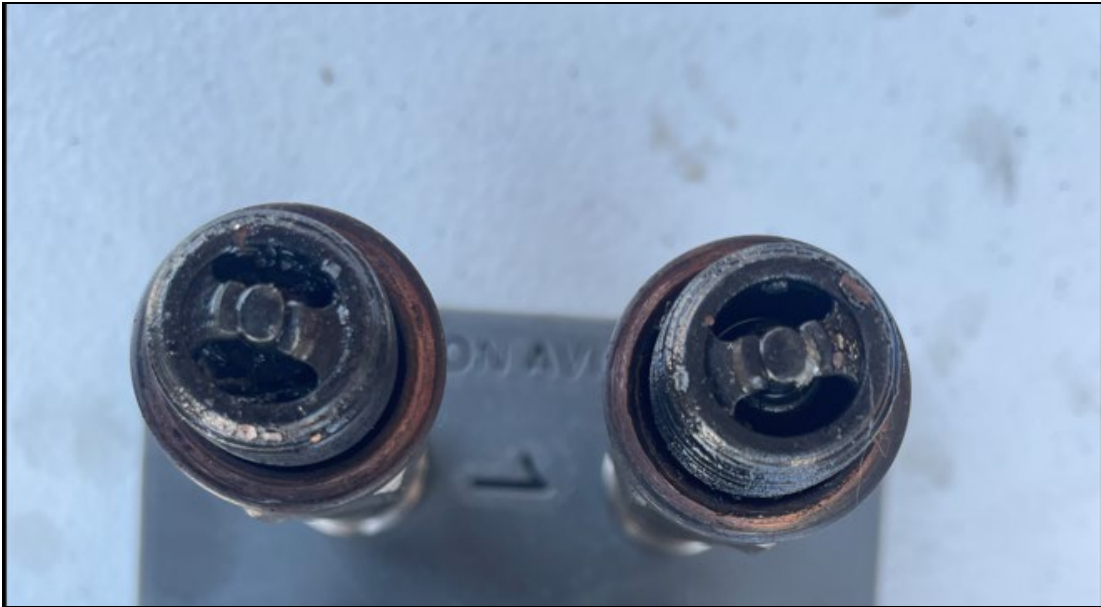


Figure 6: View of No. 1 cylinder top and bottom spark plugs with shiny metallic material between the gaps

No. 1 piston was not observed in the cylinder. The connecting rod, bearings and cap were present and unremarkable. The wrist pin caps were present, deformed and conical in appearance. The cylinder head, exhaust and intake valves were present and sustained varying degrees of FOD ingestion. The intake and exhaust valve seats sustain varying degrees of FOD ingestion signatures but were grossly unremarkable. The cylinder walls were carbon coated with a noticeable level of metallic shavings throughout. The exhaust valve push rod was removed from the push rod housing and was deformed. The intake gasket was present and unremarkable. The intake and exhaust valve springs assemblies were present and unremarkable.



Figure 7: View of No. 1 cylinder barrel, head, exhaust and intake valves

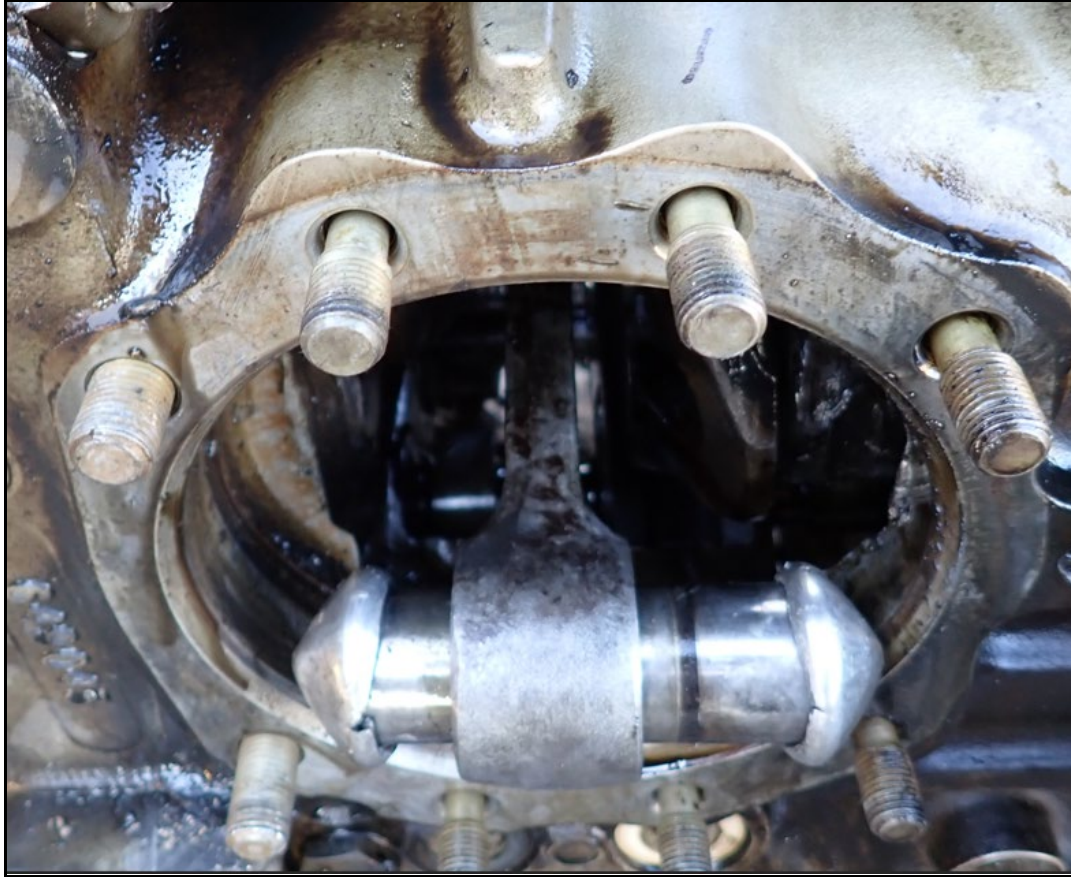


Figure 8: View of No. 1 connecting rod, wrist pin and end caps

No. 2 piston was observed in the cylinder. The piston crown and edges were unremarkable. The oil retention rings, and oil scrapper rings were present and unremarkable. The piston skirt was missing several sections. The connecting rod and wrist pin were present and unremarkable. The connecting rod was separated from the bearings and cap, with the cap and bolts, and one nut deformed and affixed to the crankshaft. The cylinder head, exhaust and intake valves were present and unremarkable. The cylinder walls were carbon coated with a noticeable level of metallic shavings throughout. The exhaust and intake valve push rods were removed from their housings and unremarkable. The intake gasket was present and unremarkable. The intake and exhaust valve springs assemblies were present and unremarkable.



Figure 9: View of No. 2 cylinder barrel, head, exhaust and intake valves



Figure 9: View of No. 2 connecting rod failure and piston skirt damage



Figure 10: View of No. 2 piston crown and skirt

No. 3 piston was observed in the cylinder. The piston crown and edges were unremarkable. The oil retention rings, and oil scrapper rings were present and unremarkable. The piston skirt was missing several sections. The connecting rod and wrist pin were present and unremarkable. The connecting rod bearings and cap were rigid and unmovable by hand, with the bolts and retaining nuts present. The cylinder head, exhaust and intake valves were present and unremarkable. The cylinder walls were lightly carbon coated with a trace level of metallic shavings throughout. The exhaust and intake valve push rods were removed from their housings and unremarkable. The intake gasket was present and unremarkable. The intake and exhaust valve springs assemblies were present and unremarkable.



Figure 11: View of No. 3 cylinder barrel, head, exhaust and intake valves

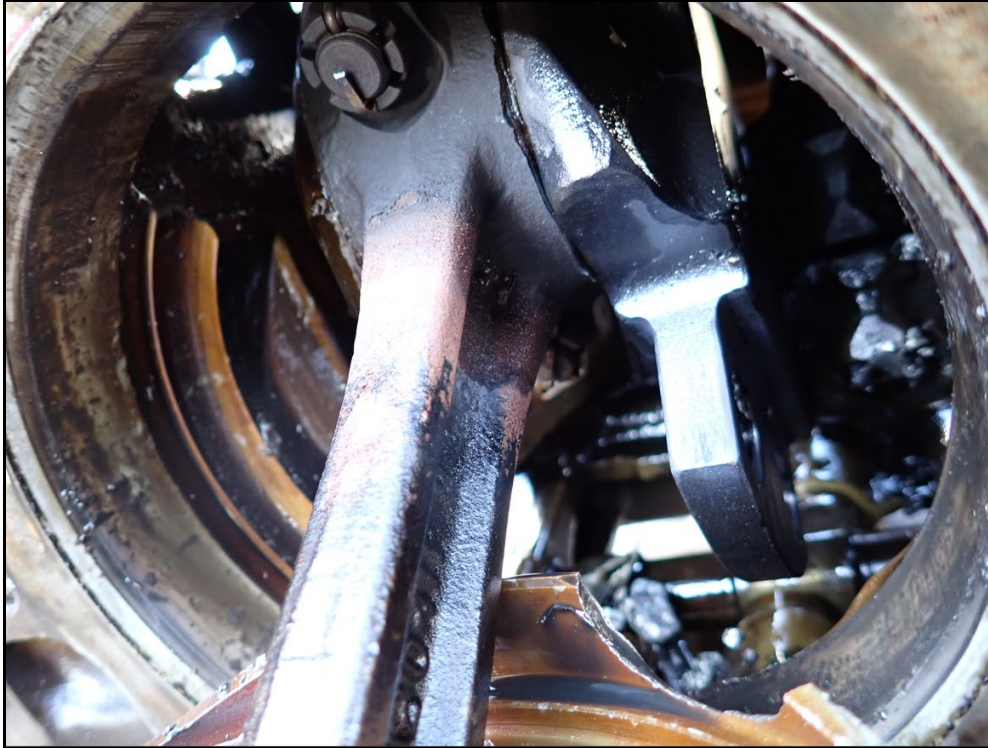


Figure 12: View of No. 3 connecting rod



Figure 13: View of No. 3 connecting rod and piston skirt



Figure 14: View of No. 3 piston crown

No. 4 piston was observed in the cylinder. The piston crown and edges were unremarkable. The oil retention rings, and oil scrapper rings were present and unremarkable. The piston skirt was unremarkable. The connecting rod and wrist pin were present and unremarkable. The connecting rod presented with reddish color, the bearings and cap were rigid and unmovable by hand, with the bolts and retaining nuts present. The cylinder head, exhaust and intake valves were present and unremarkable. The cylinder walls were lightly carbon coated with a trace level of metallic shavings throughout. The exhaust and intake valve push rods were removed from their housings and unremarkable. The intake gasket was present and unremarkable. The intake and exhaust valve springs assemblies were present and unremarkable.



Figure 15: View of No. 4 cylinder walls, head, exhaust and intake valves

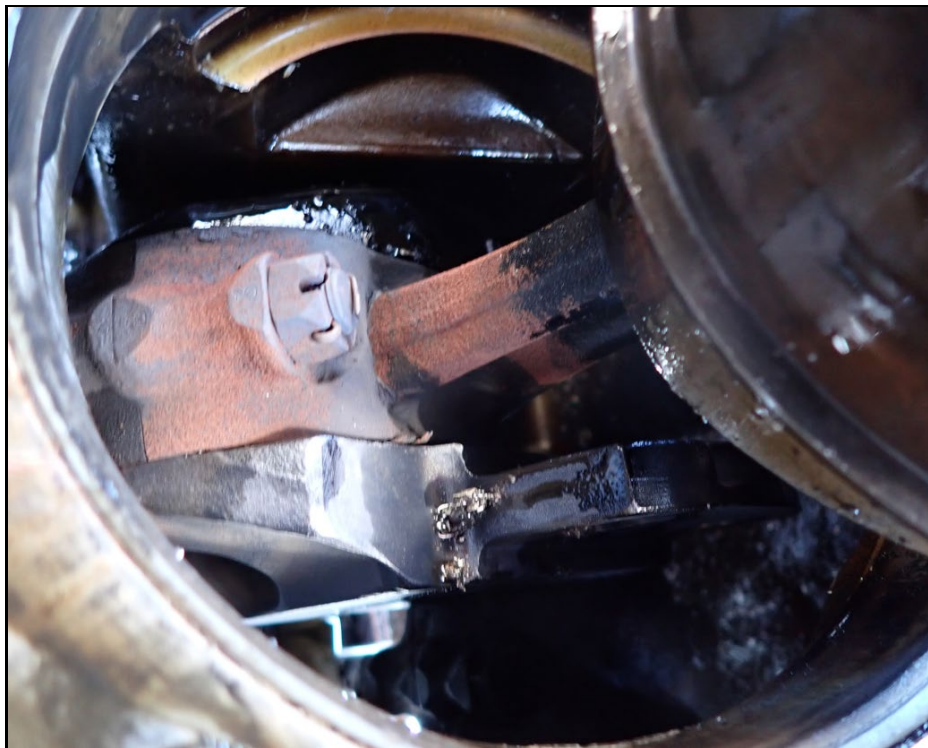


Figure 16: View of No. 4 piston connecting rod



Figure 17: View of No. 4 piston skirt



Figure 18: View of No. 4 piston crown

No. 5 piston was observed in the cylinder. The piston crown exhibited FOD ingestion signatures, and edges were unremarkable. The oil retention rings, and oil scrapper rings were present and unremarkable. The piston skirt was unremarkable. The connecting rod and wrist pin were present and unremarkable. The connecting

rod bearings and cap movable by hand, with the bolts and retaining nuts present. The cylinder head, exhaust and intake valves were present and exhibited FOD ingestion signatures. The cylinder walls exhibited rotational scoring signatures, with a trace level of metallic shavings throughout. The exhaust and intake valve push rods were removed from their housings and unremarkable. The intake gasket was present and unremarkable. The intake and exhaust valve springs assemblies were present and unremarkable.



Figure 19: View of No. 5 cylinder walls, head, exhaust and intake valves



Figure 20: View of No. 5 piston and connecting rod



Figure 21: View of No. 5 piston crown

No. 6 piston was observed in the cylinder. The piston crown and edges exhibited an increased level of lead deposits. The oil retention rings, and oil scrapper rings were present and unremarkable. The piston skirt was present and exhibited a reddish appearance around the circumference. The connecting rod and wrist pin were present and not moveable by hand. The connecting rod bearings and cap were unremarkable, with the bolts and retaining nuts present. The cylinder head, exhaust and intake valves were present and unremarkable. The cylinder walls exhibited rotational scoring signatures, with a trace level of metallic shavings throughout. The exhaust and intake valve push rods were removed from their housings and unremarkable. The intake gasket was present and unremarkable. The intake and exhaust valve springs assemblies were present and unremarkable.



Figure 22: View of No. 6 cylinder walls, head, exhaust and intake valves



Figure 23: View of No. 6 piston and connecting rod



Figure 24: View of No. 6 piston crown

4.0 Propeller Examination

Manufacturer: McAuley
SN: 611281
Last Inspection: April 26, 2024
TTP: 3,244.56 hours
SPOH: 1,044.56 hours

The 2-blade propeller sustained impact damage to both blades. There were no leading-edge gouges, or chordwise scratches observed on the propeller. The propeller blades remained attached to the hub, which remained attached to the propeller flange, which remained attached to the crankcase.



Figure 25: View of propeller hub data stamp



Figure 26: View of propeller removed from engine during engine exam

Submitted by:

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Air Safety Investigator