

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



CEN24LA200

ENGINE EXAM SUMMARY

July 19, 2024

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A. ACCIDENT

Location: Taylor, TX
Date: July 19, 2024
Time: 1145 CDT
1645 UTC
Airplane: Piper PA-28-140 (Cherokee)

B. PARTICIPANTS

Investigator-In-Charge Bradley Miller
NTSB
Denver, CO

Sr. Accident Investigator Jason Aguilera
NTSB
Denver, CO

Subject Matter Expert Lucky Louque
Air Salvage of Dallas
Lancaster, TX

C. SUMMARY

On May 27, 2024, at 1145 central daylight time, a Piper PA-28, N56466, was substantially damaged when it was involved in an accident near Taylor, Texas. The pilot and one passenger sustained minor injuries. The other passer was not injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The pilot reported that during the carburetor heat check on the engine run up, the engine sounded like it backfired and then lost RPM. A second carburetor heat check was performed, and the engine operated normally.

The airplane departed from runway 35. During initial climb after takeoff there was a decrease in engine RPM. The pilot verified that the engine controls were full forward and decided to a land in a field. During landing the airplane struck the top of a berm which resulted in substantial damage to the fuselage.

At the time of departure, the wind was reported by the pilot to be 270° at 3 knots. The surface observation recorded at Austin Executive Airport (KEDC), 13 nautical miles to the southwest, was 120° at 3 knots. A witness at the airport stated that the wind shifted just before the takeoff and was from the south at 10 knots.

D. DETAILS OF THE EXAMINATION

1.0 Engine Examination

Make: Lycoming
Model: O320-E3D
Ser. #: L-34682-27A
Rated Horsepower: 150

Tachometer hour meter: 3386.77
Hour meter: 360.8

A review of the maintenance documents provided showed the airplane's annual inspection was current.

The airplane storage facility had prepared the airplane for an engine run prior to the arrival of parties to the investigation. The wings had been removed during recovery from the accident site. The remaining fuselage and engine were strapped to a goose neck trailer with the engine overhanging the end of the trailer to obtain ground clearance for the propeller. The engine cowling had been removed. A five-gallon fuel can was utilized as a fuel source and was initially plumbed into the electric fuel boost pump. The fuel can was suspended by rope on the side of the plane at approximately wing height to simulate the same position of the fuel in the wings had they been present. The plane's damaged propeller had been removed and replaced with a similar propeller. The airplane's battery had been charged. A dial caliper was utilized to measure the crankshaft runout which was measured at .012 inches which Mr. Louque stated was acceptable for an engine run. The exhaust pipe was crushed shut and had to be opened up to facilitate its use. A broom stick was pushed up the exhaust pipe to determine if the flame tube was separated from the exhaust pipe - it was not separated.

Prior to running the engine a visual inspection was performed and the following observations were made:

- Engine mount damaged – front of engine was angled downward
- Carburetor heat valve
 - Induction tube deformed from round to oval consistent with impact damage
 - Cable continuity was verified but impact damage did limit full range of travel
 - The carburetor heat valve shaft was loose – the mounting holes were worn and the shaft was loose in the housing. There was no apparent hindering of movement of the valve in the remaining range of travel however
- #3 exhaust pipe was missing one stud and attachment hardware
- #3 primer line had side-play present at the attach point on the cylinder

- 6-7 quarts of clean looking motor oil were present when the dipstick was checked
- Spark plugs were corroded on the outside

Condition of Cylinders

The sparkplugs were removed and the cylinders borescoped. The cylinder domes and tops of some pistons were discolored black consistent with a rich fuel - air mixture (see Figure 1). The number three exhaust valve had non-uniform heat signatures (see Figure 2). Visually the cylinders did not have any anomalies that would contribute to a loss of engine power.



Figure 1 - #2 Cylinder - Top of Piston

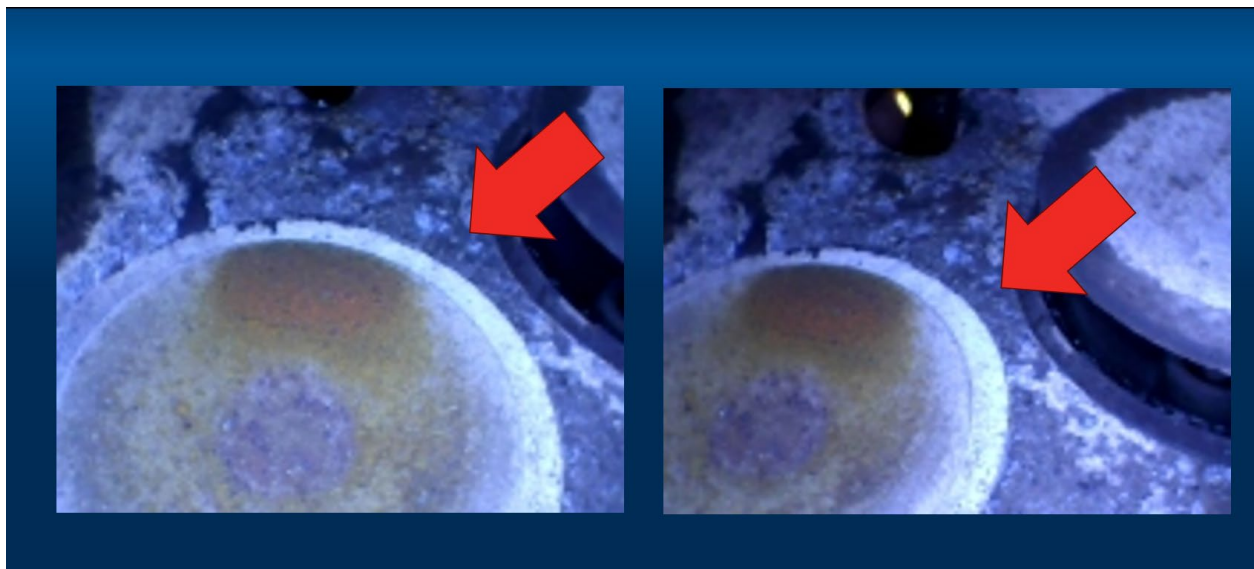


Figure 2 - #3 Cylinder Exhaust Valve

Ignition System

The corrosion present on the sparkplugs made removal difficult. Some of the sparkplugs had oval shaped center electrodes and overall were dark in color compared to later when they were removed after the fourth engine run (see Figures 3&4).



Figure 3 - Spark Plugs Before Engine Runs Conducted



Figure 4 - Spark Plugs After Engine Runs Conducted

Induction System

The air intake filter was examined. The foam prefilter was intact and no anomalies were noted (see Figure 5).

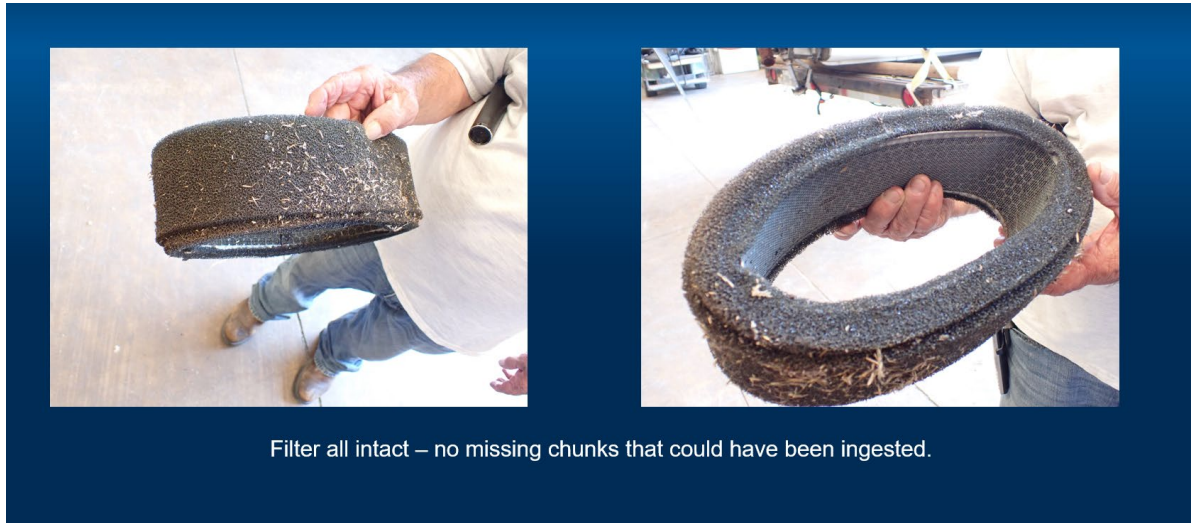


Figure 5 - Air Intake Filter

The carburetor air inlet hose that runs from the engine cowling to the inlet side of the carburetor exhibited impact damage. FAA Service Alert Information Bulletin (SAIB) CE-14-23 warns aircraft owners that use of tubing other than the manufacturer specifies may result in collapse of the tubing and could result in a rough running engine or a loss of power. Considering this bulletin, the carburetor air inlet hose was sent to the manufacturer to determine if it was the correct part (see Figure 6).



Figure 6 - Carburetor Air Inlet Hose

Fuel System

The fuel bowl on the gascolator was not present. The FAA inspector who was on the accident site was consulted by phone. He stated that he took a picture of the gascolator prior to him removing and inspecting it at the accident site (see Figure 7). The FAA inspector stated that the bowl had fuel in it and no anomalies were noted. The photo prior to disassembly taken by the FAA inspector showed there wasn't any safety wire present per Piper Service Letter #1141. The photos he provided also indicated that the wire bail had been displaced to one side with the fuel bowl remaining in its installed position to the top assembly. The displacement of the bail was consistent with being impact related. The FAA inspector bagged the components he disassembled and were located in the aft portion of the airplane's cockpit.

The top of the bail was wider, and the prongs still engaged the top of the gascolator assembly but not as fully as a new bail. The prongs that mate to the top assembly no longer had a definitive 90° angle. It was inconclusive whether this was from overtightening of the bail or impact damage.

The bottom of the fuel bowl had circular scoring the same size and shape as the bail nut (see Figure 8).

The gasket for the gascolator had black marks in a circle with one side of the circle protruding more than the rest of the circumference (see Figure 8).

At the completion of the engine runs the top assembly was removed from the airplane and the bowl was mated to it without the gasket. The top assembly was not square and the bowl rocked on its mating surface.



Figure 7 - Gascolator at Accident Site Prior to Removal by FAA



Figure 8 - Gascolator Gasket & Fuel Bowl

The engine was started and run six times. On each run the engine started and ran normally. The initial plumbing of the fuel supply was directly to the electric fuel boost pump and the gas can was suspended at wing height.

1st Engine Run

The engine was primed using the electric boost pump, the engine started and ran for about a minute before it quit. The fuel selector had been in the off position causing the motor to quit shortly after start-up.

2nd Engine Run

The engine was primed using the electric boost pump. The engine started normally and was run at low rpm to warm the engine up. The power was gradually increased without any issues. A magneto check was performed, and the rpm drop was 75-100 for both magnetos. The tachometer rpm oscillated slightly without a corresponding engine change - the cable drive mechanism was thought to be worn, but functional. The fuel primer plunger in the cockpit was found unlocked and slightly out. Once it was put back in the engine gained about 100 rpm. The plunger being slightly out didn't appear to have had any significant impact on engine operation.

3rd Engine Run

The carburetor air inlet hose was installed to replicate a collapsed or partially collapsed intake tube. The damaged engine cowlings and engine mounts prevented assembly of the complete system to replicate if this occurred on the accident flight. The tube was attached to the carburetor heat box and hung loose instead of being

hooked to the engine cowling. The engine started normally. The cuffed end of the intake tubing folded inward causing a restriction in the airflow to the engine. The engine ran 100-200 rpm lower than the previous run. The loss in rpm could be restored through use of the mixture lever, but the lever was near the idle cut-off position to accomplish it.

4th Engine Run

The air intake tubing was removed, and the engine was run again. The engine started normally and was run at full power for several minutes. The engine was shut off and allowed to cool, then the spark plugs were removed for comparison to their condition prior to the engine runs. The spark plugs overall were lighter in color and the center and ground electrodes were more uniformly light tan in color.

5th Engine Run

For the fifth engine run the gascolator bowl was reinstalled and the fuel supply was plumbed into the inlet side of the gascolator. The engine was primed using the electric fuel boost pump. Start-up was normal and the engine ran normally using various power settings. No leaking was noted from the gascolator.

6th Engine Run

For the sixth engine run the fuel can was hung lower to simulate the airplane in a climb attitude. The engine started and ran normally. During this engine run numerous throttle slams were made from idle to full power and from full power to idle – the engine responded without hesitation or stumbling. The throttle lever was repeatedly slammed in both directions a half dozen times in a row to attempt to see if the fuel bowl float needle would stick and restrict fuel flow – it did not.

Inspections After the Engine Runs

Upon completion of the engine runs the carburetor was removed and the case halves disassembled. The finger screen had a small amount of debris present covering an estimated 5% of the screen (see Figures 9&10). Based on the engine runs the amount of restriction to the finger screen was thought to be insignificant. The fuel bowl contained brown rust colored sediment (see Figure 11). Some of the sediment appeared as globules with up to about an eighth inch diameter. When poked with a pen the globules were found to have a flour like consistency and were not solid.

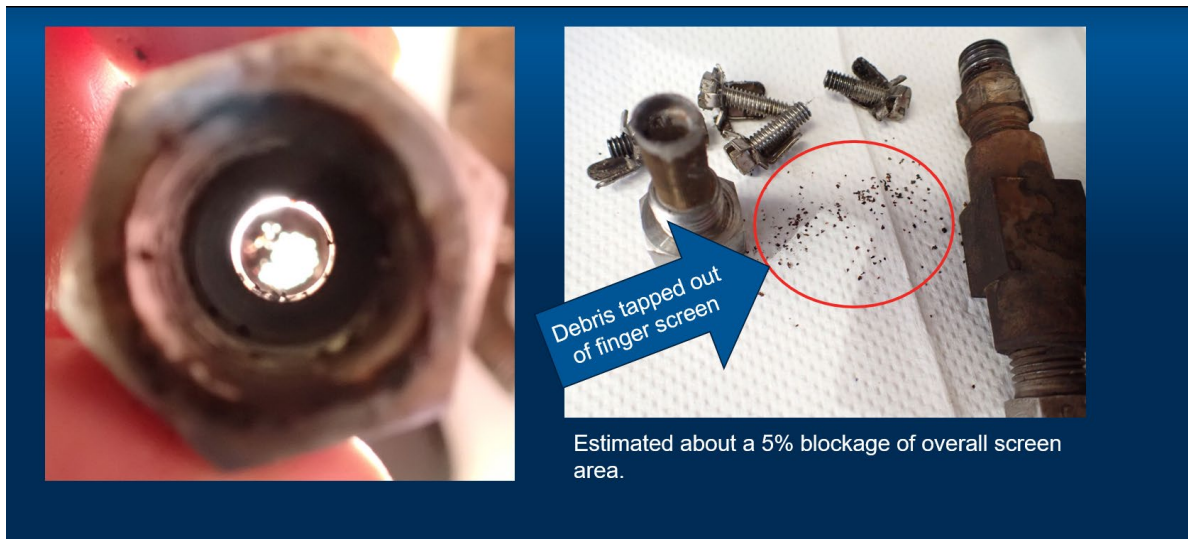


Figure 9 - Carburetor Finger Screen (disassembled after engine runs)

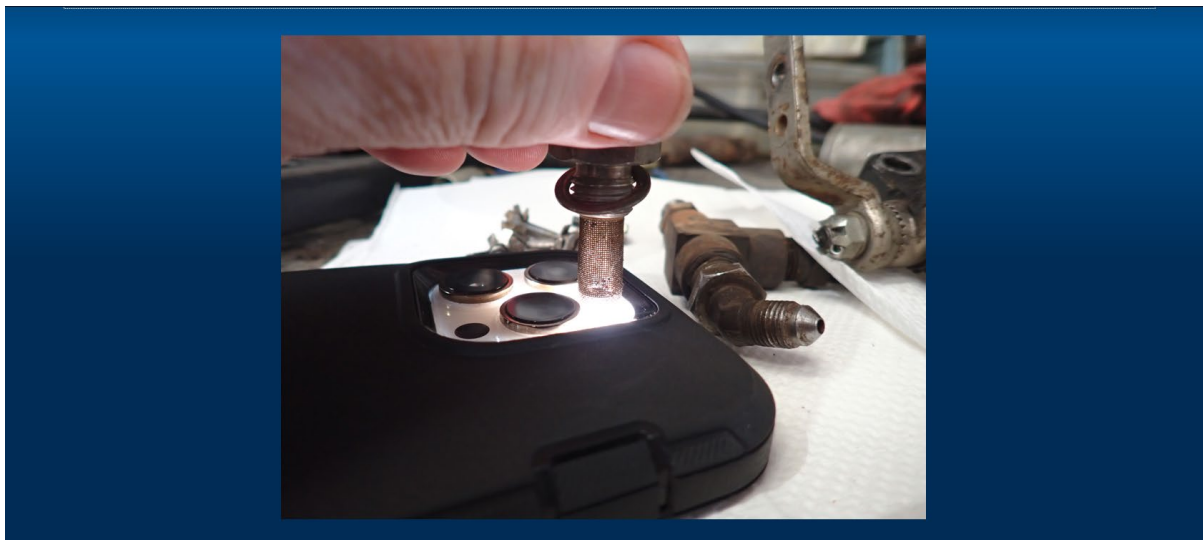


Figure 10 - Carburetor Finger Screen (disassembled after engine run)



Sediment present in left side of fuel bowl on carburetor.



Sediment present in right side of fuel bowl on carburetor.

Figure 11 - Carburetor Bowl (disassembled after engine runs)

Submitted by:

Bradley Miller
Aviation Accident Investigator