

Engine and Airframe Exam Summary

WPR21LA122

C172 Sisters Oregon.



Figure 1-Accident Site, courtesy law enforcement

Engine exam was 11/17/2021 conducted at Air Transport, Phoenix AZ. By NTSB IIC James Bledsoe and Textron Tech representative Ricardo Asensio.



Figure 2-Relocated to Phoenix for NTSB airframe and engine examination, courtesy NTSB

Engine Examination. General inspection on the engine revealed moderate oil leaks and 5 bolts were torqued hand tight. All subcomponents and assemblies were present with normal appearance.

Top six spark plugs were removed and visually inspected. All plugs were evenly gapped with minimal corrosion. No FOD present. Electrodes showed wear but no abnormal shape or distortion. Plugs 1,3,5, and 6 were lightly coated with oil. Plug 6 was grey. Rocker box covers were removed. Rocker assemblies push rod tubes, and valve springs were normal and lightly coated with oil. All components had a consistent tan color with no signs of heat stress. Cylinders 1,3, and 5.



Figure 3-Top 6 spark plugs

After removing the top spark plugs and all leads, mechanical continuity was checked by manually rotating the prop. There was no evidence of resistance or grinding during rotation. The sound of the magneto impulse coupling could be heard. Thumb compression was checked on all 6 cylinders via the top spark plug holes. While the prop was rotated by hand, compression and suction was verified on each cylinder. Additionally, each exhaust and intake valve spring and rocker arm moved correctly.



Figure 4-Rocker and Valve Assemblies, cylinders 1,3,5.



Figure 5-Rocker and Valve Assemblies, cylinders 2,4,6.

Magnetos remained on the engine to be visually inspected and tested. No signs of external damage to magneto body existed. By rotating the propellor, the right mag produced spark but the left one did not produce spark by rotating the propellor. The left magneto was then removed to be tested further. Subsequent rotation on the right magneto produced normal spark.

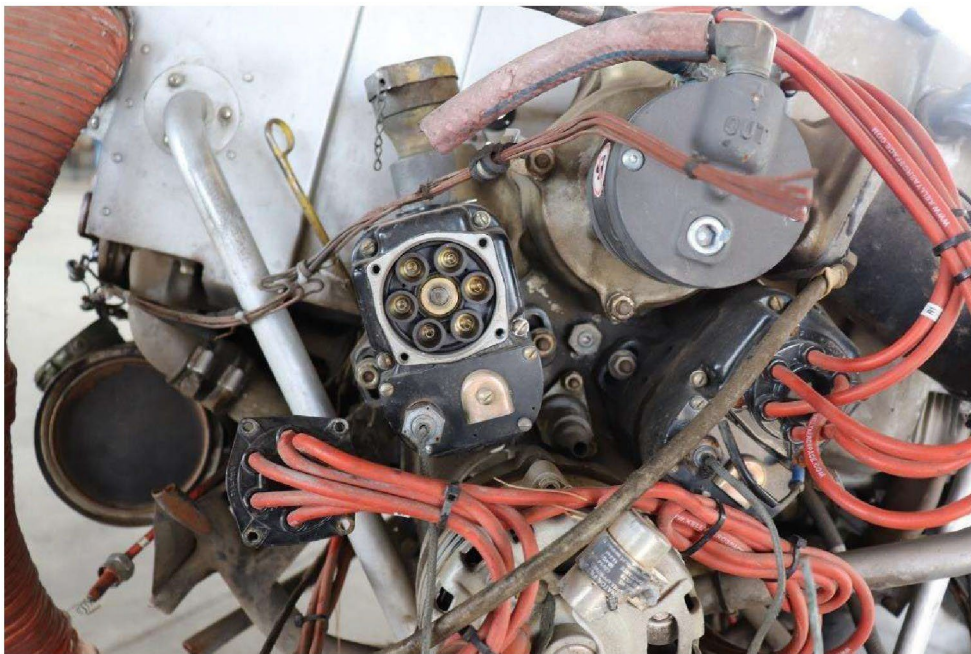


Figure 6-Magnetos

Carburetor. The carb mounting flange was partially torn away from the carb body. The throttle was exposed. All linkages were tested by pushing the linkage in each direction. Throttle and mixture linkage travel was tested favorably from stop to stop. Cables linkages were intact. Finger screen was inspected and free of debris or contaminants. Carburetor heat valve was closed, carb heat off. Carburetor main assembly was examined and found to be intact and free of debris. The main port was blown through with unpressurized air and was free of blockage. The metal floats were intact without deformation and the spring actuated normally. The venturi was normal and clear of any debris.

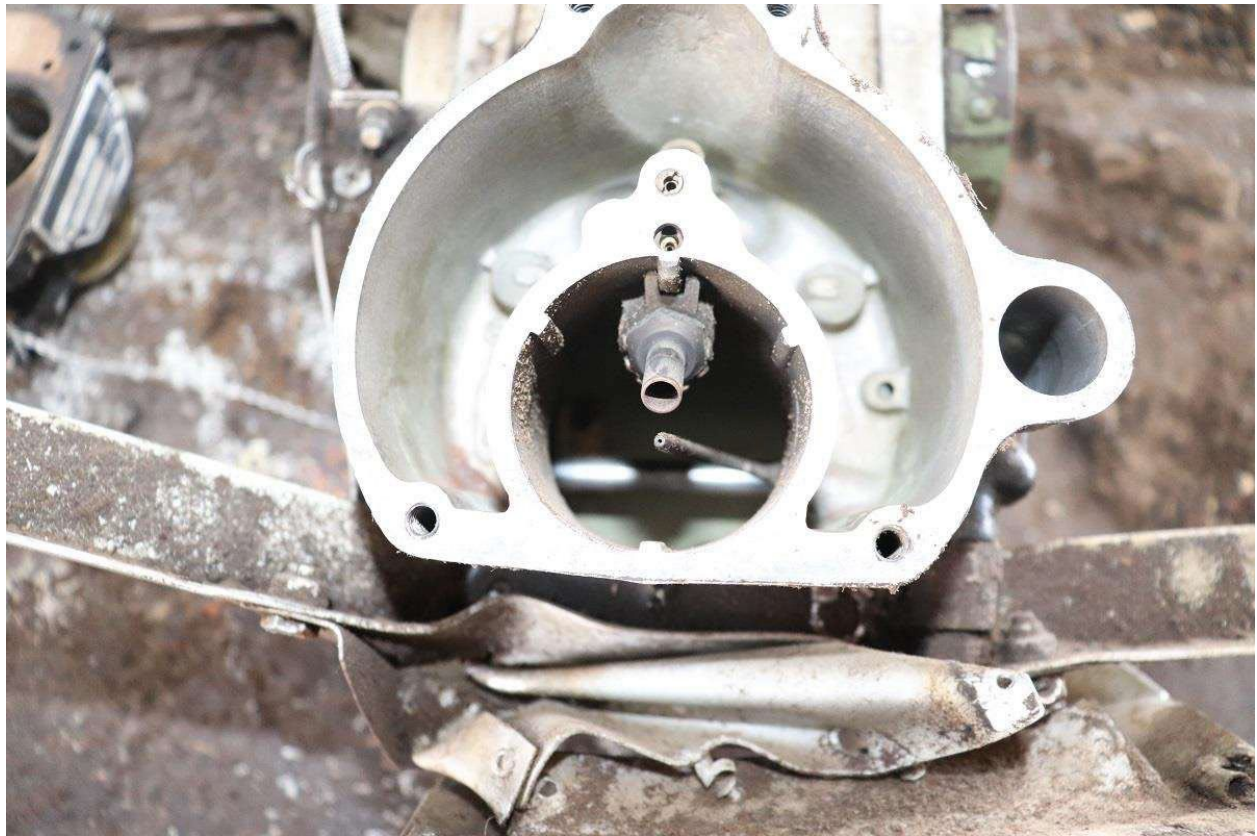
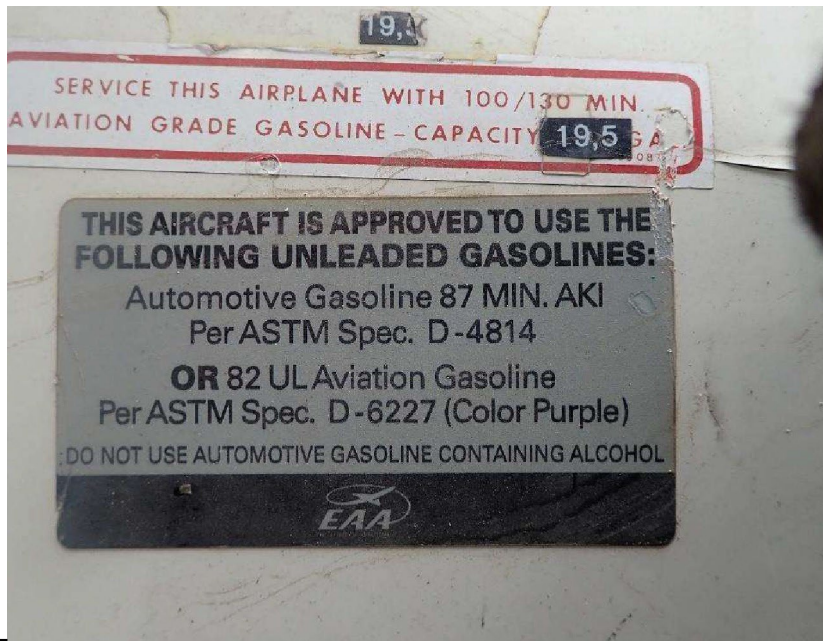


Figure 7-Carburetor

Fuel was present and tested with SARGEL with no signs of water. The fuel had the appearance and smell of automotive unleaded gas. Finger screen was clear and free of debris.



Air induction filter and screen contained compacted dirt and debris.



Figure 8-Carb Finger Screen

The exhaust system was inspected and found to have crushing damage on the right side. No obstructions were found.

Airframe

The airframe was mostly intact with the wings sawed off by the recovery company. The right horizontal stabilizer was cut off also. The main gear was intact, but the nose wheel was separated from the airframe. Oil canning was evident on the left side of the empennage but mostly appeared to be normal, same with the vertical stabilizer. The front windshield and the left rear window were broken.

Engine compartment. The entire nose section including the engine and propellor was separated from the fuselage. The recovery company reported it separated at the crash site except for one metal tube which remained attached. The recovery crew cut the tube for transport. The propellor remained intact to the crankshaft flange. Starter solenoid wires were cut about 6 inches from the solenoid. Alternator, starter, and oil filter were undamaged. Spark plug leads from magnetos remained intact.



Figure 9-Engine Compartment, courtesy Textron

Forward Fuselage. Crushing damage existed in the lower right portion of the forward fuselage. The firewall had crushing damage in the top portion. The windshield was broken, and any remnants removed from the frame.

Cockpit

Seat tracks were normal with no anomalies. All instruments were installed. Attitude indicator showed right 20 degree bank. Throttle handle was set to full in and mixture handle was extended all the way back in the full lean position. Carb heat handle was pushed in (off). The panel had an engine analyzer with a control panel and circuit breaker. The fuel selector switch was in the off position. It was placarded with "switch to single tank operation immediately upon reaching cruise altitude above 5000 feet."



Figure 10-Throttle, mixture, and carburetor heat controls, courtesy Textron

Right Wing had crushing damage on the leading edge of the tip. The right wing had crushing at a 45 degree angle at the wing root near the fuel cap. The recovery team cut the strut about 8 inches from the forward fuselage. Right Flap had crushing damage in two areas near the tip. Flaps were in the 0 or up position verified at the jack screw and showed minor damage. All control cables were cut by the

recovery company when the wings were removed. Right Aileron was bent at the tip and inboard about 10 inches.

Left Wing strut was cut in the same manner as the right strut. The left wing had crushing damage to the leading edge about four feet from the wing tip.

Damage to the Left flaps was consistent with the right side. Flap position was zero. Left aileron was intact.

Horizontal Stabilizer. The left horizontal stabilizer and elevator remained intact and undamaged. The right was cut and removed by the recovery company but showed bending and crushing on the leading edge of the horizontal stabilizer and crushing damage to the elevator.



Figure 11-Right Horizontal Stabilizer and Elevator, courtesy NTSB

Rudder appeared normal and intact.

Landing gear. Nose wheel was broken off at the bottom of the strut. Despite the front tire and wheel being dislocated from the wheel support structure, the strut remained attached to the firewall slightly bent to the left.



Figure 12-Damage to engine compartment and front wheel, courtesy Textron

Propellor

Blade A had a slight aft bend 18 in from the hub. Some light scratches were found on the camber side. The scratches were diagonal to the leading edge but began on the trailing edge of the blade. With the blade at the 12 o'clock position the scratches were from the 2 o'clock to the 7 o'clock direction. The tip was intact without damage except for light scratching from the 11 o'clock to the 5 o'clock direction.



Figure 13-Propel/or Scratches, courtesy NTSB

Blade B had a more prominent bend than A. About 10 inches from the hub, the blade was bent about 45 degrees to the rear. The leading edge had a $\frac{1}{4}$ inch wide dent by one inch located 5 inches from the blade tip.



Figure 14-Propellor with bend, courtesy NTSB

The spinner tip was crushed but remained on the airplane. All mounting hardware was intact.

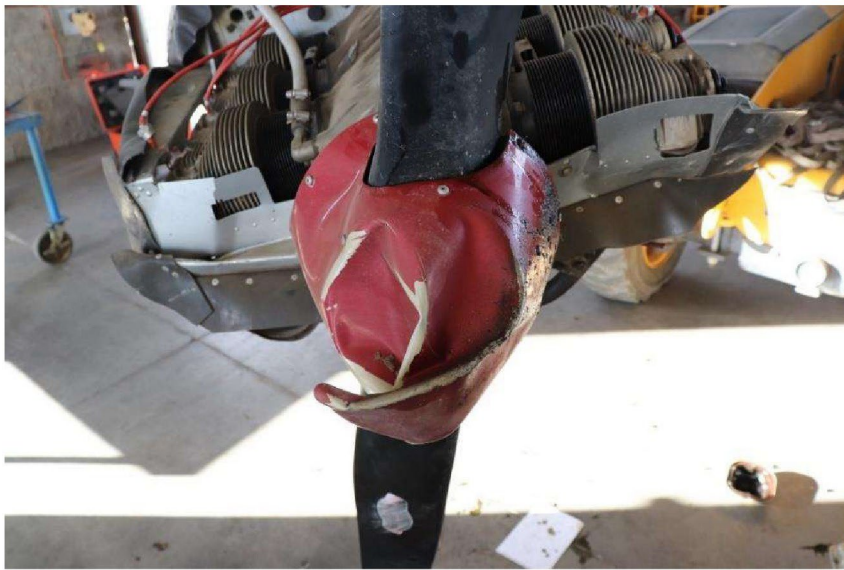


Figure 15-Spinner