



ERA23FA103

Suffolk, VA

January 7, 2023

Piper PA-28-140

NTSB ENGINE EXAMINATION REPORT

January 30, 2023

PARTICIPANTS IN THE EXAMINATION

**Robert Gretz
Senior Air Safety Investigator
National Transportation Safety Board
Moorestown, NJ**

**Christopher Freeze
Air Safety Investigator
National Transportation Safety Board
Washington, DC**

**Ryan Enders
Manager - Air Safety
Lycoming Engines
Williamsport, PA**

HISTORY OF FLIGHT

On January 7, about 1213 eastern standard time, a Piper PA-28-140, N592FL, was destroyed when it was involved in an accident near Suffolk, Virginia. The pilot and passenger were fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

ENGINE INFORMATION

Engine Manufacturer: Lycoming
Engine Model Number: O-320-E3D
Engine Serial Number: L-41631-27A
Recent Inspection: unknown
Recent Recorded Tachometer Time: unknown

The powerplant is a four-cylinder, air cooled, direct drive, horizontally opposed, carbureted, naturally aspirated engine with a rating of 150HP at 2700RPM.



Figure 1 - Powerplant Data Plate (NTSB)

INITIAL EXAMINATION

The engine was suspended from a hoist, separated from the airplane and the following was noted:

- The engine remained attached to the airframe through all engine mounts.
- The two-bladed propeller remained attached to the crankshaft flange.
 - Damage on both blades of the propeller showed “S” bending and rotational scoring consistent with crankshaft rotation at the time of impact.
- Impact damage crushed the exhaust system and bent portions of the engine mount around the engine accessories.
- The cylinders remained attached to the crankcase.
 - The #2 cylinder displayed substantial impact energy damage to the rocker area. Both rocker arms, the intake valve springs, intake keepers, rocker arm shaft, and rocker arm shaft bosses from the cylinder head were separated and missing from the examination.
- Engine crankshaft rotation was accomplished when force was applied to the propeller.



Figure 2 - Powerplant on Hoist (NTSB)

DETAILED EXAMINATION

Fuel System

The carburetor was impact separated from the engine. The carburetor – a Marvel-Schebler model MA-4SPA with a setting of 10-5135 - had the mixture control cable attached to it. The fuel inlet screen was compromised from impact damage. The unit was opened for further examination. The floats remained intact and undamaged. The main orifice of the unit appeared unobstructed.

The fuel pump – a Lycoming LW-15472 with date code 9206 - remained secured to the engine accessory housing and was heavily damaged by impact forces.



Figure 3 - Carburetor, Separated from Engine (NTSB)



Figure 4 - Carburetor, Internal Floats (Courtesy of Lycoming)



Figure 5 - Fuel Pump, Damaged (Courtesy of Lycoming)

Magnetos

The left-hand magneto – a Slick model 4371, serial no. 07061369 - remained on the accessory housing. The hold down nuts for the magneto were finger tight. The unit was removed for further examination. The impulse coupling snapped when rotated and the magneto produced spark at all leads.

The right-hand magneto – a Slick model 4370, serial no. 07061547 - was impact separated from the accessory housing. The hold down nuts remained with the accessory housing and were finger tight against the remainder of the magneto mounting flange. The unit was opened for further analysis. Impact damage to the magneto housing bent the main shaft gear away from the timing gear, preventing the unit from producing spark. The point of the magneto opened as expected when the shaft was rotated by hand.



Figure 6 - Right-hand Magneto, Separated from Engine (NTSB)

Spark Plugs

The spark plugs consisted of both Champion and Tempest manufacturers (SI 1042 approved). The number 2 top spark plug was contaminated with organic matter from the accident sequence. All four of the top spark plugs had undamaged electrode and were normal. The bottom spark plugs were not removed during the engine examination.



Figure 7 - Top Spark Plugs, Removed from Cylinders (NTSB)

Starter

The engine's starter – a Sky-Tec 122-NL, serial no. CN-430709 - remained attached to the front of the engine and was not removed for further examination. Additional label with Lycoming part number 31B23590 attached to the unit.

Alternator

The alternator remained attached to the front of the engine and was substantially damaged by the impact forces. The unit was not removed during the engine examination.



Figure 8 - Alternator, Damaged (Courtesy of Lycoming)

Vacuum Pump

The vacuum pump – a Rapco RAP215CC, serial no. A72872 - remained secured to the accessory housing and was undamaged. The unit was removed for further examination. The shaft of the unit felt still and the pump was opened for further examination. The pump appeared undamaged internally.

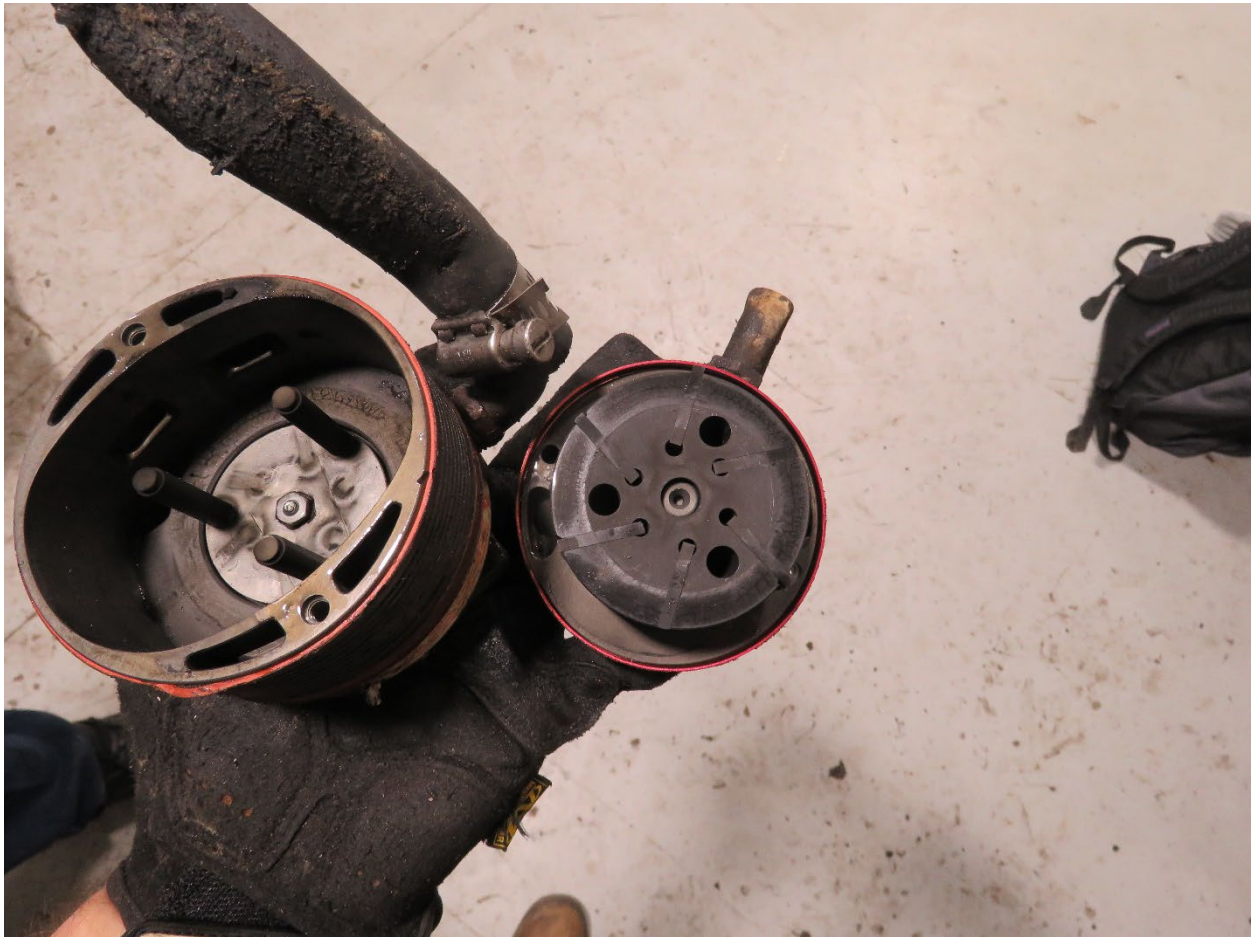


Figure 9 - Vacuum Pump, Disassembled (Courtesy of Lycoming)

Oil System

The oil suction screen remained installed in the oil sump and secured in place. The screen was removed and was clean.

The oil filter remained attached to the accessory housing but was destroyed during the impact sequence.

Cylinders and Valve Train

Thumb compressions and valve action lift was observed on cylinders 1, 3, and 4. The #2 cylinder was removed for additional investigation. The number 2 intake valve was stuck open from organic material and corrosion as a result of the impact sequence. The remaining cylinders were borescope inspected with no discrepancies noted.



Figure 10 - Cylinder No. 2, Inside (NTSB)

The number 1 and 3 exhaust stacks were damaged and pushed slightly aft. The number 1 exhaust stack was partially pulled from the cylinder head. The number 1 and 3 intake pipes remained attached with crush damage noted to the number 3 pipe at the intake boot. The 2- and 4-cylinder exhaust stacks were crushed and deformed. The number 2 intake pipe was impact separated.

SUMMARY

The examination revealed that the hold down nuts for the magneto were finger tight.

FUTURE ACTIVITIES

The wreckage will remain in storage at Anglin Air Recovery in Clayton, Delaware.