



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

September 14, 2019

ENGINE AND AIRFRAME EXAMINATION SUMMARY

WPR19LA259

This document contains 8 embedded photos.

A. ACCIDENT

Location: Marana, Arizona
Date: September 13, 2019
Aircraft: Piper PA-28-181, N4403Z, Serial #: 2843726
NTSB IIC: Andrew Swick

B. EXAMINATION PARTICIPANTS:

Andrew Swick
Aviation Accident Investigator
National Transportation Safety Board
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C. PRELIMINARY REPORT

On September 13, 2019, about 1730 mountain standard time, a Piper PA-28-181, airplane, N4403Z, caught fire during preflight startup at the Marana Regional Airport (AVQ), Marana, Arizona. The flight instructor and two student pilots not injured. The airplane sustained substantial damage to the firewall. The airplane was registered and operated by the CAE Oxford Aviation Academy Phoenix Inc under the provisions of Title 14 *Code of Federal Regulations* Part 91 as an instructional flight. Visual meteorological conditions prevailed for the flight and a flight plan was not filed for the flight.

According to the flight instructor, after landing at AVQ, he and the student pilots exited the airplane, used the airport facilities, and had the airplane refueled. About 30 minutes after the airplane was shut down, the flight instructor completed his preflight and he and the student pilots boarded the airplane. During the preflight, the flight instructor stated he did not see any fuel or liquids during the walk around. After a second failed attempt to start the engine the flight instructor and student pilots smelled smoke. The flight instructor saw smoke coming from the nose wheel well and he and the student pilots stood clear of the airplane and called the local authorities. The airplane continued to smoke for about 15 minutes before the fire department arrived.

During a post-accident examination of the airplane, the cowling was removed which revealed substantial damage to the firewall. The cowling and various lines and accessories sustained thermal damage.

D. DETAILS OF THE INVESTIGATION

1.0 Examination at the Accident Site (AVQ)

An examination of the airplane was conducted on September 14, 2019 at AVQ. The airplane was parked on the ramp at AVQ where the event occurred. The wreckage was located and secured on a parking space at AVQ. The right side of the upper and lower cowling and adjacent fuselage had thermal damage and sooting residue. A large section of the lower right side of the cowling was thermally damaged revealing the engine compartment. The right side of the cowling was opened by the responding fire department revealing the engine compartment. An axe was used to gain access for the purposes of fighting the fire. All flight control surfaces were in place and no damage was noted. The upper and lower cowlings were removed from the airplane. The lower cowling exterior surface had signs of settling fuel (blue colored fuel staining) near the area of the nose landing gear strut cutout.



Figure 1-Accident Airplane, Parked

The engine accessory section and the lower side of the engine had thermal damage and discoloration. The left magneto distributor cap and both ignition leads had thermal damage. Fuel and oil lines had thermal damage to the heat shields. The engine mount rubber bushings had thermal damage. The engine mounting carriage had thermal discoloration. The engine firewall had thermal discoloration and bending of the firewall material. All fuel line B-nut fittings were tight when checked with a wrench. Most of the excessive fire damage was centralized in the accessory section. Three fuel lines were removed from the engine; boost pump to the mechanical pump, mechanical pump to the carburetor, and the boost pump to the primer solenoid. The fuel lines removed had thermal damage to the heat shielding and were obtained by the NTSB-IIC for further examination. The carburetor, induction air box and both magnetos were removed and obtained by the NTSB-IIC for further examination.



Figure 2-Engine-Left View



Figure 3-Engine Accessory Section

2.0 Follow-up Examination and Test Run

On September 15, 2019, the fuel lines obtained by the NTSB-IIC were installed on an exemplar airplane (N4403M, a 2013 Model) at the maintenance facilities of CAE. The cowling was not reinstalled, and the engine was started and operated at various settings. The accident airplane fuel lines installed did not leak any fuel during the test run. The engine was then setup and started as per the flight instructor's statement. No anomalies were noted and no fuel was leaking from the engine.



Figure 4-Accident Airplane Fuel Lines (3) Installed on an Exemplar Airplane

The cowling were installed on the exemplar airplane. A temperature probe was installed on the primer solenoid. The engine was operated till reaching an oil temperature of about 200°F. The engine was returned back to idle and the temperature at the solenoid was 109°F. The engine was shut down and the temperature was monitored over a 40-minute span with the boost pump running. The temperature at the solenoid climbed to 151°F and the oil temperature descended to 185°F, 20 minutes after shutdown. No fuel leaks were noted.

3.0 Magneto Testing and Teardown

On September 17, 2019, the magnetos were sent to Aircraft Engine Specialists in Chandler, Arizona, for testing and teardown. The NTSB and a representative from CAE were present. The left magneto was positioned on a test bench and the drive rotated freely. No spark was produced during the test. The left magneto housing was opened and thermal damage was noted to the interior components. The internal timing was undetermined due to the points not closing. The impulse coupling and its associated components revealed no anomalies.



Figure 5-Left Magneto Teardown, Internal Thermal Damage

The right magneto had more thermal damage to the distributor area and was not installed on the test bench. The housing was opened, and thermal damage was noted to the internal components. Internal timing was undetermined, and the points were found not to close.



Figure 6-Right Magneto Teardown

4.0 Carburetor Examination and Testing

On September 19, 2019, the carburetor was examined and tested at Aircraft Engine Specialists in Chandler, Arizona. The carburetor was disassembled and no anomalies noted other than the accelerator pump needle valve wear. The accelerator pump needle valve wear was found near the valve contact area. The carburetor was reassembled and was installed on a pressure test bench. No anomalies were noted during the test.



Figure 7-Accelerator Pump Valve Shaft



Figure 8-Carburetor Testing

Submitted by: Andrew Swick