

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



WPR24LA146

FUEL SERVO SYSTEM EXAMINATION

December 3, 2024

A. ACCIDENT

Location: Lake Havasu City, Arizona
Date: May 9, 2024
Airplane: Sterling Robert 4P, N78GP

B. FUEL SERVO SYSTEM EXAMINATION

IIC	Elliott Simpson NTSB Los Angeles, California
Manufacturer	Don Rivera Airflow Performance LLC Spartanburg, South Carolina
Manufacturer	Kyle Day Airflow Performance LLC Spartanburg, South Carolina

C. SUMMARY

The fuel servo was manufactured in 1997, and the flow divider in 2008 by the original manufacturer, Airflow Performance, Inc. There was no record of overhaul through to the accident date, despite the manufacturer's requirement overhaul be accomplished every 12 years for the fuel control and 8 years for the flow divider. Irrespective, both units were tested and met the manufactures performance specifications.

Disassembly did not reveal any anomalies that would have precluded normal operation. Fine non-ferrous particles were found within the fuel side of both units, but their presence was consistent external contamination to the fuel and did not affect functionality.

D. DETAILS OF THE EXAMINATION

1.0 Fuel Servo

Model Number: FM-200
Serial Number: 972641

The unit appeared intact and undamaged. All safety wires were in place and all fittings were tight. An Airflow Performance (AP) seal was still affixed to the unit, and

representatives from AP reported that there were no records of the unit having been sent back for overhaul since it was manufactured on April 22, 1997.

AP service documentation recommends the unit is overhauled every 12 years.

The only anomaly noted was a non-standard throttle stop screw, however it was determined that this did not affect the operation of the unit.

The inlet screen was removed and was clear of debris.

The unit was fitted to the AP flow bench, and fuel pressure applied (see figure 1). Drips of fuel were initially observed to leak from the fuel mixture and idle cutoff plates but stopped after fuel was flowed through the system. The group determined that the initial leaks were likely a function of the O-rings being deformed due to exceedance of their service life.

The unit was tested in accordance with the original test procedure performed in 1997. It met, within acceptable tolerances, all those test parameters (see figure 2).

The unit was then disassembled. No internal anomalies were noted beyond deformity of all O-rings consistent with operation beyond their service life. All diaphragms were intact and pliable, the shutoff and mixture control valves were free of grooves or excessive wear. Fine non-ferrous particles were present on the fuel side diaphragm surfaces and the corresponding servo body (figure 3, 4). The particles appeared to be finer than the inlet screen¹. According to representatives from AP, it is not uncommon to see debris in this location when units are returned for overall. None of the particles appeared to be large enough to obscure any downflow orifice or line.

2.0 Flow Divider

Serial Number: AP-1276

The unit was intact and undamaged, although there was evidence of possible cowling contact to the top surface. Representatives from AP reported that there were no records of the unit having been sent back for overhaul since it was manufactured in 2008. AP service documentation recommends the unit is overhauled every 8 years.

The unit was tested on the AP flow divider work bench and performed within specifications (see figure 5). Flow division at idle flow and opening leakage was within new parts limits. At the highest inlet pressure of 12 psi, the unit flowed 214

¹ It is possible that the material was aluminum particles abraded from fuel filler nozzles against the fuel tank filler neck.

lbs/hr. of fuel equivalent to about 36 gph. The fuel output at all nozzles was equal throughout the tests.

A customer-installed check valve had been fitted to the inlet of the unit. It appeared to operate and was found to open at a pressure of 5 psi.

The unit was disassembled. The diaphragm was pliable and free of leaks, and similar fine debris was noted within the body (see figure 6). There were no anomalies that would have precluded normal operation.

3.0 Photos



Figure 1 - Servo in flow bench

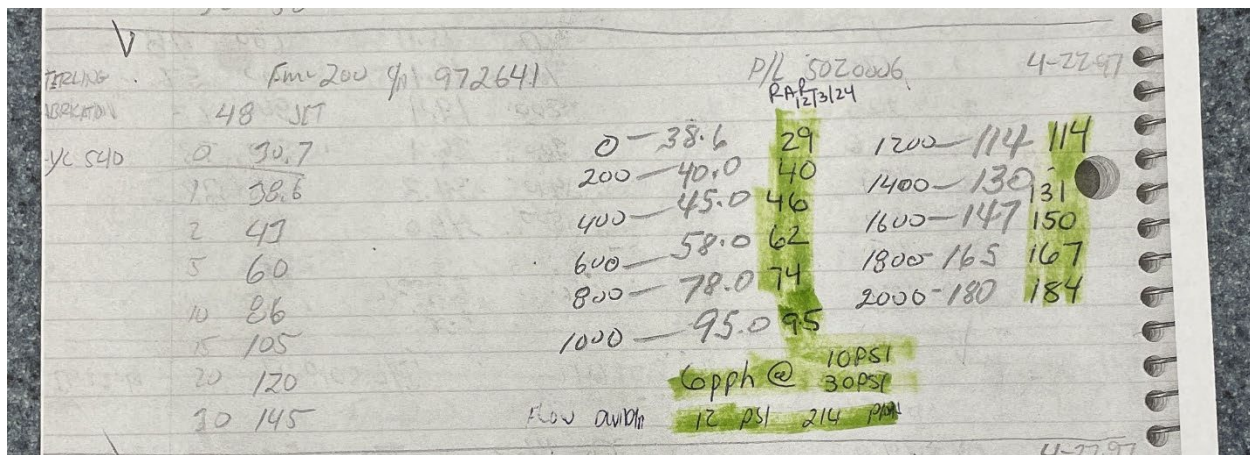


Figure 2 - Original and current (highlighted) test results



Figure 3 - Non-ferrous particles on the fuel-side diaphragm surface



Figure 4 - Non-ferrous particles on the fuel-side plate

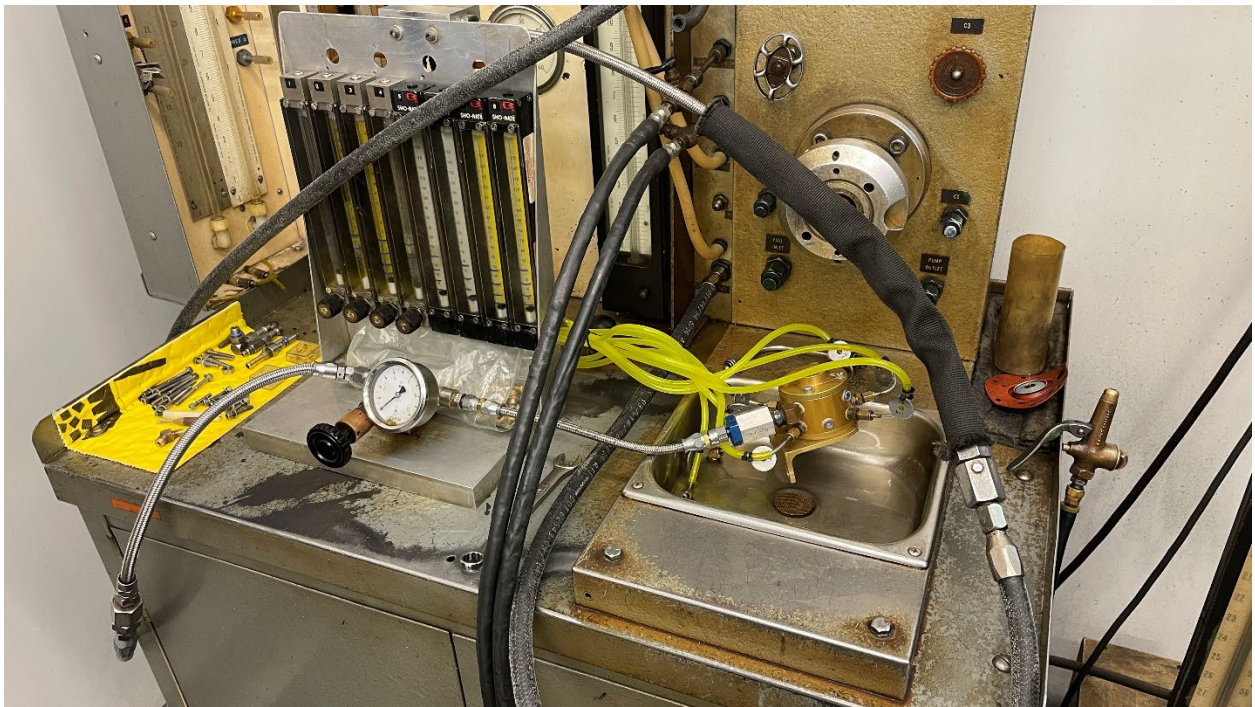


Figure 5 - Flow divider fitted to test bench



Figure 6 - Non-ferrous particles on the body inner surface

Submitted by:

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