



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

FUEL SERVO EXAMINATION

WPR19LA218

This document contains 6 embedded photos.

A. ACCIDENT

Location: Mesa, Arizona
Date: August 14, 2019
Aircraft: Extra Flugzeugbau 300/L, Registration N19AM
NTSB IIC: Dennis Hogenson

B. EXAMINATION PARTICIPANTS:

Elliott Simpson
Senior Aviation Accident Investigator
National Transportation Safety Board
Western Pacific Region
Los Angeles, California

Peter Neilson
Precision Airmotive LLC
Arlington, Washington

C. SUMMARY

The examination was conducted at the Precision Airmotive facility in Arlington, Washington on December 10, 2019. The unit appeared to have been opened and repaired since rebuild, by virtue of a non-factory valve body O-ring, an over adjusted outer regulator nut, the absence of a factory seal, and the use of safety wire thicker than the type installed by Precision Airmotive. Although the unit did not meet the airflow bench test specifications, evidence suggests that the unit had sustained impact damage and dust ingestion during the accident, potentially affecting the validity of the results.

D. DETAILS OF THE INVESTIGATION

1.0 Examination

Precision Airmotive Fuel Injection Servo
Model: RSA-10A01
Serial Number: 30696
Parts List Number: 2524318-10
Basic Number: 2524514-P

Precision Airmotive records indicated that the unit had been rebuilt at their factory in September 2013, and it incorporated a blue data tag, which denoted it had been rebuilt.



Figure 1 - Fuel Injection Servo - NTSB

The unit was coated in fine sand, and one of the four impact tubes on the throttle side had bent perpendicular to the direction of airflow (Figure 1). The damaged tube was subsequently removed to prevent it from falling off during the flow test, and damaging the test apparatus. The throttle and mixture arms were not present. Fine metallic and non-metallic particles were found on the inlet fuel screen.

The safety wire on the regulator plug was not the type (thicker) utilized by Precision Airmotive, it was not installed in the factory winding direction, and there was no factory seal. The regulator nut on the diaphragm assembly displayed a “G” stamp, indicating service information letter RS-87 had been complied with.

Rotation of the throttle shaft resulted in appropriate full travel movement of the throttle valve. The throttle-to-idle valve linkage remained intact, and moved in concert with the throttle linkage. Movement of the mixture control shaft by hand resulted in unimpeded full motion of travel. The center-to-center distance of the idle mixture linkage was 2.5 inches.

The unit was installed on an airflow bench that had been calibrated for the RSA10 servo. During installation the metered fuel pressure port was removed, and unapproved white sealant was observed on the plug threads (Figure 2).

The unit was then tested in accordance with Precision Airmotive overhaul test standards. The idle cutoff test indicated an anomalous result of 7.5 lbs/hr of fuel flow when the maximum allowed was 0.5 lbs/hr. The remaining results indicated that the unit fell just outside of the test parameters by values of about 5% on average. According to the Precision Airmotive representative, the observed values of all but the idle cutoff test were consistent with a slightly lean mixture adjustment, and typical of those observed when units are returned from the field for overhaul/rebuild. Additionally, it was noted that the damaged impact tube, along with dust ingestion could potentially result in the values observed.



Figure 2 - Metered Fuel Pressure Plug - NTSB

Following the flow bench test, the unit was disassembled. The idle lever assembly appeared intact, and undamaged; the valve surfaces exhibited light radial scoring signatures. The valve body O-ring was orange, rather than the factory blue, indicating the unit had been opened since overhaul.

The mixture control assembly was removed. The lever assembly intact and undamaged, The dowels were in place, mixture control valve was free of scoring, along with control plate. The O-rings were intact and undamaged. The mixture control lever assembly spring appeared to be bent

(Figure 3), and debris was noted on the mixture sliding plate (Figure 4). The possibility was discussed that the debris could have contributed to the higher than standard fuel flow values observed at idle shutoff.



Figure 3 - Control Lever Assy Spring - NTSB



Figure 4 - Mixture Sliding Plate - NTSB

The diaphragm assembly was disassembled, the effort spring appeared to be the yellow type (although only a small amount of yellow coloring was observed), and was intact. The outer regulator nut took five turns to bottom out (a maximum of four turns is typical). The inner regulator nut required 1/2 turn to bottom out. The regulator stem appeared undamaged and its bushings was in place. The diaphragm was pliable, intact, and did not show any evidence of leak.

Removal of the center body exposed the fuel diaphragm. The diaphragm sealing surfaces were orange in color and appeared intact with no indications of splits or cracks. The regulator seat was undamaged, along with the regulator ball valve. Examination of the center body bellows revealed that they were pliable and free of external damage.

The ambient air side of the large diaphragm was coated with fine brown dust, matching the color of the dust found on the outer body (figure 5). Similarly, when the venturi housing was removed, the same dust material was found coating the O-rings and inner sleeve and pressure slots (figure 6).



Figure 5 - Dust on Diaphragms and Housing - NTSB



Figure 6 - Dust on Venturi Sleeve - NTSB

Submitted by: Elliott Simpson