NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

October 26, 2010

FUEL INJECTION SERVO EXAMINATION

WPR10LA458

This document contains zero embedded photos.

A. ACCIDENT

Location:	Bishop, California
Date:	September, 16, 2010
Aircraft:	Robinson R44 II, Registration Number: N2153S
NTSB IIC:	Eliott Simpson

B. EXAMINATION PARTICIPANTS:

Eliott Simpson
National Transportation Safety Board
151 West 190th Street
Gardena, CA 90248

Peter Nielson
Precision Airmotive
Marysville, WA

C. SUMMARY

The examination was conducted at the Precision Airmotive facility in Marysville, Washington on October 26, 2010.

D. DETAILS OF THE INVESTIGATION

1.0 Examination

Precision Airmotive Fuel Injection Servo

Model: RSA-10AD1
Serial Number: 70282204
Basic Number: 2576629-A
Parts List Number: 2576630-4

Precision Airmotive records indicated that the unit had not been returned to Precision for service since its manufacture in 2002.

Engine logbook entries noted that the throttle body venturi was modified in May 2005 in accordance with Precision Service letter SL-81. Additionally, in December 2006, Robinson Service Bulletin 55, which superseded SL-81, was complied with by installing the servo re-orientation kit.

The group visually examined the fuel injection servo. Thermal damage was noted to the outer casing, which was covered in a film of oil and black soot. The data tag revealed an original revision number of -1, which appeared to have been crossed out, and replaced with a -4. Safety wire was noted at all the appropriate bolt heads.

Examination of the venturi inlet revealed black sooting to all surfaces of the chamber and throttle body valve. One of the four impact tubes appeared partially blocked with oily and sooty residue.

The fuel mixture control linkage cable had been cut during recovery, and the throttle linkage appeared separated 6-inches from the throttle lever in a manner consistent with overload; both linkages remained firmly attached at their respective control levers. Rotation of the throttle lever resulted in appropriate full travel movement of the throttle valve. The throttle-to-idle valve linkage remained intact, and was observed to move in concert with the throttle linkage. Movement of the mixture control lever by hand resulted in unimpeded full motion travel. The plastic mixture stop bushing was not located, and presumed to be fire consumed. The mixture return spring appeared in place.

Center-to-center measurement of the idle mixture linkage revealed a value of 2.54 inches. The mixture control lever assembly was then removed and examined. The mixture lever assembly appeared to have sustained thermal discoloration, and the white plastic guide washer was not located and presumed thermally destroyed. Fragments of molten white plastic material similar in consistency to the guide washer were noted throughout the inner chambers of the fuel and air diaphragm cavities. The mixture control plate appeared thermally discolored with a brown and blue sheen noted, the associated thrust washer appeared partially melted.

The mixture control valve remained intact with minimal wear noted. Both of the blue o-rings appeared in place with the large o-ring exhibiting multiple circumferential splits with clean fracture surfaces.

The idle lever assembly appeared intact, thermal damage was noted to the o-rings and plastic seals. The lower idle valve (brass) assembly appeared thermally discolored with a copper-colored tone. The valve surfaces exhibited minimal radial scoring signatures.

The outer regulator nut appeared in place and tight. Removal of the outer regulator cover casing revealed the orange-colored airside diaphragm. The diaphragm remained pliable and no splits or cracks were observed. White 'bubbles' of plastic-like material were noted along the sealing edges of the air and fuel side diaphragms, and on the outer regulator casing. The regulator nut setting was measured, and found to rotate down 2 full turns.

Removal of the air diaphragm revealed the effort spring. The spring appeared intact, undamaged, and was noted to be of the red type. The inner regulator nut was noted to rotate 1 3/8 turns before bottoming. The regulator stem appeared undamaged with its bushings in place.

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 inner flexible section appeared dark orange, no cracks or splits were noted. The white plastic portion of the regulator seat appeared thermally destroyed with plastic residue of similar material dispersed throughout the diaphragm chambers and seals. The castellated metal section of the regulator remained seated against the regulator ball valve. Examination of the center body bellows revealed that they were pliable and free of external damage.

Submitted by: Eliott Simpson