

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



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FUEL CONTROL UNIT AND FUEL PUMP EXAMINATION

June 19, 2025

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A. ACCIDENT

Location: McCook, Nebraska
Date: October 30, 2023
Time: 1201 Central Daylight Time
1701 UTC
Airplane: Piper PA46-350P

B. FUEL CONTROL UNIT AND FUEL PUMP EXAMINATION

Transportation Safety Board (TSB) of Canada

Pratt & Whitney Canada

C. SUMMARY

The accessories investigation was performed on 19 June 2025 at the Pratt & Whitney Canada Service Investigation Facility at Saint-Hubert, Quebec, Canada. Below is a summary of the examination.

D. DETAILS OF THE EXAMINATION

1.0 Fuel Control Unit (FCU)

The FCU was received mounted to the fuel pump. The external surfaces of the FCU were soiled. The FCU was separated at the flow body to drive body flange and loosely held by the throttle shaft. Two of the drive body to flow body flange mounting screws were torn from the housing threads while one was sectioned. Rotation of the fuel pump driveshaft by hand showed the FCU flyweights were rotating.

Removal of the FCU from the fuel pump flange showed the driveshaft coupling was correctly engaged and in an unremarkable condition. The driveshaft turned freely by hand. The index mark on the acceleration cup was aligned with the datum line on the bypass valve housing. The throttle shaft was bent, and could be partially rotated by hand, with rotation limited to approximately 20° travel. The manual override (MOR) lever was bent and was moving freely over its entire travel. The MOR body assembly was distorted. The condition lever bracket was bent and the travel was limited from the cut-off position to approximately the ground idle position. A substance similar to soot was present on the air inlet adapter, in the vicinity of the Pa bleed. The high pressure relief valve plug was fractured and retained by the lockwire.

Impact damage precluded any functional testing of the FCU, so a disassembly of the unit was performed.

The throttle shaft was bent and could not be removed. The FCU was split at the flow body to drive flange by removing the eccentric shaft. The air inlet adapter was removed, and the Px and Py bores were found free of debris. The Py orifice was found unobstructed. The governor flyweights and cap bearing turned freely by hand and were visually unremarkable. The cam lever was bent and partially fractured, most likely from the attempt to remove the throttle shaft. Side to side play was observed on the governor lever. The governor lever was removed, showing the Px side pivot bearing was fractured. The two ends of the outer race fracture were cleaned, while the remainder of the fracture was covered in debris. Cleaning of the fracture surface and further evaluation under stereoscope showed evidence of overload, most likely from the event impact. One of the released ball bearings was cleaned and examined under the stereoscope and was found unremarkable. The Py bleed was found obstructed.

The MOR body assembly was removed, and a blocking plate was installed to seal the bellows Py bore. Air pressure at 30 psig was applied to the flow body Py passage on the flow body to drive body interface and Leak-Tec was applied to the loose Py plug, showed no leakage. The governor bellows was satisfactorily tested. The acceleration (evacuated) bellows was measured and found within the CMM serviceability limit. The ball end of the bellows ratio lever showed the presence of a small flat spot. The torque tube was removed and passed the leakage testing. Removal of the metering valve assembly, the metering valve ratio lever, and the bypass valve cover assembly and diaphragm showed the components were unremarkable. The inlet strainer was visually free of debris.

2.0 Fuel Pump

The external surfaces of the fuel pump were soiled. The driveshaft was turning by hand with the typical resistance. The outlet fuel filter bowl packing was partially visible. The outlet filter bowl lockwire was missing. All other lockwires and safety cables were present at the correct locations and in good condition.

The fuel pump was tested on the FCU test rig with the use of a slave FCU. The test showed the fuel pump delivered the FCU's maximum fuel flow test point as well as the minimum fuel flow test point.

The fuel pump was disassembled. The outlet fuel filter showed darkening of the pleat surfaces, with no particulates visible. The inlet strainer surfaces were clean, with some particulates in the bottom of the inlet side. The drive shaft, the four bearings, the two gears and the carbon seals were unremarkable. The housing gear pocket was typical of units returning from the field.

Submitted by:

Jason Aguilera

FUEL CONTROL UNIT AND FUEL PUMP EXAMINATION

Investigator in Charge, National Transportation Safety Board