

ERA22FA086

POWERPLANTS

Group Chair's Factual Report - Attachment # 4

Woodward Fuel Control Unit, Serial Number, 905139, Investigation Report

June 27, 2023

CUSTOMER HONEYWELL ENGINES & SYSTEMS		INVESTIGATION NO 1181228	
CUSTOMER ORDER Crash Investigation	WOODWARD SALES ORDER 3821492	WOODWARD WORK ORDER C106563	
CUSTOMER REJECTION DOCUMENT (CAR, QN, RFA, DMR, ETC.) N/A	WARRANTY DISPOSITION N/A	PRODUCT STATUS N/A	
PROGRAM/ENGINE TYPE GARRETT		ITEM RECEIVED 8070-255	ENGINE MFR MODEL RECEIVED N/A
PROGRAM CODE 82228	SERIAL NUMBER 905139	ITEM SHIPPED 8070-255	ENGINE MFR MODEL SHIPPED 893561-17
PARENT ITEM NUMBER 8070-255	PARENT ITEM SERIAL NUMBER 905139	FIRST SHIPPED 08-SEP-2022	LAST SHIPPED 08-SEP-2022
CUSTOMER SERIAL NUMBER N/A	APPLICATION N/A	VESSEL TYPE & VESSEL NUMBER Swearingen SA-226AT, N54GP	SITE & LOCATION GRID ID N/A
TIME/CYCLES SINCE NEW, OVERHAUL, OR REPAIR N/A			
DATE REPORT OPENED 29-AUG-2022		DATE PART REMOVED N/A	DATE RECEIVED 23-AUG-2022

TEAM MEMBERS (D1)

Product Engineer: Brandon Bolley
 Customer QA Engineer: Jean Taylor
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 Customer Account Manager: Charles J. Johnson
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 Compliance: Robert A. Feggestad
 Product Integrity Coordinator: James D. Rosplock

REASON FOR INVESTIGATION (D2)

Reported Situation: On December 10, 2021, about 2330 eastern standard time, a Swearingen SA-226AT, N54GP, was destroyed when it was involved in an accident near Bedford, New Hampshire. The commercial pilot was fatally injured. The airplane was operated as a Title 14 Code of Federal Regulations Part 135 on-demand cargo flight. According to preliminary information from the Federal Aviation Administration, the airplane was on the instrument landing system approach to runway 6 at Manchester Boston Regional Airport (MHT), Manchester, New Hampshire.

Reported Issue: During the approach, the pilot reported an engine failure at 2330:42 but did not specify which engine. Radio and radar contact were lost at 2330:51, when the airplane was about 1/4 mile from the runway. The wreckage was located on a river sand jetty, oriented north, and a post-crash fire consumed the cockpit, cabin, and both wings. No debris path was observed. A crater about 6 ft long, 3 ft wide, and 2 ft deep was observed at the beginning of the sand jetty. The left aileron was recovered in the water near the crater. The empennage was located just beyond the crater. The empennage remained intact, with the elevator and rudder attached and undamaged except for the right elevator tip. The right wingtip was located near the empennage and an outboard left-wing section was located 60 ft left of the main wreckage. Three landing gear were located near the main wreckage and the radome was located at the end of the sand jetty, in water. Elevator control continuity was confirmed from the elevator to the cockpit area. Rudder control continuity was confirmed from the rudder to the cabin area. No aileron cables were identified. The left engine was located in the main wreckage. The left propeller had separated and was partially embedded in mud to the left of the left engine. All three blades remained attached to the hub and did not exhibit rotational damage. The right engine was located forward and left of the main wreckage. The right propeller remained attached to the right engine and all three propeller blade roots remained attached to the hub and were charred. The right propeller blades appeared to be at or near the feathered position. Both engines and propellers were retained for further examination.

INVESTIGATION SUMMARY (D4)

Confirmation Text: NO REPORTED PROBLEM
 Discrepant Item Number: NA
 Discrepancy: No Discrepancy Found
 Finding: No Findings
 Conclusion:

The FCU was mounted on the right engine and had significant thermal damage from a post-crash fire. The nameplate was missing therefore the serial number of the FCU was not confirmed. The housing case number was 1379. The FCU was model

8070-255, serial number 905139 per the engine logbook. Woodward shipping records show that SN 905139 originally shipped in February 1969 with case number 1379.

The presence of foreign lockwire indicates that the unit was serviced at another facility since it was last shipped from Woodward. The unit was returned with customer fittings, power lever and speed lever linkages, pressurizing valve assembly, and the Tt2 sensor still installed. The Tt2 sensor and customer hardware were removed so that a visual as-received inspection could be performed. A portion of the Tt2 sensor bellows remained stuck in the housing and had to be removed manually (see Figure 1).



Figure 1. T2 Sensor Bellows Removal

A portion of the cover was melted and missing such that the internal mechanical linkage was exposed (see Figure 2). The housing was fractured next to the Pt2 bellows assembly and the bellows was pulled out such that there was a gap between the retaining plate and the housing (see Figure 3). The speed setting lever rotated normally. The power lever rotated freely but could not reach its max stop due to damage on the cover. The drive shaft could not be rotated by hand but turned stiffly with a mating drive spline tool.



Figure 2. Cover Damage



Figure 3. Pt2 Bellows Assembly

As-received testing could not be performed due to the extensive damage. The unit was then disassembled to inspect the internal components. The cover was removed and the internal linkages were found to be seized due to corrosion (see Figure 4).



Figure 4. Internal Linkages

No other broken parts were observed during disassembly but removal of the internal components was difficult due to the corrosion and thermal damage. All fluorosilicone packings exhibited thermal damage and crumbled apart during disassembly. Debris consistent with the packings was found on the underspeed governor assembly and in the corresponding housing bore (see Figure 5). Portions of the phenolic retainers were missing from the top bearings of the overspeed governor assembly, but all bearing balls were present. All springs were intact, but several of the springs showed evidence of heat set in a loaded position. Dirt and sand was found underneath the Ps3 cap when it was removed (see Figure 6).



Figure 5. Debris on Underspeed Governor and Housing Bore

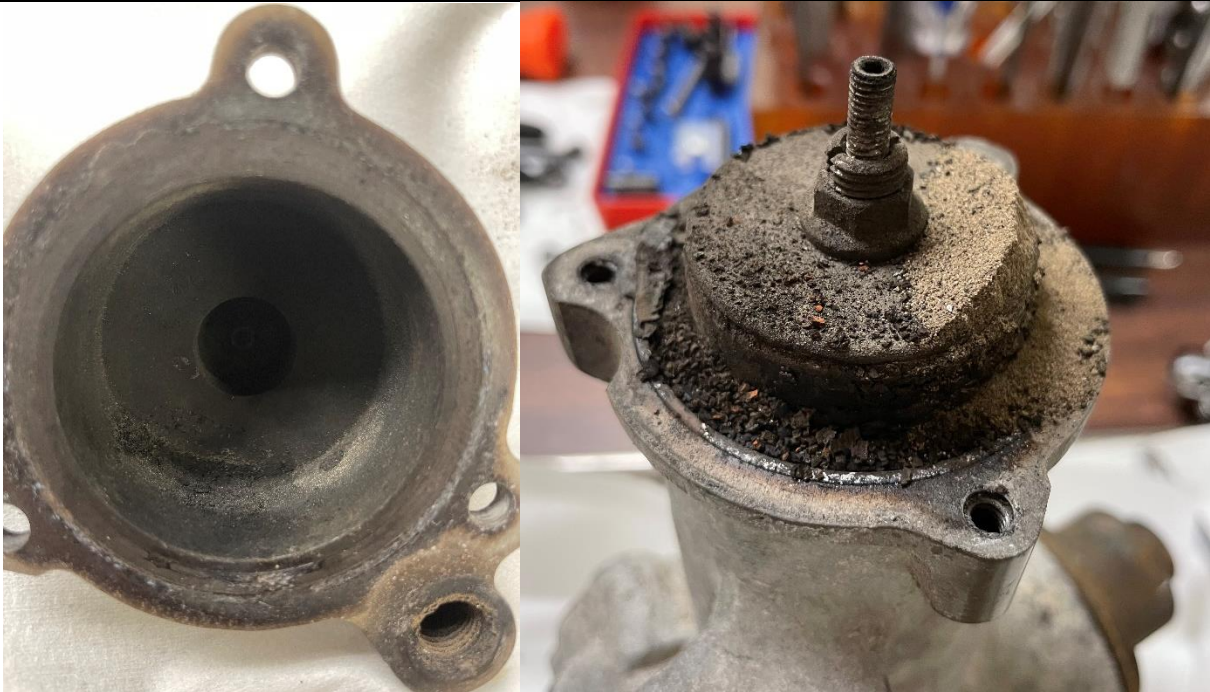


Figure 6. Ps3 Cap and Sensor Assembly

During disassembly it was noted that the tang of the Flight Idle adjustment stop was positioned at approximately 7 o'clock. The CMM has instructions to install the stop with the tang at 3 o'clock at the completion of the power lever schedule preset calibration. This is a normal customer adjustment. Clockwise rotation would result in a higher Flight Idle setting.

ROOT CAUSE (D4)

Origin of Cause: NONE

General Cause: No Problem Found

Cause: No Problem Found or Identified

Root Cause: The unit was disassembled for inspection and no evidence of a pre-incident malfunction was found. All damage observed was consistent with impact and/or thermal distress.

CORRECTIVE ACTION PLAN (D5)

General Corrective Action: None Required

Specific Corrective Action: None Required

CORRECTIVE ACTION IMPLEMENTATION (D6)

Corrective Action Status: NO ACTION