

CEN21LA237

POWERPLANTS

Group Chair's Factual Report - Attachment #2

Woodward Propeller Governor Teardown Report and As Received Test Run Sheets

February 28, 2023

CUSTOMER HONEYWELL ENGINES & SYSTEMS			INVESTIGATION NO 1181296
CUSTOMER ORDER Crash Investigation	WOODWARD SALES ORDER 3821493		WOODWARD WORK ORDER C106567
CUSTOMER REJECTION DOCUMENT (CAR,QN RFA DMR,ETC.) N/A	WARRANTY DISPOSITION N/A		PRODUCT STATUS 1 RCVD
PROGRAM/ENGINE TYPE GARRETT SMALL PROP GOVERNOR		ITEM RECEIVED 210736	ENGINE MFR. MODEL RECEIVED N/A
PROGRAM CODE 83344 SML	SERIAL NUMBER 1757508	ITEM SHIPPED 210736	ENGINE MFR. MODEL SHIPPED 869120-9
PARENT ITEM NUMBER 210736	PARENT ITEM SERIAL NUMBER 1757508	FIRST SHIPPED 08-SEP-2022	LAST SHIPPED 08-SEP-2022
CUSTOMER SERIAL NUMBER N/A	APPLICATION N/A	VESSEL TYPE & VESSEL NUMBER N/A N/A	SITE & LOCATION GRID ID N/A N/A
TIME/CYCLES SINCE NEW, OVERHAUL, OR REPAIR			
DATE REPORT OPENED 01-SEP-2022		DATE PART REMOVED N/A	DATE RECEIVED 23-AUG-2022

TEAM MEMBERS (D1)

Product Engineer: NATHAN BOGDONAS
Customer QA Engineer: Jean Taylor
Tech Advisor/Reviewer: David M. Kettle

Customer Account Manager: Charles J. Johnson
Customer Service Rep: SHANNON L. COTE
Product Integrity Coordinator: James D. Rosplack

REASON FOR INVESTIGATION (D2)

Reported Issue: Event Description: "On May 27, 2021, about 0750 central daylight time, a Grumman G-164B airplane, N8376K, was substantially damaged when it was involved in an accident near Celina, Ohio. The pilot sustained serious injuries. The airplane was operated as a Title 14 Code of Federal Regulations Part 137 aerial application flight. The pilot stated that he departed on the local flight with about 80 gallons of Jet-A aviation fuel and a 240-gallon mixture of fungicide and insecticide. The winds were light out of the east with a few clouds 3,000-4,000 ft above ground level. The pilot stated that shortly after takeoff from runway 8 he felt the engine lose thrust, but the engine speed remained at 100% according to the airplane's cockpit indicator. The pilot established best glide speed and began a slight right turn to avoid trees. He then jettisoned the chemical load in an attempt to maintain altitude, but the airplane descended into a waterway about 200 yards south of the departure end of runway 8. An examination of the propeller revealed it remained attached to the engine propeller shaft flange, and all three blades remained attached to the propeller assembly. All three blades exhibited leading edge gouging, chordwise/rotational scoring on both camber and face sides, bending aft and twisting towards low pitch (Figure 1). All three blades had 3-5 inches of the tip fractured/separated. All observed damage was consistent with impact while the propeller was rotating under power and with high impact forces.

CONTAINMENT/IMMEDIATE ACTIONS (D3)
INVESTIGATION SUMMARY (D4)

Confirmation Text: DID NOT CONFIRM REASON FOR INVESTIGATION/RETURN

Discrepant Item Number: NA

Discrepancy: No Discrepancy Found

Finding: No Findings

Conclusion:

The unit was received and an as received visual inspection was conducted. During the inspection it was noted that the lockwire was non-Woodward indicating the originals had been removed after leaving the Woodward facility. Additionally, there were no significant signs of damage to the unit that would have prevented running an As Received Test.

After the visual assessment, the unit was sent for an as received test. All test points were found within limits except the following.

"Maximum RPM" was out of limits high at 3797 rpm (Limits: 3574 +/- 10 rpm)

"Minimum RPM" was out of limits high at 3521 rpm (Limits: 2815 +/-10 rpm)

"Arm Travel - Max to Min" was out of limits low at 20 degrees (Limits: 60 +/- 5 degrees)

These test points are common field adjustments and the presence of non-Woodward lockwire indicate an adjustment was performed in the field.

Following the test, the unit was disassembled. There were no anomalies with any of the hardware. In summary, the unit had evidence of being adjusted in the field resulting in the out of tolerance conditions during testing. Even though there were a few test points outside of limits they would not have precluded normal governor operation.

ROOT CAUSE (D4)

Origin of Cause: FIELD / END CUSTOMER (OWNER)
General Cause: No Problem Found
Cause: No Problem Found or Identified
Cause Notes:

CORRECTIVE ACTION PLAN (D5)

General Corrective Action: No Action without Additional Customer Input
Specific Corrective Action: No Direct Action, Continue to Monitor
Corrective Action:

CORRECTIVE ACTION IMPLEMENTATION (D6)

Corrective Action Status: NO ACTION

WOODWARD GOVERNOR COMPANY
Rockford, Illinois
CAGE 66503
VENDOR CODE 23245

AS RECEIVED

TSP-325
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Rev. AH

CONSTANT SPEED PROP GOVERNOR - TEST REPORT
Use with Governors 210560 (869120-1), 210563 (893615-3) (See Below)

OIL INLET TEMP. 140 $\pm$ 5 DEG. F. OIL INLET PRESSURE 95 $\pm$ 10 PSIG

S/N 1757508

P/N 210736

PT.	TSP	PARAGRAPH NUMBER	SPEED (RPM)		OIL PRESSURE (PSIG)		OIL FLOW (QTS./MIN)	
			REQUIRED	ACTUAL	REQUIRED	ACTUAL	REQUIRED	ACTUAL
1	C1	CHECK VALVE PRESS. CHECK	0	0	15 Max.	7	START FLOW	START FLOW
2	C2	TOTAL LEAK CHECK	0	0	200±10	200	.5 MAX.	.3
3	C3	RELIEF VALVE CHECK a.	3500±15	3500	465±20	465	0	0
4	C4	PUMP CASE PRESSURE b.	3500±15	3500	525 PSI MAX.	475		
5	C4	PUMP CAPACITY CHECK	3500±15	3500	150±5	150	9.0 MINIMUM	9.4
6	C5	EXTERNAL LEAK	3500±15	3500	RELIEF VALVE	-----	0	NONE
7	C6	OVERSPEED SETTING	3942±10	N/A	150±5	N/A		
8	C7	MAXIMUM RPM	3754±10	3797	150±5			
9	C8	MINIMUM RPM	2815±10	3521	150±5	150	USE	
10	C9	ARM TRAVEL - MAX. TO MIN.	55 DEG. -65 DEG.	*	-----	-----	BLEED	
11	C10	INCREASE SPEED TO OBTAIN		3785	200±5	200	ORIFICE	
12	C10	INCREASE SPEED TO OBTAIN		3815	50±5	50		
13	C10	PRESSURE GAIN = PT12-PT11 20-40 RPM		30				
14	C11	DECREASE SPEED TO OBTAIN		3786	200±5 PSI	200		
15	C11	SPEED HYSTERESIS = PT11-PT 14 -15 TO +40 RPM		-1				
16	C12	INTERNAL LEAK	AS REQUIRED	3808	150±5	150	NEW 1.40 MAX. O'HAUL 1.7 MAX.	N/A 1.2
17	C13	MAGNETIC PICKUP VOLTAGE	3700±10	N/A	Adjust pickup to 4.5V±.2 peak-to-peak			N/A
18	C13	PICKUP INDICATED RPM	925±3*	N/A				
19	C16	ELECTRICAL SPEED CHANGE	50±5	N/A	28 VDC APPLIED TO COIL			

Use with Governors:
210736 (869120-6, -7, -8, -9) 8210-260 (893615-13)
210738 (893615-7, -12) 8210-100 (893615-17)
210743 (897382-1) 8210-266 (893615-18)
REMARKS: If governor is shipped without a lever, test
with P/N 210039

*Applied to 210743 prior to "D" change only.
Indicated pickup RPM (62)

SIGNATURE		DATE
TECHNICIAN	Matt Jeffers	08/24/2022
GARRETT PURCHASE ORDER # <u>N/A</u>		
W.G. SALES ORDER # <u>3821493</u>		

* Max screw is at 98 degrees
min screw is at 78 degrees
20