HARTZELL PROPELLER INC.

PIQUA, OHIO

ENGINEERING REPORT NO. 3945
March 16, 2015

Report for A1-B Governor Inspection Performed on January 28, 2015 at Hartzell Propeller

Reported By _____
Kyle C. Magoteaux
Mechanical Engineer

Approved By_____
Dan Boggs
Manager Air Safety Investigation

Approved By_____
Dennis Zimpfer
Director of Engineering

Approved By_____
Bruce C. Hanke
Vice President of Engineering

Approved By _____
Burt Mattice
Vice President of Regulatory Systems
and Strategic Sourcing

Approved By_____
Richard L. Edinger
Vice President of Certification and
Flight Safety

TABLE OF CONTENTS

1. SUBJECT

Inspection report of a Hartzell A-1B governor.

2. PURPOSE

The purpose of this report is to document the inspection of an A-1B governor performed on January 28, 2015 at Hartzell Propeller Inc.

3. INTRODUCTION

The A-1B governor, serial number 457-A, was installed on a Ryan Navion aircraft utilizing a Continental E225 engine, which crashed in Fairbanks, Alaska on August 24, 2014. The National Transportation Safety Board (NTSB) requested that Hartzell Propeller inspect the governor. The investigation was performed at Hartzell Propeller under the supervision of Hartzell Propeller engineers Kyle Magoteaux and Earl Jones as well as Air Safety Investigation Manager Dan Boggs. The NTSB was represented at the inspection by Todd Gunther. The Federal Aviation Administration (FAA) was present at the investigation and was represented by Chris Richards and Mark Grace. In addition to the NTSB and FAA, Fred Distad of Artic Aviation was present at the investigation.

A search of Hartzell Propeller governor assembly records identified that governor serial number 457-A was originally manufactured in October of 1965 as an A-1C governor. The differences between the A-1B and A-1C governors are provided in Table 1. The control lever assembly and secondary stop screw and nut affect the rigging of the RPM control cable. The speeder springs are standard production springs and control the response rate of the governors. The relief valve and spring represent unique configurations within the A-1( ) series.

Attribute	**A-1B**	**A-1C**
Control Lever Assembly	B-2165-5	B-2165-17
Secondary Stop Nut	Not Installed	Installed
Secondary Stop Screw	Not Installed	Installed
Speeder Spring	A-2541-4	A-2541-1
Relief Valve Plug	A-255	A-3137
Relief Valve Spring	B-4741	A-308
Relief Valve Pressure	90-110 psi	215-235 psi

Table 1: Differences Between A-1B and A-1C governors

Following the accident, the governor was returned to Hartzell Propeller and still attached to a Hartzell Propeller T-drive assembly. The T-drive allows the governor and a fuel pump to operate off the same engine accessory drive. The fuel pump had been previously removed from the T-drive prior to the governor being shipped to Hartzell Propeller. Figure 1 is the governor and T-drive as received from the accident. The governor could not be tested on a Hartzell Propeller test machine because the high RPM setting is higher than the Hartzell Propeller governor test stand can accommodate.

Figure 1: A-1B Governor and T-drive

4. INSPECTION REPORT

The governor, as received, was still attached to the T-drive assembly and the first portion of the inspection was verifying the governor and T-drive had not seized. The drive shaft of the T-drive could be freely rotated by hand verifying that the combined assemblies had not seized.

Prior to beginning disassembly of the governor and T-drive assembly, Hartzell Propeller informed the NTSB and FAA that the current production governor test stand did not have the operating RPM range to test the A-1B governor.

Next the governor was removed from the T-drive and the governor drive gear was rotated by hand, which verified again that it had not seized. Between the T-drive assembly and governor assembly there is a Hartzell governor gasket, as seen in Figure 2, and it was inspected for metal debris that may have been caught in the mesh protecting the inlet of the governor. There was no metal debris captured in the mesh.

Figure 2: Governor Gasket

Furthering the investigation, the control lever of the governor, which controls the RPM setting, was rotated to verify that it was functional. The control lever rotated freely. Next the governor head was removed from the governor body and the flyweights were examined. There were no abnormalities observed and the flyweights could rotate freely about their pivot point. The metering spool was inspected to verify that it could slide freely in the operating range of the spool and it did move freely

in the operating range. Next the governor base was removed from the governor body to expose the pump cavity as shown in Figure 3. The governor pump is composed of an idler gear on an idler shaft and the drive gear.

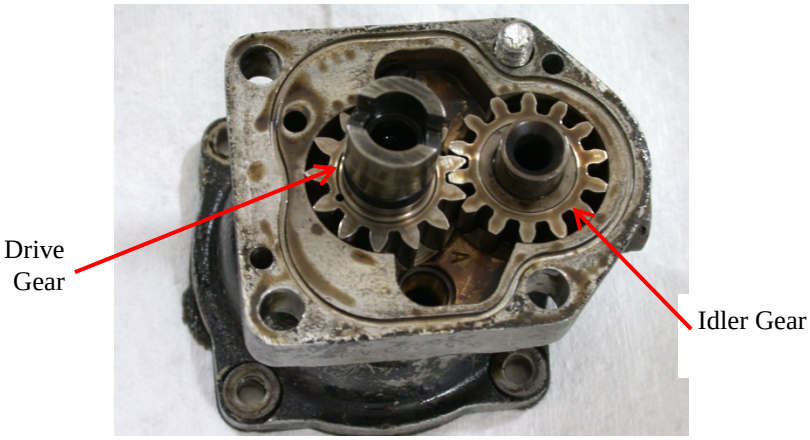

Figure 3: Pump Cavity in Governor Body with Gears Installed

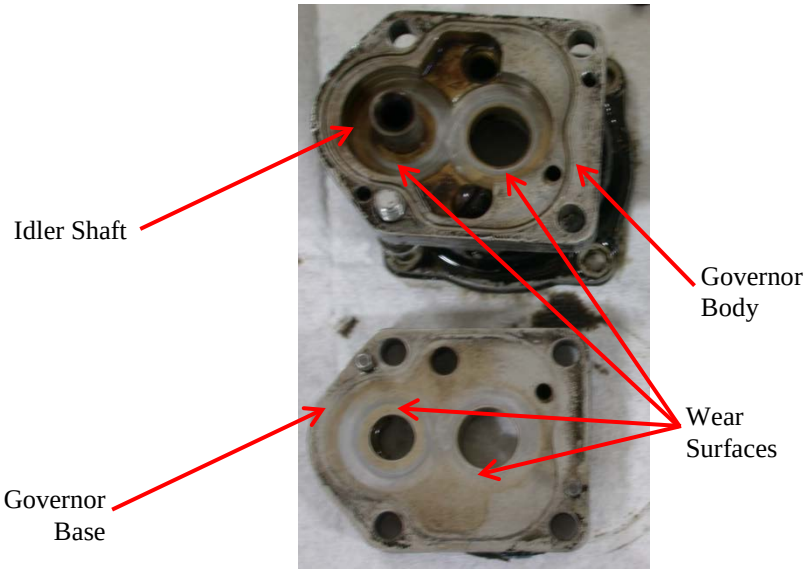

Figure 4: Governor Base, Body and Idler Shaft

The gears and shaft did not show any abnormal wear and there was no metal debris found in the pump cavity. Additionally, the wear surfaces of the governor base and body in contact with the gears did not show abnormal signs of wear. The wear surfaces can be seen in Figure 4. Finally the relief valve was removed and inspected and did not show anything that would prevent proper functioning.

5. CONCLUSION

Upon disassembling the governor and visually examining the components, it is concluded that there was nothing discovered that would prohibit the A-1B governor assembly, serial number 457-A from functioning normally.