HARTZELL PROPELLER INC.
SERVICE LETTER

HC-SL-61-254

Propeller - Propeller Operating Restrictions

1. Planning Information

   A. Effectivity

      (1) Hartzell four, five, and six blade propellers installed on turbine engine applications are affected by this Service Letter.

   B. Reason

      (1) Hartzell has become aware of a potential safety of flight issue that could exist on numerous turboprop aircraft with propellers of four or more blades. These propellers are installed on a wide variety of aircraft and the propeller installations are controlled by the various airframe manufacturer's Type Certificate (TC) or by Supplemental Type Certificate (STC) holders.

      (2) The specific issue that prompted this Service Letter results from ground operation of propellers below the minimum specified propeller RPM.

         (a) The minimum propeller idle RPM operating restriction is the result of a specific vibratory resonant condition known as a “reactionless mode”. During operation in these conditions the flight crew cannot feel the resulting high propeller vibration. Ground operation at or near an RPM that can cause a reactionless mode vibratory resonance can cause very high stresses in the propeller blades, blade clamps (if applicable), and hubs. These high stresses are more severe when operating in a tailing wind condition.

         (b) If the propeller is operating within a restricted RPM range or below a minimum idle RPM restriction for an extended period of time, the propeller blades, blade clamps (if applicable), and hub can become unairworthy due to fatigue. A failed blade, blade clamp (if applicable), or hub has the potential of causing a catastrophic event because of blade separation.

      (3) In addition to RPM restrictions below the idle RPM, there are propeller RPM restrictions above the propeller idle RPM range that are of equal importance. The RPM restrictions can vary with different airframe/engine/propeller applications.

      (4) The propeller operating restrictions or limitations are found in the Airplane Flight Manual (AFM) or Airplane Flight Manual Supplement (AFMS). It is possible that the propeller RPM restrictions or limitations are not marked on the instrumentation and/or placarded when proper rigging of the engine and propeller prevents the propeller from operating in a restricted region; therefore, it is not always evident, without checking the AFM or AFMS, that the propeller is operating below the minimum specified propeller RPM in a restricted region if the RPM has not been rigged correctly.

(5) Make sure that the propeller is rigged in accordance with the applicable Type Certificate (TC) holder's or Supplemental Type Certificate (STC) holder's propeller installation and rigging instructions, and set proper minimum propeller idle RPM, engine idle speed and engine torque settings. Depending on the application, it is possible that the mechanic could improperly rig the ground RPM or the pilot could manually control the engine such that the propeller is operating at a restricted RPM.

(6) Since either the mechanic or pilot could cause improper operation, and since they can be unaware of the serious effects of such operation, FAA includes in their published SAIB NE-06-13 dated December 12, 2005, a request that the AFM, AFMS, and Aircraft Maintenance Manual (AMM) be amended to contain a clear statement of the propeller operating restriction and an informative warning.

(a) The following is the SAIB suggested warning for the AFM or AFMS:

WARNING: STABILIZED GROUND OPERATION WITHIN THE PROPELLER RESTRICTED RPM RANGE CAN GENERATE HIGH PROPELLER STRESSES AND RESULT IN PROPELLER FAILURE, AND LOSS OF CONTROL OF THE AIRCRAFT.

(b) The following is the SAIB suggested warning for the AMM:

WARNING: STABILIZED GROUND OPERATION WITHIN THE PROPELLER RESTRICTED RPM RANGE CAN GENERATE HIGH PROPELLER STRESSES AND RESULT IN FATIGUE DAMAGE TO THE PROPELLER. THIS DAMAGE CAN LEAD TO A REDUCED PROPELLER FATIGUE LIFE, PROPELLER FAILURE, AND LOSS OF CONTROL OF THE AIRCRAFT. THE PROPELLER RESTRICTED RPM RANGE IS DEFINED IN THE AIRPLANE FLIGHT MANUAL. CONTACT THE AIRCRAFT OR PROPELLER MANUFACTURER FOR CORRECTIVE ACTIONS IF A PROPELLER RESTRICTION OR LIMITATION IS VIOLATED.

(7) This Service Letter alerts owners, operators, pilots, and technicians of all turboprop airplanes with Hartzell propellers with four or more blades, to check their propeller idle RPM settings and any propeller RPM restrictions or limitations, and to adhere to the propeller RPM restrictions or limitations.

C. Description

(1) This Service Letter may be used by an owner/operator to determine the appropriate corrective action if or when a propeller is identified as having operated below the minimum idle RPM in the propeller RPM restricted region.

(2) The corrective action will be based on the amount the RPM is below the minimum specified propeller RPM in the restricted RPM region and the total hours of operation of the propeller on an engine with improper RPM settings. The greater the amount of the RPM deviation and the longer it is permitted to exist, the more severe the corrective action required. The corrective actions may vary from no action required to scrapping of the blades, blade clamps (if applicable), and hub. Refer to Figure 1 for the required corrective action. Contact Hartzell if further clarification is required. Contact Hartzell when violating a propeller restriction that is other than what is described by Figure 1.

NOTE: A turboprop propeller having four or more blades may have a variety of operating restrictions and these different restrictions may have different operating margins. The chart in Figure 1 applies only when the minimum idle RPM for the propeller is placed just above the top-end of the propeller restriction. This chart does not apply to other propeller restrictions that are above the minimum idle RPM. Contact Hartzell if further clarification is required and for corrective action when violating other propeller RPM restrictions.

D. Compliance

(1) Before further flight, perform an engine run up to determine if engine and/or propeller rigging permits operation in the restricted RPM range below minimum RPM and perform corrective action as required in accordance with the Accomplishment Instructions in this Service Letter.

E. Approval

(1) FAA approval has been obtained on technical data in this publication that affects type design.

F. Manpower

(1) Manpower requirements will be determined by installation and operating conditions. Refer to Figure 1 for Corrective Actions.

G. References

(1) Hartzell Steel Hub Turbine Propeller Overhaul Manual 118F (61-10-18)

(2) Hartzell Five Blade Turbine Propeller Overhaul Manual 132A (61-10-32)

(3) Hartzell Steel Hub Turbine Propellers with Aluminum Blades Owner's Manual 139 (61-00-39)

(4) Hartzell Four Blade Lightweight Turbine Propeller Overhaul Manual 141 (61-10-16)

(5) Hartzell Three and Four Blade Lightweight Turbine Propeller Overhaul Manual 142 (61-10-42)

(6) Hartzell Four Blade Lightweight Turbine Propeller Overhaul Manual 143A (61-10-43)

(7) Hartzell Six Blade Lightweight Turbine Propeller Overhaul Manual 144 (61-10-44)

(8) Hartzell Steel Hub Turbine Propellers with Composite Blades Owner's Manual 146 (61-00-46)

(9) Hartzell Lightweight Turbine Propellers with Composite Blades Owner's Manual 147 (61-00-47)

(10) Hartzell Lightweight Turbine Propellers with Aluminum Blades Owner's Manual 149 (61-00-49)

(11) Hartzell Lightweight Turbine Propellers with Composite Blades Owner's Manual 154 (61-00-54)

(12) Hartzell Four Blade Lightweight Turbine Propellers with Composite Blades Overhaul Manual 156A (61-10-56)

(13) Hartzell Five Blade Lightweight Turbine Propeller Overhaul Manual 158A (61-10-58)

(14) Hartzell Standard Practices Manual 202A (61-01-02)

(15) Hartzell Service Letter HC-SL-61-185

(16) Airplane Flight Manual (AFM)

(17) Airplane Flight Manual Supplement (AFMS)

(18) Aircraft Maintenance Manual (AMM)

2. Accomplishment Instructions

   A. Check the Airplane Flight Manual or Airplane Flight Manual Supplement to determine if there are any propeller RPM restrictions or limitations.

   B. Check the accuracy of the tachometer. Refer to Hartzell Service Letter HC-SL-61-185.

   C. Perform an engine run up and determine if the engine and/or propeller rigging permits operation of the propeller below the minimum specified propeller idle RPM.

      (1) If the propeller cannot be operated below the minimum specified propeller idle RPM, no further action is required.

      (2) If the propeller can be operated below the minimum specified propeller idle RPM:

         (a) Refer to Figure 1 for corrective action. Refer to the Example in Paragraph 2.C.(2)(b) for help when using Figure 1.

         (b) The corrective action is based on the amount the RPM is below the minimum propeller idle RPM and the total hours of operation the propeller has accumulated.

            NOTE: Figure 1 applies to an aircraft that is operated in conventional service. "Hours of Operation" refers to the total number of hours the propeller is operated on an engine that has an improper RPM setting; it is not the number of hours the propeller is operated in a restricted range, which will be less than the total hours of operation.

            Example: Minimum propeller idle RPM listed in the AMM is 1180 RPM
            Propeller idle is set at 1120 RPM
            Propeller has operated with a RPM deviation of **60 RPM**

            Engine was rigged 2 months ago and has operated since it was rigged **75 hours**

            Figure 1 shows that with an RPM deviation of 60 RPM for 75 hours - the blade, blade clamps (if applicable), and hub must be overhauled and engine rigging corrected before further flight.

(c) If the corrective action requires a propeller overhaul, the propeller must be overhauled in accordance with the appropriate propeller overhaul manuals.

(d) If the corrective action requires that the blades, blade clamps (if applicable), and hub be retired from service, these components must be retired from service in accordance with the Part Retirement Procedures chapter in Hartzell Standard Practices Manual 202A (61-01-02).

NOTE: Propeller hub, blade clamps (if applicable), and/or blades from an aircraft that is affected by this Service Letter are not to be removed and reused on another aircraft application.

(e) If the corrective action requires the correction of the propeller RPM setting, refer to the applicable installation and rigging instructions for the adjustment of engine torque, engine idle speed, and propeller RPM setting.

(f) Contact Hartzell Product Support Department to report the findings.

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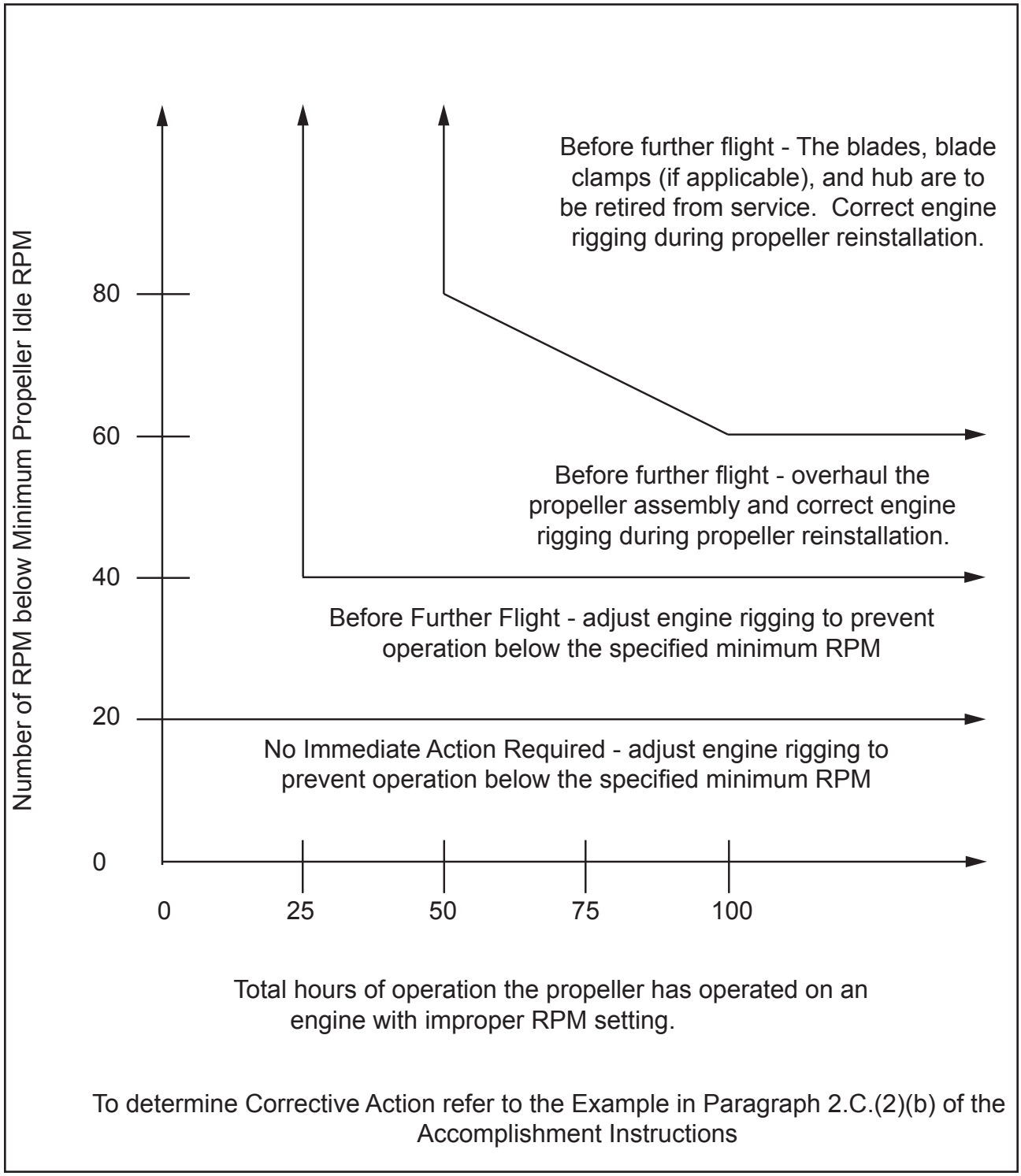

Corrective Action
Figure 1