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MANUAL REVISION TRANSMITTAL
Manual 115N (61-00-15)
Propeller Owner's Manual and Logbook

REVISION 23 dated February 2018

Attached is a copy of Revision 23 to Hartzell Propeller Inc.
Manual 115N.

Page Control Chart for Revision 23:

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**NOTE 1:** When the manual revision has been inserted in the manual, make a record of the information required on the Record of Revisions page in this manual.

**NOTE 2:** Pages distributed in this revision may include pages from previous revisions if they are on the opposite side of revised page. This is done as a convenience to those users who wish to print a two-sided copy of the new revision.
Propeller Owner's Manual and Logbook

“Compact” Models with Aluminum Blades

Constant Speed, Non-Counterweighted
( )HC - ( )( )Y( ) - 1( )

Constant Speed, Counterweighted
( )HC - ( )( )Y( ) - 4( )

Constant Speed and Feathering
( )HC - ( )( )Y( ) - 2( )

Constant Speed and Feathering, Turbine
( )HC - ( )( )Y( ) - 5( )

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Ph: 937-778-4379 (Product Support)
Product Support Fax: 937-778-4215
REVISION HIGHLIGHTS

Revision 23, dated February 2018, incorporates the following:

Front matter (Cover, Revision Highlights, etc.), has been revised to match this revision.

Minor language/format changes and renumbering, if applicable are marked with a revision bar, but are not listed below.

• INTRODUCTION
  • Revised the section, "General"
  • Revised the section, "Reference Publications"
  • Revised the section, "Definitions"
  • Revised the section, "Abbreviations"
  • Revised the section, "Hartzell Propeller Inc. Product Support"

• DESCRIPTION AND OPERATION
  • Revised Figure 2-4, "Cutaway of -5 Series Constant Speed, Feathering, Turbine Propeller ( )HC-( )( )Y( )-5( )"

• INSTALLATION AND REMOVAL
  • Revised the section, "One-Piece Spinner Dome Installation"
  • Added Figure 3-11, "UHMW Tape CM137 Location - Forward Bulkhead Bonded to the Spinner Dome"
  • Revised Table 3-5, "Spinner Dome and Spinner Cap Mounting Hardware"
  • Added Figure 3-12, "One-Piece Spinner Dome Installation with Removable Plastic Forward Bulkhead"
  • Added Figure 3-13, "Lock Nut 'A' Identification"
  • Revised the section, "Two-Piece Spinner Dome Installation"
  • Revised Figure 3-14, "Two-Piece Spinner Dome Installation - Procedure 1"
  • Revised Figure 3-15, "Two-Piece Spinner Dome Installation - Procedure 2"

• INSPECTION AND CHECK
  • Revised the section, "Periodic Inspections"
  • Revised the section, "Blade Track"
  • Revised the section, "Loose Blades"
  • Revised the section, "Corrosion"
  • Revised the section, "Spinner Damage"
  • Removed the section, "Tachometer Inspection"
• MAINTENANCE PRACTICES
  • Revised the section, "Lubrication"
  • Revised the section, "Painting After Repair"
  • Added warnings about adhesives and solvents where applicable
  • Revised the section, "Placement of Balance Weights for Dynamic Balance"
  • Revised the section, "Propeller Low Pitch Setting"
  • Incorporated Service Letter HC-SL-61-185, that added the section, "Tachometer Calibration"

• ANTI-ICE AND DE-ICE SYSTEMS
  • Revised the section, "Introduction"
  • Revised the section, "De-ice System Operational Checks"
  • Revised the section, "Anti-ice System Operational/Functional Checks"
  • Revised the section, "De-ice and Anti-ice System Inspections"
1. **Introduction**
   
   **A. General**
   
   (1) This is a list of current revisions that have been issued against this manual. Please compare it to the RECORD OF REVISIONS page to make sure that all revisions have been added to the manual.

   **B. Components**

   (1) Revision No. indicates the revisions incorporated in this manual.
   
   (2) Issue Date is the date of the revision.
   
   (3) Comments indicates the level of the revision.

   (a) New Issue is a new manual distribution. The manual is distributed in its entirety. All the page revision dates are the same and no change bars are used.

   (b) Reissue is a revision to an existing manual that includes major content and/or major format changes. The manual is distributed in its entirety. All the page revision dates are the same and no change bars are used.

   (c) Major Revision is a revision to an existing manual that includes major content or minor content changes over a large portion of the manual. The manual is distributed in its entirety. All the page revision dates are the same, but change bars are used to indicate the changes incorporated in the latest revision of the manual.

   (d) Minor Revision is a revision to an existing manual that includes minor content changes to the manual. Only the revised pages of the manual are distributed. Each page retains the date and the change bars associated with the last revision to that page.
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1. **Purpose**
   
   A. This manual has been reviewed and accepted by the FAA. Additionally, the Airworthiness Limitations Section of this manual has been approved by the FAA.

   **CAUTION:** KEEP THIS MANUAL WITH THE PROPELLER OR THE AIRCRAFT UPON WHICH IT IS INSTALLED AT ALL TIMES. THE LOGBOOK RECORD WITHIN THIS MANUAL MUST BE MAINTAINED, RETAINED CONCURRENTLY, AND BECOME A PART OF THE AIRCRAFT AND ENGINE SERVICE RECORDS.

   B. This manual supports Hartzell Propeller Inc. Constant Speed and Constant Speed Feathering Compact series propellers with aluminum blades.

   C. The purpose of this manual is to enable qualified personnel to install, operate, and maintain a Hartzell Propeller Inc. Constant Speed or Constant Speed Feathering Propeller. Separate manuals are available concerning overhaul procedures and specifications for the propeller.

   D. This manual includes several design types.

   (1) Sample propeller and blade model designation within each design are included in the Description and Operation chapter of this manual.

   1. Parentheses shown in the propeller model designations in this or other Hartzell Propeller Inc. publications indicate letter(s) and/or number(s) that may or may not be present because of different configurations permitted on the various aircraft installations.

   2. Definitions of propeller model designations and further details of letters that may be present are shown in the Description and Operation chapter of this manual.

   (2) All propeller models included in this manual use aluminum propeller blades. Propellers that use composite blades are supported by Hartzell Propeller Inc. Owner’s Manual 145 (61-00-45).
2. **Airworthiness Limitations**
   A. Refer to the Airworthiness Limitations chapter of this manual for Airworthiness Limits information.

3. **Airframe or Engine Modifications**
   A. Propellers are approved vibrationwise on airframe and engine combinations based on tests or analysis of similar installations. This data has demonstrated that propeller stress levels are affected by airframe configuration, airspeed, weight, power, engine configuration and approved flight maneuvers. Aircraft modifications that can effect propeller stress include, but are not limited to:  aerodynamic changes ahead of or behind the propeller, realignment of the thrust axis, increasing or decreasing airspeed limits, increasing or decreasing weight limits (less significant on piston engines), the addition of approved flight maneuvers (utility and aerobatic).

   B. Engine modifications can also affect the propeller. The two primary categories of engine modifications are those that affect structure and those that affect power. An example of a structural engine modification is the alteration of the crankshaft or damper of a piston engine. Any change to the weight, stiffness, or tuning of rotating components could result in a potentially dangerous resonant condition that is not detectable by the pilot. Most common engine modifications affect the power during some phase of operation. Some modifications increase the maximum power output, while others improve the power available during hot and high operation (flat rating) or at off-peak conditions. Examples of such engine modifications include, but are not limited to: changes to the compressor, power turbine or hot section of a turboprop engine; and on piston engines, the addition or alteration of a turbocharger or turbonormalizer, increased compression ratio, increased rpm, altered ignition timing, electronic ignition, full authority digital electronic controls (FADEC), or tuned induction or exhaust.

   C. All such modifications must be reviewed and approved by the propeller manufacturer prior to obtaining approval on the aircraft.
4. Restrictions and Placards
   A. The propellers included in this manual may have a restricted operating range that requires a cockpit placard.
      (1) The restrictions, if present, will vary depending on the propeller, blade, engine, and/or aircraft model.
      (2) Review the propeller and aircraft type certificate data sheet (TCDS), Pilot Operating Handbook (POH), and any applicable Airworthiness Directives for specific information.

5. General
   A. Personnel Requirements
      (1) Inspection, Repair, and Overhaul
         (a) Personnel performing maintenance are expected to have sufficient training and certifications (when required by the applicable Aviation Authority) to accomplish the work required in a safe and airworthy manner.
         (b) Compliance to the applicable regulatory requirements established by the Federal Aviation Administration (FAA) or foreign equivalent is mandatory for anyone performing or accepting responsibility for any inspection and/or repair and/or overhaul of any Hartzell Propeller Inc. product.
   B. Maintenance Practices
      (1) The propeller and its components are highly vulnerable to damage while they are removed from the engine. Properly protect all components until they are reinstalled on the engine.
      (2) Never attempt to move the aircraft by pulling on the propeller.
      (3) Avoid the use of blade paddles. Do not put the blade paddle in the area of the de-ice or anti-icing boot when applying torque to a blade assembly. Put the blade paddle in the thickest area of the blade, just outside of the de-ice or anti-icing boot. Use one blade paddle per blade.
      (4) Use only the approved consumables, e.g., cleaning agents, lubricants, etc.
(5) Safe Handling of Paints and Chemicals
   (a) Always use caution when handling or being exposed to paints and/or chemicals during propeller overhaul and maintenance procedures.

   (b) Before using paint or chemicals, always read the manufacturer's label on the container and follow specified instructions and procedures for storage, preparation, mixing, and application.

   (c) Refer to the product's Material Safety Data Sheet (MSDS) for detailed information about physical properties, health, and physical hazards of any chemical.

(6) Observe applicable torque values during maintenance.

(7) Approved corrosion protection followed by approved paint must be applied to all aluminum blades. For information about the application of corrosion protection and paint, refer to the Maintenance Practices chapter of this manual. Operation of blades without the specified coatings and finishes, i.e., “polished blades”, is not permitted.

(8) Before installing the propeller on the engine, the propeller must be statically balanced. New propellers are statically balanced at Hartzell Propeller Inc. Overhauled propellers must be statically balanced by a certified propeller repair station with the appropriate rating before return to service.

   (a) Dynamic balance is recommended, but may be accomplished at the discretion of the operator, unless specifically required by the airframe or engine manufacturer.

      1 Perform dynamic balance in accordance with the Maintenance Practices chapter of this manual.

      2 Additional procedures may be found in the aircraft maintenance manual.

(9) As necessary, use a soft, non-graphite pencil or crayon to make identifying marks on components.
(10) As applicable, follow military standard NASM33540 for safety wire, safety cable, and cotter pin general practices. Use 0.032 (0.81 mm) diameter stainless steel safety wire unless otherwise indicated.

**WARNING:**

DO NOT USE OBSOLETE OR OUTDATED INFORMATION. PERFORM ALL INSPECTIONS OR WORK IN ACCORDANCE WITH THE MOST RECENT REVISION OF THIS MANUAL. INFORMATION CONTAINED IN THIS MANUAL MAY BE SIGNIFICANTLY CHANGED FROM EARLIER REVISIONS. FAILURE TO COMPLY WITH THIS MANUAL OR THE USE OF OBSOLETE INFORMATION MAY CREATE AN UNSAFE CONDITION THAT MAY RESULT IN DEATH, SERIOUS BODILY INJURY, AND/OR SUBSTANTIAL PROPERTY DAMAGE. FOR THE MOST RECENT REVISION LEVEL OF THIS MANUAL, REFER TO THE HARTZELL PROPELLER INC. WEBSITE AT WWW.HARTZELLPROP.COM.

(11) The information in this manual revision supersedes data in all previously published revisions of this manual.

(12) The airframe manufacturer’s manuals should be used in addition to the information in this manual due to possible special requirements for specific aircraft applications.
(13) If the propeller is equipped with an ice protection system that uses components supplied by Hartzell Propeller Inc., applicable instructions and technical information for the components supplied by Hartzell Propeller Inc. can be found in the following publications available on the Hartzell Propeller Inc. website at www.hartzellprop.com:

(a) Hartzell Propeller Inc. Manual 180 (30-61-80) - Propeller Ice Protection System Manual

(b) Hartzell Propeller Inc. Manual 181 (30-60-81) - Propeller Ice Protection System Component Maintenance Manual

(c) Hartzell Propeller Inc. Manual 182 (61-12-82) - Propeller Electrical De-Ice Boot Removal and Installation Manual

(d) Hartzell Propeller Inc. Manual 183 (61-12-83) - Propeller Anti-Icing Boot Removal and Installation Manual

(14) Propeller ice protection system components not supplied by Hartzell Propeller Inc. are controlled by the applicable TC or STC holder’s Instructions for Continued Airworthiness (ICA).

C. Continued Airworthiness

(1) Operators are urged to stay informed of Airworthiness information using Hartzell Propeller Inc. Service Bulletins and Service Letters that are available from Hartzell Propeller Inc. distributors, or from the Hartzell Propeller Inc. by subscription. Selected information is also available on the Hartzell Propeller Inc. website at www.hartzellprop.com.
D. Propeller Critical Parts

(1) The following maintenance procedures may involve propeller critical parts. These procedures have been substantiated based on Engineering analysis that expects this product will be operated and maintained using the procedures and inspections provided in the Instructions for Continued Airworthiness (ICA) for this product. Refer to the Illustrated Parts List chapter of the applicable maintenance manual for the applicable propeller model for the identification of specific Critical Parts.

(2) Numerous propeller system parts can produce a propeller Major or Hazardous effect, even though those parts may not be considered as Critical Parts. The operating and maintenance procedures and inspections provided in the ICA for this product are, therefore, expected to be accomplished for all propeller system parts.
6. Reference Publications

A. Hartzell Propeller Inc. Publications

Active Hartzell Propeller Inc. Service Bulletins, Service Letters, Service Instructions, and Service Advisories.

Hartzell Propeller Inc. Manual 113B (61-10-13) - Compact and Lightweight Compact Non-Feathering (-1) and Aerobatic (-4) Propeller Overhaul and Maintenance Manual


B. References to Hartzell Propeller Inc. Publications

**NOTE:** Specific Hartzell Propeller Inc. manuals and service documents are available on the Hartzell website at www.hartzellprop.com. Refer to the section “Required Publications” in this chapter for the identification of these publications.

(1) Special tooling is required for procedures throughout this manual. For further tooling information, refer to Hartzell Propeller Inc. Illustrated Tool and Equipment Manual 165A (61-00-65).

(a) Tooling references appear with the prefix “TE” directly following the tool name to which they apply. For example, a template which is reference number 133 will appear as: template TE133.


(a) The reference number for consumable materials appear with the prefix “CM” directly following the material to which they apply. For example, an approved adhesive that is reference number 16 will appear as: approved adhesive CM16. Only those items specified may be used.
7. **Definitions**

A basic understanding of the following terms will assist in maintaining and operating Hartzell Propeller Inc. propeller systems.

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<td>Annealed</td>
<td>Softening of material due to overexposure to heat</td>
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<tr>
<td>Blade Angle</td>
<td>Measurement of blade airfoil location described as the angle between the blade airfoil and the surface described by propeller rotation</td>
</tr>
<tr>
<td>Brinelling</td>
<td>A depression caused by failure of the material in compression</td>
</tr>
<tr>
<td>Chord</td>
<td>A straight line distance between the leading and trailing edges of an airfoil</td>
</tr>
<tr>
<td>Cold Rolling</td>
<td>Compressive rolling process for the retention area of single shoulder blades which provides improved strength and resistance to fatigue</td>
</tr>
<tr>
<td>Constant Force</td>
<td>A force which is always present in some degree when the propeller is operating</td>
</tr>
<tr>
<td>Constant Speed</td>
<td>A propeller system which employs a governing device to maintain a selected engine RPM</td>
</tr>
<tr>
<td>Corrosion</td>
<td>Gradual material removal or deterioration due to chemical action</td>
</tr>
<tr>
<td>Crack</td>
<td>Irregularly shaped separation within a material, sometimes visible as a narrow opening at the surface</td>
</tr>
<tr>
<td>Depression</td>
<td>Surface area where the material has been compressed but not removed</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
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<td>-----------------------------</td>
<td>----------------------------------------------------------------------------</td>
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<tr>
<td>Distortion</td>
<td>Alteration of the original shape or size of a component</td>
</tr>
<tr>
<td>Erosion</td>
<td>Gradual wearing away or deterioration due to action of the elements</td>
</tr>
<tr>
<td>Exposure</td>
<td>Leaving material open to action of the elements</td>
</tr>
<tr>
<td>Feathering</td>
<td>The capability of blades to be rotated parallel to the relative wind, thus reducing aerodynamic drag</td>
</tr>
<tr>
<td>Gouge</td>
<td>Surface area where material has been removed</td>
</tr>
<tr>
<td>Hazardous Propeller Effect</td>
<td>The hazardous propeller effects are defined in Title 14 CFR section 35.15(g)(1)</td>
</tr>
<tr>
<td>Horizontal Balance</td>
<td>Balance between the blade tip and the center of the hub</td>
</tr>
<tr>
<td>Impact Damage</td>
<td>Damage that occurs when the propeller blade or hub assembly strikes, or is struck by, an object while in flight or on the ground</td>
</tr>
<tr>
<td>Major Propeller Effect</td>
<td>The major propeller effects are defined in Title 14 CFR section 35.15(g)(2)</td>
</tr>
<tr>
<td>Nick</td>
<td>Removal of paint and possibly a small amount of material</td>
</tr>
<tr>
<td>Onspeed</td>
<td>Condition in which the RPM selected by the pilot through the propeller control lever and the actual engine (propeller) RPM are equal</td>
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<tr>
<td>Overhaul</td>
<td>The periodic disassembly, inspection, repair, refinishing, and reassembly of a propeller assembly to maintain airworthiness</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
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<tr>
<td>Overspeed</td>
<td>Condition in which the RPM of the propeller or engine exceeds predetermined maximum limits; the condition in which the engine (propeller) RPM is higher than the RPM selected by the pilot through the propeller control lever</td>
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<tr>
<td>Overspeed Damage</td>
<td>Damage that occurs when the propeller hub assembly rotates at a speed greater than the maximum limit for which it is designed</td>
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<tr>
<td>Pitch</td>
<td>Same as “Blade Angle”</td>
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<tr>
<td>Pitting</td>
<td>Formation of a number of small, irregularly shaped cavities in surface material caused by corrosion or wear</td>
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<tr>
<td>Propeller Critical Part</td>
<td>A part on the propeller whose primary failure can result in a hazardous propeller effect, as determined by the safety analysis required by Title 14 CFR section 35.15</td>
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<tr>
<td>Reversing</td>
<td>The capability of rotating blades to a position to generate reverse thrust to slow the aircraft or back up</td>
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<tr>
<td>Scratch</td>
<td>See “Nick”</td>
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<tr>
<td>Single Acting</td>
<td>Hydraulically actuated propeller that utilizes a single oil supply for pitch control</td>
</tr>
<tr>
<td>Superseded</td>
<td>Parts that are considered airworthy for continued flight but may no longer be available</td>
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<tr>
<td>Synchronizing</td>
<td>Adjusting the RPM of all the propellers of a multi-engine aircraft to the same RPM</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Synchrophasing</td>
<td>A form of propeller synchronization in which not only the RPM of the engines (propellers) are held constant, but also the position of the propellers in relation to each other.</td>
</tr>
<tr>
<td>Track</td>
<td>In an assembled propeller, a measurement of the location of the blade tip with respect to the plane of rotation, used to verify face alignment and to compare blade tip location with respect to the locations of the other blades in the assembly.</td>
</tr>
<tr>
<td>Underspeed</td>
<td>The condition in which the actual engine (propeller) RPM is lower than the RPM selected by the pilot through the propeller control lever.</td>
</tr>
<tr>
<td>Variable Force</td>
<td>A force that may be applied or removed during propeller operation.</td>
</tr>
<tr>
<td>Vertical Balance</td>
<td>Balance between the leading and trailing edges of a two-blade propeller with the blades positioned vertically.</td>
</tr>
<tr>
<td>Windmilling</td>
<td>The rotation of an aircraft propeller caused by air flowing through it while the engine is not producing power.</td>
</tr>
</tbody>
</table>
## Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMM</td>
<td>Aircraft Maintenance Manual</td>
</tr>
<tr>
<td>AN</td>
<td>Air Force-Navy (or Army-Navy)</td>
</tr>
<tr>
<td>AOG</td>
<td>Aircraft on Ground</td>
</tr>
<tr>
<td>FAA</td>
<td>Federal Aviation Administration</td>
</tr>
<tr>
<td>Ft-Lb</td>
<td>Foot-Pound</td>
</tr>
<tr>
<td>ICA</td>
<td>Instructions for Continued Airworthiness</td>
</tr>
<tr>
<td>ID</td>
<td>Inside Diameter</td>
</tr>
<tr>
<td>In-Lb</td>
<td>Inch-Pound</td>
</tr>
<tr>
<td>IPS</td>
<td>Inches Per Second</td>
</tr>
<tr>
<td>kPa</td>
<td>Kilopascals</td>
</tr>
<tr>
<td>Lbs</td>
<td>Pounds</td>
</tr>
<tr>
<td>MIL-X-XXX</td>
<td>Military Specification</td>
</tr>
<tr>
<td>MPI</td>
<td>Major Periodic Inspection</td>
</tr>
<tr>
<td>MS</td>
<td>Military Standard</td>
</tr>
<tr>
<td>MSDS</td>
<td>Material Safety Data Sheet</td>
</tr>
<tr>
<td>NAS</td>
<td>National Aerospace Standards</td>
</tr>
<tr>
<td>NASM</td>
<td>National Aerospace Standards, Military</td>
</tr>
<tr>
<td>N•m</td>
<td>Newton-Meters</td>
</tr>
<tr>
<td>OD</td>
<td>Outside Diameter</td>
</tr>
<tr>
<td>POH</td>
<td>Pilot's Operating handbook</td>
</tr>
<tr>
<td>PSI</td>
<td>Pounds per Square Inch</td>
</tr>
<tr>
<td>RPM</td>
<td>Revolutions per Minute</td>
</tr>
<tr>
<td>STC</td>
<td>Supplemental Type Certificate</td>
</tr>
<tr>
<td>TBO</td>
<td>Time Between Overhaul</td>
</tr>
<tr>
<td>TC</td>
<td>Type Certificate</td>
</tr>
<tr>
<td>TSN</td>
<td>Time Since New</td>
</tr>
<tr>
<td>TSO</td>
<td>Time Since Overhaul</td>
</tr>
</tbody>
</table>

**NOTE:** TSN/TSO is considered as the time accumulated between rotation and landing, i.e., flight time.
9. **Hartzell Propeller Inc. Product Support**
   A. Hartzell Propeller Inc. is ready to assist you with questions about your propeller system. Hartzell Propeller Inc. Product Support may be reached during business hours (8:00 am through 5:00 pm, United States Eastern Time) at (937) 778-4379 or at (800) 942-7767, toll free from the United States and Canada. Hartzell Product Support can also be reached by fax at (937) 778-4215, and by e-mail at techsupport@hartzellprop.com.

   B. After business hours, you may leave a message on our 24 hour product support line at (937) 778-4376 or at (800) 942-7767, toll free from the United States and Canada. A technical representative will contact you during normal business hours. Urgent AOG support is available 24 hours per day, seven days per week via this message service.

   C. Additional information is available on the Hartzell Propeller Inc. website at www.hartzellprop.com.

   **NOTE:** When calling from outside the United States, dial (001) before dialing the above telephone numbers.

10. **Warranty Service**
   A. If you believe you have a warranty claim, it is necessary to contact Hartzell Propeller’s Warranty Administrator. Hartzell Propeller’s Warranty Administrator will provide a blank **Warranty Application** form. It is necessary to complete this form and return it to the Warranty Administrator for evaluation **before proceeding with repair or inspection work**. Upon receipt of this form, the Warranty Administrator will provide instructions on how to proceed. The Hartzell Propeller Inc. Warranty Administrator may be reached during business hours (8:00 am. through 5:00 pm., United States Eastern Time) at (937) 778-4379, or toll free from the United States and Canada at (800) 942-7767. Hartzell Propeller Inc. Warranty Administration can also be reached by fax, at (937) 778-4391, or by e-mail at warranty@hartzellprop.com.

   **NOTE:** When calling from outside the United States, dial (001) before dialing the above telephone numbers.
11. Hartzell Propeller Inc. Recommended Facilities

A. Hartzell Propeller Inc. recommends using Hartzell Propeller Inc. approved distributors and repair facilities for the purchase, repair and overhaul of Hartzell propeller assemblies or components.

B. Information about the Hartzell Propeller Inc. worldwide network of aftermarket distributors and approved repair facilities is available on the Hartzell website at www.hartzellprop.com.
C. Constant Speed, Counterweighted (Aerobatic) Propellers

(1) Refer to Figure 2-3. The -4 Series propellers are constant speed propellers in which blade mounted counterweight forces act to move the blades to high pitch. This model series is not equipped with an air charge and does not feather. The blade centrifugal twisting moment acts to move the blades to low blade angle (low pitch), but the counterweights are large enough to neutralize this force and produce a net increase in blade angle. Oil pressure against a propeller mounted hydraulic piston opposes the counterweight forces to move the blades to low pitch.

(2) The action of the counterweights tends to move the blades to a high blade angle (high pitch), reducing engine RPM. Oil pressure toward low pitch increases engine RPM.

(3) If oil pressure is lost at any time, the propeller will move to high pitch to avoid overspeeding. Movement to high pitch occurs because the blade counterweights are no longer opposed by hydraulic oil pressure. The blade counterweights are then free to increase blade pitch toward the high pitch stop.
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If the propeller is equipped with an ice protection system that uses components supplied by Hartzell Propeller Inc., applicable instructions and technical information for the components supplied by Hartzell Propeller Inc. can be found in the following publications available on the Hartzell Propeller Inc. website at www.hartzellprop.com:

(a) Manual 180 (30-61-80) - Propeller Ice Protection System Manual
(b) Manual 181 (30-60-81) - Propeller Ice Protection System Component Maintenance Manual
(c) Manual 182 (61-12-82) - Propeller Electrical De-ice Boot Removal and Installation Manual
(d) Manual 183 (61-12-83) - Propeller Anti-icing Boot Removal and Installation Manual

Propeller ice protection system components not supplied by Hartzell Propeller Inc. are controlled by the applicable TC or STC holder’s Instructions for Continued Airworthiness (ICA).

Install the propeller spinner dome in accordance with the section “Spinner Installation” in this chapter.
5. **Damper Installation**

   A. **Installation of C-1576 Damper (Hartzell Propeller Inc. Kit A-1583)**

   **CAUTION:** USE WITH A-2476-16 SPINNER MOUNTING KIT ONLY.

   (1) Use the A-2476-16 spinner mounting kit when installing the C-1576 damper assembly (Figure 3-10).

   (a) Remove four of the B-3834-0663 washers from the A-2476-16 spinner mounting kit when installing the C-1576 damper assembly.

   (2) Install the propeller spinner dome and cap in accordance with the section “Spinner Installation” in this chapter.

---

**Damper Installation**

**Figure 3-10**

Diagram showing the components involved in the damper installation, including washers, nuts, bolts, and spacers.
6. One-Piece Spinner Dome Installation

CAUTION: TO PREVENT DAMAGE TO THE BLADE AND BLADE PAINT, WRAP THE BLADE SHANKS IN SEVERAL LAYERS OF MASKING OR DUCT TAPE BEFORE INSTALLING THE SPINNER DOME. REMOVE THE TAPE AFTER THE SPINNER IS INSTALLED.

CAUTION 2: THE SPINNER DOME WILL WOBBLE IF NOT ALIGNED PROPERLY. THIS MAY AFFECT THE DYNAMIC BALANCE OF THE PROPELLER.

NOTE 1: The following instructions relate to Hartzell Propeller Inc. spinners only. In some cases, the airframe manufacturer produced the spinner assembly. If so, refer to the airframe manufacturer’s manual for spinner installation instructions.

NOTE 2: There are three types of one-piece spinner domes used on Hartzell Compact-series propellers:
• Spinner Dome without a Forward Bulkhead
• Spinner Dome with a Bonded Forward Bulkhead
• Spinner Dome with a Removable Forward Bulkhead

NOTE 3: A forward bulkhead is an internal support that that encircles the propeller cylinder.

NOTE 4: Refer to the applicable installation instructions for the type of dome/forward bulkhead being installed.
A. Installation of a One-Piece Spinner Dome without a Forward Bulkhead

(1) Examine the low pitch stop hardware configuration.
   (a) If the visual examination shows that the hardware configuration is one hex nut safety wired to a set screw, no further action is required.
   (b) If the visual examination shows that the hardware configuration is not one hex nut safety wired to a set screw, modify the propeller assembly to the hardware configuration of one hex nut safety wired to a set screw in accordance with the section “Modification of the Low Pitch Stop Hardware” in the Maintenance Practices chapter of this manual.

(2) Install the spinner dome.
   (a) If anti-ice travel tubes are installed:

   **CAUTION:** THE TRAVEL TUBES MUST NOT TOUCH THE SPINNER DOME BLADE CUTOUT.

   1. Make sure there is clearance between the travel tubes and the spinner dome blade cutouts.

   **CAUTION:** MAKE SURE OF PROPER THREAD ENGAGEMENT FOR THE SCREWS IN THE NUTPLATES. APPROXIMATELY 1 TO 1 1/2 THREADS MUST EXTEND PAST THE BULKHEAD NUTPLATES. TO AVOID DAMAGING THE AIRCRAFT COWLING, THE SCREWS MUST NOT EXTEND MORE THAN THREE THREADS PAST THE BULKHEAD NUTPLATES.

(3) Attach the spinner dome to the spinner bulkhead with the supplied screws and washers. Refer to Table 3-5.
   (a) If correct thread engagement cannot be achieved:

   1. The B-3845-8 screws are supplied with the spinner assembly. The B-3845-8 is 0.500 inch (12.70 mm) in length.
   2. The B-3845-9 screw may be used if correct thread engagement cannot be achieved. The B-3845-9 screw is 0.562 inch (14.27 mm) in length.
B. Installation of a One-Piece Spinner Dome with a Bonded Metal Forward Bulkhead

(1) Examine the low pitch stop hardware configuration.

(a) If the visual examination shows that the hardware configuration is one hex nut safety wired to a set screw, no further action is required.

(b) If the visual examination shows that the hardware configuration is not one hex nut safety wired to a set screw, modify the propeller assembly to the hardware configuration of one hex nut safety wired to a set screw in accordance with the section “Modification of the Low Pitch Stop Hardware” in the Maintenance Practices chapter of this manual.
(2) Install the spinner dome.

**CAUTION:** THE FORWARD BULKHEAD MUST FIT SNUGLY ON THE CYLINDER. AN IMPROPERLY SUPPORTED DOME COULD CAUSE CYLINDER DAMAGE OR A CRACK IN THE DOME OR BULKHEAD.

(3) Make sure there is a snug fit where the forward bulkhead touches the cylinder.

(a) If the forward bulkhead fits snugly on the cylinder, go to step 6.A.(4).

(b) If the forward bulkhead does not fit snugly on the cylinder, apply UHMW tape CM137 in accordance with the following steps.

1. **Option 1:** Apply UHMW tape CM137 around the cylinder.
   a. Wrap one or more layers of UHMW tape CM137 around the cylinder until the forward bulkhead fits snugly on the cylinder.

2. **Option 2:** Apply UHMW tape CM137 to the forward bulkhead.
   a. Cut pieces of UHMW tape CM137 that are approximately 2.5 inches (63 mm) long.
   b. Install the pieces of UHMW tape CM137 in equally spaced locations on the forward bulkhead as shown in Figure 3-11.
   c. If necessary, install additional layers of UHMW tape CM137 until the forward bulkhead fits snugly on the cylinder.

(c) If anti-ice travel tubes are installed:

**CAUTION:** THE TRAVEL TUBES MUST NOT TOUCH THE SPINNER DOME BLADE CUTOUT.

1. Make sure there is clearance between the travel tubes and the spinner dome blade cutouts.

CAUTION: MAKE SURE OF PROPER THREAD ENGAGEMENT FOR THE SCREWS IN THE NUTPLATES. APPROXIMATELY 1 TO 1 1/2 THREADS MUST EXTEND PAST THE BULKHEAD NUTPLATES. TO AVOID DAMAGING THE AIRCRAFT COWLING, THE SCREWS MUST NOT EXTEND MORE THAN THREE THREADS PAST THE BULKHEAD NUTPLATES.

(4) Attach the spinner to the spinner bulkhead with the supplied screws and washers. Refer to Table 3-5.

(a) If correct thread engagement cannot be achieved:

1. The B-3845-8 screws are supplied with the spinner assembly. The B-3845-8 is 0.500 inch (12.70 mm) in length.

2. The B-3845-9 screw may be used if correct thread engagement cannot be achieved. The B-3845-9 screw is 0.562 inch (14.27 mm) in length.

(5) If the spinner loosens in service, add one or more layers of UHMW tape to the cylinder until the spinner fits snugly.

<table>
<thead>
<tr>
<th>Spinner Dome/Cap</th>
<th>Washer</th>
<th>Screw</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metal Dome</td>
<td>A-1020</td>
<td>B-3845-8 10-32, Truss Head</td>
</tr>
<tr>
<td></td>
<td>Washer, Fiber</td>
<td></td>
</tr>
<tr>
<td>Metal Cap</td>
<td>n/a</td>
<td>B-3866-50 8-32, 100° Head, Cres.</td>
</tr>
<tr>
<td>Composite Dome</td>
<td>B-3860-10L</td>
<td>B-3867-272 10-32, 100° Head, Cres.</td>
</tr>
<tr>
<td></td>
<td>Dimpled, 100°, Cres.</td>
<td></td>
</tr>
</tbody>
</table>

Spinner Dome and Spinner Cap Mounting Hardware
Table 3-5
One-Piece Spinner Dome Installation with Removable Plastic Forward Bulkhead

Figure 3-12

- Spinner Shims
- UHMW Tape CM137
- Plastic Adapter
- Plastic Forward Bulkhead

Mounting holes misaligned approximately 50% in the direction of the arrow

Misalignment must be away from the bulkhead
C. Installation of a One-Piece Spinner Dome with a Removable Plastic Forward Bulkhead

(1) Put the plastic adapter on the cylinder with the radiused side of the adapter against the raised surface on the cylinder as shown in Figure 3-12.

(2) Put ten spinner shims on top of the plastic adapter.

NOTE: The spinner shims are used to adjust the spinner dome preload. Shims can be added or removed after pre-fitting the spinner dome later in this procedure.

(3) Put the forward bulkhead over the cylinder on top of the spinner shims.

CAUTION: THE FORWARD BULKHEAD MUST FIT SNUGLY ON THE CYLINDER. AN IMPROPERLY SUPPORTED DOME COULD CAUSE CYLINDER DAMAGE OR A CRACK IN THE DOME OR BULKHEAD.

(4) Make sure the forward bulkhead fits snugly on the cylinder.

(a) If the forward bulkhead fits snugly on the cylinder, go to step 6.B.(5).

(b) If the forward bulkhead does not fit snugly on the cylinder, apply UHMW tape CM137 in accordance with the following steps.

1. Option 1: Apply UHMW tape CM137 around the ID of the forward bulkhead that fits over the cylinder.
   a. Install 2 inch (50 mm) strips of UHMW tape CM137 in equally spaced locations around the ID of the forward bulkhead as shown in Figure 3-12.
   b. If necessary, install additional layers of UHMW tape CM137 until the forward bulkhead fits snugly on the cylinder.

2. Option 2: Apply UHMW tape CM137 around the cylinder.
   a. Wrap one or more layers of UHMW tape CM137 around the cylinder until the forward bulkhead fits snugly on the cylinder.
(5) Install the spinner dome and gently push the dome as far as it will go onto the bulkhead.
   (a) If anti-ice travel tubes are installed:

   **CAUTION:** THE TRAVEL TUBES MUST NOT TOUCH THE SPINNER DOME BLADE CUTOUT.

   1 Make sure there is clearance between the travel tubes and the spinner dome blade cutouts.
   2 Make adjustments to the position of the travel tubes in accordance to Hartzell Propeller Inc. Manual 180 (30-61-80).

(6) Examine the alignment of the mounting holes in the spinner dome and the bulkhead.
   (a) Approximately 50% of the diameter of each bulkhead mounting hole must be visible through the spinner dome mounting holes.

   **NOTE:** The temporary misalignment of the mounting holes is necessary to get the proper preload of the spinner dome.

   (b) If the mounting hole position is correct, go to step 6.B.(7).
   (c) If the mounting hole position is incorrect, add/remove spinner shims to get proper alignment.
CAUTION: MAKE SURE OF PROPER THREAD ENGAGEMENT FOR THE SCREWS IN THE NUTPLATES. APPROXIMATELY 1 TO 1 1/2 THREADS MUST EXTEND PAST THE BULKHEAD NUTPLATES. TO AVOID DAMAGING THE AIRCRAFT COWLING, THE SCREWS MUST NOT EXTEND MORE THAN 3 THREADS PAST THE BULKHEAD NUTPLATES.

(7) Attach the spinner dome to the spinner bulkhead with the supplied screws and washers. Refer to Table 3-5.

(a) Install a screw/washer between each blade opening at evenly spaced locations around the spinner dome.

1 Push on the spinner dome to get full alignment of the mounting holes when installing screws.

(b) Install the remaining screws/washers.

(c) Make sure that the screws do not extend more than three threads past the bulkhead nutplates.

1 If correct thread engagement cannot be achieved:
   
   a The B-3845-8 screws are supplied with the spinner assembly. The B-3845-8 is 0.500 inch (12.70 mm) in length.

   b The B-3845-9 screw can be used if correct thread engagement cannot be achieved. The B-3845-9 screw is 0.562 inch (14.27 mm) in length.

(8) If the spinner loosens in service, add one or more layers of UHMW tape to the forward bulkhead or cylinder until the spinner fits snugly.
If Lock Nut “A” has a step, use Installation Procedure 1

If Lock Nut “A” is flat, use Installation Procedure 2

Lock Nut “A” Identification
Figure 3-13
7. **Two-Piece Spinner Dome Installation**

**CAUTION:** TO PREVENT DAMAGE TO THE BLADE AND BLADE PAINT, WRAP THE BLADE SHANKS IN SEVERAL LAYERS OF MASKING OR DUCT TAPE BEFORE INSTALLING THE SPINNER DOME. REMOVE THE TAPE AFTER THE SPINNER IS INSTALLED.

**CAUTION 2:** THE SPINNER DOME WILL WOBBLE IF NOT ALIGNED PROPERLY. THIS MAY AFFECT THE DYNAMIC BALANCE OF THE PROPELLER.

**NOTE 1:** The following instructions relate to Hartzell Propeller Inc. spinners only. In some cases, the airframe manufacturer produced the spinner assembly. If so, refer to the airframe manufacturer’s manual for spinner installation instructions.

**NOTE 2:** There are two different procedures for installing two-piece spinner domes used on Compact-series propellers. Examine the lock nut “A” at the top of the cylinder, then refer to Figure 3-13 to determine the applicable installation procedure for the two-piece spinner dome.

A. **Installation Procedure 1**

   (1) General

   (a) A spinner dome that is installed using Procedure 1 can be identified by the lock nut “A” at the top of the cylinder. The lock nut “A” will have a “step” facing away from the cylinder as shown in Figure 3-13.

      1 Lock nut “A” may have drilled holes for safety wire, but safety wire is not required in this location.

   (2) Install the spinner dome.

      (a) Push the spinner dome toward the bulkhead to align the spinner mounting holes with those of the bulkhead.
(b) If anti-ice travel tubes are installed:

**CAUTION:** THE TRAVEL TUBES MUST NOT TOUCH THE SPINNER DOME BLADE CUTOUT.

1. Make sure there is clearance between the travel tubes and the spinner dome blade cutouts.


(3) Using the supplied screws and washers, attach the spinner dome to the spinner bulkhead. Refer to Table 3-5.

   (a) Install a screw/washer in each of the one or two holes centered between two blade cutouts.

   (b) Tighten the screw(s) until snug.

   (c) Install a screw/washer in each of the one or two holes centered between two blade cutouts on the opposite side of the spinner dome.

   (d) Tighten the screw(s) until snug.

   (e) Install the screws/washers in the holes centered between two blade cutouts for the remaining areas.

   (f) Tighten the screw(s) until snug.

   (g) Install the remaining screws/washers in the remaining holes.

   (h) Tighten the screws until snug.
(4) Install the lock nut “B” on the low pitch stop in accordance with Figure 3-14.
   
   (a) Refer to Table 3-1 and Figure 3-1 for lock nut torque.

(5) Safety wire the lock nut “B” to each of the two screws on the flat face of the spinner dome surrounding the lock nut “B”.

   **CAUTION:** MAKE SURE THAT THE SCREWS DO NOT EXTEND MORE THAN THREE THREADS PAST THE BULKHEAD NUTPLATES. IF THE SCREWS EXTEND MORE THAN THREE THREADS, THIS CAN CAUSE DAMAGE TO THE AIRCRAFT COWLING.

(6) Using flat head screws, attach the spinner dome cap to the spinner dome. Refer to Table 3-5.
Two-Piece Spinner Dome Installation - Procedure 2
Figure 3-15
B. Installation Procedure 2

(1) General

(a) A spinner dome that is installed using Procedure 2 can identified by the lock nut “A” at the top of the cylinder. The lock nut “A” will be flat as shown in Figure 3-15.

1 Lock nut “A” may have drilled holes for safety wire, but safety wire is not required in this location.

(2) Put spacers on the low pitch stop lock nut “A” in accordance with Figure 3-15.

(a) Up to eight spacers may be used.

(3) Install spacers, then examine the spinner fit. The spinner is correctly spaced when the holes in the spinner dome are misaligned 1/4 - 1/3 of their diameter toward the front of the aircraft, or rear in a pusher installation. Refer to Figure 3-15.

(a) Add or remove spacers to achieve this alignment.

(4) Install spinner dome.

(5) Push the spinner dome aft to align the spinner mounting holes with those of the bulkhead or adapter ring.

(a) If anti-ice travel tubes are installed:

CAUTION: THE TRAVEL TUBES MUST NOT TOUCH THE SPINNER DOME BLADE CUTOUT.

1 Make sure there is clearance between the travel tubes and the spinner dome blade cutouts.

2 Make adjustments to the position of the travel tubes in accordance to Hartzell Propeller Inc. Manual 180 (30-61-80).
CAUTION: MAKE SURE THAT THE SCREWS DO NOT EXTEND MORE THAN THREE THREADS PAST THE BULKHEAD NUTPLATES. IF THE SCREWS EXTEND MORE THAN THREE THREADS, THIS CAN CAUSE DAMAGE TO THE AIRCRAFT COWLING.

(6) Using the supplied screws and washers, attach the spinner dome to the spinner bulkhead. Refer to Table 3-5.

(a) Install a screw/washer in each of the one or two holes centered between two blade cutouts on one side of the dome.

(b) Tighten the screw(s) until snug.

(c) Install a screw/washer in each of the one or two holes centered between two blade cutouts on the opposite side of the spinner dome.

(d) Tighten the screw(s) until snug.

(e) Install the screws/washers in the holes centered between two blade cutouts for the remaining areas.

(f) Tighten the screw(s) until snug.

(g) Install the remaining screws/washers in the remaining holes.

(h) Tighten the screws until snug.

(7) Install the lock nut “B” on the low pitch stop with the step facing the cylinder as shown in Figure 3-15.

(a) Torque lock nut “B” in accordance with Table 3-1 and Figure 3-1.

(8) Safety wire the lock nut to each of the two screws on the flat face of the spinner dome surrounding the lock nut “B”.

(9) Using flat head screws, attach the spinner dome cap to the spinner dome.
8. **Post-Installation Checks**
   A. Perform Static RPM Check as outlined in the Testing and Troubleshooting chapter in this manual.

9. **Spinner Removal**
   
   **CAUTION:** WRAP THE BLADE SHANKS IN SEVERAL LAYERS OF MASKING OR DUCT TAPE BEFORE REMOVING THE SPINNER DOME TO PREVENT DAMAGING THE BLADE AND BLADE PAINT.

   A. **Removal of One-Piece Spinner**
      1. Remove the screws and washers that attach the spinner to the spinner bulkhead or adapter ring.
      2. Remove the spinner dome.

   B. **Removal of Two-Piece Spinner**
      1. Remove the flat head screws that attach the spinner dome cap to the spinner dome.
      2. Cut and remove the lock nut safety wire.
      3. Remove the lock nut.
      4. Remove the screws and washers that attach the spinner dome to the spinner bulkhead.
      5. Remove the spinner dome.

   C. **Hub Mounted Spinner Bulkhead Removal**
      1. Remove propeller. Refer to Propeller Removal in this chapter.
      2. Remove the flat washers and self-locking nuts that attach the spinner bulkhead to the propeller hub.
         Remove the spinner bulkhead.
      3. Reinstall the flat washers and self-locking nuts that were removed during the spinner bulkhead removal.

   D. **Starter Ring Gear Spinner Adapter Removal**
      1. Remove propeller. Refer to Propeller Removal in this chapter.
      2. Remove the spinner adapter by removing the hardware that attaches the spinner adapter to the starter ring gear.
10. Propeller Removal

A. Removal of “D” Flange Propellers

(1) Remove the spinner dome in accordance with the Spinner Removal procedures in this chapter.

(2) If the propeller is equipped with an ice protection system that uses components supplied by Hartzell Propeller Inc., applicable instructions and technical information for the components supplied by Hartzell Propeller Inc. can be found in the following publications available on the Hartzell Propeller Inc. website at www.hartzellprop.com:

(a) Hartzell Propeller Inc. Manual 180 (30-61-80) - Propeller Ice Protection System Manual

(b) Hartzell Propeller Inc. Manual 181 (30-60-81) - Propeller Ice Protection System Component Maintenance Manual

(c) Hartzell Propeller Inc. Manual 182 (61-12-82) - Propeller Electrical De-Ice Boot Removal and Installation Manual

(d) Hartzell Propeller Inc. Manual 183 (61-12-83) - Propeller Anti-Icing Boot Removal and Installation Manual

(3) Propeller ice protection system components not supplied by Hartzell Propeller Inc. are controlled by the applicable TC or STC holder’s Instructions for Continued Airworthiness (ICA).

(4) If installed, cut and remove the safety wire or safety cable on the propeller mounting studs.

WARNING: MAKE SURE THE SLING IS RATED UP TO 800 LBS. (363 KG) TO SUPPORT THE WEIGHT OF THE PROPELLER ASSEMBLY DURING REMOVAL.

(5) Support the propeller assembly with a sling.

NOTE: Supporting the propeller with the sling may be delayed until all but two mounting nuts and spacers have been removed.
(6) If the propeller will be reinstalled and it has been dynamically balanced, make an identifying mark (with a felt-tipped pen only) on the propeller hub and a matching mark on the engine flange to make sure of correct positioning of the propeller during re-installation.

**NOTE:** This will prevent dynamic imbalance.

**CAUTION:** DISCARD THE PROPELLER MOUNTING NUTS AND SPACERS IF THEY ARE DAMAGED OR CORRODED, OR WHEN THE PROPELLER IS REMOVED FOR OVERHAUL.

(7) Remove the eight 1/2 inch mounting nuts.

(a) If the propeller is removed between overhaul intervals, mounting studs, nuts, and spacers may be reused if they are not damaged or corroded.

**CAUTION:** REMOVE THE PROPELLER FROM THE MOUNTING FLANGE WITH CARE TO PREVENT DAMAGING THE PROPELLER MOUNTING STUDS.

(8) Using the support sling, remove the propeller from the mounting flange.

(9) Put the propeller on a cart for transport.
B. Removal of “F” Flange Propellers

(1) Remove the spinner dome in accordance with the Spinner Removal procedures in this chapter.

(2) If the propeller is equipped with an ice protection system that uses components supplied by Hartzell Propeller Inc., applicable instructions and technical information for the components supplied by Hartzell Propeller Inc. can be found in the following publications available on the Hartzell Propeller Inc. website at www.hartzellprop.com:

(a) Hartzell Propeller Inc. Manual 180 (30-61-80) - Propeller Ice Protection System Manual

(b) Hartzell Propeller Inc. Manual 181 (30-60-81) - Propeller Ice Protection System Component Maintenance Manual

(c) Hartzell Propeller Inc. Manual 182 (61-12-82) - Propeller Electrical De-Ice Boot Removal and Installation Manual

(d) Hartzell Propeller Inc. Manual 183 (61-12-83) - Propeller Anti-Icing Boot Removal and Installation Manual

(3) Propeller ice protection system components not supplied by Hartzell Propeller Inc. are controlled by the applicable TC or STC holder’s Instructions for Continued Airworthiness (ICA).

(4) If installed, cut and remove the safety wire or safety cable on the propeller mounting studs.

**WARNING:** MAKE SURE THE SLING IS RATED UP TO 800 LBS. (363 KG) TO SUPPORT THE WEIGHT OF THE PROPELLER ASSEMBLY DURING REMOVAL.

(5) Support the propeller assembly with a sling.

**NOTE:** Supporting the propeller with the sling may be delayed until all but two mounting nuts and washers have been removed.
(6) If the propeller will be reinstalled and it has been dynamically balanced, make an identifying mark (with a felt-tipped pen only) on the propeller hub and a matching mark on the engine flange to make sure of correct positioning of the propeller during re-installation.

**NOTE:** This will prevent dynamic imbalance.

**CAUTION:** DISCARD THE PROPELLER MOUNTING NUTS AND WASHERS IF THEY ARE DAMAGED OR CORRODED, OR WHEN THE PROPELLER IS REMOVED FOR OVERHAUL.

(7) Remove the six 1/2 inch mounting nuts.

(a) If the propeller is removed between overhaul intervals, mounting studs, nuts and washers may be reused if they are not damaged or corroded.

**CAUTION:** REMOVE THE PROPELLER FROM THE MOUNTING FLANGE WITH CARE TO PREVENT DAMAGING THE PROPELLER MOUNTING STUDS.

(8) Using the support sling, remove the propeller from the mounting flange.

(9) Put the propeller on a cart for transport.
C. Removal of “N” Flange Propellers

(1) Remove the spinner dome in accordance with the Spinner Removal procedures in this chapter.

(2) If the propeller is equipped with an ice protection system that uses components supplied by Hartzell Propeller Inc., applicable instructions and technical information for the components supplied by Hartzell Propeller Inc. can be found in the following publications available on the Hartzell Propeller Inc. website at www.hartzellprop.com:

(a) Hartzell Propeller Inc. Manual 180 (30-61-80) - Propeller Ice Protection System Manual
(b) Hartzell Propeller Inc. Manual 181 (30-60-81) - Propeller Ice Protection System Component Maintenance Manual
(c) Hartzell Propeller Inc. Manual 182 (61-12-82) - Propeller Electrical De-Ice Boot Removal and Installation Manual
(d) Hartzell Propeller Inc. Manual 183 (61-12-83) - Propeller Anti-Icing Boot Removal and Installation Manual

(3) Propeller ice protection system components not supplied by Hartzell Propeller Inc. are controlled by the applicable TC or STC holder’s Instructions for Continued Airworthiness (ICA).

(4) If installed, cut and remove the safety wire or safety cable on the propeller mounting studs.

**WARNING:** MAKE SURE THE SLING IS RATED UP TO 800 LBS. (363 KG) TO SUPPORT THE WEIGHT OF THE PROPELLER ASSEMBLY DURING REMOVAL.

(5) Support the propeller assembly with a sling.

**NOTE:** Supporting the propeller with the sling may be delayed until all but two mounting studs and washers have been removed.
(6) If the propeller will be reinstalled and it has been dynamically balanced, make an identifying mark (with a felt-tipped pen only) on the propeller hub and a matching mark on the engine flange to make sure of correct positioning of the propeller during re-installation.

NOTE: This will prevent dynamic imbalance.

CAUTION: DISCARD THE PROPELLER MOUNTING NUTS AND WASHERS IF THEY ARE DAMAGED OR CORRODED, OR WHEN THE PROPELLER IS REMOVED FOR OVERHAUL.

(7) Remove the eight 9/16 inch mounting nuts.

(a) If the propeller is removed between overhaul intervals, mounting studs, nuts and washers may be reused if they are not damaged or corroded.

CAUTION: REMOVE THE PROPELLER FROM THE ENGINE MOUNTING FLANGE WITH CARE TO PREVENT DAMAGING THE PROPELLER MOUNTING STUDS.

(8) Using the support sling, remove the propeller from the mounting flange.

(9) Put the propeller on a cart for transport.
D. Removal of “L” Flange Propellers, Except Model HC-E2YL-( )

(1) Remove the spinner dome in accordance with the Spinner Removal procedures in this chapter.

(2) If the propeller is equipped with an ice protection system that uses components supplied by Hartzell Propeller Inc., applicable instructions and technical information for the components supplied by Hartzell Propeller Inc. can be found in the following publications available on the Hartzell Propeller Inc. website at www.hartzellprop.com:

(a) Hartzell Propeller Inc. Manual 180 (30-61-80) - Propeller Ice Protection System Manual
(b) Hartzell Propeller Inc. Manual 181 (30-60-81) - Propeller Ice Protection System Component Maintenance Manual
(c) Hartzell Propeller Inc. Manual 182 (61-12-82) - Propeller Electrical De-Ice Boot Removal and Installation Manual
(d) Hartzell Propeller Inc. Manual 183 (61-12-83) - Propeller Anti-Icing Boot Removal and Installation Manual

(3) Propeller ice protection system components not supplied by Hartzell Propeller Inc. are controlled by the applicable TC or STC holder’s Instructions for Continued Airworthiness (ICA).

(4) If installed, cut and remove the safety wire or safety cable on the propeller mounting stud nuts.

WARNING: MAKE SURE THE SLING IS RATED UP TO 800 LBS. (363 KG) TO SUPPORT THE WEIGHT OF THE PROPELLER ASSEMBLY DURING REMOVAL.

(5) Support the propeller assembly with a sling.

(6) If the propeller will be reinstalled and it has been dynamically balanced, make an identifying mark (with a felt-tipped pen only) on the propeller hub and a matching mark on the engine flange to make sure of correct positioning of the propeller during re-installation.

NOTE: This will prevent dynamic imbalance.
CAUTION: DISCARD THE PROPELLER MOUNTING STUDS, NUTS, AND WASHERS IF THEY ARE DAMAGED OR CORRODED, OR WHEN THE PROPELLER IS REMOVED FOR OVERHAUL.

(7) Unscrew the six 7/16 inch mounting studs from the engine bushings.
   (a) If the propeller is removed between overhaul intervals, mounting studs, nuts and washers may be reused if they are not damaged or corroded.

CAUTION: REMOVE THE PROPELLER FROM THE ENGINE MOUNTING FLANGE WITH CARE TO PREVENT DAMAGING THE PROPELLER MOUNTING STUDS.

(8) Using the support sling, remove the propeller from the mounting flange.
(9) Put the propeller on a cart for transport.
E. Removal of HC-E2YL-( ) Propellers

(1) Remove the spinner dome in accordance with the Spinner Removal procedures in this chapter.

(2) If the propeller is equipped with an ice protection system that uses components supplied by Hartzell Propeller Inc., applicable instructions and technical information for the components supplied by Hartzell Propeller Inc. can be found in the following publications available on the Hartzell Propeller Inc. website at www.hartzellprop.com:

(a) Hartzell Propeller Inc. Manual 180 (30-61-80) - Propeller Ice Protection System Manual
(b) Hartzell Propeller Inc. Manual 181 (30-60-81) - Propeller Ice Protection System Component Maintenance Manual
(c) Hartzell Propeller Inc. Manual 182 (61-12-82) - Propeller Electrical De-Ice Boot Removal and Installation Manual
(d) Hartzell Propeller Inc. Manual 183 (61-12-83) - Propeller Anti-Icing Boot Removal and Installation Manual

(3) Propeller ice protection system components not supplied by Hartzell Propeller Inc. are controlled by the applicable TC or STC holder’s Instructions for Continued Airworthiness (ICA).

(4) If installed, cut and remove the safety wire or safety cable on the propeller mounting stud nuts.

WARNING: MAKE SURE THE SLING IS RATED UP TO 800 LBS. (363 KG) TO SUPPORT THE WEIGHT OF THE PROPELLER ASSEMBLY DURING REMOVAL.

(5) Support the propeller assembly with a sling.

(6) If the propeller will be reinstalled and it has been dynamically balanced, make an identifying mark (with a felt-tipped pen only) on the propeller hub and a matching mark on the engine flange to make sure of correct positioning of the propeller during re-installation.

NOTE: This will prevent dynamic imbalance.
CAUTION: DISCARD THE PROPELLER MOUNTING STUDS, NUTS, OR BOLTS IF THEY ARE DAMAGED OR CORRODED, OR WHEN THE PROPELLER IS REMOVED FOR OVERHAUL.

(7) Unscrew the four 7/16 inch mounting bolts from the engine bushings.

(8) Unscrew the two 7/16 inch mounting nuts and the attached studs from the engine bushings.

(a) If the propeller is removed between overhaul intervals, mounting studs, nuts and washers may be reused if they are not damaged or corroded.

CAUTION: REMOVE THE PROPELLER FROM THE MOUNTING FLANGE WITH CARE TO PREVENT DAMAGING THE PROPELLER MOUNTING STUDS.

(9) Using the support sling, remove the propeller from the mounting flange.

(10) Put the propeller on a cart for transport.
F. Removal of “K” and “R” Flange Propellers

(1) Remove the spinner dome in accordance with the Spinner Removal procedures in this chapter.

(2) If the propeller is equipped with an ice protection system that uses components supplied by Hartzell Propeller Inc., applicable instructions and technical information for the components supplied by Hartzell Propeller Inc. can be found in the following publications available on the Hartzell Propeller Inc. website at www.hartzellprop.com:

(a) Hartzell Propeller Inc. Manual 180 (30-61-80) - Propeller Ice Protection System Manual
(b) Hartzell Propeller Inc. Manual 181 (30-60-81) - Propeller Ice Protection System Component Maintenance Manual
(c) Hartzell Propeller Inc. Manual 182 (61-12-82) - Propeller Electrical De-Ice Boot Removal and Installation Manual
(d) Hartzell Propeller Inc. Manual 183 (61-12-83) - Propeller Anti-Icing Boot Removal and Installation Manual

(3) Propeller ice protection system components not supplied by Hartzell Propeller Inc. are controlled by the applicable TC or STC holder’s Instructions for Continued Airworthiness (ICA).

(4) If installed, cut and remove the safety wire or safety cable on the propeller mounting stud nuts.

WARNING: MAKE SURE THE SLING IS RATED UP TO 800 LBS. (363 KG) TO SUPPORT THE WEIGHT OF THE PROPELLER ASSEMBLY DURING REMOVAL.

(5) Support the propeller assembly with a sling.

(6) If the propeller will be reinstalled and it has been dynamically balanced, make an identifying mark (with a felt-tipped pen only) on the propeller hub and a matching mark on the engine flange to make sure of correct positioning of the propeller during re-installation.

NOTE: This will prevent dynamic imbalance.
CAUTION: DISCARD THE PROPELLER MOUNTING STUDS, NUTS, AND WASHERS IF THEY ARE DAMAGED OR CORRODED, OR WHEN THE PROPELLER IS REMOVED FOR OVERHAUL.

(7) Unscrew the six 1/2 inch mounting studs from the engine bushings.

(a) If the propeller is removed between overhaul intervals, mounting studs, nuts and washers may be reused if they are not damaged or corroded.

CAUTION: REMOVE THE PROPELLER FROM THE MOUNTING FLANGE WITH CARE TO PREVENT DAMAGING THE PROPELLER MOUNTING STUDS.

(8) Using the support sling, remove the propeller from the mounting flange.

(9) Put the propeller on a cart for transport.
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3 If the accumulator air pressure is routinely low, or there is engine oil leaking from the air valve, a faulty seal in the accumulator should be considered. An inspection to verify the condition should be performed by qualified personnel at an appropriately licensed propeller repair facility.

(b) For a non-Hartzell Propeller Inc. unfeathering accumulator, refer to the manufacturer’s published data for inspection and check requirements.

(9) Hartzell Propeller Inc. recommends that propeller owners/operators calibrate the engine tachometer in accordance with the National Institute of Standards and Technology (NIST) or similar national standard (traceable). Refer to the section, “Tachometer Calibration” in the Maintenance Practices chapter of this manual.

(10) If an anti-ice system is installed, clean or replace the anti-ice system filter.

(11) Make an entry in the propeller logbook about completion of these inspections.

B. Blade Inspection for an HC-C2YR-2CLUF/FLC7666A-4 Propeller Installed on OMA SUD Skycar Aircraft

CAUTION: ESTABLISH MORE FREQUENT INTERVALS FOR INSPECTION IF SERVICE EXPERIENCE INDICATES THAT SEVERE CORROSION IS FOUND DURING INSPECTIONS.

(1) Visually examine each blade for paint erosion and corrosion at intervals not exceeding 200 hours of operation or every 12 calendar months, whichever occurs first.
WARNING: CLEANING AGENTS (ACETONE, #700 LACQUER THINNER, AND MEK), ARE FLAMMABLE AND TOXIC TO THE SKIN, EYES, AND RESPIRATORY TRACT. SKIN AND EYE PROTECTION ARE REQUIRED. AVOID PROLONGED CONTACT. USE IN WELL VENTILATED AREA.

(a) Using a cloth dampened with acetone, MEK, or MPK, thoroughly clean each blade shank where exposed to engine exhaust and remove all foreign matter/exhaust residue.

(b) Paint must be in good condition in the area exposed to exhaust gasses. Repair and repainting is required if:

1. Any of the underlying aluminum blade is exposed.
2. There are any indications of corrosion, such as pitting or any other unusual conditions.

(c) All corrosion indications require repair and subsequent repainting by an appropriately licensed propeller repair facility.

1. Refer to FAA Advisory Circular AC 43.4A (or subsequent revision) for additional information about corrosion. This circular provides definitions, repair procedures, safety precautions, etc.

(2) If repair and repainting are required, refer to the Blade Repairs section in the Maintenance Practices chapter of this manual for additional information.

1. Qualified personnel must make the determination if repairs can be made locally or must be sent to an appropriately licensed propeller repair facility. Hartzell Propeller Inc. recommends that in “borderline” or questionable situations it is preferable to send the propeller to an appropriately licensed propeller repair facility.
C. Spinner Bulkhead Inspection for an HC-E3YR-1RF Propeller Installed on S.N.A. Inc. Seawind Aircraft.

(1) Inspect the spinner bulkhead (P/N D-4877-) for cracks every 50 flight hours.

(2) Visually inspect the spinner bulkhead for cracks around the bulkhead attachment bolts.

(3) If a crack is found, the spinner bulkhead must be removed and replaced or referred to an appropriately licensed repair facility for repair.

D. Low Pitch Stop Hardware Inspection for a PHC-C3YF-2UF/FC7693DFB Propeller

(1) Propellers installed on the following aircraft in accordance with Ram Aircraft STC SA09971SC and with a one piece spinner dome assembly are affected:

(a) Cessna T310 (P,Q,R)
(b) Cessna 320 (D,E,F)
(c) Cessna 340 (A)
(d) Cessna 402C
(e) Cessna 414 (A)

(2) Examine the logbook or visually examine the low pitch stop hardware configuration.

(a) If there is an entry that indicates compliance with Hartzell Propeller Inc. Service Bulletin HC-SB-61-267 or compliance with the low pitch stop hardware modification in this manual, or if a visual examination shows that the hardware configuration is one hex nut safety wired to a set screw, no further action is required.

(b) If there is not an entry that indicates compliance with Hartzell Propeller Inc. Service Bulletin HC-SB-61-267 or compliance with the low pitch stop hardware modification in this manual, or if visual examination shows that the hardware configuration is not one hex nut safety wired to a set screw, modify the propeller assembly to the hardware configuration of one hex nut safety wired to a set screw in accordance with the section "Modification of the Low Pitch Stop Hardware" in the Maintenance Practices chapter of this manual.
(4) Perform a visual inspection for cracks in the hub.
   (a) Pay particular attention to the blade retention areas of the hub.
   (b) A crack may be readily visible or may be indicated by grease leaking from a seemingly solid surface.

(5) If cracks are suspected, additional inspections must be performed before further flight. These inspections must be performed by qualified personnel at an appropriately licensed propeller repair facility to verify the condition. Such inspections typically include disassembly of the propeller, followed by inspection of parts, using nondestructive methods in accordance with published procedures.

(6) Check the blades and compare blade-to-blade differences:
   (a) Inspect the propeller blades for unusual looseness or movement. Refer to the Loose Blades section of this chapter.
   (b) Check blade track. Refer to the Blade Track section of this chapter.

**CAUTION:** DO NOT USE BLADE PADDLES TO TURN THE BLADES.

(c) Manually (by hand) attempt to turn the blades (change pitch).

(d) Visually check for damaged blades.

(7) If abnormal blade conditions or damage are found, perform additional inspections by qualified personnel at an appropriately licensed propeller repair facility to evaluate the condition. Refer to the Blade Repairs section in the Maintenance Practices chapter of this manual.

(8) If cracks or failing components are found, these parts must be replaced before further flight. Report such incidents to airworthiness authorities and Hartzell Propeller Inc. Product Support.
D. Blade Track

(1) Check blade track as follows:

(a) Chock the aircraft wheels securely.

(b) Refer to Figure 5-1. Place a fixed reference point beneath the propeller, within 0.25 inch (6.0 mm) of the lowest point of the propeller arc.

NOTE: This reference point may be a flat board with a sheet of paper attached to it. The board may then be blocked up to within 0.25 inch (6.0 mm) of the propeller arc.

WARNING: MAKE SURE THE ENGINE MAGNETO IS GROUNDED (OFF) BEFORE ROTATING THE PROPELLER.

(c) Rotate the propeller by hand (opposite the direction of normal rotation) until a blade points directly at the reference surface (paper).
1. If the propeller does not have a start lock and blade track must be checked when the propeller is in feather position:
   a. Put a spirit level or blade protractor against the flat side of the blade counterweight.
   b. Slightly rotate the propeller blade until the level or protractor indicates the blade counterweight is perpendicular with the reference surface (paper).
   (d) Mark the position of the blade tip in relation to the reference surface (paper).
   (e) Repeat this procedure with the remaining blades.
   (f) Tracking tolerance is ± 0.062 inch (1.57 mm) or 0.125 inch (3.17 mm) total.

2. Possible Correction
   (a) Remove foreign matter from the propeller mounting flange.
   (b) If no foreign matter is present, refer to a certified propeller repair station with the appropriate rating.
E. Loose Blades

(1) Refer to Figure 5-2. Limits for blade looseness are as follows:

(a) End Play
(leading edge to trailing edge)
See Note below

(b) Fore & Aft Movement
(Face to camber)
See Note below

(c) In & Out
None

(d) Radial Play
(pitch change)
± 0.5 degree
(1 degree total)
measured at reference station

NOTE: Blades are intended to be tight in the propeller, however slight movement is acceptable if the blade returns to its original position when released. Blades with excessive movement, or that do not return to their original position when released may indicate internal wear or damage which should be referred to a certified propeller repair station with the appropriate rating.
F. Corrosion

**WARNING:** REWORK THAT INVOLVES COLD WORKING THE METAL, RESULTING IN CONCEALMENT OF A DAMAGED AREA IS NOT PERMITTED.

(1) Light corrosion on the blades or counterweights may be removed by qualified personnel in accordance with the Blade Repairs section in the Maintenance Practices chapter of this manual.

(2) Heavy corrosion that results in severe pitting must be referred to a certified propeller repair station with the appropriate rating.

G. Spinner Damage

(1) Inspect the spinner for cracks, missing hardware, or other damage.

   (a) For metal spinners, refer to Hartzell Propeller Inc. Manual 127 (61-16-27) or a certified propeller repair station with the appropriate rating for spinner damage acceptance and repair information. Contact the local airworthiness authority for repair approval.

   (b) For composite spinners, refer to Hartzell Propeller Inc. Manual 173 (61-10-73) or a certified propeller repair station with the appropriate rating for spinner damage acceptance and repair information. Contact the local airworthiness authority for repair approval.

H. Electric De-ice System

(1) Refer to the Anti-ice and De-ice Systems chapter of this manual for inspection procedures.

I. Anti-ice System

(1) Refer to the Anti-ice and De-ice Systems chapter of this manual for inspection procedures.
Figure 5-3

Reciprocating Engine Overspeed Limits

Requires Evaluation by an Appropriately Licensed Propeller Repair Facility

No Action Required

Duration of Overspeed

20 Sec 1 min 3 min 5 min

Percent Overspeed - Reciprocating Engines Only

110%

105%

103%
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B. Spinner Cleaning and Polishing
   (1) Clean spinner using the General Cleaning procedures above.
   (2) Polish the dome, if necessary, with an automotive-type aluminum polish.

2. Lubrication
   
   **CAUTION:** INSTRUCTIONS AND PROCEDURES IN THIS SECTION MAY INVOLVE PROPELLER CRITICAL PARTS. REFER TO THE INTRODUCTION CHAPTER OF THIS MANUAL FOR INFORMATION ABOUT PROPELLER CRITICAL PARTS. REFER TO THE ILLUSTRATED PARTS LIST CHAPTER OF THE APPLICABLE OVERHAUL MANUAL(S) FOR THE IDENTIFICATION OF SPECIFIC PROPELLER CRITICAL PARTS.

A. Lubrication Intervals
   (1) The propeller must be lubricated at intervals not to exceed 100 hours or at 12 calendar months, whichever occurs first.
      
      (a) If propeller operation in a 6 month period from the last lubrication interval is less than 50 hours, the propeller must be re-lubricated.
      
      (b) If the aircraft is operated or stored under adverse atmospheric conditions, e.g., high humidity, salt air, calendar lubrication intervals should be reduced to six months.
   
   (2) Owners of high use aircraft may wish to extend their lubrication interval. Lubrication interval may be gradually extended after evaluation of previous propeller overhauls with regard to bearing wear and internal corrosion.
NOTE: A 2-blade propeller is shown for illustration purposes only.
6. **Painting After Repair**

CAUTION: INSTRUCTIONS AND PROCEDURES IN THIS SECTION MAY INVOLVE PROPELLER CRITICAL PARTS. REFER TO THE INTRODUCTION CHAPTER OF THIS MANUAL FOR INFORMATION ABOUT PROPELLER CRITICAL PARTS. REFER TO THE ILLUSTRATED PARTS LIST CHAPTER OF THE APPLICABLE OVERHAUL MANUAL(S) FOR THE IDENTIFICATION OF SPECIFIC PROPELLER CRITICAL PARTS.

A. **General**

1. Propeller blades are painted with a durable specialized coating that is resistant to abrasion. If this coating becomes eroded, it is necessary to repaint the blades to provide proper corrosion and erosion protection. Painting should be performed by an appropriately licensed propeller repair facility in accordance with Hartzell Propeller Inc. Manual 202A (61-01-02).

2. It is permitted to perform a blade touch-up with aerosol paint in accordance with the procedures in Painting of Aluminum Blades that follows.

3. Refer to Table 6-12 for paints that are approved for blade touch-up.

4. The paint manufacturers may be contacted by using the following information:

   **Tempo Products Co.**
   A plasti-kote Company
   1000 Lake Road
   Medina, OH 44256
   Tel: 800.321.6300
   Fax: 440.349.4241
   Cage Code: 07708

   **Sherwin Williams Co.**
   Refer to the Sherwin-Williams Product Finishes Global Finishes
   Group website at http://oem.sherwin-williams.com to find the nearest location.
B. Painting of Aluminum Blades

**WARNING:** CLEANING AGENTS (ACETONE, #700 LACQUER THINNER, AND MEK), ARE FLAMMABLE AND TOXIC TO THE SKIN, EYES, AND RESPIRATORY TRACT. SKIN AND EYE PROTECTION ARE REQUIRED. AVOID PROLONGED CONTACT. USE IN WELL VENTILATED AREA.

**CAUTION:** ANY REFINISHING PROCEDURE CAN ALTER PROPELLER BALANCE. PROPELLERS THAT ARE OUT OF BALANCE MAY EXPERIENCE EXCESSIVE VIBRATIONS WHILE IN OPERATION.

(1) Using a clean cloth moistened with acetone, #700 lacquer thinner, or MEK, wipe the surface of the blade to remove any contaminants and permit the solvent to evaporate.

(2) Using 120 to 180 grit sandpaper, sand to feather the existing coatings away from the eroded or repaired area.

(a) Paint erosion is typically very similar on all blades in a propeller assembly. If one blade has more extensive paint erosion, e.g., in the tip area, sand all the blades in the tip area to replicate the repair of the most severely damaged blade tip. This practice is essential in maintaining balance after refinishing.

(3) Using acetone, #700 lacquer thinner, or MEK, wipe the surface of the blade and permit the solvent to evaporate.
7. **Dynamic Balance**

   A. Overview

   **CAUTION 1:** INSTRUCTIONS AND PROCEDURES IN THIS SECTION MAY INVOLVE PROPELLER CRITICAL PARTS. REFER TO THE INTRODUCTION CHAPTER OF THIS MANUAL FOR INFORMATION ABOUT PROPELLER CRITICAL PARTS. REFER TO THE ILLUSTRATED PARTS LIST CHAPTER OF THE APPLICABLE OVERHAUL MANUAL(S) FOR THE IDENTIFICATION OF SPECIFIC PROPELLER CRITICAL PARTS.

   **CAUTION 2:** IF REFLECTIVE TAPE IS USED FOR DYNAMIC BALANCING, DO NOT APPLY THE TAPE ON EXPOSED BARE METAL OF THE BLADE. THIS WILL ALLOW MOISTURE TO COLLECT UNDER THE TAPE AND CAUSE CORROSION THAT CAN PERMANENTLY DAMAGE THE BLADE. REFLECTIVE TAPE MUST BE REMOVED AFTER DYNAMIC BALANCING IS COMPLETED.

   **NOTE:** Dynamic balance is recommended to reduce vibrations that may be caused by a rotating system (propeller and engine) imbalance. Dynamic balancing can help prolong the life of the propeller, engine, airframe, and avionics.

   (1) Dynamic balance is accomplished by using an accurate means of measuring the amount and location of the dynamic imbalance.

   (2) The number of balance weights installed must not exceed the limits specified in this chapter.

   (3) Follow the dynamic balance equipment manufacturer's instructions for dynamic balance in addition to the specifications of this section.

   **NOTE:** Some engine manufacturers' instructions also contain information on dynamic balance limits.
B. Inspection Procedures Before Balancing

(1) Visually inspect the propeller assembly before dynamic balancing.

**NOTE:** The first run-up of a new or overhauled propeller assembly may leave a small amount of grease on the blades and inner surface of the spinner dome.

**WARNING:** ADHESIVES AND SOLVENTS ARE FLAMMABLE AND TOXIC TO THE SKIN, EYES, AND RESPIRATORY TRACT. SKIN AND EYE PROTECTION ARE REQUIRED. AVOID PROLONGED CONTACT AND BREATHING OF VAPORS. USE SOLVENT RESISTANT GLOVES TO MINIMIZE SKIN CONTACT AND WEAR SAFETY GLASSES FOR EYE PROTECTION. USE IN A WELL VENTILATED AREA AWAY FROM SPARKS AND FLAME. READ AND OBSERVE ALL WARNING LABELS.

(a) Use Stoddard solvent (or equivalent) to completely remove any grease on the blades or inner surface of the spinner dome.

(b) Visually examine each propeller blade assembly for evidence of grease leakage.

(c) Visually examine the inner surface of the spinner dome for evidence of grease leakage.

(2) If there is no evidence of grease leakage, lubricate the propeller in accordance with the Maintenance Practices chapter in this manual.

(3) If grease leakage is evident, determine the location of the leak and correct before re-lubricating the propeller and dynamic balancing.

(4) Before dynamic balance, record the number and location of all balance weights.
(5) Static balance is accomplished at a propeller overhaul facility when an overhaul or major repair is performed.

**NOTE:** If static balancing is not accomplished before dynamic balancing, the propeller may be so severely unbalanced that dynamic balance may be unachievable because of measurement equipment limitations.

C. Modifying Spinner Bulkhead to Accommodate Dynamic Balance Weights

**CAUTION 1:** ALL HOLE/BALANCE WEIGHT LOCATIONS MUST TAKE INTO CONSIDERATION, AND MUST AVOID, ANY POSSIBILITY OF INTERFERING WITH THE ADJACENT AIRFRAME, PROPELLER ICE PROTECTION SYSTEM, AND ENGINE COMPONENTS.

**CAUTION 2:** DO NOT MODIFY A COMPOSITE SPINNER BULKHEAD TO ACCOMMODATE DYNAMIC BALANCE WEIGHTS.

(1) It is recommended that the placement of balance weights be in a radial location on aluminum spinner bulkheads that have not been previously drilled.

(2) The radial location should be outboard of the de-ice slip ring or bulkhead doubler and inboard of the bend where the bulkhead creates the flange surface to attach the spinner dome.

(3) Twelve equally spaced locations are recommended for weight attachment.

(4) Installing nut plates (10-32 thread) of the type used to attach the spinner dome will permit convenient balance weight attachment on the engine side of the bulkhead.

(5) Alternatively, drilling holes for use with the AN3(- ) type bolts with self-locking nuts is permitted.

(6) Chadwick-Helmuth Manual AW-9511-2, “The Smooth Propeller”, specifies several generic bulkhead repair procedures. These are permitted if they comply with the conditions specified herein.
D. Placement of Balance Weights for Dynamic Balance

(1) The preferred method of attachment of dynamic balance weights is to add the weights to the spinner bulkhead.

**NOTE:** Many spinner bulkheads have factory installed self-locking nut plates provided for this purpose.

(2) If the location of static balance weights has not been altered, subsequent removal of the dynamic balance weights will return the propeller to its original static balance condition.

(3) Use only stainless or plated steel washers as dynamic balance weights on the spinner bulkhead.

(4) A maximum of six AN970 style washers weighing up to approximately 1.0 oz (28.0 g) may be installed at any one location.

**NOTE:** The dimensions of an AN970 washer are:
   - ID 0.203 inch (5.16 mm), OD 0.875 inch (22.23 mm), and thickness 0.063 inch (1.59 mm).

(5) Install weights using aircraft quality #10-32 or AN-3( ) type screws or bolts.

(6) Balance weight screws attached to the spinner bulkhead must protrude through the self-locking nuts or nut plates a minimum of one thread and a maximum of four threads.

(a) It may be necessary to alter the number and/or location of static balance weights to achieve dynamic balance.

**CAUTION:** IF REFLECTIVE TAPE IS USED FOR DYNAMIC BALANCING, REMOVE THE TAPE IMMEDIATELY UPON COMPLETION. TAPE THAT REMAINS ON THE BLADE WILL PERMIT MOISTURE TO COLLECT UNDER THE TAPE AND CAUSE CORROSION THAT CAN PERMANENTLY DAMAGE THE BLADE.

(7) Unless otherwise specified by the engine or airframe manufacturer, Hartzell Propeller Inc. recommends that the propeller be dynamically balanced to a reading of 0.2 IPS, or less.

(8) If reflective tape is used for dynamic balancing, remove the tape immediately after balancing is completed.
(9) Make a record in the propeller logbook of the number and location of dynamic balance weights, and static balance weights if they have been reconfigured.

8. Propeller Low Pitch Setting

**WARNING 1:** RPM ADJUSTMENTS MUST BE MADE WITH REFERENCE TO A CALIBRATED TACHOMETER. AIRCRAFT MECHANICAL TACHOMETERS DEVELOP ERRORS OVER TIME, AND SHOULD BE PERIODICALLY RECALIBRATED TO MAKE SURE THE PROPER RPM IS DISPLAYED.

**WARNING 2:** LOW PITCH BLADE ANGLE ADJUSTMENTS MUST BE MADE IN ACCORDANCE WITH THE APPLICABLE TYPE CERTIFICATE OR SUPPLEMENTAL TYPE CERTIFICATE HOLDER'S MAINTENANCE DATA.

**CAUTION:** INSTRUCTIONS AND PROCEDURES IN THIS SECTION MAY INVOLVE PROPELLER CRITICAL PARTS. REFER TO THE INTRODUCTION CHAPTER OF THIS MANUAL FOR INFORMATION ABOUT PROPELLER CRITICAL PARTS. REFER TO THE ILLUSTRATED PARTS LIST CHAPTER OF THE APPLICABLE OVERHAUL MANUAL(S) FOR THE IDENTIFICATION OF SPECIFIC PROPELLER CRITICAL PARTS.

A. Low Pitch Stop - All Propeller Models

(1) The propeller low pitch stop is set at Hartzell Propeller Inc. in accordance with the aircraft TC or STC Holder's requirements and should not require any additional adjustment.

(2) The TC or STC Holder provides the required low pitch stop blade angle and may also provide the acceptable RPM range for a maximum power static condition.

(a) Be aware that the aircraft TC or STC holder may specify the static RPM to be less than the RPM to which the engine is rated.
Low Pitch Stop Adjustment (-1, -4)
Figure 6-7
An overspeed at the maximum power static condition may indicate that the propeller low-pitch blade angle is set too low or that the governor is improperly adjusted.

An underspeed during the maximum power static condition may be caused by any one or a combination of the following:

(a) The propeller low pitch blade angle is too high
(b) The governor is improperly adjusted
(c) The engine is not producing rated power

B. Maximum RPM (Static) Low Pitch Stop Adjustment

WARNING: SIGNIFICANT ADJUSTMENT OF THE LOW PITCH STOP TO ACHIEVE THE SPECIFIED STATIC RPM MAY MASK AN ENGINE POWER PROBLEM.

(1) Refer to the following applicable procedure for accomplishing an adjustment to the low pitch angle:

(a) Non-Feathering (-1, -4) Low Pitch Stop Adjustment

1. Loosen the jam nut while holding the low pitch stop with an allen wrench to prevent the low pitch stop from turning. Refer to Figure 6-7.

2. Turning the low pitch stop in will increase blade pitch to reduce RPM, and turning the low pitch stop out will lower blade pitch and increase RPM. The low pitch stop has 24 threads per inch.

a. Turning the low pitch stop 3/4 of a turn equals 0.030 inch (0.76 mm) of linear travel, and will change the blade pitch by approximately one degree. One degree of blade pitch will change the engine RPM by approximately 140-150 RPM.

b. Turning the low pitch stop screw one revolution equals 0.042 inch (1.06 mm) of linear travel, and results in approximately 1.4 degree blade angle change. A 1.4 degree blade angle change results in an RPM increase/decrease of approximately 200 RPM.
Low Pitch Stop Adjustment (-2, -5) For Propellers That Use a Two-piece Spinner Dome

Figure 6-8
WARNING: A MINIMUM OF FIVE THREADS IN THE CYLINDER MUST ENGAGE THE LOW PITCH STOP AFTER ADJUSTMENT IS COMPLETED.

3 When the low pitch stop is adjusted, torque the low pitch stop jam nut in accordance with Torque Table 3-1.

4 Repeat the Static RPM Check in the Testing and Troubleshooting Chapter of this manual.

(b) Feathering (-2, -5) Low Pitch Stop Adjustment For Propellers That Use a Two-piece Spinner Dome

WARNING: AIR PRESSURE (-2, -5 PROPELLERS) MUST BE REDUCED TO 0 PSI BEFORE ANY LOW PITCH ADJUSTMENT MAY BE MADE.

1 Loosen the jam nut while holding the low pitch stop with a wrench to prevent the low pitch stop from turning.

2 Turning the low pitch stop into the cylinder will increase blade pitch and reduce RPM, and turning the low pitch stop out of the cylinder will lower blade pitch and increase RPM. The low pitch stop has 20 threads per inch. Refer to Figure 6-8.

a Turning the low pitch stop 2/3 of a turn equals 0.030 inch (0.76 mm) of linear travel, and will change the blade pitch by approximately one degree. One degree of blade pitch will change the engine RPM by approximately 140-150 RPM.

b Turning the low pitch stop screw one full turn equals 0.050 inch (1.27 mm) of linear travel, and results in approximately 1.7 degree blade angle change. A 1.7 degree blade angle change results in an RPM increase/decrease of approximately 250 RPM.
Low Pitch Stop Adjustment (-2, -5) For Propellers That Use a One-piece Spinner Dome

Figure 6-9
WARNING: ADHESIVES AND SOLVENTS ARE FLAMMABLE AND TOXIC TO THE SKIN, EYES, AND RESPIRATORY TRACT. SKIN AND EYE PROTECTION ARE REQUIRED. AVOID PROLONGED CONTACT AND BREATHING OF VAPORS. USE SOLVENT RESISTANT GLOVES TO MINIMIZE SKIN CONTACT AND WEAR SAFETY GLASSES FOR EYE PROTECTION. USE IN A WELL VENTILATED AREA AWAY FROM SPARKS AND FLAME. READ AND OBSERVE ALL WARNING LABELS.

3 Using a clean cloth moistened with MEK CM106 or MPK CM219, carefully remove any sealant from the exposed threads of the low pitch stop.

WARNING: A MINIMUM OF FIVE THREADS IN THE CYLINDER MUST ENGAGE THE LOW PITCH STOP AFTER ADJUSTMENT IS COMPLETED.

4 When the low pitch stop is adjusted, apply threadlocker CM21 to the threads of the jam nut.

5 Torque the low pitch stop jam nut in accordance with Torque Table 3-1.

6 Repeat the Static RPM Check in the Testing and Troubleshooting chapter of this manual.
(c) Feathering (-2, -5) Low Pitch Stop Adjustment, For Propellers That Use a One-piece Spinner Dome

**WARNING:** AIR PRESSURE (-2 PROPELLERS) MUST BE REDUCED TO 0 PSI BEFORE ANY LOW PITCH ADJUSTMENT MAY BE MADE.

1. If a visual examination shows that the hardware configuration is not one hex nut safety wired to a set screw, the propeller assembly may be modified to the hardware configuration of one hex nut safety wired to a set screw in accordance with the section, "Modification of the Low Pitch Stop Hardware" in the Maintenance Practices chapter of this manual.

a. Some propellers models are required to be modified to the new configuration. For the affected propeller models, refer to the section, "Required Periodic Inspections and Maintenance" in the Inspection and Check chapter of this manual.

2. While holding the low pitch stop with a wrench to prevent the low pitch stop from turning, use a second wrench to loosen the jam nut.

3. Turning the low pitch stop into the cylinder will increase blade pitch and reduce RPM, and turning the low pitch stop out of the cylinder will lower blade pitch and increase RPM. The low pitch stop has 20 threads per inch. Refer to Figure 6-9.

a. Turning the low pitch stop 2/3 of a turn equals 0.030 inch (0.76 mm) of linear travel, and will change the blade pitch by approximately one degree. One degree of blade pitch will change the engine RPM by approximately 140-150 RPM.
b Turning the low pitch stop screw one full turn equals 0.050 inch (1.27 mm) of linear travel, and results in approximately 1.7 degree blade angle change. A 1.7 degree blade angle change results in an RPM increase/decrease of approximately 250 RPM.

4 Using a clean cloth moistened with MEK CM106 or MPK CM219, carefully remove any sealant from the exposed threads of the low pitch stop.

**WARNING:** A MINIMUM OF FIVE THREADS IN THE CYLINDER MUST ENGAGE THE LOW PITCH STOP AFTER ADJUSTMENT IS COMPLETED.

5 When the low pitch stop is adjusted, apply threadlocker CM21 to the threads of the jam nut.

6 Torque the low pitch stop jam nut in accordance with Torque Table 3-1.

7 Install a B-7589 set screw in one of the four threaded holes in the top of the cylinder. Refer to Figure 6-9.

a The top of the set screw must be below the surface of the hex nut.

8 Safety the hex nut and the set screw in accordance with military standard MS33540 using 0.032 inch (0.81 mm) stainless steel safety wire unless specified differently.

9 Repeat the Static RPM Check in the Testing and Troubleshooting Chapter of this manual.
Hex Nut Configuration
Figure 6-10
12. Tachometer Calibration

**WARNING:** OPERATION WITH AN INACCURATE TACHOMETER CAN CAUSE RESTRICTED RPM OPERATION AND DAMAGING HIGH STRESSES. PROPELLER LIFE WILL BE SHORTENED AND COULD CAUSE CATASTROPHIC FAILURE.

A. All engine/propeller combinations have operating conditions at which the propeller blade stresses begin to reach design limits.

(1) In most cases, these conditions occur above the maximum rated RPM of the engine.

(2) Some engine/propeller combinations have certain ranges of RPM that are less than maximum engine speed, where stresses are at a level considered too high for continuous operation. This results in a restricted operating range where continuous operation is not permitted. A placard on the instrument panel or yellow arc on the tachometer will inform the pilot to avoid operation in this range.

(3) In other cases, the limiting condition occurs at an RPM only slightly above the maximum engine RPM.

(4) For these reasons, it is very important to accurately monitor engine speed.

B. The accuracy of the tachometer is critical to the safe operation of the aircraft.

(1) Some tachometers have been found to be in error by as much as 200 RPM.

(2) Operating the aircraft with an inaccurate tachometer could cause continued operation at unacceptably high stresses, including repeatedly exceeding the maximum engine RPM.

(3) Continuous operation in a restricted RPM range subjects the propeller to stresses that are higher than the design limits.

(4) Stresses that are higher than the design limits will shorten the life of the propeller and could cause a catastrophic failure.
C. Tachometer Calibration

(1) Hartzell Propeller Inc. recommends that propeller owners/operators calibrate the engine tachometer in accordance with the National Institute of Standards and Technology (NIST) or similar national standard (traceable).

(2) Contact Hartzell Propeller Inc. if it is found that a propeller was operated in a restricted RPM range because of a tachometer error.
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1. **Introduction**
   
   A. **Propeller De-ice System**
      
      (1) A propeller de-ice system is a system that removes ice after it forms on the propeller blades. A de-ice system uses electrical heating elements to melt the ice layer next to the blades, permitting the ice to be thrown from the blade by centrifugal force. Blades are alternately heated and permitted to cool as the current is applied and removed automatically by the de-ice system timer.
      
      (2) System components include a timer or cycling unit, electrical slip ring(s), brush block assembly, and blade mounted de-ice boots.
   
   B. **Propeller Anti-ice System**
      
      (1) A propeller anti-ice system is a system that prevents formation of ice on propeller surfaces. An anti-ice system dispenses a fluid that mixes with, and reduces the freezing point of, moisture on the propeller blades. The mixture may then flow off the blades before it forms ice.
      
      (2) System components include a fluid tank, pump, slinger ring, and blade mounted fluid anti-icing boots, and a fluid dispensing tube that is found at each blade anti-icing boot.
2. **System Description**

A. **De-ice System**

**NOTE:** Because of the wide variances of various de-ice systems, the following description is general in nature. Consult the airframe manufacturer’s manual for a description of your specific de-ice system and controls.

(1) The de-ice system is controlled by the pilot via a cockpit control switch. This switch applies electrical power to the de-ice system, that will operate as long as the switch is in the ON position. Depending upon the system, another set of cockpit controls may be available. One of these controls is a mode selector, that permits the pilot to select two cycling speeds, for heavy or light icing conditions. Some systems on twin engine aircraft have a switch that provides a full de-ice mode, that permits the pilot to de-ice both propellers simultaneously. This switch may only be used for short periods and is used when ice builds up on the propeller before the system is turned on.

(2) An ammeter, that indicates current drawn by the system, is normally located near the de-ice system switches. This meter may indicate total system load, or a separate meter may be supplied for each propeller.

(3) A timer, that is turned off and on by the cockpit control, is used to sequence the de-ice system. This timer turns the de-ice system on and off in proper sequence, controlling the heating interval to each propeller for even de-icing.

(4) A brush block, that is mounted on the engine immediately behind the propeller, supplies electrical current to the de-ice boot on each propeller blade via a slip ring. The slip ring is normally mounted on the spinner bulkhead.

(5) When the pilot puts the de-ice system cockpit control switch in the ON position, the system timer begins to operate. As the timer sequences, power is delivered to a power relay. The power relay delivers high current to the brush block and slip ring. Each propeller is de-iced in turn by the timer.
B. Anti-ice System

(1) The anti-ice system is controlled by the pilot via a cockpit mounted rheostat. This rheostat operates a pump that pumps anti-ice fluid from the tank at a controlled rate.

(2) The anti-ice fluid is delivered through a filter, a check valve, and then through tubing to a slinger ring located at the rear of the spinner bulkhead. The anti-ice fluid is dispensed into the rotating slinger ring, that holds the fluid in a curved channel by centrifugal force. The fluid then flows out of the slinger ring through feed tubes that are welded to the slinger ring, and then out onto the blade anti-icing boots.

(3) The blade anti-icing boots are ridged rubber sheets that are glued to the leading edge of the blades. The ridges in the anti-icing boots direct the fluid out onto the blades and permit for an even distribution of the anti-ice fluid across the blades.
3. **De-ice System Operational Checks**

   A. Operational checks of the de-ice system should be performed in accordance with the following Hartzell Propeller Inc. manuals that are available on the Hartzell website at www.hartzellprop.com:


   B. Components supplied by Hartzell Propeller Inc. for use in de-ice systems are found in the following manuals that are available on the Hartzell website at www.hartzellprop.com:


4. **Anti-ice System Operational/Functional Tests**

   A. Operational/functional checks of the anti-ice system should be performed in accordance with the Aircraft Maintenance Manual and the following Hartzell Propeller Inc. manual that is available on the Hartzell website at www.hartzellprop.com:


   B. Components supplied by Hartzell Propeller Inc. for use in anti-ice systems are found in the following manuals that are available on the Hartzell website at www.hartzellprop.com:

5. **De-ice and Anti-ice System Inspections**

The inspections detailed below are made on a regular basis, either before flight, during the 100 hour inspection, or if a problem is noted. Possible corrections to problems discovered during inspections, additional inspections, and limits are detailed in the following Hartzell manuals.

A. **De-ice System Inspections**

   (1) Perform inspections in accordance with the following Hartzell Propeller Inc. manuals that are available on the Hartzell website at www.hartzellprop.com:


   (b) Hartzell Propeller Inc. Manual 182 (61-12-82) - Propeller Electrical De-ice Boot Removal and Installation Manual

B. **Anti-ice System Inspections**

   (1) Perform inspections in accordance with the Aircraft Maintenance Manual or the following Hartzell Propeller Inc. manuals that are available on the Hartzell website at www.hartzellprop.com:


   (b) Hartzell Propeller Inc. Manual 183 (61-12-83) - Propeller Anti-icing Boot Removal and Installation Manual
6. De-ice and Anti-ice System Troubleshooting

A. De-ice System Troubleshooting
   (1) Perform troubleshooting in accordance with the following Hartzell Propeller Inc. manuals that are available on the Hartzell website at www.hartzellprop.com:
   (b) Hartzell Propeller Inc. Manual 182 (61-12-82) - Propeller Electrical De-ice Boot Removal and Installation Manual

B. Anti-ice System Troubleshooting
   (1) Perform troubleshooting in accordance with the following Hartzell Propeller Inc. manuals that are available on the Hartzell website at www.hartzellprop.com:
   (b) Hartzell Propeller Inc. Manual 183 (61-12-83) - Propeller Anti-icing Boot Removal and Installation Manual