

Manual No. 167

61-00-67

Revision 3

June 2014

# Propeller Owner's Manual and Logbook

Steel Hub Reciprocating Propellers with Aluminum Blades

Three Blade	Four Blade
<b>HC-B3( )F-2( )</b>	<b>HC-B4TN-1</b>
<b>HC-B3WF-4</b>	
<b>HC-B3WN-2L</b>	
<b>HC-B3(W,Z)20-1</b>	
<b>HC-B3Z20-1F</b>	
<b>HC-B3( )20-2( )</b>	
<b>HC-B3( )20-4</b>	
<b>HA-B3( )30-1B</b>	
<b>HC-B3( )30-1E( )</b>	
<b>HC-B3( )30-2B( )</b>	
<b>HC-B3( )30-2E( )</b>	
<b>HC-B3( )30-4</b>	
<b>HC-B3R30-4A,-4B</b>	

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As a fellow pilot, I urge you to read this Manual thoroughly. It contains a wealth of information about your new propeller.

The propeller is among the most reliable components of your airplane. It is also among the most critical to flight safety. It therefore deserves the care and maintenance called for in this Manual. Please give it your attention, especially the section dealing with Inspections and Checks.

Thank you for choosing a Hartzell propeller. Properly maintained it will give you many years of reliable service.

A handwritten signature in black ink that reads "Jim Brown". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Jim Brown  
Chairman, Hartzell Propeller Inc.

# WARNING

People who fly should recognize that various types of risks are involved; and they should take all precautions to minimize them, since they cannot be eliminated entirely.

The propeller is a vital component of the aircraft. A mechanical failure of the propeller could cause a forced landing or create vibrations sufficiently severe to damage the aircraft, possibly causing it to become uncontrollable.

Propellers are subject to constant vibration stresses from the engine and airstream, which are added to high bending and centrifugal stresses.

Before a propeller is certified as being safe to operate on an airplane, an adequate margin of safety must be demonstrated. Even though every precaution is taken in the design and manufacture of a propeller, history has revealed rare instances of failures, particularly of the fatigue type.

It is essential that the propeller is properly maintained according to the recommended service procedures and a close watch is exercised to detect impending problems before they become serious. Any grease or oil leakage, loss of air pressure, unusual vibration, or unusual operation should be investigated and repaired, as it could be a warning that something serious is wrong.

For operators of uncertified or experimental aircraft an even greater level of vigilance is required in the maintenance and inspection of the propeller. Experimental installations often use propeller-engine combinations that have not been tested and approved. In these cases, the stress on the propeller and, therefore, its safety margin is unknown. Failure could be as severe as loss of propeller or propeller blades and cause loss of propeller control and/or loss of aircraft control.

Hartzell Propeller Inc. follows FAA regulations for propeller certification on certificated aircraft. Experimental aircraft may operate with unapproved engines or propellers or engine modifications to increase horsepower, such as unapproved crankshaft damper configurations or high compression pistons. These issues affect the vibration output of the engine and the stress levels on the propeller. Significant propeller life reduction and failure are real possibilities.

Frequent inspections are strongly recommended if operating with a non-certificated installation; however, these inspections may not guarantee propeller reliability, as a failing device may be hidden from the view of the inspector. Propeller overhaul is strongly recommended to accomplish periodic internal inspection.

Visually inspect metal blades for cracks. Inspect hubs, with particular emphasis on each blade arm for cracks. Eddy current equipment is recommended for hub inspection, since cracks are usually not apparent.

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**REVISION 3 HIGHLIGHTS**

- Revised the Cover, Revision Highlights, List of Effective Pages, and Table of Contents.
- Changed "Hartzell" to "Hartzell Propeller Inc." where applicable
- INTRODUCTION:
  - Revised the "Purpose" section
  - Revised the "Personnel Requirements" section
  - Revised the "Maintenance Practices" section
  - Added the "Propeller Critical Parts" section
  - Revised the "Definitions" section
  - Revised the "Abbreviations" section
  - Made other language/format changes
- INSTALLATION AND REMOVAL:
  - Revised the "Tooling" section
  - Added cautions about propeller critical parts where applicable
  - Added warnings about adhesives and solvents where applicable
  - Added aircraft safety cable as an alternate for safety wire where applicable
  - Made other language/format changes
- TESTING AND TROUBLESHOOTING:
  - Added cautions about propeller critical parts where applicable
  - Made other language/format changes
- INSPECTION AND CHECK:
  - Added cautions about propeller critical parts where applicable
  - Revised the "Spinner Damage" section
  - Made other language/format changes
- MAINTENANCE PRACTICES:
  - Added cautions about propeller critical parts where applicable
  - Revised the "Repair of Nicks and Gouges" section
  - Made other language/format changes

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**REVISIONS HIGHLIGHTS****1. Introduction****A. General**

This is a list of current revisions that have been issued against this manual. Please compare it to the RECORD OF REVISIONS page to ensure 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.

<u>Revision No.</u>	<u>Issue Date</u>	<u>Comments</u>
Original	March/00	New Issue
Rev. 1	Apr/06	Minor Revision
Rev. 2	Aug/11	Minor Revision
Rev. 3	Jun/14	Minor Revision

## RECORD OF REVISIONS

**Rev. No.**      **Issue Date**      **Date Inserted**      **Inserted By**

Rev. No.	Issue Date	Date Inserted	Inserted By
Rev. 1	Apr/06	Apr/06	HPI
Rev. 2	Aug/11	Aug/11	HPI
Rev. 3	Jun/14	Jun/14	HPI

RECORD OF REVISIONS

**Rev. No.      Issue Date      Date Inserted      Inserted By**

Rev. No.	Issue Date	Date Inserted	Inserted By



RECORD OF TEMPORARY REVISIONS

<b>TR No.</b>	<b>Issue Date</b>	<b>Date Inserted</b>	<b>Inserted By</b>	<b>Date Removed</b>	<b>Removed By</b>

## SERVICE DOCUMENTS LIST

CAUTION 1: DO NOT USE OBSOLETE OR OUTDATED INFORMATION. PERFORM ALL INSPECTIONS OR WORK IN ACCORDANCE WITH THE MOST RECENT REVISION OF A SERVICE DOCUMENT. INFORMATION CONTAINED IN A SERVICE DOCUMENT MAY BE SIGNIFICANTLY CHANGED FROM EARLIER REVISIONS. FAILURE TO COMPLY WITH INFORMATION CONTAINED IN A SERVICE DOCUMENT OR THE USE OF OBSOLETE INFORMATION MAY CREATE AN UNSAFE CONDITION THAT MAY RESULT IN DEATH, SERIOUS BODILY INJURY, AND/OR SUBSTANTIAL PROPERTY DAMAGE.

CAUTION 2: THE INFORMATION FOR THE DOCUMENTS LISTED INDICATES THE REVISION LEVEL AND DATE AT THE TIME THAT THE DOCUMENT WAS INITIALLY INCORPORATED INTO THIS MANUAL. INFORMATION CONTAINED IN A SERVICE DOCUMENT MAY BE SIGNIFICANTLY CHANGED FROM EARLIER REVISIONS. REFER TO THE APPLICABLE SERVICE DOCUMENT INDEX FOR THE MOST RECENT REVISION LEVEL OF THE SERVICE DOCUMENT.

Service Document Number	Incorporation Rev/Date
Service Letter No. 93	Rev. 1, Apr/06

SERVICE DOCUMENTS LIST

Service Document Number	Incorporation Rev/Date





## AIRWORTHINESS LIMITATIONS

The Airworthiness Limitations section is FAA approved and specifies maintenance required under 14 CFR §§ 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

FAA APPROVED

by:  date: \_\_\_\_\_

AUG 17 2011

 Manager, Chicago Aircraft Certification  
Office,  
ACE-115C  
Federal Aviation Administration

Rev. No.	Description of Revision
2	Relocated Airworthiness Limitations pages from Manual 177

### AIRWORTHINESS LIMITATIONS

1. The FAA establishes specific life limits for certain component parts as well as the entire propeller. Such limits require replacement of the identified parts after a specified number of hours of use.
2. The following data summarizes all current information concerning Hartzell life limited parts, as related to propeller models affected by this manual. These parts are not life limited on other installations; however, time accumulated toward life limit accrues when first operated on aircraft/engine/propeller combinations listed and continues regardless of subsequent installations (that may or may not be life limited).
  - A. Propeller models affected by this manual currently do not have any life limited parts.
  - B. There are no new (or additional) Airworthiness Limitations associated with this equipment and/or installation.

FAA APPROVED

by:  date:  \_\_\_\_\_

 Manager, Chicago Aircraft Certification  
Office,  
ACE-115C  
Federal Aviation Administration

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Cover	Cover and Inside Cover	Rev. 3	Jun/14
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Record of Revisions	9 and 10	Original	Mar/00
Record of Temporary Revisions	11 and 12	Original	Mar/00
Service Documents List	13 and 14	Rev. 2	Aug/11
Airworthiness Limitations	15 and 16	Rev. 2	Aug/11
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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 WITH THE AIRCRAFT ON WHICH IT IS INSTALLED, AT ALL TIMES. THE LOG BOOK RECORD WITHIN THIS MANUAL MUST BE MAINTAINED, RETAINED CONCURRENTLY, AND BECOME A PART OF THE AIRCRAFT AND ENGINE SERVICE RECORDS.**

- B. This manual supports the following three and four-bladed, "B" type steel hub reciprocating propellers: ground adjustable, nonfeathering; constant speed, nonfeathering; and constant speed, feathering.
- C. The purpose of this manual is to enable qualified personnel to install, operate, and maintain a Hartzell propeller. Separate manuals are available concerning overhaul procedures and specifications for the propeller.
- D. This manual includes different design types.
- (1) Sample hub and blade model numbers within each design are included in the Description and Operation Chapter of this manual.
  - (2) All propeller models included in this manual use aluminum propeller blades.

**2. Airworthiness Limits**

Refer to the Airworthiness Limitations section 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 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), and 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 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 before 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) 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.
- (2) 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. If blade paddles must be used, use at least two 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) 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 returning to service.

NOTE: Dynamic balance is recommended, but may be accomplished at the discretion of the operator, unless specifically required by the airframe or engine manufacturer. Dynamic balancing must be accomplished in accordance with the procedures and limitations in the Maintenance Practices chapter of this manual. Additional procedures can be found in the aircraft maintenance manual.

- (8) As necessary, use a soft, non-graphite pencil or crayon to make identifying marks on components.
- (9) As applicable, follow military standard NASM33540 for safety wire, safety cable, and cotter pin general practices. Use 0.032 inch (0.81 mm) diameter stainless steel safety wire unless otherwise indicated.
- (10) Refer to the airframe manufacturer's manuals in addition to the information in this manual because of possible special requirements for specific aircraft applications.

- (11) 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 can be found in the following publications, available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://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 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
- (12) 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).
- (13) Approved corrosion protection followed by approved paint must be applied to all aluminum blades. For information concerning 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, e.g., "polished blades" is not permitted.

#### C. Continued Airworthiness

- (1) Operators are urged to stay informed of Airworthiness information via Hartzell Service Bulletins and Service Letters which are available from Hartzell distributors, or from the Hartzell factory by subscription. Selected information is also available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://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.
- (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**

The following publications contain information vital to the airworthiness of the propeller models covered in this manual:

█ Hartzell Propeller Inc. Manual 177 (61-10-77) - Overhaul Manual  
Active Hartzell Service Bulletins, Letters, Instructions, and Advisories

█ Hartzell Propeller Inc. Manual 127 (61-16-27) - Spinner  
Assembly Maintenance

█ Hartzell Propeller Inc. Manual 133C (61-13-33) - Aluminum  
Propeller Blade Maintenance Manual

█ Hartzell Propeller Inc. Manual No. 159 (61-02-59) - Application  
Guide - Also available on the Hartzell Propeller Inc. website at  
[www.hartzellprop.com](http://www.hartzellprop.com)

█ Hartzell Propeller Inc. Manual 165A (61-00-65) - Illustrated Tool  
and Equipment Manual

█ Hartzell Propeller Inc. Manual No. 180 (30-61-80) - Propeller  
Ice Protection System Manual - Also available on the Hartzell  
website at [www.hartzellprop.com](http://www.hartzellprop.com)

█ Hartzell Propeller Inc. Manual No. 181 (30-60-81) - Propeller Ice  
Protection Component Maintenance Manual - Also available on  
the Hartzell website at [www.hartzellprop.com](http://www.hartzellprop.com)

█ Hartzell Propeller Inc. Manual No. 182 (61-12-82) - Propeller  
Electrical De-ice Boot Removal and Installation Manual - Also  
available on the Hartzell website at [www.hartzellprop.com](http://www.hartzellprop.com)

█ Hartzell Propeller Inc. Manual No. 183 (61-12-83) - Propeller  
Anti-icing Boot Removal and Installation Manual - Also available  
on the Hartzell website at [www.hartzellprop.com](http://www.hartzellprop.com)

█ Hartzell Propeller Inc. Manual 202A (61-01-02) - Standard  
Practices Manual, Volumes 1 through 11

█ Hartzell Propeller Inc. Service Letter HC-SL-61-61Y - Overhaul  
Periods and Service Life Limits for Hartzell Propellers,  
Governors, and Propeller Damper Assemblies - Also available  
on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://www.hartzellprop.com)

7. Definitions

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

<u>Term</u>	<u>Definition</u>
Annealed . . . . .	Softening of material due to overexposure to heat.
Blade Angle . . . . .	Measurement of blade airfoil location described as the angle between the blade airfoil and the surface described by propeller rotation.
Brinelling. . . . .	A depression caused by failure of the material in compression.
Chord . . . . .	A straight line distance between the leading and trailing edges of an airfoil.
Cold Rolling . . . . .	Compressive rolling process that provides improved strength and resistance to fatigue.
Constant Force. . . . .	A force which is always present in some degree when the propeller is operating.
Constant Speed . . . . .	A propeller system which employs a governing device to maintain a selected engine RPM.
Corrosion . . . . .	Gradual material removal or deterioration due to chemical action.
Crack . . . . .	Irregularly shaped separation within a material, sometimes visible as a narrow opening at the surface.
Depression . . . . .	Surface area where the material has been compressed but not removed.
Distortion . . . . .	Alteration of the original shape or size of a component





<u>Term</u>	<u>Definition</u>
Erosion . . . . .	Gradual wearing away or deterioration due to action of the elements.
Exposure . . . . .	Leaving material open to action of the elements.
Feathering . . . . .	A propeller with blades that may be rotated to a position parallel to the relative wind, thus reducing aerodynamic drag.
Gouge . . . . .	Surface area where material has been removed
<b>Hazardous Propeller</b>	
Effect . . . . .	The hazardous propeller effects are defined in Title 14 CFR section 35.15(g)(1).
Horizontal Balance . . . .	Balance between the blade tip and the center of the hub.
Impact Damage . . . . .	Damage that occurs when the propeller blade or hub assembly strikes, or is struck by, an object while in flight or on the ground.
Major Propeller Effect . .	The major propeller effects are defined in Title 14 CFR section 35.15(g)(2).
Nick . . . . .	Removal of paint and possibly a small amount of material.
Onspeed . . . . .	Condition in which the RPM selected by the pilot through the propeller control lever and the actual engine (propeller) RPM are equal.
Overhaul . . . . .	The periodic disassembly, inspection, repair, refinishing, and reassembly of a propeller assembly to maintain airworthiness.

- Overspeed . . . . . 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.
- Overspeed Damage . . . Damage that occurs when the propeller hub assembly rotates at a speed greater than the maximum limit for which it is designed.
- Pitch . . . . . Same as "Blade Angle".
- Pitting . . . . . Formation of a number of small, irregularly shaped cavities in surface material caused by corrosion or wear.
- Propeller Critical Part . . 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
- Scratch . . . . . Same as "Nick".
- Single Acting . . . . . Hydraulically actuated propeller which utilizes a single oil supply for pitch control.
- Synchronizing . . . . . Adjusting the RPM of all the propellers of a multi-engine aircraft to the same RPM.
- Synchrophasing . . . . . 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.

<u>Term</u>	<u>Definition</u>
Track . . . . .	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.
Underspeed . . . . .	The condition in which the actual engine (propeller) RPM is lower than the RPM selected by the pilot through the propeller control lever.
Vertical Balance . . . . .	Balance of between the leading and trailing edges of a two-blade propeller, with the blades positioned vertically.
Variable Force . . . . .	A force which may be applied or removed during propeller operation.
Windmilling . . . . .	The rotation of an aircraft propeller caused by air flowing through it while the engine is not producing power.

**8. Abbreviations**

<u>Abbreviation</u>	<u>Term</u>
AMM . . . . .	Aircraft Maintenance Manual
AN . . . . .	Air Force-Navy (or Army-Navy)
AOG . . . . .	Aircraft on Ground
FAA . . . . .	Federal Aviation Administration
Ft-Lb . . . . .	Foot-Pound
ICA . . . . .	Instructions for Continued Airworthiness
ID . . . . .	Inside Diameter
In-Lb . . . . .	Inch-Pound
IPS . . . . .	Inches Per Second
kPa . . . . .	Kilopascals
Lbs . . . . .	Pounds
MIL-X-XXX . . . . .	Military Specification
MPI . . . . .	Major Periodic Inspection
MS . . . . .	Military Standard
MSDS . . . . .	Material Safety Data Sheet
NAS . . . . .	National Aerospace Standards
NASM . . . . .	National Aerospace Standards, Military
N•m . . . . .	Newton-Meters
OD . . . . .	Outside Diameter
POH . . . . .	Pilot Operating Handbook
PSI . . . . .	Pounds per Square Inch
RPM . . . . .	Revolutions per Minute
TBO . . . . .	Time Between Overhaul
TSN . . . . .	Time Since New
TSO . . . . .	Time Since Overhaul
<u>NOTE:</u>	TSN/TSO is considered as the time accumulated between rotation and landing, i.e., flight time.

**9. Hartzell Propeller Inc. Product Support**

Hartzell Propeller Inc. is ready to assist you with questions concerning your propeller system. Hartzell Propeller Inc. Product Support may be reached during business hours (8:00 a.m. through 5:00 p.m., United States Eastern Time) at (937) 778-4379 or at (800) 942-7767, toll free from the United States and Canada. Hartzell Propeller Inc. Product Support can also be reached by fax at (937) 778-4391, and by e-mail at [techsupport@hartzellprop.com](mailto:techsupport@hartzellprop.com).

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 also available 24 hours per day, seven days per week via this message service.

Additional information is available on our website at [www.hartzellprop.com](http://www.hartzellprop.com).

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

**10. Warranty Service**

If you believe you have a warranty claim, it is necessary to contact the Warranty Administrator at Hartzell Propeller Inc. The Warranty Administrator will provide you with a *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. Warranty may be reached during business hours (8:00 a.m. through 5:00 p.m., 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](mailto: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 approved distributors and repair facilities for the purchase, repair and overhaul of Hartzell Propeller Inc. 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 Propeller Inc. website at [www.hartzellprop.com](http://www.hartzellprop.com).

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**1. Description of Propeller and Systems**

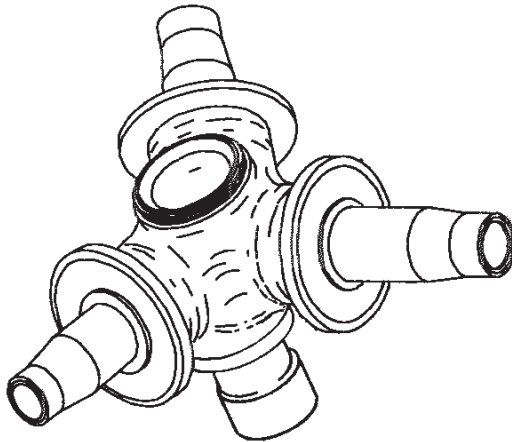
Hartzell steel hub propellers are either ground adjustable or constant speed assemblies that use a steel hub as a central component (Figure 2-1).

The propellers attach to the engine through either a splined shaft or one of several flanged designs. Spline shaft attachments use either a Society of Automotive Engineers (SAE) Number 20 or Number 30 spline (Figure 2-2).

**NOTE:** SAE Number 20 and SAE Number 30 spline shaft propellers will be identified simply as "20 spline shaft" and "30 spline shaft" propellers throughout the text of this manual.

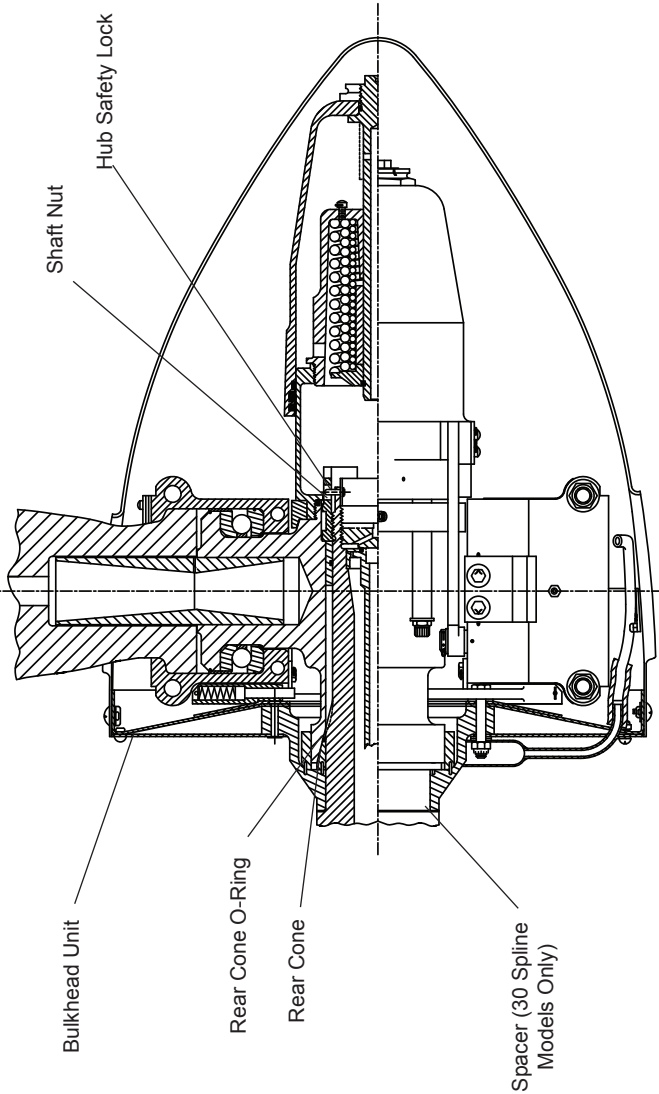
Flanged shaft attachments use a six bolt and two dowel pin interface or an eight bolt and two dowel pin interface between the engine and the propeller flange (Figure 2-3).

APS6004



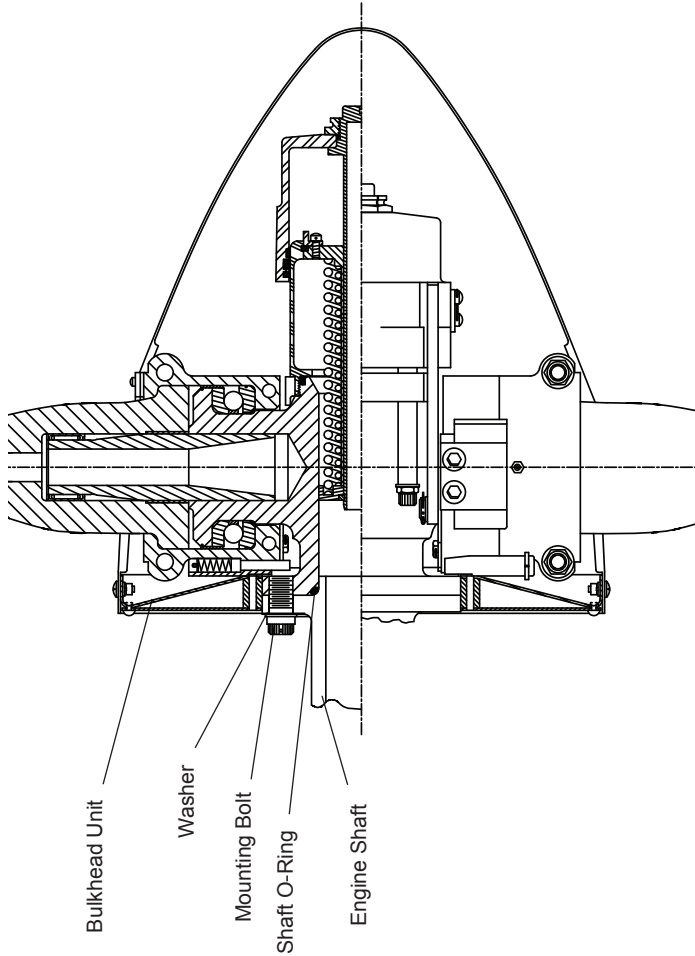
**Steel Hub Unit (For Splined Shaft Mounting)  
Figure 2-1**

D-1860R



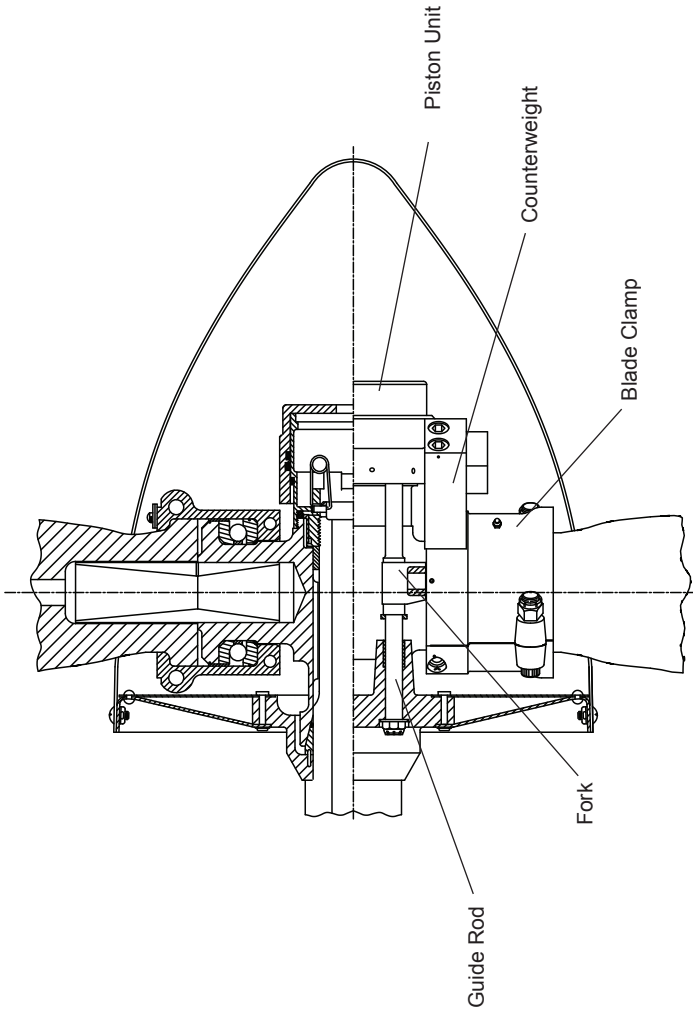
**Spline Shaft Attachment  
Figure 2-2**

D-1995



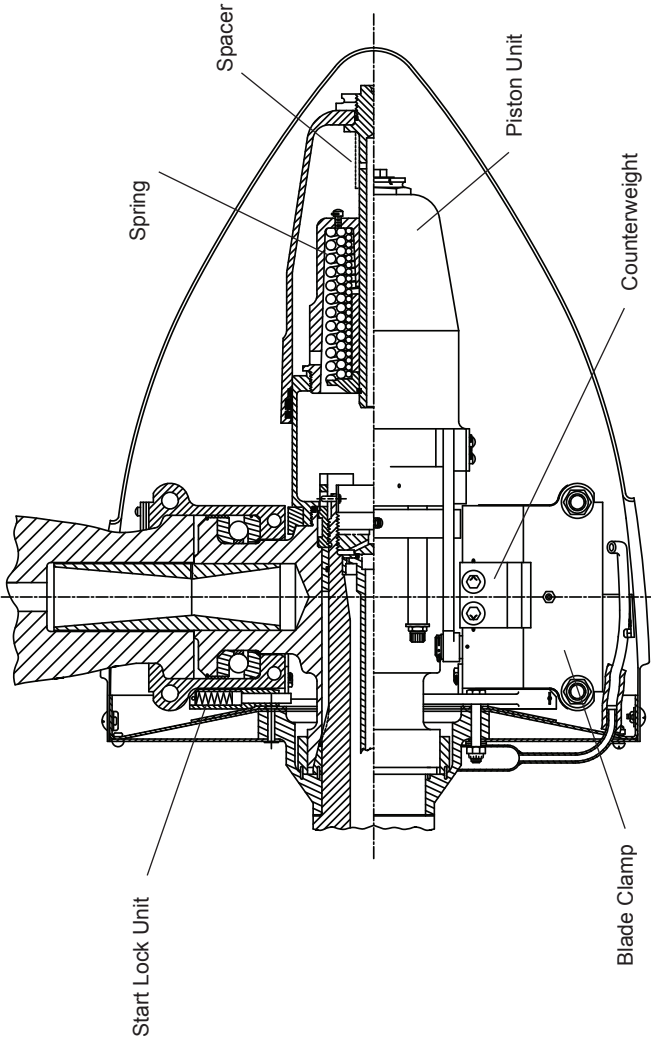
Flanged Shaft Attachment  
Figure 2-3

D-1980Z



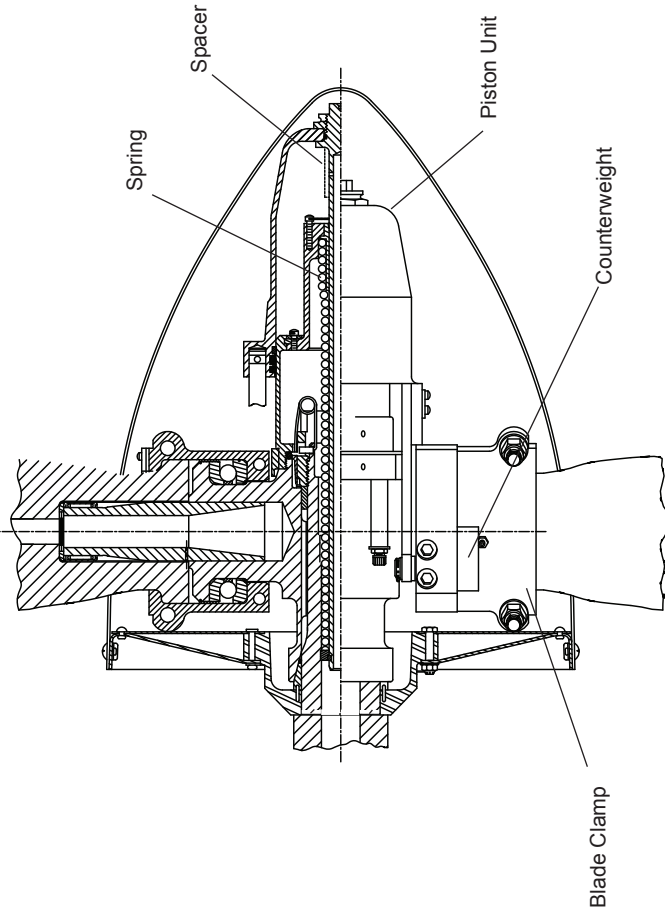
Constant Speed Counterweighted, Non-feathering (HC-B3[W,Z]20-1) Propeller Assembly  
Figure 2-4

D-1860R



Constant Speed Counterweighted, Non-feathering (HC-B3[ ]30-1E[ ]) propeller Assembly  
Figure 2-5

D-1970A



**Constant Speed Counterweighted, Non-feathering (HC-B3Z20-1F) Propeller Assembly  
Figure 2-6**

- A. Constant Speed Counterweighted, Non-feathering Propellers  
Propeller models HC-B3( )20-1, HC-B3( )30-1E( ) and HC-B4( )N-1( ). Refer to Figures 2-4 through 2-6.

Constant speed counterweighted, non-feathering propellers are typically used on single engine aircraft.

Propeller blade angle change is actuated by a hydraulic piston/cylinder combination mounted on the forward end of the propeller hub. The linear motion of the hydraulic piston is transmitted to each blade through either a link arm system, or a sliding rod and fork system, connected to a blade clamp that rotates with the blade. Each blade is retained on the propeller hub by a blade clamp and thrust bearing. The thrust bearing allows the blade to change angle with the blade under centrifugal load.

Propeller forces consisting of mechanical spring action (HC-B3[W,Z]20-1 models have no spring), blade counterweight twisting moment and centrifugal and aerodynamic twisting moment of the blades in various combinations are constantly present while the propeller is operating. The summation of these forces causes the propeller to rotate to a higher blade angle. A variable hydraulic force (oil under pressure from the engine driven governor) toward a lower blade angle opposes the summation of these forces. Oil is metered by the governor to oppose these constant forces and maintain a constant engine RPM.

A spring is installed in all models except HC-B3(W,Z)20-1. Spring force assists rotation of blade pitch to a higher blade angle.

A counterweight is a weight that is attached to each blade clamp to cause the blade to rotate to a higher blade pitch. Counterweighted propellers require governor supplied oil to decrease blade pitch. If the oil supply is lost, the counterweighted propeller will go to high pitch, or low RPM.

The weight of each propeller blade when spinning, generates centrifugal force and a twisting force that attempts to rotate each blade to a lower blade angle.

Air flow around the blade generates lift and an aerodynamic twisting moment that will attempt to increase or decrease blade angle, depending on flight condition and blade design. This force is generally very small in relation to the other forces.

A governor is an engine speed-sensing device that maintains a constant engine/propeller RPM by changing blade angle and varying load on the engine.

The governor uses an internal pump that is driven by an accessory drive from the engine. This pump uses an engine oil supply and increases the engine oil pressure for supply to the propeller. Engine speed sensing hardware within the governor controls the supply of oil to, or drain of oil from the propeller, resulting in a change of blade pitch to maintain constant engine speed.

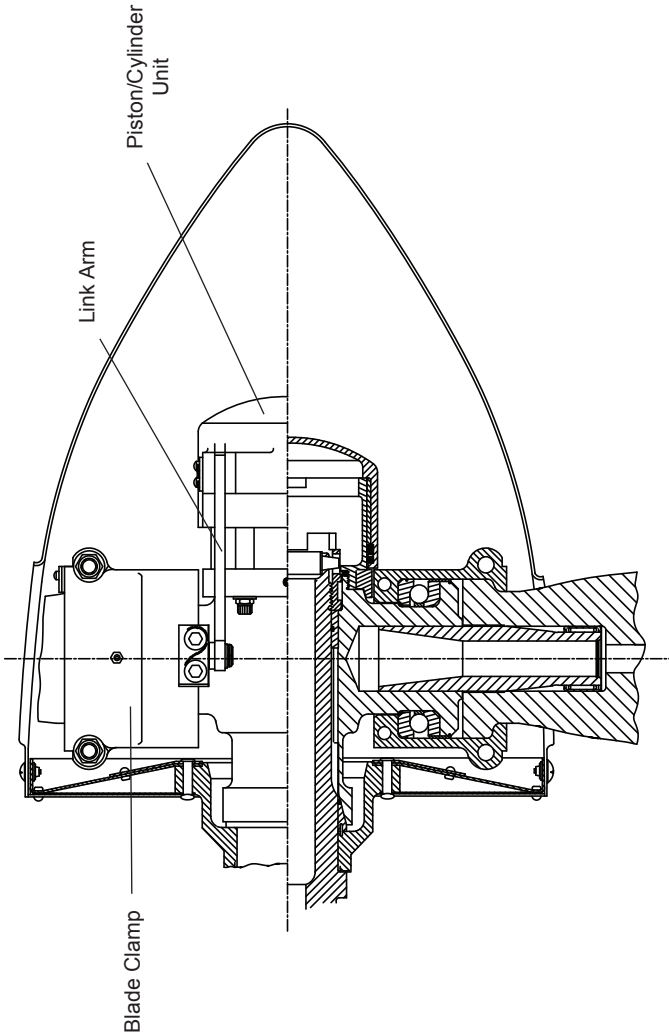
Oil pressure from the engine-driven governor is supplied to the propeller mounted hydraulic cylinder through the engine shaft and propeller hub. Increasing the oil volume within the hydraulic cylinder reduces blade angle to increase engine RPM. Decreasing the oil volume will increase blade angle to decrease engine RPM. By changing the blade angle, the governor maintains constant engine RPM (within limits), independent of the throttle setting.

On some models that have a spring (HC-B3[ ]30-1E[ ] only), it is undesirable to allow the propeller to go to high pitch when the engine is stopped after landing. To prevent the propeller from going to high pitch during normal engine shut down, the propeller incorporates spring energized latches (start locks). Refer to Figure 2-5. If the propeller rotation is approximately 800 RPM or above, the latches are disengaged by centrifugal force acting on the latch weights to compress the springs. When the propeller drops below 800 RPM, the springs overcome the centrifugal force acting on the latch weights and move the latches to engage the start locks, preventing blade angle movement to a higher blade angle.



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D-3325



Constant Speed Non-counterweighted, Non-feathering Propeller Assembly  
Figure 2-7

B. Constant Speed Non-counterweighted, Non-feathering Propellers

Propeller models HC-B3( )20-4( ),HC-B3( )30-4( ) and HC-B3( )F-4( ). Refer to Figure 2-7.

Constant speed non-counterweighted, non-feathering propellers are typically used on single engine aircraft.

Propeller blade angle change is actuated by a hydraulic piston/cylinder combination mounted on the forward end of the propeller hub. The linear motion of the hydraulic piston is transmitted to each blade through either a link arm system, or a sliding rod and fork system, connected to a blade clamp that rotates with the blade. Each blade is retained on the propeller hub by a blade clamp and thrust bearing. The thrust bearing allows the blade to change angle with the blade under centrifugal load.

Propeller forces consisting of mechanical spring action and centrifugal and aerodynamic twisting moment of the blades in various combinations are constantly present while the propeller is operating. The summation of these forces causes the propeller to rotate to a lower blade angle. A variable hydraulic force (oil under pressure from the engine driven governor) toward a higher blade angle opposes the summation of these forces. Oil is metered by the governor to oppose these constant forces and maintain a constant engine RPM.

A spring may be installed in some models. If a spring is installed, its force assists rotation of blade pitch to a higher blade angle. Propeller models HC-B3R30-4A and -4B use spring force to lower blade angle. All other -4 type propeller models covered in this manual use spring force to increase blade angle.

A non-counterweighted propeller requires governor supplied oil to increase blade angle. If the oil supply is lost, the non-counterweighted propeller will go to low pitch, or high RPM.

The weight of each propeller blade when spinning, generates centrifugal force and a twisting force that attempts to rotate each blade to a lower blade angle.

Air flow around the blade generates lift and an aerodynamic twisting moment that will attempt to increase or decrease blade angle, depending on flight condition and blade design. This force is generally very small in relation to the other forces.

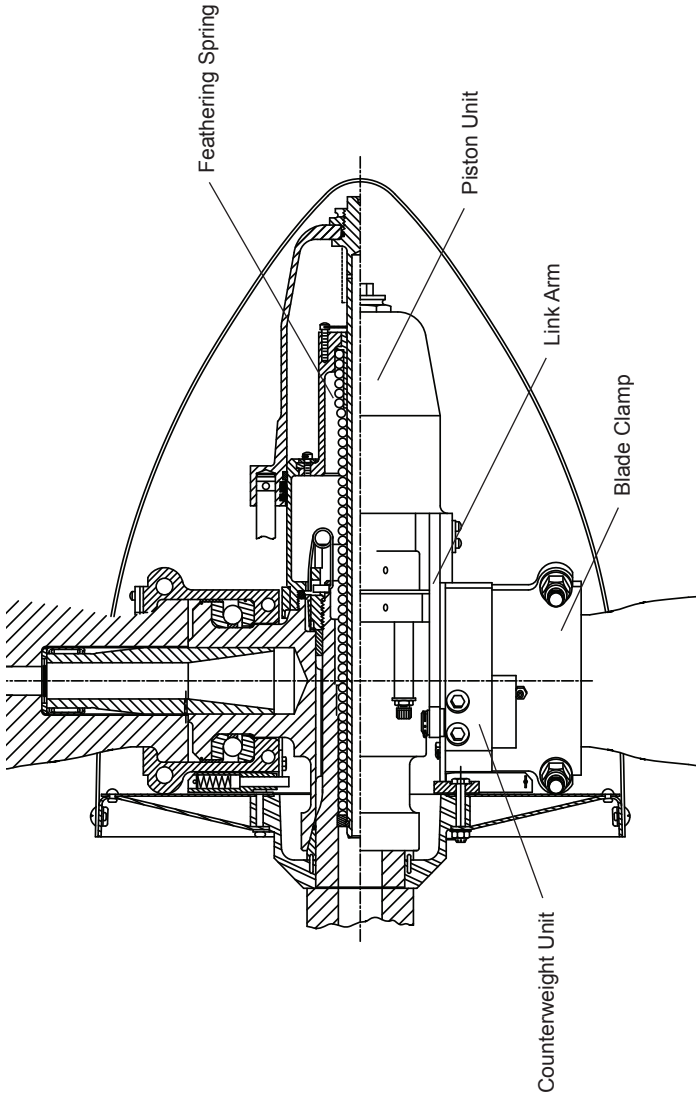
A governor is an engine speed-sensing device that maintains a constant engine/propeller RPM by changing blade angle and varying load on the engine.

The governor uses an internal pump that is driven by an accessory drive from the engine. This pump uses an engine oil supply and increases the engine oil pressure for supply to the propeller. Engine speed sensing hardware within the governor controls the supply of oil to, or drain of oil from the propeller, resulting in a change of blade pitch to maintain constant engine speed.

Oil pressure from the engine-driven governor is supplied to the propeller mounted hydraulic cylinder through the engine shaft and propeller hub. Increasing the oil volume within the hydraulic cylinder increases blade angle to decrease engine RPM. Decreasing the oil volume will decrease blade angle to increase engine RPM. By changing the blade angle, the governor maintains constant engine RPM (within limits), independent of the throttle setting.

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D-1970



Constant Speed and Feathering Propeller Assembly  
Figure 2-8

**C. Constant Speed and Feathering Propellers**

Propeller models HC-B3( )20-2( ), HC-B3( )30-2( ), HC-B3( )F-2, and HC-B3( )N-2( ). Refer to Figure 2-8.

A constant speed and feathering propeller is typically used on a twin engine aircraft. It is counterweighted, and is controlled by an engine speed-sensing device (governor) to maintain a constant engine/propeller RPM by changing blade angle and varying load on the engine.

Propeller blade angle change is actuated by a hydraulic piston/cylinder combination mounted on the forward end of the propeller hub. The linear motion of the hydraulic piston is transmitted to each blade through either a link arm system, or a sliding rod and fork system, connected to a blade clamp that rotates with the blade. Each blade is retained on the propeller hub by a blade clamp and thrust bearing. The thrust bearing allows the blade to change angle.

Propeller forces consisting of mechanical spring action, blade counterweight twisting moment, and centrifugal and aerodynamic twisting moment of the blades in various combinations are constantly present while the propeller is operating. The summation of these forces causes the propeller to rotate to a higher pitch. A variable hydraulic force (oil under pressure from the engine driven governor) toward a lower blade pitch opposes the summation of these forces. Oil is metered by the governor to oppose these constant forces and maintain a constant engine RPM.

The forces of the installed spring assist rotation of blade pitch to a higher blade angle.

The counterweight is a weight that is attached to each blade clamp to cause the blade to rotate to a higher blade pitch. Counterweighted propellers require governor supplied oil to decrease blade pitch. If the oil supply is lost, the counterweighted propeller will go to high pitch, or low RPM.

The weight of each propeller blade when spinning, generates centrifugal force and a twisting force that attempts to rotate each blade to a lower blade angle.

Air flow around the blade generates lift and an aerodynamic twisting moment that attempts to increase or decrease blade angle, depending on flight condition and blade design. This force is generally very small in relation to the other forces.

A governor is an engine speed-sensing device that maintains a constant engine/propeller RPM by changing blade angle and varying load on the engine.

The governor uses an internal pump that is driven by an accessory drive from the engine. This pump uses an engine oil supply and increases the engine oil pressure for supply to the propeller. Engine speed sensing hardware within the governor controls the supply of oil to, or the drain of oil from the propeller, resulting in a change of blade pitch to maintain constant engine speed.

Oil pressure from the engine-driven governor is supplied to the propeller mounted hydraulic cylinder through the engine shaft and propeller hub. Increasing the oil volume within the hydraulic cylinder reduces blade angle to increase engine RPM. Decreasing the oil volume will increase blade angle to decrease engine RPM. By changing the blade angle, the governor maintains constant engine RPM (within limits), independent of the throttle setting.

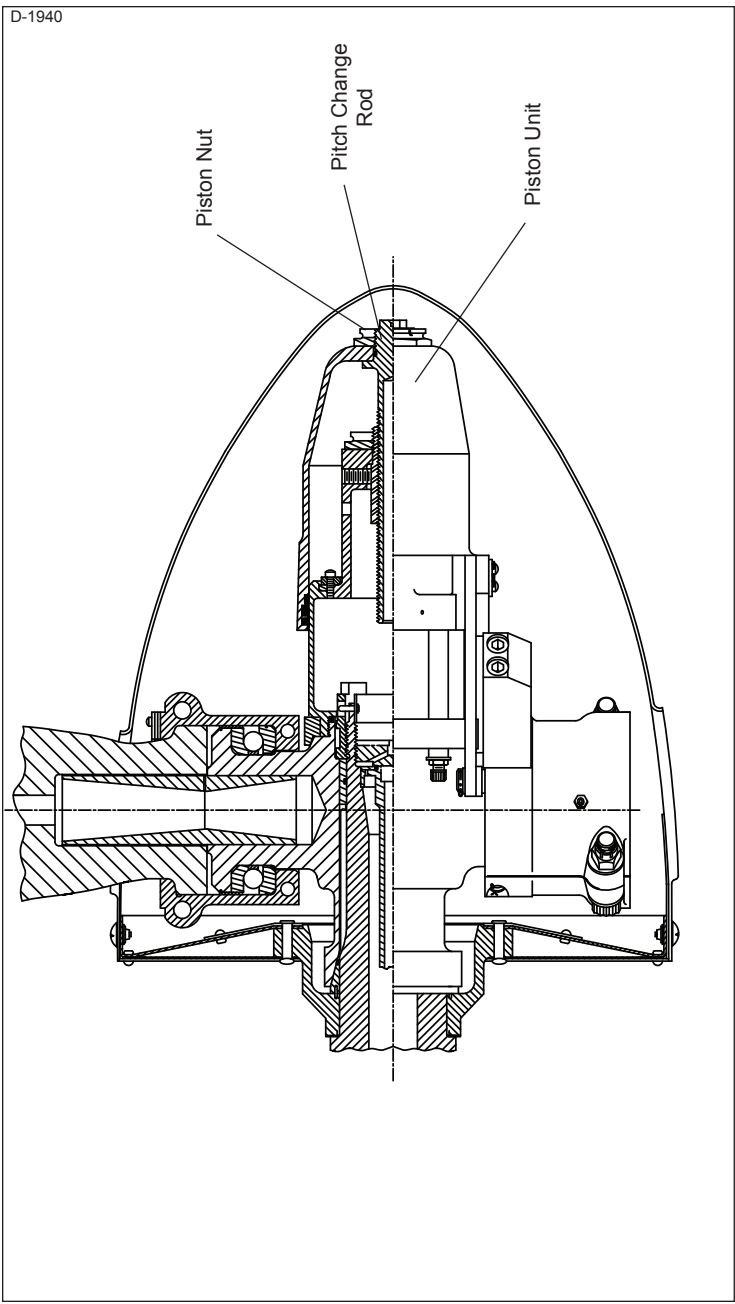
If oil supply is lost during flight, the propeller will feather. Feathering occurs because the spring and blade clamp mounted counterweight forces are no longer opposed by hydraulic oil pressure and are free to increase blade pitch to the feathering (high pitch) stop.

Normal in-flight feathering of these propellers is accomplished when the pilot retards the propeller pitch control past the feather detent. This allows oil to drain from the propeller and return to the engine sump. Engine shutdown is normally accomplished during the feathering process.



Normal in-flight unfeathering is accomplished when the pilot positions the propeller pitch control into normal flight (governing) range and restarts the engine. As engine speed increases, oil is supplied by the governor to the propeller, and the blade angle decreases.

It is undesirable to feather the propeller when the engine is stopped after landing. To prevent feathering during normal engine shut down, the propeller incorporates spring energized latches (start locks). If the propeller rotation is approximately 800 RPM or above, the latches are disengaged by centrifugal force acting on the latch weights to compress the springs. When the propeller drops below 800 RPM, the springs overcome the centrifugal force acting on the latch weights and move the latches to engage the start locks, preventing blade angle movement to feather.



Ground Adjustable Propeller Assembly  
Figure 2-9

**D. Ground Adjustable Pitch Propellers**

Propeller models HA-B3( )30-1( ). Refer to Figure 2-9.

Ground adjustable pitch propellers are typically used on single engine aircraft equipped with an engine that does not support governing capability nor is able to supply oil through a hollow shaft to the propeller.

Ground adjustable pitch propellers may be set to a desired blade pitch by manually adjusting the propeller when the aircraft is static on the ground. This allows an optimal blade pitch to be selected for different flight conditions, such as climb or cruise. A propeller adjusted for climb will not fly very fast (unless engine RPM's are excessively high). A propeller adjusted for cruise will need more runway for takeoff and will climb more slowly (engine RPM will be less than optimum).

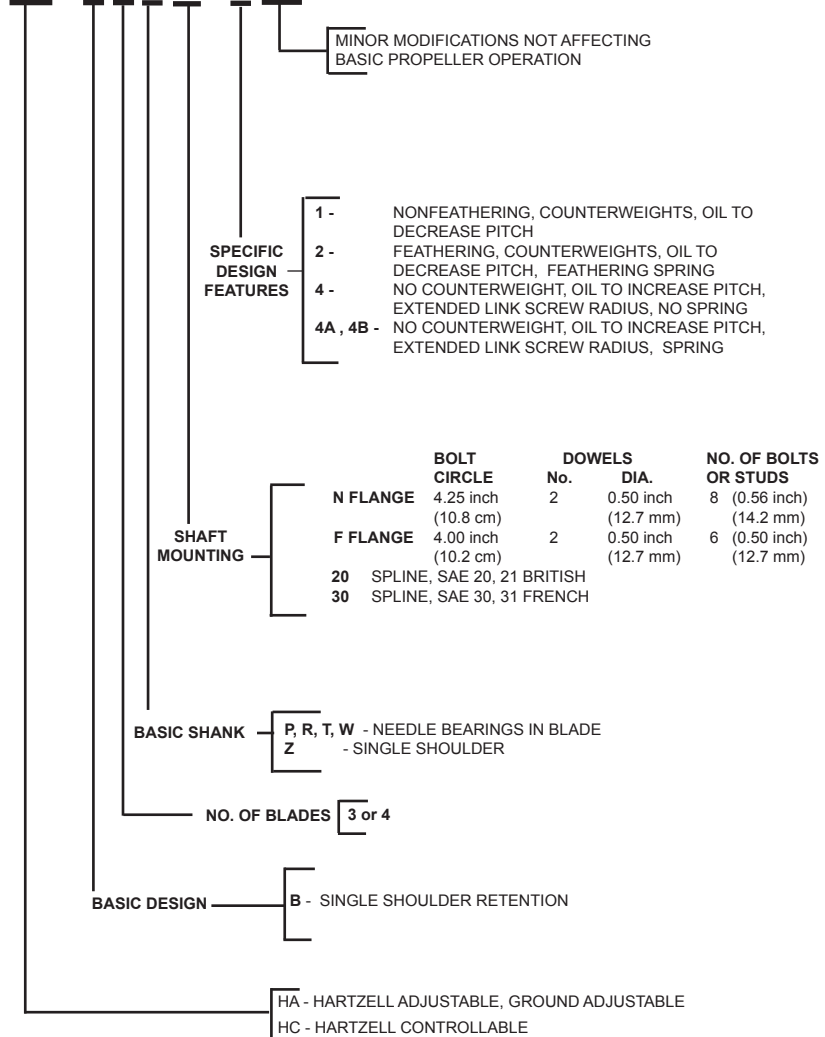
Ground adjustable propellers do not require a governor or any oil supply, as they do not change blade pitch in flight.

### 2. Model Designation

The following pages illustrate sample model designations for Hartzell steel hub reciprocating propeller hub assemblies and blades.

#### A. Steel Hub Propeller Model Identification

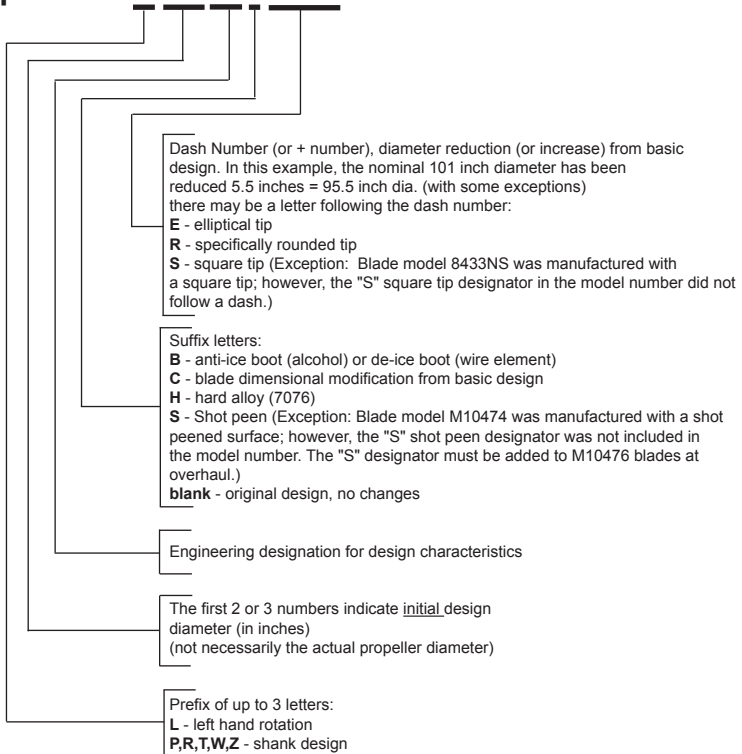
**HC - B 3 P 30 - 2 EA**

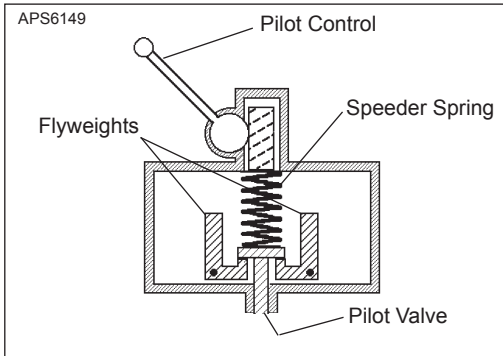


### B. Aluminum Blade Model Identification

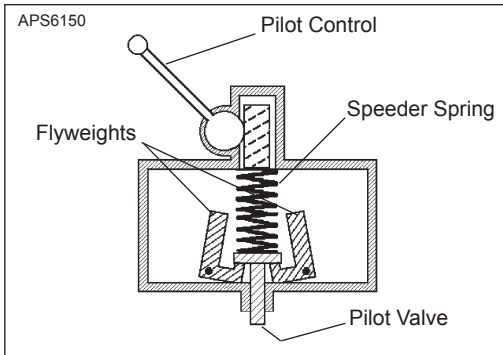
Hartzell uses a model designation to identify specific blade assemblies. Example: HC-B3R30-4/R10152-5.5R. A slash mark separates the propeller and blade designations. The blade designation is impression stamped on the blade butt end (internal) and is either on a decal or ink stamped on the blade camber side (external).

### prop model/R10152 -5.5R

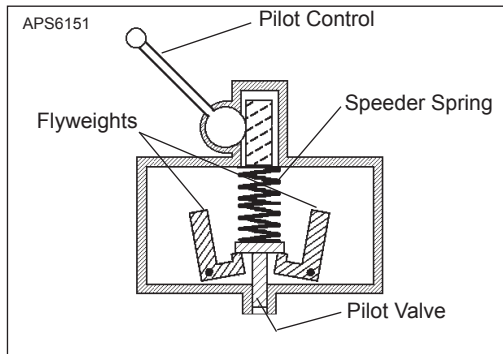




**Governor in Onspeed Condition  
Figure 2-10**



**Governor in Underspeed Condition  
Figure 2-11**

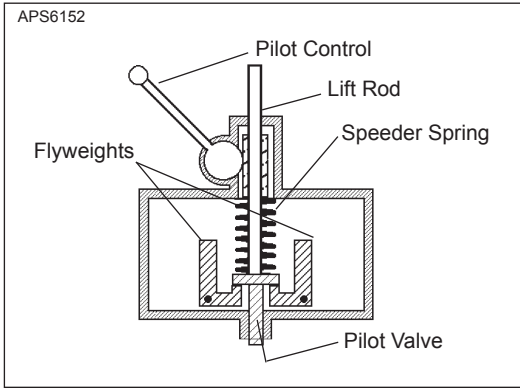


**Governor in Overspeed Condition  
Figure 2-12**

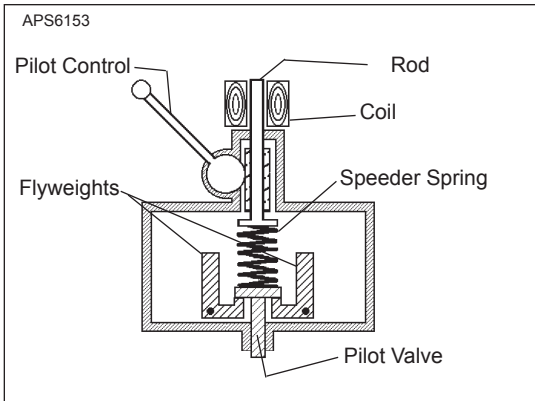
### 3. Governors

#### A. Theory of Operation

- (1) A governor is an engine RPM sensing device and high pressure oil pump. In a constant speed propeller system, the governor responds to a change in engine RPM by directing oil under pressure to the propeller hydraulic cylinder or by releasing oil from the hydraulic cylinder. The change in oil volume in the hydraulic cylinder changes the blade angle and maintains the propeller system RPM to the set value. The governor is set for a specific RPM via the cockpit propeller control that compresses or releases the governor speeder spring.
- (2) When the engine is operating at the RPM set by the pilot using the cockpit control, the governor is operating **onspeed**. Refer to Figure 2-10. In an onspeed condition, the centrifugal force acting on the flyweights is balanced by the speeder spring, and the pilot valve is neither directing oil to nor from the propeller hydraulic cylinder.
- (3) When the engine is operating below the RPM set by the pilot using the cockpit control, the governor is operating **underspeed**. Refer to Figure 2-11. In an underspeed condition, the flyweights tilt inward because there is not enough centrifugal force on the flyweights to overcome the force of the speeder spring. The pilot valve, forced down by the speeder spring, meters oil flow to decrease propeller pitch and raise engine RPM.
- (4) When the engine is operating above the RPM set by the pilot using the cockpit control, the governor is operating **overspeed**. Refer to Figure 2-12. In an overspeed condition, the centrifugal force acting on the flyweights is greater than the speeder spring force. The flyweights tilt outward, and raise the pilot valve. The pilot valve then meters oil flow to increase propeller pitch and lower engine RPM.



**Feathering Governor  
Figure 2-13**



**Synchronizer/Synchrophaser Governor  
Figure 2-14**



- (5) Refer to Figure 2-13. This figure illustrates a feathering propeller governor. This governor is similar to the constant speed governors illustrated in Figures 2-10 through 2-12 with the addition of the lift rod. When it is desired to feather the propeller, the lift rod may be moved by the cockpit control to mechanically engage the pilot valve to lift the valve. This essentially puts the pilot valve in an overspeed condition. The lifted pilot valve dumps oil to increase propeller pitch until the propeller feathers.
- (6) Refer to Figure 2-14. This figure illustrates a governor as a component of a synchronizing or synchrophasing system. A synchronizing system is employed in a multi-engine aircraft to keep the engines operating at the same RPM. A synchrophasing system not only keeps RPM of the engines consistent, but also keeps the propeller blades operating in phase with each other. Both synchronizing and synchrophasing systems serve to reduce noise and vibration.
- (7) A Hartzell synchronizing or synchrophasing system uses one engine (the master engine) as an RPM and phase reference and adjusts the RPM of the remaining engine(s) (slave engine[s]) to match it. The RPM of the master engine is monitored electronically, and this information is used to adjust the voltage applied to the electrical coil on the slave governor(s). The voltage to the coil either raises or lowers a rod which changes the force on the speeder spring. In this manner, engine RPM and phase of the propellers is synchronized or synchrophased.

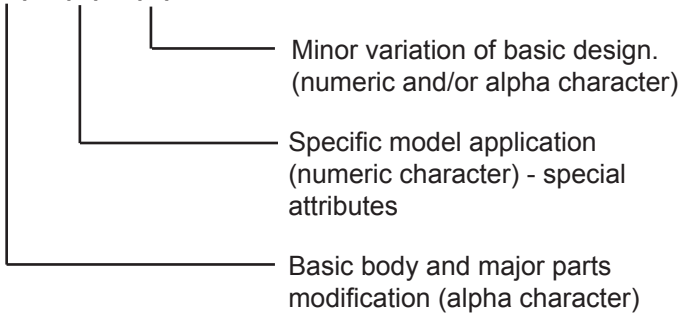
B. Governor Types

The governors commonly used in Hartzell Constant Speed propeller systems are supplied either by Hartzell or other manufacturers. These governor types function in a similar manner.

C. Identification of Hartzell Governors

Hartzell governor may be identified by model number as follows: Example F-6-4

**(X) - (X) - (X)**



NOTE: Refer to Hartzell Manual 130B (61-23-30) for maintenance and overhaul instructions for Hartzell governors.

**4. Propeller Ice Protection Systems**

Some Hartzell propellers may be equipped with an anti-ice or a de-ice system. A short description of each of these systems follows:

**A. Propeller Anti-ice System**

A propeller anti-ice system prevents ice from forming on propeller surfaces. The system dispenses a liquid (usually isopropyl alcohol) that mixes with moisture on the propeller blades, reducing the freezing point of the water. This water/alcohol mixture flows off the blades before ice forms. This system must be in use before ice forms. It is ineffective in removing ice that has already formed.

**(1) System Overview**

- (a) A typical anti-ice system consists of a fluid tank, pump, and distribution tubing.
- (b) The rate at which the anti-icing fluid is dispensed is controlled by a pump speed rheostat in the cockpit.
- (c) The anti-icing fluid is dispensed through airframe mounted distribution tubing and into a rotating slinger ring mounted on the rear of the propeller hub. The anti-icing fluid is then directed through blade feed tubes from the slinger ring onto the blades via centrifugal force. The anti-icing fluid is directed onto anti-icing boots that are attached to the leading edge of the blade. These anti-icing boots evenly distribute and direct the fluid along the blade leading edge.

**B. Propeller De-ice System**

A propeller de-ice system is a system that allows ice to form, and then removes it by electrically heating the de-ice boots. The ice partially melts and is thrown from the blade by centrifugal force.

**(1) System Overview**

- (a) A de-ice system consists of one or more on/off switches, a timer or cycling unit, a slip ring, brush blocks, and de-ice boots. The pilot controls the operation of the de-ice system by turning on one or more switches. All de-ice systems have a master switch, and may have another toggle switch for each propeller. Some systems also have a selector switch to adjust for light or heavy icing conditions.
- (b) The timer or cycling unit determines the sequence of which blades (or portion thereof) are currently being de-iced, and for what length of time. The cycling unit applies power to each de-ice boot or boot segment in a sequential order.
- (c) A brush block, which is normally mounted on the engine just behind the propeller, is used to transfer electricity to the slip ring. The slip ring rotates with the propeller and provides a current path to the blade de-ice boots.
- (d) De-ice boots contain internal heating elements. These boots are securely attached to the leading edge of each blade with adhesive.

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## 1. Tools, Consumables, and Expendables

The steel hub reciprocating propellers covered in this manual are manufactured with either a flange mounting or a spline mounting. The flange type or spline type used on a particular propeller installation is indicated in the propeller model identification number stamped on the hub. For example, HC-B3MN-3 indicates an "N" flange. HC-BR30-4 indicates a "30" spline. Refer to the Steel Hub Model Identification in the Description and Operation chapter of this manual for a description of each flange type.

The flange mounted propeller is supplied completely assembled. The spline mounted propeller is supplied with the piston removed.

The following tools, consumables, and expendables will be required for propeller removal or installation:

### A. Tooling

#### **F Flange**

- Safety wire pliers (Alternate: Safety cable tool)
- Calibrated torque wrench
- Torque wrench adapter, Hartzell Propeller Inc. P/N AST-2917 or a locally procured torque wrench adapter of the appropriate size

#### **N Flange**

- Safety wire pliers (Alternate: Safety cable tool)
- Calibrated torque wrench
- Torque wrench adapter, Hartzell Propeller Inc. P/N BST-2877 or a locally procured torque wrench adapter of the appropriate size

#### **20 Spline**

- Safety wire pliers
- Shaft nut wrench Hartzell Propeller Inc. P/N BST-2910, or equivalent

#### **30 Spline**

- Safety wire pliers
- Spanner wrench Hartzell Propeller Inc. P/N BT-461, strap wrench Hartzell Propeller Inc. P/N 100923, or equivalent
- Shaft nut wrench, Hartzell Propeller Inc. P/N BST-2910, or equivalent

### B. Consumables

- Quick Dry Stoddard Solvent or Methyl-Ethyl-Ketone (MEK)

### C. Expendables

- 0.032 inch (0.81 mm) stainless steel aircraft safety wire (Alternate: 0.032 inch [0.81 mm] aircraft safety cable, and associated hardware)
- O-ring propeller-to-engine seal (see Table 3-1)

### 2. O-ring and Propeller Mounting Hardware Identification

Part	Propeller Model	Part No.
Dowel Pin	HC-B3( )F-2( )	B-6138-8-8
	HC-B3WF-4	B-6138-8-8
	HC-B3WN-2L	B-6138-8-8
	HC-B4TN-1	B-6138-8-8
Piston Dust Seal	HC-B3( )20-2( )	B-1843
	HC-B3( )20-1B	B-1843
	HC-B3( )20-4	B-1843
	HC-B3R30-4A,-4B	B-1843
	HC-B3( )30-2( )	B-1843
	HC-B3( )30-1E( )	B-1843
	HC-B3( )30-2E( )	B-1843
	HC-B3( )20-1	B-1843
HC-B3Z20-1F	B-1843	
Hub Lock Safety Pin	HC-B3( )20-2( )	A-847
	HC-B3( )20-1	A-847
	HC-B3Z20-1F	A-847
	HC-B3( )20-4	A-847
Jam Nut (Low pitch stop)	HC-B3( )20-2( )	B-3368
	HC-B3Z20-1F	B-3368
	HC-B3( )20-4	B-3368
	HC-B3( )30-2B( )	B-3368
	HC-B3( )30-1E( )	B-3368
	HC-B3( )30-2E( )	B-3368
HC-B3R30-4A,-4B	B-3368	
Mounting Bolt	HC-B3( )F-2( )	A-1328-1
	HC-B3WF-4	A-1328-2
	HC-B3WN-2L	B-3339
	HC-B4TN-1	B-3339
Nut, Flexlock (on guide rod)	HC-B3( )20-1	A-848-2
Nut, Piston	HC-B3( )30-1E( )	A-880-1
	HC-B3( )30-2B( )	A-880-1
	HC-B3( )30-2E( )	A-880-1
	HC-B3R30-4A,-4B	A-880-1
	HA-B3( )30-1B	A-880-1

**O-ring and Propeller Mounting Hardware Identification**  
Table 3-1, Page 1 of 3

Part	Propeller Model	Part No.
O-ring, Bushing/Shaft	HC-B3( )F-2( )	C-3317-228
	HC-B3WF-4	C-3317-228
	HC-B3( )30-2( )	C-3317-141
	HA-B3( )30-1B	C-3317-141
	HC-B3R30-4A,-4B	C-3317-141
O-ring, Hub	HC-B4TN-1	C-3317-230
O-ring, Piston	HC-B3( )20-2( )	C-3317-343-1
	HC-B3( )30-2B( )	C-3317-343-1
	HC-B3( )20-1	C-3317-343-1
	HC-B3Z20-1F	C-3317-343-1
	HA-B3( )30-1B	C-3317-343-1
	HC-B3( )30-1E( )	C-3317-347-1
	HC-B3( )30-2E( )	C-3317-347-1
	HC-B3R30-4A,-4B	C-3317-347-1
	HC-B3( )20-4	C-3317-347-1
	HC-B3( )30-4	C-3317-347-1
O-ring, Rear Cone	HC-B3( )20-2( )	C-3317-229
	HC-B3( )20-4	C-3317-229
	HC-B3( )20-1	C-3317-229
	HC-B3Z20-1F	C-3317-229
	HC-B3( )30-2B( )	C-3317-231
	HC-B3( )30-1E( )	C-3317-231
	HC-B3( )30-2E( )	C-3317-231
	HC-B3( )30-4	C-3317-231
	HA-B3( )30-1B	C-3317-231
	HC-B3R30-4A,-4B	C-3317-231
O-ring, Rod	HA-B3( )30-1B	C-3317-020
	HC-B3Z20-1F	C-3317-020
	HC-B3( )20-2( )	C-3317-020
	HC-B3( )30-2B( )	C-3317-020
	HC-B3( )30-1E( )	C-3317-020
	HC-B3( )30-2E( )	C-3317-020
	HC-B3( )20-4	C-3317-235
	HC-B3( )30-4	C-3317-235
Spacer	HA-B3( )30-1B	A-1855
	HC-B3R30-4A,-4B	A-1855
	HC-B3( )30-4	A-1855
	HC-B3( )30-2B( )	A-1855
	HC-B3( )30-1E( )	A-1855
	HC-B3( )30-2E( )	A-1855

**O-ring and Propeller Mounting Hardware Identification  
Table 3-1, Page 2 of 3**

Part	Propeller Model	Part No.
Spacer, High Stop	HC-B3( )20-1	A-970-( )
Shaft/Hub Nut	HC-B3( )20-2( )	A-63B
	HC-B3( )20-4	A-63B
	HC-B3( )20-1	A-63B
	HC-B3Z20-1F	A-63B
	HC-B3( )30-4	B-1894
	HA-B3( )30-1B	B-1894
	HC-B3R30-4A,-4B	B-1894
	HC-B3( )30-2B( )	B-1894
	HC-B3( )30-1E( )	B-1894
	HC-B3( )30-2E( )	B-1894
Shaft Nut Lock	HC-B3( )30-2B( )	A-1848
	HC-B3( )30-1E( )	A-1848
	HC-B3( )30-2E( )	A-1848
	HC-B3( )30-4	A-1848
	HA-B3( )30-1B	A-1848
	HC-B3R30-4A,-4B	A-1848
Socket Head Cap Screw, (Low pitch stop)	HC-B3( )20-2( )	A-2037
	HC-B3Z20-1F	A-2037
	HC-B3( )30-2B( )	A-2037
	HC-B3( )30-1E( )	A-2037
	HC-B3( )30-2E( )	A-2037
	HC-B3R30-4A,-4B	A-2037
Split Ring	HC-B3( )20-2( )	A-859
	HC-B3Z20-1F	A-859
	HC-B3( )30-2B( )	A-859
Washer, (Guide rod)	HC-B3( )20-1	A-965
Washer, (Low pitch stop)	HC-B3( )20-2( )	A-1444
	HC-B3Z20-1F	A-1444
	HC-B3( )20-4	A-1444
	HC-B3( )30-2B( )	A-1444
	HC-B3( )30-1E( )	A-1444
	HC-B3( )30-2E( )	A-1444
	HC-B3R30-4A,-4B	A-1444
Mounting Washer	HC-B3( )F-2( )	A-1381
	HC-B3WN-2L	A-2048-2
	HC-B4TN-1	A-2048-2

**O-ring and Propeller Mounting Hardware Identification  
Table 3-1, Page 3 of 3**

**3. Pre-Installation****A. Inspection of Shipping Package**

Examine the exterior of the shipping container for signs of shipping damage, especially the box ends around each blade. A hole, tear or crushed appearance at the end of the box (blade tips) may indicate that the propeller was dropped during shipment, possibly damaging the blades.

**B. Uncrating**

- (1) Place the propeller on a firm support.
- (2) Remove the banding and any external wood bracing from the shipping container.
- (3) Remove the cardboard from the hub and blades. Place the propeller on a padded surface that supports the propeller over a large area. Never stand the propeller on a blade tip.
- (4) On flange mounted models, remove the plastic dust cover cup from the propeller mounting flange (if installed).

**C. Inspection after Shipment**

After removing the propeller from the shipping container, examine the propeller components for shipping damage.

**D. Reassembly of a Propeller Disassembled for Shipment**

If a propeller was received disassembled for shipment, it must be reassembled by trained personnel in accordance with the applicable propeller maintenance manual.

**4. Propeller Assembly Installation****A. Precautions**

**WARNING 1:** DURING ENGINE INSTALLATION OR REMOVAL, USING THE PROPELLER TO SUPPORT THE WEIGHT OF THE ENGINE IS NOT AUTHORIZED. UNAPPROVED INSTALLATION AND REMOVAL TECHNIQUES MAY CAUSE DAMAGE TO THE PROPELLER THAT MAY LEAD TO FAILURE. PROPELLER FAILURE CAN RESULT IN AN AIRCRAFT ACCIDENT.

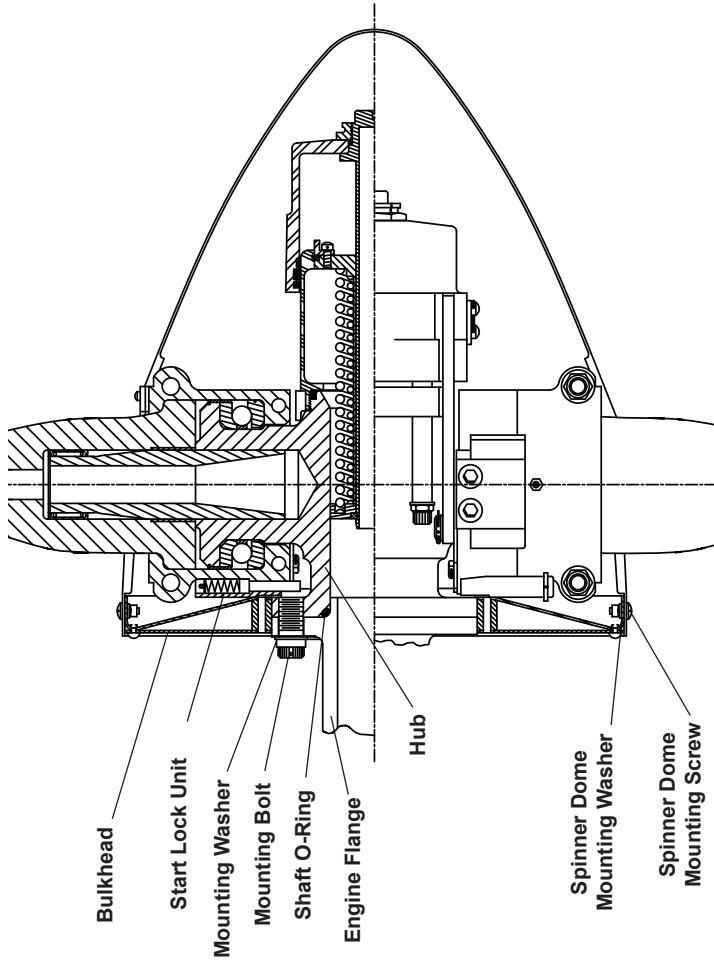
**WARNING 2:** WHEN INSTALLING THE PROPELLER, FOLLOW THE AIRFRAME MANUFACTURER'S MANUALS AND PROCEDURES, AS THEY MAY CONTAIN ISSUES VITAL TO AIRCRAFT SAFETY THAT ARE NOT CONTAINED IN THIS OWNER'S MANUAL.

- (1) Make sure the propeller is removed before the engine is removed or installed in the airframe.
- (2) Follow the airframe manufacturer's instructions for installing the propeller. If such instructions are not in the airframe manufacturer's manual, then follow the instructions in this manual; however, mechanics must consider that this owner's manual does not describe important procedures that are outside its scope. In addition to propeller installation procedures, items such as rigging and preflight testing, installation and adjustment of de-ice equipment, and propeller synchronization devices are normally found in the airframe manufacturer's manuals.

**B. O-ring and Propeller Mounting Hardware Identification**

Refer to Table 3-1 for specific part numbers of O-rings and propeller mounting hardware, and propeller model effectivity.

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HC-B3()F-2() Propeller  
Figure 3-1

- C. Installing the HC-B3( )F-2( ) Propeller - Refer to Figure 3-1.

**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.

- (1) Press two dowel pins (Table 3-1) through the holes in the propeller flange to be flush with the propeller side of the hub flange.

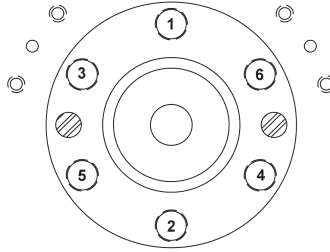
**WARNING:** ADHESIVES AND SOLVENTS ARE FLAMMABLE AND TOXIC TO THE SKIN, EYES, AND RESPIRATORY TRACT. SKIN AND EYE PROTECTION ARE REQUIRED. AVOID PROLONGED CONTACT AND BREATHING OF VAPORS. USE SOLVENT RESISTANT GLOVES TO MINIMIZE SKIN CONTACT AND WEAR SAFETY GLASSES FOR EYE PROTECTION. USE IN A WELL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

- (2) Clean the engine flange and propeller flange with Quick Dry Stoddard Solvent.



W10108C,  
W10109C,  
W10109B

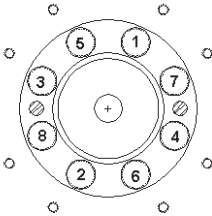
### F Flange



**Step 1** - Torque all bolts to 40 Ft-Lbs (54 N•m).

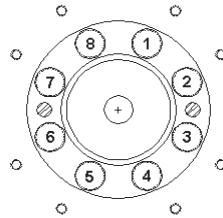
**Step 2** - Torque all bolts in accordance with Table 3-2 and Figure 3-3.

### N Flange



SEQUENCE A

Use Sequence A for Steps 1 and 2.



SEQUENCE B

Use Sequence B for Step 3.

**Step 1** - Torque all bolts to 40 Ft-Lbs (54 N•m).

**Step 2** - Torque all bolts to 80 Ft-Lbs (108 N•m).

**Step 3** - Torque all bolts in accordance with Table 3-2 and Figure 3-3.

**Diagram of Torquing Sequence for Propeller Mounting Bolts  
Figure 3-2**

WARNING 1: THE PISTON NUT SHOULD HAVE BEEN REMOVED BEFORE SHIPPING TO PERMIT ROTATING OF THE BLADES FOR PACKAGING.

WARNING 2: FOR SAFETY REASONS, IF THE PISTON NUT WAS NOT REMOVED, THE PROPELLER MUST BE PLACED IN FEATHER POSITION BEFORE IT IS INSTALLED ON THE AIRCRAFT.

WARNING 3: MAKE SURE THE SLING IS RATED UP TO 800 POUNDS (363 KG) TO SUPPORT THE WEIGHT OF THE PROPELLER ASSEMBLY DURING INSTALLATION.

CAUTION: WHEN INSTALLING THE PROPELLER ON THE AIRCRAFT, DO NOT DAMAGE THE ICE PROTECTION SYSTEM COMPONENTS, IF APPLICABLE.

- (3) Using a suitable crane hoist and sling, carefully move the propeller assembly to the aircraft engine mounting flange in preparation for installation.
- (4) If the spinner bulkhead is to be installed and is not already in place, perform the following steps:
  - (a) Install the spinner bulkhead facing toward the propeller.
  - (b) From the engine side of the bulkhead, insert the mounting bolts through the bulkhead and into the start lock.

NOTE: Installation of the 835-29 spinner assembly on the HC-B3WF-2 propeller requires that a minimum of one washer be installed under the head of each start lock mounting bolt, and that no more than two threads of the mounting bolt pass through the start lock mounting nut. Additional washers may be used under the mounting bolt head as required.

- (c) Install the washers and locking nuts on the propeller side of the start lock to secure the mounting bolts and bulkhead.
    - (d) Torque the attaching bolts to 8-12 Ft-Lb (11-16 N•m).
- (5) Install the shaft O-ring (Table 3-1) on the engine shaft.

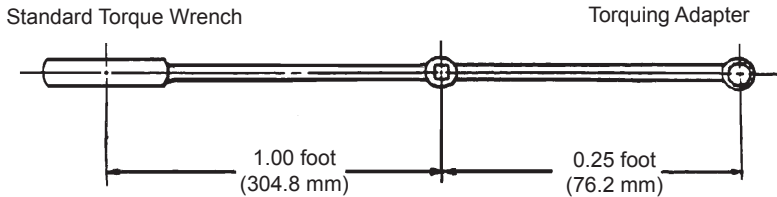
**CAUTION:** USE CARE TO AVOID SCRAPING ALUMINUM FROM THE BORE OF THE SPINNER BULKHEAD. SCRAPINGS COULD BECOME WEDGED BETWEEN THE FLANGES.

- (6) Align the threaded holes of the propeller flange with the bolt holes in the engine flange, and align the dowel pins in the propeller flange with the dowel pin holes in the engine flange.

**CAUTION:** MAKE SURE THAT COMPLETE AND TRUE SURFACE CONTACT IS ESTABLISHED BETWEEN THE PROPELLER HUB FLANGE AND THE ENGINE FLANGE.

- (7) Slide the propeller onto the engine flange.

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$$\frac{(\text{actual torque required}) \times (\text{torque wrench length})}{(\text{torque wrench length}) + (\text{length of adapter})} = \text{Torque wrench reading to achieve required actual torque}$$

EXAMPLE:

$$\frac{100 \text{ Ft-Lb (136 N}\cdot\text{m)} \times 1.00 \text{ ft (304.8 mm)}}{1.00 \text{ ft (304.8 mm)} + 0.25 \text{ ft (76.2 mm)}} = 80 \text{ Ft-Lb (108 N}\cdot\text{m)}$$

reading on torque wrench with 3-inch (76.2 mm) adapter for actual torque of 100 Ft-Lb (136 N·m)

The correction shown is for an adapter that is aligned with the centerline of the torque wrench. If the adapter is angled 90 degrees relative to the torque wrench centerline, the torque wrench reading and actual torque applied will be equal.

**Determining Torque Value When Using Torquing Adapter  
Figure 3-3**

**CAUTION 1:** TORQUE VALUES ARE BASED ON NON-LUBRICATED THREADS, UNLESS OTHERWISE SPECIFIED.

**CAUTION 2:** REFER TO FIGURE 3-3 FOR TORQUE READING WHEN USING A TORQUE WRENCH ADAPTER.

**NOTE:** WET TORQUE VALUES DENOTE THE USE OF ANTI-SEIZE COMPOUND MIL-PRF-83483

**F Flange propeller mounting bolts**

A-1328-( ) 80-90 ft-lbs (108-122 N•m)

**N Flange propeller mounting bolts**

B-3339 (HC-B4TN-1) 100-105 ft-lbs (136-142 N•m) Wet

B-3339 (HC-B3WN-2L) 100-105 ft-lbs (136-142 N•m) Wet

**Spinner mounting bolts**

30-40 ft-lbs (41-54 N•m)

**Shaft nut**

A-63B 450 ft-lbs (610 N•m)\*

B-1894 600 ft-lbs (813 N•m)\*

**Feathering Spring Assembly**

831-4 100 ft-lbs (108 N•m)\*

831-57 100 ft-lbs (108 N•m)\*

831-80 100 ft-lbs (108 N•m)\*

831-81 100 ft-lbs (108 N•m)\*

831-86 100 ft-lbs (108 N•m)\*

831-87 100 ft-lbs (108 N•m)\*

831-88 100 ft-lbs (108 N•m)\*

831-90 100 ft-lbs (108 N•m)\*

**Piston Nut**

A-880-1 (HC-B3[ ]20-2[ ]) 120 ft-lbs. (162 N•m)\*

A-880-1 (HC-B3[ ]30-[ ] [ ]) 120 ft-lbs. (162 N•m)\*

**Pitch Adjustment Nut**

A-880-1 (HA-B3[ ]30-[ ] [ ]) 75 ft-lbs. (102 N•m)\*

**Low-pitch stop jam nut**

B-3368 10 ft-lbs. (14 N•m)\*

**Flexlock Nut (on guide rod)**

A-848-2 (HC-B3[ ]20-1) 10 ft-lbs. (14 N•m)\*

\* Torque tolerance is  $\pm$  10 percent unless otherwise noted.

**Torque Values  
Table 3-2**

**CAUTION:** NEW PROPELLER MOUNTING BOLTS MUST BE USED WHEN INITIALLY INSTALLING A NEW OR OVERHAULED PROPELLER.

- (8) Install mounting bolts (Table 3-1) with washers through the engine flange from the rear and into the tapped holes in the propeller flange.
  - (a) For propeller removals between overhaul intervals, mounting bolts and washers may be reused if they are not damaged or corroded.
- (9) Using a torque wrench with the appropriate torque wrench adapter, torque all mounting bolts in the sequences and steps shown in Figure 3-2. Refer to Table 3-2 and Figure 3-3 to determine the proper torque value to which the torque wrench must be set.
- (10) Safety all mounting bolts with 0.032 inch (0.81 mm) minimum diameter stainless steel wire or equivalent aircraft safety cable and associated hardware (two bolts per safety).
- (11) Procedure for reinstallation of the piston nut, if applicable.
  - (a) Following the installation of the propeller, retract the start lock pins and hold them in place with a heavy wire inserted through the hole of each start lock housing
  - (b) Carefully push the piston onto the pitch change rod, rotate the blades to feather position, and attach the piston nut to the pitch change rod.
  - (c) Use a breaker bar and a 5/8 inch deep well socket to hold the pitch change rod.
  - (d) Using a 1-7/16 inch crowfoot wrench and torque wrench, torque the piston nut. Refer to Table 3-2 and Figure 3-3 for the proper torque value.

**NOTE:** The removal and subsequent reinstallation of the piston nut does not require that the propeller blade angles be rechecked.
- (12) Remove the wires from the start lock brackets.

CAUTION: DO NOT PUT THE BLADE PADDLE IN THE AREA OF THE DE-ICE 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 BOOT. USE ONE BLADE PADDLE PER BLADE.

- (13) Position the propeller on the start locks by using the blade paddles to slowly rotate the blades simultaneously toward low pitch until the start lock pins engage the stop plates.
- (14) 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 can be found in the following publications available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://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 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
- (15) 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).

(16) Install the spinner dome as follows:

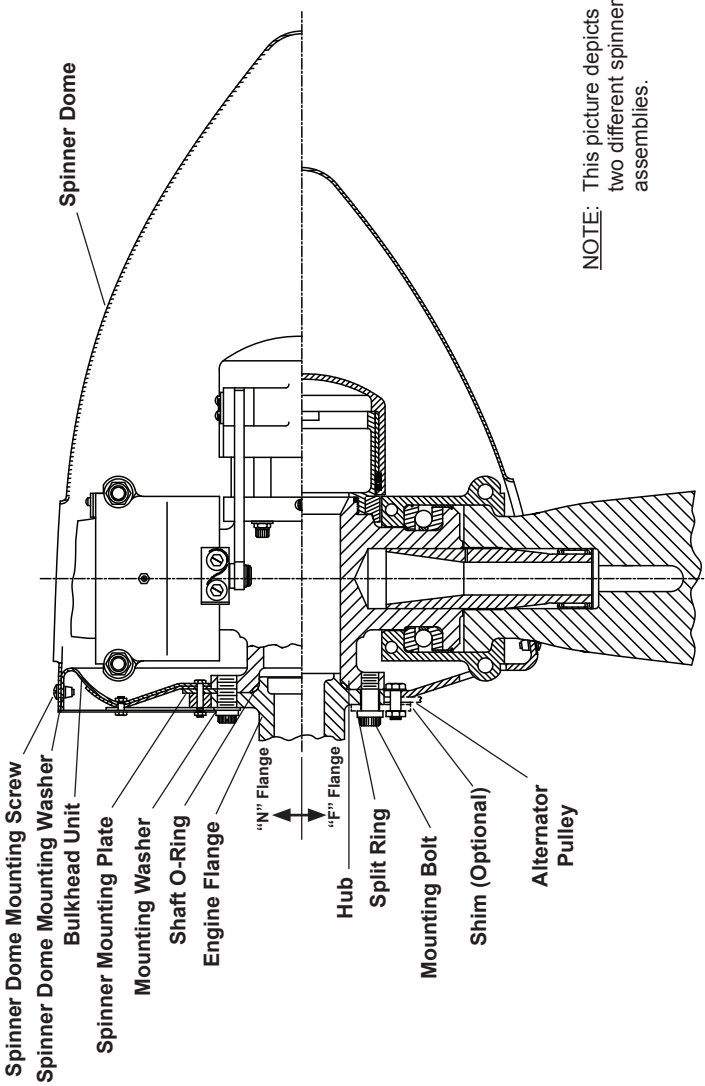
CAUTION 1: TO PREVENT DAMAGE TO THE BLADE AND BLADE PAINT, WRAP THE BLADE SHANKS IN SEVERAL LAYERS OF MASKING OR DUCT TAPE BEFORE INSTALLING THE SPINNER DOME. REMOVE THE TAPE AFTER THE SPINNER IS INSTALLED.

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

NOTE: The following instructions relate to Hartzell Propeller Inc. spinners only. If the airframe manufacturer produced the spinner assembly, refer to the airframe manufacturer's manual for spinner installation instructions.

- (a) Carefully slide the spinner dome over the assembled propeller.
- (b) Secure the spinner dome to the spinner bulkhead with the supplied screws and washers.

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HC-B3WF-4 Propeller  
Figure 3-4



- D. Installing the HC-B3WF-4 Propeller - Refer to Figure 3-4.

**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.

- (1) Press two dowel pins (Table 3-1) through the holes in the propeller flange to be flush with the propeller side of the hub flange.

**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.

- (2) Clean the engine flange and propeller flange with Quick Dry Stoddard Solvent.

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

CAUTION: WHEN INSTALLING THE PROPELLER ON THE AIRCRAFT, DO NOT DAMAGE THE ICE PROTECTION SYSTEM COMPONENTS, IF APPLICABLE.

- (3) Using a suitable crane hoist and sling, carefully move the propeller assembly to the aircraft engine mounting flange in preparation for installation.
- (4) Slide the airframe manufacturer supplied shim onto the engine block side of the engine flange.
- (5) Slide the airframe manufacturer supplied alternator pulley onto the engine block side of the engine flange, against the shim.
- (6) Slide the spinner bulkhead onto the engine flange.
- (7) Install the shaft O-ring (Table 3-1) on the engine shaft.
- (8) Align the threaded holes of the propeller flange with the bolt holes in the engine flange, and align the dowel pins in the propeller flange with the dowel pin holes in the engine flange.
- (9) Pull the bulkhead forward, toward the propeller.
- (10) Pull the alternator pulley forward against the bulkhead.
- (11) Pull the shim forward against the alternator pulley.
- (12) Position the airframe manufacturer supplied split-ring on the back side of the engine flange and on the engine side of the shim.
  - (a) Align the attachment holes of the ring, alternator pulley, and bulkhead to allow the installation of the manufacturer supplied fasteners.
  - (b) Secure the ring, shim, alternator pulley, and spinner bulkhead together with the manufacturer supplied fasteners.
  - (c) Align the ring with the mounting bolt holes in the engine flange.

**CAUTION:** MAKE SURE THAT COMPLETE AND TRUE SURFACE CONTACT IS ESTABLISHED BETWEEN THE PROPELLER HUB FLANGE AND THE ENGINE FLANGE.

(13) Slide the propeller onto the engine shaft.

**CAUTION:** NEW PROPELLER MOUNTING BOLTS MUST BE USED WHEN INITIALLY INSTALLING A NEW OR OVERHAULED PROPELLER.

(14) Install mounting bolts (Table 3-1) with washers through the ring and the engine flange and into the tapped holes in the propeller flange.

(a) For propeller removals between overhaul intervals, mounting bolts and washers may be reused if they are not damaged or corroded.

(15) Using a torque wrench with the appropriate torque wrench adapter, torque all mounting bolts in sequences and steps shown in Figure 3-2. Refer to Table 3-2 and Figure 3-3 to determine the proper torque value to which the torque wrench must be set.

(16) Safety all mounting bolts with 0.032 inch (0.81 mm) minimum diameter stainless steel wire or equivalent aircraft safety cable and associated hardware (two bolts per safety).

(17) 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 can be found in the following publications available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://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 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

(18) 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).

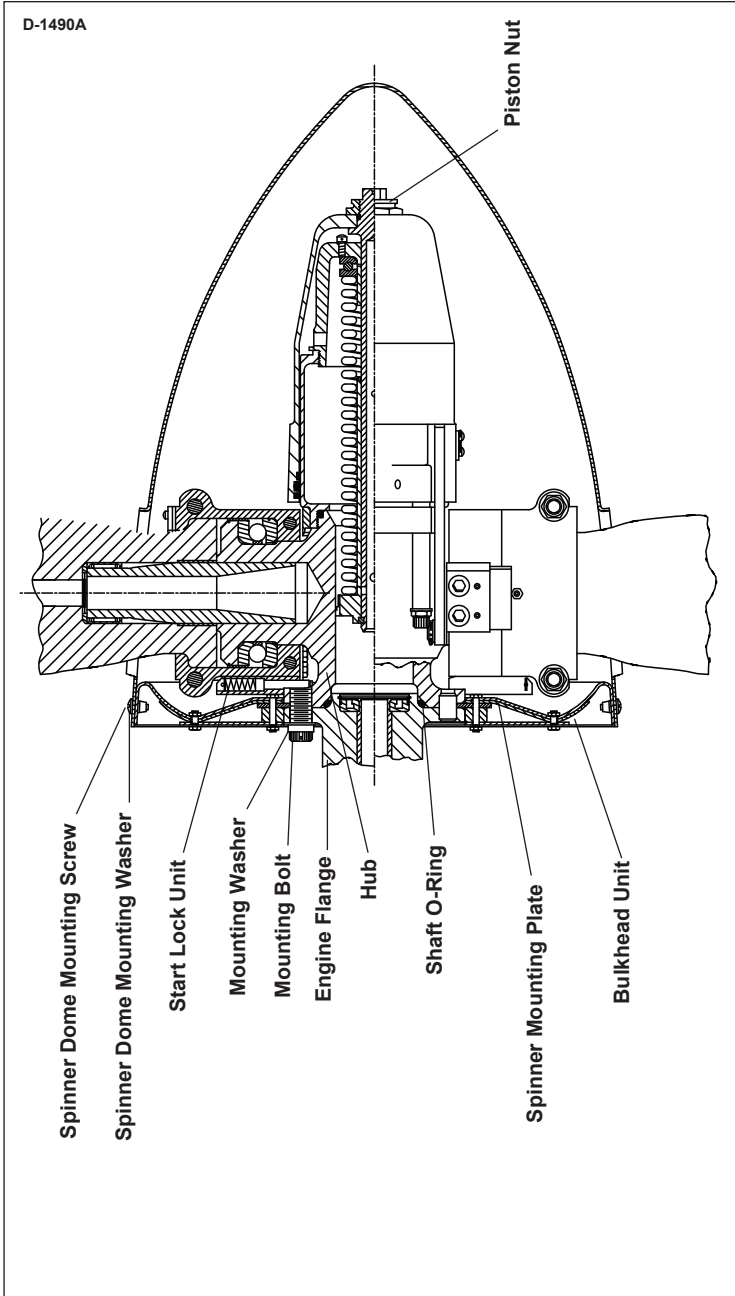
(19) Install the spinner dome as follows:

**CAUTION 1:** 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, AND MAY AFFECT THE BALANCE OF THE PROPELLER.

**NOTE:** The following instructions relate to Hartzell Propeller Inc. spinners only. If the airframe manufacturer produced the spinner assembly, refer to the airframe manufacturer's manual for spinner installation instructions.

- (a) Carefully slide the spinner dome over the reassembled propeller.
- (b) Secure the spinner dome to the spinner bulkhead with the supplied screws and washers.



HC-B3WN-2L Propeller  
Figure 3-5

- E. Installing the HC-B3WN-2L Propeller - Refer to Figure 3-5.

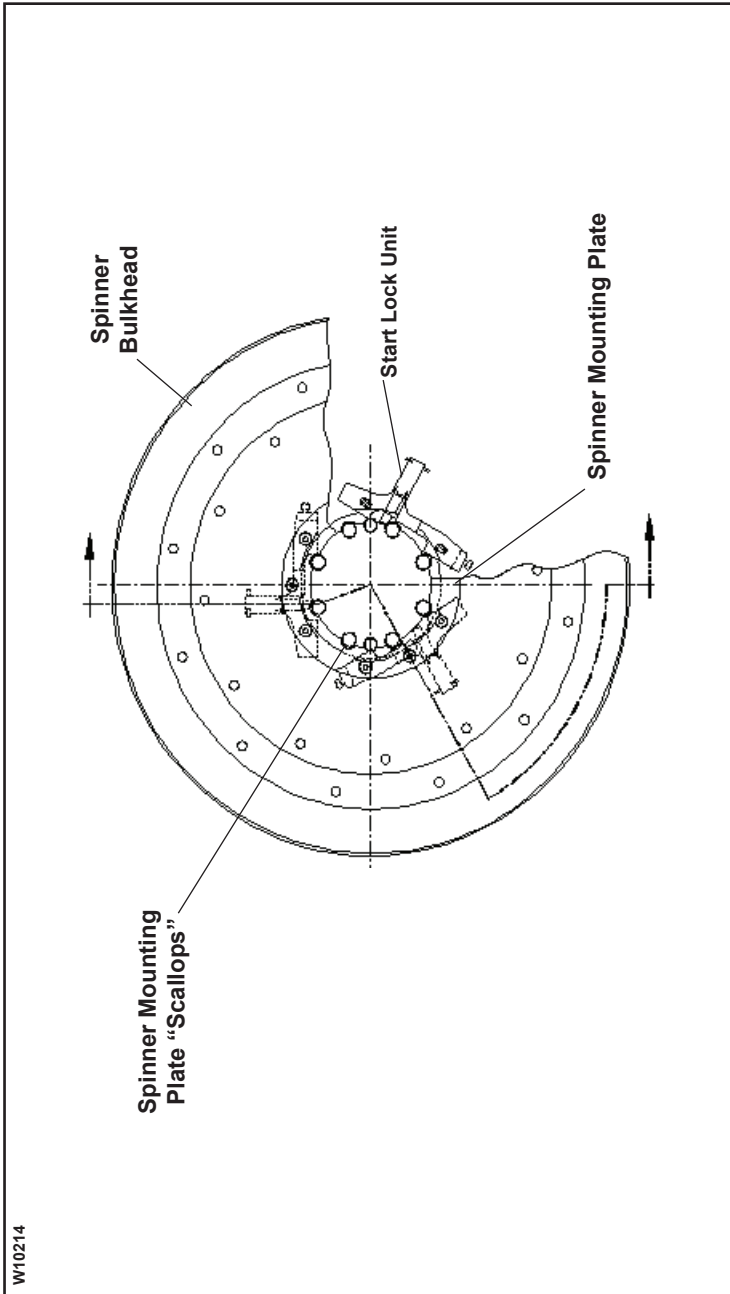
**CAUTION:** INSTRUCTIONS AND PROCEDURES IN THIS SECTION MAY INVOLVE PROPELLER CRITICAL PARTS. REFER TO THE INTRODUCTION CHAPTER OF THIS MANUAL FOR INFORMATION ABOUT PROPELLER CRITICAL PARTS.

**NOTE:** This propeller is manufactured with a one-piece spinner mounting plate. The spinner bulkhead is attached to the spinner mounting plate. The spinner mounting plate is installed in a cutaway portion of the propeller hub flange and is "pinched" between the propeller hub flange and the engine flange.

- (1) Press two dowel pins (Table 3-1) through the holes in the propeller flange to be flush with the propeller side of the hub flange.

**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.

- (2) Clean the engine flange and propeller flange with Quick Dry Stoddard Solvent.



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One-piece Spinner Mounting Plate Installation  
Figure 3-6

WARNING 1: THE PISTON NUT SHOULD HAVE BEEN REMOVED BEFORE SHIPPING TO ALLOW ROTATING OF THE BLADES FOR PACKAGING.

WARNING 2: FOR SAFETY REASONS, IF THE PISTON NUT WAS NOT REMOVED, THE PROPELLER MUST BE PLACED IN FEATHER POSITION BEFORE IT IS INSTALLED ON THE AIRCRAFT.

WARNING 3: MAKE SURE THE SLING IS RATED UP TO 800 POUNDS (363 KG) TO SUPPORT THE WEIGHT OF THE PROPELLER ASSEMBLY DURING INSTALLATION.

CAUTION: WHEN INSTALLING THE PROPELLER ON THE AIRCRAFT, DO NOT DAMAGE THE ICE PROTECTION SYSTEM COMPONENTS, IF APPLICABLE.

- (3) Using a suitable crane hoist and sling, carefully move the propeller assembly to the aircraft engine mounting flange in preparation for installation.
- (4) Install the specified shaft O-ring (Table 3-1) on the engine shaft.
- (5) Retract each start lock pin, holding it in place with a heavy wire inserted through the hole in each start lock housing.
- (6) Slide the assembled one-piece spinner mounting plate, spinner bulkhead, and start lock onto the propeller hub flange.

NOTE: The start locks must face toward the propeller.

- (7) Align the clearance "scallops" in the spinner mounting plate with the holes in the propeller hub flange. Refer to Figure 3-6.

NOTE: This will make sure that the spinner mounting plate does not interfere with the mounting bolts and dowel pins.



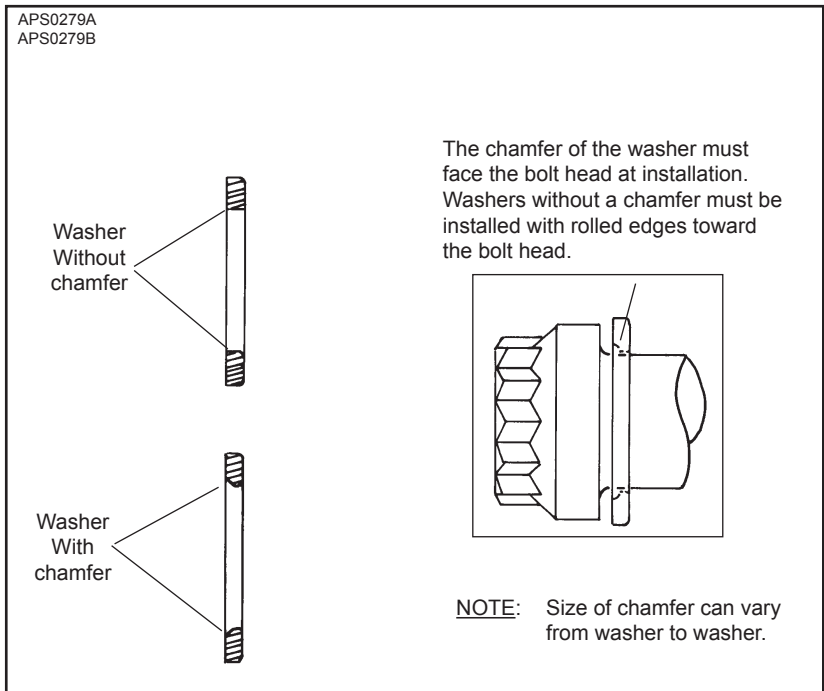
- (8) Align the start locks with each blade and clamp mounted stop plate.

NOTE: The start locks are attached to the spinner bulkhead.

- (9) Align the mounting and dowel pin holes in the propeller hub flange with the mounting holes and dowel pins in the engine flange.

CAUTION: MAKE SURE THAT COMPLETE AND TRUE SURFACE CONTACT IS ESTABLISHED BETWEEN THE PROPELLER HUB FLANGE AND THE ENGINE FLANGE.

- (10) Slide the propeller flange, spinner bulkhead, and spinner mounting plate onto the engine flange.



**Mounting Bolt and Washer**  
**Figure 3-7**

**CAUTION:** NEW PROPELLER MOUNTING BOLTS MUST BE USED WHEN INITIALLY INSTALLING A NEW OR OVERHAULED PROPELLER.

(11) Apply MIL-PRF-83483 anti-seize compound to the threaded surfaces of the mounting bolts.

**NOTE:** For propeller removals between overhaul intervals, mounting bolts and washers may be reused if they are not damaged or corroded.

**CAUTION:** THE ID CHAMFER OF THE WASHER MUST BE FACING TOWARD THE BOLT HEAD. WASHERS WITHOUT CHAMFER MUST BE INSTALLED WITH ROLLED EDGES TOWARD THE BOLT HEAD. REFER TO FIGURE 3-7.

(12) Install mounting bolts (Table 3-1) with washers through the engine flange from the rear and into the tapped holes in the propeller flange.

(a) For propeller removals between overhaul intervals, mounting bolts and washers may be reused if they are not damaged or corroded.

(13) Using a torque wrench with the appropriate torque wrench adapter, torque all mounting bolts in sequences and steps shown in Figure 3-2. Refer to Table 3-2 and Figure 3-3 to determine the proper torque value to which the torque wrench must be set.

(14) Safety all mounting bolts with 0.032 inch (0.81 mm) minimum diameter stainless steel wire or equivalent aircraft safety cable and associated hardware (two bolts per safety).

(15) Procedure for reinstallation of piston nut, if applicable.

(a) Carefully push the piston onto the pitch change rod, rotate the blades to feather position, and attach the piston nut to the pitch change rod.

(b) Use a breaker bar and a 5/8 inch deep well socket to hold the pitch change rod.

- (c) Using a 1-7/16 inch crowfoot wrench and torque wrench, torque the piston nut. Refer to Table 3-2 and Figure 3-3 for the proper torque value.

**NOTE:** The removal and subsequent reinstallation of the piston nut does not require that the propeller blade angles be rechecked.

- (16) Remove the wires from the start lock brackets.

**CAUTION:** DO NOT PUT THE BLADE PADDLE IN THE AREA OF THE DE-ICE 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 BOOT. USE ONE BLADE PADDLE PER BLADE.

- (17) Position the propeller on the start locks by using the blade paddles to slowly rotate the blades simultaneously toward low pitch until the start lock pins engage the stop plates.

- (18) 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 can be found in the following publications available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://www.hartzellprop.com):

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

(19) 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).

(20) Install the spinner dome as follows:

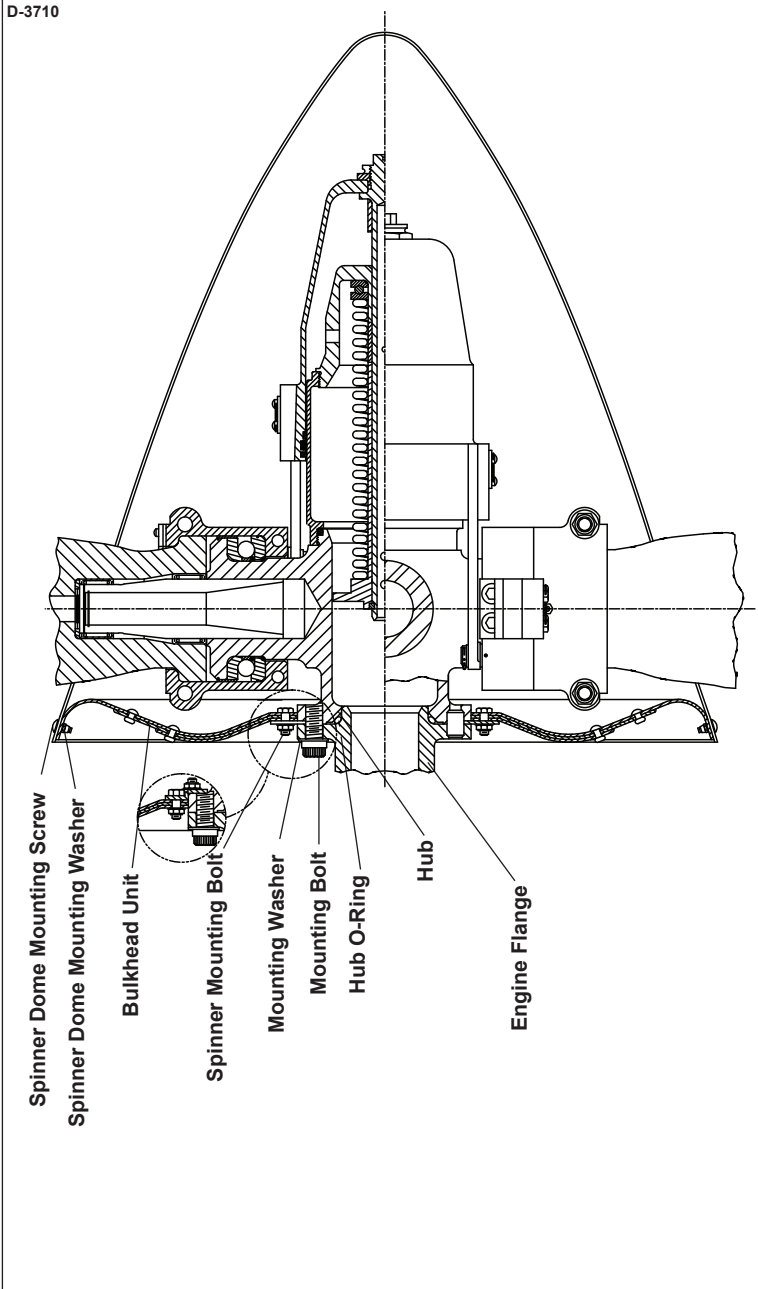
**CAUTION 1:** TO PREVENT DAMAGE TO THE BLADE AND BLADE PAINT, WRAP THE BLADE SHANKS IN SEVERAL LAYERS OF MASKING OR DUCT TAPE BEFORE INSTALLING THE SPINNER DOME. REMOVE THE TAPE AFTER THE SPINNER IS INSTALLED.

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

**NOTE:** The following instructions relate to Hartzell Propeller Inc. spinners only. If the airframe manufacturer produced the spinner assembly, refer to the airframe manufacturer's manual for spinner installation instructions.

- (a) Carefully slide the spinner dome over the reassembled propeller.
- (b) Secure the spinner dome to the spinner bulkhead with the supplied screws and washers.

D-3710



HC-B4TN-1 With One-Piece Spinner Mounting Plate  
Figure 3-8

- F. Installing the HC-B4TN-1 Propeller With a One-piece Spinner Mounting Plate.

**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.

**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.

**NOTE:** Some HC-B4TN-1 propellers were manufactured with a one-piece spinner mounting plate. The spinner bulkhead is attached to the spinner mounting plate. The spinner mounting plate is installed in a cutaway portion of the propeller hub flange and is "pinched" between the propeller hub flange and the engine flange. Refer to Figure 3-8.

- (1) Clean the engine flange and propeller flange with Quick Dry Stoddard Solvent.

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

**CAUTION:** WHEN INSTALLING THE PROPELLER ON THE AIRCRAFT, DO NOT DAMAGE THE ICE PROTECTION SYSTEM COMPONENTS, IF APPLICABLE.

- (2) Using a suitable crane hoist and sling, carefully move the propeller assembly to the aircraft engine mounting flange.
- (3) Install the hub O-ring (Table 3-1) on the engine flange.
- (4) Slide the spinner mounting plate and spinner bulkhead onto a shoulder on the propeller hub flange.
- (5) Align the clearance "scallops" in the spinner mounting plate with the holes in the propeller hub flange.

**NOTE:** This will make sure that the spinner mounting plate does not interfere with the mounting bolts and the dowel pins.

- (6) Align the threaded holes and dowel pins in the propeller hub flange with the mounting holes and the dowel pin holes in the engine flange.

**CAUTION:** MAKE SURE THAT COMPLETE AND TRUE SURFACE CONTACT IS ESTABLISHED BETWEEN THE PROPELLER HUB FLANGE AND THE ENGINE FLANGE.

- (7) Slide the propeller flange, spinner bulkhead and spinner mounting plate onto the engine flange.

**CAUTION:** NEW PROPELLER MOUNTING BOLTS MUST BE USED WHEN INITIALLY INSTALLING A NEW OR OVERHAULED PROPELLER.

- (8) Apply MIL-PRF-83483 anti-seize compound to the threaded surfaces of the mounting bolts.

- CAUTION:** THE ID CHAMFER OF THE WASHER MUST BE FACING TOWARD THE BOLT HEAD. WASHERS WITHOUT CHAMFER MUST BE INSTALLED WITH ROLLED EDGES TOWARD THE BOLT HEAD. REFER TO FIGURE 3-7.
- (9) Install mounting bolts (Table 3-1) with washers through the engine flange from the rear and into the tapped holes in the propeller flange.
    - (a) For propeller removals between overhaul intervals, mounting bolts and washers may be reused if they are not damaged or corroded.
  - (10) Using a torque wrench with the appropriate torque wrench adapter, torque all mounting bolts in sequences and steps shown in Figure 3-2. Refer to Table 3-2 and Figure 3-3 to determine the proper torque value to which the torque wrench must be set.
  - (11) Safety all mounting bolts with 0.032 inch (0.81 mm) minimum diameter stainless steel wire or equivalent aircraft safety cable and associated hardware (two bolts per safety).
  - (12) 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 can be found in the following publications available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://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 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
  - (13) 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).



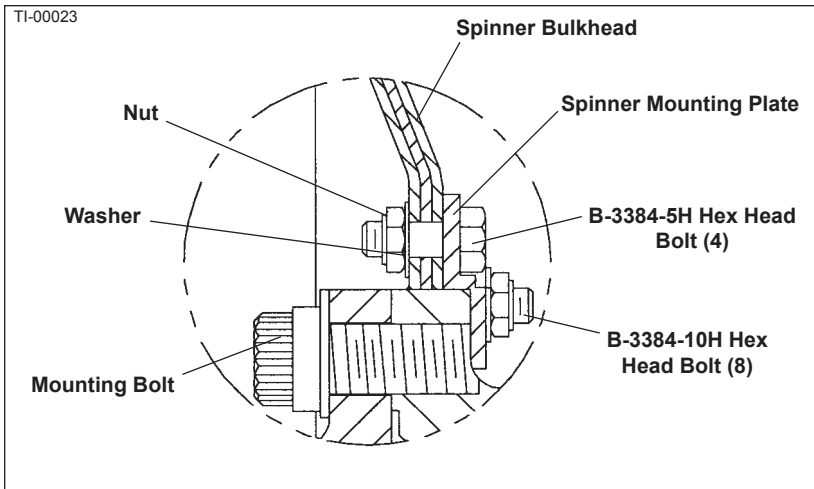
(14) Install the spinner dome as follows:

**CAUTION 1:** 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, AND MAY AFFECT THE BALANCE OF THE PROPELLER.

**NOTE:** The following instructions relate to Hartzell Propeller Inc. spinners only. If the airframe manufacturer produced the spinner assembly, refer to the airframe manufacturer's manual for spinner installation instructions.

- (a) Carefully slide the spinner dome over the reassembled propeller.
- (b) Secure the spinner dome to the spinner bulkhead with the supplied screws and washers.



**HC-B4TN-1 Configured With Two-Piece Spinner Mounting Plate**  
**Figure 3-9**

G. Installing the HC-B4TN-1 Propeller With a Two-piece Spinner Mounting Plate

**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.

**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.

**NOTE:** Some HC-B4TN-1 propellers were manufactured with a two-piece spinner mounting plate. The spinner bulkhead is attached to the spinner mounting plate, which is bolted onto the propeller hub flange. Refer to Figure 3-9.

- (1) Clean the engine flange and propeller flange with Quick Dry Stoddard Solvent.

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

**CAUTION:** WHEN INSTALLING THE PROPELLER ON THE AIRCRAFT, DO NOT DAMAGE THE ICE PROTECTION SYSTEM COMPONENTS, IF APPLICABLE.

- (2) Using a suitable crane hoist and sling, carefully move the propeller assembly to the aircraft engine mounting flange.
- (3) If the spinner bulkhead is to be installed and is not already in place, perform the following steps:
  - (a) Slide the spinner bulkhead over the propeller flange, against the spinner mounting plate.
  - (b) Align the spinner bulkhead attachment holes with the spinner mounting plate attachment holes.
  - (c) Insert the hex head bolts from the propeller side of the spinner mounting plate.
  - (d) Install the washer and locking nut on each attachment bolt.
  - (e) Torque the hex head bolts to 8-12 Ft-Lb (11-16 N•m).
- (4) Install the hub O-ring (Table 3-1) on the engine flange.
- (5) Align the mounting holes and dowel pins in the propeller hub flange with the mounting holes and dowel pin holes in the engine flange.

**CAUTION:** MAKE SURE THAT COMPLETE AND TRUE SURFACE CONTACT IS ESTABLISHED BETWEEN THE PROPELLER HUB FLANGE AND THE ENGINE FLANGE.

- (6) Slide the propeller flange onto the engine flange.

**CAUTION:** NEW PROPELLER MOUNTING BOLTS MUST BE USED WHEN INITIALLY INSTALLING A NEW OR OVERHAULED PROPELLER.

- (7) Apply anti-seize compound MIL-PRF-83483 to the threaded surfaces of the mounting bolts.

CAUTION: THE ID CHAMFER OF THE WASHER MUST BE FACING TOWARD THE BOLT HEAD. WASHERS WITHOUT A CHAMFER MUST BE INSTALLED WITH THE ROLLED EDGES TOWARD THE BOLT HEAD. REFER TO FIGURE 3-7.

- (8) Install mounting bolts (Table 3-1) with washers through the engine flange and into the tapped holes in the propeller flange.
  - (a) For propeller removals between overhaul intervals, mounting bolts and washers may be reused if they are not damaged or corroded.
- (9) Using a torque wrench with the appropriate torque wrench adapter, torque all mounting bolts in sequences and steps shown in Figure 3-2. Refer to Table 3-2 and Figure 3-3 to determine the proper torque value to which the torque wrench must be set.
- (10) Safety all mounting bolts with 0.032 inch (0.81 mm) minimum diameter stainless steel wire or equivalent aircraft safety cable and associated hardware (two bolts per safety).
- (11) 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 can be found in the following publications available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://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 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
- (12) 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).

(13) Install the spinner dome as follows:

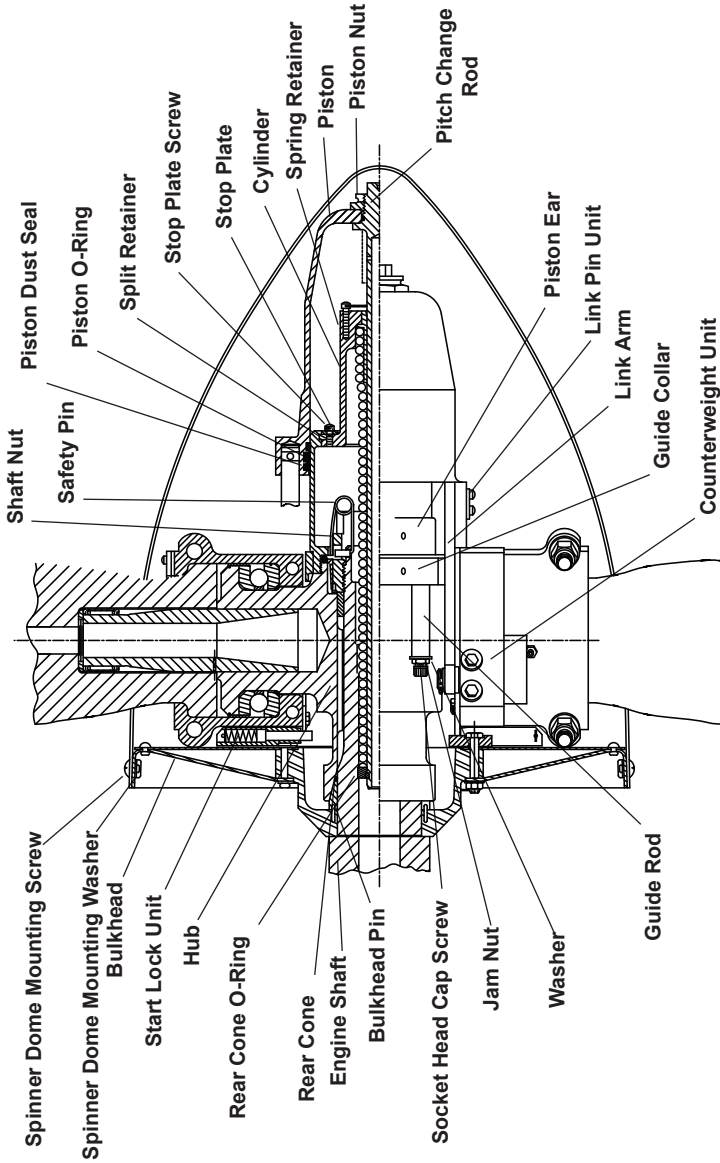
CAUTION 1: TO PREVENT DAMAGE TO THE BLADE AND BLADE PAINT, WRAP THE BLADE SHANKS IN SEVERAL LAYERS OF MASKING OR DUCT TAPE BEFORE INSTALLING THE SPINNER DOME. REMOVE THE TAPE AFTER THE SPINNER IS INSTALLED.

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

NOTE: The following instructions relate to Hartzell Propeller Inc. spinners only. If the airframe manufacturer produced the spinner assembly, refer to the airframe manufacturer's manual for spinner installation instructions.

- (a) Carefully slide the spinner dome over the reassembled propeller.
- (b) Secure the spinner dome to the spinner bulkhead with the supplied screws and washers.

D-1970



HC-B3( )20-2( ) and HC-B3( )30-2B( ) Propellers  
Figure 3-10

- H. Installing the HC-B3( )20-2( ) and HC-B3( )30-2B( ) Propellers  
- Refer to Figure 3-10

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

**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.

**CAUTION 2:** WHEN INSTALLING THE PROPELLER ON THE AIRCRAFT, DO NOT DAMAGE THE ICE PROTECTION SYSTEM COMPONENTS, IF APPLICABLE.

- (1) Using a suitable crane hoist and sling, carefully move the propeller assembly to the aircraft engine shaft.

**CAUTION:** THE PISTON MUST BE REMOVED BEFORE INSTALLING THE PROPELLER ON THE AIRCRAFT. IF THE PISTON HAS ALREADY BEEN REMOVED, PROCEED TO STEP 4.H.(4).

(2) Piston Removal - Refer to Figures 3-10 and 3-11

(a) Remove the piston nut.

**NOTE:** The piston nut should have been removed before shipping to allow rotating of the blades for packaging.

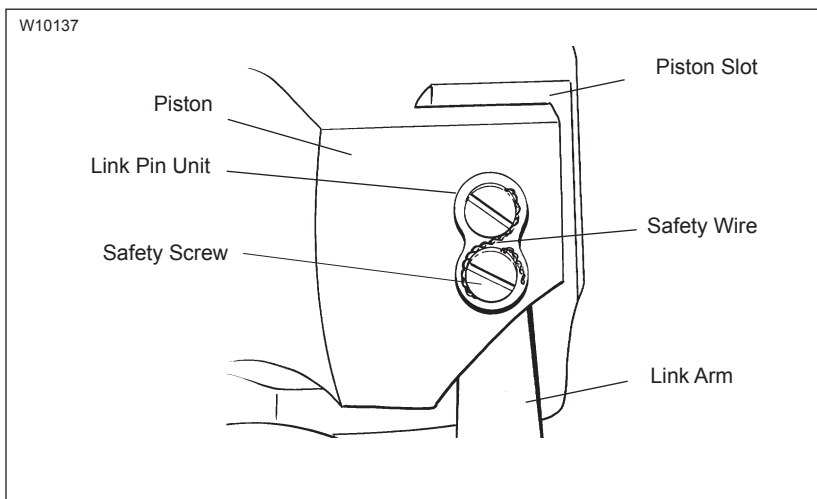
(b) Remove the safety wire (if installed) from the link pin units.

(c) Remove the safety screw from each link pin unit.

(d) Remove each link pin unit.

(e) The piston ears and guide collar should have corresponding index numbers (1, 2, and 3) impression stamped or marked with a felt-tipped pen. If they are not marked, number them with a felt-tipped pen.

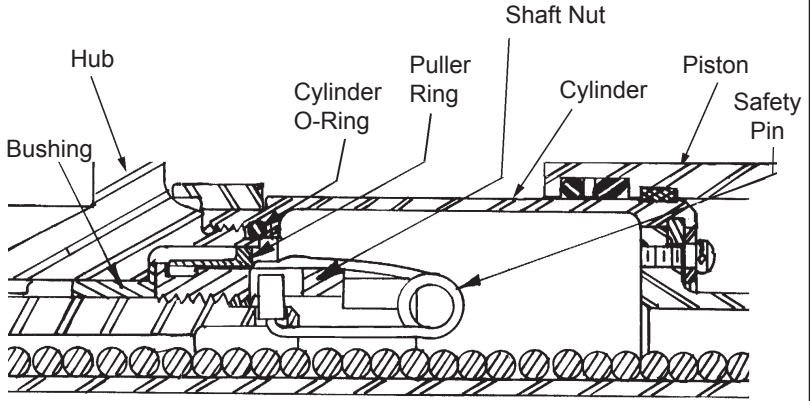
**NOTE:** This will make sure that the components are reassembled in their original location.



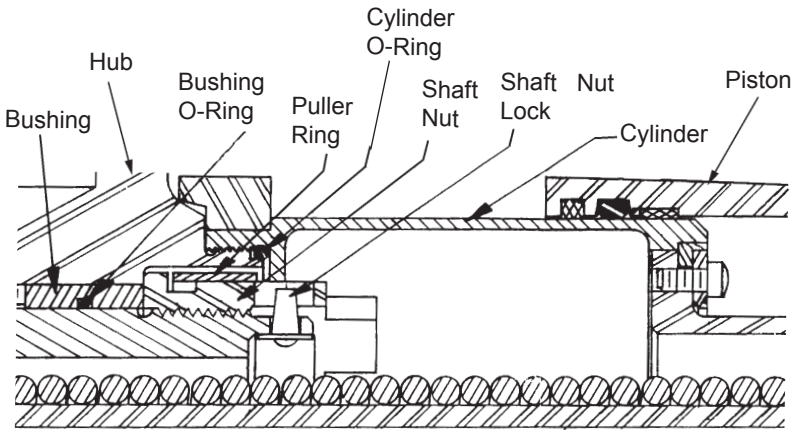
**Piston to Link Arm Attachment Details  
Figure 3-11**



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W10140

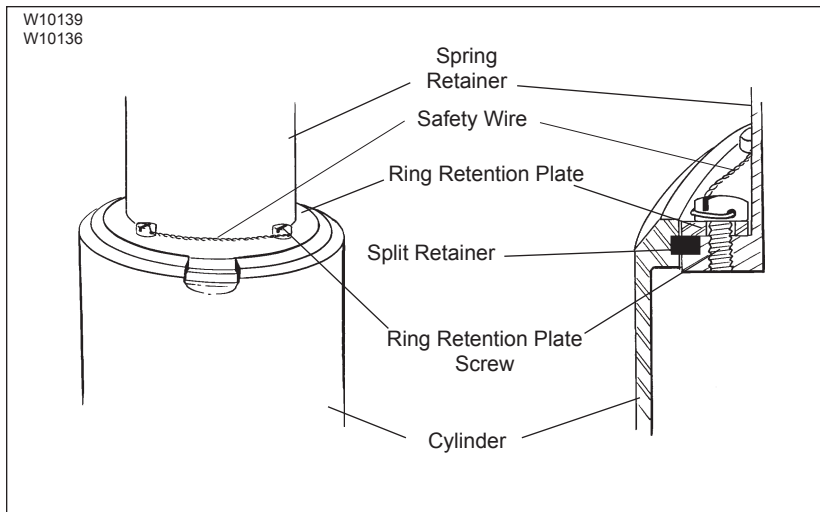


**Safety Pin on 20 Spline Shaft Models**

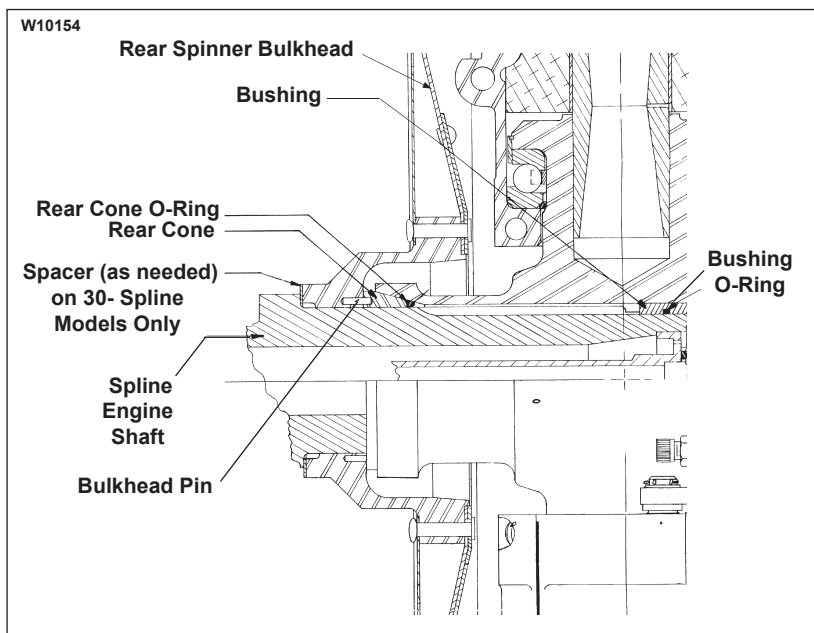


**Shaft Nut Lock on 30 Spline Shaft Models**

**Safelying the Shaft Nut on 20 and 30 Spline Shaft Propellers  
Figure 3-12**



**Spring Assembly to Cylinder Attachment Details  
Figure 3-13**



**Rear Hub Mounting Parts on 20 and 30 Spline Shaft Propellers  
Figure 3-14**

- (f) Slide the link arms out of the piston slots.
- (g) Remove the socket head cap screw (Table 3-1), jam nut, and washer from each piston guide rod.
- (h) Slide the piston off the cylinder.

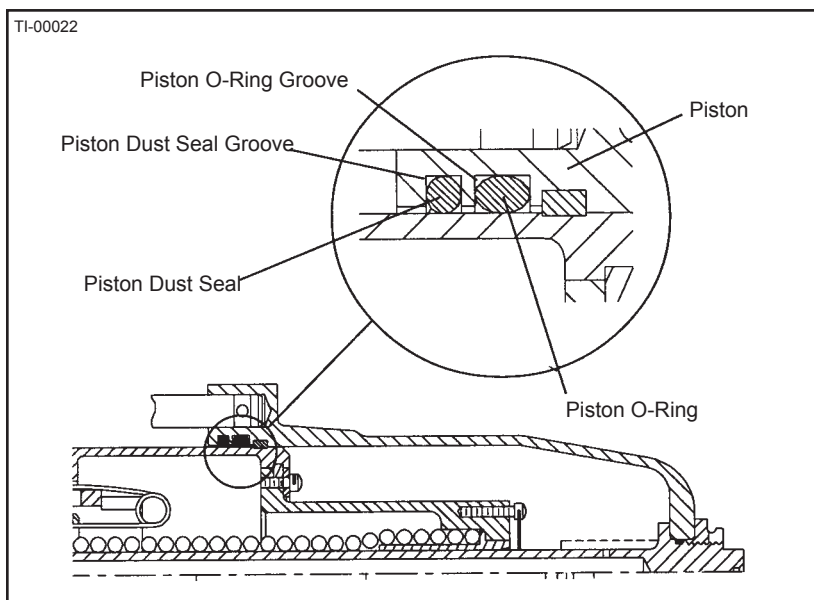
**CAUTION:** THE SPRING ASSEMBLY MUST BE REMOVED BEFORE INSTALLING THE PROPELLER ON THE AIRCRAFT. IF THE SPRING ASSEMBLY HAS ALREADY BEEN REMOVED, PROCEED TO STEP 4.H.(5).

- (3) Spring assembly removal - Refer to Figure 3-13
  - (a) Remove the ring retention plate screw safety wire (if installed).
  - (b) Remove the ring retention plate screws.
  - (c) Remove the retention plate.
  - (d) Remove the split retainer.
  - (e) Remove the spring assembly from the cylinder.
- (4) On 30 spline shaft propeller models only, install the bushing O-ring (Table 3-1) in the ID groove of the bushing, located in the hub bore. Refer to Figure 3-12.

**NOTE:** The shaft bushing is press fit into the hub.
- (5) Make sure the propeller hub spline and engine spline surfaces are clean.
- (6) On 30 spline shaft models only, slide the spacers (Table 3-1), as required, onto the shaft. Refer to Figure 3-14.
- (7) Slide the spinner bulkhead onto the shaft.
- (8) Install the rear cone onto the bulkhead, matching the holes in the cone with the pins in the bulkhead. Refer to Figure 3-14.
- (9) Install the rear cone O-ring (Table 3-1) over the shaft. Refer to Figure 3-14.
- (10) Slide the propeller hub onto the shaft and tighten the shaft nut until the rear bulkhead is snug, but not tight.

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

- (11) Carefully slide the spinner dome over the reassembled propeller.
- (12) To properly position the rear bulkhead, temporarily install the spinner dome with at least four screws.
  - (a) Make sure the start lock pins are parallel with the blade axis, but offset to one side.
- (13) Adjust the spinner to equalize the clearance between the blades and the blade cutouts in the dome.
- (14) Remove the spinner dome.



**Installing Piston O-Ring and Piston Dust Seal  
Figure 3-15**

- (15) Torque the propeller shaft nut (Table 3-1) using tool BST-2910. Refer to Table 3-2 and Figure 3-3 to determine the proper torque value to which the torque wrench must be set.
- (16) Safety the shaft nut to the engine shaft using a hub lock safety pin (Table 3-1) for 20 spline models, or a shaft nut lock for 30 spline models. Refer to Figure 3-12.
- NOTE:** The hub lock safety pin or shaft nut lock is normally supplied in a separate package when the propeller is shipped new from the factory.
- (17) Install the spring assembly -  
Refer to Figures 3-10 and 3-13
- (a) Place the feathering spring assembly into the engine shaft, with the front spring retainer inside the cylinder.
  - (b) Install the split retainer between the cylinder and the front spring retainer, sliding the split retainer into the recess in the cylinder.
  - (c) Pull the spring retainer tight against the split retainer.
  - (d) Install the ring retainer plate, which secures the split retainer, into place.
  - (e) Install the ring retention plate screws and tighten them until they are snug.
  - (f) Safety the ring retention plate screws with 0.032 inch (0.81 mm) minimum diameter stainless steel wire (two screws per safety).
- (18) If the piston O-ring (Table 3-1) and the piston dust seal are not already installed in the piston, perform the following steps. Refer to Figure 3-15.
- (a) Lubricate the piston O-ring and carefully install it in the groove provided for it in the piston.
  - (b) Cut the necessary length of oiled piston dust seal material.
    - 1 Cut the piston dust seal material on a 30 degree diagonal so there will be an overlap with a smooth surface, free of fuzz.
  - (c) Apply a layer of aviation grade reciprocating engine oil to the piston dust seal.

**CAUTION:** MAKE SURE THAT THE PISTON DUST SEAL IS FREE OF FUZZ.

(d) Install the piston dust seal material in the groove provided for it in the piston.

(19) Install the rod O-ring (Table 3-1) in the groove at the end of the threaded portion of the pitch change rod.

**CAUTION:** TO MAINTAIN PROPER BLADE ANGLES, IT IS IMPORTANT THAT THE PISTON BE REINSTALLED IN THE SAME POSITION AS WHEN IT WAS ORIGINALLY ASSEMBLED. INDEX NUMBERS ON THE PISTON AND THE GUIDE COLLAR ARE PROVIDED TO MAKE SURE OF PROPER POSITIONING.

(20) Locate and match up the index numbers (1, 2, and 3) on the piston ears with the corresponding index numbers on the guide collar.

**NOTE:** The index marks will be either impression stamped or drawn with a felt-tipped pen.

(21) Oil the surface of the cylinder and install the piston.

(22) Slide the piston onto the cylinder and pass the guide rods through the guide collar bushings.

(23) Install the washer, socket head cap screw, and jam nut (Table 3-1), at the end of each guide rod. Refer to Figure 3-10.

(24) Connect the link arms to the piston. Refer to Figure 3-11.

(25) Install the link pin units.

(26) Install the link pin safety screws.

(27) Safety the link pin screws together with 0.032 inch (0.81 mm) minimum diameter stainless steel wire. Refer to Figure 3-11.

(28) Carefully rotate the blades into feather position and fasten the piston to the pitch change rod with the piston nut (Table 3-1).

(29) Torque the piston nut per Table 3-2.

(30) Torque the jam nut against the guide rod. Refer to Table 3-2.

- (31) Remove the wires from the start lock brackets.
- (32) Position the propeller on the start locks.

**CAUTION:** DO NOT PUT THE BLADE PADDLE IN THE AREA OF THE DE-ICE 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 BOOT. USE ONE BLADE PADDLE PER BLADE.

- (33) Using the blade paddles, simultaneously rotate the blades toward low pitch until the auto high stop pins engage the stop plate.
- (34) 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 can be found in the following publications available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://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 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
- (35) 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).

(36) Install the spinner dome as follows:

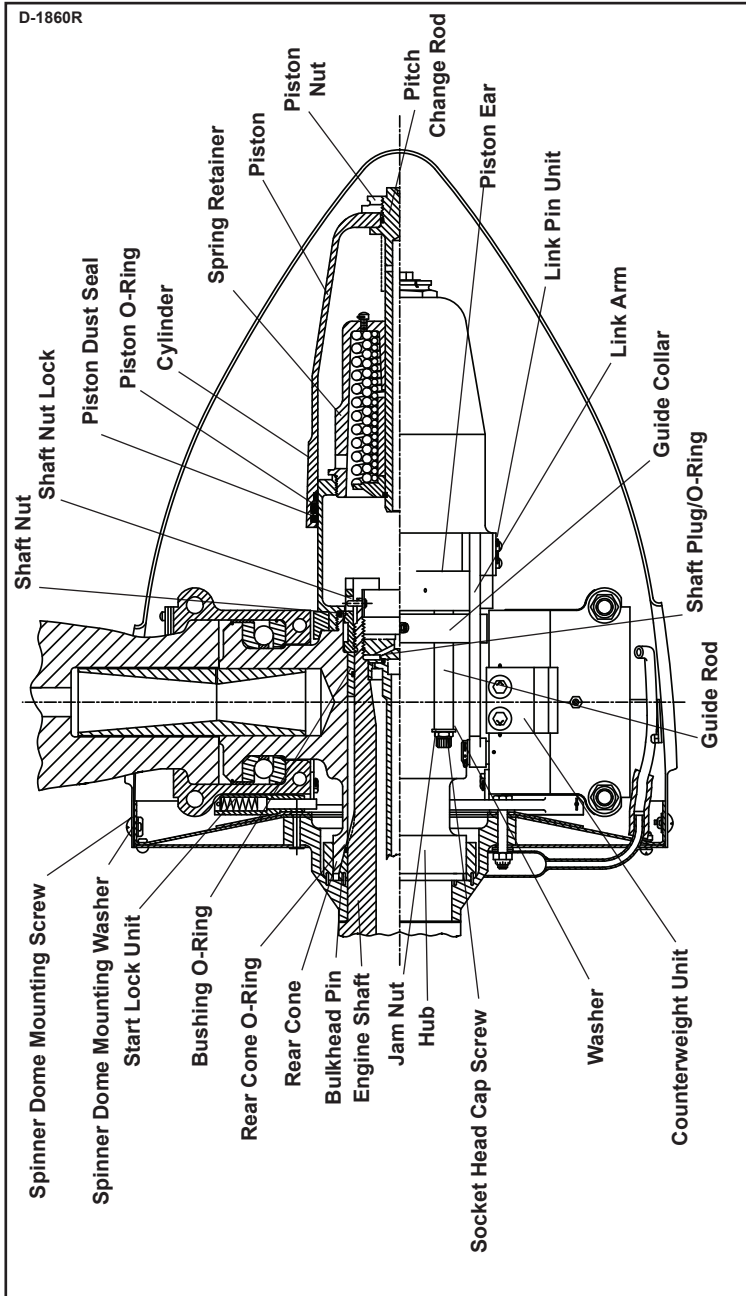
**CAUTION 1:** TO PREVENT DAMAGE TO THE BLADE AND BLADE PAINT, WRAP THE BLADE SHANKS IN SEVERAL LAYERS OF MASKING OR DUCT TAPE BEFORE INSTALLING THE SPINNER DOME. REMOVE THE TAPE AFTER THE SPINNER IS INSTALLED.

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

**NOTE:** The following instructions relate to Hartzell Propeller Inc. spinners only. If the airframe manufacturer produced the spinner assembly, refer to the airframe manufacturer's manual for spinner installation instructions.

- (a) Carefully slide the spinner dome over the reassembled propeller.
- (b) Secure the spinner dome to the spinner bulkhead with the supplied screws and washers.





HC-B3( )30-1E( ) and HC-B3( )30-2E( ) Propellers  
Figure 3-16

- I. Installing the HC-B3( )30-1E( ) and HC-B3( )30-2E( ) Propellers - Refer to Figure 3-16

**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.

- (1) This step pertains only to installation on the R985-A14B engine. If installing the propeller on an engine other than the R985-A14B, proceed to step 4.I.(2).
- (a) If installing the above propeller models on the R985-A14B engine, modification to the engine is required. On the R985-A14B engine, it is necessary to install a special plug in the front of the shaft, which plugs the central oil passage, but allows oil to flow through the outer passages.
- 1 Remove the original shaft plug.
  - 2 Install O-ring C-3317- 210-1.
  - 3 Install the new shaft plug A-1834 plug (1-15/16 -16 threads) or A-1834-1 plug (1-3/4 -16 threads).

WARNING 1: THE PISTON NUT SHOULD HAVE BEEN REMOVED BEFORE SHIPPING TO PERMIT ROTATING OF THE BLADES FOR PACKAGING.

FOR SAFETY REASONS, IF THE PISTON NUT WAS NOT REMOVED, THE PROPELLER MUST BE PLACED IN FEATHER POSITION (HC-B3[ ]30-2E[ ] MODELS ONLY) OR IN HIGH PITCH POSITION (HC-B3[ ]30-1E[ ] MODELS ONLY) BEFORE IT IS INSTALLED ON THE AIRCRAFT.

WARNING 2: MAKE SURE THE SLING IS RATED UP TO 800 POUNDS (363 KG) TO SUPPORT THE WEIGHT OF THE PROPELLER ASSEMBLY DURING INSTALLATION.

CAUTION: WHEN INSTALLING THE PROPELLER ON THE AIRCRAFT, DO NOT DAMAGE THE ICE PROTECTION SYSTEM COMPONENTS, IF APPLICABLE.

(2) Using a suitable crane hoist and sling, carefully move the propeller assembly to the aircraft engine shaft.

CAUTION: THE PISTON MUST BE REMOVED BEFORE INSTALLING THE PROPELLER ON THE AIRCRAFT. IF THE PISTON HAS ALREADY BEEN REMOVED, PROCEED TO STEP 4.1.(5).

(3) Piston removal - Refer to Figures 3-16 and 3-11

(a) Remove the piston nut.

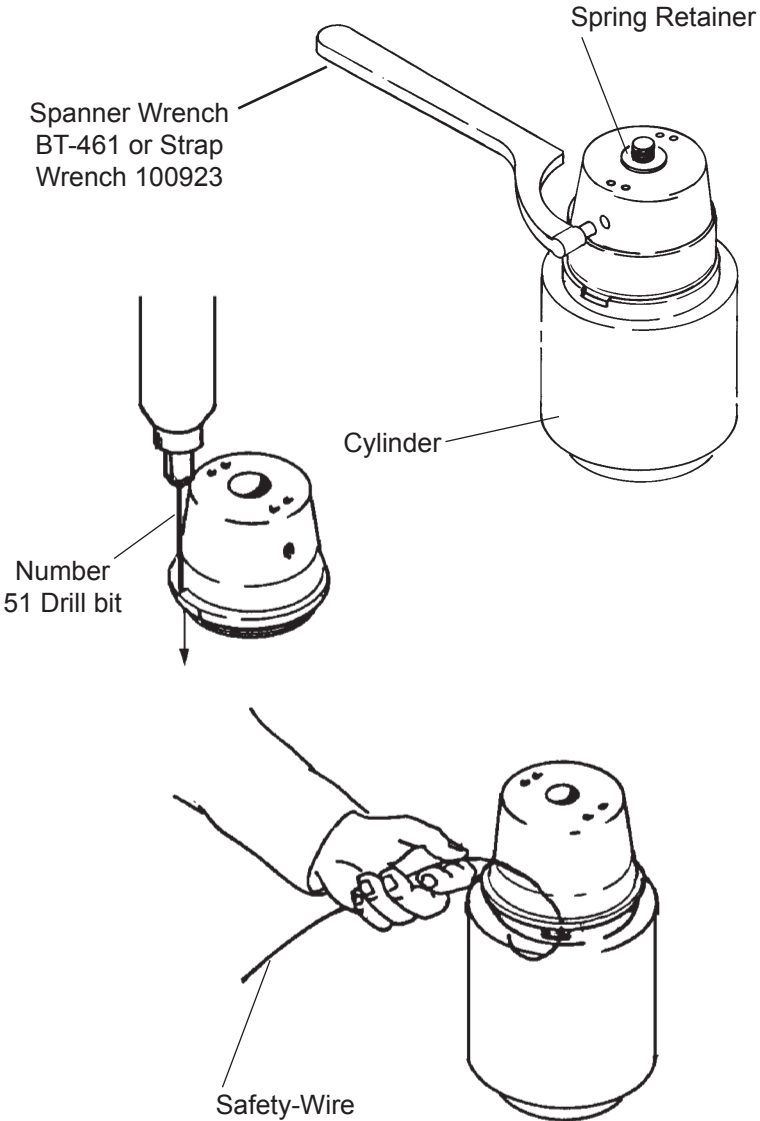
NOTE: The piston nut should have been removed before shipping to allow rotating of the blades for packaging.

(b) Remove the safety wire (if installed) from the link pin units.

(c) Remove the safety screw from each link pin unit.

(d) Remove each link pin unit.

APS0190  
APS0211



**Feathering Spring Assembly  
Figure 3-17**

- (e) The piston ears and guide collar should have corresponding index numbers (1, 2, and 3) impression stamped or marked with a felt-tipped pen. If they are not marked, number them with a felt-tipped pen.

NOTE: This will make sure that the components are reassembled in their original location.

- (f) Slide the link arms out of the piston slots.
- (g) Remove the socket head cap screw, jam nut, and washer from each piston guide rod.
- (h) Slide the piston off the cylinder.

CAUTION: THE SPRING ASSEMBLY MUST BE REMOVED BEFORE INSTALLING THE PROPELLER ON THE AIRCRAFT. IF THE ASSEMBLY HAS ALREADY BEEN REMOVED, PROCEED TO STEP 4.I.(6).

(4) Spring assembly removal

- (a) Remove the safety wire (if installed).
- (b) Unthread the spring retainer from the cylinder using spanner wrench BT-461 or strap wrench 100923. Refer to Figure 3-17.
- (c) Remove the spring retainer and the attached spring assembly from the cylinder.

(5) Install the bushing O-ring (Table 3-1) into the shaft bushing.

NOTE: The shaft bushing is press fit into the hub.

- (6) Make sure the propeller hub spline and engine spline surfaces are clean.
- (7) Slide the spacers (as required) onto the engine shaft. Refer to Figure 3-14.
- (8) Slide the rear spinner bulkhead onto the engine shaft.
- (9) Install the rear cone onto the bulkhead, matching the holes in the cone with the pins in the bulkhead. Refer to Figure 3-14.
- (10) Install the rear cone O-ring (Table 3-1) over the shaft. Refer to Figure 3-14.

**CAUTION:** IF THE START LOCK PINS ARE EXTENDED, THE STOP PLATE WILL BE BENT OR SHEARED OFF.

- (11) Retract the start lock pins and hold them in place with a heavy wire inserted through the hole of each start lock housing.

**NOTE:** The start locks are attached to the spinner bulkhead.

- (12) Slide the propeller hub onto the engine shaft, and tighten the shaft nut until the rear bulkhead is snug, but not tight.

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

- (13) Carefully slide the spinner dome over the reassembled propeller.

- (14) To properly position the rear bulkhead, temporarily install the spinner dome with at least three screws.

**NOTE:** Make sure the start lock pins are parallel with the blade axis, but offset to one side.

- (15) Adjust the spinner to equalize the clearance between the blades and the blade cutouts in the dome.

- (16) Remove the spinner dome.

- (17) Torque the propeller shaft nut (Table 3-1) using tool BST-2910. Refer to Table 3-2 and Figure 3-3 to determine the proper torque value to which the torque wrench must be set.

- (18) Safety the shaft nut to the engine shaft using a shaft nut lock (Table 3-1). Refer to Figure 3-12.

**NOTE:** The shaft nut lock is normally supplied in a separate package when the propeller is shipped new from the factory.

- (19) Insert the feathering spring assembly into the cylinder.

- (20) Use the special spanner wrench BT-461 or strap wrench 100923 to thread the feathering spring into place in the cylinder. Refer to Figure 3-17.
  - (21) Torque the feathering spring assembly. Refer to Table 3-2 and Figure 3-3 to determine the proper torque value to which the torque wrench must be set.
  - (22) Using a number 51 (0.067 inch) drill bit, drill a hole through the lip on the spring cup to line up with the slot in the cylinder. Refer to Figure 3-17.
  - (23) Insert 0.032-inch minimum diameter stainless steel wire CM131 through the hole in the spring cup, matching it with the slots in the cylinder. Refer to Figure 3-17.
    - (a) Use three loops of wire to safety the feathering spring assembly.
    - (b) Tuck the "pigtail" into the slotted area.
  - (24) If the piston O-ring (Table 3-1) and the piston dust seal are not already installed in the piston, perform the following steps. Refer to Figure 3-15.
    - (a) Lubricate the piston O-ring and carefully install it in the groove provided for it in the piston.
    - (b) Cut the necessary length of oiled piston dust seal material.
      - 1 Cut the piston dust seal material on a 30 degree diagonal so there will be an overlap with a smooth surface, free of fuzz.
    - (c) Apply a layer of aviation grade reciprocating engine oil to the piston dust seal.
- CAUTION: MAKE SURE THAT THE PISTON DUST SEAL IS FREE OF FUZZ.**
- (d) Install the piston dust seal material in the groove provided for it in the piston.
  - (e) Install the rod O-ring (Table 3-1) in the groove at the end of the threaded portion of the pitch change rod.

CAUTION: TO MAINTAIN PROPER BLADE ANGLES, IT IS IMPORTANT THAT THE PISTON BE REINSTALLED IN THE SAME POSITION AS WHEN IT WAS ORIGINALLY ASSEMBLED. INDEX NUMBERS ON THE PISTON AND THE GUIDE COLLAR ARE PROVIDED TO MAKE SURE OF PROPER POSITIONING.

(25) Locate and match up the index numbers (1, 2, and 3) on the piston ears with the corresponding index numbers on the guide collar.

NOTE: The index marks will be either impression stamped or drawn with a felt-tipped pen.

(26) Oil the surface of the cylinder and install the piston.

(27) Slide the piston onto the cylinder and pass the guide rods through the guide collar bushings.

(28) Install the low-pitch stop components: washer, socket head cap screw, and jam nut (Table 3-1), at the end of each guide rod. Refer to Figure 3-16.

(29) Connect the link arms to the piston.

(30) Install the link pin units.

(31) Install the link pin safety screws.

(32) Safety the two screws together with 0.032 inch (0.81 mm) minimum diameter stainless steel wire.

(33) Rotate the blades into feather position and fasten the piston to the pitch change rod with the piston nut (Table 3-1).

(34) Torque the piston nut per Table 3-2.

(35) Torque the jam nut against the guide rod per Table 3-2.

(36) Remove the wires from the start lock brackets.

(37) Position the propeller on the start locks.



CAUTION: DO NOT PUT THE BLADE PADDLE IN THE AREA OF THE DE-ICE 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 BOOT. USE ONE BLADE PADDLE PER BLADE.

- (38) Using blade paddles, simultaneously rotate the blades toward low pitch until the start lock pins engage the stop plate.
- (39) 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 can be found in the following publications available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://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 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
- (40) 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).

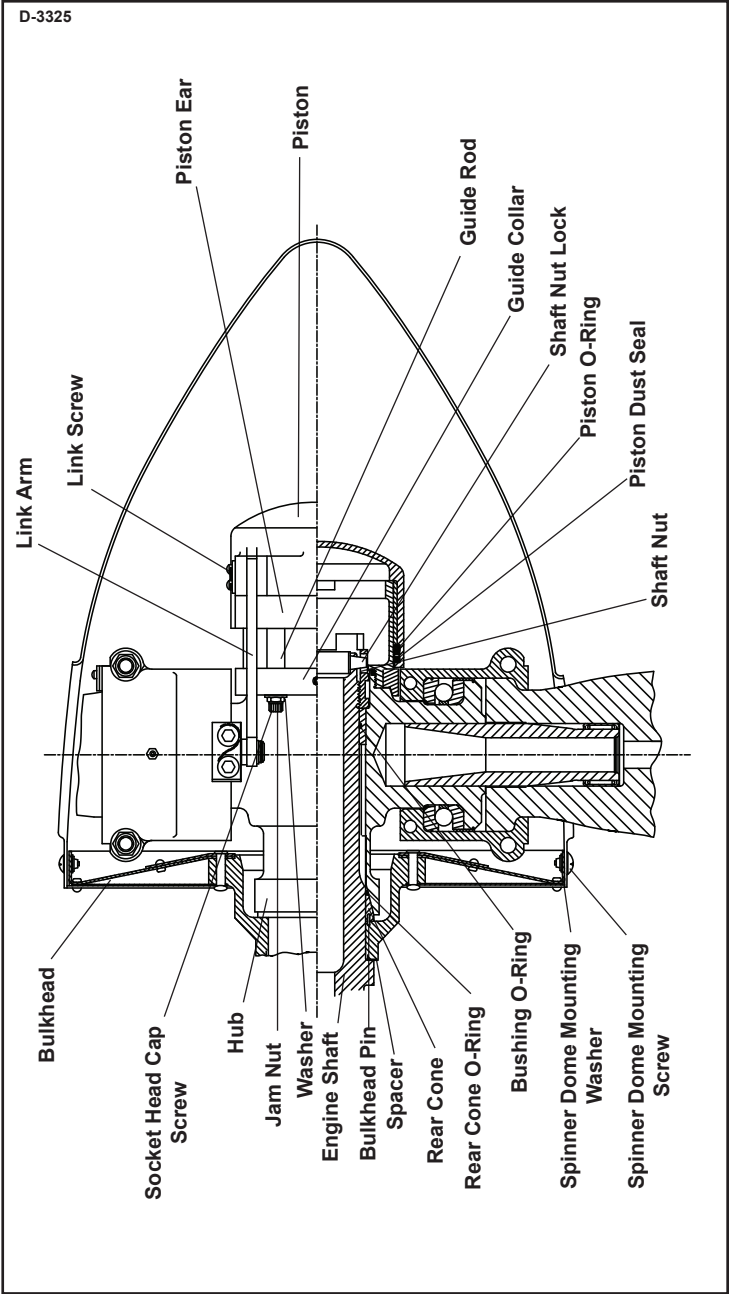
(41) Install the spinner dome as follows:

**CAUTION 1:** 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, AND MAY AFFECT THE BALANCE OF THE PROPELLER.

**NOTE:** The following instructions relate to Hartzell Propeller Inc. spinners only. If the airframe manufacturer produced the spinner assembly, refer to the airframe manufacturer's manual for spinner installation instructions.

- (a) Carefully slide the spinner dome over the reassembled propeller.
- (b) Secure the spinner dome to the spinner bulkhead with the supplied screws and washers.



HC-B3( )20-4 and HC-B3( )30-4 Propellers  
Figure 3-18

- J. Installing the HC-B3( )20-4 and HC-B3( )30-4 Propellers  
- Refer to Figure 3-18

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

**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.

**CAUTION 2:** WHEN INSTALLING THE PROPELLER ON THE AIRCRAFT, DO NOT DAMAGE THE ICE PROTECTION SYSTEM COMPONENTS, IF APPLICABLE.

- (1) Using a suitable crane hoist and sling, carefully move the propeller assembly to the aircraft engine mounting flange.

**CAUTION:** THE PISTON MUST BE REMOVED BEFORE INSTALLING THE PROPELLER ON THE AIRCRAFT. IF THE PISTON HAS ALREADY BEEN REMOVED, PROCEED TO STEP 4.J.(3).

- (2) Piston Removal - Refer to Figures 3-18 and 3-11
- (a) Remove the safety wire (if installed) from the link pin units.
  - (b) Remove the safety screw from each link pin unit.
  - (c) Remove each link pin unit.
  - (d) The piston ears and guide collar should have corresponding index numbers (1, 2, and 3) impression stamped or marked with a felt-tipped pen. If they are not marked, number them with a felt-tipped pen.

**NOTE:** This will make sure that the components are reassembled in their original location.

- (e) Slide the link arms out of the piston slots.
- (f) Remove the socket head cap screw, jam nut, and washer from each piston guide rod.
- (g) Slide the piston off the cylinder.
- (3) On HC-B3( )30-4 propellers only, install the bushing O-ring (Table 3-1) into the shaft bushing.  
**NOTE:** The shaft bushing is press fit into the hub.
- (4) Make sure the propeller hub spline and engine spline surfaces are clean.
- (5) On 30 spline shaft models only, slide the spacer (Table 3-1), as required, onto the shaft.  
Refer to Figure 3-14.
- (6) Slide the rear spinner bulkhead onto the engine shaft.
- (7) Install the rear cone onto the bulkhead, matching the holes in the cone with the pins in the bulkhead.
- (8) Install the rear cone O-ring (Table 3-1) over the shaft.  
Refer to Figure 3-14.
- (9) Slide the propeller hub onto the engine shaft and tighten the shaft nut until the rear bulkhead is snug, but not tight.

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

- (10) Carefully slide the spinner dome over the reassembled propeller.
- (11) To properly position the rear bulkhead, temporarily install the spinner dome with at least four screws.
- (12) Adjust the spinner to equalize the clearance between the blades and the blade cutouts in the dome.
- (13) Remove the spinner dome.

- (14) Torque the propeller shaft nut (Table 3-1) using tool BST-2910. Refer to Table 3-2 and Figure 3-3 to determine the proper torque value to which the torque wrench must be set.
- (15) Safety the shaft nut using a safety pin for 20 spline models or a shaft nut lock for 30 spline models. Refer to Figure 3-12.

**NOTE:** The hub lock safety pin or shaft nut lock is normally supplied in a separate package when the propeller is shipped new from the factory.

- (16) If the piston O-ring and the piston dust seal are not already installed in the piston, perform the following steps. Refer to Figure 3-15.
- (a) Lubricate the piston O-ring (Table 3-1) and carefully install it in the groove provided for it in the piston.
  - (b) Cut the necessary length of oiled piston dust seal material.
    - 1 Cut the piston dust seal material on a 30 degree diagonal so there will be an overlap with a smooth surface, free of fuzz.
  - (c) Apply a layer of aviation grade reciprocating engine oil to the piston dust seal.

**CAUTION:** MAKE SURE THAT THE PISTON DUST SEAL IS FREE OF FUZZ.

- (d) Install the piston dust seal material in the groove provided for it in the piston.

**CAUTION:** TO MAINTAIN PROPER BLADE ANGLES, IT IS IMPORTANT THAT THE PISTON BE REINSTALLED IN THE SAME POSITION AS WHEN IT WAS ORIGINALLY ASSEMBLED. INDEX NUMBERS ON THE PISTON AND THE GUIDE COLLAR ARE PROVIDED TO MAKE SURE OF PROPER POSITIONING.

(17) Locate and match up the index numbers (1, 2, and 3) on the piston ears with the corresponding index numbers on the guide collar.

**NOTE:** The index marks will be either impression stamped or drawn with a felt-tipped pen.

(18) Oil the surface of the cylinder and install the piston.

(19) Slide the piston onto the cylinder and pass the guide rods through the guide collar bushings.

(20) Install the washer, socket head cap screw, and jam nut (Table 3-1), at the end of each guide rod.

(21) Connect the link arms to the piston. Refer to Figure 3-11.

(22) Install the link pin units.

(23) Install the link pin safety screws.

(24) Safety the link pin screws together with 0.032 inch (0.81 mm) minimum diameter stainless steel wire. Refer to Figure 3-11.

(25) Torque the jam nut against the guide rod per Table 3-2.

(26) 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 can be found in the following publications available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://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 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

(27) 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).

(28) Install the spinner dome as follows:

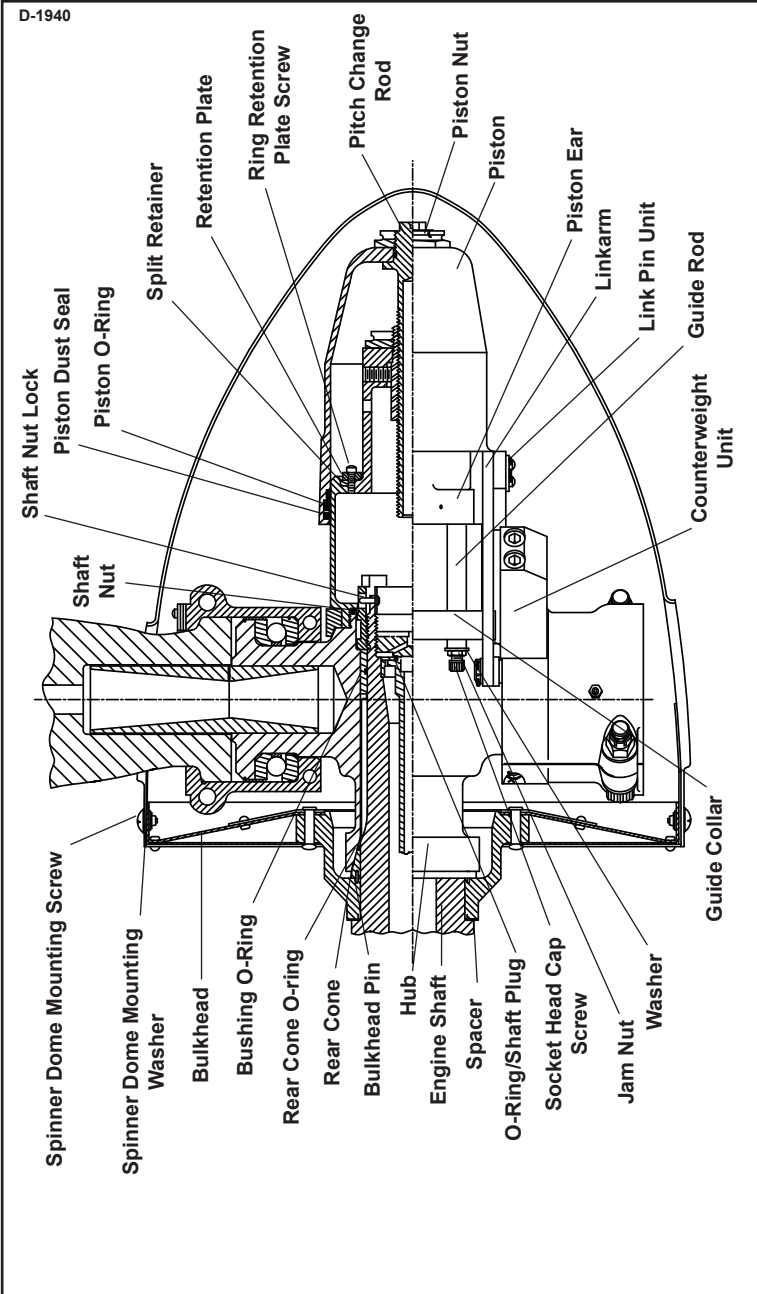
**CAUTION 1:** TO PREVENT DAMAGE TO THE BLADE AND BLADE PAINT, WRAP THE BLADE SHANKS IN SEVERAL LAYERS OF MASKING OR DUCT TAPE BEFORE INSTALLING THE SPINNER DOME. REMOVE THE TAPE AFTER THE SPINNER IS INSTALLED.

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

**NOTE:** The following instructions relate to Hartzell Propeller Inc. spinners only. If the airframe manufacturer produced the spinner assembly, refer to the airframe manufacturer's manual for spinner installation instructions.

- (a) Carefully slide the spinner dome over the reassembled propeller.
- (b) Secure the spinner dome to the spinner bulkhead with the supplied screws and washers.





HA-B3( )30-1B Propellers  
Figure 3-19

**K. Installing the HA-B3( )30-1B Propellers**

- Refer to Figure 3-19.

**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.

(1) Plug the engine shaft.

(a) Install O-ring C-3317-210-1.

(b) If applicable, install the new shaft plug A-1857 plug (1-15/16 -16 threads) or A-1857-1 plug (1-3/4 -16 threads).

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

**CAUTION:** WHEN INSTALLING THE PROPELLER ON THE AIRCRAFT, DO NOT DAMAGE THE ICE PROTECTION SYSTEM COMPONENTS, IF APPLICABLE.

(2) Using a suitable crane hoist and sling, carefully move the propeller assembly to the aircraft engine mounting flange.

**CAUTION:** THE PISTON MUST BE REMOVED BEFORE INSTALLING THE PROPELLER ON THE AIRCRAFT. IF THE PISTON HAS ALREADY BEEN REMOVED, PROCEED TO STEP 4.K.(4).

- (3) Piston Removal - Refer to Figures 3-19 and 3-11
- (a) Remove the piston nut.
  - (b) Remove the safety wire (if installed) from the link pin units.
  - (c) Remove the safety screw from each link pin unit.
  - (d) Remove each link pin unit.
  - (e) The piston ears and guide collar should have corresponding index numbers (1, 2, and 3) impression stamped or marked with a felt-tipped pen. If they are not marked, number them with a felt-tipped pen.

**NOTE:** This will make sure that the components are reassembled in their original location.

- (f) Slide the link arms out of the piston slots.
- (g) Remove the socket head cap screw, jam nut, and washer from each piston guide rod.
- (h) Slide the piston off the cylinder.

**CAUTION:** THE PITCH ADJUSTMENT ASSEMBLY MUST BE REMOVED BEFORE INSTALLING THE PROPELLER ON THE AIRCRAFT. IF THE PITCH ADJUSTMENT ASSEMBLY HAS ALREADY BEEN REMOVED, PROCEED TO STEP 4.K.(5).

- (4) Pitch adjustment assembly removal
- (a) Remove the ring retention plate screw safety wire (if installed).
  - (b) Remove the ring retention plate screws.
  - (c) Remove the retention plate.
  - (d) Remove the split retainer.
  - (e) Remove the pitch adjustment assembly from the cylinder.

- (5) Install the bushing O-ring (Table 3-1) into the shaft bushing ID.  
**NOTE:** The shaft bushing is press fit into the hub.
- (6) Make sure the propeller hub spline and engine spline surfaces are clean.
- (7) Slide the spacers (Table 3-1), as required, onto the shaft.
- (8) Slide the rear spinner bulkhead onto the shaft.
- (9) Install the rear cone onto the bulkhead, matching the holes in the cone with the pins in the bulkhead.  
Refer to Figure 3-14.
- (10) Install the rear cone O-ring (Table 3-1) over the shaft.  
Refer to Figure 3-14.
- (11) Slide the propeller hub onto the engine shaft and tighten the shaft nut until the rear bulkhead is snug, but not tight.

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

- (12) Carefully slide the spinner dome over the reassembled propeller.
- (13) To properly position the rear bulkhead, temporarily install the spinner dome with at least three screws.
- (14) Adjust the spinner to equalize the clearance between the blades and the blade cutouts in the dome.
- (15) Remove the spinner dome.
- (16) Torque the propeller shaft nut using tool BST-2910.  
Refer to Table 3-2 and Figure 3-3 to determine the proper torque value to which the torque wrench must be set.
- (17) Safety the shaft nut (Table 3-1) to the engine shaft using a shaft nut lock. Refer to Figure 3-12.

**NOTE:** The shaft nut lock is normally supplied in a separate package when the propeller is shipped new from the factory.

- (18) Install the pitch adjustment assembly into the cylinder.
  - (19) Install the split retainer between the cylinder and the front spring retainer. Slide the split retainer into the recess in the cylinder.
  - (20) Pull the pitch adjustment assembly forward, tight against the split retainer, locking the split retainer into place.
  - (21) Install the ring retention plate, which secures the split retainer, into place.
  - (22) Install the ring retention plate screws and tighten them until snug.
  - (23) Safety the plate screws using 0.032 inch (0.81 mm) minimum diameter stainless steel wire (two screws per safety).
  - (24) If the piston O-ring (Table 3-1) and the piston dust seal are not already installed in the piston, perform the following steps. Refer to Figure 3-15.
    - (a) Lubricate the piston O-ring and carefully install it in the groove provided for it in the piston.
    - (b) Cut the necessary length of oiled piston dust seal material.
      - 1 Cut the piston dust seal material on a 30 degree diagonal so there will be an overlap with a smooth surface, free of fuzz.
    - (c) Apply a layer of aviation grade reciprocating engine oil to the piston dust seal.
- CAUTION: MAKE SURE THAT THE PISTON DUST SEAL IS FREE OF FUZZ.**
- (d) Install the piston dust seal material in the groove provided for it in the piston.
  - (e) Install the rod O-ring (Table 3-1) in the groove at the end of the threaded portion of the pitch change rod.

**CAUTION:** TO MAINTAIN PROPER BLADE ANGLES, IT IS IMPORTANT THAT THE PISTON BE REINSTALLED IN THE SAME POSITION AS WHEN IT WAS ORIGINALLY ASSEMBLED. INDEX NUMBERS ON THE PISTON AND THE GUIDE COLLAR ARE PROVIDED TO MAKE SURE OF PROPER POSITIONING.

(25) Locate and match up the index numbers (1, 2, and 3) on the piston ears with the corresponding index numbers on the guide collar.

**NOTE:** The index marks will be either impression stamped or drawn with a felt-tipped pen.

(26) Oil the surface of the cylinder.

(27) Slide the piston onto the cylinder and pass the guide rods through the guide collar bushings.

(28) Install the washer, socket head cap screw, and jam nut (Table 3-1), at the end of each guide rod.

(29) Connect the link arms to the piston.

(30) Install the link pin units.

(31) Install the link pin safety screws.

(32) Safety the link pin screws together with 0.032 inch (0.81 mm) minimum diameter stainless steel wire. Refer to Figure 3-11.

(33) Rotate the blades to a higher pitch to seat the piston onto the pitch change rod.

(34) Install the piston nut. Torque per Table 3-2.

(35) Install the low-pitch stop components: washer, socket head cap screw, and jam nut (Table 3-1), at the end of each guide rod.

(36) Torque the jam nut against the guide rod per Table 3-2.

(37) 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 can be found in the following publications available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://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 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

(38) 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).

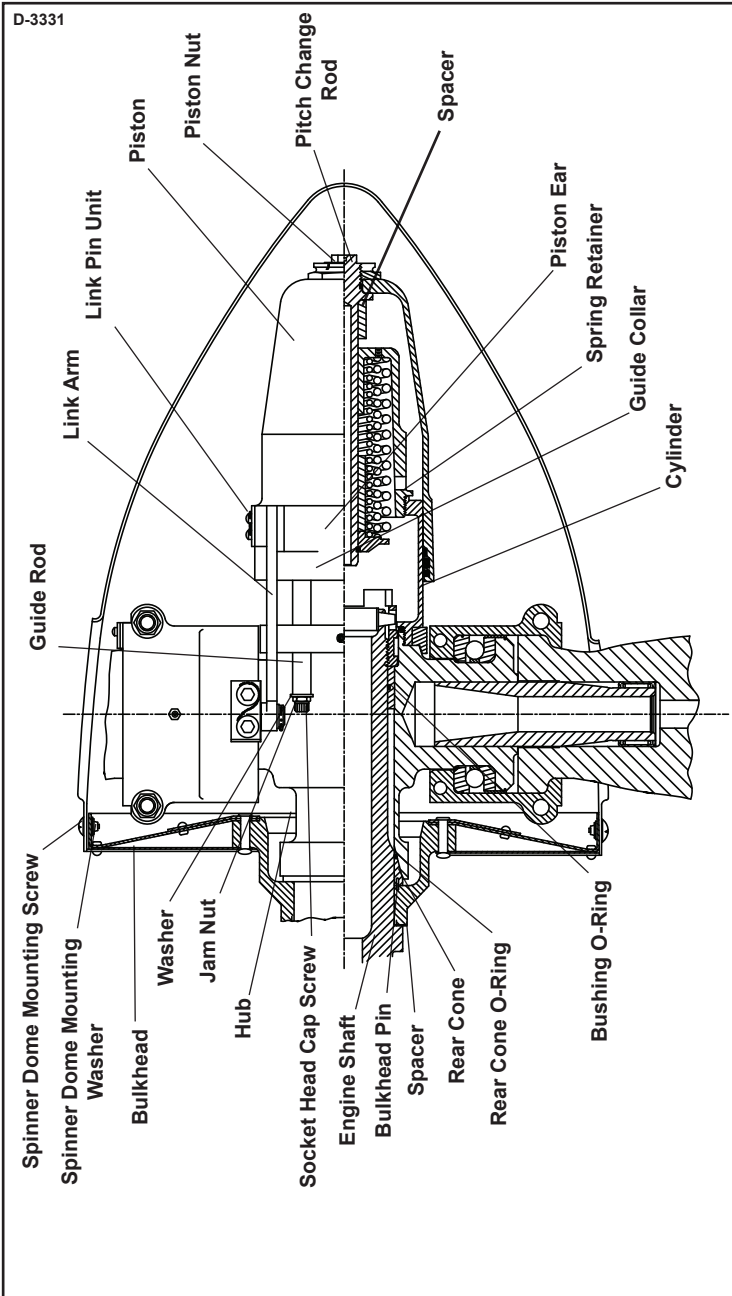
(39) Install the spinner dome as follows:

**CAUTION 1:** 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, AND MAY AFFECT THE BALANCE OF THE PROPELLER.

**NOTE:** The following instructions relate to Hartzell Propeller Inc. spinners only. If the airframe manufacturer produced the spinner assembly, refer to the airframe manufacturer's manual for spinner installation instructions.

- (a) Carefully slide the spinner dome over the reassembled propeller.
- (b) Secure the spinner dome to the spinner bulkhead with the supplied screws and washers.



HC-B3R30-4A,-4B Propeller  
Figure 3-20



- L. Installing the HC-B3R30-4A,-4B Propeller  
- Refer to Figure 3-20.

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

**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.

**CAUTION 2:** WHEN INSTALLING THE PROPELLER ON THE AIRCRAFT, DO NOT DAMAGE THE ICE PROTECTION SYSTEM COMPONENTS, IF APPLICABLE.

- (1) Using a suitable crane hoist and sling, carefully move the propeller assembly to the aircraft engine mounting flange.

**CAUTION:** THE PISTON MUST BE REMOVED BEFORE INSTALLING THE PROPELLER ON THE AIRCRAFT. IF THE PISTON HAS ALREADY BEEN REMOVED, PROCEED TO STEP 4.L.(3).

- (2) Piston Removal - Refer to Figures 3-20 and 3-11
- (a) Remove the piston nut.
  - (b) Remove the safety wire (if installed) from the link pin units.
  - (c) Remove the safety screw from each link pin unit.
  - (d) Remove each link pin unit.
  - (e) The piston ears and guide collar should have corresponding index numbers (1, 2, and 3) impression stamped or marked with a felt-tipped pen. If they are not marked, number them with a felt-tipped pen.

**NOTE:** This will make sure that the components are reassembled in their original location.

- (f) Slide the link arms out of the piston slots.
- (g) Remove the socket head cap screw, jam nut, and washer from each piston guide rod.
- (h) Slide the piston off the cylinder.

**CAUTION:** THE SPRING ASSEMBLY MUST BE REMOVED BEFORE INSTALLING THE PROPELLER ON THE AIRCRAFT. IF THE SPRING ASSEMBLY HAS ALREADY BEEN REMOVED, PROCEED TO STEP 4.L.(4).

- (3) Spring assembly removal - Refer to Figure 3-13
  - (a) Remove the safety wire (if installed).
  - (b) Unthread the spring retainer from the cylinder using spanner wrench BT-461 or strap wrench 100923. Refer to Figure 3-17.
  - (c) Remove the spring retainer and the attached spring assembly from the cylinder.
- (4) Install the bushing O-ring (Table 3-1) into the ID groove of the shaft bushing, located in the hub bore. Refer to Figure 3-12.

**NOTE:** The shaft bushing is press fit into the hub.

- (5) Make sure the propeller hub spline and engine spline surfaces are clean.
- (6) Slide the spacers (Table 3-1), as required, onto the shaft. Refer to Figure 3-14.
- (7) Slide the rear spinner bulkhead onto the shaft.
- (8) Install the rear cone onto the bulkhead, matching the holes in the cone with the pins in the bulkhead. Refer to Figure 3-14.
- (9) Install the rear cone O-ring (Table 3-1) over the shaft. Refer to Figure 3-14.
- (10) Slide the propeller hub onto the engine shaft and tighten the shaft nut until the rear bulkhead is snug, but not tight.

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

- (11) Carefully slide the spinner dome over the reassembled propeller.
- (12) To properly position the rear bulkhead, temporarily install the spinner dome with at least three screws.
- (13) Adjust the spinner to equalize the clearance between the blades and the blade cutouts in the dome.
- (14) Remove the spinner dome.
- (15) Torque the propeller shaft nut (Table 3-1) using tool BST-2910. Refer to Table 3-2 and Figure 3-3 to determine the proper torque value to which the torque wrench must be set.
- (16) Safety the shaft nut to the engine shaft using a shaft nut lock. Refer to Table 3-1 and Figure 3-12.  
**NOTE:** The shaft nut lock is normally supplied in a separate package when the propeller is shipped new from the factory.
- (17) Insert the feathering spring assembly into the cylinder.
- (18) Use the special spanner wrench BT 461 to thread the feathering spring into place in the cylinder. Refer to Figure 3-17.
- (19) Torque the feathering spring assembly. Refer to Table 3-2 and Figure 3-3 to determine the proper torque value to which the torque wrench must be set.
- (20) Using a number 51 drill bit, drill a hole through the lip on the spring cup to line up with the slot in the cylinder. Refer to Figure 3-17.

(21) Insert 0.032-inch minimum diameter stainless steel wire CM131 through the hole in the spring cup, matching it with the slots in the cylinder. Refer to Figure 3-17.

- (a) Use three loops of wire to safety the feathering spring assembly.
- (b) Tuck the "pigtail" into the slotted area.

(22) If the piston O-ring (Table 3-1) and the piston dust seal are not already installed in the piston, perform the following steps. Refer to Figure 3-15.

- (a) Lubricate the piston O-ring and carefully install it in the groove provided for it in the piston.
- (b) Cut the necessary length of oiled piston dust seal material.

1 Cut the piston dust seal material on a 30 degree diagonal so there will be an overlap with a smooth surface, free of fuzz.

- (c) Apply a layer of aviation grade reciprocating engine oil to the piston dust seal.

**CAUTION:** MAKE SURE THAT THE PISTON DUST SEAL IS FREE OF FUZZ.

- (d) Install the piston dust seal material in the groove provided for it in the piston
- (e) Install the rod O-ring (Table 3-1) in the groove at the end of the threaded portion of the pitch change rod.

**CAUTION:** TO MAINTAIN PROPER BLADE ANGLES, IT IS IMPORTANT THAT THE PISTON BE REINSTALLED IN THE SAME POSITION AS WHEN IT WAS ORIGINALLY ASSEMBLED. INDEX NUMBERS ON THE PISTON AND THE GUIDE COLLAR ARE PROVIDED TO MAKE SURE OF PROPER POSITIONING.

(23) Locate and match up the index numbers (1, 2, and 3) on the piston ears with the corresponding index numbers on the guide collar.

**NOTE:** The index marks will be either impression stamped or drawn with a felt-tipped pen.

- (24) Oil the surface of the cylinder and install the piston.
- (25) Slide the piston onto the cylinder and pass the guide rods through the collar bushings.
- (26) Install the washer, socket head cap screw, and jam nut (Table 3-1), at the end of each guide rod.
- (27) Connect the link arms to the piston. Refer to Figure 3-11.
- (28) Install the link pin units.
- (29) Install the link pin safety screws.
- (30) Safety the link pin screws together with 0.032 inch (0.81 mm) minimum diameter stainless steel wire. Refer to Figure 3-11.
- (31) By hand, carefully rotate the blades into low pitch position, and fasten the piston to the pitch change rod with the piston nut (Table 3-1).
- (32) Torque the piston nut in accordance with Table 3-2.
- (33) Torque the jam nut against the guide rod. Refer to Table 3-2.
- (34) 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 can be found in the following publications available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://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 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
- (35) 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).

(36) Install the spinner dome as follows:

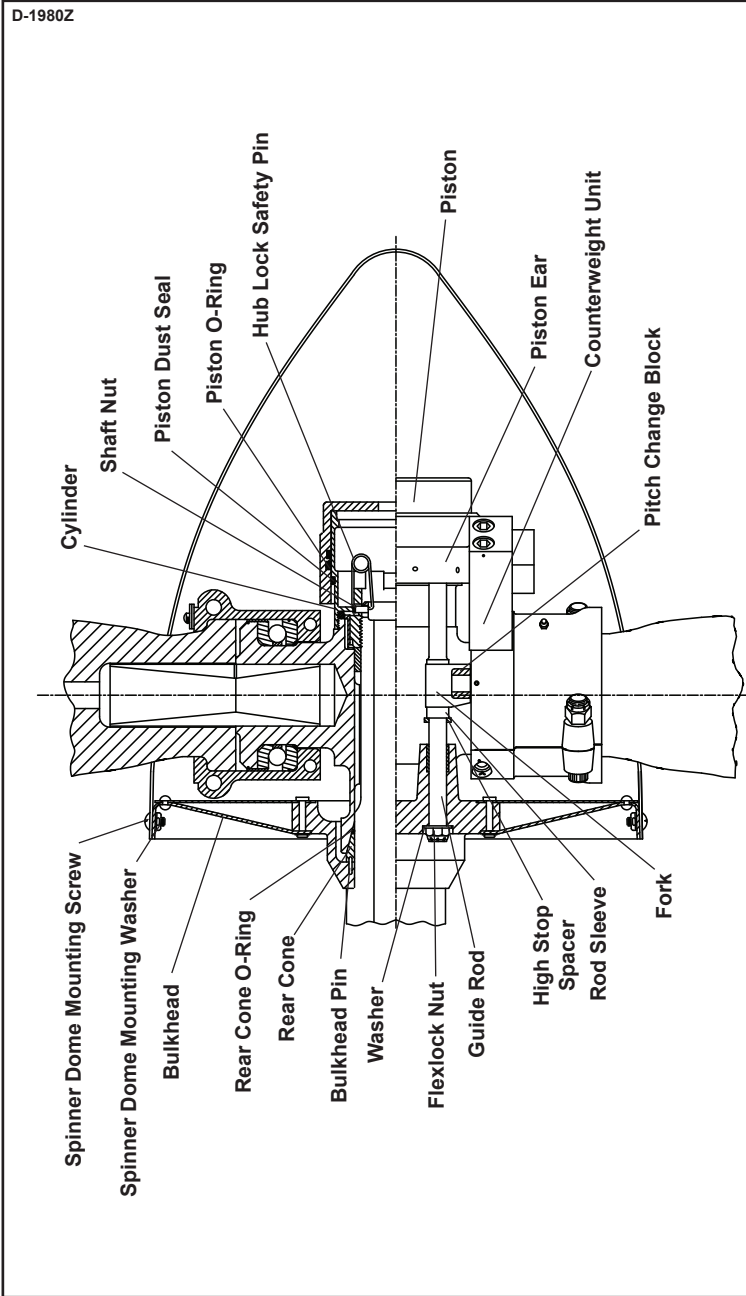
CAUTION 1: TO PREVENT DAMAGE TO THE BLADE AND BLADE PAINT, WRAP THE BLADE SHANKS IN SEVERAL LAYERS OF MASKING OR DUCT TAPE BEFORE INSTALLING THE SPINNER DOME. REMOVE THE TAPE AFTER THE SPINNER IS INSTALLED.

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

NOTE: The following instructions relate to Hartzell Propeller Inc. spinners only. If the airframe manufacturer produced the spinner assembly, refer to the airframe manufacturer's manual for spinner installation instructions.

- (a) Carefully slide the spinner dome over the reassembled propeller.
- (b) Secure the spinner dome to the spinner bulkhead with the supplied screws and washers.

D-1980Z



HC-B3(W,Z)20-1 Propeller  
Figure 3-21

**M. Installing the HC-B3(W,Z)20-1 Propeller**

- Refer to Figure 3-21

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

**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.

**CAUTION 2:** WHEN INSTALLING THE PROPELLER ON THE AIRCRAFT, DO NOT DAMAGE THE ICE PROTECTION SYSTEM COMPONENTS, IF APPLICABLE.

- (1) Using a suitable crane hoist and sling, carefully move the propeller assembly to the aircraft engine mounting flange.

**NOTE:** In most cases, the piston is not installed on the cylinder when the propeller is not installed on the engine.

- (2) If the piston is installed on the cylinder, perform the following steps. Refer to Figure 3-21:
  - (a) Move the piston to low pitch and rotate the forks away from the clamp linkscrews.
  - (b) Remove the flexlock nut from each piston rod.
  - (c) Remove the washer from each piston rod.
  - (d) Loosen the set screw in each fork.
  - (e) Lift the piston from the cylinder.
  - (f) Remove the sleeve from each bulkhead boss.
  - (g) Remove the high stop spacer from each sleeve.



- (h) The piston ears, forks, and counterweights should have corresponding index numbers (1, 2, and 3) impression-stamped or marked with a felt-tipped pen. If they are not marked, number them with a felt-tipped pen.

**NOTE:** This will make sure that the components are reassembled in their original location.

- (3) Make sure the propeller hub spline and engine spline surfaces are clean.
- (4) Slide the rear spinner bulkhead onto the shaft.
- (5) Install the rear cone onto the bulkhead, matching the holes in the cone with the pins in the bulkhead. Refer to Figure 3-14.
- (6) Install the rear cone O-ring (Table 3-1) over the shaft. Refer to Figure 3-14.
- (7) Slide the propeller hub onto the engine shaft and tighten the hub nut until the rear bulkhead is snug, but not tight.

**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.

- (8) Carefully slide the spinner dome over the reassembled propeller.
- (9) To properly position the rear bulkhead, temporarily install the spinner dome with at least four screws.
- (10) Adjust the spinner to equalize the clearance between the blades and the blade cutouts in the dome.
- (11) Remove the spinner dome.
- (12) Using tool BST-2910, torque the propeller shaft nut (Table 3-1). Refer to Table 3-2 and Figure 3-3 to determine the proper torque value to which the torque wrench must be set.
- (13) Safety the hub nut using the hub lock safety pin (Table 3-1). Refer to Figure 3-12.

(14) If the piston O-ring (Table 3-1) and the piston dust seal are not already installed in the piston, perform the following steps. Refer to Figure 3-15.

(a) Lubricate the piston O-ring and carefully install it in the groove provided for it in the piston.

(b) Cut the necessary length of oiled piston dust seal material.

1 Cut the piston dust seal material on a 30 degree diagonal so there will be an overlap with a smooth surface, free of fuzz.

(c) Apply a layer of aviation grade reciprocating engine oil to the piston dust seal.

**CAUTION:** MAKE SURE THAT THE PISTON DUST SEAL IS FREE OF FUZZ.

(d) Install the piston dust seal material in the groove provided for it in the piston.

**CAUTION:** TO MAINTAIN PROPER BLADE ANGLES, IT IS IMPORTANT THAT THE PISTON BE REINSTALLED IN THE SAME POSITION AS WHEN IT WAS ORIGINALLY ASSEMBLED. INDEX NUMBERS ON THE PISTON AND THE GUIDE COLLAR ARE PROVIDED TO MAKE SURE OF PROPER POSITIONING.

(15) Locate and match up the index numbers (1, 2, and 3) on the forks and piston ears with the corresponding index numbers on the counterweights.

**NOTE:** The index marks will be either impression stamped or drawn with a felt-tipped pen.

(16) Install the rod sleeve (Table 3-1) on each piston rod.

(17) Install the high stop spacer(s) (Table 3-1) on each of the guide rods and over each rod sleeve.

(18) Oil the surface of the cylinder and install the piston.

(19) Install the pitch change block on each clamp linkscrew.

- (20) Install the piston
  - (a) Engage the forks on the pitch change blocks.
  - (b) Slide the guide rods through the bores in the spinner bulkhead.
- (21) Install the washer and flexlock nut (Table 3-1) on the end of each of the guide rods.
- (22) Torque the flexlock nut against the guide rod. Refer to Table 3-2.
- (23) 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 can be found in the following publications available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://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 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
- (24) 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).

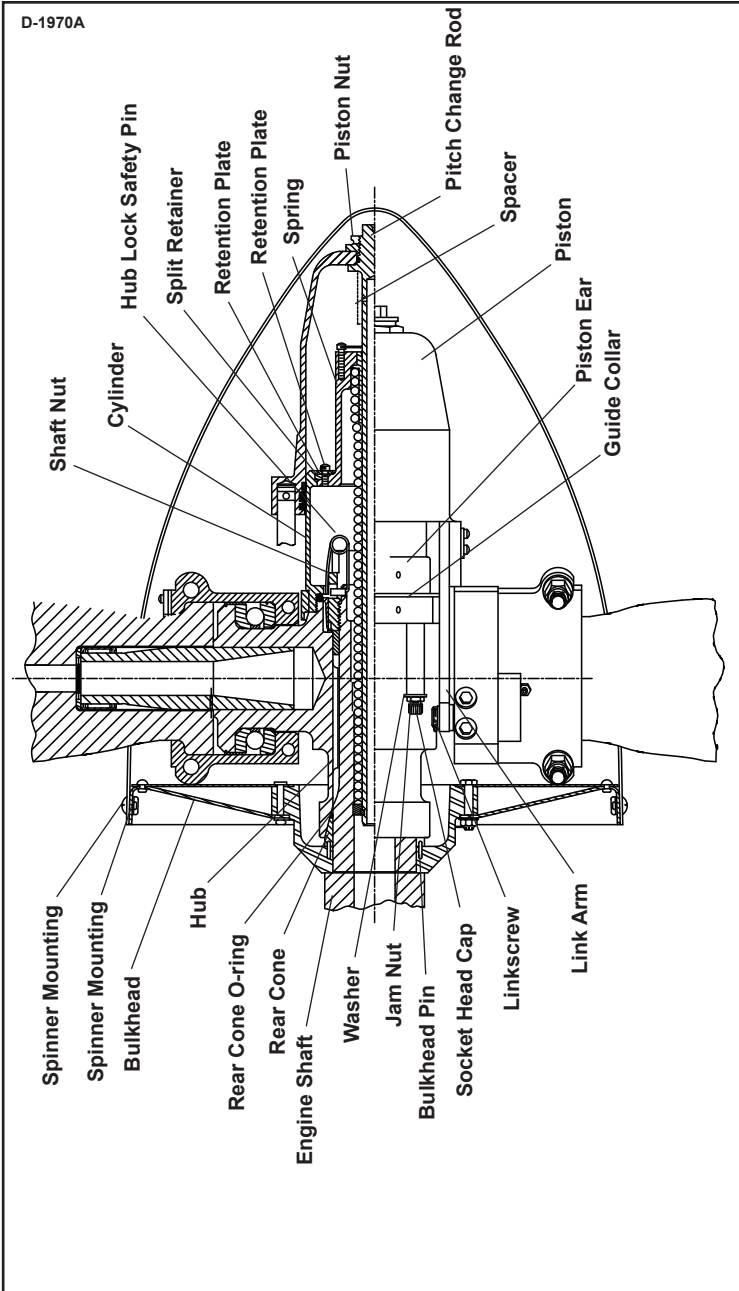
(25) Install the spinner dome as follows:

CAUTION 1: 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, AND MAY AFFECT THE BALANCE OF THE PROPELLER.

NOTE: The following instructions relate to Hartzell Propeller Inc. spinners only. If the airframe manufacturer produced the spinner assembly, refer to the airframe manufacturer's manual for spinner installation instructions.

- (a) Carefully slide the spinner dome over the reassembled propeller.
- (b) Secure the spinner dome to the spinner bulkhead with the supplied screws and washers.



HC-B3Z20-1F Propeller  
Figure 3-22

**N. Installing the HC-B3Z20-1F Propeller**

- Refer to Figure 3-22.

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

**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.

**CAUTION 2:** WHEN INSTALLING THE PROPELLER ON THE AIRCRAFT, DO NOT DAMAGE THE ICE PROTECTION SYSTEM COMPONENTS, IF APPLICABLE.

- (1) Using a suitable crane hoist and sling, carefully move the propeller assembly to the aircraft engine mounting flange.

**CAUTION:** THE PISTON MUST BE REMOVED BEFORE INSTALLING THE PROPELLER ON THE AIRCRAFT. IF THE PISTON HAS ALREADY BEEN REMOVED, PROCEED TO STEP 4.N.(4).

- (2) Piston Removal - Refer to Figures 3-22 and 3-11

- (a) Remove the piston nut.
- (b) Remove the safety wire (if installed) from the link pin units.
- (c) Remove the safety screw from each link pin unit.
- (d) Remove each link pin unit.
- (e) The piston ears and guide collar should have corresponding index numbers (1, 2, and 3) impression stamped or marked with a felt-tipped pen. If they are not marked, number them with a felt-tipped pen.

**NOTE:** This will make sure that the components are reassembled in their original location.

- (f) Slide the link arms out of the piston slots.
- (g) Remove the socket head cap screw, jam nut (Table 3-1), and washer from each piston guide rod.
- (h) Slide the piston off the cylinder.

**CAUTION:** THE SPRING ASSEMBLY MUST BE REMOVED BEFORE INSTALLING THE PROPELLER ON THE AIRCRAFT. IF THE SPRING ASSEMBLY HAS ALREADY BEEN REMOVED, PROCEED TO STEP 4.N.(5).

- (3) Spring assembly removal - Refer to Figure 3-13
  - (a) Remove the ring retention plate screw safety wire (if installed).
  - (b) Remove the ring retention plate screws.
  - (c) Remove the retention plate.
  - (d) Remove the split retainer.
  - (e) Remove the spring assembly from the cylinder.
- (4) Make sure the propeller hub spline and engine spline surfaces are clean.
- (5) Slide the rear spinner bulkhead onto the shaft.
- (6) Install the rear cone onto the bulkhead, matching the holes in the cone with the pins in the bulkhead. Refer to Figure 3-14.
- (7) Install the rear cone O-ring (Table 3-1) over the shaft. Refer to Figure 3-14.
- (8) Slide the propeller hub onto the shaft and tighten the shaft nut until the rear bulkhead is snug, but not tight.

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

- (9) Carefully slide the spinner dome over the reassembled propeller.
- (10) To properly position the rear bulkhead, temporarily install the spinner dome with at least four screws.
- (11) Adjust the spinner to equalize the clearance between the blades and the blade cutouts in the dome.
- (12) Remove the spinner dome.
- (13) Torque the propeller shaft nut (Table 3-1) using tool BST-2910. Refer to Table 3-2 and Figure 3-3 to determine the proper torque value to which the torque wrench must be set.
- (14) Safety the shaft nut to the engine shaft using a hub lock safety pin (Table 3-1). Refer to Figure 3-12.

**NOTE:** The hub lock safety pin is normally supplied in a separate package when the propeller is shipped new from the factory.

- (15) Install the spring assembly -  
Refer to Figures 3-22 and 3-13
  - (a) Place the feathering spring assembly into the engine shaft, with the front spring retainer inside the cylinder.
  - (b) Install the split retainer between the cylinder and the front spring retainer, sliding the split retainer into recess in the cylinder.
  - (c) Pull the spring retainer tight against the split retainer.
  - (d) Install the ring retainer plate, which secures the split retainer, into place.
  - (e) Install the ring retention plate screws and tighten them until they are snug.
  - (f) Safety the ring retention plate screws with 0.032 inch (0.81 mm) minimum diameter stainless steel wire (two screws per safety).



(16) If the piston O-ring (Table 3-1) and the piston dust seal are not already installed in the piston, perform the following steps. Refer to Figure 3-15.

(a) Lubricate the piston O-ring and carefully install it in the groove provided for it in the piston.

(b) Cut the necessary length of oiled piston dust seal material.

1 Cut the piston dust seal material on a 30 degree diagonal so there will be an overlap with a smooth surface, free of fuzz.

(c) Apply a layer of aviation grade reciprocating engine oil to the piston dust seal.

**CAUTION: MAKE SURE THAT THE PISTON DUST SEAL IS FREE OF FUZZ.**

(d) Install the piston dust seal material in the groove provided for it in the piston.

(17) Install the rod O-ring (Table 3-1) in the groove at the end of the threaded portion of the pitch change rod.

**CAUTION: TO MAINTAIN PROPER BLADE ANGLES, IT IS IMPORTANT THAT THE PISTON BE REINSTALLED IN THE SAME POSITION AS WHEN IT WAS ORIGINALLY ASSEMBLED. INDEX NUMBERS ON THE PISTON AND THE GUIDE COLLAR ARE PROVIDED TO MAKE SURE OF PROPER POSITIONING.**

(18) Locate and match up the index numbers (1, 2, and 3) on the piston ears with the corresponding index numbers on the guide collar.

**NOTE: The index marks will be either impression stamped or drawn with a felt-tipped pen.**

(19) Oil the surface of the cylinder and install the piston.

(20) Slide the piston onto the cylinder and pass the guide rods through the guide collar bushings.

- (21) Connect the link arms to the piston. Refer to Figure 3-11.
- (22) Install the link pin units.
- (23) Install the link pin safety screws.
- (24) Safety the link pin screws together with 0.032 inch (0.81 mm) minimum diameter stainless steel wire.  
Refer to Figure 3-11.
- (25) By hand, carefully rotate the blades into high pitch position and fasten the piston to the pitch change rod with the piston nut (Table 3-1).
- (26) Torque the piston nut per Table 3-2.
- (27) Install the low-pitch stop components: washer, socket head cap screw, and jam nut (Table 3-1), at the end of each guide rod. Refer to Figure 3-22.
- (28) Torque the jam nut against the guide rod.  
Refer to Table 3-2.
- (29) 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 can be found in the following publications available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://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 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
- (30) 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).

(31) Install the spinner dome as follows:

CAUTION 1: 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, AND MAY AFFECT THE BALANCE OF THE PROPELLER.

NOTE: The following instructions relate to Hartzell Propeller Inc. spinners only. If the airframe manufacturer produced the spinner assembly, refer to the airframe manufacturer's manual for spinner installation instructions.

- (a) Carefully slide the spinner dome over the reassembled propeller.
- (b) Secure the spinner dome to the spinner bulkhead with the supplied screws and washers.

5. Post-Installation Checks

- A. Refer to the airframe manufacturer's instructions for post-installation checks.
- B. Perform a static RPM check as outlined in the Maintenance Practices chapter of this manual.

**6. Propeller Assembly Removal****A. Removing the HC-B3( )F-2( ) Propeller**

**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.

- (1) 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 can be found in the following publications available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://www.hartzellprop.com):
  - (a) Hartzell Propeller Inc. Manual 180 (30-61-80) - Propeller Ice Protection System Manual
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  - (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
- (2) 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).

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

(3) Spinner dome removal

- (a) Remove the screws and washers that secure the spinner to the spinner bulkhead.
- (b) Remove the spinner dome.

WARNING 1: DURING ENGINE INSTALLATION OR REMOVAL, USING THE PROPELLER TO SUPPORT THE WEIGHT OF THE ENGINE IS NOT AUTHORIZED. UNAPPROVED INSTALLATION AND REMOVAL TECHNIQUES MAY CAUSE DAMAGE TO THE PROPELLER THAT MAY LEAD TO FAILURE. PROPELLER FAILURE CAN RESULT IN AN AIRCRAFT ACCIDENT.

WARNING 2: DURING PROPELLER REMOVAL, AIRFRAME MANUFACTURER'S MANUALS AND PROCEDURES MUST BE FOLLOWED BECAUSE THEY MAY CONTAIN ISSUES VITAL TO AIRCRAFT SAFETY THAT ARE NOT CONTAINED IN THIS MANUAL OR IN THE HARTZELL PROPELLER INC. OVERHAUL MANUALS.

WARNING 3: FOR SAFETY REASONS, THE PROPELLER MUST BE PLACED IN THE FEATHER POSITION BEFORE IT IS REMOVED FROM THE AIRCRAFT.

- (4) Routine propeller engine shutdown will engage the start lock units, preventing the propeller from feathering. For purposes of propeller removal, the propeller should be placed in feather position during engine shutdown. If this was not accomplished, then the propeller may be feathered as follows:

**CAUTION:** DO NOT PUT THE BLADE PADDLES IN THE AREA OF THE DE-ICE BOOT WHEN APPLYING TORQUE TO A BLADE ASSEMBLY. PUT THE BLADE PADDLES IN THE THICKEST AREA OF THE BLADE, JUST OUTBOARD OF THE DE-ICE BOOT. USE ONE BLADE PADDLE PER BLADE.

- (a) Rotate the blades simultaneously to a slightly lower pitch to disengage the stop plates from the start lock units.
  - (b) Retract the start lock pins and hold them in place with a heavy wire inserted through the hole of each start lock housing.
  - (c) Slowly and carefully allow the blades to rotate to high/feather pitch.
- (5) Cut and remove the safety wire from the propeller mounting bolts.

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

- (6) Support the propeller assembly with a sling.

**NOTE 1:** Supporting the propeller with a sling may be delayed until all but two mounting bolts and washers have been removed to permit rotating the propeller for ease of bolt removal.

**NOTE 2:** If the propeller will be reinstalled, and it has been dynamically balanced, make an identifying mark on the propeller hub and a matching mark on the engine flange to ensure proper orientation. This mark will ensure proper orientation during reinstallation to prevent dynamic imbalance.

**CAUTION:** DISCARD THE PROPELLER MOUNTING BOLTS IF THEY ARE DAMAGED OR CORRODED, OR IF THE PROPELLER IS REMOVED FOR OVERHAUL.

- (7) Remove the propeller mounting bolts and washers.
- (a) For propeller removals between overhaul intervals, mounting bolts and washers may be reused if they are not damaged or corroded.

**CAUTION:** USE ADEQUATE PRECAUTIONS TO PROTECT THE PROPELLER ASSEMBLY FROM DAMAGE WHEN IT IS REMOVED FROM THE AIRCRAFT ENGINE AND WHEN IT IS STORED.

- (8) Using the support sling, lift the propeller from the mounting flange.
- (9) Remove and discard the shaft O-ring.
- (10) Place the propeller and spinner dome on a suitable cart for transportation.

**B. Removing the HC-B3WF-4 Propeller**

**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.

- (1) 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 can be found in the following publications available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://www.hartzellprop.com):
  - (a) Hartzell Propeller Inc. Manual 180 (30-61-80) - Propeller Ice Protection System Manual
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  - (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
- (2) 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).



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

(3) Spinner dome removal

- (a) Remove the screws and washers that secure the spinner to the spinner bulkhead.
- (b) Remove the spinner dome.

WARNING 1: DURING ENGINE INSTALLATION OR REMOVAL, USING THE PROPELLER TO SUPPORT THE WEIGHT OF THE ENGINE IS NOT AUTHORIZED. UNAPPROVED INSTALLATION AND REMOVAL TECHNIQUES MAY CAUSE DAMAGE TO THE PROPELLER THAT MAY LEAD TO FAILURE. PROPELLER FAILURE CAN RESULT IN AN AIRCRAFT ACCIDENT.

WARNING 2: DURING PROPELLER REMOVAL, AIRFRAME MANUFACTURER'S MANUALS AND PROCEDURES MUST BE FOLLOWED BECAUSE THEY MAY CONTAIN ISSUES VITAL TO AIRCRAFT SAFETY THAT ARE NOT CONTAINED IN THIS MANUAL OR IN THE HARTZELL PROPELLER INC. OVERHAUL MANUALS.

- (4) Cut and remove the safety wire from the propeller mounting bolts.

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

(5) Support the propeller assembly with a sling.

**NOTE 1:** Supporting the propeller with a sling may be delayed until all but two mounting bolts and washers have been removed to permit rotating the propeller for ease of bolt removal.

**NOTE 2:** If the propeller will be reinstalled, and it has been dynamically balanced, make an identifying mark on the propeller hub and a matching mark on the engine flange to ensure proper orientation. This mark will ensure proper orientation during reinstallation to prevent dynamic imbalance.

**CAUTION:** DISCARD THE PROPELLER MOUNTING BOLTS IF THEY ARE DAMAGED OR CORRODED, OR IF THE PROPELLER IS REMOVED FOR OVERHAUL.

(6) Remove the propeller mounting bolts and washers.

**NOTE:** For propeller removals between overhaul intervals, mounting bolts and washers may be reused if they are not damaged or corroded.

**CAUTION:** USE ADEQUATE PRECAUTIONS TO PROTECT THE PROPELLER ASSEMBLY FROM DAMAGE WHEN IT IS REMOVED FROM THE AIRCRAFT ENGINE AND WHEN IT IS STORED.

(7) Using the support sling, lift the propeller from the mounting flange.

(8) Remove the fasteners that attach the spinner bulkhead, airframe manufacturer supplied alternator pulley, shim (if installed), and ring to each other.

(9) Remove the airframe manufacturer supplied split ring.

(10) Remove the spinner bulkhead.

(11) Remove the alternator pulley.

(12) Remove the shim.

(13) Remove and discard the shaft O-ring.

(14) Place the propeller and spinner dome on a suitable cart for transportation.

**C. Removing the HC-B3WN-2L Propeller**

**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.

- (1) 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 can be found in the following publications available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://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 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
- (2) 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).

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

- (3) Spinner dome removal
  - (a) Remove the screws and washers that secure the spinner to the spinner bulkhead.
  - (b) Remove the spinner dome.

WARNING 1: DURING ENGINE INSTALLATION OR REMOVAL, USING THE PROPELLER TO SUPPORT THE WEIGHT OF THE ENGINE IS NOT AUTHORIZED. UNAPPROVED INSTALLATION AND REMOVAL TECHNIQUES MAY CAUSE DAMAGE TO THE PROPELLER THAT MAY LEAD TO FAILURE. PROPELLER FAILURE CAN RESULT IN AN AIRCRAFT ACCIDENT.

WARNING 2: DURING PROPELLER REMOVAL, AIRFRAME MANUFACTURER'S MANUALS AND PROCEDURES MUST BE FOLLOWED BECAUSE THEY MAY CONTAIN ISSUES VITAL TO AIRCRAFT SAFETY THAT ARE NOT CONTAINED IN THIS MANUAL OR IN THE HARTZELL PROPELLER INC. OVERHAUL MANUALS.

WARNING 3: FOR SAFETY REASONS, THE PROPELLER MUST BE PLACED IN THE FEATHER POSITION BEFORE IT IS REMOVED FROM THE AIRCRAFT.

- (4) Routine propeller engine shutdown will engage the start locks, preventing the propeller from feathering. For purposes of propeller removal, the propeller should be placed in feather position during engine shutdown. If this was not accomplished, then the propeller may be feathered as follows:

**CAUTION:** DO NOT PUT THE BLADE PADDLES IN THE AREA OF THE DE-ICE BOOT WHEN APPLYING TORQUE TO A BLADE ASSEMBLY. PUT THE BLADE PADDLES IN THE THICKEST AREA OF THE BLADE, JUST OUTBOARD OF THE DE-ICE BOOT. USE ONE BLADE PADDLE PER BLADE.

- (a) Rotate the blades simultaneously to a slightly lower pitch to disengage the stop plates from the start locks.
  - (b) Retract the start lock pins and hold them in place with a heavy wire inserted through the hole of each start lock housing.
  - (c) Slowly and carefully allow the blades to rotate to high/feather pitch.
- (5) Cut and remove the safety wire on the propeller mounting bolts.

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

- (6) Support the propeller assembly with a sling.

**NOTE 1:** Supporting the propeller with a sling may be delayed until all but two mounting bolts and washers have been removed to permit rotating the propeller for ease of bolt removal.

**NOTE 2:** If the propeller will be reinstalled, and it has been dynamically balanced, make an identifying mark on the propeller hub and a matching mark on the engine flange to ensure proper orientation. This mark will ensure proper orientation during reinstallation to prevent dynamic imbalance.

**CAUTION:** DISCARD THE PROPELLER MOUNTING BOLTS IF THEY ARE DAMAGED OR CORRODED, OR IF THE PROPELLER IS REMOVED FOR OVERHAUL.

- (7) Remove the propeller mounting bolts and washers.
  - (a) For propeller removals between overhaul intervals, mounting bolts and washers may be reused if they are not damaged or corroded.

**CAUTION:** USE ADEQUATE PRECAUTIONS TO PROTECT THE PROPELLER ASSEMBLY FROM DAMAGE WHEN IT IS REMOVED FROM THE AIRCRAFT ENGINE AND WHEN IT IS STORED.

- (8) Using the support sling, lift the propeller from the mounting flange.
- (9) Remove the one-piece spinner mounting plate and the attached spinner bulkhead.
- (10) Remove and discard the shaft O-ring.
- (11) Place the propeller and spinner on a suitable cart for transportation.

D. Removing the HC-B4TN-1 Propeller With a One-piece Spinner Mounting Plate

**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.

- (1) 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 can be found in the following publications available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://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 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
- (2) 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).

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

- (3) Spinner dome removal
  - (a) Remove the screws and washers that secure the spinner to the spinner bulkhead.
  - (b) Remove the spinner dome.

WARNING 1: DURING ENGINE INSTALLATION OR REMOVAL, USING THE PROPELLER TO SUPPORT THE WEIGHT OF THE ENGINE IS NOT AUTHORIZED. UNAPPROVED INSTALLATION AND REMOVAL TECHNIQUES MAY CAUSE DAMAGE TO THE PROPELLER THAT MAY LEAD TO FAILURE. PROPELLER FAILURE CAN RESULT IN AN AIRCRAFT ACCIDENT.

WARNING 2: DURING PROPELLER REMOVAL, AIRFRAME MANUFACTURER'S MANUALS AND PROCEDURES MUST BE FOLLOWED BECAUSE THEY MAY CONTAIN ISSUES VITAL TO AIRCRAFT SAFETY THAT ARE NOT CONTAINED IN THIS MANUAL OR IN THE HARTZELL PROPELLER INC. OVERHAUL MANUALS.

- (4) Cut and remove the safety wire from the propeller mounting bolts.



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

(5) Support the propeller assembly with a sling.

**NOTE 1:** Supporting the propeller with a sling may be delayed until all but two mounting bolts and washers have been removed to permit rotating the propeller for ease of bolt removal.

**NOTE 2:** If the propeller will be reinstalled, and it has been dynamically balanced, make an identifying mark on the propeller hub and a matching mark on the engine flange to ensure proper orientation. This mark will ensure proper orientation during reinstallation to prevent dynamic imbalance.

**CAUTION:** DISCARD THE PROPELLER MOUNTING BOLTS IF THEY ARE DAMAGED OR CORRODED, OR IF THE PROPELLER IS REMOVED FOR OVERHAUL.

(6) Remove the propeller mounting bolts and washers.

(a) For propeller removals between overhaul intervals, mounting bolts and washers may be reused if they are not damaged or corroded.

(7) Using the support sling, lift the propeller from the mounting flange.

(8) Remove the one-piece spinner mounting plate and the attached spinner bulkhead.

(9) Remove and discard the shaft O-ring.

(10) Place the propeller and spinner on a suitable cart for transportation.

E. Removing the HC-B4TN-1 Propeller With a Two-piece Spinner Mounting Plate

**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.

- (1) 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 can be found in the following publications available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://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 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
- (2) 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).

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

(3) Spinner dome removal

- (a) Remove the screws and washers that secure the spinner to the spinner bulkhead.
- (b) Remove the spinner dome.

WARNING 1: DURING ENGINE INSTALLATION OR REMOVAL, USING THE PROPELLER TO SUPPORT THE WEIGHT OF THE ENGINE IS NOT AUTHORIZED. UNAPPROVED INSTALLATION AND REMOVAL TECHNIQUES MAY CAUSE DAMAGE TO THE PROPELLER THAT MAY LEAD TO FAILURE. PROPELLER FAILURE CAN RESULT IN AN AIRCRAFT ACCIDENT.

WARNING 2: DURING PROPELLER REMOVAL, AIRFRAME MANUFACTURER'S MANUALS AND PROCEDURES MUST BE FOLLOWED BECAUSE THEY MAY CONTAIN ISSUES VITAL TO AIRCRAFT SAFETY THAT ARE NOT CONTAINED IN THIS MANUAL OR IN THE HARTZELL PROPELLER INC. OVERHAUL MANUALS.

- (4) Cut and remove the safety wire from the propeller mounting bolts.

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

- (5) Support the propeller assembly with a sling.

**NOTE 1:** Supporting the propeller with a sling may be delayed until all but two mounting bolts and washers have been removed to allow rotating the propeller for ease of bolt removal.

**NOTE 2:** If the propeller will be reinstalled, and it has been dynamically balanced, make an identifying mark on the propeller hub and a matching mark on the engine flange to ensure proper orientation. This mark will ensure proper orientation during reinstallation to prevent dynamic imbalance.

**CAUTION:** DISCARD THE PROPELLER MOUNTING BOLTS IF THEY ARE DAMAGED OR CORRODED, OR IF THE PROPELLER IS REMOVED FOR OVERHAUL.

- (6) Remove the propeller mounting bolts and washers.  
(a) For propeller removals between overhaul intervals, mounting bolts and washers may be reused if they are not damaged or corroded.

**CAUTION:** USE ADEQUATE PRECAUTIONS TO PROTECT THE PROPELLER ASSEMBLY FROM DAMAGE WHEN IT IS REMOVED FROM THE AIRCRAFT ENGINE AND WHEN IT IS STORED.

- (7) Using the support sling, lift the propeller from the mounting flange.  
(8) Remove and discard the shaft O-ring.  
(9) Place the propeller and attached spinner bulkhead on a suitable cart for transportation.

- F. Removing the HC-B3( )20-2( ) and HC-B3( )30-2B( ) Propellers

**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.

- (1) 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 can be found in the following publications available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://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 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
- (2) 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).

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

(3) Spinner dome removal

- (a) Remove the screws and washers that secure the spinner to the spinner bulkhead.
- (b) Remove the spinner dome.

WARNING 1: DURING ENGINE INSTALLATION OR REMOVAL, USING THE PROPELLER TO SUPPORT THE WEIGHT OF THE ENGINE IS NOT AUTHORIZED. UNAPPROVED INSTALLATION AND REMOVAL TECHNIQUES MAY CAUSE DAMAGE TO THE PROPELLER THAT MAY LEAD TO FAILURE. PROPELLER FAILURE CAN RESULT IN AN AIRCRAFT ACCIDENT.

WARNING 2: DURING PROPELLER REMOVAL, AIRFRAME MANUFACTURER'S MANUALS AND PROCEDURES MUST BE FOLLOWED BECAUSE THEY MAY CONTAIN ISSUES VITAL TO AIRCRAFT SAFETY THAT ARE NOT CONTAINED IN THIS MANUAL OR IN THE HARTZELL PROPELLER INC. OVERHAUL MANUALS.

WARNING 3: FOR SAFETY REASONS, THE PROPELLER MUST BE PLACED IN THE FEATHER POSITION BEFORE IT IS REMOVED FROM THE AIRCRAFT.

- (4) Routine propeller engine shutdown will engage the start locks, preventing the propeller from feathering. For purposes of propeller removal, the propeller should be placed in feather position during engine shutdown. If this was not accomplished, then the propeller may be feathered as follows:

CAUTION: DO NOT PUT THE PADDED BAR IN THE AREA OF THE DE-ICE BOOT WHEN APPLYING TORQUE TO A BLADE ASSEMBLY. PUT THE BAR IN THE THICKEST AREA OF THE BLADE, JUST OUTBOARD OF THE DE-ICE BOOT. USE ONE BLADE PADDLE PER BLADE.

- (a) Rotate the blades simultaneously to a slightly lower pitch to disengage the stop plates from the start lock units.
- (b) Retract the start lock pins and hold them in place with a heavy wire inserted through the hole of each start lock housing.
- (c) Slowly and carefully allow the blades to rotate to high/feather pitch.

(5) Piston removal - Refer to Figures 3-10 and 3-11

- (a) Remove the piston nut.
- (b) Remove the safety wire from the link pin units.
- (c) Remove the safety screws from each link pin unit.
- (d) Remove each link pin unit.
- (e) The piston ears and guide collar should have corresponding index numbers (1, 2, and 3) impression stamped or marked with a felt-tipped pen. If they are not marked, number them with a felt-tipped pen.

NOTE: This will make sure that the components are reassembled in their original location.

- (f) Remove the socket head cap screw, jam nut, and washer from each piston guide rod.
- (g) Slide the piston off the cylinder.

(6) Spring assembly removal - Refer to Figure 3-13

- (a) Remove the safety wire from the ring retention plate screws.
- (b) Remove the ring retention plate screws.
- (c) Remove the ring retention plate.
- (d) Remove the split retainer.
- (e) Remove the spring assembly from the cylinder.

- (7) Remove the hub lock safety pin (20 spline models) or the shaft nut lock (30 spline models).

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

- (8) Support the propeller assembly with a sling.  
(9) Completely loosen the shaft nut from the engine shaft threads.

**NOTE:** Because the shaft nut is pulling the propeller hub off the tapered rear cone, there will be significant resistance to the loosening of the shaft nut.

**CAUTION:** USE ADEQUATE PRECAUTIONS TO PROTECT THE PROPELLER ASSEMBLY FROM DAMAGE WHEN IT IS REMOVED FROM THE AIRCRAFT ENGINE AND WHEN IT IS STORED.

- (10) Using the support sling, slide the propeller from the engine splined shaft and lift the propeller from the engine.  
(11) On 30 spline shaft models only, remove and discard the bushing O-ring from the ID groove of the bushing, located in the hub bore.  
(12) Remove and discard the rear cone O-ring on the engine splined shaft.  
(13) Place the propeller and associated parts on a suitable cart for transportation.



**G. Removing HC-B3( )30-1( ) and HC-B3( )30-2E( ) Propellers**

**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.

- (1) 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 can be found in the following publications available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://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 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
- (2) 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).

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

(3) Spinner dome removal

- (a) Remove the screws and washers that secure the spinner to the spinner bulkhead.
- (b) Remove the spinner dome.

WARNING 1: DURING ENGINE INSTALLATION OR REMOVAL, USING THE PROPELLER TO SUPPORT THE WEIGHT OF THE ENGINE IS NOT AUTHORIZED. UNAPPROVED INSTALLATION AND REMOVAL TECHNIQUES MAY CAUSE DAMAGE TO THE PROPELLER THAT MAY LEAD TO FAILURE. PROPELLER FAILURE CAN RESULT IN AN AIRCRAFT ACCIDENT.

WARNING 2: DURING PROPELLER REMOVAL, AIRFRAME MANUFACTURER'S MANUALS AND PROCEDURES MUST BE FOLLOWED BECAUSE THEY MAY CONTAIN ISSUES VITAL TO AIRCRAFT SAFETY THAT ARE NOT CONTAINED IN THIS MANUAL OR IN THE HARTZELL PROPELLER INC. OVERHAUL MANUALS.

WARNING 3: FOR SAFETY REASONS, THE PROPELLER MUST BE PLACED IN THE HIGH/FEATHER PITCH POSITION BEFORE IT IS REMOVED FROM THE AIRCRAFT.

- (4) Routine propeller engine shutdown will engage the start lock units, preventing the propeller from going to high/feather pitch. For purposes of propeller removal, the propeller should be placed in high/feather pitch position during engine shutdown. If this was not accomplished, it may be done as follows:

CAUTION: DO NOT PUT THE PADDED BAR IN THE AREA OF THE DE-ICE BOOT WHEN APPLYING TORQUE TO A BLADE ASSEMBLY. PUT THE BAR IN THE THICKEST AREA OF THE BLADE, JUST OUTBOARD OF THE DE-ICE BOOT. USE ONE BLADE PADDLE PER BLADE.

- (a) Rotate the blades simultaneously to a slightly lower pitch to disengage the stop plates from the start lock units.
- (b) Retract the auto high pitch stop pins and hold them in place with a heavy wire inserted through the hole of each start lock housing.
- (c) Slowly and carefully allow the blades to rotate to high/feather pitch.

CAUTION: OIL WILL FLOW OUT OF THE PROPELLER WHEN THE PISTON IS REMOVED. PLACE A DRIP PAN UNDER THE PROPELLER TO CATCH THE EXCESS OIL.

- (5) Piston removal - Refer to Figures 3-16 and 3-11
  - (a) Remove the piston nut.
  - (b) Remove the safety wire from the link pin units.
  - (c) Remove the safety screws from each link pin unit.
  - (d) Remove each link pin unit.
  - (e) The piston ears and guide collar should have corresponding index numbers (1, 2, and 3) impression stamped or marked with a felt-tipped pen. If they are not marked, number them with a felt-tipped pen.

NOTE: This will make sure that the components are reassembled in their original location.

- (f) Remove the socket head cap screw, jam nut, and washer from each piston guide rod.
- (g) Slide the piston off the cylinder.
- (h) Remove and discard the piston O-ring.

- (6) Spring assembly removal
  - (a) Remove the safety wire.
  - (b) Unthread the spring retainer from the cylinder using spanner wrench BT-461 or strap wrench 100923. Refer to Figure 3-17.
  - (c) Remove the spring retainer and the attached spring assembly from the cylinder.
- (7) Remove the shaft nut lock. Refer to Figure 3-12.

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

- (8) Support the propeller assembly with a sling.
- (9) Completely loosen the shaft nut from the engine shaft threads.

**NOTE:** Because the shaft nut is pulling the propeller hub off the tapered rear cone, there will be significant resistance to the loosening of the shaft nut.

**CAUTION:** USE ADEQUATE PRECAUTIONS TO PROTECT THE PROPELLER ASSEMBLY FROM DAMAGE WHEN IT IS REMOVED FROM THE AIRCRAFT ENGINE AND WHEN IT IS STORED.

- (10) Using the support sling, slide the propeller from the engine splined shaft and lift the propeller from the engine.
- (11) Remove and discard the bushing O-ring from the ID groove of the bushing, located in the hub bore.
- (12) Remove and discard the rear cone O-ring from the engine shaft.
- (13) Place the propeller and associated parts on a suitable cart for transportation.

**H. Removing HC-B3( )20-4 and HC-B3( )30-4 Propellers**

**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.

- (1) 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 can be found in the following publications available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://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 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
- (2) 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).

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

- (3) Spinner dome removal
- (a) Remove the screws and washers that secure the spinner to the spinner bulkhead.
  - (b) Remove the spinner dome.

WARNING 1: DURING ENGINE INSTALLATION OR REMOVAL, USING THE PROPELLER TO SUPPORT THE WEIGHT OF THE ENGINE IS NOT AUTHORIZED. UNAPPROVED INSTALLATION AND REMOVAL TECHNIQUES MAY CAUSE DAMAGE TO THE PROPELLER THAT MAY LEAD TO FAILURE. PROPELLER FAILURE CAN RESULT IN AN AIRCRAFT ACCIDENT.

WARNING 2: DURING PROPELLER REMOVAL, AIRFRAME MANUFACTURER'S MANUALS AND PROCEDURES MUST BE FOLLOWED BECAUSE THEY MAY CONTAIN ISSUES VITAL TO AIRCRAFT SAFETY THAT ARE NOT CONTAINED IN THIS MANUAL OR IN THE HARTZELL PROPELLER INC. OVERHAUL MANUALS.

- (4) Piston removal - Refer to Figures 3-18 and 3-11
- (a) Remove the safety wire from the link pin units.
  - (b) Remove the safety screws from each link pin unit.
  - (c) Remove each link pin unit.
  - (d) The piston ears and guide collar should have corresponding index numbers (1, 2, and 3) impression stamped or marked with a felt-tipped pen. If they are not marked, number them with a felt-tipped pen.

NOTE: This will make sure that the components are reassembled in their original location.

- (e) Remove the socket head cap screw, jam nut, and washer from each piston guide rod.
- (f) Slide the piston off the cylinder.
- (5) Remove the hub lock safety pin (20 spline models) or the shaft nut lock (30 spline models).  
Refer to Figure 3-12.

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

- (6) Support the propeller assembly with a sling.

**CAUTION:** USE ADEQUATE PRECAUTIONS TO PROTECT THE PROPELLER ASSEMBLY FROM DAMAGE WHEN IT IS REMOVED FROM THE AIRCRAFT ENGINE AND WHEN IT IS STORED.

- (7) Completely loosen the shaft nut from the engine shaft threads.

**NOTE:** Because the shaft nut is pulling the propeller hub off the tapered rear cone, there will be significant resistance to the loosening of the shaft nut.

- (8) Using the support sling, slide the propeller from the engine splined shaft and lift the propeller from the engine.
- (9) Remove and discard the rear cone O-ring from the engine shaft.
- (10) Place the propeller and associated parts on a suitable cart for transportation.

**I. Removing HA-B3( )30-1B Propellers**

**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.

- (1) 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 can be found in the following publications available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://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 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
- (2) 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).



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

(3) Spinner dome removal

- (a) Remove the screws and washers that secure the spinner to the spinner bulkhead.
- (b) Remove the spinner dome.

WARNING 1: DURING ENGINE INSTALLATION OR REMOVAL, USING THE PROPELLER TO SUPPORT THE WEIGHT OF THE ENGINE IS NOT AUTHORIZED. UNAPPROVED INSTALLATION AND REMOVAL TECHNIQUES MAY CAUSE DAMAGE TO THE PROPELLER THAT MAY LEAD TO FAILURE. PROPELLER FAILURE CAN RESULT IN AN AIRCRAFT ACCIDENT.

WARNING 2: DURING PROPELLER REMOVAL, AIRFRAME MANUFACTURER'S MANUALS AND PROCEDURES MUST BE FOLLOWED BECAUSE THEY MAY CONTAIN ISSUES VITAL TO AIRCRAFT SAFETY THAT ARE NOT CONTAINED IN THIS MANUAL OR IN THE HARTZELL PROPELLER INC. OVERHAUL MANUALS.

CAUTION: OIL WILL FLOW OUT OF THE PROPELLER WHEN THE PISTON IS REMOVED. PLACE A DRIP PAN UNDER THE PROPELLER TO CATCH THE EXCESS OIL.

(4) Piston Removal - Refer to Figures 3-19 and 3-11

- (a) Remove the piston nut.
- (b) Remove the safety wire from the link pin units.
- (c) Remove the safety screw from each link pin unit.
- (d) Remove each link pin unit.

- (e) The piston ears and guide collar should have corresponding index numbers (1, 2, and 3) impression stamped or marked with a felt-tipped pen. If they are not marked, number them with a felt-tipped pen.

**NOTE:** This will make sure that the components are reassembled in their original location.

- (f) Slide the link arms out of the piston slots.
- (g) Remove the socket head cap screw, jam nut, and washer from each piston guide rod.
- (h) Slide the piston off the cylinder.
- (5) Pitch adjustment assembly removal
  - (a) Remove the ring retention plate screw safety wire.
  - (b) Remove the ring retention plate screws.
  - (c) Remove the ring retention plate.
  - (d) Remove the split retainer.
  - (e) Remove the pitch adjustment assembly from the cylinder.
- (6) Remove the shaft nut lock. Refer to Figure 3-12.

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

- (7) Support the propeller assembly with a sling.

**CAUTION:** USE ADEQUATE PRECAUTIONS TO PROTECT THE PROPELLER ASSEMBLY FROM DAMAGE WHEN IT IS REMOVED FROM THE AIRCRAFT ENGINE AND WHEN IT IS STORED.

- (8) Completely loosen the shaft nut from the engine shaft threads.

**NOTE:** Because the shaft nut is pulling the propeller hub off the tapered rear cone, there will be significant resistance to the loosening of the shaft nut.

- (9) Using the support sling, slide the propeller from the engine splined shaft and lift the propeller from the engine.
- (10) Remove and discard the bushing O-ring in the ID groove of the bushing located in the hub bore.
- (11) Remove and discard the rear cone O-ring from the engine shaft.
- (12) Place the propeller and associated parts on a suitable cart for transportation.

**J. Removing HC-B3R30-4A,-4B Propeller**

**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.

- (1) 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 can be found in the following publications available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://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 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
- (2) 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).

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

- (3) Spinner dome removal
  - (a) Remove the screws and washers that secure the spinner to the spinner bulkhead.
  - (b) Remove the spinner dome.

WARNING 1: DURING ENGINE INSTALLATION OR REMOVAL, USING THE PROPELLER TO SUPPORT THE WEIGHT OF THE ENGINE IS NOT AUTHORIZED. UNAPPROVED INSTALLATION AND REMOVAL TECHNIQUES MAY CAUSE DAMAGE TO THE PROPELLER THAT MAY LEAD TO FAILURE. PROPELLER FAILURE CAN RESULT IN AN AIRCRAFT ACCIDENT.

WARNING 2: DURING PROPELLER REMOVAL, AIRFRAME MANUFACTURER'S MANUALS AND PROCEDURES MUST BE FOLLOWED BECAUSE THEY MAY CONTAIN ISSUES VITAL TO AIRCRAFT SAFETY THAT ARE NOT CONTAINED IN THIS MANUAL OR IN THE HARTZELL PROPELLER INC. OVERHAUL MANUALS.

CAUTION: OIL WILL FLOW OUT OF THE PROPELLER WHEN THE PISTON IS REMOVED. PLACE A DRIP PAN UNDER THE PROPELLER TO CATCH THE EXCESS OIL.

- (4) Piston Removal - Refer to Figures 3-20 and 3-11
- (a) Remove the piston nut.
  - (b) Remove the safety wire from the link pin units.
  - (c) Remove the safety screw from each link pin unit.
  - (d) Remove each link pin unit.
  - (e) The piston ears and guide collar should have corresponding index numbers (1, 2, and 3) impression stamped or marked with a felt-tipped pen. If they are not marked, number them with a felt-tipped pen.

NOTE: This will make sure that the components are reassembled in their original location.

- (f) Slide the link arms out of the piston slots.
- (g) Remove the socket head cap screw, jam nut, and washer from each piston guide rod.
- (h) Slide the piston off the cylinder.

- (5) Spring assembly removal
  - (a) Remove the safety wire (if installed).
  - (b) Unthread the spring retainer from the cylinder using spanner wrench BT-461 or strap wrench 100923. Refer to Figure 3-17.
  - (c) Remove the spring retainer and the attached spring assembly from the cylinder.
- (6) Remove the shaft nut lock. Refer to Figure 3-12.

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

- (7) Support the propeller assembly with a sling.

**CAUTION:** USE ADEQUATE PRECAUTIONS TO PROTECT THE PROPELLER ASSEMBLY FROM DAMAGE WHEN IT IS REMOVED FROM THE AIRCRAFT ENGINE AND WHEN IT IS STORED.

- (8) Completely loosen the shaft nut from the engine shaft threads.

**NOTE:** Because the shaft nut is pulling the propeller hub off the tapered rear cone, there will be significant resistance to the loosening of the shaft nut.

- (9) Using the support sling, slide the propeller from the engine splined shaft and lift the propeller from the engine.
- (10) Remove and discard the rear cone O-ring from the engine shaft.
- (11) Place the propeller and associated parts on a suitable cart for transportation.

**K. Removing the HC-B3(W,Z)20-1 Propeller**

**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.

- (1) 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 can be found in the following publications available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://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 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
- (2) 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)

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

- (3) Spinner dome removal
  - (a) Remove the screws and washers that secure the spinner to the spinner bulkhead.
  - (b) Remove the spinner dome.

WARNING 1: DURING ENGINE INSTALLATION OR REMOVAL, USING THE PROPELLER TO SUPPORT THE WEIGHT OF THE ENGINE IS NOT AUTHORIZED. UNAPPROVED INSTALLATION AND REMOVAL TECHNIQUES MAY CAUSE DAMAGE TO THE PROPELLER THAT MAY LEAD TO FAILURE. PROPELLER FAILURE CAN RESULT IN AN AIRCRAFT ACCIDENT.

WARNING 2: DURING PROPELLER REMOVAL, AIRFRAME MANUFACTURER'S MANUALS AND PROCEDURES MUST BE FOLLOWED BECAUSE THEY MAY CONTAIN ISSUES VITAL TO AIRCRAFT SAFETY THAT ARE NOT CONTAINED IN THIS MANUAL OR IN THE HARTZELL PROPELLER INC. OVERHAUL MANUALS.

CAUTION 1: OIL WILL FLOW OUT OF THE PROPELLER WHEN THE PISTON IS REMOVED. PLACE A DRIP PAN UNDER THE PROPELLER TO CATCH THE EXCESS OIL.

CAUTION 2: USING A FELT-TIPPED PEN, IDENTIFY EACH PISTON ROD AND ITS COMPONENTS WITH A CORRESPONDING LETTER. THIS WILL MAKE SURE THAT THE COMPONENTS ARE REASSEMBLED ON THE PISTON ROD FROM WHICH THEY WERE REMOVED.

- (4) Piston Removal - Refer to Figures 3-21 and 3-11
- (a) Remove the flexlock nut from each piston rod.
  - (b) Loosen the set screw in each fork.
  - (c) Remove the washer from each piston rod.
  - (d) Slide the piston away from the hub and to the low pitch position, until the piston rods clear the bulkhead.
  - (e) Rotate the piston and forks away from the clamp link screws.



- (f) Remove the pitch change block from each clamp linkscrew.
- (g) The piston ears and guide collar should have corresponding index numbers (1, 2, and 3) impression stamped or marked with a felt-tipped pen. If they are not marked, number them with a felt-tipped pen.  
**NOTE:** This will make sure that the components are reassembled in their original location.
- (h) Slide the piston off the cylinder.
- (i) To prevent the loss of the sleeve, fork, and high pitch stop washers, reinstall the flexlock nut on each piston rod.

(5) Remove the hub lock safety pin. Refer to Figure 3-12.

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

- (6) Support the propeller assembly with a sling.
- (7) Completely loosen the shaft nut from the engine shaft threads.

**NOTE:** Because the shaft nut is pulling the propeller hub off the tapered rear cone, there will be significant resistance to the loosening of the shaft nut.

**CAUTION:** USE ADEQUATE PRECAUTIONS TO PROTECT THE PROPELLER ASSEMBLY FROM DAMAGE WHEN IT IS REMOVED FROM THE AIRCRAFT ENGINE AND WHEN IT IS STORED.

- (8) Using the support sling, slide the propeller from the engine splined shaft and lift the propeller from the engine.
- (9) Remove and discard the rear cone O-ring.
- (10) Remove the rear cone.
- (11) Remove the rear spinner bulkhead.
- (12) Put the propeller and associated parts on a suitable cart for transportation.

**L. Removing the HC-B3Z20-1F Propeller**

**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.

- (1) 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 can be found in the following publications available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://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 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
- (2) 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).

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

- (3) Spinner dome removal
  - (a) Remove the screws and washers that secure the spinner to the spinner bulkhead.
  - (b) Remove the spinner dome.

WARNING 1: DURING ENGINE INSTALLATION OR REMOVAL, USING THE PROPELLER TO SUPPORT THE WEIGHT OF THE ENGINE IS NOT AUTHORIZED. UNAPPROVED INSTALLATION AND REMOVAL TECHNIQUES MAY CAUSE DAMAGE TO THE PROPELLER THAT MAY LEAD TO FAILURE. PROPELLER FAILURE CAN RESULT IN AN AIRCRAFT ACCIDENT.

WARNING 2: DURING PROPELLER REMOVAL, AIRFRAME MANUFACTURER'S MANUALS AND PROCEDURES MUST BE FOLLOWED BECAUSE THEY MAY CONTAIN ISSUES VITAL TO AIRCRAFT SAFETY THAT ARE NOT CONTAINED IN THIS MANUAL OR IN THE HARTZELL PROPELLER INC. OVERHAUL MANUALS.

CAUTION: OIL WILL FLOW OUT OF THE PROPELLER WHEN THE PISTON IS REMOVED. PLACE A DRIP PAN UNDER THE PROPELLER TO CATCH THE EXCESS OIL.

- (4) Piston Removal - Refer to Figures 3-22 and 3-11
- (a) Remove the piston nut.
  - (b) Remove the safety wire from the link pin units.
  - (c) Remove the safety screw from each link pin unit.
  - (d) Remove each link pin unit.
  - (e) The piston ears and guide collar should have corresponding index numbers (1, 2, and 3) impression stamped or marked with a felt-tipped pen. If they are not marked, number them with a felt-tipped pen.
- NOTE: This will make sure that the components are reassembled in their original location.
- (f) Slide the link arms out of the piston slots.
  - (g) Remove the socket head cap screw, jam nut, and washer from each piston guide rod.
  - (h) Slide the piston off the cylinder.

- (5) Spring assembly removal - Refer to Figure 3-13
  - (a) Remove the ring retention plate screw safety wire.
  - (b) Remove the ring retention plate screws.
  - (c) Remove the retention plate.
  - (d) Remove the split retainer.
  - (e) Remove the spring assembly from the cylinder.
- (6) Remove the hub lock safety pin. Refer to Figure 3-12.

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

- (7) Support the propeller assembly with a sling.

**CAUTION:** USE ADEQUATE PRECAUTIONS TO PROTECT THE PROPELLER ASSEMBLY FROM DAMAGE WHEN IT IS REMOVED FROM THE AIRCRAFT ENGINE AND WHEN IT IS STORED.

- (8) Completely loosen the shaft nut from the engine shaft threads.

**NOTE:** Because the shaft nut is pulling the propeller hub off the tapered rear cone, there will be significant resistance to the loosening of the shaft nut.

- (9) Using the support sling, slide the propeller from the engine splined shaft and lift the propeller from the engine.
- (10) Remove and discard the rear cone O-ring from the engine shaft.
- (11) Remove the rear cone.
- (12) Remove the rear spinner bulkhead.
- (13) Place the propeller and associated parts on a suitable cart for transportation.

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**1. Operational Tests**

Following propeller installation, and before flight, the propeller hydraulic system must be purged of air and proper operation verified.

**WARNING:** REFER TO THE AIRCRAFT MAINTENANCE MANUAL FOR ADDITIONAL PROCEDURES THAT MAY BE REQUIRED AFTER PROPELLER INSTALLATION.

**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.

**A. Initial Run-Up**

- (1) Perform engine start and warm-up per the Pilot's Operating Handbook (POH).
- (2) Cycle the propeller control throughout its operating pitch range from low to high (or as directed by the POH).
- (3) Repeat this procedure at least three times to purge air from the propeller hydraulic system and to introduce warmed oil to the cylinder.

**NOTE:** Pitch change response on the first operation from low to high blade angle may be slow, but should speed up on the second and third cycles.

- (4) Verify proper operation from low pitch to high pitch and throughout operating range.
- (5) Shut down the engine in accordance with the POH.

**NOTE:** Air trapped in the propeller hydraulic system will cause the pitch control to be imprecise and may result in propeller surging.

**B. Static RPM Check**

**NOTE:** This operational check should be performed after installation, maintenance, or propeller adjustment.

**CAUTION:** A CALIBRATED TACHOMETER MUST BE USED TO MAKE SURE OF THE ACCURACY OF THE RPM CHECK.

- (1) Set the brakes and chock the aircraft or tie aircraft down.
- (2) Back the governor Maximum RPM Stop out one turn.
- (3) Start the engine.
- (4) Advance the propeller control lever to MAX (max RPM), then retard the control lever one inch (25.4 mm).
- (5) SLOWLY advance the throttle to maximum manifold pressure.
- (6) Slowly advance the propeller control lever until the engine speed stabilizes.
  - (a) If engine speed stabilizes at the maximum power static RPM specified by the TC or STC holder, then the low pitch stop is set correctly.
  - (b) If engine speed stabilizes above or below the rated RPM, the low pitch stop may require adjustment. Refer to the Troubleshooting section of this chapter.
- (7) Stop the engine.
- (8) Return the governor Maximum RPM Stop to the original position, or adjust the governor to the rated RPM with the Maximum RPM Stop screw.

**C. Post-Run Check**

After engine shutdown, check the propeller for signs of engine oil leakage.



**2. Propeller Ice Protection Systems****A. Electric De-ice System**

- (1) Consult the Pilot Operating Handbook (including all supplements) regarding flight into conditions of known icing. The aircraft may not be certificated for flight in known icing conditions, even though propeller de-ice equipment is installed.
- (2) Refer to the Anti-ice and De-ice Systems Chapter of this manual for functional tests of the de-ice system.

**B. Anti-ice System**

- (1) Consult the Pilot Operating Handbook (including all supplements) regarding flight into conditions of known icing. The aircraft may not be certificated for flight in known icing conditions, even though propeller anti-ice equipment is installed.
- (2) Refer to the Anti-ice and De-ice Systems Chapter of this manual for functional tests of the anti-ice system.

**3. Troubleshooting**

**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.

**A. Incorrect Static RPM (on ground)**

- (1) Incorrect maximum RPM on the ground may be caused by low engine power, an incorrect governor maximum RPM stop setting, or an incorrect propeller low pitch stop.

**CAUTION:** A CALIBRATED TACHOMETER MUST BE USED TO ENSURE THE ACCURACY OF THE RPM CHECK.

- (2) Perform a check as described in the Static RPM Check (On Ground) procedure in this chapter.

**NOTE:** Incorrect RPM and associated checks apply to governing propellers only and do not apply to ground adjustable propeller models HA-B( )( )-( ).

**(3) Maximum RPM is Low****(a) If engine power is low:**

- 1** Follow the aircraft POH and/or AMM recommended checks to determine if the engine power is low.
- 2** If the engine power is low, refer to a certified repair station with the appropriate rating or refer to the engine manufacturer.

- (b) If the engine power is within acceptable limits, examine the maximum RPM stop setting of the governor.

- (4) Maximum RPM is High
  - (a) If engine power is high:
    - 1 Follow the aircraft POH and/or AMM recommended engine checks to determine if the engine power is high.
    - 2 If the engine power is high, refer to a certified repair station with the appropriate rating or refer to the engine manufacturer.
  - (b) If the engine power is within acceptable limits, examine the maximum RPM stop setting of the governor.
- (5) Governor maximum RPM stop setting
  - (a) When RPM is high, both the governor maximum RPM stop and the propeller low pitch blade angle are improperly adjusted.
  - (b) Adjust the governor maximum RPM stop to obtain the rated maximum RPM
  - (c) For low pitch setting verification refer to the procedures in the Maintenance Practices chapter of this manual.

**B. Hunting and Surging**

Hunting is characterized by a cyclic variation in engine speed above and below desired speed. Surging is characterized by a large increase/decrease in engine speed, followed by a return to set speed after one or two occurrences.

NOTE: Propeller model HA-B3( )30-1B only does not change blade pitch in flight; therefore, it does not hunt or surge as a result of propeller pitch control issues. Only a cyclic variation in engine power would result in a cyclic variation in engine speed.

(1) If propeller is hunting, an appropriately licensed propeller repair facility should check:

- (a) Governor
- (b) Fuel control
- (c) Synchrophaser, or synchronizer.

(2) If propeller is surging:

- (a) Perform the steps 1.A.(1)-(5) under Operational Tests section in this chapter to release trapped air from the propeller. If surging reoccurs it is most likely due to a faulty governor.
- (b) Hunting and/or surging may also be caused by friction or binding within the governor control, or internal propeller corrosion, which causes the propeller to react slower to governor commands.

NOTE: The propeller must be tested on a test bench at an appropriately licensed propeller repair facility to isolate these faults.

**C. Engine Speed Varies with Airspeed**

**NOTE:** Propeller model HA-B3( )30-1B is not constant speed and does not change blade pitch in flight; therefore, engine speed will increase with increasing airspeed and will decrease with decreasing airspeed.

- (1) Constant speed propeller models HC-B( )( )(-1( ), HC-B( )( )(-2( ) and HC-B( )( )(-4( ) will experience some small variances in engine speed that are normal and are no cause for concern.
- (2) Increase in engine speed while descending or increasing airspeed:
  - (a) HC-B( )( )(-4( ) propeller models:
    - 1 Governor is not increasing oil volume in the propeller.
    - 2 Engine oil transfer bearing is leaking excessively.
    - 3 Excessive friction in the blade bearings, in the pitch change mechanism, or in the misalignment between the guide collar and the piston rods.
  - (b) HC-B( )( )(-1( ) and HC-B( )( )(-2( ) propeller models:
    - 1 Governor is not reducing oil volume in the propeller.
    - 2 Excessive friction in the blade bearings or the pitch change mechanism.
    - 3 Excessive friction in the misalignment between the guide collar and the piston rods - HC-B( )( )(-2( ) propellers only.

- (3) Decrease in engine speed while increasing airspeed:
- (a) HC-B( ) ( ) -4( ) propeller models:
    - 1 Governor pilot valve is stuck and is excessively increasing oil volume.
  - (b) HC-B( ) ( ) -1( ) and HC-B( ) ( ) propeller models:
    - 1 Governor pilot valve is stuck and is excessively decreasing oil volume.
    - 2 Feathering command is engaged on the propeller pitch control - HC-B( ) ( ) -2( ) propeller models only.
- (4) Increase in engine speed while decreasing airspeed:
- (a) HC-B( ) ( ) -4 propeller models:
    - 1 Governor pilot valve is stuck and is excessively decreasing oil volume in the propeller.
  - (b) HC-B( ) ( ) -1( ) and HC-B( ) ( ) -2( ) propeller models:
    - 1 Governor pilot valve is stuck and is excessively increasing oil volume.
- (5) Decrease in engine speed while decreasing airspeed:
- (a) HC-B( ) ( ) -4( ) propeller models:
    - 1 Governor is not reducing oil volume in the propeller.
    - 2 Excessive friction in the blade bearings or pitch change mechanism.
  - (b) HC-B( ) ( ) -1( ) and HC-B( ) ( ) -2( ) propeller models:
    - 1 Governor is not increasing oil volume in the propeller.
    - 2 Engine oil transfer bearing is leaking excessively.
    - 3 Excessive friction in the blade bearings or the pitch change mechanism.

- I** D. Loss of Propeller Control - HC-B( )( )-4( ) propeller models:
- (1) Propeller goes to uncommanded low pitch (high RPM)
    - (a) Loss of oil pressure - check:
      - 1 Governor pressure relief valve for proper operation.
      - 2 Governor pilot valve sticking.
      - 3 Governor drive for damage.
      - 4 Adequate engine oil supply.
      - 5 Engine oil transfer bearing for excessive leakage.
    - (2) Propeller goes to uncommanded high pitch (low RPM)
      - (a) Governor pilot valve sticking.
    - (3) RPM increases with power and airspeed, propeller RPM control has little or no effect.
      - (a) Excessive friction in blade bearings or pitch change mechanism.
      - (b) Misalignment between the guide collar and piston rods.
- I** E. Loss of propeller Control - HC-B( )( )-1( ) and HC-B( )( )-2( ) propeller models:
- (1) Propeller goes to uncommanded high pitch (or feather)
    - (a) Loss of propeller oil pressure - check:
      - 1 Governor pressure relief valve for proper operation.
      - 2 Governor drive for damage.
      - 3 Adequate engine oil supply.
      - 4 Engine oil transfer bearing for excessive leakage.
    - (b) Start Locks not engaging - HC-B( )( )-2( ) propeller models only
  - (2) Propeller goes to uncommanded low pitch (high RPM)
    - (a) governor pilot valve sticking.
  - (3) RPM increases with power and airspeed. Propeller RPM control has little or no effect.
    - (a) Excessive friction in blade bearings or pitch change mechanism.

(b) Excessive friction in misalignment between the guide collar and the piston rods - HC-B( ) ( ) -2( ) propeller models only.

(c) Broken spring

NOTE: Does not apply to some HC-B( ) ( ) -1( ) propeller models.

Refer to the propeller assembly figures in the Description and Operation chapter of this manual to determine if a spring is installed.

F. Failure to Feather or Feathers Slowly - HC-B( ) ( ) -2( ) propellers only:

- (1) Broken feathering spring.
- (2) Check for proper function and rigging of the propeller/governor control linkage.
- (3) Check governor drain function.
- (4) Propeller must be checked for misadjustment or internal corrosion (usually in blade bearings or pitch change mechanism) that results in excessive friction. This must be accomplished at an appropriately licensed propeller repair facility.

G. Failure to Unfeather - HC-B( ) ( ) -2( ) propeller models only:

- (1) Check for proper function and rigging of the propeller control linkage to the governor.
- (2) Check governor function.
- (3) Check for excessive oil leakage at the engine oil transfer bearing.
- (4) Propeller must be checked for misadjustment or internal corrosion (usually in blade bearings or pitch change mechanism) that results in excessive friction. This must be accomplished at an appropriately licensed propeller repair facility.



- H. Start Locks Fail to Engage on Shutdown - HC-B( ) ( ) -2( ) propeller models:

Refer to the propeller assembly figures in the Description and Operation chapter of this manual to determine if start locks are installed.

- (1) Propeller was feathered before shutdown.

- (a) The problem may be corrected by using blade paddles as follows:

**CAUTION:** DO NOT PLACE THE BLADE PADDLE IN THE AREA OF THE DE-ICE BOOT WHEN APPLYING TORQUE TO A BLADE ASSEMBLY. PLACE THE BLADE PADDLE IN THE THICKEST AREA OF THE BLADE, JUST OUTSIDE OF THE DE-ICE BOOT. USE ONE BLADE PADDLE PER BLADE.

- (b) Using the blade paddles, simultaneously rotate the blades toward low pitch until the start lock pins engage a clamp mounted stop plate.

- (2) Shutdown occurred at high RPM with the propeller control set for coarse blade angle or low RPM.

**CAUTION:** DO NOT PLACE THE BLADE PADDLE IN THE AREA OF THE DE-ICE BOOT WHEN APPLYING TORQUE TO A BLADE ASSEMBLY. PLACE THE BLADE PADDLE IN THE THICKEST AREA OF THE BLADE, JUST OUTSIDE OF THE DE-ICE BOOT. USE ONE BLADE PADDLE PER BLADE.

- (a) Using the blade paddles, simultaneously rotate the blades toward low pitch until the auto high pitch stop pins engage a clamp mounted stop plate.

- (3) Excessive engine oil transfer bearing leakage.  
Refer to an appropriately licensed propeller repair facility.

- (4) Excessive governor pump leakage.  
Refer to an appropriately licensed propeller repair facility.

- (5) Broken start lock(s).  
Refer to an appropriately licensed propeller repair facility.

**I. Vibration**

**CAUTION:** ANY VIBRATION THAT CAN BE DESCRIBED AS APPEARING SUDDENLY, OR IS ACCOMPANIED BY UNEXPLAINED GREASE LEAKAGE, SHOULD BE INVESTIGATED IMMEDIATELY, BEFORE FURTHER FLIGHT.

**NOTE:** Vibration problems due to propeller system imbalance are normally felt throughout the RPM range, with the intensity of vibration increasing with RPM. Vibration problems that occur in a narrow RPM range are a symptom of resonance, which is potentially harmful to the propeller. Avoid operation until the propeller can be checked by an appropriately licensed propeller repair facility.

**(1) Check:**

- (a) Control surfaces, cowl flaps, exhaust system, landing gear doors, etc. for excessive play, which may be causing vibration unrelated to the propeller.
- (b) Secure attachment of engine mounted hardware.
- (c) Engine mount wear.
- (d) Uneven lubrication of propeller.
- (e) Proper engine/propeller flange mating.
- (f) Blade track. (For procedure, see the Inspection and Check chapter of this manual.)
- (g) Blade angles: Blade angle must be within 0.2 degree from blade to blade.
- (h) Spinner for cracks, improper installation, or "wobble" during operation.
- (i) Static balance.
- (j) Airfoil profile identical between blades (after overhaul or rework for nicks - verify at propeller repair station).
- (k) Hub, blade or blade clamp for damage or cracking.

- (l) Grease or oil leakage from a seemingly solid surface of the hub, blade clamp or blade.
- (m) Blade deformation.

NOTE: Dynamic balancing is recommended after installing or performing maintenance on a propeller. While normally an optional task, it may be required by the engine or airframe manufacturer to make certain the propeller/engine combination is balanced within close tolerances before operation. Refer to the engine or airframe manuals, and the Maintenance Practices chapter of this manual.

#### J. Propeller Overspeed

##### (1) Check:

- (a) Tachometer error.
- (b) Low pitch stop adjustment.
- (c) Governor maximum RPM set too high.
- (d) Loss of oil pressure - HC-B( ) ( ) -4C( ) propeller models
  - 1 Governor failure
  - 2 Excessive leakage in the governor oil supply to the propeller.
- (e) Broken spring causes momentary overspeed - HC-B( ) ( ) -1( ) and HC-B( ) ( ) -2( ) propeller models, except HC-B3Z20-1( ).
- (f) Governor pilot valve jammed, supplying high pressure only - HC-B( ) ( ) -1( ) and HC-B( ) ( ) -2( ) propeller models.

**K. Propeller Underspeed****(1) Check:**

- (a) Tachometer error.
- (b) Excessive transfer bearing leakage - HC-B( ) ( ) -1( ) and HC-B( ) ( ) -2( ) propeller models.
- (c) Governor oil pressure low - HC-B( ) ( ) -1( ) and HC-B( ) ( ) -2( ) propeller models.
- (d) Governor oil passage clogged - HC-B( ) ( ) -1( ) and HC-B( ) ( ) -2( ) propeller models
- (e) Governor pilot valve jammed, supplying high pressure only - HC-B( ) ( ) -4( ) propeller models.

**L. Oil or Grease Leakage**

**CAUTION:** GREASE LEAKAGE WHICH CAN BE DESCRIBED AS EXCESSIVE AND APPEARING SUDDENLY, ESPECIALLY WHEN ACCOMPANIED BY VIBRATION, SHOULD BE INVESTIGATED IMMEDIATELY BEFORE FURTHER FLIGHT.

**(1) Grease Leakage - Probable Cause:**

**NOTE:** The blade clamp/split-bearing is the only source of grease leakage.

- (a) Improperly torqued or loose lubrication fitting. (Tighten the fitting).
- (b) Defective lubrication fitting. (Replace the fitting).
- (c) Incorrect O-ring between the blade clamp and the propeller hub. (Refer to an appropriately licensed propeller repair facility for replacement of the O-ring).
- (d) Grease leaks past the blade clamp seal gaskets. (Replace gaskets).
- (e) Grease leaks from between the blade clamp and the blade. (Refer to an appropriately licensed propeller repair facility for replacement of sealant).

- (2) Oil Leakage - Probable Cause
  - (a) Faulty O-ring seal between the hub and the cylinder.
  - (b) Faulty O-ring seal between the piston and the cylinder.
  - (c) Displaced felt seal between the piston and the cylinder.
  - (d) Faulty O-ring between the propeller hub and the engine flange.
  - (e) Faulty O-ring between the piston and the pitch change rod.

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**1. Pre-Flight Checks**

**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.

Follow propeller preflight inspection procedures as specified in the aircraft maintenance manual or this manual. In addition, perform the following inspections:

**A. Blades**

- (1) Visually inspect the entire blade (lead, trail, face, and camber sides) for nicks, gouges, erosion and cracks. Repair before further flight. Refer to the Maintenance Practices chapter of this manual, for blade repair information. Normal blade lead edge erosion (sand-blasted appearance) is acceptable, and does not require removal before further flight.
- (2) Visually inspect the blades for lightning strike. Refer to the Lightning Strike Damage section in this chapter for a description of damage.

- B. Inspect the spinner and visible blade retention components for damage or cracks. Repair or replace components as required before further flight.
- C. Check for loose/missing hardware. Retighten or reinstall as necessary.

WARNING: ABNORMAL GREASE LEAKAGE CAN BE AN INDICATION OF A FAILING PROPELLER BLADE OR BLADE RETENTION COMPONENT. AN IN-FLIGHT BLADE SEPARATION CAN RESULT IN A CATASTROPHIC AIRCRAFT ACCIDENT.

- D. Inspect for grease and oil leakage and determine its source.
- E. Check the blades for radial play or movement of the blade tip (in and out or back and forth). Refer to Loose Blades, in the Periodic Inspections section of this chapter, for blade play limits.
- F. Inspect de-ice boots (if installed) for damage. Refer to De-Ice Systems in the Anti-Ice and De-Ice Systems chapter of this manual, for inspection information.

WARNING: ABNORMAL VIBRATION CAN BE AN INDICATION OF A FAILING PROPELLER BLADE OR BLADE RETENTION COMPONENT. AN IN-FLIGHT BLADE SEPARATION CAN RESULT IN A CATASTROPHIC AIRCRAFT ACCIDENT.

- G. Refer to the Periodic Inspections section in this chapter for additional inspection information and possible corrections to any discrepancies discovered as a result of preflight checks.

**2. Operational Checks**

**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.

- A. Following propeller installation and before flight, perform initial run-up as outlined in Operational Tests in the Testing and Troubleshooting chapter of this manual.
- B. Check the propeller speed control and operation from reverse or low pitch to high pitch, using the procedure specified in the Pilot Operating Handbook (POH) for the aircraft.
  - (1) Perform all ground functional, feathering, and cycling checks with a minimum propeller RPM drop required to demonstrate function.
  - (2) A typical RPM drop is 300-500 RPM for feathering propellers and 100 to 300 RPM for non-feathering propellers.

**WARNING:** ABNORMAL VIBRATION CAN BE AN INDICATION OF A FAILING PROPELLER BLADE OR BLADE RETENTION COMPONENT. AN IN-FLIGHT BLADE SEPARATION MAY RESULT IN DEATH, SERIOUS BODILY INJURY, AND/OR SUBSTANTIAL PROPERTY DAMAGE.

- C. Check for any abnormal vibration during this run-up. If vibration occurs, shut the engine down, determine the cause, and correct it before further flight. Refer to the Vibration section in the Testing and Troubleshooting chapter of this manual.
- D. Refer to Periodic Inspections in this chapter for additional inspection information and possible corrections to any discrepancies discovered as a result of Pre-Flight Checks.
- E. Refer to the airframe manufacturer's manual for additional operational checks.

### 3. Required Periodic Inspections and Maintenance

**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.

#### A. Periodic Inspection

Perform detailed inspection procedures at 100 hour intervals, not to exceed twelve (12) calendar months. Procedures involved in these inspections are detailed below.

**NOTE 1:** Inspection and maintenance specified by an airframe manufacturer's maintenance program and approved by the applicable airworthiness agency may not coincide with the inspection time interval specified. In this situation the airframe manufacturer's schedule may be applied with the exception that the calendar limit for the inspection interval may not exceed (12) calendar months.

**NOTE 2:** Refer to Inspection Procedures in this chapter for additional inspection information and possible corrections to any discrepancies discovered as a result of the Periodic Inspection.

- (1) Remove the spinner.
- (2) Visually inspect the blades for nicks, gouges, and cracks. If any damage is discovered, refer to the Blade Repairs section in the Maintenance Practices chapter of this manual for additional information. A cracked blade must be referred to an appropriately licensed propeller repair facility.
- (3) Inspect all visible propeller parts for cracks, wear or unsafe conditions.
- (4) Check for oil and grease leaks. Refer to Oil and Grease Leakage in the Inspection Procedures section of this chapter.
- (5) Check the blade track. Refer to Blade Track in the Inspection Procedures section of this chapter.

- (6) For the model HC-B3( )30-2( ) propeller installed on the Pratt & Whitney R-985-( ) engine
  - (a) Inspect the A-944 clamp linkscrew sleeve for lubrication and wear in the area between the A-304 link screw and the A-861-3 link arm.
  - (b) For propellers with 300 hours or more of time in service from new or overhaul, replace the A-944 linkscrew sleeve with an A-944 linkscrew sleeve manufactured of Delrin material and lubricate.
  - (c) Replace the A-944 linkscrew sleeve with an A-944 linkscrew sleeve manufactured of Delrin material and lubricate at 300 hour intervals of service time following the initial change.
    - 1 Lubricate the A-944 clamp linkscrew sleeve with approved lubricant, as specified in the Approved Lubricants section of the Maintenance Practices chapter of this manual.
- (7) Check the accuracy of the tachometer. Refer to Tachometer Inspection in the Inspection Procedures section of this chapter.
- (8) Clean or replace the anti-ice system filter (if anti-ice system is installed).
- (9) Make an entry in the propeller logbook verifying this inspection.

**B. Periodic Maintenance**

- (1) Lubricate the propeller assembly. Refer to the Lubrication section in the Maintenance Practices chapter of this manual for intervals and procedures.

**C. Airworthiness Limitations**

- (1) Certain components, as well as the entire propeller may have specific life limits established as part of the certification by the FAA. Such limits call for mandatory replacement of specified parts after a defined number of hours and/or cycles of use.
- (2) Life limited component times may exist for the propeller models covered in this manual. Refer to the Airworthiness Limitations section of this manual.
- (3) Operators are urged to keep informed of airworthiness information via Hartzell Propeller Inc. Service Bulletins and Service Letters, which are available from Hartzell distributors or from the Hartzell factory by subscription. Selected information is also available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://www.hartzellprop.com).

**D. Overhaul Periods**

In flight, the propeller is constantly subjected to vibration from the engine and the airstream, as well as high centrifugal forces. The propeller is also subject to corrosion, wear, and general deterioration due to aging. Under these conditions, metal fatigue or mechanical failures can occur. To protect your safety and your investment, and to maximize the safe operating lifetime of your propeller, it is essential that a propeller be properly maintained and overhauled according to the recommended service procedures.

CAUTION 1: OVERHAUL PERIODS LISTED BELOW, ALTHOUGH CURRENT AT THE TIME OF PUBLICATION, ARE FOR REFERENCE PURPOSES ONLY. OVERHAUL PERIODS MAY BE INCREASED OR DECREASED AS A RESULT OF CONTINUING EVALUATION.

CAUTION 2: CHECK THE LATEST REVISION OF HARTZELL PROPELLER INC. SERVICE LETTER HC-SL-61-61Y FOR THE MOST CURRENT INFORMATION. THE SERVICE LETTER IS AVAILABLE ON THE HARTZELL PROPELLER INC. WEBSITE AT WWW.HARTZELLPROP.COM.

(1) Hartzell Propeller Inc. "reciprocating" propellers installed on piston engine aircraft are to be overhauled at intervals as follows:

(a) Agricultural Aircraft - 2000 hours or 36 calendar months (whichever occurs first).

NOTE: Agricultural aircraft are defined as aircraft used as aerial applicators, which expose the propeller to a relatively severe chemical/corrosive environment.

1 Once the propeller is used on agricultural aircraft, the 36 month overhaul limit is to be maintained even if the propeller is later installed on other category airplanes.

(b) Aerobatic Aircraft - 1000 hours or 60 calendar months (whichever occurs first).

NOTE: Aerobatic aircraft are defined as certificated acrobatic category aircraft or other aircraft routinely exposed to aerobatic use.

(c) Jacobs R-755 engine applications - 1000 hours or 60 calendar months (whichever occurs first).

(d) All others - 2000 hours or 60 calendar months (whichever occurs first).

#### 4. Inspection Procedures

**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.

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

##### A. Blade Damage

Refer to Blade Repairs section in the Maintenance Practices chapter of this manual for information regarding blade damage.

##### B. Grease or Oil Leakage

**NOTE:** A new or newly overhauled propeller may leak slightly during the first several hours of operation. This leakage may be caused by the seating of seals and O-rings, and the slinging of lubricants used during assembly. Such leakage should cease within the first ten hours of operation.

Leakage that persists beyond the first ten hours of operation on a new or newly overhauled propeller, or occurs on a propeller that has been in service for some time will require repair. A determination should be made as to the source of the leak. The only leakage that is field repairable is the removal and replacement of the O-ring seal between the engine and propeller flange. All other leakage repairs should be referred to a certified propeller repair station with the appropriate rating. An instance of abnormal grease leakage should be inspected using the following procedure:

- (1) Remove the spinner dome.



- CAUTION:      PERFORM A VISUAL INSPECTION WITHOUT CLEANING THE PARTS. A TIGHT CRACK IS OFTEN EVIDENT DUE TO TRACES OF GREASE EMANATING FROM THE CRACK. CLEANING CAN REMOVE SUCH EVIDENCE AND MAKE A CRACK VIRTUALLY IMPOSSIBLE TO SEE.
- (2) Perform a visual inspection of the hub, blade clamps and blades to locate the origin of leakage. If the origin of the grease leakage is determined to be a noncritical part, such as an O-ring, gasket or sealant, repairs can be accomplished during scheduled maintenance as long as flight safety is not compromised.
- (3) If cracks are suspected, additional inspections must be performed before further flight. These inspections must be performed by a certified propeller repair station with the appropriate rating. Such inspections typically include disassembly of the propeller followed by inspection of parts, using nondestructive methods in accordance with published procedures.
- (4) If cracks or failing components are found, these parts must be replaced before further flight. Report such occurrences to airworthiness authorities and to Hartzell Propeller Inc. Product Support.

**C. Vibration**

Instances of abnormal vibration should be investigated immediately. If the cause of the vibration is not readily apparent, the propeller may be inspected following the procedure below:

**NOTE:** It may sometimes be difficult to readily identify the cause of abnormal vibration. Vibration may originate in the engine, propeller, or airframe. Troubleshooting procedures typically begin with an investigation of the engine. Airframe components, such as engine mounts or loose landing gear doors, can also be the source of vibration. When investigating an abnormal vibration, the possibility of a failing blade or blade retention component should be considered as a potential source of the problem.

- (1) Perform troubleshooting and evaluation of possible sources of vibration in accordance with engine or airframe manufacturer's instructions.
- (2) Refer to Vibration section in the Testing and Troubleshooting chapter of this manual. Perform the checks to determine possible cause of the vibration. If no cause is found, then consider that the origin of the problem could be the propeller and proceed with steps 4.C.(3) through 4.C.(8).
- (3) Remove the spinner dome.
- (4) Perform a visual inspection for cracks in the hub, blade clamps and blades.

**NOTE:** 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 a certified propeller repair station with the appropriate rating. 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 Loose Blades section of this chapter.
  - (b) Check blade track. Refer to Blade Track section of this chapter.

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

- (c) Manually (by hand) attempt to turn the blades (change pitch). Do not use blade paddles.
  - (d) Visually check for damaged blades.
- (7) If abnormal blade conditions or damage are found, perform additional inspections to evaluate the condition. These inspections must be performed by a certified propeller repair station with the appropriate rating. Refer to Blade Repairs section in Maintenance Practices chapter of this manual.
- (8) If cracks or failing components are found, these parts must be replaced before further flight. Report such occurrences to airworthiness authorities and Hartzell Propeller Inc. Product Support.

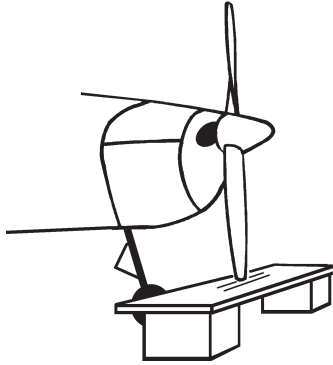
#### D. Tachometer Inspection

**NOTE:** An appropriately licensed propeller repair facility may also be able to perform a tachometer inspection.

**WARNING:** OPERATION WITH AN INACCURATE TACHOMETER MAY RESULT IN OPERATION AT A RESTRICTED RPM AND DAMAGING HIGH STRESSES. BLADE LIFE WILL BE SHORTENED AND COULD RESULT IN CATASTROPHIC FAILURE.

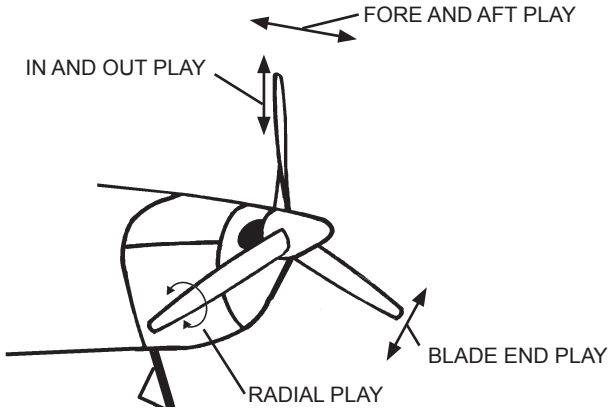
- (1) Verify the accuracy of the engine tachometer with a hand-held tachometer at 100 hour intervals or at annual inspection, whichever occurs first.
- (2) Hartzell Propeller Inc. recommends using a tachometer that is accurate within +/- 10 RPM, has NIST calibration (traceable), and has an appropriate calibration schedule.

APS6155



**Checking Blade Track**  
**Figure 5-1**

APS6163



**Blade Play**  
**Figure 5-2**

**E. Blade Track - Refer to Figure 5-1**

(1) Check the blade track as follows:

- (a) Chock the aircraft wheels securely.
- (b) Place a fixed reference point beneath the propeller, within 0.25 inch (6 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 (the opposite direction of normal rotation) until a blade points directly at the paper. Mark the position of the blade tip in relation to the paper.
- (d) Repeat this procedure with the remaining blades.
- (e) Tracking tolerance is  $\pm 0.062$  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 an appropriately licensed propeller repair facility.

**F. Loose Blades - Refer to Figure 5-2**

(1) Blade movement is measured at the tip.

Limits are as follows:

End Play	$\pm 0.062$ inch (1.57 mm)
Fore & Aft Movement	$\pm 0.062$ inch (1.57 mm)
Radial Play (pitch change)	$\pm 0.5$ degree (1 degree total)
In and Out	0.032 inch (0.81 mm)

(2) Blade movement beyond these limits should be referred to an appropriately licensed propeller repair facility.

**G. Corrosion**

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

- (1) Light corrosion on blades 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.

**H. Spinner Damage**

- (1) Inspect the spinner for cracks, missing hardware, or other damage. Refer to a certified propeller repair station with the appropriate rating for spinner damage acceptance and repair information.

**I. Electric De-ice System**

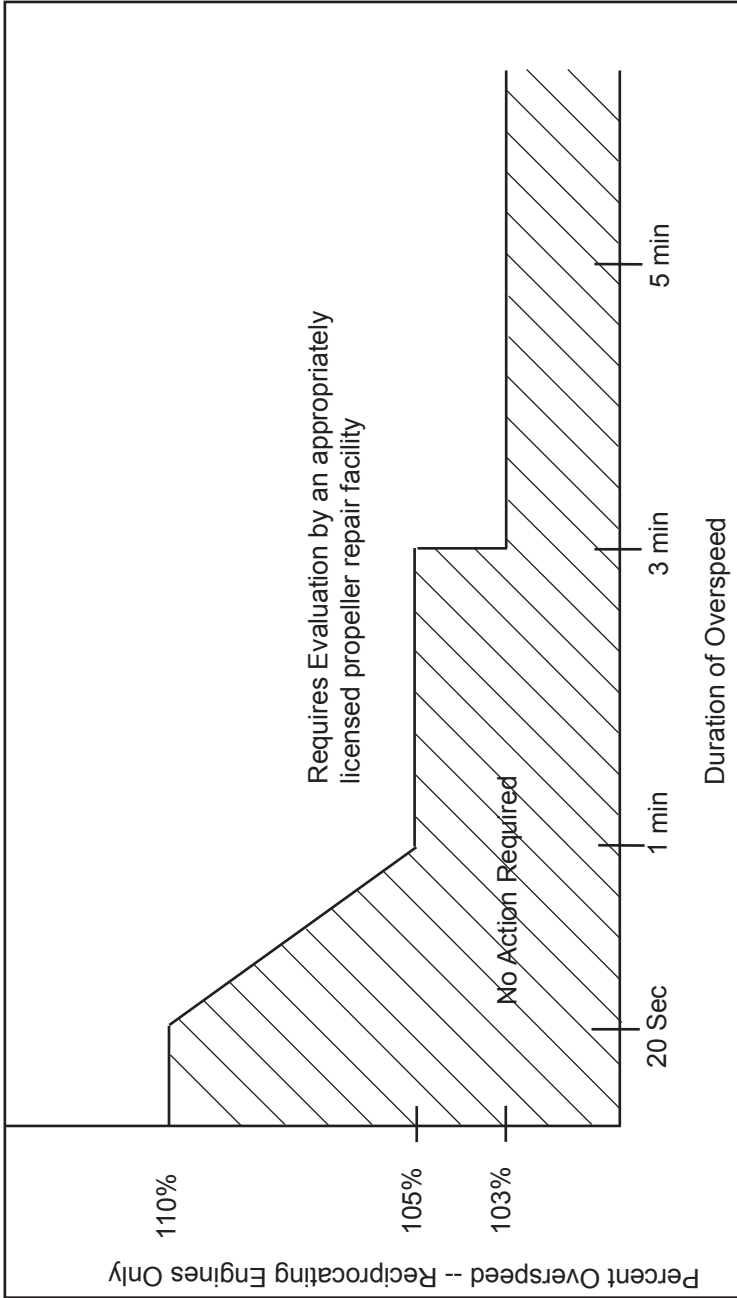
- (1) Refer to the Anti-ice and De-ice Systems chapter of this manual for inspection procedures.

**J. Anti-ice System**

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

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**Reciprocating Engine Overspeed Limits**  
Figure 5-3



**5. Special Inspections**

**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.

**A. Overspeed**

An overspeed has occurred when the propeller RPM has exceeded the maximum RPM stated in the applicable Aircraft Type Certificate Data Sheet. The duration of time and magnitude of overspeed for a single event determines the corrective action that must be taken to ensure no damage to the propeller has occurred.

The criteria for determining the required action after an overspeed are based on many factors. The additional centrifugal forces that occur during overspeed are not the only concern. Some applications have sharp increases in vibratory stresses at RPMs above the maximum rated for the airframe/engine/propeller combination

- (1) When a propeller installed on a reciprocating engine has an overspeed event, refer to the Reciprocating Engine Overspeed Limits in Figure 5-3 to determine the corrective action to be taken.
- (2) Make an entry in the propeller logbook to document the overspeed event.

**B. Lightning Strike**

**CAUTION:** ALSO CONSULT ENGINE AND AIRFRAME MANUFACTURER'S MANUALS. THERE MAY BE ADDITIONAL REQUIREMENTS SUCH AS DE-ICE AND ENGINE SYSTEM CHECKS TO PERFORM AFTER A PROPELLER LIGHTNING STRIKE.

**(1) General**

- (a) In the event of a propeller lightning strike, an inspection is required before further flight. It may be permissible to operate a propeller for an additional ten (10) hours of operation if the propeller is not severely damaged and meets the requirements in paragraph 5.B.(2).
- (b) Regardless of the outcome of the initial inspection, the propeller must eventually be removed from the aircraft, disassembled, evaluated, and/or repaired by a certified propeller repair station with the appropriate rating.

**(2) Procedure for Temporary Operation**

If temporary additional operation is desired before propeller removal and disassembly:

- (a) Remove spinner dome and perform visual inspection of propeller, spinner, and de-ice system for evidence of significant damage that would require repair before flight (such as broken de-ice wires or arcing damage to propeller hub).

**CAUTION:** IF THE PROPELLER EXPERIENCES LIGHTNING STRIKE, THE ALUMINUM BLADES MUST BE WITHIN AIRWORTHY LIMITS FOR ANY ADDITIONAL FLIGHT.

- (b) If the only evident damage is minor arcing burns to the blades, then operation for ten (10) hours is acceptable before disassembly and inspection.
- (c) Perform a functional check of the propeller de-ice system (if installed) in accordance with aircraft maintenance manual procedures.

- (d) Regardless of the degree of damage, make a log book entry to document the lightning strike.
  - (e) The propeller must be removed from the aircraft, disassembled, evaluated, and/or repaired by qualified personnel at an appropriately licensed propeller repair facility for flight beyond the temporary operation limits granted above.
- C. Foreign Object Strike/Ground Strike
- (1) General
    - (a) A foreign object strike can include a broad spectrum of damage, from a minor stone nick to severe ground impact damage. A conservative approach in evaluating the damage is required because there may be hidden damage that is not readily apparent during an on-wing, visual inspection.
    - (b) A foreign object strike is defined as:
      - 1 Any incident, whether or not the engine is operating, that requires repair to the propeller other than minor dressing of the blades. Examples of foreign object strike include situations where an aircraft is stationary and the landing gear collapses causing one or more blades to be significantly damaged, or where a hangar door (or other object) strikes the propeller blade. These cases should be handled as foreign object strikes because of potentially severe side loading on the propeller hub, blades and retention bearings.
      - 2 Any incident during engine operation in which the propeller impacts a solid object that causes a drop in revolutions per minute (RPM) and also requires structural repair of the propeller (incidents requiring only paint touch-up are not included). This is not restricted to propeller strikes against the ground.
      - 3 A sudden RPM drop while impacting water, tall grass, or similar yielding medium, where propeller blade damage is not normally incurred.

**(2) Procedure**

(a) In the event of a foreign object strike, an inspection is required before further flight. If the inspection reveals one or more of the following indications, the propeller must be removed from the aircraft, disassembled and overhauled in accordance with the applicable propeller and blade maintenance manuals.

- 1 A blade rotated in the clamp
- 2 Any noticeable or **suspected** damage to the pitch change mechanism.
- 3 A bent blade (out of track or angle)
- 4 Any diameter reduction
- 5 Blade Damage
- 6 A bent, cracked, or failed engine shaft
- 7 Vibration during operation that was not present before the event.

(b) Nicks, gouges, and scratches on blade surfaces or the leading and trailing edges must be removed before flight. Refer to the Blade Repairs section in the Maintenance Practices chapter of this manual.

(c) Engine mounted components - such as governors, pumps, etc. may be damaged by a foreign object strike, especially if the strike resulted in a sudden stoppage of the engine. These components should be inspected, repaired, or overhauled as recommended by the applicable component maintenance manual.

(d) Make an entry in the propeller logbook to document the foreign object strike/ground strike incident and any corrective action(s) taken.

**D. Fire Damage or Heat Damage**

**WARNING:** HUBS AND CLAMPS ARE MANUFACTURED FROM HEAT TREATED FORGINGS AND ARE SHOT PEENED. BLADES ARE MANUFACTURED FROM HEAT TREATED FORGINGS AND ARE COMPRESSIVELY ROLLED AND SOMETIMES SHOT PEENED. EXPOSURE TO HIGH TEMPERATURES CAN DESTROY THE FATIGUE BENEFITS OBTAINED FROM THESE PROCESSES.

- (1) On rare occasions propellers may be exposed to fire or heat damage, such as an engine or hangar fire. In the event of such an incident, an inspection by qualified personnel at an appropriately licensed propeller repair facility is required before further flight.

**6. Long Term Storage**

- A.** Parts shipped from the Hartzell Propeller Inc. factory are not shipped or packaged in a container which is designed for long term storage.
- B.** Long term storage procedures may be obtained by contacting a Hartzell Propeller Inc. distributor, or the Hartzell factory via the product support number listed in the Introduction chapter of this manual. Storage information is also detailed in Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).
- C.** Information regarding the return of a propeller assembly to service after long term storage may be obtained by contacting a Hartzell Propeller Inc. distributor, or the Hartzell factory via the product support number listed in the Introduction chapter of this manual. This information is also detailed in Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

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## 1. Cleaning

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.

CAUTION 2: DO NOT USE PRESSURE WASHING EQUIPMENT TO CLEAN THE PROPELLER OR CONTROL COMPONENTS. PRESSURE WASHING CAN FORCE WATER AND/OR CLEANING SOLVENTS PAST SEALS, AND LEAD TO INTERNAL CORROSION OF PROPELLER COMPONENTS.

### A. General Cleaning

CAUTION 1: WHEN CLEANING THE PROPELLER, DO NOT ALLOW SOAP OR SOLVENT SOLUTIONS TO RUN OR SPLASH INTO THE HUB AREA.

CAUTION 2: DO NOT CLEAN PROPELLER WITH CAUSTIC OR ACIDIC SOAP SOLUTIONS. IRREPARABLE CORROSION OF PROPELLER COMPONENTS MAY OCCUR.

(1) Wash propeller with a noncorrosive soap solution.

CAUTION: DO NOT USE ANY SOLVENT DURING CLEANING THAT COULD SOFTEN OR DESTROY THE BOND BETWEEN CHEMICALLY ATTACHED PARTS.

(2) To remove grease or oil from propeller surfaces, apply Stoddard Solvent or equivalent to a clean cloth and wipe the part clean.

(3) Thoroughly rinse with water and allow to dry.

**B. Spinner Cleaning and Polishing**

- (1) Clean the spinner using the General Cleaning procedures above.
- (2) Polish the dome (if required) 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.

**A. Lubrication Intervals**

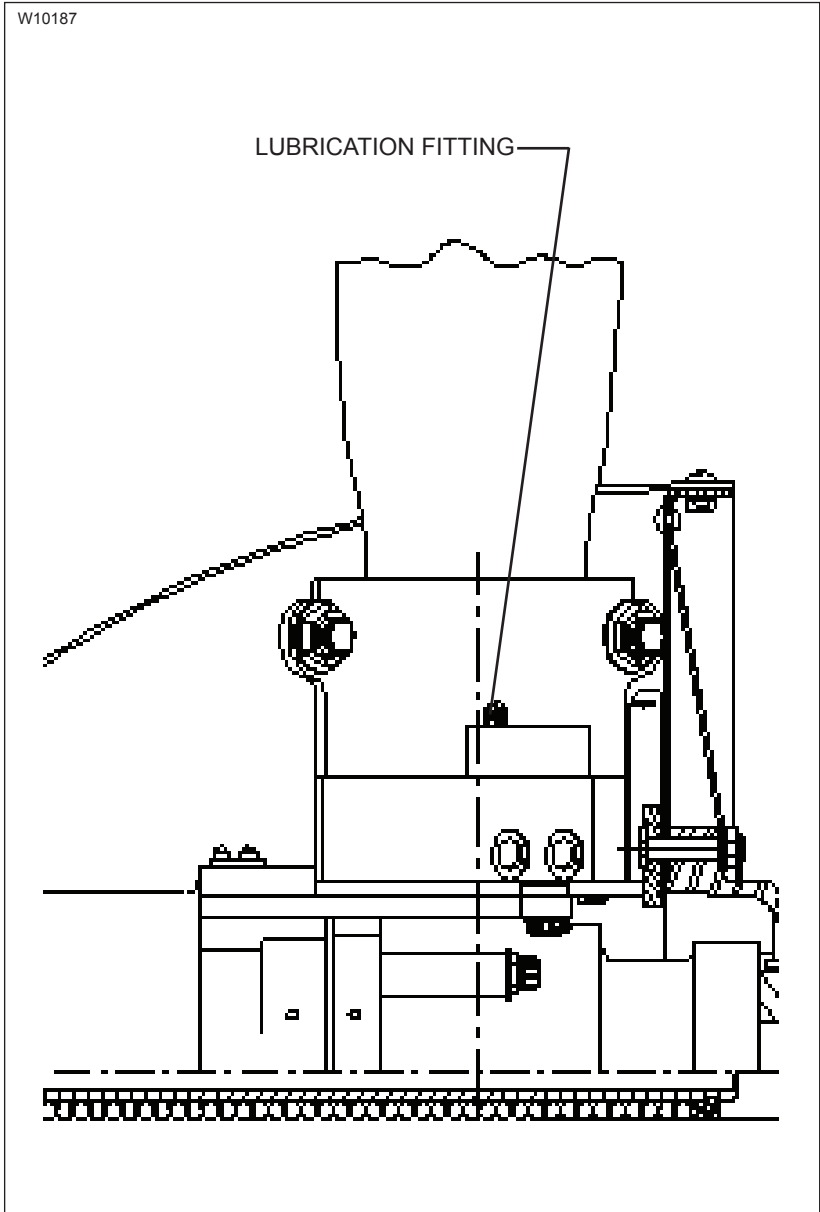
- (1) The propeller is to be lubricated at 12 months or at 100 hour intervals, whichever occurs first.

**NOTE 1:** If annual operation is significantly less than 100 hours, calendar lubrication intervals should be reduced to six months.

**NOTE 2:** 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 intervals. Lubrication interval may be gradually extended after evaluation of previous propeller overhauls, with regard to bearing wear and internal corrosion.
- (3) New or newly overhauled propellers should be lubricated after the first one or two hours of operation, because centrifugal loads will pack and redistribute grease.
  - (a) Purchasers of new aircraft should check the propeller logbook to verify whether the propeller was lubricated by the manufacturer during flight testing. If not, the propeller should be serviced at earliest convenience.

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Lubrication Fitting  
Figure 6-1

**B. Lubrication Procedure**

**CAUTION:** FOLLOW LUBRICATION PROCEDURES CORRECTLY TO MAINTAIN AN ACCURATE BALANCE OF THE PROPELLER ASSEMBLY.

- (1) Remove the propeller spinner.
- (2) Each blade clamp has two lubrication fittings. Remove both lubrication fitting caps and one of the lubrication fittings from each blade clamp. Refer to Figure 6-1.

**NOTE:** Certain steel blade clamps produced before 1967 may have only one fitting, which must be carefully re-lubricated without excessive pressure.

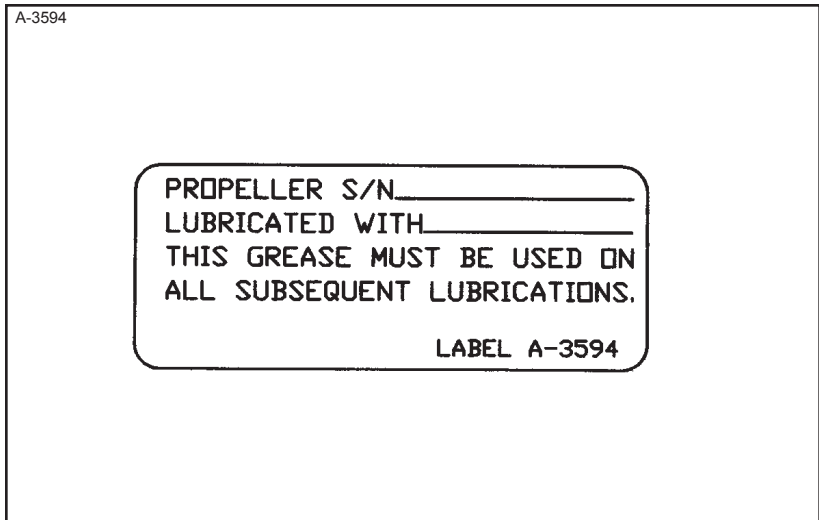
- (3) Use a piece of safety wire to loosen any blockage or hardened grease at the threaded holes where the lubrication fitting was removed.

**WARNING:** WHEN MIXING AEROSHELL GREASES 5 AND 6, AEROSHELL GREASE 5 MUST BE INDICATED ON THE LABEL (HARTZELL PROPELLER INC. P/N A-3594) AND THE AIRCRAFT MUST BE PLACARDED TO INDICATE THAT FLIGHT IS PROHIBITED IF THE OUTSIDE AIR TEMPERATURE IS LESS THAN -40°F (-40°C).

**CAUTION:** USE HARTZELL PROPELLER INC. APPROVED GREASE ONLY. EXCEPT IN THE CASE OF AEROSHELL GREASES 5 AND 6, DO NOT MIX DIFFERENT SPECIFICATIONS AND/OR BRANDS OF GREASE.

- (4) Aeroshell greases 5 and 6 both have a mineral oil base and have the same thickening agent; therefore, mixing of these two greases is acceptable in Hartzell Propeller Inc. propellers.

- (5) A label (Hartzell Propeller Inc. P/N A-3494) is normally applied to the propeller to indicate the type of grease previously used. Refer to Figure 6-2.
  - (a) This grease type should be used during re-lubrication unless the propeller has been disassembled and the old grease removed.
  - (b) Purging of old grease through lubrication fittings is only about 30% effective.
  - (c) To completely replace one grease with another, the propeller must be disassembled in accordance with the applicable overhaul manual.



Lubrication Label  
Figure 6-2

CAUTION 1: IF A PNEUMATIC GREASE GUN IS USED, EXTRA CARE MUST BE TAKEN TO AVOID EXCESSIVE PRESSURE BUILDUP.

CAUTION 2: GREASE MUST BE APPLIED TO ALL BLADES OF A PROPELLER ASSEMBLY AT THE TIME OF LUBRICATION.

(6) Apply lubricant

(a) Blade clamps with two lubrication fittings: Pump grease into each blade clamp grease fitting until grease emerges from the hole of the removed lubrication fitting.

NOTE: Lubrication is complete when grease emerges in a steady flow with no air pockets or moisture, and has the color and texture of the new grease.

(b) Blade clamps that have only one lubrication fitting: Without using excessive pressure, add a small amount (1 to 2 fluid ounces) of grease equally to the lubrication fitting in each blade clamp.

(7) Reinstall the removed lubrication fitting on each clamp.

(8) Tighten each lubrication fitting until snug.

(a) Make sure the ball of each lubrication fitting is properly seated.

(9) Reinstall a lubrication fitting cap on each lubrication fitting.

**C. Approved Lubricants**

- (1) The following lubricants are approved for use in Hartzell Propeller Inc. propellers:

Aeroshell 6 -	Recommended "all purpose" grease. Used in most new production propellers since 1989. Higher leakage/oil separation than Aeroshell 5 at higher temperatures (approximately 100°F [38°C]).
Aeroshell 5 -	Good high temperature qualities, very little oil separation or leakage. Cannot be used in temperatures colder than -40°F (-40°C). Aircraft serviced with this grease must be placarded to indicate that flight is prohibited if the outside air temperature is less than -40°F (-40°C).
Aeroshell 7 -	Good low temperature grease, but high leakage/oil separation at higher temperatures. This grease has been associated with sporadic problems involving seal swelling.
Aeroshell 22 -	Qualities similar to Aeroshell 7.
Royco 22CF -	Not widely used. Qualities similar to Aeroshell 22

- (2) A label indicating the type of grease used for previous lubrication (if used) is installed on the propeller piston or on the blade clamp. If the propeller is to be lubricated with a different type of grease, the propeller must be disassembled and cleaned of old grease before relubricating.

**3. Blade Repairs**

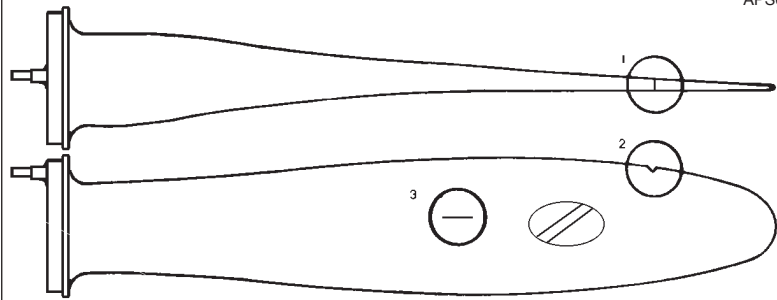
**WARNING:** ALL NICKS, GOUGES, OR SCRATCHES OF ANY SIZE CAN CREATE A STRESS RISER THAT COULD POTENTIALLY LEAD TO BLADE CRACKING. ALL DAMAGE MUST BE VISUALLY EXAMINED BEFORE FLIGHT FOR THE PRESENCE OF CRACKS OR OTHER ABNORMALITIES.

**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.

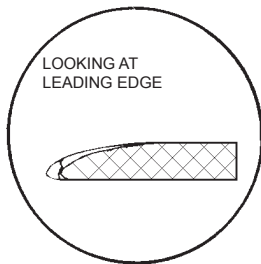
**CAUTION 2:** BLADES THAT HAVE BEEN PREVIOUSLY REPAIRED OR OVERHAULED MAY HAVE BEEN DIMENSIONALLY REDUCED. BEFORE REPAIR OF SIGNIFICANT DAMAGE OR MAKING REPAIRS ON A BLADES THAT MAY BE APPROACHING SERVICEABLE LIMITS, CONTACT A CERTIFIED PROPELLER REPAIR STATION OR HARTZELL PROPELLER INC. PRODUCT SUPPORT DEPARTMENT FOR BLADE DIMENSIONAL LIMITS.

Nicks, gouges, and scratches on blade surfaces or on the leading or trailing edges of the blade, greater than 1/32 inch (0.793 mm) wide or deep, must be removed before flight. Field repair of small nicks and scratches may be performed by qualified personnel in accordance with FAA Advisory Circular 43.13-1B, as well as the procedures specified below. Normal blade lead edge erosion (sand-blasted appearance) is acceptable, and does not require removal before further flight.

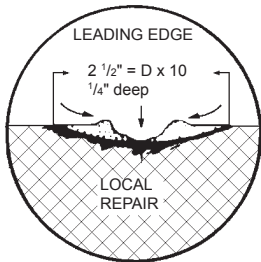




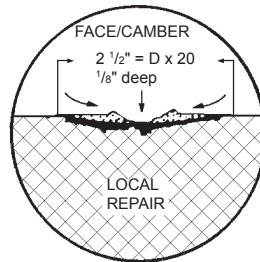
Example 1



Example 2



Example 3



To determine amount of rework needed, use the following formula:

**On the leading and trailing edge** of the blade, measure the depth of the damage, and multiply this number x 10 (see Example 2, above). Rework the area surrounding the damage 10 times the depth of the damage.

**On the face and camber** of the blade, measure the depth of the damage, and multiply this number x 20 (see Example 3, above). Rework the area surrounding the damage 20 times the depth of the damage.

### Repair Limitations

Figure 6-3

**A. Repair of Nicks and Gouges**

Local repairs may be made using files, electrical or air powered equipment. Emery cloth, scotch brite, and crocus cloth are to be used for final finishing. Refer to Figure 6-3.

**CAUTION 1:** REWORK THAT INVOLVES COLD WORKING THE METAL, RESULTING IN CONCEALMENT OF A DAMAGED AREA, IS NOT ACCEPTABLE. A STRESS CONCENTRATION MAY EXIST THAT CAN RESULT IN A BLADE FAILURE

**CAUTION 2:** SHOTPEENED BLADES ARE IDENTIFIED WITH AN "S" FOLLOWING THE BLADE MODEL NUMBER, AS DESCRIBED IN THE DESCRIPTION AND OPERATION CHAPTER OF THIS MANUAL. BLADES THAT HAVE BEEN SHOT PEENED (AS INDICATED BY A "PEBBLE GRAIN" SURFACE) THAT HAVE DAMAGE IN THE SHOT PEENED AREAS IN EXCESS OF 0.015 INCH (0.38 MM) DEEP ON THE FACE OR CAMBER OR 0.250 INCH (6.35 MM) ON THE LEADING OR TRAILING EDGES MUST BE REMOVED FROM SERVICE, AND THE REWORKED AREA SHOT PEENED BEFORE FURTHER FLIGHT. SHOT PEENING OF AN ALUMINUM BLADE MUST BE ACCOMPLISHED BY AND FAA APPROVED REPAIR FACILITY IN ACCORDANCE WITH HARTZELL PROPELLER INC. ALUMINUM BLADE OVERHAUL MANUAL 133C (61-13-33).

- (1) Repairs to the leading or trailing edge are to be accomplished by removing material from the bottom of the damaged area. Remove material from this point out to both sides of the damage, providing a smooth, blended depression which maintains the original airfoil general shape.

- (2) Repairs to the blade face or camber should be made in the same manner as above. Repairs that form a continuous line across the blade section (chordwise) are unacceptable.
- (3) The area of repair should be determined as follows:  
Leading and trailing edge damage: Depth of nick x 10.  
Face and camber: Depth of nick x 20. Refer to Figure 6-3.
  - (a) Leading edge includes the first 10 percent of chord from the leading edge. The trailing edge consists of the last 20 percent of chord adjacent to the trailing edge.
- (4) After filing or sanding of the damaged area, the area must then be polished, first with emery cloth or Scotch Brite®, and finally with crocus cloth to remove any traces of filing.
- (5) Inspect the repaired area with a 10X magnifying glass. Make sure that no indication of the damage, file marks, or coarse surface finish remain.
- (6) If inspection shows any remaining blade damage, repeat steps 3.A.(4) and 3.A.(5) until no damage remains. Penetrant inspection is recommended in accordance with Hartzell Propeller Inc. Manual 202A (61-01-02).
- (7) Apply chemical conversion coating and approved paint to the repaired area before returning the blade to service. Refer to the section "Painting After Repair" in this chapter.

#### B. Repair of Bent Blades

**CAUTION:** DO NOT ATTEMPT TO "PRE-STRAIGHTEN" A BLADE BEFORE DELIVERY TO AN APPROPRIATELY LICENSED PROPELLER REPAIR FACILITY. THIS WILL CAUSE THE BLADE TO BE SCRAPPED BY THE REPAIR STATION.

- (1) Repair of a bent blade or blades is considered a major repair. This type of repair must be accomplished by a certified propeller repair station with the appropriate rating, and only within approved guidelines.

#### 4. Painting After Repair A. General

**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.

- (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.
- (2) Painting should be performed by an appropriately licensed propeller repair facility in accordance with Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).
- (3) Blade paint touch-up using aerosol paint is permitted in accordance with the procedures in the Painting of Aluminum Blades section in this chapter.
  - 1 On-wing paint touch-up may be performed by any appropriately licensed personnel.

- (4) The following paints (Table 6-1) are approved for blade touch-up:

The paint manufacturers may be contacted as listed below:

**Tempo Products Co.**

A plasti-kote Company  
1000 Lake Road  
Medina, OH 44256  
Tel: 800.321.6300  
Fax: 216.349.4241  
Cage Code: 07708

**Sherwin Williams Co.**

2390 Arbor Boulevard  
Dayton, Ohio  
Tel: 937.298.8691  
Fax: 937.298.3820  
Cage Code: 0W199

Vendor	Color/Type	Vendor P/N	Hartzell P/N
Tempo	Epoxy Black	A-150	n/a
Tempo	Epoxy Gray	A-151	n/a
Tempo	Epoxy White (tip stripe)	A-152	n/a
Tempo	Epoxy Red (tip stripe)	A-153	n/a
Tempo	Epoxy Yellow (tip stripe)	A-154	n/a
Sherwin-Williams	Black	F75KXB9958-4311	A-6741-145-1
Sherwin-Williams	Gray	F75KXA10445-4311	A-6741-146-1
Sherwin-Williams	White (tip stripe)	F75KXW10309-4311	A-6741-147-1
Sherwin-Williams	Red (tip stripe)	F75KXR12320-4311	A-6741-149-1
Sherwin-Williams	Yellow (tip stripe)	F75KXY11841-4311	A-6741-150-1
Sherwin-Williams	Silver Metallic	F75KXS13564-4311	A-6741-163-1
Sherwin-Williams	Silver	F75KXS13564-4311	A-6741-190-1

**Approved Touch-up Paints  
Table 6-1**

**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 IS 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 acetone, #700 lacquer thinner, or MEK, wipe the surface of the blade to remove any contaminants.
- (2) Feather the existing coatings away from the eroded or repaired area with 120 to 180 grit sandpaper.

**NOTE:** Paint erosion is typically very similar on all blades in a propeller assembly. If one blade has more extensive damage, e.g. in the tip area, all the blades should be sanded 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) Use acetone, #700 lacquer thinner, or MEK to wipe the surface of the blade. Allow solvent to evaporate.
- (4) Before refinishing the blades, apply a corrosion preventive coating to the bare aluminum surface. Oakite 31, Chromicote L-25, or Alodine 1201 are approved chemical conversion coatings. Apply these coatings in accordance with the directions provided by the product manufacturer.
- (5) Apply masking material for the deice boot and tip stripes, as needed.

WARNING: FINISH COATINGS ARE FLAMMABLE AND TOXIC TO THE SKIN. EYES AND RESPIRATORY TRACT. SKIN AND EYE PROTECTION IS REQUIRED. AVOID PROLONGED CONTACT. USE IN WELL VENTILATED AREA.

CAUTION: APPLY FINISH COATING ONLY TO THE DEGREE REQUIRED TO UNIFORMLY COVER THE REPAIR/EROSION. AVOID EXCESSIVE PAINT BUILD-UP ALONG THE TRAILING EDGE TO AVOID CHANGING BLADE PROFILE.

- (6) Apply sufficient finish coating to achieve 2 to 4 mils thickness when dry. Re-coat before 30 minutes, or after 48 hours. If the paint is allowed to dry longer than four (4) hours, it must be lightly sanded before another coat is applied.
- (7) Remove the masking material from the tip stripes and re-mask to allow for the tip stripe refinishing, if required.
- (8) Apply sufficient tip stripe coating to achieve 2 to 4 mils thickness when dry. Re-coat before 30 minutes, or after 48 hours. If the paint is permitted to dry longer than four (4) hours, it must be lightly sanded before another coat is applied.
- (9) Remove the masking material immediately from the de-ice boot and tip stripes, if required.
- (10) Optionally, perform dynamic balancing in accordance with the procedures and limitations specified in Dynamic Balance section of this chapter.

**5. 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.

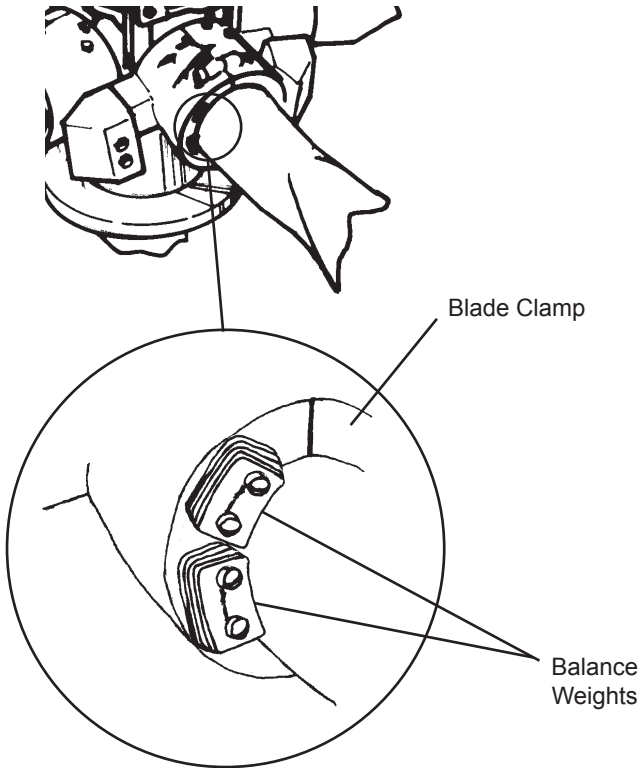
**CAUTION 2:** WHEN USING REFLECTIVE TAPE FOR DYNAMIC BALANCING, DO NOT APPLY THE TAPE ON EXPOSED BARE METAL OF A BLADE. THIS WILL PERMIT MOISTURE TO COLLECT UNDER THE TAPE AND CAUSE CORROSION THAT CAN PERMANENTLY DAMAGE THE BLADE. REFLECTIVE TAPE MUST BE REMOVED AFTER DYNAMIC BALANCING IS COMPLETED.

**NOTE:** Dynamic balance is recommended to reduce vibrations which 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.



APS6166  
APS6167



Location of Balance Weights  
Figure 6-4

**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.

- (a) Visually check each propeller blade assembly for evidence of grease leakage.
  - (b) Visually inspect the inner surface of the spinner dome for evidence of grease leakage.
  - (c) Use Stoddard solvent (or equivalent) to completely remove any grease on the blades or inner surface of the spinner dome.
- (2) If there is no evidence of grease leakage, lubricate the propeller in accordance with the Maintenance Practices chapter in this manual. If grease leakage is evident, determine the location of the leak and correct before re-lubricating the propeller and dynamic balancing.
  - (3) Before dynamic balance record the number and location of all static balance weights.
  - (4) Static balance is required when an overhaul or major repair is performed at a certified propeller repair station.

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

**C. Placement of Balance Weights for Dynamic Balance**

The preferred method of attachment of dynamic balance weights is to add the weights to the spinner bulkhead; however, the configuration of the spinner bulkhead on propeller models covered in this manual may make it impractical to mount dynamic balance weights in this manner. In this case, dynamic balance must be accomplished through the removal or addition and/or the relocation of the static balance weights located on the blade clamps.

- (1) Each blade clamp has four balance weight locations on the outboard circular surface of the clamp.  
Refer to Figure 6-4.
- (2) Maximum number of balance weights per location
  - (a) Propeller model HC-B3(P,R)30-2E/(P,R)10152( )-5.5 installed on a Beech aircraft: The maximum number of balance weights per location is two (2).
  - (b) All other propeller models: The maximum number of balance weights per location is four (4).

**NOTE:** For propellers with a deice system using a blade clamp-mounted terminal block, a maximum of three weights may be attached to the deice terminal block mounted on the blade clamp.

**CAUTION 1:** BEFORE DYNAMIC BALANCE, RECORD THE NUMBER AND LOCATION OF ALL STATIC BALANCE WEIGHTS.

**CAUTION 2:** USE ONLY STEEL BALANCE WEIGHTS A-1305.

**CAUTION 3:** DO NOT EXCEED THE MAXIMUM NUMBER OF BALANCE WEIGHTS PER LOCATION.

- (3) Alter the number and/or location of static balance weights as necessary to achieve dynamic balance.
- (4) 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.
- (5) Make a record in the propeller logbook to indicate the number and location of dynamic balance weights and static balance weights, if they have been reconfigured.

**6. 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 CONSULTATION 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.

**A. Low Pitch Stop - All Propeller Models**

- (1) The propeller low pitch stop is set at the factory to the aircraft TC or STC Holder's requirements and should not require any additional adjustment. 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. 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.

- B. Low Pitch Measurement on Propeller Models  
HC-B3( )30-2B, HC-B3R30-4A,4B, HC-B3WF-2,  
HC-B3WN-2L, HC-B3ZF-2( ), HC-B3( )30-2E( ), and  
HC-B3( )30-E:

**NOTE:** On propeller models HC-B4TN-1( ) the low pitch blade angle is not easily measured on the aircraft. It is recommended that the propeller be removed and sent to an appropriately licensed propeller repair facility for blade angle measurement and adjustment as applicable.

**CAUTION:** PUT A PAN UNDER THE PROPELLER PISTON BEFORE REMOVING THE NUT AND MOVING THE PISTON, AS ENGINE OIL MAY COME OUT OF THE OPENING IN THE PISTON.

- (1) Untorque and remove the piston nut from the pitch change rod.
- (2) Rotate the blades by hand to move the blades and piston to low pitch.

**NOTE:** Low pitch is reached when a washer on the end of each piston guide rod stops against the guide collar.

- (3) With the blade in a horizontal position, measure low pitch blade angle.
- (4) If the blade angle requires adjustment, have the low pitch stop adjusted by a certified propeller repair station with the appropriate rating or by the Hartzell Propeller Inc. factory.

- C. Low Pitch Measurement on Propeller Models HC-B3( )20-4, HC-B3( )30-4( ), HC-B3W( )-4, and HC-B3Z20-1:

- (1) Rotate the blades by hand to move the blades and piston to low pitch.

NOTE: Low pitch is reached when the piston is seated on the cylinder.

- (2) With the blade in a horizontal position, measure the low pitch blade angle.

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

- (3) If the blade angle requires adjustment, have the low pitch stop adjusted by a certified propeller repair station with the appropriate rating or by the Hartzell Propeller Inc. factory.

## 7. Propeller High Pitch Settings

- A. Adjusting High Pitch (Minimum RPM) Stop - Propeller Models HC-B( )( )-1( ) and HC-B( )( )-4( )

- (1) The high pitch stop is set at the factory per the aircraft manufacturer's recommendations.

- (2) These stops are adjustable only by a certified propeller repair station with the appropriate rating or by the Hartzell Propeller Inc. factory.

## 8. Propeller Feathering Pitch Settings

- A. Adjusting Feathering Pitch Stop Adjustment - Propeller Models HC-B( )( )-2( )

- (1) The feathering pitch stop is set at the factory per the aircraft manufacturer's recommendations.

- (2) This stop is adjustable only by a certified propeller repair station with the appropriate rating or by the Hartzell Propeller Inc. factory.

**9. Start Lock Pitch Settings**

A. Start Lock Adjustment - Propeller Models HC-B( ) ( ) -2( ), HC-B( ) ( ) -1E( )

- (1) Start locks are set at the factory per the aircraft manufacturer's recommendations.
- (2) These stops are adjustable only by a certified propeller repair station with the appropriate rating or by the Hartzell Propeller Inc. factory.

**10. Adjusting Blade Angle - Propeller Models HA-B( ) ( ) (-)**

A. Blade angle adjustment is accomplished by rotating the pitch change rod that protrudes from the center of the piston.

- (1) Using a 5/8 inch (15.88 mm) socket wrench, hold the pitch change rod in place and loosen the piston lock nut with slight rotation using a 1-1/2 inch (38 mm) box or open end wrench.
- (2) Rotate the pitch change rod using a 5/8 inch (15.88 mm) socket wrench to increase or decrease pitch. Facing the propeller piston, rotate the pitch change rod clockwise to increase blade pitch, or counterclockwise to decrease blade pitch.

**NOTE:** One full rotation of the pitch change rod will change the blade angle 2 degrees.

- (3) When the desired angle is obtained, hold the pitch change rod in place with a 5/8 inch (15.88 mm) socket wrench and tighten the piston lock nut on the pitch change rod and piston with a 1-1/2 inch (38 mm) inch box end or open end wrench.
- (4) Torque the piston lock nut to 120 ft-lbs. (163 N•m).

**11. Propeller Ice Protection Systems**

A. Refer to the Anti-ice and De-ice Systems chapter of this manual for de-ice system maintenance information.

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**1. Introduction****A. Propeller De-ice System**

- (1) A propeller de-ice system is a system which 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, allowing the ice to be thrown from the blade by centrifugal force. Blades are alternately heated and allowed 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.

## 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.

The de-ice system is controlled by the pilot via a cockpit control switch. This switch applies electrical power to the de-ice system, which 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, which allows the pilot to select two cycling speeds, for heavy or light icing conditions. Some systems on twin engine aircraft have a switch which provides a full de-ice mode, which allows 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.

An ammeter, which 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.

A timer, which 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 for each propeller and ensuring even de-icing.

A brush block, which 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.

When the pilot places the de-ice system cockpit control switch in the ON position, 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, which holds the fluid in a curved channel by centrifugal force. The fluid then flows out of the slinger ring through feed tubes which 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 an even distribution of the anti-ice fluid across the blades.

**3. De-ice System Functional Tests**

A. Functional tests of the de-ice system should be performed in accordance with the following Hartzell Manuals, which are available on the Hartzell Propeller website at [www.hartzellprop.com](http://www.hartzellprop.com):

- (1) Hartzell Manual No. 181 (30-60-81) - Propeller Ice Protection Component Maintenance Manual
- (2) Hartzell Manual No. 182 (61-12-82) - Propeller Electrical De-ice Boot Removal and Installation Manual

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

A. Operational Checks of the anti-ice system should be performed in accordance with the following Hartzell Manuals, which are available on the Hartzell Propeller website at [www.hartzellprop.com](http://www.hartzellprop.com):

- (1) Hartzell Manual No. 181 (30-60-81) - Propeller Ice Protection Component Maintenance Manual
- (2) Hartzell Manual No. 183 (61-12-83) - Propeller Anti-icing Boot Removal and Installation Manual

**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 Manuals, which are available on the Hartzell Propeller website at [www.hartzellprop.com](http://www.hartzellprop.com):

- (a) Hartzell Manual No. 181 (30-60-81) - Propeller Ice Protection Component Maintenance Manual
- (b) Hartzell Manual No. 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 following Hartzell Manuals, which are available on the Hartzell Propeller website at [www.hartzellprop.com](http://www.hartzellprop.com):

- (a) Hartzell Manual No. 181 (30-60-81) - Propeller Ice Protection Component Maintenance Manual
- (b) Hartzell Manual No. 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 Manuals, which are available on the Hartzell Propeller website at [www.hartzellprop.com](http://www.hartzellprop.com):

(a) Hartzell Manual No. 181 (30-60-81) - Propeller Ice Protection Component Maintenance Manual

(b) Hartzell Manual No. 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 Manuals, which are available on the Hartzell Propeller website at [www.hartzellprop.com](http://www.hartzellprop.com):

(a) Hartzell Manual No. 181 (30-60-81) - Propeller Ice Protection Component Maintenance Manual

(b) Hartzell Manual No. 183 (61-12-83) - Propeller Anti-icing Boot Removal and Installation Manual



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3. Propeller Logbook

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**1. Introduction**

Federal Aviation Regulations require that a record be kept of any repairs, adjustments, maintenance, or required inspections performed on a propeller or propeller system.

This chapter provides a method for maintaining these records. It also provides a location for recording information that can aid the service technician in maintaining the propeller system.

**2. Record Keeping****A. Information to be Recorded**

- (1) Information that is required to be recorded is listed in Part 43 of the U.S. Federal Aviation Regulations.
- (2) The log book may also be used to record:
  - (a) Propeller position (on aircraft)
  - (b) Propeller model
  - (c) Propeller serial number
  - (d) Blade design number
  - (e) Blade serial numbers
  - (f) Spinner assembly part number
  - (g) Propeller pitch range
  - (h) Aircraft information (aircraft type, model, serial number and registration number)

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