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MANUAL REVISION TRANSMITTAL
Manual 139 (61-00-39)
Propeller Owner's Manual and Logbook

REVISION 13 dated June 2015

Attached is a copy of Revision 13 to Hartzell Manual 139.

Page Control Chart for Revision 13:

Remove	Insert
<u>Page No.</u>	<u>Page No.</u>
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REVISION HIGHLIGHTS pages 5 thru 8	REVISION HIGHLIGHTS pages 5 thru 8
LIST OF EFFECTIVE PAGES pages 23 and 24	LIST OF EFFECTIVE PAGES pages 23 and 24
TABLE OF CONTENTS pages 27 and 28 pages 31 and 32	TABLE OF CONTENTS pages 27 and 28 pages 31 and 32
INTRODUCTION pages 1-5 thru 1-14	INTRODUCTION pages 1-5 thru 1-14
INSTALLATION AND REMOVAL pages 3-1 thru 3-4 pages 3-11 and 3-12 pages 3-17 thru 3-68	INSTALLATION AND REMOVAL pages 3-1 thru 3-4 pages 3-11 and 3-12 pages 3-17 thru 3-70
INSPECTION AND CHECK pages 5-23 and 5-24	INSPECTION AND CHECK pages 5-23 and 5-24
MAINTENANCE PRACTICES pages 6-9 and 6-10	MAINTENANCE PRACTICES pages 6-9 and 6-10

This page may be discarded after proper filing of the revision.

Page Control Chart for Revision 13, continued:

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

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

Manual No. 139

61-00-39

Revision 13

June 2015

Propeller Owner's Manual and Logbook

Series: HC-B3()()-2()
HC-B3()()-3()
HC-B3()()-5()
HC-B3TF-7()
HC-B4()()-3()
HC-B4()()-5()
HC-B5M()-2()
HC-B5M()-3()
HC-B5M()-5()
HC-A3(V,MV)F-7()

Steel Hub Turbine Propellers with Aluminum Blades

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REVISION 13 HIGHLIGHTS

Revision 13, dated June 2015, incorporates the following:

- COVER
 - Revised to match the manual revision
- REVISION HIGHLIGHTS
 - Revised to match the manual revision
- LIST OF EFFECTIVE PAGES
 - Revised to match the manual revision
- TABLE OF CONTENTS
 - Revised to match the manual revision
- INTRODUCTION
 - Revised to add the use of safety cable
 - Revised the section, "Reference Publications"
 - Made other language/format changes
- INSTALLATION AND REMOVAL
 - Revised to add the use of safety cable, where applicable
 - Revised the section, "Installing HC-B(3, 4)()W-3() Propeller on the Aircraft Engine" to include compliance with GE Aviation Service Bulletin H80-100-72-00019 on Thrush aircraft models S2R-H80 or S2RHG-H80
 - Made other language/format changes
- INSPECTION AND CHECK
 - Revised the illustration, "Turbine Engine Overtorque Limits"
- MAINTENANCE PRACTICES
 - Revised the section, "Carbon Block Assemblies"

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REVISION HIGHLIGHTS**1. Introduction****A. General**

- (1) This is a list of current revisions that have been issued against this manual. Please compare it to the RECORD OF REVISIONS page to make sure that all revisions have been added to the manual.

B. Components

- (1) Revision No. indicates the revisions incorporated in this manual.
- (2) Issue Date is the date of the revision.
- (3) Comments indicates the level of the revision.
 - (a) New Issue is a new manual distribution. The manual is distributed in its entirety. All the page revision dates are the same and no change bars are used.
 - (b) Reissue is a revision to an existing manual that includes major content and/or major format changes. The manual is distributed in its entirety. All the page revision dates are the same and no change bars are used.
 - (c) Major Revision is a revision to an existing manual that includes major content or minor content changes over a large portion of the manual. The manual is distributed in its entirety. All the page revision dates are the same, but change bars are used to indicate the changes incorporated in the latest revision of the manual.
 - (d) Minor Revision is a revision to an existing manual that includes minor content changes to the manual. Only the revised pages of the manual are distributed. Each page retains the date and the change bars associated with the last revision to that page.

<u>Revision No.</u>	<u>Issue Date</u>	<u>Comments</u>
Revision 5	Oct/99	Reissue
Revision 6	Mar/01	Minor Revision
Revision 7	Oct/02	Minor Revision
Revision 8	Dec/06	Minor Revision
Revision 9	Aug/09	Minor Revision
Revision 10	Jun/11	Minor Revision
Revision 11	Jul/12	Minor Revision
Revision 12	Mar/13	Minor Revision
Revision 13	Jun/15	Minor Revision

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Record of Revisions	9 and 10	Rev. 6	Mar/01
Record of Temporary Revisions	11 and 12	Rev. 6	Mar/01
Service Documents List	13 and 14	Rev. 11	Jul/12
Airworthiness Limitations	15 thru 22	Rev. 10	Jun/11
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Description and Operation	2-2	Rev. 11	Jul/12
Description and Operation	2-3	Rev. 10	Jun/11
Description and Operation	2-4	Rev. 7	Oct/02
Description and Operation	2-5	Rev. 11	Jul/12
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Testing and Troubleshooting	4-5 thru 4-10	Rev. 7	Oct/02
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- (2) Review the propeller and aircraft type certificate data sheet (TCDS), Pilot Operating Handbook (POH), and any applicable Airworthiness Directives for specific information.

5. General

A. Personnel Requirements

- (1) Inspection, Repair, and Overhaul
 - (a) 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) Personnel performing maintenance on steel hub propellers are expected to have sufficient training and certifications (when required by the applicable Aviation Authority) to accomplish the work required in a safe and airworthy manner.

B. Maintenance Practices

- (1) The propeller and its components are highly vulnerable to damage while they are removed from the engine. Properly protect all components until they are reinstalled on the engine.
- (2) Never attempt to move the aircraft by pulling on the propeller.
- (3) Avoid the use of blade paddles. Do not 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.
- (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.

- (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 return 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 is to be accomplished in accordance with the procedures and limitations in Maintenance Practices chapter of this manual. Additional procedures may 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 NASMS33540 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.

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

- (10)The information in this manual revision supersedes data in all previous published revisions of this manual.
- (11)The airframe manufacturer's manuals should be used in addition to the information in this manual due to possible special requirements for specific aircraft applications.
- (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 Propeller Inc. can be found in the following publications available on the Hartzell Propeller Inc. website at www.hartzellprop.com:
 - (a) Manual 180 (30-61-80) - Propeller Ice Protection System Manual
 - (b) Manual 181 (30-60-81) - Propeller Ice Protection System Component Maintenance Manual
 - (c) Manual 182 (61-12-82) - Propeller Electrical De-ice Boot Removal and Installation Manual
 - (d) Manual 183 (61-12-83) - Propeller Anti-icing Boot Removal and Installation Manual

(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) 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, i.e., "polished blades", is not permitted.

C. Continued Airworthiness

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

D. Propeller Critical Parts

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

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

6. Reference Publications**A. Hartzell Propeller Inc. Publications**

NOTE: The following publications are referenced within this manual:

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

Hartzell Propeller Inc. Manual No. 118F (61-10-18) - Three and Four-Blade Steel Hub Turbine Propeller Maintenance Manual

Hartzell Propeller Inc. Manual No. 127 (61-16-27) - Metal Spinner Assembly Maintenance Manual - Available on the Hartzell Propeller Inc. website at www.hartzellprop.com

Hartzell Propeller Inc. Manual No. 132A (61-10-32) - Five-Blade Steel Hub Turbine Propellers

Hartzell Propeller Inc. Manual No. 133C (61-13-33) - Aluminum Propeller Blade Maintenance Manual

Hartzell Propeller Inc. Manual No. 159 (61-02-59) - Application Guide - Available on the Hartzell Propeller Inc. website at www.hartzellprop.com

Hartzell Propeller Inc. Manual 165A (61-00-65) - Illustrated Tool and Equipment Manual - Available on the Hartzell Propeller Inc. website at www.hartzellprop.com

Hartzell Propeller Inc. Manual No. 180 (30-61-80) - Propeller Ice Protection System Manual - Available on the Hartzell Propeller Inc. website at www.hartzellprop.com

Hartzell Propeller Inc. Manual No. 181 (30-60-81) - Propeller Ice Protection System Component Maintenance Manual - Available on the Hartzell Propeller Inc. website at www.hartzellprop.com

Hartzell Propeller Inc. Manual No. 182 (61-12-82) - Propeller Electrical De-ice Boot Removal and Installation Manual - Available on the Hartzell Propeller Inc. website at www.hartzellprop.com

Hartzell Propeller Inc. Manual No. 183 (61-12-83) - Propeller Anti-icing Boot Removal and Installation Manual - Available on the Hartzell Propeller Inc. website at www.hartzellprop.com

Hartzell Propeller Inc. Manual No. 202A (61-01-02) - Standard Practices Manual, Volumes 1 through 11 (Volume 7, Consumable Materials is available on the Hartzell Propeller Inc. website at www.hartzellprop.com)

Hartzell Propeller Inc. Service Letter HC-SL-61-61Y - Overhaul Periods and Service Life Limits for Hartzell Propellers Inc. Aviation Components - Propellers, Governors, and Propeller Damper Assemblies - Available on the Hartzell Propeller Inc. website at www.hartzellprop.com

7. Definitions

A basic understanding of the following terms will assist in maintaining and operating Hartzell Propeller Inc. 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 for the retention area of single shoulder blades that provides improved strength and resistance to fatigue
Constant Force	A force that is always present in some degree when the propeller is operating
Constant Speed	A propeller system that employs a governing device to maintain a selected engine RPM

<u>Term</u>	<u>Definition</u>
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
Erosion	Gradual wearing away or deterioration due to action of the elements
Exposure	Leaving material open to action of the elements
Feathering	The capability of blades to be rotated parallel to the relative wind, thus reducing aerodynamic drag
Gouge	Surface area where material has been removed
Hazardous Propeller 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



<u>Term</u>	<u>Definition</u>
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, refinish, 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 Parts .	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
Reversing	The capability of rotating blades to a position to generate reverse thrust to slow the aircraft or back up
Scratch	Same as "Nick"



<u>Term</u>	<u>Definition</u>
Single Acting	Hydraulically actuated propeller that utilizes a single oil supply for pitch control
Superseded	Parts that are considered airworthy for continued flight but may no longer be available
Synchronizing	Adjusting the RPM of all the propellers of a multi-engine aircraft to the same RPM
Synchrophasing	A form of propeller sychronization 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
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
Variable Force	A force that may be applied or removed during propeller operation
Vertical Balance	Balance between the leading and trailing edges of a two-blade propeller with the blades positioned vertically
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
Lbs	Pounds
MIL-X-XXX	Military Specification
MPI	Major Periodic Inspection (Overhaul)
MS	Military Standard
MSDS	Material Safety Data Sheet
OD	Outside Diameter
NAS	National Aerospace Standards
NASM	National Aerospace Standards, Military
N•m	Newton-Meters
POH	Pilot's Operating Handbook
PSI	Pounds per Square Inch
RPM	Revolutions per Minute
TBO	Time Between Overhaul
TC	Type Certificate
TSN	Time Since New
TSO	Time Since Overhaul

NOTE: TSN/TSO is considered as the time accumulated between rotation and landing, i.e., flight time.

INSTALLATION AND REMOVAL - CONTENTS

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1. Tools, Consumables, and Expendables

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

A. Tooling

Each propeller model requires a calibrated torque wrench, safety wire pliers (alternate: safety cable tool), and the model specific tooling listed below:

HC-B3()(A,N,P)-2()

- Torque wrench adaptor (Hartzell Propeller Inc. P/N AST-2877)
- 5/8 inch deep well socket
- 1-7/16 inch crowfoot wrench

HC-B(3,4,5)()(A,N,P)-3()

- Torque wrench adaptor (Hartzell Propeller Inc. P/N AST-2877)
- 5/8 inch deep well socket
- 1-7/16 inch crowfoot wrench
- Feeler gage
- Beta system puller (Hartzell Propeller Inc. P/N CST-2987)

HC-B(3,4)()W-3()

- Torque wrench adaptor (Hartzell Propeller Inc. P/N AST-3175)
- Torque check tool (Hartzell Propeller Inc. P/N AST-2968-1)
- Feeler gage
- Beta system puller (Hartzell Propeller Inc. P/N CST-2987)
- 5/8 inch deep well socket
- 1-7/16 inch crowfoot wrench

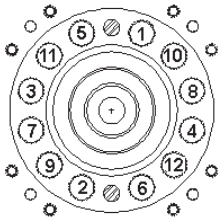
HC-B5M()-2**HC-B(3,4,5)()-5()**

- Torque wrench adaptor (Hartzell Propeller Inc. P/N AST-2877)
- One inch deep well socket
- 1-13/16 inch crowfoot wrench

HC-()3()F-7()

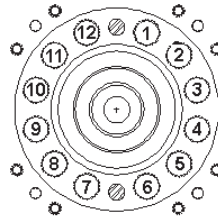
- Torque wrench adaptor (Hartzell Propeller Inc. P/N AST-2917)
 - 5/8 inch deep well socket
 - 1-7/16 inch crowfoot wrench
- B. Consumables
- Quick Dry Stoddard Solvent or Methyl-Ethyl-Ketone (MEK)
 - Anti-Seize Compound (MIL-PRF-83483)
- C. Expendables
- 0.032 inch (0.81 mm) Stainless Steel Aircraft Safety Wire (Alternate: 0.032 inch [0.81 mm] aircraft safety cable and associated hardware)
 - O-ring, propeller flange (see Table 3-1)
 - O-ring, for HC-B(3,4)()W-3() spacer (see Table 3-1)

W10107C
W10107B
W10109C
W10109B



SEQUENCE A

A Flange

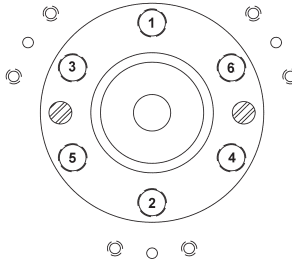


SEQUENCE B

Use Sequence A for steps one and two. Use Sequence B for step three.

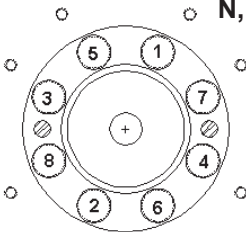
Step 1 - Torque all bolts to 40 ft-lbs (54 N•m). Step 3 - Torque all bolts to Table 3-3.
Step 2 - Torque all bolts to 80 ft-lbs (108 N•m).

F Flange

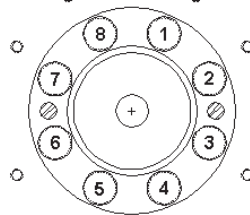


Step 1 - Torque all bolts to 40 ft-lbs (54 N•m).
Step 2 - Torque all bolts to Table 3-3.

N, P or W Flange



SEQUENCE A



SEQUENCE B

Use Sequence A for steps one and two. Use Sequence B for step three.

Step 1 - Torque all bolts to 40 ft-lbs (54 N•m). Step 3 - Torque all bolts to Table 3-3.
Step 2 - Torque all bolts to 80 ft-lbs (108 N•m).

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

- (7) Install the mounting bolts with washers through the engine flange and into the propeller hub flange. Refer to Figure 3-2.
- (8) Use a torque wrench and the specified torque wrench adaptor (see paragraph 1.A. Tooling in this chapter) to torque all mounting bolts in sequences and steps shown in Figure 3-3. Refer to Table 3-3 and Figure 3-4 to determine the proper torque value.
- (9) 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.)

CAUTION: TO FACILITATE BOXING AND SHIPPING OF PROPELLERS, THE PISTON NUT (A-880-1) ON HC-B3() ()-2() STEEL HUB TURBINE PROPELLERS MAY HAVE BEEN REMOVED TO ALLOW ROTATING OF THE BLADES BEFORE PACKAGING.

A flange mounting bolts	100-105 Ft-Lbs (136-142 N•m) wet
F flange mounting bolts	80-90 Ft-Lbs (108-122 N•m)
N/P flange mounting bolts	100-105 Ft-Lbs (136-142 N•m) wet
W flange mounting nuts	120-125 Ft-Lbs (163-170 N•m)
Spinner mounting bolts	30-40 Ft-Lbs (41-54 N•m)
Piston nut (lock nut)	120 Ft-Lbs (163 N•m)*
Guide rod jam nuts	10 Ft-Lbs (14 N•m)*
Lubrication Fitting	4 Ft-Lbs (5 N•m)*
Check Nut (beta valve assembly)	9-11 Ft-Lbs (12-15 N•m)

* Torque tolerance is ± 10 percent unless otherwise noted.

NOTE 1: Torque values are based on non-lubricated threads, unless otherwise specified.

NOTE 2: Wet torque values denote the use of anti-seize compound MIL-PRF-83483.

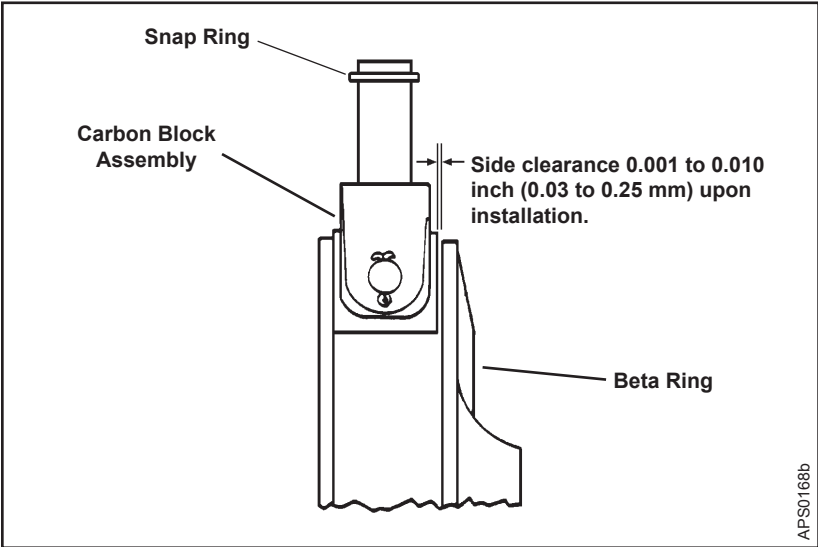
**Torque Table
Table 3-3**

CAUTION: 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 3-1).

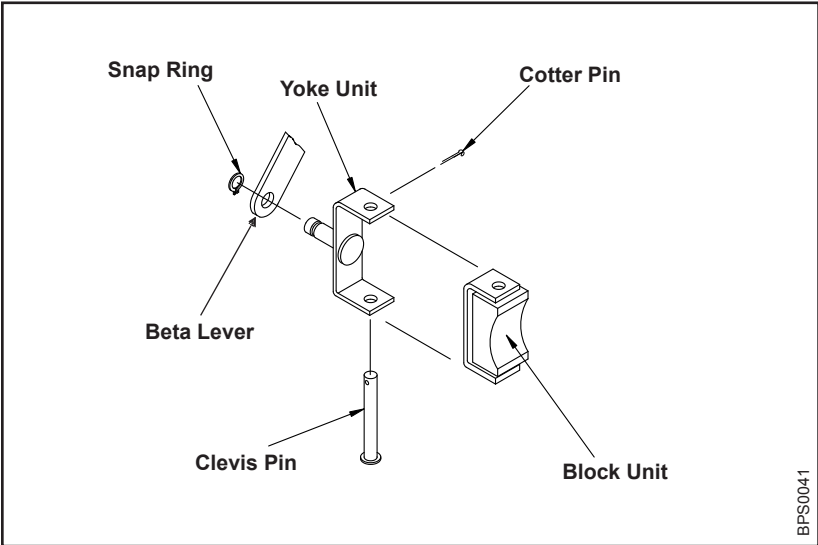
- (8) Install mounting bolts with washers through the engine flange and into the propeller hub flange. Refer to Figure 3-2.
- (9) Use a torque wrench and the specified torque wrench adaptor (see paragraph 1.A. Tooling in this chapter) to torque all mounting bolts in sequences and steps shown in Figure 3-3. Refer to Table 3-3 and Figure 3-4 to determine the proper torque value.
- (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) Decompress the external beta system and remove the beta system puller.

CAUTION: THE BETA RING MUST NOT CONTACT ANY ENGINE COMPONENT OR MOUNTING BOLT SAFETY WIRE. THE BETA SYSTEM COULD BE DAMAGED IF IT CONTACTS ANY STATIC ENGINE COMPONENT WHILE ROTATING.

- (12) Examine the beta ring to make sure that it is not in contact with any engine component or mounting bolt safety wire.
 - (a) If there is contact between the beta ring and any engine component or mounting bolt safety wire, consult qualified personnel at an appropriately licensed propeller repair facility.
- (13) Install the carbon block into the beta linkage lever in accordance with the airframe manufacturer's instructions.



Carbon Block and Beta Ring Clearance
Figure 3-6



Carbon Block Assembly
Figure 3-7

CAUTION 1: FIT THE BLOCK IN THE BETA RING WITH A MINIMUM SIDE CLEARANCE OF 0.001 INCH (0.03 mm). REFER TO FIGURE 3-6.

CAUTION 2: MAXIMUM SIDE CLEARANCE PERMITTED IS 0.010 INCH (0.25 mm) IN ACCORDANCE WITH THE CARBON BLOCK ASSEMBLIES SECTION IN THE MAINTENANCE PRACTICES CHAPTER OF THIS MANUAL.

█ (14) Install the carbon block assembly (Figure 3-7) into the beta ring.

█ (15) Install, adjust and safety the beta linkage per the airframe manufacturer's instructions.

CAUTION: TO FACILITATE BOXING AND SHIPPING OF PROPELLERS, THE PISTON NUT MAY HAVE BEEN REMOVED TO ALLOW ROTATING OF THE BLADES BEFORE PACKAGING.

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

(a) Following the installation of the propeller, use a breaker bar and a 5/8 inch deep well socket to hold the pitch change rod.

(b) Using a 1-7/16 inch crowfoot wrench and torque wrench, torque the A-880-1 piston nut. Refer to Table 3-3 and Figure 3-4 for the proper torque value.

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

█ (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 Propeller Inc. can be found in the following publications available on the Hartzell Propeller Inc. website at www.hartzellprop.com:

█ (a) Manual 180 (30-61-80) - Propeller Ice Protection System Manual

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

D. Installing HC-B(3,4)()W-3() Propeller on the Aircraft Engine

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

CAUTION 2: WHEN INSTALLING THE HC-B4TW-3/T10282N PROPELLER ON THRUSH AIRCRAFT MODELS S2R-H80 OR S2RHG-H80, COMPLIANCE WITH GE AVIATION SERVICE BULLETIN H80-100-72-00019 IS REQUIRED.

- (1) Use a beta system puller CST-2987 (Figure 3-5) to compress the beta system and pull the beta ring forward to allow access to the propeller mounting flange.

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

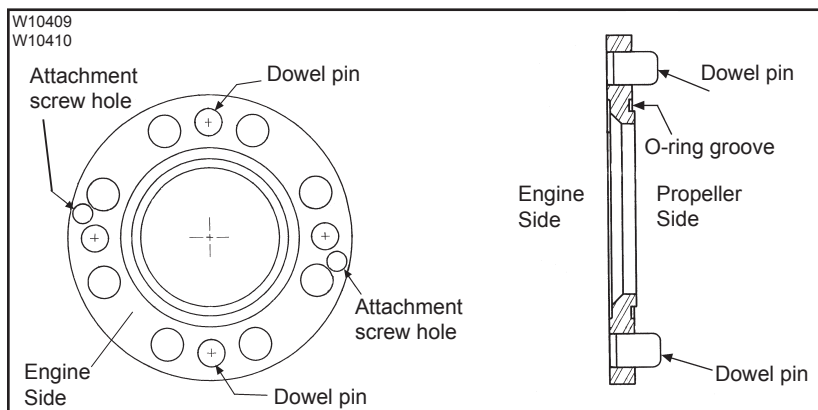
CAUTION: WHEN INSTALLING THE PROPELLER ON THE AIRCRAFT, DO NOT DAMAGE THE ICE PROTECTION SYSTEM COMPONENTS, IF APPLICABLE.

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

CAUTION: IF THE PROPELLER IS REMOVED BETWEEN OVERHAUL INTERVALS, A TORQUE CHECK OF THE MOUNTING STUDS MUST BE PERFORMED.

- (3) Unless this is the first installation of a new, or newly overhauled propeller, perform a torque check of the propeller mounting studs as follows:
- (a) Thread the torque check tool AST-2968-1 onto each propeller mounting stud and torque to 35 ft-lbs (47.6 N•m).
 - (b) Visually inspect each stud for evidence of movement.
 - (c) Remove the torque check tool AST-2968-1 while visually inspecting each stud for evidence of movement.
 - (d) If any stud rotates due to either the tightening or removal of the torque check tool, all studs must be replaced. Refer to Hartzell Propeller Inc. Standard Practices Manual 202A (ATA 61-01-02) for stud replacement procedures.
- (4) Make sure the propeller hub flange and the engine flange mating surfaces are clean.
- (5) Install the specified O-ring on the engine flange. Refer to Table 3-1.
- (6) If the C-7364-2 spacer is attached to the propeller hub with screws, proceed to step 3.D.(8).

- (7) If the C-7364-2 spacer is not already installed on the propeller hub perform the following installation procedures:
- (a) If the hub flange does not have two 8-32 threaded holes to attach the spacer or, if two attachment screws were not provided, perform the following steps:
- 1 Coat the hub-to-spacer O-ring with grease. Refer to Table 3-1.
 - 2 Install the hub-to-spacer O-ring in the groove in the spacer that interfaces with the face of the hub flange. Refer to Figure 3-8.
 - 3 Align the mounting studs and dowel pin holes in the propeller hub flange with the mounting holes and dowel pins in the spacer.



Hub-to-Spacer O-ring Location in the Spacer
Figure 3-8

CAUTION: MAKE SURE THE HUB-TO-SPACER O-RING STAYS IN THE GROOVE IN THE SPACER. IF THE O-RING IS TWISTED OR PINCHED, OIL LEAKAGE WILL RESULT WHEN THE PROPELLER IS OPERATED ON THE AIRCRAFT.

- 4 Slide the spacer onto the mounting studs and against the hub flange.

NOTE: If the propeller installation will be delayed, the spacer and O-ring should be installed and temporarily held in place with non-self locking nuts and a sufficient number of washers on at least two mounting studs. Remove the nuts and washers before installation.

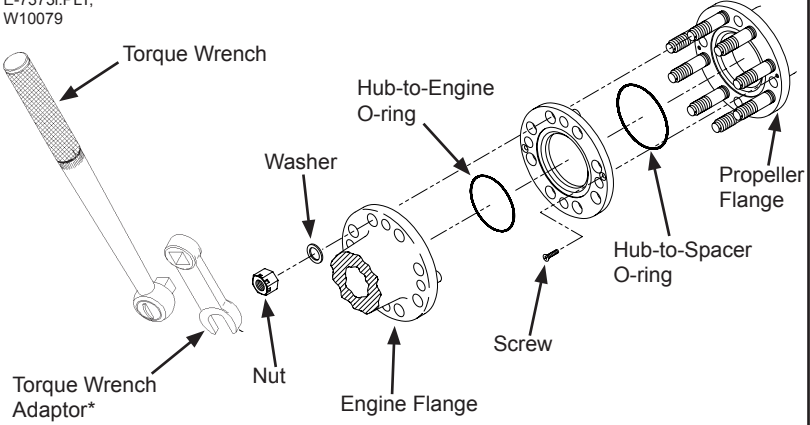
- (b) If the hub flange has two 8-32 threaded holes and two MS24693-S2 flat-head screws (HPI P/N B-3868-S52) are provided to attach the C-7364-2 spacer, perform the following steps:

- 1 Coat the hub-to-spacer O-ring with grease. Refer to Table 3-1.
- 2 Install the hub-to-spacer O-ring in the groove in the spacer that interfaces with the face of the hub flange. Refer to Figure 3-8.
- 3 Align the spacer attachment holes with the two 8-32 threaded holes in the hub flange.

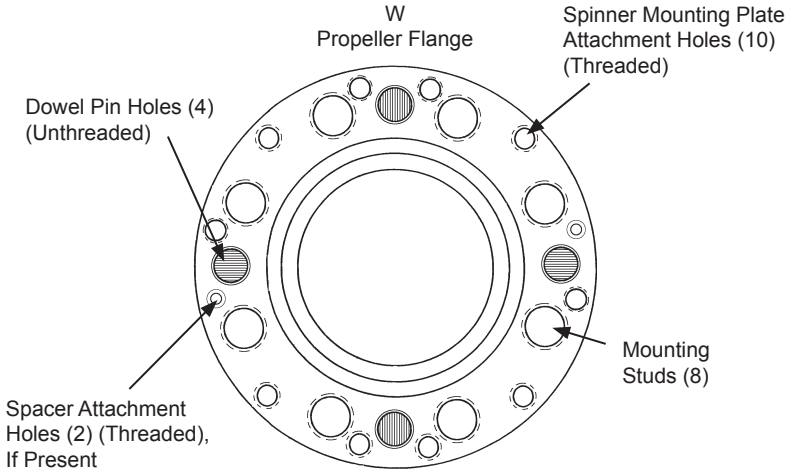
CAUTION: MAKE SURE THE HUB-TO-SPACER O-RING STAYS IN THE GROOVE IN THE SPACER. IF THE O-RING IS TWISTED OR PINCHED, OIL LEAKAGE WILL RESULT WHEN THE PROPELLER IS OPERATED ON THE AIRCRAFT.

- 4 Slide the spacer onto the mounting studs and against the hub flange.

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***Note:** If torque wrench adaptor is used, use the calculation in Figure 3-4 to determine correct torque wrench setting.



**Installing the HC-B(3,4)()W-3() Propeller on the Engine Flange
Figure 3-9**

- 5 Insert supplied flat-head screw through each screw hole in the spacer and into the 8-32 threaded holes in the hub flange. Refer to Figure 3-9.

CAUTION: MAKE SURE THE FLAT-HEAD ATTACHMENT SCREWS DO NOT PROTRUDE ABOVE THE ENGINE-SIDE SURFACE OF THE SPACER.

- 6 Tighten the flat-head screw until snug.
- 7 If after the flat-head screws are tightened, one or both are protrude above the engine side surface of the spacer, perform the following steps:
- a Remove both flat-head screws and the spacer.
 - b Rotate the spacer 180 degrees, aligning the screw holes in the spacer with the 8-32 threaded holes in the hub flange.

CAUTION: MAKE SURE THE FLAT-HEAD ATTACHMENT SCREWS DO NOT PROTRUDE ABOVE THE ENGINE-SIDE SURFACE OF THE SPACER.

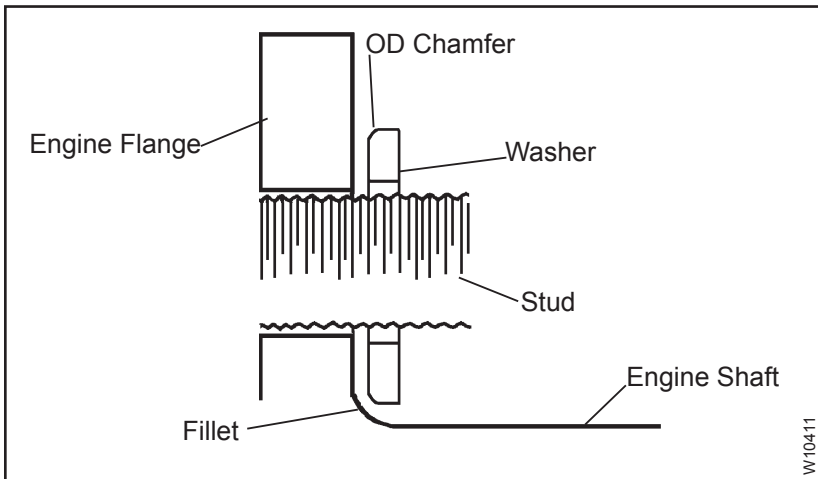
- c Slide the spacer onto the mounting studs and against the hub flange.
- d Insert a flat-head screw through each screw hole in the spacer and into the 8-32 threaded holes in the hub flange. Refer to Figure 3-9.
- e Tighten the flat-head screw until snug.
- f If after the flat-head screws are tightened, one or both are protrude above the engine side surface of the spacer, remove the screws.

NOTE: If the propeller installation will be delayed, the spacer and O-ring should be installed and temporarily held in place with non-self locking nuts and a sufficient number of washers on at least two mounting studs. Remove the nuts and washers before installation.

CAUTION 1: MAKE SURE THAT COMPLETE AND TRUE SURFACE CONTACT IS ESTABLISHED BETWEEN THE SPACER AND THE ENGINE FLANGE.

CAUTION 2: IF THE C-7364-2 SPACER IS NOT ATTACHED TO THE HUB, MAKE SURE THE HUB-TO-SPACER O-RING STAYS IN THE GROOVE IN THE SPACER. IF THE O-RING IS TWISTED OR PINCHED, OIL LEAKAGE WILL RESULT WHEN THE PROPELLER IS OPERATED ON THE AIRCRAFT.

(8) Slide the propeller onto the engine flange.



Installing the Washer on the Mounting Stud
Figure 3-10

CAUTION 1: NEW PROPELLER MOUNTING NUTS MUST BE USED WHEN INITIALLY INSTALLING A NEW OR OVERHAULED PROPELLER.

CAUTION 2: THE SIDE OF THE WASHER WITH THE OD CHAMFER MUST BE AGAINST THE ENGINE FLANGE. REFER TO FIGURE 3-10.

(9) Install self locking mounting nuts with washers onto the propeller mounting studs. Refer to Table 3-2 for appropriate mounting hardware. Refer to Figure 3-10.

NOTE 1: The OD chamfer on the washer is for clearance of the engine flange fillet. Refer to Figure 3-10.

NOTE 2: If the propeller is removed between overhaul intervals, mounting nuts and washers may be reused if they are not damaged or corroded.

(10) Use a torque wrench and the specified torque wrench adaptor (see paragraph 1.A. Tooling in this chapter) to torque all mounting nuts in the sequences and steps shown in Figure 3-3. Refer to Table 3-3 and Figure 3-4 to determine the proper torque value.

(11) Safety all propeller mounting studs 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) Decompress the external beta system and remove the beta system puller.

CAUTION: THE BETA RING MUST NOT CONTACT ANY ENGINE COMPONENT OR MOUNTING BOLT SAFETY WIRE. THE BETA SYSTEM COULD BE DAMAGED IF IT CONTACTS ANY STATIC ENGINE COMPONENT WHILE ROTATING.

(13) Examine the beta ring to make sure that it is not in contact with any engine components or mounting bolt safety wire.

- (a) If there is contact between the beta ring and any engine components or mounting bolt safety wire, consult qualified personnel at an appropriately licensed propeller service facility.
- (14) Install the carbon block into the beta linkage lever per the airframe manufacturer's instructions.

CAUTION 1: FIT THE BLOCK IN THE BETA RING WITH A SIDE CLEARANCE OF 0.001 INCH (0.03 mm). REFER TO FIGURE 3-6.

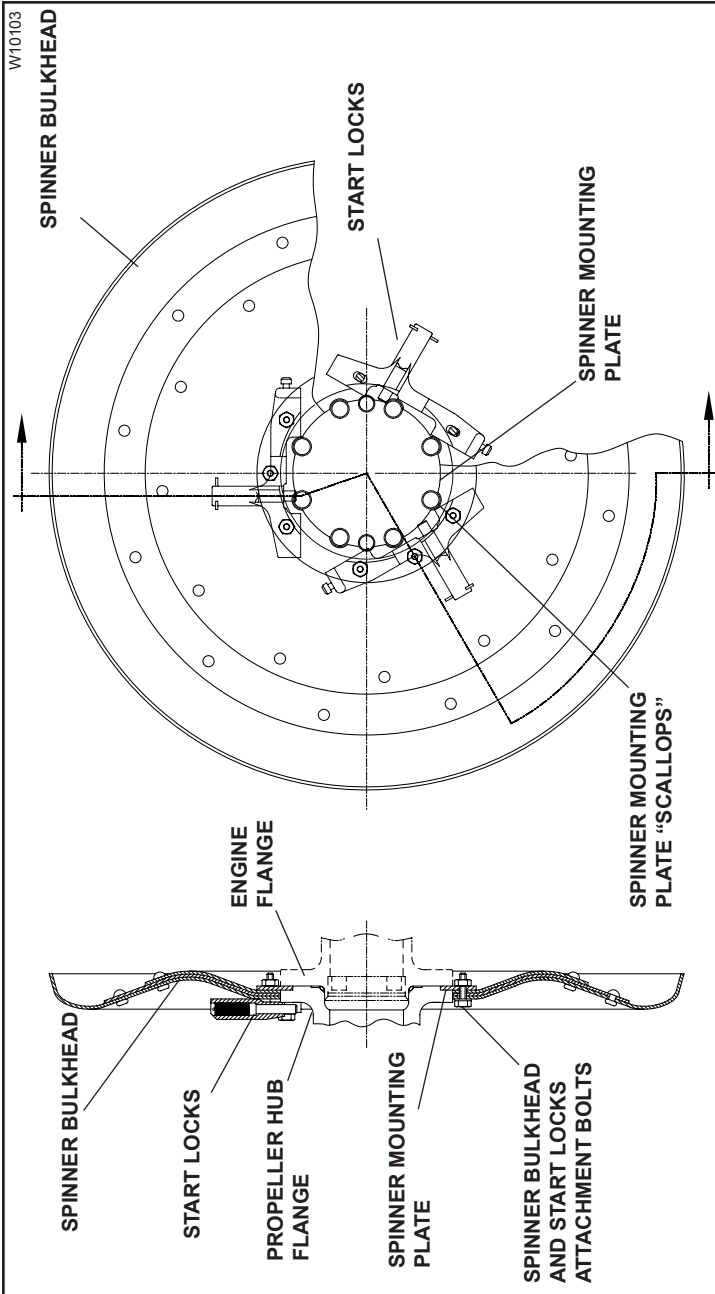
CAUTION 2: MAXIMUM SIDE CLEARANCE PERMITTED IS 0.010 INCH (0.25 mm) IN ACCORDANCE WITH THE CARBON BLOCK ASSEMBLIES SECTION IN THE MAINTENANCE PRACTICES CHAPTER OF THIS MANUAL.

- (15) Install the carbon block assembly (Figure 3-7) into the beta ring.
- (16) Install, adjust and safety the beta linkage per the airframe manufacturer's instructions.

CAUTION: TO FACILITATE BOXING AND SHIPPING OF THE PROPELLER, THE PISTON NUT MAY HAVE BEEN REMOVED TO ALLOW ROTATING OF THE BLADES BEFORE PACKAGING.

- (17) Procedure for reinstallation of the piston nut, if applicable.
- (a) Following the installation of the propeller, use a breaker bar and a 5/8 inch deep well socket to hold the pitch change rod.
 - (b) Using a 1-7/16 inch crowfoot wrench and torque wrench, torque the A-880-1 piston nut. Refer to Table 3-3 and Figure 3-4 for the proper torque value.
- NOTE:** The removal and subsequent reinstallation of the piston nut does not require that the propeller blade angles be re-checked.

- (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 Propeller Inc. can be found in the following publications available on the Hartzell Propeller Inc. website at www.hartzellprop.com:
- (a) Manual 180 (30-61-80) - Propeller Ice Protection System Manual
 - (b) Manual 181 (30-60-81) - Propeller Ice Protection System Component Maintenance Manual
 - (c) Manual 182 (61-12-82) - Propeller Electrical De-ice Boot Removal and Installation Manual
 - (d) Manual 183 (61-12-83) - Propeller Anti-icing Boot Removal and Installation Manual
- (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).



One-piece Spinner Mounting Plate Installation
Figure 3-11

- E. Installing HC-B(3,4)()(-5()) Propeller, with a One-piece Spinner Mounting Plate, on the Aircraft Engine

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

NOTE: Some -5 propellers were previously manufactured with a one-piece spinner mounting plate. The spinner bulkhead, which has start locks mounted on it, 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 3-11.

WARNING: MAKE SURE THE SLING IS RATED UP TO 800 LBS (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.

- (1) With a suitable crane hoist and sling, carefully move the propeller assembly to the aircraft engine mounting flange.
- (2) Make sure the propeller hub flange and engine flange mating surfaces are clean.
- (3) Install the specified O-ring on the engine flange. Refer to Table 3-1.

- (4) Retract each start lock pin and hold into place with a heavy wire inserted into the hole in each auto high pitch housing.
- (5) Slide the assembled one-piece spinner mounting plate, spinner bulkhead and start lock onto the propeller hub flange.
 - (a) The start locks must face toward the propeller.
- (6) Align the clearance “scallops” in the spinner mounting plate with the holes in the propeller hub flange. Refer to Figure 3-11.

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

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

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

- (8) Align 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.

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

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

- (10) Apply MIL-PRF-83483 anti-seize compound to the threaded surfaces of the mounting bolts. Refer to Table 3-2 for appropriate mounting hardware.

NOTE: If the propeller is removed between overhaul intervals, mounting bolts and washers may be reused if they are not damaged or corroded.

CAUTION: 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 (FIGURE 3-1).

- (11) Install the mounting bolts with washers through the engine flange and into the propeller hub flange. Refer to Figure 3-2.
- (12) Use a torque wrench and the specified torque wrench adaptor (see paragraph 1.A. Tooling in this chapter) to torque all mounting bolts in sequences and steps shown in Figure 3-3. Refer to Table 3-3 and Figure 3-4 to determine the proper torque value.
- (13) 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.)
- (14) Remove the heavy wire from the start lock housings to free the start lock pins.
- (15) Refer to the airframe manufacturer's instructions to seat the start lock plates on the start locks.

NOTE: The start lock plates interface with the start lock pins and are attached to the inboard surface of each blade clamp.

CAUTION: TO FACILITATE BOXING AND SHIPPING OF PROPELLERS, THE PISTON NUT (A-880-2) ON -5 STEEL HUB TURBINE PROPELLERS MAY HAVE BEEN REMOVED TO ALLOW ROTATING OF THE BLADES BEFORE PACKAGING.

- (16) Procedure for reinstallation of piston nut, if applicable.
 - (a) Following the installation of the propeller, use a breaker bar and a one inch deep well socket to hold the pitch change rod.

- (b) Using a 1-13/16 inch crowfoot wrench and torque wrench, torque the A-880-2 piston nut. Refer to Table 3-3 and Figure 3-4 for the proper torque value.

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

- (17) Install the beta tube per airframe and/or engine manufacturer's instructions.

NOTE 1: Follow the airframe manufacturer's instructions for adjusting the beta tube to obtain the correct low pitch (flight idle blade angle).

NOTE 2: Refer to the Aircraft Type Certificate Data Sheet for the low pitch blade angle setting.

- (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 Propeller Inc. can be found in the following publications available on the Hartzell Propeller Inc. website at www.hartzellprop.com:

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

- (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).

- F. Installing HC-B(3,4,5)()(-5() Propeller, with a Two-piece Spinner Mounting Plate, on the Aircraft Engine

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

NOTE: Some -5 propellers are manufactured with a two-piece spinner mounting plate which is bolted on the propeller hub flange. On four and five-blade propellers (see Figure 2-7) the bulkhead and start locks are attached to the spinner mounting plate. On three-bladed propellers (see Figure 2-6) the start locks are attached to the guide collar (between the hub and cylinder); although the bulkhead is attached to the spinner mounting plate.

WARNING: MAKE SURE THE SLING IS RATED UP TO 800 LBS (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.

- (1) With a suitable crane hoist and sling, carefully move the propeller assembly to the aircraft engine mounting flange.
 - (a) If the propeller is equipped with a de-ice system, refer to the General Maintenance Practices section in the Introduction chapter of this manual.

- (2) Make sure the propeller hub flange and engine flange mating surfaces are clean.
- (3) Install the specified O-ring on the engine flange. Refer to Table 3-1.
- (4) 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.

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

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

- (6) Apply MIL-PRF-83483 anti-seize compound to the threaded surfaces of the mounting bolts. Refer to Table 3-2 for appropriate mounting hardware.

NOTE: If the propeller is removed between overhaul intervals, mounting bolts and washers may be reused if they are not damaged or corroded.

CAUTION: 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 (FIGURE 3-1).

- (7) Install the mounting bolts with washers through the engine flange and into the propeller hub flange. Refer to Figure 3-2.
- (8) Use a torque wrench and the specified torque wrench adaptor (see paragraph 1.A. Tooling) to torque all mounting bolts in sequences and steps shown in Figure 3-3. Refer to Table 3-3 and Figure 3-4 to determine the proper torque value.

- (9) 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.)

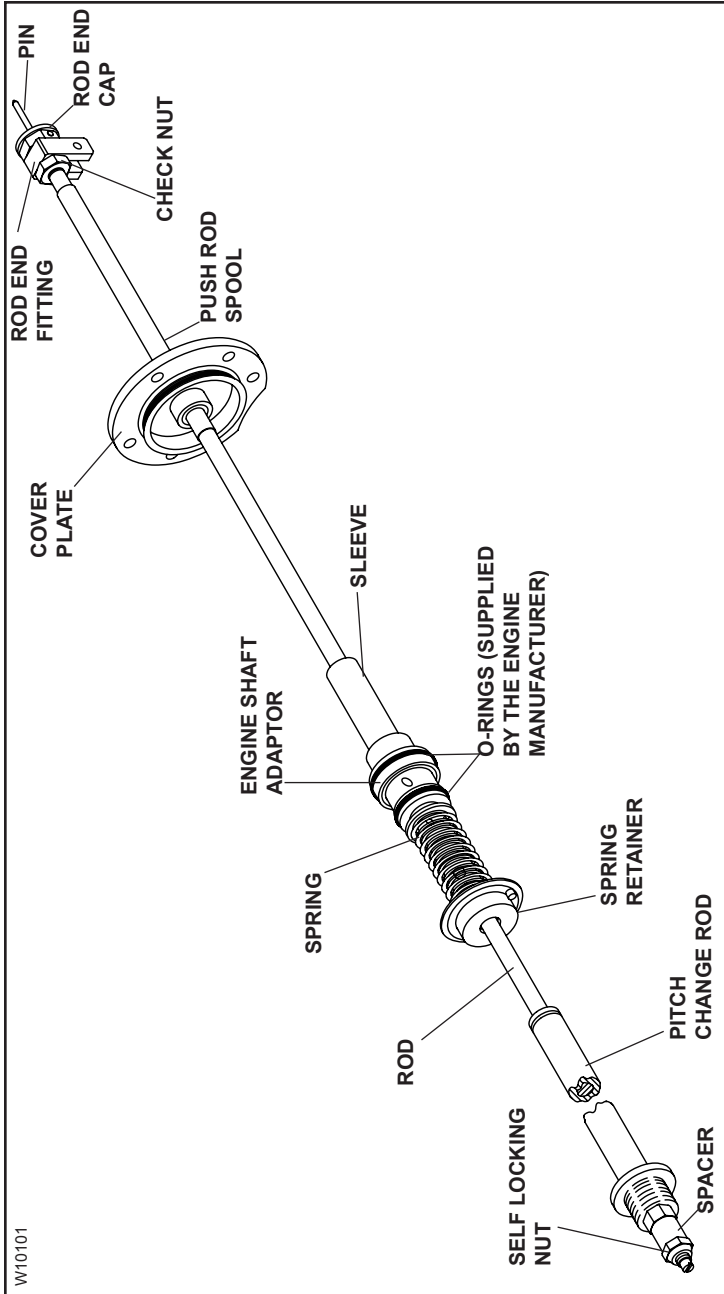
CAUTION: TO FACILITATE BOXING AND SHIPPING OF PROPELLERS, THE PISTON NUT (A-880-2) ON -5 STEEL HUB TURBINE PROPELLERS MAY HAVE BEEN REMOVED TO ALLOW ROTATING OF THE BLADES BEFORE PACKAGING.

- (10) Procedure for reinstallation of piston nut, if applicable.
- (a) Following the installation of the propeller, use a breaker bar and a one inch deep well socket to hold the pitch change rod.
 - (b) Using a 1-13/16 inch crowfoot wrench and torque wrench, torque the A-880-2 piston nut. Refer to Table 3-3 and Figure 3-4 for the proper torque value.

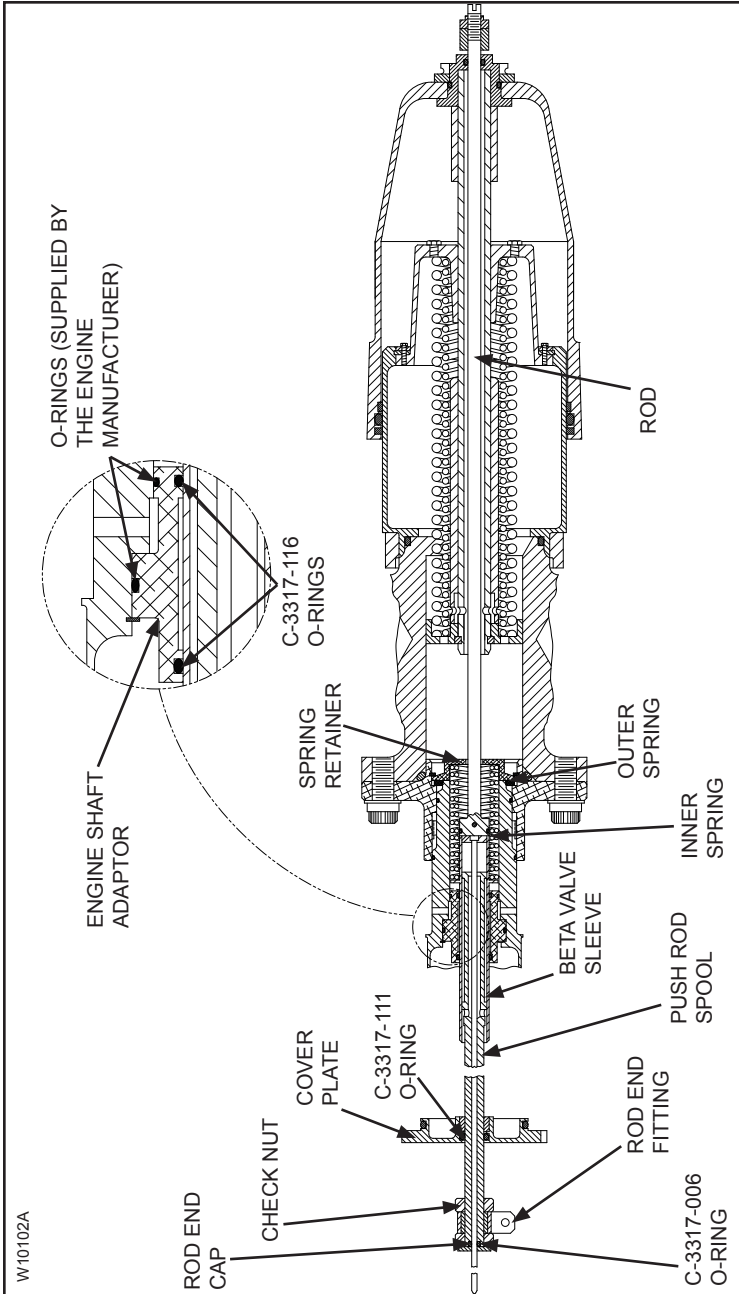
NOTE: The removal and subsequent reinstallation of the piston nut does not require that the propeller blade angles be re-checked.

- (11) Install the beta tube per airframe and/or engine manufacturer's instructions.
- (a) Follow the airframe manufacturer's instructions for adjusting the beta tube to obtain the correct low pitch (flight idle blade angle).
 - (b) Refer to the Aircraft Type Certificate Data Sheet for the low pitch blade angle setting.

- (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 Propeller Inc. can be found in the following publications available on the Hartzell Propeller Inc. website at www.hartzellprop.com:
- (a) Manual 180 (30-61-80) - Propeller Ice Protection System Manual
 - (b) Manual 181 (30-60-81) - Propeller Ice Protection System Component Maintenance Manual



Beta Valve System
Figure 3-12



**Cross Section View of the Beta Valve System
Figure 3-13**

- (c) Manual 182 (61-12-82) - Propeller Electrical De-ice Boot Removal and Installation Manual
 - (d) Manual 183 (61-12-83) - Propeller Anti-icing Boot Removal and Installation Manual
- (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).
- G. Installing HC-()3()(-)7() Propeller on the Allison Engine

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

This propeller incorporates a beta valve assembly (Figures 3-12 and 3-13), which is installed inside of the propeller shaft and extends from the rear of the engine to the front of the propeller piston. This assembly is installed in the engine shaft before the propeller is installed.

- (1) Make sure that the shaft adaptor (see Figure 3-13) is installed in the engine shaft.
- (2) Install the C-3317-116 O-rings in the two grooves (see Figure 3-13) of the shaft adaptor.
- (3) Remove the cover plate from the rear of engine case. Refer to Figures 3-12 and 3-13.
- (4) Prepare the beta valve.

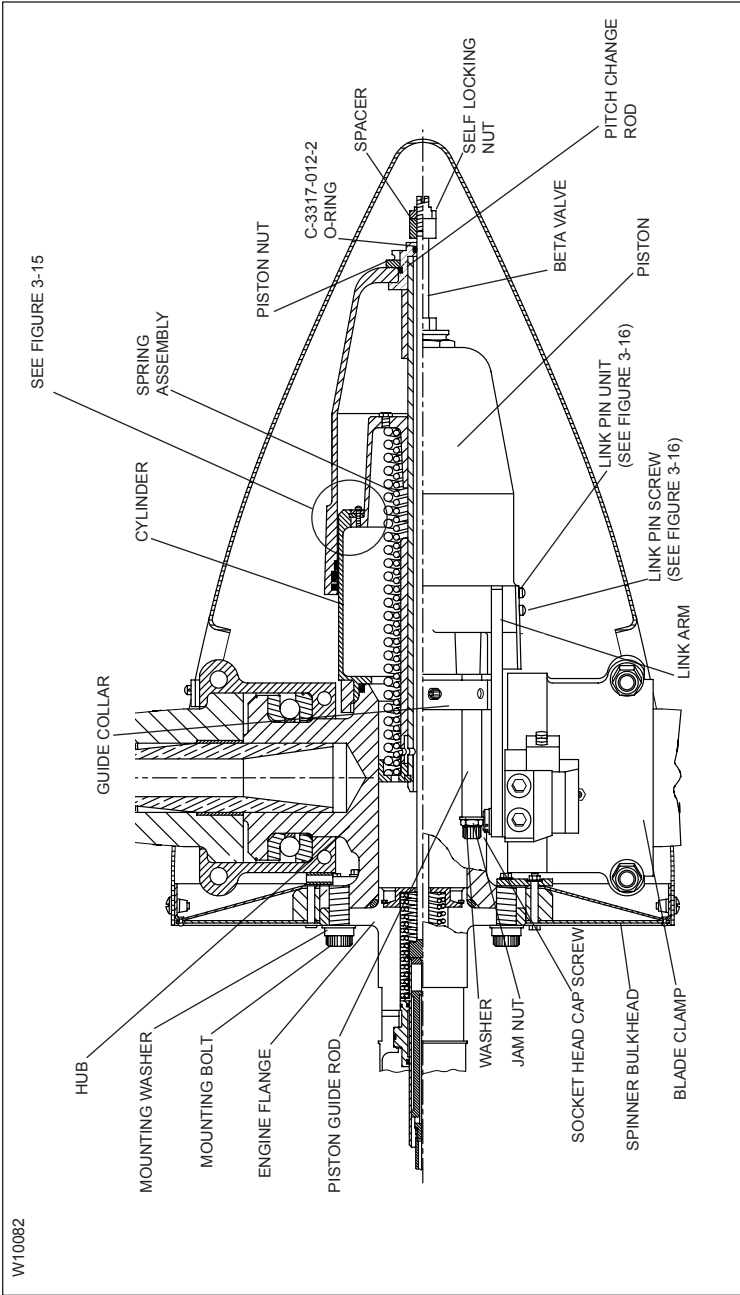
NOTE: The beta valve should be preassembled as shown in Figure 3-12 less the pitch change rod, engine shaft adaptor, engine supplied o-rings and cover plate when new or from overhaul.

Refer to Figures 3-12 and 3-13.

- (a) If the beta valve is supplied preassembled, remove the self locking nut, spacer, rod end cap, rod end fitting, bushing and check nut.
- (b) If the beta valve is supplied disassembled, assemble as follows:
 - 1 Slide the push rod spool onto the pin and into the sleeve with the threaded end facing away from the sleeve.
 - 2 Slide the inner and outer springs onto the rod up to and against the shoulder of the sleeve.
 - 3 Install the spring retainer onto the rod with the recessed center section facing toward the two springs.
- (5) Slide the partially assembled beta valve into the engine shaft from the front, allowing the push rod spool to extend out the rear of the engine.
 - (a) The shoulder of the sleeve should be against the shaft adaptor.
- (6) Compress the springs with spring retainer and install the retaining ring that is furnished with the engine to secure the spring retainer.

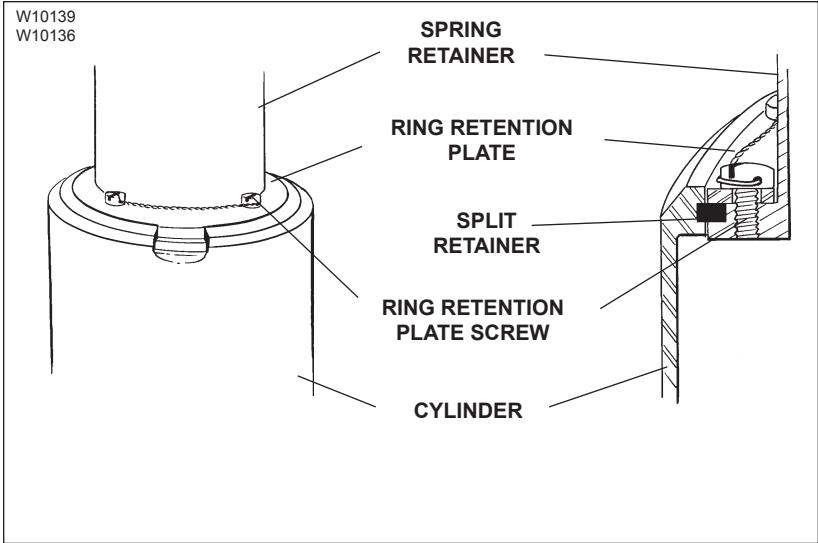
NOTE: A locator button on the spring retainer will fit into a recess in the engine shaft/flange.
- (7) Install the ID and OD O-rings on the engine cover, per the airframe or engine manufacturer's instructions.
- (8) Install the engine cover on the rear of the engine gear box encircling the beta valve push rod spool, per airframe or engine manufacturer's instructions.

NOTE: Cover plate fasteners are supplied by the engine manufacturer.

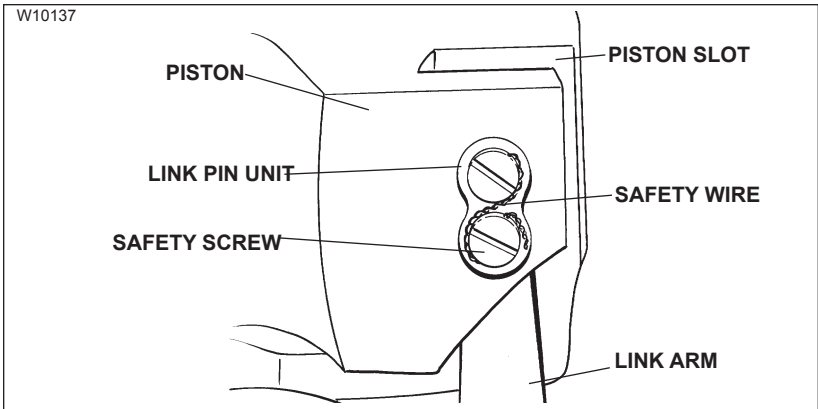


-7() Propeller Assembly
Figure 3-14

W10082



Spring Assembly to Cylinder Attachment Details
Figure 3-15



Piston to Link Arm Attachment Details
Figure 3-16

- (9) Prepare the propeller for installation (see Figures 3-14 through 3-16).
- (a) Piston removal
- 1 Remove the flexlock nut with a 1-7/16 inch wrench, if installed.
 - 2 Remove the safety wire from the three link pin units.
 - 3 Remove the safety screws from the link pin units.
 - 4 Remove the link pin units.
 - 5 Mark the piston and link pins with a felt tip pen or equivalent, so the piston can be reinstalled in the same position.
 - 6 Slide the link arms out of the piston slots.
 - 7 Remove the socket head cap screw, jam nut, and washer from each piston guide rod.
 - 8 Slide the piston off the cylinder.
- (b) Spring assembly removal.
- 1 Remove the ring retention plate screw safety wire.
 - 2 Remove the ring retention plate screws.
 - 3 Remove the retention plate.
 - 4 Remove the split retainer.
 - 5 Remove the spring assembly from the cylinder.

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

CAUTION: INSERT THE DOWEL PINS INTO THE PROPELLER FLANGE USING A BRASS HAMMER OR EQUIVALENT TOOL TO PREVENT DAMAGE TO THE DOWEL PINS. THE DOWEL PINS ARE AN INTERFERENCE FIT WITH THE PROPELLER FLANGE.

(10) Insert two dowel pins (Table 3-1) through the threadless holes in the propeller flange, flush with the propeller side of the hub flange. The dowel pins will protrude from the engine side of the hub flange to engage the engine flange.

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

NOTE: If the propeller is equipped with a de-ice system, refer to the General Maintenance Practices section in the Introduction chapter of this manual.

(12) Make sure the propeller hub flange and engine flange mating surfaces are clean.

(13) Install the specified O-ring on the engine flange. Refer to Table 3-1.

CAUTION: DO NOT ALLOW THE PROPELLER ASSEMBLY TO HIT OR REST ON THE BETA FEEDBACK ROD. THIS COULD BEND OR OTHERWISE DAMAGE THE FEEDBACK ROD.

(14) Slide the propeller over the beta valve assembly.

(15) 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.

(16) Slide the propeller hub flange onto the engine flange.

CAUTION 1: 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 (FIGURE 3-1).

CAUTION 2: NEW PROPELLER MOUNTING BOLTS MUST BE USED WHEN INITIALLY INSTALLING A NEW OR OVERHAULED PROPELLER.

(17) Install the propeller mounting bolts and washers through the engine flange and into the propeller hub flange. Refer to Table 3-2 for appropriate mounting hardware.

NOTE: If the propeller is removed between overhaul intervals, mounting bolts and washers may be reused if they are not damaged or corroded.

(18) Use a torque wrench and the specified torque wrench adaptor (see paragraph 1.A. Tooling in this chapter) to torque all mounting bolts in sequences and steps shown in Figure 3-3. Refer to Table 3-3 and Figure 3-4 to determine the proper torque value.

(19) 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.)

(20) Reinstall the spring assembly (see Figures 3-14 and 3-15).

(a) Slide the spring assembly into the cylinder and around the beta valve rod.

(b) Install split retainer between the cylinder and front spring retainer. Slide retainer into the recess in the cylinder.

- (c) Pull the spring retainer tight against the split retainer.
 - (d) Install the ring retention plate.
 - (e) Install the ring retention plate screws and tighten until snug.
 - (f) Safety screws with 0.032 inch (0.81 mm) minimum diameter stainless steel safety wire or equivalent aircraft safety cable and associated hardware (two bolts per safety.)
- (21) Install the C-3317-012-2 O-ring in the front inside cavity of the pitch change rod. (See Figure 3-14.)
- (22) Reinstall the piston on the cylinder and pitch change rod in the same position it was before disassembly. Refer to Figures 3-14 and 3-16.
- (a) Reconnect the link arms to the piston.
 - (b) Install the link pin units.
 - (c) Install the link pin unit safety screws.
 - (d) Safety the link pin screws with 0.032 inch (0.81 mm) minimum diameter stainless steel safety wire (see Figure 3-16).
 - (e) Hand tighten the A-880-1 piston nut on the pitch change rod.
 - (f) Position a breaker bar and a 5/8 inch deep well socket on the pitch change rod.
 - (g) Use 1-7/16 inch crowfoot wrench and torque wrench to torque the A-880-1 piston nut. Refer to Table 3-3 and Figure 3-4 for the proper torque value.

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

- (h) Install a socket head screw, washer and jam nut onto each piston guide rod. Refer to Figure 3-14.
- (i) Torque the jam nuts on the piston guide rods as indicated in Table 3-3.

CAUTION: THE ROD END CAP MUST BOTTOM ON THE PUSH ROD SPOOL WHEN INSTALLED.

(23) Install the rod end cap onto the threaded end of the push rod spool.

NOTE: Do not tighten the set screw in the rod end cap.

(a) Mark the location of the set screw on the rod and then remove the end cap unit.

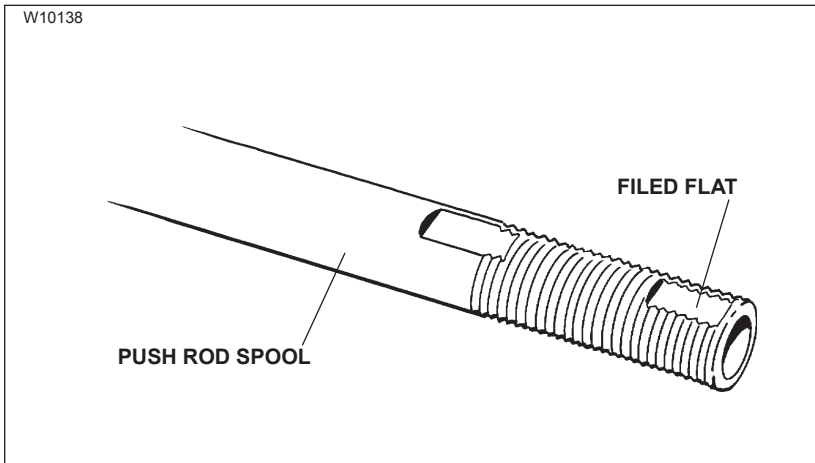
(b) File a flat, tangent to the rod, no deeper than the depth of the threads at the marked location of the set screw. Refer to Figure 3-17.

(24) Install the check nut onto the threaded end of the push rod spool.

(25) Install the bushing onto the threaded end of the push rod spool.

(26) Install the rod end fitting onto the threaded end of the push rod spool.

(27) Install the C-3317-006 O-ring in the cavity at the rear end of the push rod spool.



**Filed Rod for Set Screw
Figure 3-17**

(28) Install the rod end cap onto the threaded end of the push rod spool.

NOTE: Make sure the rod end cap is bottomed on the end of the push rod spool.

- (a) Apply Loctite® 272 to the set screw threads.
- (b) Tighten the set screw.

(29) Apply Loctite® 272 to the push rod threads where the check nut will be located on the push rod spool next to the bushing.

(30) Tighten the check nut against the bushing to torque indicated in Table 3-3.

(31) Attach engine mounted beta system control hardware to rod end fitting and adjust per airframe or engine manufacturer's instructions.

(32) Install the beta light switch against the pin per airframe manufacturer's instructions.

(33) Install the spacer and self-locking nut onto the front of the rod that protrudes through the front of the pitch change rod and piston.

- (a) Follow the airframe manufacturer's instructions for making pitch control adjustments.

(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 Propeller Inc. can be found in the following publications available on the Hartzell Propeller Inc. website at www.hartzellprop.com:

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

(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).

4. Spinner Dome Installation

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

CAUTION 2: 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 3: SPINNER DOME WILL WOBBLE IF NOT ALIGNED PROPERLY, AND MAY AFFECT DYNAMIC BALANCE OF PROPELLER.

- 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 maximum RPM (Static) hydraulic low pitch stop check in accordance with the Testing and Troubleshooting chapter of this manual.

6. Spinner Dome Removal

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

CAUTION 2: TO PREVENT DAMAGING THE BLADE AND BLADE PAINT, WRAP THE BLADE SHANKS IN SEVERAL LAYERS OF MASKING OR DUCT TAPE BEFORE REMOVING THE SPINNER DOME.

- A. Remove the screws and washers that secure the spinner to the spinner bulkhead.
- B. Remove the spinner dome.

7. Propeller Assembly Removal**A. Removal of HC-B(3,5)() (-2() Propellers**

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

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

- (1) Remove the spinner dome in accordance with the procedure in the Spinner Dome Removal section of this chapter.
 - (a) If the propeller is equipped with an ice protection system that uses components supplied by Hartzell Propeller Inc., applicable instructions and technical information for the components supplied by Hartzell Propeller Inc. can be found in the following publications available on the Hartzell Propeller Inc. website at www.hartzellprop.com:
 - 1 Manual 180 (30-61-80) - Propeller Ice Protection System Manual
 - 2 Manual 181 (30-60-81) - Propeller Ice Protection System Component Maintenance Manual
 - 3 Manual 182 (61-12-82) - Propeller Electrical De-ice Boot Removal and Installation Manual
 - 4 Manual 183 (61-12-83) - Propeller Anti-icing Boot Removal and Installation Manual

- (b) 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).

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 AND 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 THE HARTZELL PROPELLER INC. OVERHAUL MANUALS 118F (61-10-18) AND 132A (61-10-32).

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

- (2) Cut and remove the safety wire on the propeller mounting bolts.

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

NOTE 1: Supporting the propeller with the 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 during re-installation to prevent dynamic imbalance.

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

- (4) Remove the propeller mounting bolts and washers.

NOTE: If the propeller is removed 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.

- (5) Using the support sling, lift the propeller from the mounting flange.
- (6) Remove and discard the propeller mounting O-ring.
- (7) Place the propeller on a suitable cart for transportation.

B. Removal of HC-B(3,4,5)() (A,N,P)-3() Propellers

WARNING: FOR SAFETY REASONS, THE PROPELLER MUST BE PUT IN FEATHER POSITION BEFORE IT IS REMOVED FROM THE AIRCRAFT, IF THE BLADES ARE AT A STARTING BLADE ANGLE DUE TO START LOCKS.

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

- (1) Remove the spinner dome in accordance with the procedure in the Spinner Dome Removal section of this chapter.
 - (a) If the propeller is equipped with an ice protection system that uses components supplied by Hartzell Propeller Inc., applicable instructions and technical information for the components supplied by Hartzell Propeller Inc. can be found in the following publications available on the Hartzell Propeller Inc. website at www.hartzellprop.com:
 - 1 Manual 180 (30-61-80) - Propeller Ice Protection System Manual
 - 2 Manual 181 (30-60-81) - Propeller Ice Protection System Component Maintenance Manual
 - 3 Manual 182 (61-12-82) - Propeller Electrical De-ice Boot Removal and Installation Manual
 - 4 Manual 183 (61-12-83) - Propeller Anti-icing Boot Removal and Installation Manual

- (b) 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).
 - (2) Disconnect the engine beta linkage and carbon block assembly from the beta ring per the airframe manufacturer's instructions. Refer to Figure 3-7.
 - (a) If the carbon block must be removed, perform the following procedures:
 - 1 Remove the snap ring that retains the carbon block assembly to the beta linkage.
 - 2 Remove the carbon block assembly.
- CAUTION: MAKE SURE THAT THE BETA LINKAGE IS DISCONNECTED BEFORE COMPRESSING THE BETA SYSTEM.**
- (3) Use the beta system puller, Hartzell Propeller Inc. P/N CST-2987, to compress the beta system and pull the beta ring forward to expose the propeller mounting bolts and washers. Refer to Figure 3-5.

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 AND 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 THE HARTZELL PROPELLER INC. OVERHAUL MANUALS 118F (61-10-18) AND 132A (61-10-32).

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

- (4) Cut and remove the safety wire on the propeller mounting bolts.
- (5) Support the propeller assembly with a sling.

NOTE 1: Supporting the propeller with the 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 during re-installation to prevent dynamic imbalance.

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

(6) Remove the propeller mounting bolts and washers.

NOTE: If the propeller is removed 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 propeller mounting O-ring.

(9) Decompress and remove the beta system puller.

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

C. Removal of HC-B(3,4)()W-3() Propellers

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

- (1) Remove the spinner dome in accordance with the procedure in the Spinner Dome Removal section of this chapter.
 - (a) If the propeller is equipped with an ice protection system that uses components supplied by Hartzell Propeller Inc., applicable instructions and technical information for the components supplied by Hartzell Propeller Inc. can be found in the following publications available on the Hartzell Propeller Inc. website at www.hartzellprop.com:
 - 1 Manual 180 (30-61-80) - Propeller Ice Protection System Manual
 - 2 Manual 181 (30-60-81) - Propeller Ice Protection System Component Maintenance Manual
 - 3 Manual 182 (61-12-82) - Propeller Electrical De-ice Boot Removal and Installation Manual
 - 4 Manual 183 (61-12-83) - Propeller Anti-icing Boot Removal and Installation Manual
 - (b) 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).
- (2) Disconnect the engine beta linkage and carbon block assembly from the beta ring per the airframe manufacturer's instructions. Refer to Figure 3-7.

(a) If the carbon block must be removed, perform the following procedures:

- 1 Remove the snap ring that retains the carbon block assembly to the beta linkage.
- 2 Remove the carbon block assembly.

CAUTION: MAKE SURE THAT THE BETA LINKAGE IS DISCONNECTED BEFORE COMPRESSING THE BETA SYSTEM.

(3) Use the beta system puller, Hartzell Propeller Inc. P/N CST-2987, to compress the beta system and pull the beta ring forward to expose the propeller mounting nuts and washers. Refer to Figure 3-5.

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 AND 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 THE HARTZELL PROPELLER INC. OVERHAUL MANUALS 118F (61-10-18) AND 132A (61-10-32).

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

(4) Cut and remove the safety wire on the propeller mounting studs.

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

NOTE 1: Supporting the propeller with the sling may be delayed until all but two mounting nuts and washers have been removed to allow rotating the propeller for ease of nut 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 during re-installation to prevent dynamic imbalance.

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

- (6) Remove the propeller mounting nuts and washers.

NOTE: If the propeller is removed between overhaul intervals, mounting nuts 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 engine flange-to-spacer O-ring.
- (9) If the C-7364-2 spacer is not attached with flat-head screws, perform the following procedures:
- (a) Remove the spacer from the hub.
 - (b) Remove and discard the hub-to-spacer O-ring.
- (10) If the C-7364-2 spacer is attached to the hub with flat-head screws, perform the following procedures if the O-ring must be replaced due to oil leakage.
- (a) Remove the spacer attachment screws, if applicable.

- (b) Remove the C-7364-2 spacer.
- (c) Remove and discard the propeller hub-to-spacer O-ring.

(11) Decompress and remove the beta system puller.

(12) Place the propeller on a suitable cart for transportation.

D. Removal of HC-B(3,4,5)()(-)5() Propellers

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

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

(1) Remove the spinner dome in accordance with the procedure in the Spinner Dome Removal section of this chapter.

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

- 1 Manual 180 (30-61-80) - Propeller Ice Protection System Manual
- 2 Manual 181 (30-60-81) - Propeller Ice Protection System Component Maintenance Manual
- 3 Manual 182 (61-12-82) - Propeller Electrical De-ice Boot Removal and Installation Manual

- 4 Manual 183 (61-12-83) - Propeller Anti-icing Boot Removal and Installation Manual
- (b) 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: THE BETA TUBE MUST BE REMOVED BEFORE THE PROPELLER ASSEMBLY IS REMOVED FROM THE AIRCRAFT. REFER TO THE AIRCRAFT MAINTENANCE INSTRUCTION MANUAL.

(2) Remove the beta tube.

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 AND 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 THE HARTZELL PROPELLER INC. OVERHAUL MANUALS 118F (61-10-18) AND 132A (61-10-32).

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

(3) Cut and remove the safety wire on the propeller mounting bolts.

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

NOTE 1: Supporting the propeller with the 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 during re-installation to prevent dynamic imbalance.

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

- (5) Remove the propeller mounting bolts and washers.

NOTE: If the propeller is removed 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.

- (6) Using the support sling, lift the propeller from the mounting flange.
- (7) If the propeller has a two-piece spinner mounting plate, proceed to paragraph 9.C.(9).
- (8) Propellers with the one-piece spinner mounting plate only (refer to Figure 3-11):
- (a) Remove the spinner mounting plate, spinner bulkhead and start locks, as a unit, from the propeller hub flange.
- (9) Remove and discard propeller mounting O-ring.
- (10) Place the propeller on a suitable cart for transportation.

E. Removal of HC-()3()-7() Propellers

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

NOTE: Refer to Figures 3-12 through 3-16 for the Beta Valve System.

- (1) Remove the spinner dome in accordance with the procedure in the Spinner Dome Removal section of this chapter.
 - (a) If the propeller is equipped with an ice protection system that uses components supplied by Hartzell Propeller Inc., applicable instructions and technical information for the components supplied by Hartzell Propeller Inc. can be found in the following publications available on the Hartzell Propeller Inc. website at www.hartzellprop.com:
 - 1 Manual 180 (30-61-80) - Propeller Ice Protection System Manual
 - 2 Manual 181 (30-60-81) - Propeller Ice Protection System Component Maintenance Manual
 - 3 Manual 182 (61-12-82) - Propeller Electrical De-ice Boot Removal and Installation Manual
 - 4 Manual 183 (61-12-83) - Propeller Anti-icing Boot Removal and Installation Manual
 - (b) 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).

- (2) Remove the self-locking nut and spacer from the beta system rod that protrudes from the pitch change rod and piston.
- (3) Prepare the propeller for removal (see Figures 3-14 through 3-16).
 - (a) Piston Removal
 - 1 Remove the flexlock nut with Hartzell Propeller Inc. P/N AST-2917 or a 1 7/16 inch wrench, if installed.
 - 2 Remove the safety wire from the three link pin units.
 - 3 Remove the safety screws from the link pin units.
 - 4 Remove the link pin units.
 - 5 Mark the piston and link pins with a felt tip pen or equivalent, so the piston can be reinstalled in the same position.
 - 6 Slide the link arms out of the piston slots.
 - 7 Remove the socket head cap screw, jam nut, and washer from each piston guide rod.
 - 8 Slide the piston off the cylinder.
 - (b) Spring assembly removal.
 - 1 Remove the ring retention plate screw safety wire.
 - 2 Remove the ring retention plate screws.
 - 3 Remove the retention plate.
 - 4 Remove the split retainer.
 - 5 Remove the spring assembly from the cylinder.

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 AND 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 THE HARTZELL PROPELLER INC. OVERHAUL MANUALS 118F (61-10-18) AND 132A (61-10-32).

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

- (4) Cut and remove the safety wire on the propeller mounting bolts.
- (5) Support the propeller assembly with a sling.

NOTE 1: Supporting the propeller with the 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 during re-installation to prevent dynamic imbalance.

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

(6) Remove the propeller mounting bolts and washers.

NOTE: If the propeller is removed between overhaul intervals, mounting bolts and washers may be reused if they are not damaged or corroded.

CAUTION 1: DO NOT ALLOW THE PROPELLER ASSEMBLY TO HIT OR REST ON THE BETA FEEDBACK ROD. THIS COULD BEND OR OTHERWISE DAMAGE THE ROD.

CAUTION 2: 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 propeller mounting O-ring.

(9) Place the propeller on a suitable cart for transportation.

F. Removal of Beta Valve Assembly for
HC-()3()(-)7() Propellers

(1) Remove the beta light switch from the beta valve pin per airframe manufacturer's instructions.

(2) Remove the engine mounted beta system control hardware from the beta valve rod end fitting, per the airframe/engine manufacturer's instructions.

(3) Loosen the check nut on the push rod spool from the bushing to break the Loctite® bond.

(4) Loosen the set screw to clear the threads of the push rod spool and to allow removal of the rod end cap.

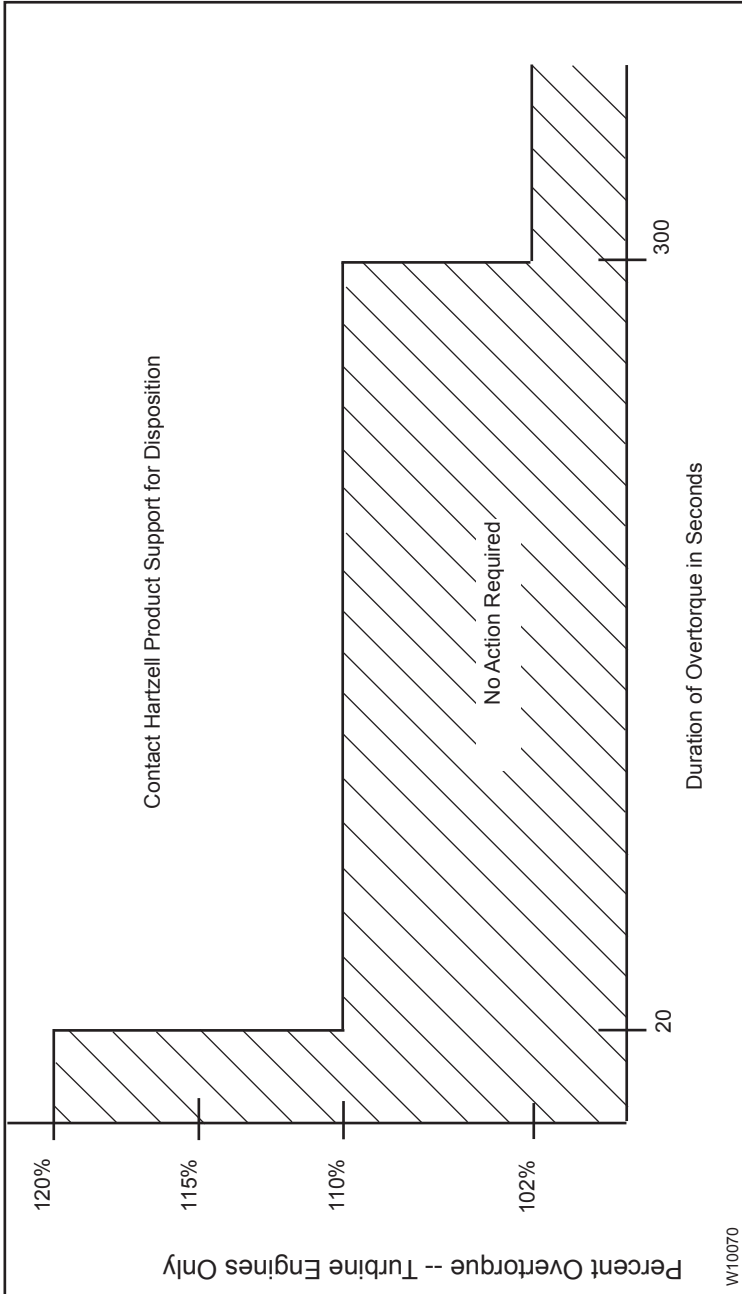
(5) Loosen the rod end cap to break the Loctite® bond and remove the rod end cap from the push rod spool.

- (6) Remove the rod end fitting from the push rod spool.
- (7) Remove the bushing from the push rod spool.
- (8) Remove the check nut from the push rod spool.
- (9) Remove the O-ring from the cavity at the rear of the threaded end of the push rod spool.
- (10) Remove the engine cover from the rear of the engine gear box encircling the beta valve push rod spool per the airframe or engine manufacturer's instructions.
- (11) Remove and discard the ID and OD O-rings from the engine cover.

WARNING: TO AVOID INJURY, SPRINGS IN THE ENGINE SHAFT ARE PRELOADED AND MUST BE PROPERLY CONTROLLED WHEN RELEASING THE SPRING RETAINER.

- (12) Secure the spring retainer and remove the retaining ring that holds the spring retainer in place.
- (13) Remove the spring retainer from the engine shaft and beta valve.
- (14) Remove the inner and outer springs from the engine shaft and beta valve.
- (15) Slide the beta valve's remaining assembly and push rod spool out of the engine shaft toward where the propeller had been mounted.
- (16) Place all beta valve parts together, including the self locking nut and spacer that were removed to allow the removal of the propeller assembly.

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Turbine Engine Overtorque Limits
Figure 5-4

B. Propeller Ground Idle Operating Restrictions

WARNING: STABILIZED GROUND OPERATION WITHIN THE PROPELLER RESTRICTED RPM RANGE CAN GENERATE HIGH PROPELLER STRESSES AND RESULT IN FATIGUE DAMAGE TO THE PROPELLER. THIS DAMAGE CAN LEAD TO A REDUCED PROPELLER FATIGUE LIFE, PROPELLER FAILURE, AND LOSS OF CONTROL OF THE AIRCRAFT. THE PROPELLER RESTRICTED RPM RANGE IS DEFINED IN THE AIRPLANE FLIGHT MANUAL.

(1) General

- (a) The information in this section applies only to the four and five bladed propeller models that are addressed in this manual.
- (b) The information in this section is intended to emphasize the critical importance of correct propeller ground idle RPM on certain turboprop installations. It also defines the appropriate corrective action required when a propeller has been operated within this restricted RPM region.
- (c) If the propeller is operated within a restricted RPM range or below a minimum idle RPM restriction for an extended period of time, the propeller blades and hub can become unairworthy because of fatigue. A failed blade or hub has the potential to cause a catastrophic blade separation.
- (d) Four, five and six blade propellers operating on turbine engines can be sensitive to operation within restricted RPM ranges. These restricted ranges are usually in the lower RPM ranges, requiring that ground idle RPM be set above a critical minimum value.

3. Carbon Block Assemblies

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

A. Inspection

The clearance between the yoke pin and the corresponding linkage (beta lever bushing) can become too close due to a buildup of plating and foreign particles between the two pieces. This can cause a binding action, resulting in excessive wear to the carbon block, beta ring, and beta linkage.

- (1) Inspect the beta lever and carbon block interface for free movement. If there is binding, do the following:
 - (a) Disconnect the beta linkage and remove the carbon block assemblies from the beta ring.
 - (b) Using an abrasive pad, lightly polish the yoke pin to provide adequate clearance and eliminate binding.
 - (c) Reinstall the carbon block assembly into the beta ring.
 - (d) Install, adjust and safety the beta linkage per the airframe manufacturer's instructions.

B. Replacement of A-3026 Carbon Block Unit in the A-3044 Carbon Block Assembly

Replace an A-3026 carbon block unit if the side clearance between the beta ring and carbon block exceeds 0.010 inch (0.25 mm).

- (1) Remove the cotter pin from the end of the clevis pin.
- (2) Slide the pin from the assembly and remove and discard the carbon block unit.
- (3) Inspect the yoke for wear or cracks. Replace the yoke if necessary.

- (4) Install a new carbon block unit and slide a new clevis pin into place.
 - (5) Secure the clevis pin with a T-head cotter pin (Figure 3-7).
 - (6) Refit the carbon block (Figure 3-6).
 - (a) Establish the required clearance by sanding the sides of the carbon block as needed.
- C. Installation of the A-3044 Carbon Block Assembly
Refer to Installation and Removal Chapter of this manual for installation instructions.