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MANUAL REVISION TRANSMITTAL

MANUAL 141 (61-10-41)
Four Blade Lightweight Turbine Propeller Overhaul Manual

REVISION 17 dated March 2024

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NOTE 1: Record the removal of a Temporary Revision on the Record of Temporary Revisions pages in this manual if applicable.

NOTE 2: When the manual revision has been inserted in the manual, record the information required on the Record of Revisions pages in this manual.

NOTE 3: Pages distributed in this revision may include pages from previous revisions if they are on the opposite side of revised pages. This is done as a convenience to those users who wish to print a two-sided copy of the new revision.

Manual No. 141
61-10-41
Revision 17
March 2024

Four Blade Lightweight Turbine Propeller Overhaul Manual

HC-D4N-5( )
HC-D4P-5( )
HC-E4N-5( )
HC-E4P-5( )
HC-E4W-5L

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REVISION 17 HIGHLIGHTS

Revision 17, dated March 2024, incorporates the following:

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

Incorporated the HC-E4P-5( )/E11990K propeller, where applicable.

Removed references to "Hartzell Propeller Inc.". Revised to "Hartzell Propeller LLC" where applicable.

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

- INTRODUCTION
  - Revised the section, "Reference Publications"
  - Added the section, "Video" Icon/QR Code
  - Added Figure 1, "Video" Icon/QR Code
- DESCRIPTION AND OPERATION
  - Revised the section, "General"
- TESTING AND FAULT
  - Revised Figure 1-2, "Checking Blade Play"
  - Revised the section, "Troubleshooting Guide"
- DISASSEMBLY
  - Revised the section, "Disassembly of HC-(D,E)4(N,P,W)-5( ) Propeller Models"
  - Revised the section, "Blade Disassembly"
  - Added Figure 3-5, "Pitch Change Knob Bracket Disassembly"
- CHECK
  - Revised Figure 5-13, "Start Lock Piston Ring Inspection Criteria"
  - Added Figure 5-38, "Counterweight Slug"
  - Added the section, "Counterweight Slug, P/N A-745-4" (Item 9040)
  - Added the section, "Counterweight Slug, P/N A-890-13" (Item 9045)
- REPAIR
  - Revised the section, "Repair/Modification Procedures"
  - Revised Figure 6-3, "Optical Comparator Overlay"
  - Revised the section, "Inspection of the Internal Surface of a Cylinder"
  - Revised Figure 6-4, "Inspection for a Sharp Corner"

REVISION 17 HIGHLIGHTS, CONTINUED

- ASSEMBLY
  - Revised Figure 7-2, "Installing O-ring on the Rotatable Fixture"
  - Revised Figure 7-4, "Installing the Dowel Pin into the Pitch Change Knob Bracket"
  - Revised Table 7-1, "Blade Pitch Change Knob Bracket Unit Selection"
  - Revised Figure 7-38, "Checking Blade Play"
  - Revised Figure 7-43, "Counterweight Slug Placement for HC-E4N-5( ) Propellers"
  - Added Figure 7-44, "Counterweight Slug Placement for HC-E4P-5( ) Propellers"
  - Revised the section, "Installing Counterweight Slugs"
  - Revised the section, "Propeller Disassembled for Shipping"
  - Revised the section, "Reassembly of a Propeller Disassembled for Shipping"
- FITS AND CLEARANCES
  - Revised the section, "Torque Values"
  - Revised Table 8-1, "Torque Values"
  - Revised Figure 8-2, "Blade Play"
  - Revised the section, "Blade Tolerances"
- ILLUSTRATED PARTS LIST
  - Revised the Parts List for Propeller Model HC-D4N-5AL
  - Revised the Parts List for Propeller Model HC-D4N-5C
  - Revised the Parts List for Propeller Model HC-D4N-5E
  - Revised the Parts List for Propeller Model HC-D4P-5
  - Revised the Parts List for Propeller Model HC-D4P-5L
  - Revised the Parts List for Propeller Model HC-E4N-5A
  - Revised the Parts List for Propeller Model HC-E4N-5B
  - Revised the Parts List for Propeller Model HC-E4N-5D
  - Added Figure 10-12, "HC-E4P-5: Propeller Parts"
  - Added the Parts List for Propeller Model HC-E4P-5
  - Added Figure 10-13, "HC-E4P-5E: Propeller Parts"
  - Added the Parts List for Propeller Model HC-E4P-5E
  - Added Figure 10A-5, "Blade Retention Parts"
  - Added the Parts List for the HC-E4P-5 and HC-E4P-5E Propellers Blade Retention Parts
  - Added Figure 10A-8, "E-6771-Hub Unit"
  - Added the Parts List for the E-6771-Hub Unit
  - Added Figure 10A-15, "B-6258-( ): Pitch Change Knob Bracket Assembly"
  - Added the Parts List for the B-6258-( ): Pitch Change Knob Bracket Assembly
  - Revised Figure 10A-21, "100641-( ): Preload Plate Assembly"
  - Added the Parts List for the 100641-( ): Preload Plate Assembly

REVISIONS 17 HIGHLIGHTS

1. Introduction

   A. General

   (1) This is a list of current revisions that have been issued against this manual. Please compare to 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 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 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 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 format changes over a large portion of the manual. The manual is distributed in its entirety. All the 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.

REVISIONS 17 HIGHLIGHTS

Revision No.	Issue Date	Comments
Revision 1	Apr/96	
Revision 2	Feb/98	
Revision 3	Jul/98	
Revision 4	Jul/02	
Revision 5	Mar/03	Minor Revision
Revision 6	June/04	Minor Revision
Revision 7	Aug/07	Minor Revision
Revision 8	Aug/15	Reissue
Revision 9	Nov/16	Reissue
Revision 10	Jun/17	Minor Revision
Revision 11	Mar/18	Minor Revision
Revision 12	Apr/19	Minor Revision
Revision 13	Sep/20	Minor Revision
Revision 14	Mar/22	Minor Revision
Revision 15	Oct/22	Minor Revision
Revision 16	Jun/23	Major Revision
Revision 17	Mar/24	Minor Revision

RECORD OF REVISIONS

This is a record of revisions inserted into this manual.
Revision 16 includes all prior revisions.

Revision Number	Issue Date	Date Inserted	Inserted By
16	Jun/23	Jun/23	HPI
17	Mar/24	Mar/24	Hartzell

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RECORD OF TEMPORARY REVISIONS

Update this page to show all temporary revisions inserted into this manual.
Revision 16 includes all prior temporary revisions, up to and including TR-013.

Temporary Revision No.	Section/ Page	Issue Date	Date Inserted	Inserted By	Date Removed	Removed By

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SERVICE DOCUMENT LIST

CAUTION 1: DO NOT USE OBSOLETE OR OUTDATED INFORMATION. PERFORM ALL INSPECTIONS OR WORK IN ACCORDANCE WITH THE MOST RECENT REVISION OF THE 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 Bulletins:	
SB 158B	Rev. 1 Apr/96
SB 171A	Rev. 4, Jul/02
SB 185	Rev. 2, Feb/98
HC-SB-61-215, R3	Rev. 1 Apr/96
HC-SB-61-216	Rev. 17, Mar/24
HC-SB-61-225, R2	Rev. 2, Feb/98
HC-SB-61-231, R1	Rev. 8, Aug/15
HC-SB-61-235, R1	Rev. 5, Mar/03
HC-SB-61-276, R4	Rev. 7, Aug/07
HC-SB-61-276, R5	Rev. 8, Aug/15
HC-SB-61-289	Rev. 7, Aug/07
HC-SB-61-309	Rev. 8, Aug/15
HC-SB-61-346	Rev. 8, Aug/15
HC-SB-61-374, R1	Rev. 17, Mar/24
HC-SB-61-389, R1	Rev. 16, Jun/23

Service Document Number	Incorporation Rev./Date
Service Letters:	
SL 39	Rev. 2, Feb/98
HC-SL-61-177	Rev. 2, Feb/98
HC-SL-61-181, R1	Rev. 5, Mar/03
HC-SL-61-187, R1	Rev. 5, Mar/03
HC-SL-61-187, R2	Rev. 7, Aug/07
HC-SL-61-187, R3	Rev. 8, Aug/15
HC-SL-61-195	Rev. 7, Aug/07
HC-SL-61-241, R1	Rev. 7, Aug/07
HC-SL-61-241, R3	Rev. 8, Aug/15
HC-SL-61-250	Rev. 8, Aug/15
HC-SL-61-282	Rev. 8, Aug/15
HC-SL-61-301	Rev. 8, Aug/15
HC-SL-61-350	Rev. 11, Mar/18
HC-SL-61-354	Rev. 9, Nov/16

SERVICE DOCUMENT LIST

Service Document Number	Incorporation Rev./Date
Service Instructions:	
SI 152A	Rev. 8, Aug/15
SI 180	Rev. 8, Aug/15
SI 189	Rev. 8, Aug/15
SI 209	Rev. 1, Apr/96
Service Advisories:	
SA 2C	Rev. 5, Feb/98

AIRWORTHINESS LIMITATIONS

1. Airworthiness Limitations

A. Life Limits

(1) Certain component parts, as well as the entire propeller, may have specific life limits established by the FAA. Such limits require replacement of items after a specific number of hours of use.

(2) For airworthiness limitations information for a propeller that has composite blades, refer to Hartzell Propeller Owner's Manual 147 (61-00-47).

(3) For airworthiness limitations information for a propeller that has metal blades, refer to Hartzell Propeller Owner's Manual 149 (61-00-49).

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INTRODUCTION - CONTENTS

LIST OF FIGURES

1. General (Rev. 2)

A. Statement of Purpose

(1) This manual has been reviewed and accepted by the FAA. Additionally, this manual contains data that has been approved in a manner acceptable to the FAA administrator.

(2) This manual provides maintenance and overhaul procedures for use in propeller repair stations by personnel that are trained and experienced with Hartzell Propeller LLC products.

(a) This manual does not provide complete information for an inexperienced technician to attempt propeller overhaul without supervision.

(3) This manual is intended to be the primary source of maintenance and overhaul information for the applicable Hartzell propeller/component models.

(a) Propeller models addressed in this manual may be Type Certificated by the FAA, or may be experimental. Experimental parts must not be installed on a Type Certificated propeller. Always use the current illustrated parts list for the assembly of any propeller. Always refer to the aircraft Type Certificate (TC) or Supplemental Type Certificate (STC) to determine installation eligibility of any propeller. If installation eligibility is not identifiable, an additional installation approval, such as FAA form 337 field approval or Supplemental Type Certificate may be required. If in doubt, contact Hartzell Propeller Product Support.

(b) Information published in Service Bulletins, Service Letters, Service Advisories, and Service Instructions may supersede information published in this manual. The reader must consult active Service Bulletins, Service Letters, Service Advisories, and Service Instructions for information that may have not yet been incorporated into the latest revision of this manual.

(4) This manual makes reference to other Hartzell Propeller manuals that provide important details for procedures such as anodizing, penetrant inspection, and overhaul procedures for hub units.

(5) Where possible, this manual is written in the format specified by ATA iSpec 2200.

B. Item References

(1) Item references throughout the text in this manual refer to item numbers in the Illustrated Parts List chapter of this manual. The item numbers appear in parentheses directly following the part name. Only the item base number will appear in the text of the manual. Item base numbers and the alpha variants of the base numbers will appear in the illustrated parts list. There are two reasons for the use of alpha variants:

(a) A part may be superseded, replaced, or obsoleted by another part. For example, the pitch change block unit (105733) that is item 320 was superseded by the pitch change block unit (105733-1) that is item 320A.

(b) An Illustrated Parts List may contain multiple configurations. Effectivity codes are used to distinguish different part numbers within the same list. For example, one configuration may use a piston (B-2419) that is item 80, yet another configuration uses a piston (104256) that is item 80A. Effectivity codes are very important in the determination of parts in a given configuration.

2. Reference Publications

A. Hartzell Propeller Publications

(1) Information published in Service Bulletins, Service Letters, Service Advisories, and Service Instructions may supersede information published in this manual. The reader must consult active Service Bulletins, Service Letters, Service Advisories, and Service Instructions for information that may have not yet been incorporated into the latest revision of this manual.

(2) In addition to this manual, one or more of the following publications are required for information regarding specific recommendations and procedures to maintain propeller assemblies that are included in this manual.

Manual No. (ATA No.)	Available at www.hartzellprop.com	Hartzell Propeller Manual Title
n/a	Yes	Active Hartzell Propeller Service Bulletins, Service Letters, Service Instructions, and Service Advisories
Manual 127 (61-16-27)	Yes	Metal Spinner Maintenance Manual
Manual 133C (61-13-33)	-	Aluminum Blade Overhaul Manual
Manual 135F (61-13-35)	-	Composite Blade Overhaul Manual
Manual 147 (61-00-47)	Yes	Propeller Owner’s Manual and Logbook for Lightweight Turbine Propeller Models with Composite Blades
Manual 148 (61-16-48)	Yes	Composite Spinner Maintenance Manual
Manual 149 (61-00-49)	Yes	Propeller Owner’s Manual and Logbook for Lightweight Turbine Propeller Models with Aluminum Blades
Manual 159 (61-02-59)	Yes	Application Guide
Manual 165A (61-00-65)	Yes	Illustrated Tool and Equipment Manual
Manual 180 (30-61-80)	Yes	Ice Protection System Manual
Manual 202A (61-01-02)	Vol. 7, Yes Vol. 11, Yes	Standard Practices Manual, Volumes 1 through 11

B. Vendor Publications

None.

3. Personnel Requirements (Rev. 2)

A. Service and Maintenance Procedures in this Manual

(1) Personnel performing the service and maintenance procedures in this manual are expected to have the required equipment/tooling, training, and certifications (when required by the applicable Aviation Authority) to accomplish the work in a safe and airworthy manner.

(2) Compliance to the applicable regulatory requirements established by the Federal Aviation Administration (FAA) or international equivalent is mandatory for anyone performing or accepting responsibility for the inspection and/or repair of any Hartzell Propeller LLC product.

(a) Maintenance records must be kept in accordance with the requirements established by the Federal Aviation Administration (FAA) or international equivalent.

(b) Refer to Federal Aviation Regulation (FAR) Part 43 for additional information about general aviation maintenance requirements.

4. Special Tooling and Consumable Materials (Rev. 2)

A. Special Tooling

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

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

B. Consumable Materials

(1) Consumable materials are referenced in certain sections throughout this manual. Specific approved materials are listed in the Consumable Materials chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

(a) Consumable material reference numbers appear with the prefix “CM” directly following the material to which they apply. For example, an adhesive that is reference number 16 will appear as: adhesive CM16. Only the material(s) specified can be used.

5. Safe Handling of Paints and Chemicals (Rev. 1)

A. Instructions for Use

(1) Always use caution when handling or being exposed to paints and/or chemicals during propeller overhaul and maintenance procedures.

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

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

6. Calendar Limits and Long Term Storage (Rev. 3)

A. Calendar Limits

(1) The effects of exposure to the environment over a period of time create a need for propeller overhaul regardless of flight time.

(2) A calendar limit between overhauls is specified in Hartzell Propeller Service Letter HC-SL-61-61Y.

(3) Experience has shown that special care, such as keeping an aircraft in a hangar, is not sufficient to permit extension of the calendar limit.

(4) The start date for the calendar limit is when the propeller is first installed on an engine.

(5) The calendar limit is not interrupted by subsequent removal and/or storage.

(6) The start date for the calendar limit must not be confused with the warranty start date, that is with certain exceptions, the date of installation by the first retail customer.

B. Long Term Storage

(1) Propellers that have been in storage have additional inspection requirements before installation. Refer to the Packaging and Storage chapter in the Hartzell Propeller Standard Practices Manual 202A (61-01-02).

7. Component Life and Overhaul (Rev. 3)

WARNING: CERTAIN PROPELLER COMPONENTS USED IN NON-AVIATION APPLICATIONS ARE MARKED WITH DIFFERENT PART NUMBERS TO DISTINGUISH THEM FROM COMPONENTS USED IN AVIATION APPLICATIONS. DO NOT ALTER THE PART NUMBERS SHOWN ON PARTS DESIGNATED FOR NON-AVIATION APPLICATIONS OR OTHERWISE APPLY THOSE PARTS FOR USE ON AVIATION APPLICATIONS.

A. Component Life

(1) Component life is expressed in terms of hours of service (Time Since New, TSN) and in terms of hours of service since overhaul (Time Since Overhaul, TSO).

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

(2) Time Since New (TSN) and Time Since Overhaul (TSO) records for the propeller hub and blades must be maintained in the propeller logbook.

(3) Both TSN and TSO are necessary for defining the life of the component. Certain components or in some cases an entire propeller, may be "life limited", which means that they must be replaced after a specified period of use (TSN).

(a) It is a regulatory requirement that a record of the Time Since New (TSN) be maintained for all life limited parts.

(b) Refer to the Airworthiness Limitations chapter in the applicable Hartzell Propeller Owner's Manual for a list of life limited components.

(4) When a component or assembly undergoes an overhaul, the TSO is returned to zero hours.

(a) Time Since New (TSN) can never be returned to zero.

(b) Repair without overhaul does not affect TSO or TSN.

(5) Blades and hubs are sometimes replaced while in service or at overhaul.

(a) Maintaining separate TSN and TSO histories for a replacement hub or blade is required.

(b) Hub replacement

1 If the hub is replaced, the replacement hub serial number must be recorded (the entry signed and dated) in the propeller logbook.

2 The propeller will be identified with the serial number of the replacement hub.

NOTE: Propeller assembly serial numbers are impression stamped on the hub. For stamping information, refer to the Parts Identification and Marking chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

3 The TSN and TSO of the replacement hub must be recorded and maintained in the propeller logbook.

4 If tracking any component(s) other than the hub/blades, maintain these TSN/TSO records separately in the propeller logbook.

NOTE: Hub replacement does not affect the TSN/TSO of any other propeller components.

B. Overhaul

(1) Overhaul is the periodic disassembly, cleaning, inspecting, repairing as necessary, reassembling, and testing in accordance with approved standards and technical data approved by Hartzell Propeller LLC.

(2) The overhaul interval is based on hours of service, i.e., flight time, or on calendar time.

(a) Overhaul intervals are specified in Hartzell Propeller Service Letter HC-SL-61-61Y.

(b) At such specified periods, the propeller hub assembly and the blade assemblies must be completely disassembled and inspected for cracks, wear, corrosion, and other unusual or abnormal conditions.

(3) Overhaul must be completed in accordance with the latest revision of the applicable component maintenance manual and other publications applicable to, or referenced in, the component maintenance manual.

(a) Parts that are not replaced at overhaul must be inspected in accordance with the check criteria in the applicable Hartzell Propeller component maintenance manual.

(b) Parts that must be replaced at overhaul are identified by a "Y" in the O/H column of the Illustrated Parts List in the applicable Hartzell Propeller component maintenance manual.

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

8. Damage/Repair Types (Rev. 2)

A. Airworthy/Unairworthy Damage

(1) Airworthy damage is a specific condition to a propeller component that is within the airworthy damage limits specified in the applicable Hartzell Propeller component maintenance manual.

(a) Airworthy damage does not affect the safety or flight characteristics of the propeller and conforms to its type design.

(b) Airworthy damage does not require repair before further flight, but should be repaired as soon as possible to prevent degradation of the damage.

(2) Unairworthy damage is a specific condition to a propeller component that exceeds the airworthy damage limits specified in the applicable Hartzell Propeller component maintenance manual.

(a) Unairworthy damage can affect the safety or flight characteristics of the propeller and does not conform to its type design.

(b) Unairworthy damage must be repaired before the propeller is returned to service.

B. Minor/Major Repair

(1) Minor Repair

(a) Minor repair is that which may be done safely in the field by a certified aircraft mechanic.

1 For serviceable limits and repair criteria for Hartzell propeller components, refer to the applicable Hartzell Propeller component maintenance manual.

(2) Major Repair

(a) Major repair cannot be done by elementary operations.

(b) Major repair work must be accepted by an individual that is certified by the Federal Aviation Administration (FAA) or international equivalent.

1 Hartzell recommends that individuals performing major repairs also have a Factory Training Certificate from Hartzell Propeller LLC.

2 The repair station must meet facility, tooling, and personnel requirements and is required to participate in Hartzell Propeller Sample Programs as defined in the Approved Facilities chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

9. Propeller Critical Parts (Rev. 2)

A. Propeller Critical Parts

(1) Procedures in this manual may involve Propeller Critical Parts (PCP).

(a) 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.

(b) Refer to the Illustrated Parts List chapter in the applicable Hartzell Propeller maintenance manual to identify the Propeller Critical Parts.

(2) Numerous propeller system parts can produce a propeller Major or Hazardous effect, even though those parts may not be considered as Propeller Critical Parts.

(a) 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.

10. Warranty Service (Rev. 2)

A. Warranty Claims

(1) If you believe you have a warranty claim, contact the Hartzell Propeller Product Support Department to request a *Warranty Application* form. Complete this form and return it to Hartzell Propeller Product Support for evaluation **before proceeding with repair or inspection work**. Upon receipt of this form, the Product Support Department will provide instructions on how to proceed.

(a) For Hartzell Propeller Product Support Department contact information, refer to the “Hartzell Propeller Contact Information” section in this chapter.

11. Hartzell Propeller Contact Information (Rev. 3)

A. Product Support Department

(1) Contact the Hartzell Propeller Product Support Department about any maintenance problems or to request information not included in this publication.

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

(a) The Product Support Department 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.

(b) The Product Support Department can also be reached by fax at (937) 778-4215, and by e-mail at techsupport@hartzellprop.com.

(c) 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.

1 A technical representative will contact you during normal business hours.

2 Urgent AOG support is also available 24 hours per day, seven days per week via this message service.

(d) Additional information is available on the Hartzell Propeller website at www.hartzellprop.com.

B. Technical Publications Department

(1) For Hartzell Propeller service literature and revisions, contact:

Hartzell Propeller LLC
Attn: Technical Publications Department
One Propeller Place
Piqua, Ohio 45356-2634 U.S.A.

Telephone: 937.778.4200
Fax: 937.778.4215
E-mail: manuals@hartzellprop.com

C. Recommended Facilities

(1) Hartzell Propeller LLC recommends using Hartzell-approved distributors and repair facilities for the purchase, repair, and overhaul of Hartzell propeller assemblies or components.

(2) Information about the Hartzell Propeller LLC worldwide network of aftermarket distributors and approved repair facilities is available on the Hartzell website at www.hartzellprop.com.

12. "Video" Icon/QR Code

A. Instructions for Use

(1) The "Video" icon/QR code (refer to Figure 1) that appears in this manual allows you to access a video or animated demonstration of the applicable procedure.

CAUTION: THESE VIDEOS/ANIMATIONS ARE INTENDED TO SUPPLEMENT THE APPLICABLE INSTRUCTIONS. THEY SHOULD NOT BE USED WITHOUT FIRST READING AND UNDERSTANDING THE LATEST REVISION OF THE PROCEDURE AND ANY APPLICABLE WARNINGS/CAUTIONS.

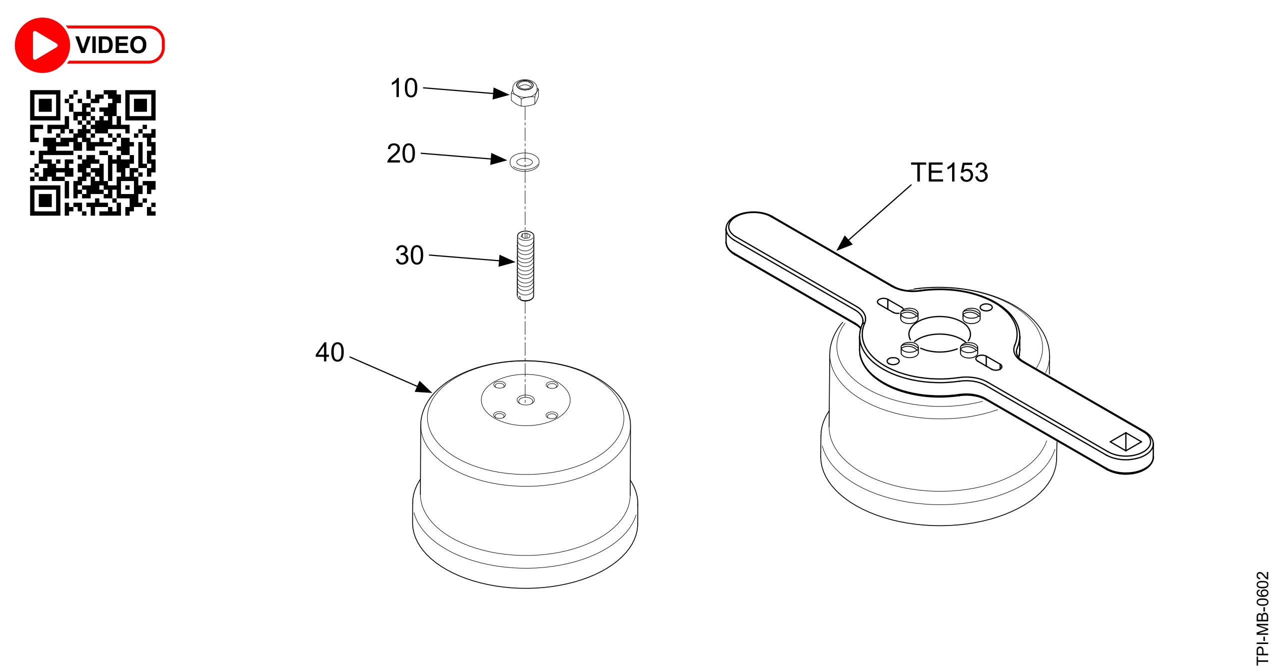
(2) To access the video/animated demonstration:

(a) If viewing the document file digitally:

1 Click on the QR code

(b) From a printed copy of the page:

1 Scan the QR code from any mobile device equipped with a QR reader application.



"Video" Icon/QR Code
Figure 1

13. Definitions (Rev. 5)

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

Term	Definition
Annealed	Softening of material due to overexposure to heat
Aviation Certified	Intended for FAA or international equivalent type certificated aircraft applications. A TC and PC number must be stamped on the hub, and a PC number must be stamped on blades.
Aviation Experimental	Intended for aircraft/propeller applications not certified by the FAA or international equivalent. Products marked with an “X” at or near the end of the model number or part number are not certified by the FAA or international equivalent and are not intended to use on certificated aircraft.
Beta Operation	A mode of pitch control that is directed by the pilot rather than by the propeller governor
Beta Range	Blade angles between low pitch and maximum reverse blade angle
Beta System	Parts and/or equipment related to operation (manual control) of propeller blade angle between low pitch blade angle and full reverse blade angle
Blade Angle	Measurement of blade airfoil location described as the angle between the blade airfoil and the surface described by propeller rotation
Blade Centerline	An imaginary reference line through the length of a blade around which the blade rotates
Blade Station	Refers to a location on an individual blade for blade inspection purposes. It is a measurement from the blade “zero” station to a location on a blade, used to apply blade specification data in blade overhaul manuals. Note: Do not confuse *blade station* with *reference blade radius*; they may not originate at the same location.
Blemish	An imperfection with visible attributes, but having no impact on safety or utility
Brinelling	A depression caused by failure of the material in compression

Term	Definition
Bulge	An outward curve or bend
Camber	The surface of the blade that is directed toward the front of the aircraft. It is the low pressure, or suction, side of the blade. The camber side is convex in shape over the entire length of the blade.
Chord	A straight line distance between the leading and trailing edges of an airfoil
Chordwise	A direction that is generally from the leading edge to the trailing edge of an airfoil
Co-bonded	The act of bonding a composite laminate and simultaneously curing it to some other prepared surface
Composite Material	Kevlar®, carbon, or fiberglass fibers bound together with, or encapsulated within an epoxy resin
Compression Rolling	A process 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
Corrosion (Aluminum)	The chemical or electrochemical attack by an acid or alkaline that reacts with the protective oxide layer and results in damage of the base aluminum. Part failure can occur from corrosion due to loss of structural aluminum converted to corrosion product, pitting, a rough etched surface finish, and other strength reduction damage caused by corrosion.
Corrosion (Steel)	Typically, an electrochemical process that requires the simultaneous presence of iron (component of steel), moisture and oxygen. The iron is the reducing agent (gives up electrons) while the oxygen is the oxidizing agent (gains electrons). Iron or an iron alloy such as steel is oxidized in the presence of moisture and oxygen to produce rust. Corrosion is accelerated in the presence of salty water or acid rain. Part failure can occur from corrosion due to loss of structural steel converted to corrosion product, pitting, a rough etched surface finish and other strength reduction damage caused by corrosion.

Term	Definition
Corrosion Product (Aluminum)	A white or dull gray powdery material that has an increased volume appearance (compared to non-corroded aluminum). Corrosion product is not to be confused with damage left in the base aluminum such as pits, worm holes, and etched surface finish.
Corrosion Product (Steel)	When iron or an iron alloy such as steel corrodes, a corrosion product known as rust is formed. Rust is an iron oxide which is reddish in appearance and occupies approximately six times the volume of the original material. Rust is flakey and crumbly and has no structural integrity. Rust is permeable to air and water, therefore the interior metallic iron (steel) beneath a rust layer continues to corrode. Corrosion product is not to be confused with damage left in the base steel such as pits and etched surface finish.
Crack	Irregularly shaped separation within a material, sometimes visible as a narrow opening at the surface
Debond	Separation of two materials that were originally bonded together in a separate operation
Defect	An imperfection that affects safety or utility
Delamination	Internal separation of the layers of composite material
Dent	The permanent deflection of the cross section that is visible on both sides with no visible change in cross sectional thickness
Depression	Surface area where the material has been compressed but not removed
Distortion	Alteration of the original shape or size of a component
Edge Alignment	Distance from the blade centerline to the leading edge of the blade
Erosion	Gradual wearing away or deterioration due to action of the elements
Exposure	Leaving material open to action of the elements

Term	Definition
Face	The surface of the blade that is directed toward the rear of the aircraft. The face side is the high pressure, or thrusting, side of the blade. The blade airfoil sections are normally cambered or curved such that the face side of the blade may be flat or even concave in the midblade and tip region.
Face Alignment	Distance from the blade centerline to the highest point on the face side perpendicular to the chord line
Feathering	The capability of blades to be rotated parallel to the relative wind, thus reducing aerodynamic drag
Fraying	A raveling or shredding of material
Fretting	Damage that develops when relative motion of small displacement takes place between contacting parts, wearing away the surface
Galling	To fret or wear away by friction
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
Inboard	Toward the butt of the blade
Intergranular Corrosion	Corrosion that attacks along the grain boundaries of metal alloys
Jog	A term used to describe movement up/down, left/right, or on/off in short incremental motions
Laminate	To unite composite material by using a bonding material, usually with pressure and heat
Lengthwise	A direction that is generally parallel to the pitch axis
Loose Material	Material that is no longer fixed or fully attached
Low Pitch	The lowest blade angle attainable by the governor for constant speed operation

Term	Definition
Major Propeller Effect	The major propeller effects are defined in Title 14 CFR section 35.15(g)(2)
Minor Deformation	Deformed material not associated with a crack or missing material
Monocoque	A type of construction in which the outer skin carries all or a major part of the load
Nick	Removal of paint and possibly a small amount of material
Non-Aviation Certified	Intended for non-aircraft application, such as Hovercraft or Wing in Ground Effect (WIG) applications. These products are certificated by an authority other than FAA. The hub and blades will be stamped with an identification that is different from, but comparable to TC and PC.
Non-Aviation Experimental	Intended for non-aircraft application, such as Hovercraft or Wing-In-Ground effect (WIG) applications. Products marked with an “X” at or near the end of the model number or part number are not certified by any authority and are not intended for use on certificated craft.
Onspeed	Condition in which the RPM selected by the pilot through the propeller control/condition lever and the actual engine (propeller) RPM are equal
Open Circuit	Connection of high or infinite resistance between points in a circuit which are normally lower
Outboard	Toward the tip of the blade
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/condition lever
Pitch	Same as “Blade Angle”
Pitting	Formation of a number of small, irregularly shaped cavities in surface material caused by corrosion or wear

Term	Definition
Pitting (Linear)	The configuration of the majority of pits forming a pattern in the shape of a line
Porosity	An aggregation of microvoids. See “voids”
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
Reference Blade Radius	Refers to the propeller reference blade radius in an assembled propeller, e.g., 30-inch radius. A measurement from the propeller hub centerline to a point on a blade, used for blade angle measurement in an assembled propeller. An adhesive stripe (blade angle reference tape CM160) is usually located at the reference blade radius location. Note: Do not confuse *reference blade radius* with *blade station*; they may not originate at the same point.
Reversing	The capability of rotating blades to a position to generate reverse thrust to slow the aircraft or back up
Scratch	Same as “Nick”
Short Circuit	Connection of low resistance between points on a circuit between which the resistance is normally much greater
Shot Peening	Process where steel shot is impinged on a surface to create compressive surface stress, that provides improved strength and resistance to fatigue
Single Acting	Hydraulically actuated propeller that utilizes a single oil supply for pitch control
Split	Delamination of blade extending to the blade surface, normally found near the trailing edge or tip
Station Line	See "Blade Station"
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
Ticking	A series of parallel marks or scratches running circumferentially around the diameter of the blade

Term	Definition
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
Trailing Edge	The aft edge of an airfoil over which the air passes last
Trimline	Factory terminology referring to where the part was trimmed to length
Underspeed	The condition in which the actual engine (propeller) RPM is lower than the RPM selected by the pilot through the propeller control/condition lever
Unidirectional Material	A composite material in which the fibers are substantially oriented in the same direction
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
Voids	Air or gas that has been trapped and cured into a laminate
Windmilling	The rotation of an aircraft propeller caused by air flowing through it while the engine is not producing power
Woven Fabric	A material constructed by interlacing fiber to form a fabric pattern
Wrinkle (aluminum blade)	A wavy appearance caused by high and low material displacement
Wrinkle (composite blade)	Overlap or fold within the material

14. Abbreviations (Rev. 2)

Abbreviation	Term
AD	Airworthiness Directives
AMM	Aircraft Maintenance Manual
AOG	Aircraft on Ground
AR	As Required
ATA	Air Transport Association
CSU	Constant Speed Unit
FAA	Federal Aviation Administration
FH	Flight Hour
FM	Flight Manual
FMS	Flight Manual Supplement
FT-Lb	Foot-Pound
HMI	Human Machine Interface
ICA	Instructions for Continued Airworthiness
ID	Inside Diameter
In-Lb	Inch-Pound
IPL	Illustrated Parts List
IPS	Inches Per Second
kPa	Kilopascals
Lb(s)	Pound(s)
Max.	Maximum
Min.	Minimum
MIL-X-XXX	Military Specification
MPI	Major Periodic Inspection (Overhaul)
MS	Military Standard
MSDS	Material Safety Data Sheet
N	Newtons

Abbreviation	Term
N/A	Not Applicable
NAS	National Aerospace Standards
NASM	National Aerospace Standards, Military
NDT	Nondestructive Testing
NIST	National Institute of Standards and Technology
N•m	Newton-Meters
OD	Outside Diameter
OPT	Optional
PC	Production Certificate
PCP	Propeller Critical Part
PLC	Programmable Logic Controller
PMB	Plastic Media Blasting (Cleaning)
POH	Pilot's Operating Handbook
PSI	Pounds per Square Inch
RF	Reference
RPM	Revolutions per Minute
SAE	Society of Automotive Engineers
STC	Supplemental Type Certificate
TBO	Time Between Overhaul
TC	Type Certificate
TSI	Time Since Inspection
TSN	Time Since New
TSO	Time Since Overhaul
UID	Unique Identification
WIG	Wing-In-Ground-Effect

DESCRIPTION AND OPERATION - CONTENTS

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1. General (Rev. 2)

A. Propeller/Blade Model Designation

(1) Hartzell Propeller LLC uses a model number designation system to identify specific propeller and blade assemblies. The propeller model number and blade model number are separated by a slash (/).

(a) Example: *propeller model number / blade model number*

(2) The propeller model number is impression stamped on the propeller hub.

(a) For additional information about the propeller model number designation system, refer to the applicable Hartzell Propeller owner's manual.

(3) The blade model number is impression stamped on the butt end of the blade, and also identified by a label on the cylinder.

(a) For additional information about the model number designation system for composite blades, refer to Hartzell Propeller Composite Blade Overhaul Manual 135F (61-13-35).

(b) For additional information about the model number designation system for aluminum blades, refer to Hartzell Propeller Aluminum Blade Overhaul Manual 133C (61-13-33).

2. Operation

A. Lightweight Turbine Propellers HC-(D,E)4(N,P,W)-5( ) Series

(1) The propellers described in this section are constant speed, feathering, and reversing.

(a) They use a single oil supply from a governing device to hydraulically actuate a change in blade angle.

(b) The propellers are four-bladed and are used primarily on Garrett TPE-331 Series turbopro engines.

(2) A two piece aluminum hub retains each propeller blade on a thrust bearing.

(a) A cylinder is attached to the hub and contains a feathering spring and piston.

(b) The hydraulically actuated piston transmits linear motion through a pitch change rod and fork to each blade to result in blade angle change.

(3) While the propeller is operating, the following forces are constantly present, 1) spring force, 2) counterweight force, 3) centrifugal twisting moment of each blade and 4) blade aerodynamic twisting forces.

(a) The spring and counterweight forces attempt to rotate the blades to higher blade angle while the centrifugal twisting moment of each blade is generally toward lower blade angle.

(b) Blade aerodynamic twisting force is very small in relation to the other forces and can attempt to increase or decrease blade angle.

(4) Summation of the propeller forces is toward higher pitch (low RPM) and is opposed by a variable force toward lower pitch (high RPM).

(a) The variable force is oil under pressure from a governor with an internal pump that is mounted on and driven by the engine.

(b) The oil from the governor is supplied to the propeller and hydraulic piston through a hollow engine shaft. Increasing the volume of oil within the piston and cylinder will decrease the blade angle and increase propeller RPM.

(c) Decreasing the volume of oil will increase blade angle and decrease propeller RPM.

(d) By changing the blade angle, the governor can vary the load on the engine and maintain constant engine RPM (within limits), independent of where the power lever is set.

(e) The governor uses engine speed sensing mechanisms that allow it to supply or drain oil as necessary to maintain constant engine speed (RPM).

(5) If governor supplied oil is lost during operation, the propeller will increase pitch and feather.

(a) Feathering occurs because the summation of internal propeller forces causes the oil to drain out of the propeller until the feather stop position is reached.

(6) Normal in-flight feathering is accomplished when the pilot retards the propeller condition lever past the feather detent.

(a) This allows control oil to drain from the propeller and return to the engine sump.

(b) Engine shutdown is normally accomplished during the feathering process.

(7) Normal in-flight unfeathering is accomplished when the pilot positions the propeller condition lever into the normal flight (governing) range and restarts the engine.

(a) As engine speed increases, the governor supplies oil to the propeller and the blade angle decreases.

(8) In reverse mode of operation, the governor operates in an underspeed condition to act strictly as a source of pressurized oil, without attempting to control RPM.

(a) Control of the propeller blade angle in reverse is accomplished with the beta valve.

NOTE: The beta valve on a Garrett/Aireseach or Honeywell TPE-331-( ) turbine engine is attached to an offset engine gearbox on the opposite side from where the propeller attaches. A tube interfaces from the beta valve through the gear box and attaches to the propeller.

(9) The propeller is reversed by manually repositioning the cockpit-control to cause the beta valve to supply oil from the governor pump to the propeller.

(a) A beta tube installed through the propeller to the beta valve and attached to the propeller communicates propeller blade angle position to the beta valve.

(10) The pilot will manually communicate a desired propeller blade angle in beta range to the engine mounted beta valve.

(a) When the propeller reaches the desired blade angle in the beta range, movement of the beta tube initiated by the propeller piston will align with a sleeve in the beta valve to keep propeller blade angle at the desired blade angle.

(11) Propeller movement toward more reverse will cause the beta valve to drain excess oil and propeller movement toward a higher (less reverse) blade angle will cause the beta valve to supply oil to the propeller.

(a) In this manner the propeller is maintained at a blade angle selected by the pilot in beta range and enforced by the beta valve.

(12) Movement of the cockpit-control to governing will manually return propeller blade angle back to low pitch where the governor will take over control of propeller blade angle.

(13) Propellers installed on fixed shaft engines, such as the Garrett/Airesearch or Honeywell TPE-331-( ) series turbine engine, will rotate during an engine start process.

(a) If the propeller is in feather position during engine start, an overload of the electric starter and batteries will occur.

(b) To prevent feathering during normal engine shutdown, the propeller incorporates spring-energized latch pins called start locks. Two units are installed on the cylinder.

(c) If propeller rotation is approximately 800 RPM or above, the start locks disengage from the piston by centrifugal force acting on the latch pins to compress the spring (within the units).

(d) When RPM drops below 800 RPM, the springs overcome the centrifugal force and move the latch pins to engage the piston, preventing blade angle movement to feather.

(14) Shortly after start up with the propeller RPM above 800, the latch pins in the start locks will still retain the blade angle.

(a) To release the latch pins, it is necessary to manually actuate the propeller slightly toward reverse.

(b) This will move the piston, allowing the latch pins to slide freely.

(c) Centrifugal force on the pins will compress the springs and disengage the pins from the piston.

TESTING AND FAULT ISOLATION - CONTENTS

LIST OF FIGURES

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1. Troubleshooting Guide

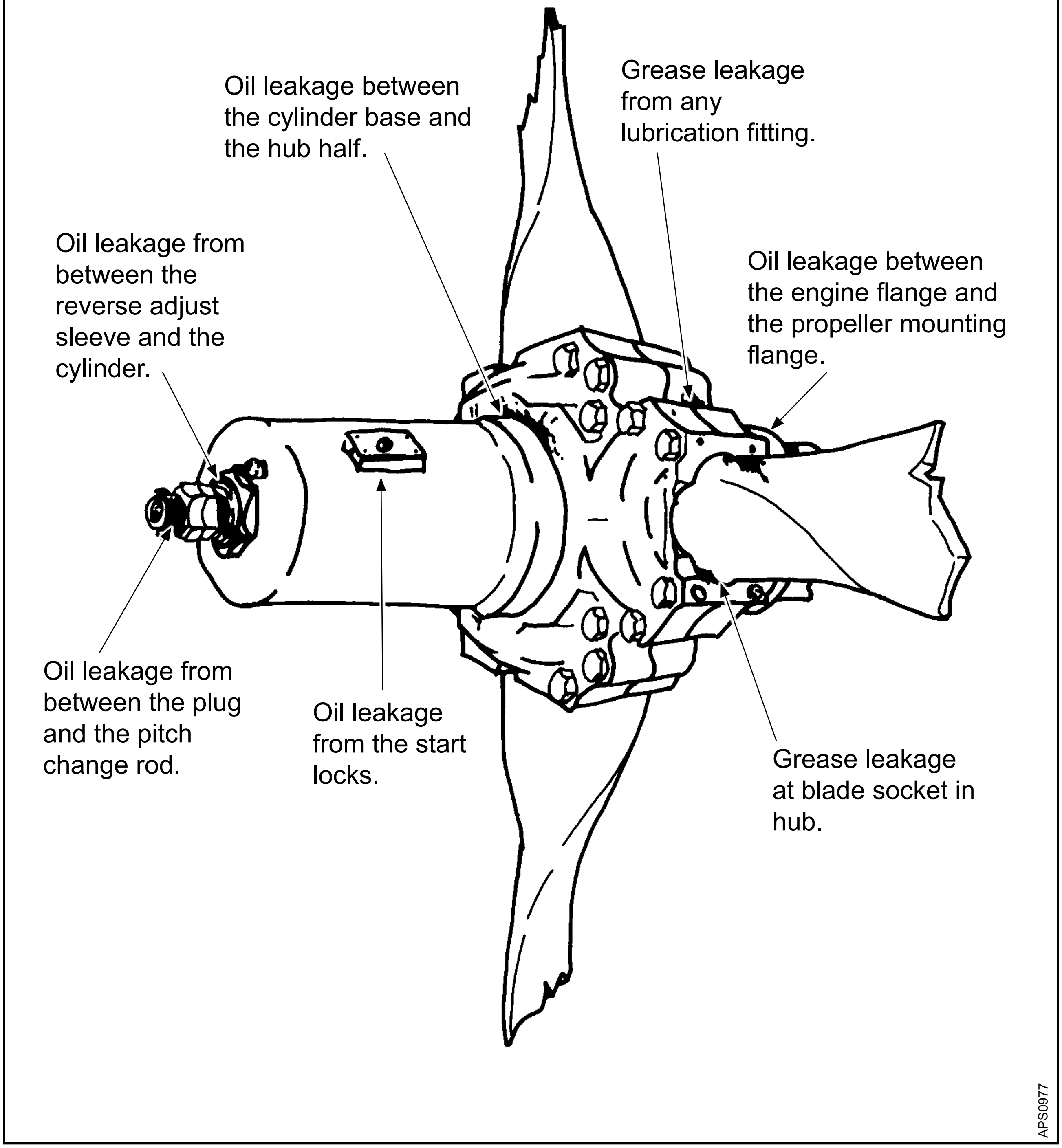
CAUTION: INSTRUCTIONS AND PROCEDURES IN THIS CHAPTER MAY INVOLVE PROPELLER CRITICAL PARTS. REFER TO THE INTRODUCTION CHAPTER OF THIS MANUAL FOR INFORMATION ABOUT PROPELLER CRITICAL PARTS. REFER TO THE ILLUSTRATED PARTS LIST IN THIS MANUAL FOR IDENTIFICATION OF PROPELLER CRITICAL PARTS.

The purpose of this chapter is to isolate probable causes and suggest remedies for common propeller service problems. In all cases, the remedy for a problem should follow the procedures detailed in the applicable section of this manual.

Problem	Probable Cause	Remedy
A. Pitch Control Difficulty	Excessive friction in moving parts.	Refer to problem 1.B. Friction.
	or Oil passages are not clear and open.	Check out the hydraulic system.
	or Incorrect governor has been installed.	Refer to the airframe or the engine manufacturer's maintenance manual for installation instructions.
B. Friction	Blade preload is excessive.	Disassemble the propeller and readjust the blade preload.
	or Lack of lubrication.	Add approved lubricant.
	or Balls in the blade retention split-bearing are unusually rough, corroded, or chipped.	Replace the blade retention split-bearing assembly.
	or Insufficient clearances between various moving parts in the pitch change mechanism.	Check the moving parts individually. Increase the clearances between the individual parts as necessary to decrease friction in the mechanism.

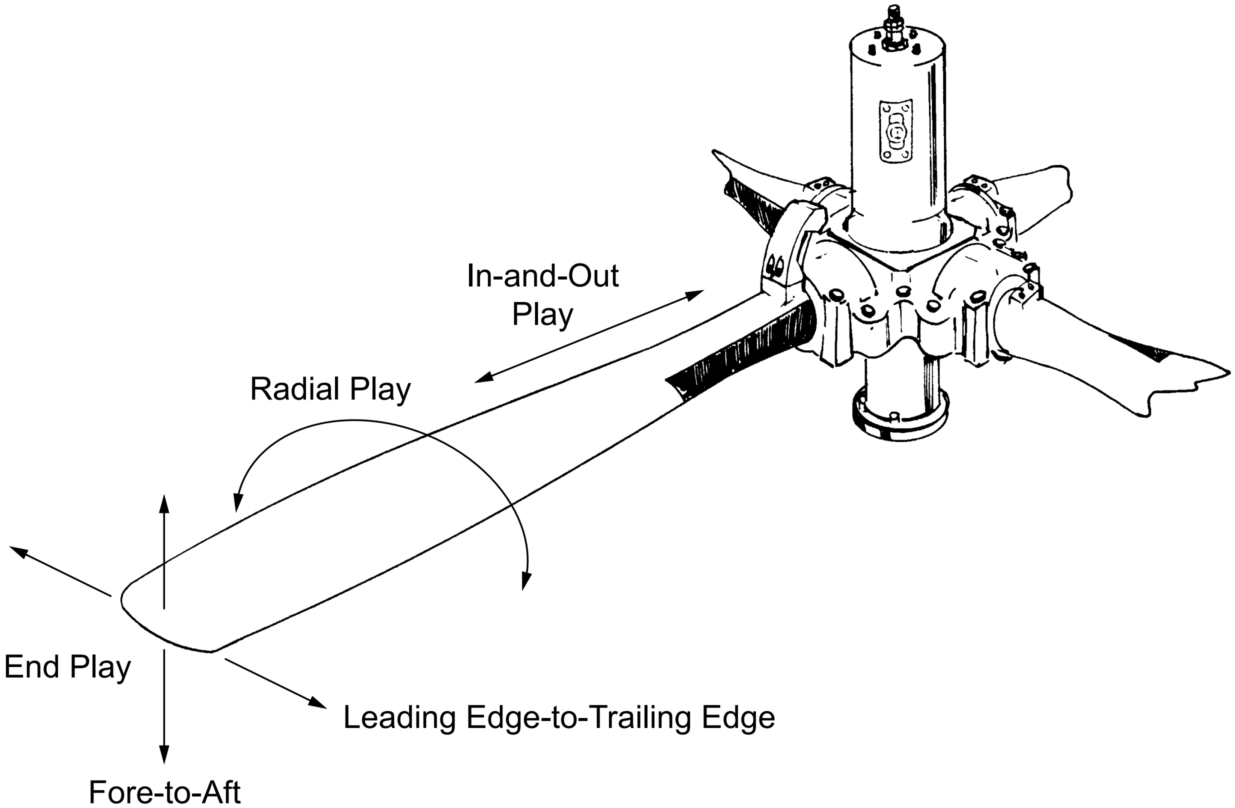
Problem	Probable Cause	Remedy
C. Abnormal Propeller Vibration	Bent, cracked, or damaged blade.	For aluminum blades, refer to Hartzell Propeller Aluminum Blade Overhaul Manual 133C (61-13-33). For composite blades, refer to Hartzell Propeller Composite Blade Overhaul Manual 135F (61-13-35).
	or Cracked or damaged hub.	Refer to the Aluminum Hub Overhaul chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).
	or Broken blade retention split bearings.	Replace the bearings and inspect the other blade retention components
	or Grease leakage.	Refer to the section, "Grease Leakage" in this chapter.
D. Slight Vibration	Blades not tracking.	Refer to the section, "Blades Not Tracking" in this chapter.
	or Static balance is incorrect.	Refer to the Static and Dynamic Balance chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).
	or Dynamic balance is incorrect.	Refer to the Static and Dynamic Balance chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).
	or Blade wear.	For aluminum blades, refer to Hartzell Propeller Aluminum Blade Overhaul Manual 133C (61-13-33). For composite blades, refer to Hartzell Propeller Composite Blade Overhaul Manual 135F (61-13-35).
	or Grease leakage.	Refer to the section, "Grease Leakage" in this chapter.

Problem	Probable Cause	Remedy
E. Surging RPM or Torque	Excessive friction in the pitch change mechanism.	Refer to the section "Friction" in this chapter.
	or Air is trapped in the propeller actuating piston or in the engine shaft.	After propeller installation and before each flight, exercise the propeller by changing pitch or feathering.
		The engine should have a provision for allowing trapped air to escape from the system during one-half of the pitch cycle.
	or Governor problem.	Refer to the airframe or the engine manufacturer's maintenance manual for installation instructions.
	or Beta system rigging.	Refer to the airframe manufacturer's instructions.



Inspection for Leakage of Oil or Grease
Figure 1-1

Problem	Probable Cause	Remedy
F. Oil Leakage (Refer to Figure 1-1)	Faulty O-ring seal between the engine flange and the propeller mounting flange.	Remove the propeller from the engine and inspect the O-ring and the sealing surface. Replace the defective O-ring.
	or Faulty O-ring seal between the cylinder and the hub.	Remove the cylinder and inspect the O-ring and the sealing surface. Replace the defective O-ring.
	or Faulty O-ring seal between the piston and the cylinder, resulting in leakage from the start locks on the cylinder or between the reverse adjust sleeve and the cylinder.	Remove the cylinder and inspect the piston O-ring and cylinder sealing surface. Replace the defective O-ring.
	or Faulty O-ring seal between the pitch change rod plug and the pitch change rod.	Remove the pitch change rod plug and inspect O-ring. Replace the defective O-ring.
	or Faulty O-ring seal between the pitch change rod and either hub half, resulting in leakage from the hub, beta rod holes, and around the blade shanks.	Remove the lubrication fitting at the bottom of the hub and insert a wire. If oil runs out, then one or both O-rings are defective.
		Remove the propeller from the engine and disassemble. Inspect both O-rings and sealing surfaces. Replace the defective O-ring(s).
G. Grease Leakage (Refer to Figure 1-1) A new or newly overhauled propeller may leak slightly during the first several hours of operation. The 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.	Defective lubrication fitting.	Replace defective lubrication fittings.
	or Faulty seal at blade socket in hub.	Disassemble the propeller and inspect the seal and the sealing surface. Replace the defective seal.



NOTE: Blades should be tight in the propeller, however, play that is within the allowable limits is acceptable if the blade returns to its original position when released. If blade play is greater than the allowable limits, or if blade(s) do not return to their original position when released, there may be internal wear or damage that should be referred to a certified propeller repair station with the appropriate rating.

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Checking Blade Play
Figure 1-2

Problem	Probable Cause	Remedy
H. End-Play (Leading Edge-to-Trailing Edge) of the Blade Refer to Figure 1-2 and the section, "Blade Tolerances" in the Fits and Clearances chapter of this manual.	Buildup of manufacturing tolerances.	Disassemble the propeller and reset the preload. Replace the preload plate, if necessary.
	or Blade retention bearing is worn.	Follow Blade Retention Split Bearing Inspection and Replacement Procedures.
	or Internal blade bearing is worn.	Disassemble the propeller, remove the blade, and inspect the bearing. Replace the worn bearing.
I. End-Play (Fore-to-Aft) of the Blade Refer to Figure 1-2 and the section, "Blade Tolerances" in the Fits and Clearances chapter of this manual.	Buildup of manufacturing tolerances.	Disassemble the propeller and reset the preload. Replace the preload plate, if necessary.
	or Blade retention bearing is worn.	Follow Blade Retention Split Bearing Inspection and Replacement Procedures.
J. In-and-Out Play of the Blade Refer to Figure 1-2 and the section, "Blade Tolerances" in the Fits and Clearances chapter of this manual.	Buildup of manufacturing tolerances.	Disassemble the propeller and reset the preload. Replace the preload plate, if necessary.
	or Blade retention bearing is worn.	Follow Blade Retention Split Bearing Inspection and Replacement Procedures.
K. Excessive Radial Play of the Blade (backlash) Refer to Figure 1-2 and the section, "Blade Tolerances" in the Fits and Clearances chapter of this manual.	Pitch change fork is worn.	Disassemble the propeller. Inspect and replace the fork, as required.
	or Pitch change cam follower is worn.	Disassemble the propeller. Inspect and replace the cam follower, as required.

Problem	Probable Cause	Remedy
L. Blades Not Tracking Refer to the section, "Blade Tolerances" in the Fits and Clearances chapter of this manual for blade track tolerances.	Ground strike damage.	For ground or foreign object strike information, refer to Hartzell Propeller Standard Practices Manual 202A (61-01-02). For aluminum blade repair procedures, refer to Hartzell Propeller Aluminum Blade Overhaul Manual 133C (61-13-33). For composite blade repair procedures, refer to Hartzell Propeller Composite Blade Overhaul Manual 135F (61-13-35).
	or Blade twist is not correct.	For aluminum blade repair procedures, refer to Hartzell Propeller Aluminum Blade Overhaul Manual 133C (61-13-33).

2. <u>Lightning Strike on Hub or Blade</u> (Rev. 3)

A. Before Further Flight

(1) In the event of a propeller lightning strike, an inspection is required before further flight.

(a) A lightning strike on the propeller usually leaves arcing damage on the hub or blade, as evidence of where it entered or left the propeller.

(b) Refer to the Special Inspections chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02) for lightning strike inspection criteria.

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AUTOMATIC TEST REQUIREMENTS (NOT APPLICABLE) (Rev. 2)

NOTE: In accordance with ATA iSpec 2200 specification, this space is reserved for automatic test requirements. Such requirements are not applicable to the Hartzell propeller models included in this manual.

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DISASSEMBLY - CONTENTS

LIST OF FIGURES

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1. Important Information (Rev. 4)

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 1: INSTRUCTIONS AND PROCEDURES IN THIS CHAPTER MAY INVOLVE PROPELLER CRITICAL PARTS. REFER TO THE INTRODUCTION CHAPTER OF THIS MANUAL FOR INFORMATION ABOUT PROPELLER CRITICAL PARTS. REFER TO THE ILLUSTRATED PARTS LIST IN THIS MANUAL FOR IDENTIFICATION OF PROPELLER CRITICAL PARTS.

A. Removing the Propeller

(1) Remove the propeller from the aircraft in accordance with the applicable Hartzell Propeller owner's manual.

B. Record Serial Numbers/Blade Location Before Disassembly

(1) Make a record of the serial number and model number of the hub, blades, and any other serial-numbered parts and compare with the data in the propeller logbook.

(a) For the location of the serial number on the hub, refer to the Parts Identification and Marking chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

CAUTION 1: DO NOT ETCH, SCRIBE, PUNCH MARK, OR SIMILARLY IDENTIFY PARTS IN ANY MANNER THAT MAY BE HARMFUL TO THE STRENGTH OR FUNCTION OF THE PROPELLER.

CAUTION 2: GRAPHITE ("LEAD") PENCIL MARKS WILL CAUSE CORROSION. ALL MARKS MADE ON PARTS MUST BE MADE WITH A CRAYON OR SOFT, NON-GRAPHITE PENCIL SUCH AS CM162.

(2) Before disassembly, use a crayon or soft, non-graphite pencil such as CM162 to number the blades counterclockwise from the propeller serial number impression stamped on the propeller hub unit.

(a) Make a record of each blade serial number and the hub socket/arm from which it was removed.

C. Ice Protection System (if applicable)

(1) If the propeller is equipped with an ice protection system supplied by Hartzell, refer to Hartzell Propeller Ice Protection System Manual 180 (30-61-80) for technical information about the applicable ice protection system.

(2) If the propeller is equipped with an ice protection system not supplied by Hartzell Propeller, refer to the applicable TC or STC holder's Instructions for Continued Airworthiness (ICA) for technical information about the applicable ice protection system.

2. Disassembly of HC-(D,E)4(N,P,W)-5( ) Propeller Models

WARNING: THE USE OF BLADE PADDLES TO MOVE BLADES CAN RESULT IN THE OVERLOAD AND DAMAGE OF THE BLADE PITCH CHANGE MECHANISM. THIS DAMAGE IS NOT REPAIRABLE AND CAN RESULT IN SEPARATION BETWEEN THE BLADE AND THE PITCH CHANGE MECHANISM, CAUSING LOSS OF PITCH CONTROL DURING FLIGHT.

CAUTION 1: INSTRUCTIONS AND PROCEDURES IN THIS CHAPTER MAY INVOLVE PROPELLER CRITICAL PARTS. REFER TO THE INTRODUCTION CHAPTER OF THIS MANUAL FOR INFORMATION ABOUT PROPELLER CRITICAL PARTS. REFER TO THE ILLUSTRATED PARTS LIST IN THIS MANUAL FOR IDENTIFICATION OF PROPELLER CRITICAL PARTS.

CAUTION 2: USE COMPRESSED AIR THAT HAS BEEN FILTERED FOR MOISTURE, OR NITROGEN TO ACTUATE THE PROPELLERS.

CAUTION 3: DO NOT USE USE MORE THAN 200 PSI (13.79 BARS) OF PRESSURE WHEN ACTUATING PROPELLERS INCLUDED IN THIS MANUAL.

CAUTION 4: USE ENOUGH PRESSURE TO MAKE SURE THAT THE PROPELLER ACTUATES AGAINST EACH POSITIVE STOP.

A. Hub Balance Weight Removal

(1) Remove the safety wire from the balance weight screws (1100).

(2) Remove and discard the balance weight screws (1100).

(3) Remove the balance weights (1110).

B. Counterweight Removal

(1) Aluminum Blade Counterweight Removal

(a) Remove and discard all counterweight slug nuts (9060) and bolts (9050).

(b) Remove the counterweight slugs (9040).

(c) For counterweight removal instructions, refer to the Blade Shank Overhaul chapter of Hartzell Propeller Aluminum Blade Overhaul Manual 133C (61-13-33).

(2) Composite Blade Counterweight Removal

(a) For counterweight removal instructions, refer to the Overhaul chapter of Hartzell Propeller Composite Blade Overhaul Manual 135F (61-13-35).

C. Hydraulic System and Pitch Adjustment Unit Disassembly

CAUTION: MOVE THE PROPELLER TO THE FEATHER POSITION BEFORE BEGINNING DISASSEMBLY.

(1) Remove and discard the hex head bolt (410), self-locking hex nut (390), and flat washer (400) from the pitch change rod (420), if applicable.

(2) Start Lock Disassembly

(a) Remove and discard the cotter pin (120) and clevis pin (110), if present.

(b) Remove the start lock spring (170) and start lock pin (150).

(c) Discard the start lock spring (170).

(d) Remove and discard the socket head cap screws (160) that attach the start lock housing cover (140) to the cylinder (40).

(e) Remove the start lock housing cover (140).

(f) Remove the start lock housing (130).

(g) Remove and discard the socket set screws (100) from the cylinder.

(h) Repeat the start lock disassembly procedure for the opposite start lock.

(3) Apply 200 psi (13.8 bar) air pressure to the propeller to move the pitch change rod drilled thin hex nuts (10,15) off the reverse adjust sleeve unit (280).

(4) Remove and discard the safety wire from the drilled thin hex nuts (10,15) on the pitch change rod (420).

(5) Separate the drilled thin hex nuts (10,15) from each other, by rotating in opposite directions.

(6) Remove the drilled thin hex nuts (10,15) from the pitch change rod (420).

(7) Release the air pressure from the propeller to move the blades to maximum feather angle.

WARNING: PROPELLER BLADE ANGLE MUST BE AT FEATHER POSITION WITH ALL AIR PRESSURE RELEASED BEFORE CONTINUING DISASSEMBLY.

(8) Unthread the beta adjust screw (30) and remove it from the pitch change rod (420).

(9) Remove and discard the safety wire between the fillister head screw (50) on the cylinder (40) and drilled thin hex nut (20) on the pitch change rod (420).

(10) Remove and discard the fillister head screw (50) and corrosion resistant washer (60) from the cylinder (40).

(11) Remove the drilled thin hex nut (20) from the reverse adjust sleeve unit (280).

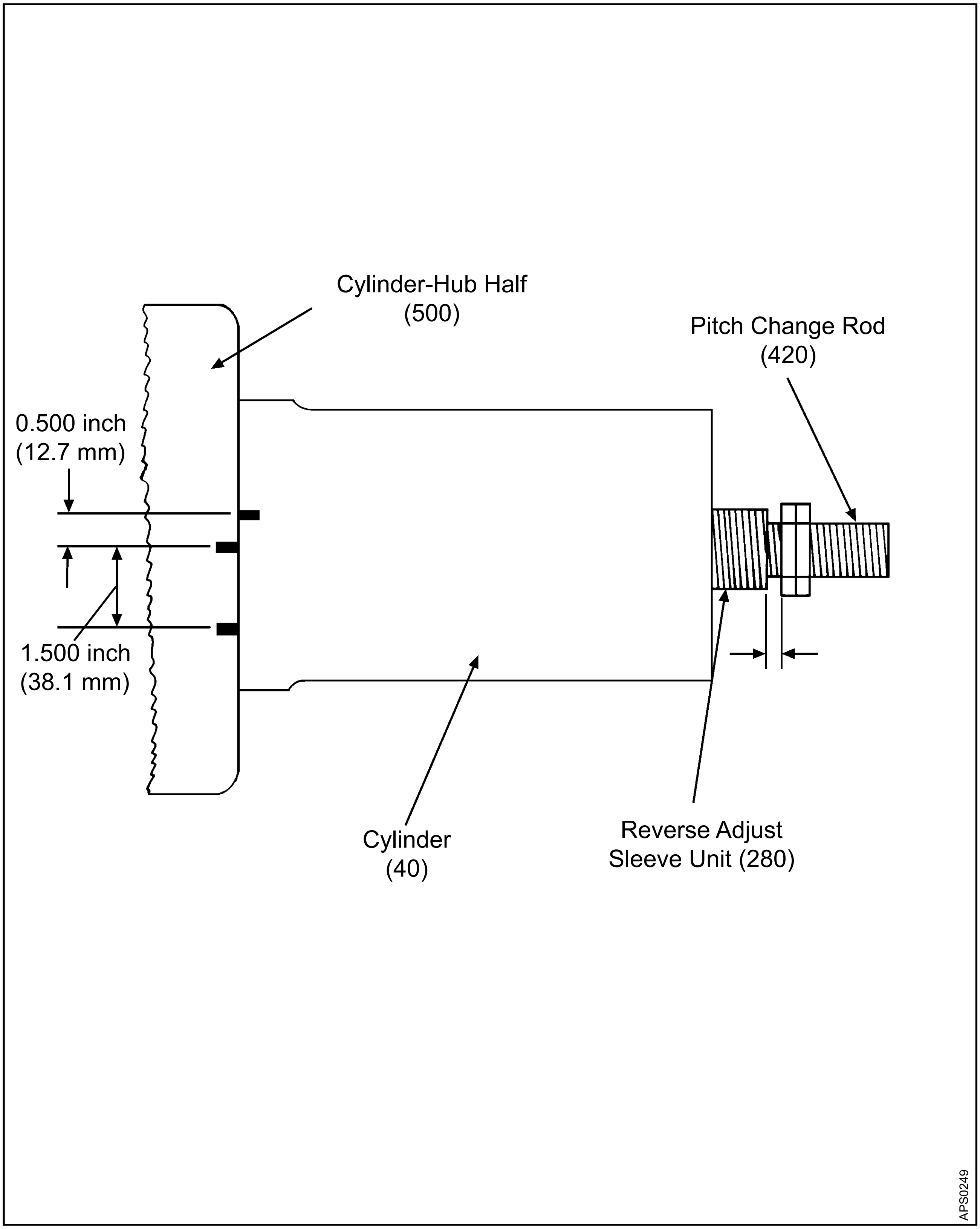
WARNING: THE FEATHERING COMPRESSION SPRING IS PRELOADED TO APPROXIMATELY 600 POUNDS (271.8 kg) OF FORCE. FAILURE TO FULLY COMPRESS THE FEATHERING COMPRESSION SPRING INTO THE CYLINDER BEFORE CYLINDER REMOVAL COULD RESULT IN INJURY OR DEATH.

(12) Turn the reverse adjust sleeve unit (280) counterclockwise with a 1 3/16 inch open-end wrench on the flats to fully compress the feathering compression spring (260).

NOTE: The feathering compression spring (260) will compress between the cylinder (40) or forward spring retainer (250) and the plastic spring guide (270).

(13) Attach a cylinder wrench TE153 to the top of the cylinder (40).

(a) Install four (4) 1/4-28 UNF-3B screws through the wrench TE153 into the four threaded holes provided in the cylinder (40).



Cylinder Removal
Figure 3-1

WARNING: USE EXTREME CAUTION WHEN REMOVING THE CYLINDER AND FEATHERING COMPRESSION SPRING ASSEMBLY. WHEN COMPRESSED, THE FEATHERING COMPRESSION SPRING ASSEMBLY IS LOADED TO APPROXIMATELY 1800 POUNDS (815.4 kg) FORCE. MAKE SURE OF THE SAFETY OF PERSONNEL IN THE VICINITY DURING THE DISASSEMBLY PROCEDURES.

CAUTION: DO NOT DAMAGE THE CYLINDER THREADS WHEN REMOVING THE CYLINDER (40) FROM THE HUB (500).

(14) Removing the cylinder (40) from the hub (500).

(a) Using permanent ink, make a mark on the lower end of the cylinder (40), then make a mark on the hub (500) 0.500 inch (12.7 mm) counterclockwise from the mark on the cylinder. Make another mark on the hub 1.500 inches (38.1 mm) counterclockwise from the first hub marking. Refer to Figure 3-1.

(b) Using a breaker bar, turn the cylinder (40) counterclockwise 0.500 inch (12.7 mm) until the mark on the cylinder lines up with the first mark on the hub (500).

CAUTION 1: ACTUAL TORQUE SETTINGS MUST BE CALCULATED TO INCLUDE THE LENGTH OF THE CYLINDER WRENCH. REFER TO THE TORQUE VALUE FORMULA IN FIGURE 8-1 OF THE FITS AND CLEARANCES CHAPTER OF THIS MANUAL.

CAUTION 2: MAKE SURE THAT THE TORQUE REQUIRED TO TURN THE CYLINDER THE REQUIRED 1.500 INCHES (38.1 mm) IS NOT GREATER THAN 235 FT-LBS (319 N•m).

(c) Using a calibrated torque wrench, apply 235 Ft-Lbs (319 N•m) of corrected torque to the cylinder threads to turn the cylinder (40) counterclockwise 1.500 inches (38.1 mm) until the mark on the cylinder lines up with the second mark on the hub (500).

1 If the torque is greater than 235 Ft-Lbs (319 N•m), refer to the Cylinder Removal section in the Repair chapter of this manual.

(d) If the torque required to turn the cylinder (40) an additional 1.500 inches (38.1 mm) was not greater than 235 Ft-Lbs (319 N•m), reset the torque wrench to achieve an actual torque of 55 Ft-Lbs (75 N•m).

CAUTION: MAKE SURE THAT THE TORQUE REQUIRED TO REMOVE THE CYLINDER (40) IS NOT GREATER THAN 55 FT-LBS (75 N•m).

(e) While making sure that the torque is not greater than 55 Ft-Lbs (75 N•m), turn the cylinder (40) counterclockwise to remove the cylinder (40) from the hub (500).

1 If the torque required to remove the cylinder (40) is greater than 55 Ft-Lbs (75 N•m) actual torque, refer to the section, "Cylinder Removal" in the Repair chapter of this manual.

(15) Lift the cylinder (40) and the retained feathering compression spring (260) off the pitch change rod (420) and put aside for further disassembly.

(16) Remove the four (4) 1/4-28 UNF-3B screws that hold the cylinder wrench TE153 to the cylinder (40) and remove the cylinder wrench TE153.

(17) Rotate the reverse adjust sleeve unit (280) clockwise to extend the feathering compression spring (260) and unthread the reverse adjust sleeve unit from the cylinder (40).

NOTE: The feathering compression spring (260) will fully extend before the reverse adjust sleeve unit (280) unthreads from the cylinder (40).

(18) Remove the reverse adjust sleeve unit (280), plastic spring guide (270), feathering compression spring (260), and forward spring retainer (250), if applicable, from the cylinder (40). Discard the plastic spring guide.

CAUTION: DO NOT REMOVE THE BUSHING (300) AT THE THREADED END OF THE REVERSE ADJUST SLEEVE (280).

(a) Early versions of the reverse adjust sleeve unit (280) contained two internal bushings (300). The bushing located at the threaded end of reverse adjust sleeve unit must stay in position.

(b) Remove the bushing (300) located in the unthreaded portion of the reverse adjust sleeve unit (280), if applicable.

NOTE 1: If the propeller contains the C-447 feathering compression spring (260), B-442 plastic spring guide (270), and B-476 pitch adjust sleeve unit (280), there will not be a forward spring retainer (250).

NOTE 2: If the propeller contains a B-6768 forward spring retainer (250), it will also contain a C-6760 feathering compression spring (260), B-6761 plastic spring guide (270), and B-6758 pitch adjust sleeve unit (280).

(19) Using a modified deep well socket TE120 on the self-locking hex nut (310) and a modified deep well socket TE120 with a 1-3/8 inch crowfoot wrench, remove the pitch change rod (420) and piston (340) from the fork (710).

(a) If the self-locking hex nut (310) comes loose from the pitch change rod (420) and piston (340) before the pitch change rod (420) comes loose from the fork (710), perform the following procedures:

1 Remove and discard the self-locking hex nut (310) from the pitch change rod (420).

2 Remove the piston (340) from the pitch change rod (420).

3 Using a 1-5/16 inch wrench on the wrenching flats, unthread and remove the pitch change rod (420) from the fork (710).

(b) If the pitch change rod (420) comes loose from the fork (710) before the self-locking hex nut (310) comes loose, perform the following procedures:

1 Remove the pitch change rod (420) with the self-locking hex nut (310) and piston (340) from the fork (710).

2 Insert the pitch change rod (420) through the piston unit installation socket TE228, fitting the socket over the shoulder flats on the pitch change rod (420).

3 Put the modified deep well socket TE120 on the self-locking hex nut (310).

4 Engage the modified deep well socket TE120 with a 1-3/8 inch crowfoot wrench.

5 Remove and discard the self-locking hex nut (310) from the pitch change rod (420).

6 Remove the piston (340) from the pitch change rod (420).

(20) Remove and discard the piston dust seal (370), piston OD O-ring (380), and piston ID O-ring (360).

(21) Remove the beta rod seal components from the pitch change rod (420), if applicable.

(a) Remove and discard the retaining ring (425) and washer (424).

(b) Remove the beta tube bushing (423).

(c) Remove and discard the O-ring (422).

(d) Remove the beta tube bushing (421).

(22) Remove and discard the cylinder mounting O-ring (430) from the cylinder-half hub shoulder.

(23) Remove all hex head bolts (620, 630), flat washers (640), and self-locking hex nuts (650) from the hub unit (500).

(24) Discard all flat washers (640) and self-locking hex nuts (650).

CAUTION 1: DO NOT DAMAGE THE BLADE WHEN TRYING TO SEPARATE THE HALVES OF THE HUB (500).

CAUTION 2: IF THE PROPELLER IS EQUIPPED WITH AN ICE PROTECTION SYSTEM, DO NOT TAP THE BLADE IN THE BOOT AREA.

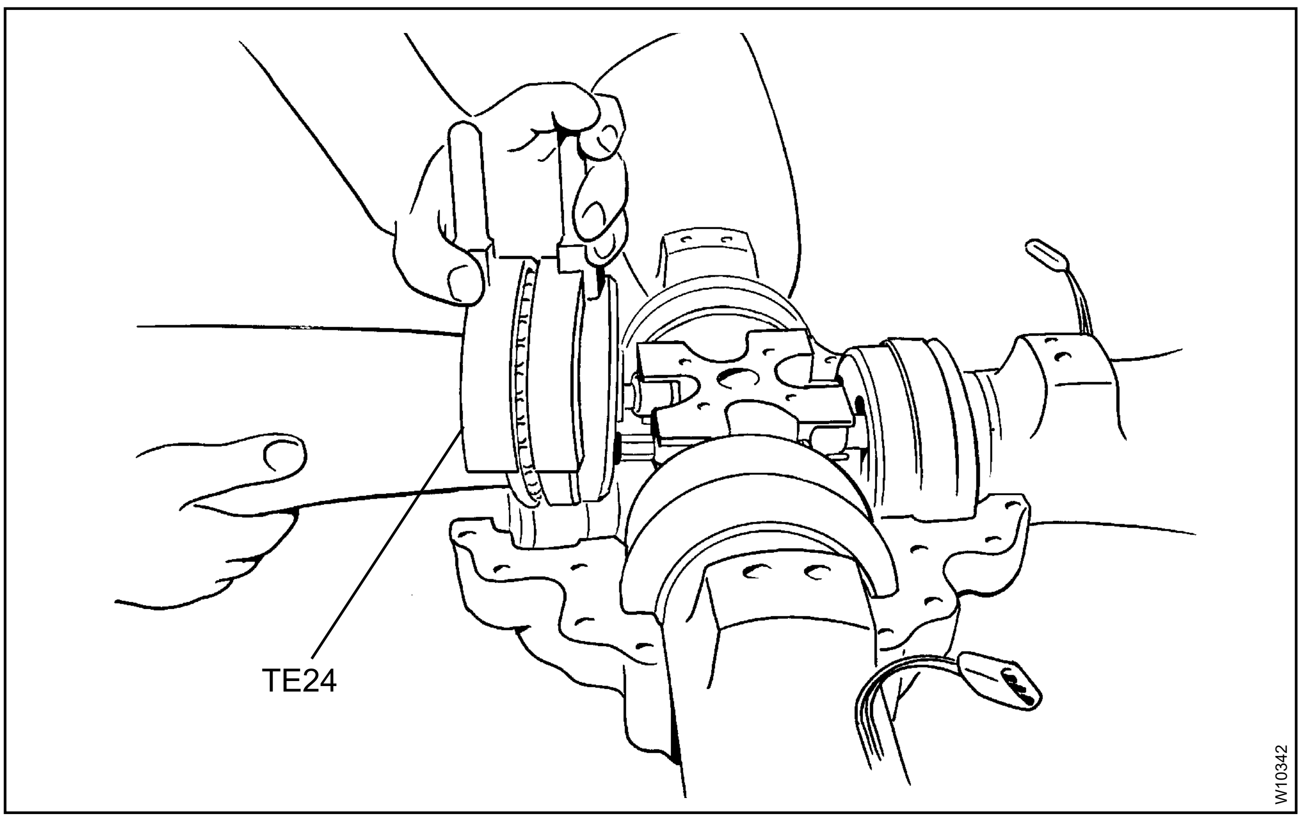
(25) With a soft mallet, lightly tap the end of one blade to loosen and separate the halves of the hub unit (500).

CAUTION: DO NOT USE A SCREWDRIVER OR OTHER SHARP TOOL TO PRY THE HUB HALVES (500) APART.

(26) Using a plastic wedge TE138, or similar tool, gently pry apart the hub halves (500).

CAUTION: DO NOT PERMIT THE BLADE ASSEMBLIES TO FALL OUT OF THEIR SOCKETS WHEN THE CYLINDER-SIDE HALF OF THE HUB UNIT (500) IS REMOVED.

(27) Remove the cylinder-side hub half of the hub unit (500).



Removing Blades from the Hub
Figure 3-2

(28) Using blade clamp TE24, if desired, remove two adjacent blade assemblies from the fork (710) and hub half (500). Refer to Figure 3-2.

(29) Remove the fork assembly (700).

(30) Remove the remaining blade assemblies from the hub half (500).

(31) Remove and discard the engine-side hub half O-ring (610) that seals between the hub unit (500) and pitch change rod (420).

(32) Remove and discard the cylinder-side hub half O-ring (510) that seals between the hub unit (500) and pitch change rod (420).

(33) Remove and discard the spinner bulkhead mounting bolts and washers.

NOTE: This permits the engine-side spinner bulkhead unit to drop clear of the engine-side hub half, which remains on the rotatable fixture.

(34) Remove the engine-side hub half (500) from the rotatable fixture.

(35) Remove the spinner bulkhead from the rotatable fixture bench.

D. Disassembling the Piston Unit C-497( ) (320)

(1) Measure and make a record of the O-ring groove width "A" on the piston (340). Refer to Figure 3-3.

(a) This measurement is necessary to complete step 4.D.(12).

(2) Remove and discard the spring pin (350) from the piston unit (320). Refer to Figure 3-3.

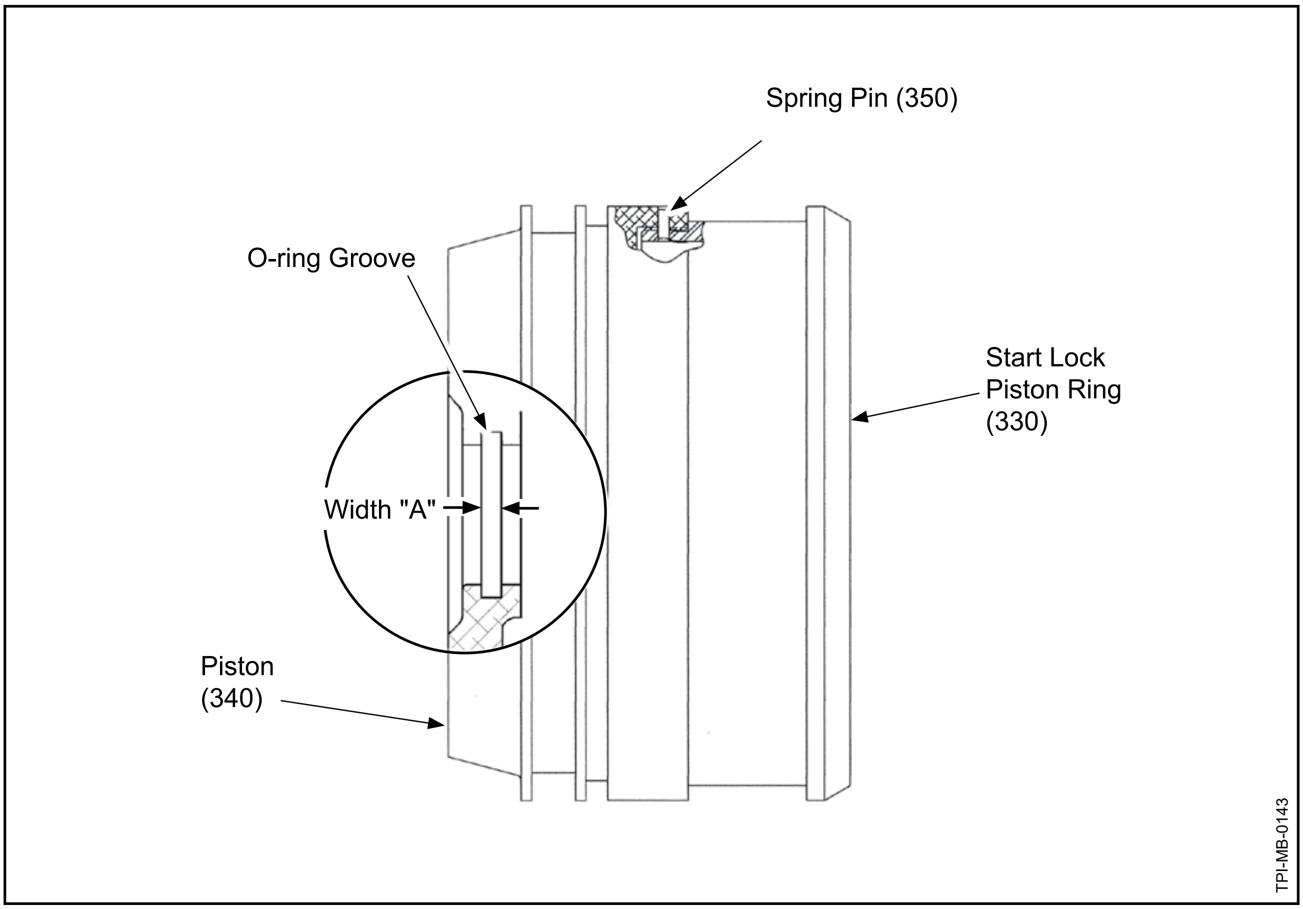
(3) Put the clamp base TE618 in a vise. Refer to Figure 3-4.

(4) Attach the piston unit (320) to the clamp base TE618.

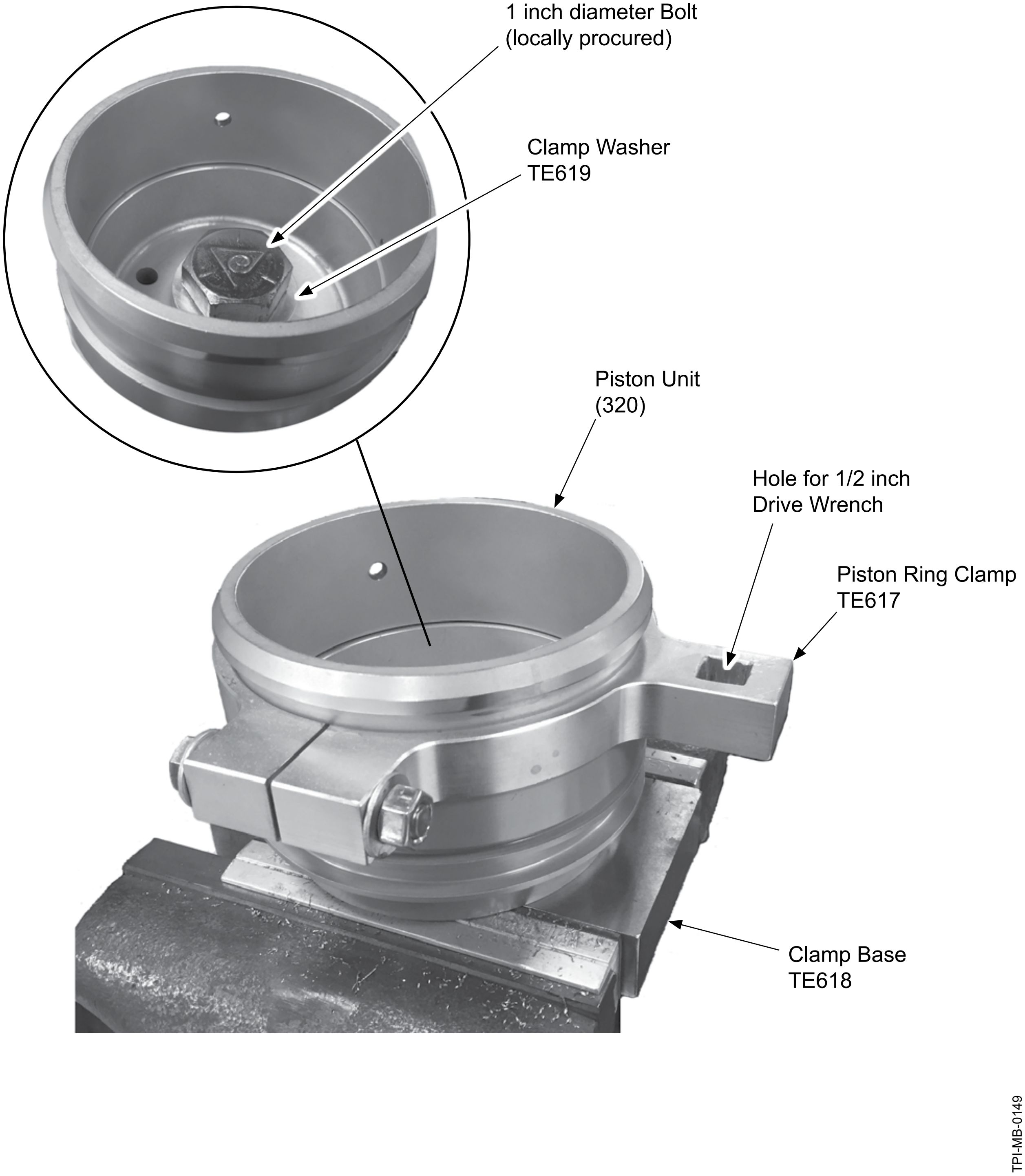
(a) Install the clamp washer TE619 onto a locally procured 1 inch (25.4 mm) diameter bolt.

(b) Put the bolt with the clamp washer TE619 through the piston unit (320) and the clamp base TE618, as shown in Figure 3-4.

(c) Install a locally procured nut of the appropriate size onto the 1 inch (25.4 mm) diameter bolt.



Piston Unit C-497
Figure 3-3



Using the Piston Ring Clamp TE617
Figure 3-4

CAUTION: DO NOT OVERTIGHTEN THE LOCALLY PROCURED NUT. THE MAXIMUM TORQUE IS 200 FT-LBS (271 N•m). OVERTIGHTENING THE NUT MAY COMPRESS THE O-RING GROOVE AND DAMAGE THE PISTON (340).

(d) Tighten the nut to prevent the piston unit (320) from rotating on the clamp base TE618.

(5) Install the piston ring clamp TE617 on the piston unit (320), as shown in Figure 3-4.

(6) Remove the clamp base TE618 and the piston unit (320) with the piston ring clamp TE617 installed, from the vise.

CAUTION: DO NOT HEAT THE PISTON UNIT (320) TO MORE THAN 180°F (82°C).

(7) Heat the piston unit (320) to 180°F (82°C), then immediately put the clamp base TE618 and the piston unit with the piston ring clamp TE617 installed, in a vise as shown in Figure 3-4.

(a) While the piston unit (320) is hot, use a 1/2 inch drive wrench in the hole on the piston ring clamp TE617 to separate the start lock piston ring (330) from the piston (340).

1 A breaker bar or adapter can be used when separating the start lock piston ring (330) from the piston (340).

2 If the piston unit (320) cannot be separated, retire the piston unit in accordance with the Part Retirement chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

(8) Let the parts cool.

(9) Remove the piston ring clamp TE617 from the start lock piston ring (330).

(10) Remove the clamp base TE618 from the piston (340).

(11) Measure and make a record of the O-ring groove width "A" on the piston (340). Refer to Figure 3-3.

(12) Subtract the width "A" measured in step 4.D.(11) from the width "A" measured in step 4.D.(1).

(a) If the difference between the two width "A" measurements is greater than 0.002 inch (0.05 mm), retire the piston (340) in accordance with the Part Retirement chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

(b) If the difference between the two width "A" measurements is less than or equal to 0.002 inch (0.05 mm), go to step 4.D.(13).

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.

(13) Using solvent CM106 MEK or CM219 MPK, clean the start lock piston ring (330) and the piston (340) to remove any remaining adhesive.

E. Pitch Change Fork Disassembly

(1) Using a 3/8 inch wrench, unthread and remove the bumper extension (720) from each fork arm.

CAUTION: DO NOT DAMAGE THE BUMPER EXTENSION (720) WHILE REMOVING THE FORK BUMPER (730).

(2) Remove and discard the fork bumper (730) from each bumper extension (720).

3. Hub Disassembly

A. All Propeller Models

(1) Remove components of the hub assembly/unit (470/500) in accordance with the Aluminum Hub Overhaul chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

(a) The inspection criteria for hub assembly components is located in the Aluminum Hub Overhaul chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

4. Blade Disassembly

A. All Propeller Models

(1) Remove and discard safety wire and silicone tubing (895), if applicable.

(2) Remove and discard the blade O-ring (1010).

(3) Remove the hub-side blade bearing race (980).

(4) Remove and discard the ball bearings (990).

(5) Remove and discard the ball spacer (1000).

(6) Remove the preload plate (910), as applicable.

(7) Remove and discard the thin hex nut (940) and set screw (930) from the preload plate (910).

(8) For an N-shank blade only:

(a) Remove and discard the ball bearing (1014) or closed end needle bearing (1016), as applicable.

(b) Remove the blade plug (1013).

1 Plug Puller TE454 is available for use when removing the blade plug (1013).

(c) Remove and discard the O-ring (1012) from the blade plug (1013), if applicable.

(9) Remove the blade seal (955) from the butt of the blade, if applicable.

(10) Remove and discard the blade seal O-ring (956), if applicable.

(11) Remove and discard the safety wire and the silicone tubing (895), if applicable.

(12) Remove and discard the screws/bolts (810) that attach the pitch change knob unit (820).

(13) Remove the pitch change knob unit (820) from the blade using the following steps:

(a) If the dowel pin (850) remains in the blade, remove and discard the dowel pin (850).

(b) If the dowel pin (850) remains in the pitch change knob bracket (830), removal of the dowel pin (850) from the pitch change knob bracket (830) is not required.

(14) For a pitch change knob bracket (830) that uses a swaged washer to retain the cam follower (840), remove the cam follower from the pitch change knob bracket using the following steps:

(a) Install puller TE98, or equivalent, so that the center post pushes on the pitch change knob bracket (830).

(b) Put the arms of the puller TE98, or equivalent, on the back of the cam follower (840).

(c) Turn in the handle of the puller TE98, or equivalent, to pull off the cam follower (840) and the knob unit retaining washer (860).

(d) Discard the cam follower (840) and the knob unit retaining washer (860).

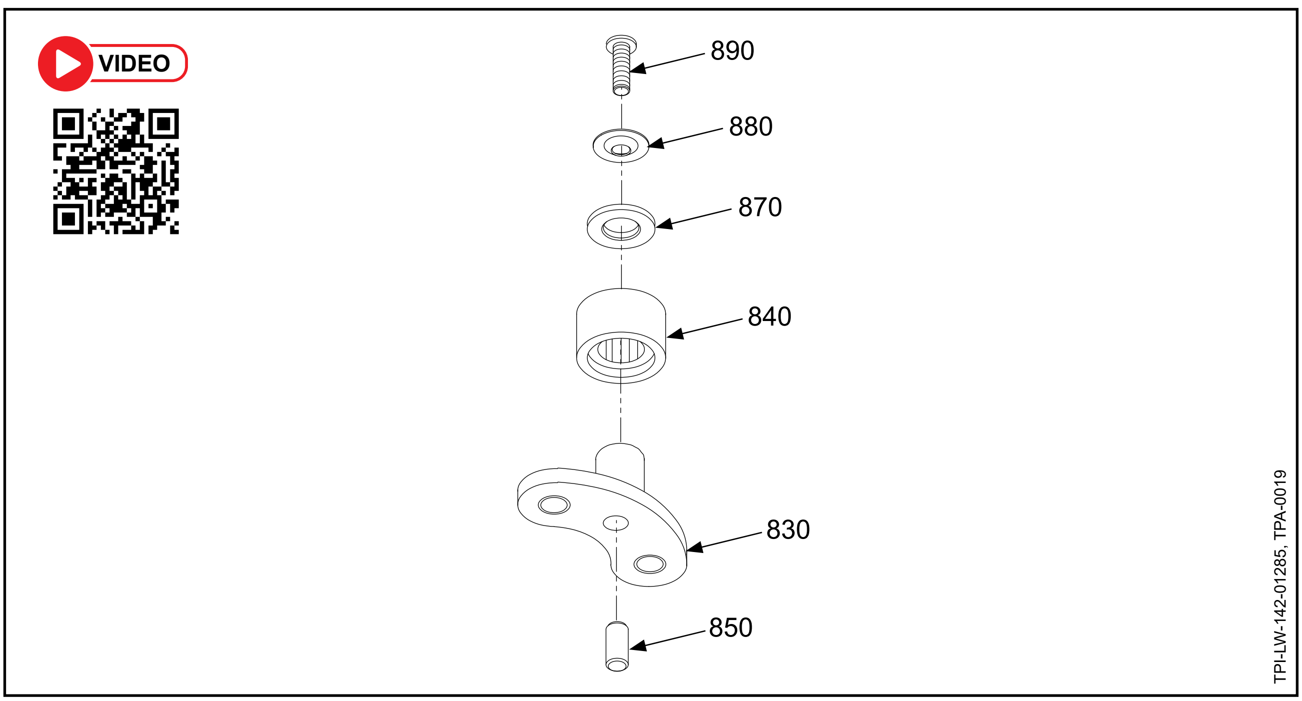
(15) For a pitch change knob bracket (830) that uses a screw to retain the cam follower (840), remove the cam follower from the pitch change knob bracket, using the following steps and Figure 3-5:

(a) Remove and discard the screw (890) from the end of the pitch change knob bracket (830).

(b) Remove and discard the dimpled washer (880).

(c) Remove the knob unit retaining washer (870).

(d) Remove and discard the cam follower (840).



Pitch Change Knob Bracket Unit Disassembly
Figure 3-5

(16) Using an applicable gear puller or brass drift, remove the bearing retaining ring (950).

(17) Remove the blade-side blade bearing race (970) of the blade retention bearing.

(18) For additional aluminum blade disassembly instructions, refer to Hartzell Propeller Aluminum Blade Overhaul Manual 133C (61-13-33).

(19) For additional composite blade disassembly instructions, refer to Hartzell Propeller Composite Blade Overhaul Manual 135F (61-13-35).

CLEANING - CONTENTS

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1. Cleaning Procedures (Rev. 5)

   A. General Cleaning

      (1) Refer to the Cleaning chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

   B. Cleaning Steel Parts for Magnetic Particle Inspection

      (1) Refer to the Magnetic Particle Inspection chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

   C. Cleaning Steel Parts for Cadmium Replating Procedures

      (1) Refer to the Cadmium Replating chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

   D. Cleaning Aluminum Parts for Penetrant Inspection

      (1) Refer to the Penetrant Inspection chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

   E. Cleaning Titanium Parts for Penetrant Inspection

      (1) Refer to the Penetrant Inspection chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

   F. Cleaning Aluminum Parts for Chromic Acid Anodizing Procedures

      (1) Refer to the Chromic Acid Anodizing chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

   G. Cleaning Cylinder Threads (Propellers with screw-on cylinders only)

      (1) It is preferable that the cylinder threads be cleaned only with solvent CM23; however, removal of sealant in the threaded area can be difficult.

      CAUTION: DO NOT USE GLASS BEAD OR OTHER ABRASIVE CLEANING METHODS, AS THEY MAY CAUSE EXCESSIVE DAMAGE TO THE CYLINDER THREADS.

      (2) Use plastic media in accordance with the Cleaning chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02) to remove the sealant from the cylinder threads.

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CHECK - CONTENTS

CHECK - CONTENTS, CONTINUED

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LIST OF FIGURES, CONTINUED

LIST OF TABLES

1. Inspection Interval Requirements (Rev. 2)

A. General

(1) For information about life limited components and mandatory inspections, refer to the Airworthiness Limitations chapter of the applicable Hartzell Propeller owner's manual.

(2) For overhaul periods of Hartzell Propeller propellers, refer to Hartzell Propeller Service Letter HC-SL-61-61Y.

2. Dimensional Inspection (Rev. 1)

A. Diameter Measurements

(1) When measuring the diameter of a part with a two point measuring instrument, take at least two measurements unless specified differently.

(a) Obtaining a measurement outside the specified tolerance at any point of measurement is cause for retirement of the part when a minimum of two measurements are taken.

(b) Alternately, take eight evenly spaced measurements, unless specified differently.

1 Obtaining a measurement outside the specified tolerance on three or more measurements is cause for retirement of the part when eight measurements are taken (two of eight measurements may be out of specified tolerance).

2 This alternate method may not be used to accept a diameter that has obvious damage beyond repairable (serviceable) limits.

(2) When measuring the diameter of a part with a three point measuring instrument, take one measurement. A measurement outside the specified tolerance is cause for retirement of the part.

B. Decimal Places

(1) Inspect the part features to the number of decimal places specified. If three decimal places are specified, inspect the part to three decimal places only.

3. Inspection Criteria/Procedures (Rev. 4)

A. Propeller Components (Except for those listed separately in this section)

(1) Refer to Table 5-1, "Component Inspection Criteria" in this chapter.

B. Hubs

(1) Aluminum Hubs: Refer to the Aluminum Hub Overhaul chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

C. Blades

(1) Aluminum Blades: Refer to Hartzell Propeller Aluminum Blade Overhaul Manual 133C (61-13-33).

(2) Composite Blades: Refer to Hartzell Propeller Composite Blade Overhaul Manual 135F (61-13-35).

D. Blade Clamps (For steel hub propellers only)

(1) Refer to the Blade Clamp Overhaul chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

E. Ice Protection Systems

(1) For ice protection systems supplied by Hartzell, refer to Hartzell Propeller Ice Protection System Manual 180 (30-61-80).

(2) For ice protection systems not supplied by Hartzell, refer to the applicable TC or STC holder's Instructions for Continued Airworthiness (ICA).

F. Spinner Assemblies

(1) Metal Spinners: Refer to Hartzell Propeller Metal Spinner Maintenance Manual 127 (61-16-27).

(2) Composite Spinners: Refer to Hartzell Propeller Composite Spinner Maintenance Manual 148 (61-16-48).

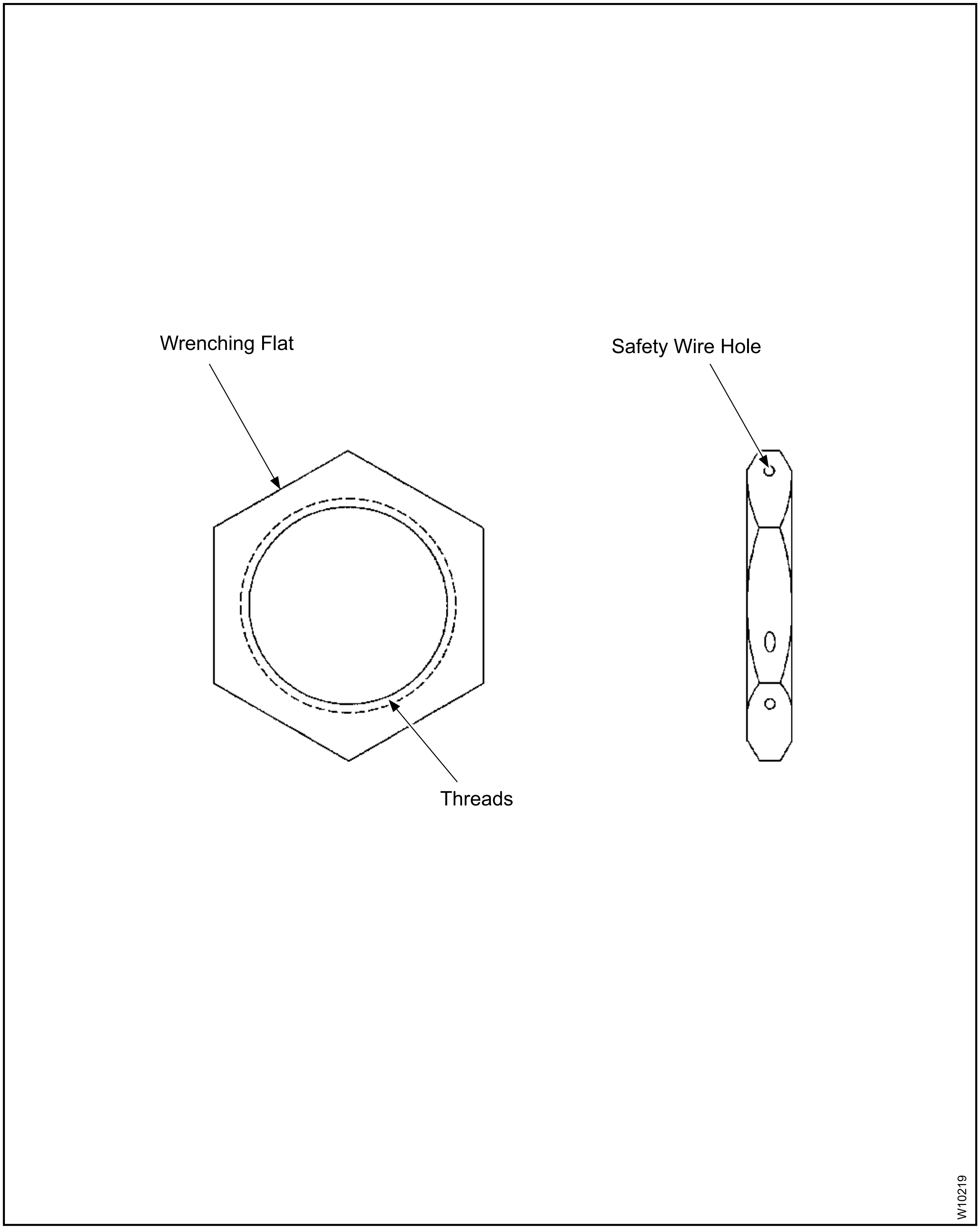
G. Special Inspections (Lightning Strike, Foreign Object Strike, etc.)

(1) Refer to the Special Inspections chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

4. Propeller Component Checks

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

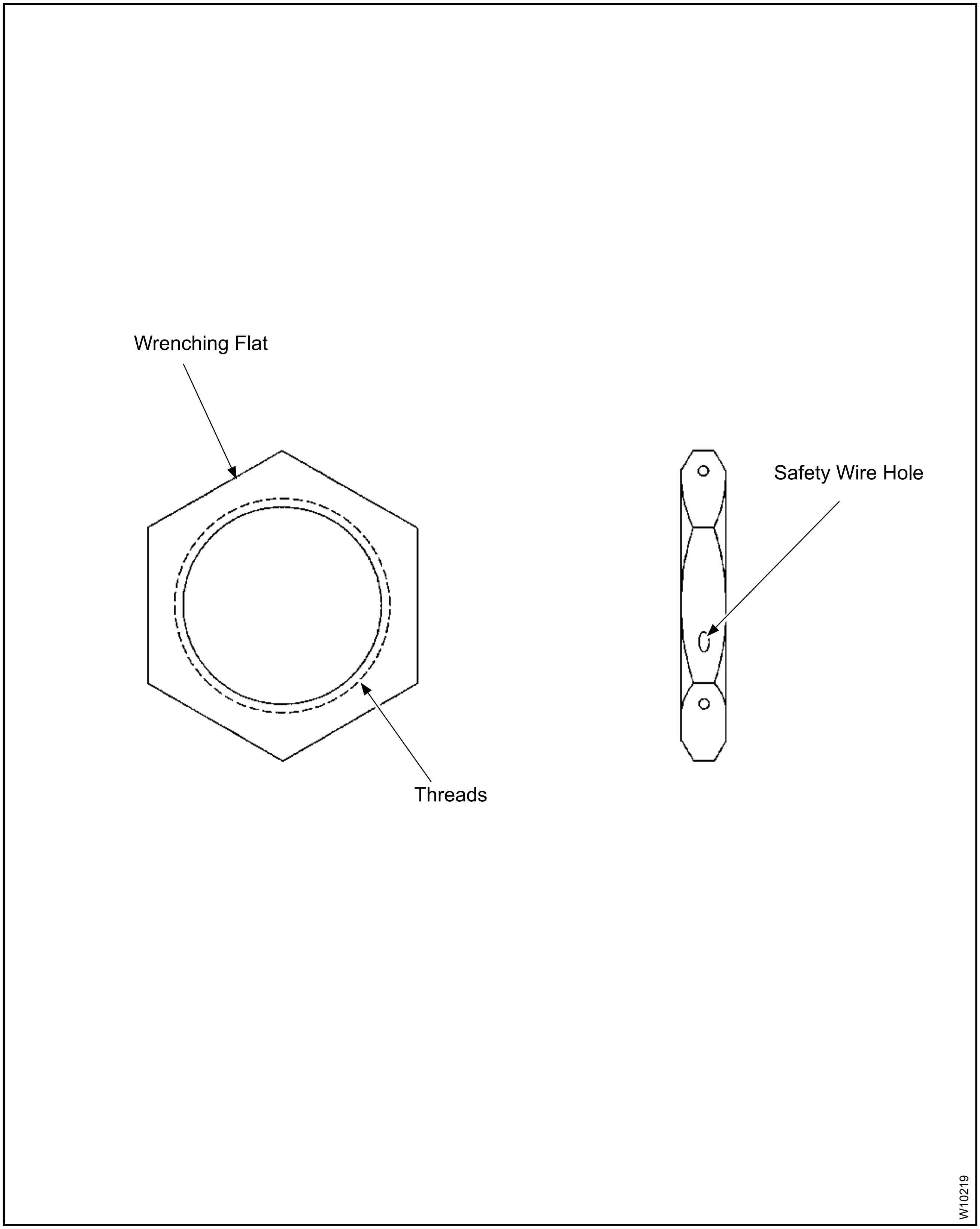
Refer to Table 5-1, "Component Inspection Criteria" in this chapter.



Drilled Thin Hex Nut
Figure 5-1

Component Inspection Criteria
Table 5-1

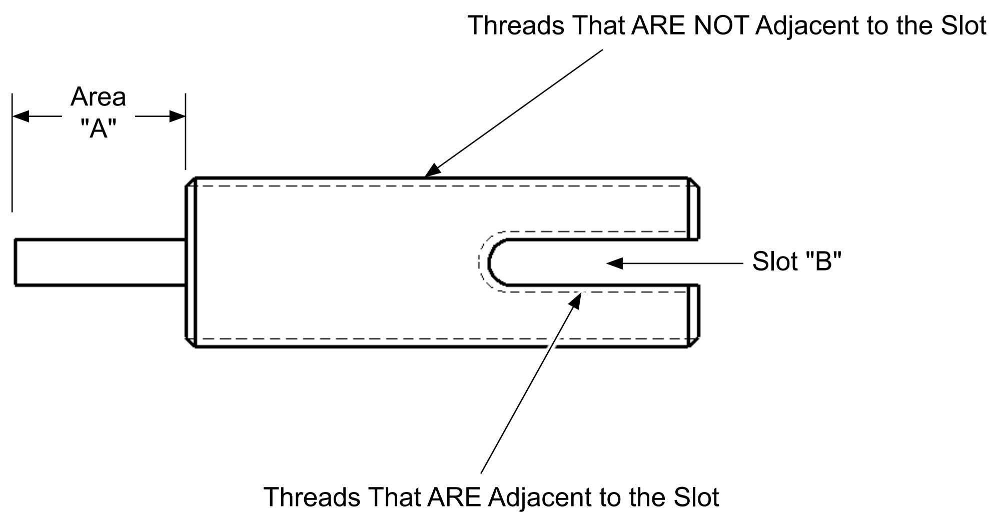
Inspect	Serviceable Limits	Corrective Action
A. <u>DRILLED THIN HEX NUT</u> (Items 10,15) Refer to Figure 5-1.		
(1) Visually examine each drilled thin hex nut for damage to the wrenching flats.	Corners between the wrenching flats may be rounded. Two wrenching flats must be sufficiently undamaged to withstand installation torque. Material may not be displaced above or below the nut that could result in interference with the mating parts.	File away unwanted displaced material. If a minimum of two flats will not withstand installation torque, replace the drilled thin hex nut.
(2) Visually examine each drilled thin hex nut for corrosion product and pitting on all surfaces.	Corrosion product is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits. The maximum permitted depth of pitting is 0.005 inch (0.12 mm).	Remove corrosion product using glass bead cleaning. Refer to the Cleaning chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). If the corrosion product cannot be removed, replace the drilled thin hex nut. If the depth of pitting is greater than the permitted serviceable limits, replace the drilled thin hex nut.
(3) Visually examine each drilled thin hex nut for wear on surfaces other than the wrenching flats.	If there is wear, measure the depth of the material loss. The maximum permitted depth of material loss is 0.005 inch (0.12 mm).	If the wear is greater than the permitted serviceable limits, replace the drilled thin hex nut.
(4) Visually examine the safety wire holes of the drilled thin hex nut.	Wrenching flat damage must not expose the holes and prevent retention of safety wire.	If the damage is greater than the permitted serviceable limits, replace the drilled thin hex nut.
(5) Visually examine the threads of the drilled thin hex nut.	A maximum of 1/4 of one thread total accumulated damage is permitted.	If the damage is greater than the permitted serviceable limits, replace the drilled thin hex nut.
(6) Visually examine the drilled thin hex nut for cadmium plating coverage.	Cadmium plating must cover all surfaces of the drilled thin hex nut.	If the cadmium plating coverage is less than the permitted serviceable limits, cadmium replate the drilled thin hex nut in accordance with the Cadmium Replating chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).



Drilled Thin Hex Nut
Figure 5-2

Component Inspection Criteria
Table 5-1

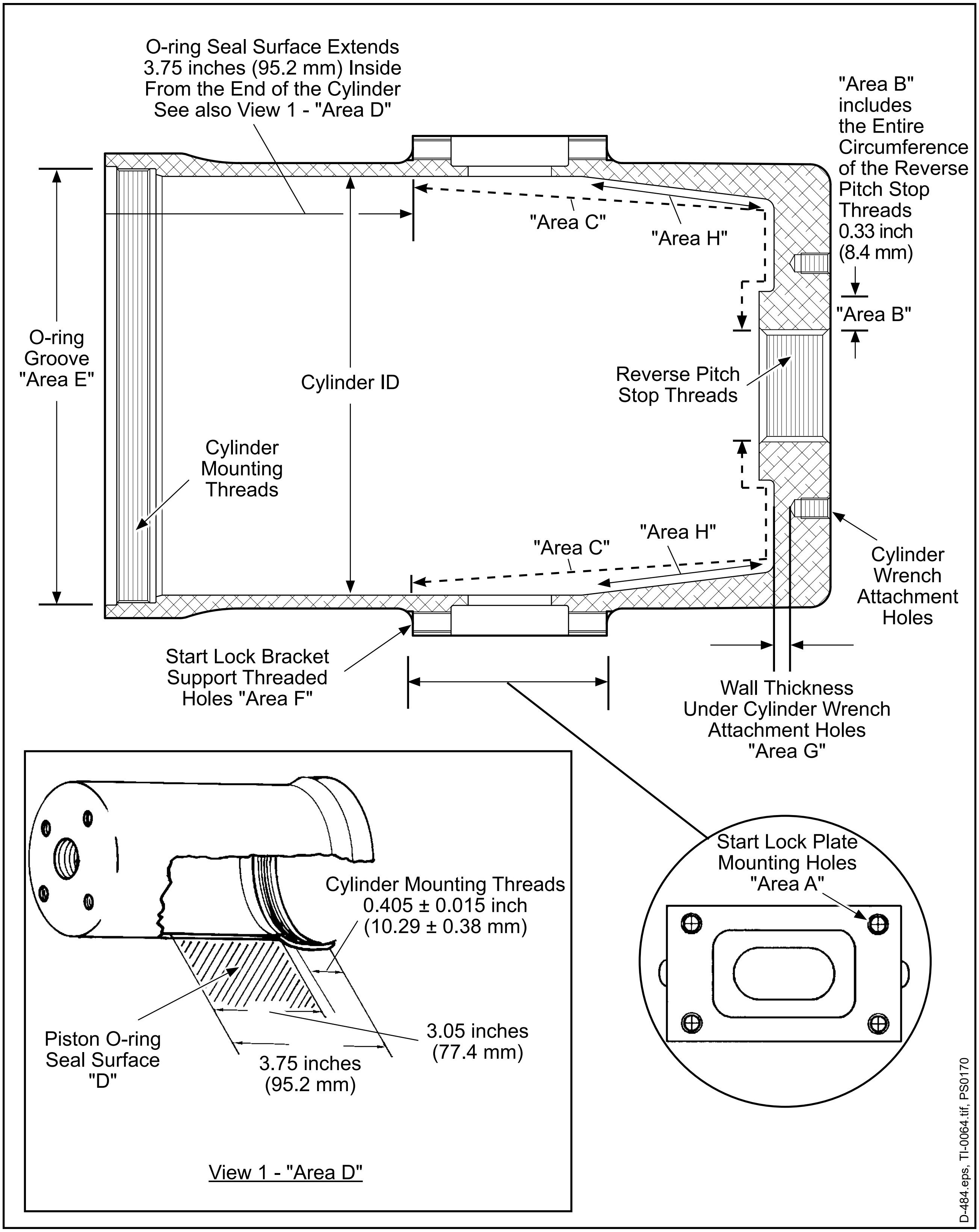
Inspect	Serviceable Limits	Corrective Action
B. DRILLED THIN HEX 1-3/8-12 NUT (Item 20) Refer to Figure 5-2.		
(1) Visually examine each drilled thin hex nut for damage to the wrenching flats.	Corners between the wrenching flats may be rounded. Two wrenching flats must be sufficiently undamaged to withstand installation torque. Material may not be displaced above or below the nut that could result in interference with the mating parts.	File away unwanted displaced material. If a minimum of two flats will not withstand installation torque, replace the drilled thin hex nut.
(2) Visually examine each drilled thin hex nut for corrosion product and pitting on all surfaces.	Corrosion product is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits. The maximum permitted depth of pitting is 0.005 inch (0.12 mm).	Remove corrosion product using glass bead cleaning. Refer to the Cleaning chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). If the corrosion product cannot be removed, replace the drilled thin hex nut. If the depth of pitting is greater than the permitted serviceable limits, replace the drilled thin hex nut.
(3) Visually examine each drilled thin hex nut for wear on surfaces other than the wrenching flats.	If there is wear, measure the depth of the material loss. The maximum permitted depth of material loss is 0.005 inch (0.12 mm).	If the wear is greater than the permitted serviceable limits, replace the drilled thin hex nut.
(4) Visually examine the safety wire holes of the drilled thin hex nut.	Wrenching flat damage must not expose the holes and prevent retention of safety wire.	If the damage is greater than the permitted serviceable limits, replace the drilled thin hex nut.
(5) Visually examine the threads of the drilled thin hex nut.	A maximum of 1/4 of one thread total accumulated damage is permitted.	If the damage is greater than the permitted serviceable limits, replace the drilled thin hex nut.
(6) Visually examine the drilled thin hex nut for cadmium plating coverage.	Cadmium plating must cover all surfaces of the drilled thin hex nut.	If the cadmium plating coverage is less than the permitted serviceable limits, cadmium replate the drilled thin hex nut in accordance with the Cadmium Replating chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).



Beta Adjust Screw
Figure 5-3

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
C. BETA ADJUST SCREW (Item 30) Refer to Figure 5-3.		
(1) Visually examine the beta adjust screw for corrosion product and pitting.	Corrosion product is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits. The maximum permitted depth of pitting is 0.005 inch (0.12 mm).	Remove corrosion product using glass bead cleaning. Refer to the Cleaning chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). If the corrosion product cannot be removed, replace the beta adjust screw. If pitting is greater than the permitted serviceable limits, replace the beta adjust screw.
(2) Visually examine the threads of the beta adjust screw that are not adjacent to the slot for damage.	A maximum of 2 threads of total accumulated damage is permitted. Damage must not prevent correct threading into the pitch change rod.	If damage is greater than the permitted serviceable limits, replace the beta adjust screw.
(3) Visually examine the threads that are adjacent to the slot for damage.	Damage must not prevent the correct threading into the pitch change rod.	Thread edges that are adjacent to the slot only may be filed to remove damage. If damage is greater than the permitted serviceable limits, replace the beta adjust screw.
(3) Visually examine the non-threaded areas of the beta adjust screw for damage, Area "A" and Slot "B".	The maximum permitted depth of damage in Area "A" is 0.005 inch (0.12 mm). The maximum permitted depth of damage in Slot "B" is 0.015 inch (0.38 mm).	If damage is greater than the permitted serviceable limits, replace the beta adjust screw.
(4) Visually examine the beta adjust screw for cadmium plating coverage.	A few random scratches are permitted; otherwise, complete coverage of the cadmium plating is required.	If cadmium plating coverage is less than the permitted serviceable limits, replate the beta adjust screw in accordance with the Cadmium Replating chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).



Cylinder
Figure 5-4

Component Inspection Criteria
Table 5-1

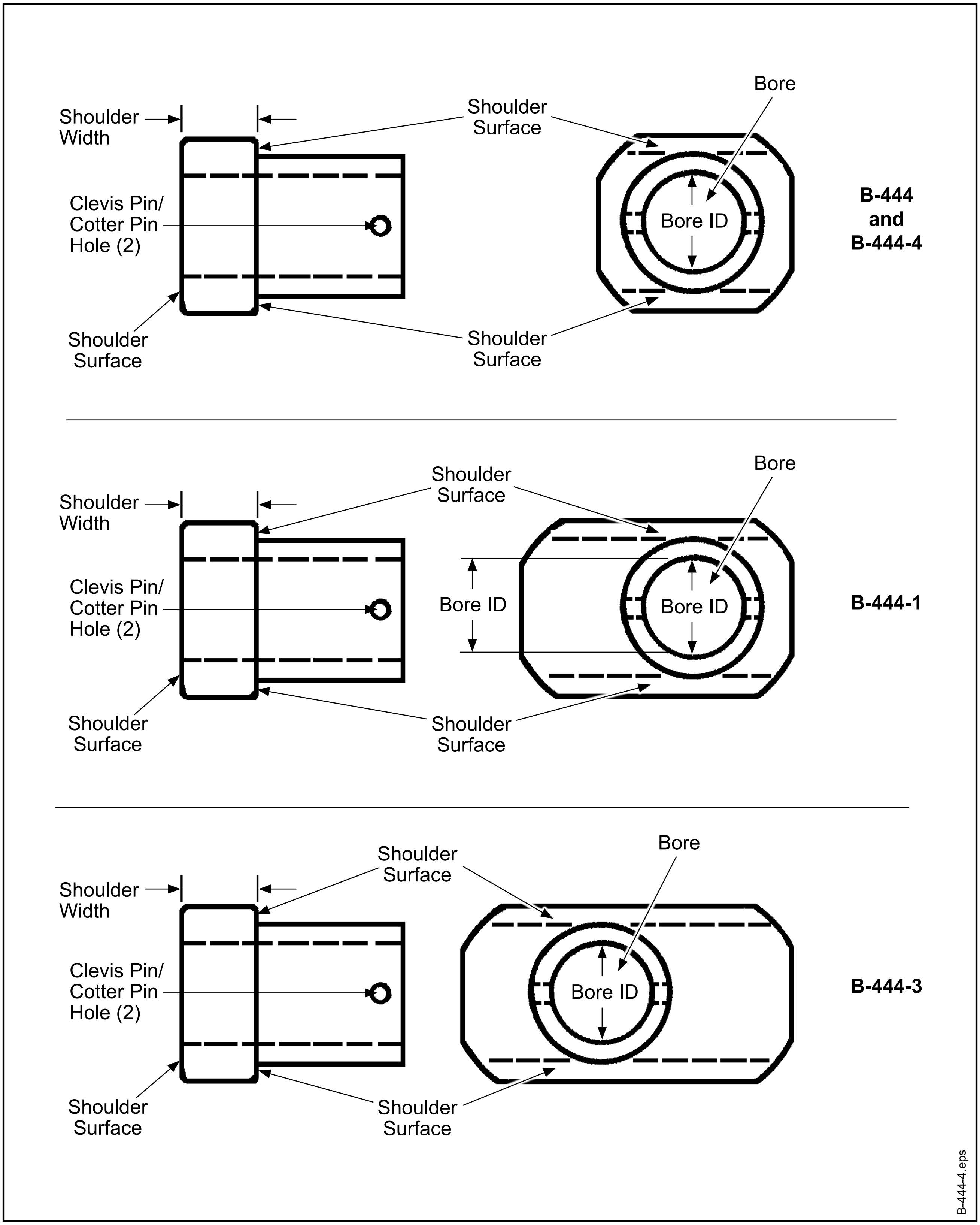
Inspect	Serviceable Limits	Corrective Action
D. CYLINDER (Item 40) Refer to Figure 5-4.		
(1) Except "Area B", visually examine the external surfaces of the cylinder for wear, nicks, scratches, or other damage.	The maximum permitted damage (including linear corrosion pitting) is: 0.5 inch (12 mm) length, 0.05 inch (1.2 mm) width, and 0.005 inch (0.12 mm) depth. Two damage marks closer than 0.5 inch (12 mm) at the nearest point are not permitted. Raised material is not permitted.	Using an abrasive pad CM47 or equivalent, lightly polish to blend out damage. If base aluminum is exposed, apply a chemical conversion coating in accordance with the Chromic Acid Anodizing chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). If damage is greater than the permitted serviceable limits, replace the cylinder.
(2) Visually examine "Area B" for damage.	The maximum permitted depth of damage in "Area B" around the entire circumference of the reverse pitch stop threads is 0.020 inch (0.50 mm). Sufficient flat surface must remain to support the drilled thin hex nut.	If damage is greater than the permitted serviceable limits, replace the cylinder.
(3) Visually examine the cylinder wrench attachment holes for thread damage.	If there is thread damage, install a 1/4-28UNF-3B screw and verify that it will tighten to secure the cylinder wrench for installation and removal.	If damage is greater than the permitted serviceable limits, repair the cylinder wrench attachment holes in accordance with the Standard Repairs and Instructions chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). If a previously repaired hole has damage that is greater than the permitted serviceable limits, replace the cylinder.
(4) If the cylinder wrench attachment holes are repaired with a threaded insert, measure the depth of the cylinder wrench attachment holes (Area "G").	The minimum permitted wall thickness between the center point of the hole and the inner surface is 0.080 inch (2.03 mm).	If the wall thickness is less than the permitted serviceable limits, replace the cylinder.
(5) Visually examine the reverse pitch stop threads for damage.	A maximum of 1/2 of one thread total accumulated damage is permitted.	If damage is greater than the permitted serviceable limits, replace the cylinder.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
D. <u>CYLINDER, CONTINUED</u> (Item 40) Refer to Figure 5-4.		
(6) Visually examine the cylinder-to-hub O-ring groove for wear (Area "E").	If the cylinder-to-hub O-ring groove shows wear, measure the ID of the O-ring groove. For D-484 and D-484-1 cylinders, the maximum permitted O-ring groove ID is 5.376 inches (136.55 mm). For the D-6845 cylinder, the maximum permitted O-ring groove ID is 5.4945 inches (139.56 mm).	If the ID is greater than the permitted serviceable limit, replace the cylinder.
(7) Visually examine the cylinder mounting threads for damage.	A maximum of 1/4 of one thread total accumulated damage is permitted.	If damage is greater than the permitted serviceable limits, replace the cylinder.
(8) Visually examine the start lock plate mounting holes for damage (8 holes) (Area "A").	For each hole, a maximum of one thread total accumulated damage is permitted.	If damage is greater than the permitted serviceable limits, repair the cylinder start lock plate mounting holes in accordance with the Standard Repairs and Instructions chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). If a previously repaired hole has damage that is greater than the permitted serviceable limits, replace the cylinder.
(9) Visually examine the start lock bracket support threaded holes (4 holes) (Area "F").	For each hole, a maximum of two threads total accumulated damage is permitted.	If damage is greater than the permitted serviceable limits, replace the cylinder.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
D. CYLINDER, CONTINUED (Item 40) Refer to Figure 5-4.		
(10) Visually examine the internal surfaces, between the piston O-ring seal surface and the reverse pitch stop threads, for nicks, scratches, or other damage (Area "C").	The maximum permitted damage (including linear corrosion pitting) is: 0.5 inch (12 mm) length, 0.05 inch (1.2 mm) width, and 0.005 inch (0.12 mm) depth. Two damage marks closer than 0.5 inch (12 mm) at the nearest point are not permitted. Raised material is not permitted.	Using an abrasive pad CM47 or equivalent, lightly polish to blend out damage. If base aluminum is exposed, apply a chemical conversion coating in accordance with the Chromic Acid Anodizing chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). If damage is greater than the permitted serviceable limits, replace the cylinder.
(11) Visually examine the internal surface in Area "H" for a material deviation.	If there is material deviation, inspect in accordance with the instructions in the "Inspection of the Internal Surface of a Cylinder" section of the Repair chapter of this manual. The maximum permitted depth of deviation of material is 0.030 inch (0.76 mm). A sharp corner is not permitted.	If there is a sharp corner, replace the cylinder. If the material deviation is greater than the permitted serviceable limits, replace the cylinder.
(12) For D-484 and D-484-1 cylinders only, measure the cylinder mounting thread ID within the 0.405 ± 0.015 inch (10.29 ± 0.38 mm) dimension from the end of the cylinder at six positions, 30 degrees apart. NOTE: Does not apply to the D-6845 cylinder.	The maximum permitted cylinder thread ID is 5.2691 inches (133.835 mm).	If the thread ID is greater than the permitted serviceable limits, replace the cylinder.
(13) Measure the cylinder ID where the piston O-ring seals (Area "D").	The maximum permitted cylinder ID is 5.131 inches (130.32 mm).	If the cylinder ID is greater than the permitted serviceable limits, replace the cylinder.



Start Lock Housing
Figure 5-5

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
E. START LOCK HOUSING B-444-1, B-444-3, AND B-444-4 (Item 130) Refer to Figure 5-5.		
(1) Visually examine the outer surfaces of the start lock housing for corrosion product and pitting.	Corrosion is not permitted. The maximum permitted depth of pitting is 0.005 inch (0.12 mm).	Remove corrosion product using glass bead cleaning. Refer to the Cleaning chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). If the corrosion product cannot be removed or if the pitting is greater than the permitted serviceable limits, replace the start lock housing.
(2) Visually examine the outer surfaces of the start lock housing for wear or damage.	The maximum permitted depth of wear or damage is 0.005 inch (0.12 mm). Raised material is not permitted.	Using an abrasive pad CM47 or equivalent, lightly polish to blend damage with the surrounding areas. If wear or damage is greater than the permitted serviceable limits, replace the start lock housing.
(3) Visually examine the shoulder surfaces of the start lock housing for wear, damage, or pitting.	If there is wear, damage, or pitting, measure the shoulder width. For B-444-1 and B-444-4 start lock housings, the minimum permitted shoulder width is 0.373 inch (9.47 mm). For the B-444-3 start lock housing, the minimum permitted shoulder width is 0.436 inch (11.08 mm). Wear, damage, or pitting may not affect more than 25% of either shoulder surface.	If the shoulder width is less than the permitted serviceable limits, replace the start lock housing. If wear, damage, or pitting is greater than the permitted serviceable limits, replace the start lock housing.
(4) Visually examine the bore of the start lock housing for corrosion product, pitting, or damage.	Corrosion product, pitting, or damage is not permitted.	If there is corrosion product, pitting, or damage, replace the start lock housing.
(5) Visually examine the bore ID of the start lock housing for wear.	If there is wear, measure the bore ID. The maximum permitted bore ID is 0.504 inch (12.80 mm).	If the bore ID is greater than the permitted serviceable limits, replace the start lock housing.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
E. START LOCK HOUSING B-444-1, B-444-3, AND B-444-4, CONTINUED (Item 130) Refer to Figure 5-5.		
(6) Visually examine the clevis pin/cotter pin holes for corrosion product, pitting, or damage.	Corrosion product, pitting, or damage is not permitted.	If there is corrosion product, pitting, or damage, replace the start lock housing.
(7) Visually examine the clevis pin/cotter pin holes for wear.	Slight wear in the form of hole elongation is permitted. The maximum permitted width of a clevis pin/cotter pin hole is 0.105 inch (2.66 mm).	If the width of the clevis pin/cotter pin hole is greater than the permitted serviceable limits, replace the start lock housing.
(8) Visually examine the start lock housing for cadmium plating coverage.	A few random scratches are permitted; otherwise, cadmium plating must cover the start lock housing.	If cadmium plating coverage is less than the permitted serviceable limits, replate the start lock housing in accordance with the Cadmium Replating chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

Component Inspection Criteria
Table 5-1

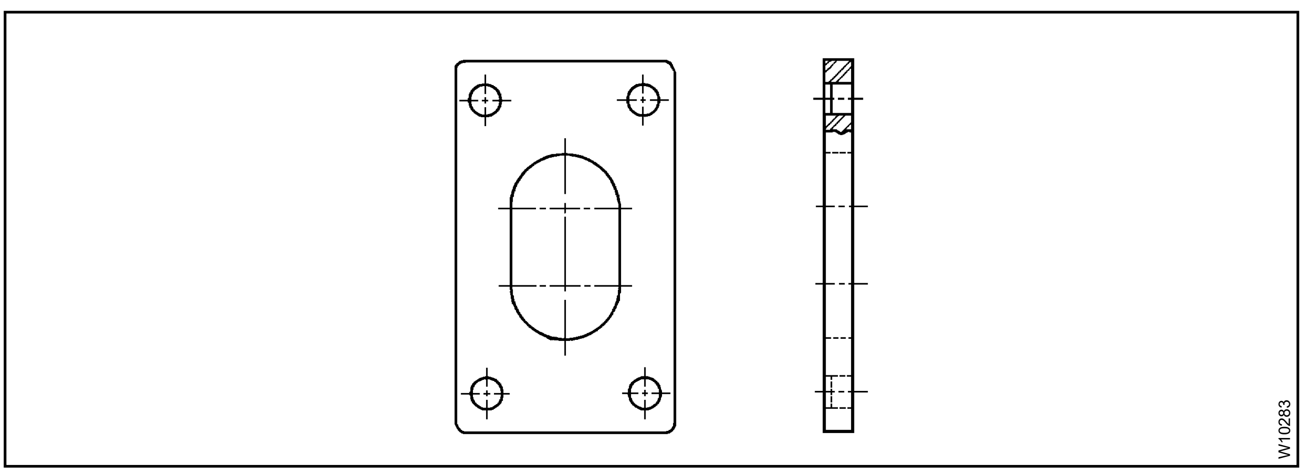
Inspect	Serviceable Limits	Corrective Action
F. START LOCK HOUSING B-444 (Item 130) Refer to Figure 5-5.		
(1) Visually examine the outer surfaces of the start lock housing for corrosion product and pitting.	Corrosion product is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits. The maximum permitted depth of pitting is 0.004 inch (0.10 mm).	If the corrosion product cannot be removed, replace the start lock housing. If the pitting is greater than the permitted serviceable limits, replace the start lock housing.
(2) Visually examine the outer surfaces of the start lock housing for wear or damage.	The maximum permitted depth of wear or damage is 0.004 inch (0.10 mm). Raised material is not permitted.	Using an abrasive pad CM47 or equivalent, lightly polish to blend damage with the surrounding areas. If wear or damage is greater than the permitted serviceable limits, replace the start lock housing.
(3) Visually examine the shoulder surfaces of the start lock housing for wear, damage, or pitting.	If there is wear, damage, or pitting, measure the shoulder width. The minimum permitted shoulder width is 0.373 inch (9.47 mm). Wear, damage, or pitting may not affect more than 25% of either shoulder surface.	If the shoulder width is less than the permitted serviceable limits, replace the start lock housing. If wear, damage, or pitting is greater than the permitted serviceable limits, replace the start lock housing.
(4) Visually examine the bore of the start lock housing for corrosion product, pitting, or damage.	Corrosion product, pitting, or damage is not permitted.	If there is corrosion product, pitting, or damage, replace the start lock housing.
(5) Visually examine the bore ID of the start lock housing for wear.	If there is wear, measure the bore ID. The maximum permitted bore ID is 0.504 inch (12.80 mm).	If the bore ID is greater than the permitted serviceable limits, replace the start lock housing.
(6) Visually examine the clevis pin/cotter pin holes for corrosion product, pitting, or damage.	Corrosion product, pitting, or damage is not permitted.	If there is corrosion product, pitting, or damage, replace the start lock housing.
(7) Visually examine the clevis pin/cotter pin holes for wear.	Slight wear in the form of hole elongation is permitted. The maximum permitted width of a clevis pin/cotter pin hole is 0.105 inch (2.66 mm).	If the width of the clevis pin/cotter pin hole is greater than the permitted serviceable limits, replace the start lock housing.

Component Inspection Criteria
Table 5-1

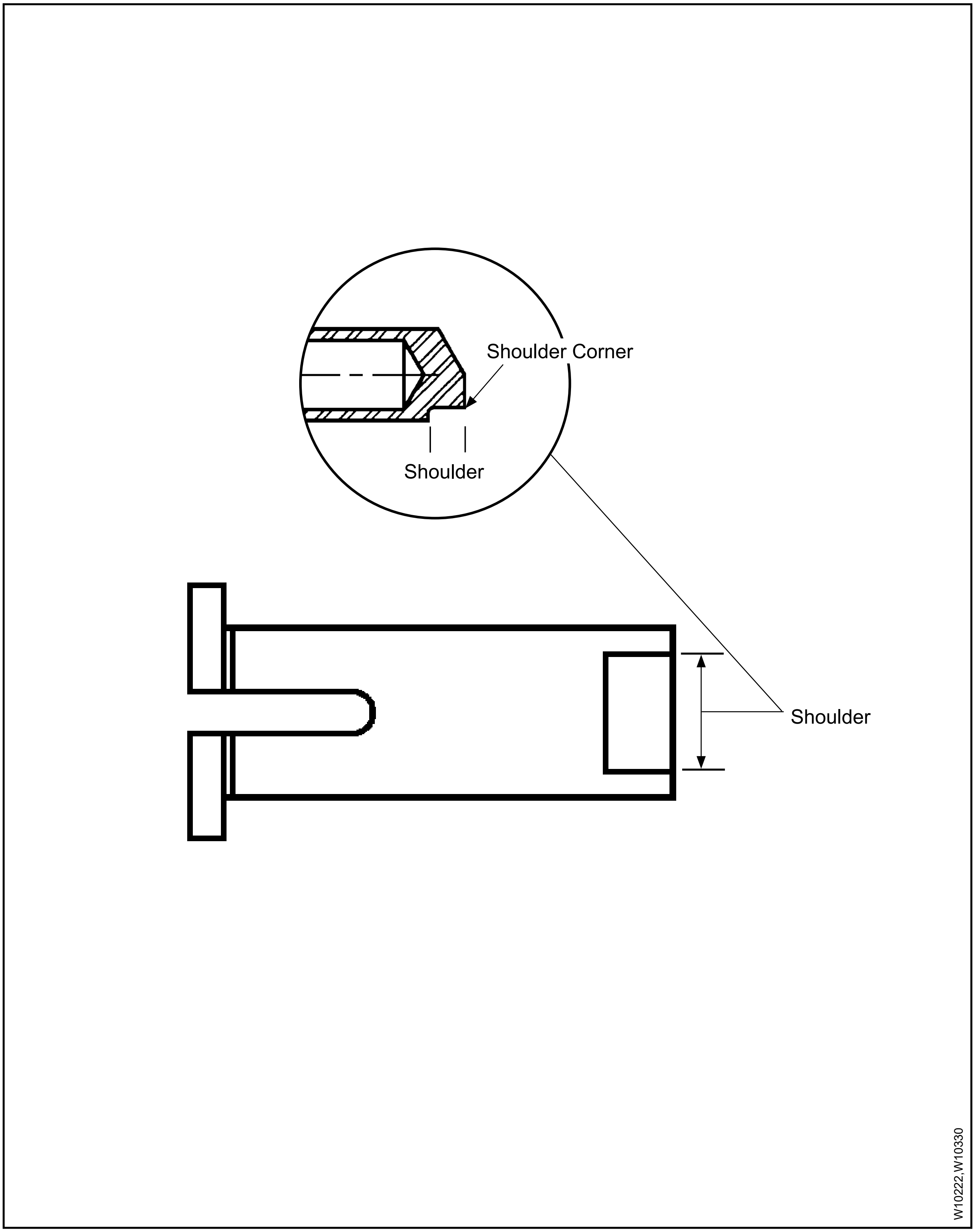
Inspect	Serviceable Limits	Corrective Action
F. START LOCK HOUSING B-444, CONTINUED (Item 130) Refer to Figure 5-5.		
(8) Visually examine the start lock housing for anodize coverage.	A few random scratches are permitted; otherwise, anodize must cover the start lock housing.	If anodize coverage is less than the permitted serviceable limits, re-anodize the start lock housing in accordance with the Chromic Acid Anodizing Replating chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
G. <u>START LOCK HOUSING COVER</u> (Item 140) Refer to Figure 5-6.		
(1) Visually examine the start lock housing cover for corrosion product and pitting.	Corrosion product is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits. The maximum permitted depth of pitting is 0.005 inch (0.12 mm). Pitting must not affect the secure retention of the start lock housing (130).	Remove corrosion product using glass bead cleaning. Refer to the Cleaning chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). If the corrosion product cannot be removed, replace the start lock housing cover. If the depth of pitting is greater than the permitted serviceable limits, replace the start lock housing.
(2) Visually examine the start lock housing cover for wear or damage.	The maximum permitted depth of wear or damage is 0.005 inch (0.12 mm). Wear or damage must not affect the secure retention of the start lock housing (130).	If wear or damage is greater than the permitted serviceable limits, replace the start lock housing cover.
(3) Visually examine the start lock housing cover for cadmium plating coverage.	A few random scratches are permitted; otherwise, cadmium plating must cover the start lock housing cover.	If cadmium plating coverage is less than the permitted serviceable limits, replate the start lock housing cover in accordance with the Cadmium Replating chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).



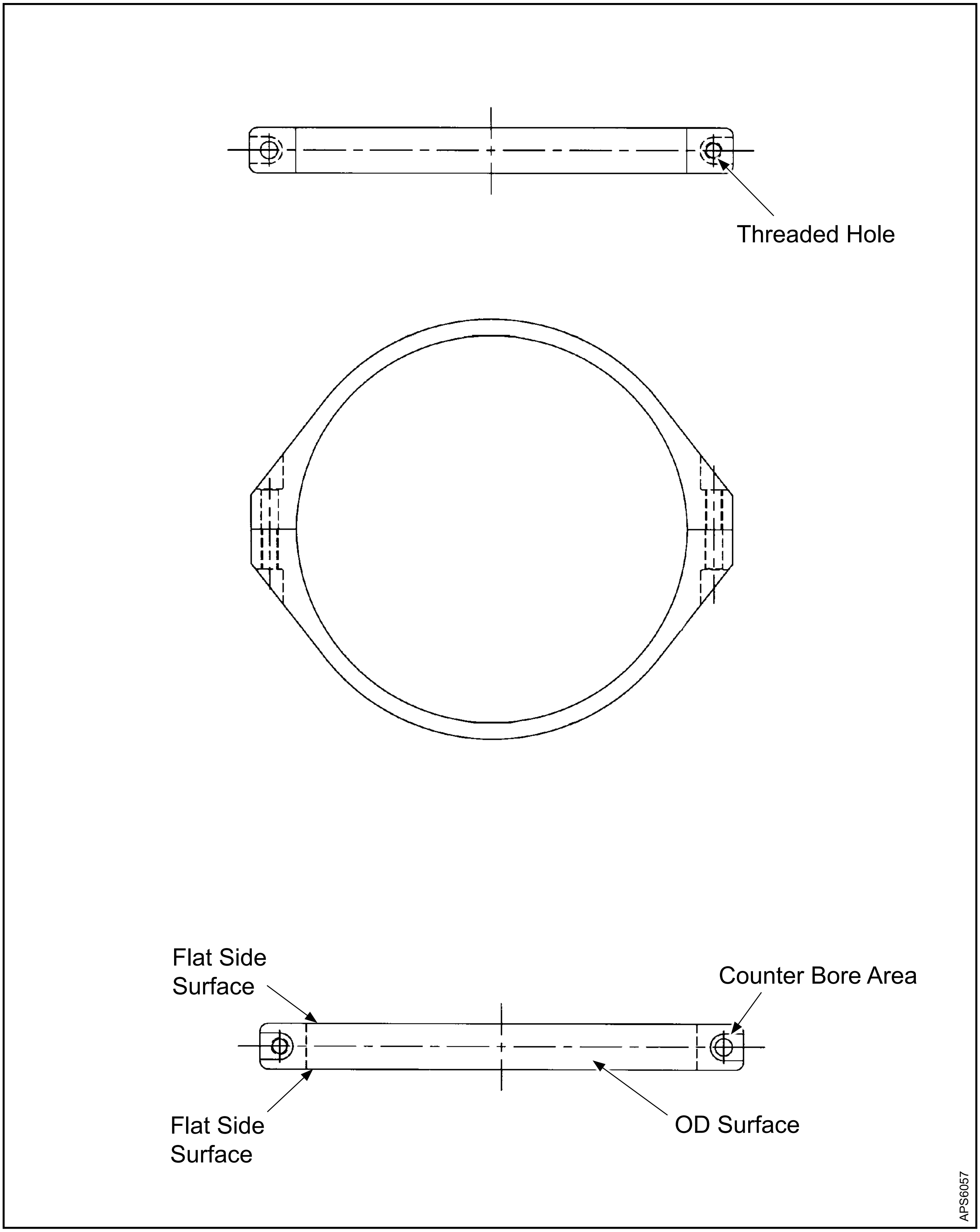
Start Lock Housing Cover
Figure 5-6



Start Lock Pin
Figure 5-7

Component Inspection Criteria
Table 5-1

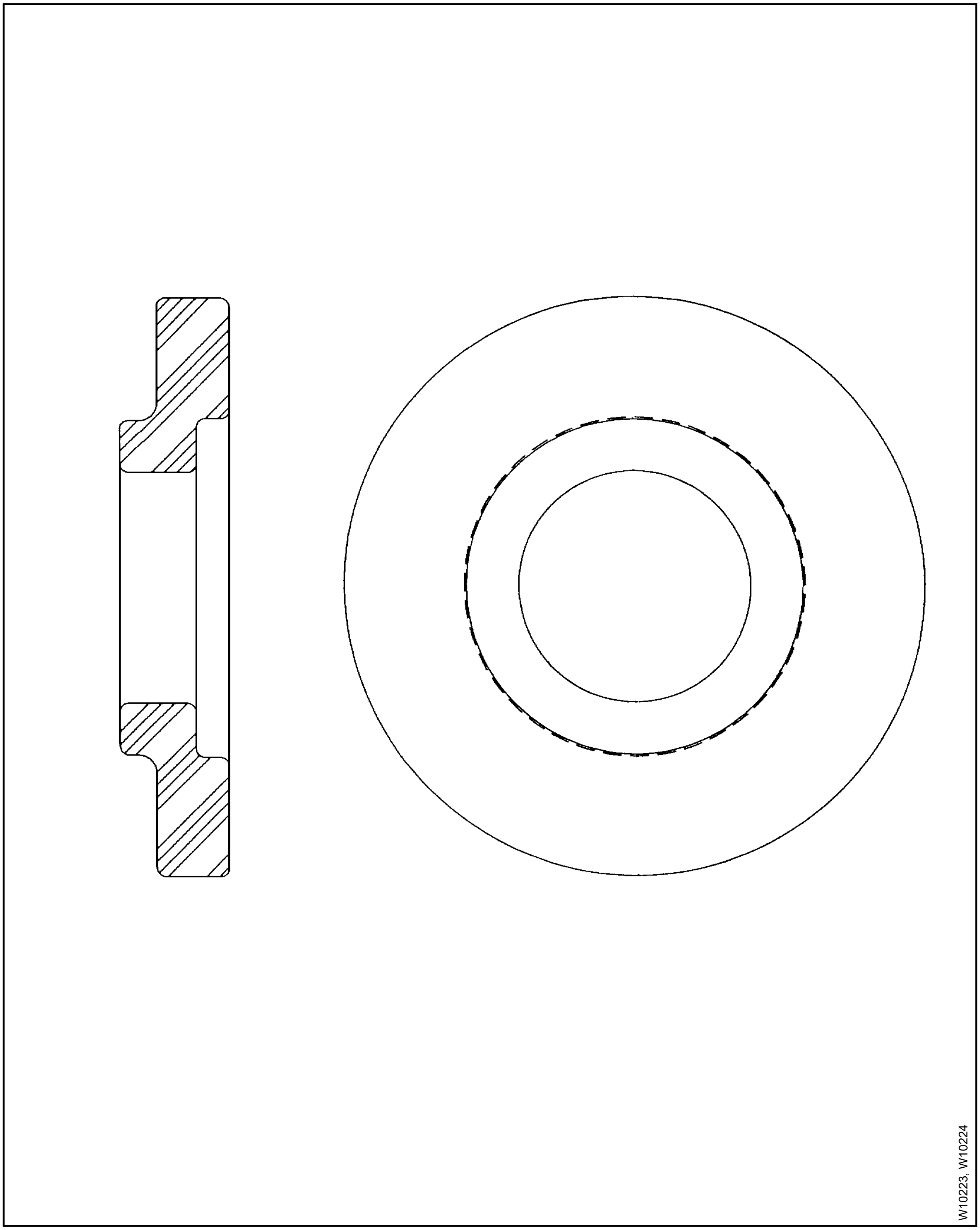
Inspect	Serviceable Limits	Corrective Action
H. START LOCK PIN (Item 150) Refer to Figure 5-7.		
(1) Visually examine the start lock pin for corrosion product or damage.	Corrosion product or damage is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits.	Light corrosion product may be removed with glass bead cleaning. Refer to the Cleaning chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). If the corrosion product cannot be removed or if there is damage, replace the start lock pin.
(2) Visually examine the start lock pin shaft diameter for wear.	If there is wear, measure the start lock pin shaft OD. The minimum permitted shaft OD is 0.494 inch (12.55 mm).	If the OD is less than the permitted serviceable limits, replace the start lock pin.
(3) Visually examine the shoulder corner for wear.	If there is wear, measure the shoulder corner. The maximum permitted shoulder corner radius is 0.032 inch (0.81 mm).	If the shoulder corner radius is greater than serviceable limits, replace the start lock pin.



Inspection Areas of the B-6472-1 Cylinder Clamp
Figure 5-8

Component Inspection Criteria
Table 5-1

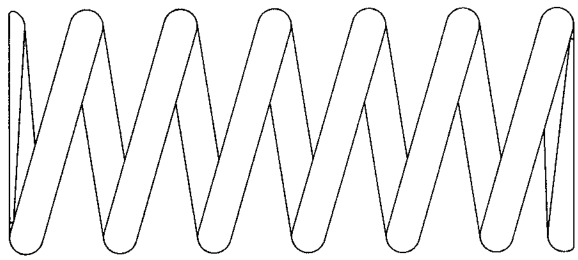
Inspect	Serviceable Limits	Corrective Action
I. CYLINDER CLAMP (Item 200) Refer to Figure 5-8.		
(1) Visually examine the cylinder clamp ID and OD for scratches, nicks, or gouges.	The maximum permitted depth of damage is 0.015 inch (0.38 mm). More than 3 linear indications for each 1 sq. inch (645 sq. mm) are not permitted. Indications may be no closer than 0.250 inch (6.35 mm) to each other and must not form a continuous linear pattern within that area.	If the depth of damage is greater than the permitted serviceable limits, replace the cylinder clamp.
(2) Visually examine the cylinder clamp ID and OD for corrosion product or pitting.	More than 10 non-linear indications of corrosion product or pitting greater than 0.032 inch (0.81 mm) diameter within a 1 sq. inch (645 sq. mm) area are not permitted.	If the corrosion product or pitting is greater than the permitted serviceable limits, replace the cylinder clamp.
(3) Visually examine the counterbore area for scratches, nicks, or gouges.	The maximum permitted depth of damage is 0.015 inch (0.38 mm).	If the depth of damage is greater than the permitted serviceable limits, replace the cylinder clamp.
(4) Visually examine the counterbore area for corrosion product or pitting.	Corrosion product or pitting is not permitted.	If there is corrosion product or pitting, replace the cylinder clamp.
(5) Visually examine the threaded area for damage.	A total of one thread accumulated damage in each threaded hole is permitted. A damaged thread must not interfere with installed screw threads. Corrosion product or pitting is not permitted.	If the damage is greater than the permitted serviceable limits, replace the cylinder clamp.
(6) Inspect the threaded area with a "Go-No/Go" thread gauge.	Only the "Go" portion of a 0.250 X 28UNF thread gauge is permitted to enter the threaded hole.	If the inspection does not meet the permitted serviceable limits, replace the cylinder clamp.



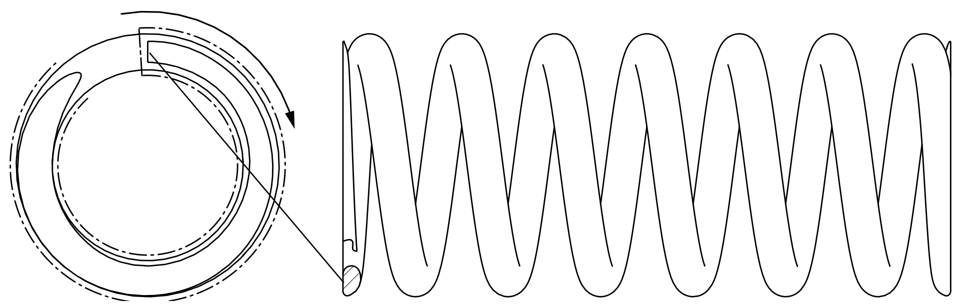
Forward Spring Retainer
Figure 5-9

Component Inspection Criteria
Table 5-1

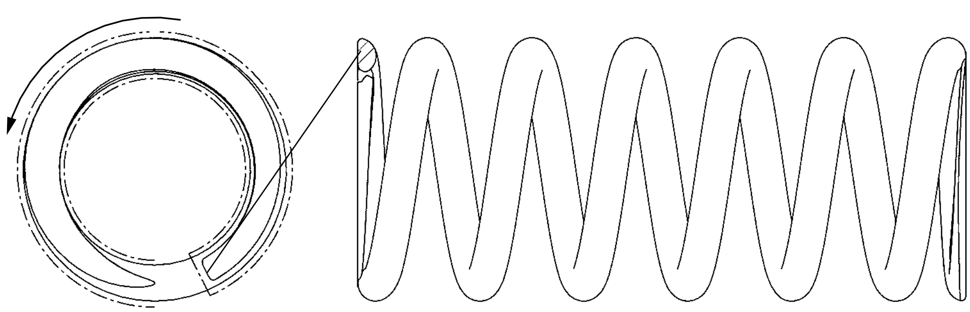
Inspect	Serviceable Limits	Corrective Action
J. FORWARD SPRING RETAINER (Item 250) Refer to Figure 5-9.		
(1) Visually examine the forward spring retainer for wear or damage.	The maximum permitted depth of wear or damage is 0.020 inch (0.50 mm). Damage or wear that prevents the correct support and positioning of the spring is not permitted.	If wear or damage is greater than the permitted serviceable limits, replace the forward spring retainer.



Feathering Compression Spring



106926 Feathering Compression Spring
Right Hand Winding



C-6760 Feathering Compression Spring
Left Hand Winding

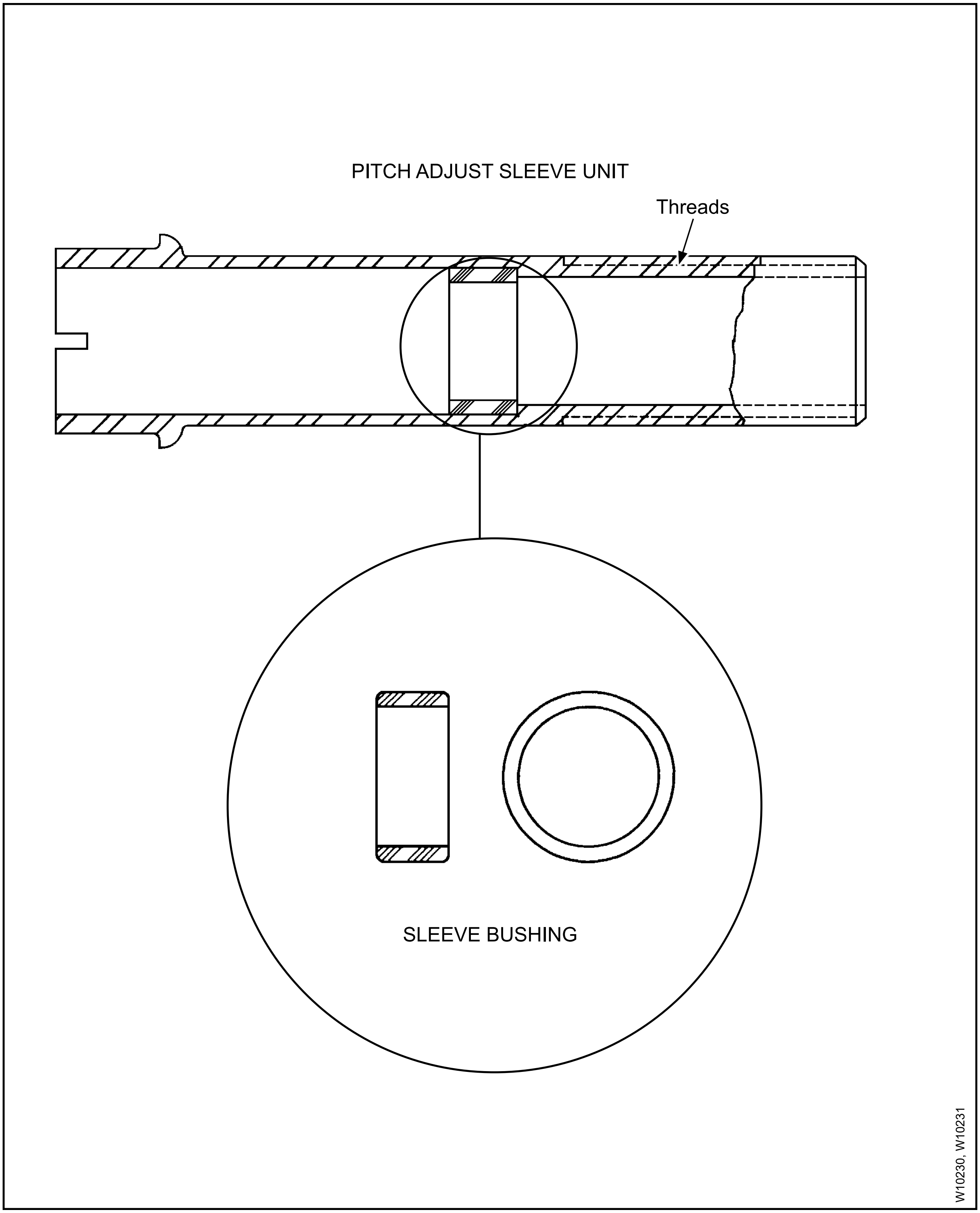
Feathering Compression Springs
Figure 5-10

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
K. FEATHERING COMPRESSION SPRING (Item 260) Refer to Figure 5-10.		

NOTE: If the C-447 feathering compression spring is currently in the propeller and must be replaced, the A-6828 feathering spring kit must be used. The A-6828 feathering spring kit contains: B-6758 pitch adjust sleeve unit, C-6760 feathering compression spring, B-6761 spring guide, and B-6768 forward spring retainer.

Inspect	Serviceable Limits	Corrective Action
(1) Visually examine the feathering compression spring for corrosion product and pitting.	Corrosion product is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits. The maximum permitted depth of pitting is 0.005 inch (0.12 mm).	Remove corrosion product using glass bead cleaning. Refer to the Cleaning chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). If the corrosion product cannot be removed, replace the feathering compression spring. If the pitting is greater than the permitted serviceable limits, replace the feathering compression spring.
(2) Visually examine the feathering compression spring for wear, nicks, or other damage.	The maximum permitted depth of wear, nicks, or other damage is 0.005 inch (0.12 mm).	If wear, nicks, or damage is greater than the permitted serviceable limits, replace the feathering compression spring.
(3) Magnetic particle inspect the feathering compression spring in accordance with the Magnetic Particle Inspection chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). Do not strip the original zinc plating or zinc chromate primer.	A relevant indication is not permitted.	If there is a relevant indication, replace the feathering compression spring.
(4) After magnetic particle inspection, visually examine the feathering compression spring for zinc plating or zinc chromate primer coverage.	A few random scratches are permitted; otherwise, complete coverage of zinc plating or zinc chromate primer on all surfaces of the feathering compression spring is required.	Apply a layer of zinc chromate primer CM67, or equivalent, to the feathering compression spring in accordance with the Repair chapter of this manual. Do not apply zinc chromate primer before magnetic particle inspection.



Pitch Adjust Sleeve Unit and Sleeve Bushing
Figure 5-11

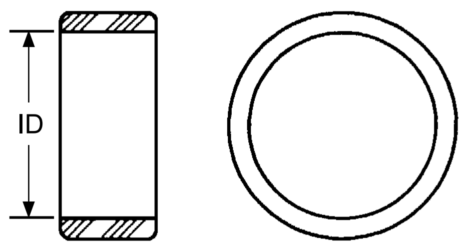
Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
L. PITCH ADJUST SLEEVE UNIT (Item 280) Refer to Figure 5-11.		

NOTE 1: If a pitch adjust sleeve is found cracked, in addition to replacement of the pitch adjust sleeve unit, it is now considered necessary to also replace the feathering compression spring, the spring guide, and the forward spring retainer.

NOTE 2 If the C-447 feathering compression spring is currently in the propeller and must be replaced, the A-6828 feathering spring kit must be used. The A-6828 feathering spring kit contains: B-6758 pitch adjust sleeve unit, C-6760 feathering compression spring, B-6761 spring guide, and B-6768 forward spring retainer.

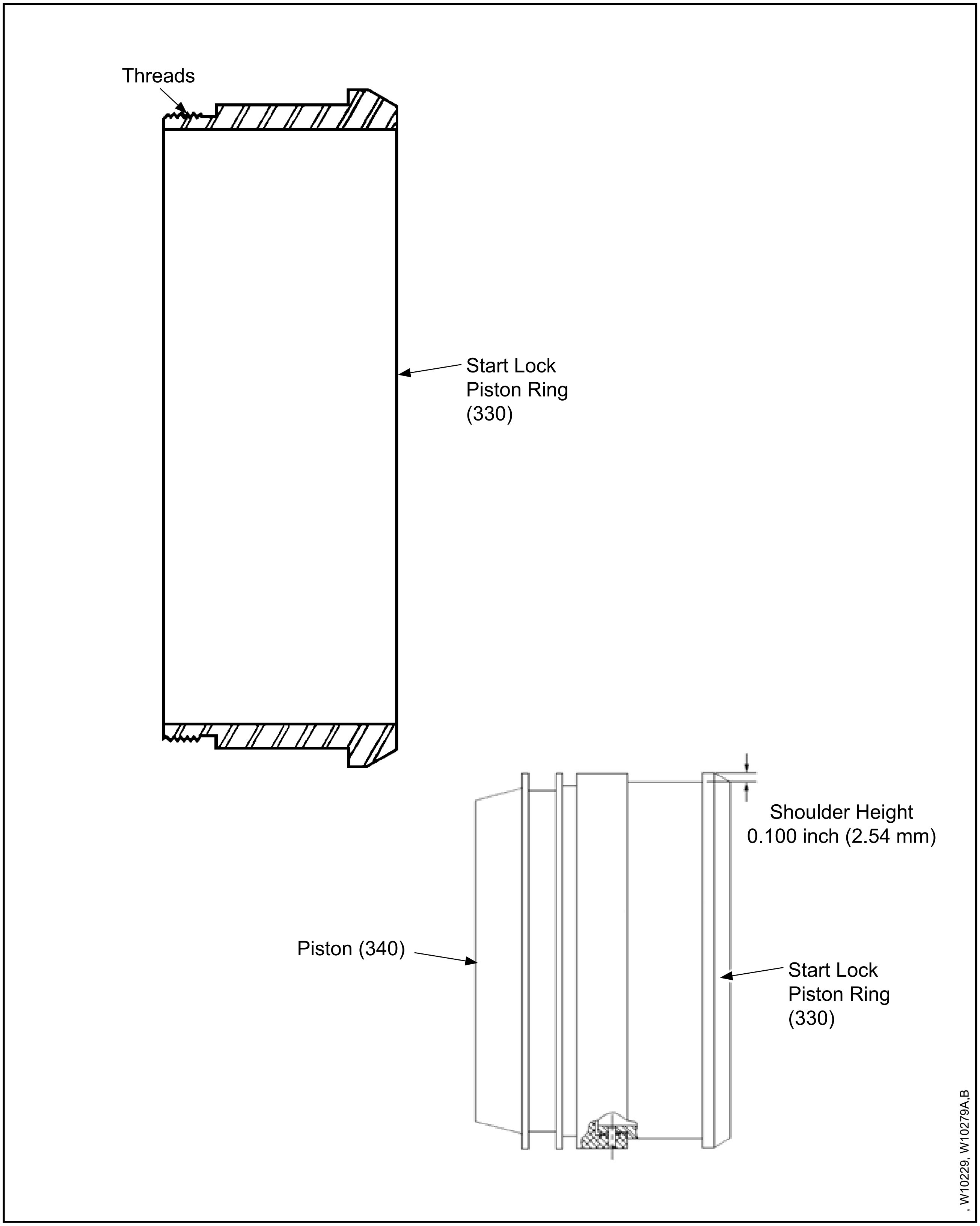
Inspect	Serviceable Limits	Corrective Action
(1) Visually examine the reverse adjust sleeve threads for damage or distortion.	A total of one thread accumulated damage is permitted. Thread damage must not interfere with the movement of the mating jam nut or movement of the reverse adjust sleeve in the cylinder.	If damage is greater than the permitted serviceable limits, replace the pitch adjust sleeve unit. Refer to NOTE 1 and NOTE 2 above.
(2) Visually examine the pitch adjust sleeve unit for cadmium plating coverage.	A few scratches, corners with plating missing, and light wear of the cadmium plating from the threads because of nut installation is permitted; otherwise, complete cadmium plating coverage is required.	If cadmium plating coverage is less than the permitted serviceable limits, remove the sleeve bushing (300) and cadmium replate the reverse adjust sleeve in accordance with the Cadmium Replating chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). For sleeve bushing removal procedures, refer to the Repair section of this manual.
(3) Magnetic particle inspect the pitch adjust sleeve unit in accordance with the Magnetic Particle Inspection chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). NOTE: It is not necessary to remove the sleeve bushing.	A relevant indication is not permitted.	If there is a relevant indication, replace the pitch adjust sleeve unit. Refer to NOTE 1 and NOTE 2 above.



Sleeve Bushing, Pitch Adjust Sleeve Unit
Figure 5-12

Component Inspection Criteria
Table 5-1

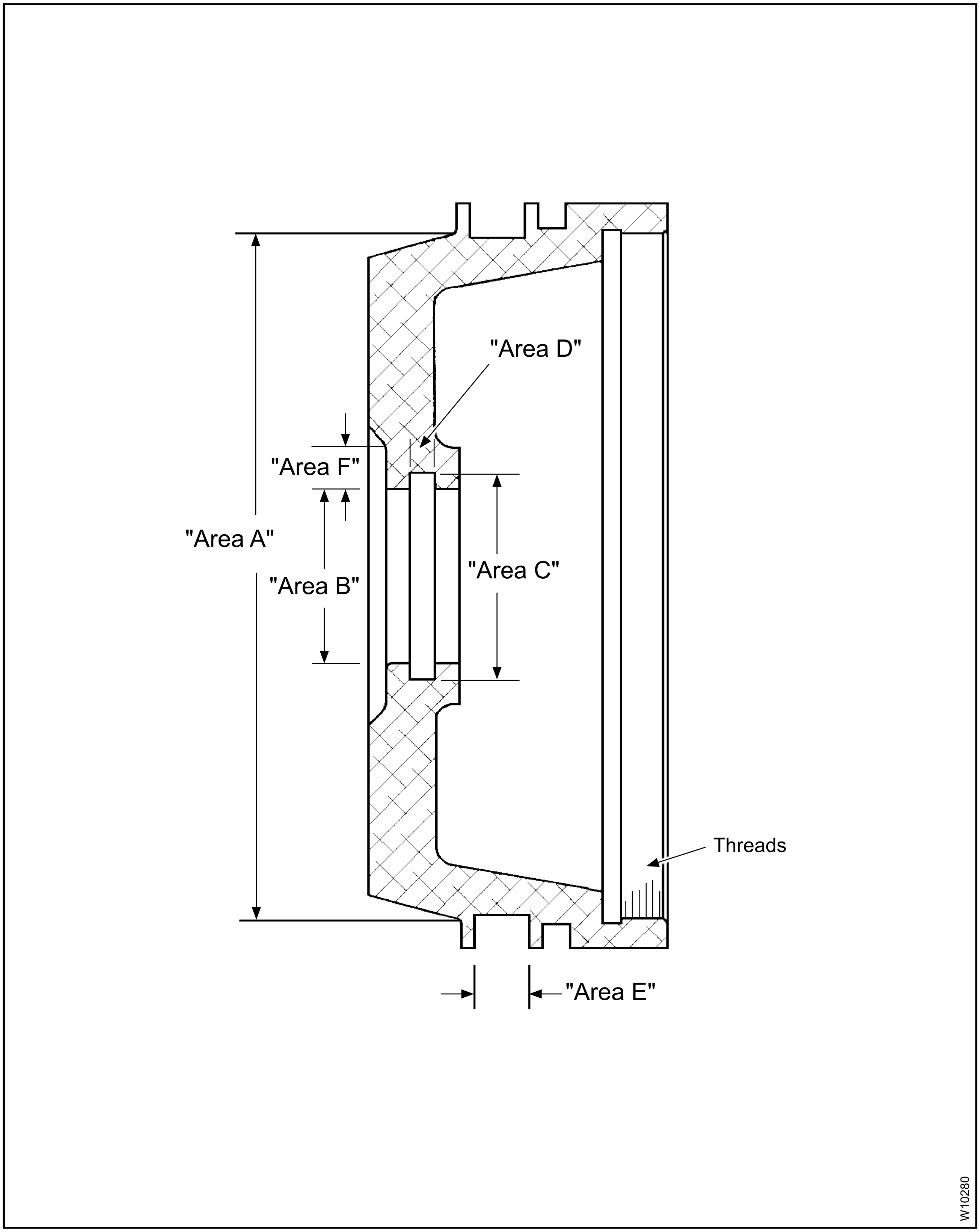
Inspect	Serviceable Limits	Corrective Action
M. SLEEVE BUSHING (Item 300) Refer to Figure 5-12.		
(1) Visually examine the sleeve bushing ID for damage.	The maximum permitted depth of damage is 0.010 inch (0.25 mm). The maximum permitted damage to the ID surface is 10%.	If damage is greater than the permitted serviceable limits, remove and replace the pitch sleeve bushing in accordance with the Repair section of this manual. NOTE: If the pitch adjust sleeve (290) must be replated, install the sleeve bushing after plating.
(2) Measure the ID of the sleeve bushing.	The maximum permitted ID is 1.006 inch (25.55 mm).	If the ID is greater than the permitted serviceable limits, remove and replace the sleeve bushing in accordance with the Repair section of this manual. NOTE: If the pitch adjust sleeve (290) must be replated, install the sleeve bushing after plating.



Start Lock Piston Ring Inspection Criteria
Figure 5-13

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
N. START LOCK PISTON RING (Item 330) Refer to Figure 5-13.		
(1) Visually examine the threads of the start lock piston ring for corrosion product or damage.	Corrosion is not permitted. A maximum of 1/2 of one thread total accumulated damage is permitted. Damage must not affect the ability to thread onto the piston. Spring pin holes are considered thread damage.	Remove corrosion product using glass bead cleaning. Refer to the Cleaning chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). If the corrosion product cannot be removed or if the damage is greater than the permitted serviceable limits, replace the start lock piston ring.
(2) Visually examine the surface of the start lock piston ring for nicks, scratches, or other damage.	The maximum permitted depth of nicks, scratches, or damage is 0.010 inch (0.25 mm).	If the depth of nicks, scratches, or damage is greater than the permitted serviceable limits, replace the start lock piston ring.
(3) Measure the shoulder height of the start lock piston ring.	The minimum permitted shoulder height is 0.100 inch (2.54 mm) in all locations around the circumference.	If the height is less than the permitted serviceable limits, replace the start lock piston ring.
(4) Visually examine the start lock piston ring for the number of spring pin holes.	A maximum of five empty holes and a sixth with a spring pin installed is permitted.	If there are more holes than the permitted serviceable limits, replace the start lock piston ring.
(5) Visually examine the Cadmium plating coverage on the surface of the start lock piston ring.	Cadmium plating must cover the ring. A few random scratches and wear where the start lock pins contact the start lock piston ring are permitted; otherwise, the ring must have complete cadmium plating coverage.	If cadmium plating coverage is less than the permitted serviceable limits, cadmium replate the start lock piston ring in accordance with the Cadmium Replating chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).
(6) Magnetic particle inspect the start lock piston ring in accordance with the Magnetic Particle Inspection chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).	A relevant indication is not permitted.	If there is a relevant indication, replace the start lock piston ring.



Piston
Figure 5-14

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
O. PISTON (Item 340) Refer to Figure 5-14.		
(1) Excluding the O-ring grooves, visually examine the anodized surfaces of the piston for wear, nicks, scratches, or other damage.	The maximum permitted depth of wear, nicks, scratches, or damage is 0.005 inch (0.12 mm).	If wear, nicks, scratches, or damage is greater than the permitted serviceable limits, replace the piston.
(2) Visually examine the piston threads for damage.	A maximum of 1/2 of one thread total accumulated damage is permitted. Damage must not interfere with the ability to thread a ring onto the piston.	If damage is greater than the permitted serviceable limits, replace the piston.
(3) Visually examine the piston bore recessed area around the entire circumference of the center hole for scoring or gouging caused by pitch change rod wrenching flats (Area "F").	The maximum permitted depth of damage is 0.030 inch (0.76 mm). Sufficient flat surface must remain in Area "F" to support the piston correctly on the pitch change rod shoulder.	If damage is greater than the permitted serviceable limits, replace the piston.
(4) Visually examine the piston for the number of spring pin holes.	A maximum of five empty holes and a sixth with a spring pin installed is permitted.	If there are more holes than the permitted serviceable limits, replace the piston.
(5) Measure the piston O-ring groove OD (Area "A").	The minimum permitted O-ring groove OD is 4.644 inches (117.96 mm).	If the OD is less than the permitted serviceable limits, replace the piston.
(6) Measure the piston bore ID (Area "B").	The maximum permitted piston bore ID is 1.191 inch (30.25 mm).	If the ID is greater than the permitted serviceable limits, replace the piston.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
O. PISTON, CONTINUED (Item 340) Refer to Figure 5-14.		
(7) Measure the piston O-ring groove ID (Area "C").	The maximum permitted piston O-ring groove ID is 1.416 inch (35.96 mm).	If the piston O-ring groove ID is greater than the permitted serviceable limits, replace the piston.
(8) Measure the piston O-ring groove width (Area "D").	The maximum permitted piston O-ring groove width in area "D" is 0.180 inch (4.57 mm). The minimum permitted piston O-ring groove width in area "D" is 0.163 inch (4.15 mm).	If the width of the piston O-ring groove is greater than the permitted serviceable limits, replace the piston.
(9) Measure the piston O-ring groove width (Area "E").	The maximum permitted piston O-ring groove width in area "E" is 0.385 inch (9.77 mm).	If the piston O-ring groove width is greater than the permitted serviceable limits, replace the piston.
(10) Penetrant inspect the piston in accordance with the Hartzell Propeller Standard Practices Manual 202A (61-01-02). CAUTION: DO NOT REMOVE THE ANODIZE COATING BEFORE PENETRANT INSPECTION.	A relevant indication is not permitted.	If a relevant indication cannot be removed within the permitted serviceable limits, replace the piston.

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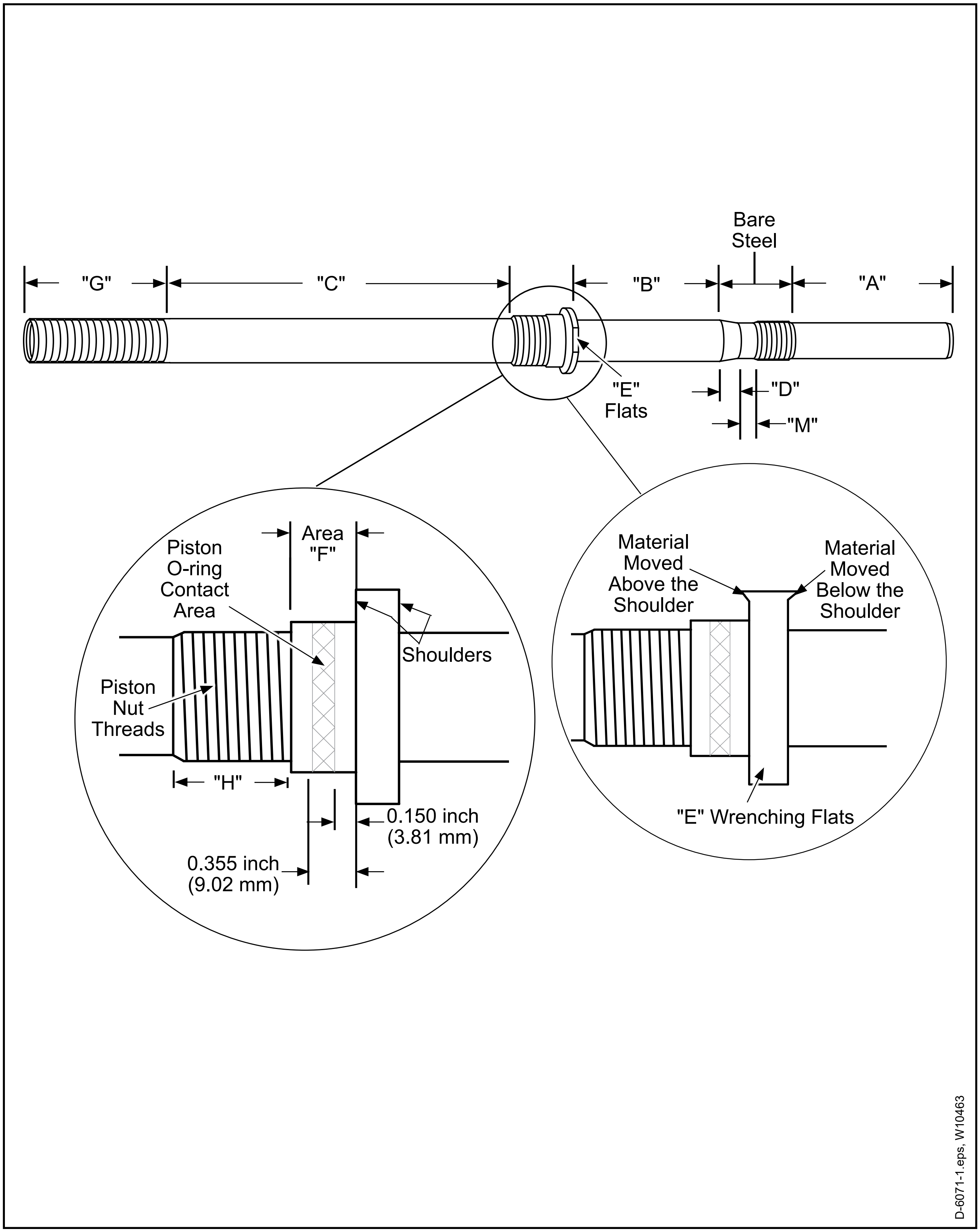
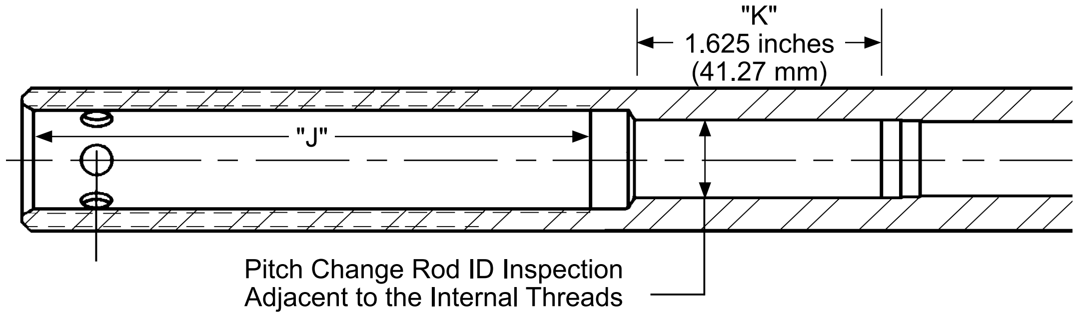
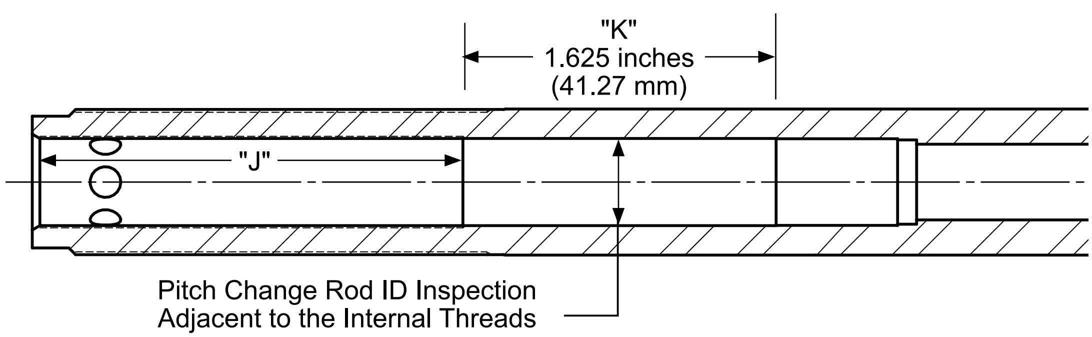


Pitch Change Rod
Figure 5-15



D-494-1, 106503, and 107224



D-6114-1

W10282, TPI-LW-141-00892

D-494-1, D-6114-1, 106503 and 107224 Pitch Change Rods
Figure 5-16

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
P. PITCH CHANGE ROD (Item 420) Refer to Figure 5-15 and Figure 5-16.		
(1) Visually examine the pitch change rod for corrosion product and pitting.	Except where specifically permitted in this section of the manual, corrosion product is not permitted. Pitting is not permitted.	Remove corrosion product using glass bead cleaning. Refer to the Cleaning chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). If the corrosion product cannot be removed, replace the pitch change rod. If the pitting is greater than the permitted serviceable limits, replace the pitch change rod.
(2) Visually examine the pitch change rod for chrome plating coverage (Areas "A", "B", and "C").	Minor wear on corners and random light scratches are permitted; otherwise, complete chrome plating coverage is required.	If the chrome plating coverage is less than the permitted serviceable limits, return the pitch change rod to Hartzell Propeller LLC.
(3) Visually examine the pitch change rod threads for cadmium plating coverage (Areas "G" and "H") (Area "J" if applicable)	Minor wear on corners and random light scratches are permitted; otherwise, complete cadmium plating coverage is required.	If the cadmium plating coverage is less than the permitted serviceable limits, cadmium replate the threaded areas of the pitch change rod in accordance with the Cadmium Replating chapter of the Hartzell Propeller Standard Practices Manual 202A (61-01-02).
(4) Visually examine the pitch change rod for straightness.	The pitch change rod must be straight.	If the pitch change rod is not straight, replace the pitch change rod.
(5) Visually examine the pitch change rod external threads for damage.	A maximum of 1/2 of one thread total accumulated damage in each threaded area is permitted. A damaged thread must not interfere with mating part threads.	If damage is greater than the permitted serviceable limits, replace the pitch change rod.

Component Inspection Criteria
Table 5-1

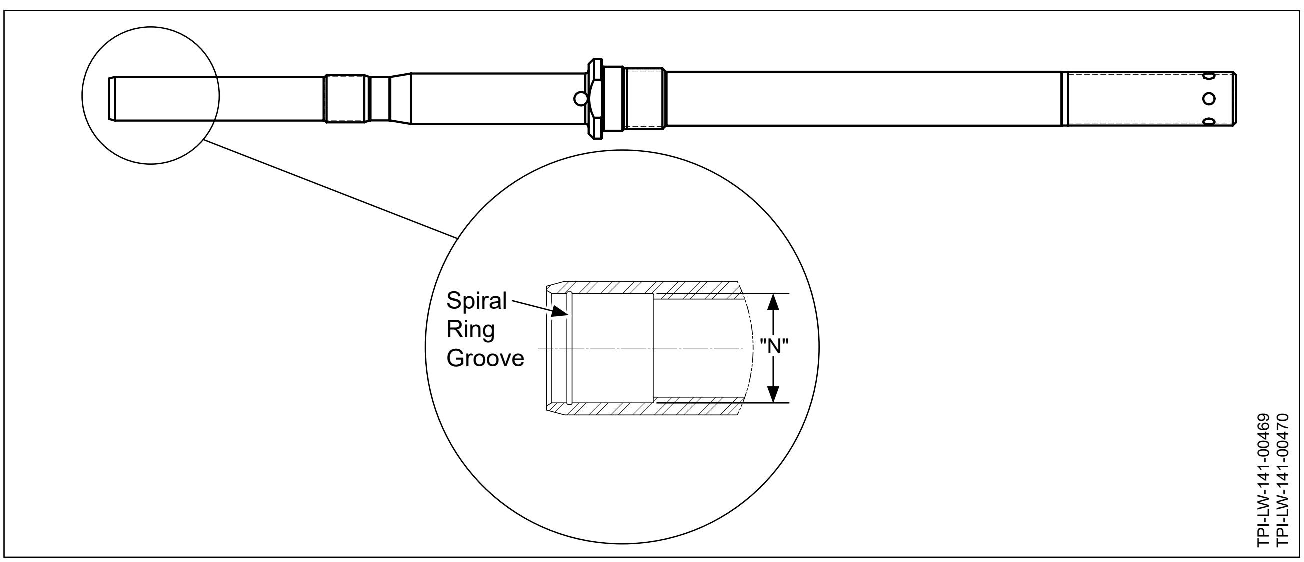
Inspect	Serviceable Limits	Corrective Action
P. PITCH CHANGE ROD, CONTINUED (Item 420) Refer to Figure 5-15.		
(6) Visually examine the pitch change rod fork taper for pitting, wear, or damage (Area "D").	Pitting, wear, or damage is not permitted at the smallest diameter of the taper or within 0.093 inch (2.36 mm) of the smallest diameter. The remaining taper surface may have a maximum damage depth of 0.004 inch (0.10 mm) over 10% of the surface area. Raised material is not permitted.	If damage causes raised material above the existing surface, remove only the raised material. If pitting, wear, or damage is greater than the permitted serviceable limits, replace the pitch change rod.
(7) Visually examine the pitch change rod fork taper for pitting, wear, or damage (Area "M).	Pitting, wear, or damage is not permitted. The minimum permitted OD including repair is 0.794 inch (20.16 mm).	Pitting or damage may be repaired by polishing with emery cloth to a maximum permitted depth of 0.002 inch (0.05 mm). If pitting, wear, or damage is greater than the permitted serviceable limits or corrective action limits replace the pitch change rod
(8) Visually examine the pitch change rod wrenching flats for moved material (Area "E").	Moved material caused by wrench engagement must not be above or below the pitch change rod shoulder surfaces. Sufficient flat surfaces must remain to support applied open-end wrench torque.	Remove the moved material flush with the pitch change rod shoulder thickness. If damage is greater than the permitted serviceable limits, replace the pitch change rod.
(9) Visually examine the pitch change rod-to-piston contact area of Area "F" between the shoulder and threads for damage or pitting.	Pitting or damage is not permitted in the area between 0.150 inch (3.81 mm) and 0.355 inch (9.01 mm) from the shoulder.	If there is pitting or damage, replace the pitch change rod.
(10) Visually examine the pitch change rod-to-piston contact area between the shoulder and threads outside of the piston O-ring contact area of Area "F" for damage or pitting.	The maximum permitted depth of pitting or damage is 0.007 inch (0.178 mm).	Using an abrasive pad CM47 or equivalent, polish to remove damage or pitting. If damage or pitting is greater than the permitted serviceable limits, replace the pitch change rod.

Component Inspection Criteria
Table 5-1

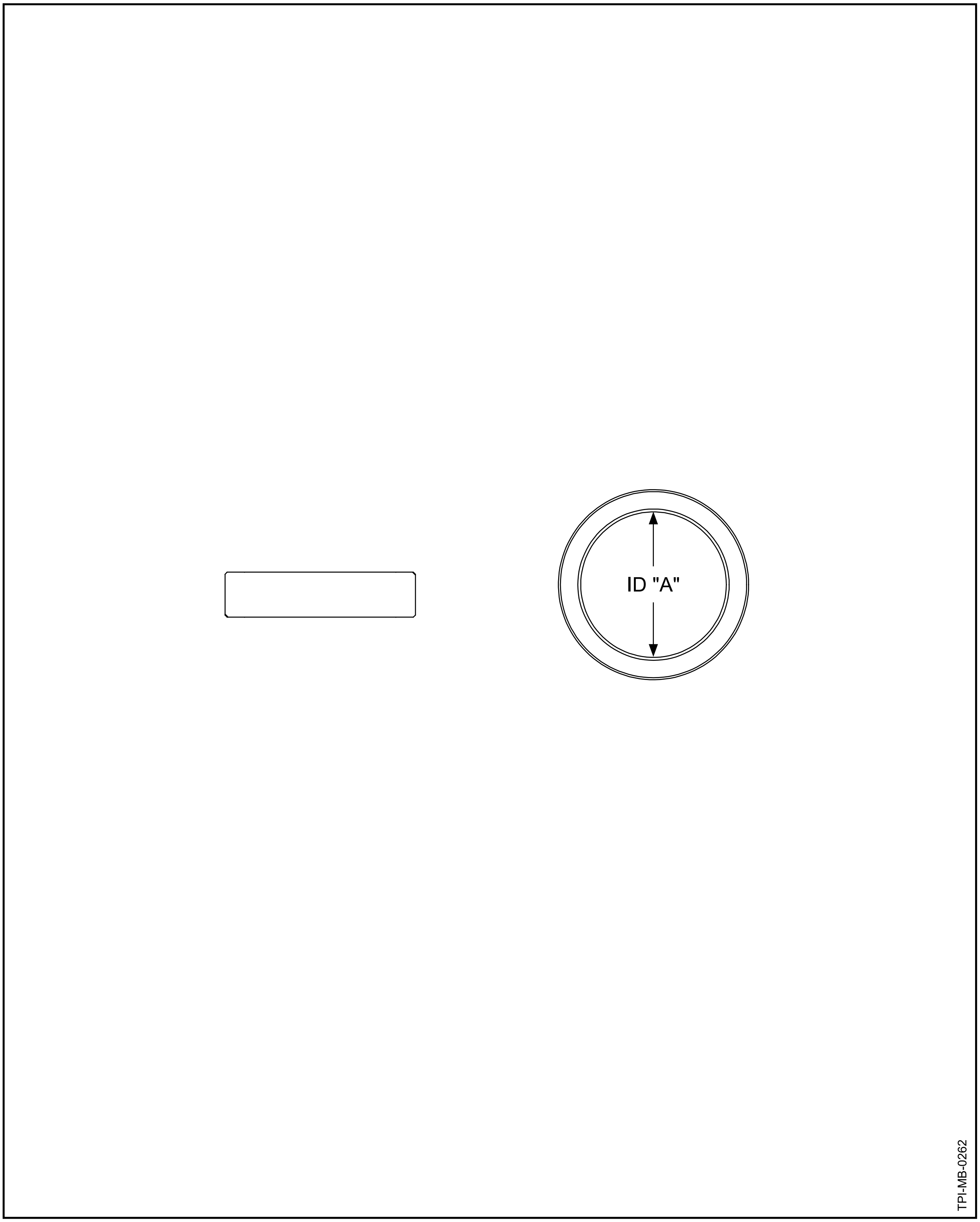
Inspect		Serviceable Limits	Corrective Action
P.	PITCH CHANGE ROD, CONTINUED (Item 420) Refer to Figure 5-15 and 5-16.		
(11)	Visually examine the oil supply bore for unwanted material.	Unwanted material is not permitted.	Remove all unwanted material. Refer to the Cleaning chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).
(12)	Visually examine the internal threads of the pitch change rod for damage.	A maximum of one thread total accumulated damage is permitted. Damaged threads must not interfere with mating part threads.	If damage is greater than the permitted serviceable limits, replace the pitch change rod.
(13)	For D-494-1, 106503 and 107224 rods, visually examine the pitch change rod ID adjacent to the internal threads for wear or damage. (Area "K")	If there is wear or damage, measure the ID in Area "K". The maximum permitted ID is 0.550 inch (13.97 mm). Damage is not permitted.	If wear or damage is greater than the permitted serviceable limits, replace the pitch change rod.
(14)	For D-6114-1 rods, visually examine the pitch change rod ID adjacent to the internal threads for wear or damage. (Area "K")	If there is wear or damage, measure the ID in Area "K". The maximum permitted ID is 0.600 inch (15.24 mm). Damage is not permitted.	If wear or damage is greater than the permitted serviceable limits, replace the pitch change rod.
(15)	Measure the pitch change rod OD in areas "A", "B", and "C".	The minimum permitted OD in area "A" is 0.807 inch (20.50 mm). The minimum permitted OD in area "B" is 0.932 inch (23.67 mm). The minimum permitted OD in area "C" is 0.994 inch (25.25 mm).	If the OD in area "A", "B", or "C" is less than the permitted serviceable limits, replace the pitch change rod.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
P. PITCH CHANGE ROD, CONTINUED (Item 420) Refer to Figure 5-15 and 5-17.		
(16) For the 107224 Pitch Change Rod Only: Visually examine the spiral ring groove for damage.	Damage that interferes with the fit of the spiral ring is not permitted.	If the damage is greater than the permitted serviceable limits, replace the pitch change rod.
(17) For the 107224 Pitch Change Rod Only: Visually examine the ID Area "N" in the rear of the pitch change rod for wear or damage.	If there is wear or damage, measure the ID. Damage is not permitted. The maximum permitted ID is 0.665 inch (16.89 mm).	If wear or damage is greater than the permitted serviceable limits, replace the pitch change rod.
(18) Magnetic particle inspect the pitch change rod in accordance with the Magnetic Particle Inspection chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). Do not strip the chrome plating.	A relevant indication is not permitted.	If there is a relevant indication, replace the pitch change rod.



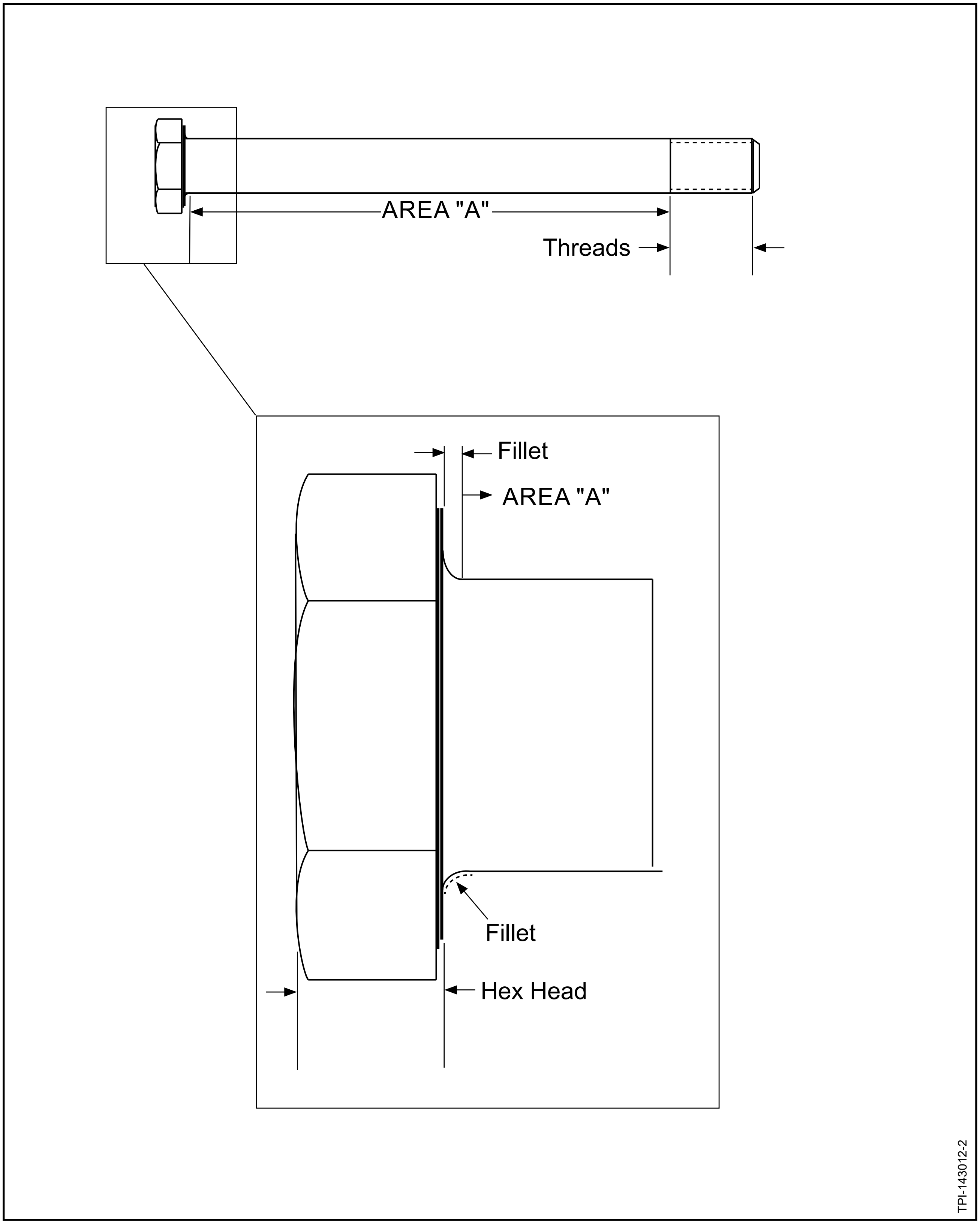
107224 Pitch Change Rod
Figure 5-17



Beta Tube Bushing
Figure 5-18

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
Q. BETA TUBE BUSHING (Item 421, 423) Refer to Figure 5-18.		
(1) Measure the ID "A" of the bushing.	The maximum permitted ID "A" of the beta tube bushing is 0.509 inch (12.92 mm).	If the ID "A" of the beta tube bushing is greater than the permitted serviceable limit, replace the bushing.

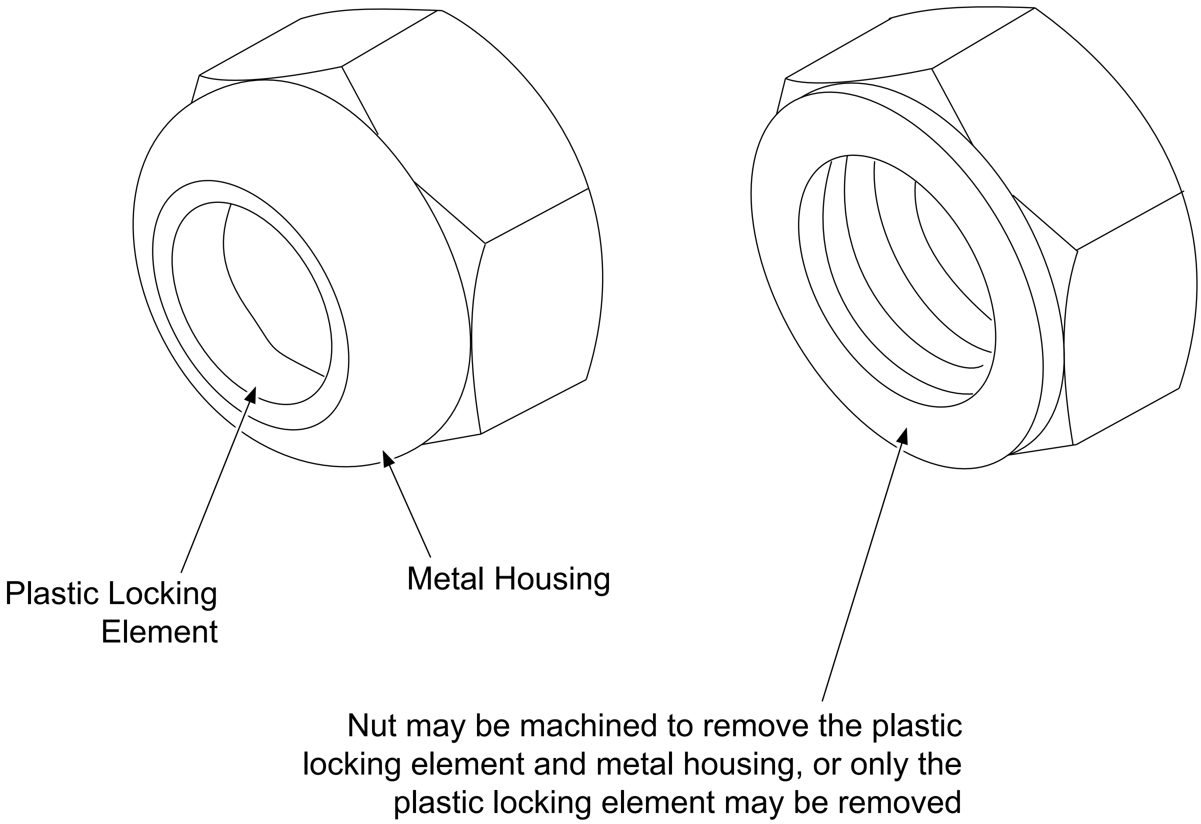


Hex Head Bolt
Figure 5-19

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
R. HEX HEAD BOLT (Items 620, 630) Refer to Figure 5-19 and Figure 5-20.		
(1) Visually examine the hex head bolt for corrosion product and pitting.	Corrosion product is not permitted. The maximum permitted depth of pitting is 0.002 inch (0.05 mm). No more than 5% of the total unthreaded surface may be pitted. The maximum permitted diameter of an individual pit is 0.032 inch (0.81 mm). Pitting is not permitted in the fillet between the hex head and the grip, Area "A". Pitting must not affect the fit or function of the hex head bolt.	Remove corrosion product using glass bead cleaning in accordance with the Cleaning chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). If corrosion product cannot be removed, replace the hex head bolt. If the pitting is greater than the permitted serviceable limits, replace the hex head bolt.
(2) Except for the threads, visually examine the hex head bolt for damage or scratches.	The maximum permitted depth of damage or a scratch is 0.002 inch (0.05 mm). Scratches or damage must not affect the fit or function of the hex head bolt. Pushed up material is not permitted.	Pushed up material may be removed with a thread file. Use of the thread file must not affect the fit or function of the hex head bolt. If the depth of a scratch or damage is greater than the permitted serviceable limits or if the scratch, damage, or repair affects the fit or function of the hex head bolt, replace the hex head bolt.
(3) Visually examine the hex head bolt for circumferential scoring caused by installation and removal.	Circumferential scoring that reduces the diameter of the hex head bolt is not permitted. The minimum permitted OD in Area "A" is 0.370 inch (9.40 mm).	If scoring is greater than the permitted serviceable limits or if the OD in Area "A" is less than the permitted serviceable limits, replace the hex head bolt.
(4) Visually examine the wrenching surfaces of the head of the hex head bolt for metal movement caused by wrenching.	Limited damage from wrenching is permitted, but it must be possible to torque the hex head bolt, and metal movement must not interfere with the installation of the hex head bolt or cause damage to the hub.	Remove metal movement with a file or equivalent. Only corners may be repaired. Refacing a complete surface is not permitted. If metal movement is greater than the permitted serviceable limits, replace the hex head bolt.

CAUTION: DO NOT USE MODIFIED A-2043-1 NUTS ON THE PROPELLER ASSEMBLY. A-2043-1 NUTS THAT HAVE BEEN MODIFIED ARE TO BE USED ONLY FOR THE HEX HEAD BOLT THREAD CHECK.



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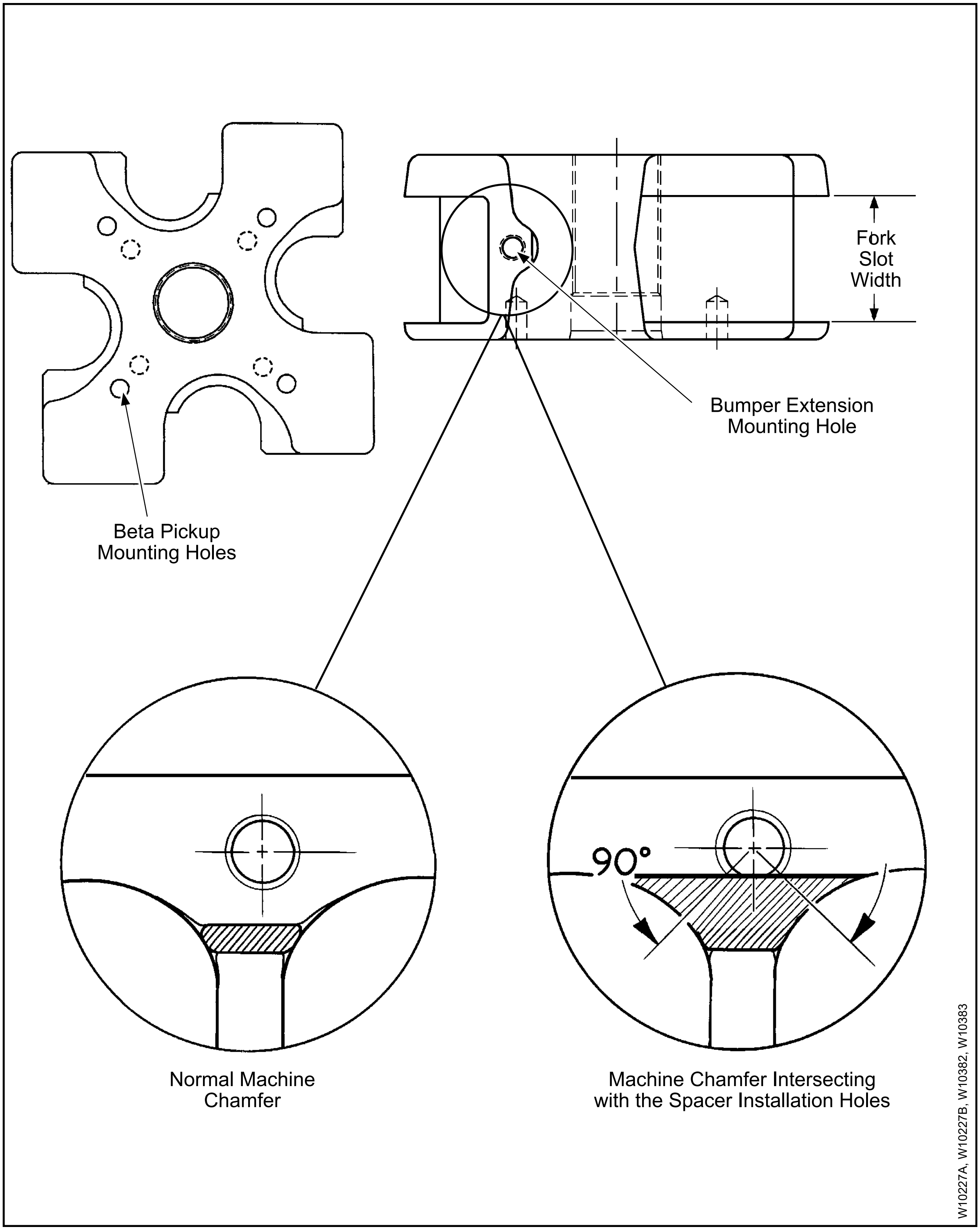
A-2043-1 Nut Modification
Figure 5-20

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
R. HEX HEAD BOLT (Items 620, 630) Refer to Figure 5-19 and Figure 5-20.		
(5) Visually examine the threads of the hex head bolt for damage and pitting.	A maximum total accumulation of 3/4 thread of damage and pitting is permitted. Thread damage must not cause damage to the mating part. An A-2043-1 nut with the plastic locking element removed should be able to be freely rotated by hand on the bolt threads. For the modification of the nut, refer to Figure 5-20.	Limited thread file repair is permitted, but must be considered as thread damage. If the damage and pitting are greater than the permitted serviceable limits, replace the hex head bolt.
(6) Magnetic particle inspect each bolt in accordance with the Magnetic Particle Inspection chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).	A relevant indication is not permitted.	If there is a relevant indication, replace the hex head bolt.
(7) Visually examine the hex head bolt for cadmium plating coverage.	Cadmium plating must completely cover the bolt with the following exceptions: A few scratches and corners with cadmium plating missing, minor abrading of cadmium plating on the threads, or minor abrading of the cadmium plating on the hex head because of wrenching are permitted.	If the cadmium plating coverage is less than the permitted serviceable limits, cadmium replate and bake for a minimum of 23 hours within four hours after plating the hex head bolt in accordance with the Cadmium Replating chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).



Fork
Figure 5-21

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
S. FORK (Item 710) Refer to Figure 5-21.		
(1) Visually examine the pitch change rod engagement threads of the fork bore for damage.	One thread total accumulated damage is permitted.	If damage is greater than the permitted serviceable limits, replace the fork.
(2) Visually examine the beta pickup mounting holes for thread damage.	One thread total accumulated damage is permitted.	If damage is greater than the permitted serviceable limits, replace the fork.
(3) Visually examine the bumper extension mounting holes for thread damage.	One thread total accumulated damage is permitted.	If damage is greater than the permitted serviceable limits, replace the fork.
(4) Visually examine the tapered portion of the fork bore for wear, nicks, fretting, or other damage.	The maximum permitted depth of damage is 0.003 inch (0.07 mm).	If the depth of damage is greater than the permitted serviceable limits, replace the fork.
(5) Visually examine the fork slots for damage.	The maximum permitted depth of damage is 0.006 inch (0.15 mm).	If the depth of damage is greater than the permitted serviceable limits, replace the fork.
(6) Measure the fork slot.	The maximum permitted fork slot width is 1.266 inches (32.15 mm).	If the slot width is greater than the permitted serviceable limits, replace the fork.
(7) Magnetic particle inspect the machined areas of the fork in accordance with the Magnetic Particle Inspection chapter of the Hartzell Propeller Standard Practices Manual 202A (61-01-02).	A relevant indication is not permitted.	If there is a relevant indication that cannot be removed within the permitted serviceable limits, replace the fork.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
S. FORK, CONTINUED (Item 710) Refer to Figure 5-21.		
(8) Magnetic particle inspect the non-machined areas of the fork in accordance with the Magnetic Particle Inspection chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).	A shallow forging lap or fold indication must be removed.	For the procedure to repair the non-machined areas of the fork, refer to the section "Repair of Fork Non-machined Areas" in the Repair chapter of this manual.
(9) Visually examine the spacer attachment holes for too much chamfer.	The chamfer may intersect the spacer installation holes no more than 90 degrees of the circumference of the hole.	If the chamfer is not within the permitted serviceable limits, replace the fork.
(10) Visually examine the cadmium plated surface of the fork (excluding the slots, threaded bore and tapered section of the bore) for wear, scratches, or other damage.	The maximum permitted depth of wear, scratches, or damage is 0.003 inch (0.07 mm).	If the depth of wear, scratches, or damage is greater than the permitted serviceable limits, replace the fork.
(11) Visually examine the fork for cadmium plating coverage.	A few random scratches, corners with plating missing, normal wear of the plating from the threads, internal taper, and fork slots are permitted; otherwise, cadmium plating must cover the fork.	If the cadmium plating coverage is less than the permitted serviceable limits, replate the fork in accordance with the Cadmium Replating chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

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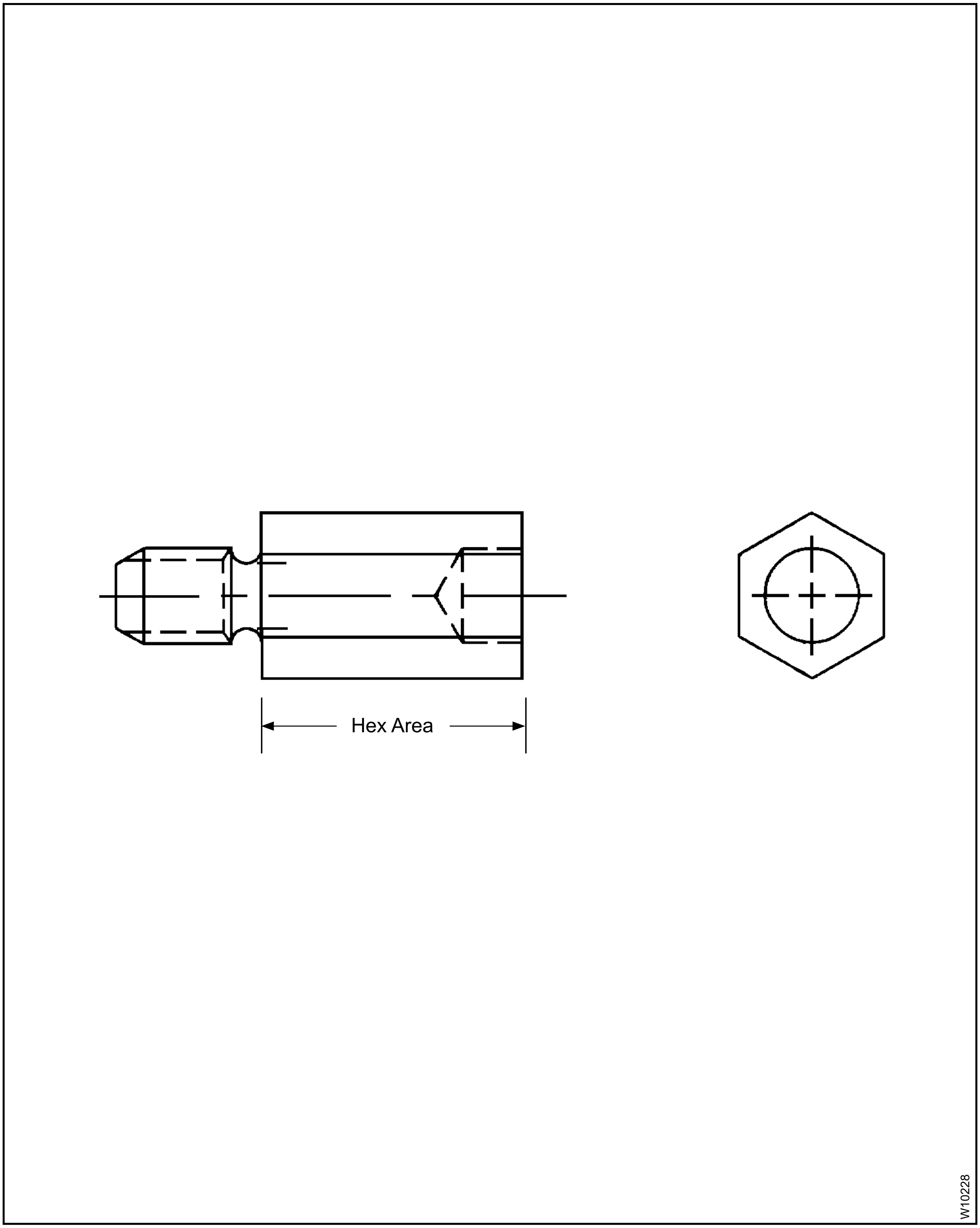
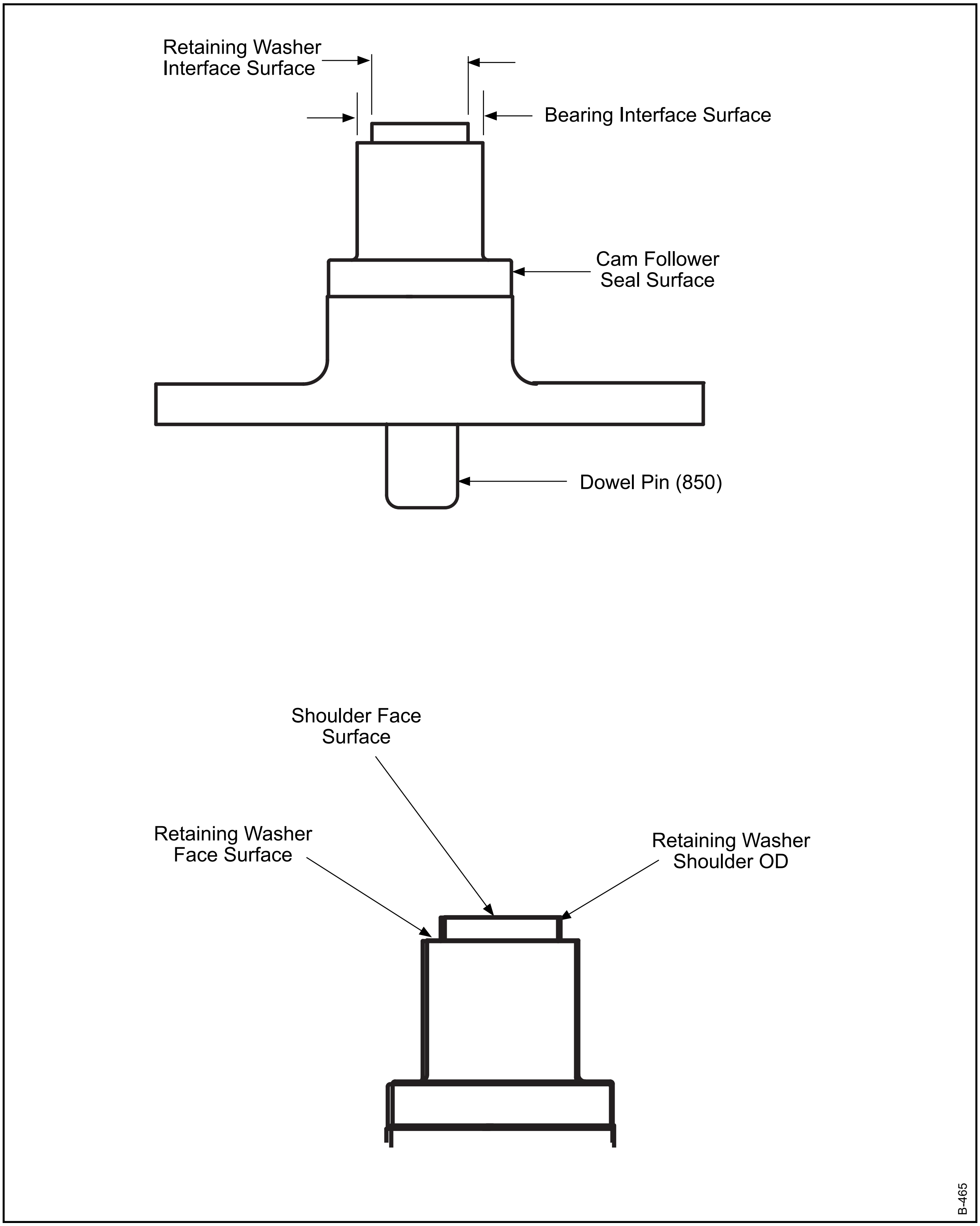


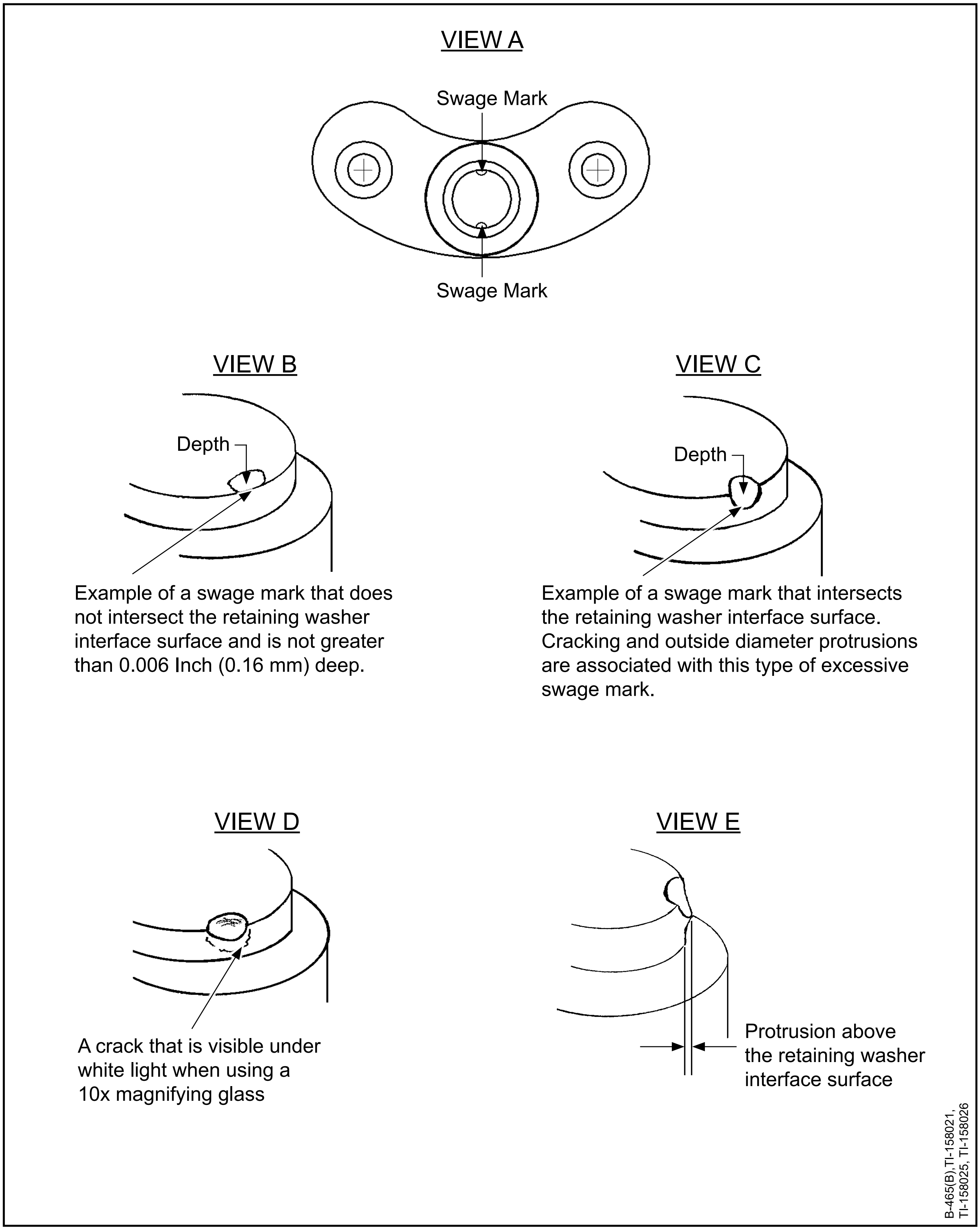
Bumper Extension
Figure 5-22

Component Inspection Criteria
Table 5-1

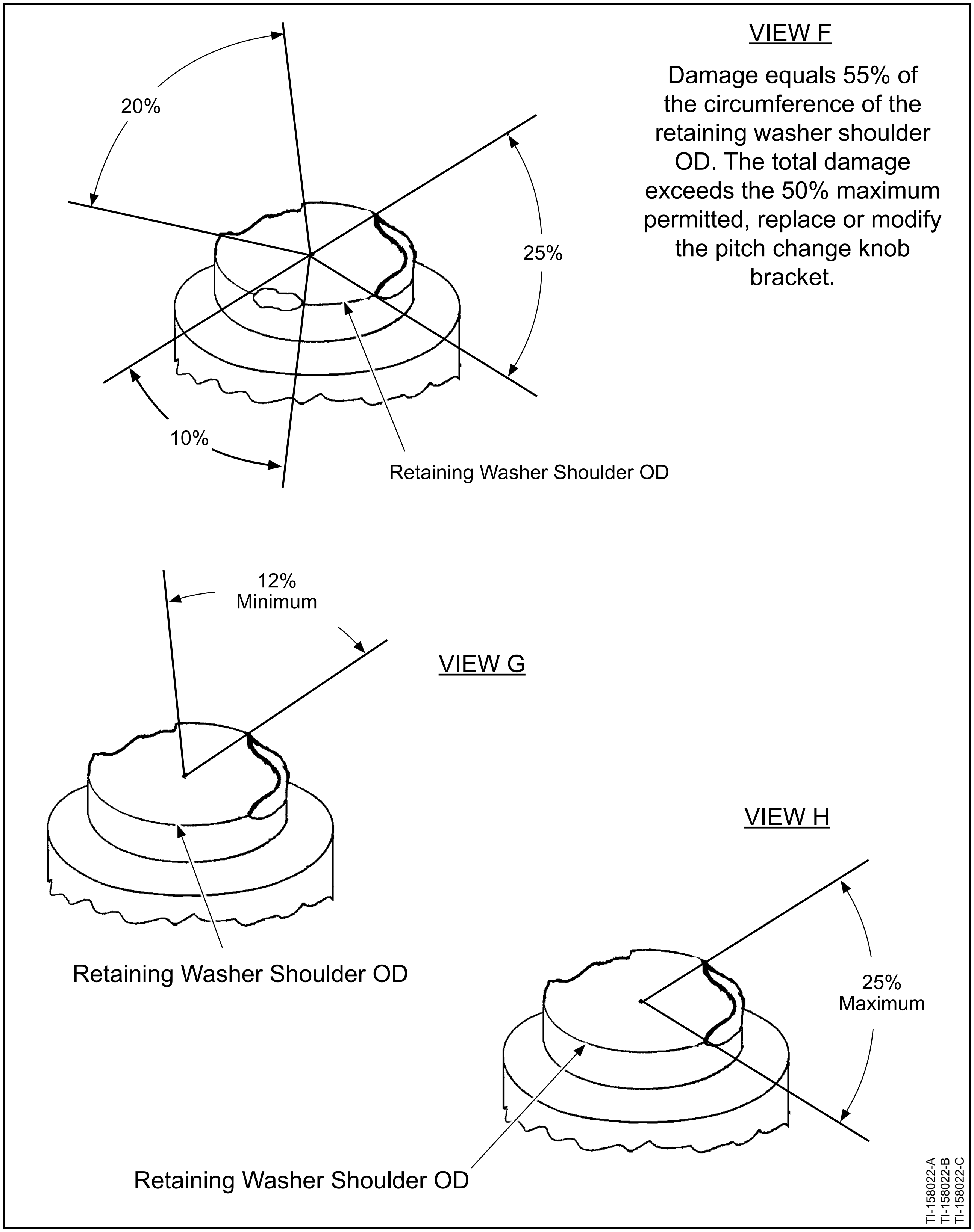
Inspect	Serviceable Limits	Corrective Action
T. BUMPER EXTENSION (Item 720) Refer to Figure 5-22.		
(1) Visually examine the bumper extension for corrosion product.	Corrosion product is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits.	Corrosion product may be removed with glass bead cleaning. Refer to the Cleaning chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). If the corrosion product cannot be removed, replace the bumper extension. Replate the bumper extension in accordance with the Cadmium Replating chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).
(2) Visually examine the bumper extension for damage.	A slight wrenching depression on the outer hex area of the bumper extension is permitted.	If damage is greater than the permitted serviceable limits, replace the bumper extension.
(3) Visually examine the threads of the bumper extension for damage.	A maximum of 1/2 of one thread total accumulated damage is permitted.	If the damage is greater than the permitted serviceable limits, replace the bumper extension.
(4) Visually examine the bumper extension for cadmium plating coverage.	A few random scratches and slight wear on the threads are permitted; otherwise, cadmium plating must completely cover the bumper extension.	If the cadmium plating coverage is less than the permitted serviceable limits, replate the bumper extension in accordance with the Cadmium Replating chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).



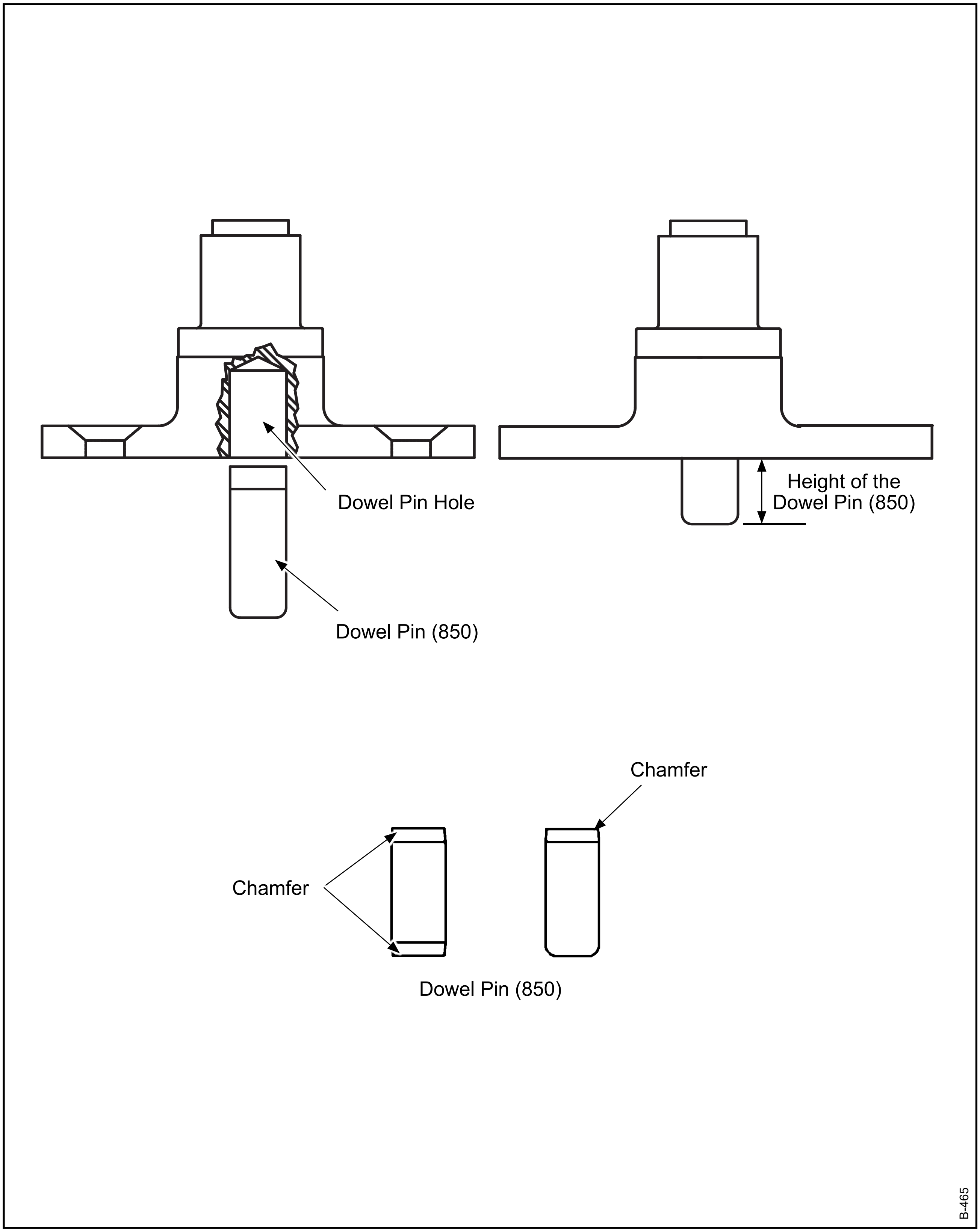
Pitch Change Knob Bracket That Uses a Swaged Washer to Retain the Cam Follower
Figure 5-23



Pitch Change Knob Bracket That Uses a Swaged Washer to Retain the Cam Follower
Figure 5-24



Pitch Change Knob Bracket That Uses a Swaged Washer to Retain the Cam Follower
Figure 5-25



Pitch Change Knob Bracket That Uses a Swaged Washer to Retain the Cam Follower
Figure 5-26

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action

U. PITCH CHANGE KNOB BRACKET
THAT USES A SWAGED WASHER TO RETAIN THE CAM FOLLOWER
(Item 830)
Refer to Figure 5-23 through Figure 5-26.

(1) Before inspection, remove cadmium plating in accordance with the Cadmium Replating chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

(2) If dowel pin removal is not required, apply masking material to protect the dowel pin from stripping materials. Dowel pin extension from the pitch change knob bracket base must meet the permitted Serviceable Limits for this part given in this section.

(3) An example of correct swaging is shown in Figure 5-24, View B. An example of incorrect swaging is shown in Figure 5-24, View C.

(4) A pitch change knob bracket that does not meet the Serviceable Limits specified in step U.(5), U.(6), U.(7), U.(8), or U.(9) may be modified in accordance with the section "Pitch Change Knob Bracket Modification" in the Repair chapter of this manual.

Inspect	Serviceable Limits	Corrective Action
(5) Using white light and a 10X magnifying glass, visually examine each swage mark on the washer shoulder of the pitch change knob bracket for cracks.	A crack is not permitted. Refer to Figure 5-24, View D.	A crack may be removed by spot polishing using an emery cloth or abrasive pad CM47. Crack removal must not interfere with the retaining washer face surface or greater than 25% of the retaining washer shoulder OD in one location. Refer to Figure 5-23 and Figure 5-25, View H. Total accumulated damage or repair must not be greater than 50% of the circumference of the retaining washer shoulder OD. Refer to Figure 5-25 View F. If the damage or repair is greater than the limits given, replace the pitch change knob bracket or modify the pitch change knob bracket to use a screw to retain the cam follower in accordance with the section "Pitch Change Knob Bracket Modification" in the Repair chapter of this manual.

Component Inspection Criteria
Table 5-1

Inspect		Serviceable Limits	Corrective Action
U.	PITCH CHANGE KNOB BRACKET THAT USES A SWAGED WASHER TO RETAIN THE CAM FOLLOWER, CONTINUED (Item 830) Refer to Figure 5-23 through Figure 5-26.		
(6)	Visually examine each swage mark on the retaining washer shoulder OD and the retaining washer interface surface for material protrusion. Refer to Figure 5-24, View E.	Material protrusion is not permitted above the retaining washer interface surface.	If there is material protrusion, using an emery cloth remove the material protrusion to flush or below the surface of the retaining washer interface surface or modify the pitch change knob bracket to use a screw to retain the cam follower in accordance with the section "Pitch Change Knob Bracket Modification" in the Repair chapter of this manual.
(7)	Visually examine the retaining washer shoulder OD for two undamaged swaging sites to secure the retention washer. Refer to Figure 5-25, View G.	Two unswaged areas that are a minimum width of 12% or 0.188 inch (4.78 mm) of the circumference positioned 120 to 180 degrees apart from each other are required.	If the available swaging sites are not within the permitted serviceable limits, replace the pitch change knob bracket or modify the pitch change knob bracket to use a screw to retain the cam follower in accordance with the section "Pitch Change Knob Bracket Modification" in the Repair chapter of this manual.
(8)	Measure the OD of the unplated retaining washer interface surface. Refer to Figure 5-23.	The minimum permitted OD of the unplated retaining washer interface surface is 0.5005 inch (12.713 mm).	If the OD of the unplated retaining washer interface surface is less than the serviceable limits, replace the pitch change knob bracket or modify the pitch change knob bracket to use a screw to retain the cam follower in accordance with the section "Pitch Change Knob Bracket Modification" in the Repair chapter of this manual.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
U. PITCH CHANGE KNOB BRACKET THAT USES A SWAGED WASHER TO RETAIN THE CAM FOLLOWER, CONTINUED (Item 830) Refer to Figure 5-23 through Figure 5-26.		
(9) Visually examine the retaining washer interface surface for damage, corrosion product, or pitting. Refer to Figure 5-23.	Minor scratches less than 0.001 inch (0.025 mm) deep are permitted. A sharp edge, material protrusion, or raised material from scratches or swaging are not permitted. Corrosion product or pitting is not permitted.	Using an emery cloth or abrasive pad CM47, lightly polish to remove a sharp edge, material protrusion, or raised material and blend into machined surfaces. If the damage, corrosion product, or pitting is greater than the permitted serviceable limits, replace the pitch change knob bracket or modify the pitch change knob bracket to use a screw to retain the cam follower in accordance with the section "Pitch Change Knob Bracket Modification" in the Repair chapter of this manual.
(10) Visually examine the bearing interface surface for damage, corrosion product, or pitting. Refer to Figure 5-23.	Bearing roller impressions of any depth are not permitted. Minor scratches less than 0.001 inch (0.025 mm) deep are permitted. Sharp edges or pushed up edges from scratches are not permitted. Corrosion product or pitting is not permitted.	If the damage, corrosion product, or pitting is greater than the permitted serviceable limits, replace the pitch change knob bracket.
(11) Measure the OD of the unplated bearing interface surface. Refer to Figure 5-23.	The minimum permitted OD of the unplated bearing interface surface is 0.653 inch (16.59 mm).	If the OD of the unplated bearing interface surface is less than the serviceable limits, replace the pitch change knob bracket

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
U. PITCH CHANGE KNOB BRACKET THAT USES A SWAGED WASHER TO RETAIN THE CAM FOLLOWER, CONTINUED (Item 830) Refer to Figure 5-23 through Figure 5-26.		
(12) Visually examine the cam follower seal surface for scratches, corrosion product, or pitting. Refer to Figure 5-23.	Minor scratches less than 0.001 inch (0.025 mm) deep are permitted. Sharp or pushed up edges from scratches are not permitted. Corrosion product or pitting is not permitted.	If the scratches, corrosion product, or pitting is greater than the permitted serviceable limits, replace the pitch change knob bracket.
(13) Measure the OD of the cam follower seal surface. Refer to Figure 5-23.	The minimum permitted unplated OD of the cam follower seal surface is 0.948 inch (24.08 mm).	If the OD of the cam follower seal surface is less than the permitted serviceable limits, replace the pitch change knob bracket.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
U. PITCH CHANGE KNOB BRACKET THAT USES A SWAGED WASHER TO RETAIN THE CAM FOLLOWER, CONTINUED (Item 830) Refer to Figure 5-23 through Figure 5-26.		
(14) Visually examine the pitch change knob bracket for corrosion product and pitting. NOTE: This inspection and repair does not include the bearing interface surface, the cam follower seal surface, or the retaining washer interface surface.	Corrosion product is not permitted. If the pitch change knob bracket has pitting, depth, diameter and area of pitting. The maximum permitted depth of pitting is 0.003 inch (0.07 mm). The maximum permitted total area of pitting is 0.500 square inch (322 square mm) area. The maximum permitted diameter of an individual pit is 0.032 inch (0.81 mm). A maximum of 10 non-linear pits within 1 square inch (645 square mm) area are permitted. Linear pitting is not permitted.	Do not glass bead clean the bearing interface surface, the cam follower seal surface, or the retaining washer interface surface. For all surfaces of the pitch change knob bracket other than those listed above, remove corrosion product using glass bead cleaning or local polishing using emery cloth. Refer to the Cleaning chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). If the corrosion product cannot be removed, replace the pitch change knob bracket. The maximum permitted depth for repair is 0.005 inch (0.12 mm). The maximum permitted total area of repair is 1 square inch (645 square mm). For each hole used to attach the pitch change bracket to the blade, the maximum permitted repair is 25% of the surface area of the hole. Using an emery cloth or abrasive pad CM47, lightly polish to remove raised material or pushed up edge and blend into machined surfaces. If pitting or repair is greater than the permitted serviceable limits or Corrective Action repair limits, replace the pitch change knob bracket.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
U. PITCH CHANGE KNOB BRACKET THAT USES A SWAGED WASHER TO RETAIN THE CAM FOLLOWER, CONTINUED (Item 830) Refer to Figure 5-23 through Figure 5-26.		
(15) Visually examine the pitch change knob bracket for nicks, scratches, or other damage. NOTE: This inspection and repair does not include the bearing interface surface, the retaining washer interface surface, or the cam follower seal surface.	If the pitch change knob bracket is damaged, measure the depth and area of nicks, scratches, or other damage. The maximum permitted depth of nicks, scratches, or other damage is 0.003 inch (0.07 mm). The maximum permitted total area of nicks, scratches, or other damage is 0.500 square inch (322 square mm) area. Raised material or edges of pushed up material on the surfaces that interface with other components are not permitted.	The maximum permitted depth of repair is 0.005 inch (0.12 mm). The maximum permitted total area of repair is 1 square inch (645 square mm). For each hole used to attach the pitch change bracket to the blade, the maximum permitted repair is 25% of the surface area of the hole. Using an emery cloth or abrasive pad CM47, lightly polish to remove raised material or pushed up edges and blend into machined surfaces. If the nicks, scratches, other damage, or repair is greater than the permitted serviceable or Corrective Action repair limits, replace the pitch change knob bracket.
(16) Examine the dowel pin for movement in the pitch change knob bracket.	Using firm hand pressure, try to move the dowel pin. Movement is not permitted.	If there is movement of the dowel pin, replace the dowel pin.
(17) Measure the height of the dowel pin from the pitch change knob bracket base. Refer to Figure 5-26.	The maximum permitted height is 0.440 inch (11.17 mm). The minimum permitted height is 0.390 inch (9.91 mm).	If the height of the dowel pin is greater than the permitted serviceable limits, press the pin into the bracket to the correct height. If height of the dowel pin is less than the permitted serviceable limits, replace the pin. The replacement pin must fit tightly.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
U. PITCH CHANGE KNOB BRACKET THAT USES A SWAGED WASHER TO RETAIN THE CAM FOLLOWER, CONTINUED (Item 830) Refer to Figure 5-22 through Figure 5-26.		
(18) Visually examine the OD of the exposed portion of the dowel pin for damage or corrosion product.	Damage or corrosion product is not permitted.	If there is damage or corrosion product, replace the dowel pin.
(19) If the dowel pin is removed, visually examine the dowel pin hole. Refer to Figure 5-26.	Corrosion product or pitting is not permitted.	If there is corrosion product or pitting, replace the pitch change knob bracket.
(20) Perform magnetic particle inspection of the pitch change knob bracket in accordance with the Magnetic Particle Inspection chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). NOTE: It is not necessary to remove the dowel pin.	A relevant indication is not permitted.	If there is a relevant indication, replace the pitch change knob bracket.

(21) If removal of the dowel pin is not required, apply masking material to protect the dowel pin from cadmium plating materials.

(22) If the pitch change knob has successfully passed all inspections, apply masking material to the Bearing Interface Surface, reapply cadmium plating, and bake in accordance with the Cadmium Replating chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

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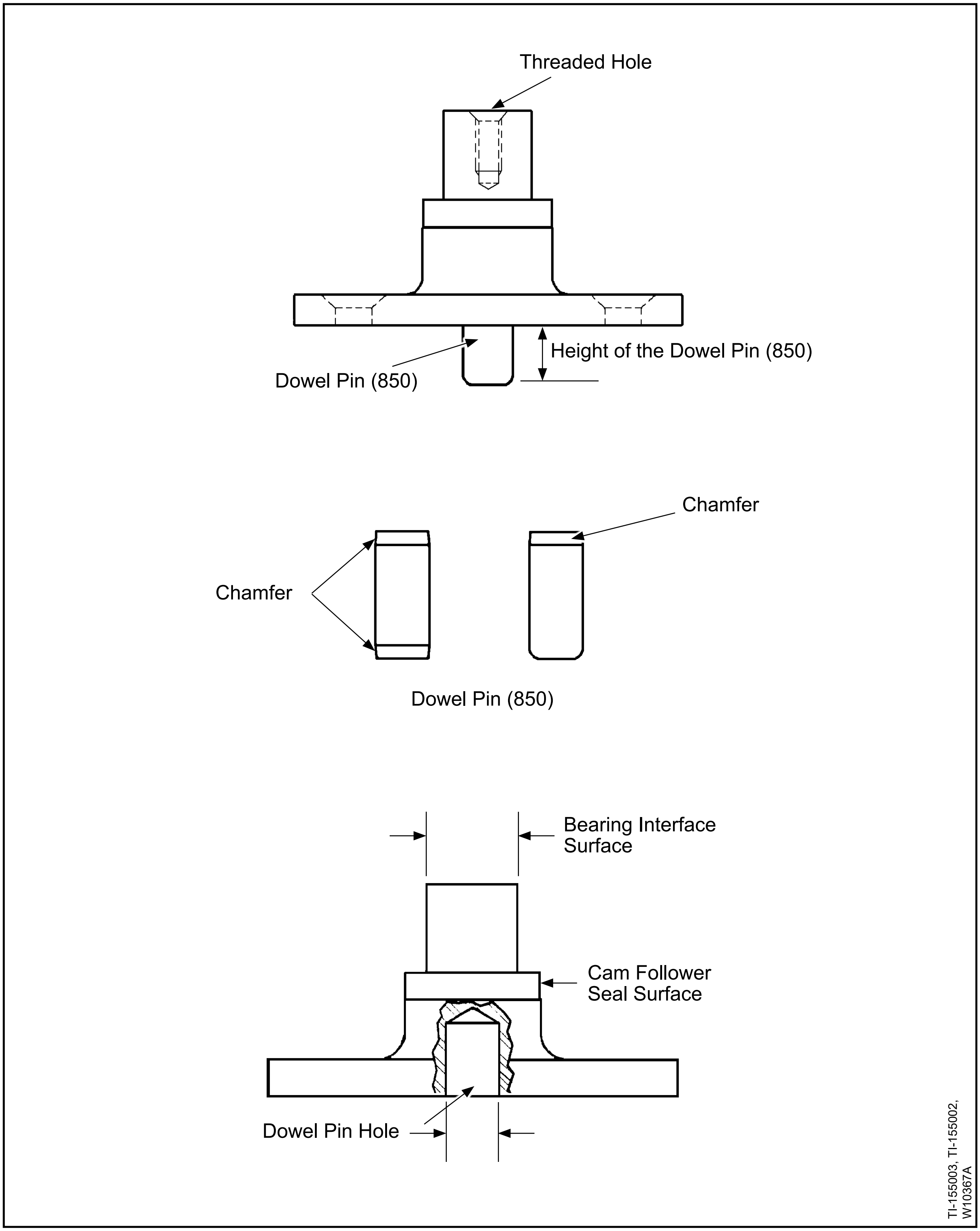


Pitch Change Knob Bracket That Uses a Screw to Retain the Cam Follower
Figure 5-27

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
V. PITCH CHANGE KNOB BRACKET THAT USES A SCREW TO RETAIN THE CAM FOLLOWER (Item 830) Refer to Figure 5-27.		
(1) Before inspection, remove cadmium plating in accordance with the Cadmium Replating chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).		
(2) If dowel pin removal is not required, apply masking material to protect the dowel pin from stripping materials. Dowel pin extension from the pitch change knob bracket base must meet the permitted Serviceable Limits for the dowel pin specified in this section.		
(3) Visually examine the bearing interface surface for damage, corrosion product, or pitting. Refer to Figure 5-27.	Bearing roller impressions of any depth are not permitted. Minor scratches less than 0.001 inch (0.025 mm) deep are permitted. Sharp edges or pushed up edges from scratches are not permitted. Corrosion product or pitting is not permitted.	If the damage, corrosion product, or pitting is greater than the permitted serviceable limits, replace the pitch change knob bracket.
(4) Measure the OD of the unplated bearing interface surface. Refer to Figure 5-27.	The minimum permitted OD of the unplated bearing interface surface is 0.653 inch (16.59 mm).	If the OD of the unplated bearing interface surface is less than the serviceable limits, replace the pitch change knob bracket.
(5) Visually examine the cam follower seal surface for scratches, corrosion product, or pitting. Refer to Figure 5-27.	Minor scratches less than 0.001 inch (0.025 mm) deep are permitted. Sharp or pushed up edges from scratches are not permitted. Corrosion product or pitting is not permitted.	If the scratches, corrosion product, or pitting is greater than the permitted serviceable limits, replace the pitch change knob bracket.
(6) Measure the OD of the cam follower seal surface. Refer to Figure 5-27.	The minimum permitted unplated OD of the cam follower seal surface is 0.948 inch (24.08 mm).	If the OD of the cam follower seal surface is less than the permitted serviceable limits, replace the pitch change knob bracket.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
V. <u>PITCH CHANGE KNOB BRACKET THAT USES A SCREW TO RETAIN THE CAM FOLLOWER, CONTINUED</u> (Item 830) Refer to Figure 5-27.		
(7) Visually examine the pitch change knob bracket for corrosion product and pitting. <u>NOTE</u>: This inspection and repair does not include the bearing interface surface, the cam follower seal surface, or the threaded hole.	Corrosion product is not permitted. If the pitch change knob bracket has pitting, measure the depth, diameter, and area of pitting. The maximum permitted depth of pitting is 0.003 inch (0.07 mm). The maximum permitted total area of pitting is 0.500 square inch 322 square mm) area. The maximum permitted diameter of an individual pit is 0.032 inch (0.81 mm). A maximum of 10 non-linear pits within 1 square inch (645 square mm) area are permitted. Linear pitting is not permitted.	Do not glass bead clean the bearing interface surface, the cam follower seal surface, or the threaded hole. For all surfaces of the pitch change knob bracket other than those listed above, remove corrosion product using glass bead cleaning or local polishing using emery cloth. Refer to the Cleaning chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). If the corrosion product cannot be removed, replace the pitch change knob bracket. The maximum permitted depth for repair is 0.005 inch (0.12 mm). The maximum permitted total area of repair is 1 square inch (645 square mm). For each hole used to attach the pitch change bracket to the blade, the maximum permitted repair is 25% of the surface area of the hole. Using an emery cloth or abrasive pad CM47, lightly polish to remove raised material or pushed up edges and blend into machined surfaces. If pitting or repair is greater than the permitted serviceable limits or Corrective Action repair limits, replace the pitch change knob bracket.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
V. PITCH CHANGE KNOB BRACKET THAT USES A SCREW TO RETAIN THE CAM FOLLOWER, CONTINUED (Item 830) Refer to Figure 5-27.		
(8) Visually examine the pitch change knob bracket for nicks, scratches, or other damage. NOTE: This inspection and repair does not include the bearing interface surface, the threaded hole, or the cam follower seal surface.	If the pitch change knob bracket is damaged, measure the depth, diameter, and area of pitting. The maximum permitted depth of nicks, scratches, or other damage is 0.003 inch (0.07 mm). The maximum permitted total area of nicks, scratches, or other damage is 0.500 square inch (322 square mm) area. Raised material or edges of pushed up material on the surfaces that interface with other components are not permitted.	The maximum permitted depth of repair is 0.005 inch (0.12 mm). The maximum permitted total area of repair is 1 square inch (645 square mm). For each hole used to attach the pitch change bracket to the blade, the maximum permitted repair is 25% of the surface area of the hole. Using an emery cloth or abrasive pad CM47, lightly polish to remove raised material or pushed up edges and blend into machined surfaces. If the nicks, scratches, other damage, or repair is greater than the permitted serviceable or Corrective Action repair limits, replace the pitch change knob bracket.
(9) Examine the dowel pin for movement in the pitch change knob bracket.	Using firm hand pressure, try to move the dowel pin. Movement is not permitted.	If there is movement of the dowel pin, replace the dowel pin.
(10) Measure the height of the dowel pin from the pitch change knob bracket base. Refer to Figure 5-27.	The maximum permitted height is 0.440 inch (11.17 mm).	If the height of the dowel pin is greater than the permitted serviceable limits, press the pin into the bracket to the correct height.
	The minimum permitted height is 0.390 inch (9.91 mm).	If the height of the dowel pin is less than the permitted serviceable limits, replace the pin. The replacement pin must fit tightly.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
V. PITCH CHANGE KNOB BRACKET THAT USES A SCREW TO RETAIN THE CAM FOLLOWER, CONTINUED (Item 830) Refer to Figure 5-27.		
(11) Visually examine the OD of the exposed portion of the dowel pin for damage or corrosion product.	Damage or corrosion product is not permitted.	If there is damage or corrosion product, replace the dowel pin.
(12) If the dowel pin is removed, visually examine the dowel pin hole.	Corrosion product or pitting is not permitted.	If there is corrosion product or pitting, replace the pitch change knob bracket.
(13) Visually examine the pitch change knob bracket threaded hole for corrosion product or damage.	Corrosion product is not permitted. A maximum of 3/4 if one thread total accumulated damage is permitted.	If damage is greater than the permitted serviceable limits, replace the pitch change knob bracket.
(14) Perform magnetic particle inspection of the pitch change knob bracket in accordance with the Magnetic Particle Inspection chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). NOTE: It is not necessary to remove the dowel pin.	A relevant indication is not permitted.	If there is a relevant indication, replace the pitch change knob bracket.

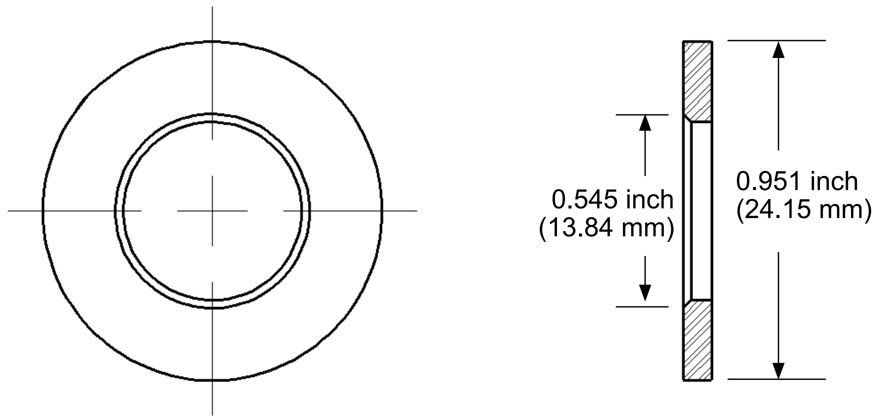
Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action

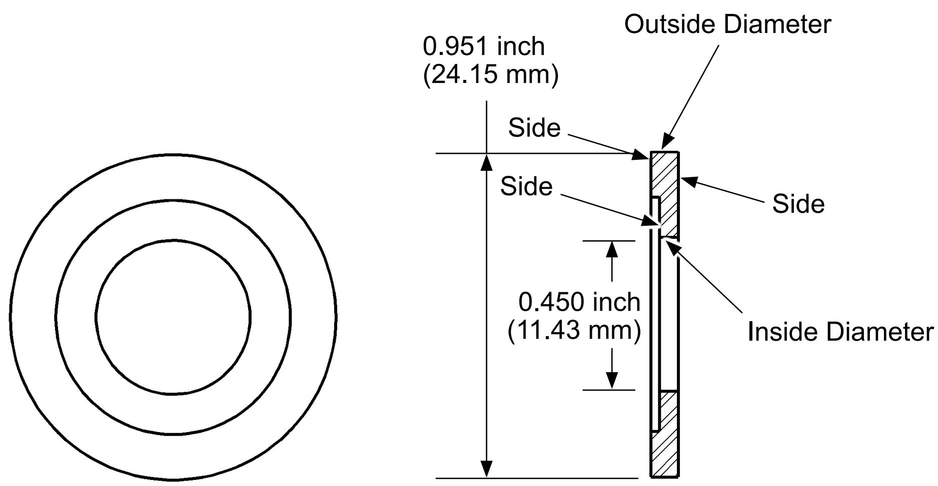
V. PITCH CHANGE KNOB BRACKET
THAT USES A SCREW TO RETAIN THE CAM FOLLOWER, CONTINUED
(Item 830)
Refer to Figure 5-27.

(15) If removal of the dowel pin is not required, apply masking material to protect the dowel pin from cadmium plating materials.

(16) If the pitch change knob has successfully passed all inspections, apply masking material to the Bearing Interface Surface, reapply cadmium plating, and bake in accordance with the Cadmium Replating chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).



B-475 Knob Unit Retaining Washer
(Used Only With the Swaged Washer Method
for Retention of the Cam Follower
and is Required to be Replaced at Overhaul)



103395 Knob Unit Retaining Washer
(Used Only With the Screw Method
for Retention of the Cam Follower
and is Not Required to be Replaced at Overhaul)

Dimensions are for identification purposes only.

B-475, 103395

Knob Unit Retaining Washer
Figure 5-28

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
W. KNOB UNIT RETAINING WASHER, PART NUMBER 103395 (Item 870) Refer to Figure 5-28.		
(1) Visually examine the sides and inside diameter of the knob unit retaining washer for corrosion product and pitting.	Corrosion product is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits. The maximum permitted depth of pitting is 0.002 inch (0.05 mm). The maximum permitted total surface area that may have pitting is 5%. The maximum permitted diameter of an individual pit is 0.062 inch (1.57 mm). Pitting must not affect the fit or function of the knob unit retaining washer.	After applying masking material to the outside diameter of the knob unit retaining washer, corrosion product may be removed by glass bead cleaning. Refer to the Cleaning chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). If the corrosion product cannot be removed, replace the knob unit retaining washer. If pitting is greater than the serviceable limits, replace the knob unit retaining washer.
(2) Visually examine the sides and inside diameter of the knob unit retaining washer for scratches.	The maximum permitted depth of a scratch is 0.002 inch (0.05 mm). Scratches must not affect the fit or function of the knob unit retaining washer.	If scratches are greater than the serviceable limits, replace the retaining washer.
(3) Visually examine the knob unit retaining washer for wear or damage.	Wear or damage is not permitted.	If there is wear or damage, replace the knob unit retaining washer.
(4) Visually examine the outside diameter of the knob unit retaining washer for corrosion product and pitting.	Corrosion product or pitting is not permitted.	If there is corrosion product or pitting, replace the knob unit retaining washer.
(5) Visually examine the outside diameter of the knob unit retaining washer for scratches.	A scratch is not permitted.	If there is a scratch, replace the knob unit retaining washer.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
W. KNOB UNIT RETAINING WASHER, PART NUMBER 103395 (Item 870) Refer to Figure 5-28.		
(6) Visually examine the outside diameter of the knob unit retaining washer for wear or damage.	Wear or damage in the base metal is not permitted. If the sides or inside diameter were glass bead cleaned to remove corrosion product, examine the outside diameter for a rough surface from the glass bead cleaning. The maximum permitted surface finish is 16 Ra.	If wear or damage is greater than the serviceable limits, replace the knob unit retaining washer.
(7) Measure the outside diameter of the knob unit retaining washer.	The minimum permitted outside diameter after or over cadmium plate is 0.950 inch (24.13 mm).	If the outside diameter is less than the serviceable limits, replace the knob unit retaining washer.
(8) Visually examine the knob unit retaining washer for cadmium plate coverage.	A few random scratches are permitted on the sides and inside diameter; otherwise, cadmium plate must completely cover the sides and inside diameter of the knob unit retaining washer. Cadmium plate must completely cover the outside diameter without scratches, although slight cadmium loss on the corners between sides and outside diameter is permitted.	Replate and bake the knob unit retaining washer in accordance with the Cadmium Replating chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

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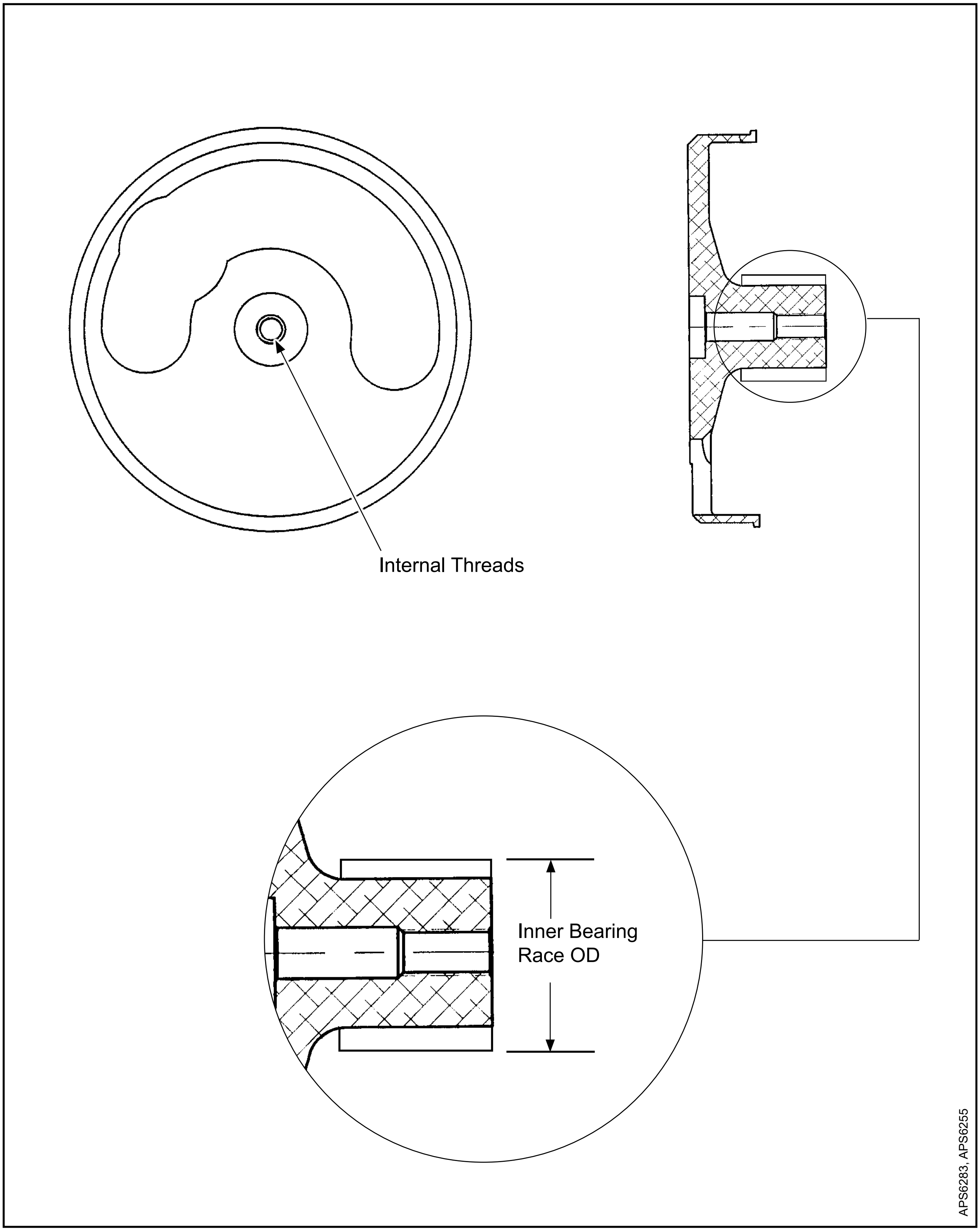


Preload Plate Assembly with Inner Bearing Race
Figure 5-29

Component Inspection Criteria
Table 5-1

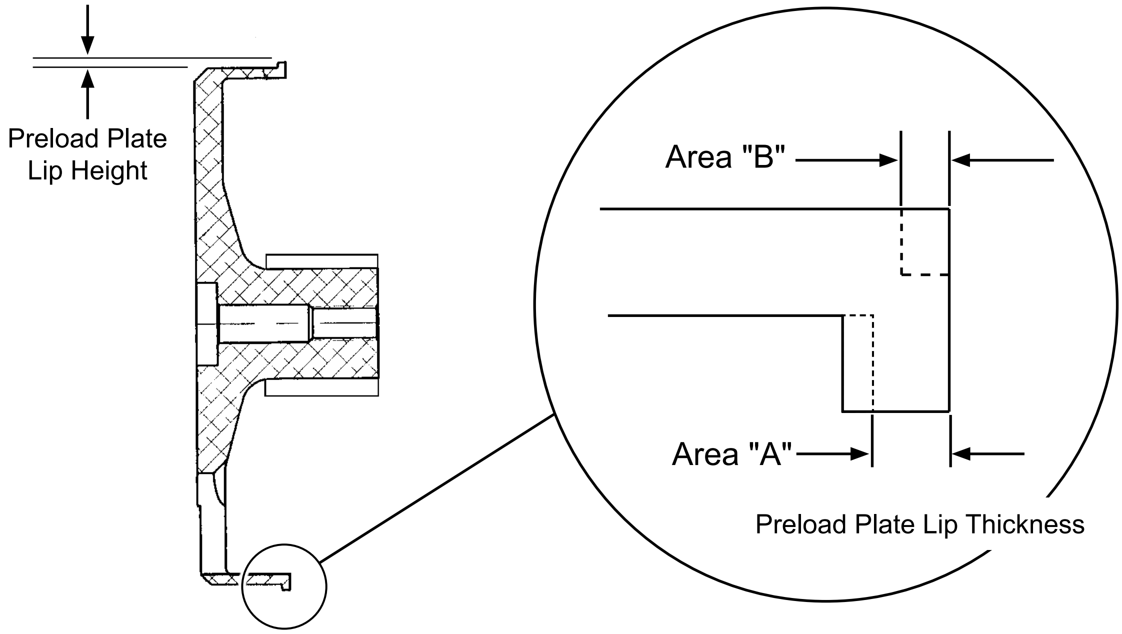
Inspect	Serviceable Limits	Corrective Action
X. PRELOAD PLATE ASSEMBLY WITH INNER BEARING RACE (Item 910) Refer to Figure 5-29 and 5-30.		
(1) Visually examine the aluminum part of the preload plate assembly for corrosion product.	Corrosion product is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits.	Mask the internal threads then remove corrosion product using glass bead cleaning. Refer to the Cleaning chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). If the corrosion product cannot be removed, replace the preload plate assembly.
(2) Visually examine the aluminum part of the preload plate assembly for pitting.	The maximum permitted depth of pitting is 0.004 inch (0.10 mm).	Pitting may be removed by polishing using an abrasive pad CM47 or equivalent, up to 0.007 inch (0.17 mm) deep. If the depth of pitting or polishing is greater than the permitted serviceable limits, replace the preload plate assembly.
(3) Visually examine the internal threads for damage.	A maximum of two threads of total accumulated damage are permitted.	If the damage is greater than the permitted serviceable limits, replace the preload plate assembly.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
X. PRELOAD PLATE ASSEMBLY WITH INNER BEARING RACE, CONTINUED (Item 910) Refer to Figure 5-29 and 5-30.		
(4) Visually examine the OD of the inner bearing race (920) for corrosion product, brinelling, pitting, and damage.	Corrosion product is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits.	Mask the internal threads then remove corrosion product using glass bead cleaning. Refer to the Cleaning chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).
	Raised material is not permitted.	Polish raised material using abrasive pad CM47 or equivalent.
	The maximum permitted depth of brinelling is 0.003 inch (0.07 mm). The maximum permitted depth of pitting and damage is 0.005 inch (0.12 mm). The maximum permitted total area of brinelling, pitting, and damage is 5%.	**B-6679 inner bearing race:** If corrosion product cannot be removed, or if raised material, brinelling, pitting, or damage of the inner bearing race is greater than the permitted serviceable limits, remove the inner bearing race in accordance with the Repair Chapter of this manual, then examine the preload plate spindle in accordance with the applicable step in this Preload Plate Assembly inspection criteria. **A-1272 inner bearing race:** If corrosion product cannot be removed, or if raised material, brinelling, pitting, or damage of the inner bearing race is greater than the permitted serviceable limits, replace the preload plate assembly.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
X. PRELOAD PLATE ASSEMBLY WITH INNER BEARING RACE, CONTINUED (Item 910) Refer to Figure 5-29 and 5-30.		
(5) Measure the OD of the inner bearing race (920).	**B-6679 inner bearing race:** The minimum permitted OD is 1.249 inch (31.73 mm). **A-1272 inner bearing race:** The minimum permitted OD is 1.124 inch (28.55 mm).	**B-6679 inner bearing race:** If the OD is less than the permitted serviceable limits, remove the inner bearing race in accordance with the Repair chapter of this manual, then examine the preload plate spindle in accordance with the applicable step in this Preload Plate Assembly inspection criteria. **A-1272 inner bearing race:** If the OD is less than the permitted serviceable limits, replace the preload plate assembly.
(6) If the inner bearing race (920) is removed, visually examine the preload plate spindle for corrosion product, raised material, and damage.	Corrosion product is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits. Raised material is not permitted. The maximum permitted depth of damage is 0.004 inch (0.10 mm).	Mask the threads then remove corrosion product using glass bead cleaning. Refer to the cleaning chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). Polish raised material using abrasive pad CM47 or equivalent. If corrosion product cannot be removed, or if raised material or damage to the preload plate spindle is greater than the permitted serviceable limits, replace the preload plate assembly.



Lip Thickness in Area "A"	Maximum Permitted Depth of Damage in Area "B"
0.060 inch (1.53 mm)	0.013 inch (0.33 mm) or less
0.061 inch (1.55 mm)	0.014 inch (0.35 mm)
0.062 inch (1.58 mm)	0.015 inch (0.38 mm)
0.063 inch (1.61 mm)	0.016 inch (0.40 mm)
0.064 inch (1.63 mm)	0.017 inch (0.43 mm)
0.065 inch (1.66 mm)	0.018 inch (0.45 mm)
0.066 inch (1.68 mm)	0.019 inch (0.48 mm)
0.067 inch (1.71 mm) or greater	0.020 inch (0.50 mm)

Example 1: Lip thickness in Area "A" is greater than 0.063 inch (1.61 mm)
Depth of damage in Area "B" is 0.016 inch (0.40 mm).
Preload plate is within permitted serviceable limits.

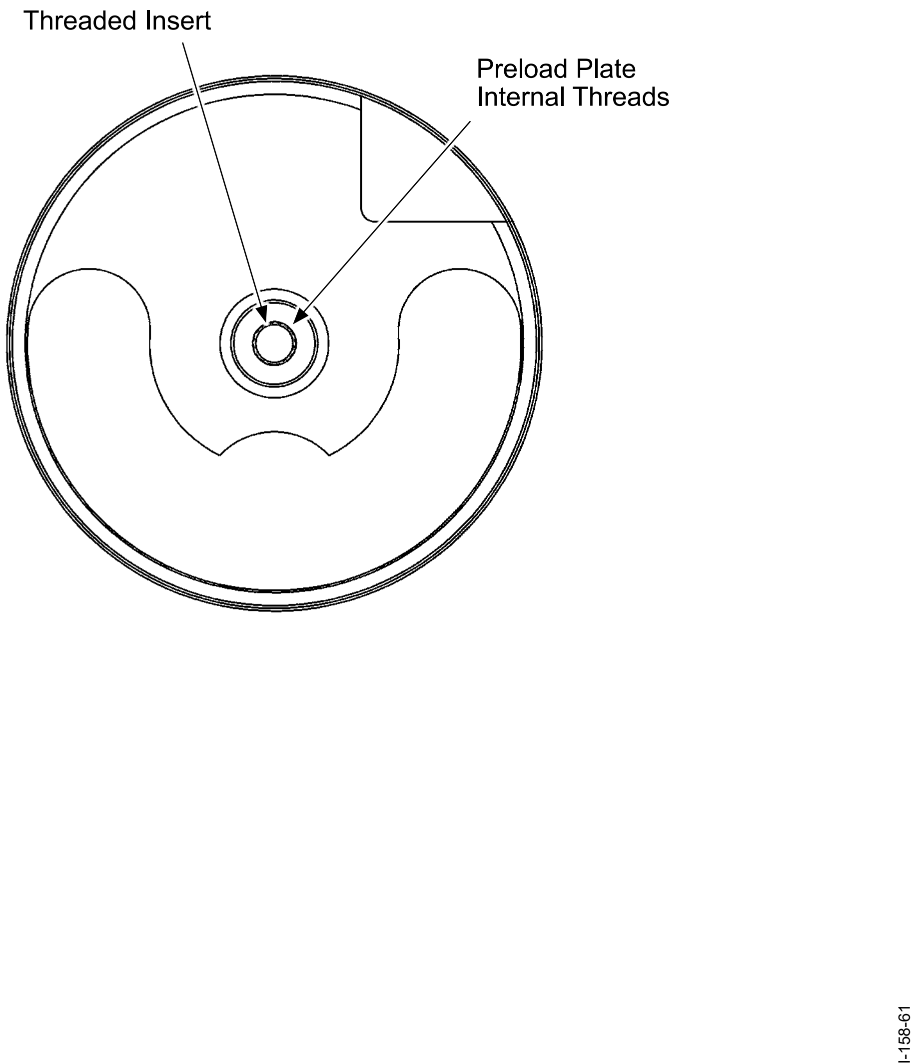
Example 2: Lip thickness in Area "A" is less than 0.063 inch (1.61 mm)
Depth of damage in Area "B" is 0.018 inch (0.45 mm).
Damage is greater than the permitted serviceable limits, replace the preload plate.

APS6283, APS6284

Preload Plate Lip Measurement
Figure 5-30

Component Inspection Criteria
Table 5-1

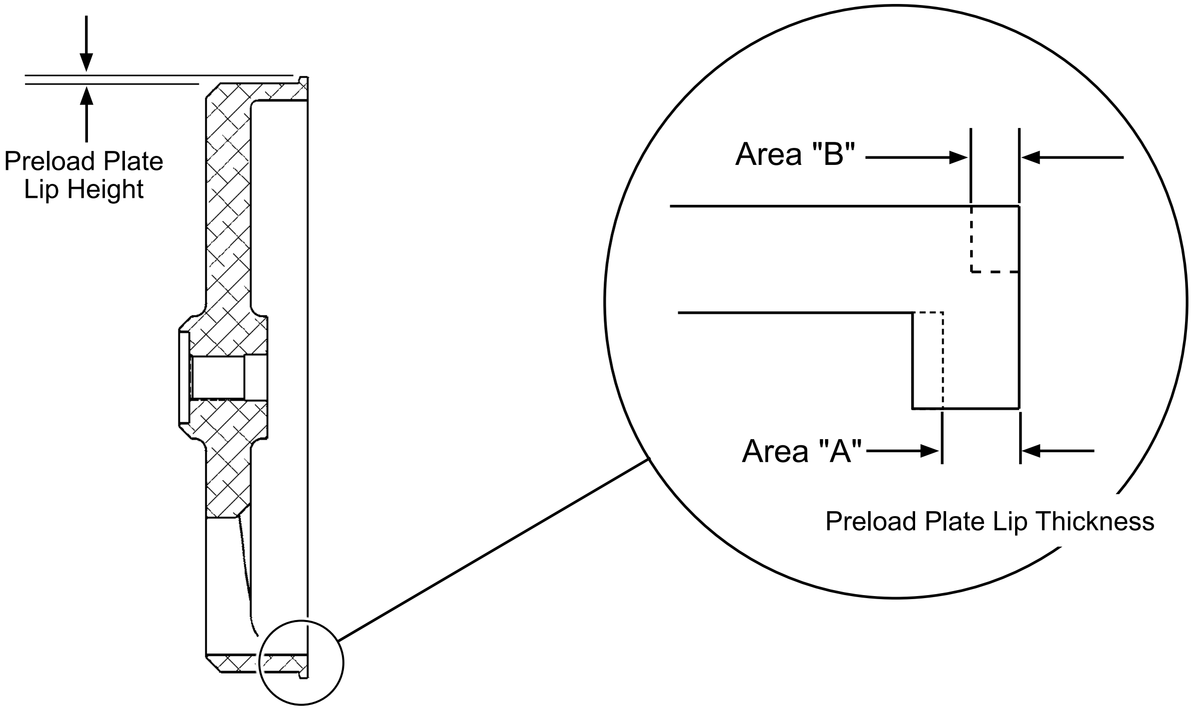
Inspect	Serviceable Limits	Corrective Action
X. <u>PRELOAD PLATE ASSEMBLY WITH INNER BEARING RACE, CONTINUED</u> (Item 910) Refer to Figure 5-29 and 5-30.		
(7) Visually examine the preload plate lip for damage. If the lip is damaged, measure the height.	The minimum permitted lip height is 0.040 inch (1.02 mm).	Remove any rough edges or evidence of fretting. If damage or repair is greater than the permitted serviceable limits, or the lip height is less than the permitted serviceable limits, replace the preload plate assembly.
(8) Visually examine the preload plate lip for damage. If the lip is damaged, measure the lip thickness.	The minimum permitted lip thickness in Area "A" is 0.060 inch (1.53 mm). The maximum permitted depth of damage in Area "B" of the lip of the preload plate is dependent on the thickness in Area "A" of the lip of the preload plate. Use the information and examples in Figure 5-26 to find the maximum permitted depth of damage in Area "B" when lip thickness in Area "A" is equal to or greater than the dimension specified in Figure 5-30.	If the lip thickness in Area "A" is less than the permitted serviceable limits, replace the preload plate. If the depth of damage in Area "B" is greater than the permitted serviceable limits, replace the preload plate assembly.
(9) Penetrant inspect the preload plate in accordance with the Penetrant Inspection chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). Pre-penetrant etch is not required.	A relevant indication is not permitted.	If there is a relevant indication, replace the preload plate assembly.



Preload Plate Assembly with Threaded Insert
Figure 5-31

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
Y. PRELOAD PLATE ASSEMBLY WITH THREADED INSERT (Item 910) Refer to Figure 5-31 and 5-32.		
(1) Visually examine the preload plate for corrosion product.	Corrosion product is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits.	Mask the threads. Remove corrosion product using glass bead cleaning. Refer to the Cleaning chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). If the corrosion product cannot be removed, replace the preload plate.
(2) Visually examine the preload plate for pitting.	The maximum permitted depth of pitting is 0.004 inch (0.10 mm).	Using an abrasive pad CM47 or equivalent, pitting may be removed by polishing up to 0.007 inch (0.17 mm) deep. If the pitting or polishing is greater than the permitted serviceable limits or the corrective action limits, replace the preload plate.
(3) Visually examine the threaded insert for thread damage.	Thread damage is not permitted.	If the damage is greater than the permitted serviceable limits, replace the threaded insert in accordance with the section, "Replacement of a Preload Plate Threaded Insert" in the Repair chapter of this manual.
(4) If the threaded insert has been removed, visually examine the preload plate threads for damage.	A maximum 1/4 of one thread of total accumulated damage is permitted. Damage must not interfere with the threaded insert.	If the damage is greater than the permitted serviceable limits, replace the preload plate.



Lip Thickness in Area "A"	Maximum Permitted Depth of Damage in Area "B"
0.060 inch (1.53 mm)	0.013 inch (0.33 mm) or less
0.061 inch (1.55 mm)	0.014 inch (0.35 mm)
0.062 inch (1.58 mm)	0.015 inch (0.38 mm)
0.063 inch (1.61 mm)	0.016 inch (0.40 mm)
0.064 inch (1.63 mm)	0.017 inch (0.43 mm)
0.065 inch (1.66 mm)	0.018 inch (0.45 mm)
0.066 inch (1.68 mm)	0.019 inch (0.48 mm)
0.067 inch (1.71 mm) or greater	0.020 inch (0.50 mm)

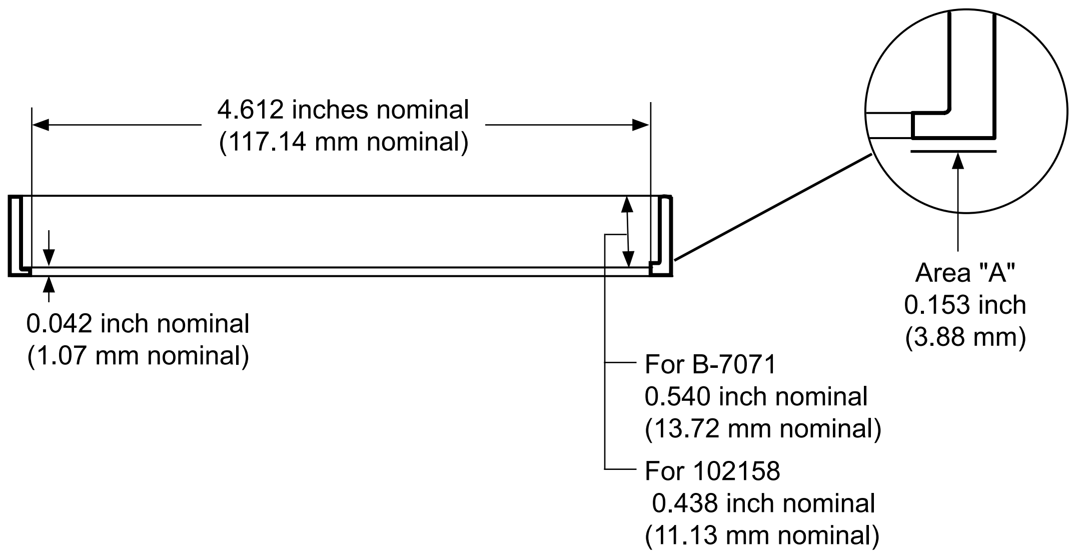
Example 1: Lip thickness in Area "A" is greater than 0.063 inch (1.61 mm)
Depth of damage in Area "B" is 0.016 inch (0.40 mm).
Preload plate is within permitted serviceable limits.

Example 2: Lip thickness in Area "A" is less than 0.063 inch (1.61 mm)
Depth of damage in Area "B" is 0.018 inch (0.45 mm).
Damage is greater than the permitted serviceable limits, replace the preload plate.

Preload Plate Lip Measurement
Figure 5-32

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
Y. PRELOAD PLATE ASSEMBLY WITH THREADED INSERT, CONTINUED (Item 910) Refer to Figure 5-31 and 5-32.		
(5) Visually examine the lip of the preload plate for damage. If the lip is damaged, measure the height.	The minimum permitted lip height is 0.040 inch (1.02 mm).	If the lip height is less than the permitted serviceable limits, replace the preload plate.
(6) Visually examine the preload plate lip for damage. If the lip is damaged, measure the lip thickness.	The minimum lip thickness in Area "A" is 0.060 inch (1.53 mm). The maximum permitted depth of damage in Area "B" of the lip of the preload plate is dependent on the thickness in Area "A" of the lip of the preload plate. Use the information and examples in Figure 5-28 to find the maximum permitted depth of damage in Area "B" when lip thickness in Area "A" is equal to or greater than the dimension specified in Figure 5-32.	If the lip thickness in Area "A" is less than the permitted serviceable limits, replace the preload plate. If the depth of damage in Area "B" is greater than the permitted serviceable limits, replace the preload plate assembly.
(7) Penetrant inspect the preload plate in accordance with the Penetrant Inspection chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). NOTE: The threaded insert does not need to be removed for this inspection. Pre-penetrant etch is not required if the threaded insert is not removed.	A relevant indication is not permitted.	If there is a relevant indication, replace the preload plate assembly.



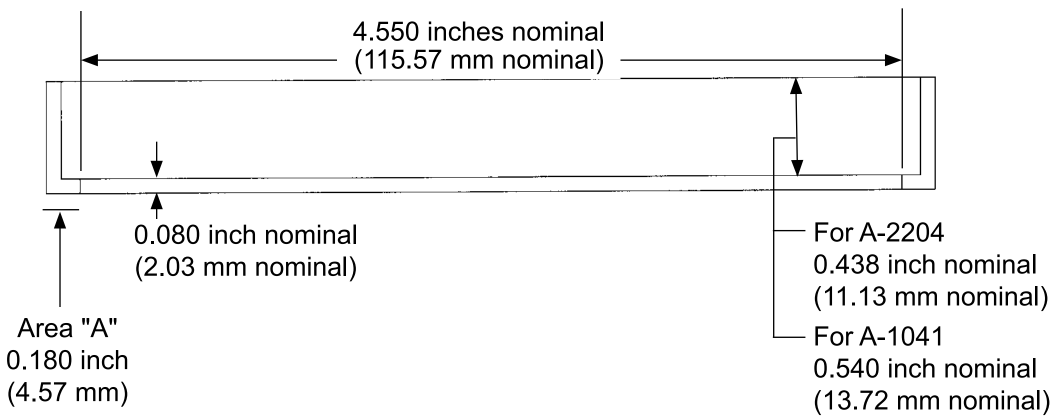
NOTE: Dimensions are for identification purposes only

B-7071

B-7071 and 102158 Bearing Retaining Ring
Figure 5-33

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
Z. <u>B-7071 AND 102158 BEARING RETAINING RING</u> (Item 950) Refer to Figure 5-33.		
(1) Except for Area "A", visually examine the bearing retaining ring for corrosion product and pitting.	Corrosion product is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits. The maximum permitted depth of pitting is 0.005 inch (0.12 mm). Pitting must not interfere with the ability of the bearing retaining ring to fit tightly to the blade and the bearing race.	If there is corrosion product, remove the corrosion product using glass bead cleaning. Refer to the Cleaning chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). If the corrosion product cannot be removed, replace the bearing retaining ring. If the damage is greater than the permitted serviceable limits, replace the bearing retaining ring.
(2) Visually examine the bearing retaining ring for corrosion product, pitting, or wear in Area "A”.	Corrosion product, pitting, or wear is not permitted.	If there is corrosion product, pitting, or wear, replace the bearing retaining ring.
(3) Except for Area "A", visually examine the bearing retaining ring for wear, damage, or fretting.	The bearing retaining ring must fit tightly to the blade and the bearing race when installed over the blade and bearing race.	If the wear, damage, or fretting is greater than the permitted serviceable limits, replace the bearing retaining ring.
(4) Visually examine the entire bearing retaining ring for cadmium plating coverage.	A few random scratches and corners with cadmium plating missing are permitted; otherwise, complete cadmium plating coverage is required.	If cadmium plating is not on all surfaces, replate the bearing retaining ring in accordance with the Cadmium Replating chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).



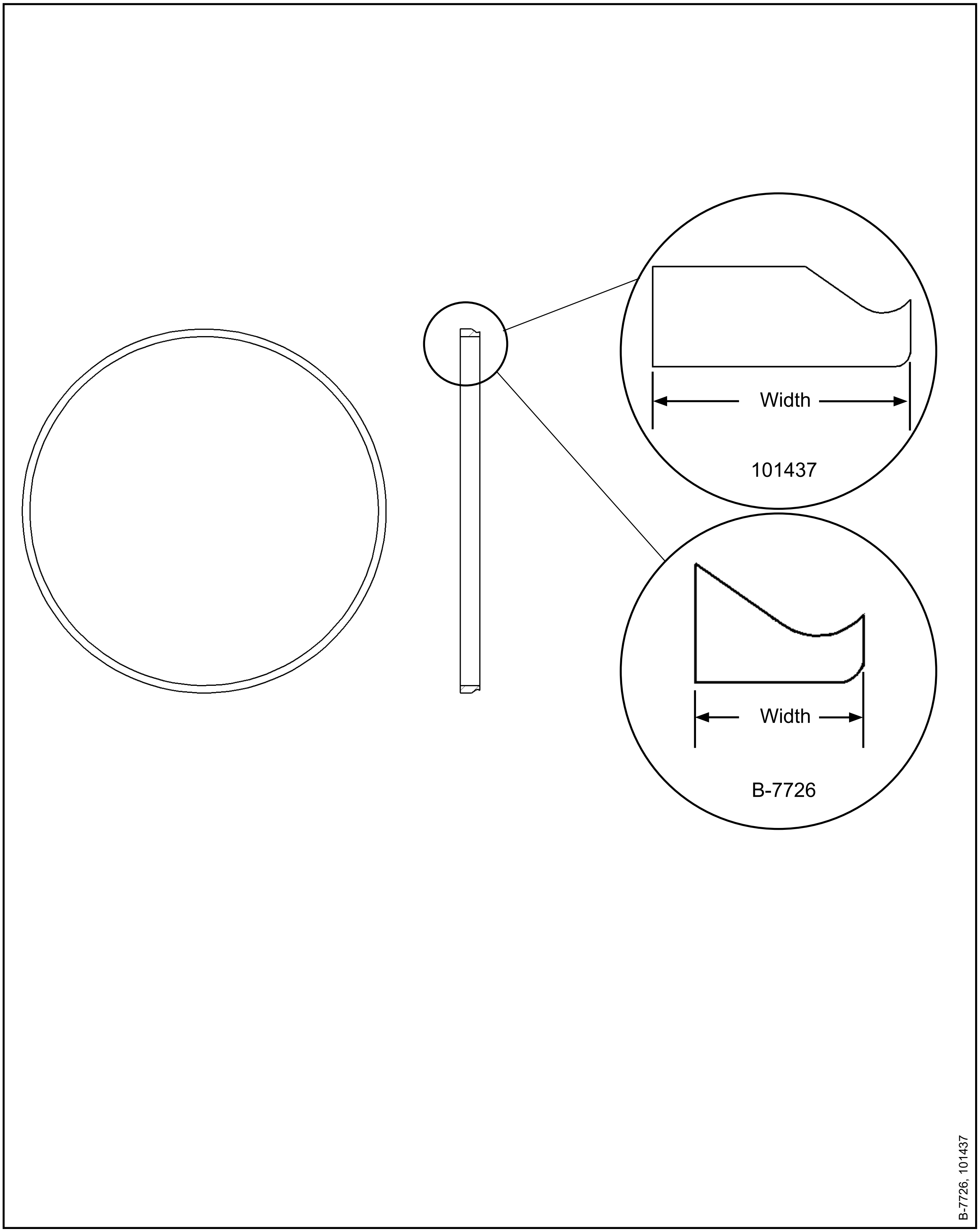
NOTE: Dimensions are for identification purposes only.

B-1041

A-2204 and B-1041 Bearing Retaining Ring
Figure 5-34

Component Inspection Criteria
Table 5-1

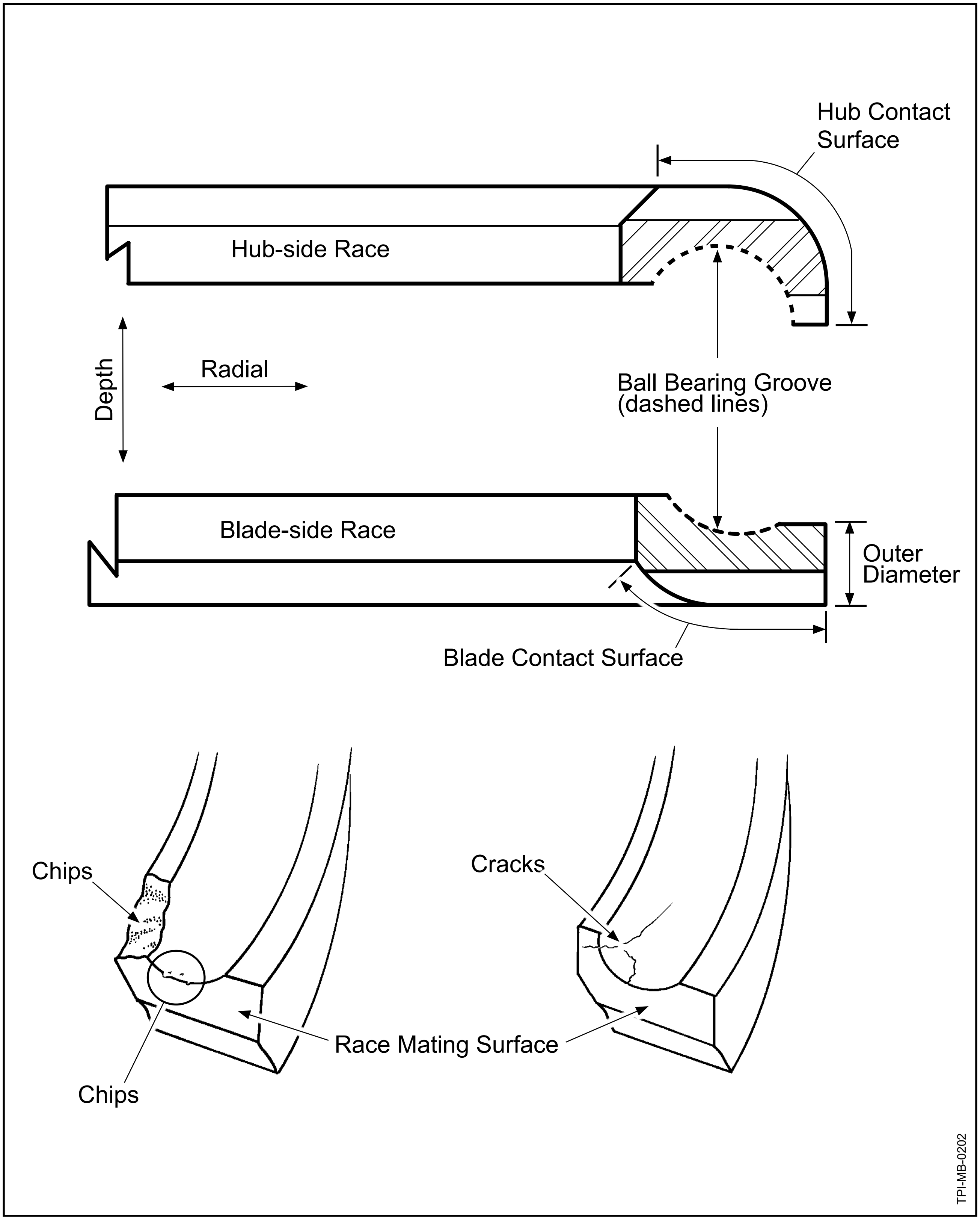
Inspect	Serviceable Limits	Corrective Action
AA. A-2204 AND B-1041 BEARING RETAINING RING (Item 950) Refer to Figure 5-34.		
(1) Visually examine the bearing retaining ring for corrosion product and pitting.	Corrosion product is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits. The maximum permitted depth of pitting is 0.005 inch (0.12 mm). Pitting must not interfere with the ability of the bearing retaining ring to fit tightly to the blade and the bearing race.	Remove corrosion product using glass bead cleaning. Refer to the Cleaning chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). If the corrosion product cannot be removed, replace the bearing retaining ring. If damage is greater than the permitted serviceable limits, replace the bearing retaining ring.
(2) Visually examine the bearing retaining ring for wear, damage, or fretting.	The bearing retaining ring must fit tightly to the blade and the bearing race when installed over the blade and bearing race.	If wear, damage, or fretting is greater than the permitted serviceable limits, replace the bearing retaining ring.
(3) Visually examine the entire bearing retaining ring for cadmium plating coverage.	A few random scratches and corners with cadmium plating missing are permitted; otherwise, complete coverage is required.	If cadmium plating is not on all surfaces, replate the bearing retaining ring in accordance with the Cadmium Replating chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).



Blade Seal
Figure 5-35

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
AB. BLADE SEAL (Item 955) Refer to Figure 5-35.		
(1) Using 10X magnification and an appropriate light source, visually examine the blade seal for damage, missing material, separation, or form irregularities of the continuous ring.	Damage, missing material, separation, or irregularities are not permitted.	If the damage or other conditions are greater than the permitted serviceable limits, replace the blade seal.
(2) Visually examine the width of the blade seal for wear.	If there is wear, measure the width of the blade seal. The minimum permitted width of the blade seal is: B-7726 - 0.090 inch (2.29 mm), 101437 - 0.230 inch (5.84 mm).	If the width is less than the permitted serviceable limits, replace the blade seal.



Bearing Race
Figure 5-36

Component Inspection Criteria
Table 5-1

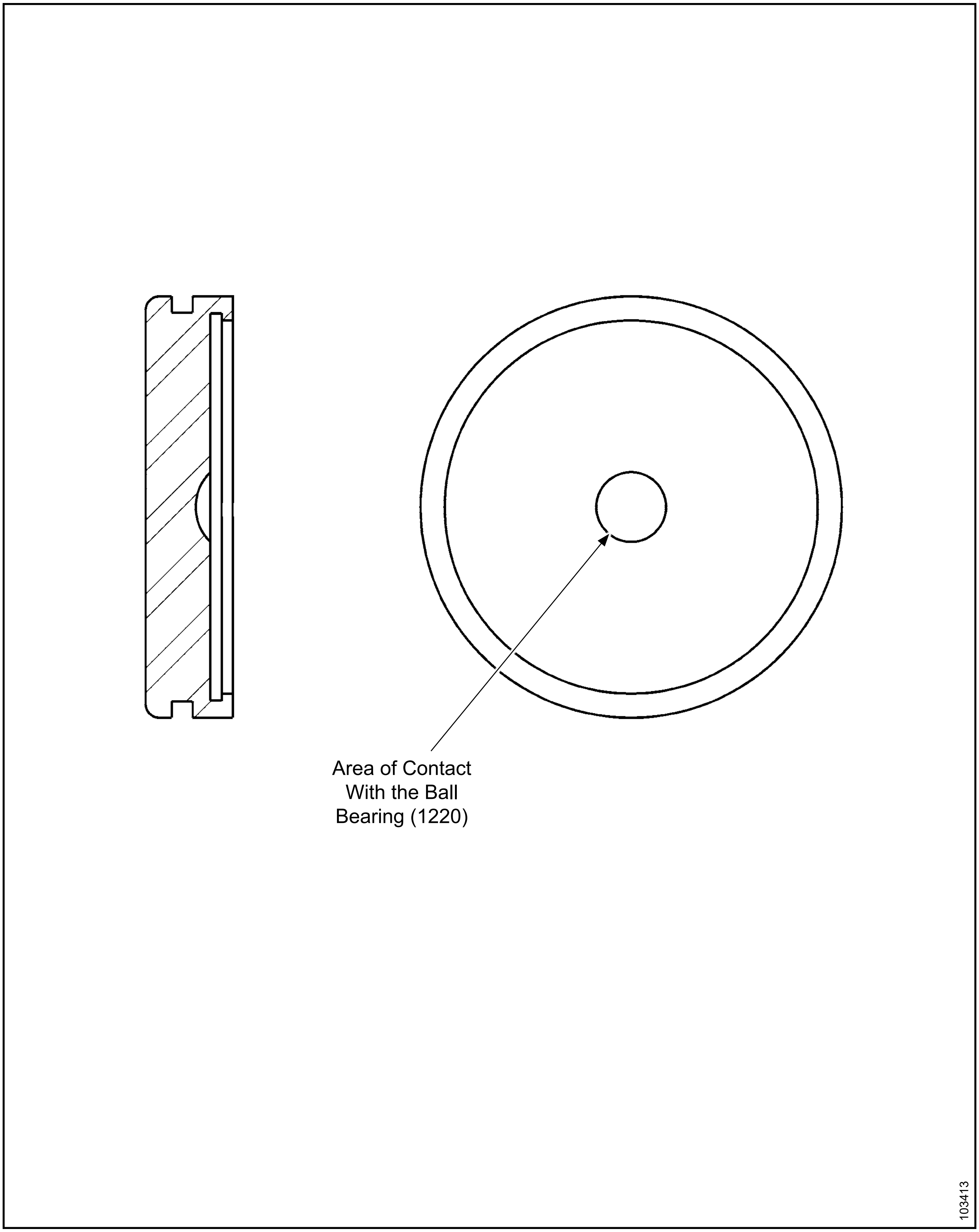
Inspect	Serviceable Limits	Corrective Action
AC. BEARING RACE (Items 970, 980) Refer to Figure 5-36.		
(1) Visually examine the ball bearing groove in each bearing race for corrosion product.	Corrosion product is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits.	Remove corrosion product using glass bead cleaning. For glass bead cleaning refer to the Cleaning chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). If the corrosion product cannot be removed, replace the bearing race.
(2) Visually examine the ball bearing groove in each bearing race for pitting, wear, fretting, and damage.	The maximum permitted depth of pitting is 0.003 inch (0.076 mm) in the ball bearing groove. The maximum permitted diameter of a pit is 0.032 inch (0.81 mm). The maximum permitted total area of pitting in the ball bearing groove on a complete bearing race is 0.12 square inch (77.4 square mm) (two bearing races for each bearing set). Pitting must not interfere with bearing ball movement or support.	If the pitting is greater than the serviceable limits, replace the bearing race.
	If the ball bearing groove has wear, measure the wear. The maximum permitted depth of wear is 0.005 inch (0.12 mm).	If the wear is greater than the permitted serviceable limits, replace the bearing race.
	Fretting damage is not permitted.	If there is fretting damage, replace the bearing race.
	For damage other than pitting or fretting, the maximum permitted depth of damage is 0.003 inch (0.076 mm) and must not interfere with bearing ball movement or support.	If damage is greater than the permitted serviceable limits, replace the bearing race.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
AC. BEARING RACE, CONTINUED (Item 970, 980) Refer to Figure 5-36.		
(3) Except for the ball bearing groove, visually examine all other surfaces of each bearing race for corrosion product.	Corrosion product is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits.	Remove corrosion product glass bead cleaning refer to the Cleaning chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). If the corrosion product cannot be removed, replace the bearing race.
(4) Except for the ball bearing groove, visually examine all other surfaces of each bearing race for pitting, wear, fretting, and damage.	The maximum permitted depth of pitting is 0.005 inch (0.12 mm). The maximum permitted diameter of a pit is 0.062 inch (1.57 mm). The maximum permitted total area of pitting on all surfaces except the ball bearing groove of a complete bearing race is 0.25 square inch (161.2 square mm) (two bearing races for each bearing set).	If the pitting is greater than the permitted serviceable limits, replace the bearing race.
	Fretting damage is permitted on the outer diameter of the bearing races that interface with the bearing retaining ring (950). Fretting must not loosen the tight fit with the bearing retaining ring (950).	Clean the fretted area thoroughly using an abrasive pad CM47 or equivalent to decrease fretting damage to a minimum. If the fit of the bearing retaining ring (950) to the bearing race is not tight, replace the bearing race.
	Wear is not permitted.	If there is wear, replace the bearing race.
	For damage other than pitting, the maximum permitted depth of damage is 0.005 inch (0.12 mm) and must not interfere with the mating surfaces.	If the damage is greater than the permitted serviceable limits, replace the bearing race.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
AC. BEARING RACE, CONTINUED (Item 970, 980) Refer to Figure 5-36.		
(5) Visually examine the bearing race for chips or cracks that are adjacent to the mating surfaces of the bearing race.	Chips or cracks that are adjacent to the mating surfaces of the bearing race are not permitted.	If there are chips or cracks adjacent to the mating surfaces of the bearing race, replace the bearing race.
(6) Magnetic particle inspect each bearing race in accordance with the Magnetic Particle Inspection chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).	A relevant indication is not permitted.	If there is a relevant indication, replace the bearing race.



Blade Plug Inspection Area
Figure 5-37

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
AD. BLADE PLUG (Item 1013) Refer to Figure 5-37.		
(1) Visually examine the blade plug for corrosion product and pitting.	Corrosion product is not permitted. The maximum permitted depth of pitting is 0.005 inch (0.12 mm). Pitting is not permitted where it would interface with the bearing ball. Pitting may not cover more than 10% of the blade plug surface.	Remove corrosion product to a maximum depth of 0.005 inch (0.12 mm) using glass bead cleaning. Do not glass bead clean the area of contact with the ball bearing. Refer to the Cleaning chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). If the damage is greater than the permitted serviceable limits, replace the blade plug.
(2) Visually examine the blade plug for wear or scoring damage in the area of contact with the ball bearing.	If the blade plug is worn or damaged, measure the depth of wear or damage. The maximum permitted depth of wear or damage is 0.004 inch (0.10 mm) beyond the surrounding undamaged surface. The surface finish in the area of contact with the ball bearing must be 32 Ra or smoother.	Using an abrasive pad CM47 or equivalent, polish to remove wear or damage and maintain a surface finish of 32 Ra or smoother. The maximum permitted depth of repair is 0.004 inch (0.10 mm) beyond the surrounding unrepaired surface. If wear or damage is greater than the permitted serviceable limits, replace the blade plug.
(3) Visually examine the blade plug for scratches, gouges, or other damage, outside of the area of contact with the ball bearing.	The maximum permitted depth of damage is 0.005 inch (0.12 mm). Damage must not interfere with the blade plug fit into the blade bore.	Using an abrasive pad CM47 or equivalent, polish pushed up material to blend with the surrounding surfaces. If damage is greater than the permitted serviceable limits or the repair is greater than the correction action limits, replace the blade plug.
(4) Visually examine the blade plug for cadmium plating coverage.	Minor wear on corners and a few light random scratches are permitted; otherwise, cadmium plating must completely cover the blade plug.	If the cadmium plating coverage is less than the permitted serviceable limits, replate, and bake (for a minimum of 23 hours) the blade plug in accordance with the Cadmium Replating chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
AE. <u>BALANCE WEIGHT</u> (Item 1110)		
(1) Visually examine the balance weight for corrosion product.	Corrosion product is not permitted. Remove corrosion product in accordance with the corrective action instructions.	Remove corrosion product using glass bead cleaning. Refer to the Cleaning chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). If the corrosion product cannot be removed, replace the balance weight.
(2) Visually examine the balance weight for pitting, wear, or damage.	The maximum permitted depth of pitting, wear, or damage is 0.003 inch (0.07 mm).	Using an abrasive pad CM47 or equivalent, polish to a maximum depth of 0.005 inch (0.12 mm). If the depth of pitting, wear, or damage is greater than the permitted serviceable limits or the corrective action limits, replace the balance weight.
(3) For an aluminum (gray color) balance weight: Visually examine the balance weight for anodize coverage.	Except for a few scratches and corners with anodize coating missing, complete coverage is required.	If the coverage is less than the permitted serviceable limits, re-anodize the weight in accordance with the Chromic Acid Anodizing chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).
(4) For a steel (silver color) balance weight: Visually examine for cadmium plating coverage.	Except for a few scratches and corners with cadmium plating missing, complete coverage is required.	If the coverage is less than the permitted serviceable limits, replate the weight in accordance with the Cadmium Replating chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

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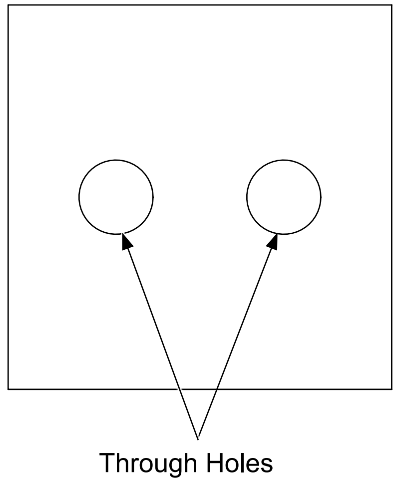
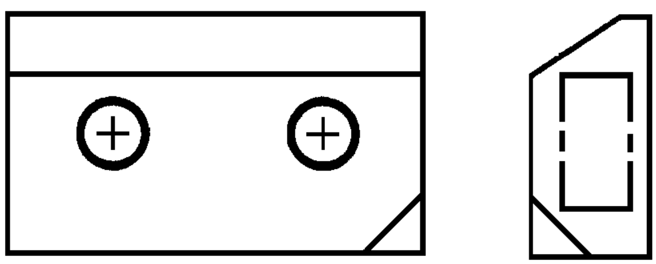


A-745-( ) (steel base metal)



A-890-( ) (steel base metal)

TPI-LW-156A-01386, A-890

Counterweight Slug
Figure 5-38

Component Inspection Criteria
Table 5-1

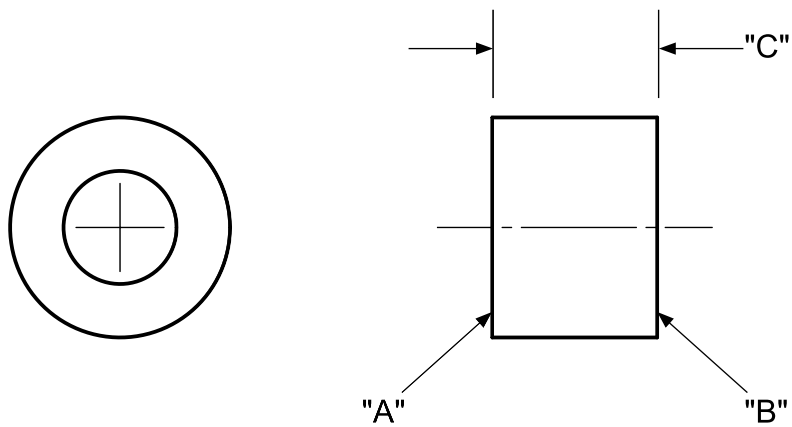
Inspect	Serviceable Limits	Corrective Action
AF. COUNTERWEIGHT SLUG, P/N A-745-4 (Item 9040) Refer to Figure 5-38.		
(1) Visually examine the counterweight slug for corrosion product.	Corrosion product is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits.	Remove corrosion product using glass bead cleaning. Refer to the Cleaning chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). If the corrosion product cannot be removed, replace the counterweight slug.
(2) Visually examine the counterweight slug for pitting, damage, or pushed-up material.	The maximum permitted depth of pitting (resulting from corrosion) or damage is 0.005 inch (0.12 mm). The maximum permitted coverage of pitting or damage combined is 10% of each external flat surface (6 surfaces) or each through hole (2).	Using an abrasive pad CM47 or equivalent, polish to remove pitting that is deeper than 0.005 inch (0.12 mm) to a maximum depth of 0.020 inch (0.50 mm). Repair is considered as damage and is to be included in the maximum coverage of pitting and damage. Using a file, remove pushed-up material until flush with the adjacent area. If pitting or damage is greater than the permitted serviceable limits or corrective action, replace the counterweight slug.
(3) Visually examine the two through holes for wear or repair. If there is wear or repair, measure the diameter of each hole.	The maximum permitted diameter of each hole is 0.403 inch (10.23 mm).	If the diameter of a hole is greater than the permitted serviceable limits, replace the counterweight slug.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
AF. COUNTERWEIGHT SLUG, P/N A-745-4, CONTINUED (Item 9040) Refer to Figure 5-38.		
(4) Visually examine the countwerweight slug for cadmium plating coverage.	Except for a few random scratches with cadmium plating missing, cadmium plating must completely cover the counterweight slug.	If the cadmium plating coverage is less than the permitted serviceable limits, cadmium replate and bake the counterweight slug in accordance with the Cadmium Replating chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).
(5) Magnetic particle inspect the counterweight slug in accordance with the Magnetic Particle Inspection chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). NOTE: It is not necessary to remove cadmium plating.	Pin-point penetrant indications from corrosion pitting are permitted. Linear indications are not permitted.	If there is a linear indication across a hole, remove the indication by polishing to a maximum depth of 0.020 inch (0.050 mm) deep. If a linear indication is not across a hole, remove the indication by polishing to a maximum depth of 0.050 inch (1.27 mm). Repairs that effects the fit or retention of the counterweight slug is not permitted. If penetrant indications are greater than the serviceable limits or corrective action limits, replace the counterweight slug.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
AG. COUNTERWEIGHT SLUG, P/N A-890-13 (Item 9045) Refer to Figure 5-38.		
(1) Visually examine each counterweight slug for corrosion product.	Corrosion product is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits.	Remove corrosion product using glass bead cleaning. Refer to the Cleaning chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). If corrosion product cannot be removed, replace the counterweight slug.
CAUTION: MAJOR MATERIAL REMOVAL WILL AFFECT WEIGHT AND COULD AFFECT PROPELLER DYNAMIC BALANCE AS BLADES CHANGE ANGLE DURING PROPELLER ROTATION.		
(2) Visually examine each counterweight slug for pitting or wear.	The maximum permitted depth of pitting or wear is 0.005 inch (0.12 mm).	Pitting or wear may be polished up to 0.010 inch (0.25 mm) deep using an abrasive pad CM47 or equivalent. If the depth of pitting, wear, or polishing is greater than the permitted serviceable limits or the corrective action limits, replace the counterweight slug.
(3) Visually examine each counterweight slug for scratches, gouges, or other damage.	The maximum permitted depth of a scratch, gouge, or other damage is 0.050 inch (1.27 mm). Damage that interferes with installation, fit, or function of the counterweight slug is not permitted.	Material that pushed up above the normal surface is not permitted. Remove all pushed up material by polishing with an abrasive pad CM47 or equivalent. If a scratch, gouge, or other damage is greater than the permitted serviceable limits, replace the counterweight slug.
(4) Visually examine each counterweight slug for cadmium plating coverage.	Except for a few scratches and corners with cadmium plating missing, complete coverage is required.	If the coverage is less than the permitted serviceable limits, replate the counterweight slug in accordance with the Cadmium Replating chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).



Part Number	Minimum Height "C"
106501	0.124 inch (3.15 mm)
106501-1	0.249 inch (6.33 mm)
106501-2	0.374 inch (9.50 mm)

106501( ) Bulkhead Spacer Heights
Figure 5-39

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
AH. BULKHEAD SPACER (Item 9070) Refer to Figure 5-39.		
(1) Visually examine the bulkhead spacer for corrosion product, pitting, wear, or damage.	Corrosion product is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits. The maximum permitted depth of pitting, wear, or damage is 0.005 inch (0.12 mm). Pitting must not cover more than 10% of each surface of the bulkhead spacer. The maximum permitted diameter of wear or damage on each contact surface "A" or "B" is 0.125 inch (3.17 mm).	Using an abrasive pad CM47 or equivalent, polish to a maximum depth of 0.005 inch (0.12 mm). If the corrosion product cannot be removed, replace the bulkhead spacer. If the pitting, wear, or damage is greater than the serviceable limits or the corrective action limits, replace the bulkhead spacer.
(2) Measure the height "C" of the bulkhead spacer. Refer to the table in Figure 5-39.	Refer to the table in Figure 5-38 for the minimum permitted height "C".	If the bulkhead spacer height "C" is less than the permitted serviceable limits, replace the bulkhead spacer.
(3) Visually examine the bulkhead spacer for anodize coverage.	Except for a few scratches and corners with anodize missing, complete coverage is required.	Re-anodize the bulkhead spacer in accordance with the Chromic Acid Anodizing chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

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REPAIR - CONTENTS

LIST OF FIGURES

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WARNING 1: DO NOT ATTEMPT IN THE FIELD ANY REPAIR, REPLACEMENT, REPLATING, RE-ANODIZING, OR RE-SHOT PEENING PROCEDURE NOT SPECIFICALLY AUTHORIZED BY HARTZELL PROPELLER LLC OR NOT SPECIFICALLY REFERRED TO IN HARTZELL PROPELLER MANUALS. CONTACT THE HARTZELL PROPELLER LLC FOR GUIDANCE ABOUT THE AIRWORTHINESS OF ANY PART WITH UNUSUAL WEAR OR DAMAGE.

WARNING 2: 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 CHAPTER MAY INVOLVE PROPELLER CRITICAL PARTS. REFER TO THE INTRODUCTION CHAPTER OF THIS MANUAL FOR INFORMATION ABOUT PROPELLER CRITICAL PARTS. REFER TO THE ILLUSTRATED PARTS LIST IN THIS MANUAL FOR IDENTIFICATION OF PROPELLER CRITICAL PARTS.

1. General Repair Requirements (Rev. 3)

A. Shot Peening

CAUTION: THE PEENING MARKS ON CERTAIN PROPELLER PARTS ARE NOT TOOL MARKS AND SHOULD NOT BE REMOVED.

(1) Some propeller assembly parts have been shot peened at Hartzell Propeller LLC to improve fatigue strength.

(2) Shot peened surfaces may require re-shot peening because of rust, corrosion, fretting, or nicks. For shot peening procedures, refer to the Shot Peening chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

WARNING: FAILURE TO CORRECTLY SHOT PEEN APPLICABLE PROPELLER PARTS MAY CREATE AN UNSAFE CONDITION THAT MAY RESULT IN DEATH, SERIOUS BODILY INJURY, AND/OR SUBSTANTIAL PROPERTY DAMAGE. A QUALITY SHOT PEENING PROCESS IS CRITICAL FOR FLIGHT SAFETY. SHOT PEENING OF PROPELLER PARTS REQUIRES SPECIAL TECHNIQUES, TRAINING, MATERIALS, AND EQUIPMENT.

(a) Only repair stations that are properly certified by Hartzell Propeller LLC should shot peen Hartzell propeller parts.

1 For certification requirements, refer to the Approved Facilities chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

2 For a list of repair stations that are certified by Hartzell Propeller LLC to perform shot peening on Hartzell propeller parts:

a Go to the Sample Program Approvals page on the Hartzell Propeller LLC website at www.hartzellprop.com

b Contact Hartzell Propeller Product Support

(1) Refer to the section, "Contact Information" in the Introduction chapter of this manual.

B. Aluminum and Steel Parts

(1) Remove scratches, nicks, burrs, and other minor damage using a fine emery cloth or abrasive pad, such as CM47.

(a) Blend the polished area in with the surrounding area.

(b) Use extreme care to completely remove the damage while removing as little material as possible.

(2) After any repair, inspect the part in accordance with the applicable inspection criteria to be sure it is within the permitted limits.

2. Repair/Modification Procedures (Rev. 3)

A. Propeller Components (Except for those listed separately in this section)

(1) For repair and modification procedures of propeller components (except for those listed separately in this section), refer to the applicable section in this chapter.

B. Hubs

(1) Aluminum Hubs: Refer to the Aluminum Hub Overhaul chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

C. Blades

(1) Aluminum Blades: Refer to Hartzell Propeller Aluminum Blade Overhaul Manual 133C (61-13-33).

(2) Composite Blades: Refer to Hartzell Propeller Composite Blade Propeller Manual 135F (61-13-35).

D. Spinner Assemblies

(1) Metal Spinners: Refer to Hartzell Propeller Metal Spinner Maintenance Manual 127 (61-16-27).

(2) Composite Spinners: Refer to Hartzell Propeller Composite Spinner Maintenance Manual 148 (61-16-48).

E. Ice Protection Systems

(1) For ice protection systems supplied by Hartzell, refer to Hartzell Propeller Ice Protection System Manual 180 (30-61-80).

(2) For ice protection systems not supplied by Hartzell, refer to the applicable TC or STC holder's Instructions for Continued Airworthiness (ICA).

3. <u>Specific Repair Requirements</u>

A. Repair of Damaged Balance Weight Attachment Holes

(1) For requirements and procedures for repair of balance weight attachment holes and lubrication fitting holes, refer to the Aluminum Hub Overhaul chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

B. Repair of Damaged Cylinder Wrench Attachment Holes

(1) For requirements and procedures for repair of damaged cylinder wrench attachment holes, refer to the Standard Repairs and Instructions chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

C. Repair of Damaged Cylinder Start Lock Cover Attachment Holes

(1) For requirements and procedures for repair of damaged cylinder start lock cover attachment holes, refer to the Standard Repairs and Instructions chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

D. Repair of Fork Non-machined Areas

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

(1) General

(a) Shallow forging laps or folds in non-machined areas of the fork are repairable in accordance with the following procedure.

(b) Perform the procedure only on forks with the following part numbers:

D-495-( ) D-496-( ) 103548(L)

(2) Procedure

(a) Remove the Cadmium plating from the fork in accordance with the Cadmium Replating chapter of Hartzell Propeller Manual 202A (61-01-02).

(b) Magnetic particle inspect the fork and mark the indications. Refer to the Magnetic Particle Inspection chapter of Hartzell Propeller Manual 202A (61-01-02).

(c) Refer to the Check chapter of this manual for serviceable limits.

(d) Grind and polish the fork to remove all indications found in the forged surfaces between the arms with milled slots.

1 Indications must not be closer than 0.200 inch (5.08 mm) to the adjacent milled surfaces, but indications may come up to the corner of the forged and machined surface within 0.5 inch (12.7 mm) radius of the spacer knob center.

2 Inside radii must not be less than 0.125 inch (3.18 mm).

(e) Inspect the depth of the repair. The maximum permitted repair depth is 0.015 inch (0.38 mm).

(f) Inspect the surface finish of the repair. The maximum permitted repair finish is 63 micro-inch.

(g) Magnetic particle inspect the fork in accordance with the Magnetic Particle Inspection chapter of Hartzell Propeller Manual 202A (61-01-02).

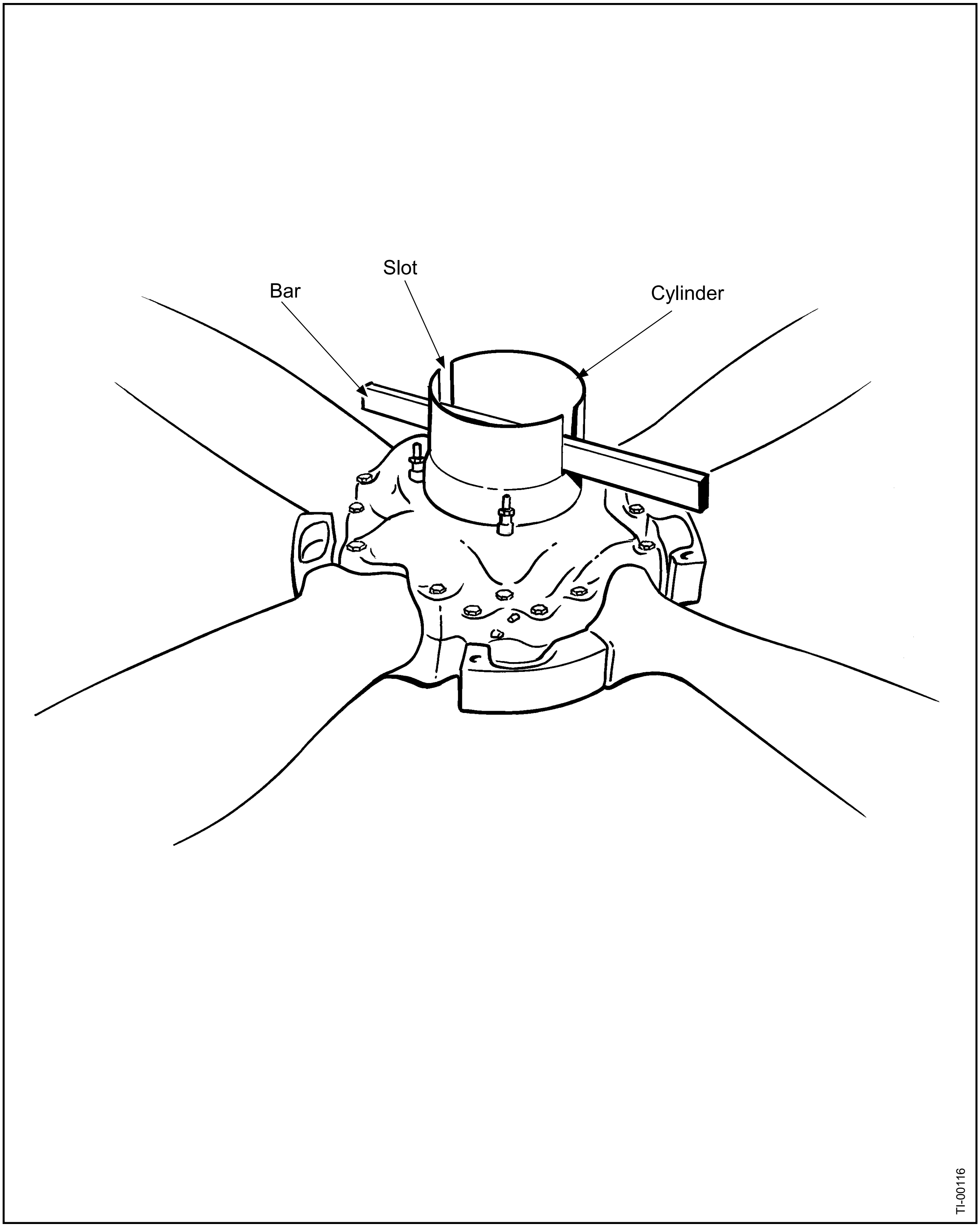
1 If an indication is found, repeat steps (2)(c) through (2)(f) of this section.

a The maximum total depth of repair is 0.015 inch (0.38 mm).

2 If no indications are found, continue with the steps below.

(h) Cadmium plate and bake the fork in accordance with the Cadmium Replating chapter of Hartzell Propeller Manual 202A (61-01-02).

(i) Inspect the cadmium plating in accordance with the serviceable limits in the Check chapter of this manual.



Cylinder Removal
Figure 6-1

E. Cylinder Removal

CAUTION: INSTRUCTIONS AND PROCEDURES IN THIS SECTION INVOLVES PROPELLER CRITICAL PARTS. REFER TO THE INTRODUCTION CHAPTER OF THIS MANUAL FOR INFORMATION ABOUT PROPELLER CRITICAL PARTS. REFER TO THE ILLUSTRATED PARTS LIST IN THIS MANUAL FOR IDENTIFICATION OF PROPELLER CRITICAL PARTS.

(1) General

(a) This procedure is to help in the removal of a cylinder that the threads have bound on the hub threads. Although this procedure requires the replacement of the cylinder, the hub may not have to be replaced. Refer to Figure 6-1.

(2) Removal Procedure

CAUTION: MAKE SURE THAT THE PROPELLER IS IN FEATHER BEFORE ATTEMPTING THE REMOVAL OF THE CYLINDER.

(a) Mark a line around the cylinder 3 to 4 inches (76 to 102 mm) above the hub.

CAUTION: DO NOT DAMAGE THE PISTON AND/OR FEATHERING COMPRESSION SPRING WHEN CUTTING THE CYLINDER.

(b) Cut around the circumference of the cylinder and remove the portion that is cut.

(c) Remove the pitch change rod from the fork.

CAUTION: DO NOT DAMAGE THE HUB THREADS WHEN CUTTING THE SLOTS IN THE CYLINDER.

(d) Cut two slots from the outboard end of the cylinder to the outboard end of the hub threads, as follows:

1 The slots must be 180 degrees from each other.

2 The slots must be approximately 0.75 inch (19 mm) wide.

3 Each slot must come to a point at the outboard end of the hub threads.

CAUTION: DO NOT DAMAGE THE HUB THREADS WHEN CHISELING A NOTCH INTO THE CYLINDER.

(e) Using a chisel, notch the cylinder just below the slots.

(f) Put a bar in the cut slots of the cylinder.

(g) Using the bar, turn the cylinder counterclockwise. The cylinder will either turn off or break at the chiseled notches.

F. Feather Compression Spring Zinc Chromate Primer Repair

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

(1) Cleaning

(a) For procedures for cleaning the feather spring (260), refer to Cleaning of Steel Parts in the Cleaning chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

(b) Inspect the feather compression spring (260) for scratches, corrosion, and zinc plate coverage in accordance with the Check chapter of this manual.

(c) Remove any loose material and feather the existing coating with 120 to 180 grit sandpaper.

WARNING: PAINTS 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.

(d) Using solvent CM106, clean the entire feather spring (260).

(e) Permit the solvent CM106 to air dry.

(2) Painting

(a) For general information about finishing procedures, refer to the Paint and Finish chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

(b) Apply a layer of zinc chromate primer, CM67, or equivalent, to the entire surface of the feather compression spring (260).

(c) Permit the primer to dry for a minimum of 24 hours before handling.

(d) Examine the feather compression spring (260) for complete primer coverage.

G. Reverse Adjust Sleeve Bushing Removal and 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. REFER TO THE ILLUSTRATED PARTS LIST IN THIS MANUAL FOR IDENTIFICATION OF PROPELLER CRITICAL PARTS.

(1) Removal Procedure

(a) Put a customer supplied 1.187 inch diameter reamer in a vise.

(b) Put the non-threaded end of the reverse adjust sleeve over the reamer.

CAUTION: DO NOT DAMAGE THE REVERSE ADJUST SLEEVE OR REMOVE METAL FROM THE REVERSE ADJUST SLEEVE SHOULDER THAT IS NEXT TO THE BUSHING WHEN REMOVING THE BUSHING.

(c) By hand, turn the reverse adjust sleeve on the reamer to cut out the bushing.

NOTE: To make it easier to turn the reverse adjust sleeve, a tool may be made that functions as a handle. To make the tool, weld a small metal bar to a nut that will fit on the threaded end of the reverse adjust sleeve. Install the tool on the reverse adjust sleeve.

(d) Using plastic media, remove the remaining bushing and adhesive. Refer to the Cleaning chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

(2) Installation Procedure

(a) Install a new bushing in accordance with the Special Adhesive and Bonding chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

H. Brass Counterweight Slug Mounting Hole Repair

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

(1) General

(a) This procedure provides the instructions to remove wear around the counterweight slug mounting through hole.

(2) Procedure

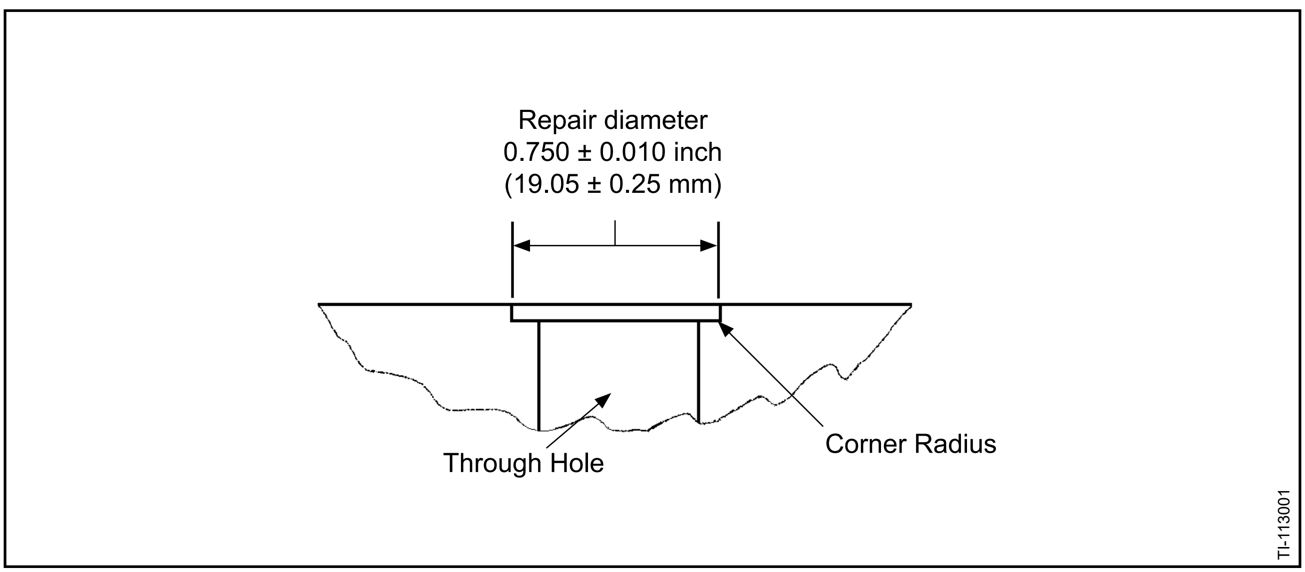
(a) Use a locally procured end mill cutter that is 0.750 ± 0.010 inch (19.05 ± 0.25 mm) outside diameter.

1 The corner radius blending between the outside diameter and the cutting end must be 0.005 to 0.033 inch (0.13 to 0.83 mm).

(b) Put the brass weight slug in the end mill.

CAUTION: MAKE SURE THAT THE BRASS WEIGHT SLUG IS HELD TIGHTLY IN PLACE WITH THE THROUGH HOLE CENTERED UNDER THE END MILL CUTTER.

(c) Center the through hole that is to be repaired under the end mill cutter and make sure that the brass weight slug is held tightly in place.



Brass Counterweight Slug Mounting Hole Repair
Figure 6-2

CAUTION: DO NOT SPOTFACE DEEPER THAN THE MAXIMUM PERMITTED DEPTH.

(d) Spotface the brass weight slug to remove wear damage. Refer to Figure 6-2.

1 The maximum permitted depth of repair is 0.020 inch (0.50 mm).

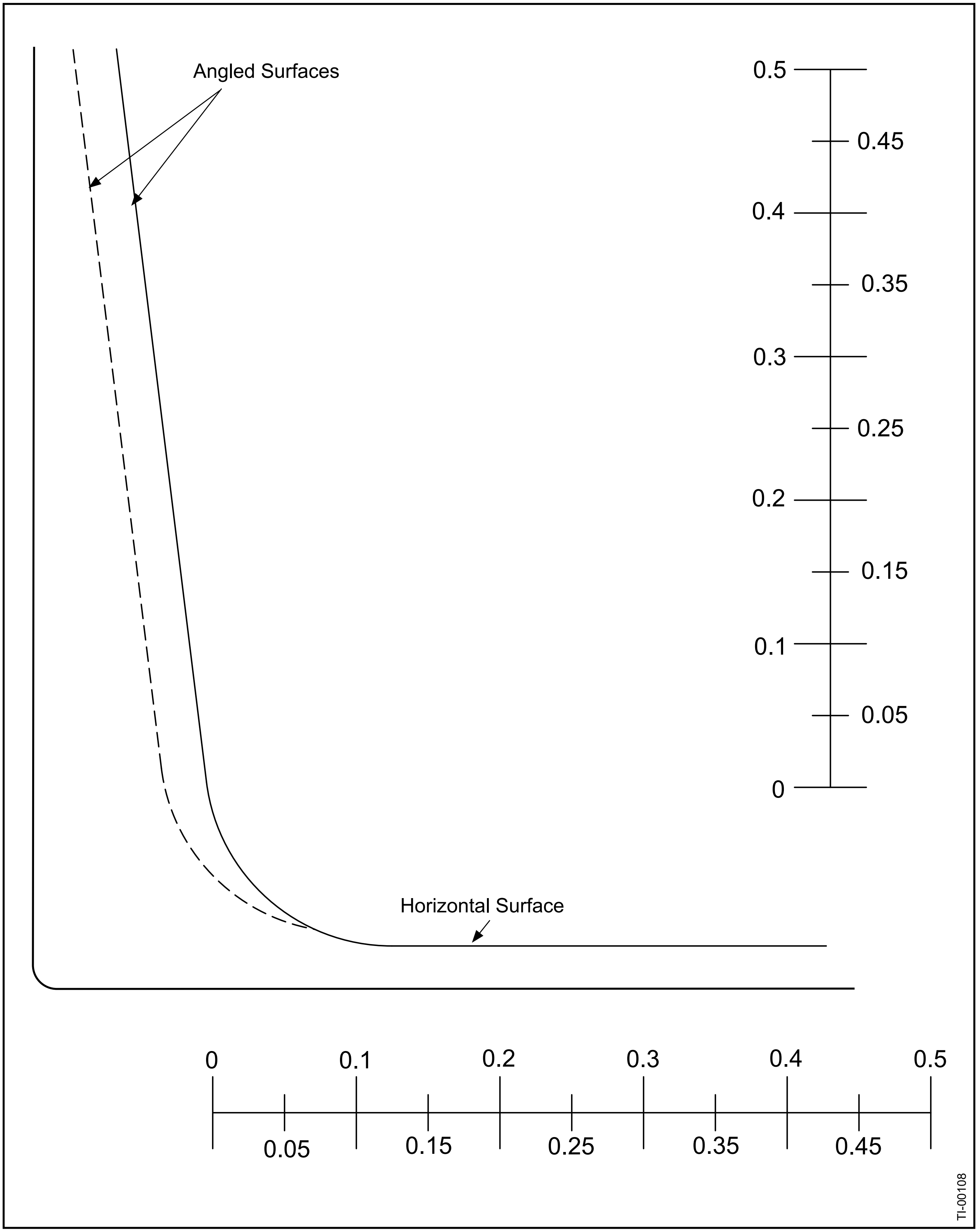
2 If the repair is greater than the maximum permitted depth of repair, replace the brass weight slug.

(e) Remove all burrs.

(f) Break any sharp corners.

(g) Visually examine the repair to make sure that the repair is centered on the through hole.

(h) Cadmium plate of any bare brass surface is required. Refer to the Check chapter of this manual.



Optical Comparator Overlay
Figure 6-3

I. Inspection of the Internal Surface of a Cylinder

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

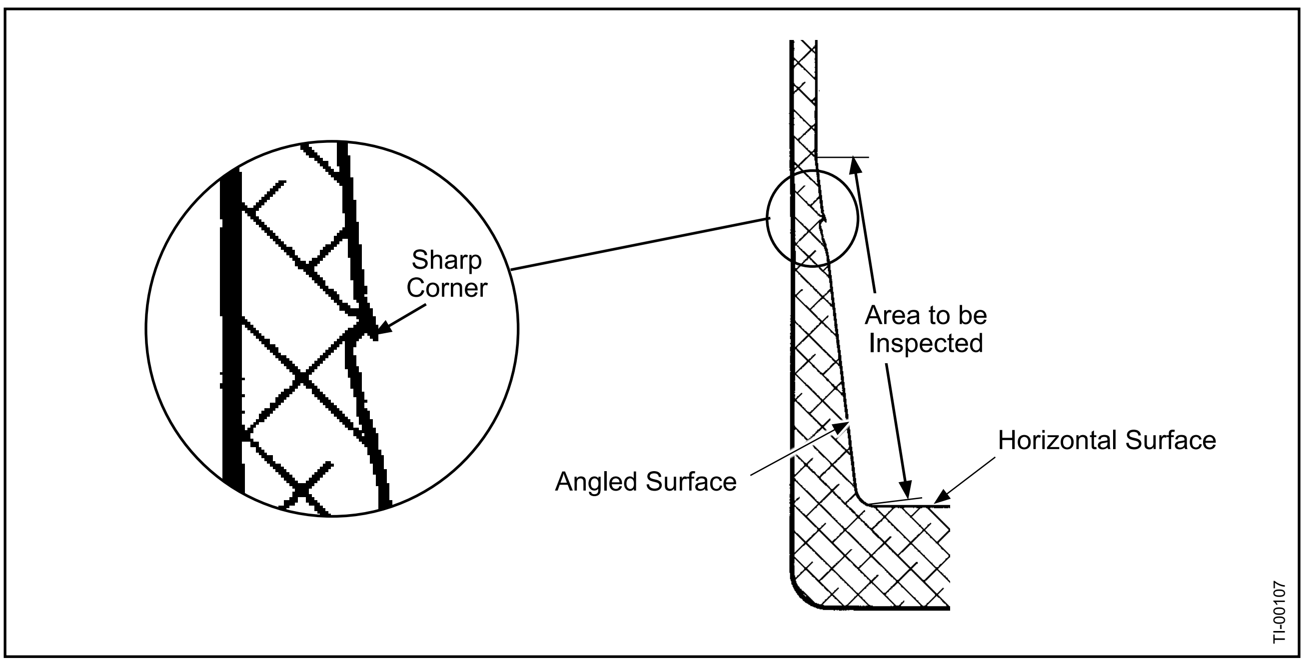
(1) General

(a) Use this procedure to inspect the rough part of an internal surface of a cylinder for depth of material loss when required by the Serviceable Limits in the Check chapter of this manual. Refer to Figure 6-4.

(b) An optical comparator and replication putty CM125 is required for this inspection.

1 An optical comparator is a device that projects a magnified profile image of the object onto a screen. The image is then compared to a clear overlay that has the required shape imprinted on its surface.

2 For a list of vendors that produce an optical comparator considered acceptable for inspection purposes, refer to optical comparators TE28 in the Hartzell Propeller Tool and Equipment Manual 165A (61-00-65).



Inspection for a Sharp Corner
Figure 6-4

(c) A pattern for the overlay required for this inspection is provided as Figure 6-4.

1 Figure 6-4 is drawn correctly for 20X magnification.

2 If a different magnification is desired, use Figure 6-3 as a pattern and adjust the scale as necessary for the different magnification.

3 Make a clear overlay to use with the optical comparator.

(2) Inspection for a Sharp Corner. Refer to Figure 6-4.

(a) Move your finger across the rough surface area of the cylinder.

(b) If there is any material that catches on the skin of your finger, then there is a sharp corner. Refer to the Check chapter of this manual for the serviceable limits about a sharp corner of the cylinder.

(3) Dimensional Inspection

(a) Making the Mold

1 Make sure that the replication mold includes the deepest area of the rough part of the internal surface of the area to be inspected and some of the horizontal surface used for staging.

2 Using two-part replication putty CM125, make a replication mold of the area that will be dimensionally inspected. Refer to the section "Measuring Depth of Damage with Replication Material" in the Standard Repairs and Instructions chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

(b) Alignment of the Overlay on the Optical Comparator Screen

1 Set the optical comparator for the magnification that correctly matches the overlay.

2 Put the overlay on the screen of the optical comparator in approximately the final position.

3 Lightly clip the overlay in place so that the overlay can be shifted for exact alignment.

4 Adjust the stage so that an image of the stage surface appears halfway up on the screen.

5 Adjust the overlay on the screen so that the horizontal surface of the overlay aligns with the stage surface.

(c) Alignment of the Cylinder Replication Mold on the Overlay

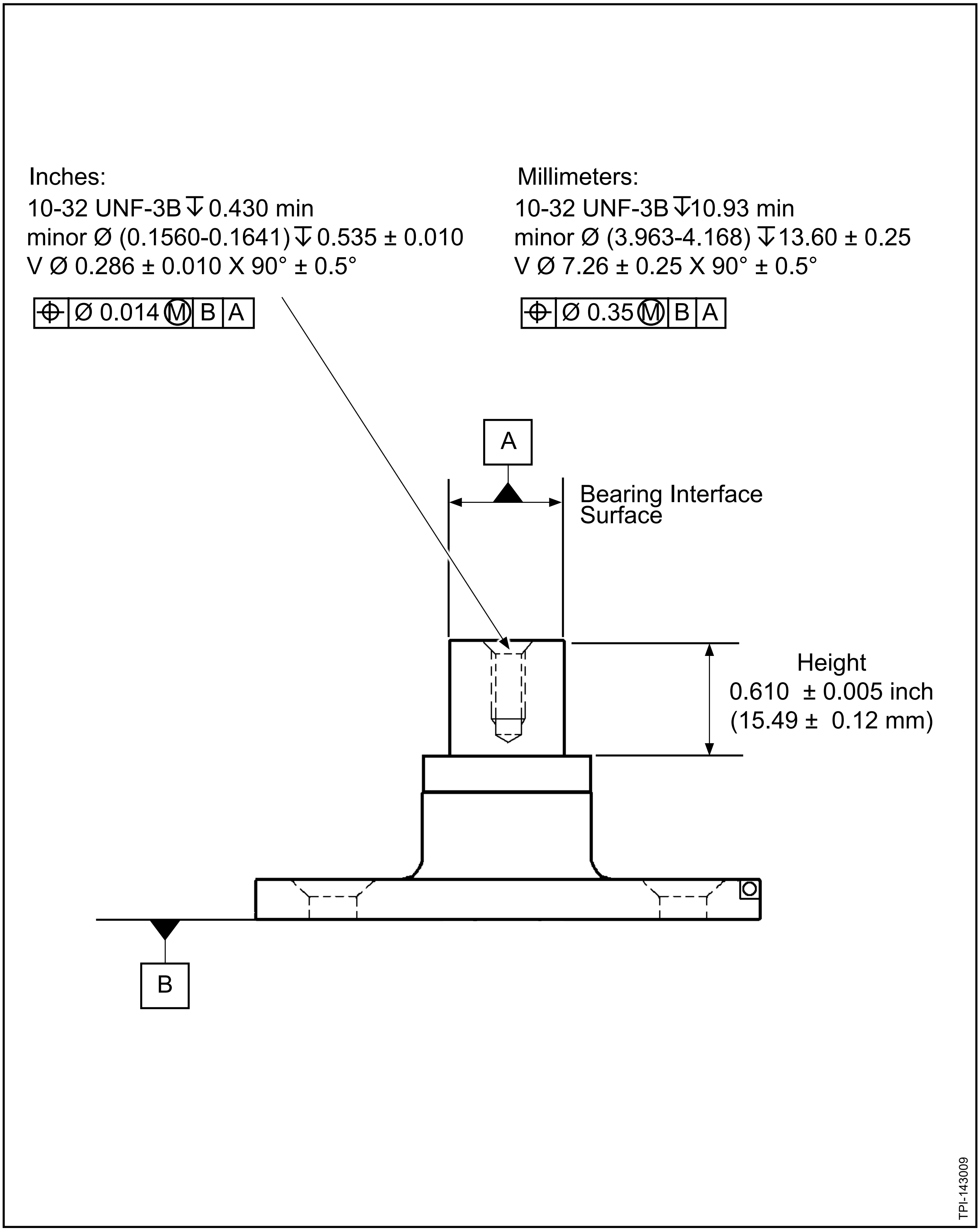
1 Put the horizontal surface of the cured cylinder replication mold on the stage.

2 Adjust the horizontal position of the vertical surface of the cylinder replication mold to position all parts of the vertical surface of the replication mold between the vertical surface lines on the optical comparator overlay, if possible.

(d) Compare the projected image with the overlay.

1 If the projected image of the vertical surface of the cylinder replication mold falls between the solid line on the overlay and the dotted line on the overlay, the depth below the surrounding machined surface is 0.030 inch (0.76 mm) or less.

2 Refer to the Check chapter of this manual for the serviceable limits about the permitted depth for the rough surface of the cylinder.



Modified Pitch Change Knob Bracket
Figure 6-5

J. Pitch Change Knob Bracket Modification - Refer to Figure 6-5

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. REFER TO THE ILLUSTRATED PARTS LIST IN THIS MANUAL FOR IDENTIFICATION OF PROPELLER CRITICAL PARTS.

(1) Mill off the retaining washer shoulder of the pitch change knob bracket to the height given in Figure 6-5.

(2) Drill, thread, and countersink/chamfer to the true position requirement as specified in Figure 6-5.

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

(a) Using solvent CM106 MEK or CM219 MPK, clean the threaded hole and permit the threads to dry.

(3) Inspect the pitch change knob bracket in accordance with the section "Pitch Change Knob Bracket That Uses a Screw to Retain the Cam Follower" in the Check chapter of this manual.

(4) If the pitch change knob successfully passes all inspections, apply masking material to the pitch change knob bearing OD interface surface, reapply cadmium plating and bake in accordance with the Cadmium Replating chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

(5) Use metal impression stamping or vibra engraving to mark the modified pitch change knob bracket with the letter "**A**" at the end of the part number in accordance with the Parts Identification and Marking chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

NOTE: A part number with an **A** suffix will identify that it is a modified pitch change knob bracket unit.

K. Replacement of a Preload Plate Threaded Insert

(1) General

(a) Preload plate model Hartzell Propeller part number 103525 incorporates a threaded insert (942) in the set screw threaded hole.

1 Replace the threaded insert (942), as required, in accordance with the following procedure.

(b) Slimsert® installation tool TE389-1 is a necessary tool to replace the preload plate threaded insert (942).

(2) Insert Removal

(a) Align the tapered end of the BST-2930-1 Slimsert® installation tool TE389-1, with the bore of the threaded insert (942).

(b) Put the Slimsert® installation tool TE389-1 into the threaded insert (942).

(c) Turn the end of the Slimsert® installation tool TE389-1 counterclockwise to break loose the adhesive.

(d) Remove the threaded insert (942) from the preload plate (910).

(3) Thread Inspection

(a) Complete an inspection of the threaded hole of the preload plate (910) in accordance with the Check chapter in this manual.

(4) Threaded Insert Installation

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

(a) Using solvent CM106 or CM11, clean the threaded hole of the preload plate (910) and exterior threads of the threaded insert (942).

(b) Permit the solvent CM106 or CM11 to air dry completely.

(c) Apply a layer of primer CM127 to the threaded hole of the preload plate (910) and to the exterior threads of the insert (942).

(d) Permit the primer CM127 to air dry for 3 to 5 minutes.

(e) Apply a layer of retaining compound CM74 to the threaded hole of the preload plate (910) and to the exterior threads of the insert (942).

(f) Using Slimsert® installation tool TE389-1, install the insert (942) into the threaded hole of the preload plate (910) so that the end of the threaded insert (942) is flush to one thread below the hole chamfer of the preload plate (910). This is the side opposite of the counterbore.

(g) Using a clean, dry cloth, remove any excess retaining compound CM74.

(h) Using a 0.50 inch (1.27 mm) diameter locally procured peening tool, peen the threaded insert in from the counterbored side of the preload plate (910).

(i) Permit the retaining compound CM74 to air dry for 12 hours.

WARNING: PAINTS 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.

(j) Apply chemical conversion coating to the machined surface areas near either end of the threaded insert (942) in accordance with Hartzell Propeller Standard Practices Manual 202A (61-01-02).

(k) Using a 3/8-24UNF-3B thread plug gage, inspect the internal threads of the threaded insert (942) for damage.

1 If the threads of the threaded insert (942) are damaged, remove the threaded insert and install a new threaded insert in accordance with applicable steps in this section.

L. Preload Plate Assembly Inner Bearing Race Repair

CAUTION: ONLY DO THIS PROCEDURE IF THERE IS A SUFFICIENT AMOUNT OF SPACE BETWEEN THE BOTTOM OF THE INNER BEARING RACE (920) AND THE SURFACE OF THE PRELOAD PLATE (910). DO NOT DO THIS PROCEDURE IF THE BOTTOM OF THE INNER BEARING RACE (920) IS TOUCHING THE PRELOAD PLATE (910).

(1) Removing and Installing the Preload Plate Inner Bearing Race (920) to the Preload Plate Spindle

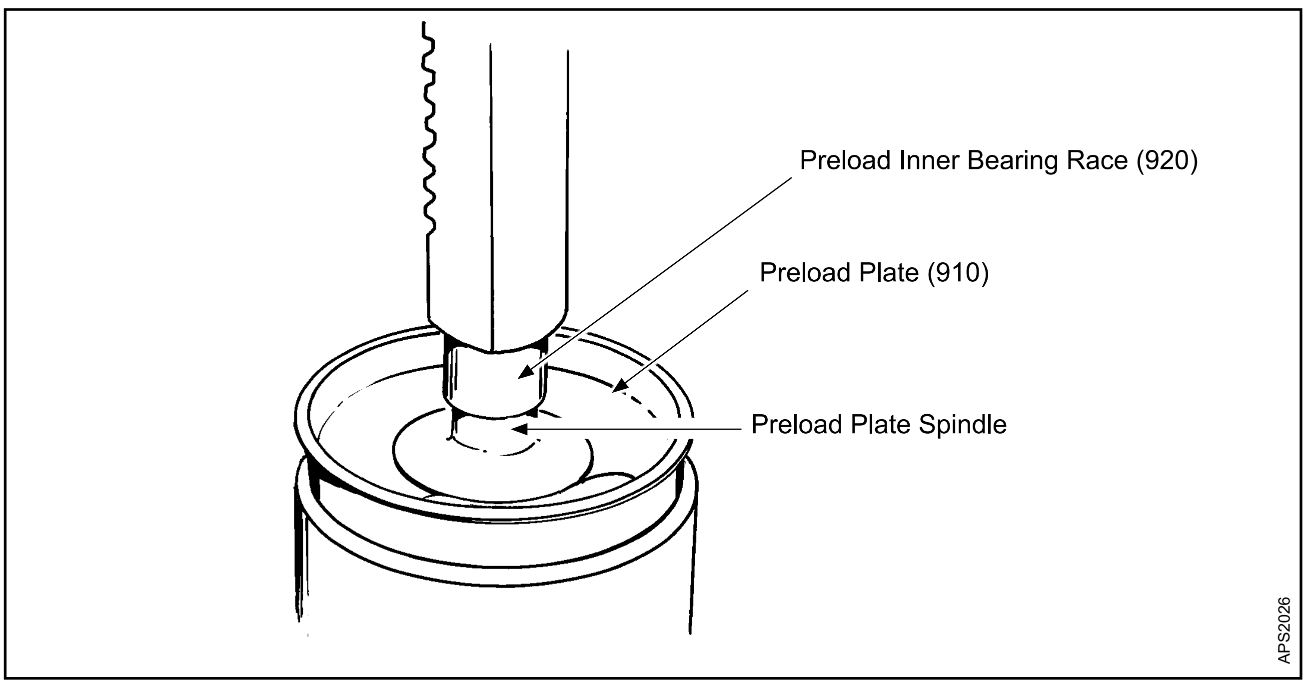
CAUTION: WHEN REMOVING THE INNER BEARING RACE (920), USE CARE TO NOT DAMAGE THE PRELOAD PLATE (910) THREADS.

(a) Remove the inner bearing race (920) using the puller TE98 or a locally procured tool.

1 If using puller TE98, put a spacer below the collar of the puller TE98 to keep the puller TE98 from touching the preload plate (910) threads.

(b) Discard the inner bearing race (920).

(c) Do the required inspections of the preload plate spindle in accordance with the Check chapter of this manual.



Pushing the Preload Inner Bearing Race onto the Preload Plate Spindle
Figure 6-6

(d) Using number 4 oil, CM80, lubricate the inside diameter of the new inner bearing race (920).

(e) Put the preload plate (910) in a locally procured fixture.

CAUTION 1: THE FORCE WHEN PUSHING THE INNER BEARING RACE (920) ONTO THE PRELOAD PLATE (910) MUST NOT BE GREATER THAN 5000 POUNDS.

CAUTION 2: WHEN PUSHING THE INNER BEARING RACE (920) ONTO THE PRELOAD PLATE SPINDLE, USE CARE TO NOT DAMAGE THE PRELOAD PLATE (910) THREADS.

(f) Push the inner bearing race (920) over the preload plate spindle. Refer to Figure 6-6.

1 The top of the inner bearing race (920) must be flush to 0.005 inch (0.12 mm) below the top surface of the preload plate spindle.

(g) Turn the set screw (930) into the preload plate (910) to test the preload plate (910) threads.

1 If the set screw (930) does not turn smoothly into the preload plate (910), replace the preload plate (910).

(h) Twist, turn, and pull by hand the inner bearing race (920) to make sure it holds a press fit on the preload plate assembly (910).

1 If the inner bearing race (920) does not hold a press fit on the preload plate assembly (910), replace the preload plate assembly.

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ASSEMBLY - CONTENTS

ASSEMBLY - CONTENTS, CONTINUED

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LIST OF FIGURES, CONTINUED

LIST OF TABLES

1. General (Rev. 7)

WARNING 1: ANY PART IDENTIFIED IN THIS MANUAL AS AN EXPERIMENTAL OR NON-AVIATION PART MUST NOT BE USED IN AN FAA OR INTERNATIONAL EQUIVALENT TYPE CERTIFICATED PROPELLER. A PART IDENTIFIED AS EXPERIMENTAL OR NON-AVIATION DOES NOT HAVE FAA OR INTERNATIONAL EQUIVALENT APPROVAL EVEN THOUGH IT MAY STILL SHOW AN AVIATION TC OR PC NUMBER STAMP. USE ONLY THE APPROVED ILLUSTRATED PARTS LIST PROVIDED IN THE APPLICABLE OVERHAUL MANUAL OR ADDITIONAL PARTS APPROVED BY AN FAA ACCEPTED DOCUMENT FOR ASSEMBLY OF A PROPELLER. THE OPERATOR ASSUMES ALL RISK ASSOCIATED WITH THE USE OF EXPERIMENTAL PARTS. USE OF EXPERIMENTAL PARTS ON AN AIRCRAFT MAY RESULT IN DEATH, SERIOUS BODILY INJURY, AND/OR SUBSTANTIAL PROPERTY DAMAGE.

WARNING 2: 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 1: INSTRUCTIONS AND PROCEDURES IN THIS CHAPTER MAY INVOLVE PROPELLER CRITICAL PARTS. REFER TO THE INTRODUCTION CHAPTER OF THIS MANUAL FOR INFORMATION ABOUT PROPELLER CRITICAL PARTS. REFER TO THE ILLUSTRATED PARTS LIST IN THIS MANUAL FOR IDENTIFICATION OF PROPELLER CRITICAL PARTS.

CAUTION 2: THE USE OF BLADE PADDLES TO MOVE BLADES CAN RESULT IN THE OVERLOAD AND DAMAGE OF THE BLADE PITCH CHANGE MECHANISM. THIS DAMAGE IS NOT REPAIRABLE AND CAN RESULT IN SEPARATION BETWEEN THE BLADE AND THE PITCH CHANGE MECHANISM, CAUSING LOSS OF PITCH CONTROL DURING FLIGHT.

A. Important Information

(1) Read all assembly instructions before beginning the assembly procedures.

(2) Protect all unassembled components from damage.

(3) Use applicable torque values. Refer to Table 8-1, "Torque Values", in the Fits and Clearances chapter of this manual.

(4) Unless specified differently, safety wire in accordance with NASM33540 using 0.032 inch (0.81 mm) safety wire.

(5) For information about additional weight slugs that may be required to be attached to the counterweight arms of certain clamp models, refer to the Hartzell Propeller Application Guide Manual 159 (61-02-59).

CAUTION: BEFORE ASSEMBLING THE PROPELLER, DETERMINE IF AN ICE PROTECTION SYSTEM IS REQUIRED.

B. Ice Protection Systems

(1) If installing an ice protection system supplied by Hartzell, refer to Hartzell Propeller Ice Protection System Manual 180 (30-61-80).

(2) If installing an ice protection system not supplied by Hartzell, refer to the applicable TC or STC holder's Instructions for Continued Airworthiness (ICA).

C. O-rings

(1) Unless specified differently, lubricate all O-rings with lubricant CM12 before installing them in the propeller assembly.

(2) Hartzell Propeller LLC recommends that the lot number and cure date for each O-ring be recorded with all work orders when an O-ring is installed in any propeller assembly.

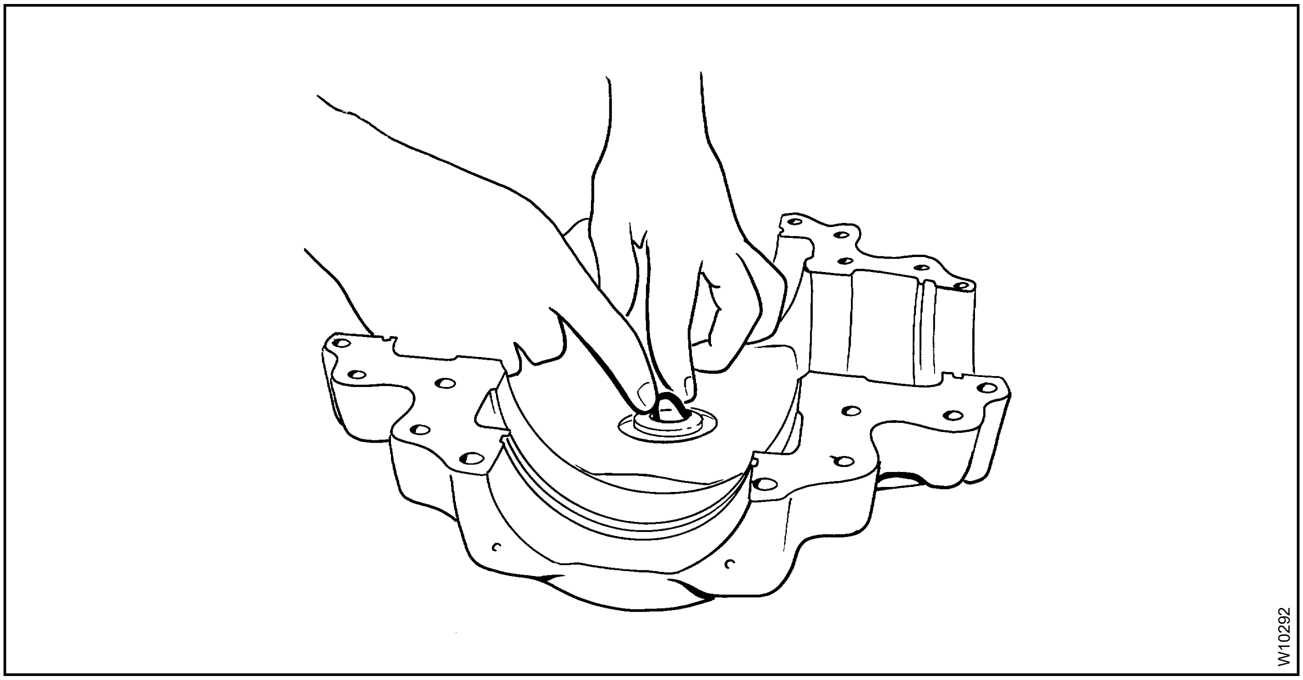
D. Blade Bore Plug/Bearing Installation

(1) For aluminum blades, refer to Hartzell Propeller Aluminum Blade Overhaul Manual 133C (61-13-33).

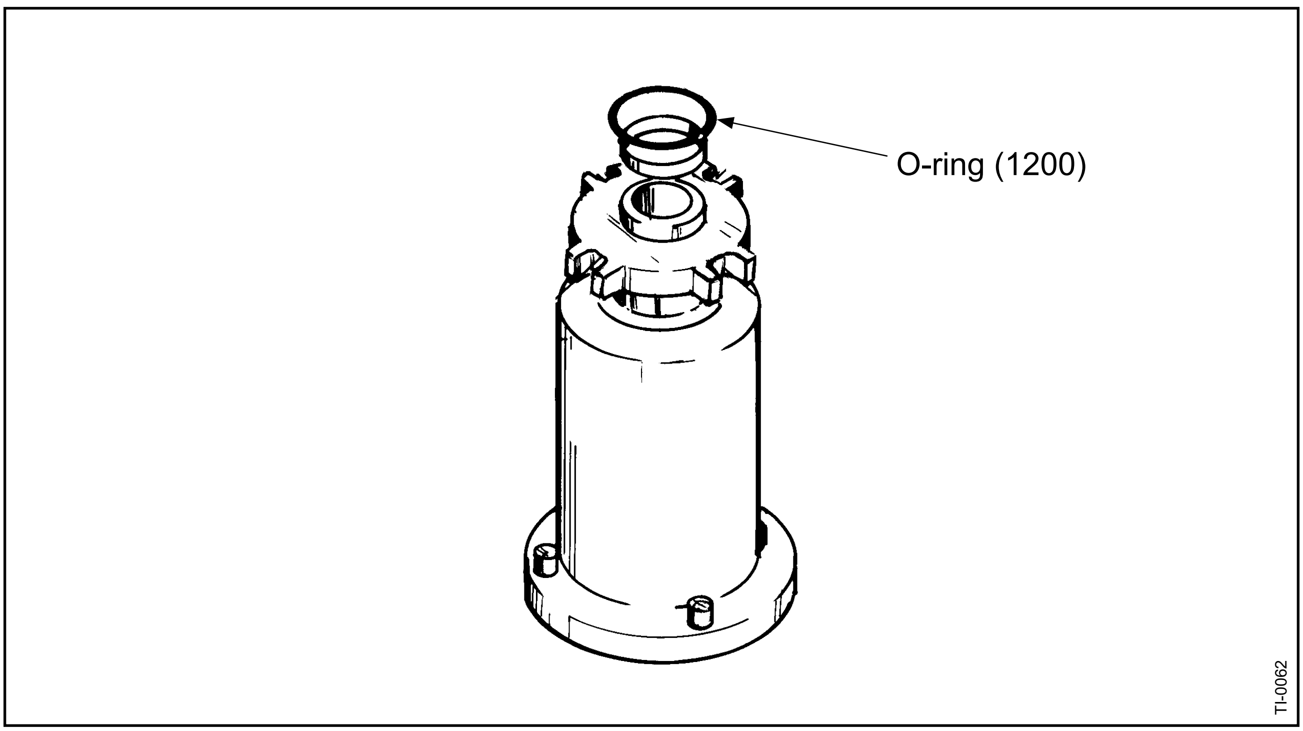
(2) For composite blades, refer to Hartzell Propeller Composite Blade Overhaul Manual 135F (61-13-35).

E. Blade Angle Information

(1) For specific blade angle information, refer to the Hartzell Propeller Application Guide Manual 159 (61-02-59).



Installing the Pitch Change Rod O-Ring in the Hub Half
Figure 7-1



Installing O-ring on the Rotatable Fixture
Figure 7-2

2. Hub Assembly Procedures

A. All Propeller Models

(1) Install components of the hub assembly/unit (470/500) in accordance with the Aluminum Hub Overhaul chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

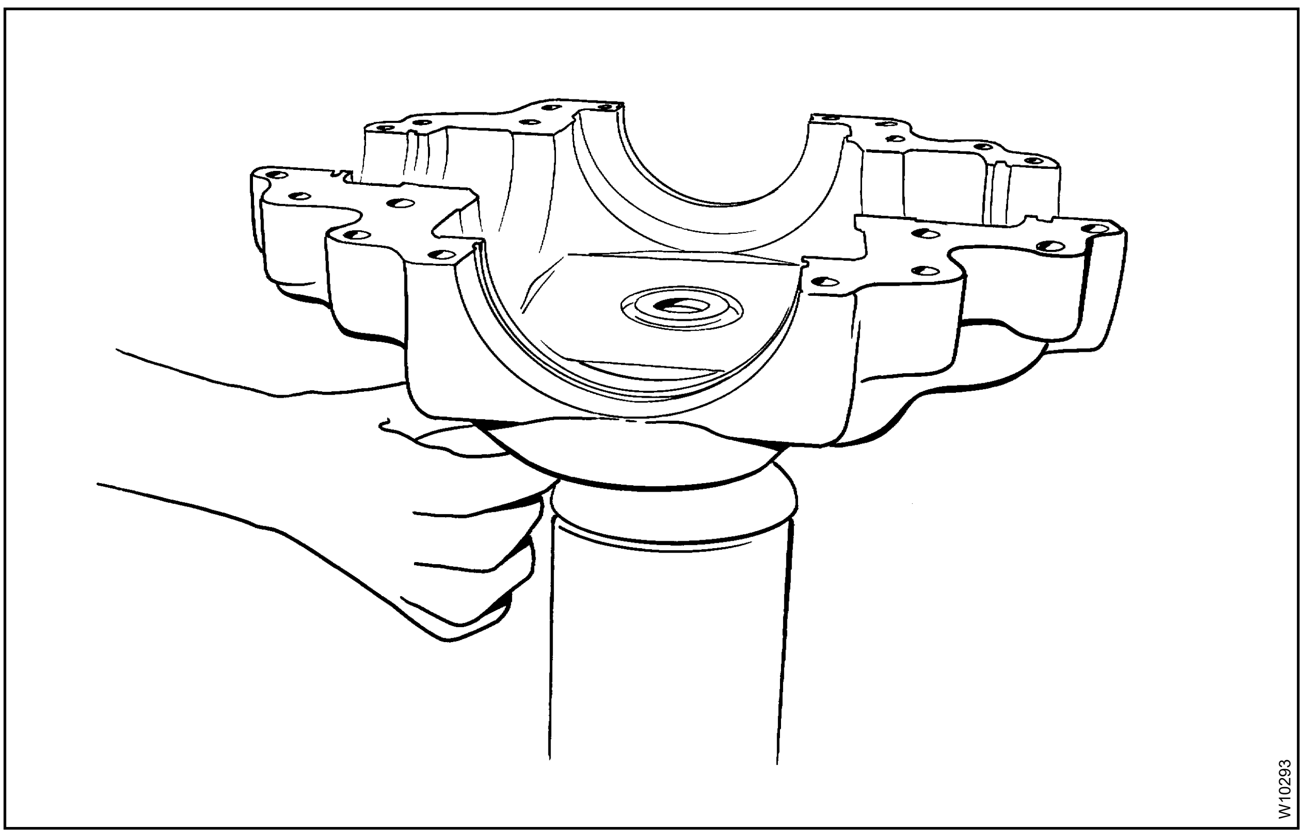
(a) The inspection criteria for hub assembly components is located in the Aluminum Hub Overhaul chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

(2) Install a new pitch change rod O-ring (510) in the cylinder-side half of the hub (500). Refer to Figure 7-1.

(3) Install a new pitch change rod O-ring (610) in the engine-side half of the hub (500). Refer to Figure 7-1.

(4) Install the flange O-ring (1200) on the rotatable fixture to seal between the hub (500) and rotatable fixture. Refer to Figure 7-2.

(5) Install and secure the engine-side half of the hub (500) on the rotatable fixture on the propeller assembly table TE129. Refer to Figure 7-3.



Installing the Engine-Side Hub Half on the Rotatable Fixture
Figure 7-3

3. Assembly of HC-(D,E)4(N,P,W)-5( ) Propeller Models

CAUTION 1: INSTRUCTIONS AND PROCEDURES IN THIS CHAPTER MAY INVOLVE PROPELLER CRITICAL PARTS. REFER TO THE INTRODUCTION CHAPTER OF THIS MANUAL FOR INFORMATION ABOUT PROPELLER CRITICAL PARTS. REFER TO THE ILLUSTRATED PARTS LIST IN THIS MANUAL FOR IDENTIFICATION OF PROPELLER CRITICAL PARTS.

CAUTION 2: ACTUATION OF PROPELLERS MUST BE ACCOMPLISHED USING COMPRESSED AIR THAT HAS BEEN FILTERED FOR MOISTURE, OR NITROGEN.

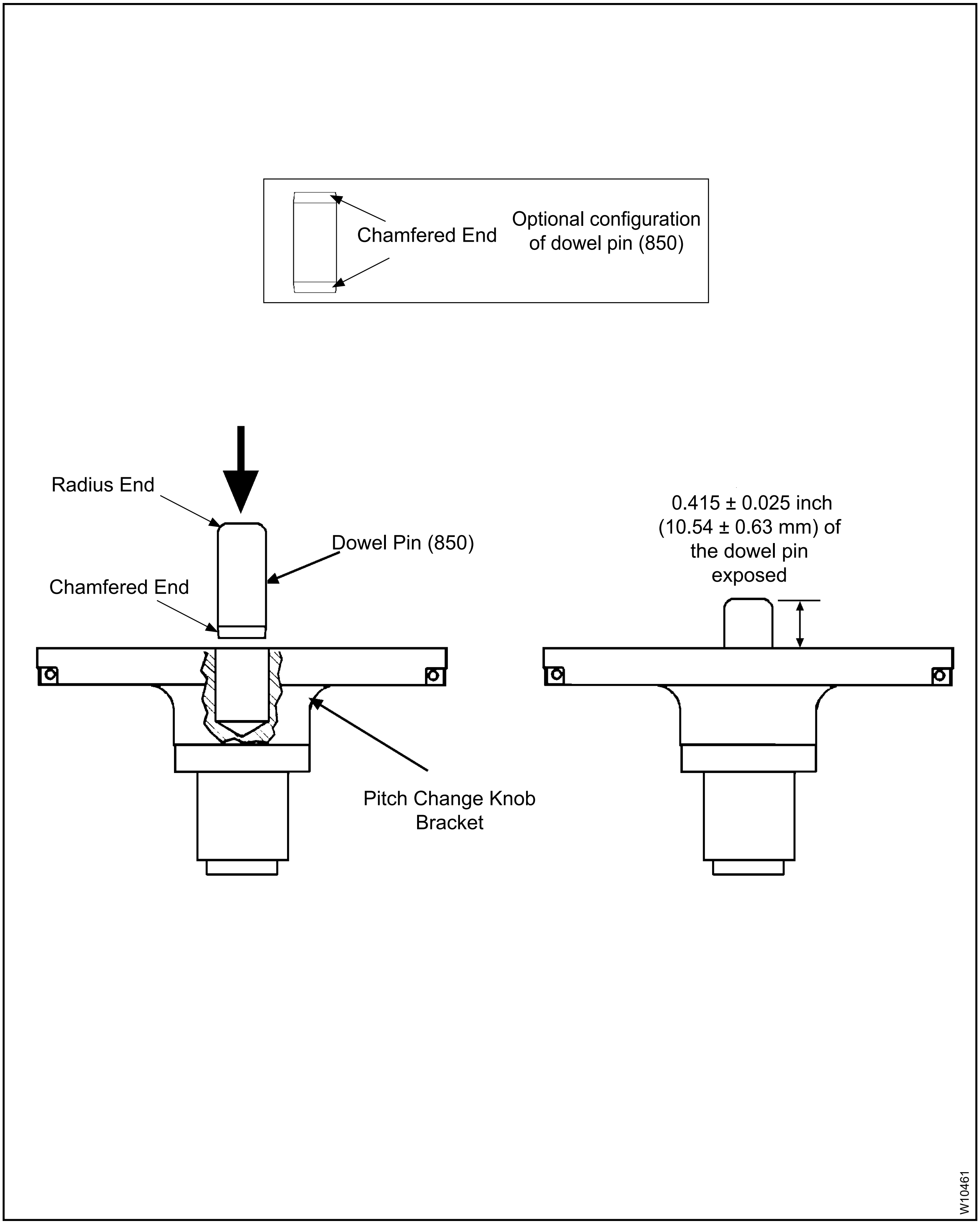
CAUTION 3: DO NOT USE A PRESSURE THAT IS GREATER THAN 200 PSI (13.78 BARS) WHEN ACTUATING PROPELLERS COVERED IN THIS MANUAL.

CAUTION 4: USE SUFFICIENT PRESSURE TO MAKE SURE THAT THE PROPELLER ACTUATES AGAINST EACH POSITIVE STOP.

A. Blade Assembly Procedures

(1) General

(a) The following procedure assumes that the blade has been inspected and repaired and that the blade bore plug, blade bore bearing, counterweight or counterweight clamp, and blade thrust bearings are installed in accordance with Hartzell Propeller Aluminum Blade Overhaul Manual 133C (61-13-33) or Hartzell Propeller Composite Blade Overhaul Manual 135F (61-13-35).



Installing the Dowel Pin into the Pitch Change Knob Bracket
Figure 7-4

(2) Installing the Dowel Pin

(a) If the dowel pin (850) has been removed, press the chamfered end of the dowel pin (850) into the pitch change knob bracket (830), leaving 0.415 ± 0.025 inch (10.54 ± 0.63 mm) of the dowel pin exposed. Refer to Figure 7-4.

(3) Lubricating the cam follower (840).

NOTE: The cam followers (840) are shipped from Hartzell Propeller LLC greased with approved lubricant.

(a) Lubricating of the cam follower (840) is not necessary if one of the following two criteria is met:

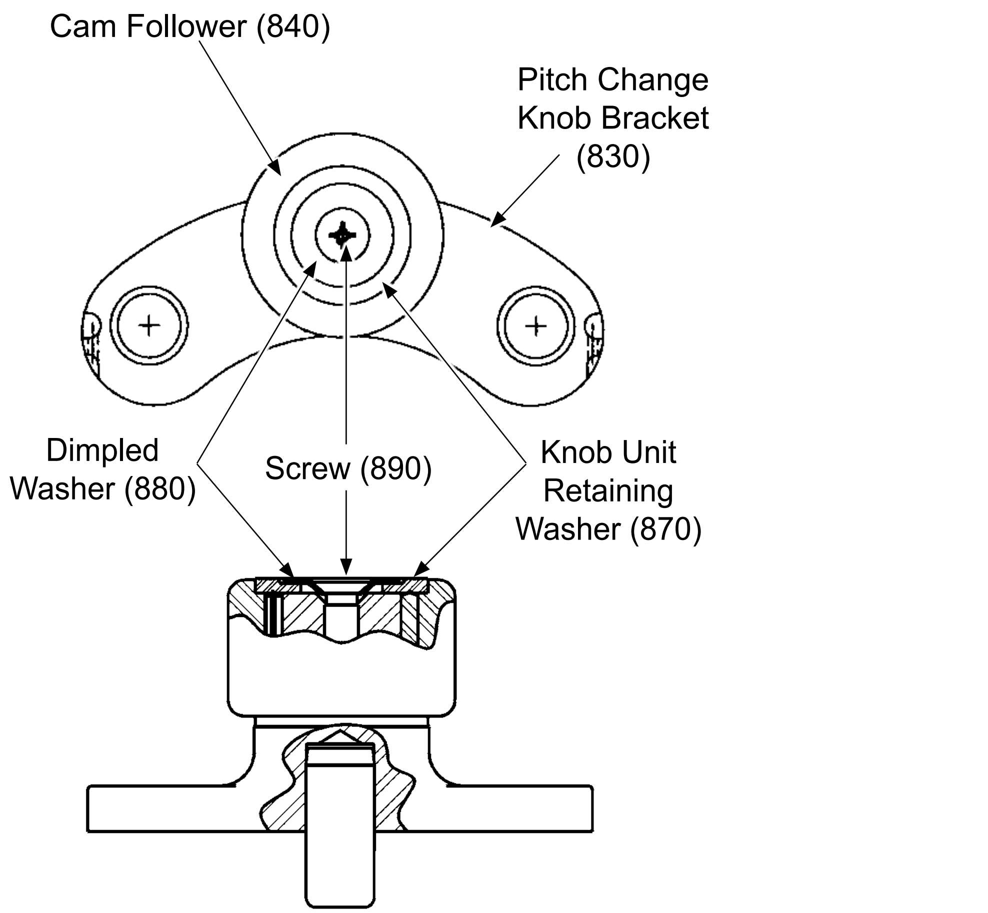
1 It has been less than two years from the date marked on the packaging by Hartzell Propeller LLC.

2 It has been less than 1 year from the date of receipt if there is no date marked on the packaging.

(b) If none of the above criteria are met, complete the following lubrication procedure:

1 Using solvent CM23, flush the grease from the cam follower (840).

2 Using lubricant CM12, lubricate the cam follower (840).



Assembly of the Pitch Change Knob Unit That Uses a Screw
Figure 7-5

(4) For a pitch change knob bracket (830) that uses a screw to retain the cam follower, install the cam follower (840) on the pitch change knob bracket (830), using the following steps. Refer to Figure 7-5.

(a) Using solvent CM106 or CM219, clean the threads of the screw (890) and the threads of the pitch change knob bracket (830).

(b) Permit the solvent CM106 or CM219 to dry.

(c) Apply threadlocker CM21 to the clean, dry threads in the top of the pitch change knob bracket (830).

(d) Put the cam follower (840) onto the pitch change knob bracket (830).

(e) With the counterbored side up, put the knob unit retaining washer (870) on the end of the pitch change knob bracket (830).

(f) With the raised side down, put the dimpled washer (880) on the knob unit retaining washer (870).

(g) Examine the knob unit retaining washer (870) and the dimpled washer (880) on the pitch change knob bracket (830) to make sure that the parts are seated correctly.

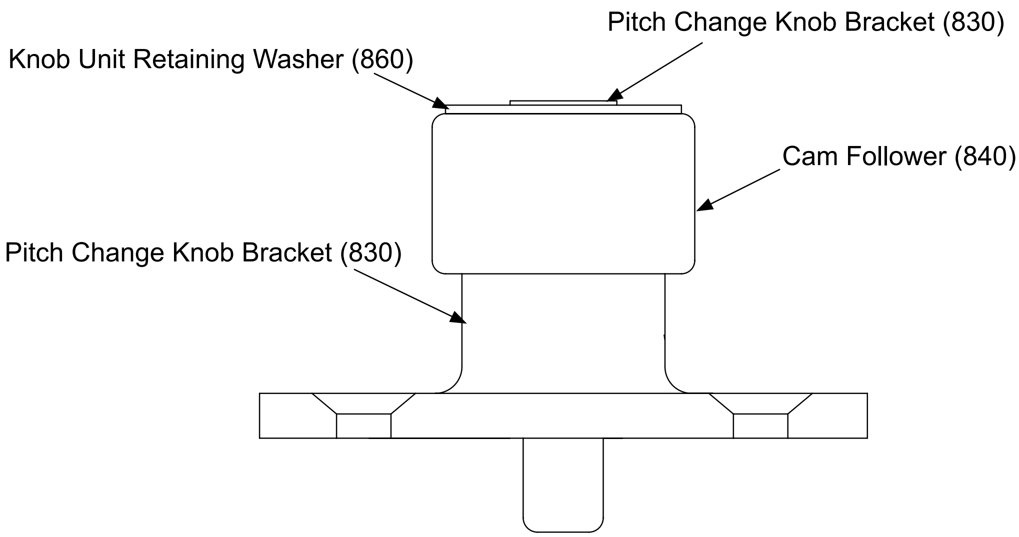
CAUTION: USE CARE TO PREVENT THREADLOCKER CM21 FROM GETTING BETWEEN THE KNOB UNIT RETAINING WASHER (870) AND THE CAM FOLLOWER (840). TOO MUCH THREADLOCKER CM21 CAN INTERFERE WITH THE PERFORMANCE OF THE CAM FOLLOWER (840).

(h) Apply a small amount of threadlocker CM21 to the clean, dry threads of the screw (890).

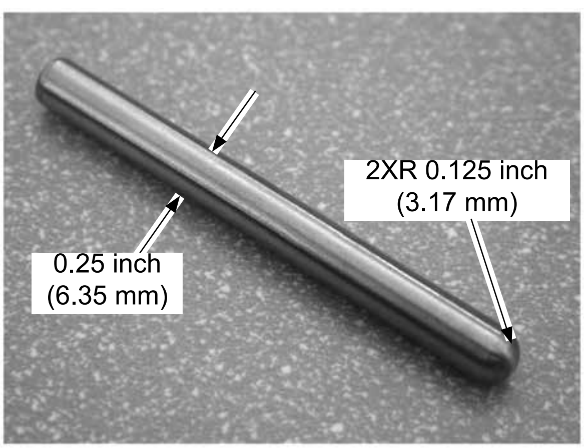
(i) Using the screw (890), attach the knob unit retaining washer (870) and the dimpled washer (880) to the pitch change knob bracket (830).

(j) Torque the screw (890) in accordance with the Torque Values Table 8-1 in the Fits and Clearances chapter of this manual.

(k) Repeat steps (4)(a) through (4)(j) in this section for each of the remaining pitch change knob brackets (830).



Assembly of the Pitch Change Knob Unit That Uses a Swaged Washer
Figure 7-6



Locally Fabricated Swage Tool

Description:
Dowel Pin with a spherical radius tip. Refer to the illustration in this figure.

Material:
A2 tool steel
hardened to 55-62 HRC
(recommended)

TPI-TI-00100

Swage Tool
Figure 7-7

(5) For a pitch change knob bracket that uses a swaged washer to retain the cam follower, install the cam follower (840) on the pitch change knob bracket (830) using the following steps.

(a) Slide the cam follower (840) onto the pitch change knob bracket (830). Refer to Figure 7-5.

CAUTION: PRESS THE KNOB UNIT RETAINING WASHER, COUNTERSUNK SIDE DOWN, EVENLY AGAINST THE SHOULDER OF THE PITCH CHANGE KNOB BRACKET. THE KNOB UNIT RETAINING WASHER MUST BE COMPLETELY SEATED ON THE PITCH CHANGE KNOB BRACKET.

(b) Press the washer (860), bevel down, onto the top of the pitch change knob bracket (830). Refer to Figure 7-5.

1 The knob unit retaining washer (860) is completely seated on the pitch change knob bracket (830) when the pitch change knob bracket extends slightly through the top of the knob unit retaining washer. Refer to Figure 7-6.

(c) Swage the end of the pitch change knob bracket (830).

CAUTION: DIMPLES CAUSED BY SWAGING MUST NOT CONTACT PREVIOUS DIMPLES. THERE MUST BE AN UNSWAGED AREA BETWEEN THE CENTER OF PREVIOUS SWAGE HITS.

1 Using a locally fabricated swage tool, apply sufficient force to swage the end of the pitch change knob bracket (830) in two places 180 degrees apart to force a small amount of material over the edge of the knob unit retaining washer (860). Refer to Figure 7-7 and Figure 7-8.

(d) After assembly of the parts, perform the following pull test:

1 Hold the pitch change knob bracket (830) firmly in one hand.

2 Grip the cam follower (840) firmly in the other hand.

3 Firmly pull on the cam follower (840) to test the integrity of the interference fit between the knob unit retaining washer and the swaging to the pitch change knob bracket (830).

4 If the knob unit retaining washer (860) remains firmly in position on the pitch change knob bracket (830), perform the turn test in step (5)(e) in this section.

5 If the knob unit retaining washer (860) does not remain firmly in position on the pitch change knob bracket (830), perform the following:

a Discard the knob unit retaining washer (860).

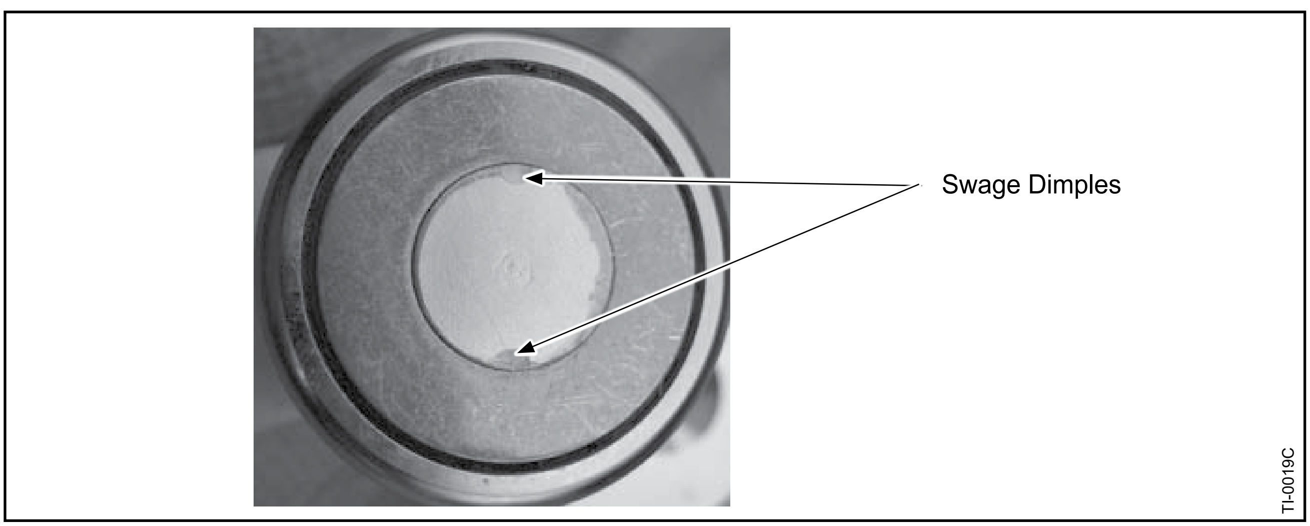
b Reassemble a pitch change knob bracket (830), a cam follower (840), and a new knob unit retaining washer (860), using new or overhauled parts as necessary, in accordance with the applicable steps in this manual.

c Swage the pitch change knob bracket in accordance with step (5)(c) in this section.

d Repeat the pull test in accordance with step (5)(d) in this section.

e If the knob unit retaining washer (860) does not remain firmly in position on the pitch change knob bracket (830), measure the diameter of the knob unit retaining surface of the pitch change knob bracket. If the OD is less than the serviceable limits as specified in the Check chapter of this manual, discard the pitch change knob bracket.

f Report to Hartzell Propeller Product Support each occurrence of a pitch change knob bracket (830) that is less than the serviceable limits specified.



Swaged Pitch Change Knob Bracket
Figure 7-8

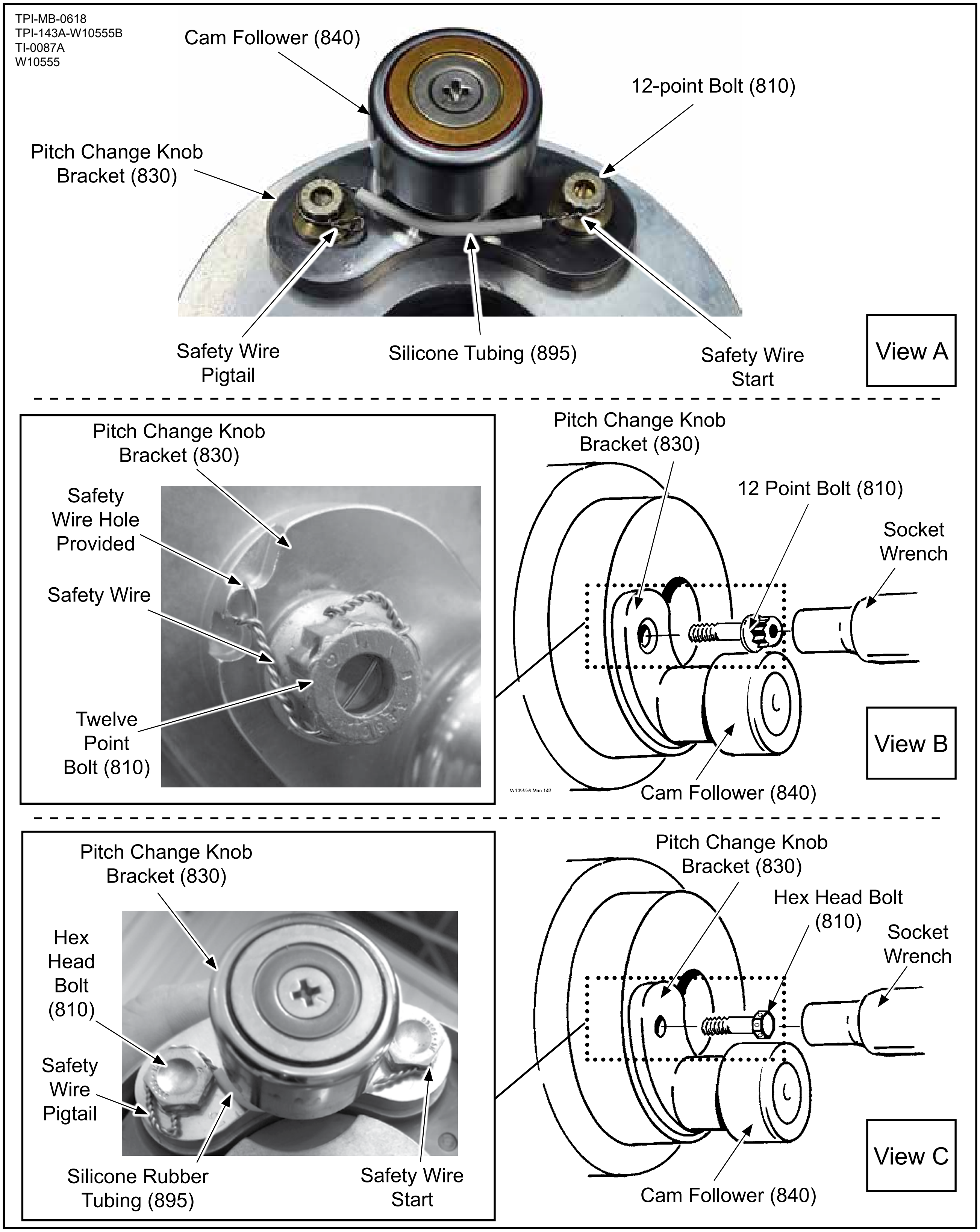
(e) After assembly of the parts, perform the following turn test:

1 Grip and turn the cam follower (840) on the pitch change bracket (830).

a If the cam follower (840) turns freely on the pitch change bracket (830), continue the propeller assembly process.

b If the cam follower (840) does not turn freely on the pitch change bracket (830), replace the cam follower in accordance with steps (5)(d)1 through (5)(d)5e in this section. Repeat the pull test and the turn test until the results are satisfactory.

(f) Repeat steps (5)(a) through (5)(e)b in this section for each of the remaining pitch change knob brackets (830).



Attaching the Pitch Change Knob Bracket
Figure 7-9

(6) Installation of the Pitch Change Knob Unit (820) - Refer to Figure 7-9

(a) Make sure that the butt of the blade and the pitch change knob unit (820) surfaces are clean and free of oil, dirt, and other foreign materials.

(b) Put the pitch change knob unit (820) on the butt of the blade.

(c) Line up the holes in the pitch change knob unit (820) with the threaded holes in the butt of the blade.

(d) Using a mallet, tap the pitch change knob bracket (830) until it is firmly against the butt of the blade.

1 Use the alternate pitch change knob unit (820) choices as necessary to bring the floating pitch angle of all four blades within the specified tolerance of ± 0.1 degree. Refer to the pitch change knob unit selection data in Table 7-1.

(e) For propeller models that use 1/4-28 12 point bolts (810) to attach the pitch change knob unit (820) to the butt of the blade:

1 Refer to Figure 7-9, View A.

2 Install the 1/4-28 12 point bolts (810).

3 Torque each bolt (810) in accordance with Table 8-1 in the Fits and Clearances chapter of this manual.

4 Using rubber silicone tubing (895) if applicable, safety wire the bolts (810) in accordance with NASM33540.

(f) For propeller models that use 5/16-24 12 point bolts (810) to attach the pitch change knob unit (820) to the butt of the blade:

1 Refer to Figure 7-9, View B.

2 Install the 5/16-24 12 point bolts (810).

3 Torque each bolt (810) in accordance with Table 8-1 in the Fits and Clearances chapter of this manual.

4 Safety wire the bolts (810) to the hole in the pitch change knob bracket (830) in accordance with NASM33540.

(g) For propeller models that use 5/16-24 hex head bolts (810) to attach the pitch change knob unit (820) to the butt of the blade:

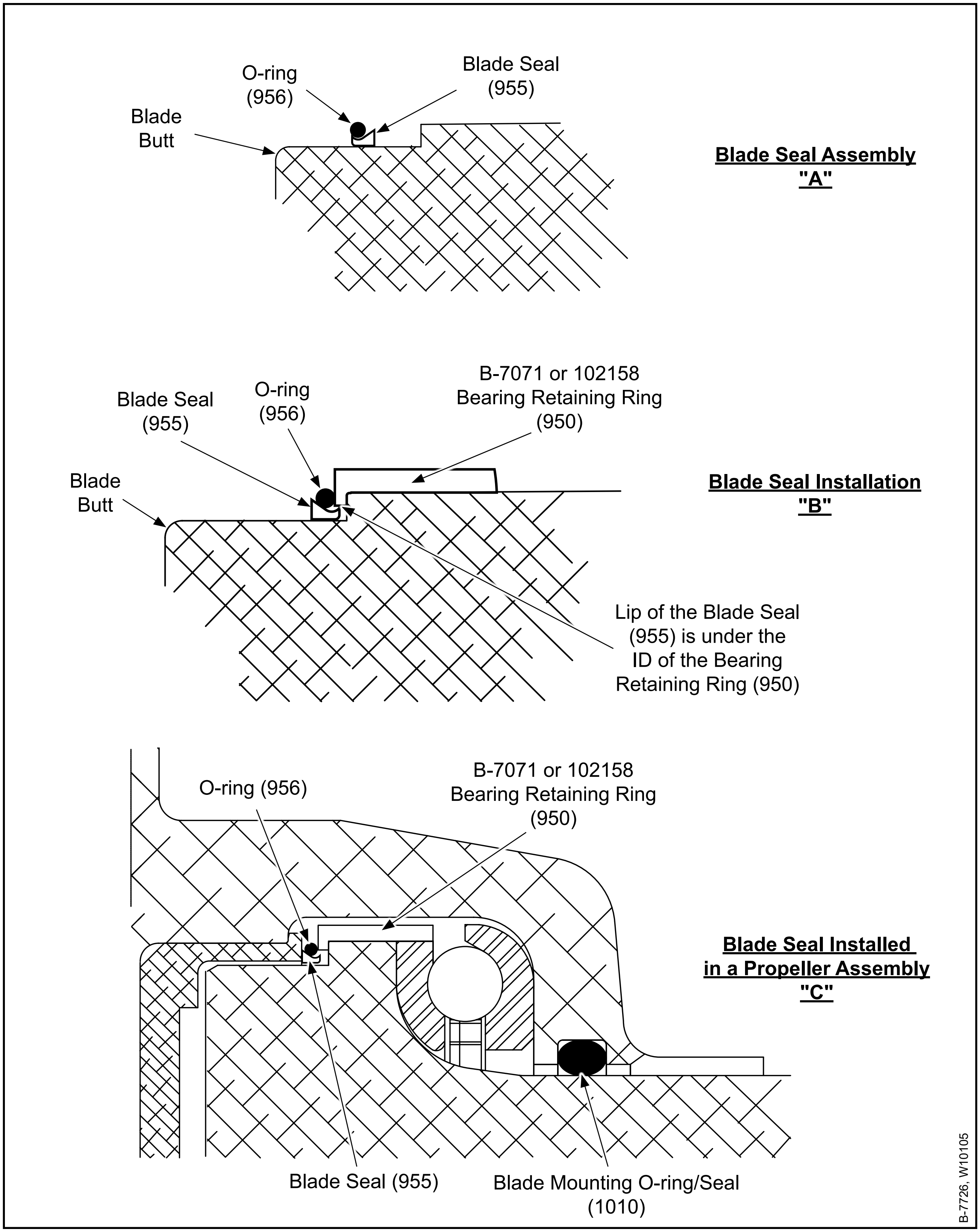
1 Refer to Figure 7-9, View C.

2 Install the 5/16-24 hex head bolts (810).

3 Torque each bolt (810) in accordance with Table 8-1 in the Fits and Clearances chapter of this manual.

4 Using rubber silicone tubing (895) if applicable, safety wire the bolts (810) to each other in accordance with NASM33540.

(h) Repeat the applicable steps (6)(a) through (6)(g) for the remaining blades.



Blade Seal Installation
Figure 7-10

(7) For N-shank composite blades only:

(a) Install the O-ring (1012) on the OD of the blade plug (1013) in the groove provided for it.

(b) With the dimple in the blade plug (1013) facing toward the butt of the blade, install the blade plug in the bore of the blade.

(8) For blades that use an end needle bearing (1016):

(a) With the dimple in the blade plug (1013) facing toward the butt of the blade, install the blade plug in the bore of the blade.

(b) Put the closed end needle bearing (1016) on the blade plug (1013).

(9) Blade Seal Assembly Installation

CAUTION: THE B-7071 OR THE 102158 BEARING RETAINING RING MUST BE INSTALLED WHEN USING THIS BLADE SEALING METHOD.

(a) Assemble the blade seal (955) and O-ring (956). Refer to Figure 7-10, "A".

CAUTION: DO NOT OVER STRETCH OR TWIST THE BLADE SEAL DURING INSTALLATION.

1 Install the blade seal (955) on the butt of the blade with the recessed area of the blade seal facing away from the bearing retaining ring (950). If the blade seal (955) stretches, replace the blade seal (955).

NOTE: Initially installing the blade seal with the recessed area facing away from the bearing retaining ring will make it easier to install the O-ring onto the blade seal. An optional method may be to pre-assemble the blade seal assembly on an unserviceable blade butt, or equivalent fixture.

2 Install the O-ring (956) into the recessed area of the blade seal (955).

3 If the O-ring does not remain in place, replace the blade seal.

4 Remove the blade seal assembly from the butt of the blade.

CAUTION 1: DO NOT DEFORM THE BLADE SEAL ASSEMBLY WHEN INSTALLING THE BLADE SEAL AND O-RING ASSEMBLY ONTO THE BLADE.

CAUTION 2: THE CORRECT INSTALLATION OF THE BLADE SEAL ASSEMBLY IS CRITICAL TO THE SEAL FUNCTION AND BLADE ROTATION.

(b) Reinstall the blade seal assembly onto the butt of the blade with the recessed area facing the bearing retaining ring (950). Refer to Figure 7-10, "B".

1 The seal assembly must slide easily into position on the blade butt.

(10) Install the blade O-ring (1010). Refer to Figure 7-10, "C".

(a) Using lubricant CM12, lubricate the blade O-ring (1010).

(b) Install the blade O-ring (1010) over the base of the blade shank.

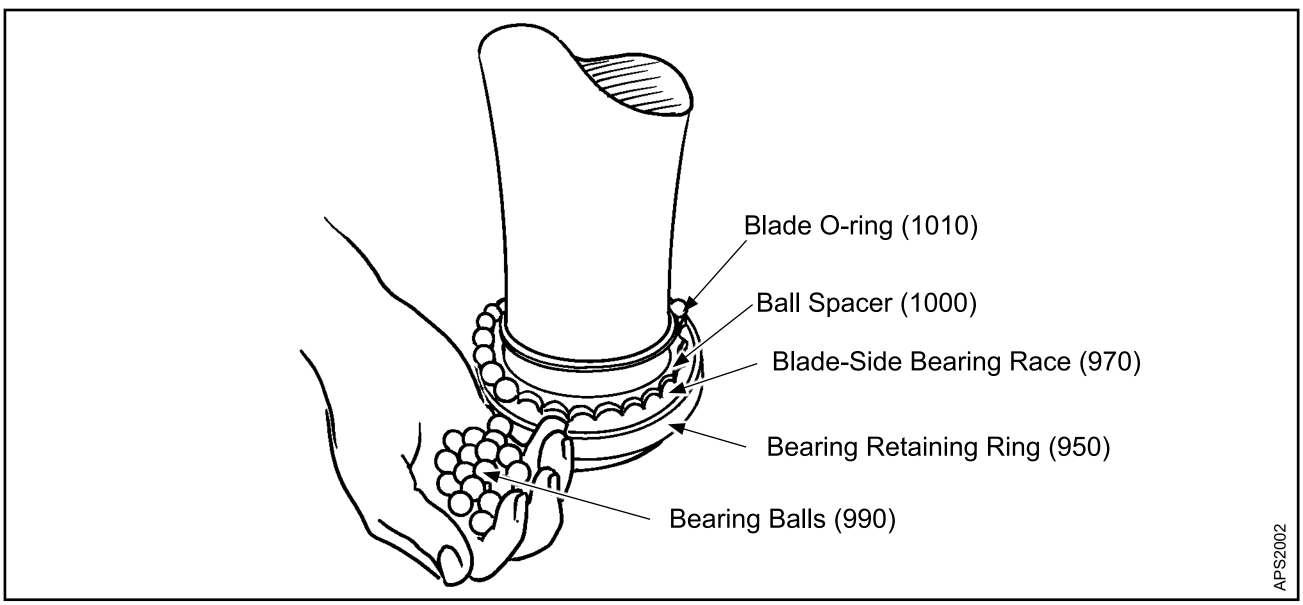
(11) Installation of the Hub-Side Bearing Race and Bearing Balls - Refer to Figure 7-11.

(a) Using lubricant CM12, lubricate the blade-side bearing race (970).

(b) Put the ball spacer (1000) on the blade-side bearing race (970).

CAUTION: ALL BEARING BALLS (990) INSTALLED IN A SINGLE BEARING MUST BE OF THE SAME GAUGE. BEARING BALLS SUPPLIED BY HARTZELL PROPELLER LLC ARE OF THE SAME GAUGE.

(c) Put the bearing balls (990) in the openings of the ball spacer (1000) on the blade-side bearing race (970).



Installing the Blade Bearing Balls
Figure 7-11

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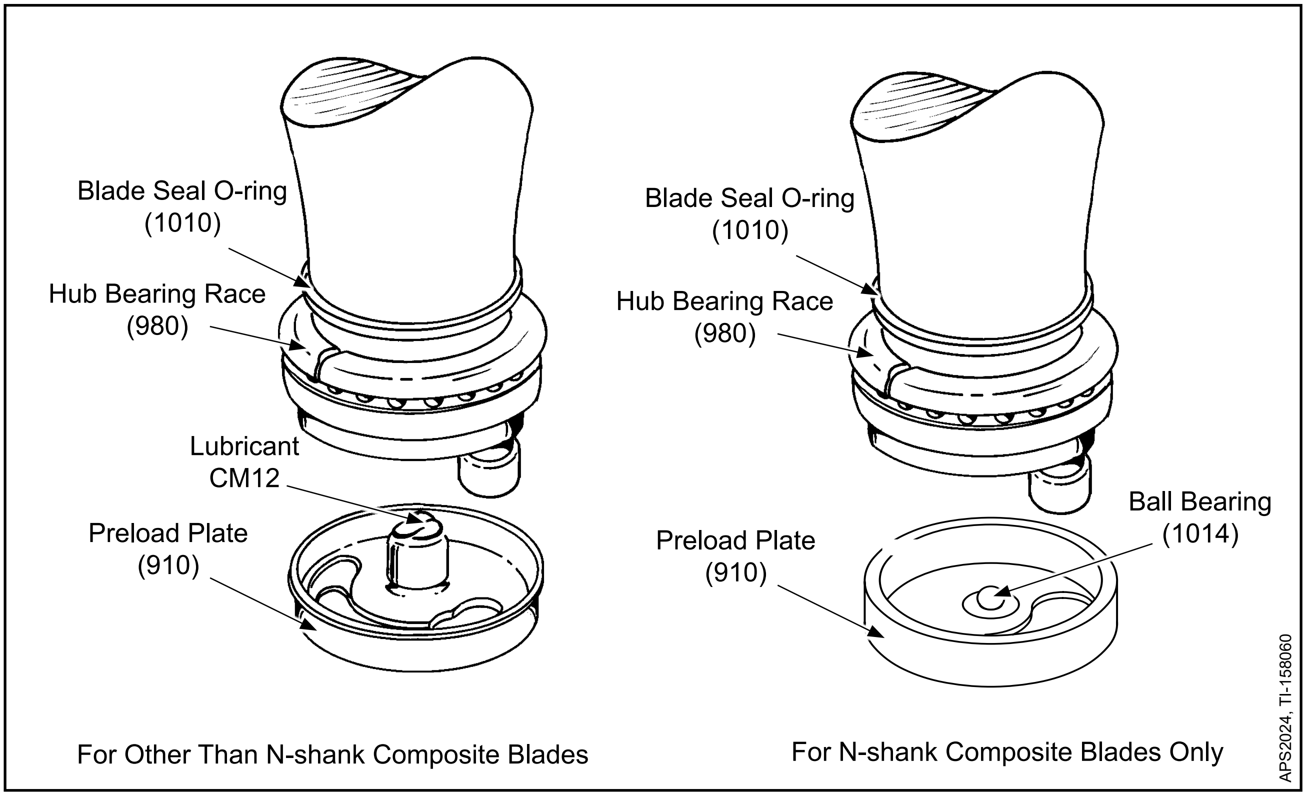
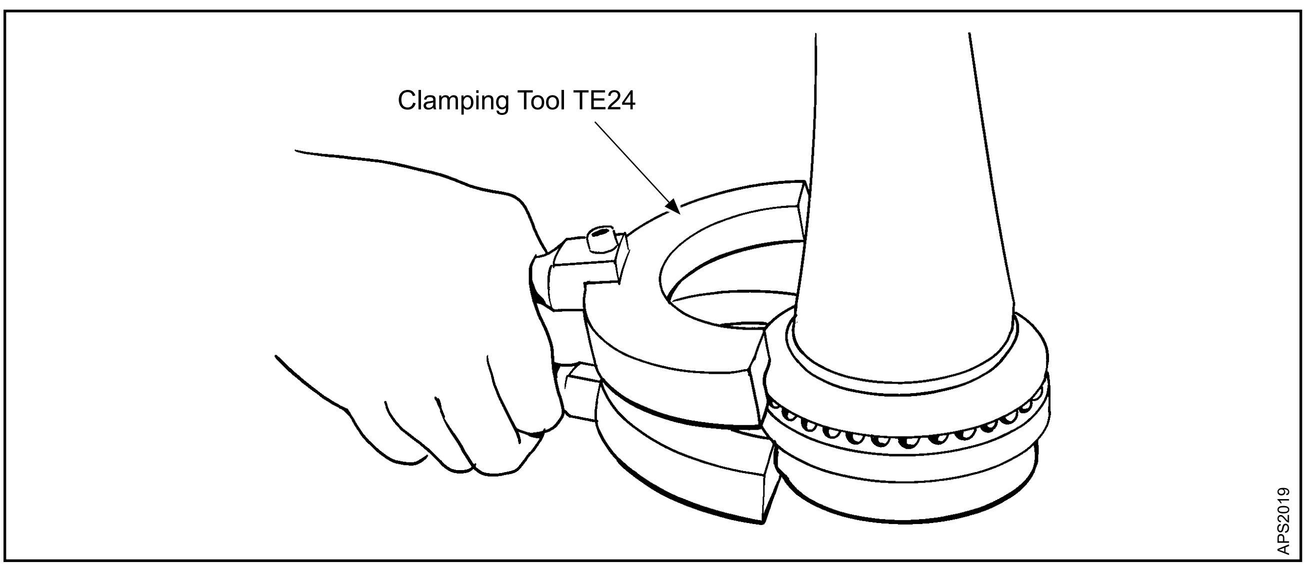


Installing the Preload Plate on the Blade Shank
Figure 7-12



Applying the Clamping Tool TE24 to the Blade Assembly
Figure 7-13

CAUTION: THE BEARING RACE HALVES MUST HAVE MATCHING SERIAL NUMBERS.

(d) Place the hub-side bearing race (980) on the bearing balls (990) Refer to Figure 7-12.

1 Install the hub-side bearing race (980) with the parting line perpendicular to the hub parting line when installed in the hub (500). Refer to Figure 7-14.

B. Preload Plate Assembly

(1) Install the set screw (930) in the preload plate (910) so the end of the set screw protruding toward the blade butt is flush with the preload plate.

NOTE: The set screw (930) will be repositioned later to set the blade preload.

(2) Install the nut (940) on the set screw (930) and position the nut a short distance from the preload plate.

NOTE: Thread locking compound will be applied to the set screw (930) between the nut (940) and the preload plate (910) later in the build process.

(3) For a propeller that does not use an N-shank composite blade:

(a) Put approximately one tablespoon of lubricant CM12 on top of the inner bearing ring of the preload plate (910) to lubricate the blade bore bearing. Refer to Figure 7-12.

NOTE: Using this amount of lubricant will force lubrication into the blade bore bearing when the preload plate is installed on the blade.

(4) For a propeller that uses an N-shank composite blade:

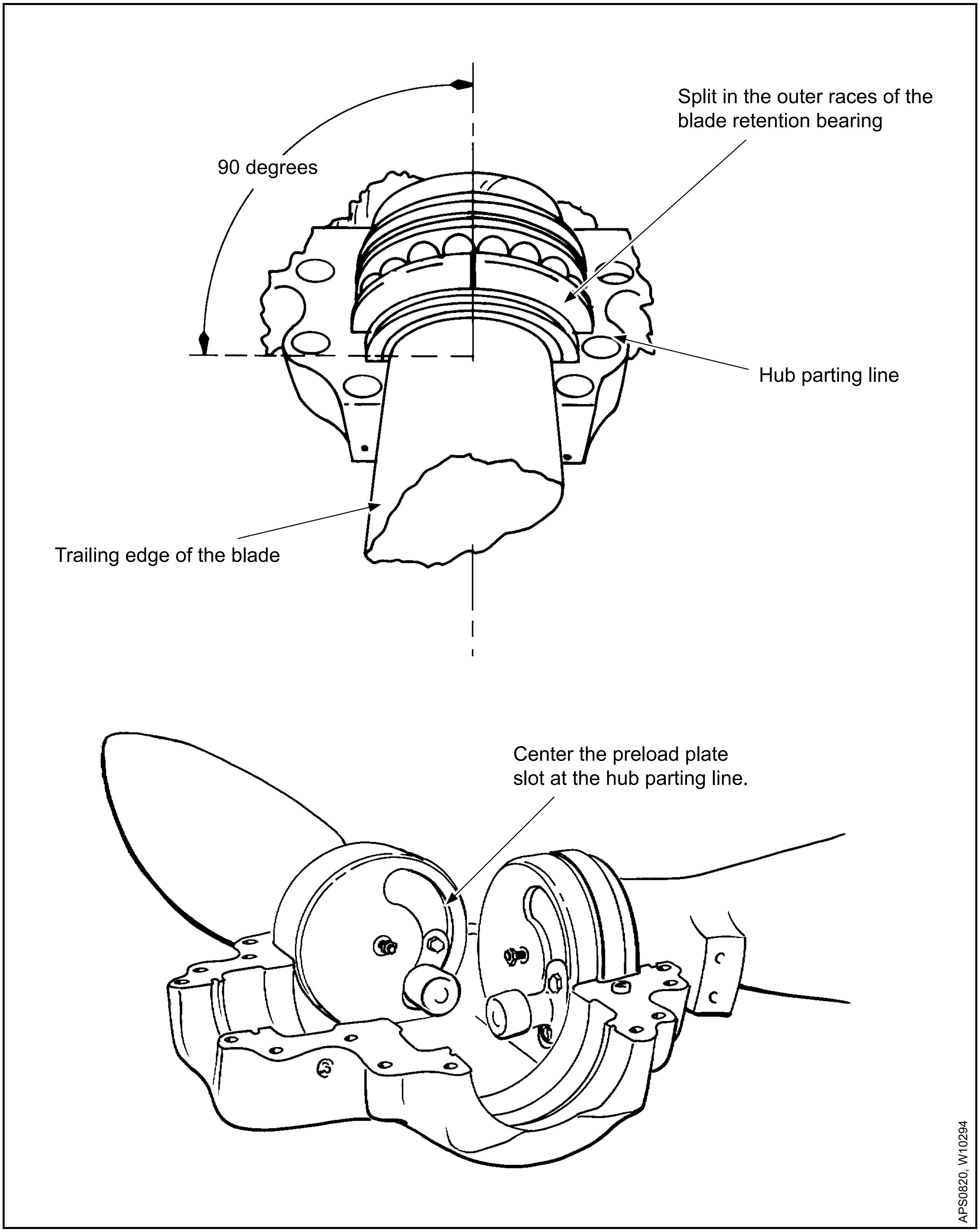
(a) On the inside of the preload plate (910), put the ball bearing (1014) on the threads for the set screw (930). Refer to Figure 7-12.

CAUTION: THE SPLIT-BEARING RACE PARTING LINE MUST BE PERPENDICULAR TO THE HUB PARTING LINE WHEN INSTALLED IN THE HUB (500). REFER TO FIGURE 7-14.

(5) Install the preload plate (910) on the butt of the blade. Refer to Figure 7-12.

NOTE: If desired, to ease installation of the blade into the hub (500), hold the split bearing and preload plate assembly to the blade butt with the clamping tool TE24. Refer to Figure 7-13.

(6) Repeat the blade and preload plate assembly procedures for the remaining blades.



Installing a Blade in the Hub Socket
Figure 7-14

C. Blade Installation

(1) Apply a thin layer of lubricant CM12 to the hub blade retention radii of the hub (500) and the O-ring grooves of the hub (500).

CAUTION: BLADES MUST BE PRELOADED WHILE RESTING IN THE SOCKET OF THE HUB (500) THAT THEY WILL OCCUPY WHEN ASSEMBLED. DO NOT PRELOAD ALL THE BLADES IN THE SAME SOCKET.

(2) Install blade number one and blade number two assemblies into the sockets of the engine-side half of the hub (500). Refer to Figure 7-14.

(3) Center the slot of the preload plate (910) at the hub parting line. Refer to Figure 7-14.

(a) Position the blade knob slot in the preload plate to permit the blade to travel within the full blade angle range without restriction.

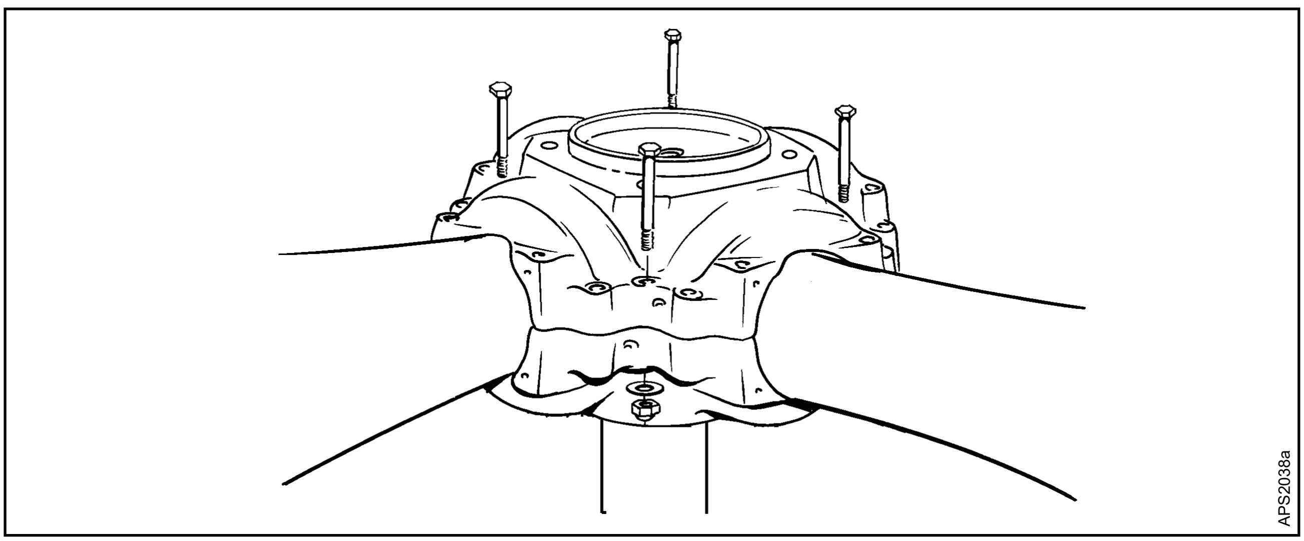
CAUTION: IMPROPER PRELOAD CAN CAUSE THE BLADES TO BE LOOSE IN THE HUB (500) OR MAY EXERT EXCESSIVE PRESSURE THAT CAN INTERFERE WITH PITCH CHANGE MOVEMENT.

(4) Setting the blade preload.

(a) Install the cylinder-side half of the hub (500). Refer to Figure 7-15.

(b) Bolt the halves of the hub (500) together using four hex head bolts (620), four washers (640), and four self-locking nuts (650) located midway between the blades. Refer to Figure 7-15.

(c) Torque the self-locking nuts (650) in accordance with Table 8-1 in the Fits and Clearances chapter of this manual.



Installing the Cylinder-Side Hub Half to Set Preload
Figure 7-15

(d) On blade number one, tighten the preload set screw (930) through the open end of the hub (500). Refer to Figure 7-16.

1 The loose blade will become rigid in the hub (500) as the set screw is tightened.

(e) Tighten the preload set screw (930) until the tip of the blade stops moving vertically.

(f) Gently push on the tip of the blade to make sure the blade is properly seated in the retention socket.

(g) Loosen the preload set screw (930) and retighten.

1 When the blade tip stops moving, turn the preload set screw (930) approximately 1/4 to 1/2 additional turn into the preload plate (910).

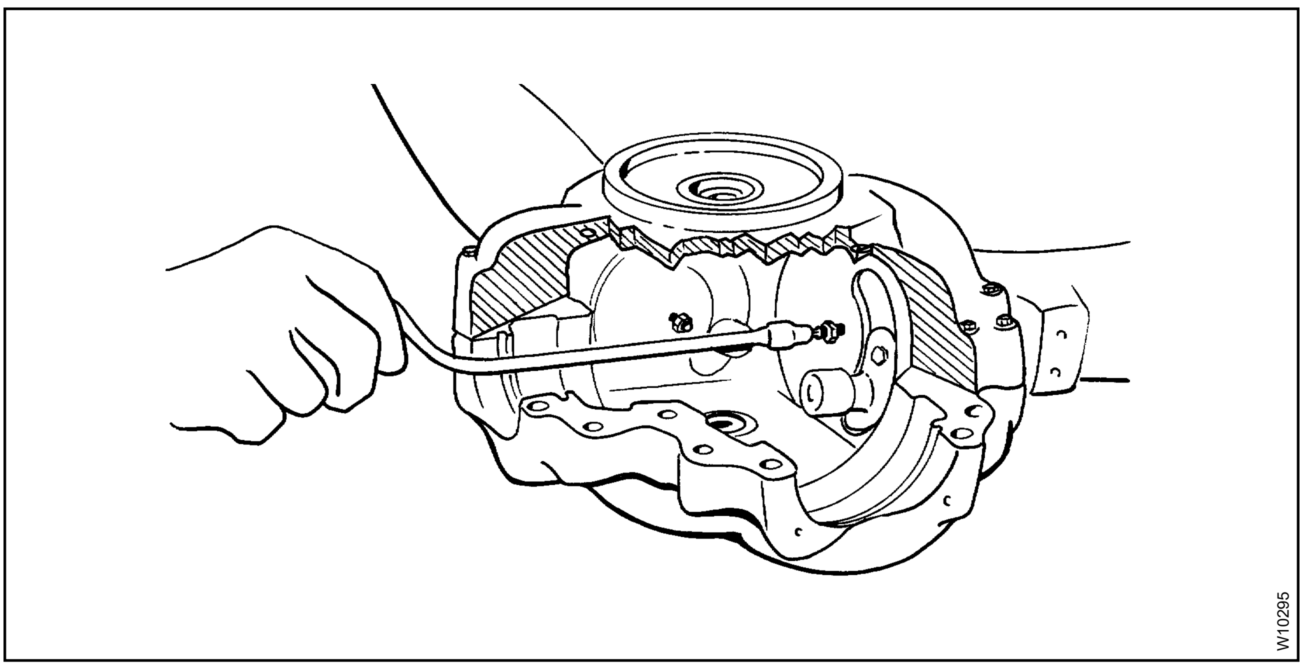
(h) Check the blade for free rotation. If the blade does not rotate freely, examine the following:

1 Blade O-ring (1010) for proper fit in the hub groove.

2 The needle rollers in the blade bore bearing may be skewed. The needle rollers should be parallel to the axis of blade pitch change.

3 Blade preload may be too tight.

(i) Repeat the preload setting procedure on blade number two.



Tightening Preload Plate Set Screw and Thin Hex Nut
Figure 7-16

(j) Remove the four bolts (620), four washers (640), and four nuts (650).

(k) Remove the cylinder-side half of the hub (500).

(l) Apply one drop of thread locking compound CM21 on the threads of the preload set screws (930) between the thin hex nut (940) and the preload plate (910).

CAUTION: MAKE SURE TO PREVENT THE SET SCREW (930) FROM ROTATING WHEN TORQUING THE THIN HEX NUT (940).

(m) Torque each thin hex nut (940) against the preload plate (910) in accordance with Table 8-1 in the Fits and Clearances chapter of this manual.

(6) Using clamping tool TE24, if desired, remove blades one and two from the hub (500).

CAUTION: THE PARTING LINE OF THE SPLIT BEARING RACE CONTACTING THE HUB (500) MUST BE PERPENDICULAR TO THE HUB PARTING SURFACE WHEN INSTALLED IN THE HUB (500).

(7) Install the remaining blades in the hub (500) and set the blade preload.

(a) Set the preload for the remaining blades by following the same blade installation and preload setting procedures as prescribed for blades one and two.

(8) Reinstalling blades one and two.

CAUTION: THE PARTING LINE OF THE SPLIT BEARING RACE CONTACTING THE HUB (500) MUST BE PERPENDICULAR TO THE HUB PARTING SURFACE WHEN INSTALLED IN THE HUB (500).

(a) Using clamping tool TE24, if desired, install blade two into the engine-side half of the hub (500).

(b) Center the slot of the preload plate (910) at the hub parting line. Refer to Figure 7-14.

(c) Position the pitch change knob unit in the preload plate to permit the blade to travel the full blade angle range without restriction.

(d) Move the blades into full reverse position.

(e) Apply thread lock CM74 to the threads of each bumper extension (720).

(f) Install each bumper extension (720) onto the pitch change fork (710).

(g) Torque each bumper extension (720) in accordance with Table 8-1 in the Fits and Clearances chapter of this manual.

(h) Install a fork bumper (730) on each bumper extension (720).

1 Using a plastic mallet, tap the fork bumper (730) into the hole in the bumper extension (720).

NOTE: The fork bumper (730) nipple is an interference fit with the hole in the bumper extension (720).

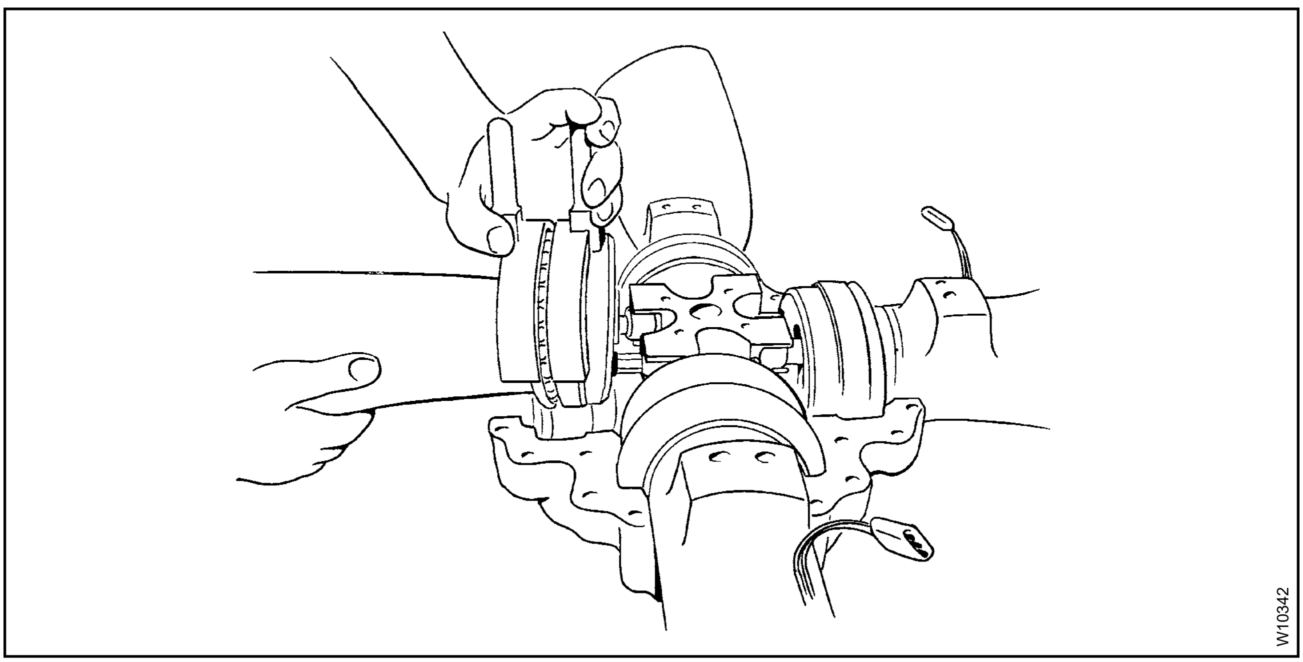
(i) Apply anti-seize compound CM118 to the threads in the fork (710).

CAUTION: MAKE SURE THAT THE TAPER IN THE CENTER THREADED HOLE OF THE FORK (710) IS FACING TOWARD THE CYLINDER HALF OF THE HUB (500) TO CORRECTLY FIT ONTO THE PITCH CHANGE ROD (420) THAT WILL BE INSTALLED LATER.

(j) Install the fork (710) by positioning the fork slots around the pitch change knobs of the blades.

(k) Reinstall blade number one. Refer to Figure 7-17.

1 Insert the pitch change knob in the fork (710) slot, then lower the blade and blade retention bearing into the hub (500).



Reinstalling Blade Number One in the Hub
Figure 7-17

(l) Position the center of the slot in each preload plate (910) on the plane of the parting line of the hub (500).

<u>1</u> Position the blade knob slot in the preload plate to permit the blade to travel within the full blade angle range without restriction.

(m) Use the guide hub bushing (580) to line up the halves of the hub (500), and fit the cylinder half of the hub unit onto the engine half of the hub unit.

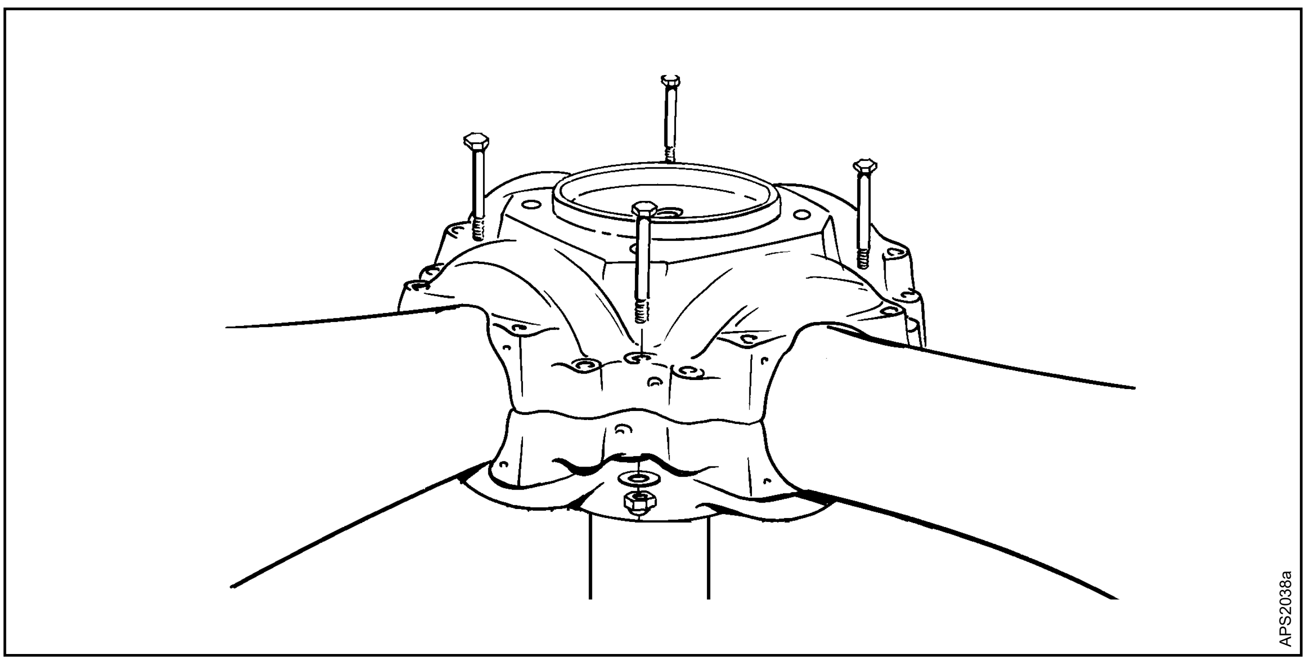
<u>CAUTION</u>: CHECK THE BLADE O-RING FOR BINDING OR PINCHING WHEN THE CYLINDER-SIDE HALF OF THE HUB (500) IS INSTALLED.

(n) Install the cylinder-side half of the hub (500).

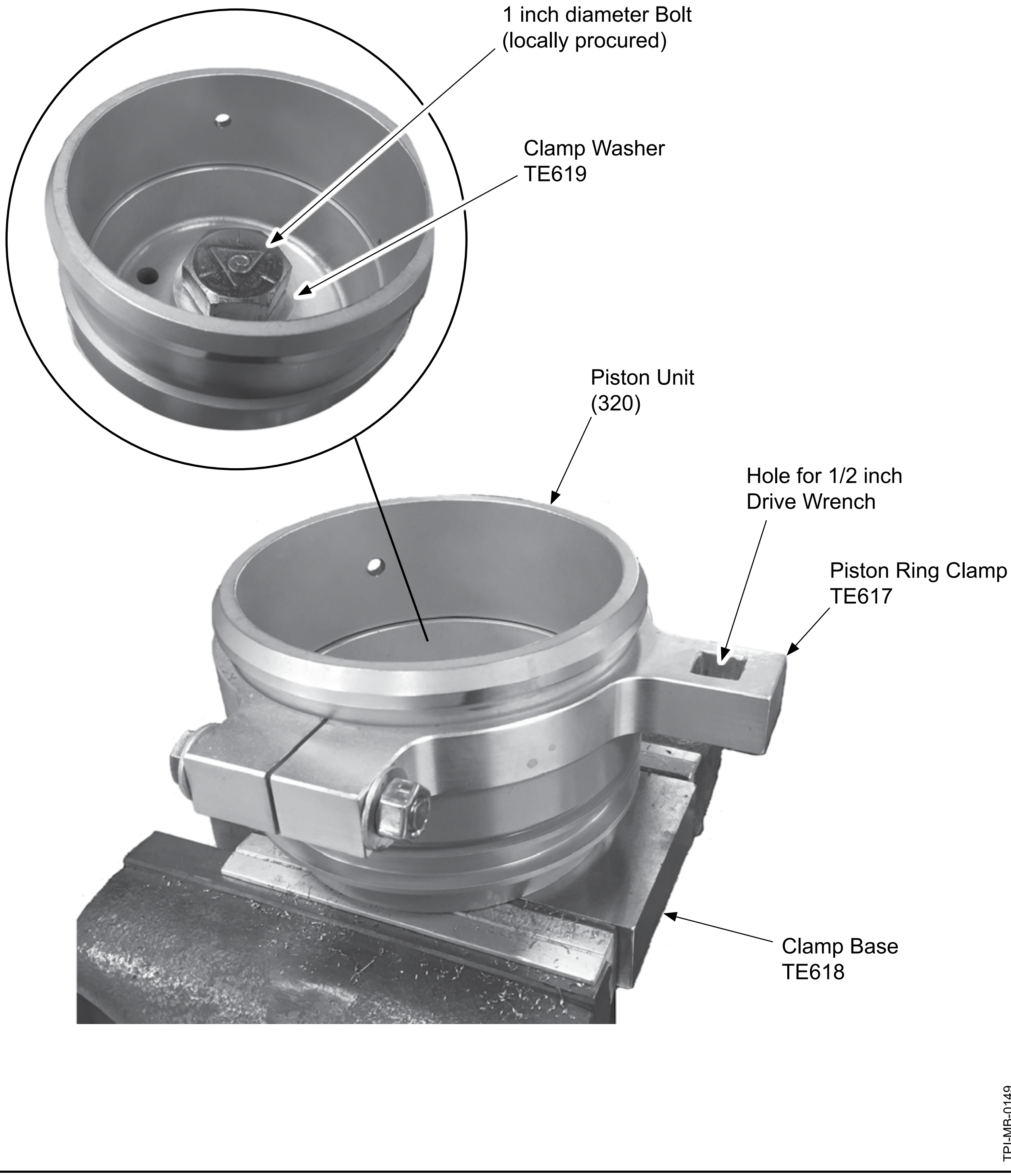
<u>1</u> Position the half of the hub (500), using a rubber mallet if necessary.

(o) Positioned midway between each of the four blade sockets, install a bolt (620), washer (640), and nut (650). Refer to Figure 7-18.

(p) Torque the nuts (650) in accordance with Table 8-1 in the Fits and Clearances chapter of this manual.



Installing the Cylinder-Side Hub Half
Figure 7-18



Using the Piston Ring Clamp TE617
Figure 7-19

D. Assembling the Piston Unit C-497( ) (320)

(1) Make an inspection of the start lock piston ring (330) and the piston (340) in accordance with the check criteria of this manual.

(2) Preassemble the start lock piston ring (330) and the piston (340) before application of the adhesive to make sure that they fit together correctly.

(3) Using solvent CM106 MEK, CM219 MPK, or equivalent, clean the threads on the start lock piston ring (330) and the piston (340).

(a) Let the start lock piston ring (330) and the piston (340) air dry.

(4) Apply a thin layer of removable threadlocker CM116 to the threads of the start lock piston ring (330).

(a) Make sure that the threadlocker CM116 covers the entire circumference of at least the first three threads on the start lock piston ring (330).

(5) Turn the start lock piston ring (330) into the piston (340) until the shoulder of the start lock piston ring touches the piston.

(6) Put the clamp base TE618 in a vise. Refer to Figure 7-19.

(7) Measure and make a record of the O-ring groove width "A" on the piston (340). Refer to Figure 7-20.

(a) This measurement is necessary to complete step (13) in this section.

(8) Attach the piston unit (320) to the clamp base TE618. Refer to Figure 7-19.

(a) Install the clamp washer TE619 onto a locally procured 1 inch (25.4 mm) diameter bolt.

(b) Put the bolt with the clamp washer TE619 through the piston unit (320) and the clamp base TE618, as shown in Figure 7-19.

(c) Install a locally procured nut of the appropriate size onto the 1 inch (25.4 mm) diameter bolt.

<u>CAUTION</u>: WHEN TIGHTENING THE NUT, THE MAXIMUM ALLOWABLE TORQUE IS 150 FT-LBS (203 N•m). OVERTIGHTENING THE NUT MAY COMPRESS THE O-RING GROOVE AND DAMAGE THE PISTON (340).

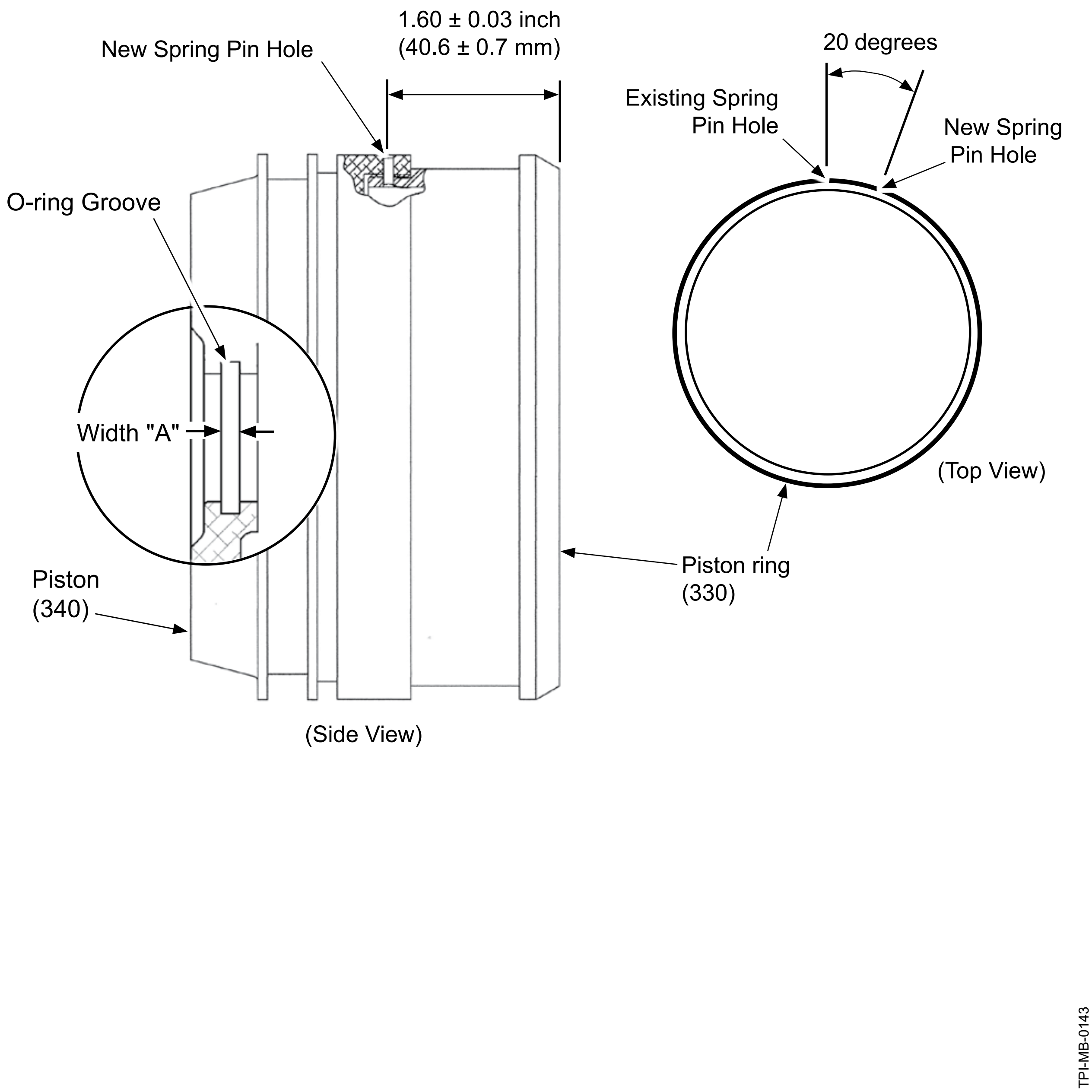
(d) Tighten the nut securely to prevent the piston unit (320) from rotating on the clamp base TE618.

(9) Install the piston ring clamp TE617 on the piston unit (320), as shown in Figure 7-19.

(10) Using a 1/2 inch drive torque wrench in the hole on the piston ring clamp TE617 apply 140 Ft-Lbs (189 N•m) of torque to the start lock piston ring (330).

(a) If an adapter is used with the torque wrench, refer to Figure 8-1 in the Fits and Clearances chapter of this manual.

(11) Remove the piston ring clamp TE617 and the clamp base TE618 from the piston unit (320).



Piston Unit C-497 O-ring Groove and New Spring Pin Hole
Figure 7-20

(12) Measure and make a record of the O-ring groove width "A" on the piston (340). Refer to Figure 7-20.

(13) Subtract the width "A" measured in step (12) from the width "A" measured in step (7) in this section.

(a) If the difference between the two width "A" measurements is greater than 0.002 inch (0.05 mm), disassemble the piston unit (320) and retire the piston (340) in accordance with the Part Retirement chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

(b) If the difference between the two width "A" measurements is less than or equal to 0.002 inch (0.05 mm), go to step (14) in this section.

(14) Using a cloth dampened with solvent CM106 MEK, CM219 MPK, or equivalent, clean the piston unit (320) to remove any remaining adhesive.

(15) Let the adhesive on the piston unit (320) cure for two hours at 65°-100°F (18°-38°C).

(a) Removable threadlocker CM116 cures to handling strength in ten minutes, and full-bond strength or machining strength after two hours at 65°-100°F (18°-38°C).

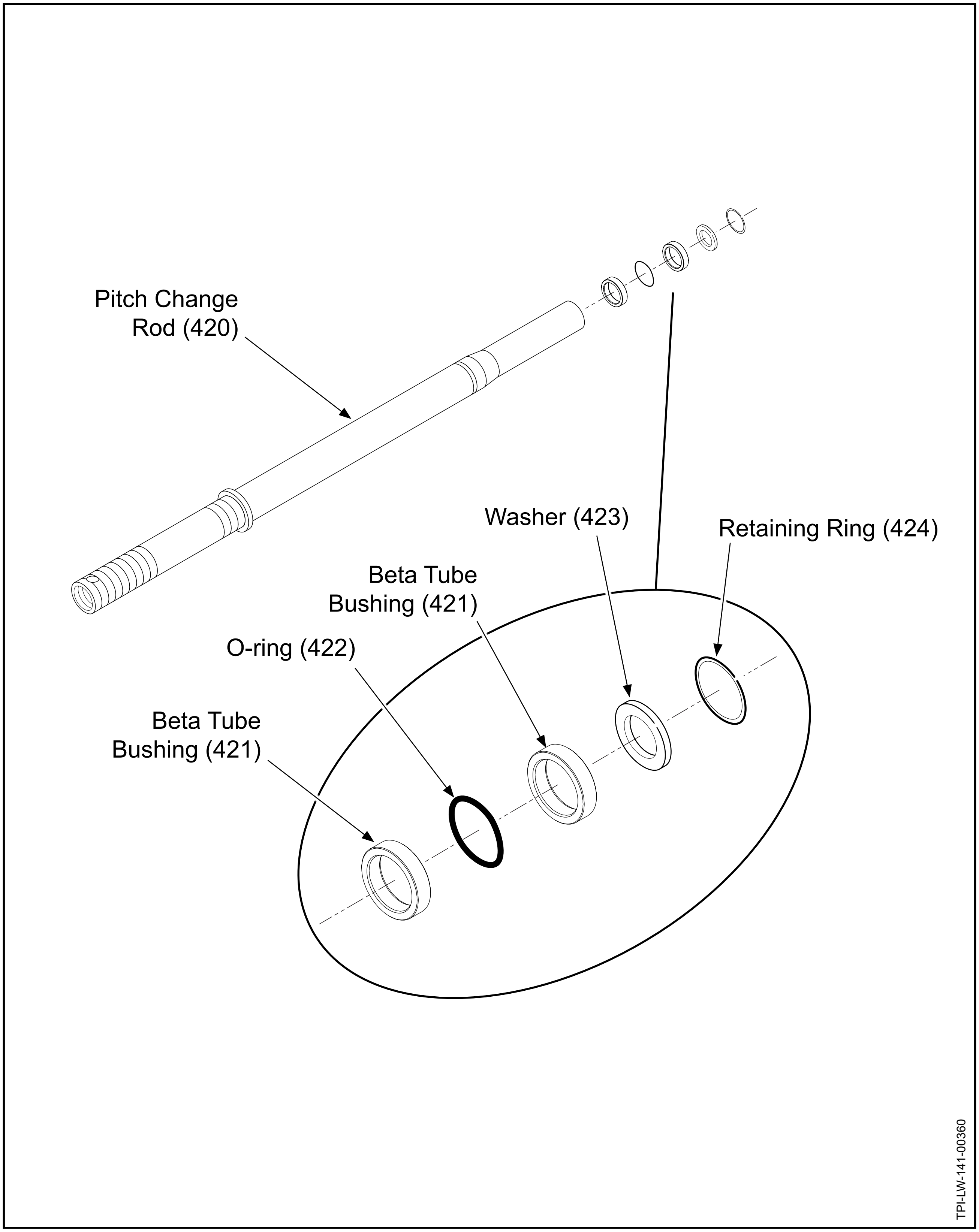
(16) Drill a new spring pin hole through both the piston (340) and the start lock piston ring (330) in accordance with Figure 7-20.

(a) Hole size: 0.094 inch (2.38 mm) to 0.097 inch (2.46 mm)

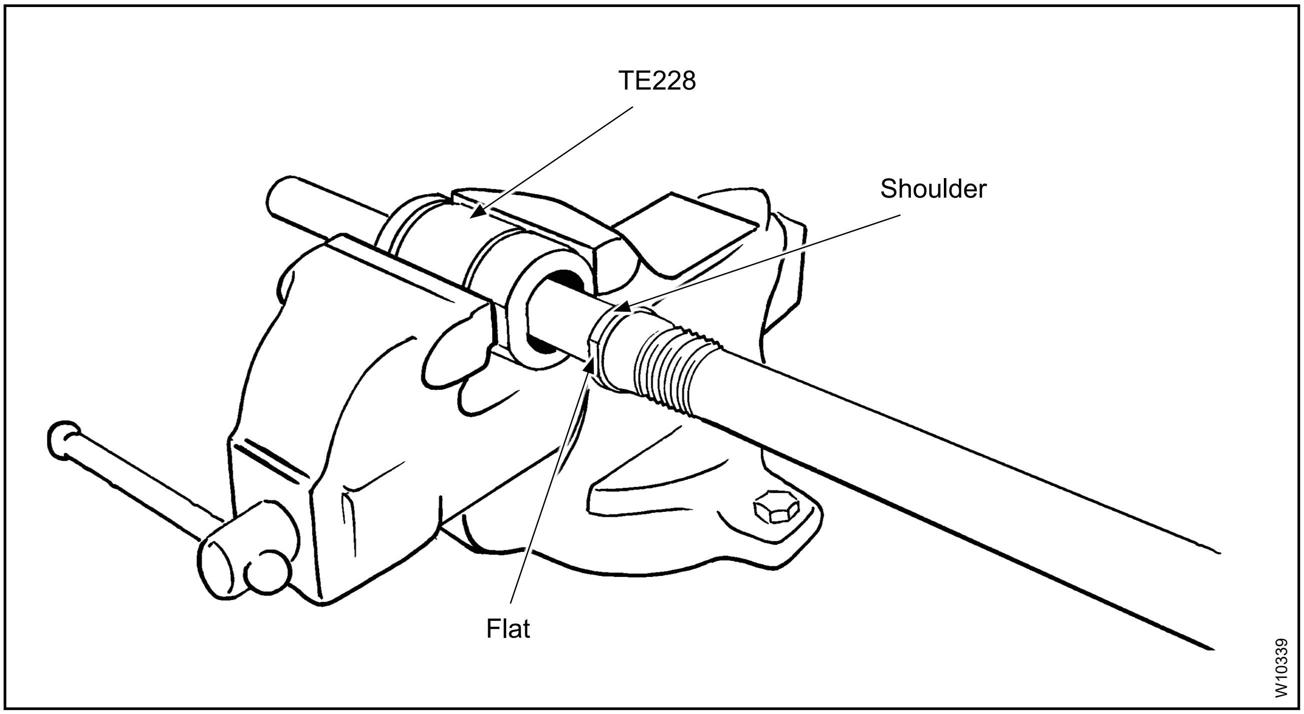
(b) Hole location: 1.60 ± 0.03 inch (40.6 ± 0.7 mm) from the end of the start lock piston ring (330), and at least 20 degrees away from any existing spring pin holes.

(17) Install the spring pin (350) into the hole drilled in step (16) in this section.

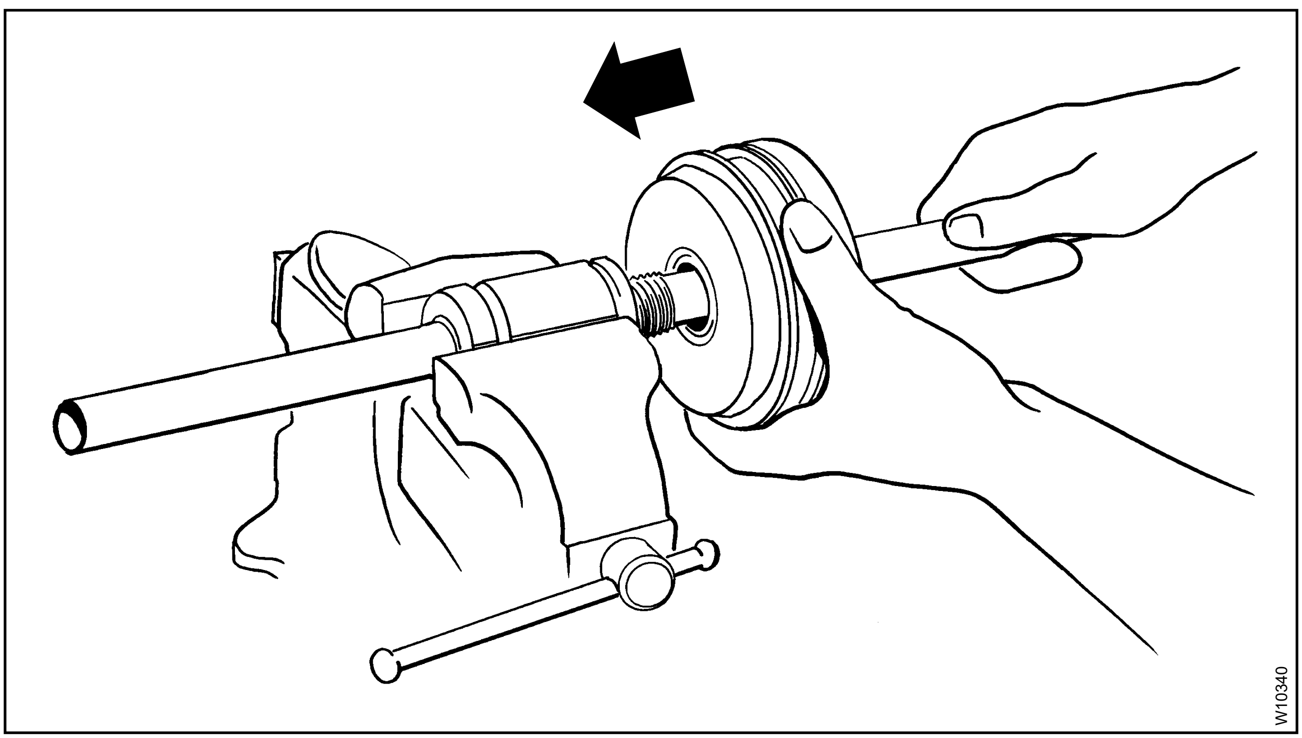
(a) Using a locally procured peening tool, peen the hole to hold the spring pin (350).



Installing the Beta Rod Seal Components
Figure 7-21



Using the TE228 Tool on the Pitch Change Rod
Figure 7-22



Installing the Piston
Figure 7-23

E. Hydraulic System Assembly

(1) Install the beta rod seal components in the pitch change rod (420), if applicable.

(a) Apply a thin layer of grease CM12 to the ID and OD of the beta tube bushings (421 and 423)

(b) Install the beta tube bushing (421), O-ring (422), beta tube bushing (423), washer (424) and retaining ring (425) in the pitch change rod (420) in accordance with Figure 7-21.

(2) Install the small piston O-ring (360) in the piston (340).

(3) Install the piston (340) on the pitch change rod (420).

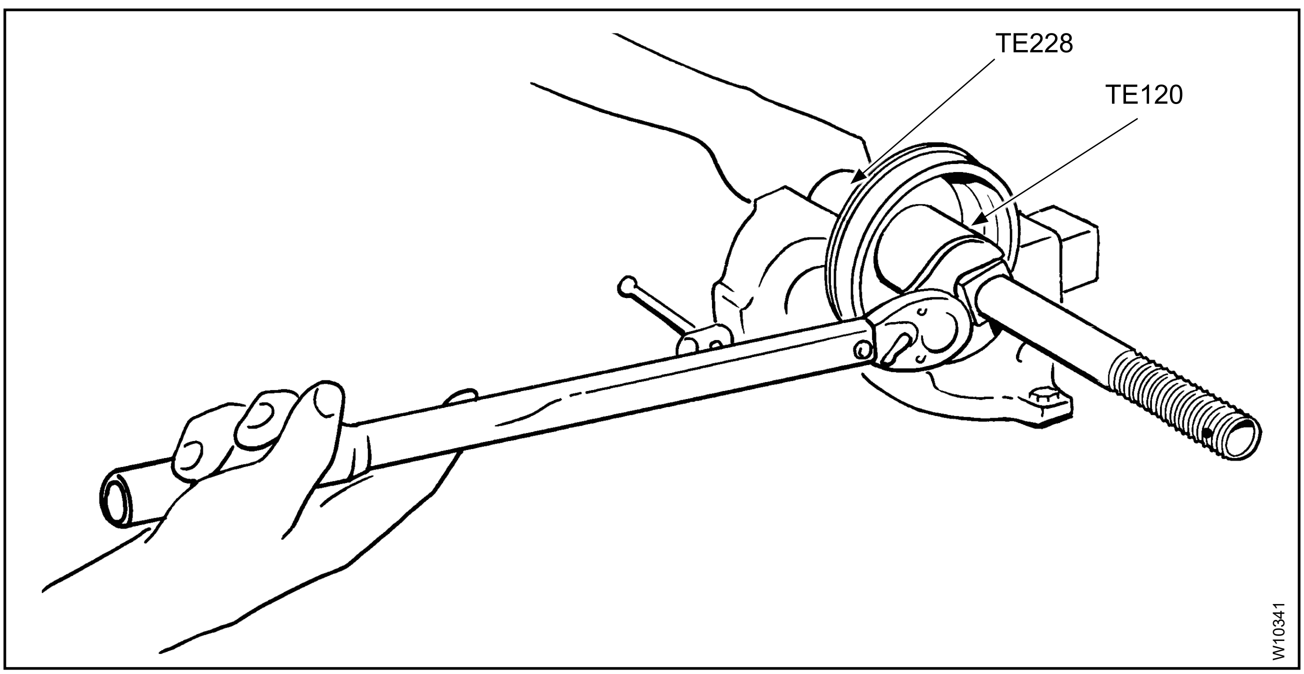
(a) Put the piston unit installation socket TE228 in a vise. Refer to Figure 7-22.

(b) Insert the pitch change rod (420) through the piston unit installation socket TE228, fitting the socket over the shoulder flats on the pitch change rod as shown in Figure 7-22.

(c) Put the piston (340) into position against the shoulder on the pitch change rod (420). Refer to Figure 7-23.

(d) Turn the piston self-locking nut (310) onto the pitch change rod (420) until the self-locking nut locking mechanism engages the pitch change rod threads.

(4) Using the modified deep well socket TE120, torque the piston self-locking nut (310) against the piston (340) in accordance with Table 8-1 in the Fits and Clearances chapter of this manual. Refer to Figure 7-24.



Torquing the Piston Nut
Figure 7-24

(5) Apply anti-seize compound CM118 to the external threads that are adjacent to the tapered section of the pitch change rod (420). Refer to Figure 7-25.

(6) Insert the small diameter end of the pitch change rod (420) into the cylinder-side half of the hub (500) and through the fork (710) and engine-side half of the hub.

CAUTION: WHEN INSTALLING THE PITCH CHANGE ROD (420) INTO THE FORK (710), DO NOT USE TORQUE THAT IS GREATER THAN THE MAXIMUM TORQUE IN ACCORDANCE WITH TABLE 8-1 IN THE FITS AND CLEARANCES CHAPTER OF THIS MANUAL.

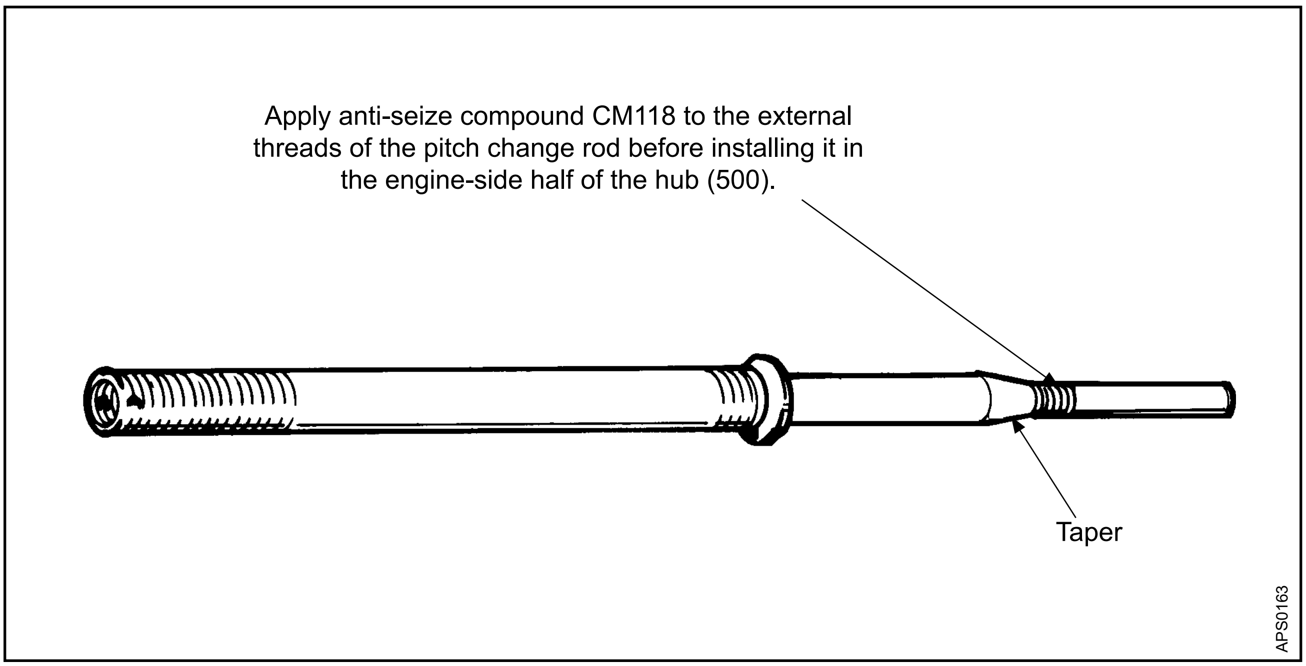
(7) Turn the pitch change rod (420) into the fork (710).

(8) Using the modified deep well socket TE120 on the self-locking hex nut (310), torque the pitch change rod (420) in accordance with Table 8-1 in the Fits and Clearances chapter of this manual.

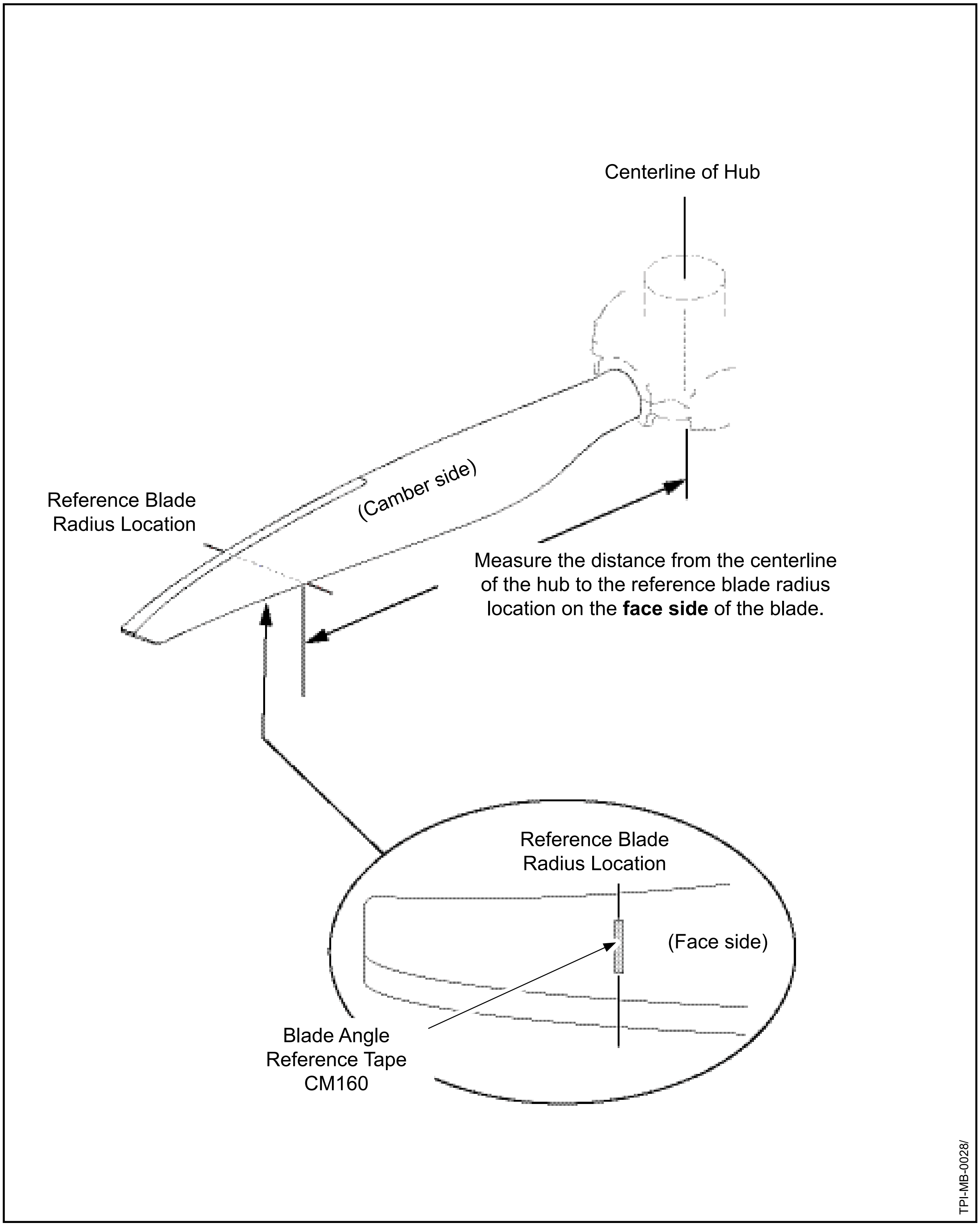
(9) Move the blades by hand to make sure that the blades have full range of movement from reverse pitch to feather pitch.

(a) If there is not full blade angle movement, remove the hub-clamping bolts (620) and nuts (650) and slightly separate the halves of the hub (500) to permit preload plate (910) rotation.

(b) Repeat the hub-clamping bolt installation procedure after the preload plates have been properly positioned.



Applying CM118 to the Pitch Change Rod
Figure 7-25



Blade Angle Reference Tape
Figure 7-26

F. Blade Angle Reference Tape Application (Optional) (Rev. 3)

CAUTION: DO NOT CONFUSE REFERENCE BLADE RADIUS WITH BLADE STATION. REFERENCE BLADE RADIUS AND BLADE STATION OF THE SAME NUMBER MAY NOT ALWAYS INDICATE THE SAME LOCATION ON THE BLADE.

(1) Reference blade radius is measured from the center of the propeller hub to a predetermined reference location on the blade for blade angle measurement.

(2) Blade stations are used during the repair or overhaul process of a blade to define a blade span location for dimensional measurement.

(3) Establish a reference blade radius location.

(a) Refer to the Aircraft Type Certificate Data Sheet or the Hartzell Propeller Application Guide Manual 159 (61-02-59), for the reference blade radius location specified for the applicable aircraft installation.

(b) Beginning with blade one, measure from the center of the propeller hub to the reference blade radius location specified. Refer to Figure 7-26.

(c) Apply a piece of reference tape CM160 to the face side of the blade at the reference blade radius location, perpendicular to the blade centerline as shown in Figure 7-26.

1 Put the reference tape CM160 on the blade so that the reference blade radius location runs through the centerline of the tape.

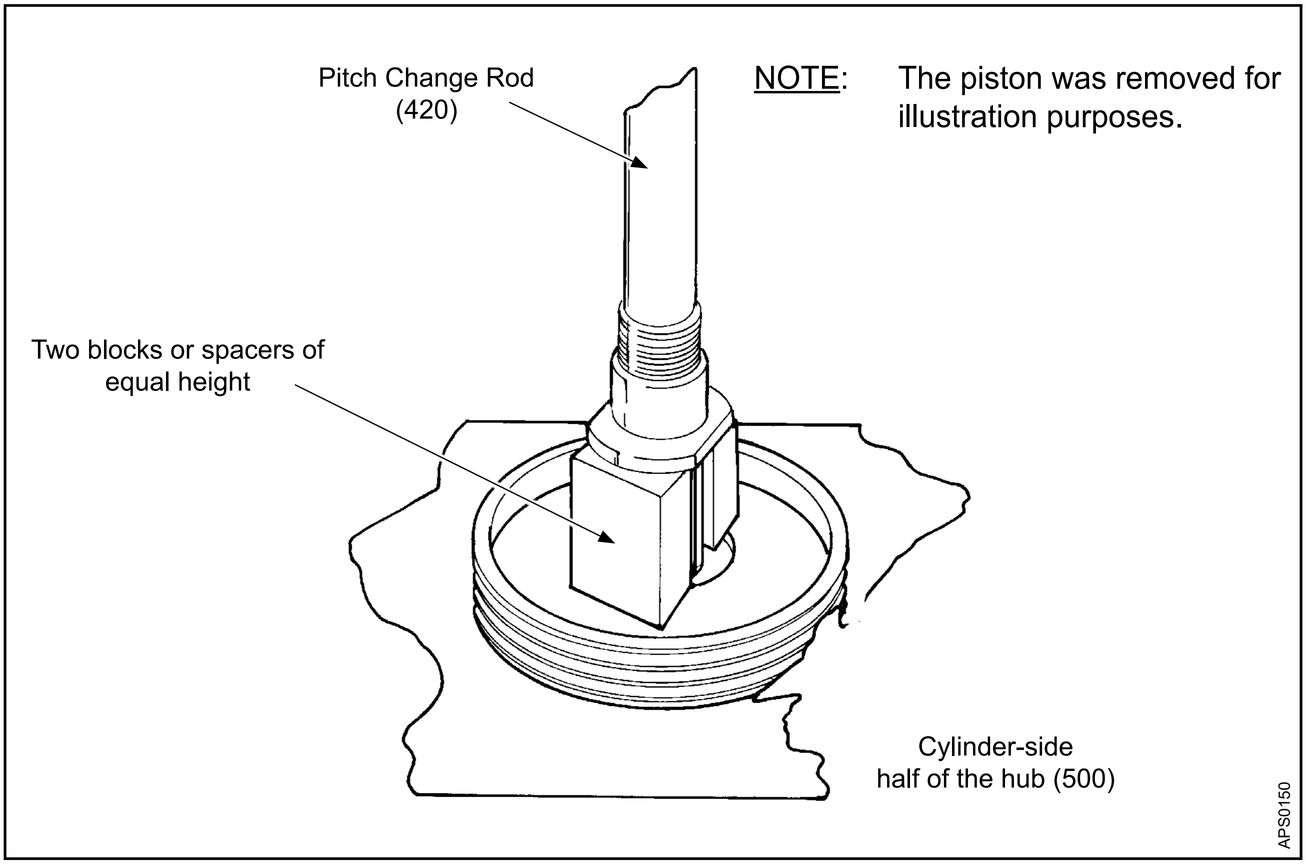
(d) Repeat steps (3)(b) and (3)(c) for the remaining blades in the hub assembly.

(e) Put a pattern cut-out over each a piece of reference tape CM160.

(f) Spray each a piece of reference tape CM160 with clear lacquer CM129 to prevent peeling.

PITCH CHANGE KNOB BRACKET UNIT PART NUMBER	CHANGE OF BLADE ANGLE	PITCH CHANGE KNOB BRACKET UNIT PART NUMBER	CHANGE OF BLADE ANGLE
B-464-1( )	-0.3°	100032-1	-0.3°
B-464-2( )	---	100032-2	---
B-464-3( )	+0.3°	100032-3	+0.3°
B-6257-1	-0.3°	103545-1	-0.3°
B-6257-2	---	103545-2	---
B-6257-3	+0.3°	103545-3	+0.3°
100028-1	-0.3°	108303-1	-0.3°
100028-2	---	108303-2	---
100028-3	+0.3°	108303-3	+0.3°

Blade Pitch Change Knob Bracket Unit Selection
Table 7-1



Checking Blade-to-Blade Angle Tolerance
Figure 7-27

G. Checking Blade-to-Blade Angle Tolerance

NOTE: The purpose of checking the blade angles is to verify that the blade angles of all four blades are within 0.2 degree of each other at the reference blade radius.

(1) As shown in Figure 7-27, put two blocks or spacers of equal height [± 0.0005 inch (0.012 mm)] under the piston and on opposite sides of the pitch change rod (420) to hold the propeller in a low blade angle position.

(2) Check the blade angle at the reference blade radius location that is indicated by the blade angle reference tape.

(a) The propeller does not have to be at the final low pitch position for this check, but the blade angle for this check is 18-25 degrees.

(b) Move the blades by hand toward the high pitch position to make sure that the cam followers (840) are properly seated against the fork (710).

(3) Using a protractor, check to make sure that the angle of each blade within the propeller varies no more than 0.2 degree from highest to lowest angle measurement.

(a) If the difference between the highest blade angle and the lowest blade angle is greater than 0.2 degree:

1 Replace the pitch change knob bracket unit(s) on the blade(s).

a Refer to Table 7-1, "Blade Pitch Change Knob Unit Selection" to select the applicable pitch change bracket unit to increase or decrease the blade angle.

2 Recheck the blade-to-blade angle tolerance until the tolerance is achieved on all four blades.

NOTE: Each blade has tolerances for blade angles at the various blade stations. The ultimate effects of these tolerances upon vibration during operation are magnified by the blade-to-blade tolerances in the assembled propeller. Maintaining a blade-to-blade tolerance within 0.2 degree at the reference blade radius has been found to be an acceptable limit. Although not a requirement, an additional check of the blade-to-blade tolerance at the outermost blade station may be a worthwhile verification that all blades of a set are within tolerance. The difference between the highest blade angle and the lowest blade angle at the outermost station should not be greater than 0.4 degree.

(4) When the difference between the highest blade angle and the lowest blade angle is within 0.2 degree, continue to the next step.

(5) When assembling a propeller that will be disassembled for shipping, it is not necessary to remove the pitch change rod (420) and the cylinder-side half of the hub (500), to install the remaining hex head bolts (620, 580), washers (640), and self-locking nuts (650), or to apply CM92 to the mating surfaces of the hub (500).

(6) Remove the pitch change rod (420) and the cylinder-side half of the hub (500).

CAUTION: DO NOT PERMIT EXCESSIVE SEALANT TO BE SQUEEZED INTO THE BLADE RETENTION SOCKETS.

(7) Put a bead of sealant CM92 on the mating surfaces of the hub (500). Refer to Figure 7-28.

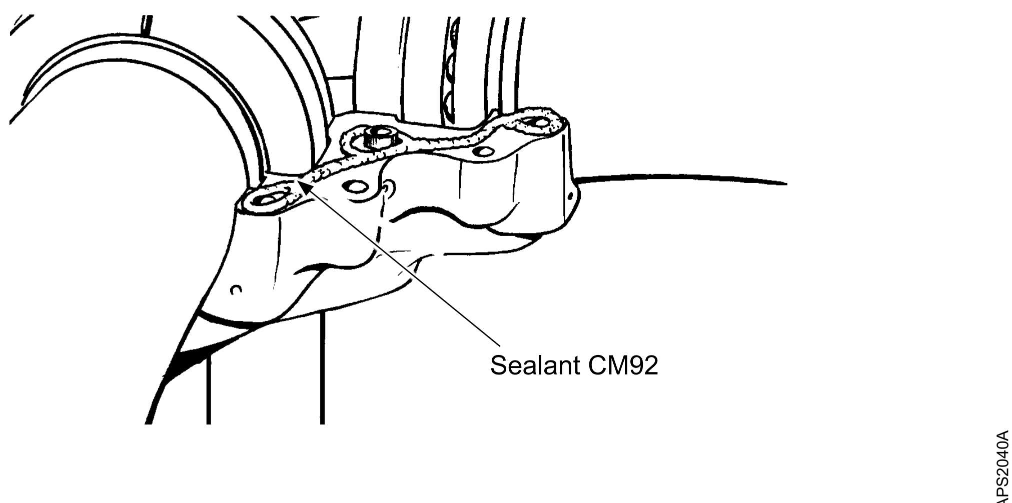
  (a) Sealant must contact the blade O-rings.

  (b) Use only enough sealant on the mating surfaces so that a small amount will be squeezed out along the entire parting surface when the hub nuts are properly torqued.

(8) Install the pitch change rod (420) and the cylinder-side half of the hub (500).

(9) Install the hex head bolts (620, 580), washers (640), and self-locking nuts (650).

(10) Torque the nuts (650) on the hex head bolts (620, 580) in accordance with Table 8-1 in the Fits and Clearances chapter of this manual.



Applying Sealant Between the Hub Halves
Figure 7-28

H. Pitch Adjustment Unit Assembly (Rev. 3)

CAUTION: REFER TO THE APPLICABLE AIRCRAFT TYPE CERTIFICATE DATA SHEET AND/OR HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59) FOR SPECIFIC BLADE ANGLES REQUIRED.

(1) Install the piston OD O-ring (380) in the groove closest to the hub (500). Refer to Figure 7-29.

(2) Cut the necessary length of piston dust seal material (370).

(a) Cut the piston dust seal material (370) on a 30 degree diagonal so there will be an overlap at the parting line with a smooth surface, free of fuzz. Refer to Figure 7-29, View A-A.

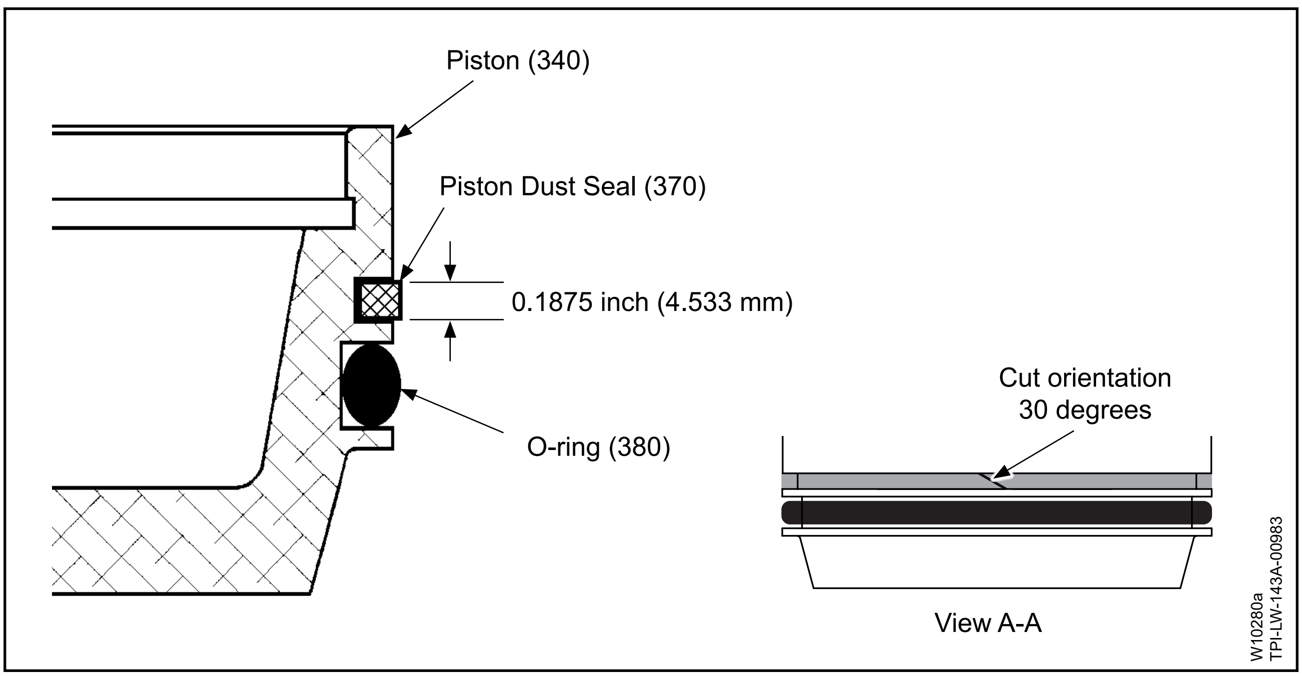
(3) Soak the piston dust seal (370) in aviation grade turbine engine oil until the seal is completely saturated.

(4) Squeeze the excess oil from the piston dust seal (370).

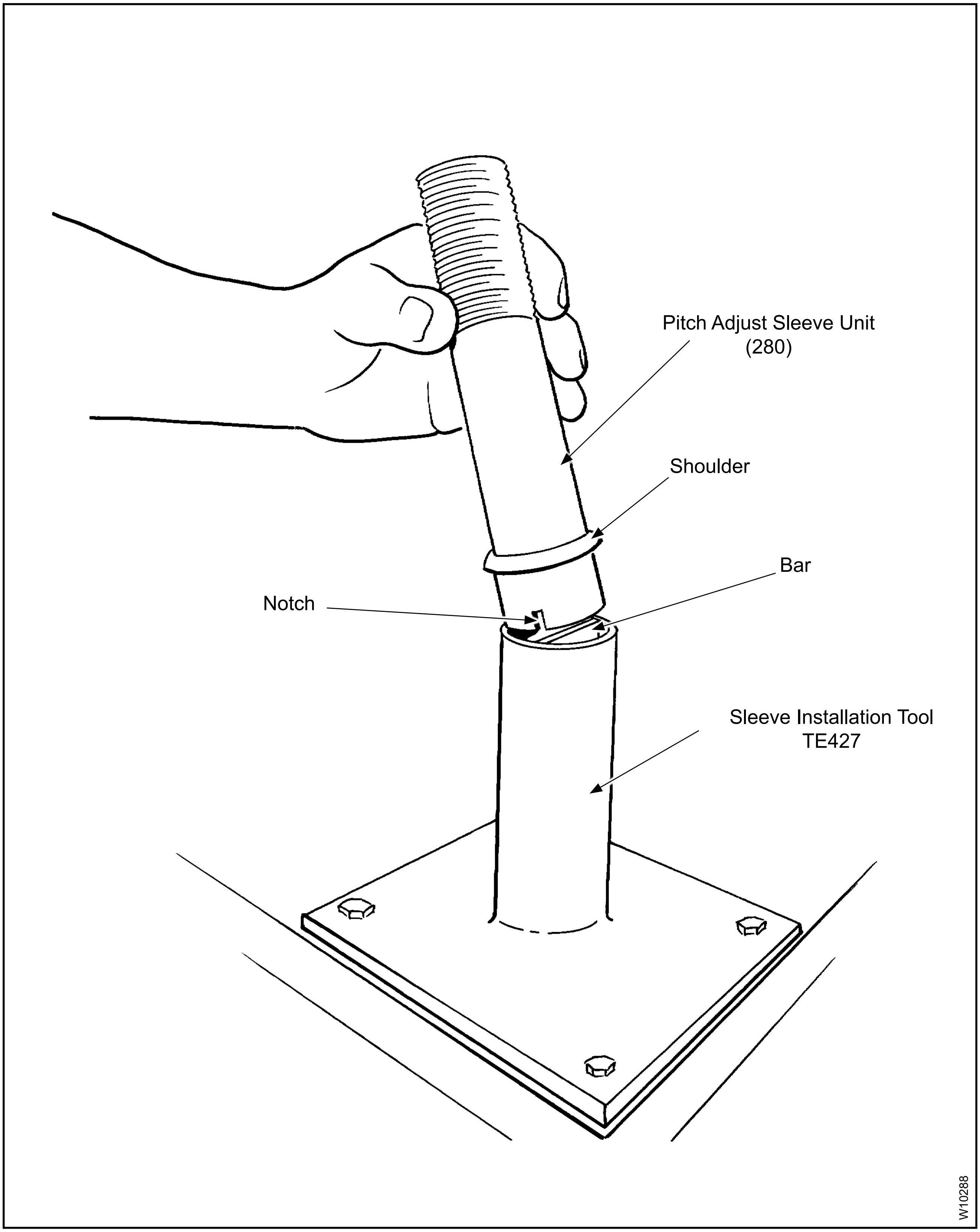
CAUTION: MAKE SURE THAT THE PISTON DUST SEAL (370) IS FREE OF FUZZ.

(5) If the piston dust seal (370) has fuzz or long strands that could interfere with O-ring operation, replace the piston dust seal.

(6) Install the thinnest section of the piston dust seal (370) in the remaining piston OD groove. Refer to Figure 7-29.



Locations of the Piston O-ring and Piston Dust Seal
Figure 7-29



Putting the Pitch Adjustment Sleeve Unit on the Sleeve Installation Tool TE427
Figure 7-30

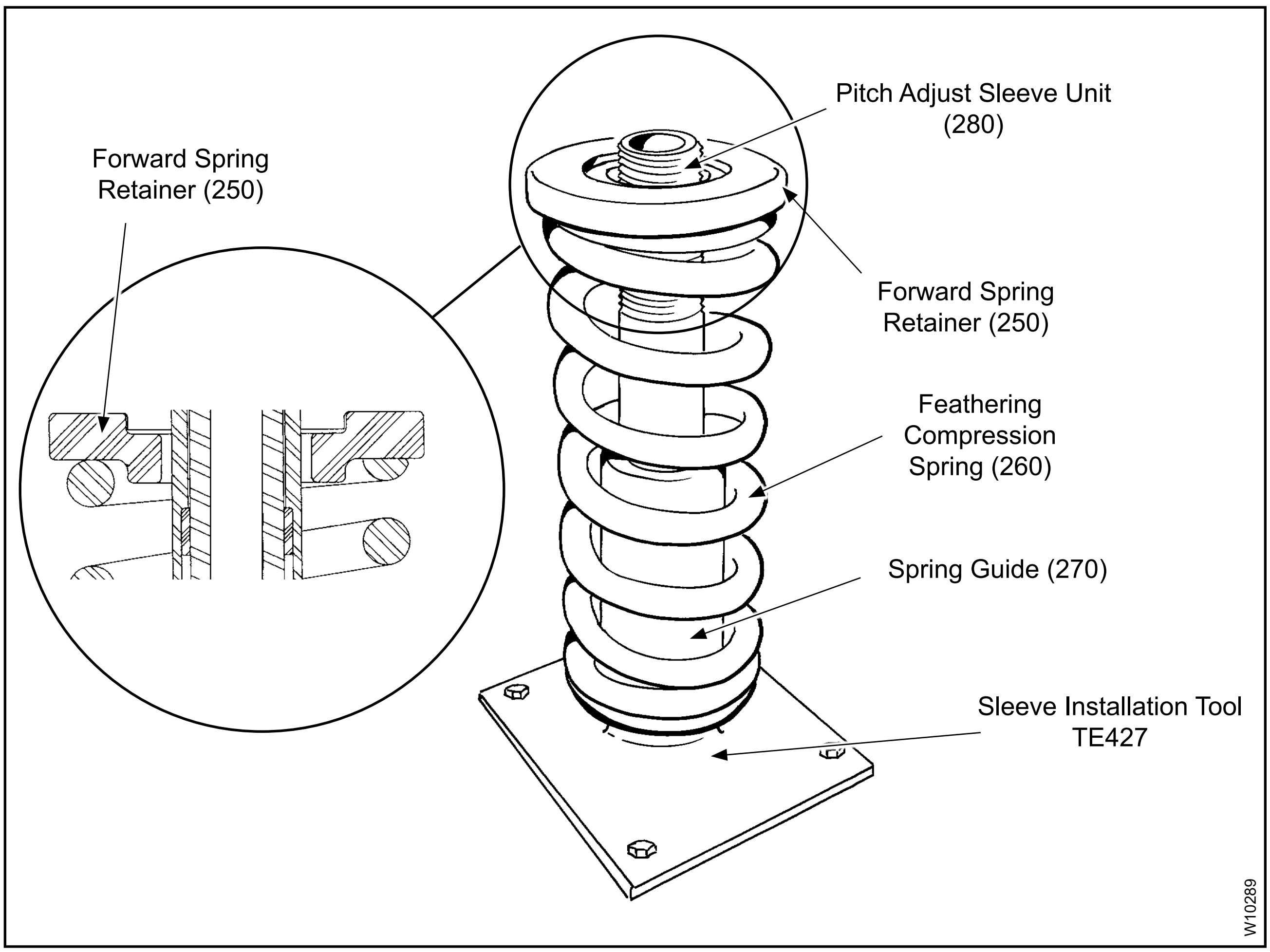
(7) Installing the cylinder

(a) Installing the pitch adjust sleeve unit (280) into the cylinder (40) using the sleeve installation tool TE427, or equivalent.

1 Fit the notches of the pitch adjust sleeve unit (280) into place on the bar of the sleeve installation tool TE427, or equivalent. Refer to Figure 7-30.

2 Slide the spring guide (270) over the pitch adjust sleeve unit (280) on the sleeve installation tool TE427, or equivalent until the spring guide is resting on the shoulder of the pitch adjust sleeve unit. Refer to Figure 7-30 and Figure 7-31.

3 Apply anti-seize compound CM118 or CM151 to both end coils of the spring (260) and to the first two threads of the pitch adjust sleeve unit (280).



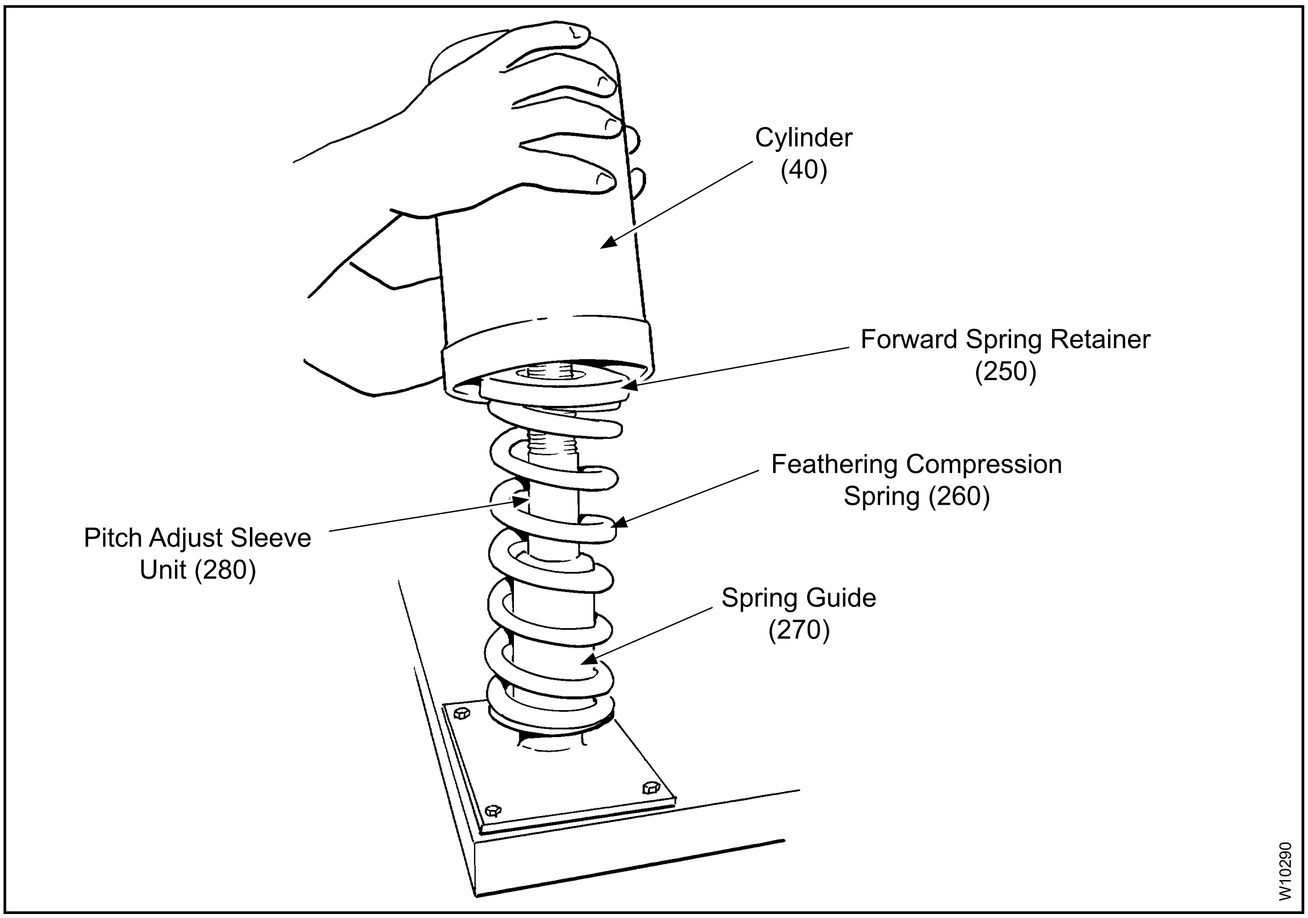
Installing the Feathering Compression Spring on the Pitch Adjust Sleeve Unit
Figure 7-31

4 Put the feathering compression spring (260) over the pitch adjust sleeve unit (280) and spring guide (270) on the sleeve installation tool TE427, or equivalent, with the feathering compression spring resting on the lip of the spring guide (270). Refer to Figure 7-32.

5 With the raised shoulder of the forward spring retainer (250) toward the feathering compression spring (260), install the forward spring retainer (250), if applicable, over the pitch adjust sleeve unit (280) on the sleeve installation tool TE427, or equivalent. Refer to Figure 7-31.

CAUTION: DO NOT DAMAGE THE PITCH ADJUST SLEEVE UNIT (280) OR THE CYLINDER (40) THREADS WHEN INSTALLING THE CYLINDER (40).

6 Put the cylinder (40) over the parts on the sleeve installation tool TE427, or equivalent and turn the cylinder (40) onto the pitch adjust sleeve unit (280). Refer to Figure 7-32.



Starting the Cylinder on the Reverse Adjust Sleeve
Figure 7-32

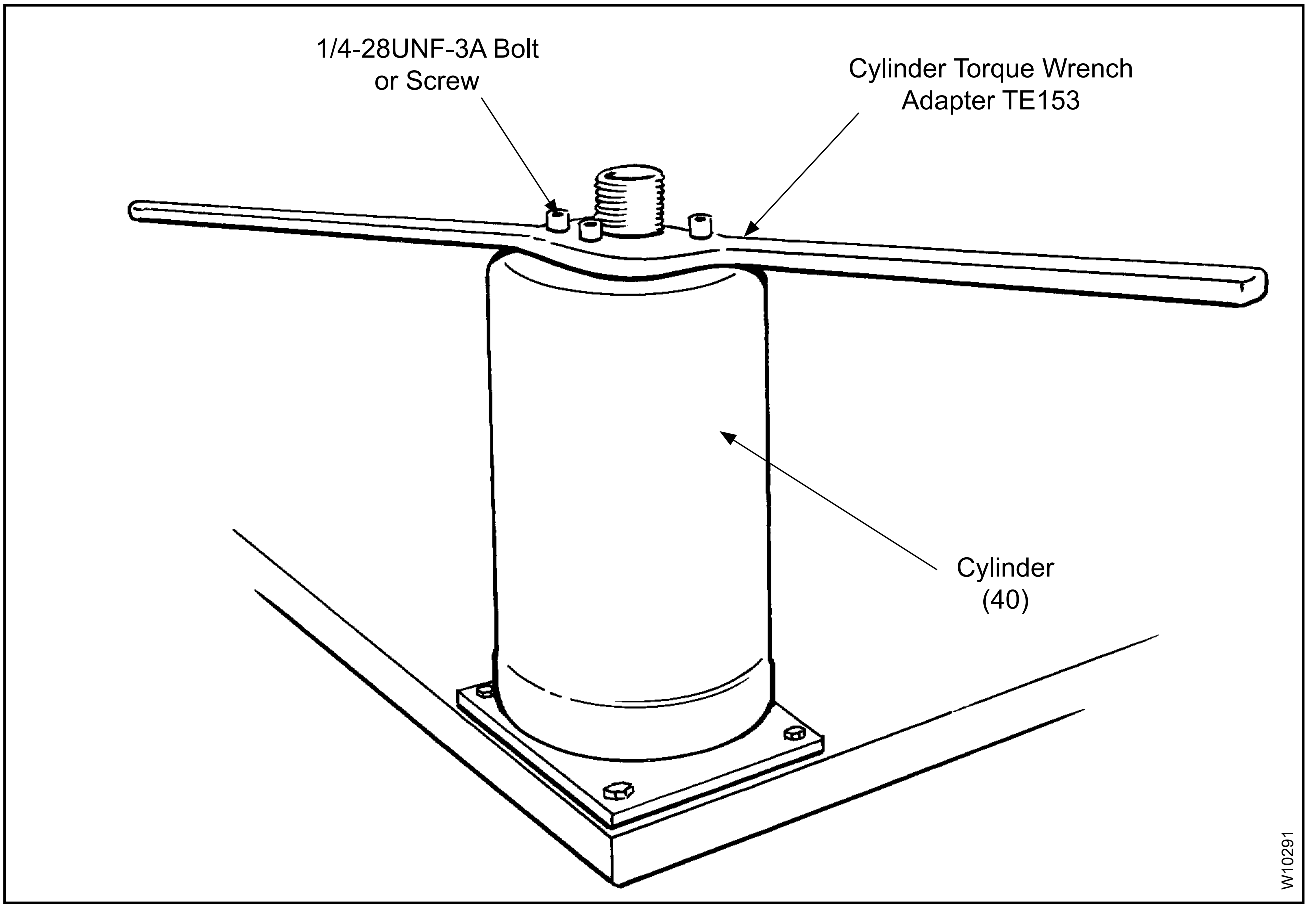
7 Using four 1/4-28UNF-3A bolts or screws, attach the cylinder torque wrench adapter TE153, or equivalent to the cylinder (40). Refer to Figure 7-32.

WARNING: MAKE SURE OF THE SAFETY OF PERSONNEL IN THE AREA DURING THE ASSEMBLY PROCEDURE. WHEN COMPRESSED, THE SPRING IS LOADED TO APPROXIMATELY 1000 POUNDS (454 KG) FORCE.

8 Turn the cylinder torque wrench adapter TE153, or equivalent until the feathering compression spring (260) is fully compressed. Refer to Figure 7-33.

WARNING: USE CARE WHEN HANDLING A CYLINDER (40) CONTAINING A COMPRESSED SPRING.

9 With the cylinder torque wrench adapter TE153, or equivalent attached, remove the cylinder (40) from the sleeve installation tool TE427, or equivalent.



Compressing the Feathering Compression Spring
Figure 7-33

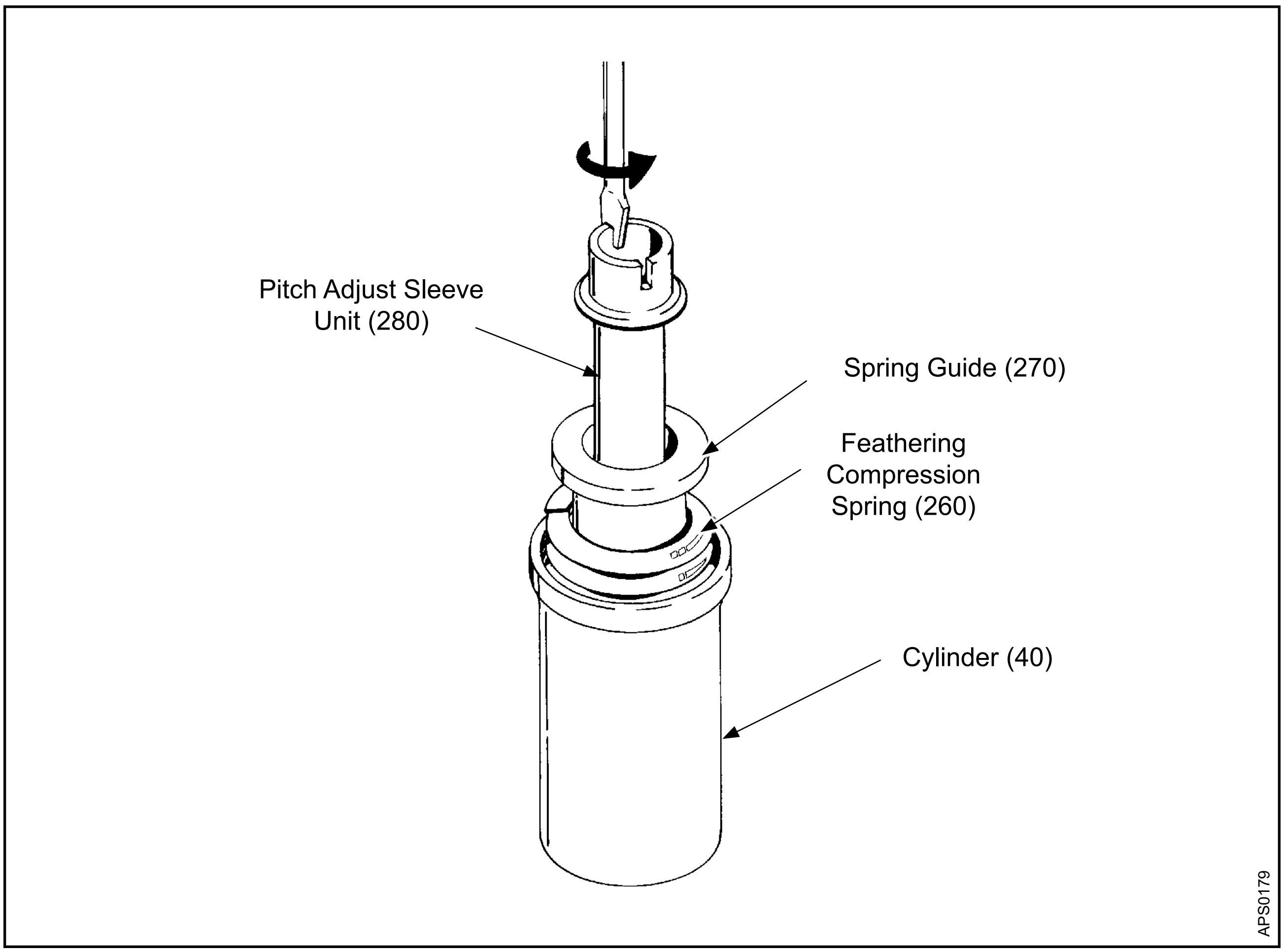
(b) If installing the pitch adjust sleeve unit (280) into the cylinder (40) without using the sleeve installation tool TE427, or equivalent:

1 Apply anti-seize compound CM118 or CM151 to both end coils of the spring (260) and the first two threads of the pitch adjust sleeve unit (280).

2 Install the pitch adjust sleeve unit (280) through the spring guide (270), feathering compression spring (260), and the forward spring retainer (250).

3 As shown in Figure 7-34, use a screwdriver in the slot in the pitch adjust sleeve unit (280) to thread the sleeve through the cylinder (40) far enough that a wrench can be applied to the flat surface on the end of the sleeve to continue screwing it into the cylinder (40) until the feathering compression spring (260) is fully compressed.

4 Using four 1/4-28UNF-3A bolts or screws, attach the cylinder torque wrench adapter TE153, or equivalent to the cylinder (40).



Using a Screwdriver to Thread the Pitch Adjust Sleeve Unit Through the Cylinder
Figure 7-34

(c) Install the O-ring (430) on the shoulder of the cylinder-half of the hub (500). Refer to Figure 7-35.

CAUTION: DO NOT APPLY ANTI-SEIZE COMPOUND CM118 TO THE MOUNTING THREADS ON THE CYLINDER (40).

(d) Apply anti-seize compound CM118 to the cylinder mounting threads on the hub (500) only.

1 Using a clean cloth, remove any excess anti-seize compound CM118 from the area above the cylinder mounting threads on the hub (500).

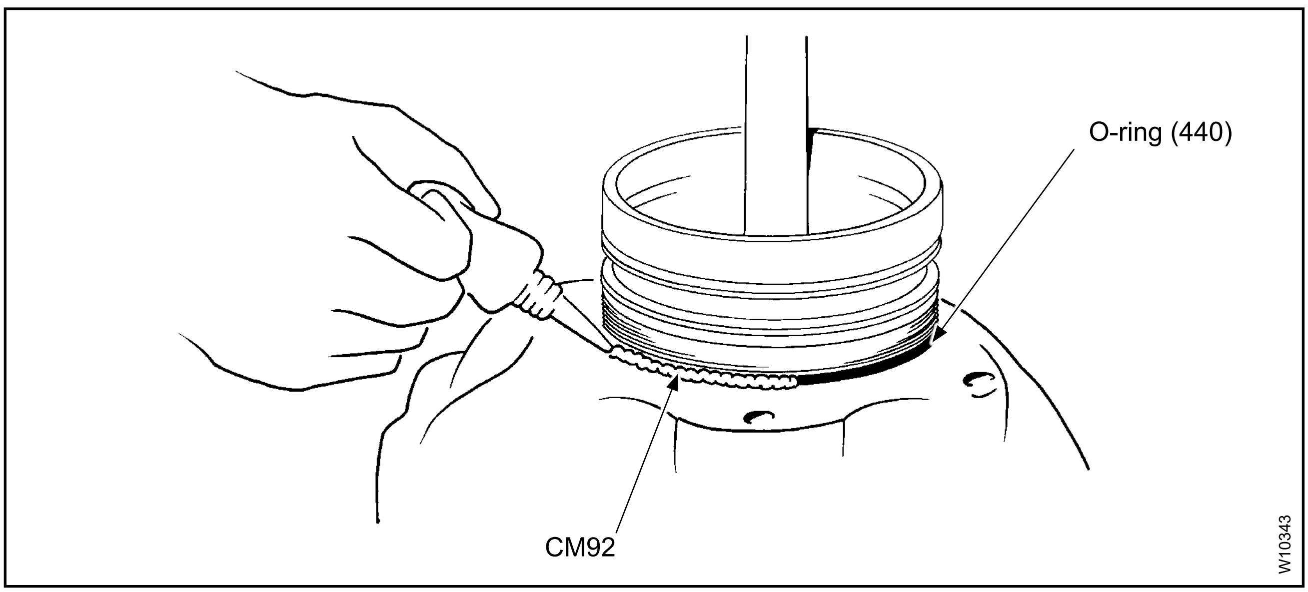
NOTE: When assembling a propeller that will be disassembled for shipping, it is not necessary to apply CM92 around the shoulder of the cylinder-half of the hub (500) next to the O-ring (430).

(e) Apply a bead of sealant CM92 around the shoulder of the cylinder-half of the hub (500) next to the O-ring (430). Refer to Figure 7-35.

CAUTION 1: DO NOT DAMAGE THE THREADS OF THE CYLINDER (40) WHEN INSTALLING THE CYLINDER (40).

CAUTION 2: DO NOT DAMAGE THE PISTON O-RING (380) WHEN INSTALLING THE CYLINDER (40).

(f) Carefully slide the cylinder (40) over the piston unit (320) onto the threads of the hub (500).



Applying a Bead of Sealant to the Hub Shoulder
Figure 7-35

CAUTION: MAKE SURE THAT THE THREADS OF THE CYLINDER (40) THREADS ARE ALIGNED WITH THE THREADS OF THE HUB (500).

(g) Turn the cylinder (40) counterclockwise until the threads align.

(h) By hand, turn the cylinder (40) on the threads of the hub (500).

(i) Using the torque wrench adapter TE153, or equivalent, torque the cylinder (40) onto the hub (500) in accordance with the Torque Values Table 8-1 in the Fits and Clearances chapter of this manual.

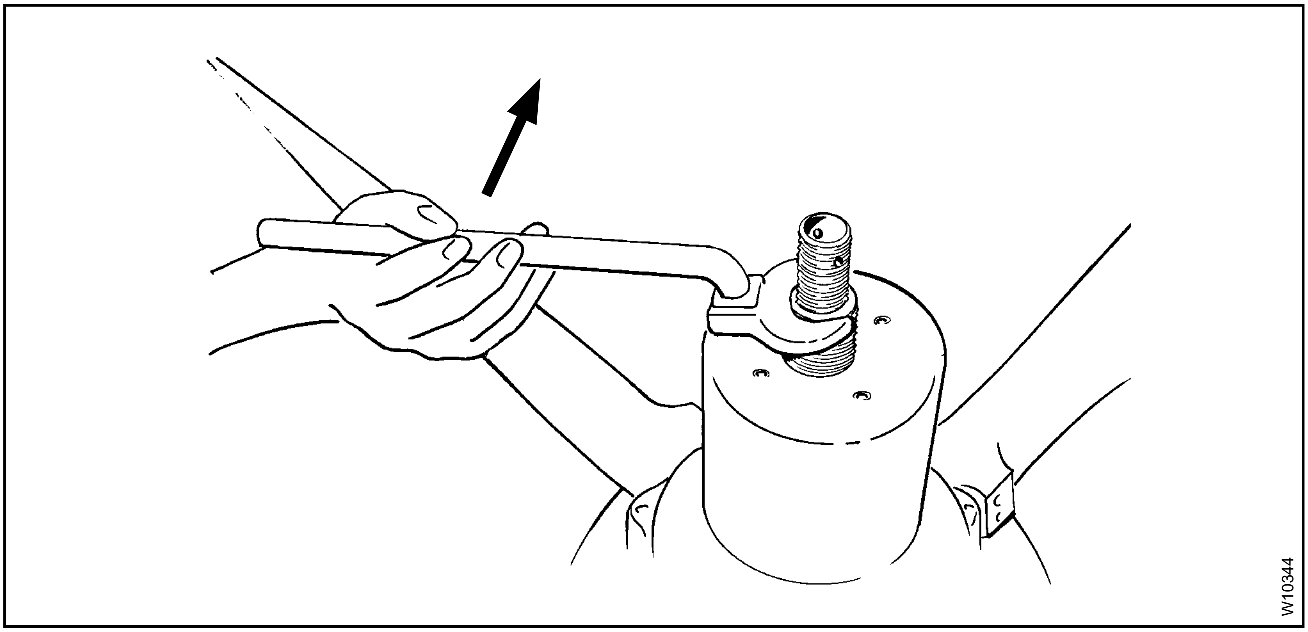
(j) Remove the four 1/4-28UNF-3A bolts or screws from the torque wrench adapter TE153, or equivalent, and the cylinder (40).

(k) Remove the torque wrench adapter TE153, or equivalent from the cylinder (40).

(8) Install the drilled hex nut (20) on the pitch adjust sleeve unit (280).

CAUTION: IF THE FEATHERING COMPRESSION SPRING (260) IS NOT IN CONTACT WITH THE PISTON (340), THE PISTON (340) WILL SLAM UP ONTO THE BOTTOM OF THE FEATHERING COMPRESSION SPRING (260) WHEN 200 PSI IS APPLIED.

(9) Using a 1-3/16 inch open end wrench, engage two of the flats on the pitch adjust sleeve unit (280) and turn the wrench approximately three turns clockwise, or until all resistance is eliminated, to permit the feathering compression spring (260) to make contact with the piston (340). Refer to Figure 7-36.



Turning the Pitch Adjust Sleeve Unit
Figure 7-36

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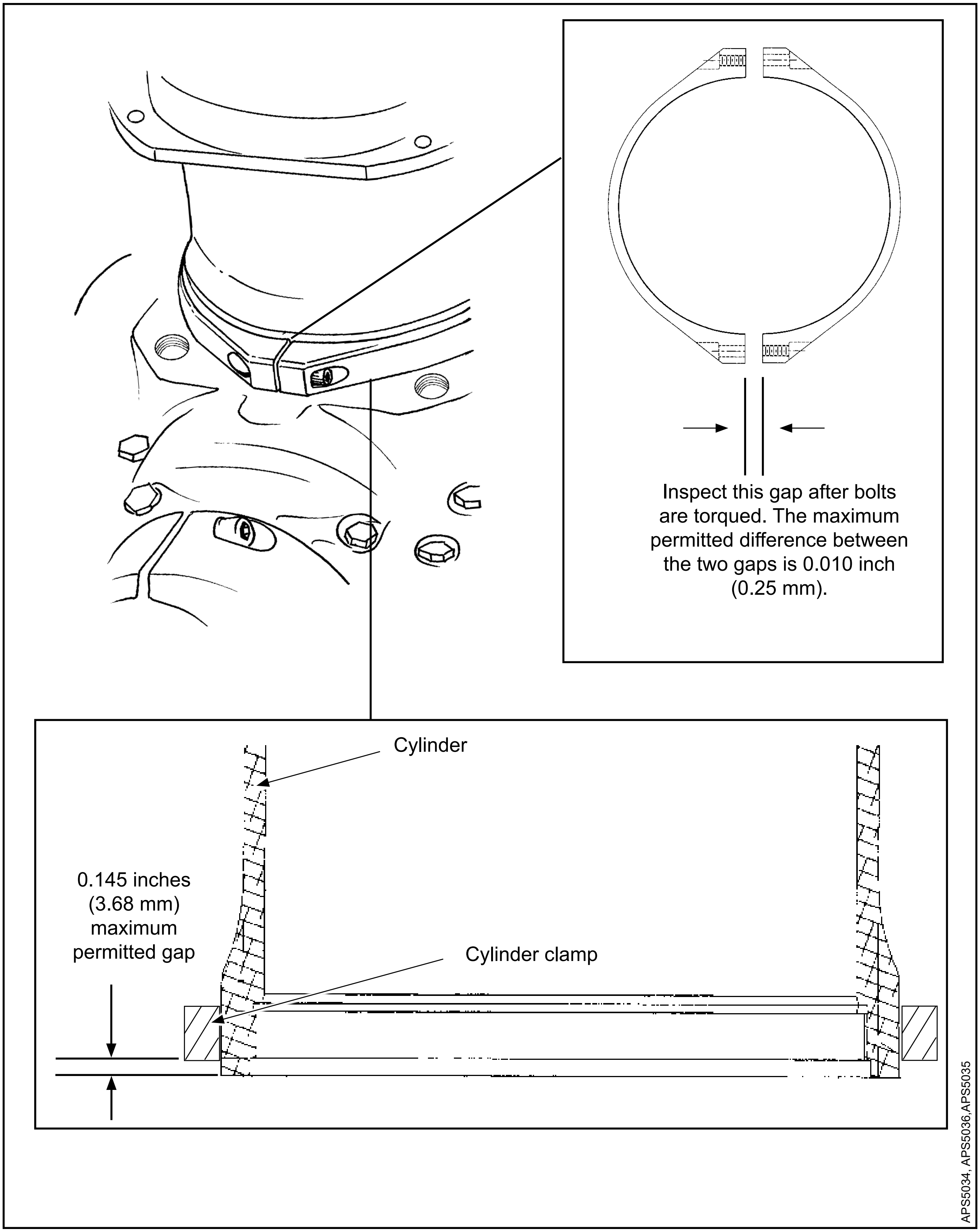


Cylinder Clamp Position and Gap Specifications
Figure 7-37

(10) Install the cylinder clamp (200), if applicable.

NOTE: A bead of sealant CM92 is applied to the cylinder shoulder of the hub (500) during assembly of the propeller. During cylinder (40) installation the sealant usually squeezes out between the cylinder (40) and the hub (500). There is no need to remove the excess cured sealant from the base of the cylinder (40) as long as no sealant will be between the cylinder (40) and the clamp.

CAUTION: DURING INSTALLATION ON THE CYLINDER (40), CENTER THE CYLINDER CLAMP FLANGES ON THE BLADE SOCKET AND AS CLOSE TO THE HUB (500) AS POSSIBLE.

(a) Install the cylinder clamp halves (200) onto the cylinder (40) with the threaded end of one cylinder clamp half aligned with the unthreaded half of the other cylinder clamp half. Position the cylinder clamp halves with the mating flanges centered on the sockets of the hub (500). Refer to Figure 7-37.

CAUTION: DO NOT REUSE THE CYLINDER CLAMP SCREWS (210). THE SCREWS ARE MANUFACTURED WITH LOCKING COMPOUND ALREADY ON THE THREADS. THE LOCKING COMPOUND CAN ONLY BE ACTIVATED ONCE DURING INSTALLATION OF THE SCREW; THEREFORE, THE SCREWS MUST BE DISCARDED IF THEY ARE REMOVED FROM THE CYLINDER CLAMP.

(b) Install the cylinder clamp screw (210) in both clamp flanges and tighten until the clamp (200) becomes snug on the cylinder (40). Refer to Figure 7-37.

(c) Measure the gap between the cylinder clamp (200) and the hub (500).

1 The maximum permitted gap between the cylinder clamp and the hub (500) is 0.145 inches (3.68 mm).

2 Make sure that there is an equal amount of gap around the entire circumference of the cylinder clamp. Refer to Figure 7-37.

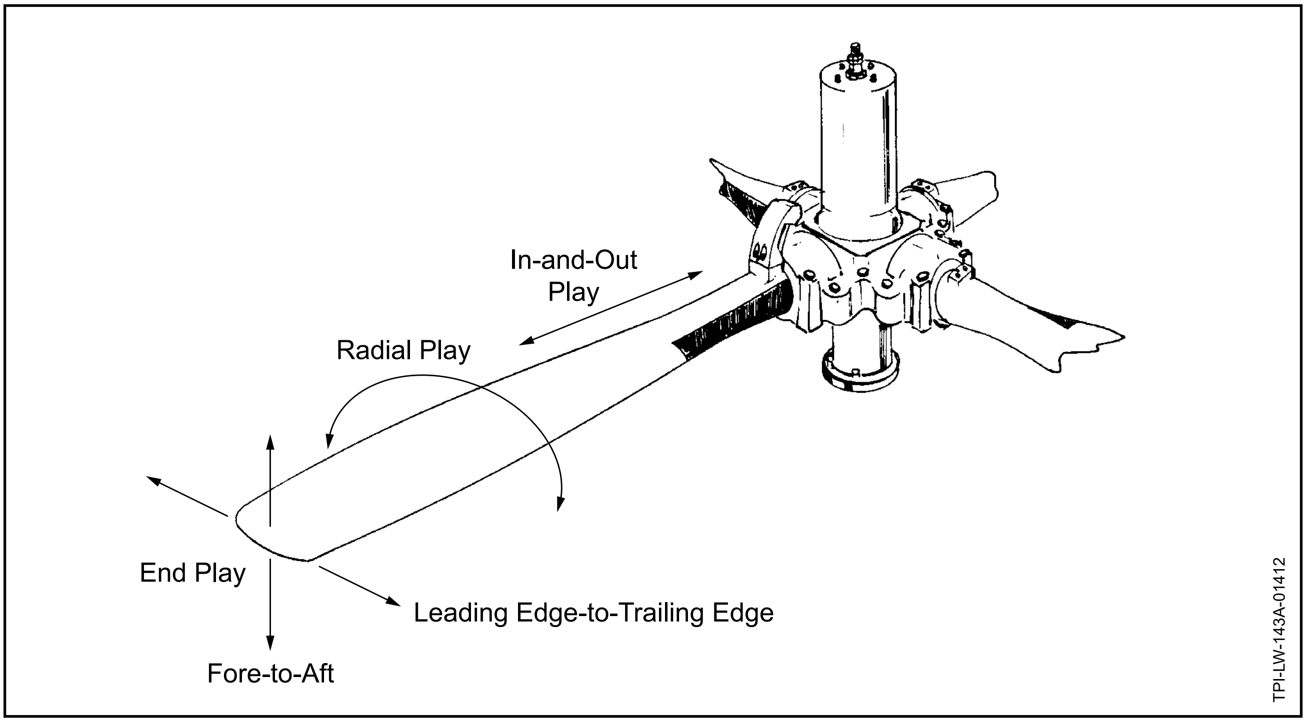
(d) Torque the cylinder clamp screws (210) in accordance with Table 8-1 in the Fits and Clearances chapter of this manual.

1 Measure the gap between the clamp halves (200) while torquing the screws.

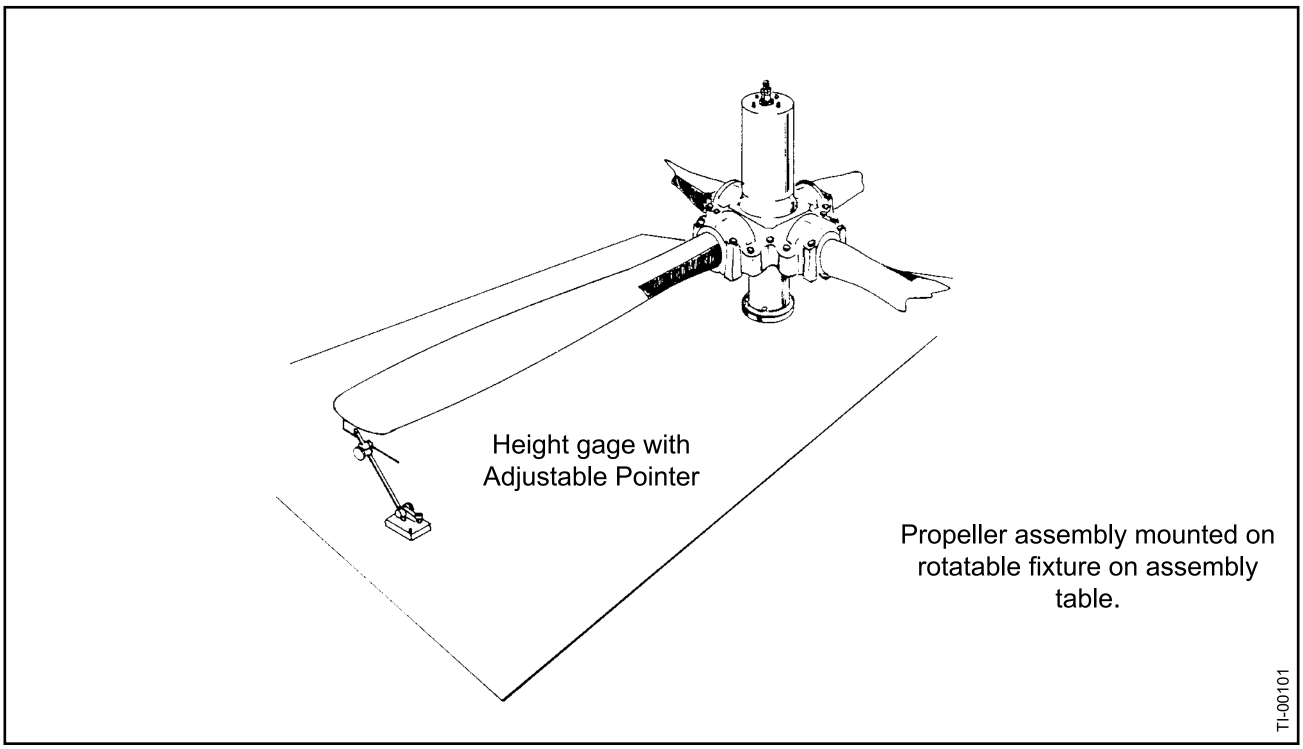
2 The difference between the two gaps must not be greater than 0.010 inch (0.25 mm).

(11) If applicable, turn the pitch change rod plug (70) into the pitch change rod (420) until the end of the pitch change rod plug is flush or slightly below flush with the end of the pitch change rod (420).

(a) Align the slot in the pitch change rod plug with the holes in the pitch change rod (420).



Checking Blade Play
Figure 7-38



Checking Blade Track
Figure 7-39

I. Blade Installation Checks

(1) Apply 200 psi (13.78 bars) air pressure to the propeller to move the blades toward low pitch until the blade tips are approximately parallel to the bench surface.

(2) Check for fore-and-aft or end play movement in each blade. Refer to the Fits and Clearances chapter of this manual for blade tolerances. Refer to Figure 7-38.

(a) If there is fore-and-aft movement in a blade, it may indicate that the blade preload is set too loosely. Refer to the Setting Blade Preload section in this chapter.

CAUTION: BLADE TRACK MUST NOT VARY MORE THAN THE TOLERANCE SPECIFIED FROM HIGHEST BLADE HEIGHT TO LOWEST BLADE HEIGHT.

(3) Using a height gage, check the blade track at the tip/face of each blade. Refer to Figure 7-39. Refer to the Fits and Clearances chapter of this manual for blade tolerances.

J. Setting the Reverse Angle of the Blades

<u>NOTE</u>: Refer to the applicable Aircraft Type Certificate Data Sheet or Hartzell Propeller Application Guide Manual 159 (61-02-59) for the specific reverse blade angle and blade radius required.

(1) Apply 200 psi (13.78 bars) air pressure to the propeller to move the propeller pitch change components against the pitch adjust sleeve unit (280).

(2) Remove play from the blades by pushing the counterweight or counterweight clamp toward feather.

(3) Using a protractor TE96, TE97, or equivalent, check the reverse angle of each blade at the appropriate blade radius location. Refer to Figure 7-40.

(4) If the reverse blade angle is not correct:

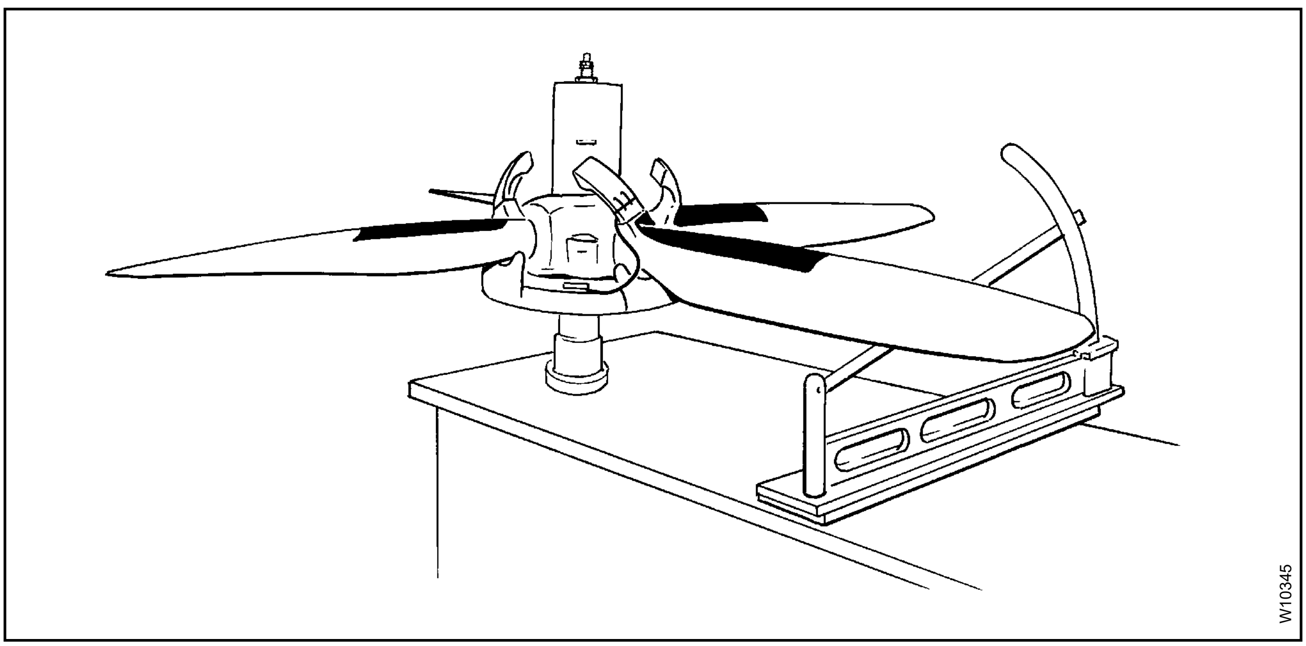
(a) Relieve the pressure from the propeller.

(b) Turn the pitch adjust sleeve unit (280) clockwise to decrease the amount of negative pitch or counterclockwise to increase the amount of negative pitch.

<u>NOTE</u>: One full turn of the pitch adjust sleeve unit equals approximately five degrees.

(5) After adjustment, repressurize the propeller, and recheck the reverse angle.

(6) When the correct reverse angle has been established in all four blades, turn the drilled hex nut (20) on the pitch adjustment sleeve unit (280) against the cylinder (40).



Checking Blade Angles with the Bench Top Protractor TE96
Figure 7-40

CAUTION: DO NOT PERMIT THE PITCH ADJUST SLEEVE UNIT (280) TO ROTATE WHEN TORQUING THE DRILLED THIN HEX NUT (20).

(7) While holding the pitch adjust sleeve unit (280) to prevent rotation, torque the drilled thin hex nut (20) against the cylinder (40) in accordance with Table 8-1 in the Fits and Clearances chapter of this manual.

(8) Cycle the propeller to feather and back to reverse.

(9) Measure the reverse blade angle.

(a) If the angle is incorrect, loosen the drilled hex nut (20) and repeat steps (4) through (9) in this section.

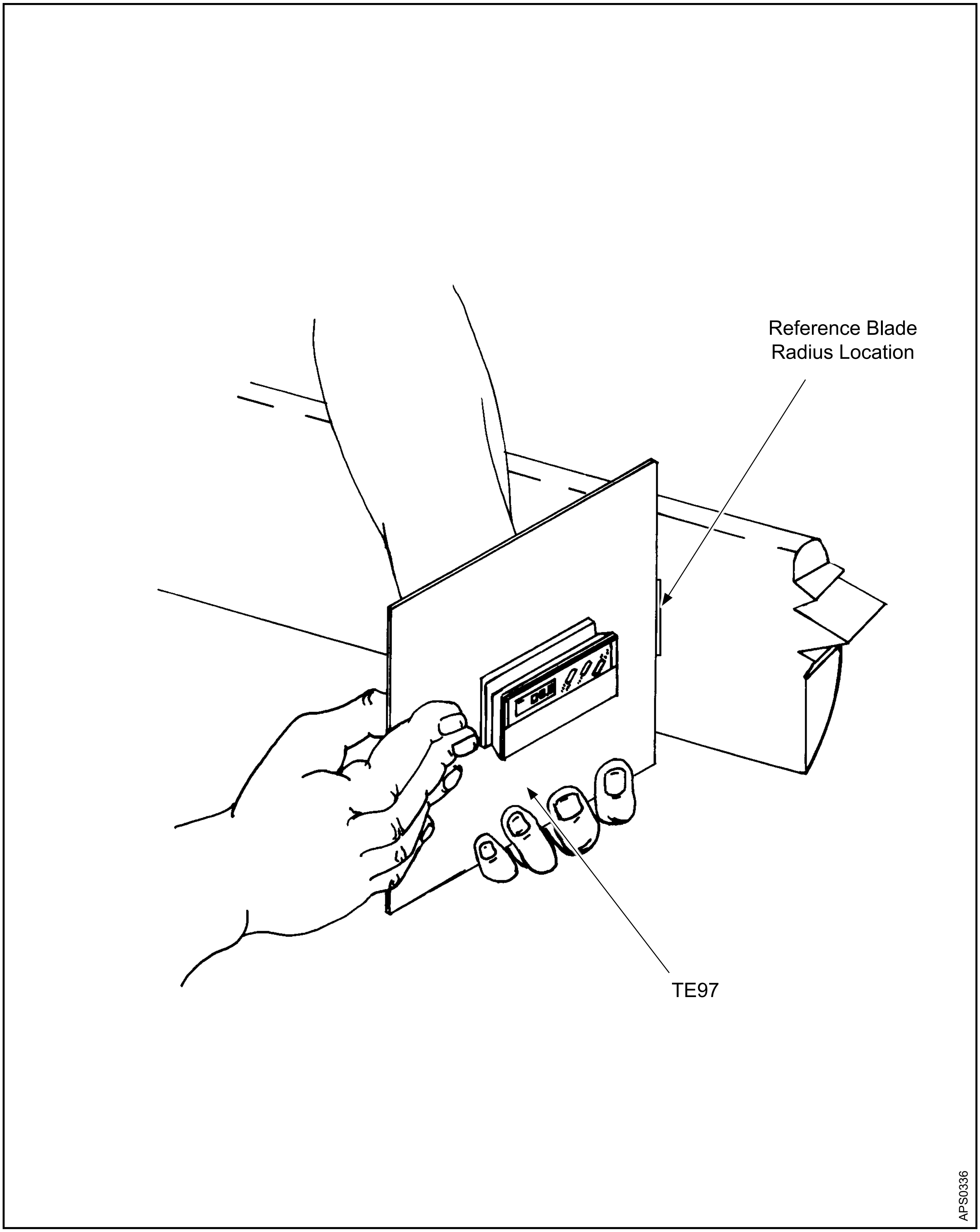
(b) When the reverse blade angle is correct, continue to the next step.

(10) Install the corrosion resistant washer (60) and fillister head screw (50) into one of the holes provided in the cylinder (40).

(11) Torque the fillister head screw (50) in accordance with Table 8-1 in the Fits and Clearances chapter of this manual.

NOTE: When assembling a propeller that will be disassembled for shipping, it is not necessary to install safety wire to the drilled thin hex (20) nut and fillister head screw (50).

(12) Using 0.032 inch (0.81 mm) minimum diameter stainless steel wire, safety wire the drilled thin hex nut (20) to the fillister head screw (50).



Checking Feathering Angle with Protractor TE97
Figure 7-41

K. Setting the Feather Blade Angle

(1) Refer to the applicable Aircraft Type Certificate Data Sheet or Hartzell Propeller Application Guide Manual 159 (61-02-59) for the specific feather blade angle and reference blade radius required.

CAUTION: TO ACHIEVE THE CORRECT FEATHER BLADE ANGLE, THE THIN HEX NUT (15) MUST CONTACT THE SHOULDER OF THE PITCH ADJUST SLEEVE UNIT (280).

(2) Release all air pressure from the propeller.

(3) Install the thin hex nut (15) on the pitch change rod (420) and turn the thin, drilled hex nut (15) until it bottoms against the pitch adjust sleeve unit (280).

(4) Apply air pressure to the propeller to move the pitch change rod (420) and the thin, drilled hex nut (15) off of the pitch adjust sleeve unit (280).

(5) Turn the thin, drilled hex nut (15) clockwise approximately five (5) turns to provide a starting point for feather blade angle adjustment.

(6) Release the air pressure from the propeller and permit the thin, drilled hex nut (15) to rest on the pitch adjust sleeve unit (280).

(7) Remove the play from the blades by pushing the counterweight or counterweight clamp toward feather.

(8) Using a protractor TE96, TE97, or equivalent, measure the feather angle of blade number one at the appropriate reference blade radius. Refer to Figure 7-41.

(9) If the feather blade angle is not correct, apply enough air pressure to the propeller to move the pitch change rod (420) and thin, drilled hex nut (10) off the pitch adjust sleeve unit (280).

(10) Adjust the feather blade angle by turning the thin, drilled hex nut (15) on the pitch change rod (420).

NOTE: One full turn of the thin, drilled hex nut (15) equals approximately five (5) degrees.

(a) To decrease the angle, turn the thin, drilled hex nut (15) clockwise.

(b) To increase the angle, turn the thin, drilled hex nut (15) counterclockwise.

(11) When the correct feather angle is established for all four blades, install a second thin, drilled hex nut (10).

CAUTION: THE THIN, DRILLED HEX NUT (15) MUST NOT MOVE WHEN TORQUING THE THIN, DRILLED HEX NUT (10) AGAINST THE THIN, DRILLED HEX NUT (15).

(12) Torque the thin, drilled hex nut (10) against the first thin, drilled hex nut (15), in accordance with Table 8-1 in the Fits and Clearances chapter of this manual.

(13) Cycle the propeller to reverse and back to feather.

(14) Measure the feather blade angle.

(a) If the angle is incorrect, loosen the thin, drilled hex nut (10) and repeat steps (8) through (13) in this section.

(b) When the feather blade angle is correct, continue to the next step.

(15) After torquing the thin, drilled hex nuts (10,15), recheck the feather blade angle.

NOTE: When assembling a propeller that will be disassembled for shipping, it is not necessary to install safety wire to the thin, drilled hex nuts (10,15).

(16) Using 0.032 inch (0.81 mm) minimum diameter stainless steel wire, safety wire the two thin, drilled hex nuts (10,15) together for safety.

NOTE: When assembling a propeller that will be disassembled for shipping, it is not necessary to install the hex head bolt (410), washer (400), and nut (390).

(17) Install the hex head bolt (410) through the hole in the pitch change rod (420) and the slot in the beta adjust screw (30).

(18) Install the washer (400) and nut (390) on the hex head bolt (410).

(19) Hold the hex head bolt (410) to keep it from turning and torque the nut (390) in accordance with Table 8-1 in the Fits and Clearances chapter of this manual.

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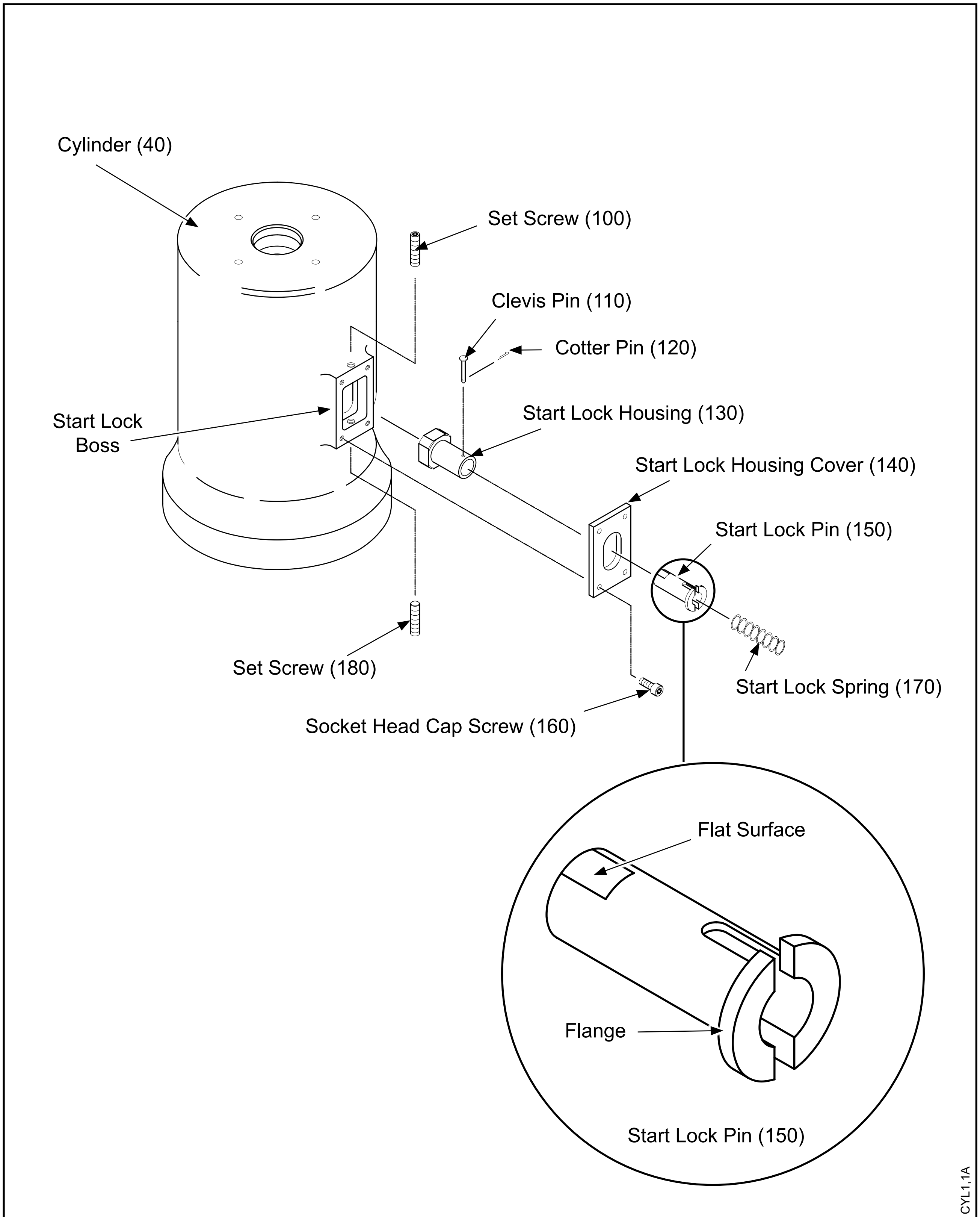


Start Lock Assembly
Figure 7-42

L. Start Lock Assembly - Refer to Figure 7-42

(1) Turn the two set screws (110,180) an equal number of turns into the end of each start lock boss on the cylinder (40).

NOTE: The set screw (180) is installed on the end of the start lock boss on the cylinder (40) that is closest to the hub (500).

(2) Insert one start lock housing (130) into a start lock housing cover (140).

(3) Slide a start lock pin (150) into the start lock housing (130).

(a) Position the flat surface of the start lock pin in the direction of the piston lip it engages. The flat surface must face away from the hub (500).

(4) Put a start lock spring (170) inside the start lock pin (150).

(5) Compress the start lock spring (170), and insert the clevis pin (110) and cotter pin (120), as applicable.

CAUTION: MAKE SURE THE FLAT SURFACE ON THE START LOCK PIN (150) FACES AWAY FROM THE HUB (500) DURING THE START LOCK HOUSING (130) PLACEMENT IN THE START LOCK BOSS.

(6) Install the squared portion of the start lock housing (130) into the channel inside the start lock boss and position the start lock housing cover (140) over the start lock boss.

(a) Align the four holes in the start lock housing cover (140) with the four threaded holes in the start lock boss for mounting the start lock housing cover.

CAUTION: DO NOT TIGHTEN THE START LOCK COVER CAP SCREWS (160) AT THIS TIME.

(7) Using four socket head cap screws (160), loosely fasten the start lock housing cover (140) to the start lock boss.

NOTE: The socket head cap screws will be tightened after the start lock angle of the blades is set.

(8) Insert a 0.25 inch (6.3 mm) thick spacer between each start lock pin (150) flange and start lock housing (130).

NOTE: This will prevent interference with subsequent piston movement.

(9) Repeat the start lock assembly procedure for the other start lock.

M. Setting the Start Lock Angle of the Blades

(1) Apply 200 psi (13.78 bars) air pressure to the propeller and move the propeller blade pitch to the reverse stop.

(2) Lightly snug the socket head cap screws (160) against the start lock housing cover (140).

NOTE: This will hold the start lock housing (130) and the start lock pins (150) square with the cylinder (40) and make sure of correct and accurate setting of the start lock angle of the blades.

(3) Put the set screws (100,180) in the start lock boss so that the screws do not enter the start lock housing (130) cavity in the start lock boss.

(4) Remove the 0.25 inch (6.3 mm) thick spacers used to hold the start lock pins (150) off the start lock housings (130) while the reverse and feathering blade angles were set.

(5) Position the set screws (100,180) so that the same number of threads protrude from each start lock boss. Refer to Figure 7-42.

NOTE: Four threads protruding is a recommended starting location.

(6) Release the air pressure and permit the steel ring (330) on the piston (340) to engage the start lock pins (150).

(7) Pull on each start lock pin (150) to determine if each is engaging the steel ring (330) on the piston (340).

(a) If a start lock pin (150) is not engaging the steel ring (330), it will move away from the cylinder (40) when pulled.

(b) If the start lock pin moves away from the cylinder (40) when pulled, turn the set screws (100,180) into the cylinder boss until the start lock pin (150) does not pull away from the cylinder (40).

(8) Using a protractor TE96, TE97, or equivalent, measure the start lock angle at the appropriate reference blade radius.

(9) If the start lock angle is not correct, identify the difference and apply 200 psi (13.78 bars) air pressure to the propeller and move the propeller blade pitch to the reverse stop.

(10) Adjust the location of both set screws (100,180) equally.

(a) Turn the set screws (100,180) into the start lock boss to decrease the start lock angle or out of the start lock boss to increase start lock angle.

NOTE: One full rotation of the set screw equals approximately 1.7 degrees of blade pitch change.

(11) Release the air pressure and permit the steel ring (330) on the piston (340) to again engage the start lock pins (150).

(12) Using a protractor TE96, TE97, or equivalent, measure the start lock angle at the appropriate reference blade radius.

(13) If further adjustment is necessary, repeat the previously described adjustment procedure.

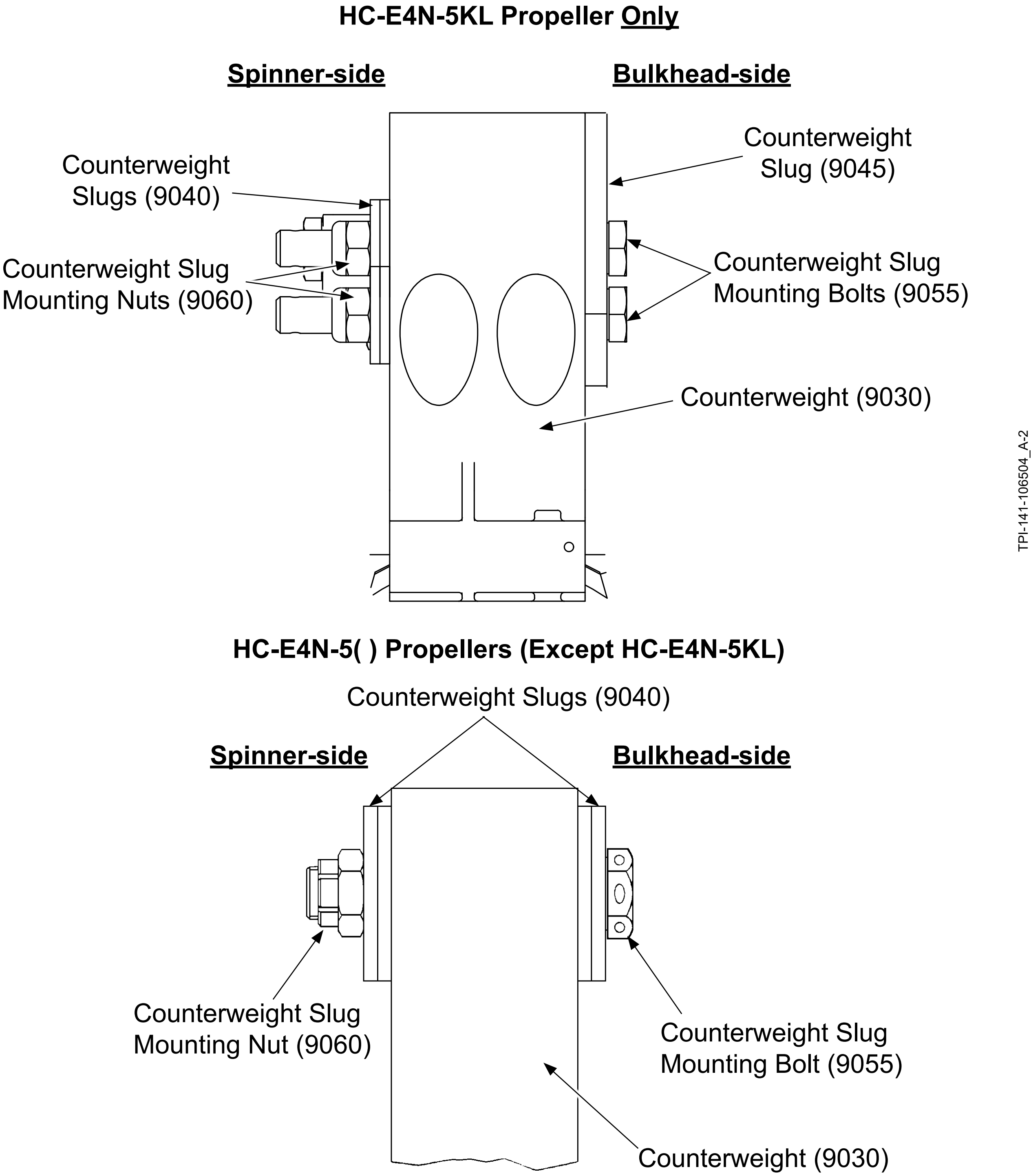
(14) When the start lock angle is correctly set, check the start lock pins (150) for correct engagement of the steel ring (330) on the piston (340) as previously described.

(15) Torque the four socket head cap screws (160) against the start lock housing cover (140) in accordance with Table 8-1 in the Fits and Clearances chapter of this manual.

(16) Using 0.032 inch (0.81 mm) minimum diameter stainless steel wire, safety wire the four socket head cap screws to each other.

(17) Turn each set screw (100) into the start lock boss until it bottoms out against the start lock housing (130).

NOTE: This will secure the start lock housing (130) in place.



NOTE: Counterweight slugs (9040, 9045) are application specific. For the number of counterweight slugs (9040) to be used, refer to Hartzell Propeller Application Guide Manual 159 (61-02-59).

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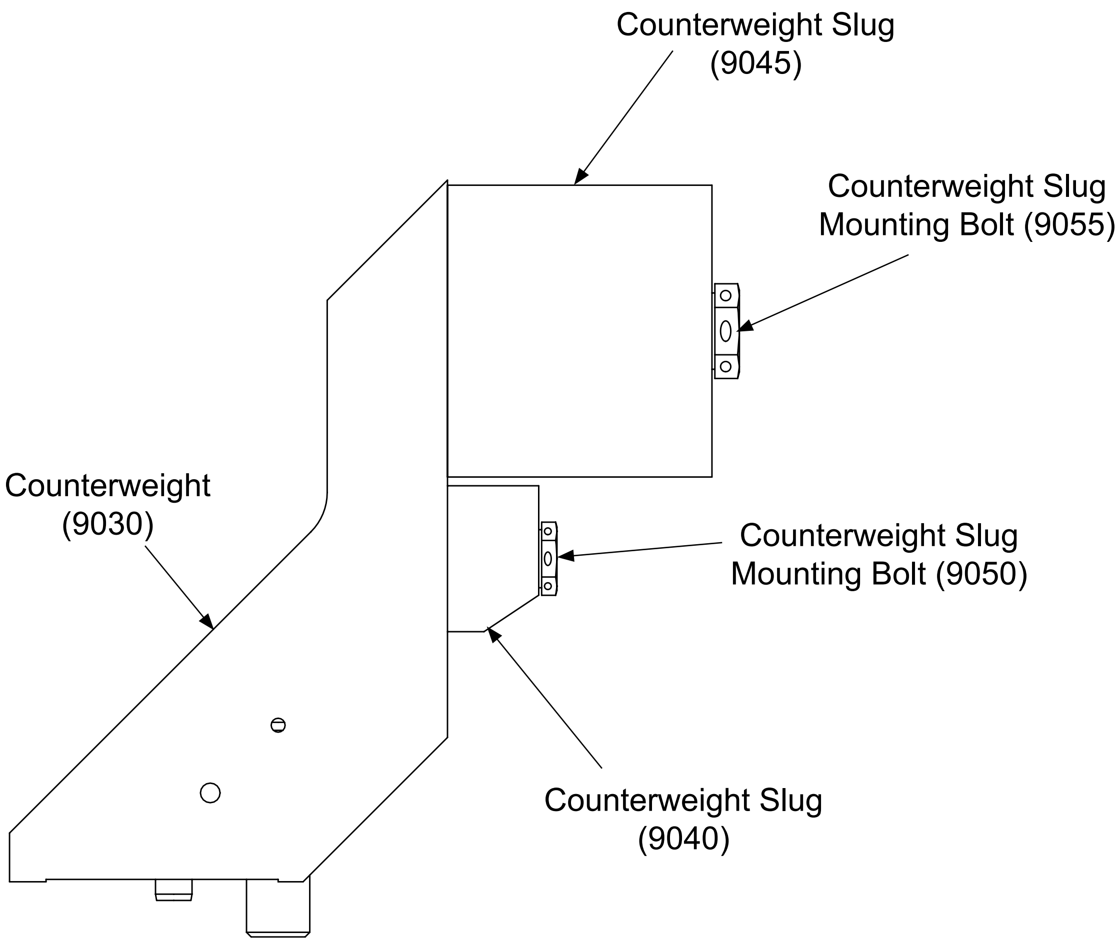
Counterweight Slug Placement for HC-E4N-5( ) Propellers
Figure 7-43

HC-E4P-5( ) Propellers



NOTE: Counterweight slugs (9040, 9045) are application specific. For the number of counterweight slugs to be used, refer to Hartzell Propeller Application Guide Manual 159 (61-02-59).

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Counterweight Slug Placement for HC-E4P-5( ) Propellers
Figure 7-44

N. Installing Counterweight Slugs

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

(1) For the applicable blade counterweight slugs (9040) to be installed on each propeller model, refer to Hartzell Propeller Application Guide Manual 159 (61-02-59).

CAUTION: MAKE SURE THAT THE HEAD OF THE COUNTERWEIGHT BOLT (9050) THAT ATTACHES THE COUNTERWEIGHT SLUGS (9040) TO THE COUNTERWEIGHT (9030) IS ON THE ENGINE FLANGE OR BULKHEAD-SIDE OF THE BLADE.

(2) For the HC-E4N-5KL propeller only:

(a) Install a counterweight slug (9045) and counterweight slug mounting bolts (9050) with the counterweight slug (9045) and the head of the counterweight slug mounting bolts (9050) on the bulkhead-side of the blade. Refer to Figure 7-43.

(b) Install two counterweight slugs (9040) on each of the counterweight slug mounting bolts (9050) on the spinner-side of the blade counterweight (9030) as shown in Figure 7-43.

1 There are no counterweight slugs (9040) on the bulkhead-side of the blade counterweight (9030).

(c) Install a counterweight slug mounting nut (9060) on each counterweight slug mounting bolt (9050).

(d) Torque each counterweight slug mounting nut (9060) in accordance with the Torque Values Table 8-1 in the Fits and Clearances chapter of this manual.

(3) For the HC-E4N-5( ) propellers (except HC-E4N-5KL):

(a) Using new counterweight slug mounting bolts (9050), install the counterweight slugs (9040).

1 With the head of the counterweight slug mounting bolt (9050) on the engine flange or bulkhead-side of the blade, install the applicable number of counterweight slugs (9040) on each side of the blade counterweight (9030), as shown in Figure 7-43.

a For the number of counterweight slugs (9040) to be used, refer to Hartzell Propeller Application Guide Manual 159 (61-02-59).

b If the quantity of counterweight slugs (9040) is an odd number, put the extra counterweight slug (9040) on the spinner bulkhead-side of the counterweight (9030).

2 Install a counterweight slug mounting nut (9060) on each counterweight slug mounting bolt (9050).

3 Torque each counterweight slug mounting nut (9060) in accordance with the Torque Values Table 8-1 in the Fits and Clearances chapter of this manual.

(4) For the HC-E4P-5( ) propellers:

(a) Using new counterweight slug mounting bolts (9050), install the counterweight slugs (9040, 9045).

1 With the head of the counterweight slug mounting bolt (9050, 9055) on the engine flange or bulkhead-side of the blade, install the applicable number of counterweight slugs (9040, 9045) on the blade counterweight (9030), as shown in Figure 7-44.

a For the number of counterweight slugs (9040) to be used, refer to Hartzell Propeller Application Guide Manual 159 (61-02-59).

2 Torque each counterweight slug mounting bolt (9050, 9055) in accordance with Table 8-1, "Torque Values" in the Fits and Clearances chapter of this manual.

O. Propeller Lubrication

(1) Lubricate the propeller in accordance with the Propeller Lubrication chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

P. Static Balance

NOTE: When assembling a propeller that will be disassembled for shipping, it is not necessary to install safety wire to the static balance weight screws (1100).

(1) Perform static balance of propeller in accordance with the Static and Dynamic Balance chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

Q. Label Placement

(1) Refer to the Parts Identification and Marking chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02) for information about label use.

4. Propeller Disassembled for Shipping

A. General

(1) A propeller disassembled for shipping has had one or more blades removed from the propeller after assembly. The propeller was fully assembled, tested, inspected, lubricated, and statically balanced before blade removal and shipping.

(2) A propeller disassembled for shipping must be assembled by trained personnel in accordance with Hartzell Propeller manuals.

(3) For additional general assembly information, refer to the General section at the beginning of this chapter.

B. Preparing Propeller for Shipping

NOTE 1: New hardware was installed during propeller assembly for shipping. When disassembling a propeller for shipping, it is not necessary to discard hardware that would require replacement at overhaul.

NOTE 2: New O-rings have been installed during propeller assembly for shipping. During propeller disassembly for shipping, it is not necessary to replace O-rings unless damaged during component installation or removal.

(1) Before removal, make a mark to indicate alignment of each blade assembly, fork unit, spinner bulkhead, and balance weight location with the hub unit. Refer to the Marking before Disassembly section in the Disassembly chapter of this manual.

(2) If the propeller will be shipped without the bulkhead installed, put index labels AR-20 and AR-30 on the hub (500) and bulkhead to show alignment of the bulkhead to the hub (500), before removing the bulkhead from the hub (500).

(3) Remove all balance weight screws (1100) and balance weights (1110).

(4) Disconnect the electric de-ice lead wires from the hub (500) and bulkhead, if applicable.

(5) Disassemble the hydraulic system and pitch adjustment unit. Refer to the Hydraulic System and Pitch Adjustment Unit Disassembly section in the Disassembly chapter of this manual.

NOTE: It is not necessary to remove the pitch adjust sleeve unit (280) from the cylinder (40) or the piston (340) and hex nut (310) from the pitch change rod (420).

(6) Propeller Reassembly with Blades Removed for Shipping

(a) When reassembling the propeller with the blades removed, do not accomplish procedures related to blade installation or setting of blade angles.

(b) Reassemble the propeller without the blade assemblies. Refer to the Assembly section in this chapter.

(7) Packing the Propeller and Blades for Shipping

(a) Refer to the Packaging and Storage chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02), for packing the propeller and blades for shipping.

(b) Pack the propeller without blades for shipping.

(c) Pack the blades for shipping with the preload plate (910), blade retention bearing (980), blade seal (1010), and grease CM12 on each blade shank.

5. Reassembly of a Propeller Disassembled for Shipping

A. Unpacking the Propeller and Blades

(1) Carefully unpack the propeller and blades from shipping.

(2) Visually inspect all propeller components for shipping damage. If damage is found, refer to the Check chapter of this manual for specific inspection, serviceable limits, and corrective action criteria.

B. Preparing Propeller for Reassembly

NOTE 1: New hardware was installed during propeller assembly for shipping. When disassembling a propeller from shipping, it is not be necessary to discard hardware that would require replacement at overhaul.

NOTE 2: New O-rings have been installed during propeller assembly for shipping. During propeller disassembly from shipping, it is not necessary to replace O-rings, unless they were damaged during component installation or removal.

(1) Make sure that each blade assembly, the fork unit, the spinner bulkhead, and each balance weight has been marked for alignment with the hub unit.

(2) Remove all balance weight screws (1100) and balance weights (1110).

(3) Disassemble the beta system. Refer to the Beta System Disassembly section in the Disassembly chapter of this manual.

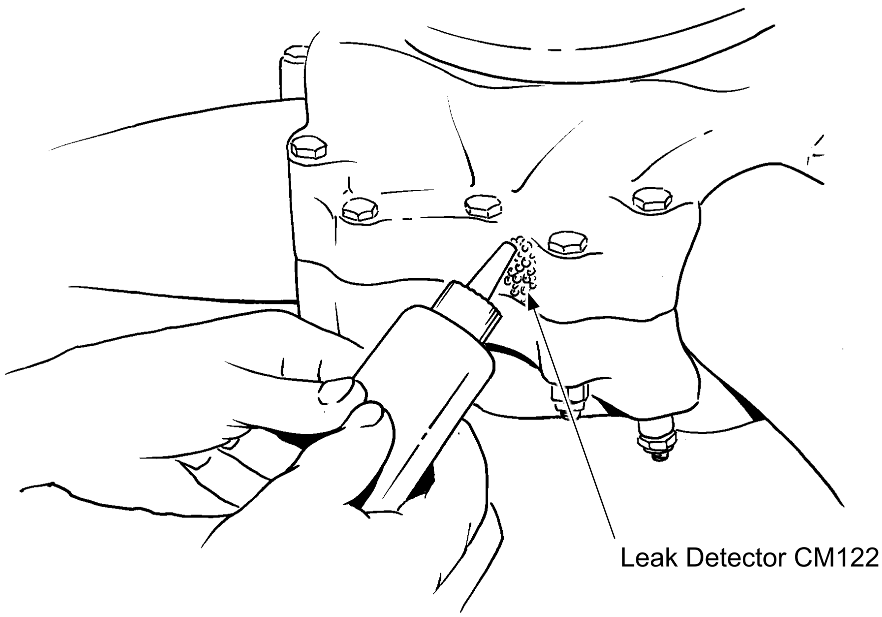
(4) Disassemble the hydraulic system and pitch adjustment unit. Refer to the Hydraulic System and Pitch Adjustment Unit Disassembly section in the Disassembly chapter of this manual.

NOTE: It is not necessary to remove the pitch adjust sleeve unit (280) from the cylinder (40) or the piston (340) and hex nut (310) from the pitch change rod (420).

C. Propeller Reassembly

(1) Reassemble HC-(D,E)4(N,P,W)-5( ) propellers in accordance with the Assembly of HC-(D,E)4(N,P,W)-5( ) Propeller Models in this chapter.

(2) Reconnect the electric de-ice lead wires to the bulkhead, if applicable.



Hub Leak Test
Figure 7-45

6. Leak Test (Rev. 3)

A. Leak Test Procedure

NOTE: Refer to the Illustration Parts List chapter of this manual for the location of the lubrication fittings and lubrication plugs (engine-side/cylinder-side) for the applicable propeller model.

(1) Install the lubrication fittings (660) in the applicable side of the hub.

(a) Tighten each lubrication fitting (660) until finger-tight, then tighten one additional 360 degree turn.

(2) Install the lubrication plugs (665) in the applicable side of the hub.

(a) Leave one lubrication plug hole open for leak testing.

(b) Tighten each lubrication plug (665) until finger-tight, then tighten one additional 360 degree turn.

(3) With the hub installed on the propeller test stand, perform the leak test in accordance with the following steps:

(a) Move the propeller to low pitch.

(b) Apply leak detector CM122 to the open lubrication plug hole. Refer to Figure 7-45.

1 If there is any indication of air exiting the hub, refer to the Testing and Fault Isolation chapter of this manual.

(4) After the leak test is complete, install the remaining lubrication plug (665) in the applicable side of the hub.

(a) Tighten the lubrication plug (665) until finger-tight, then tighten one additional 360 degree turn.

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FITS AND CLEARANCES - CONTENTS

LIST OF FIGURES

LIST OF TABLES

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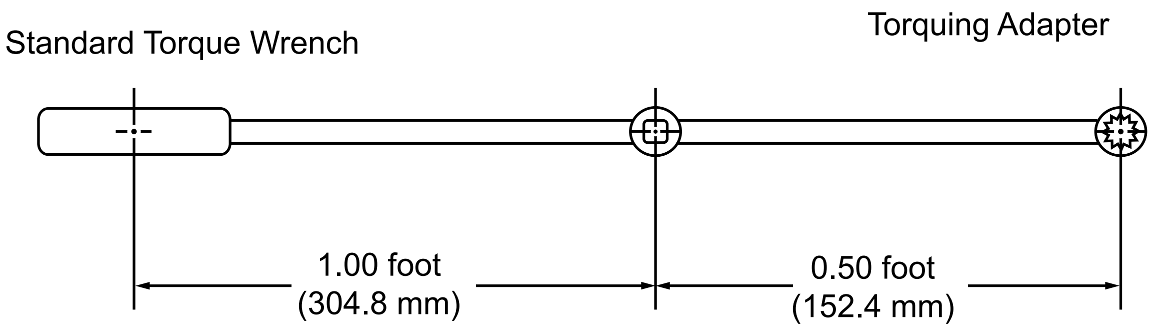


$$\frac{\text{(actual torque required)} \times \text{(torque wrench length)}}{\text{(torque wrench length)} + \text{(length of adapter)}} = \text{torque wrench reading to achieve required actual torque}$$

EXAMPLE:

$$\frac{100 \text{ Ft-Lb } (136 \text{ N}\bullet\text{m}) \times 1 \text{ ft } (304.8 \text{ mm})}{1 \text{ ft } (304.8 \text{ mm}) + 0.50 \text{ ft } (152.4 \text{ mm})} = 66.7 \text{ Ft-Lb } (90.4 \text{ N}\bullet\text{m})$$

reading on torque wrench with 6-inch (152.4 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.

APS212

Calculating Torque When Using a Torque Wrench Adapter
Figure 8-1

1. Torque Values (Rev. 3)

A. Important Information

(1) The structural integrity of joints in the propeller that are held together with threaded fasteners is dependent upon proper torque application.

(a) Vibration can cause an incorrectly tightened fastener to fail in a matter of minutes.

(b) Correct tension in a fastener depends on a variety of known load factors and can influence fastener service life.

(c) Correct tension is achieved by application of measured torque.

(2) Use accurate wrenches and professional procedures to make sure of correct tensioning.

(3) For the torque values to use when assembling a Hartzell propeller, refer to Table 8-1, "Torque Values" in this chapter.

(4) When an adapter is used with a torque wrench, use the equation in Figure 8-1 to determine the correct torque value.

CAUTION 1: TORQUE VALUES ARE BASED ON NON-LUBRICATED THREADS, UNLESS SPECIFIED IN TABLE 8-1.

CAUTION 2: FOR TORQUE READING WHEN USING A TORQUE WRENCH ADAPTER, REFER TO FIGURE 8-1.

NOTE: Torque tolerance is ±10 percent unless otherwise noted. Wet torque denotes use of anti-seize compound CM118.

Item No.	Part Number	Description / Location	Torque		
			Ft-Lb	In-Lb	N•m
10	B-3839-16	Nut, Hex, Thin, Drilled/Feather Stop, Cylinder	120	1440	163
15	B-3839-16	Nut, Hex, Thin, Drilled/Feather Stop, Cylinder	120	1440	163
20	B-3375	Nut, 1 3/8-12, Hex, Thin, Drilled/Cylinder	165	1980	224
40	D-484	PCP: Cylinder	200 wet	2400 wet	271 wet
	D-484-1	Cylinder	200 wet	2400 wet	271 wet
	D-6845	Cylinder	200 wet	2400 wet	271 wet
50	B-3841-5	Screw, 1/4-28, Fillister Head/Cylinder	--	41	4.6
160	B-3821	Screw, 10-32, Cap/Start Lock Housing	--	72	8.1
210	A-2038-12	Screw, 1/4-28, Cap/Clamp, Cylinder	--	60-80	6.8-9
310	B-474	Nut, 1 1/8-12, Hex, Self-Locking/Piston	100	1200	136
390	B-3808-3	Nut, Hex, Self-Locking/Pitch Change Rod	--	43-53	5-6
420	D-494-( )	PCP: Pitch Change Rod	80 wet	960 wet	109 wet
	D-6114-( )	PCP: Rod, Pitch Change	80 wet	960 wet	109 wet
	106503	PCP: Rod, Pitch Change	80 wet	960 wet	109 wet
	107224	PCP: Rod, Pitch Change	80 wet	960 wet	109 wet
650	A-2043-1	Nut, 3/8-24, Hex, Self-Locking/Hub, Clamping	22	264	30
660	A-279	Fitting, Lubrication	Finger-tight then tighten one additional 360 degree turn		
	C-6349	Fitting, Lubrication	Finger-tight then tighten one additional 360 degree turn		
665	106545	Plug, Lubrication	Finger-tight then tighten one additional 360 degree turn		
720	B-468	Extension, Bumper/Pitch Change Fork	--	72-96	8.1-10.8
810	108142	Bolt, 1/4-28, 12 Point/Pitch Change Knob	16-18	192-216	22-24
	B-3385-3H	Bolt, 5/16-24, Hex Head/Pitch Change Knob	16-18	192-216	22-24
	B-3830	Bolt, 5/16-24, 12 Point/Pitch Change Knob	18-22	216-264	25-29
890	B-3867-272	Screw, 10-32 100°, Head, Cres/Washer Retaining	--	8-10	0.9 -1.1
940	B-3368	Nut, 5/16-24, Hex, Thin/Preload Plate	--	120	13.6

Torque Values
Table 8-1, page 1 of 2

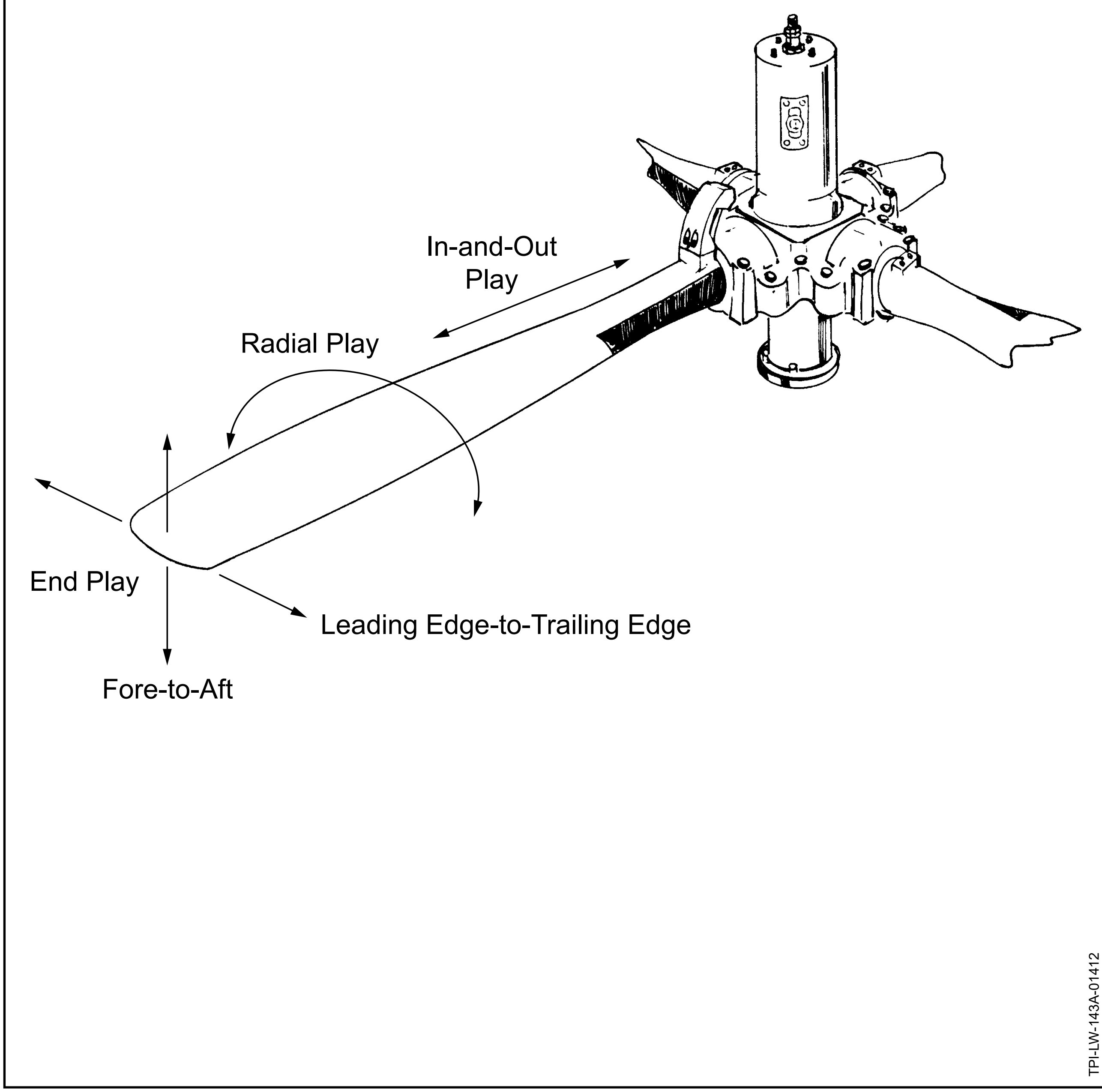
CAUTION 1: TORQUE VALUES ARE BASED ON NON-LUBRICATED THREADS, UNLESS SPECIFIED IN TABLE 8-1.

CAUTION 2: FOR TORQUE READING WHEN USING A TORQUE WRENCH ADAPTER, REFER TO FIGURE 8-1.

NOTE: Torque tolerance is ±10 percent unless otherwise noted. Wet torque denotes use of anti-seize compound CM118.

Item No.	Part Number	Description / Location	Torque		
			Ft-Lb	In-Lb	N•m
9050	***	Bolt, 1/4-28, Hex Head (Counterweight Slug Attachment)	10	120	13.5
9055	***	Bolt, 3/8-24, Hex Head (Counterweight Slug Attachment)	22	264	30
9060	***	Nut, 3/8-24, Hex, Self-Locking (Counterweight Slug attachment)	22	264	30
-	B-3384-( )	Bolt, 1/4-28, Hex Head/Bulkhead	--	96-120	10.8-13.6
-	A-2070-( )	Screw, 1/4-28, Button Head/Bulkhead	--	96-120	10.8-13.6
*** Counterweight slug mounting hardware is application specific. Refer to Hartzell Propeller Application guide Manual 159 (61-02-59).					

Torque Values
Table 8-1, page 2 of 2



Blade Play
Figure 8-2

2. Blade Tolerances (Rev. 6)

A. Blade Play

(1) Limits for aluminum blade play are specified below. Refer to Figure 8-2.

(a) End Play:

1	Leading Edge-to-Trailing Edge	± 0.0625 inch (1.58 mm) Total: 0.125 inch (3.17 mm)
2	Fore-to-Aft (face-to-camber)	± 0.0625 inch (1.58 mm) Total: 0.125 inch (3.17 mm)

(b)	In-and-Out Play	None permitted
(c)	Radial Play (pitch change)	±0.5 degree (1 degree total) measured at reference station

(2) Limits for composite blade play are specified below. Refer to Figure 8-2.

(a) End Play

1	Leading Edge-to-Trailing Edge	± 0.125 inch (3.17 mm) Total: 0.250 inch (6.35 mm)
2	Fore-to-Aft (face-to-camber)	± 0.125 inch (3.17 mm) Total: 0.250 inch (6.35 mm)

(b)	In-and-Out Play	None permitted
(c)	Radial Play (pitch change)	±0.5 degree (1 degree total) measured at reference station

(3) Blades should be tight in the propeller; however, play that is within the allowable limits is acceptable if the blade returns to its original position when released.

(a) If blade play is greater than the allowable limits, or if the blade(s) do not return to their original position when released, there may be internal wear or damage that should be referred to a certified propeller repair station with the appropriate rating.

B. Blade Track

(1)	Aluminum Blades	± 0.0625 inch (1.58 mm) Total: 0.125 inch (3.17 mm)
(2)	Composite Blades:	± 0.125 inch (3.17 mm) Total: 0.250 inch (6.35 mm)

C. Blade Pitch Tolerance

(1) Blade pitch setting tolerance between blades at low pitch — 0.2 degree

SPECIAL TOOLS, FIXTURES, AND EQUIPMENT - CONTENTS

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1. Tooling and Facility Requirements (Rev. 2)

A. Standard Tooling

(1) Propeller repair stations certified by the FAA or international equivalent to overhaul Hartzell Propeller LLC propellers are expected to possess precision fixtures, tools, and blade tables for blade inspection and repair.

(a) Except as specifically required in this manual, locally fabricated tooling is acceptable for most repair and inspection operations.

B. Special Tooling

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

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

(b) It is the responsibility of the repair station or the technician performing the repair or servicing to use these special tools as required.

C. Facilities

(1) Grinding, plating, and painting of propeller components can create health and safety hazards beyond that of other areas of a typical workshop.

(a) Areas where grinding, plating, and painting are performed should comply with governmental regulations for occupational safety and health, industry standards, and environmental regulations.

(2) Workshop areas need to be segregated to prevent contamination.

(a) Separate areas should be designated for cleaning, inspection, painting, plating, and assembly.

(b) Propeller balancing must be performed in a draft free area.

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ILLUSTRATED PARTS LIST - CONTENTS

PROPELLER PARTS LISTS and FIGURES

SUB-ASSEMBLY PARTS LISTS and FIGURES

SUB-ASSEMBLY PARTS LISTS and FIGURES

1. Introduction (Rev. 2)

WARNING: ANY PART IDENTIFIED AS AN EXPERIMENTAL OR NON-AVIATION PART MUST NOT BE USED IN AN FAA OR INTERNATIONAL EQUIVALENT TYPE CERTIFICATED PROPELLER. A PART IDENTIFIED AS EXPERIMENTAL OR NON-AVIATION DOES NOT HAVE FAA OR INTERNATIONAL EQUIVALENT APPROVAL EVEN THOUGH IT MAY STILL SHOW AN AVIATION TC OR PC NUMBER STAMP. USE ONLY THE APPROVED ILLUSTRATED PARTS LIST PROVIDED IN THE APPLICABLE OVERHAUL MANUAL OR ADDITIONAL PARTS APPROVED BY AN FAA ACCEPTED DOCUMENT FOR ASSEMBLY OF A PROPELLER. THE OPERATOR ASSUMES ALL RISK ASSOCIATED WITH THE USE OF EXPERIMENTAL PARTS. USE OF EXPERIMENTAL PARTS ON AN AIRCRAFT MAY RESULT IN DEATH, SERIOUS BODILY INJURY, AND/OR SUBSTANTIAL PROPERTY DAMAGE.

A. General

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

(1) This chapter includes the parts lists and applicable illustrations for the propeller models included in this manual.

CAUTION: THE ILLUSTRATIONS IN THIS CHAPTER ARE PROVIDED FOR PART IDENTIFICATION AND LOCATION REFERENCE ONLY. THEY SHOULD NOT BE USED FOR ASSEMBLY.

(a) The illustrations in this chapter use some general views of parts that may not exactly depict every propeller part configuration.

B. Counterweights/Slugs/Mounting Hardware

(1) Counterweights, counterweight slugs, and the applicable mounting hardware are application specific. Refer to Hartzell Propeller Application Guide Manual 159 (61-02-59).

C. Spinner Assemblies/Mounting Hardware

(1) Spinner assemblies and the applicable mounting hardware are application specific. Refer to Hartzell Propeller Application Guide Manual 159 (61-02-59).

D. Ice Protection System Components

(1) Ice protection systems are application specific. Refer to Hartzell Propeller Application Guide Manual 159 (61-02-59).

(a) For components of ice protection systems supplied by Hartzell, refer to Hartzell Propeller Ice Protection System Manual 180 (30-61-80).

(b) For components of ice protection systems not supplied by Hartzell, refer to the applicable TC or STC holder’s Instructions for Continued Airworthiness (ICA).

2. Description of Columns (Rev. 2)

A. Fig./Item Number

(1) Figure Number refers to the illustration where items appear.
Item Numbers refer to the specific part callout in the applicable illustration.

(a) Item Numbers that are listed but not shown in the illustration are identified by a dash to the left of the item number. (example: "-800")

(b) Alpha variants will be used to add additional items. There are two reasons for the use of alpha variants:

1 A part may have an alternate, or may be superseded, replaced, or obsoleted by another part.

a For example, the self-locking nut (A-2043) that is item 20 was superseded by the self-locking nut (A-2043-1) that is item 20A.

2 An Illustrated Parts List may contain multiple configurations. Effectivity codes are used to distinguish different part numbers within the same list.

a For example, one propeller configuration may use a mounting bolt (B-3339-1) that is item 30, yet another propeller configuration uses a mounting bolt (B-3347) that is item 30A. Effectivity codes are very important in the determination of parts in a given configuration.

B. Part Number

(1) The Part Number is the Hartzell Propeller identification number for the part.

(2) Use the Hartzell Propeller part number when ordering the part from Hartzell or a Hartzell-approved distributor.

C. Description

(1) This column provides the Hartzell Propeller description of the part.

(2) Bullets and indentations are used to indicate parts that are components of a sub-assembly.

(a) For example, a Fork Assembly that is part of a HC-C2YR-1 propeller assembly will have one bullet (•) before the description. This indicates that the Fork Assembly is part of the propeller assembly.

1 A Fork Bumper that is part of the Fork Assembly will appear directly below the Fork Assembly with two bullets (• •) before the description. This indicates that the Fork Bumper is part of the Fork Assembly - that is part of the Propeller Assembly.

a Example: HC-C2YR-1
• Fork Assembly
• • Fork Bumper

(3) If the description in this column includes a "PCP:" prefix, the part is classified as a Propeller Critical Part.

(4) If applicable, information regarding part alternatives, supersedures, replacements, or obsolescence will appear in the Description column.

(a) Refer to the section, "Description of Terms" in this chapter for definitions and requirements for part "alternates", "supersedures", etc.

(b) When part alternatives, supersedures, replacements, etc. are listed, the service document number related to the change may be included for reference.

(5) If applicable, vendor CAGE codes will be listed in the Description column.

D. Effectivity Code (EFF CODE)

(1) This column is used when additional information about a part is required.

(a) Effectivity codes can be used to identify parts that are only used on a particular model, or to direct the user to additional information in the "Effectivity" box at the bottom of the page.

(b) Whenever an effectivity code is present, refer to the "Effectivity" box at the bottom of the page for the applicable information.

(2) Parts common to all assembly models on the page show no effectivity code.

E. Units Per Assembly (UPA)

(1) Designates the total quantity of an item required for the next higher assembly or subassembly.

F. Overhaul (O/H)

(1) Designates the parts to be replaced at overhaul. A “Y” identifies the parts that must be replaced at overhaul.

NOTE: An overhaul kit may not contain all the parts identified with a "Y" for a particular model propeller. An example of parts that may not be included in the overhaul kit is spinner mounting parts.

G. Propeller Critical Part (PCP)

(1) This column identifies the Propeller Critical Parts (PCP) that are contained in each propeller model.

(a) Refer to the Introduction chapter of this manual for the definition of Propeller Critical Parts (PCP).

3. Description of Terms (Rev. 1)

A. Alternate

(1) Alternate parts are identified by the term "ALTERNATE" in the Description column. Alternate items are considered airworthy for continued flight and existing stock of parts may be used for maintenance and/or repair. The new or alternate part number may be used interchangeably when ordering/stocking new parts.

B. Supersedure

(1) Part changes are identified by the terms “SUPERSEDES ITEM _____” or “SUPERSEDED BY ITEM _____” in the Description column. Superseded items are considered airworthy for continued flight and existing stock of superseded parts may be used for maintenance and/or repair. Once the superseding part has been incorporated/installed into an assembly, the original superseded part may no longer be used. Superseded parts may no longer be available, and the new part number must be used when ordering/stocking new parts.

C. Replacement

(1) Part changes identified by the terms "REPLACES ITEM _____” or “REPLACED BY ITEM _____” in the Description column are considered airworthy for continued flight, but must be replaced with a part with the new part number at overhaul. Existing stock of replaced parts may not be used for maintenance and/or repair of effected assemblies. Replaced parts may no longer be available, and the new part number must be used when ordering/stocking new parts.

D. Obsolete

(1) Obsolete parts are identified by "OBS” in the Units Per Assembly (UPA) column. Obsolete items are considered unairworthy for continued flight.

4. Vendor Supplied Hardware (Rev. 2)

A. Important Information

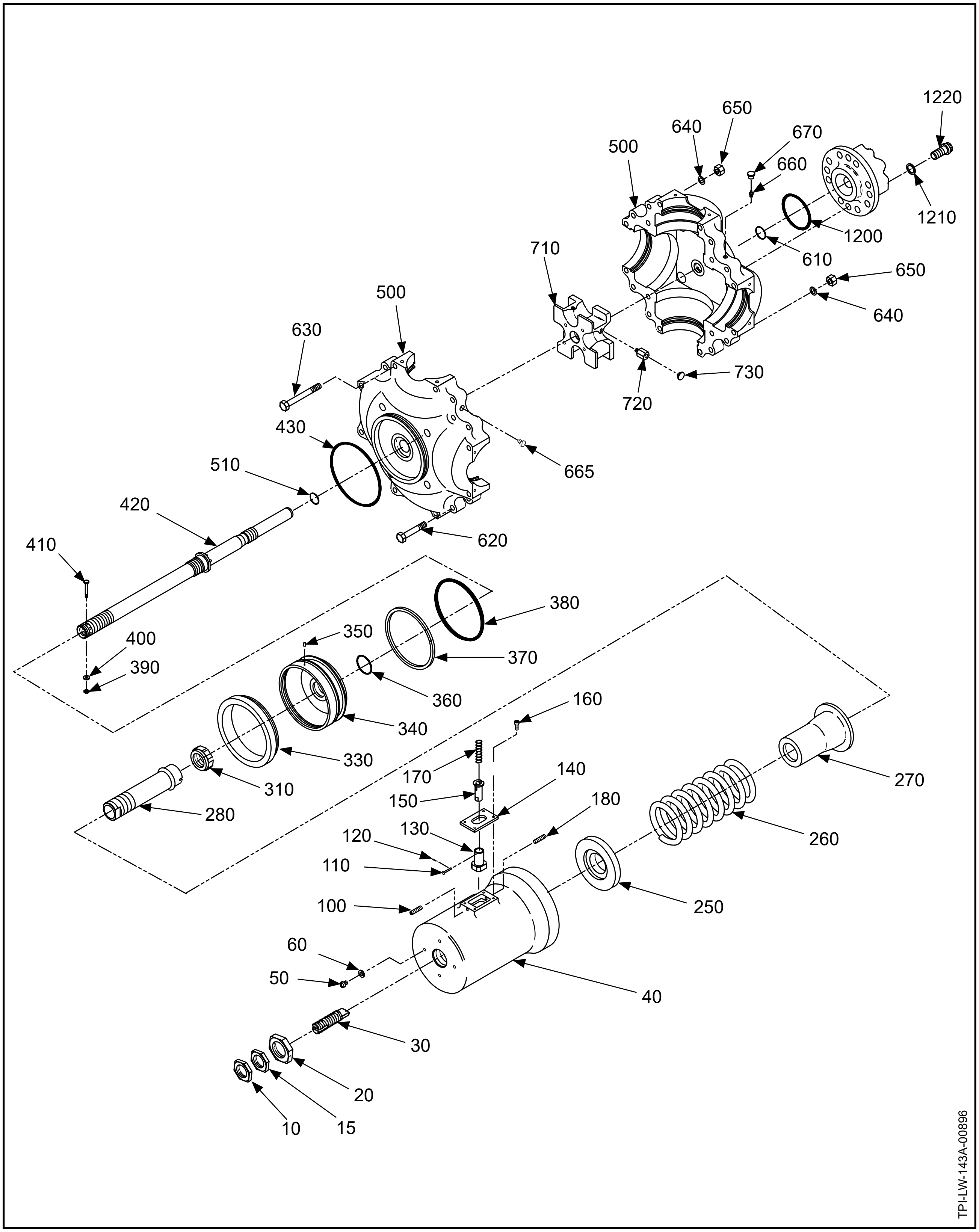
(1) Many O-rings, fasteners, and other vendor supplied hardware listed in Hartzell Propeller LLC manuals have previously been specified with AN, MS, NAS, or vendor part number. To provide internal controls and procurement flexibility, Hartzell part numbers have been assigned to all O-rings, fasteners, and hardware. Part shipments from Hartzell Propeller LLC will specify only the Hartzell part numbers.

(2) Some O-rings, fasteners, and hardware manufactured in accordance with established industry specifications (certain AN, MS, NAS items) are acceptable for use in Hartzell Propeller products without additional standards imposed by Hartzell.

(a) For a listing of part number interchangeability, refer to the Vendor Cross Reference chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).

(b) Where permitted, both the Hartzell part number item and AN, MS, NAS, and other specified vendor number items can be used interchangeably.

(c) The Hartzell part number must be used when ordering these parts from Hartzell Propeller LLC.



HC-D4N-5AL: Propeller Parts
Figure 10-1

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-1		**PROPELLER PARTS - HC-D4N-5AL**				
10	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
15	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
20	B-3375	• PCP: NUT, 1 3/8-12, HEX,THIN, DRILLED		1		PCP
30	B-439	• SCREW, BETA ADJUST		1		
40	D-484	• PCP: CYLINDER		1		PCP
50	B-3841-5	• SCREW, 1/4-28, FILLISTER HEAD		1	Y	
60	B-3837-0463	• WASHER, CORROSION RESISTANT		1	Y	
100	B-6639-131	• SCREW, SET		2	Y	
110	B-2877	• CLEVIS PIN, 3/32		2	Y	
120	B-3838-3-5	• COTTER PIN		2	Y	
130	B-444	• HOUSING, START LOCK		2		
140	B-446	• COVER, HOUSING, START LOCK		2		
150	A-2620-1	• PIN, START LOCK		2		
160	B-3821	• SCREW, 10-32, CAP		8	Y	
170	B-658	• SPRING, COMPRESSION		2	Y	
180	B-6639-131	• SCREW, SET		2	Y	
250	B-6768	• SPRING RETAINER, FORWARD		1		
260	C-6760	• PCP: SPRING, COMPRESSION, FEATHERING		1		PCP
270	B-6761	• GUIDE, SPRING, PLASTIC		1	Y	
280	B-476	• PCP: SLEEVE, PITCH ADJUST - UNIT, SUPERSEDED BY ITEM 280A		1		PCP
280A	B-6758	• PCP: SLEEVE, PITCH ADJUST - UNIT NOTE: PURCHASED UNIT INCLUDES SUPERSEDED ITEM 290A		1		PCP
-290	C-438	• • PCP: SLEEVE, REVERSE ADJUST SUPERSEDED BY ITEM 290A		1		PCP
-290A	C-6759	• • PCP: SLEEVE, REVERSE ADJUST SUPERSEDED BY ITEM 280A. NOTE: ITEM 290A IS ONLY AVAILABLE AS PART OF ITEM 280A		1		PCP
-300	A-441	• • BUSHING, SLEEVE		1		
310	B-474	• NUT, 1-1/8-12, HEX, SELF-LOCKING		1	Y	
-320	C-497	• PISTON UNIT		1		
330	B-493	• • RING, PISTON, START LOCK		1		
340	C-492	• • PISTON		1		
350	B-3842-0250	• • SPRING PIN, 3/32", CRES		1	Y	
360	C-3317-217	• O-RING (PISTON ID)		1	Y	
370	B-1843	• SEAL, DUST, PISTON		1	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-1		**PROPELLER PARTS - HC-D4N-5AL, CONTINUED**				
380	C-3317-426-2	• O-RING (PISTON OD)		1	Y	
390	B-3808-3	• NUT, HEX, SELF-LOCKING		1	Y	
400	B-3851-0363	• WASHER		1	Y	
410	B-3383-15	• BOLT, 10-32, HEX HEAD		1	Y	
420	D-494	• PCP: ROD, PITCH CHANGE REPLACED BY ITEM 420A		1		PCP
420A	D-494-1	• PCP: ROD, PITCH CHANGE REPLACES ITEM 420, POST HC-SB-61-215		1		PCP
430	C-3317-251	• O-RING (CYLINDER MOUNTING)		1	Y	
500	D-489	• PCP: HUB UNIT (2 DOWEL HOLES) SUPERSEDED BY ITEM 500B OR 500C (REFER TO “D-489-( ) HUB UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
500A	D-489-1	• PCP: HUB UNIT (4 DOWEL HOLES) (ALTERNATE) SUPERSEDED BY ITEM 500B OR 500C (REFER TO “D-489-( ) HUB UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
500B	D-489-2	• PCP: HUB UNIT (2 DOWEL HOLES) SUPERSEDES ITEM 500 OR 500A (REFER TO “D-489-( ) HUB UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
500C	D-489-3	• PCP: HUB UNIT (4 DOWEL HOLES) (ALTERNATE) SUPERSEDES ITEM 500 OR 500A (REFER TO “D-489-( ) HUB UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
510	C-3317-213-2	• O-RING (CYLINDER-SIDE BUSHING ID)		1	Y	
610	C-3317-211-2	• O-RING (ENGINE-SIDE BUSHING ID)		1	Y	
620	A-2431	• BOLT, 3/8-24, HEX HEAD		12		
630	A-2432	• BOLT, 3/8-24, HEX HEAD		8		
640	B-3834-0632	• WASHER		20	Y	
650	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		20	Y	
660	A-279	• FITTING, LUBRICATION REPLACED BY ITEMS 660A AND 665		8	Y	
660A	A-279	• FITTING, LUBRICATION REPLACES ITEM 660 IN CYLINDER-SIDE OF HUB		4	Y	
660B	C-6349	• FITTING, LUBRICATION, 45° (POST HC-SL-61-187) ALTERNATE FOR ITEM 660A		4	Y	
665	106545	• PLUG, LUBRICATION (POST HC-SL-61-354) REPLACES ITEMS 660 IN ENGINE-SIDE OF HUB		4	Y	
670	B-6544	• CAP, FITTING, LUBRICATION USED WITH ITEMS 660, 660A, AND 660B		4	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-1		**PROPELLER PARTS - HC-D4N-5AL, CONTINUED**				
-700	C-636	• FORK, FOUR BLADE, LH - ASSEMBLY		1		
710	D-496-1	• • FORK, FOUR BLADE, LH, SUPERSEDED BY ITEM 710B		OBS		
710A	D-496	• • FORK, FOUR BLADE, LH, SUPERSEDED BY ITEM 710B		OBS		
710B	D-496-2	• • FORK, FOUR BLADE, LH, SUPERSEDES ITEMS 710 AND 710A		1		
720	B-468	• • EXTENSION, BUMPER		4		
730	A-3256	• • BUMPER, FORK		4	Y	
10A-1		**BLADE RETENTION PARTS**				
		(REFER TO "BLADE RETENTION PARTS" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		PROPELLER MOUNTING PARTS				
1200	C-3317-230	• O-RING (FLANGE)		1	Y	
1210	A-2048-2	• WASHER, MOUNTING, 9/16" CSK		8	Y	
1220	B-3339-1	• BOLT, MOUNTING, 9/16-18, 12 POINT		8	Y	

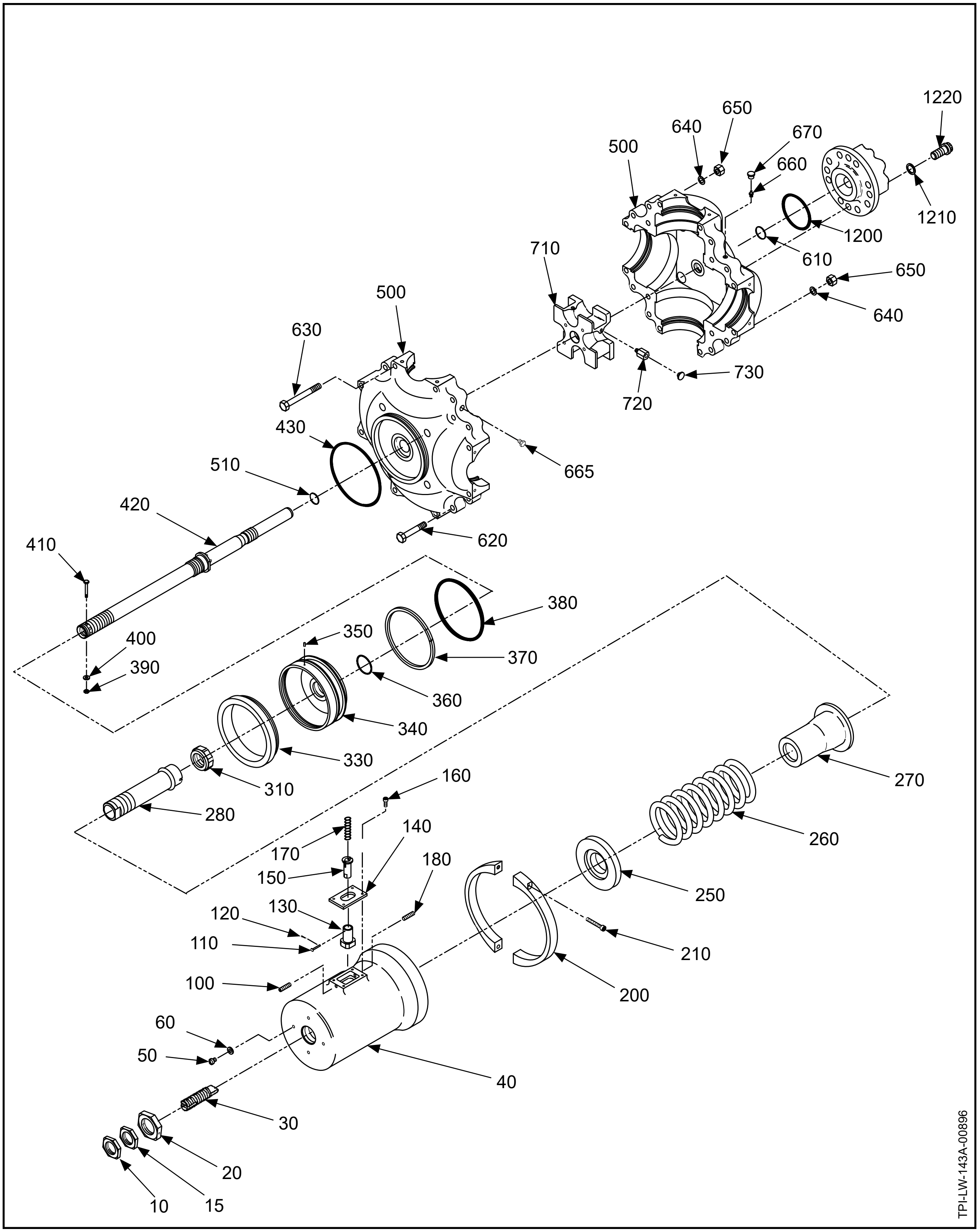
EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-1		PROPELLER PARTS - HC-D4N-5AL, CONTINUED				
		BALANCE PARTS				
-1100	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		AR		
-1110	A-2424(A)-( )	• BALANCE WEIGHT		AR		
		COUNTERWEIGHTS/MOUNTING BOLTS				
		APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION				
-9035		• COUNTERWEIGHT MOUNTING BOLTS REFER TO THE APPLICABLE HARTZELL PROPELLER BLADE OVERHAUL MANUAL: MANUAL 135F (61-13-35) - COMPOSITE BLADES MANUAL 133C (61-13-33) - ALUMINUM BLADES			Y	
		COUNTERWEIGHT SLUGS/MOUNTING HARDWARE				
-9040		• COUNTERWEIGHT SLUGS				
-9045		• COUNTERWEIGHT SLUGS				
-9050		• COUNTERWEIGHT SLUG MOUNTING BOLT APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION			Y	
		SPINNER PARTS				
		APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION MANUAL 159 (61-02-59) AND THE APPLICABLE HARTZELL PROPELLER SPINNER MAINTENANCE MANUAL: MANUAL 127 (61-16-27) - METAL SPINNER ASSEMBLIES MANUAL 148 (61-16-48) - COMPOSITE SPINNER ASSEMBLIES				
-9070		• SPACER APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59)				

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED



HC-D4N-5C: Propeller Parts
Figure 10-2

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-2		**PROPELLER PARTS - HC-D4N-5C**				
10	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
15	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
20	B-3375	• PCP: NUT, 1 3/8-12, HEX,THIN, DRILLED		1		PCP
30	B-439	• SCREW, BETA ADJUST		1		
40	D-484	• PCP: CYLINDER		1		PCP
40A	D-6845	• CYLINDER SUPERSEDES ITEM 40, POST HC-SL-61-181 WHEN THE D-6845 CYLINDER IS USED, THE C-3317-354 O-RING AND E-6866 HUB UNIT MUST BE USED AND THE PROPELLER MODEL DESIGNATION HC-D4N-5C/D9327K MUST BE CHANGED TO HC-D4N-5E/D9327K. THE A-6828 REVERSE STOP KIT PARTS MUST ALSO BE INCORPORATED. REFER TO THE HC-D4N-5E PARTS LIST.		1		
50	B-3841-5	• SCREW, 1/4-28, FILLISTER HEAD		1	Y	
60	B-3837-0463	• WASHER, CORROSION RESISTANT		1	Y	
100	B-6639-131	• SCREW, SET		2	Y	
110	B-2877	• CLEVIS PIN, 3/32		2	Y	
120	B-3838-1	• COTTER PIN		2	Y	
130	B-444	• HOUSING, START LOCK REPLACED BY ITEM 130A		2		
130A	B-444-4	• HOUSING, START LOCK REPLACED BY ITEM 130A, POST SB 171A		2		
140	B-446	• COVER, HOUSING, START LOCK		2		
150	A-2620-1	• PIN, START LOCK		2		
160	B-3821	• SCREW, 10-32, CAP		8	Y	
170	B-658	• SPRING, COMPRESSION		2	Y	
180	B-6639-131	• SCREW, SET		2	Y	
200	B-6472-1	• CLAMP, CYLINDER		1		
210	A-2038-12	• SCREW, 1/4-28, CAP		2		
250	B-6768	• SPRING RETAINER, FORWARD		1		
260	C-447	• PCP: SPRING, COMPRESSION, FEATHERING SUPERSEDED BY ITEM 260A		1		PCP
260A	C-6760	• PCP: SPRING, COMPRESSION, FEATHERING SUPERSEDES ITEM 260, POST HC-SB-61-235		1		PCP
270	B-442	• GUIDE, SPRING, PLASTIC SUPERSEDED BY ITEM 270A		1	Y	
270A	B-6761	• GUIDE, SPRING, PLASTIC SUPERSEDES ITEM 270, POST HC-SB-61-235		1	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-2		**PROPELLER PARTS - HC-D4N-5C, CONTINUED**				
280	B-476	• PCP: SLEEVE, PITCH ADJUST - UNIT SUPERSEDED BY ITEM 280A IF A B-476 SLEEVE UNIT IS RETIRED, THE PARTS CONTAINED IN THE A-6828 REVERSE STOP KIT MUST BE USED.		1		PCP
280A	B-6758	• PCP: SLEEVE, PITCH ADJUST - UNIT SUPERSEDES ITEM 280, POST HC-SB-61-235 NOTE: PURCHASED UNIT INCLUDES SUPERSEDED ITEM 290A		1		PCP
-290	C-438	• • PCP: SLEEVE, REVERSE ADJUST SUPERSEDED BY ITEM 290A		1		PCP
-290A	C-6759	• • PCP: SLEEVE, REVERSE ADJUST SUPERSEDED BY ITEM 280A. NOTE: ITEM 290A IS ONLY AVAILABLE AS PART OF ITEM 280A		1		PCP
-300	A-441	• • BUSHING, SLEEVE		1		
310	B-474	• NUT, 1-1/8-12, HEX, SELF-LOCKING		1	Y	
-320	C-497	• PISTON UNIT		1		
330	B-493	• • RING, PISTON, START LOCK		1		
340	C-492	• • PISTON		1		
350	B-3842-0250	• • SPRING PIN, 3/32", CRES		1	Y	
360	C-3317-217	• O-RING (PISTON ID)		1	Y	
370	B-1843	• SEAL, DUST, PISTON		1	Y	
380	C-3317-426-2	• O-RING (PISTON OD)		1	Y	
390	B-3808-3	• NUT, HEX, SELF-LOCKING		1	Y	
400	B-3851-0363	• WASHER		1	Y	
410	B-3383-15	• BOLT, 10-32, HEX HEAD		1	Y	
420	D-494	• PCP: ROD, PITCH CHANGE REPLACED BY ITEM 420A		1		PCP
420A	D-494-1	• PCP: ROD, PITCH CHANGE REPLACES ITEM 420, POST HC-SB-61-215		1		PCP

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-2		**PROPELLER PARTS - HC-D4N-5C, CONTINUED**				
430	C-3317-251	• O-RING (CYLINDER MOUNTING) SUPERSEDED BY ITEM 430A		1	Y	
430A	C-3317-354	• O-RING (CYLINDER MOUNTING) SUPERSEDES ITEM 430, POST HC-SL-61-181 WHEN THE C-3317-354 O-RING IS USED, THE D-6845 CYLINDER AND E-6866 HUB UNIT MUST BE USED AND THE PROPELLER MODEL DESIGNATION HC-D4N-5C/D9327K MUST BE CHANGED TO HC-D4N-5E/D9327K. THE A-6828 REVERSE STOP KIT PARTS MUST ALSO BE INCORPORATED. REFER TO THE HC-D4N-5E PARTS LIST.		1	Y	
500	D-489	• PCP: HUB UNIT (2 DOWEL HOLES) SUPERSEDED BY ITEM 500B OR 500C (REFER TO “D-489-( ) HUB UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
500A	D-489-1	• PCP: HUB UNIT (4 DOWEL HOLES) (ALTERNATE) SUPERSEDED BY ITEM 500B OR 500C (REFER TO “D-489-( ) HUB UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
500B	D-489-2	• PCP: HUB UNIT (2 DOWEL HOLES) SUPERSEDES ITEM 500 OR 500A SUPERSEDED BY ITEM 500D (REFER TO “D-489-( ) HUB UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
500C	D-489-3	• PCP: HUB UNIT (4 DOWEL HOLES) (ALTERNATE) SUPERSEDES ITEM 500 OR 500A (REFER TO “D-489-( ) HUB UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
500D	E-6866	• PCP: HUB UNIT (2 DOWEL HOLES) SUPERSEDES ITEM 500B, POST HC-SL-61-181 WHEN THE E-6866 HUB UNIT IS USED, THE D-6845 CYLINDER AND C-3317-354 O-RING MUST BE USED AND THE PROPELLER MODEL DESIGNATION HC-D4N-5C/D9327K MUST BE CHANGED TO HC-D4N-5E/D9327K. THE A-6828 REVERSE STOP KIT PARTS MUST ALSO BE INCORPORATED. REFER TO THE HC-D4N-5E PARTS LIST. (REFER TO “E-6866 HUB UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
510	C-3317-213-2	• O-RING (CYLINDER-SIDE BUSHING ID)		1	Y	
610	C-3317-211-2	• O-RING (ENGINE-SIDE BUSHING ID)		1	Y	
620	A-2431	• BOLT, 3/8-24, HEX HEAD		12		
630	A-2432	• BOLT, 3/8-24, HEX HEAD		8		
640	B-3834-0632	• WASHER		20	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-2		**PROPELLER PARTS - HC-D4N-5C, CONTINUED**				
650	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		20	Y	
660	A-279	• FITTING, LUBRICATION REPLACED BY ITEMS 660A AND 665		8	Y	
660A	A-279	• FITTING, LUBRICATION REPLACES ITEM 660 IN ENGINE-SIDE OF HUB		4	Y	
660B	C-6349	• FITTING, LUBRICATION, 45° (POST HC-SL-61-187) ALTERNATE FOR ITEM 660A		4	Y	
665	106545	• PLUG, LUBRICATION (POST HC-SL-61-354) REPLACES ITEMS 660 IN CYLINDER-SIDE OF HUB		4	Y	
670	B-6544	• CAP, FITTING, LUBRICATION USED WITH ITEMS 660, 660A, AND 660B		4	Y	
-700	C-635	• FORK, FOUR BLADE - ASSEMBLY		1		
710	D-495-1	• • FORK, FOUR BLADE, REPLACED BY ITEM 710B		OBS		
710A	D-495	• • FORK, FOUR BLADE, REPLACED BY ITEM 710B		OBS		
710B	D-495-2	• • FORK, FOUR BLADE, REPLACES ITEMS 710 AND 710A		1		
720	B-468	• • EXTENSION, BUMPER		4		
730	A-3256	• • BUMPER, FORK		4	Y	
10A-1		**BLADE RETENTION PARTS**				
		(REFER TO "BLADE RETENTION PARTS" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		PROPELLER MOUNTING PARTS				
1200	C-3317-230	• O-RING (FLANGE)		1	Y	
1210	A-2048-2	• WASHER, MOUNTING, 9/16" CSK		8	Y	
1220	B-3339-1	• BOLT, MOUNTING, 9/16-18, 12 POINT		8	Y	

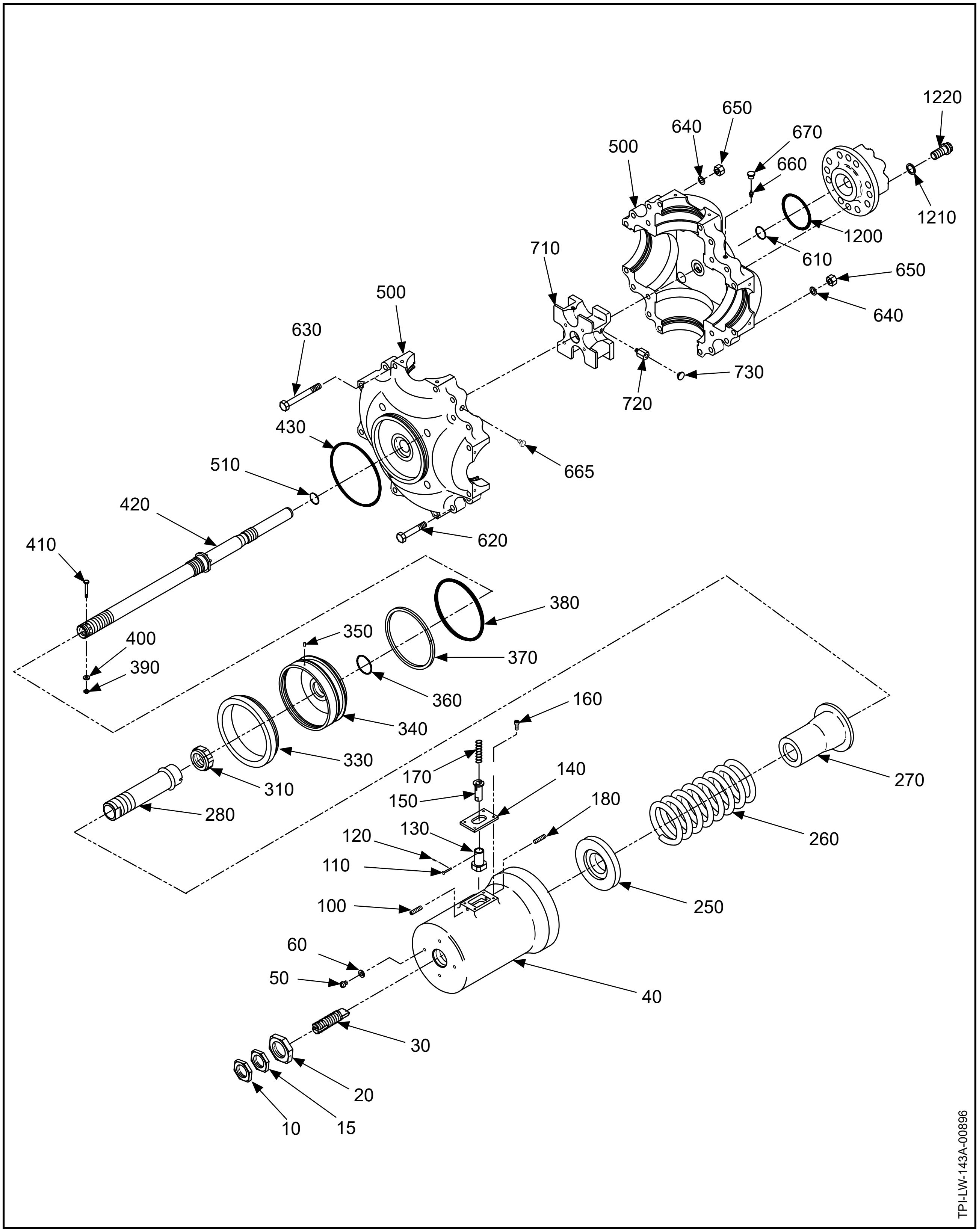
EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-2		**PROPELLER PARTS - HC-D4N-5C, CONTINUED**				
		BALANCE PARTS				
-1100	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		AR		
-1110	A-2424(A)-( )	• BALANCE WEIGHT		AR		
		COUNTERWEIGHTS/MOUNTING BOLTS				
-9030		• COUNTERWEIGHT APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION				PCP
-9035		• COUNTERWEIGHT MOUNTING BOLTS REFER TO THE APPLICABLE HARTZELL PROPELLER BLADE OVERHAUL MANUAL: MANUAL 135F (61-13-35) - COMPOSITE BLADES MANUAL 133C (61-13-33) - ALUMINUM BLADES			Y	
		COUNTERWEIGHT SLUGS/MOUNTING HARDWARE				
-9040		• COUNTERWEIGHT SLUGS				
-9050		• COUNTERWEIGHT SLUG MOUNTING BOLT			Y	
-9060		• COUNTERWEIGHT SLUG MOUNTING NUT APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION			Y	
		SPINNER PARTS				
		APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION MANUAL 159 (61-02-59) AND THE APPLICABLE HARTZELL PROPELLER SPINNER MAINTENANCE MANUAL: MANUAL 127 (61-16-27) - METAL SPINNER ASSEMBLIES MANUAL 148 (61-16-48) - COMPOSITE SPINNER ASSEMBLIES				

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED



HC-D4N-5E: Propeller Parts
Figure 10-3

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-3		**PROPELLER PARTS - HC-D4N-5E**				
10	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
15	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
20	B-3375	• PCP: NUT, 1 3/8-12, HEX,THIN, DRILLED		1		PCP
30	B-439	• SCREW, BETA ADJUST		1		
40	D-6845	• CYLINDER		1		
50	B-3841-5	• SCREW, 1/4-28, FILLISTER HEAD		1	Y	
60	B-3837-0463	• WASHER, CORROSION RESISTANT		1	Y	
100	B-6639-131	• SCREW, SET		2	Y	
110	B-2877	• CLEVIS PIN, 3/32		2	Y	
120	B-3838-1	• COTTER PIN		2	Y	
130	B-444	• HOUSING, START LOCK REPLACED BY ITEM 130A		2		
130A	B-444-4	• HOUSING, START LOCK REPLACED BY ITEM 130A, POST SB 171A		2		
140	B-446	• COVER, HOUSING, START LOCK		2		
150	A-2620-1	• PIN, START LOCK		2		
160	B-3821	• SCREW, 10-32, CAP		8	Y	
170	B-658	• SPRING, COMPRESSION		2	Y	
180	B-6639-131	• SCREW, SET		2	Y	
250	B-6768	• SPRING RETAINER, FORWARD		1		
260	C-447	• PCP: SPRING, COMPRESSION, FEATHERING SUPERSEDED BY ITEM 260A		1		PCP
260A	C-6760	• PCP: SPRING, COMPRESSION, FEATHERING SUPERSEDES ITEM 260, POST HC-SB-61-235		1		PCP
270	B-442	• GUIDE, SPRING, PLASTIC SUPERSEDED BY ITEM 270A		1	Y	
270A	B-6761	• GUIDE, SPRING, PLASTIC SUPERSEDES ITEM 270, POST HC-SB-61-235		1	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-3		**PROPELLER PARTS - HC-D4N-5E, CONTINUED**				
280	B-476	• PCP: SLEEVE, PITCH ADJUST - UNIT SUPERSEDED BY ITEM 280A, IF A B-476 SLEEVE UNIT IS RETIRED, THE PARTS CONTAINED IN THE A-6828 REVERSE STOP KIT MUST BE USED.		1		PCP
280A	B-6758	• PCP: SLEEVE, PITCH ADJUST - UNIT SUPERSEDES ITEM 280, POST HC-SB-61-235 NOTE: PURCHASED UNIT INCLUDES SUPERSEDED ITEM 290A		1		PCP
-290	C-438	• • PCP: SLEEVE, REVERSE ADJUST SUPERSEDED BY ITEM 290A		1		PCP
-290A	C-6759	• • PCP: SLEEVE, REVERSE ADJUST SUPERSEDED BY ITEM 280A. NOTE: ITEM 290A IS ONLY AVAILABLE AS PART OF ITEM 280A		1		PCP
-300	A-441	• • BUSHING, SLEEVE		1		
310	B-474	• NUT, 1-1/8-12, HEX, SELF-LOCKING		1	Y	
-320	C-497	• PISTON UNIT		1		
330	B-493	• • RING, PISTON, START LOCK		1		
340	C-492	• • PISTON		1		
350	B-3842-0250	• • SPRING PIN, 3/32", CRES		1	Y	
360	C-3317-217	• O-RING (PISTON ID)		1	Y	
370	B-1843	• SEAL, DUST, PISTON		1	Y	
380	C-3317-426-2	• O-RING (PISTON OD)		1	Y	
390	B-3808-3	• NUT, HEX, SELF-LOCKING		1	Y	
400	B-3851-0363	• WASHER		1	Y	
410	B-3383-15	• BOLT, 10-32, HEX HEAD		1	Y	
420	D-494	• PCP: ROD, PITCH CHANGE REPLACED BY ITEM 420A		1		PCP
420A	D-494-1	• PCP: ROD, PITCH CHANGE REPLACES ITEM 420, POST HC-SB-61-215		1		PCP
430	C-3317-354	• O-RING (CYLINDER MOUNTING) POST HC-SL-61-181 WHEN THE C-3317-354 O-RING IS USED, THE D-6845 CYLINDER AND E-6866 HUB UNIT MUST BE USED AND THE PROPELLER MODEL DESIGNATION HC-D4N-5C/D9327K MUST BE CHANGED TO HC-D4N-5E/D9327K. THE A-6828 REVERSE STOP KIT PARTS MUST ALSO BE INCORPORATED.		1	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-3		**PROPELLER PARTS - HC-D4N-5E, CONTINUED**				
500	E-6847	• PCP: HUB UNIT, SUPERSEDED BY ITEM 500A (REFER TO “E-6847 HUB UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
500A	E-6866	• PCP: HUB UNIT, HC-D4(N,P)-(2,5) SUPERSEDES ITEM 500 (REFER TO “E-6866 HUB UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
510	C-3317-213-2	• O-RING (CYLINDER-SIDE BUSHING ID)		1	Y	
610	C-3317-211-2	• O-RING (ENGINE-SIDE BUSHING ID)		1	Y	
620	A-2431	• BOLT, 3/8-24, HEX HEAD		12		
630	A-2432	• BOLT, 3/8-24, HEX HEAD		8		
640	B-3834-0632	• WASHER		20	Y	
650	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		20	Y	
660	A-279	• FITTING, LUBRICATION REPLACED BY ITEMS 660A AND 665		8	Y	
660A	A-279	• FITTING, LUBRICATION REPLACES ITEM 660 IN ENGINE-SIDE OF HUB		4	Y	
660B	C-6349	• FITTING, LUBRICATION, 45° (POST HC-SL-61-187) ALTERNATE FOR ITEM 660A		4	Y	
665	106545	• PLUG, LUBRICATION (POST HC-SL-61-354) REPLACES ITEMS 660 IN CYLINDER-SIDE OF HUB		4	Y	
670	B-6544	• CAP, FITTING, LUBRICATION USED WITH ITEMS 660, 660A, AND 660B		4	Y	
-700	C-635	• FORK, FOUR BLADE - ASSEMBLY		1		
710	D-495-1	• • FORK, FOUR BLADE, REPLACED BY ITEM 710B		OBS		
710A	D-495	• • FORK, FOUR BLADE, REPLACED BY ITEM 710B		OBS		
710B	D-495-2	• • FORK, FOUR BLADE, REPLACES ITEMS 710 AND 710A		1		
720	B-468	• • EXTENSION, BUMPER		4		
10A-1		**BLADE RETENTION PARTS**				
		(REFER TO "BLADE RETENTION PARTS" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		PROPELLER MOUNTING PARTS				
1200	C-3317-230	• O-RING (FLANGE)		1	Y	
1210	A-2048-2	• WASHER, MOUNTING, 9/16" CSK		8	Y	
1220	B-3339-1	• BOLT, MOUNTING, 9/16-18, 12 POINT		8	Y	

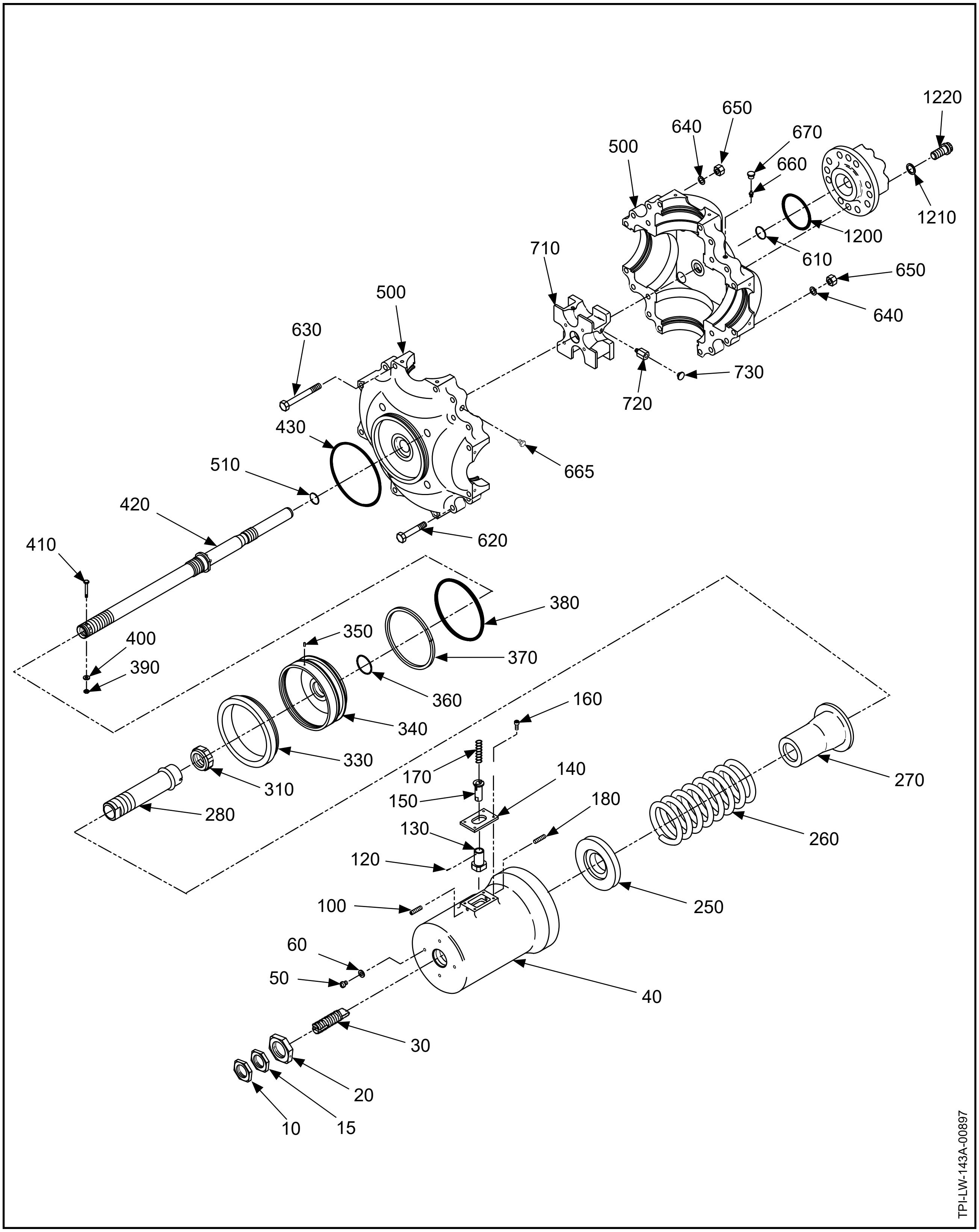
EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-3		**PROPELLER PARTS - HC-D4N-5E, CONTINUED**				
		BALANCE PARTS				
-1100	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		AR		
-1110	A-2424(A)-( )	• BALANCE WEIGHT		AR		
		COUNTERWEIGHTS/MOUNTING BOLTS				
-9030		• COUNTERWEIGHT APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION				PCP
-9035		• COUNTERWEIGHT MOUNTING BOLTS REFER TO THE APPLICABLE HARTZELL PROPELLER BLADE OVERHAUL MANUAL: MANUAL 135F (61-13-35) - COMPOSITE BLADES MANUAL 133C (61-13-33) - ALUMINUM BLADES			Y	
		COUNTERWEIGHT SLUGS/MOUNTING HARDWARE				
-9040		• COUNTERWEIGHT SLUGS				
-9050		• COUNTERWEIGHT SLUG MOUNTING BOLT			Y	
-9060		• COUNTERWEIGHT SLUG MOUNTING NUT APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION			Y	
		SPINNER PARTS				
		APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION MANUAL 159 (61-02-59) AND THE APPLICABLE HARTZELL PROPELLER SPINNER MAINTENANCE MANUAL: MANUAL 127 (61-16-27) - METAL SPINNER ASSEMBLIES MANUAL 148 (61-16-48) - COMPOSITE SPINNER ASSEMBLIES				

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED



HC-D4P-5: Propeller Parts
Figure 10-4

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-4		**PROPELLER PARTS HC-D4P-5**				
10	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
15	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
20	B-3375	• PCP: NUT, 1 3/8-12, HEX,THIN, DRILLED		1		PCP
30	B-439	• SCREW, BETA ADJUST		1		
40	D-484-1	• CYLINDER		1		
50	B-3841-5	• SCREW, 1/4-28, FILLISTER HEAD		1	Y	
60	B-3837-0463	• WASHER, CORROSION RESISTANT		1	Y	
100	B-6639-139	• SCREW, SET		2	Y	
120	B-3838-3-5	• COTTER PIN		2	Y	
130	B-444-3	• HOUSING, START LOCK		2		
140	B-446-1	• COVER, HOUSING, START LOCK		2		
150	A-2620-2	• PIN, START LOCK		2		
160	B-3821	• SCREW, 10-32, CAP		8	Y	
170	B-331	• SPRING, COMPRESSION		2	Y	
180	B-6639-139	• SCREW, SET		2	Y	
250	B-6768	• SPRING RETAINER, FORWARD		1		
260	C-6760	• PCP: SPRING, COMPRESSION, FEATHERING		1		PCP
270	B-6761	• GUIDE, SPRING, PLASTIC		1	Y	
280	B-6758	• PCP: SLEEVE, PITCH ADJUST - UNIT NOTE: PURCHASED UNIT INCLUDES SUPERSEDED ITEM 290A		1		PCP
-290	C-438	• • PCP: SLEEVE, REVERSE ADJUST SUPERSEDED BY ITEM 290A		1		PCP
-290A	C-6759	• • PCP: SLEEVE, REVERSE ADJUST SUPERSEDED BY ITEM 280. NOTE: ITEM 290A IS ONLY AVAILABLE AS PART OF ITEM 280A		1		PCP
-300	A-441	• • BUSHING, SLEEVE		1		
310	B-474	• NUT, 1-1/8-12, HEX, SELF-LOCKING		1	Y	
-320	C-497-1	• PISTON UNIT		1		
330	B-493	• • RING, PISTON, START LOCK		1		
340	C-492	• • PISTON		1		
350	B-3842-0250	• • SPRING PIN, 3/32", CRES		1	Y	
360	C-3317-217-2	• O-RING (PISTON ID)		1	Y	
370	B-1843	• SEAL, DUST, PISTON		1	Y	
380	C-3317-426-2	• O-RING (PISTON OD)		1	Y	
390	B-3808-3	• NUT, HEX, SELF-LOCKING		1	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-4		**PROPELLER PARTS HC-D4P-5, CONTINUED**				
400	B-3851-0363	• WASHER		1	Y	
410	B-3383-15	• BOLT, 10-32, HEX HEAD		1	Y	
420	D-494	• PCP: ROD, PITCH CHANGE REPLACED BY ITEM 420A		1		PCP
420A	D-494-1	• PCP: ROD, PITCH CHANGE REPLACES ITEM 420, POST HC-SB-61-215		1		PCP
430	C-3317-251	• O-RING (CYLINDER MOUNTING)		1	Y	
500	D-489	• PCP: HUB UNIT SUPERSEDED BY ITEM 500B (REFER TO “D-489-( ) HUB UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
500A	D-489-1	• PCP: HUB UNIT ALTERNATE FOR ITEM 500 SUPERSEDED BY ITEM 500B (REFER TO “D-489-( ) HUB UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
500B	D-489-3	• PCP: HUB UNIT, SUPERSEDES ITEMS 500, 500A (REFER TO “D-489-( ) HUB UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
510	C-3317-213-2	• O-RING (CYLINDER-SIDE BUSHING ID)		1	Y	
610	C-3317-211-2	• O-RING (ENGINE-SIDE BUSHING ID)		1	Y	
620	A-2431	• BOLT, 3/8-24, HEX HEAD		12		
630	A-2432	• BOLT, 3/8-24, HEX HEAD		8		
640	B-3834-0632	• WASHER		20	Y	
650	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		20	Y	
660	A-279	• FITTING, LUBRICATION REPLACED BY ITEMS 660A AND 665		8	Y	
660A	A-279	• FITTING, LUBRICATION REPLACES ITEM 660 IN ENGINE-SIDE OF HUB		4	Y	
660B	C-6349	• FITTING, LUBRICATION, 45° (POST HC-SL-61-187) ALTERNATE FOR ITEM 660A		4	Y	
665	106545	• PLUG, LUBRICATION (POST HC-SL-61-354) REPLACES ITEMS 660 IN CYLINDER-SIDE OF HUB		4	Y	
670	B-6544	• CAP, FITTING, LUBRICATION USED WITH ITEMS 660, 660A, AND 660B		4	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-4		**PROPELLER PARTS HC-D4P-5, CONTINUED**				
-700	C-635	• FORK, FOUR BLADE - ASSEMBLY		1		
710	D-495-1	• • FORK, FOUR BLADE, REPLACED BY ITEM 710A		OBS		
710A	D-495-2	• • FORK, FOUR BLADE, REPLACES ITEM 710		1		
720	B-468	• • EXTENSION, BUMPER		4		
730	A-3256	• • BUMPER, FORK				
710A	D-495	• • FORK, FOUR BLADE (ALTERNATE) REPLACED BY ITEM 710B		1		
710B	D-495-2	• • FORK, FOUR BLADE (ALTERNATE) REPLACES ITEM 710A		1		
10A-1		**BLADE RETENTION PARTS**				
		(REFER TO "BLADE RETENTION PARTS" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		PROPELLER MOUNTING PARTS				
1200	C-3317-230	• O-RING (FLANGE)		1	Y	
1210	A-2048-2	• WASHER, MOUNTING, 9/16" CSK		8	Y	
1220	B-3347	• BOLT, MOUNTING, 9/16-18, 12 POINT		8	Y	

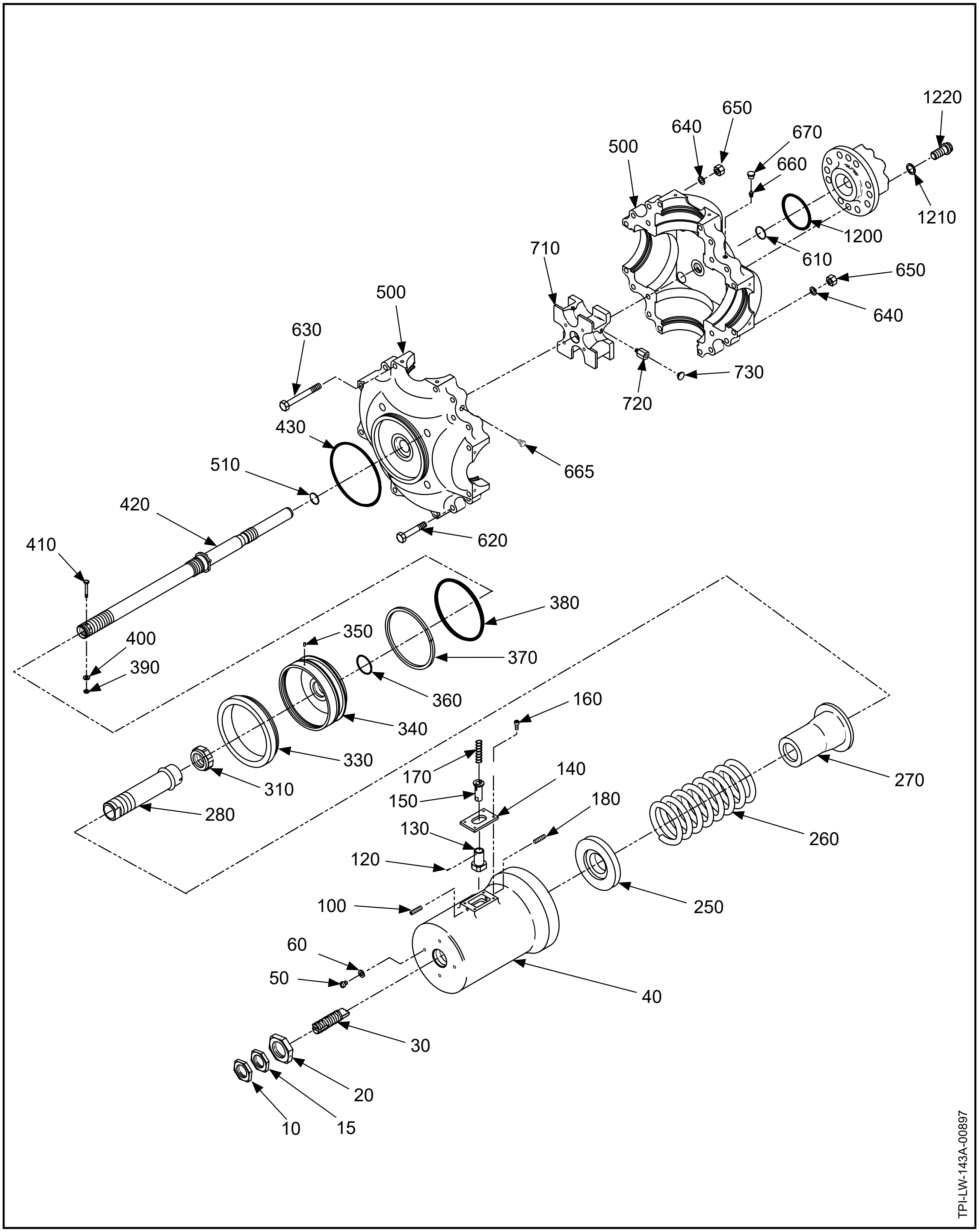
EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-4		**PROPELLER PARTS HC-D4P-5, CONTINUED**				
		BALANCE PARTS				
-1100	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		AR		
-1110	A-2424(A)-( )	• BALANCE WEIGHT		AR		
		COUNTERWEIGHTS/MOUNTING BOLTS				
-9030		• COUNTERWEIGHT APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION				PCP
-9035		• COUNTERWEIGHT MOUNTING BOLTS REFER TO THE APPLICABLE HARTZELL PROPELLER BLADE OVERHAUL MANUAL: MANUAL 135F (61-13-35) - COMPOSITE BLADES MANUAL 133C (61-13-33) - ALUMINUM BLADES			Y	
		COUNTERWEIGHT SLUGS/MOUNTING HARDWARE				
-9040		• COUNTERWEIGHT SLUGS AND SLUG MTG. HARDWARE APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION			Y	
		SPINNER PARTS				
		APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION MANUAL 159 (61-02-59) AND THE APPLICABLE HARTZELL PROPELLER SPINNER MAINTENANCE MANUAL: MANUAL 127 (61-16-27) - METAL SPINNER ASSEMBLIES MANUAL 148 (61-16-48) - COMPOSITE SPINNER ASSEMBLIES				

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED



HC-D4P-5L: Propeller Parts
Figure 10-5

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-5		**PROPELLER PARTS HC-D4P-L**				
10	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
15	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
20	B-3375	• PCP: NUT, 1 3/8-12, HEX,THIN, DRILLED		1		PCP
30	B-439	• SCREW, BETA ADJUST		1		
40	D-484-1	• CYLINDER		1		
50	B-3841-5	• SCREW, 1/4-28, FILLISTER HEAD		1	Y	
60	B-3837-0463	• WASHER, CORROSION RESISTANT		1	Y	
100	B-6639-139	• SCREW, SET		2	Y	
120	B-3838-3-5	• COTTER PIN		2	Y	
130	B-444-3	• HOUSING, START LOCK		2		
140	B-446-1	• COVER, HOUSING, START LOCK		2		
150	A-2620-2	• PIN, START LOCK		2		
160	B-3821	• SCREW, 10-32, CAP		8	Y	
170	B-331	• SPRING, COMPRESSION		2	Y	
180	B-6639-139	• SCREW, SET		2	Y	
250	B-6768	• SPRING RETAINER, FORWARD		1		
260	C-6760	• PCP: SPRING, COMPRESSION, FEATHERING		1		PCP
270	B-6761	• GUIDE, SPRING, PLASTIC		1	Y	
280	B-6758	• PCP: SLEEVE, PITCH ADJUST - UNIT NOTE: PURCHASED UNIT INCLUDES SUPERSEDED ITEM 290A		1		PCP
-290	C-438	• • PCP: SLEEVE, REVERSE ADJUST SUPERSEDED BY ITEM 290A		1		PCP
-290A	C-6759	• • PCP: SLEEVE, REVERSE ADJUST SUPERSEDED BY ITEM 280. NOTE: ITEM 290A IS ONLY AVAILABLE AS PART OF ITEM 280A		1		PCP
-300	A-441	• • BUSHING, SLEEVE		1		
310	B-474	• NUT, 1-1/8-12, HEX, SELF-LOCKING		1	Y	
-320	C-497-1	• PISTON UNIT		1		
330	B-493	• • RING, PISTON, START LOCK		1		
340	C-492	• • PISTON		1		
350	B-3842-0250	• • SPRING PIN, 3/32", CRES		1	Y	
360	C-3317-217-2	• O-RING (PISTON ID)		1	Y	
370	B-1843	• SEAL, DUST, PISTON		1	Y	
380	C-3317-426-2	• O-RING (PISTON OD)		1	Y	
390	B-3808-3	• NUT, HEX, SELF-LOCKING		1	Y	
400	B-3851-0363	• WASHER		1	Y	
410	B-3383-15	• BOLT, 10-32, HEX HEAD		1	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

HC-D4P-5L

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-5		**PROPELLER PARTS HC-D4P-5L, CONTINUED**				
420	D-494	• PCP: ROD, PITCH CHANGE REPLACED BY ITEM 420A		1		PCP
420A	D-494-1	• PCP: ROD, PITCH CHANGE REPLACES ITEM 420, POST HC-SB-61-215		1		PCP
430	C-3317-251	• O-RING (CYLINDER MOUNTING)		1	Y	
500	D-489	• PCP: HUB UNIT SUPERSEDED BY ITEM 500B (REFER TO “D-489-( ) HUB UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
500A	D-489-1	• PCP: HUB UNIT, ALTERNATE FOR ITEM 500 SUPERSEDED BY ITEM 500B (REFER TO “D-489-( ) HUB UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
500B	D-489-3	• PCP: HUB UNIT, SUPERSEDES ITEMS 500, 500A (REFER TO “D-489-( ) HUB UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
510	C-3317-213-2	• O-RING (CYLINDER-SIDE BUSHING ID)		1	Y	
610	C-3317-211-2	• O-RING (ENGINE-SIDE BUSHING ID)		1	Y	
620	A-2431	• BOLT, 3/8-24, HEX HEAD		12		
630	A-2432	• BOLT, 3/8-24, HEX HEAD		8		
640	B-3834-0632	• WASHER		20	Y	
650	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		20	Y	
660	A-279	• FITTING, LUBRICATION REPLACED BY ITEMS 660A AND 665		8	Y	
660A	A-279	• FITTING, LUBRICATION REPLACES ITEM 660 IN CYLINDER-SIDE OF HUB		4	Y	
660B	C-6349	• FITTING, LUBRICATION, 45° (POST HC-SL-61-187) ALTERNATE FOR ITEM 660A		4	Y	
665	106545	• PLUG, LUBRICATION (POST HC-SL-61-354) REPLACES ITEMS 660 IN ENGINE-SIDE OF HUB		4	Y	
670	B-6544	• CAP, FITTING, LUBRICATION USED WITH ITEMS 660, 660A, AND 660B		4	Y	
-700	C-636	• FORK, FOUR BLADE, LH - ASSEMBLY		1		
710	D-496-1	• • FORK, FOUR BLADE, LH, SUPERSEDED BY ITEM 710B		OBS		
710A	D-496	• • FORK, FOUR BLADE, LH, SUPERSEDED BY ITEM 710B		OBS		
710B	D-496-2	• • FORK, FOUR BLADE, LH, SUPERSEDES ITEMS 710 AND 710A		1		
720	B-468	• • EXTENSION, BUMPER		4		
730	A-3256	• • BUMPER, FORK				

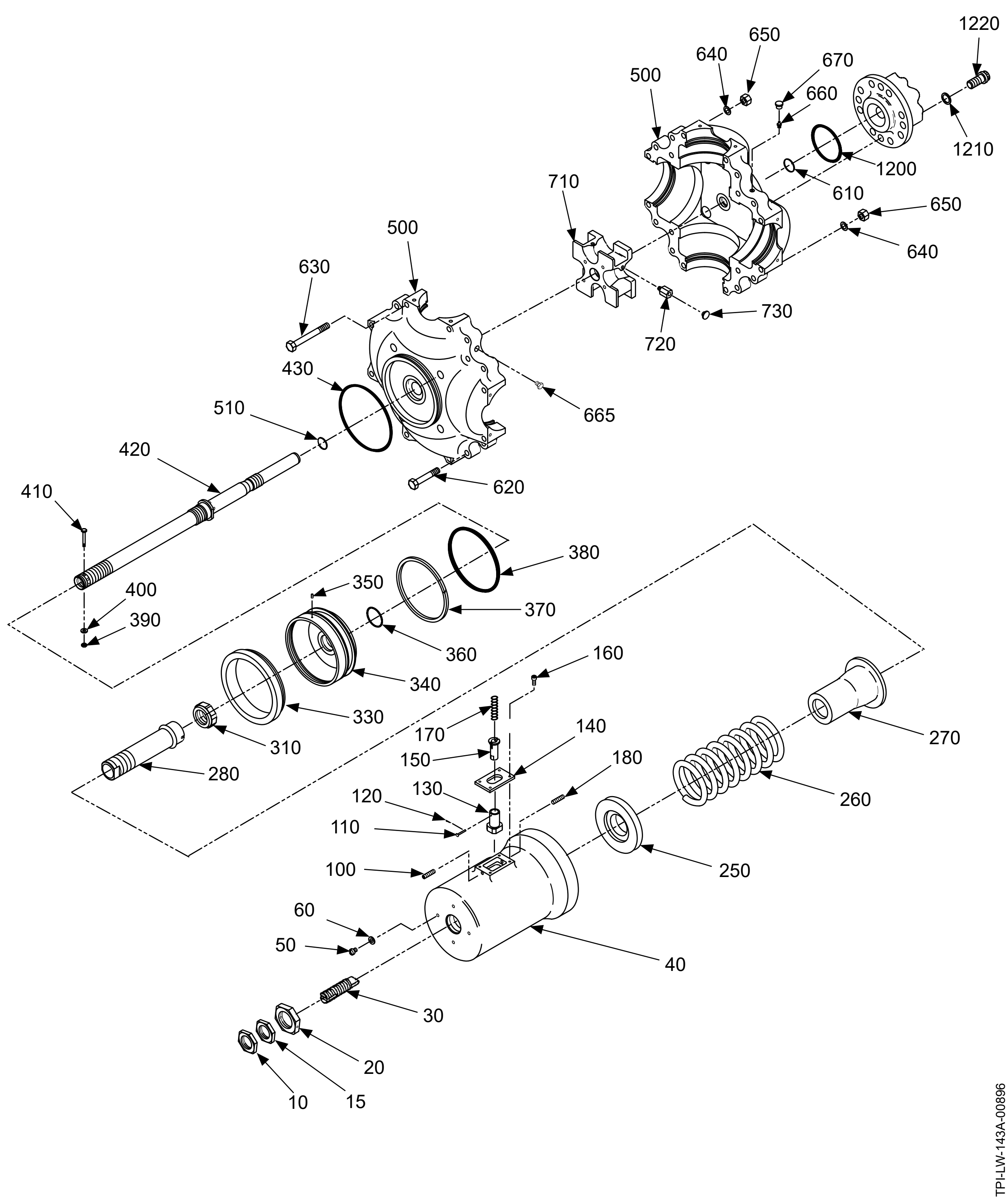
EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-5		**PROPELLER PARTS HC-D4P-5L, CONTINUED**				
10A-1		**BLADE RETENTION PARTS**				
		(REFER TO "BLADE RETENTION PARTS" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		PROPELLER MOUNTING PARTS				
1200	C-3317-230	• O-RING (FLANGE)		1	Y	
1210	A-2048-2	• WASHER, MOUNTING, 9/16" CSK		8	Y	
1220	B-3347	• BOLT, MOUNTING, 9/16-18, 12 POINT		8	Y	
		BALANCE PARTS				
-1100	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		AR		
-1110	A-2424(A)-( )	• BALANCE WEIGHT		AR		
		COUNTERWEIGHTS/MOUNTING BOLTS				
-9030		• COUNTERWEIGHT APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION				PCP
-9035		• COUNTERWEIGHT MOUNTING BOLTS REFER TO THE APPLICABLE HARTZELL PROPELLER BLADE OVERHAUL MANUAL: MANUAL 135F (61-13-35) - COMPOSITE BLADES MANUAL 133C (61-13-33) - ALUMINUM BLADES			Y	
		COUNTERWEIGHT SLUGS/MOUNTING HARDWARE				
-9040		• COUNTERWEIGHT SLUGS AND SLUG MTG. HARDWARE APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION			Y	
		SPINNER PARTS				
		APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION MANUAL 159 (61-02-59) AND THE APPLICABLE HARTZELL PROPELLER SPINNER MAINTENANCE MANUAL: MANUAL 127 (61-16-27) - METAL SPINNER ASSEMBLIES MANUAL 148 (61-16-48) - COMPOSITE SPINNER ASSEMBLIES				

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED



HC-E4N-5A: Propeller Parts
Figure 10-6

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-6		**PROPELLER PARTS HC-E4N-5A**				
10	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
15	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
20	B-3375	• PCP: NUT, 1 3/8-12, HEX,THIN, DRILLED		1		PCP
30	B-439	• SCREW, BETA ADJUST		1		
40	D-484	• PCP: CYLINDER		1		PCP
50	B-3841-5	• SCREW, 1/4-28, FILLISTER HEAD		1	Y	
60	B-3837-0463	• WASHER, CORROSION RESISTANT		1	Y	
100	B-6639-131	• SCREW, SET		2	Y	
110	B-2877	• CLEVIS PIN, 3/32		2	Y	
120	B-3838-1	• COTTER PIN		2	Y	
130	B-444-4	• HOUSING, START LOCK		2		
140	B-446	• COVER, HOUSING, START LOCK		2		
150	A-2620-1	• PIN, START LOCK		2		
160	B-3821	• SCREW, 10-32, CAP		8	Y	
170	B-658	• SPRING, COMPRESSION		2	Y	
180	B-6639-131	• SCREW, SET		2	Y	
250	B-6768	• SPRING RETAINER, FORWARD		1		
260	C-6760	• PCP: SPRING, COMPRESSION, FEATHERING		1		PCP
270	B-6761	• GUIDE, SPRING, PLASTIC		1	Y	
280	B-6758	• PCP: SLEEVE, PITCH ADJUST - UNIT NOTE: PURCHASED UNIT INCLUDES SUPERSEDED ITEM 290A		1		PCP
-290	C-438	• • PCP: SLEEVE, REVERSE ADJUST SUPERSEDED BY ITEM 290A		1		PCP
-290A	C-6759	• • PCP: SLEEVE, REVERSE ADJUST SUPERSEDED BY ITEM 280. NOTE: ITEM 290A IS ONLY AVAILABLE AS PART OF ITEM 280		1		PCP
-300	A-441	• • BUSHING, SLEEVE		1		
310	B-474	• NUT, 1-1/8-12, HEX, SELF-LOCKING		1	Y	
-320	C-497	• PISTON UNIT		1		
330	B-493	• • RING, PISTON, START LOCK		1		
340	C-492	• • PISTON		1		
350	B-3842-0250	• • SPRING PIN, 3/32", CRES		1	Y	
360	C-3317-217	• O-RING (PISTON ID)		1	Y	
370	B-1843	• SEAL, DUST, PISTON		1	Y	
380	C-3317-426-2	• O-RING (PISTON OD)		1	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-6		**PROPELLER PARTS HC-E4N-5A - CONTINUED**				
390	B-3808-3	• NUT, HEX, SELF-LOCKING		1	Y	
400	B-3851-0363	• WASHER		1	Y	
410	B-3383-15	• BOLT, 10-32, HEX HEAD		1	Y	
420	D-494	• PCP: ROD, PITCH CHANGE REPLACED BY ITEM 420A		1		PCP
420A	D-494-1	• PCP: ROD, PITCH CHANGE REPLACES ITEM 420, POST HC-SB-61-215		1		PCP
430	C-3317-251	• O-RING (CYLINDER MOUNTING)		1	Y	
500	D-389	• PCP: HUB UNIT (2 DOWEL HOLES) SUPERSEDED BY ITEM 500B (REFER TO “D-389-( ) HUB UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
500A	D-389-1	• PCP: HUB UNIT (4 DOWEL HOLES) ALTERNATE FOR ITEM 500 SUPERSEDED BY ITEM 500C (REFER TO “D-389-( ) HUB UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
500B	D-389-2	• PCP: HUB UNIT (2 DOWEL HOLES) SUPERSEDES ITEM 500 (REFER TO “D-489-( ) HUB UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
500C	D-389-3	• PCP: HUB UNIT (4 DOWEL HOLES) ALTERNATE FOR ITEM 500A SUPERSEDES ITEM 500A (REFER TO “D-389-( ) HUB UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
510	C-3317-213-2	• O-RING (CYLINDER-SIDE BUSHING ID)		1	Y	
610	C-3317-211-2	• O-RING (ENGINE-SIDE BUSHING ID)		1	Y	
620	A-2431	• BOLT, 3/8-24, HEX HEAD		12		
630	A-2432	• BOLT, 3/8-24, HEX HEAD		8		
640	B-3834-0632	• WASHER		20	Y	
650	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		20	Y	
660	A-279	• FITTING, LUBRICATION REPLACED BY ITEMS 660A AND 665		8	Y	
660A	A-279	• FITTING, LUBRICATION REPLACES ITEM 660 IN ENGINE-SIDE OF HUB		4	Y	
660B	C-6349	• FITTING, LUBRICATION, 45° (POST HC-SL-61-187) ALTERNATE FOR ITEM 660A		4	Y	
665	106545	• PLUG, LUBRICATION (POST HC-SL-61-354) REPLACES ITEMS 660 IN CYLINDER-SIDE OF HUB		4	Y	
670	B-6544	• CAP, FITTING, LUBRICATION USED WITH ITEMS 660, 660A, AND 660B		4	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-6		**PROPELLER PARTS HC-E4N-5A - CONTINUED**				
-700	C-635	• FORK, FOUR BLADE - ASSEMBLY		1		
710	D-495-1	• • FORK, FOUR BLADE, REPLACED BY ITEM 710B		OBS		
710A	D-495	• • FORK, FOUR BLADE, REPLACED BY ITEM 710B		OBS		
710B	D-495-2	• • FORK, FOUR BLADE, REPLACES ITEMS 710 AND 710A		1		
720	B-468	• • EXTENSION, BUMPER		4		
730	A-3256	• • BUMPER, FORK		4	Y	
10A-2		**BLADE RETENTION PARTS**				
		(REFER TO "BLADE RETENTION PARTS" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		PROPELLER MOUNTING PARTS				
1200	C-3317-230	• O-RING (FLANGE)		1	Y	
1210	A-2048-2	• WASHER, MOUNTING, 9/16" CSK		8	Y	
1220	B-3339-1	• BOLT, MOUNTING, 9/16-18, 12 POINT		8	Y	

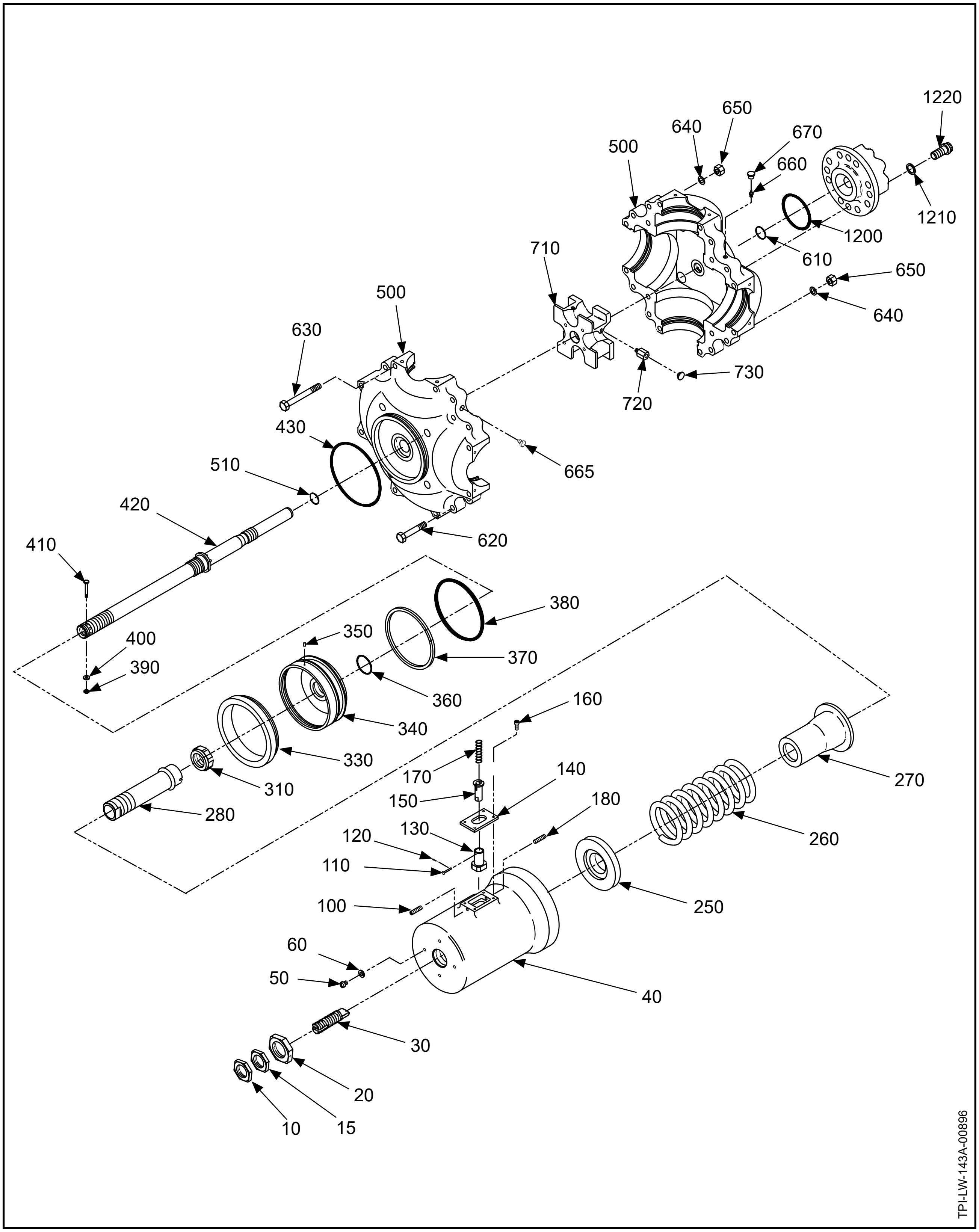
EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-6		**PROPELLER PARTS HC-E4N-5A - CONTINUED**				
		BALANCE PARTS				
-1100	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		AR		
-1110	102578	• BALANCE WEIGHT		AR		
		COUNTERWEIGHTS/MOUNTING BOLTS				
-9030		• COUNTERWEIGHT APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION				PCP
-9035		• COUNTERWEIGHT MOUNTING BOLTS REFER TO THE APPLICABLE HARTZELL PROPELLER BLADE OVERHAUL MANUAL: MANUAL 135F (61-13-35) - COMPOSITE BLADES MANUAL 133C (61-13-33) - ALUMINUM BLADES			Y	
		COUNTERWEIGHT SLUGS/MOUNTING HARDWARE				
-9040		• COUNTERWEIGHT SLUGS				
-9050		• COUNTERWEIGHT SLUG MOUNTING BOLT			Y	
-9060		• COUNTERWEIGHT SLUG MOUNTING NUT APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION			Y	
		SPINNER PARTS				
		APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION MANUAL 159 (61-02-59) AND THE APPLICABLE HARTZELL PROPELLER SPINNER MAINTENANCE MANUAL: MANUAL 127 (61-16-27) - METAL SPINNER ASSEMBLIES MANUAL 148 (61-16-48) - COMPOSITE SPINNER ASSEMBLIES				
-9070		• SPACER APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59)				

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED



HC-E4N-5B: Propeller Parts
Figure 10-7

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-7		**PROPELLER PARTS HC-E4N-5B**				
10	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
15	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
20	B-3375	• PCP: NUT, 1 3/8-12, HEX,THIN, DRILLED		1		PCP
30	B-6116	• SCREW, BETA ADJUST		1		
40	D-484	• PCP: CYLINDER		1		PCP
50	B-3841-5	• SCREW, 1/4-28, FILLISTER HEAD		1	Y	
60	B-3837-0463	• WASHER, CORROSION RESISTANT		1	Y	
100	B-6639-131	• SCREW, SET		2	Y	
110	B-2877	• CLEVIS PIN, 3/32		2	Y	
120	B-3838-1	• COTTER PIN		2	Y	
130	B-444-4	• HOUSING, START LOCK		2		
140	B-446	• COVER, HOUSING, START LOCK		2		
150	A-2620-1	• PIN, START LOCK		2		
160	B-3821	• SCREW, 10-32, CAP		8	Y	
170	B-658	• SPRING, COMPRESSION		2	Y	
180	B-6639-131	• SCREW, SET		2	Y	
250	B-6768	• SPRING RETAINER, FORWARD		1		
260	C-6760	• PCP: SPRING, COMPRESSION, FEATHERING		1		PCP
270	B-6761	• GUIDE, SPRING, PLASTIC		1	Y	
280	B-6758	• PCP: SLEEVE, PITCH ADJUST - UNIT PURCHASED UNIT INCLUDES ITEM 290A, C-6759		1		PCP
-290	C-438	• • PCP: SLEEVE, REVERSE ADJUST SUPERSEDED BY ITEM 290A		1		PCP
-290A	C-6759	• • PCP: SLEEVE, REVERSE ADJUST SUPERSEDED BY ITEM 280. ITEM 290A IS ONLY AVAILABLE AS PART OF ITEM 280		1		PCP
-300	A-441	• • BUSHING, SLEEVE		1		
310	B-474	• NUT, 1-1/8-12, HEX, SELF-LOCKING		1	Y	
-320	C-497	• PISTON UNIT		1		
330	B-493	• • RING, PISTON, START LOCK		1		
340	C-492	• • PISTON		1		
350	B-3842-0250	• • SPRING PIN, 3/32", CRES		1	Y	
360	C-3317-217	• O-RING (PISTON ID)		1	Y	
370	B-1843	• SEAL, DUST, PISTON		1	Y	
380	C-3317-426-2	• O-RING (PISTON OD)		1	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-7		**PROPELLER PARTS HC-E4N-5B - CONTINUED**				
390	B-3808-3	• NUT, HEX, SELF-LOCKING		1	Y	
400	B-3851-0363	• WASHER		1	Y	
410	B-3383-15	• BOLT, 10-32, HEX HEAD		1	Y	
420	D-6114	• ROD, PITCH CHANGE REPLACED BY ITEM 420C		1		
420A	D-6114-1	• PCP: ROD, PITCH CHANGE REPLACES ITEM 420B, POST HC-SB-61-215		1		PCP
430	C-3317-251	• O-RING (CYLINDER MOUNTING)		1	Y	
500	D-389	• PCP: HUB UNIT (2 DOWEL HOLES) SUPERSEDED BY ITEM 500B (REFER TO “D-389-( ) HUB UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
500A	D-389-1	•PCP: HUB UNIT (4 DOWEL HOLES) ALTERNATE FOR ITEM 500 SUPERSEDED BY ITEM 500C (REFER TO “D-389-( ) HUB UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
500B	D-389-2	• PCP: HUB UNIT (2 DOWEL HOLES) SUPERSEDES ITEM 500 (REFER TO “D-389-( ) HUB UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
500C	D-389-3	• PCP: HUB UNIT (4 DOWEL HOLES) ALTERNATE FOR ITEM 500A SUPERSEDES ITEM 500A (REFER TO “D-389-( ) HUB UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
510	C-3317-213-2	• O-RING (CYLINDER-SIDE BUSHING ID)		1	Y	
610	C-3317-211-2	• O-RING (ENGINE-SIDE BUSHING ID)		1	Y	
620	A-2431	• BOLT, 3/8-24, HEX HEAD		12		
630	A-2432	• BOLT, 3/8-24, HEX HEAD		8		
640	B-3834-0632	• WASHER		20	Y	
650	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		20	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-7		**PROPELLER PARTS HC-E4N-5B - CONTINUED**				
660	A-279	• FITTING, LUBRICATION REPLACED BY ITEMS 660A AND 665		8	Y	
660A	A-279	• FITTING, LUBRICATION REPLACES ITEM 660 IN ENGINE-SIDE OF HUB		4	Y	
660B	C-6349	• FITTING, LUBRICATION, 45° (POST HC-SL-61-187) ALTERNATE FOR ITEM 660A		4	Y	
665	106545	• PLUG, LUBRICATION (POST HC-SL-61-354) REPLACES ITEMS 660 IN CYLINDER-SIDE OF HUB		4	Y	
670	B-6544	• CAP, FITTING, LUBRICATION USED WITH ITEMS 660, 660A, AND 660B		4	Y	
-700	C-635	• FORK, FOUR BLADE - ASSEMBLY		1		
710	D-495-1	• • FORK, FOUR BLADE, REPLACED BY ITEM 710B		OBS		
710A	D-495	• • FORK, FOUR BLADE, REPLACED BY ITEM 710B		OBS		
710B	D-495-2	• • FORK, FOUR BLADE, REPLACES ITEMS 710 AND 710A		1		
720	B-468	• • EXTENSION, BUMPER		4		
730	A-3256	• • BUMPER, FORK		4	Y	
10A-2		**BLADE RETENTION PARTS** (REFER TO "BLADE RETENTION PARTS" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		PROPELLER MOUNTING PARTS				
1200	C-3317-230	• O-RING (FLANGE)		1	Y	
1210	A-2048-2	• WASHER, MOUNTING, 9/16" CSK		8	Y	
1220	B-3339-1	• BOLT, MOUNTING, 9/16-18, 12 POINT		8	Y	

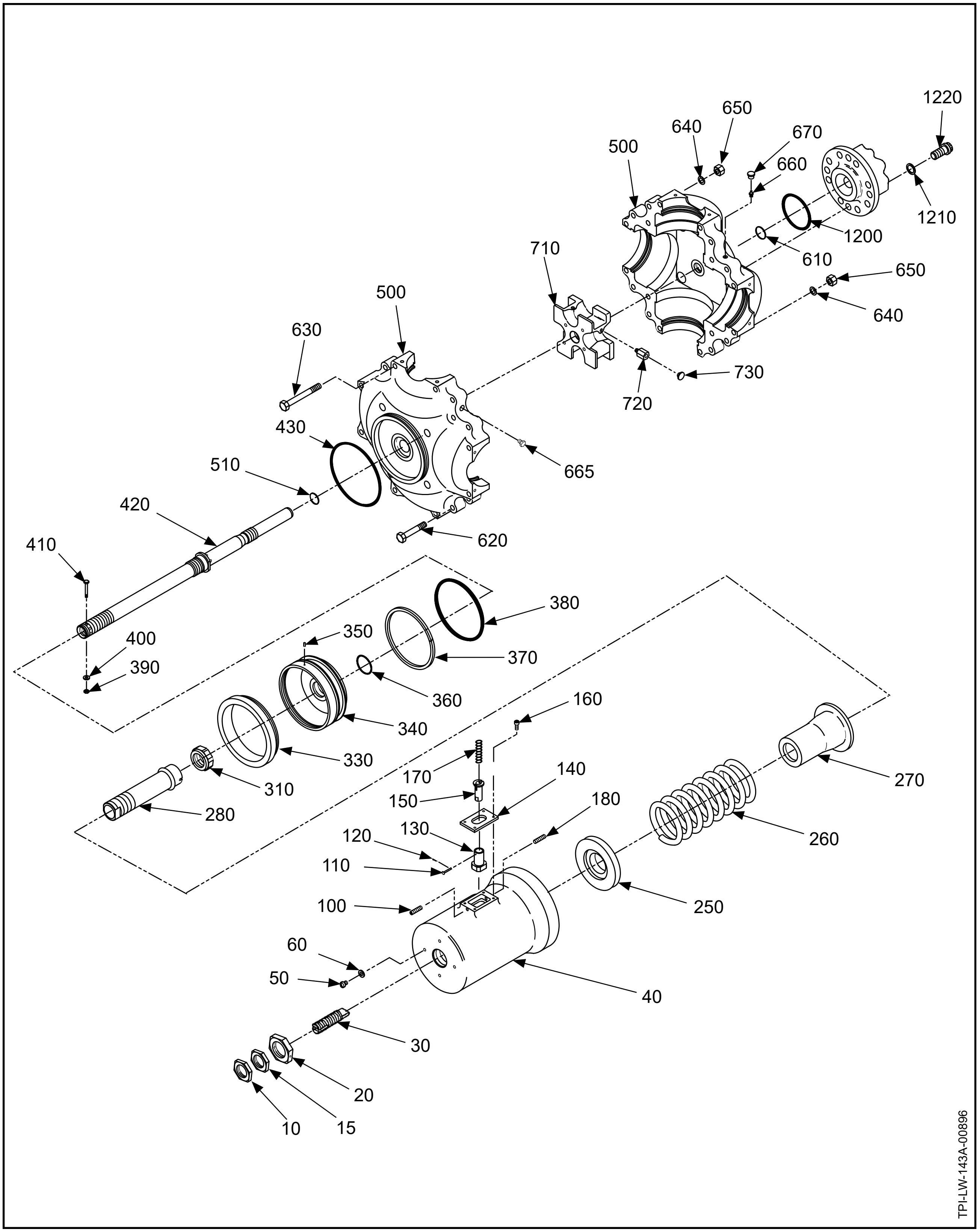
EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-7		**PROPELLER PARTS HC-E4N-5B - CONTINUED**				
		BALANCE PARTS				
-1100	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		AR		
-1110	A-2424(A)-( )	• BALANCE WEIGHT		AR		
		COUNTERWEIGHTS/MOUNTING BOLTS				
-9030		• COUNTERWEIGHT APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION				PCP
-9035		• COUNTERWEIGHT MOUNTING BOLTS REFER TO THE APPLICABLE HARTZELL PROPELLER BLADE OVERHAUL MANUAL: MANUAL 135F (61-13-35) - COMPOSITE BLADES MANUAL 133C (61-13-33) - ALUMINUM BLADES			Y	
		COUNTERWEIGHT SLUGS/MOUNTING HARDWARE				
-9040		• COUNTERWEIGHT SLUGS				
-9050		• COUNTERWEIGHT SLUG MOUNTING BOLT			Y	
-9060		• COUNTERWEIGHT SLUG MOUNTING NUT APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION			Y	
		SPINNER PARTS				
		APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION MANUAL 159 (61-02-59) AND THE APPLICABLE HARTZELL PROPELLER SPINNER MAINTENANCE MANUAL: MANUAL 127 (61-16-27) - METAL SPINNER ASSEMBLIES MANUAL 148 (61-16-48) - COMPOSITE SPINNER ASSEMBLIES				
-9070		• SPACER APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59)				

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED



HC-E4N-5D: Propeller Parts
Figure 10-8

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-8		**PROPELLER PARTS - E4N-5D**				
10	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
15	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
20	B-3375	• PCP: NUT, 1 3/8-12, HEX,THIN, DRILLED		1		PCP
30	B-439	• SCREW, BETA ADJUST		1		
40	D-484	• PCP: CYLINDER		1		PCP
50	B-3841-5	• SCREW, 1/4-28, FILLISTER HEAD		1	Y	
60	B-3837-0463	• WASHER, CORROSION RESISTANT		1	Y	
100	B-6639-131	• SCREW, SET		2	Y	
110	B-2877	• CLEVIS PIN, 3/32		2	Y	
120	B-3838-1	• COTTER PIN		2	Y	
130	B-444-4	• HOUSING, START LOCK		2		
140	B-446	• COVER, HOUSING, START LOCK		2		
150	A-2620-1	• PIN, START LOCK		2		
160	B-3821	• SCREW, 10-32, CAP		8	Y	
170	B-658	• SPRING, COMPRESSION		2	Y	
180	B-6639-131	• SCREW, SET		2	Y	
250	B-6768	• SPRING RETAINER, FORWARD		1		
260	C-6760	• PCP: SPRING, COMPRESSION, FEATHERING		1		PCP
270	B-6761	• GUIDE, SPRING, PLASTIC		1	Y	
280	B-6758	• PCP: SLEEVE, PITCH ADJUST - UNIT PURCHASED UNIT INCLUDES ITEM 290A, C-6759		1		PCP
-290	C-438	• • PCP: SLEEVE, REVERSE ADJUST SUPERSEDED BY ITEM 290A		1		PCP
-290A	C-6759	• • PCP: SLEEVE, REVERSE ADJUST SUPERSEDED BY ITEM 280. ITEM 290A IS ONLY AVAILABLE AS PART OF ITEM 280		1		PCP
-300	A-441	• • BUSHING, SLEEVE		1		
310	B-474	• NUT, 1-1/8-12, HEX, SELF-LOCKING		1	Y	
-320	C-497	• PISTON UNIT		1		
330	B-493	• • RING, PISTON, START LOCK		1		
340	C-492	• • PISTON		1		
350	B-3842-0250	• • SPRING PIN, 3/32", CRES		1	Y	
360	C-3317-217	• O-RING (PISTON ID)		1	Y	
370	B-1843	• SEAL, DUST, PISTON		1	Y	
380	C-3317-426-2	• O-RING (PISTON OD)		1	Y	
390	B-3808-3	• NUT, HEX, SELF-LOCKING		1	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

HC-E4N-5D

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-8		**PROPELLER PARTS - E4N-5D, CONTINUED**				
400	B-3851-0363	• WASHER		1	Y	
410	B-3383-15	• BOLT, 10-32, HEX HEAD		1	Y	
420	D-494	• PCP: ROD, PITCH CHANGE REPLACED BY ITEM 420A		1		PCP
420A	D-494-1	• PCP: ROD, PITCH CHANGE REPLACES ITEM 420, POST HC-SB-61-215		1		PCP
430	C-3317-251	• O-RING (CYLINDER MOUNTING)		1	Y	
500	D-389-2	• PCP: HUB UNIT (REFER TO “D-389-( ) HUB UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
500A	D-389-3	• PCP: HUB UNIT HC-E4(N,P) ALTERNATE FOR ITEM 500 (REFER TO “D-389-( ) HUB UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
510	C-3317-213-2	• • O-RING (CYLINDER-SIDE BUSHING ID)		1	Y	
610	C-3317-211-2	• • O-RING (ENGINE-SIDE BUSHING ID)		1	Y	
620	A-2431	• BOLT, 3/8-24, HEX HEAD		12		
630	A-2432	• BOLT, 3/8-24, HEX HEAD		8		
640	B-3834-0632	• WASHER		20	Y	
650	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		20	Y	
660	A-279	• FITTING, LUBRICATION REPLACED BY ITEMS 660A AND 665		8	Y	
660A	A-279	• FITTING, LUBRICATION REPLACES ITEM 660 IN ENGINE-SIDE OF HUB		4	Y	
660B	C-6349	• FITTING, LUBRICATION, 45° (POST HC-SL-61-187) ALTERNATE FOR ITEM 660A		4	Y	
665	106545	• PLUG, LUBRICATION (POST HC-SL-61-354) REPLACES ITEMS 660 IN CYLINDER-SIDE OF HUB		4	Y	
670	B-6544	• CAP, FITTING, LUBRICATION USED WITH ITEMS 660, 660A, AND 660B		4	Y	
-700	C-635	• FORK, FOUR BLADE - ASSEMBLY		1		
710	D-495-1	• • FORK, FOUR BLADE, REPLACED BY ITEM 710A		OBS		
710A	D-495-2	• • FORK, FOUR BLADE, REPLACES ITEM 710		1		
720	B-468	• • EXTENSION, BUMPER		4		
730	A-3256	• • BUMPER, FORK		4	Y	
10A-1		**BLADE RETENTION PARTS** (REFER TO "BLADE RETENTION PARTS" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				

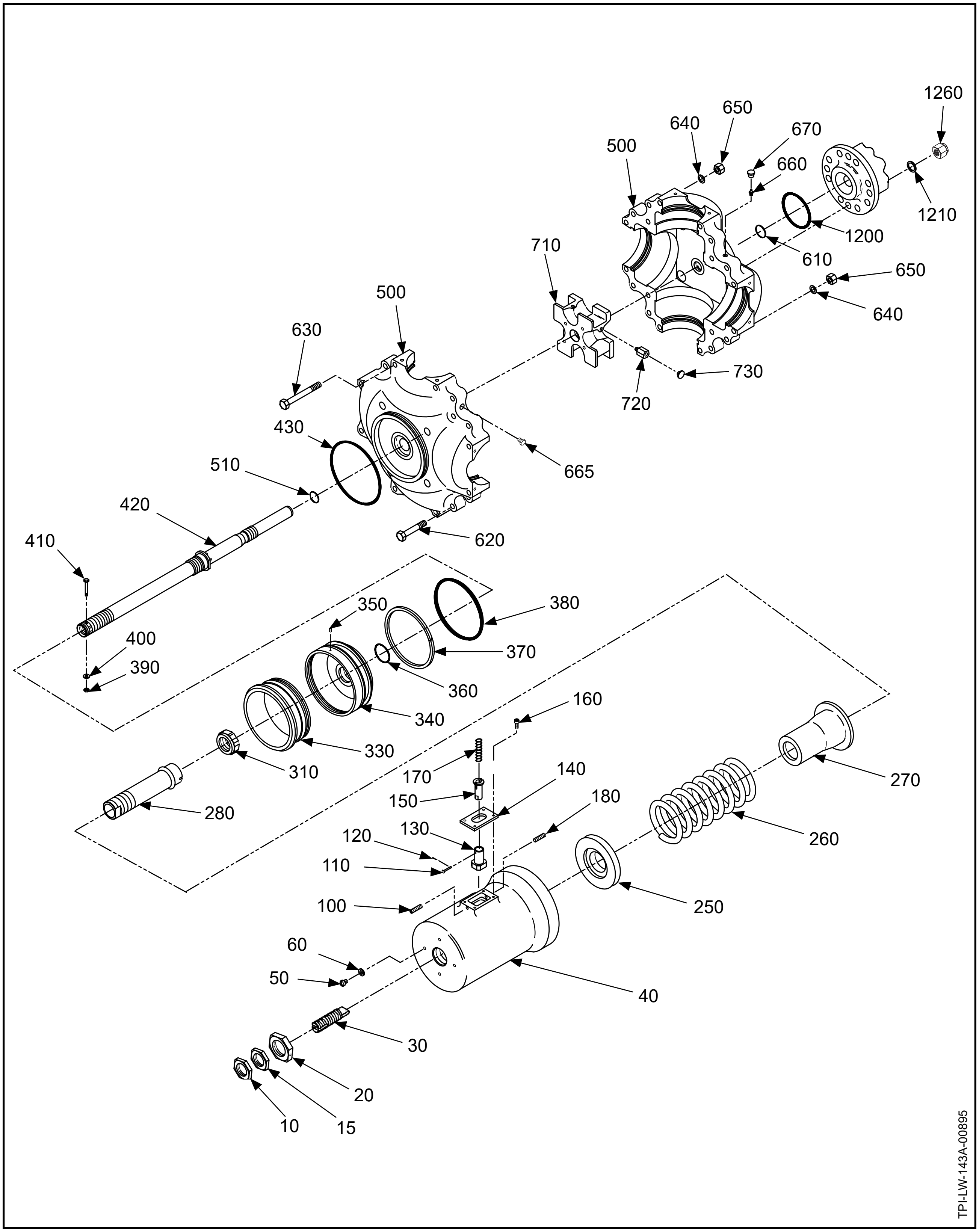
EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-8		**PROPELLER PARTS - E4N-5D, CONTINUED**				
		PROPELLER MOUNTING PARTS				
1200	C-3317-230	• O-RING (FLANGE)		1	Y	
1210	A-2048-2	• WASHER, MOUNTING, 9/16" CSK		8	Y	
1220	B-3339-1	• BOLT, MOUNTING, 9/16-18, 12 POINT		8	Y	
		BALANCE PARTS				
-1100	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		AR		
-1110	A-2424(A)-( )	• BALANCE WEIGHT		AR		
		COUNTERWEIGHTS/MOUNTING BOLTS				
-9030		• COUNTERWEIGHT APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION				PCP
-9035		• COUNTERWEIGHT MOUNTING BOLTS REFER TO THE APPLICABLE HARTZELL PROPELLER BLADE OVERHAUL MANUAL: MANUAL 135F (61-13-35) - COMPOSITE BLADES MANUAL 133C (61-13-33) - ALUMINUM BLADES			Y	
		COUNTERWEIGHT SLUGS/MOUNTING HARDWARE				
-9040		• COUNTERWEIGHT SLUGS				
-9050		• COUNTERWEIGHT SLUG MOUNTING BOLT			Y	
-9060		• COUNTERWEIGHT SLUG MOUNTING NUT APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION			Y	
		SPINNER PARTS				
		APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION MANUAL 159 (61-02-59) AND THE APPLICABLE HARTZELL PROPELLER SPINNER MAINTENANCE MANUAL: MANUAL 127 (61-16-27) - METAL SPINNER ASSEMBLIES MANUAL 148 (61-16-48) - COMPOSITE SPINNER ASSEMBLIES				
-9070		• SPACER APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59)				

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED



HC-E4N-5KCL: Propeller Parts
Figure 10-9

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-9		**PROPELLER PARTS - HC-E4N-5KCL**				
10	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
15	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
20	B-3375	• PCP: NUT, 1 3/8-12, HEX,THIN, DRILLED		1		PCP
30	B-439	• SCREW, BETA ADJUST		1		
40	D-484	• PCP: CYLINDER		1		PCP
50	B-3841-5	• SCREW, 1/4-28, FILLISTER HEAD		1	Y	
60	B-3837-0463	• WASHER, CORROSION RESISTANT		1	Y	
100	B-6639-131	• SCREW, SET		2	Y	
110	B-2877	• CLEVIS PIN, 3/32		2	Y	
120	B-3838-1	• COTTER PIN		2	Y	
130	B-444-4	• HOUSING, START LOCK		2		
140	B-446	• COVER, HOUSING, START LOCK		2		
150	A-2620-1	• PIN, START LOCK		2		
160	B-3821	• SCREW, 10-32, CAP		8	Y	
170	B-658	• SPRING, COMPRESSION		2	Y	
180	B-6639-131	• SCREW, SET		2	Y	
250	B-6768	• SPRING RETAINER, FORWARD		1		
260	106926	• SPRING, COMPRESSION, FEATHERING		1		PCP
270	B-6761	• GUIDE, SPRING, PLASTIC		1	Y	
280	B-6758	• PCP: SLEEVE, PITCH ADJUST - UNIT		1		PCP
-300	A-441	• • BUSHING, SLEEVE		1		
310	B-474	• NUT, 1-1/8-12, HEX, SELF-LOCKING		1	Y	
-320	C-497	• PISTON UNIT		1		
330	B-493	• • RING, PISTON, START LOCK		1		
340	C-492	• • PISTON		1		
350	B-3842-0250	• • SPRING PIN, 3/32", CRES		1	Y	
360	C-3317-217	• O-RING (PISTON ID)		1	Y	
370	B-1843	• SEAL, DUST, PISTON		1	Y	
380	C-3317-426-2	• O-RING (PISTON OD)		1	Y	
390	B-3808-3	• NUT, HEX, SELF-LOCKING		1	Y	
400	B-3851-0363	• WASHER		1	Y	
410	B-3383-15	• BOLT, 10-32, HEX HEAD		1	Y	
420	106503	• PCP: ROD, PITCH CHANGE		1		PCP
430	C-3317-251	• O-RING (CYLINDER MOUNTING)		1	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

HC-E4N-5KCL

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-9		**PROPELLER PARTS - HC-E4N-5KCL, CONTINUED**				
-470	106497	• PCP: HUB ASSEMBLY, HC-E4N-5K (REFER TO “106497 HUB ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
500	106498	• • PCP:HUB UNIT, HC-E4N-5K		1		PCP
510	C-3317-213-2	• O-RING (CYLINDER-SIDE BUSHING ID)		1	Y	
610	C-3317-211-2	• O-RING (ENGINE-SIDE BUSHING ID)		1	Y	
620	A-2431	• BOLT, 3/8-24, HEX HEAD		12		
630	A-2432	• BOLT, 3/8-24, HEX HEAD		8		
640	B-3834-0632	• WASHER		20	Y	
650	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		20	Y	
660	C-6349	• FITTING, LUBRICATION, 45° (CYLINDER-SIDE OF HUB)		4	Y	
665	106545	• PLUG, LUBRICATION, (ENGINE-SIDE OF HUB)		4	Y	
670	B-6544	• CAP, FITTING, LUBRICATION USED WITH ITEM 660		4	Y	
-700	106171L	• FORK, FOUR BLADE - ASSEMBLY, LH		1		
710	103548L	• • FORK, FOUR BLADE, LH		1		
720	B-468	• • EXTENSION, BUMPER		4		
730	A-3256	• • BUMPER, FORK		4		
10A-3		**BLADE RETENTION PARTS** (REFER TO "BLADE RETENTION PARTS" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		PROPELLER MOUNTING PARTS				
1200	C-3317-230	• O-RING (FLANGE)		1	Y	
1210	A-2048-2	• WASHER, MOUNTING, 9/16" CSK		8	Y	
1260	C-6006	• NUT, MOUNTING, 9/16-18, 12 POINT		8	Y	

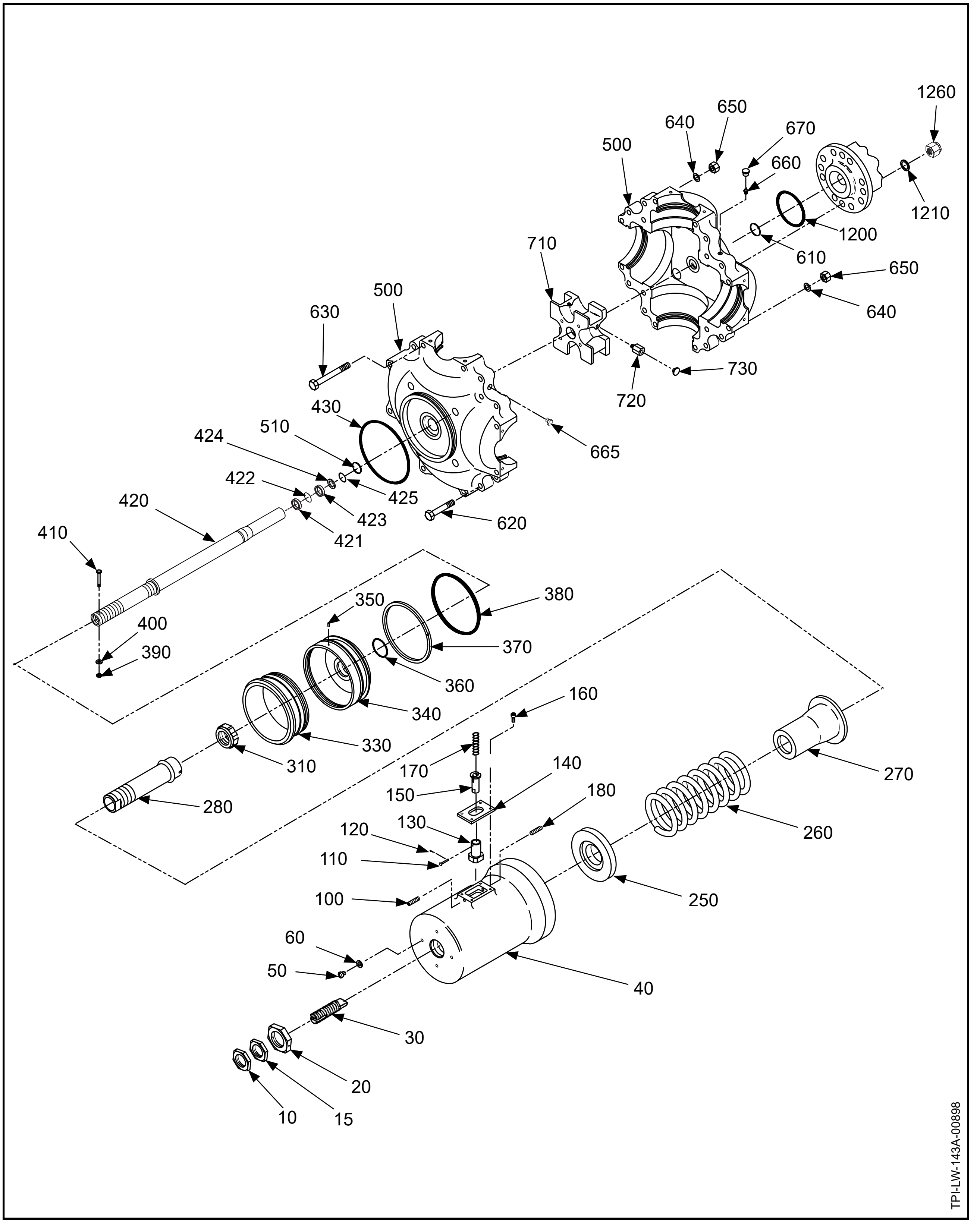
EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-9		**PROPELLER PARTS - HC-E4N-5KCL, CONTINUED**				
		BALANCE PARTS				
-1100	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		AR		
-1110	A-2424(A)-( )	• BALANCE WEIGHT		AR		
		COUNTERWEIGHTS/MOUNTING BOLTS				
-9030		• COUNTERWEIGHT APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION				PCP
-9035		• COUNTERWEIGHT MOUNTING BOLTS REFER TO THE APPLICABLE HARTZELL PROPELLER BLADE OVERHAUL MANUAL: MANUAL 135F (61-13-35) - COMPOSITE BLADES MANUAL 133C (61-13-33) - ALUMINUM BLADES			Y	
		COUNTERWEIGHT SLUGS/MOUNTING HARDWARE				
-9040		• COUNTERWEIGHT SLUGS				
-9045		• COUNTERWEIGHT SLUGS				
-9050		• COUNTERWEIGHT SLUG MOUNTING BOLT			Y	
-9060		• COUNTERWEIGHT SLUG MOUNTING NUT APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION			Y	
		SPINNER PARTS				
		APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION MANUAL 159 (61-02-59) AND THE APPLICABLE HARTZELL PROPELLER SPINNER MAINTENANCE MANUAL: MANUAL 127 (61-16-27) - METAL SPINNER ASSEMBLIES MANUAL 148 (61-16-48) - COMPOSITE SPINNER ASSEMBLIES				
-9070		• SPACER APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59)				

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED



HC-E4N-5KFL: Propeller Parts
Figure 10-10

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-10		**PROPELLER PARTS - HC-E4N-5KFL**				
10	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
15	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
20	B-3375	• PCP: NUT, 1 3/8-12, HEX,THIN, DRILLED		1		PCP
30	B-439	• SCREW, BETA ADJUST		1		
40	D-484	• PCP: CYLINDER		1		PCP
50	B-3841-5	• SCREW, 1/4-28, FILLISTER HEAD		1	Y	
60	B-3837-0463	• WASHER, CORROSION RESISTANT		1	Y	
100	B-6639-131	• SCREW, SET		2	Y	
110	B-2877	• CLEVIS PIN, 3/32		2	Y	
120	B-3838-1	• COTTER PIN		2	Y	
130	B-444-4	• HOUSING, START LOCK		2		
140	B-446	• COVER, HOUSING, START LOCK		2		
150	A-2620-1	• PIN, START LOCK		2		
160	B-3821	• SCREW, 10-32, CAP		8	Y	
170	B-658	• SPRING, COMPRESSION		2	Y	
180	B-6639-131	• SCREW, SET		2	Y	
250	B-6768	• SPRING RETAINER, FORWARD		1		
260	106926	• SPRING, COMPRESSION, FEATHERING		1		PCP
270	B-6761	• GUIDE, SPRING, PLASTIC		1	Y	
280	B-6758	• PCP: SLEEVE, PITCH ADJUST - UNIT		1		PCP
-300	A-441	• • BUSHING, SLEEVE		1		
310	B-474	• NUT, 1-1/8-12, HEX, SELF-LOCKING		1	Y	
-320	C-497	• PISTON UNIT		1		
330	B-493	• • RING, PISTON, START LOCK		1		
340	C-492	• • PISTON		1		
350	B-3842-0250	• • SPRING PIN, 3/32", CRES		1	Y	
360	C-3317-217	• O-RING (PISTON ID)		1	Y	
370	B-1843	• SEAL, DUST, PISTON		1	Y	
380	C-3317-426-2	• O-RING (PISTON OD)		1	Y	
390	B-3808-3	• NUT, HEX, SELF-LOCKING		1	Y	
400	B-3851-0363	• WASHER		1	Y	
410	B-3383-15	• BOLT, 10-32, HEX HEAD		1	Y	
420	107224	• PCP: ROD, PITCH CHANGE		1		PCP
421	107136	• BUSHING, BETA TUBE		1		

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

HC-E4N-5KFL

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-10		**PROPELLER PARTS - HC-E4N-5KFL, CONTINUED**				
422	C-3317-112	• O-RING		1	Y	
423	107136	• BUSHING, BETA TUBE		1		
424	107202	• WASHER, 1/2", CRES		1	Y	
425	A-5839-65	• RING, RETAINING, INTERNAL SPIRAL		1	Y	
430	C-3317-251	• O-RING (CYLINDER MOUNTING)		1	Y	
-470	108112	• PCP:HUB ASSEMBLY, HC-E4N-5K(F) (REFER TO “108112 HUB ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
500	107961	• • PCP:HUB UNIT, HC-E4N-5K		1		PCP
510	C-3317-213-2	• O-RING (CYLINDER-SIDE BUSHING ID)		1	Y	
610	C-3317-211-2	• O-RING (ENGINE-SIDE BUSHING ID)		1	Y	
620	A-2431	• BOLT, 3/8-24, HEX HEAD		12		
630	A-2432	• BOLT, 3/8-24, HEX HEAD		8		
640	B-3834-0632	• WASHER		20	Y	
650	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		20	Y	
660	C-6349	• FITTING, LUBRICATION, 45° (CYLINDER-SIDE OF HUB)		4	Y	
665	106545	• PLUG, LUBRICATION, (ENGINE-SIDE OF HUB)		4	Y	
670	B-6544	• CAP, FITTING, LUBRICATION USED WITH ITEM 660		4	Y	
-700	106171L	• FORK, FOUR BLADE - ASSEMBLY, LH		1		
710	103548L	• • FORK, FOUR BLADE, LH		1		
720	B-468	• • EXTENSION, BUMPER		4		
730	A-3256	• • BUMPER, FORK		4	Y	
10A-3		**BLADE RETENTION PARTS** (REFER TO "BLADE RETENTION PARTS" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		PROPELLER MOUNTING PARTS				
1200	C-3317-230	• O-RING (FLANGE)		1	Y	
1210	A-2048-2	• WASHER, MOUNTING, 9/16" CSK		8	Y	
1260	C-6006	• NUT, MOUNTING, 9/16-18, 12 POINT		8	Y	

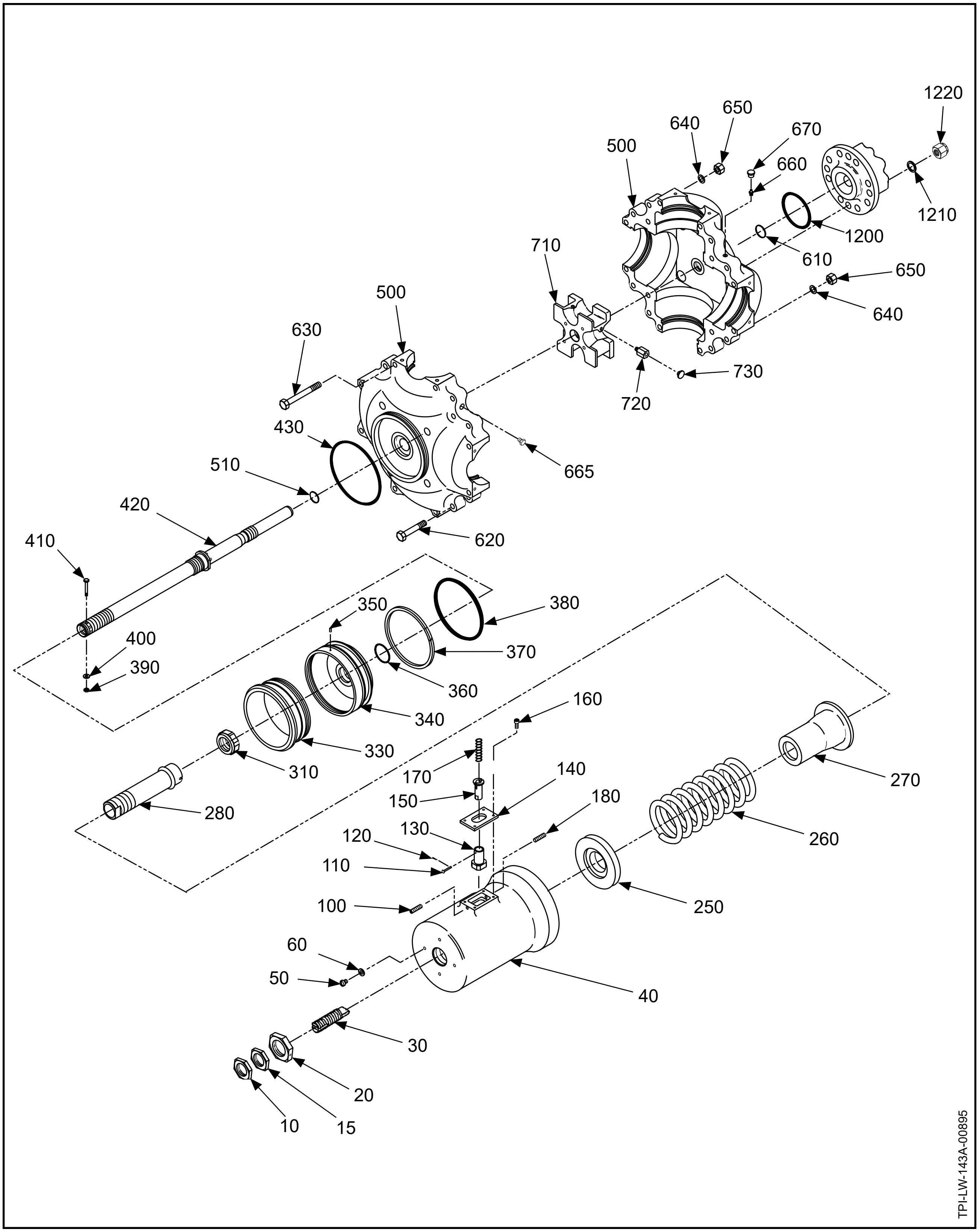
EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-10		**PROPELLER PARTS - HC-E4N-5KFL, CONTINUED**				
		BALANCE PARTS				
-1100	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		AR		
-1110	A-2424(A)-( )	• BALANCE WEIGHT		AR		
		COUNTERWEIGHTS/MOUNTING BOLTS				
-9030		• COUNTERWEIGHT APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION				PCP
-9035		• COUNTERWEIGHT MOUNTING BOLTS REFER TO THE APPLICABLE HARTZELL PROPELLER BLADE OVERHAUL MANUAL: MANUAL 135F (61-13-35) - COMPOSITE BLADES MANUAL 133C (61-13-33) - ALUMINUM BLADES			Y	
		COUNTERWEIGHT SLUGS/MOUNTING HARDWARE				
-9040		• COUNTERWEIGHT SLUGS				
-9045		• COUNTERWEIGHT SLUGS				
-9050		• COUNTERWEIGHT SLUG MOUNTING BOLT			Y	
-9060		• COUNTERWEIGHT SLUG MOUNTING NUT APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION			Y	
		SPINNER PARTS				
		APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION MANUAL 159 (61-02-59) AND THE APPLICABLE HARTZELL PROPELLER SPINNER MAINTENANCE MANUAL: MANUAL 127 (61-16-27) - METAL SPINNER ASSEMBLIES MANUAL 148 (61-16-48) - COMPOSITE SPINNER ASSEMBLIES				
-9070		• SPACER APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59)				

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED



HC-E4N-5KL: Propeller Parts
Figure 10-11

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-11		**PROPELLER PARTS - HC-E4N-5KL**				
10	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
15	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
20	B-3375	• PCP: NUT, 1 3/8-12, HEX,THIN, DRILLED		1		PCP
30	B-439	• SCREW, BETA ADJUST		1		
40	D-484	• PCP: CYLINDER		1		PCP
50	B-3841-5	• SCREW, 1/4-28, FILLISTER HEAD		1	Y	
60	B-3837-0463	• WASHER, CORROSION RESISTANT		1	Y	
100	B-6639-131	• SCREW, SET		2	Y	
110	B-2877	• CLEVIS PIN, 3/32		2	Y	
120	B-3838-1	• COTTER PIN		2	Y	
130	B-444-4	• HOUSING, START LOCK		2		
140	B-446	• COVER, HOUSING, START LOCK		2		
150	A-2620-1	• PIN, START LOCK		2		
160	B-3821	• SCREW, 10-32, CAP		8	Y	
170	B-658	• SPRING, COMPRESSION		2	Y	
180	B-6639-131	• SCREW, SET		2	Y	
250	B-6768	• SPRING RETAINER, FORWARD		1		
260	C-6760	• PCP: SPRING, COMPRESSION, FEATHERING, REPLACED BY BY ITEM 260A		1		PCP
260A	106926	• SPRING, COMPRESSION, FEATHERING REPLACES ITEM 260		1		PCP
270	B-6761	• GUIDE, SPRING, PLASTIC		1	Y	
280	B-6758	• PCP: SLEEVE, PITCH ADJUST - UNIT PURCHASED UNIT INCLUDES ITEM 290, C-6759		1		PCP
-290	C-6759	• • PCP: SLEEVE, REVERSE ADJUST ITEM 290 IS ONLY AVAILABLE AS PART OF ITEM 280		1		PCP
-300	A-441	• • BUSHING, SLEEVE		1		
310	B-474	• NUT, 1-1/8-12, HEX, SELF-LOCKING		1	Y	
-320	C-497	• PISTON UNIT		1		
330	B-493	• • RING, PISTON, START LOCK		1		
340	C-492	• • PISTON		1		
350	B-3842-0250	• • SPRING PIN, 3/32", CRES		1	Y	
360	C-3317-217	• O-RING (PISTON ID)		1	Y	
370	B-1843	• SEAL, DUST, PISTON		1	Y	
380	C-3317-426-2	• O-RING (PISTON OD)		1	Y	
390	B-3808-3	• NUT, HEX, SELF-LOCKING		1	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-11		**PROPELLER PARTS - HC-E4N-5KL, CONTINUED**				
400	B-3851-0363	• WASHER		1	Y	
410	B-3383-15	• BOLT, 10-32, HEX HEAD		1	Y	
420	106503	• PCP: ROD, PITCH CHANGE		1		PCP
430	C-3317-251	• O-RING (CYLINDER MOUNTING)		1	Y	
-470	106497	• PCP:HUB ASSEMBLY, HC-E4N-5K (REFER TO “106497 HUB ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
510	C-3317-213-2	• O-RING (CYLINDER-SIDE BUSHING ID)		1	Y	
610	C-3317-211-2	• O-RING (ENGINE-SIDE BUSHING ID)		1	Y	
620	A-2431	• BOLT, 3/8-24, HEX HEAD		12		
630	A-2432	• BOLT, 3/8-24, HEX HEAD		8		
640	B-3834-0632	• WASHER		20	Y	
650	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		20	Y	
660	A-279	• FITTING, LUBRICATION REPLACED BY ITEMS 660A AND 665		8	Y	
660A	A-279	• FITTING, LUBRICATION REPLACES ITEM 660 IN CYLINDER-SIDE OF HUB		4	Y	
660B	C-6349	• FITTING, LUBRICATION, 45° (POST HC-SL-61-187) ALTERNATE FOR ITEM 660A		4	Y	
665	106545	• PLUG, LUBRICATION (POST HC-SL-61-354) REPLACES ITEMS 660 IN ENGINE-SIDE OF HUB		4	Y	
670	B-6544	• CAP, FITTING, LUBRICATION USED WITH ITEMS 660, 660A, AND 660B		4	Y	
-700	106171L	• FORK, FOUR BLADE - ASSEMBLY, LH		1		
710	103548L	• • FORK, FOUR BLADE, LH		1		
720	B-468	• • EXTENSION, BUMPER		4		
730	A-3256	• • BUMPER, FORK		4	Y	
10A-4		**BLADE RETENTION PARTS** (REFER TO "BLADE RETENTION PARTS" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		PROPELLER MOUNTING PARTS				
1200	C-3317-230	• O-RING (FLANGE)		1	Y	
1210	A-2048-2	• WASHER, MOUNTING, 9/16" CSK		8	Y	
1260	C-6006	• NUT, MOUNTING, 9/16-18, 12 POINT		8	Y	

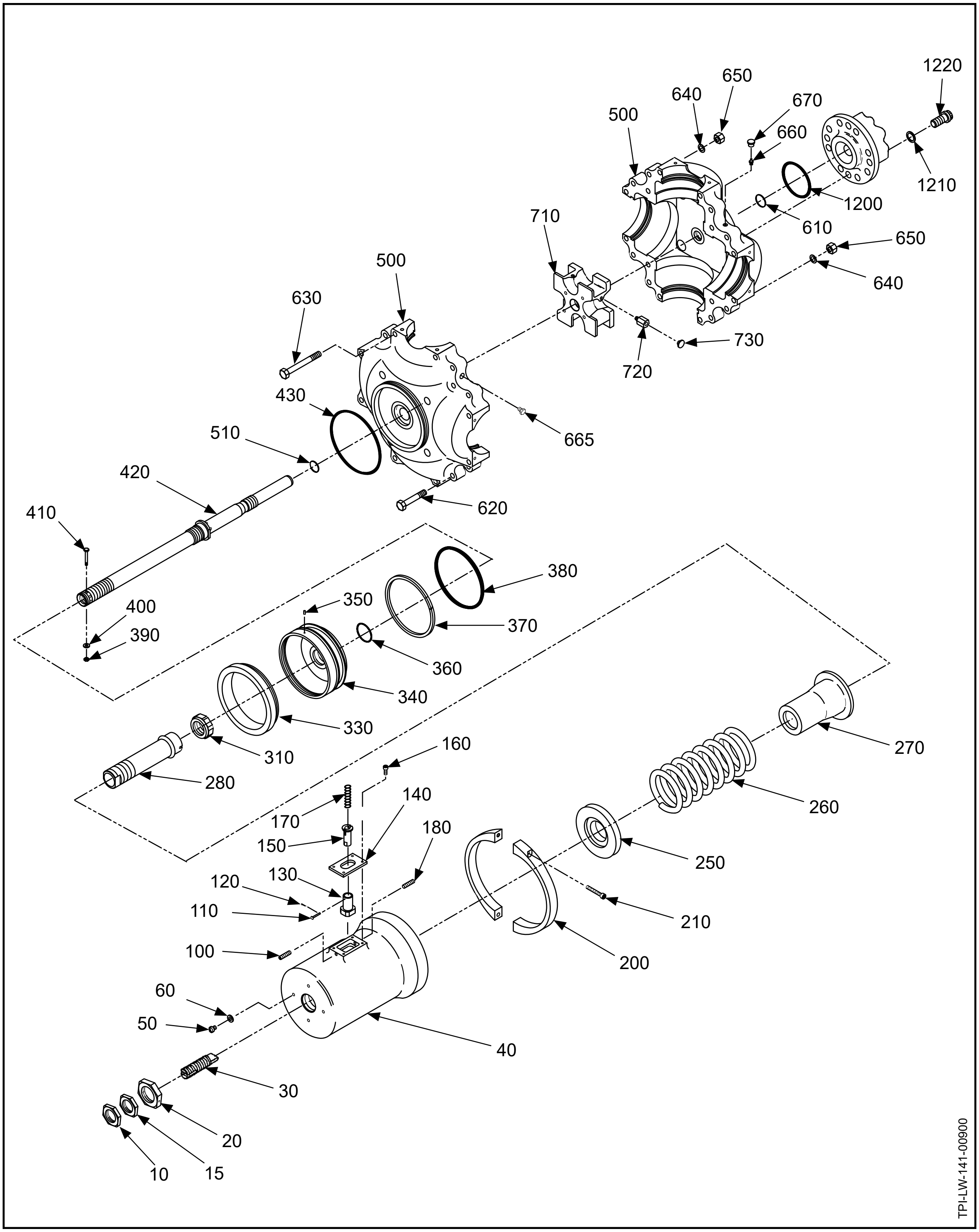
EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-11		**PROPELLER PARTS - HC-E4N-5KL, CONTINUED**				
		BALANCE PARTS				
-1100	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		AR		
-1110	A-2424(A)-( )	• BALANCE WEIGHT		AR		
		COUNTERWEIGHTS/MOUNTING BOLTS				
-9030		• COUNTERWEIGHT APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION				PCP
-9035		• COUNTERWEIGHT MOUNTING BOLTS REFER TO THE APPLICABLE HARTZELL PROPELLER BLADE OVERHAUL MANUAL: MANUAL 135F (61-13-35) - COMPOSITE BLADES MANUAL 133C (61-13-33) - ALUMINUM BLADES			Y	
		COUNTERWEIGHT SLUGS/MOUNTING HARDWARE				
-9040		• COUNTERWEIGHT SLUGS				PCP
-9045		• COUNTERWEIGHT SLUGS				PCP
-9050		• COUNTERWEIGHT SLUG MOUNTING BOLT			Y	
-9060		• COUNTERWEIGHT SLUG MOUNTING NUT APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION			Y	
		SPINNER PARTS				
		APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION MANUAL 159 (61-02-59) AND THE APPLICABLE HARTZELL PROPELLER SPINNER MAINTENANCE MANUAL: MANUAL 127 (61-16-27) - METAL SPINNER ASSEMBLIES MANUAL 148 (61-16-48) - COMPOSITE SPINNER ASSEMBLIES				
-9070		• SPACER APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59)				

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED



HC-E4P-5: Propeller Parts
Figure 10-12

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-12		**PROPELLER PARTS - HC-E4P-5**				
10	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
15	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
20	B-3375	• PCP: NUT, 1 3/8-12, HEX,THIN, DRILLED		1		PCP
30	B-439	• SCREW, BETA ADJUST		1		
40	D-484	• PCP: CYLINDER		1		PCP
50	B-3841-5	• SCREW, 1/4-28, FILLISTER HEAD		1	Y	
60	B-3837-0463	• WASHER, CORROSION RESISTANT		1	Y	
100	B-6639-131	• SCREW, SET		2	Y	
110	B-2877	• CLEVIS PIN, 3/32		4	Y	
120	B-3838-1	• COTTER PIN		2	Y	
130	B-444-1	• HOUSING, START LOCK		2		
140	B-446	• COVER, HOUSING, START LOCK		2		
150	A-2620-1	• PIN, START LOCK		2		
160	B-3821	• SCREW, 10-32, CAP		8	Y	
170	B-331	• SPRING, COMPRESSION		2	Y	
180	B-6639-131	• SCREW, SET		2	Y	
200	B-6472-1	• CLAMP, CYLINDER		1		
210	A-2038-12	• SCREW, 1/4-28, CAP		2	Y	
250	B-6768	• SPRING RETAINER, FORWARD		1		
260	C-447	• SPRING, FEATHER REPLACED BY ITEM 260A		1		
260A	C-6760	• PCP: SPRING, COMPRESSION, FEATHERING REPLACES ITEM 260		1		PCP
270	B-442	• GUIDE, SPRING, PLASTIC, REPLACED BY ITEM 270A		1	Y	
270A	B-6761	• GUIDE, SPRING, PLASTIC, REPLACES ITEM 270		1	Y	
280	B-476	• SLEEVE, PITCH ADJUST-UNIT, REPLACED BY ITEM 280A		OBS		
280A	B-6758	• PCP: SLEEVE, PITCH ADJUST-UNIT, REPLACES ITEMS 280 AND 290A		1		PCP
-290	C-438	• SLEEVE, REVERSE ADJUST, REPLACED BY ITEM 290A		OBS		PCP
-290A	C-6759	• PCP: SLEEVE, REVERSE ADJUST REPLACES ITEM 290, REPLACED BY ITEM 280A		OBS		PCP
-300	A-441	• • BUSHING, SLEEVE		1		
310	B-474	• NUT, 1-1/8-12, HEX, SELF-LOCKING		1	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

HC-E4P-5

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-12		**PROPELLER PARTS - HC-E4P-5, CONTINUED**				
-320	C-497	• PISTON UNIT		1		
330	B-493	• • RING, PISTON, START LOCK		1		
340	C-492	• • PISTON		1		
350	A-637	• • SPRING PIN, REPLACED BY ITEM 350A		OBS		
350A	B-3842-0250	• • SPRING PIN, 3/32", CRES, REPLACES ITEM 350		1	Y	
360	C-3317-217	• O-RING (PISTON ID)		1	Y	
370	B-1843	• SEAL, DUST, PISTON		1	Y	
380	C-3317-426-2	• O-RING (PISTON OD)		1	Y	
390	B-3808-3	• NUT, HEX, SELF-LOCKING		1	Y	
400	B-3851-0363	• WASHER		1	Y	
410	B-3383-15	• BOLT, 10-32, HEX HEAD		1	Y	
420	D-494	• PCP: ROD, PITCH CHANGE REPLACED BY ITEM 420A		OBS		PCP
420A	D-494-1	• PCP: ROD, PITCH CHANGE REPLACES ITEM 420, POST HC-SB-61-215		1		PCP
430	C-3317-251	• O-RING, HUB, CYLINDER HALF		1	Y	
500	D-389-1	• PCP: HUB UNIT, REPLACED BY ITEM 500A		OBS		PCP
500A	D-389-3	• PCP: HUB UNIT HC-E4(N,P) REPLACES ITEM 500 (REFER TO “D-389-3 HUB UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
510	C-3317-213-2	• • O-RING (CYLINDER-SIDE BUSHING ID)		1	Y	
610	C-3317-211-2	• • O-RING (ENGINE-SIDE BUSHING ID)		1	Y	
620	A-2431	• BOLT, 3/8-24, HEX HEAD		12		
630	A-2432	• BOLT, 3/8-24, HEX HEAD		8		
640	B-3834-0632	• WASHER		20	Y	
650	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		20	Y	
660	A-279	• FITTING, LUBRICATION REPLACED BY ITEMS 660A AND 665		8	Y	
660A	A-279	• FITTING, LUBRICATION REPLACES ITEM 660 IN ENGINE-SIDE OF HUB		4	Y	
660B	C-6349	• FITTING, LUBRICATION, 45° (POST HC-SL-61-187) ALTERNATE FOR ITEM 660A		4	Y	
665	106545	• PLUG, LUBRICATION (POST HC-SL-61-354) REPLACES ITEMS 660 IN CYLINDER-SIDE OF HUB		4	Y	
670	B-6544	• CAP, FITTING, LUBRICATION USED WITH ITEMS 660, 660A, AND 660B		4	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

HC-E4P-5

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-12		**PROPELLER PARTS - HC-E4P-5, CONTINUED**				
-700	C-635	• FORK, FOUR BLADE - ASSEMBLY		1		
710	D-495	• • FORK, FOUR BLADE, REPLACED BY ITEM 710A		OBS		
710A	D-495-1	• • FORK, FOUR BLADE, REPLACED BY ITEM 710B		OBS		
710B	D-495-2	• • FORK, FOUR BLADE, REPLACES ITEM 710A		1		
720	B-468	• • EXTENSION, BUMPER		4		
730	A-3256	• • BUMPER, FORK		4	Y	
		PROPELLER MOUNTING PARTS				
1200	C-3317-230	• O-RING (FLANGE)		1	Y	
1210	A-2048-2	• WASHER, MOUNTING, 9/16" CSK		8	Y	
1220	B-3347	• BOLT, MOUNTING, 9/16-18, 12 POINT		8	Y	
		BALANCE PARTS				
-1100	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		AR	Y	
-1110	A-2424(A)-( )	• BALANCE WEIGHT		AR		

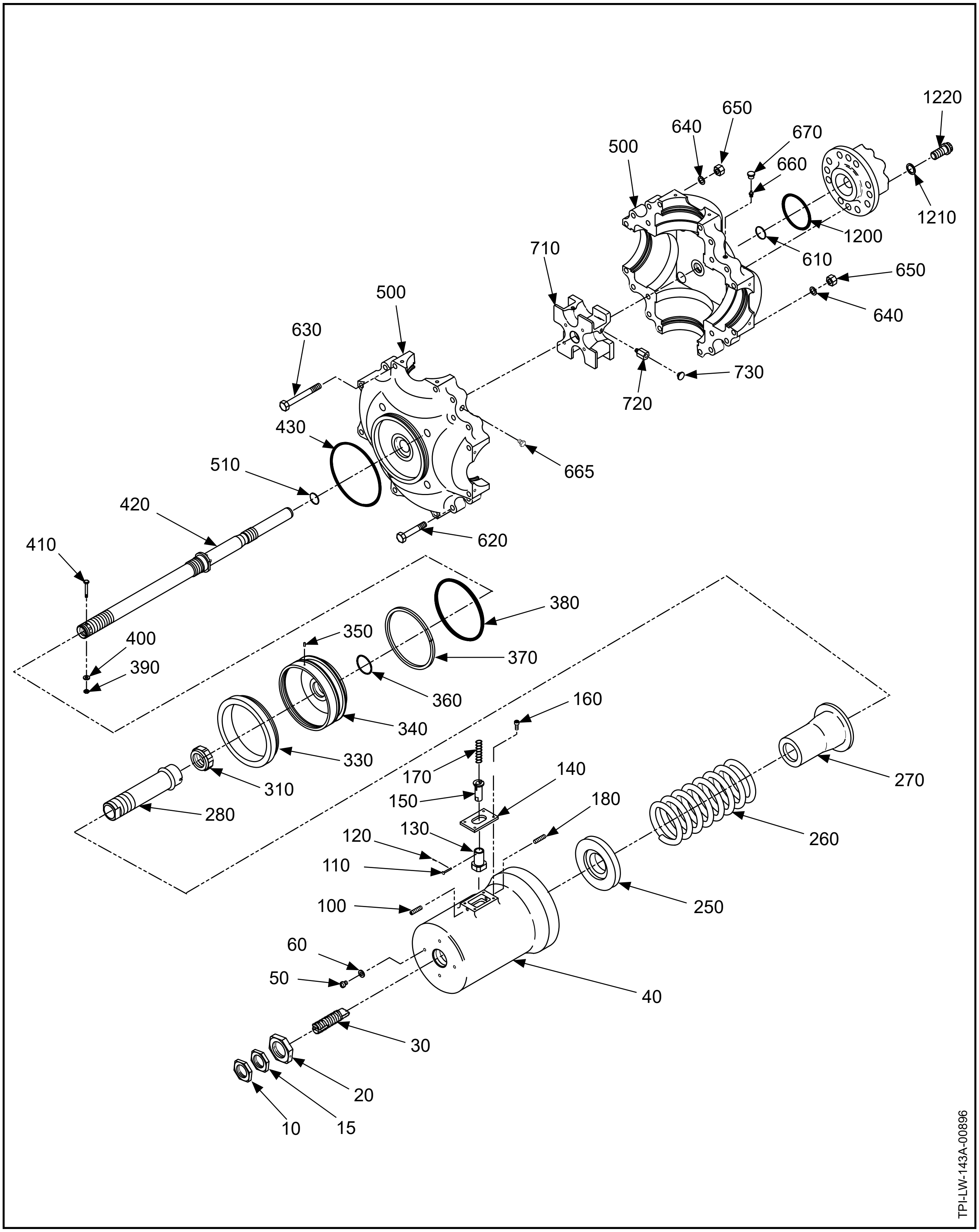
EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-12		**PROPELLER PARTS - HC-E4P-5, CONTINUED**				
10A-1		**BLADE RETENTION PARTS**				
		(REFER TO "BLADE RETENTION PARTS" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		COUNTERWEIGHTS/MOUNTING BOLTS				
-9030		• COUNTERWEIGHT APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION				PCP
-9035		• COUNTERWEIGHT MOUNTING BOLTS REFER TO THE APPLICABLE HARTZELL PROPELLER BLADE OVERHAUL MANUAL: MANUAL 135F (61-13-35) - COMPOSITE BLADES MANUAL 133C (61-13-33) - ALUMINUM BLADES			Y	
		COUNTERWEIGHT SLUGS/MOUNTING HARDWARE				
-9040		• COUNTERWEIGHT SLUGS				
-9045		• COUNTERWEIGHT SLUGS				
-9050		• COUNTERWEIGHT SLUG MOUNTING BOLT			Y	
-9060		• COUNTERWEIGHT SLUG MOUNTING NUT APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION			Y	
		SPINNER PARTS				
		APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION MANUAL 159 (61-02-59) AND THE APPLICABLE HARTZELL PROPELLER SPINNER MAINTENANCE MANUAL: MANUAL 127 (61-16-27) - METAL SPINNER ASSEMBLIES MANUAL 148 (61-16-48) - COMPOSITE SPINNER ASSEMBLIES				
-9070		• SPACER APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59)				

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED



HC-E4P-5E: Propeller Parts
Figure 10-13

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-13		**PROPELLER PARTS - HC-E4P-5E**				
10	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
15	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
20	B-3375	• PCP: NUT, 1 3/8-12, HEX,THIN, DRILLED		1		PCP
30	B-439	• SCREW, BETA ADJUST		1		
40	D-6845	• CYLINDER		1		
50	B-3841-5	• SCREW, 1/4-28, FILLISTER HEAD		1	Y	
60	B-3837-0463	• WASHER, CORROSION RESISTANT		1	Y	
100	B-6639-131	• SCREW, SET		2	Y	
110	B-2877	• CLEVIS PIN, 3/32		4	Y	
120	B-3838-1	• COTTER PIN		2	Y	
130	B-444-1	• HOUSING, START LOCK		2		
140	B-446	• COVER, HOUSING, START LOCK		2		
150	A-2620-1	• PIN, START LOCK		2		
160	B-3821	• SCREW, 10-32, CAP		8	Y	
170	B-331	• SPRING, COMPRESSION		2	Y	
180	B-6639-131	• SCREW, SET		2	Y	
250	B-6768	• SPRING RETAINER, FORWARD		1		
260	C-447	• SPRING, FEATHER REPLACED BY ITEM 260A		1		
260A	C-6760	• PCP: SPRING, COMPRESSION, FEATHERING REPLACES ITEM 260		1		PCP
270	B-6761	• GUIDE, SPRING, PLASTIC		1	Y	
-280	B-476	• SLEEVE, PITCH ADJUST-UNIT, REPLACED BY ITEM 280A		OBS		
-290	C-438	• SLEEVE, REVERSE ADJUST REPLACED BY ITEM 290A		OBS		PCP
-290A	C-6759	• PCP: SLEEVE, REVERSE ADJUST REPLACES ITEM 290, SUPERSEDED BY ITEM 280A NOTE: ITEM 290A IS ONLY AVAILABLE AS PART OF ITEM 280A		OBS		PCP
280A	B-6758	• PCP: SLEEVE, PITCH ADJUST-UNIT NOTE: PURCHASED UNIT INCLUDES SUPERSEDED ITEM 290A		1		PCP
-300	A-441	• • BUSHING, SLEEVE		1		
310	B-474	• NUT, 1-1/8-12, HEX, SELF-LOCKING		1	Y	
-320	C-497	• PISTON UNIT		1		
330	B-493	• • RING, PISTON, START LOCK		1		
340	C-492	• • PISTON		1		
350	A-637	• • SPRING PIN, REPLACED BY ITEM 350A		OBS		
350A	B-3842-0250	• • SPRING PIN, 3/32", CRES, REPLACES ITEM 350		1	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-13		PROPELLER PARTS - HC-E4P-5E, CONTINUED				
360	C-3317-217	• O-RING (PISTON ID)		1	Y	
370	B-1843	• SEAL, DUST, PISTON		1	Y	
380	C-3317-426-2	• O-RING (PISTON OD)		1	Y	
390	B-3808-3	• NUT, HEX, SELF-LOCKING		1	Y	
400	B-3851-0363	• WASHER		1	Y	
410	B-3383-15	• BOLT, 10-32, HEX HEAD		1	Y	
420	D-494	• PCP: ROD, PITCH CHANGE REPLACED BY ITEM 420A		OBS		PCP
420A	D-494-1	• PCP: ROD, PITCH CHANGE REPLACES ITEM 420, POST HC-SB-61-215		1		PCP
430	C-3317-354	• O-RING, HUB, CYLINDER HALF		1	Y	
500	E-6771	• PCP:HUB UNIT, HC-E4(N,P)-(2,5) (REFER TO “E-6771 HUB UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
510	C-3317-213-2	• • O-RING (CYLINDER-SIDE BUSHING ID)		1	Y	
610	C-3317-211-2	• • O-RING (ENGINE-SIDE BUSHING ID)		1	Y	
620	A-2431	• BOLT, 3/8-24, HEX HEAD		12		
630	A-2432	• BOLT, 3/8-24, HEX HEAD		8		
640	B-3834-0632	• WASHER		20	Y	
650	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		20	Y	
660	A-279	• FITTING, LUBRICATION REPLACED BY ITEMS 660A AND 665		8	Y	
660A	A-279	• FITTING, LUBRICATION REPLACES ITEM 660 IN ENGINE-SIDE OF HUB		4	Y	
660B	C-6349	• FITTING, LUBRICATION, 45° (POST HC-SL-61-187) ALTERNATE FOR ITEM 660A		4	Y	
665	106545	• PLUG, LUBRICATION (POST HC-SL-61-354) REPLACES ITEMS 660 IN CYLINDER-SIDE OF HUB		4	Y	
670	B-6544	• CAP, FITTING, LUBRICATION USED WITH ITEMS 660, 660A, AND 660B		4	Y	
-700	C-635	• FORK, FOUR BLADE - ASSEMBLY		1		
710	D-495	• • FORK, FOUR BLADE, REPLACED BY ITEM 710A		OBS		
710A	D-495-1	• • FORK, FOUR BLADE, REPLACED BY ITEM 710B		OBS		
710B	D-495-2	• • FORK, FOUR BLADE, REPLACES ITEM 710A		1		
720	B-468	• • EXTENSION, BUMPER		4		
730	A-3256	• • BUMPER, FORK		4	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-13		**PROPELLER PARTS - HC-E4P-5E, CONTINUED**				
		PROPELLER MOUNTING PARTS				
1200	C-3317-230	• O-RING (FLANGE)		1	Y	
1210	A-2048-2	• WASHER, MOUNTING, 9/16" CSK		8	Y	
1220	B-3347	• BOLT, MOUNTING, 9/16-18, 12 POINT		8	Y	
		BALANCE PARTS				
-1100	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		AR	Y	
-1110	A-2424(A)-( )	• BALANCE WEIGHT		AR		

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

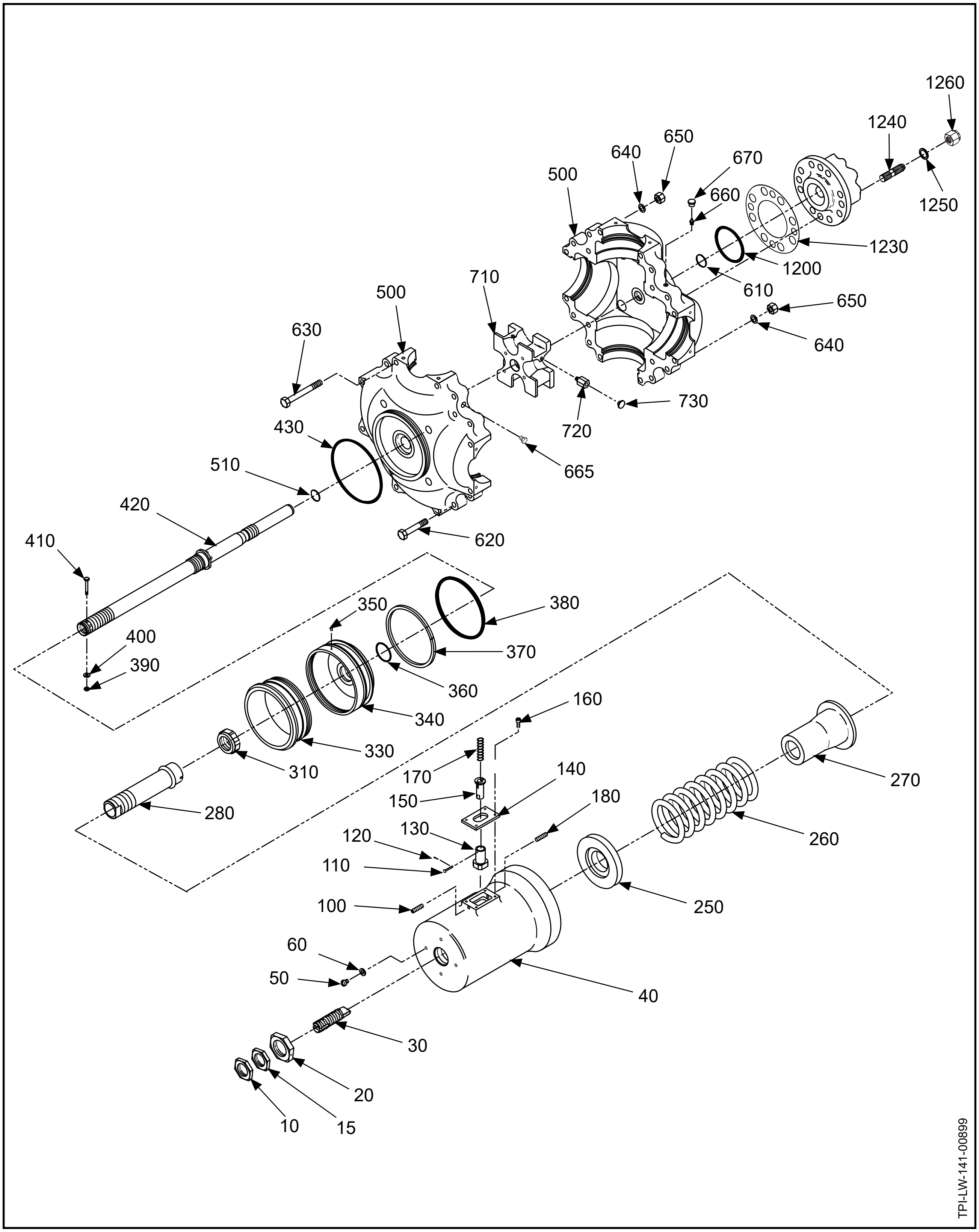
- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-13		**PROPELLER PARTS - HC-E4P-5E, CONTINUED**				
10A-1		**BLADE RETENTION PARTS**				
		(REFER TO "BLADE RETENTION PARTS" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		COUNTERWEIGHTS/MOUNTING BOLTS				
-9030		• COUNTERWEIGHT APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION				PCP
-9035		• COUNTERWEIGHT MOUNTING BOLTS REFER TO THE APPLICABLE HARTZELL PROPELLER BLADE OVERHAUL MANUAL: MANUAL 135F (61-13-35) - COMPOSITE BLADES MANUAL 133C (61-13-33) - ALUMINUM BLADES			Y	
		COUNTERWEIGHT SLUGS/MOUNTING HARDWARE				
-9040		• COUNTERWEIGHT SLUGS				
-9045		• COUNTERWEIGHT SLUGS				
-9050		• COUNTERWEIGHT SLUG MOUNTING BOLT			Y	
-9060		• COUNTERWEIGHT SLUG MOUNTING NUT APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION			Y	
		SPINNER PARTS				
		APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION MANUAL 159 (61-02-59) AND THE APPLICABLE HARTZELL PROPELLER SPINNER MAINTENANCE MANUAL: MANUAL 127 (61-16-27) - METAL SPINNER ASSEMBLIES MANUAL 148 (61-16-48) - COMPOSITE SPINNER ASSEMBLIES				
-9070		• SPACER APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59)				

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

HC-E4P-5E



HC-E4W-5L: Propeller Parts
Figure 10-14

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-14		**PROPELLER PARTS - HC-E4W-5L**				
10	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
15	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
20	B-3375	• PCP: NUT, 1 3/8-12, HEX,THIN, DRILLED		1		PCP
30	B-6116	• SCREW, BETA ADJUST		1		
40	D-484	• PCP: CYLINDER		1		PCP
50	B-3841-5	• SCREW, 1/4-28, FILLISTER HEAD		1	Y	
60	B-3837-0463	• WASHER, CORROSION RESISTANT		1	Y	
100	B-6639-131	• SCREW, SET		2	Y	
110	B-2877	• CLEVIS PIN, 3/32		2	Y	
120	B-3838-1	• COTTER PIN		2	Y	
130	B-444-4	• HOUSING, START LOCK		2		
140	B-446	• COVER, HOUSING, START LOCK		2		
150	A-2620-1	• PIN, START LOCK		2		
160	B-3821	• SCREW, 10-32, CAP		8	Y	
170	B-658	• SPRING, COMPRESSION		2	Y	
180	B-6639-131	• SCREW, SET		2	Y	
250	B-6768	• SPRING RETAINER, FORWARD		1		
260	C-6760	• PCP: SPRING, COMPRESSION, FEATHERING		1		PCP
270	B-6761	• GUIDE, SPRING, PLASTIC		1	Y	
280	B-6758	• PCP: SLEEVE, PITCH ADJUST - UNIT UNIT INCLUDES C-6759 REVERSE ADJUST SLEEVE (C-6759 IS NOT AVAILABLE FOR PURCHASE INDIVIDUALLY).		1		PCP
-300	A-441	• • BUSHING, SLEEVE		1		
310	B-474	• NUT, 1-1/8-12, HEX, SELF-LOCKING		1	Y	
-320	C-497	• PISTON UNIT		1		
330	B-493	• • RING, PISTON, START LOCK		1		
340	C-492	• • PISTON		1		
350	B-3842-0250	• • SPRING PIN, 3/32", CRES		1	Y	
360	C-3317-217	• O-RING (PISTON ID)		1	Y	
370	B-1843	• SEAL, DUST, PISTON		1	Y	
380	C-3317-426-2	• O-RING (PISTON OD)		1	Y	
390	B-3808-3	• NUT, HEX, SELF-LOCKING		1	Y	
400	B-3851-0363	• WASHER		1	Y	
410	B-3383-15	• BOLT, 10-32, HEX HEAD		1	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

HC-E4W-5L

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-14		**PROPELLER PARTS - HC-E4W-5L, CONTINUED**				
420	D-6114-1	• PCP: ROD, PITCH CHANGE		1		PCP
430	C-3317-251	• O-RING (CYLINDER MOUNTING)		1	Y	
500	102339	• PCP: HUB UNIT, HC-E4W-5( ) (REFER TO “102339 HUB UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
510	C-3317-213-2	• • O-RING (CYLINDER-SIDE BUSHING ID)		2	Y	
610	C-3317-211-2	• • O-RING (ENGINE-SIDE BUSHING ID)		1	Y	
620	A-2431	• BOLT, 3/8-24, HEX HEAD		12		
630	A-2432	• BOLT, 3/8-24, HEX HEAD		8		
640	B-3834-0632	• WASHER		20	Y	
650	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		20	Y	
660	A-279	• FITTING, LUBRICATION REPLACED BY ITEMS 660A AND 665		8	Y	
660A	A-279	• FITTING, LUBRICATION REPLACES ITEM 660 IN CYLINDER-SIDE OF HUB		4	Y	
660B	C-6349	• FITTING, LUBRICATION, 45° (POST HC-SL-61-187) ALTERNATE FOR ITEM 660A		4	Y	
665	106545	• PLUG, LUBRICATION (POST HC-SL-61-354) REPLACES ITEMS 660 IN ENGINE-SIDE OF HUB		4	Y	
670	B-6544	• CAP, FITTING, LUBRICATION USED WITH ITEMS 660, 660A, AND 660B		4	Y	
710	D-496-1	• FORK, FOUR BLADE		1		
720	B-468	• EXTENSION, BUMPER		4		
730	A-3256	• BUMPER, FORK		4	Y	
10A-2		**BLADE RETENTION PARTS** (REFER TO "BLADE RETENTION PARTS" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		PROPELLER MOUNTING PARTS				
1200	C-3317-230	• O-RING (FLANGE)		1	Y	
1230	101058	• SHIM, MOUNTING, PROPELLER		1	Y	
1240	A-3254	• STUD, MOUNTING, 9/16-18		8	Y	
1250	B-7624	• WASHER, MOUNTING, 9/16"		8	Y	
1260	B-7458	• NUT, 9/16-18, HEX, SELF-LOCKING		8	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-14		**PROPELLER PARTS - HC-E4W-5L, CONTINUED**				
		BALANCE PARTS				
-1100	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		AR		
-1110	A-2424(A)-( )	• BALANCE WEIGHT		AR		
		COUNTERWEIGHTS/MOUNTING BOLTS				
-9030		• COUNTERWEIGHT APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION				PCP
-9035		• COUNTERWEIGHT MOUNTING BOLTS REFER TO THE APPLICABLE HARTZELL PROPELLER BLADE OVERHAUL MANUAL: MANUAL 135F (61-13-35) - COMPOSITE BLADES MANUAL 133C (61-13-33) - ALUMINUM BLADES			Y	
		COUNTERWEIGHT SLUGS/MOUNTING HARDWARE				
-9040		• COUNTERWEIGHT SLUGS APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION				
		SPINNER PARTS				
		APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER APPLICATION MANUAL 159 (61-02-59) AND THE APPLICABLE HARTZELL PROPELLER SPINNER MAINTENANCE MANUAL: MANUAL 127 (61-16-27) - METAL SPINNER ASSEMBLIES MANUAL 148 (61-16-48) - COMPOSITE SPINNER ASSEMBLIES				

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

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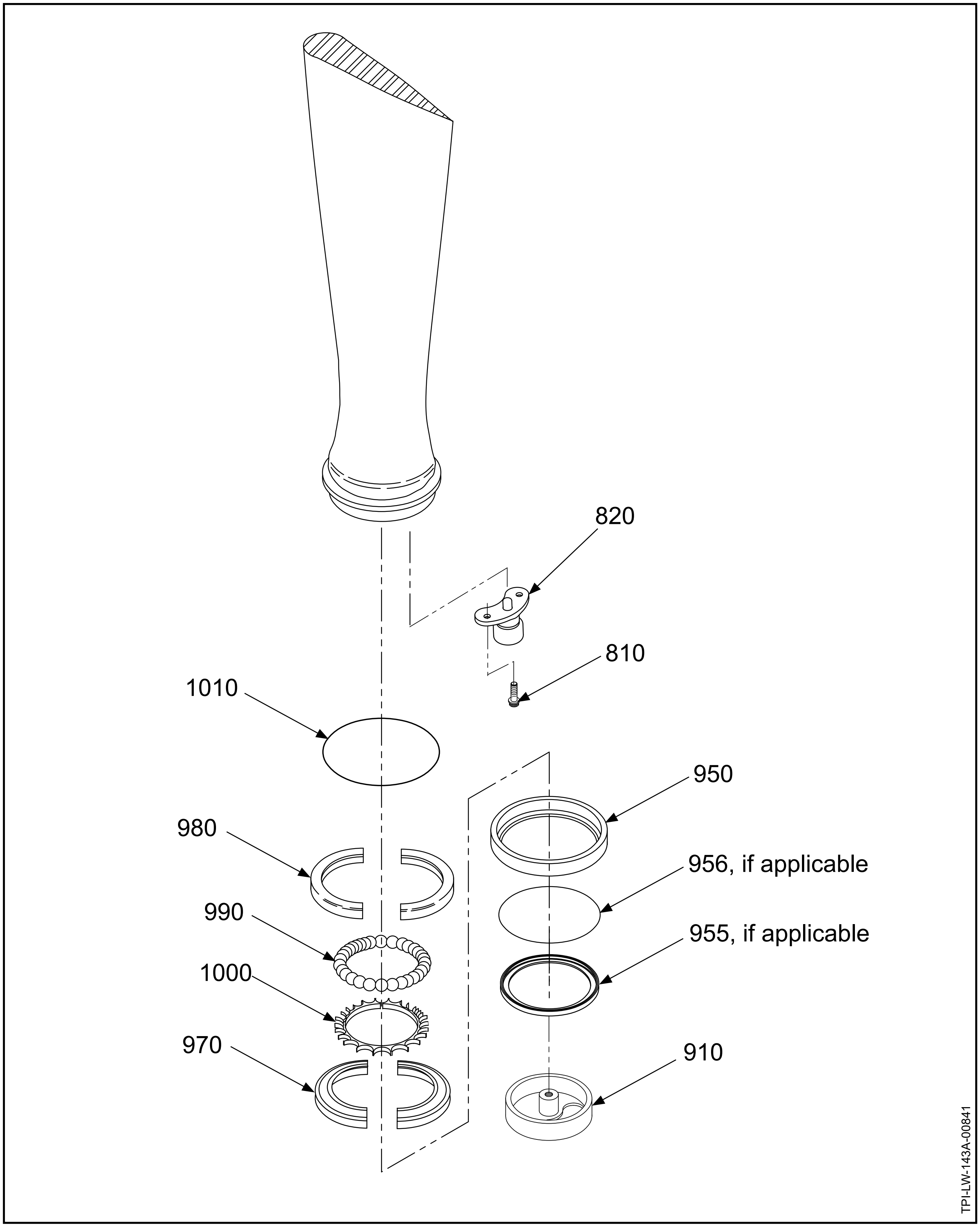
SUB-ASSEMBLY
PARTS LISTS and FIGURES



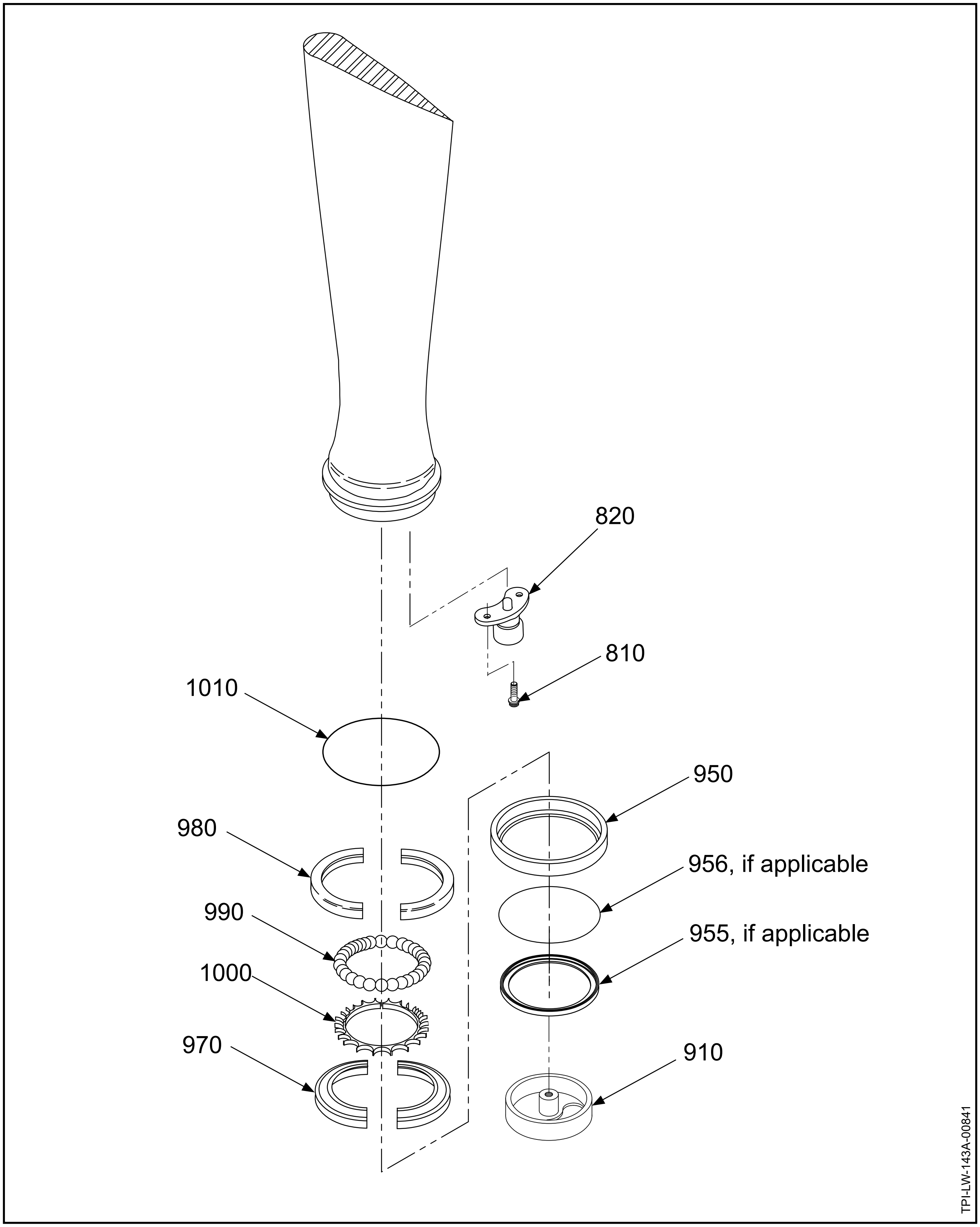
Blade Retention Parts
Figure 10A-1

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-1		**BLADE RETENTION PARTS** **FOR HC-D4N-5AL, HC-D4N-5C, HC-D4N-5E, HC-D4P-5, HC-D4P-5L, AND HC-E4N-5D PROPELLERS** **All quantities (UPA) in this parts list are per blade assembly.**				
810	B-3825	SCREW, 1/4-28, 100° HEAD, REPLACED BY ITEM 810A, USED ONLY WITH ITEMS 820 AND 820A		2	Y	
810A	108142	BOLT, 1/4-28, 12 POINT, REPLACES ITEM 810, USED ONLY WITH ITEMS 820 AND 820A		2	Y	
820	100028-( )	BRACKET, KNOB, PITCH CHANGE - UNIT REPLACED BY ITEM 820B (REFER TO “100028-( ): PITCH CHANGE KNOB BRACKET UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
820A	B-464-( )	BRACKET, KNOB, PITCH CHANGE - UNIT ALTERNATE FOR ITEM 510, POST HC-SB-61-346 REPLACED BY ITEM 820B (REFER TO “B-464-( ): PITCH CHANGE KNOB BRACKET UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
820B	108303-( )	BRACKET, KNOB, PITCH CHANGE - UNIT REPLACES ITEM 820 AND 820A, POST HC-SB-61-389 (REFER TO “108303-( ): PITCH CHANGE KNOB BRACKET UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
-895	102632	TUBING, SILICONE		1	Y	
910	C-459	PRELOAD PLATE ASSEMBLY, REPLACED BY ITEM 910A, (REFER TO “C-459 PRELOAD PLATE ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
910A	101004	PRELOAD PLATE ASSEMBLY, REPLACES ITEM 910, POST HC-SB-61-289, HC-SB-61-309 (REFER TO “101004 PRELOAD PLATE ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
950	A-2204	RING, RETAINING, BEARING SUPERSEDED BY ITEMS 950A, 955, AND 956		1		
950A	102158	RING, RETAINING, BEARING POST HC-SL-61-241, R3, SUPERSEDES ITEM 950 USE WITH ITEMS 955 AND 956		1		
955	B-7726	SEAL, BLADE, POST HC-SL-61-241, R3 USE WITH ITEMS 950A AND 956		1		
956	C-3317-045	O-RING, POST HC-SL-61-241, R3 USE WITH ITEM 950A AND 955		1		
-960	A-2202	BEARING, RETENTION, BLADE		1		
970	A-2202-B	• RACE, BLADE SIDE		1		
980	A-2202-A	• RACE, HUB SIDE		1		
990	B-6144	• BALL, BEARING, 1/2" DIA		25	Y	
	B-6144-650	• BALL, BEARING, 1/2" DIA (BOX OF 650)		RF		
1000	B-3211	BALL SPACER		1	Y	
1010	C-3317-340	O-RING (BLADE), SUPERSEDED BY ITEM 1010A			1	Y
1010A	C-3317-340-8	O-RING (BLADE) SUPERSEDES ITEM 1010, POST HC-SL-61-301	E	1	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL
E	BLADES MUST HAVE 0.010 INCH (0.25 mm) THICK CM155 TEFLON® TAPE INSTALLED IN ACCORDANCE WITH HARTZELL PROPELLER ALUMINUM BLADE MANUAL 133C (61-13-33).		

- ITEM NOT ILLUSTRATED

Blade Retention Parts



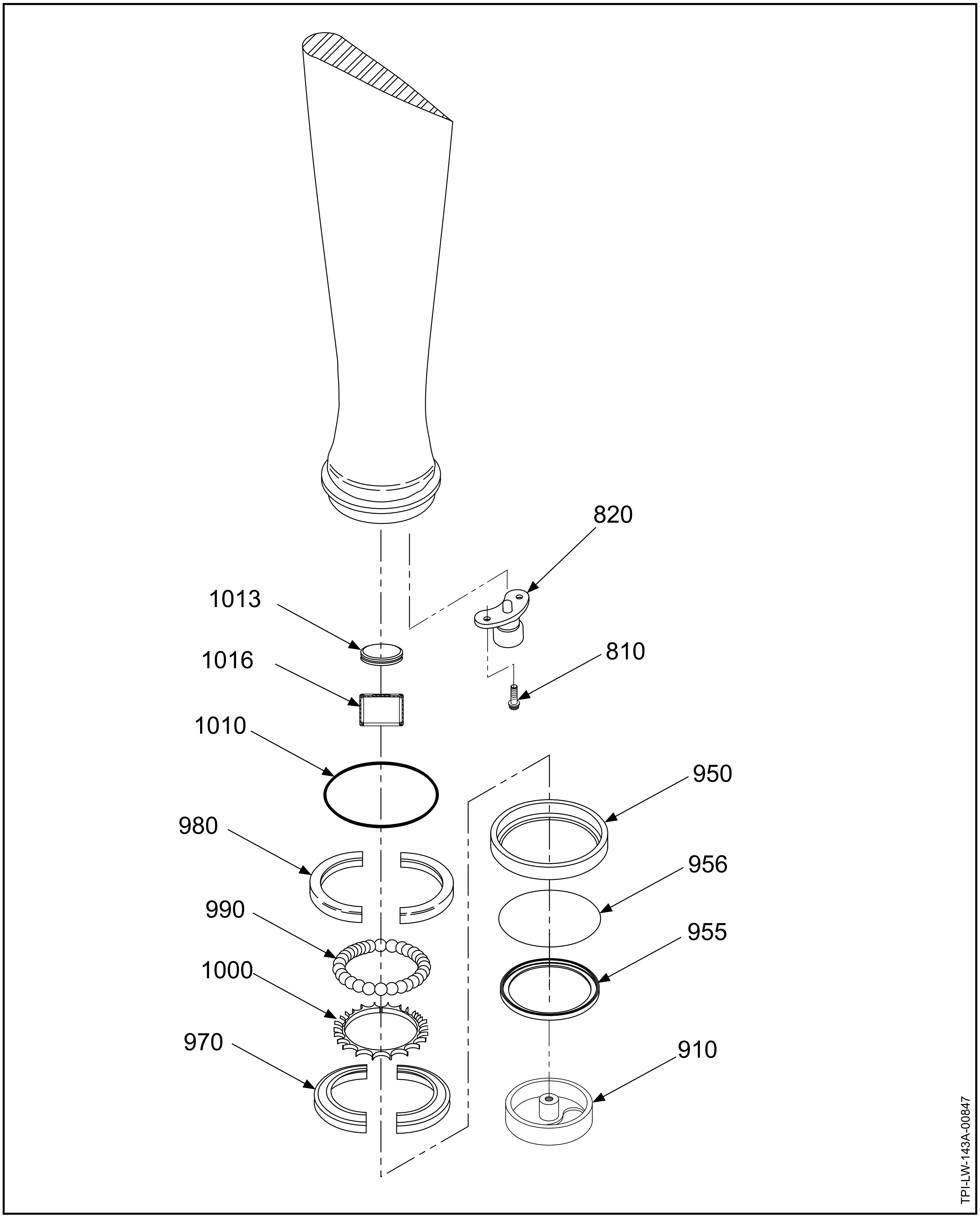
Blade Retention Parts
Figure 10A-2

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-2		**BLADE RETENTION PARTS**				
		FOR HC-E4N-5A, HC-E4N-5B, AND HC-E4W-5L PROPELLERS **All quantities (UPA) in this parts list are per blade assembly.**				
810	B-3825	SCREW, 1/4-28, 100° HEAD, REPLACED BY ITEM 810A		2	Y	
810A	108142	BOLT, 1/4-28, 12 POINT, REPLACES ITEM 810		2	Y	
820	100028-( )	BRACKET, KNOB, PITCH CHANGE - UNIT REPLACED BY ITEM 820B (REFER TO “100028-( ): PITCH CHANGE KNOB BRACKET UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
820A	B-464-( )	BRACKET, KNOB, PITCH CHANGE - UNIT ALTERNATE FOR ITEM 510, POST HC-SB-61-346 REPLACED BY ITEM 820B (REFER TO “B-464-( ): PITCH CHANGE KNOB BRACKET UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
820B	108303-( )	BRACKET, KNOB, PITCH CHANGE - UNIT REPLACES ITEM 820 AND 820A, POST HC-SB-61-389 (REFER TO “108303-( ): PITCH CHANGE KNOB BRACKET UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
-895	102632	TUBING, SILICONE		1	Y	
910	B-6209	PRELOAD PLATE ASSEMBLY, REPLACED BY ITEM 910A	5A, 5B	1		
910A	100641	PRELOAD PLATE ASSEMBLY REPLACES ITEM 910, POST HC-SB-61-289, HC-SB-61-309 (REFER TO “100641 PRELOAD PLATE ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
950	B-1041	RING, RETAINING, BEARING SUPERSEDED BY ITEMS 950A, 955, AND 956		1		
950A	B-7071	RING, RETAINING, BEARING SUPERSEDES ITEM 950, POST HC-SL-61-241 USE WITH ITEMS 955A AND 956		1		
955	B-7726	SEAL, BLADE, POST HC-SL-61-241 USE WITH ITEMS 950A AND 956		1		
956	C-3317-045	O-RING, POST HC-SL-61-241 USE WITH ITEMS 950A AND 955		1		
-960	C-792	BEARING, RETENTION, BLADE		1		
970	C-792-B	• RACE, BLADE SIDE		1		
980	C-792-A	• RACE, HUB SIDE		1		
990	B-6144-1	• BALL, BEARING, 3/8" DIA		33	Y	
	B-6144-1-1500	• BALL, BEARING, 3/8" DIA (BOX OF 1500)		RF		
1000	B-793	BALL SPACER		1	Y	
1010	C-3317-340	O-RING (BLADE), SUPERSEDED BY ITEM 1010A		1	Y	
1010A	C-3317-340-8	O-RING (BLADE), SUPERSEDES ITEM 1010, POST HC-SL-61-301	E	1	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL
E	BLADES MUST HAVE 0.010 INCH (0.25 mm) THICK CM155 TEFLON® TAPE INSTALLED IN ACCORDANCE WITH HARTZELL PROPELLER ALUMINUM BLADE MANUAL 133C (61-13-33).	5A	HC-E4N-5A
		5B	HC-E4N-5B

- ITEM NOT ILLUSTRATED

Blade Retention Parts



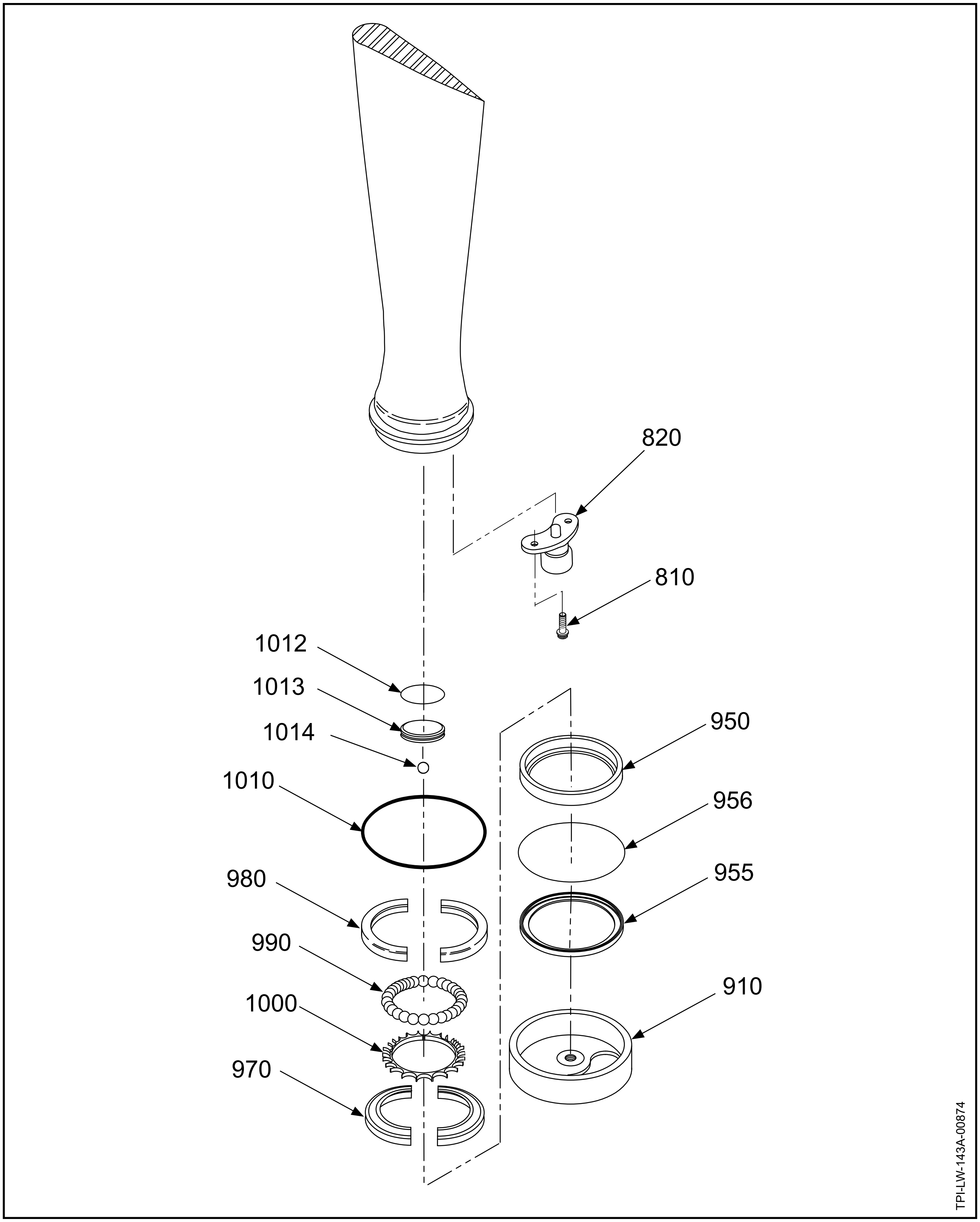
Blade Retention Parts
Figure 10A-3

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-3		**BLADE RETENTION PARTS**				
		FOR HC-E4N-5KCL AND HC-E4N-5KFL PROPELLERS **All quantities (UPA) in this parts list are per blade assembly.**				
810	B-3830	BOLT, 5/16-24, 12 POINT		2	Y	
820	100032-( )	BRACKET, KNOB, PITCH CHANGE - UNIT (REFER TO “100032-( ): PITCH CHANGE KNOB BRACKET UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
910	100641	PRELOAD PLATE ASSEMBLY (REFER TO “100641 PRELOAD PLATE ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
950	B-7071	RING, RETAINING, BEARING		1		
955	B-7726	SEAL, BLADE		1		
956	C-3317-045	O-RING		1	Y	
-960	C-792	BEARING, RETENTION, BLADE		1		
970	C-792-B	• RACE, BLADE SIDE		1		
980	C-792-A	• RACE, HUB SIDE		1		
990	B-6144-1	• BALL, BEARING, 3/8" DIA		33	Y	
	B-6144-1-1500	• BALL, BEARING, 3/8" DIA (BOX OF 1500)		RF		
1000	B-793	BALL SPACER		1	Y	
1010	C-3317-340-8	O-RING (BLADE)		1	Y	
1013	A-665	PLUG, BLADE		1		
1016	A-1271	BEARING, NEEDLE, CLOSED END		1	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

Blade Retention Parts



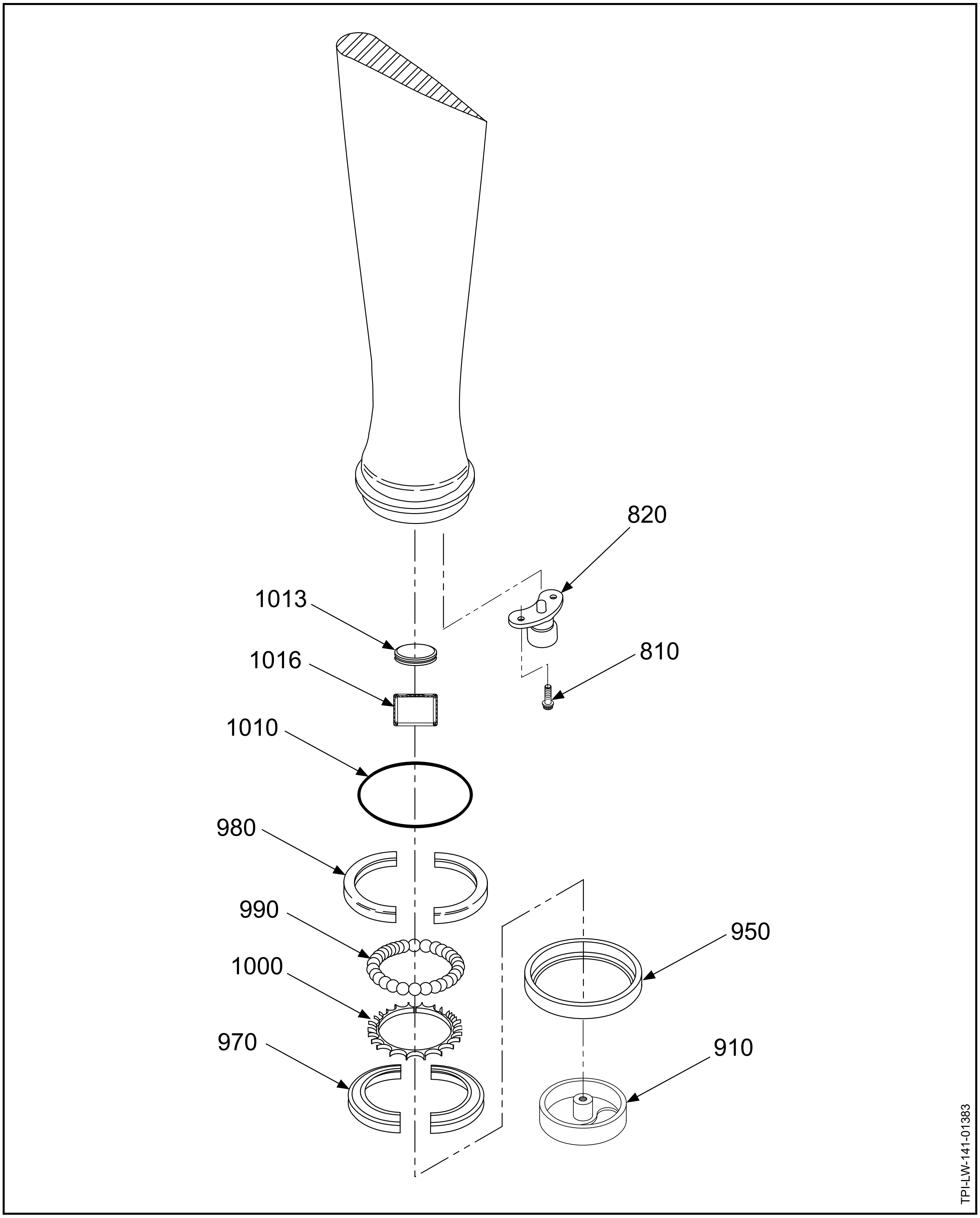
Blade Retention Parts
Figure 10A-4

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-4		**BLADE RETENTION PARTS**				
		FOR HC-E4N-5KL PROPELLERS **All quantities (UPA) in this parts list are per blade assembly.**				
810	B-3385-3H	BOLT, 5/16-28-4, HEX HEAD		2	Y	
820	103545-( )	BRACKET, KNOB, PITCH CHANGE - UNIT (REFER TO “103545-( ): PITCH CHANGE KNOB BRACKET UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
-895	102632	TUBING, SILICONE		1	Y	
910	103525	PRELOAD PLATE ASSEMBLY (REFER TO “103525 PRELOAD PLATE ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
950	101512	RING, RETAINING, BEARING		1		
955	101437	SEAL, BLADE		1		
956	C-3317-045	O-RING				
-960	C-792	BEARING, RETENTION, BLADE		1		
970	C-792-B	• RACE, BLADE SIDE		1		
980	C-792-A	• RACE, HUB SIDE		1		
990	B-6144-1	• BALL, BEARING, 3/8" DIA		33	Y	
	B-6144-1-1500	• BALL, BEARING, 3/8" DIA (BOX OF 1500)		RF		
1000	B-793	BALL SPACER		1	Y	
1010	C-3317-340-8	O-RING (BLADE)		1	Y	
1012	C-3317-028	O-RING		1	Y	
1013	103413	PLUG, BLADE		1		
1014	B-6144-1	BALL, BEARING, 3/8" DIA		4	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

Blade Retention Parts



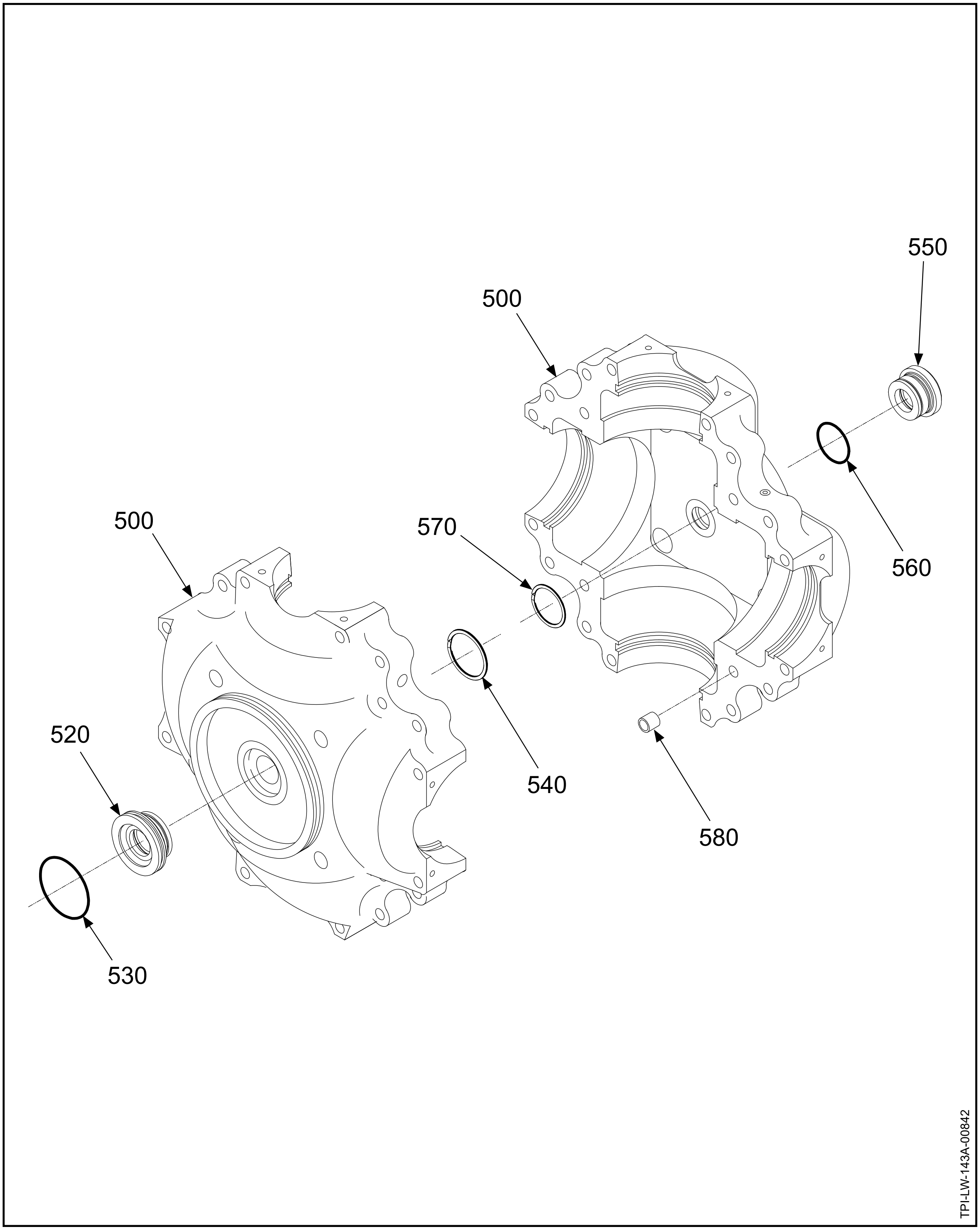
Blade Retention Parts
Figure 10A-5

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-5		**BLADE RETENTION PARTS**				
		FOR HC-E4P-5 AND HC-E4P-5E PROPELLERS **All quantities (UPA) in this parts list are per blade assembly.**				
810	B-3825	SCREW, 1/4-28, 100° HEAD, PRE HC-SB-61-216 REPLACED BY ITEM 810A		2		
810A	B-3830	BOLT, 5/16-24, 12 POINT REPLACES ITEM 810, POST HC-SB-61-216		2	Y	
820	B-463-( )	BRACKET, KNOB, PITCH CHANGE-ASSEMBLY REPLACED BY ITEM 820A		1		
820A	B-6258-( )	BRACKET, KNOB, PITCH CHANGE-KIT REPLACES ITEM 820 SUPERSEDED BY ITEM 820B (REFER TO “B-6258-( ): PITCH CHANGE KNOB BRACKET UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
820B	100032-( )	BRACKET, KNOB, PITCH CHANGE-UNIT SUPERSEDES ITEM 820A (REFER TO “100032-( ): PITCH CHANGE KNOB BRACKET UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
910	C-6259	PRELOAD PLATE ASSEMBLY REPLACED BY ITEM 910A PRE HC-SB-61-289 AND HC-SB-61-309				
910A	100641-1	PRELOAD PLATE ASSEMBLY REPLACES ITEM 910 POST HC-SB-61-289 AND HC-SB-61-309 (REFER TO “100641 PRELOAD PLATE ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
950	B-1041	BEARING RETAINING RING REPLACED BY ITEM 950A		1		
950A	B-7071	BEARING RETAINING RING REPLACES ITEM 950		1		
-960	C-792	BLADE RETENTION BEARING		1		
970	C-792-B	• RACE, BLADE SIDE		1		
980	C-792-A	• RACE, HUB SIDE		1		
990	B-6144-1	• BEARING BALL, 3/8 INCH		33	Y	
	B-6144-1-1500	• BEARING BALL, 3/8 INCH (BOX OF 1500)		RF		
1000	B-793	BALL SPACER		1	Y	
1010	C-3317-340	O-RING SUPERSEDED BY ITEM 1010A, PRE HC-SL-61-301		1	Y	
1010A	C-3317-340-8	O-RING SUPERSEDES ITEM 1010, POST HC-SL-61-301		1	Y	
1013	A-665	PLUG, BLADE		1	Y	
1016	A-1271	BEARING, NEEDLE, CLOSED END		1	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

Blade Retention Parts



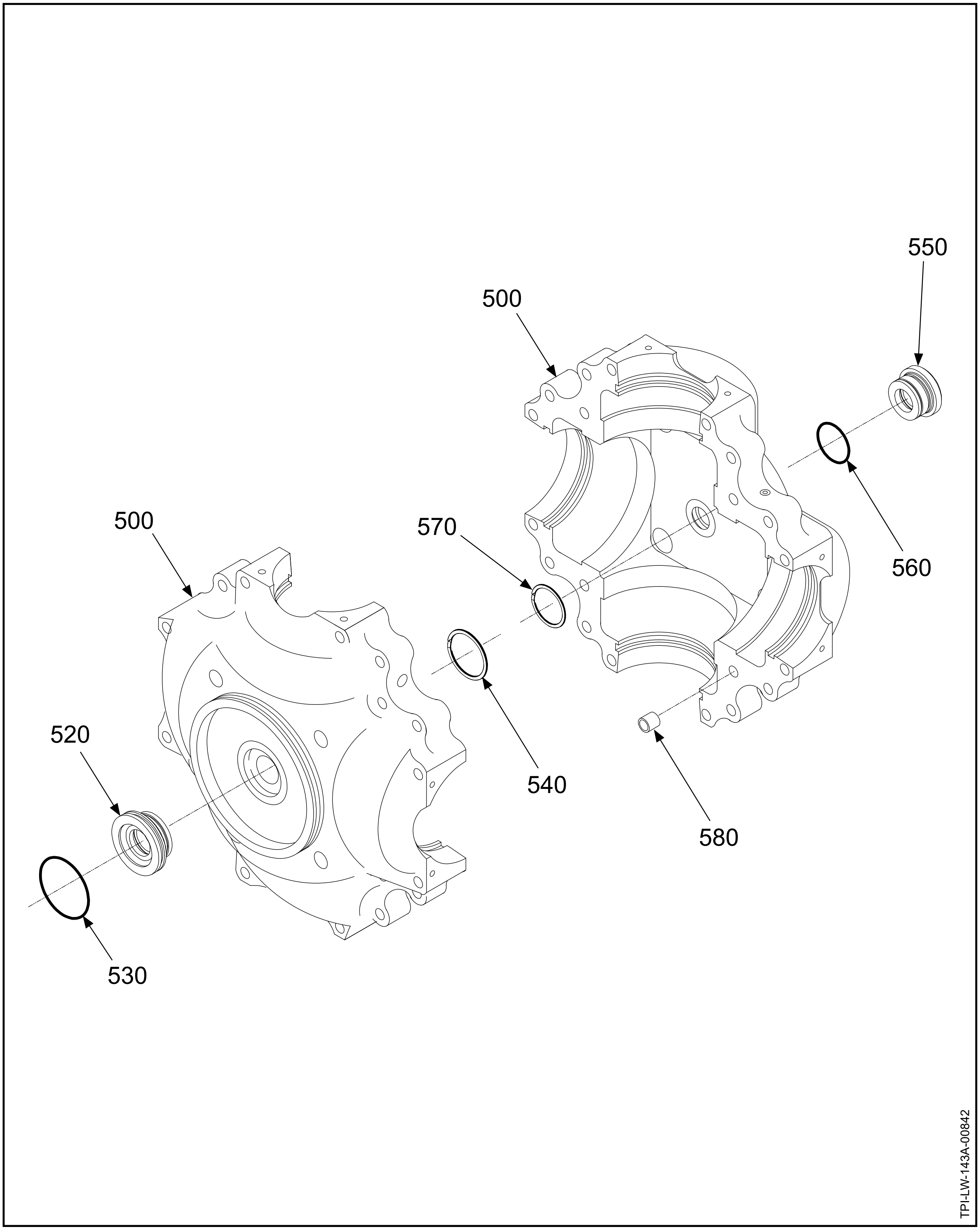
D-389-( ): Hub Unit
Figure 10A-6

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-6		**D-389-( ): HUB UNIT PARTS**				
500	D-389-(1,2,3)	PCP:HUB UNIT		1		PCP
520	B-5952	• HUB BUSHING, ROD		1		
530	C-3317-135-2	• O-RING (CYLINDER-SIDE BUSHING OD)		1	Y	
540	A-6153-162	• RING, RETAINING, EXTERNAL, SPIRAL (CYLINDER-SIDE)		1	Y	
550	B-6108	• HUB BUSHING, ROD		1		
560	C-3317-026-2	• O-RING (ENGINE-SIDE BUSHING OD)		1	Y	
570	A-6153-137	• RING, RETAINING, EXTERNAL, SPIRAL (ENGINE-SIDE)		1	Y	
580	A-2249	• HUB BUSHING, GUIDE		1	Y	
-590	B-6142	• INSERT, 1/4-28, CRES, COILED		8	Y	
-600	B-1243	• INSERT, 9/16-18, CRES, STAKED		8	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

D-389-( ): Hub Unit



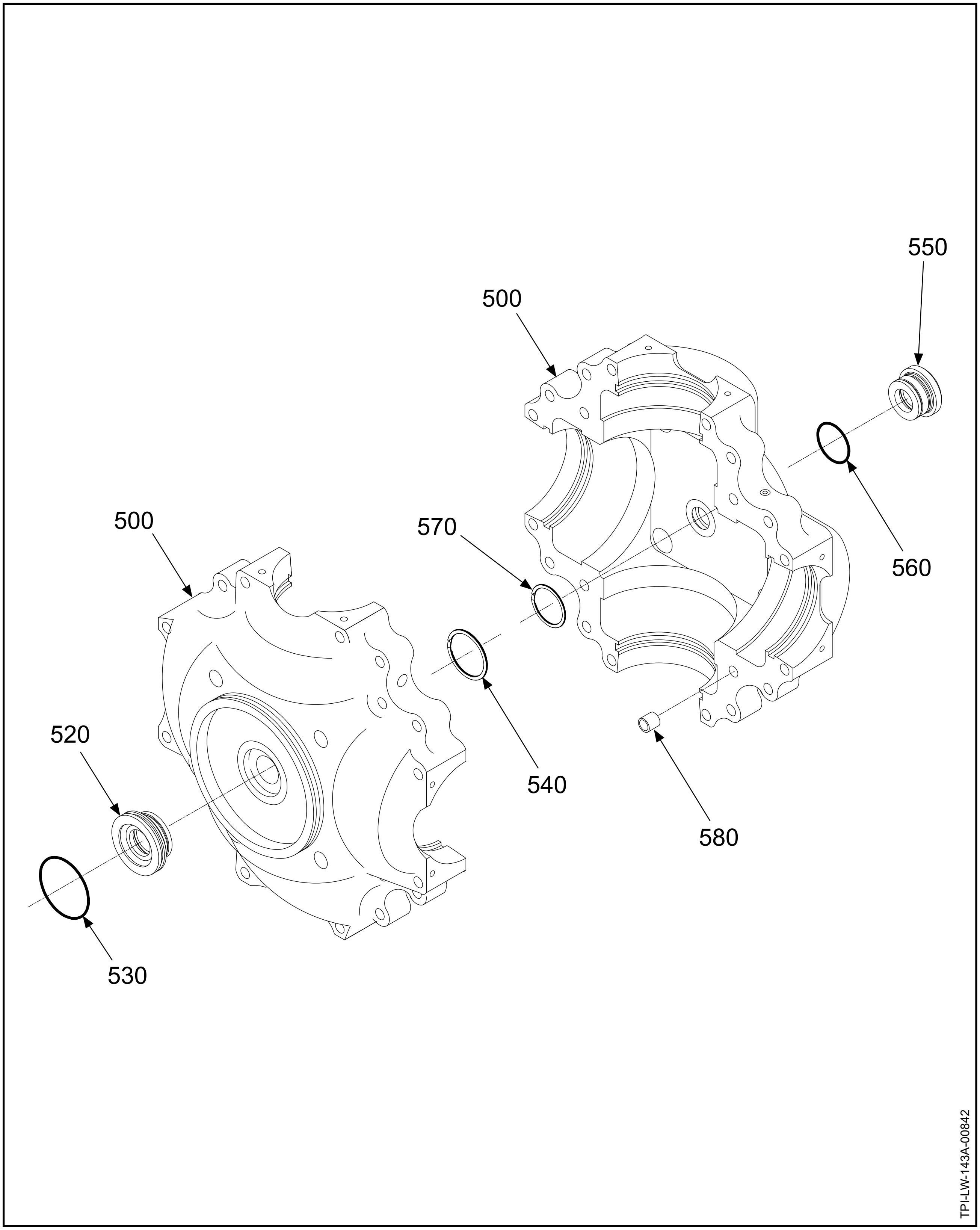
D-489-( ): Hub Unit
Figure 10A-7

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-7		**D-489-( ): HUB UNIT PARTS**				
500	D-489-(1,2,3)	PCP:HUB UNIT		1		PCP
520	B-5952	• HUB BUSHING, ROD		1		
530	C-3317-135-2	• O-RING (CYLINDER-SIDE BUSHING OD)		1	Y	
540	A-6153-162	• RING, RETAINING, EXTERNAL, SPIRAL (CYLINDER-SIDE)		1	Y	
550	B-6108	• HUB BUSHING, ROD		1		
560	C-3317-026-2	• O-RING (ENGINE-SIDE BUSHING OD)		1	Y	
570	A-6153-137	• RING, RETAINING, EXTERNAL, SPIRAL (ENGINE-SIDE)		1	Y	
580	A-2249	• HUB BUSHING, GUIDE		1	Y	
-590	B-6142	• INSERT, 1/4-28, CRES, COILED		8	Y	
-600	B-1243	• INSERT, 9/16-18, CRES, STAKED		8	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

D-489-( ): Hub Unit



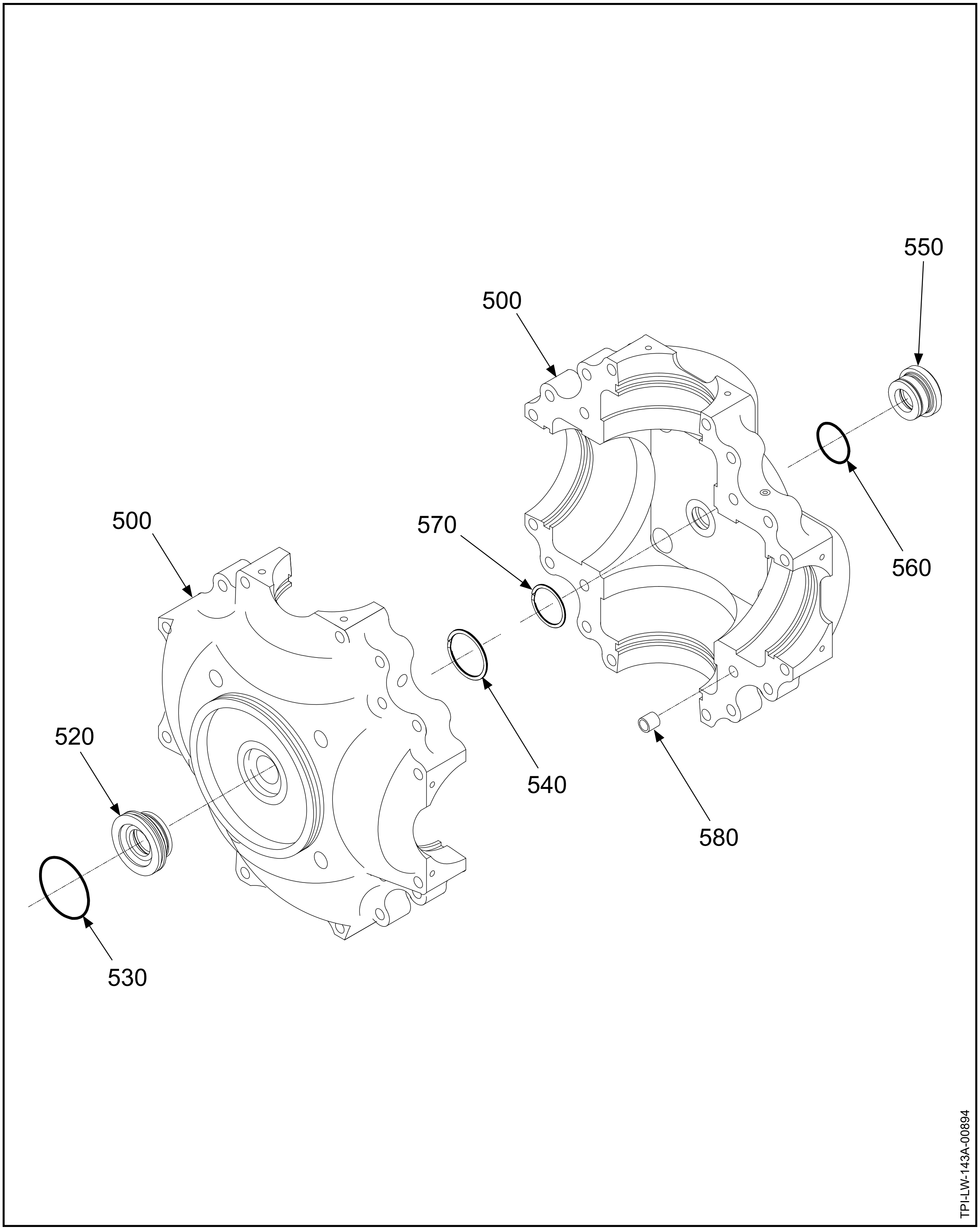
E-6771: Hub Unit
Figure 10A-8

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-8		**E-6771: HUB UNIT PARTS**				
500	E-6771	PCP: HUB UNIT, HC-E4(N,P)-(2,5)		1		PCP
520	B-5952	• HUB BUSHING, ROD		1		
530	C-3317-135-2	• O-RING (CYLINDER-SIDE BUSHING OD)		1	Y	
540	A-6153-162	• RING, RETAINING, EXTERNAL, SPIRAL (CYLINDER-SIDE)		1	Y	
550	B-6108	• HUB BUSHING, ROD		1		
560	C-3317-026-2	• O-RING (ENGINE-SIDE BUSHING OD)		1	Y	
570	A-6153-137	• RING, RETAINING, EXTERNAL, SPIRAL (ENGINE-SIDE)		1	Y	
580	A-2249	• HUB BUSHING, GUIDE		1	Y	
-590	B-6142	• INSERT, 1/4-28, CRES, COILED		8	Y	
-600	B-1243	• INSERT, 9/16-18, CRES, STAKED		8	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

E-6771: Hub Unit



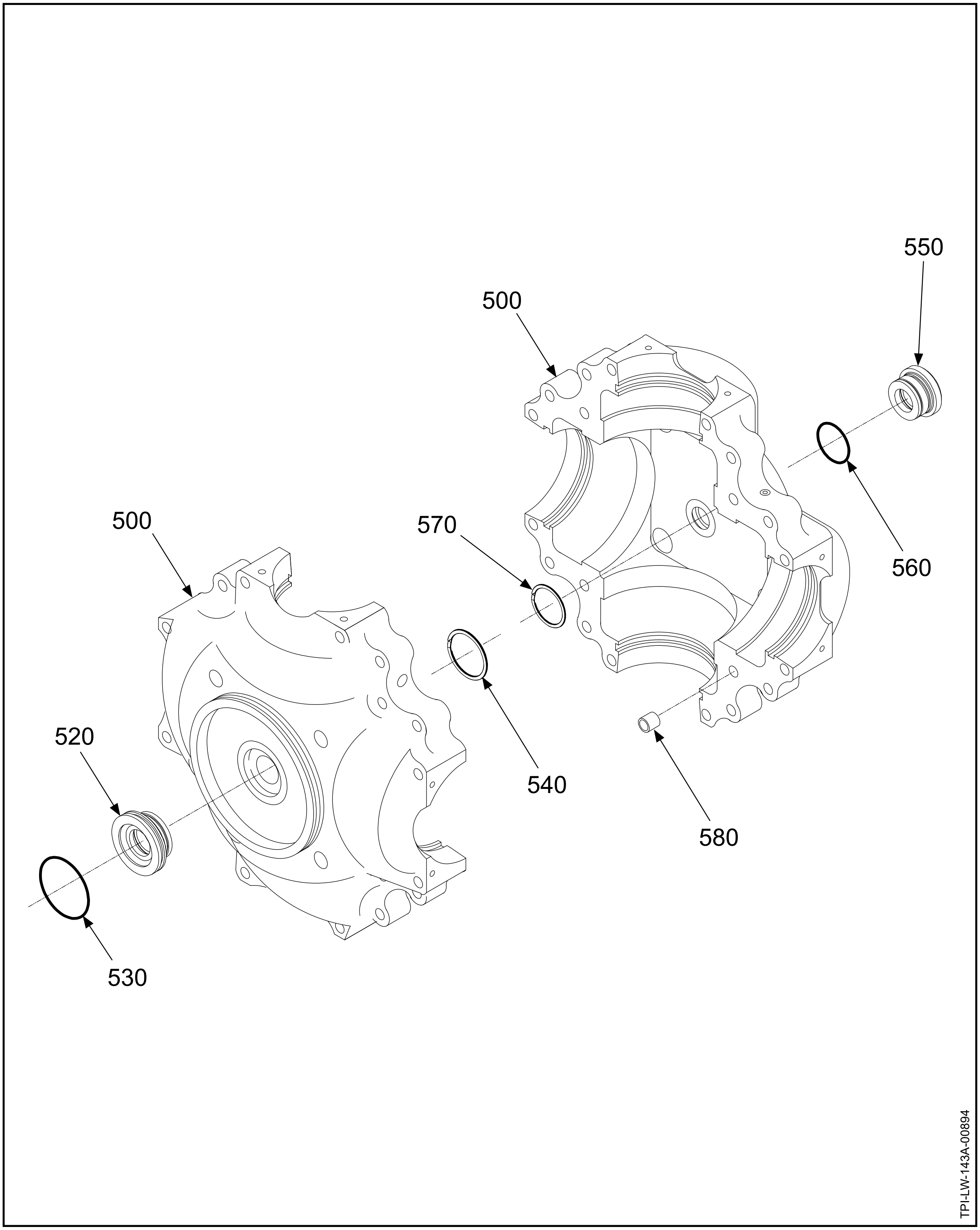
E-6847: Hub Unit
Figure 10A-9

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-9		**E-6847: HUB UNIT PARTS**				
500	E-6847	PCP:HUB UNIT, HC-D4(N,P)-(2,5)		1		PCP
520	B-5952	• HUB BUSHING, ROD		1		
530	C-3317-135-2	• O-RING (CYLINDER-SIDE BUSHING OD)		1	Y	
540	A-6153-162	• RING, RETAINING, EXTERNAL, SPIRAL (CYLINDER-SIDE)		1	Y	
550	B-6108	• HUB BUSHING, ROD		1		
560	C-3317-026-2	• O-RING (ENGINE-SIDE BUSHING OD)		1	Y	
570	A-6153-137	• RING, RETAINING, EXTERNAL, SPIRAL (ENGINE-SIDE)		1	Y	
580	A-2249	• HUB BUSHING, GUIDE		1	Y	
-590	7917535914	• 3591-4CN 0375 HELICOIL, REPLACED BY ITEM 590A		8	Y	
-590A	B-6142	• INSERT, 1/4-28, CRES, COILED, REPLACES ITEM 590		8	Y	
-600	B-1243	• INSERT, 9/16-18, CRES, STAKED		8	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

E-6847: Hub Unit



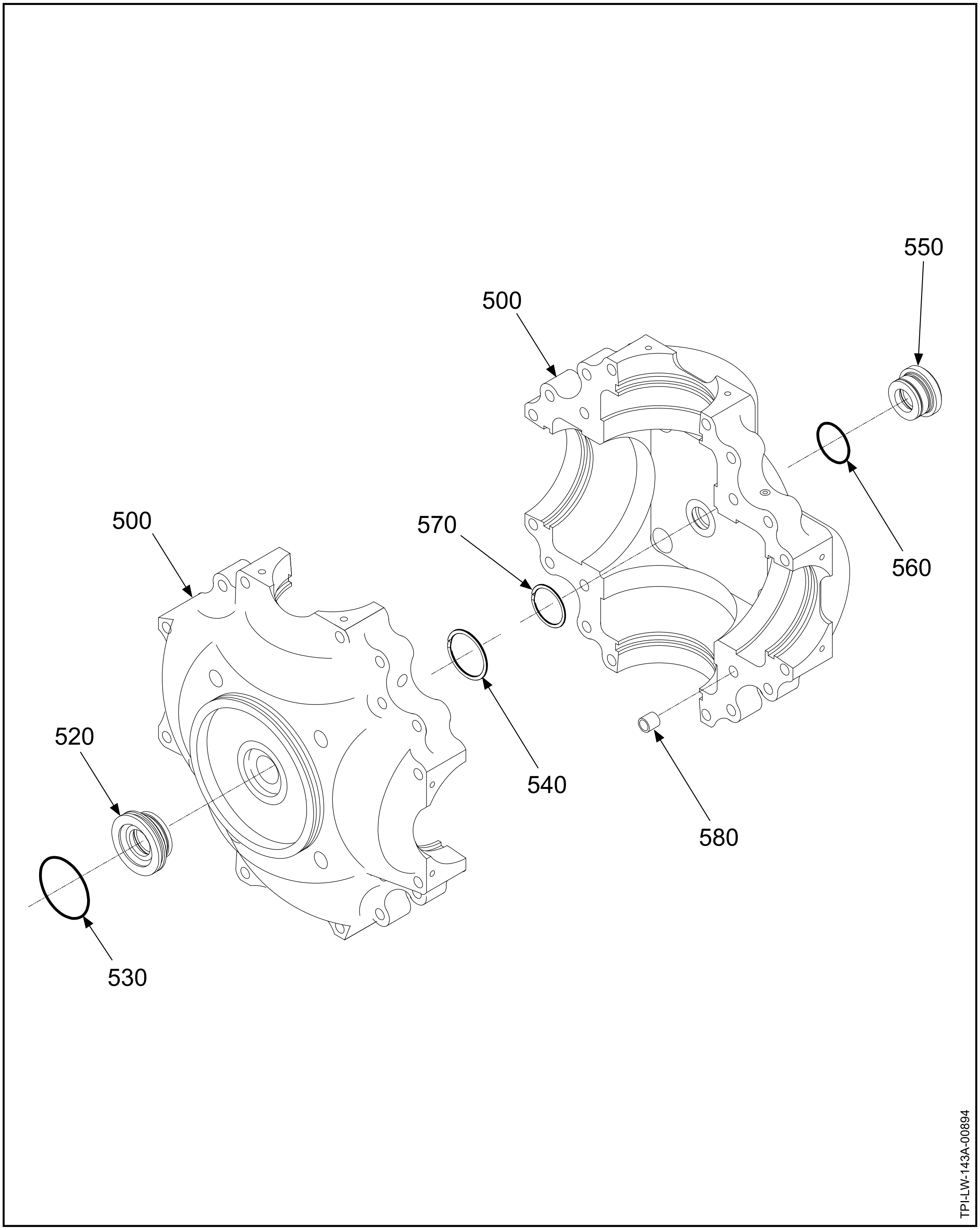
E-6866: Hub Unit
Figure 10A-10

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-10		**E-6866: HUB UNIT PARTS**				
500	E-6866	PCP:HUB UNIT, HC-D4(N,P)-(2,5)		1		PCP
520	B-5952	• HUB BUSHING, ROD		1		
530	C-3317-135-2	• O-RING (CYLINDER-SIDE BUSHING OD)		1	Y	
540	A-6153-162	• RING, RETAINING, EXTERNAL, SPIRAL (CYLINDER-SIDE)		1	Y	
550	B-6108	• HUB BUSHING, ROD		1		
560	C-3317-026-2	• O-RING (ENGINE-SIDE BUSHING OD)		1	Y	
570	A-6153-137	• RING, RETAINING, EXTERNAL, SPIRAL (ENGINE-SIDE)		1	Y	
580	A-2249	• HUB BUSHING, GUIDE		1	Y	
-590	B-6142	• INSERT, 1/4-28, CRES, COILED		8	Y	
-600	B-1243	• INSERT, 9/16-18, CRES, STAKED		8	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

E-6866: Hub Unit



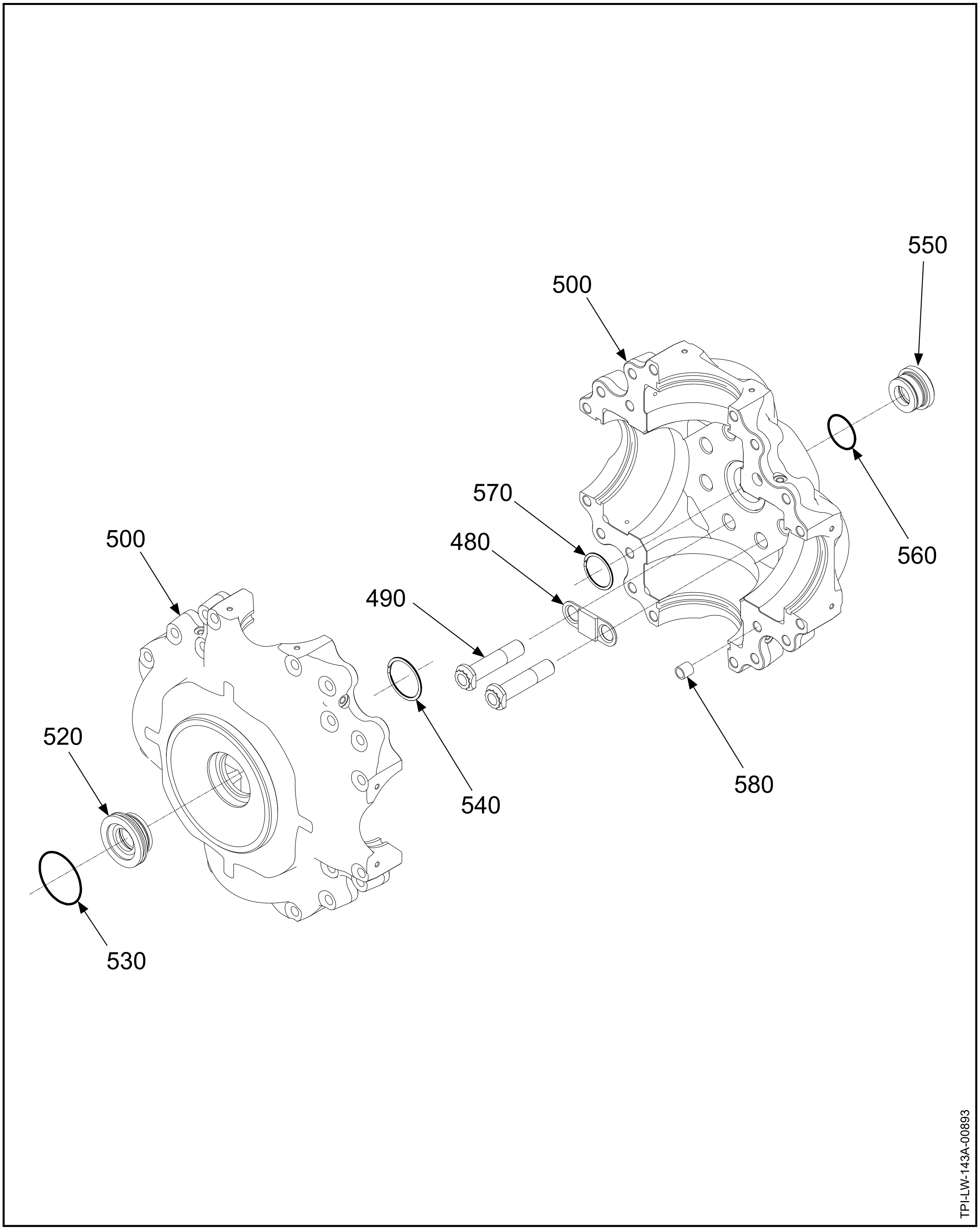
102339: Hub Unit
Figure 10A-11

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-11		**102339: HUB UNIT PARTS**				
500	102339	PCP:HUB UNIT, HC-E4W-5( )		1		PCP
520	B-5952	• HUB BUSHING, ROD		1		
530	C-3317-135-2	• O-RING (CYLINDER-SIDE BUSHING OD)		1	Y	
540	A-6153-162	• RING, RETAINING, EXTERNAL, SPIRAL (CYLINDER-SIDE)		1	Y	
550	B-6108	• HUB BUSHING, ROD		1		
560	C-3317-026-2	• O-RING (ENGINE-SIDE BUSHING OD)		1	Y	
570	A-6153-137	• RING, RETAINING, EXTERNAL, SPIRAL (ENGINE-SIDE)		1	Y	
580	A-2249	• HUB BUSHING, GUIDE		1	Y	
-590	B-6142	• INSERT, 1/4-28, CRES, COILED		8	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

102339: Hub Unit



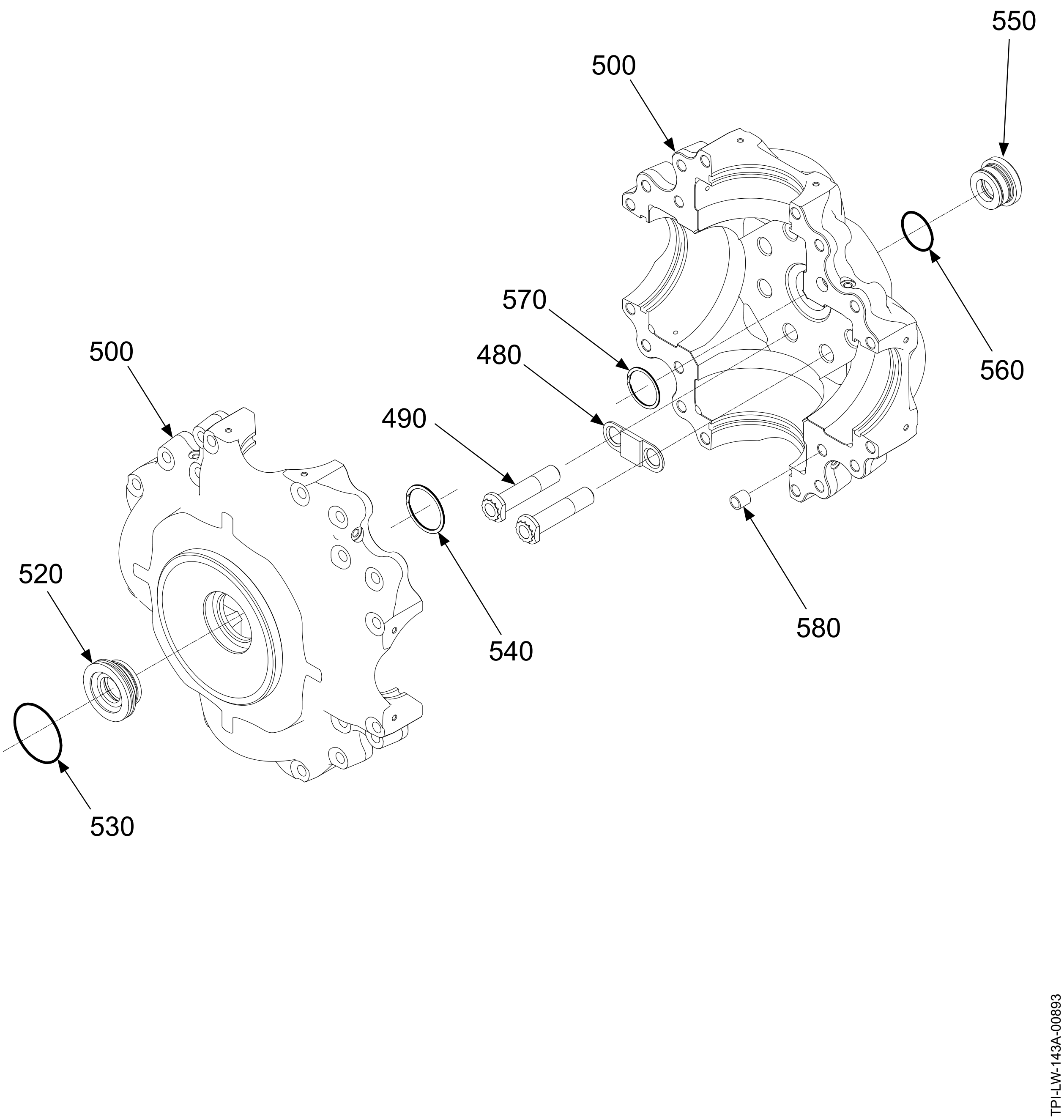
106497: Hub Assembly
Figure 10A-12

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-12		**106497: HUB ASSEMBLY PARTS**				
-470	106497	PCP: HUB ASSEMBLY, HC-E4N-5K		1		PCP
480	103419	• PLATE, HUB MOUNTING		4		
490	103560	• BOLT, MOUNTING, 9/16-18, FLANGED		8	Y	
500	106498	• PCP:HUB UNIT, HC-E4N-5K		1		PCP
520	B-5952	• • HUB BUSHING, ROD		1		
530	C-3317-135-2	• • O-RING (CYLINDER-SIDE BUSHING OD)		1	Y	
540	A-6153-162	• • RING, RETAINING, EXTERNAL, SPIRAL (CYLINDER-SIDE)		1	Y	
550	B-6108	• • HUB BUSHING, ROD		1		
560	C-3317-026-2	• • O-RING (ENGINE-SIDE BUSHING OD)		1	Y	
570	A-6153-137	• • RING, RETAINING, EXTERNAL, SPIRAL (ENGINE-SIDE)		1	Y	
580	A-2249	• • HUB BUSHING, GUIDE		1	Y	
-590	B-6142	• • INSERT, 1/4-28, CRES, COILED		8	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

106497: Hub Assembly



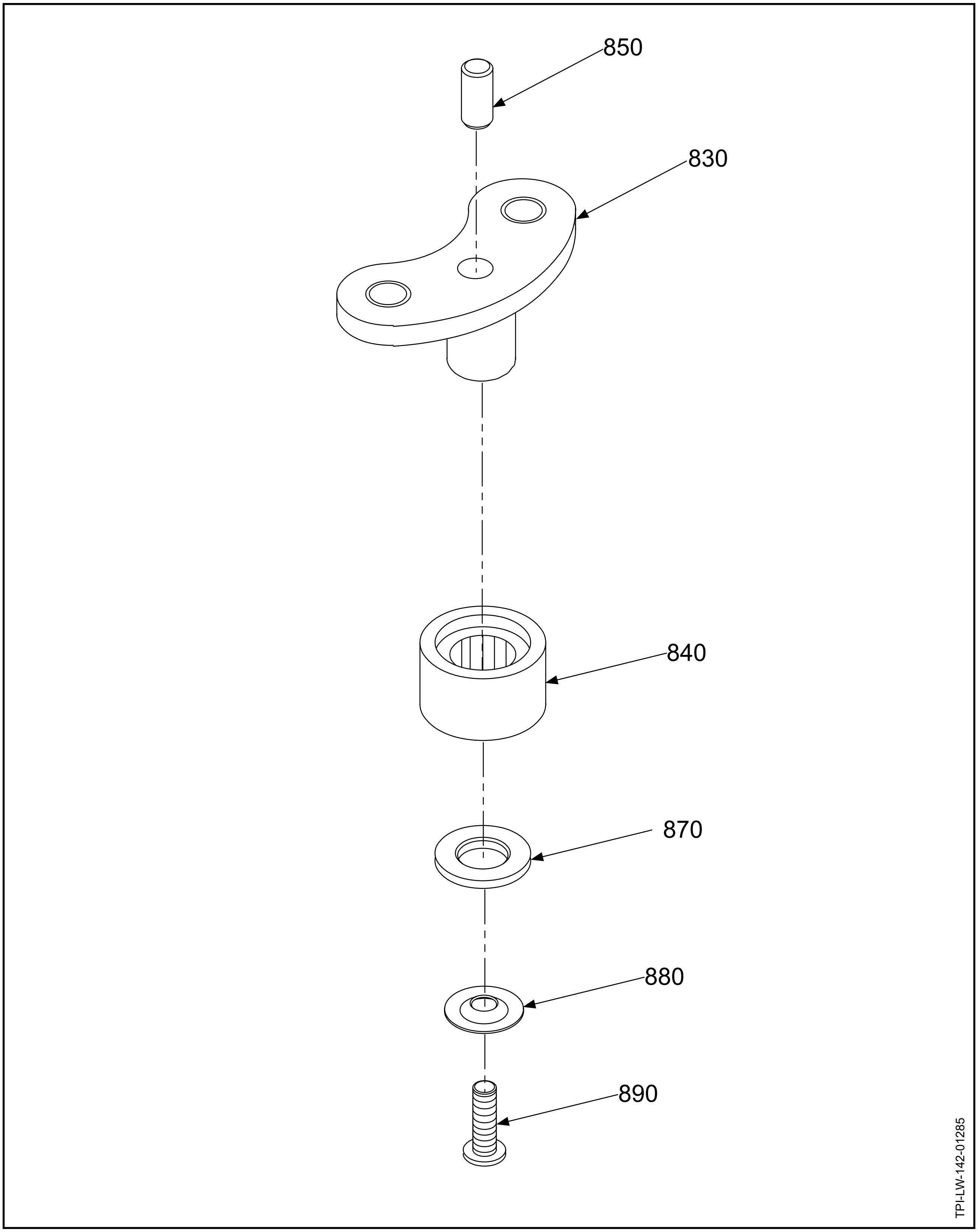
108112: Hub Assembly
Figure 10A-13

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-13		**108112: HUB ASSEMBLY PARTS**				
-470	108112	PCP: HUB ASSEMBLY, HC-E4N-5K(F)		1		PCP
480	103419	• PLATE, HUB MOUNTING		4		
490	103560	• BOLT, MOUNTING, 9/16-18, FLANGED		8	Y	
500	107961	• PCP:HUB UNIT, HC-E4N-5K		1		PCP
520	B-5952	• • HUB BUSHING, ROD		1		
530	C-3317-135-2	• • O-RING (CYLINDER-SIDE BUSHING OD)		1	Y	
540	A-6153-162	• • RING, RETAINING, EXTERNAL, SPIRAL (CYLINDER-SIDE)		1	Y	
550	B-6108	• • HUB BUSHING, ROD		1		
560	C-3317-026-2	• • O-RING (ENGINE-SIDE BUSHING OD)		1	Y	
570	A-6153-137	• • RING, RETAINING, EXTERNAL, SPIRAL (ENGINE-SIDE)		1	Y	
580	A-2249	• • HUB BUSHING, GUIDE		1	Y	
-590	B-6142	• • INSERT, 1/4-28, CRES, COILED		8	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

108112: Hub Assembly



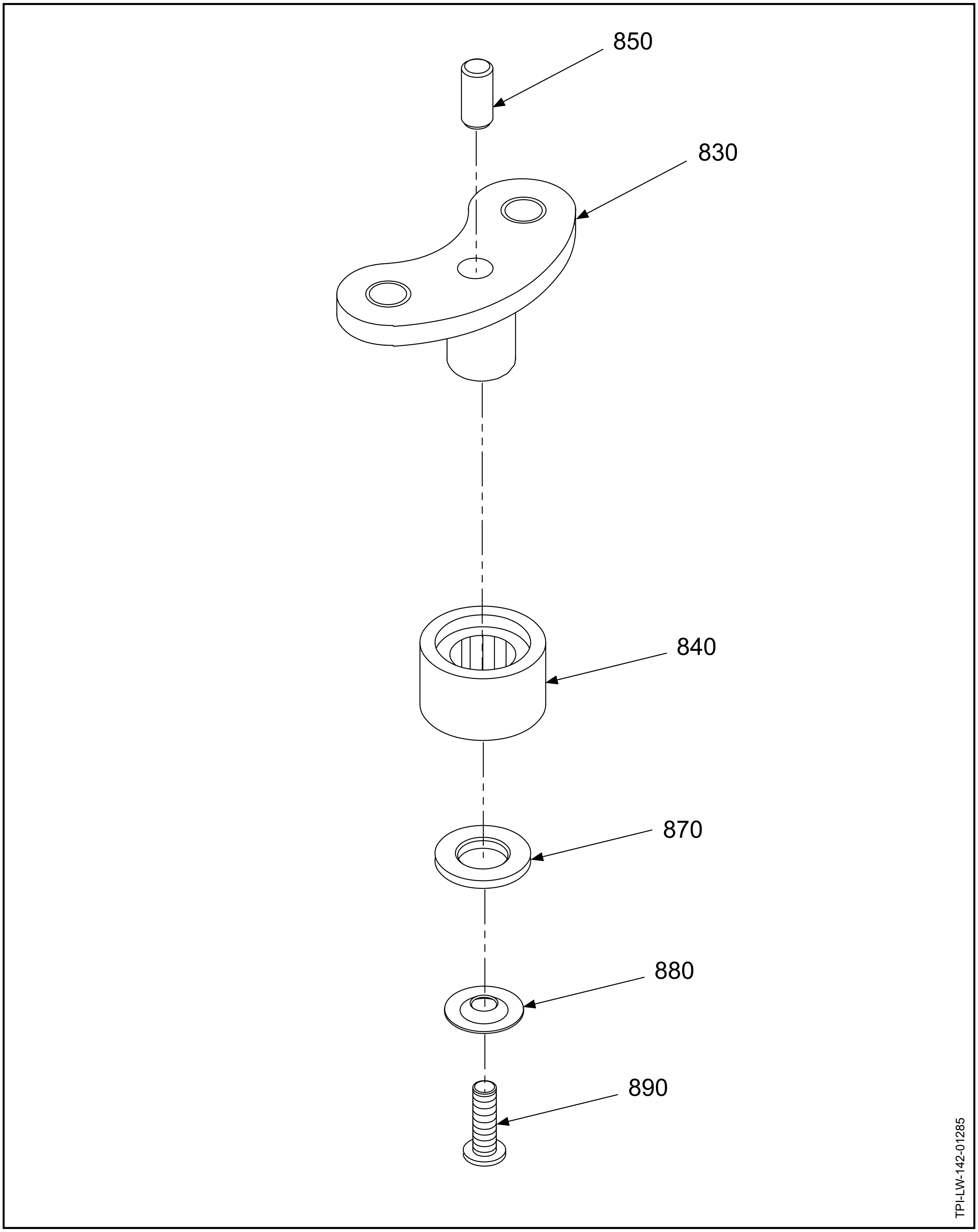
B-464-( ): Pitch Change Knob Bracket Unit
Figure 10A-14

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-14		**B-464-( ): PITCH CHANGE KNOB BRACKET UNIT**				
-820	B-464-( )	BRACKET, KNOB, PITCH CHANGE - UNIT		1		
830	B-465-( )	• BRACKET, KNOB, PITCH CHANGE USE WITH ITEM 860		1		
830A	B-465-( )A	• BRACKET, KNOB, PITCH CHANGE (MODIFIED) ALTERNATE FOR ITEM 830 USE WITH ITEMS 870, 880, AND 890 POST HC-SB-61-346	A	1		
840	B-6545	• CAM FOLLOWER		1	Y	
850	B-6260	• DOWEL PIN, 3/8 INCH		1		
-860	B-475	• WASHER, RETAINING, KNOB UNIT USE WITH ITEM 830		1	Y	
870	103395	• KNOB UNIT RETAINING WASHER USE WITH ITEMS 830A, 880, AND 890 POST HC-SB-61-346		1		
880	B-3860-10L	• WASHER, DIMPLED, 100° CRES USE WITH ITEMS 830A, 880, AND 890 POST HC-SB-61-346		1	Y	
890	B-3867-272	• SCREW, 10-32 100°, HEAD, CRES USE WITH ITEMS 830A, 870, AND 880 POST HC-SB-61-346		1	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL
A	A-465-( )A IS A MODIFICATION OF THE A-465-( ). REFER TO THE CHECK CHAPTER AND THE REPAIR CHAPTER IN THIS MANUAL.		

- ITEM NOT ILLUSTRATED

B-464-( ): Pitch Change Knob Bracket Unit



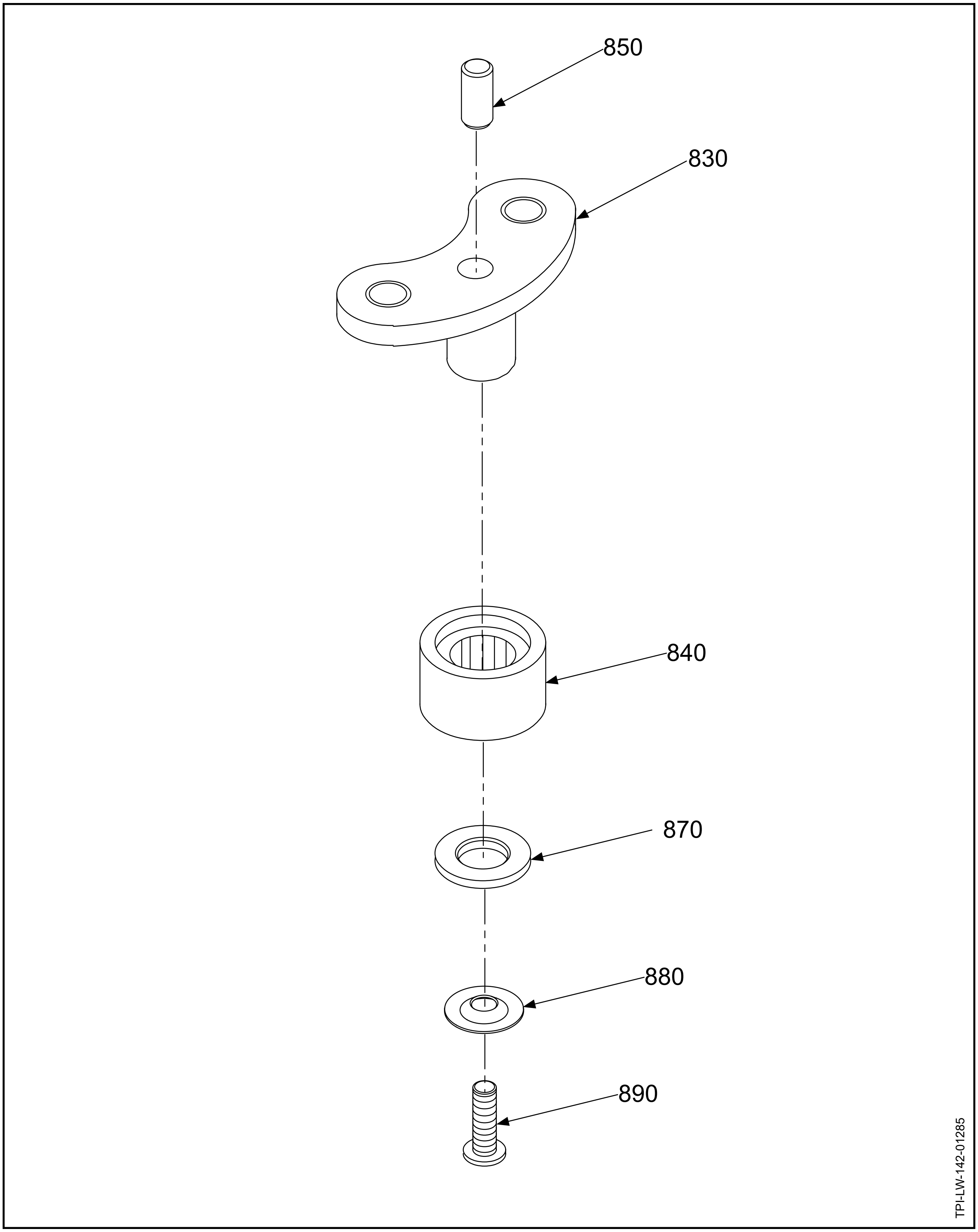
B-6258-( ): Pitch Change Knob Bracket Assembly
Figure 10A-15

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-15		**B-6258-( ): PITCH CHANGE KNOB BRACKET ASSEMBLY**				
-820	B-6257-( )	BRACKET, KNOB, PITCH CHANGE - UNIT		1		
-820A	B-6257-1	• BRACKET, KNOB, PITCH CHANGE-UNIT REPLACES ITEM 17A (-0.3 DEGREE CHANGE OF BLADE ANGLE FOR TRACTOR INSTALLATION)		4		
-820B	B-6257-2	• BRACKET, KNOB, PITCH CHANGE-UNIT REPLACES ITEM 17B (0.0 DEGREE CHANGE OF BLADE ANGLE FOR TRACTOR INSTALLATION)		4		
-820C	B-6257-3	• BRACKET, KNOB, PITCH CHANGE-UNIT REPLACES ITEM 17C (0.3 DEGREE CHANGE OF BLADE ANGLE FOR TRACTOR INSTALLATION)		4		
830	B-465-( )	• BRACKET, KNOB, PITCH CHANGE USE WITH ITEM 860 SUPERSEDED BY ITEM 830A, PRE HC-SB-61-389 REPLACED BY ITEM 830C, POST HC-SB-61-389		1		
830A	C-6253-( )	• BLADE PITCH CHANGE KNOB BRACKET USE WITH ITEM 860 SUPERSEDES ITEM 830 REPLACED BY ITEM 830D, POST		1		
830B	B-465-( )A	• BRACKET, KNOB, PITCH CHANGE (MODIFIED) ALTERNATE FOR ITEM 830 AND 830A USE WITH ITEMS 870, 880, AND 890B POST HC-SB-61-346	A	1		
830C	108302-( )	• BRACKET, KNOB, PITCH CHANGE REPLACES ITEM 830, POST HC-SB-61-389		1		
830D	100031-( )	• BRACKET, KNOB, PITCH CHANGE REPLACES ITEM 830A, POST HC-SB-61-346		1		
840	B-6545	• CAM FOLLOWER		1	Y	
850	B-6260	• DOWEL PIN, 3/8 INCH		1		
-860	B-475	• WASHER, RETAINING, KNOB UNIT USE WITH ITEM 830 OR 830A		1	Y	
870	103395	• KNOB UNIT RETAINING WASHER USE WITH ITEMS 830B, 880, AND 890 POST HC-SB-61-346		1		
880	B-3860-10L	• WASHER, DIMPLED, 100° CRES USE WITH ITEMS 830B, 870, AND 890B POST HC-SB-61-346		1	Y	
890	B-3825	• • SCREW REPLACED BY ITEM 890A, PRE HC-SB-61-216		1		
890A	B-3830	• • BOLT, 12 POINT REPLACES ITEM 890, POST HC-SB-61-216		1	Y	
890B	B-3867-272	• SCREW, 10-32 100°, HEAD, CRES USE WITH ITEMS 830B, 870, AND 880, POST HC-SB-61-346		1	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL
A	A-465-( )A IS A MODIFICATION OF THE A-465-( ). REFER TO THE CHECK CHAPTER AND THE REPAIR CHAPTER IN THIS MANUAL.		

- ITEM NOT ILLUSTRATED

B-6258-( ): Pitch Change Knob Bracket Assembly



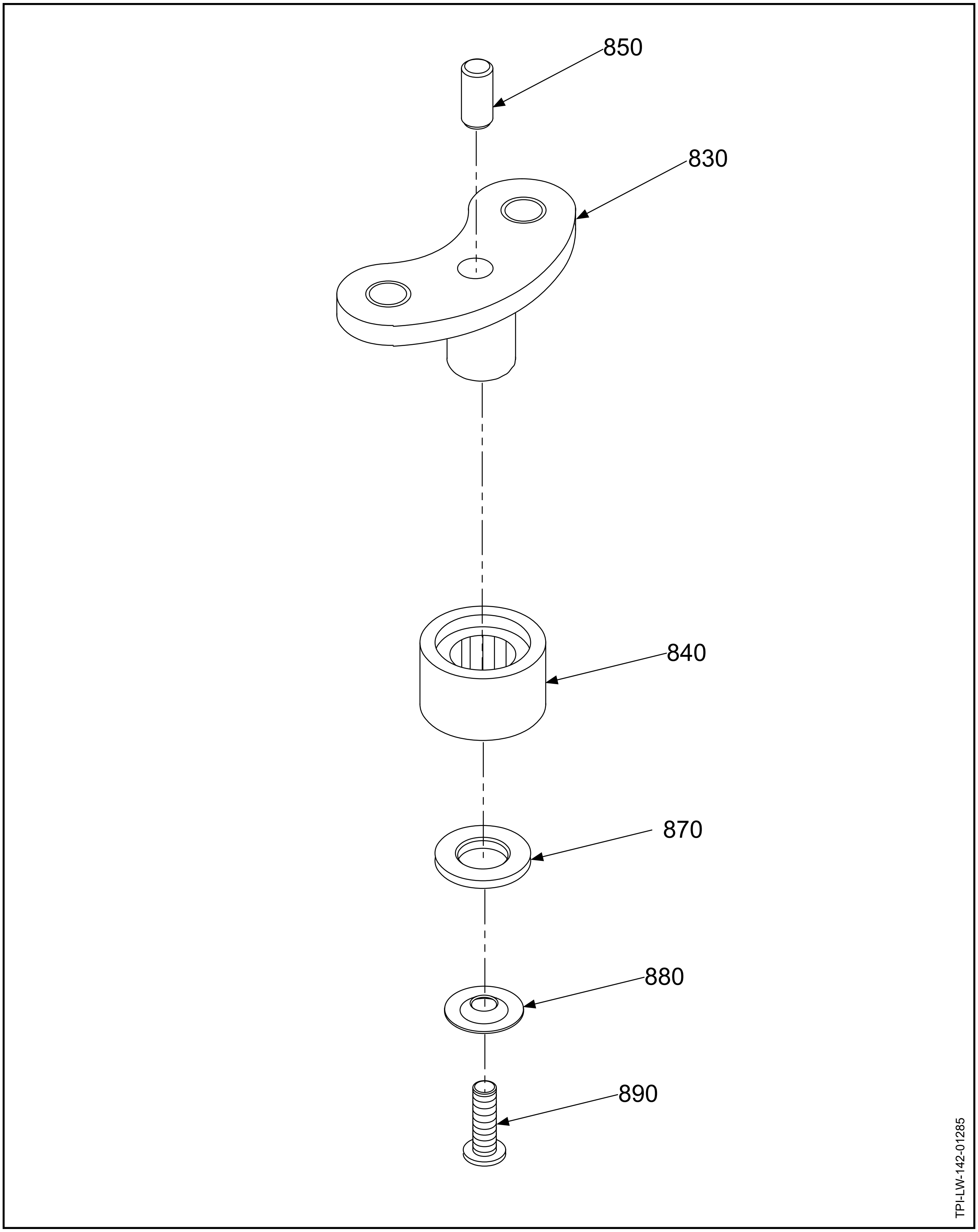
100028-( ): Pitch Change Knob Bracket Unit
Figure 10A-16

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-16		**100028-( ): PITCH CHANGE KNOB BRACKET UNIT**				
-820	100028-( )	BRACKET, KNOB, PITCH CHANGE - UNIT		1		
830	100027-( )	• BRACKET, KNOB, PITCH CHANGE		1		
840	B-6545	• CAM FOLLOWER		1	Y	
850	B-6260	• DOWEL PIN, 3/8 INCH		1		
870	103395	• WASHER, RETAINING, KNOB UNIT		1		
880	B-3860-10L	• WASHER, DIMPLED, 100° CRES		1	Y	
890	B-3867-272	• SCREW, 10-32 100°, HEAD, CRES		1	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

100028-( ): Pitch Change Knob Bracket Unit



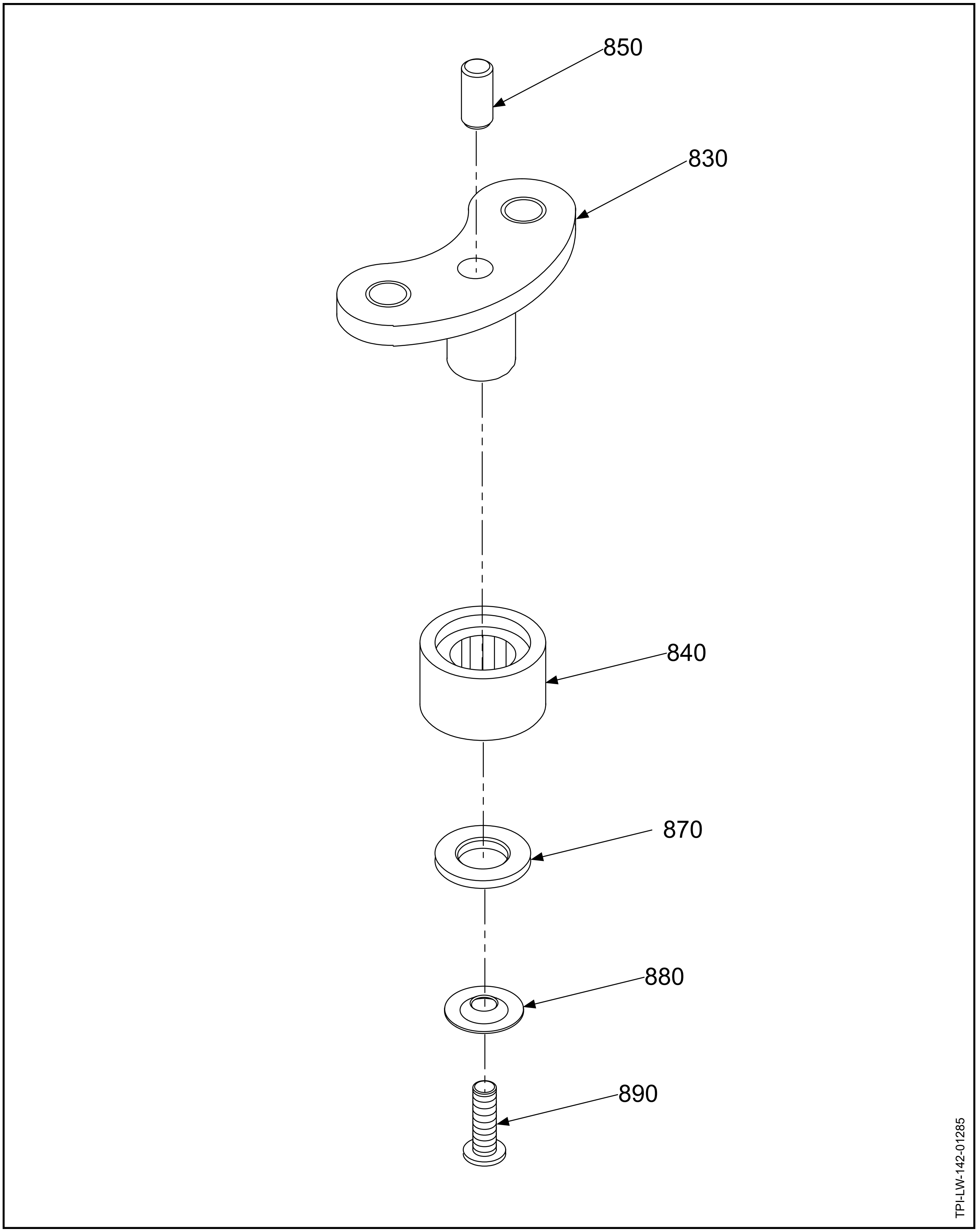
100032-( ): Pitch Change Knob Bracket Unit
Figure 10A-17

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-17		**100032-( ): PITCH CHANGE KNOB BRACKET UNIT**				
-820	100032-( )	BRACKET, KNOB, PITCH CHANGE - UNIT		1		
830	100031-( )	• BRACKET, KNOB, PITCH CHANGE		1		
840	B-6545	• CAM FOLLOWER		1	Y	
850	B-6260	• DOWEL PIN, 3/8 INCH		1		
870	103395	• WASHER, RETAINING, KNOB UNIT		1		
880	B-3860-10L	• WASHER, DIMPLED, 100° CRES		1	Y	
890	B-3867-272	• SCREW, 10-32 100°, HEAD, CRES		1	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

100032-( ): Pitch Change Knob Bracket Unit



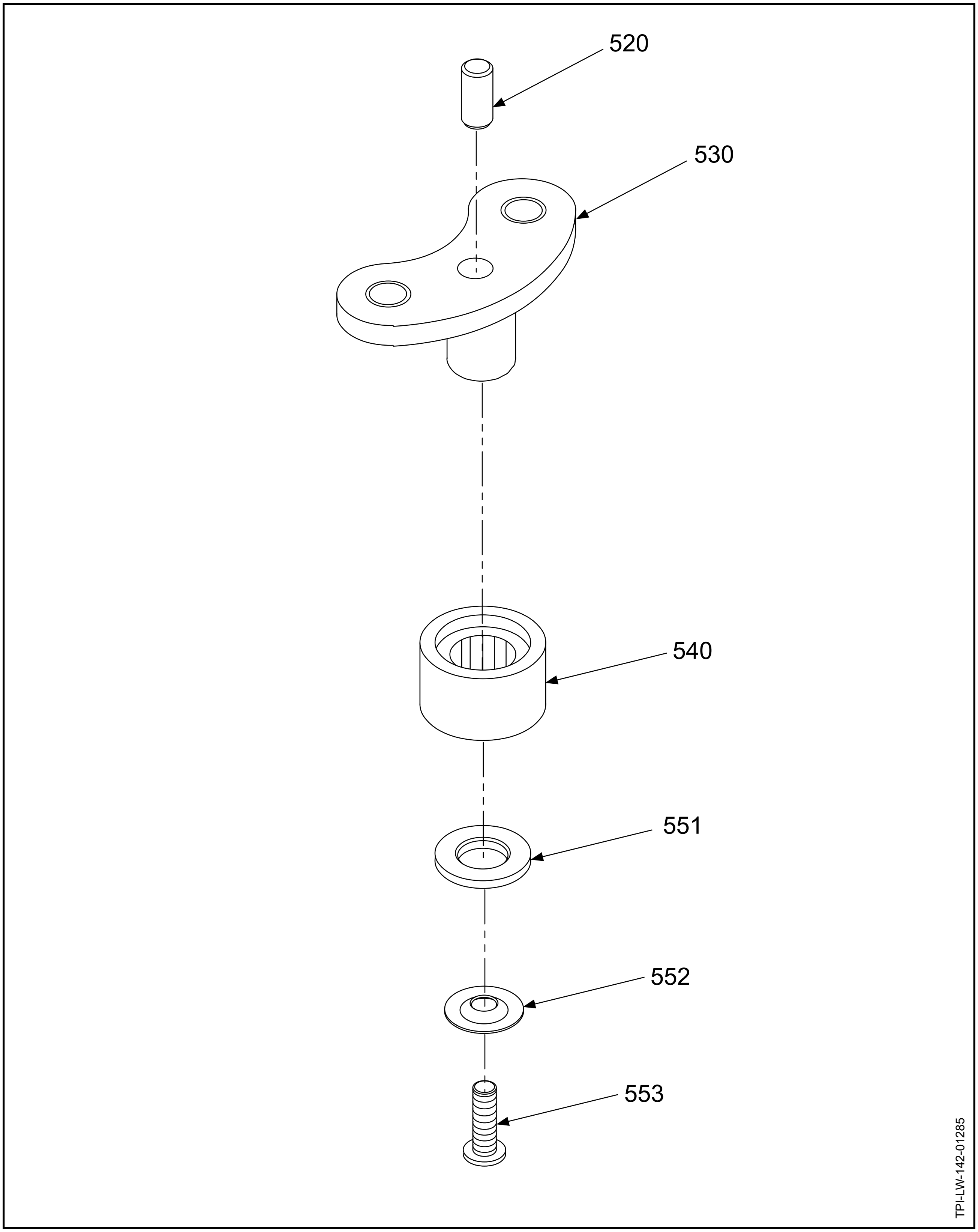
103545-( ): Pitch Change Knob Bracket Unit
Figure 10A-18

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-18		**103545-( ): PITCH CHANGE KNOB BRACKET UNIT**				
-820	103545-( )	BRACKET, KNOB, PITCH CHANGE - UNIT		1		
830	103393-( )	• BRACKET, KNOB, PITCH CHANGE		1		
840	B-6545	• CAM FOLLOWER		1	Y	
850	B-6260	• DOWEL PIN, 3/8 INCH		1		
870	103395D	• WASHER, RETAINING, KNOB UNIT		1		
880	B-3860-10L	• WASHER, DIMPLED, 100° CRES		1	Y	
890	B-3867-272	• SCREW, 10-32 100°, HEAD, CRES		1	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

103545-( ): Pitch Change Knob Bracket Unit



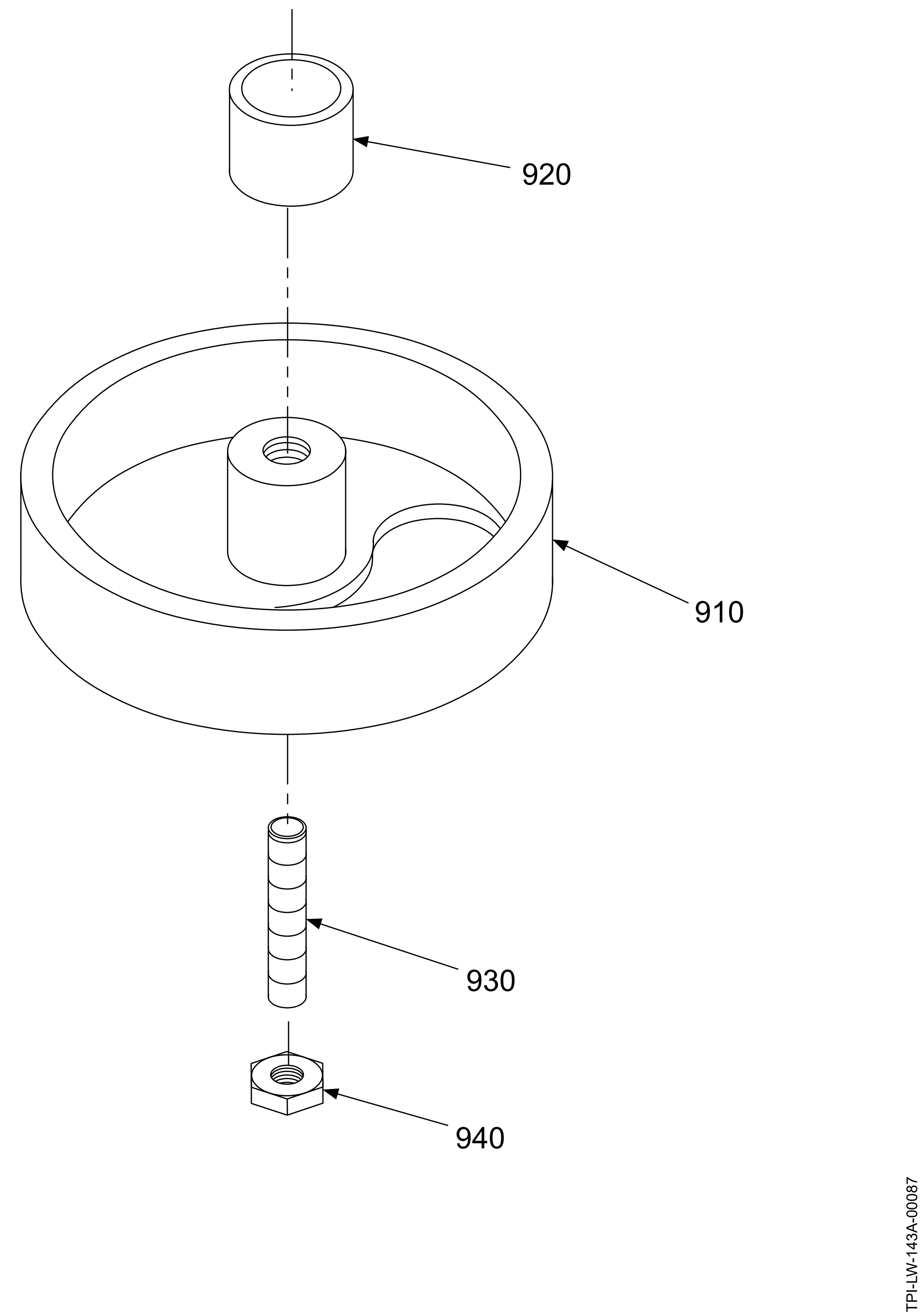
108303-( ): Pitch Change Knob Bracket Unit
Figure 10A-19

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-19		**108303-( ): PITCH CHANGE KNOB BRACKET UNIT**				
-510	108303-( )	BRACKET, KNOB, PITCH CHANGE - UNIT		1		
520	B-6260	• DOWEL PIN, 3/8 INCH		1		
530	108302-( )	• BRACKET, KNOB, PITCH CHANGE		1		
540	B-6545	• CAM FOLLOWER		1	Y	
551	103395	• WASHER, RETAINING, KNOB UNIT		1		
552	B-3860-10L	• WASHER, DIMPLED, 100° CRES		1	Y	
553	B-3867-272	• SCREW, 10-32 100°, HEAD, CRES		1	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

108303-( ): Pitch Change Knob Bracket Unit



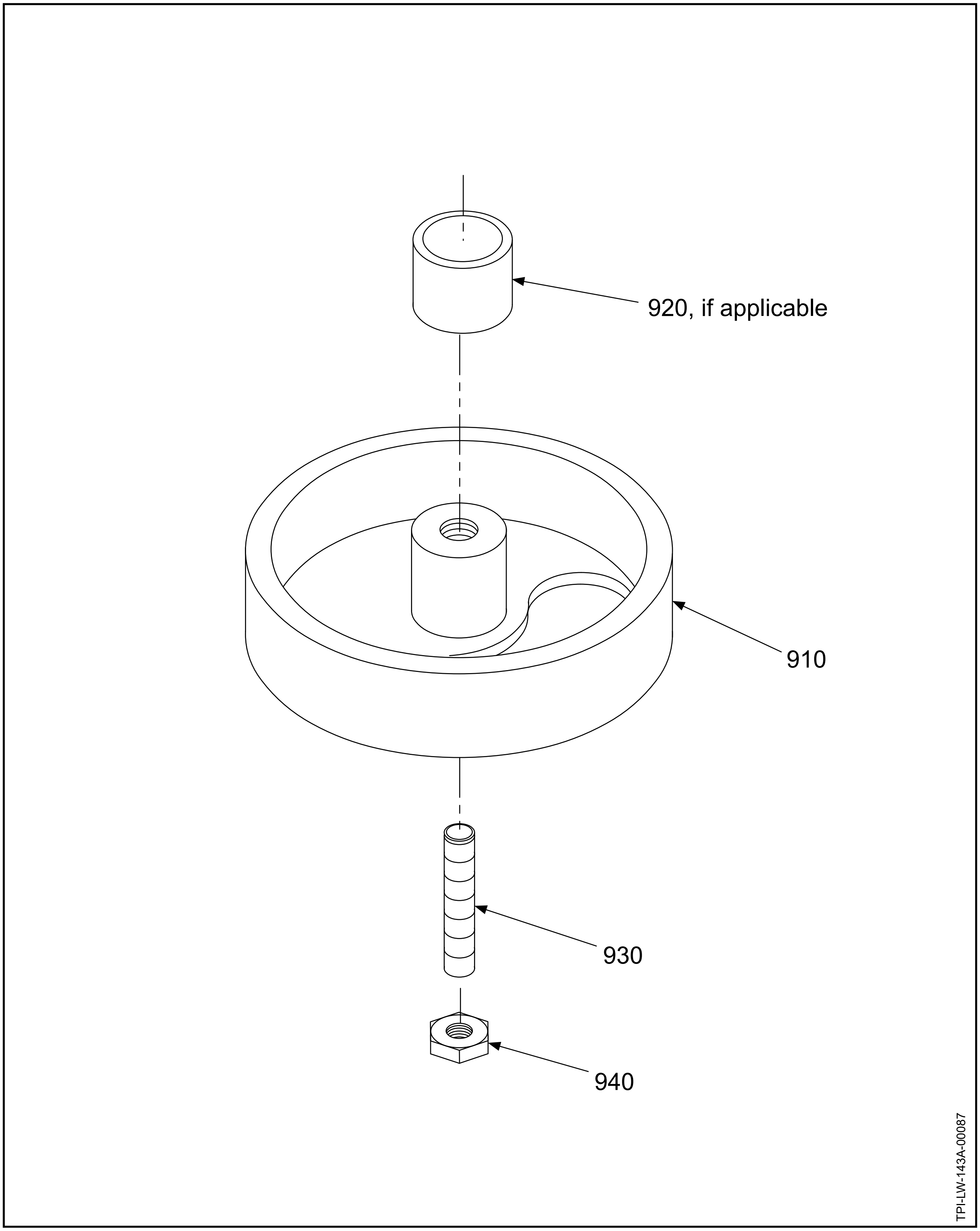
C-459: Preload Plate Assembly
Figure 10A-20

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-20		**C-459: PRELOAD PLATE ASSEMBLY**				
910	C-459	PRELOAD PLATE ASSEMBLY		1		
920	B-6679	• RACE, INNER, BEARING		1		
930	A-3204	• • SCREW, SET, 5/16-24, REPLACED BY ITEM 930A		1	Y	
930A	A-3204-2	• • SCREW, SET, 5/16-24, REPLACES ITEM 930		1	Y	
940	B-3368	• NUT, 5/16-24, HEX, THIN		1	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

C-459: Preload Plate Assembly



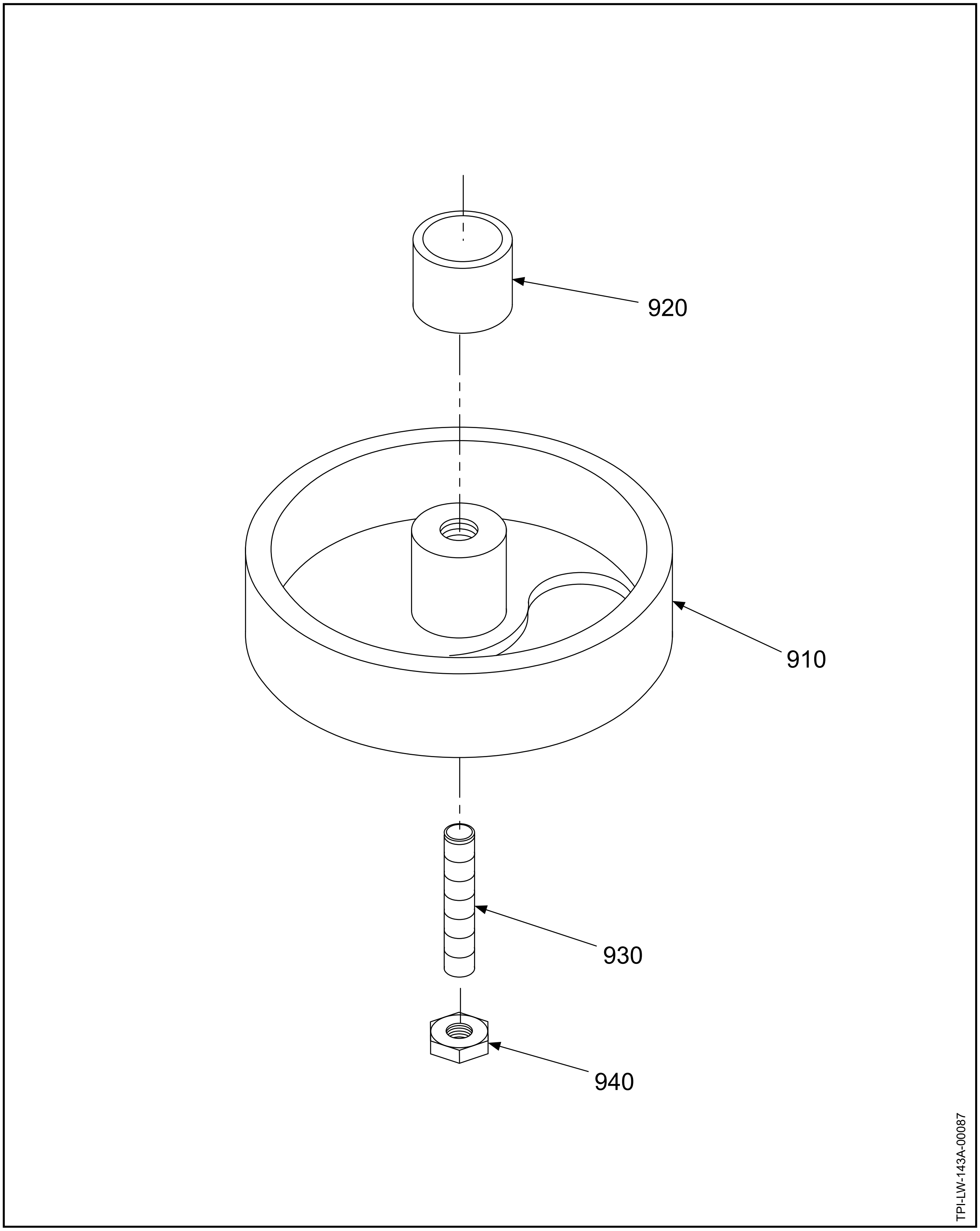
100641-( ): Preload Plate Assembly
Figure 10A-21

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-21		**100641-( ): PRELOAD PLATE ASSEMBLY**				
		100641: PRELOAD PLATE ASSEMBLY				
910	100641	PRELOAD PLATE ASSEMBLY		1		
920	A-1272	• RACE, INNER BEARING		1		
930	A-3204-2	• SCREW, SET, 5/16-24		1	Y	
940	B-3368	• NUT, 5/16-24, HEX, THIN		1	Y	
		100641-1: PRELOAD PLATE ASSEMBLY				
910	100641-1	PRELOAD PLATE ASSEMBLY		1		
930	B-7019-2	• SCREW, SET, 5/16-24		1	Y	
940	B-3368	• NUT, 5/16-24, HEX, THIN		1	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

100641-( ): Preload Plate Assembly



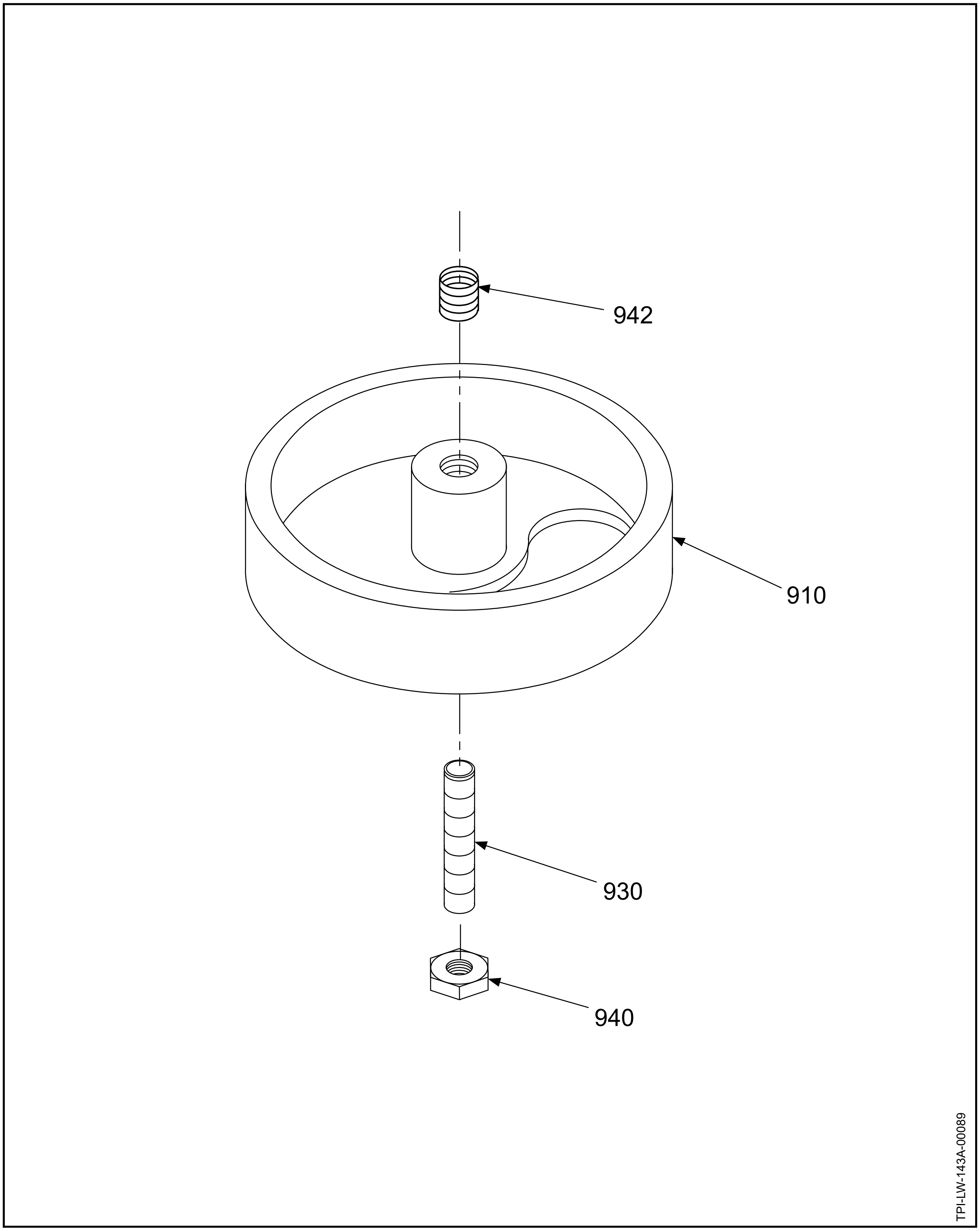
101004: Preload Plate Assembly
Figure 10A-22

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-22		**101004: PRELOAD PLATE ASSEMBLY**				
910	101004	PRELOAD PLATE ASSEMBLY		1		
920	B-6679	• RACE, INNER, BEARING		1		
930	A-3204-2	• SCREW, SET, 5/16-24		1	Y	
940	B-3368	• NUT, 5/16-24, HEX, THIN		1	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

101004: Preload Plate Assembly



103525: Preload Plate Assembly
Figure 10A-23

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-23		**103525: PRELOAD PLATE ASSEMBLY**				
910	103525	PRELOAD PLATE ASSEMBLY		1		
930	101667	• SCREW, SET, 5/16-24		1	Y	
940	B-3368	• NUT, 5/16-24, HEX, THIN		1	Y	
942	B-6986-314M	• INSERT, THREADED, THIN WALL		1		

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

103525: Preload Plate Assembly

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