HARTZELL PROPELLER INC.
One Propeller Place
Piqua, Ohio 45356-2634 U.S.A.
Telephone: 937.778.4200
Fax: 937.778.4215

MANUAL REVISION TRANSMITTAL

MANUAL 496 (61-10-96)
Raptor Series Turbine Propeller Overhaul Manual

REVISION 11 dated December 2023

Remove Pages:	Insert Pages:
COVER	**COVER**
Cover and Inside Cover	Ccover and Inside Cover
REVISION HIGHLIGHTS	**REVISION HIGHLIGHTS**
pages 1 thru 4	pages 1 thru 4
SERVICE DOCUMENT LIST	**SERVICE DOCUMENT LIST**
pages 1 thru 2	pages 1 thru 2
LIST OF EFFECTIVE PAGES	**LIST OF EFFECTIVE PAGES**
pages 1 thru 4	pages 1 thru 4
DISASSEMBLY	**DISASSEMBLY**
pages 3-1 thru 3-2	pages 3-1 thru 3-2
pages 3-7 thru 3-8.2	pages 3-7 thru 3-8.2
pages 3-23 thru 3-26	pages 3-23 thru 3-26
CHECK	**CHECK**
pages 5-1 thru 5-2.2	pages 5-1 thru 5-2.2
pages 5-87 thru 5-110	pages 5-87 thru 5-112
ASSEMBLY	**ASSEMBLY**
pages 7-1 thru 7-2.2	pages 7-1 thru 7-2.2
pages 7-49 thru 7-80	pages 7-49 thru 7-84
ILLUSTRATED PARTS LIST	**ILLUSTRATED PARTS LIST**
pages 10-11 thru 10-12	pages 10-11 thru 10-12
pages 10-15 thru 10-16	pages 10-15 thru 10-16
pages 10-21 thru 10-22	pages 10-21 thru 10-22
pages 10-29 thru 10-34	pages 10-29 thru 10-34
pages 10-37 thru 10-38	pages 10-37 thru 10-38
pages 10-43 thru 10-48	pages 10-43 thru 10-48

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

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. 496
61-10-96
Revision 11
December 2023

Raptor Series Turbine Propeller Overhaul Manual

( )D3-( )( )( )
( )D31-( )( )( )

Hartzell Propeller Inc.
One Propeller Place
Piqua, Ohio 45356-2634 U.S.A.
Phone: 937.778.4200
Fax: 937.778.4215

REVISION 11 HIGHLIGHTS

Revision 11 dated December 2023, incorporates the following:

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

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

DISASSEMBLY
- Revised Figure 3-3, "Beta System Disassembly: ( )D31-( )( )( ) Propellers"
- Revised the section, "Beta System Disassembly"
- Revised Figure 3-11, "Cylinder/Spring Pack Assembly Removal"
- Revised the section, "Hydraulic System and Pitch Adjustment Unit Disassembly"

CHECK
- Added the inspection criteria and the applicable Figure for the BETA ROD SUPPORT RING (Item 630)

ASSEMBLY
- Revised the section, "Blade-to-Blade Angle Tolerance Check"
- Added the section, "Cylinder/Spring Pack Assembly Installation" and the applicable Figure
- Revised the section, "Beta System Assembly: ( )D3-( )( )( ) Propellers"
- Revised the section, "Beta System Assembly: ( )D31-( )( )( ) Propellers"
- Added the section, "Beta Rod Support Ring Installation" and the applicable Figure
- Revised the section, "Using the Spring Installation Tool"

ILLUSTRATED PARTS LIST
- Added "PCP" to the description of the Nut, Hex, Thin Drilled (p/n B-3839-5) where applicable
- Incorporated HC-ASB-61-405 that revised the part list and the applicable Figure for the 5D31-NK366B1 propeller model
- Revised the part list and the applicable Figure for the 6D31-NK366B1 propeller model

(Blank Page)

REVISION 11 HIGHLIGHTS

1. Introduction

A. General

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

B. Components

(1) Revision No. indicates the revisions incorporated in this manual.

(2) Issue Date is the date of the revision.

(3) Comments indicates the level of the revision.

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

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

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

(d) Minor Revision is a revision to an existing manual that includes minor content changes to the manual. Only the revised pages of the manual are distributed. Each page retains the date and the change bars associated with the last revision to that page.

Revision No.	Issue Date	Comments
Original	Dec/15	New Issue
Rev. 1	Aug/16	Minor Revision
Rev. 2	May/19	Minor Revision
Rev. 3	Feb/21	Minor Revision
Rev. 4	May/21	Minor Revision
Rev. 5	Aug/21	Minor Revision
Rev. 6	Dec/21	Minor Revision
Rev. 7	Sep/22	Minor Revision
Rev. 8	Jan/23	Major Revision
Rev. 9	May/23	Minor Revision
Rev. 10	Jul/23	Minor Revision
Rev. 11	Dec/23	Minor Revision

(Blank Page)

RECORD OF REVISIONS

Revision Number	Issue Date	Date Inserted	Inserted By	Revision Number	Issue Date	Date Inserted	Inserted By
Orig	Dec/15	Dec/15	HPI				
1	Aug/16	Aug/16	HPI				
2	May/19	May/19	HPI				
3	Feb/21	Feb/21	HPI				
4	May/21	May/21	HPI				
5	Aug/21	Aug/21	HPI				
6	Dec/21	Dec/21	HPI				
7	Sep/22	Sep/22	HPI				
8	Jan/23	Jan/23	HPI				
9	May/23	May/23	HPI				
10	Jul/23	Jul/23	HPI				
11	Dec/23	Dec/23	HPI				

(Blank Page)

RECORD OF TEMPORARY REVISIONS

Update this page to show all temporary revisions inserted into this manual.
Revision 8 includes all prior temporary revisions, up to and including TR-001.

Temporary Revision No.	Section/ Page	Issue Date	Date Inserted	Inserted By	Date Removed	Removed By
TR-002	10-16	Mar/23	Mar/23	HPI	May/23	HPI

(Blank Page)

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 Bulletin Number	Incorporation Rev./Date
HC-SB-61-374, Rev. 1	Rev. 2, May/19
HC-SB-61-392	Rev. 4, May/21
HC-SB-61-401	Rev. 8, Jan/23
HC-ASB-61-405	Rev. 11, Dec/23

Service Letter Number	Incorporation Rev./Date
HC-SL-61-354	Rev. 2, May/19

(Blank Page)

AIRWORTHINESS LIMITATIONS

1. Airworthiness Limitations (Rev. 1)

   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, refer to Hartzell Propeller Inc. Owner's Manual 486 (61-00-86).

(Blank Page)

LIST OF EFFECTIVE PAGES

LIST OF EFFECTIVE PAGES

Chapter	Page	Rev. Level	Date
Check	5-41 thru 5-68	Rev. 8	Jan/23
	5-68.1 thru 5-68.10	Rev. 9	May/23
	5-69 thru 5-70	Rev. 9	May/23
	5-71 thru 5-86	Rev. 8	Jan/23
	5-87 thru 5-112	Rev. 11	Dec/23
Repair	6-1 thru 6-16	Rev. 8	Jan/23
Assembly	7-1 thru 7-2	Rev. 11	Dec/23
	7-2.1	Rev. 8	Jan/23
	7-2.2	Rev. 11	Dec/23
	7-3 thru 7-18	Rev. 8	Jan/23
	7-19 thru 7-21	Rev. 9	May/23
	7-22 thru 7-49	Rev. 8	Jan/23
	7-50 thru 7-51	Rev. 11	Dec/23
	7-52	Rev. 8	Jan/23
	7-53 thru 7-84	Rev. 11	Dec/23
Fits and Clearances	8-1	Rev. 9	May/23
	8-2 thru 8-5	Rev. 8	Jan/23
	8-6	Rev. 9	May/23
	8-7 thru 8-8	Rev. 8	Jan/23
Special Tools, Fixtures and Equipment	9-1 thru 9-4	Rev. 8	Jan/23
Illustrated Parts List	10-1	Rev. 8	Jan/23
	10-2	Rev. 9	May/23
	10-2.1 thru 10-2.2	Rev. 9	May/23
	10-3 thru 10-10	Rev. 8	Jan/23
	10-11	Rev. 11	Dec/23
	10-12 thru 10-15	Rev. 8	Jan/23
	10-16	Rev. 11	Dec/23
	10-17 thru 10-21	Rev. 8	Jan/23
	10-22	Rev. 11	Dec/23
	10-23 thru 10-26	Rev. 8	Jan/23
	10-27	Rev. 10	Jul/23
	10-28 thru 10-29	Rev. 8	Jan/23
	10-30 thru 10-33	Rev. 11	Dec/23

LIST OF EFFECTIVE PAGES

(Blank Page)

TABLE OF CONTENTS

(Blank Page)

INTRODUCTION - CONTENTS

(Blank Page)

1. General (Rev. 1)

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 Inc. 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 Inc. 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 Inc. 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 Inc. 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 Inc. Manual Title
n/a	Yes	Active Hartzell Propeller Inc. Service Bulletins, Service Letters, Service Instructions, and Service Advisories
Manual 127 (61-16-27)	Yes	Hartzell Propeller Inc. Metal Spinner Maintenance Manual
Manual 135F (61-13-35)	-	Hartzell Propeller Inc. Composite Propeller Blade Maintenance Manual
Manual 159 (61-02-59)	Yes	Hartzell Propeller Inc. Application Guide
Manual 165A (61-00-65)	Yes	Hartzell Propeller Inc. Illustrated Tool and Equipment Manual
Manual 170 (61-13-70)	Yes	Hartzell Propeller Inc. Composite Propeller Blade Field Maintenance and Minor Repair Manual
Manual 180 (30-61-80)	Yes	Hartzell Propeller Inc. Propeller Ice Protection System Manual
Manual 202A (61-01-02)	Vol. 7, Yes	Hartzell Propeller Inc. Standard Practices Manual, Volumes 1 through 11
Manual 486 (61-00-86)	Yes	Hartzell Propeller Inc. Propeller Owner's Manual and Logbook for Raptor Turbine Propeller Series with Composite Blades

B. Vendor Publications

None.

3. Personnel Requirements (Rev. 1)

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 Inc. 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. 1)

A. Special Tooling

(1) Special tooling may be required for procedures in this manual. For further tooling information, refer to Hartzell Propeller Inc. 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 Inc. 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/or 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 the physical properties, health, and physical hazards of any paint or chemical.

6. Calendar Limits and Long Term Storage (Rev. 2)

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 Inc. 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 of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

7. Component Life and Overhaul (Rev. 2)

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 Inc. 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 Inc. 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 Inc.

(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 Inc. 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 Inc. 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 Inc. component maintenance manual.

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

8. Damage/Repair Types (Rev. 1)

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 Inc. 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 posible 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 Inc. 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 Inc. 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 Inc.

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

9. Propeller Critical Parts (Rev. 1)

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 Inc. 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. 1)

A. Warranty Claims

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

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

11. Hartzell Propeller Inc. Contact Information (Rev. 2)

A. Product Support Department

(1) Contact the Product Support Department of Hartzell Propeller Inc. 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) Hartzell Propeller Inc. Product Support may be reached during business hours (8:00 a.m. through 5:00 p.m., United States Eastern Time) at (937) 778-4379 or at (800) 942-7767, toll free from the United States and Canada.

(b) Hartzell Propeller Inc. Product Support 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 Inc. website at www.hartzellprop.com.

B. Technical Publications Department

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

Hartzell Propeller Inc.
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 Inc. 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 Inc. worldwide network of aftermarket distributors and approved repair facilities is available on the Hartzell website at www.hartzellprop.com.

12. Definitions (Rev. 4)

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

Term	Definition
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.
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 corrode, 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

Term	Definition
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
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

Term	Definition
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
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
Parting Line	The Parting line is formed where the face and camber composite materials meet at the leading and trailing edges of the blade. They are most visible in the shank area of the blade
Pitch	Same as “Blade Angle”

Term	Definition
Pitting	Formation of a number of small, irregularly shaped cavities in surface material caused by corrosion or wear
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 fiber 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

13. 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
N/A	Not Applicable

Abbreviation	Term
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

(Blank Page)

1. General (Rev. 1)

A. Propeller/Blade Model Designation

(1) Hartzell Propeller Inc. 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 Inc. 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 Inc. Composite Propeller Blade Maintenance Manual 135F (61-13-35).

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

2. Operation

A. Feathering and Reversing Propellers ( )D3( )-( )( )( ) Series

(1) The propellers described in this section are constant speed, feathering and reversing. They use a single oil supply from a governing device to hydraulically actuate a change in blade angle. The propellers are used primarily on Pratt & Whitney turbine engines.

A two piece aluminum hub retains each propeller blade on a thrust bearing. A cylinder is attached to the hub and contains a feathering spring and piston. The hydraulically actuated piston transmits linear motion through a pitch change rod and fork to each blade to result in blade angle change.

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

Summation of the propeller forces is toward higher pitch (low RPM) and is opposed by a variable force toward lower pitch (high RPM). The variable force is oil under pressure from a governor with an internal pump that is mounted on and driven by the engine. 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. Decreasing the volume of oil will increase blade angle and decrease propeller RPM. 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. The governor uses engine speed sensing mechanisms that allow it to supply or drain oil as necessary to maintain constant engine speed (RPM).

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

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

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

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. Control of the propeller blade angle in reverse is accomplished with the beta valve for propellers with beta feedback block assemblies, and with the PCU for propellers with electronic beta sensors.

NOTE: For installations with beta feedback block assemblies, the beta valve is normally built into the base of the governor. For installations with beta sensors, the beta valve function is built into the PCU control system.

For installations with beta feedback block assemblies, 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. Several external propeller mechanisms, which include a beta ring and beta feedback block assembly, communicate propeller blade angle position to the beta valve.

When the propeller reaches the desired reverse position, movement of the beta ring and beta feedback block assembly initiated by the propeller piston, causes the beta valve to shut off the flow of oil to the propeller. Any additional unwanted movement of the propeller toward reverse, or any movement of the manually positioned beta valve control toward high pitch position will cause the beta valve to drain oil from the propeller to increase pitch.

For installations with electronic beta sensors, the propeller is reversed by manually repositioning the cockpit-control to cause the PCU to supply oil from the PCU pump to the propeller. The electronic beta sensor reads the position of the specially designed beta ring and communicates propeller blade angle position to the FADEC.

When the propeller reaches the desired reverse position, the electronic beta sensor determines the movement of the specially designed beta ring, initiated by propeller piston, and the FADEC tells the PCU to stop the flow of the oil to the propeller. Any additional unwanted movement of the propeller toward reverse, or any movement of the cockpit control toward the high pitch position will cause the PCU to drain oil from the propeller to increase pitch.

(Blank Page)

TESTING AND FAULT ISOLATION - CONTENTS

LIST OF FIGURES

(Blank Page)

1. Troubleshooting Guide (Rev. 1)

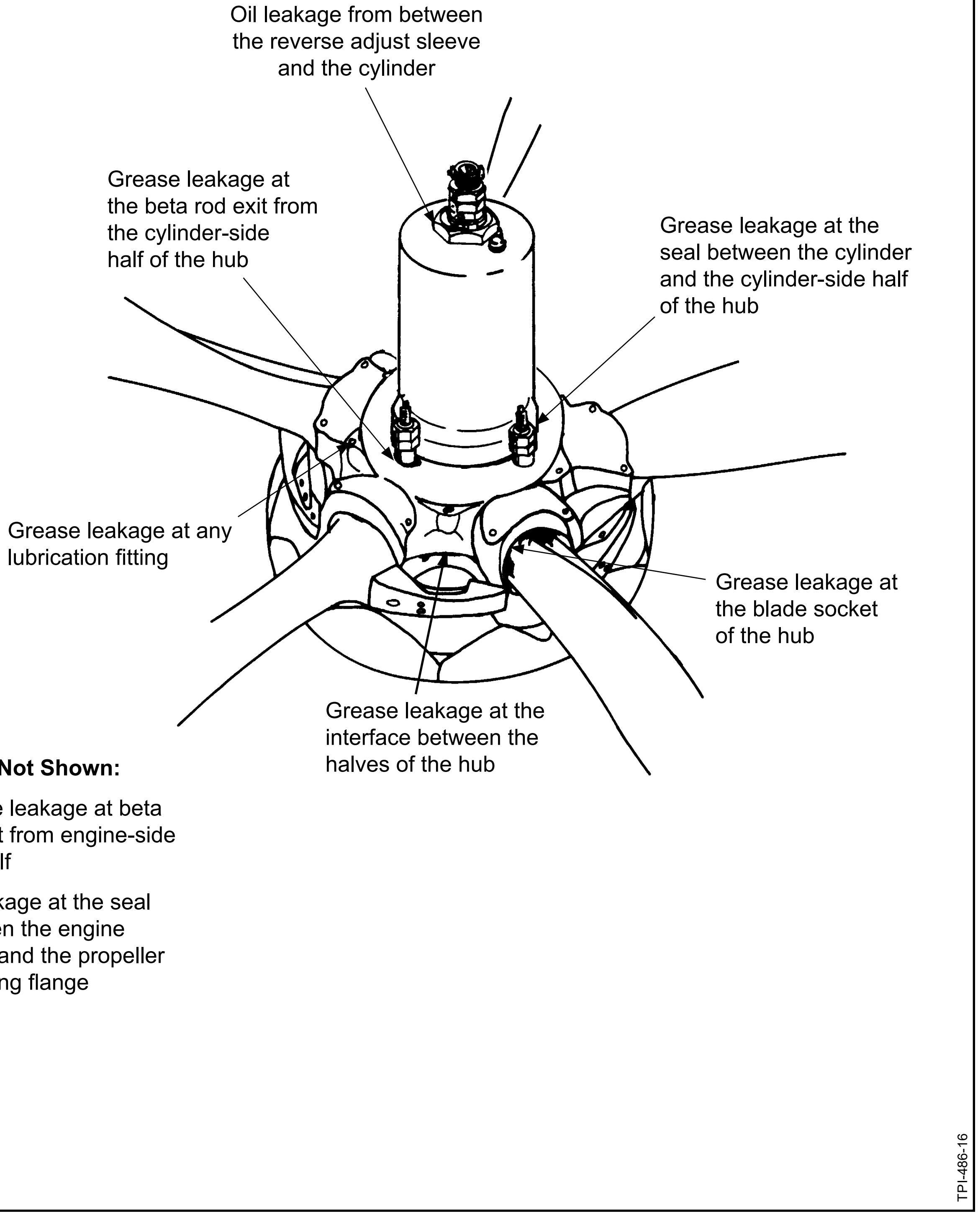
CAUTION: INSTRUCTIONS AND PROCEDURES IN THIS CHAPTER MAY INVOLVE CRITICAL PARTS. REFER TO THE INTRODUCTION CHAPTER OF THIS MANUAL FOR INFORMATION ABOUT PROPELLER CRITICAL PARTS. REFER TO THE ILLUSTRATED PARTS LIST IN THIS MANUAL FOR IDENTIFICATION OF SPECIFIC PROPELLER CRITICAL PARTS.

The purpose of this guide is to isolate probable causes and suggest possible 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 Friction in this chapter.
	or	Oil passages are not clear and open.	Examine 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 clearance between the various moving parts in the pitch change mechanism.	Examine the moving parts individually. Increase the clearances between the individual parts as necessary to decrease friction in the mechanism.

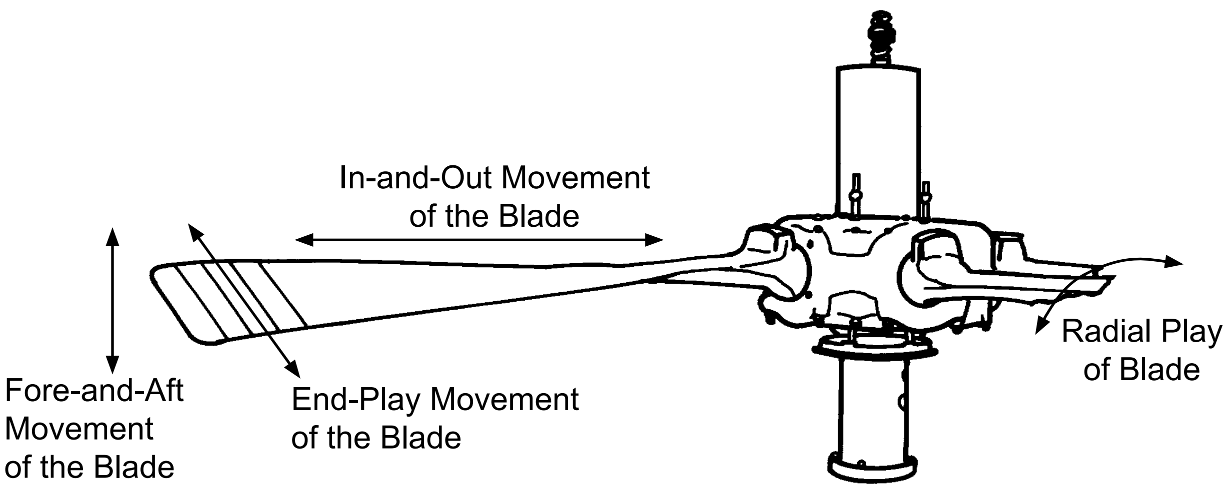
Problem		Probable Cause	Remedy
C. Abnormal Propeller Vibration		Bent, cracked, or damaged blade.	For composite blades, refer to Hartzell Propeller Inc. Manual 135F (61-13-35).
	or	Cracked or damaged hub.	Refer to Appendix A in Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02) Volume 3.
	or	Broken blade retention split bearings.	Replace the bearings and inspect the other blade retention components.
	or	Grease leakage.	Refer to the problem Grease Leakage in this chapter.
D. Slight Vibration		Blades not tracking.	Refer to the problem Blades Not Tracking in this chapter.
	or	Static balance incorrect.	Refer to the Static and Dynamic Balance chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).
	or	Dynamic balance incorrect.	Refer to the Static and Dynamic Balance chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02.
	or	Blade wear.	For composite blades, refer to Hartzell Propeller Inc. Manual 135F (61-13-35).
	or	Grease leakage.	Refer to the problem Grease Leakage in this chapter.

Problem		Probable Cause	Remedy
E. Surging RPM or Torque		Excessive friction in the pitch change mechanism.	Refer to the problem 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 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 ring runout is excessive, causing vibration of the carbon block.	Reset the beta ring run-out to specified limits. Refer to the Assembly chapter in this manual.
	or	Beta system rigging.	Refer to the airframe manufacturer's instructions.



Areas of Leaking 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 openings in the hub for the beta system or between the pitch change rod plug 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 defective seal.
	or	Too much grease was used for lubrication, resulting in leakage from the beta rod holes.	Disassemble the propeller and remove excess grease from the hubs.



NOTE: Perform preload checks with blade in feather pitch.

TPI-496-15

Blade Preload Problems
Figure 1-2

Problem		Probable Cause	Remedy
H. End-Play of the Blade NOTE: The maximum permitted amount of movement is 0.25 inch (6.3 mm) Refer to Figure 1-2.		Buildup of manufacturing tolerances.	Disassemble the propeller and reset the preload.
	or	Blade retention bearing is worn.	Follow the Blade Retention Split Bearing Inspection and Replacement Procedures.
	or	Internal blade shim is worn.	Disassemble the propeller, remove the blade, and inspect the blade shim. Replace the worn blade shim.
I. Fore-and-Aft Movement of the Blade NOTE: The maximum permitted amount of movement is 0.25 inch (6.3) Refer to Figure 1-2.		Buildup of manufacturing tolerances.	Disassemble the propeller and reset the preload.
	or	Blade retention bearing is worn.	Follow Blade Retention Split Bearing Inspection and Replacement Procedures.
	or	Internal blade shim is worn.	Disassemble the propeller, remove the blade, and inspect the blade shim. Replace the worn blade shim.
J. In-and-Out Movement of the Blade NOTE: The maximum permitted amount of movement is 0.020 inch (0.05 mm) Refer to Figure 1-2.		Buildup of manufacturing tolerances.	Disassemble the propeller and reset the preload.
	or	Blade retention bearing is worn.	Follow Blade Retention Split Bearing Inspection and Replacement Procedures.
K. Excessive Radial Play of the Blade (backlash) NOTE: Radial play of ± 0.5 degree (1 degree total measured at the reference station) is permitted. Refer to Figure 1-2.		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.
L. Blades Not Tracking		Ground strike damage.	For a composite blade, refer to Hartzell Propeller Inc. Manual 135F (61-13-35).

2. Lightning Strike on Hub or Blade (Rev. 2)

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 Inc. Standard Practices Manual 202A (61-01-02) for lightning strike inspection criteria.

AUTOMATIC TEST REQUIREMENTS (NOT APPLICABLE) (Rev. 1)

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 Inc. propellers included in this manual.

(Blank Page)

DISASSEMBLY - CONTENTS

LIST OF FIGURES

1. Important Information (Rev. 3)

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

CAUTION: INSTRUCTIONS AND PROCEDURES IN THIS 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 Inc. owner's manual.

B. Record Serial Numbers/Blade Location Before Disasssembly

(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 Inc. 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 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 Inc. 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 Inc., refer to the applicable TC or STC holder's Instructions for Continued Airworthiness (ICA) for technical information about the applicable ice protection system.

2. Propeller Disassembly

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

CAUTION 2: DO NOT USE MORE THAN 200 PSI (13.8 BARS) WHEN ACTUATING PROPELLERS INCLUDED IN THIS MANUAL.

CAUTION 3: USE ENOUGH PRESSURE TO MAKE SURE THAT THE PROPELLER ACTUATES AGAINST EACH POSITIVE STOP.

A. General

(1) Put the propeller on the rotatable fixture TE125 on the assembly table TE129 for disassembly.

B. Hub Balance Weight Removal

(1) Remove the safety wire from the balance weight screws (1210).

(2) Remove and discard the balance weight screws (1210).

(3) Remove the balance weights (1220).

C. Counterweight Removal

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

3. Beta System Disassembly

A. ( )D3-( )( )( ) Propeller Models

(1) Remove/disassemble the beta feedback block (850) in accordance with Figure 3-1 and the following steps:

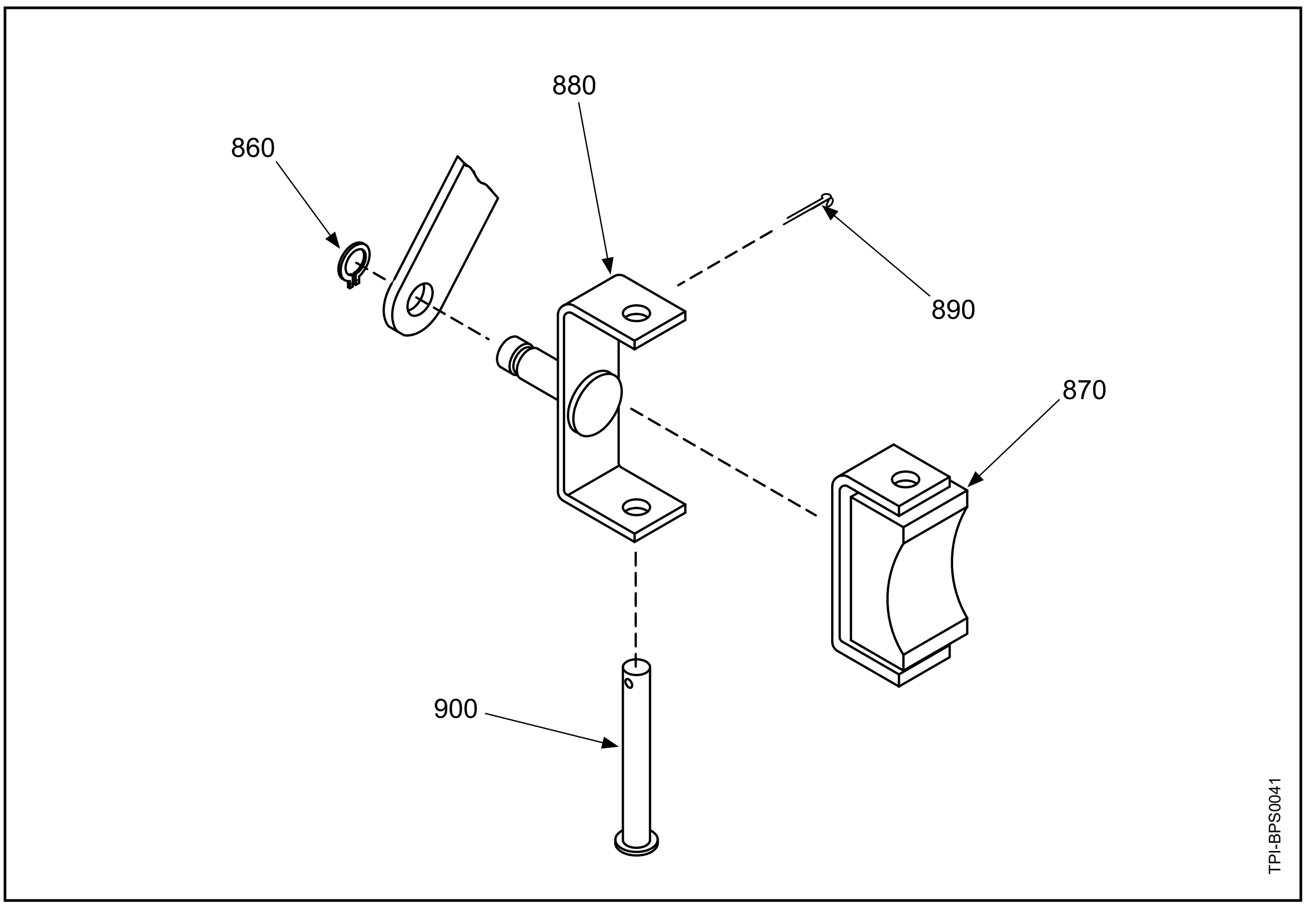
(a) Remove and discard the cotter pin (890) from the clevis pin (900).

(b) Remove and discard the clevis pin (900) from the yoke unit (880) and the carbon block unit (870).

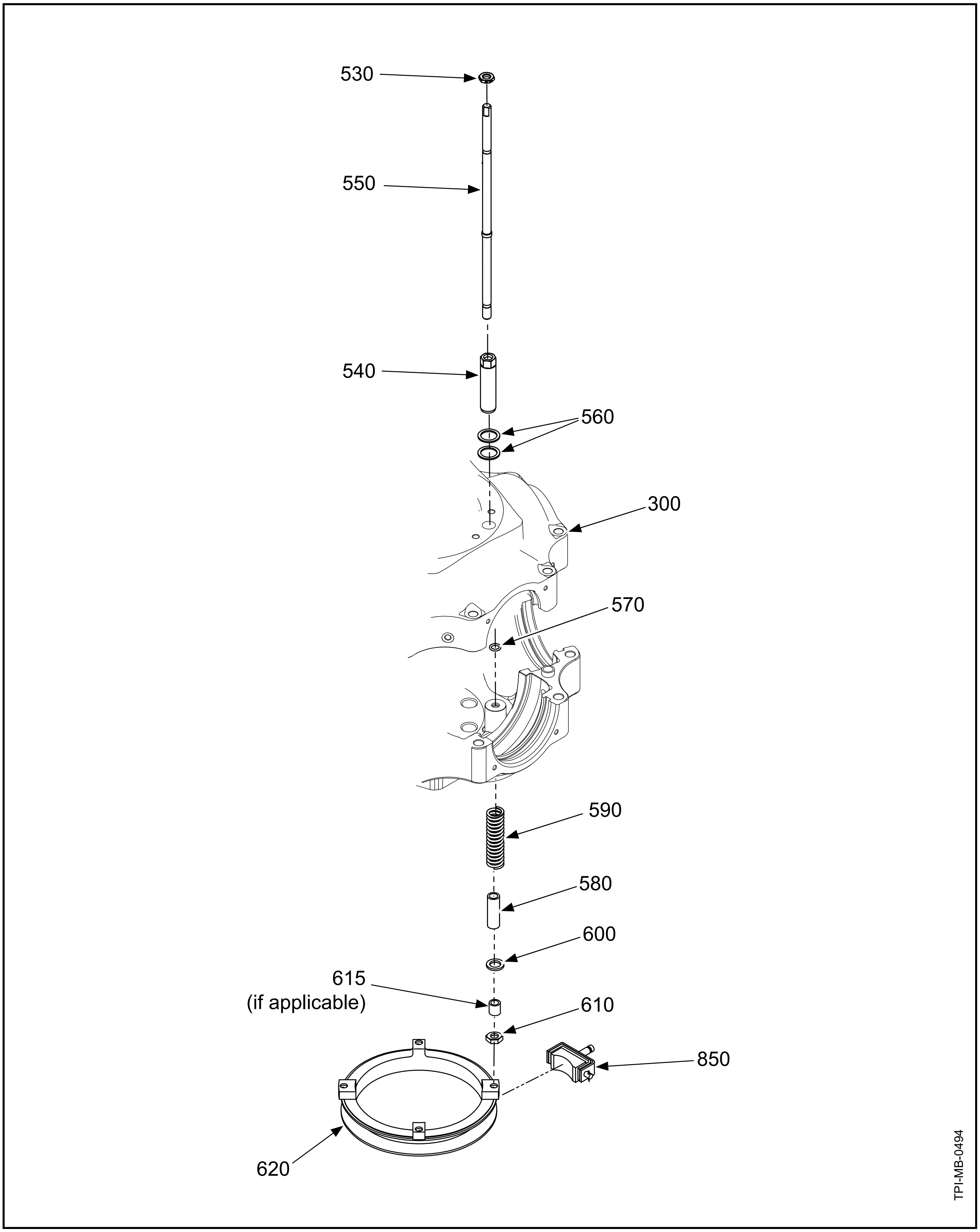
(c) Remove and discard the carbon block unit (870) from the yoke unit (880).

(d) For yoke unit inspection serviceable limits, refer to the Check chapter of this manual.

(e) For carbon block assembly repair procedures, refer to the Repair chapter of this manual.



A-3044 Beta Feedback Block Disassembly
Figure 3-1



Beta System Disassembly: ( )D3-( )( )( ) Propellers
Figure 3-2

(2) Disassemble the beta system in accordance with Figure 3-2 and the following steps:

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

(a) Using a 1/4 inch open-end wrench, engage the flats on the cylinder-end of the beta rods (550) and loosen the drilled thin hex nuts (530).

(b) Remove and discard the drilled thin hex nuts (530).

(c) Remove the threaded beta sleeve (540) from each beta rod (550).

(d) Loosen the beta ring drilled thin hex nuts (610).

CAUTION: TURN THE BETA RODS (550) ALTERNATELY TO AVOID DAMAGE TO THE BETA RING (620).

(e) Using a 1/4 inch open-end wrench on the flats on the cylinder-end of the beta rods (550), turn the beta rods out of the beta ring (620).

(f) Remove the beta ring (620) from the beta rods (550).

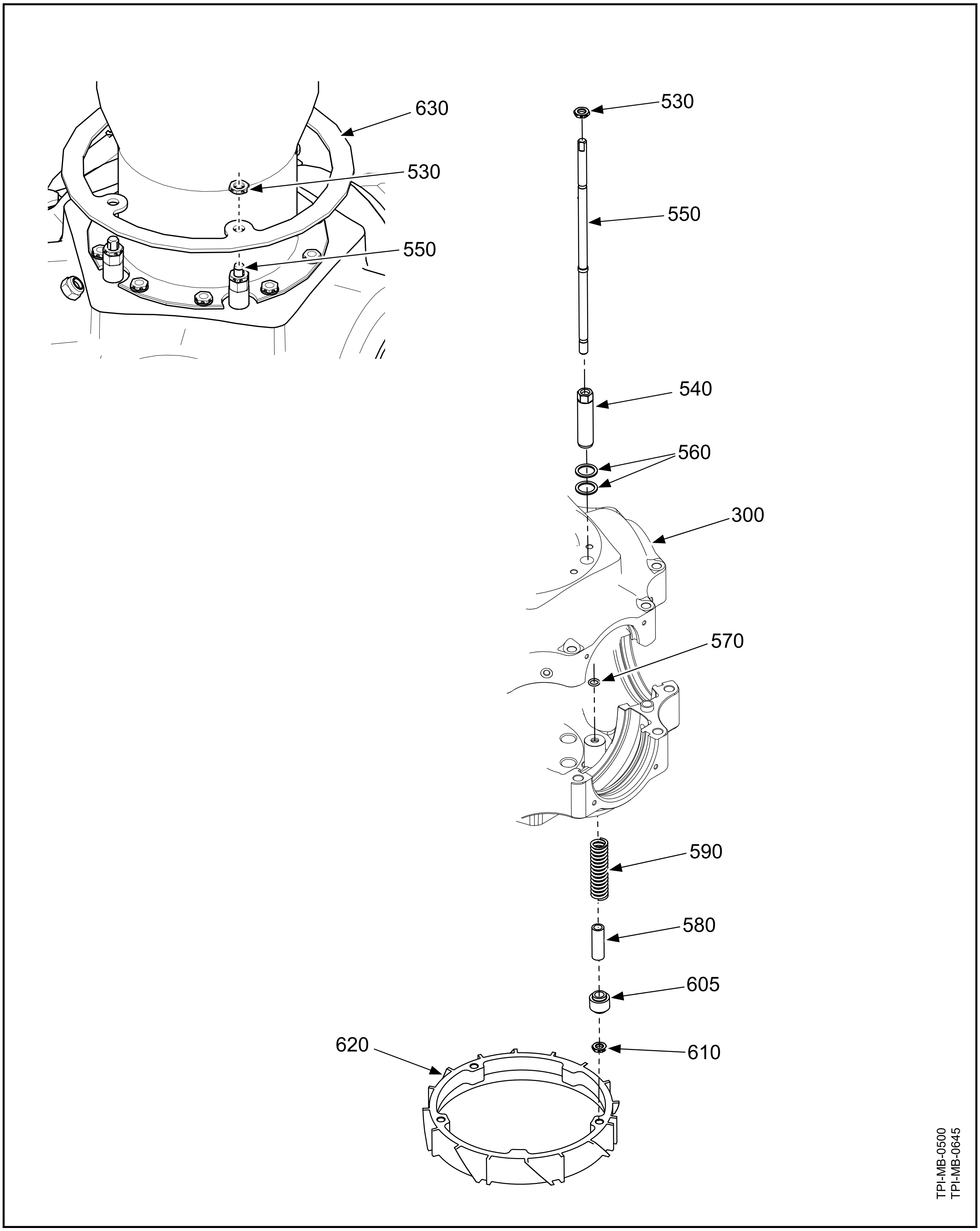
(g) Remove and discard the drilled thin hex nuts (610) and washers (600). If applicable, remove but do not discard the spacers (615).

1 Optionally, use the spring installation tool TE658 to compress the beta compression spring (590) before removing the hex nuts (610). Refer to the section, "Using the Spring Installation Tool" in this chapter.

(h) Remove and discard the beta compression spring (590) and beta sleeve (580).

(i) Remove the beta rods (550) from the hub unit (300) through the cylinder-side of the hub unit.

(j) Remove and discard the backup rings (560) from each beta rod hole in the cylinder-side of the hub (300).



Beta System Disassembly: ( )D31-( )( )( ) Propellers
Figure 3-3

B. ( )D31-( )( )( ) Propellers Models

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

(1) Disassemble the beta system in accordance with Figure 3-3 and the following steps:

(a) Remove and discard three drilled thin hex nuts (530), then lift the beta rod support ring (630) off of the three beta rods (550).

NOTE: The beta rod support ring (630) will remain in place until the cylinder/spring pack assembly is removed.

(b) Using a 1/4 inch open-end wrench, engage the flats on the cylinder-end of the beta rods (550) and loosen the drilled thin hex nuts (530).

(c) Remove and discard the drilled thin hex nuts (530).

(d) Remove the threaded beta sleeve (540) from each beta rod (550).

(e) Loosen the drilled thin hex nuts (610).

CAUTION: TURN THE BETA RODS (550) ALTERNATELY TO PREVENT DAMAGE TO THE BETA RING (620).

(f) Using a 1/4 inch open-end wrench on the flats on the cylinder-end of the beta rods (550), turn the beta rods out of the beta ring (620).

(g) Remove the beta ring (620) from the beta rods (550).

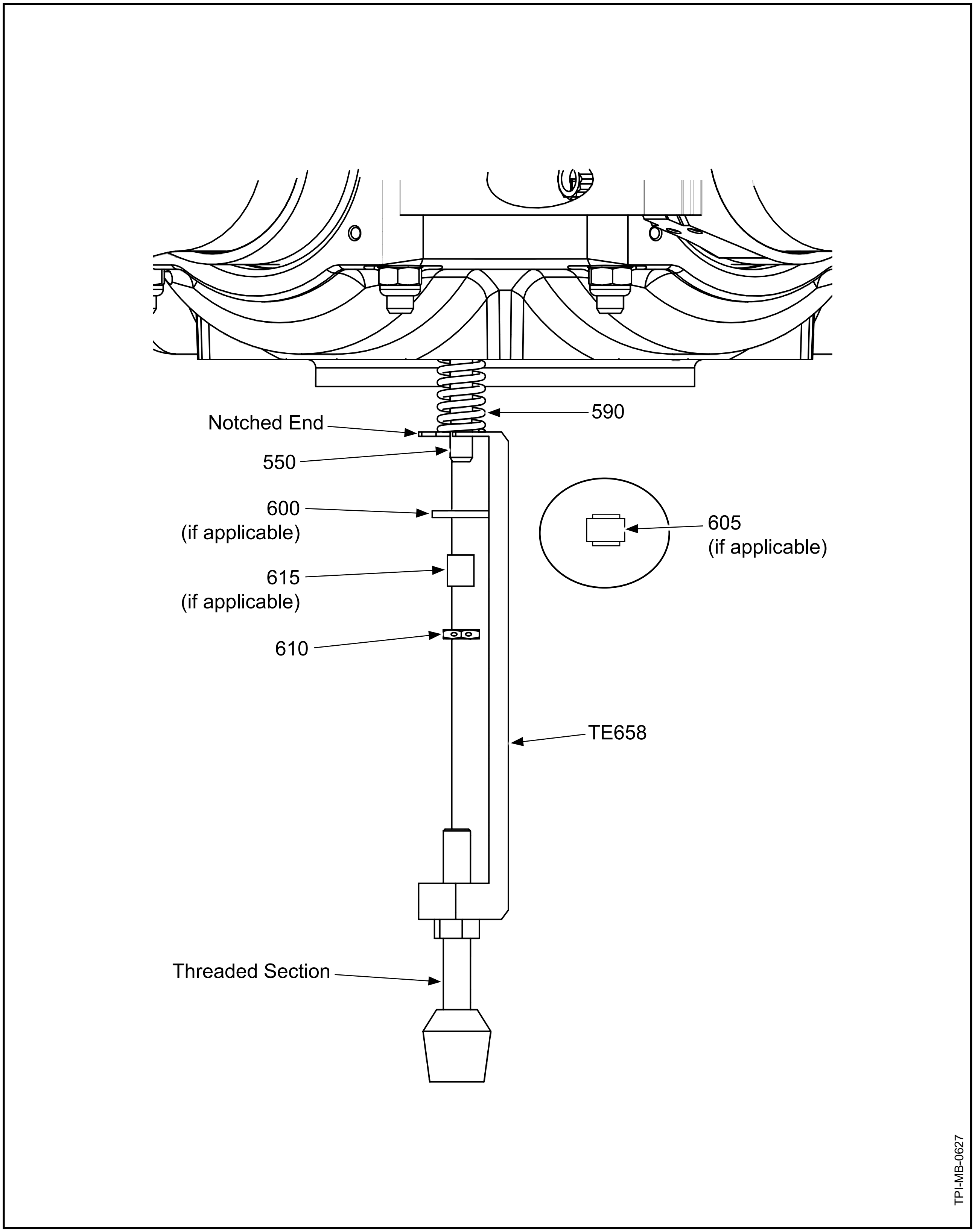
(h) Remove and discard the drilled thin hex nuts (610), then remove but do not discard the spring guides (605).

1 Optionally, use the spring installation tool TE658 to compress the beta compression spring (590) before removing the hex nuts (610). Refer to the section, "Using the Spring Installation Tool" in this chapter.

(i) Remove and discard the beta compression spring (590) and the beta sleeve (580).

(j) Remove the beta rods (550) from the hub unit (300) through the cylinder-side of the hub unit.

(k) Remove and discard the backup rings (560) from each beta rod hole in the cylinder-side of the hub (300).



Spring Installation Tool
Figure 3-3.1

C. Using the Spring Installation Tool

(1) Insert the notched end of the spring installation tool TE658 onto the beta rod (550) between the beta compression spring (590) and the spacer (615), washer (600), or spring guide (605) as applicable. Refer to Figure 3-3.1.

(2) Adjust the threaded section of the spring installation tool TE658 until it compresses the beta compression spring (590).

(3) Remove and discard the drilled thin hex nuts (610).

(4) Remove the spring installation tool TE658 from the beta rod, then complete the disassembly steps in the applicable procedure.

4. Hydraulic System and Pitch Adjustment Unit Disassembly

   A. ( )D3( )-( )( )A(1,2)(Y) Propeller Models

      (1) Start Lock Disassembly (applicable models only):
      Refer to Figure 3-4

         (a) Remove and discard the cotter pin (56) and clevis pin (57).

         (b) Remove the compression spring (51) and start lock pin (53).

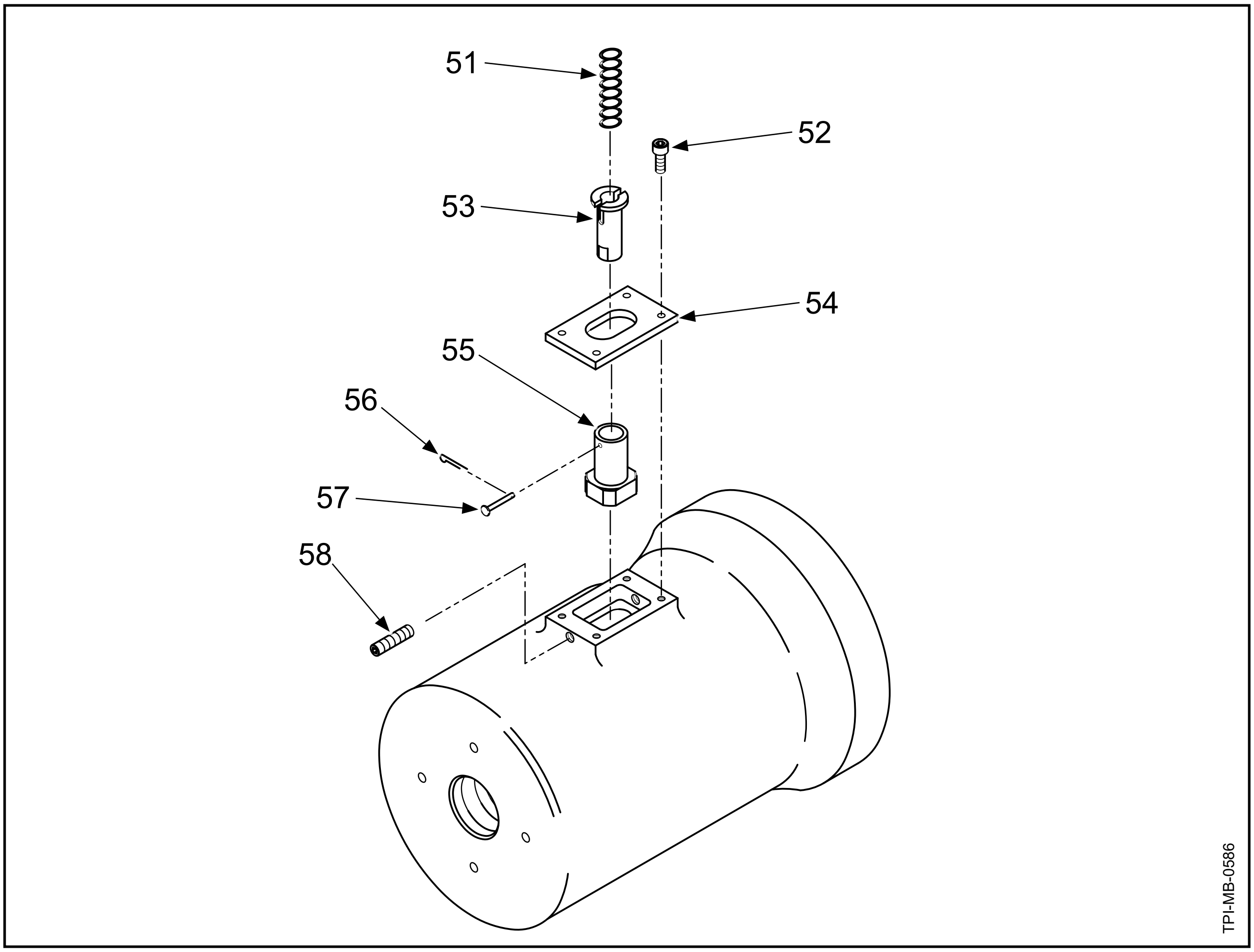
            1 Discard the compression spring (51).

         (c) Remove and discard four screws (52), then remove the start lock housing cover (54).

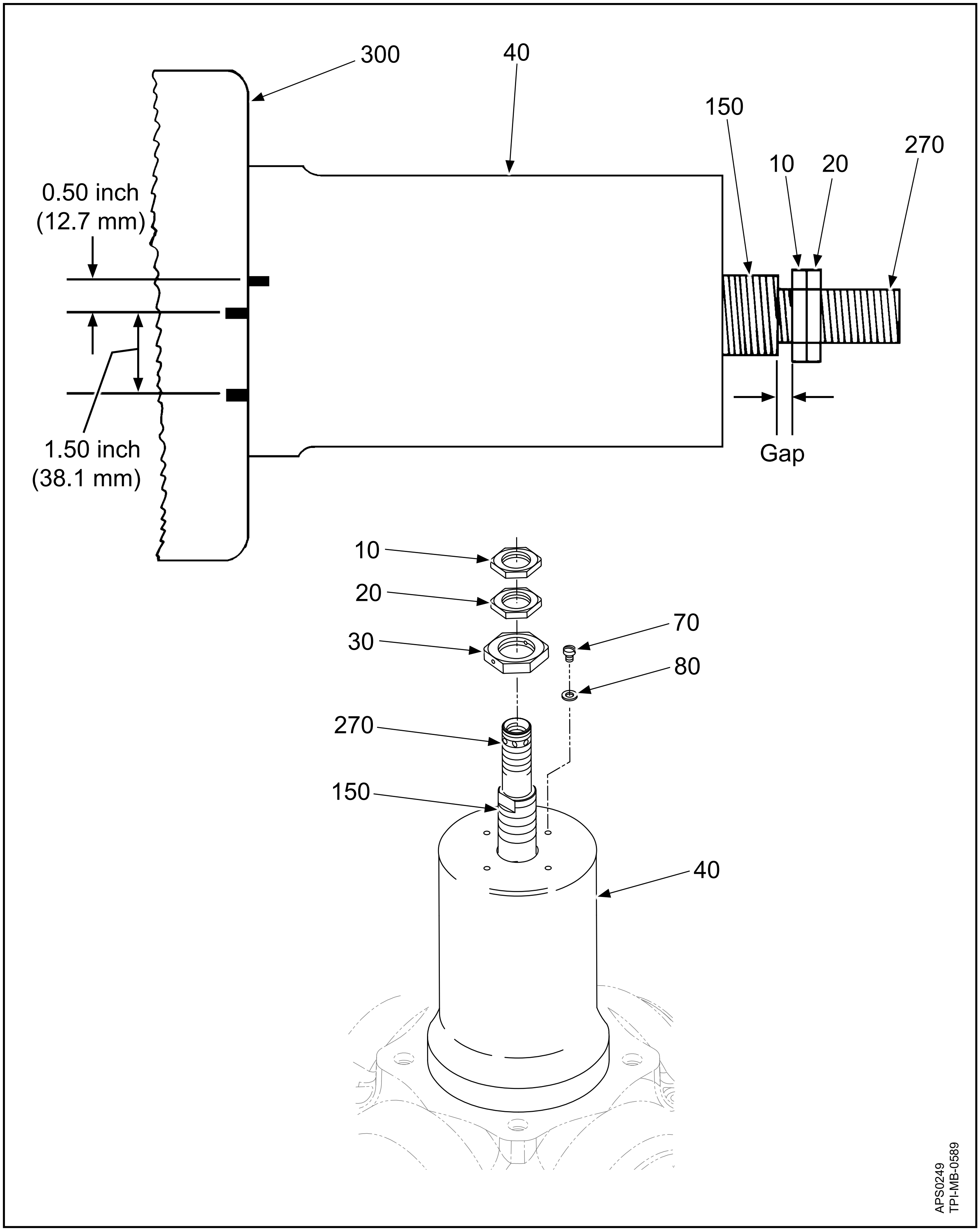
         (d) Remove the start lock housing (55).

         (e) Remove and discard two set screws (58).

         (f) Repeat these steps for the start lock on the other side of the cylinder.



Start Lock Disassembly
Figure 3-4



Cylinder Removal
Figure 3-5

(2) Remove the cylinder (40) in accordance with Figure 3-5 and the following steps:

(a) Apply 200 psi (13.8 bar) air or oil pressure to the propeller to move the drilled thin hex nuts (10, 20) off of the reverse adjust sleeve unit (150) as shown in Figure 3-5.

(b) Remove and discard the safety wire from the drilled thin hex nuts (10, 20) on the pitch change rod (270).

(c) Separate the drilled thin hex nuts (10, 20) from each other, by rotating in opposite directions.

(d) Remove the drilled thin hex nuts (10, 20) from the pitch change rod (270).

(e) Release the air (or oil) 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.

(f) Remove and discard the safety wire between the fillister head screw (70) on the cylinder (40) and drilled thin hex nut (30).

(g) Remove and discard the fillister head screw (70) and the washer (80) from the cylinder (40).

(h) Loosen and remove the drilled thin hex nut (30) from the reverse adjust sleeve unit (150).

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.

(i) Turn the reverse adjust sleeve unit (150) counterclockwise with a 1-3/16 inch open-end wrench on the flats to fully compress the feathering compression spring (110).

NOTE: The feathering compression spring (110) will compress between the forward spring retainer (100) and the plastic spring guide (120).

(j) Attach a cylinder wrench TE153 to the top of the cylinder (40). Refer to Figure 3-6.

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

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 AREA DURING THE DISASSEMBLY PROCEDURES.

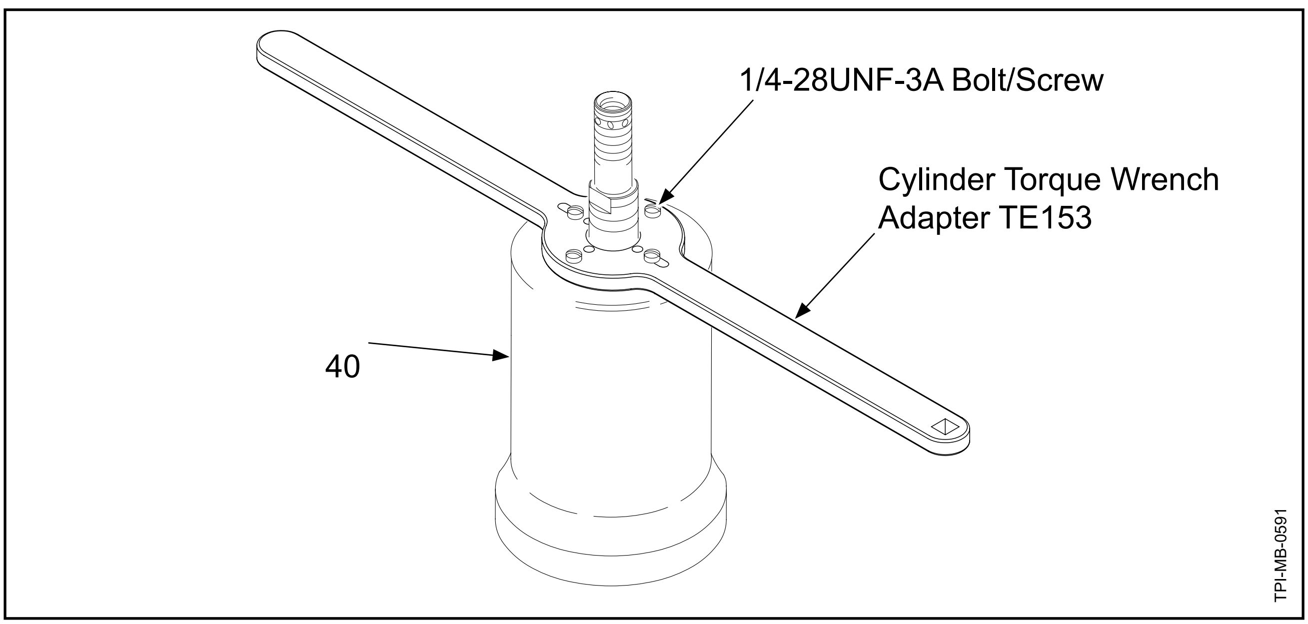
CAUTION: DO NOT DAMAGE THE CYLINDER THREADS WHEN REMOVING THE CYLINDER (40) FROM THE HUB (300).

(k) Removing the cylinder (40) from the hub (300).

1 Using permanent ink, make a mark on the lower end of the cylinder (40), then make a mark on the hub (300) 0.50 inch (12.7 mm) counterclockwise from the mark on the cylinder.

a Make another mark on the hub 1.50 inches (38.1 mm) counterclockwise from the first hub marking.

2 Using a breaker bar, turn the cylinder (40) counterclockwise 0.50 inch (12.7 mm) until the mark on the cylinder lines up with the first mark on the hub (300).



Cylinder Torque Wrench Adapter TE153
Figure 3-6

CAUTION 1: ACTUAL TORQUE SETTINGS MUST BE CALCULATED TO INCLUDE THE LENGTH OF THE CYLINDER WRENCH USING THE TORQUE VALUES 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-LB (319 N•m).

3 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 (300).

a 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.

4 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 IS NOT GREATER THAN 55 FT-LBS (75 N•m).

5 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 from the hub (300).

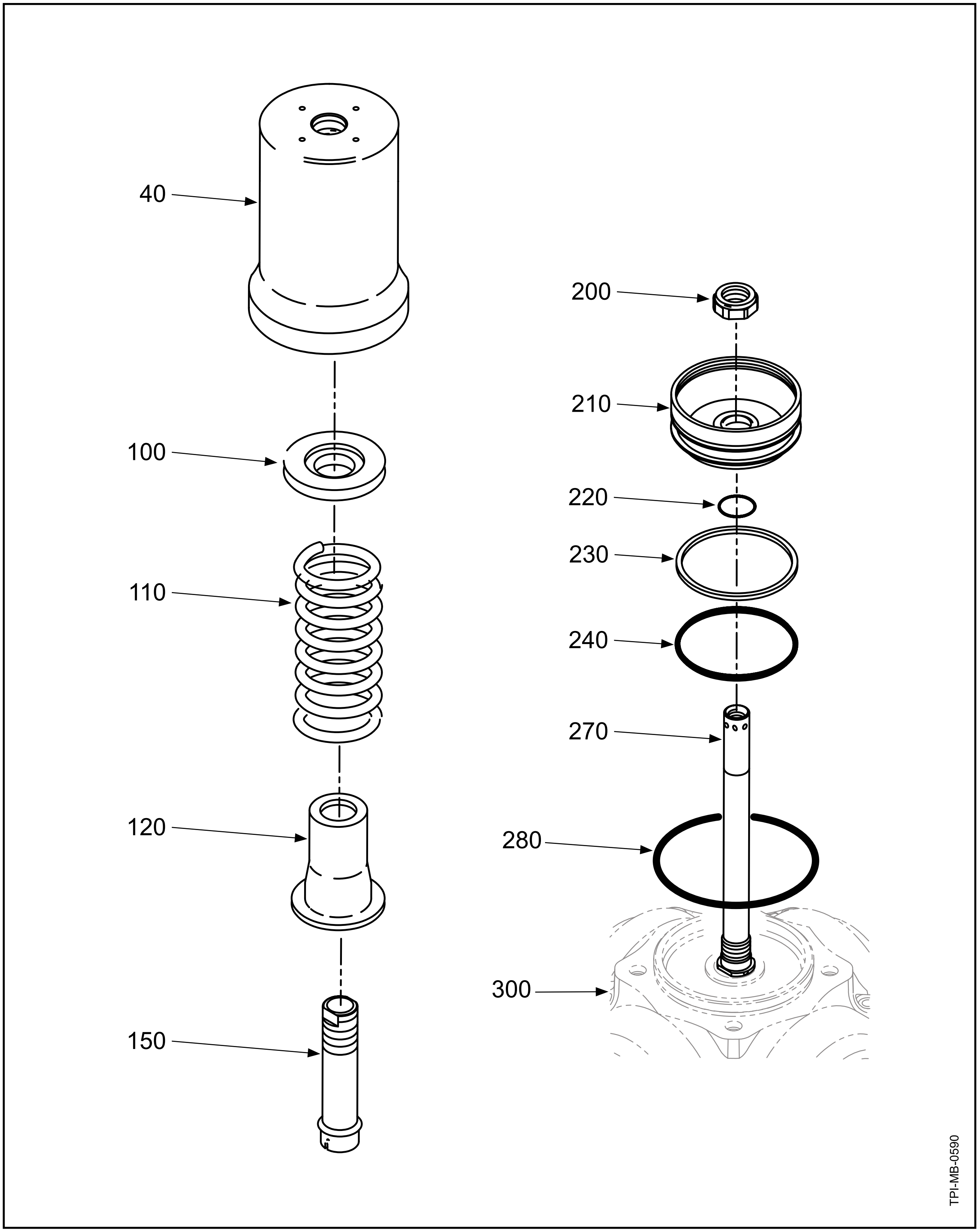
a If the torque required to remove the cylinder is greater than 55 Ft-Lbs (75 N•m) actual torque, refer to the section, "Cylinder Removal" in the Repair chapter of this manual.

(3) Lift the cylinder (40) and the retained feathering compression spring (110) off the pitch change rod (270).

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

(5) Rotate the reverse adjust sleeve unit (150) clockwise to extend the feathering compression spring (110) and unthread the reverse adjust sleeve unit (150) from the cylinder (40).

NOTE: The feathering compression spring (110) will fully extend before the reverse adjust sleeve unit (150) unthreads from the cylinder (40).



Compression Spring/Piston Removal
Figure 3-7

(6) Remove the reverse adjust sleeve unit (150), plastic spring guide (120), feathering compression spring (110), and forward spring retainer (100) from the cylinder (40). Refer to Figure 3-7.

(7) Using a modified deep well socket TE120 on the self-locking hex nut (200) and a modified deep well socket TE120 with a 1-3/8 inch crowfoot wrench, remove the pitch change rod (270), and piston (210) or piston unit (205), from the fork (500). Refer to Figure 3-7.

(a) If the self-locking hex nut (200) comes loose from the pitch change rod (270) and piston (210) or piston unit (205), before the pitch change rod comes loose from the fork (500), perform the following procedures:

1 Remove and discard the self-locking hex nut (200) from the pitch change rod (270).

2 Remove the piston (210) or piston unit (205), from the pitch change rod (270).

3 Using a 1-5/16 inch wrench on the wrenching flats, unthread and remove the pitch change rod (270) from the fork (500).

(b) If the pitch change rod (270) comes loose from the fork (500) before the self-locking hex nut (200) comes loose, perform the following procedures:

1 Remove the pitch change rod (270) with the self-locking hex nut (200) and piston (210) or piston unit (205), from the fork (500).

2 Insert the pitch change rod (270) through the piston unit installation socket TE228, fitting the socket over the shoulder flats on the pitch change rod (270).

3 Put the modified deep well socket TE120 on the self-locking hex nut (200).

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 (200) from the pitch change rod (270).

6 Remove the piston (210) from the pitch change rod (270).

(8) Remove and discard the piston dust seal (230), piston OD O-ring (240), and piston ID O-ring (220).

(9) Remove and discard the cylinder mounting O-ring (280) from the shoulder of the cylinder-side half of the hub (300).

(10) Remove and discard the hub clamping nuts (460) and the washers (450).

(11) Remove the hub clamping bolts (430) from the hub (300).

NOTE: A soft mallet may be used to drive the bolts (430) out of the hub (300).

(12) Remove and discard the washers (440) if applicable.

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

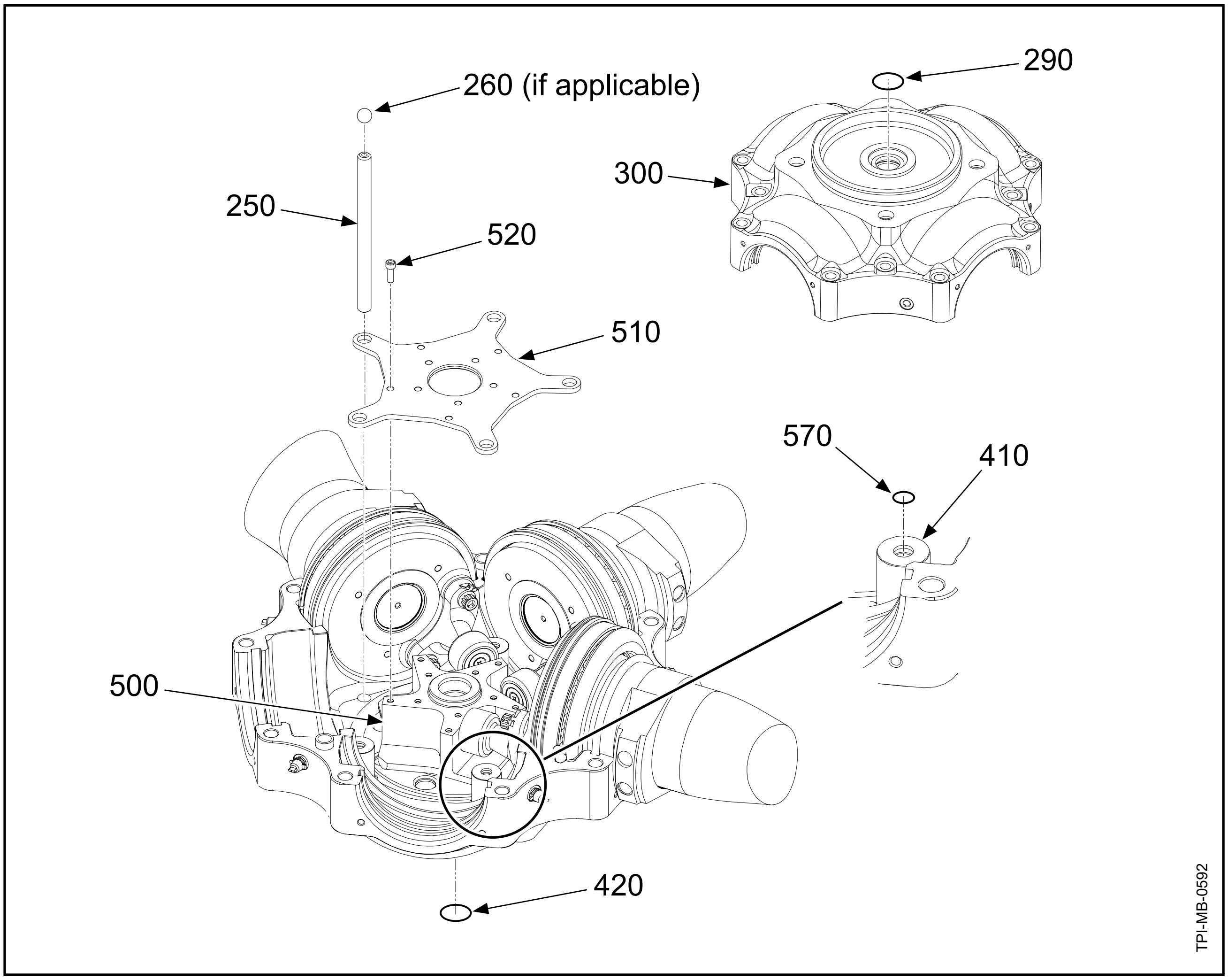
(13) Separate the hub (300) in accordance with the following steps:

(a) Loosen the sealant between the hub halves by lightly tapping or lifting the end of each blade.

CAUTION: DO NOT USE A SCREWDRIVER OR OTHER SHARP TOOL TO PRY APART THE HALVES OF THE HUB (300).

(b) Using a plastic wedge TE138, or similar tool, gently pry apart the halves of the hub (300).

(c) Remove the cylinder-side half of the hub (300).



Removing the Blades and Fork
Figure 3-8

(14) Remove the blades and the fork (500) in accordance with Figure 3-8 and the following steps:

(a) Remove and discard the O-ring (290) from the cylinder-side hub half.

(b) Remove and discard each anti-rotation rod spacer (260).

(c) Remove each anti-rotation rod (250).

(d) If applicable, remove and discard the screws (520) that attach the fork plate (510) or beta pickup (515) to the fork (500).

1 Remove the fork plate (510) or beta pickup (515).

(e) Using blade clamp TE25, if desired, remove each blade from the hub socket and set aside for disassembly.

(f) Remove the fork (500) from the hub (300).

(g) Remove and discard the O-ring (420) from the engine-side hub half.

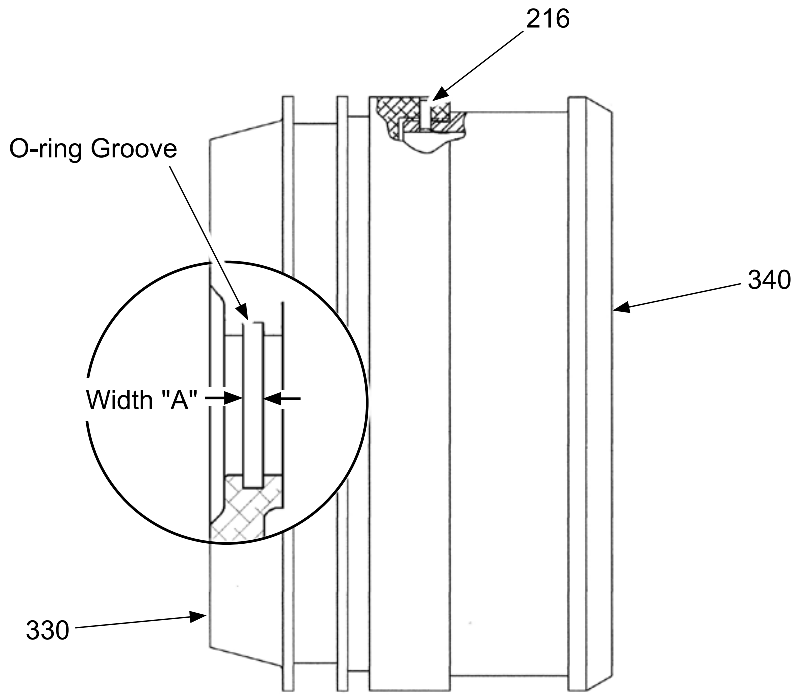
(h) Remove and discard the O-ring (570) from each beta spring retainer (410).

(15) 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.

(16) Remove the engine-side half of the hub (300) from the rotatable fixture.

(17) Remove the spinner bulkhead and beta ring (620) from the rotatable fixture bench.



C-497 Piston Unit
Figure 3-9

B. C-497 Piston Unit Disassembly (applicable models only)

(1) Measure and make a record of the O-ring groove width "A" on the piston (210). Refer to Figure 3-9.

(a) This measurement will be required to complete this procedure.

(2) Remove and discard the spring pin (216) from the piston unit (210). Refer to Figure 3-9.

(3) Put the clamp base TE618 in a vise. Refer to Figure 3-10.

(4) Attach the piston unit (205) to the clamp base TE618.

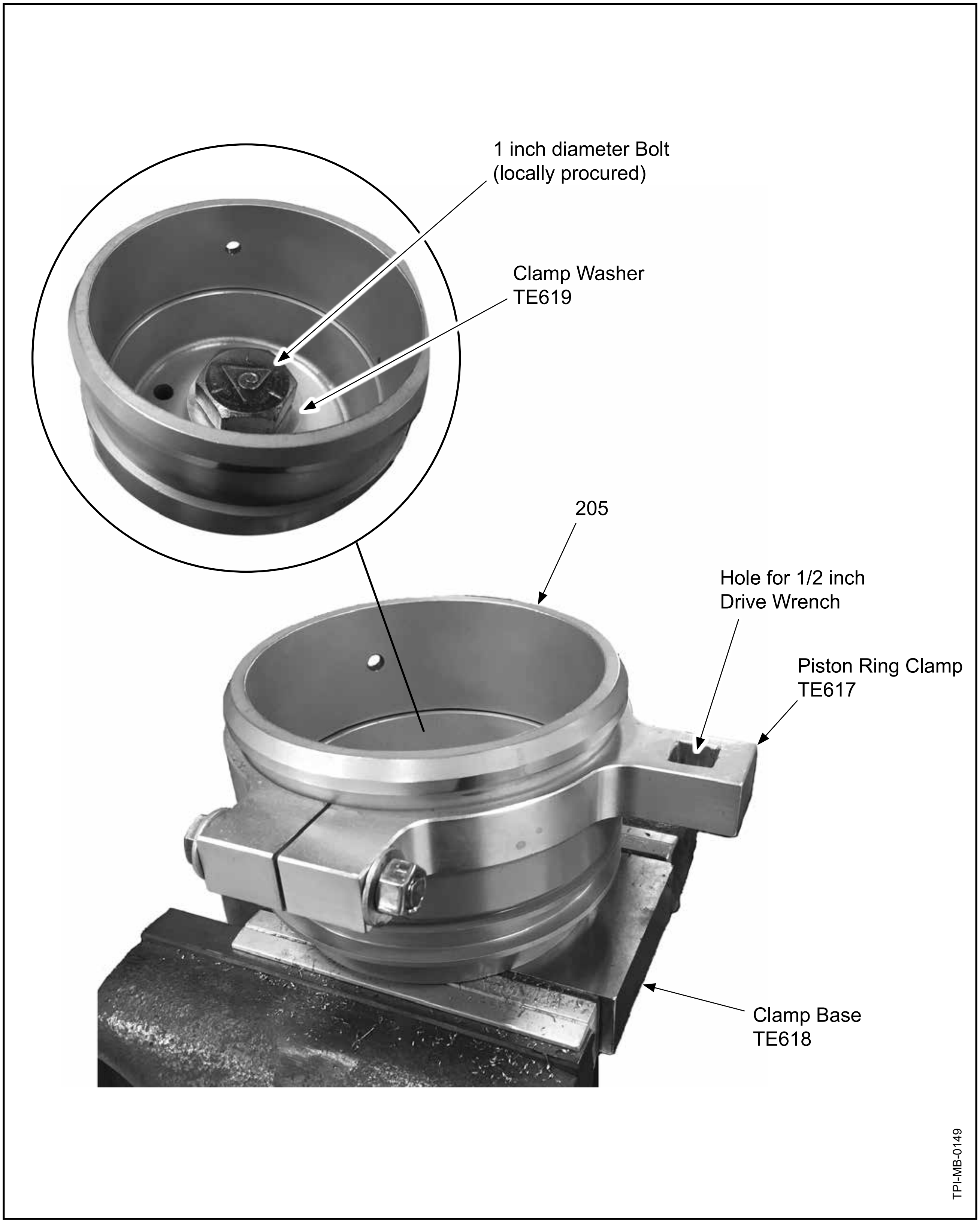
(a) Install the clamp washer TE619 onto a locally procured 1 inch (25.4 mm) diameter bolt.

(b) Put the bolt with the clamp washer TE619 through the piston unit (205) and the clamp base TE618, as shown in Figure 3-10.

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

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 (210).

(d) Tighten the nut to prevent the piston unit (205) from rotating on the clamp base TE618.



C-497 Piston Unit Disassembly
Figure 3-10

(5) Install the piston ring clamp TE617 on the piston unit (205), as shown in Figure 3-10.

(6) Remove the clamp base TE618 and the piston unit (205) with the piston ring clamp TE617 installed, from the vise.

CAUTION: DO NOT HEAT THE PISTON UNIT (205) TO MORE THAN 180°F (82°C).

(7) Heat the piston unit (205) 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 3-10.

(a) While the piston unit (205) 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 (215) from the piston (210).

1 A breaker bar or adapter can be used when separating the start lock piston ring (215) from the piston (210).

2 If the piston unit (205) cannot be separated, retire the piston unit (205) in accordance with the Part Retirement chapter of Hartzell Propeller Inc. 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 (215).

(10) Remove the clamp base TE618 from the piston (210).

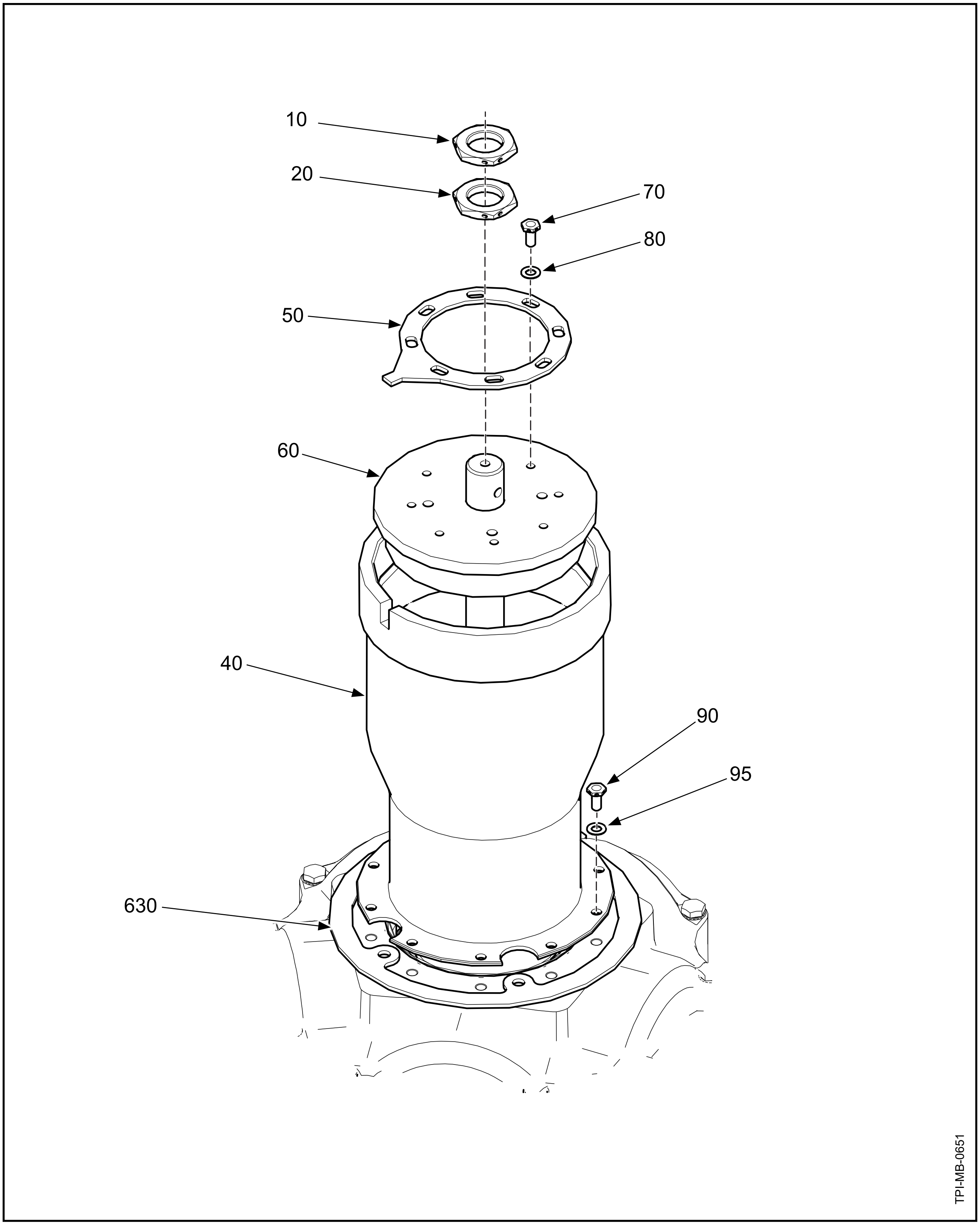
(11) Measure and make a record of the O-ring groove width "A" on the piston (210). Refer to Figure 3-9.

(12) Subtract the width "A" measured in step (11) from the width "A" measured in step (1) in this procedure.

(a) If the difference between the two width "A" measurements is greater than 0.002 inch (0.05 mm), retire the piston (210) in accordance with the Part Retirement chapter of Hartzell Propeller Inc. 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 (13) in this procedure.

(13) Using solvent CM106 MEK or CM219 MPK, clean the start lock piston ring (215) and the piston (210) to remove any remaining adhesive.



Cylinder/Spring Pack Assembly Removal
Figure 3-11

C. ( )D3( )-( )( )B1 Propeller Models

(1) Remove the the anti-rotation plate (50) and the pitch stop plate in accordance with the following steps and Figure 3-11.

(a) Apply sufficient air pressure to the propeller assembly to lift the feather adjust nuts (10, 20) away from the pitch stop plate (60).

(b) Remove the feather adjust nuts (10, 20) from the pitch change rod (270).

(c) Release the air pressure from the propeller.

(d) Remove and discard the bolts (70) and washers (80) from the anti-rotation plate (50).

(e) Remove the anti-rotation plate (50).

(f) Using the applicable screws, attach the torque wrench adapter TE153 to the pitch stop plate (60).

(g) Using the torque wrench adapter TE153, turn and remove the pitch stop plate (60).

(h) Remove and discard the bolts (90) and the washers (95).

WARNING: THE FEATHERING SPRING ASSEMBLY IS PRELOADED TO APPROXIMATELY 800 POUNDS (362.4 KG) FORCE. FAILURE TO FULLY COMPRESS THE FEATHERING COMPRESSION SPRING INTO THE CYLINDER BEFORE CYLINDER REMOVAL COULD RESULT IN INJURY OR DEATH.

(2) Using a crowfoot wrench with an extension on the piston retainer nut (200), loosen the pitch change rod/cylinder assembly from the fork (500).

(a) Rotate the cylinder (40) counterclockwise by hand until the pitch change rod/cylinder assembly disengages from the pitch change fork (500).

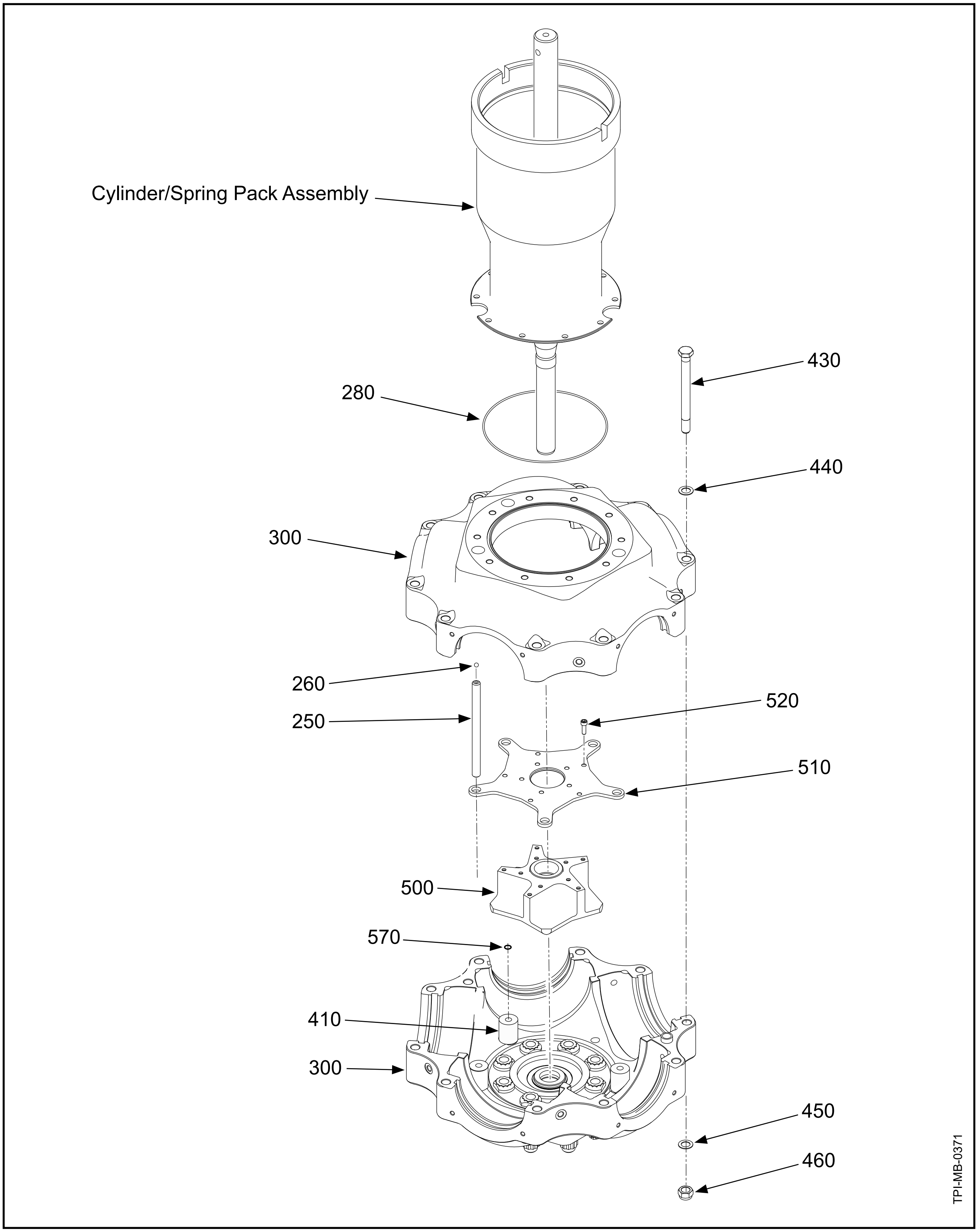
(b) If only the piston nut (200) turns, instead of the entire pitch change rod/cylinder assembly, temporarily reinstall and jam together the feather adjust nuts (10, 20).

1 After torquing the feather adjust nuts (10, 20) together, use a wrench on the inboard feather adjust nut (20) to loosen the pitch change rod/cylinder assembly from the fork (500).

(3) Carefully lift out the pitch change rod (270) with the cylinder (40) and the feathering spring assembly attached.

(a) Set aside the cylinder/spring pack assembly for later disassembly.

(b) Remove the beta rod support ring (630).



Fork Removal
Figure 3-12

(4) Disassemble the hub (300) and remove the fork (500) in accordance with the following steps and Figure 3-12.

(a) Remove and discard the cylinder mounting O-ring (280) from the hub (300).

(b) Remove and discard the self-locking hex nuts (460) and the washers (450).

(c) Remove the hex head bolts (430) that clamp together the halves of the hub (300).

NOTE: A soft mallet can be used to drive the hex head bolts (430) out of the halves of the hub (300).

(d) Remove and discard the washers (440).

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

(e) Separate the halves of the hub (300) by lightly tapping or lifting the end of one blade to loosen the halves of the hub (300).

(f) Continue to lightly tap or lift each blade until the halves of the hub (300) separate.

CAUTION: DO NOT USE A SCREWDRIVER OR OTHER SHARP TOOL TO PRY APART THE HALVES OF THE HUB (300).

(g) Using a plastic wedge TE138 or equivalent, carefully pry apart the halves of the hub (300).

(h) Remove the cylinder-side half of the hub (300).

(i) Remove and discard the beta spring retainer O-ring (570) from each beta spring retainer (410).

(j) Remove and discard each anti-rotation rod spacer (260).

(k) Remove each anti-rotation rod (250).

(l) If applicable, remove and discard the screws (520) that attach the fork plate (510) to the fork (500).

1 Remove the fork plate (510).

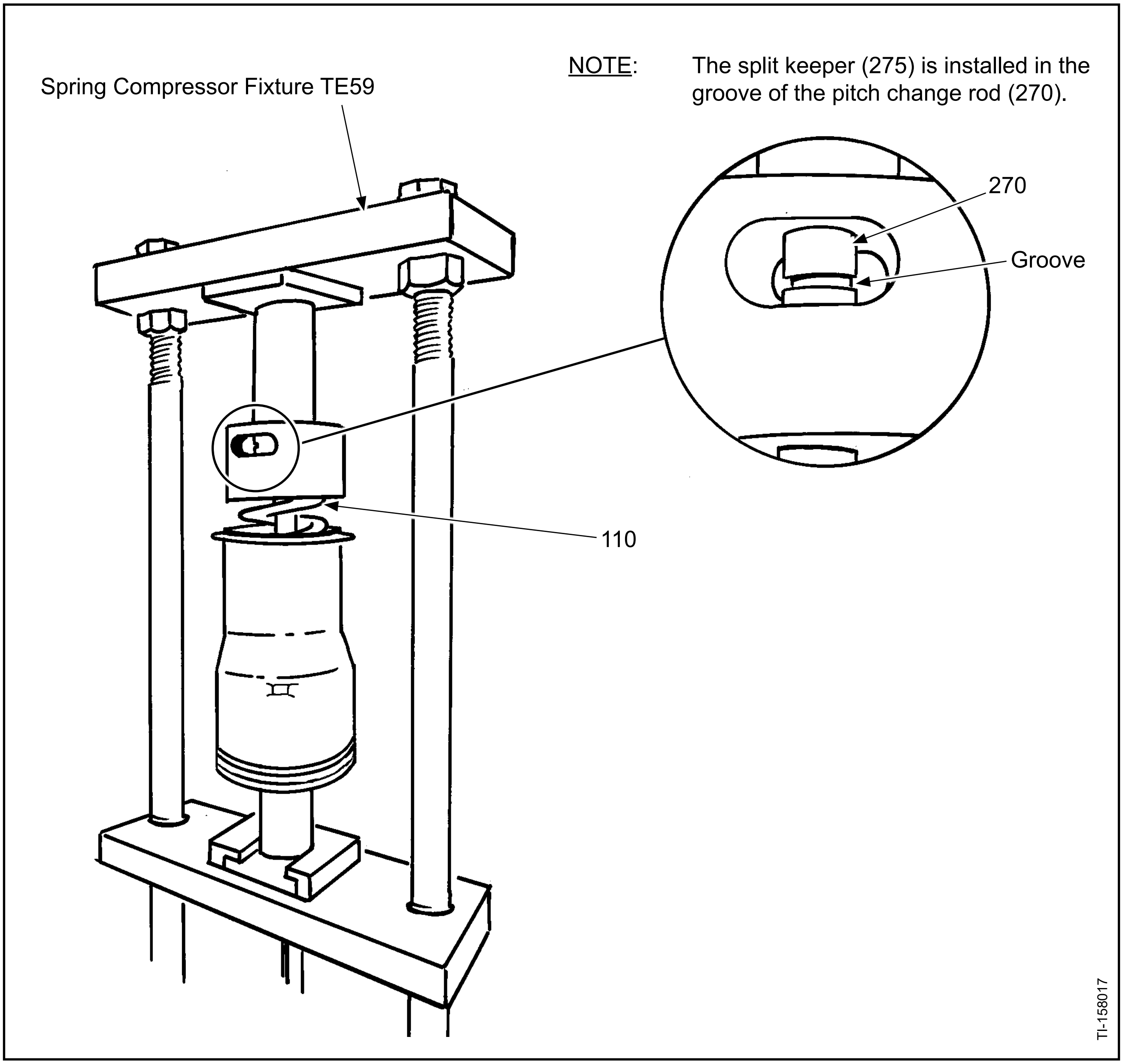
(m) Using blade clamp TE25 if necessary, remove each blade from the hub socket and set aside for later disassembly.

(n) Remove the fork (500) from the hub (300).

(5) Remove and discard the spinner bulkhead mounting bolts and washers to release the spinner bulkhead from the engine-side of the hub.

(6) Remove the engine-side half of the hub (300) from the rotatable fixture.

(7) Remove the spinner bulkhead and beta ring (620) from the rotatable fixture bench.



Compressing the Cylinder/Spring Pack
Figure 3-13

5. Cylinder/Spring Pack Disassembly

A. ( )D3( )-( )( )( )B1 Propeller Models Only

WARNING: USE EXTREME CAUTION WHEN PERFORMING THIS PROCEDURE. THE FEATHERING COMPRESSION SPRING ASSEMBLY IS LOADED TO APPROXIMATELY 800 POUNDS (363 kg) FORCE. MAKE SURE OF THE SAFETY OF PERSONNEL IN THE VICINITY DURING THE DISASSEMBLY PROCEDURES.

(1) Disassemble the feathering compression spring components.

(a) Put the cylinder/spring pack in the spring compressor fixture TE59, or equivalent as shown in Figure 3-13.

(b) Compress the cylinder/spring pack until there is access to the split keeper (275) that is installed in the groove of the pitch change rod (270). Refer to Figure 3-13.

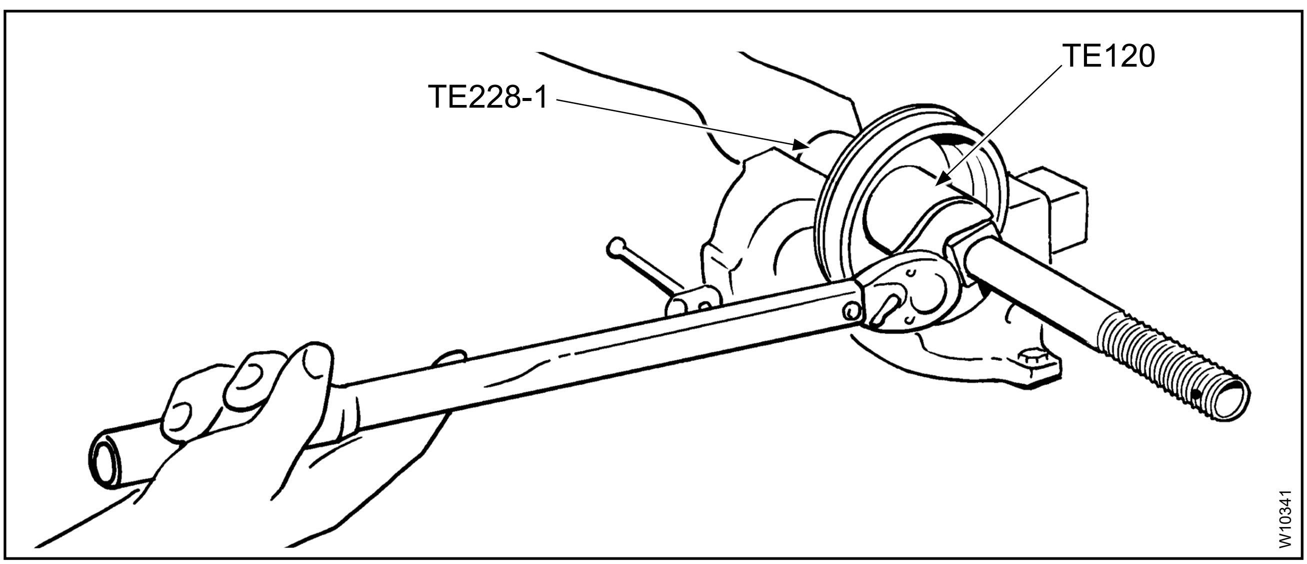
(c) Remove and discard the two halves of the split keeper (275).

(d) Permit the cylinder/spring pack to slowly decompress.

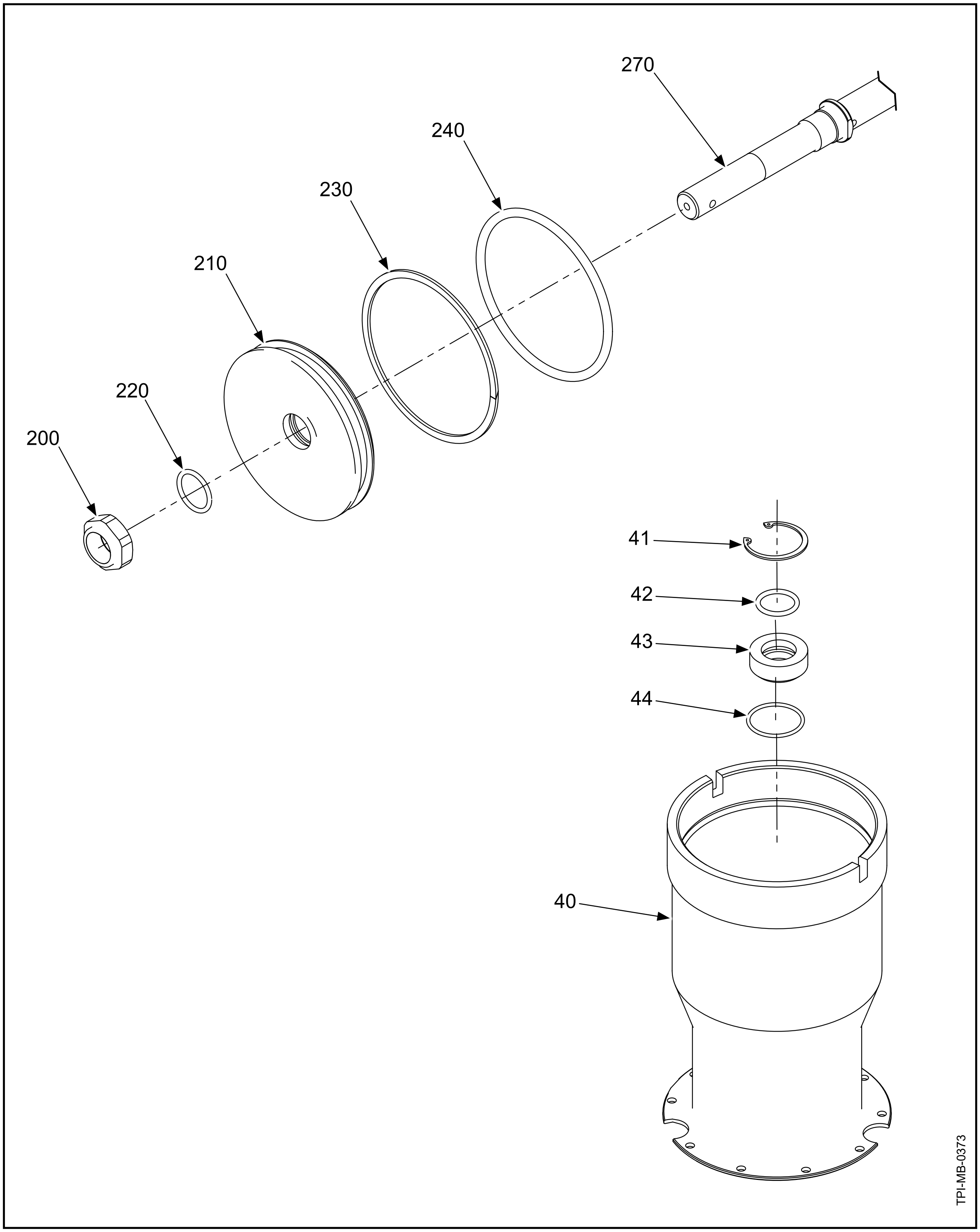
(e) Remove the cylinder/spring pack from the spring compressor fixture TE59, or equivalent.

(f) Remove the rear spring retainer (120), the feathering compression spring (110), and spring seat (100).

(g) Remove the pitch change rod/piston assembly from the cylinder (40).



Removing the Piston Nut
Figure 3-14



Piston/Cylinder Components
Figure 3-15

(2) Using a piston installation socket TE228-1, a modified deep well socket TE120, and an applicable crowfoot adapter, remove and discard the large pitch change rod nut (200) from the pitch change rod/piston assembly. Refer to Figure 3-14 and Figure 3-15.

(3) Remove the piston (210) components in accordance with the following steps and Figure 3-15.

(a) Remove the piston (210) from the pitch change rod (270).

(b) Remove and discard the dust seal (230) and the O-ring (240) from the OD of the piston (210).

(c) Remove and discard the O-ring (220) from the ID of the piston (210).

(4) Remove the cylinder bushing (43) in accordance with the following steps and Figure 3-15:

(a) Remove and discard the O-ring (42) from the cylinder bushing (43).

(b) Remove and discard the internal retaining ring (41) from the cylinder bushing (43).

(c) Press the cylinder bushing (43) out of the cylinder (40).

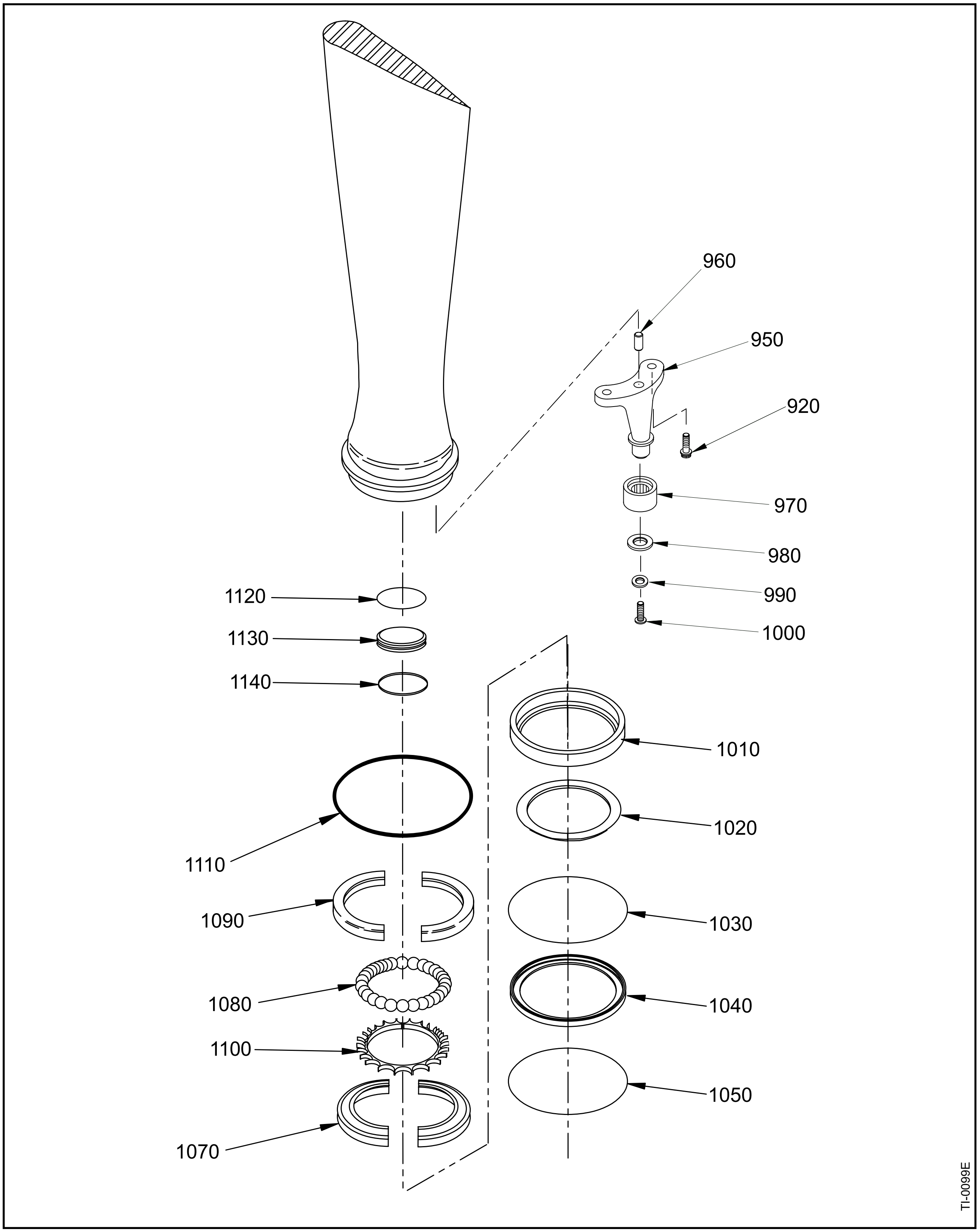
(d) Remove and discard the O-ring (44) from the cylinder bushing (43).

6. <u>Hub Disassembly</u>

A. All Propeller Models

(1) Remove components of the hub unit/assembly (295/300) in accordance with Appendix A in the Aluminum Hub Overhaul chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

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



Blade Retention Parts
Figure 3-16

7. Blade Disassembly

A. All Propeller Models (Refer to Figure 3-16)

(1) Remove and discard the blade O-ring (1110).

(2) Remove the hub-side blade bearing race (1090).

(3) Remove and discard the bearing balls (1080).

(4) Remove and discard the ball spacer (1100).

(5) Remove and discard the bolts (920) that attach the pitch change knob bracket unit (940).

(6) Remove the pitch change knob bracket unit (940) from the blade using the following steps:

(a) If the dowel pin (960) remains in the blade, remove and discard the dowel pin (960).

(b) If the dowel pin (960) remains in the pitch change knob bracket (950), removal of the dowel pin (960) from the pitch change knob bracket (950) is not required.

(7) Remove and discard the screw (1000) from the end of the pitch change knob bracket (950).

(8) Remove and discard the dimpled washer (990).

(9) Remove the knob unit retaining washer (980).

(10) Remove and discard the cam follower (970).

(11) Remove the pre-load seal housing (1040) and the blade shim (1020).

(12) Remove the blade shim (1020) from the pre-load seal housing (1040).

(a) To make the re-assembly of the propeller easier, measure the thickness of the blade shim (1020) and make a record of the measurement.

(13) Remove and discard the O-ring (1030) from the ID of the pre-load seal housing (1040).

(14) Remove and discard the O-ring (1050) from the OD of the pre-load seal housing (1040).

(15) Remove and discard the blade plug internal spiral retaining ring (1140).

(16) Remove the blade plug (1130).

(a) Turn a screw with 8-32 UNC-3B threads into the threaded hole in the blade plug(1130).

(b) Pull the blade plug (1130) from the bore of the blade.

(17) Remove and discard the O-ring (1120) from the OD of the blade plug (1130).

(18) Using a suitable gear puller or brass drift, remove the bearing retaining ring (1010).

(19) Remove the blade-side blade bearing race (1070) of the blade retention bearing.

(20) For additional blade disassembly instructions, refer to Hartzell Propeller Inc. Composite Blade Maintenance Manual 135F (61-13-35).

(Blank Page)

CLEANING - CONTENTS

(Blank Page)

1. Cleaning Procedures (Rev. 4)

A. General Cleaning

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

D. Cleaning Aluminum Parts for Penetrant Inspection

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

E. Cleaning Titanium Parts for Penetrant Inspection

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

G. Cleaning Cylinder Threads

(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 Inc. Standard Practices Manual 202A (61-01-02) to remove the sealant from the cylinder threads.

(Blank Page)

CHECK - CONTENTS

CHECK - CONTENTS, continued

4. Propeller Component Checks - continued

LIST OF FIGURES

LIST OF FIGURES, continued

LIST OF TABLES

1. Inspection Interval Requirements (Rev. 1)

   A. General

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

      (2) For overhaul periods of Hartzell Propeller Inc. propellers, refer to Hartzell Propeller Inc. 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. 2)

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) For requirements and procedures for inspecting aluminum hubs, refer to Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02) Volume 3, Appendix A (Raptor Turbine Propellers).

C. Blades

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

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

D. Ice Protection Systems

(1) For ice protection systems supplied by Hartzell, refer to Hartzell Propeller Inc. 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).

E. Spinner Assemblies

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

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

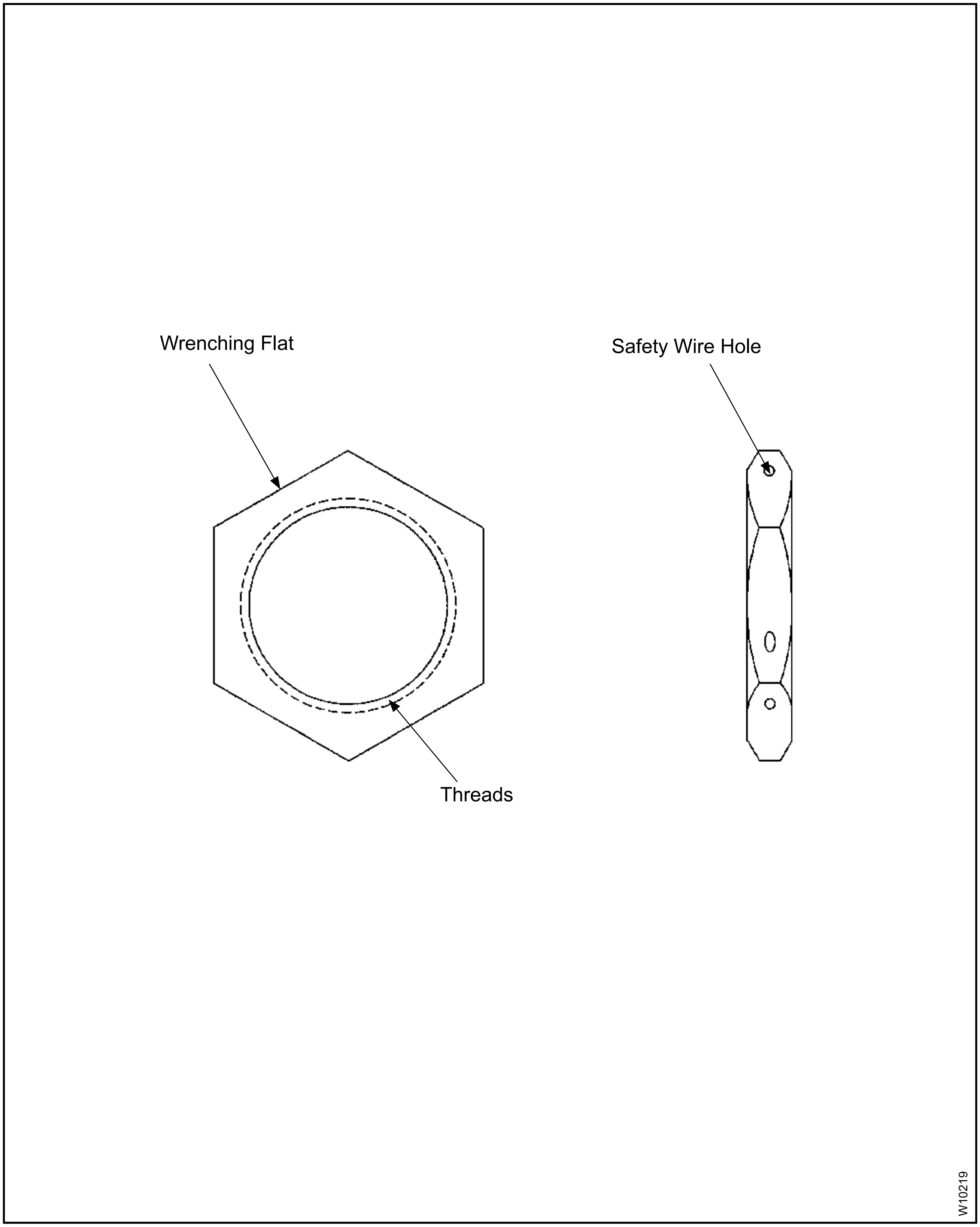
F. Special Inspections (Lightning Strike, Foreign Object Strike, etc.)

(1) Refer to the Special Inspections chapter of Hartzell Propeller Inc. 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.

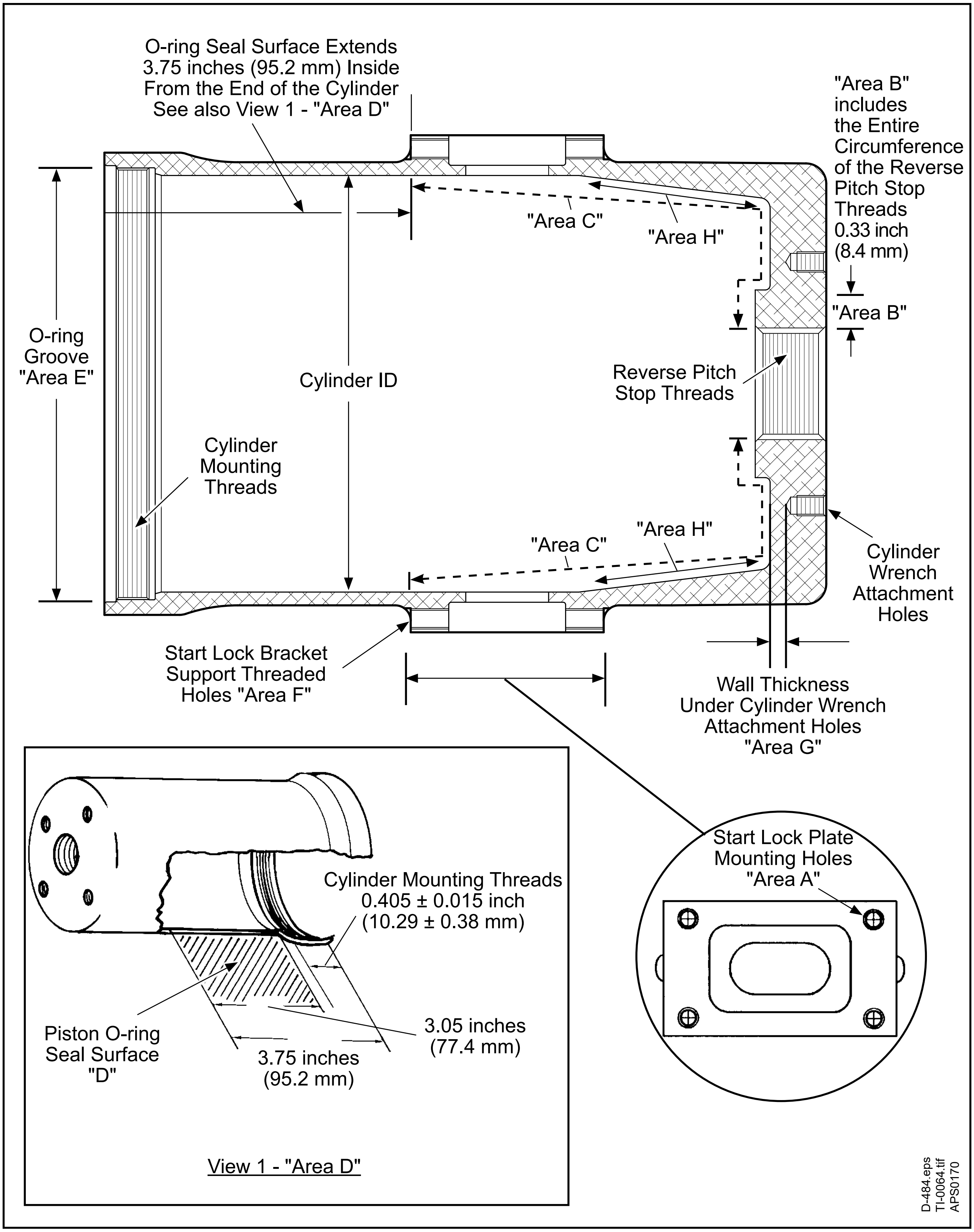
Refer to Table 5-1, "Component Inspection Criteria" in this chapter.



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, 20, 30) 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 that could result in interference with the mating parts may not be displaced above or below the nut.	File away unwanted displaced material. If a minimum of two (2) 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 Inc. 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, dimensionally inspect. 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 be on 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 Inc. Standard Practices Manual 202A (61-01-02).



Cylinder - p/n D-484
Figure 5-2

Component Inspection Criteria
Table 5-1

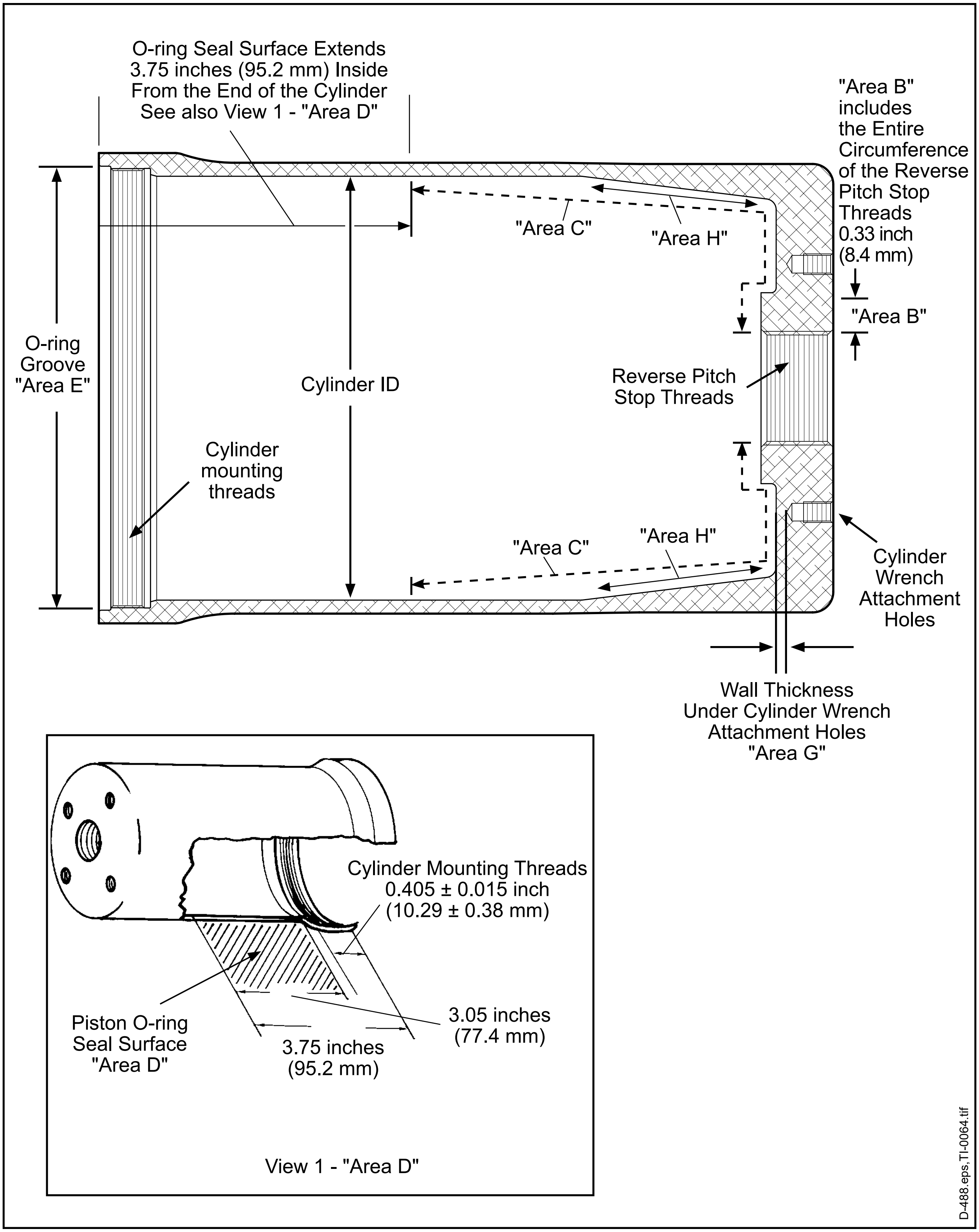
	Inspect	Serviceable Limits	Corrective Action
B.	CYLINDER, p/n D-484 (Item 40) Refer to Figure 5-2		
(1)	Except "Area B", visually examine the external surfaces of the cylinder for wear, nicks, scratches, or other damage.	The maximum permitted damage (including linear corrosion pitting) is: 0.5 inch (12 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 Inc. 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 damage, install a 1/4-28UNF-3B screw and make sure that it will tighten to attach 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 Inc. 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 Slimsert®, 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 the damage is greater than the permitted serviceable limits, replace the drilled thin hex nut.

Component Inspection Criteria
Table 5-1

	Inspect	Serviceable Limits	Corrective Action
B.	CYLINDER, p/n D-484, continued (Item 40) Refer to Figure 5-2		
(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. The maximum permitted O-ring groove ID is 5.376 inches (136.55 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 places) (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 Inc. 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.
(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 Inc. Standard Practices Manual 202A (61-01-02). If damage is greater than the permitted serviceable limits, replace the cylinder.

Component Inspection Criteria
Table 5-1

Inspect		Serviceable Limits	Corrective Action
B.	CYLINDER, p/n D-484, continued (Item 40) Refer to Figure 5-2		
	(11) Visually examine the internal surface in Area "H" for a material deviation.	If there is material deviation, measure in accordance with the instructions in the "Inspection of the Internal Surface of the 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) 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.	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 (130.33 mm).	If the cylinder ID is greater than the permitted serviceable limits, replace the cylinder.



Cylinder - p/n D-488
Figure 5-2.1

Component Inspection Criteria
Table 5-1

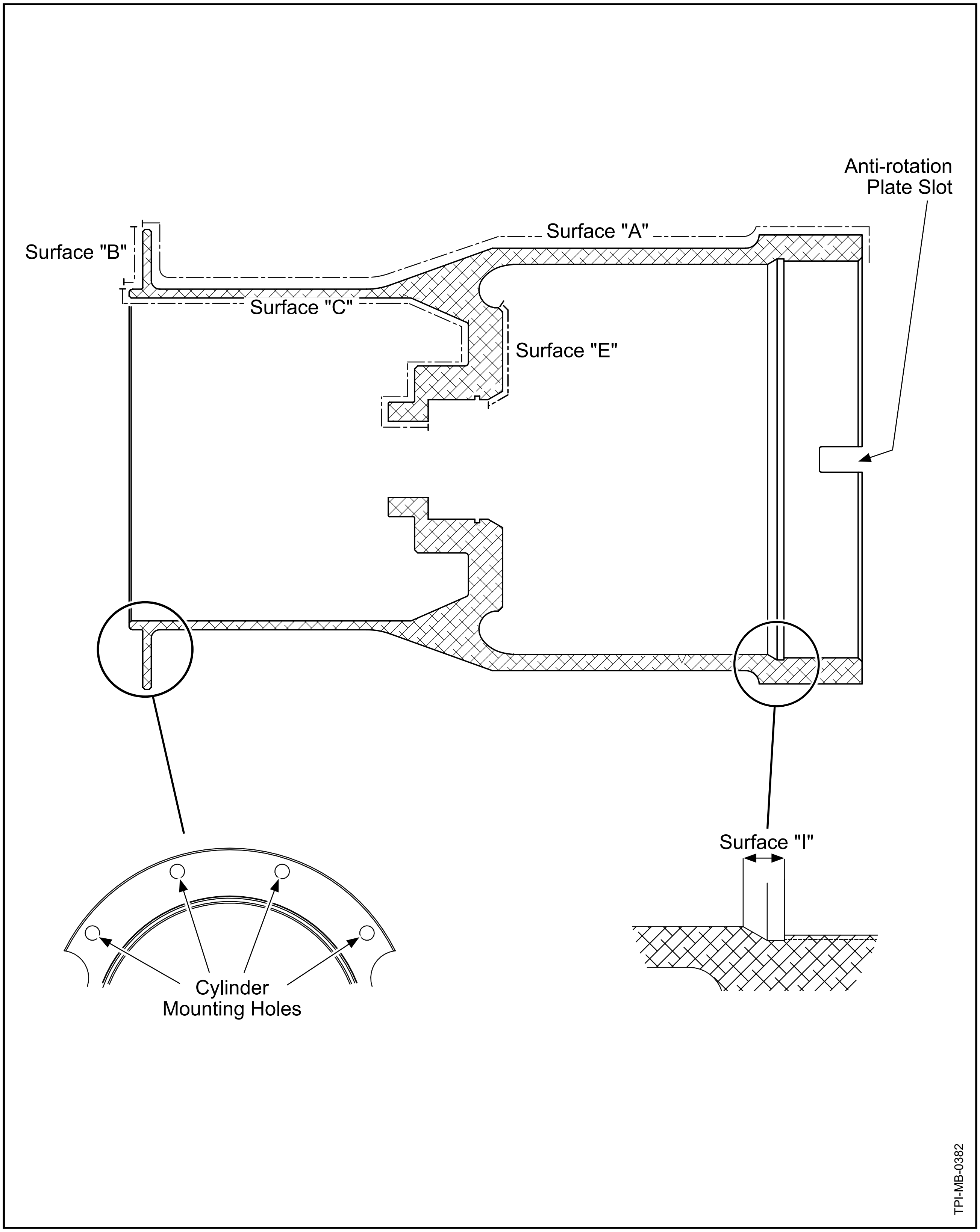
Inspect	Serviceable Limits	Corrective Action
B1. CYLINDER, p/n D-488 (Item 40) Refer to Figure 5-2.1		
(1) Except "Area B", visually examine the external surfaces of the cylinder for wear, nicks, scratches, or other damage.	The maximum permitted damage (including linear corrosion pitting) is: 0.5 inch (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 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 Inc. 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 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 Inc. 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 a cylinder wrench attachment hole is repaired with a Slimsert®, measure the depth of the cylinder wrench attachment hole ("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

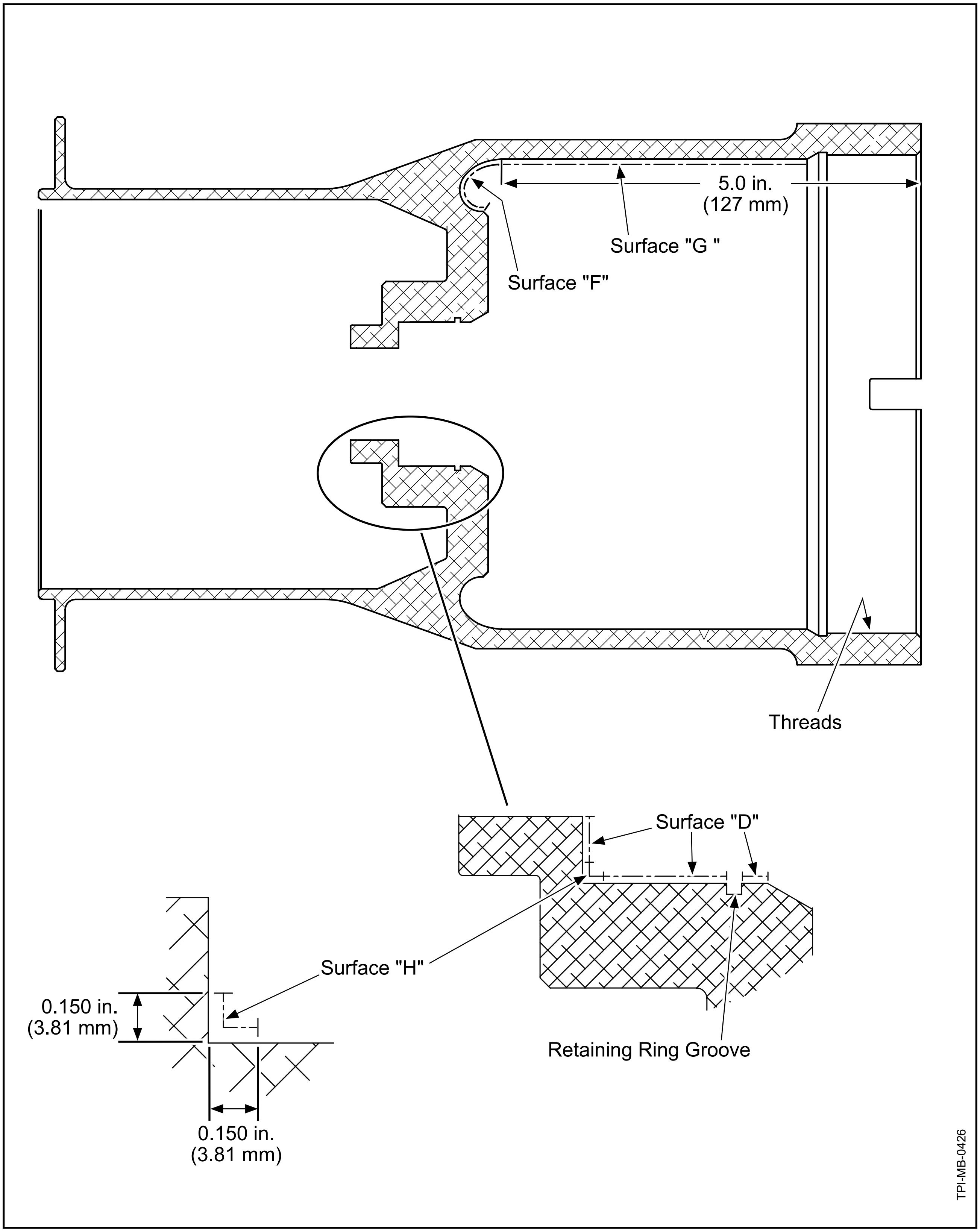
Inspect	Serviceable Limits	Corrective Action
B1. CYLINDER, p/n D-488, CONTINUED (Item 40) Refer to Figure 5-2.1		
(6) Visually examine the cylinder-to-hub O-ring groove for wear. ("Area E")	If there is wear in the O-ring groove, measure the ID. The maximum permitted O-ring groove ID is 5.376 inches (136.55 mm).	If the ID is greater than the permitted serviceable limits, 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 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 (12.7 mm) at the nearest point are not permitted. Raised material is not permitted.	Using abrasive pad CM47 or equivalent, lightly polish to blend out damage. If base aluminum is exposed, apply a chemical chemical conversion coat in accordance with the Chromic Acid Anodizing chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). If damage is greater than the permitted serviceable limits, replace the cylinder.
(9) Visually examine the internal surface in Area "H" for material deviation.	If there is material deviation, measure the internal surface in accordance with the instructions in the Repair chapter of this manual. The maximum permitted 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 more than the permitted servicable limits, replace the cylinder.

Component Inspection Criteria
Table 5-1

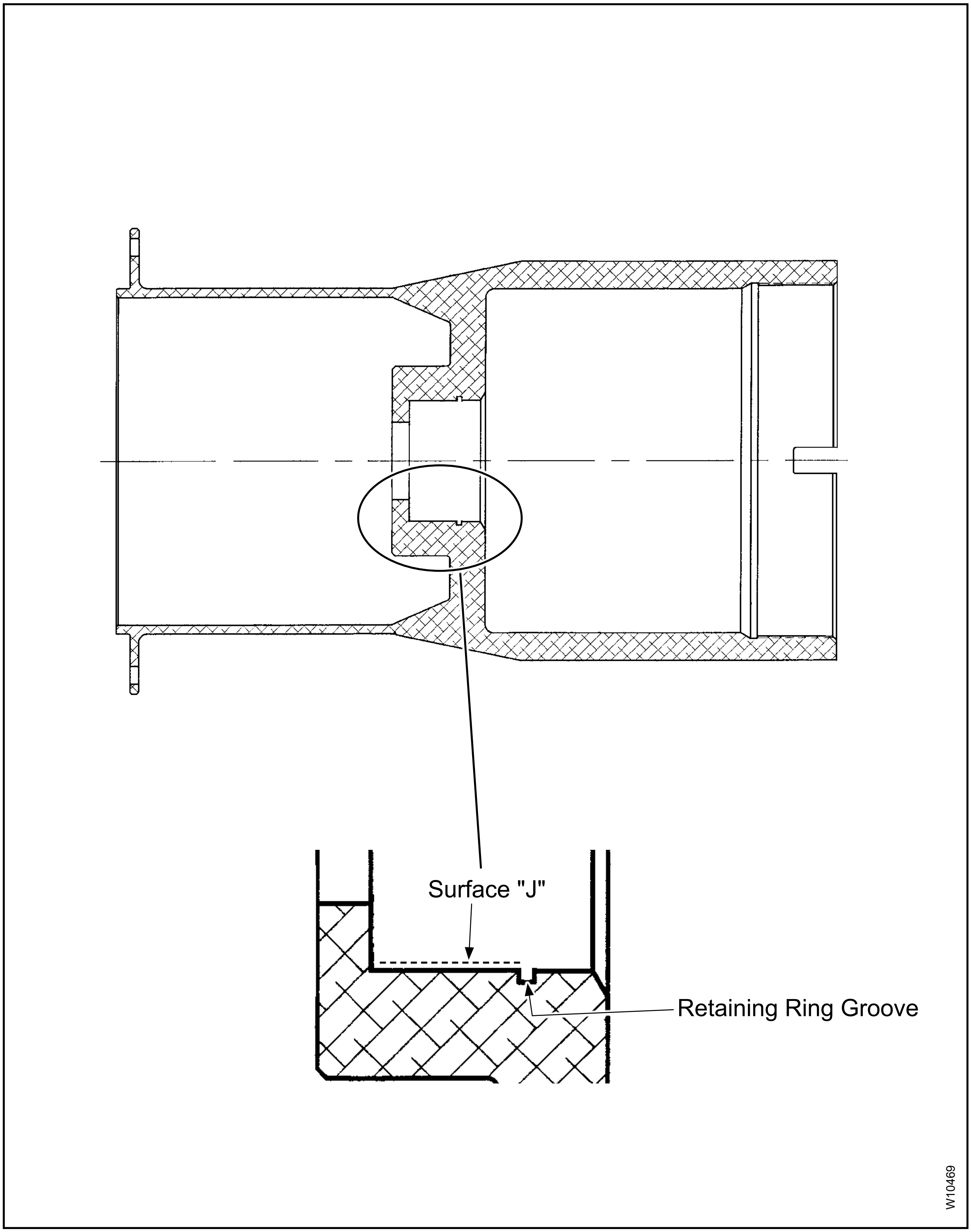
Inspect	Serviceable Limits	Corrective Action
B1. CYLINDER, p/n D-488, CONTINUED (Item 40) Refer to Figure 5-2.1		
(10) Measure the cylinder mounting thread ID within the 0.405 ± 0.015 inch (10.29 ± 0.38 mm) dimension from the end of the cylinder at six positions, 30 degrees apart.	The maximum permitted cylinder thread ID is 5.2691 inches (133.835 mm).	If thread ID is greater than the permitted serviceable limits, replace the cylinder.
(11) Measure the cylinder ID where the piston O-ring seals (Area "D").	The maximum permitted cylinder ID is 5.131 inches (130.33 mm).	If the cylinder ID is greater than the permitted serviceable limits, replace the cylinder.



Cylinder - p/n 107650 and 107659
Figure 5-2.2, page 1 of 3



Cylinder - p/n 107650 and 107659
Figure 5-2.2, page 2 of 3



Cylinder - p/n 107650 and 107659
Figure 5-2.2, page 3 of 3

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
B2. CYLINDER, p/n 107650 and 107659 (Item 40) Refer to Figure 5-2.2		
(1) Visually examine Surface "A" for corrosion product, pitting, nicks, scratches, or other damage.	Corrosion product is not permitted. The maximum permitted depth of damageis 0.003 inch (0.07 mm). The maximum permitted total area of damage is 1 square inch (645 square mm). The maximum permitted diameter of an individual pit is 0.032 inch (0.81 mm). A maximum of 10 non-linear pits within a 1 square inch (645 square mm) area are permitted. Linear pitting is not permitted.	Using an abrasive pad CM47 or equivalent, lightly polish to remove corrosion product, pitting, nicks, scratches, or other damage. The maximum permitted depth of repair is 0.005 inch (0.127 mm). The maximum permitted area of repair is 2 square inches (1290 square mm). If base aluminum is exposed, chemical conversion coat in accordance with the Chromic Acid Anodizing chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). To improve the appearance or corrosion product protection surface "A" may be painted with a polane paint. Refer to the Paint and Finish chapter of Hartzell Standard Practices Manual 202A (61-01-02). If damage is greater than the permitted serviceable or repair limits, replace the cylinder.
(2) Visually examine Surface "B" for corrosion product, pitting, nicks, scratches, or other damage.	Corrosion product is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits. The maximum depth of damage permitted is 0.003 inch (0.07 mm). The maximum permitted total area of damage is 0.5 square inch (322 square mm). The maximum permitted diameter of an individual pit is 0.032 inch (0.81 mm). A maximum of 10 non-linear pits within a 1 square inch (645 square mm) area are permitted. Linear pitting is not permitted. High spots or edges above surrounding machined surfaces are not permitted. Pitting, nicks, scratches, or other damage must not affect the attachment of the cylinder to the hub.	Using an abrasive pad CM47 or equivalent, lightly polish to remove corrosion product, pitting, nicks, scratches, or other damage. The maximum permitted depth of repair is 0.005 inch (0.127 mm). The maximum permitted area of damage and repair is 1 square inch (645 square mm). If the base aluminum is exposed, chemical conversion coat in accordance with the Chromic Acid Anodizing chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). Repair must not affect the attachment of the cylinder to the hub. If damage is greater than the permitted serviceable or repair limits, replace the cylinder.

Component Inspection Criteria
Table 5-1

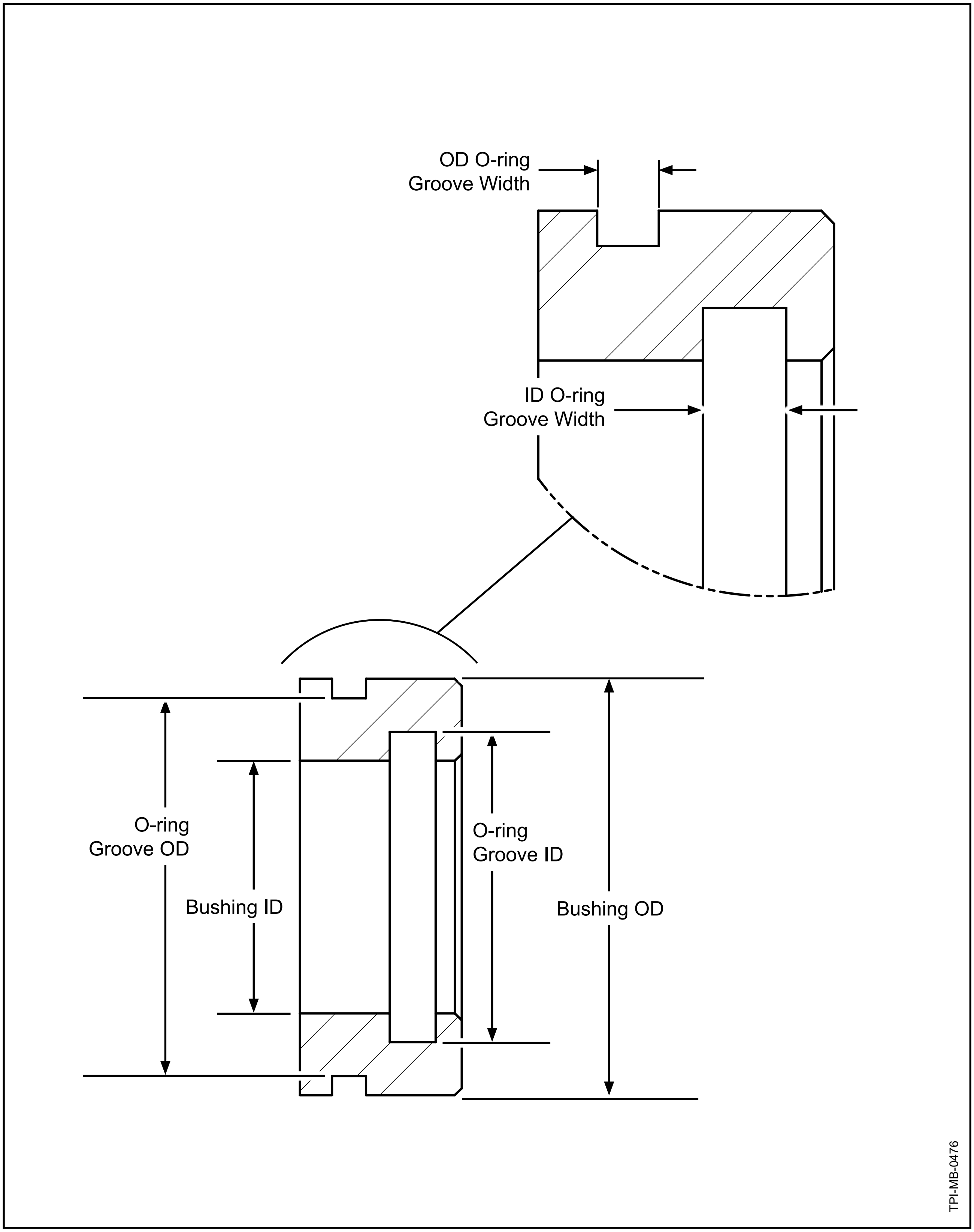
Inspect	Serviceable Limits	Corrective Action
B2. CYLINDER , p/n 107650 and 107659, CONTINUED (Item 40) Refer to Figure 5-2.2		
(3) Visually examine Surface "C" for corrosion product, pitting, nicks, scratches, or other damage.	Corrosion product is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits. If the cylinder is damaged, measure the damage. The maximum permitted depth of damage is 0.003 inch (0.07 mm). The maximum permitted total area of damage is 0.75 square inch (483 square mm). The maximum permitted diameter of an individual pit is 0.032 inch (0.81 mm). A maximum of 10 non-linear pits within a 1 square inch (645 square mm) area are permitted. Linear pitting is not permitted.	Using an abrasive pad CM47 or equivalent, lightly polish to remove corrosion product, pitting, nicks, scratches, or other damage. The maximum permitted depth of repair is 0.005 inch (0.12 mm). The maximum permitted area of repair is 1.5 square inch (967 square mm). If base aluminum is exposed, chemical conversion coat in accordance with the Chromic Acid Anodizing chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). To improve the appearance or corrosion product protection, surface "C" can be painted with a polane paint. Refer to the Paint and Finish chapter of Hartzell Propeller Inc Standard Practices Manual 202A (61-01-02). If damage is greater than the permitted serviceable or repair limits, replace the cylinder.
(4) Visually examine Surface "D" for corrosion product, pitting, nicks, scratches, or other damage.	Corrosion product is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits. If the cylinder is damaged, measure the damage. High spots or edges above surrounding machined surfaces are not permitted. The maximum permitted depth of damage is 0.003 inch (0.07 mm) for scratches or nicks. Pitting or other damage must be removed. High spots or edges above surrounding machined surfaces are not permitted. Pitting, nicks, scratches, or other damage must not affect the fit or the positioning of the plastic bushing.	Using an abrasive pad CM47 or equivalent, lightly polish to remove corrosion product, pitting, nicks, scratches, or other damage. The maximum permitted depth of repair is 0.008 inch (0.20 mm). The maximum permitted total area of repair is 0.5 square inch (322 square mm). Repair is not permitted to intersect with the retaining ring groove. Repair must not affect the fit or the positioning of the plastic bushing. If base aluminum is exposed, chemical conversion coat in accordance with the Chromic Acid Anodizing chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). If damage is greater than permitted serviceable or repair limits, replace the cylinder.

Component Inspection Criteria
Table 5-1

	Inspect	Serviceable Limits	Corrective Action
B2.	CYLINDER , p/n 107650 and 107659, CONTINUED (Item 40) Refer to Figure 5-2.2		
(5)	Visually examine Surface "E" for corrosion product, pitting, nicks, scratches, or other damage.	Corrosion product is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits. If the cylinder is damaged, measure the damage. The maximum depth of damage permitted is 0.003 inch (0.07 mm). The maximum permitted total area of damage is 0.5 square inch (322 square mm). The maximum permitted diameter of an individual pit is 0.032 inch (0.81 mm). A maximum of 10 non-linear pits within a 1 square inch (645 square mm) area are permitted. Linear pitting is not permitted.	Using an abrasive pad CM47 or equivalent, lightly polish to remove corrosion product, pitting, nicks, scratches, or other damage. The maximum permitted depth of repair is 0.005 inch (0.127 mm). The maximum permitted area of repair is 1.0 square inch (645 square mm). If base aluminum is exposed, chemical conversion coat in accordance with the Chromic Acid Anodizing chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). If damage is greater than permitted serviceable or repair limits, replace the cylinder.
(6)	Visually examine Surface "F" for corrosion product, pitting, nicks, scratches, or other damage.	Corrosion product, pitting, nicks, scratches, or other damage is not permitted.	If there is corrosion product, pitting, nicks, scratches, or other damage, replace the cylinder.
(7)	Visually examine the cylinder ID, Surface "G" where the piston O-ring seals to the cylinder for wear, corrosion product, pitting, and damage such as nicks and scratches. If Surface "G" shows wear, measure the cylinder ID.	The maximum permitted ID is 5.729 inches (126.46 mm). Wear through the anodize to the base aluminum is not permitted. Corrosion product, pitting, nicks, scratches, or other damage is not permitted.	If there is corrosion product, pitting, nicks, scratches, or damage, replace the cylinder. If the wear is greater than the permitted serviceable limits, replace the cylinder.
(8)	Visually examine Surface "H" for corrosion product, pitting, nicks, scratches and other damage.	Corrosion product, pitting, nicks, scratches, or other damage is not permitted.	If there is corrosion product, pitting, nicks, scratches, or other damage, replace the cylinder.
(9)	Visually examine the retaining ring groove for wear or damage. If the retaining ring groove is worn or damaged, measure the groove.	The maximum permitted groove width is 0.074 inch (1.87 mm). The maximum permitted ID is 1.867 inches (47.42 mm).	If the wear or damage is greater than the permitted serviceable limits, replace the cylinder.

Component Inspection Criteria
Table 5-1

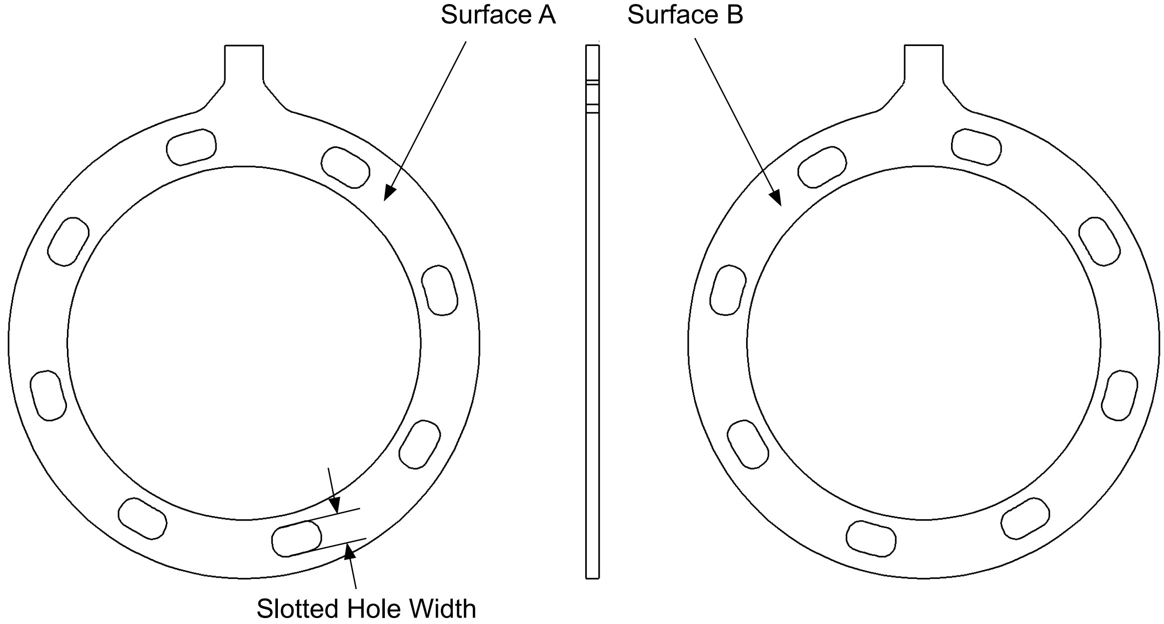
	Inspect	Serviceable Limits	Corrective Action
B2.	CYLINDER , p/n 107650 and 107659, CONTINUED (Item 40) Refer to Figure 5-2.2		
(10)	Using white light, visually examine Surface "F" and Surface "I" for cracks.	A crack is not permitted.	If there is a crack, replace the cylinder.
(11)	Using a Profilometer TE436-2 or equivalent, examine the finish on Surface "J".	The maximum permitted surface finish is 32Ra.	If the surface finish is greater than the permitted serviceable limits, polish Surface "J" using 3M microfinishing film (373L), or equivalent. The maximum permitted diameter of Surface "J" after repair is 1.7560 inch (44.602 mm).
(12)	Using white light, visually examine the immediate area encircling each cylinder mounting hole for cracks on both sides of the mounting flange.	A crack is not permitted.	If there is a crack, replace the cylinder.
(13)	Visually examine the threads of the cylinder for damage.	Damage to 1/2 of one thread total accumulated damage is permitted.	If the damage is greater than the permitted serviceable limits, replace the cylinder.
(14)	Visually examine the two anti-rotation plate slots for corrosion product, pitting, nicks, scratches, and other damage.	Corrosion product is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits. If the cylinder is damaged, measure the damage. The maximum permitted depth of pitting is 0.005 inch (0.12 mm). The maximum permitted depth of nicks, scratches, or other damage is 0.10 inch (2.54 mm). Damage that has a sharp corner is not permitted.	Using an abrasive pad CM47 or equivalent, locally polish to remove corrosion product. Abrupt or extremely rough damage can be repaired by locally polishing the damaged area using an abrasive pad CM47 or equivalent. Refer to the Cleaning chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). The maximum permitted depth of repair is 0.030 inch (0.76 mm). If the base aluminum is exposed, apply chemical conversion coating in accordance with the Chromic Acid Anodizing chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). If the damage is greater than the corrective action limits, replace the cylinder.



Cylinder Bushing - p/n 108298
Figure 5-3

Component Inspection Criteria
Table 5-1

Inspect		Serviceable Limits	Corrective Action
C.	BUSHING, CYLINDER, p/n 108298 (Item 43) Refer to Figure 5-3		
(1)	Visually examine both sides of the cylinder bushing for wear, damage, and distortion.	Wear, damage, or distortion is not permitted.	If there is wear, damage, or distortion, replace the cylinder bushing.
(2)	Measure the cylinder bushing OD.	The minimum permitted bushing OD is 1.750 inches (44.45 mm).	If the bushing OD is less than the permitted serviceable limit, replace the cylinder bushing.
(3)	Measure the cylinder bushing ID and examine the surface finish.	The maximum permitted ID is 1.064 inches (27.02 mm). A smooth surface is required.	If the bushing ID is greater than the permitted serviceable limit, or if the surface finish is not smooth, replace the cylinder bushing.
(4)	Measure the cylinder bushing O-ring groove ID and examine the surface finish.	The maximum permitted O-ring groove ID is 1.306 inches (33.17 mm). A smooth surface is required.	If the O-ring groove ID is greater than the permitted serviceable limit, or if the surface finish is not smooth, replace the cylinder bushing.
(5)	Measure the cylinder bushing O-ring groove OD and examine the surface finish.	The minimum permitted O-ring groove OD is 1.586 inches (40.29 mm). A smooth surface is required.	If the O-ring groove OD is less than the permitted serviceable limit, or if the surface finish is not smooth, replace the cylinder bushing.
(6)	Measure the width of the ID O-ring groove and examine the groove for wear, damage, and distrotion.	The maximum permitted width of the ID O-ring groove is 0.170 inch (4.31 mm). Wear, damage, or distortion is not permitted.	If the width of the ID O-ring groove is greater than the permitted serviceable limit, or if there is wear, damage, or distortion, replace the the cylinder bushing.
(7)	Measure the width of the OD O-ring groove and examine the groove for wear, damage, and distortion.	The maximum permitted width of the OD O-ring groove is 0.146 inch (3.70 mm). Wear, damage, or distortion is not permitted.	If the width of the OD O-ring groove is greater than the permitted serviceable limit, or if there is wear, damage, or distortion, replace the the cylinder bushing.



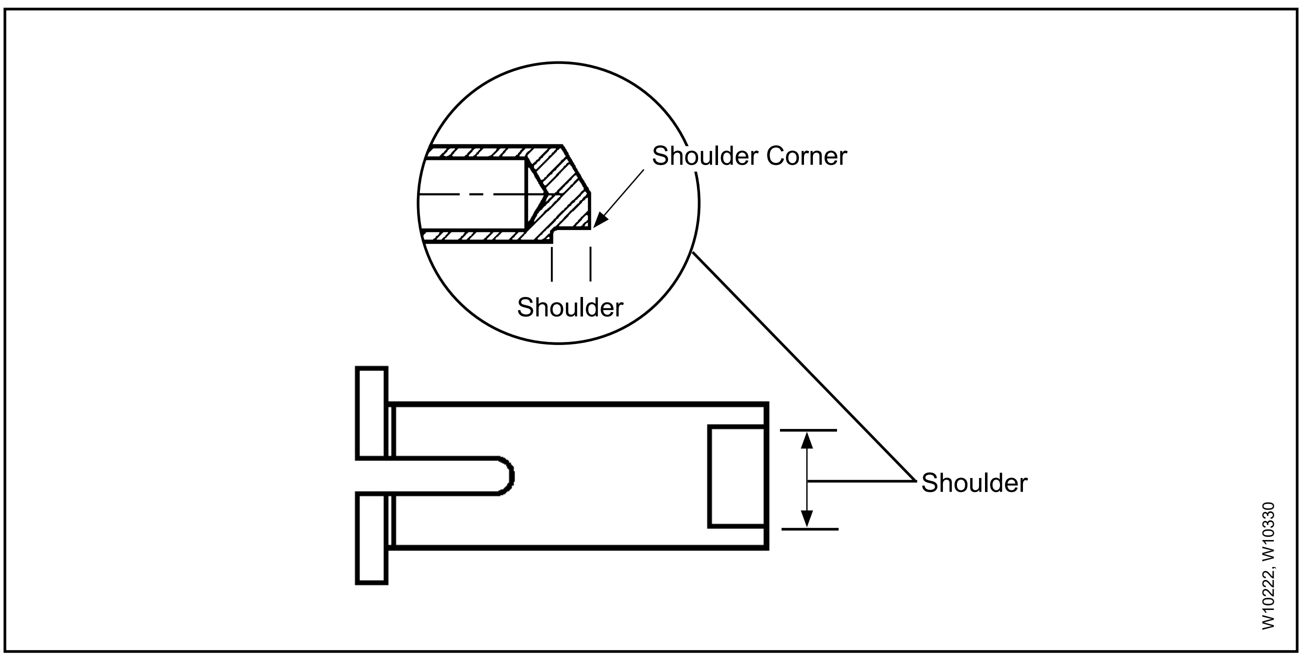
Anti-rotation Plate
Figure 5-4

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
D. ANTI-ROTATION PLATE (Item 50) Refer to Figure 5-4		
(1) Visually examine the anti-rotation plate for corrosion, pitting, nicks, scratches, or other damage.	Corrosion is not permitted. The maximum permitted depth of pitting, nicks, scratches, or other damage is 0.008 inch (0.20 mm). A high spot or an edge above the surrounding machined surfaces is not permitted on Surface A or Surface B. The maximum permitted total coverage of pits, nicks, scratches, or other damage is 10% of the total area. Pits, nicks, scratches, or other damage are not permitted to interfere with the fit or performance of the mating part.	Remove corrosion using glass bead cleaning. A high spot may be removed by polishing. Refer to the Cleaning chapter of Hartzell Standard Practices Manual 202A (61-01-02). If the pitting, nicks, scratches, or other damage is greater than the permitted serviceable limits, replace the anti-rotation plate.
(2) Visually examine each slotted hole for wear.	If there is wear, measure the slotted hole width. The maximum permitted radial slotted hole width is 0.305 inch (7.74 mm).	If the slotted hole width is greater than the permitted serviceable limits, replace the anti-rotation plate.
(3) Visually examine the anti-rotation plate for cadmium plating coverage.	Loss of cadmium plating, caused by interference with the clamping fastener threads, around each slotted hole is permitted. A few random scratches and corners with cadmium plating missing are permitted. In all other areas, complete coverage of the cadmium plating is required.	If the cadmium plating coverage is less than the permitted serviceable limits, cadmium replate and bake the anti-rotation plate in accordance with the Cadmium Replating chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).
(4) Visually examine the anti-rotation plate surfaces for flatness.	Each anti-rotation plate surface must be flat to within 0.003 inch (0.07 mm) when put on a flat surface.	If flatness is not within the permitted serviceable limits, replace the anti-rotation plate.

Component Inspection Criteria
Table 5-1

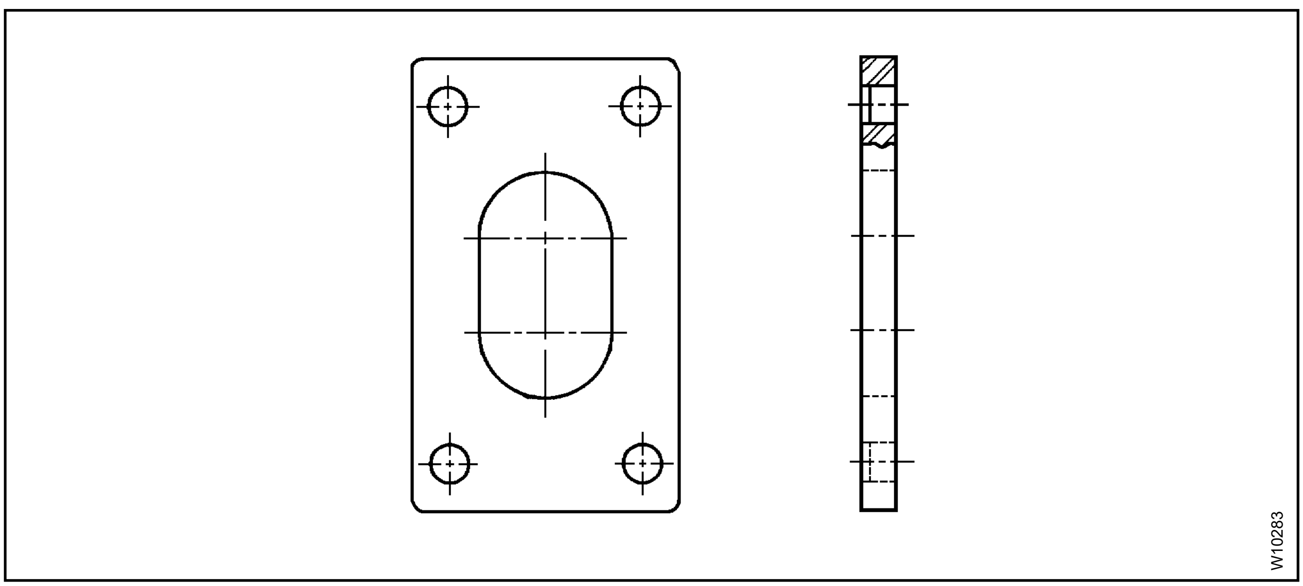
Inspect	Serviceable Limits	Corrective Action
E. START LOCK PIN (Item 53) Refer to Figure 5-5		
(1) Visually examine the start lock pin for corrosion product or damage.	Corrosion product or damage is not permitted.	Remove corrosion product using glass bead cleaning. Refer to the Cleaning chapter of Hartzell Propeller Inc. 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. 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.



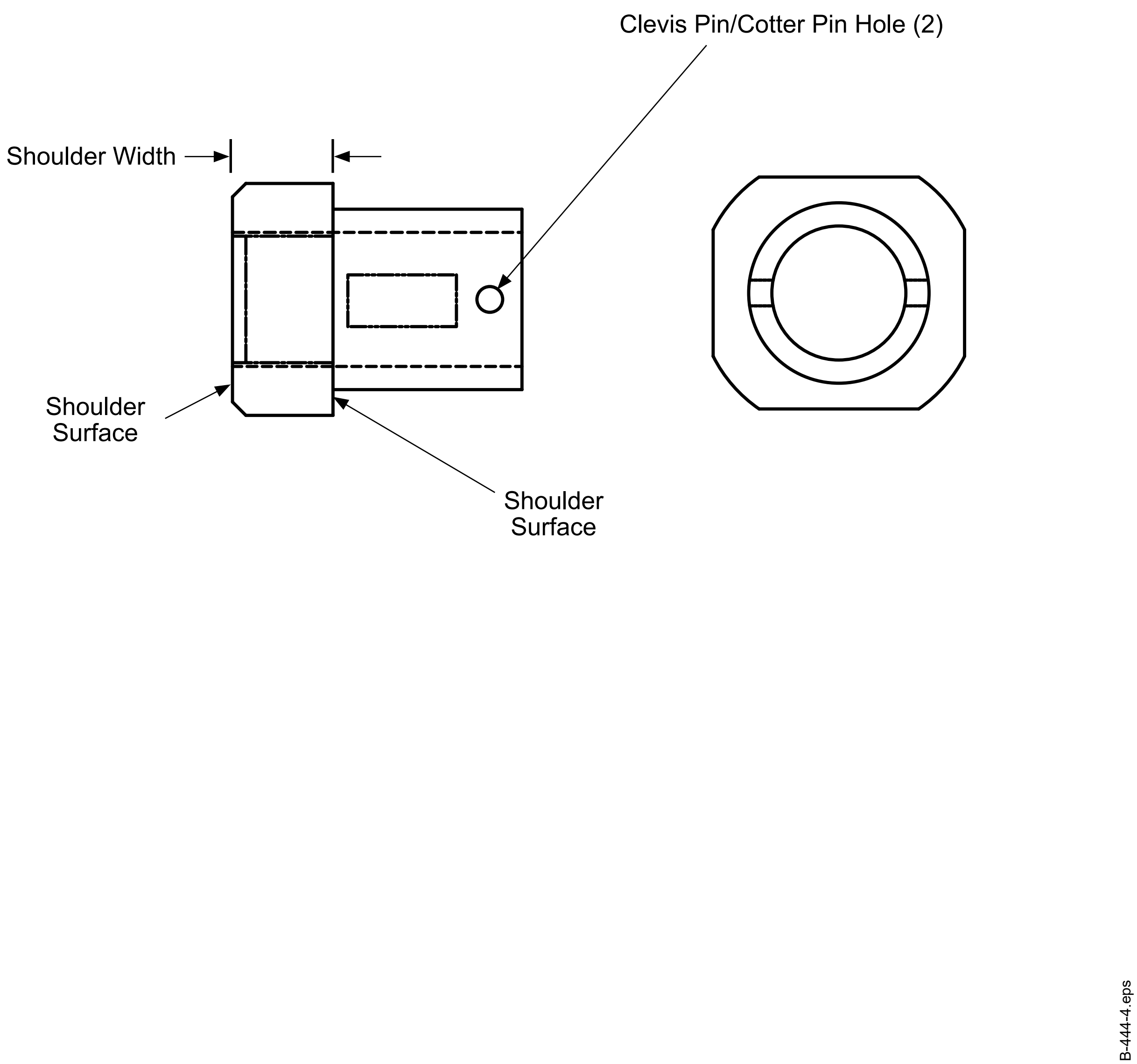
Start Lock Pin
Figure 5-5

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
F. START LOCK HOUSING COVER (Item 54) Refer to Figure 5-6		
(1) Visually examine the start lock housing cover for corrosion product and pitting.	Corrosion product is not permitted. 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 (53).	Remove corrosion product using glass bead cleaning. Refer to the Cleaning chapter of Hartzell Standard Practices Manual 202A (61-01-02). If 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.	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 (53).	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 plate coverage.	A few random scratches are permitted; otherwise, cadmium plate must cover the start lock housing cover.	If coverage is less than the permitted serviceable limits, replate the start lock housing cover in accordance with the Cadmium Replating chapter of Hartzell Standard Practices Manual 202A (61-01-02).



Start Lock Housing Cover
Figure 5-6



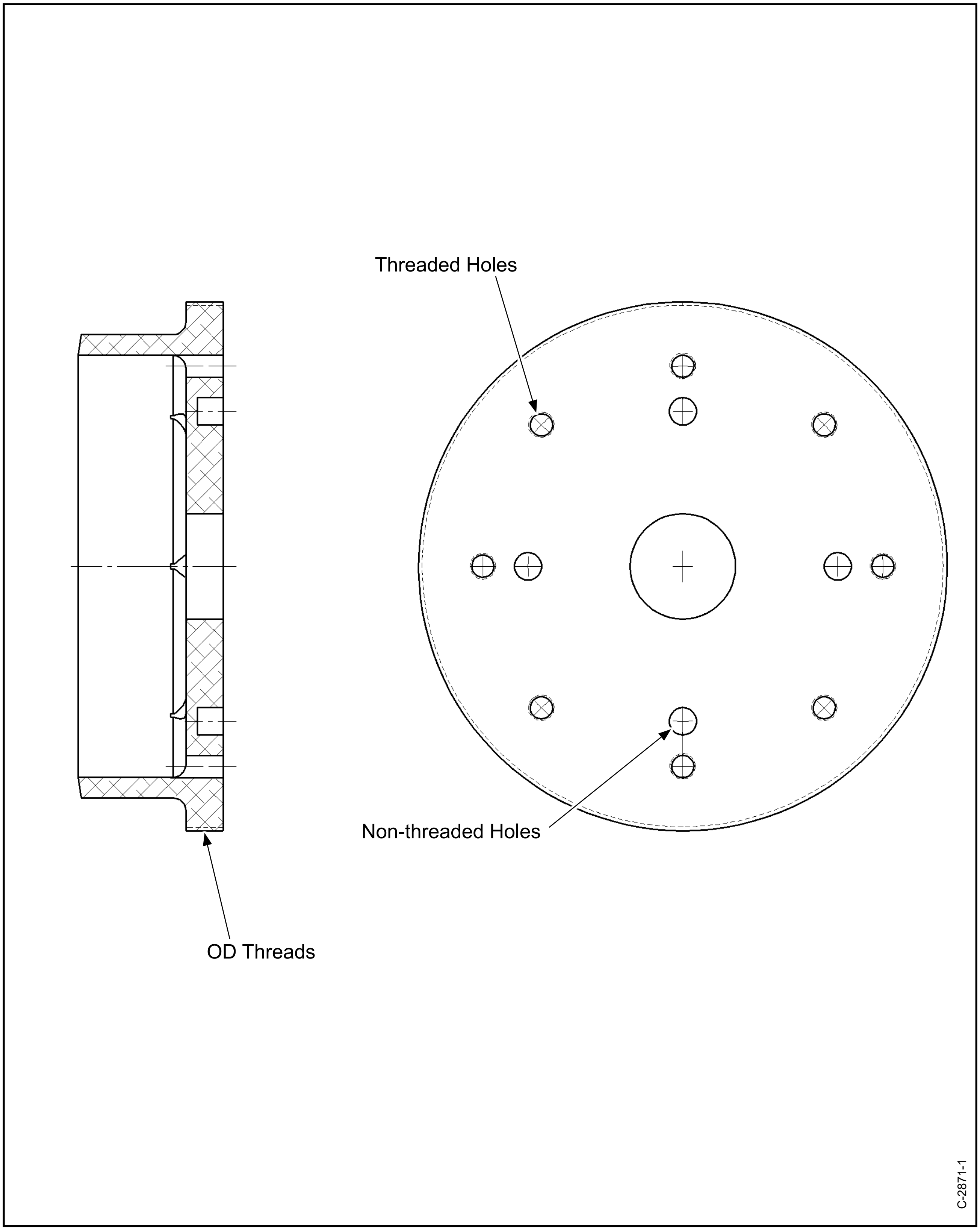
Start Lock Housing
Figure 5-7

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
G. START LOCK HOUSING (Item 55) Refer to Figure 5-7		
(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 0.005 inch (0.12 mm).	Remove corrosion product using glass bead cleaning. Refer to the Cleaning chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). 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 0.005 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 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 width is 0.373 inch (9.47 mm).	If the shoulder width is less than the permitted serviceable limits, replace the start lock housing.
	The maximum permitted area of wear, damage, or pitting is 25% of either shoulder surface area.	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 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.

Component Inspection Criteria
Table 5-1

Inspect		Serviceable Limits	Corrective Action
G.	START LOCK HOUSING, continued (Item 55) Refer to Figure 5-7		
(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 hole is 0.10 inch (2.5 mm).	If the width is greater than the permitted serviceable limits, replace the start lock housing.
(8)	Visually examine the start lock housing for cadmium plate coverage.	A few random scratches are permitted; otherwise, cadmium plate must cover the start lock housing.	If coverage is less than the permitted serviceable limits, replate the start lock housing in accordance with the Cadmium Replating chapter of Hartzell Standard Practices Manual 202A (61-01-02).



Pitch Stop Plate
Figure 5-8

Component Inspection Criteria
Table 5-1

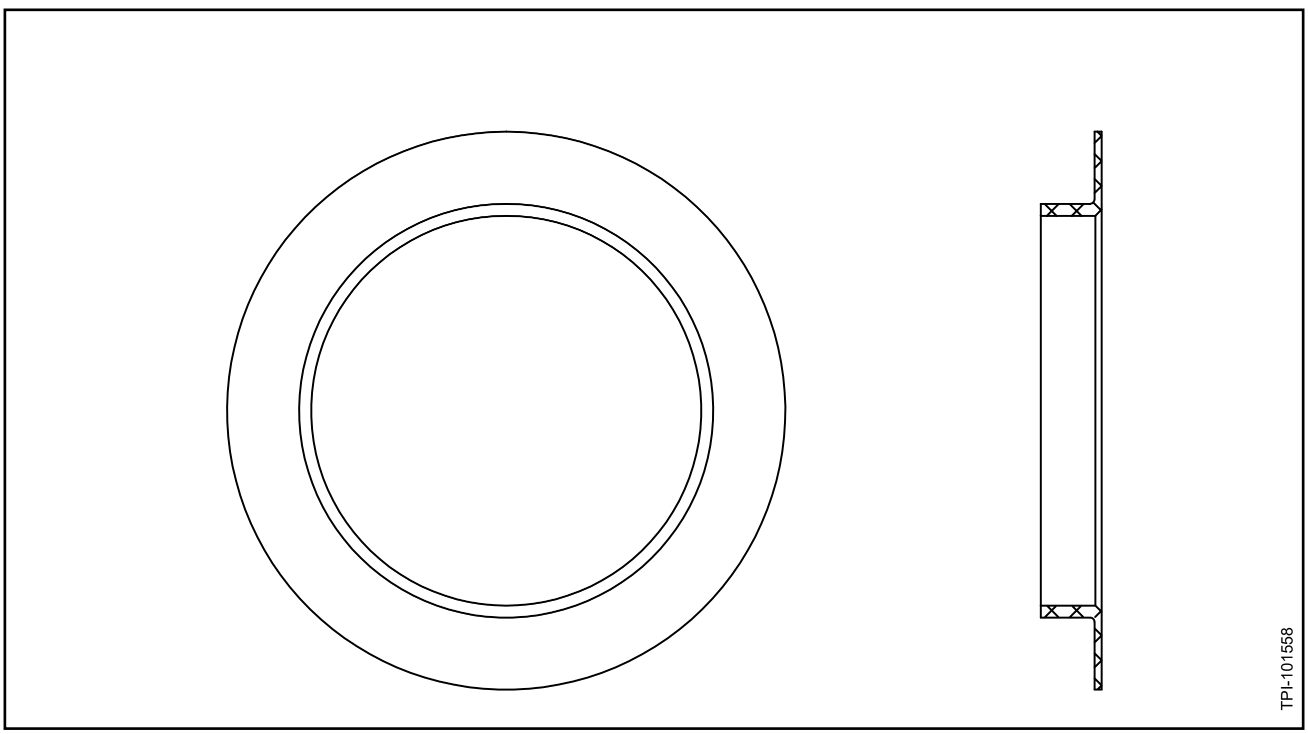
Inspect	Serviceable Limits	Corrective Action
H. PLATE, STOP, PITCH (Item 60) Refer to Figure 5-8		
(1) Except for the OD threads and the threaded holes, visually examine the pitch stop plate for wear or damage.	The maximum permitted depth of wear or damage is 0.005 inch (0.12 mm).	Repair using an abrasive pad CM47 or equivalent is permitted to a depth of 0.010 inch (0.25 mm). The maximum permitted total area of repair is 2 square inches (1290 sq. mm). If the wear or damage is greater than the permitted serviceable limits or the corrective action limits, replace the pitch stop plate.
(2) Except for the OD threads and the threaded holes, visually examine the pitch stop plate for corrosion and pitting.	Corrosion is not permitted. The maximum permitted depth of pitting is 0.005 inch (0.12 mm). The maximum permitted diameter of an individual pit is 0.062 inch (1.57 mm). A maximum of 10 non-linear pits less than 0.062 inch (1.57 mm) diameter within a 1 square inch (645 sq. mm) area are permitted. Pits can be no closer than 2 diameters [0.064 inch or (1.62 mm)]. Linear pitting is not permitted.	Remove corrosion using glass bead cleaning. Refer to the Cleaning chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). Repair using an abrasive pad CM47 or equivalent is permitted to a depth of 0.010 inch (0.25 mm). The maximum permitted total area of repair is 2 square inches (1290 sq. mm). If repair is greater than the permitted serviceable limits or the corrective action limits, replace the pitch stop plate.
(3) Using a 10X magnifying glass, visually examine the pitch stop plate OD threads for corrosion, pitting, or damage.	Corrosion is not permitted. A maximum of 1/2 of one thread total accumulated damage is permitted. The maximum permitted depth of pitting is 0.005 inch (0.12 mm).	Using an abrasive pad CM47 or equivalent, spot polish to remove corrosion or pitting. Repair is permitted to a depth of 0.010 inch (0.25 mm). If the damage or repair is greater than the permitted serviceable limits or the corrective action limits, replace the pitch stop plate.
(4) Visually examine the eight pitch stop plate threaded holes for corrosion, pitting, or damage.	Corrosion is not permitted. A maximum of 1/3 of one thread total accumulated damage is permitted for each threaded hole. The maximum permitted depth of pitting is 0.005 inch (0.12 mm).	Repair is not permitted. If the damage is greater than the permitted serviceable limits, replace the pitch stop plate.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
H. PLATE, STOP, PITCH, CONTINUED (Item 60) Refer to Figure 5-8		
(6) Visually examine the four flat bottom non-threaded holes for corrosion or damage.	Corrosion is not permitted. Some displaced material is permitted. The maximum permitted hole ID is 0.300 inch (7.62 mm) at the widest place. The maximum permitted depth is 0.290 inch (7.36 mm).	Using an abrasive pad CM47 or equivalent, spot polishing to remove corrosion is permitted. If the damage or repair is greater than the permitted serviceable limits, replace the pitch stop plate.
(7) Penetrant inspect the pitch stop plate in accordance with Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). Locally etch repaired areas to avoid covering any cracks. CAUTION: DO NOT REMOVE THE ANODIZE COATING BEFORE PENETRANT INSPECTION.	A relevant indication is not permitted. "Pin-point" penetrant indications (from pitting) are permitted. A crack is not permitted.	If a there is a relevant indication that cannot be removed within the permitted serviceable limits or corrective action limits for the pitch stop plate in this section, replace the pitch stop plate.
(8) Visually examine the pitch stop plate for anodize coverage.	Except for a few scratches and corners with anodize missing, complete coverage is required.	If the anodize coverage is less than the permitted serviceable limits, anodize the pitch stop plate in accordance with the Chromic Acid Anodizing chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

Component Inspection Criteria
Table 5-1

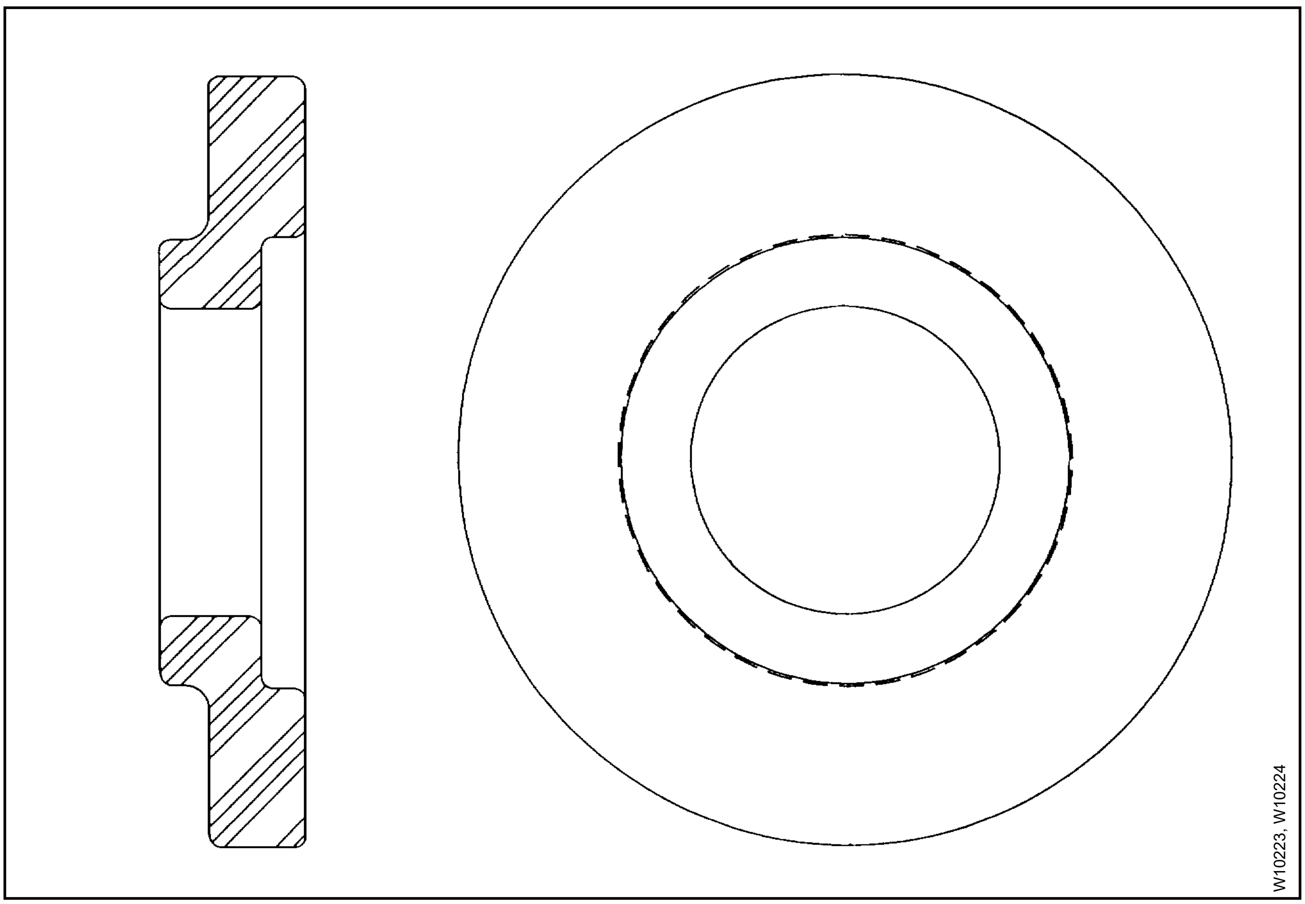
Inspect	Serviceable Limits	Corrective Action
I. SPRING SEAT, p/n 101558 (Items 100) Refer to Figure 5-9		
(1) Visually examine the spring seat for wear.	The maximum depth of wear permitted is 0.020 inch (0.50 mm).	If the wear is greater than the permitted serviceable limits, replace the spring seat.
(2) Visually examine the spring seat for nicks, scratches, and gouges.	The maximum permitted total area of accumulated damage is 0.5 square inch (322 square mm) area. Damage that extends all the way through the part is not permitted.	If the damage is greater than the permitted serviceable limits, replace the spring seat.



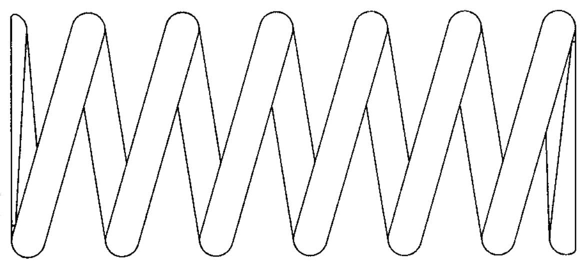
Spring Seat
Figure 5-9

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
J. FORWARD SPRING RETAINER, p/n B-6768 (Item 100) Refer to Figure 5-10		
(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).	If the depth of wear or damage is greater than the permitted serviceable limits, replace the forward spring retainer.



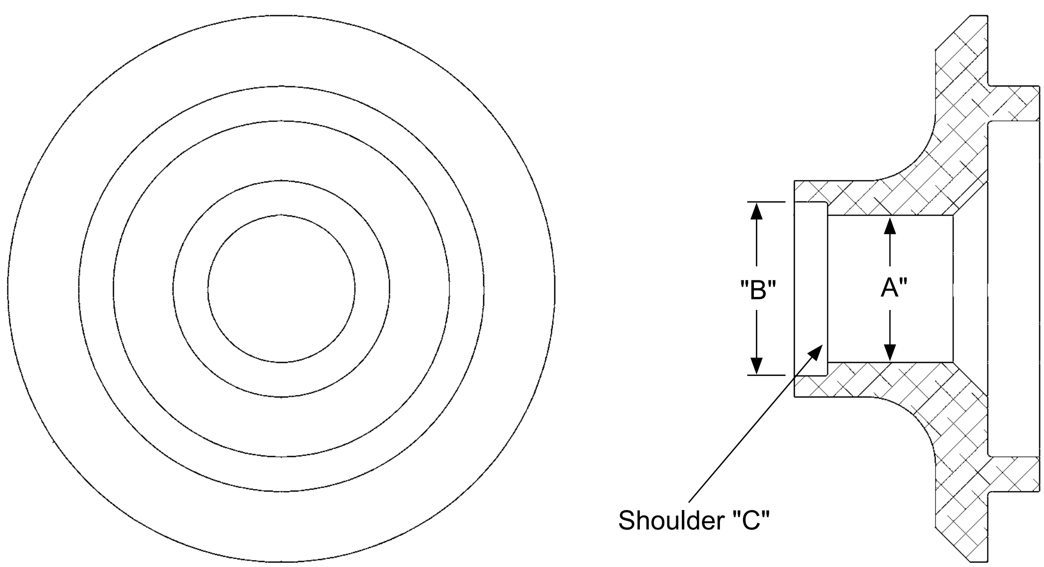
Forward Spring Retainer
Figure 5-10



Feathering Compression Spring
Figure 5-11

Component Inspection Criteria
Table 5-1

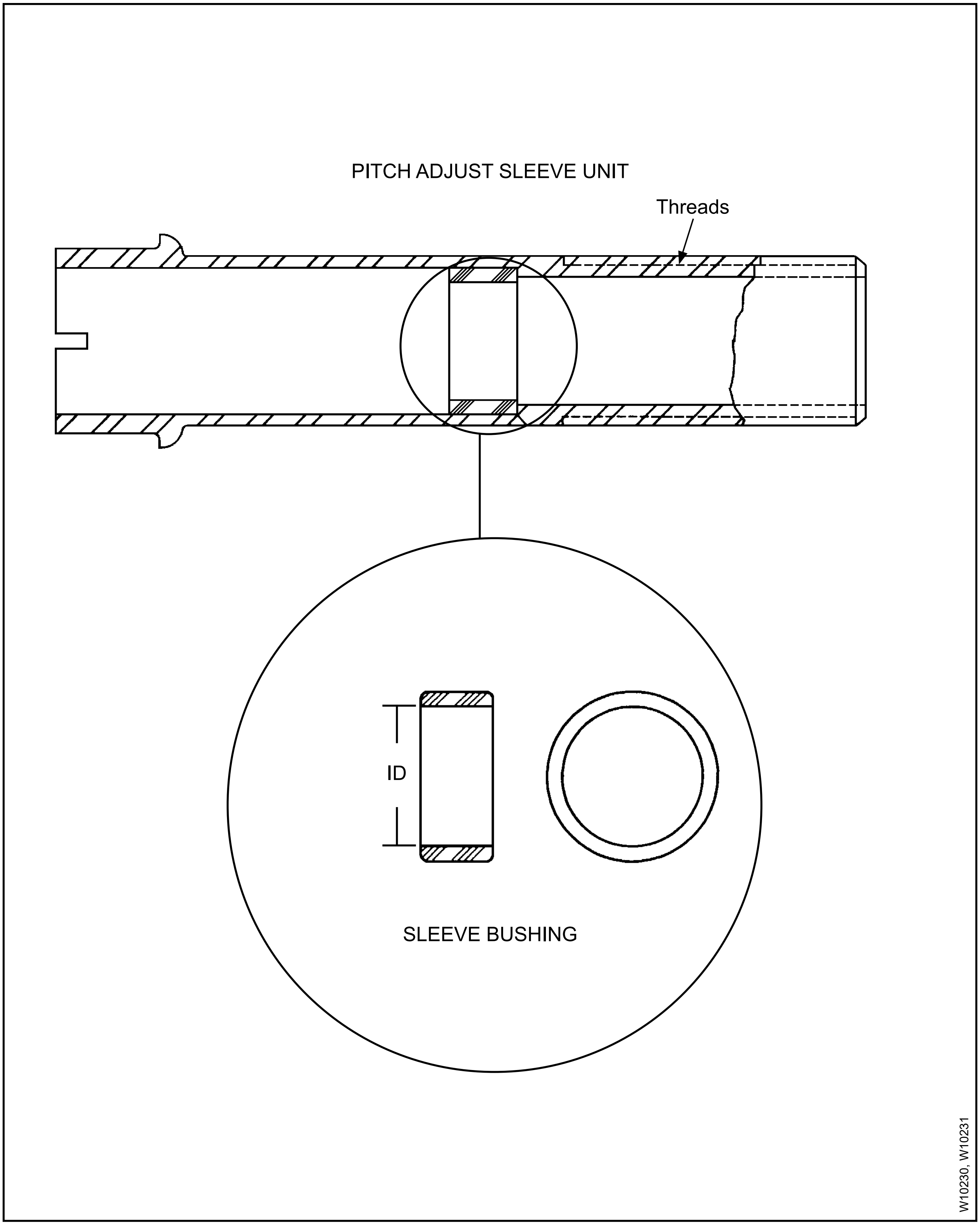
Inspect		Serviceable Limits	Corrective Action
K.	FEATHERING COMPRESSION SPRING (Item 110) Refer to Figure 5-11		
(1)	Visually examine the feathering compression spring for corrosion product and pitting.	Corrosion product is not permitted. If there is corrosion product, remove it in accordance with the 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 Inc.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 feathering compression spring.
(2)	Visually examine the feathering compression spring for wear, nicks, or other damage.	The maximum permitted depth of damage is 0.005 inch (0.12 mm).	If 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 Inc. Standard Practices Manual 202A (61-01-02).	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 plate or zinc chromate primer coverage.	A few random scratches are permitted; otherwise, complete coverage of zinc plate 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.



Spring Retainer, Flanged, p/n 101556
Figure 5-12

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
L. SPRING RETAINER, FLANGED, p/n 101556 (Item 120) Refer to Figure 5-12		
(1) Visually examine the flanged spring retainer for corrosion and pitting.	Corrosion is not permitted. The maximum permitted depth of pitting is 0.005 inch (0.12 mm).	Remove corrosion using glass bead cleaning in accordance with the Cleaning chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). If the pitting is greater than the permitted serviceable limits, replace the flanged spring retainer.
(2) Visually examine the flanged spring retainer for damage caused by the feathering spring.	The maximum permitted depth of damage is 0.010 inch (0.25 mm).	Remove material that is raised above the normal machined surface. If the depth of damage is greater than the permitted serviceable limits, replace the flanged spring retainer.
(3) Visually examine the flanged spring retainer for mechanically caused damage.	The maximum permitted depth of damage is 0.010 inch (0.25 mm).	If the depth of damage is greater than the permitted serviceable limits, replace the flanged spring retainer.
(4) Visually examine bore "A" for wear.	If there is wear, measure the ID of the bore. The maximum permitted ID is 1.066 inch (27.07 mm).	If the wear is greater than the permitted serviceable limits, replace the flanged spring retainer.
(5) Visually examine bore "B" for wear.	If there is wear, measure the ID of the bore. The maximum permitted ID is 1.260 inch (32.00 mm).	If the wear is greater than the permitted serviceable limits, replace the flanged spring retainer.
(6) Visually examine shoulder "C" for damage or wear.	A few areas of wear or damage are permitted. The surface must be flat enough to support the flanged spring retainer on the interfacing split retainer.	If the damage or wear is greater than the permitted serviceable limits, replace the flanged spring retainer.
(7) Penetrant inspect the flanged spring retainer in accordance with Penetrant Inspection chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).	A relevant indication is not permitted.	If there is a relevant indication, replace the flanged spring retainer.



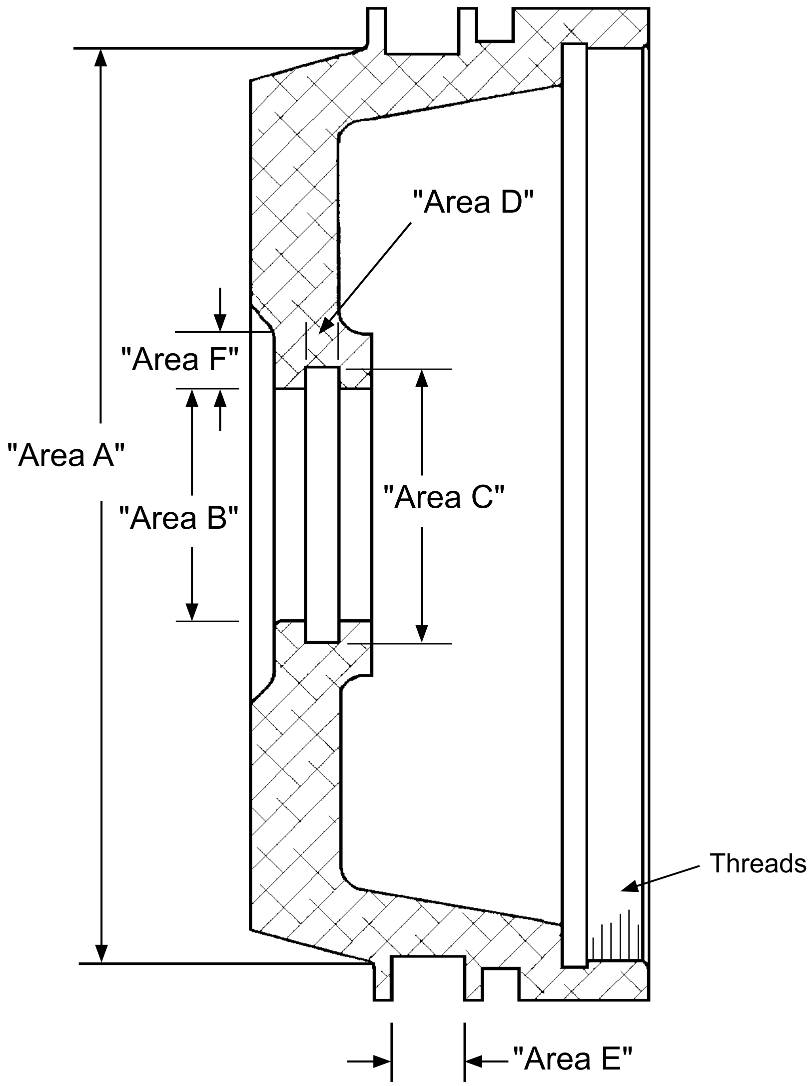
Pitch Adjust Sleeve Unit and Sleeve Bushing
Figure 5-13

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
M. PITCH ADJUST SLEEVE UNIT (Item 150) Refer to Figure 5-13		
(1) Visually examine the reverse adjust sleeve threads for damage.	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.
(2) Visually examine the pitch adjust sleeve unit for cadmium plating coverage.	A few scratches, corners with plating missing, and light wear of the plating from the threads because of nut installation is permitted; otherwise, complete cadmium plating coverage is required.	If cadmium plating coverage it less than the permitted serviceable limits, remove the sleeve bushing (170) and replate the reverse adjust sleeve in accordance with the Cadmium Replating chapter of Hartzell Propeller Inc. 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 Inc. 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.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
N. SLEEVE BUSHING (Item 170) Refer to Figure 5-13		
(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 (160) 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 (160) must be replated, install the sleeve bushing after plating.



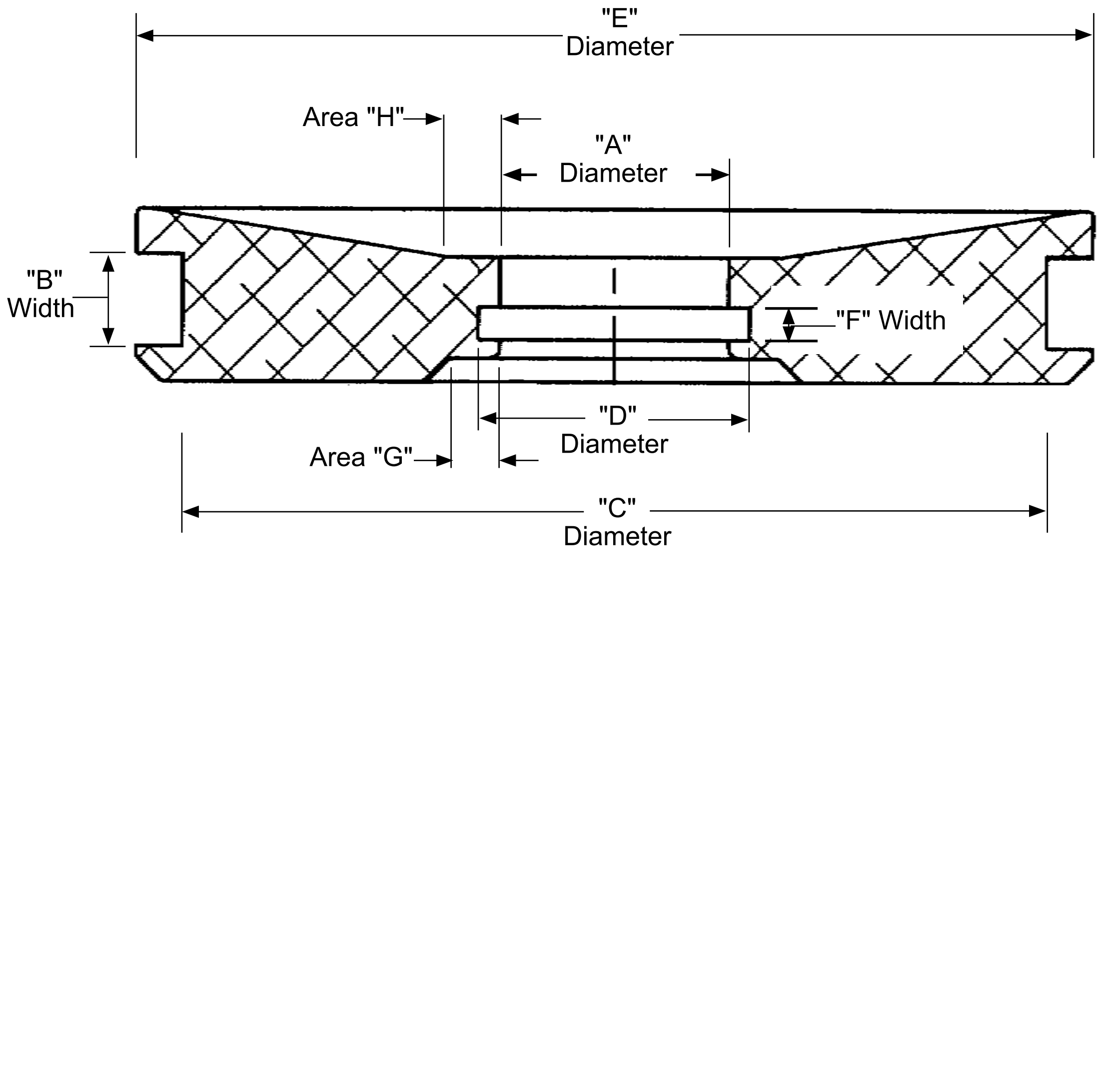
Piston - p/n C-492
Figure 5-14

Component Inspection Criteria
Table 5-1

Inspect		Serviceable Limits	Corrective Action
O. PISTON, p/n C-492 (Item 210) Refer to Figure 5-14			
(1)	Excluding the O-ring grooves, visually inspect the anodized surfaces of the piston for wear, nicks, scratches, or other damage.	The maximum permitted depth of wear, nicks, scratches, or other damage is 0.005 inch (0.12 mm).	If damage is greater than the permitted serviceable limits, replace the piston. If not already disassembled, disassemble the piston from the piston bushing. Replace the piston.
NOTE: The piston thread and spring pin hole inspections apply to pistons that use a start lock ring (215).			
(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 start lock piston ring or piston bushing onto the piston.	If damage is greater than the permitted serviceable limits, replace the piston.
(3)	Visually examine the number of spring pin holes in the piston.	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.
(4)	Visually examine the recessed area of the piston bore 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 properly on the pitch change rod shoulder.	If damage is greater 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 bore ID is 1.191 inch (30.25 mm).	If the ID is greater than the permitted serviceable limits, replace the piston.
(7)	Measure the piston O-ring groove ID (Area "C").	The maximum permitted O-ring groove ID is 1.416 inch (35.96 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, p/n C-492, continued (Item 210) Refer to Figure 5-14		
(8) Measure the piston O-ring groove width (Area "D").	The maximum permitted O-ring groove width in Area "D" is 0.180 inch (4.57 mm). The minimum permitted O-ring groove width in Area "D" is 0.163 inch (4.15 mm).	If the width is not within the permitted serviceable limits, replace the piston.
(9) Measure the piston O-ring groove width (Area "E").	The maximum permitted O-ring groove width in Area "E" is 0.385 inch (9.77 mm).	If the width is greater than the permitted serviceable limits, replace the piston.
(10) Penetrant inspect the piston in accordance with the Penetrant Inspection chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). CAUTION: DO NOT REMOVE THE ANODIZE COATING BEFORE PENETRANT INSPECTION.	A relevant indication is not permitted.	If there is a relevant indication, replace the piston.



PART NUMBER	"A" MAXIMUM DIAMETER	"B" MAXIMUM WIDTH	"C" MINIMUM DIAMETER	"D" MAXIMUM DIAMETER	"E" MINIMUM DIAMETER	"F" MAXIMUM WIDTH
107651	1.191 (30.25 mm)	0.492 (12.49 mm)	5.240 (133.10 mm)	1.416 (35.96 mm)	5.713 (145.12 mm)	0.180 (4.57 mm)

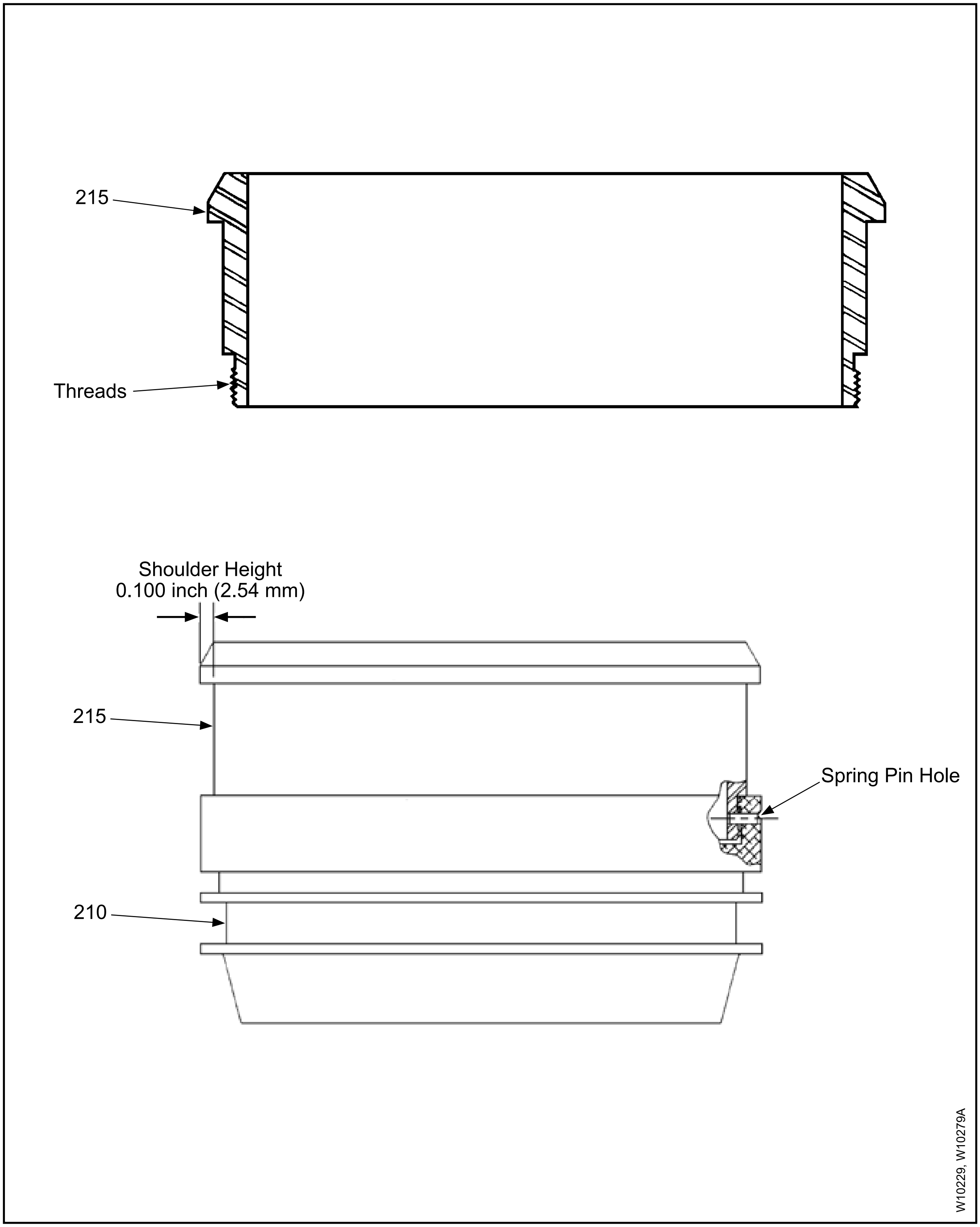
Piston - p/n 107651
Figure 5-14.1

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
O1. PISTON, p/n 107651 (Item 210) Refer to Figure 5-14.1		
(1) Visually examine all surfaces of the piston, not including O-ring grooves, area "G", and area "H", for wear, nicks, scratches, or other damage.	The maximum permitted depth of wear or damage is 0.005 inch (0.12 mm).	If the wear or damage is greater than the permitted serviceable limits, replace the piston.
(2) Visually examine all surfaces of the piston for corrosion and pitting.	Corrosion is not permitted. The maximum permitted diameter of an individual pit is 0.062 inch (1.57 mm). The maximum permitted depth of an individual pit is 0.005 inch (0.12 mm). Pin-point penetrant indications (during penetrant inspection) from corrosion pitting are permitted. A maximum of 10 non-linear pits within a 1 square inch (645 sq. mm) area are permitted. Pitting is not permitted in the O-ring groove ID or OD, but pitting in the O-ring groove side walls is permitted. Linear pitting is not permitted.	Except on O-ring grooves, O-ring groove side walls, diameter "E" OD, or diameter "A" ID, corrosion may be removed using glass bead cleaning. Refer to the Cleaning chapter of Hartzell Standard Practices Manual 202A (61-01-02). If corrosion or pitting is greater than the permitted serviceable limits, replace the piston.
(3) Measure the piston areas "A", "B", "C", "D", "E", and "F".	Refer to Figure 5-13 for the permitted limits for areas."A", "B", "C", "D", "E", and "F".	If any measurement is not within permitted serviceable limits, replace the piston.
(4) Visually examine the piston for anodize coverage.	A maximum of 10% of the base metal visible is permitted.	If the anodize coverage is less than the permitted serviceable limits, anodize the piston in accordance with the Chromic Acid Anodizing chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).
(5) Visually examine area "G" around the entire circumference of the center hole for scoring and gouging caused by pitch change rod wrenching flats.	The maximum permitted depth of damage is 0.020 inch (0.50 mm). Sufficient flat surface must remain to correctly support the pitch change rod shoulder.	If damage is greater than the permitted serviceable limits, replace the piston.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
O1. PISTON, p/n 107651, CONTINUED (Item 210) Refer to Figure 5-14.1		
(6) Visually examine area "H" around the entire circumference for scoring and gouging caused by the hex nut.	The maximum permitted depth of damage is 0.020 inch (0.50 mm). Sufficient flat surface must remain to correctly support the hex nut.	If damage is greater than the permitted serviceable limits, replace the piston.
(7) Penetrant inspect the piston in accordance with the Hartzell Propeller Inc. 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, replace the piston.



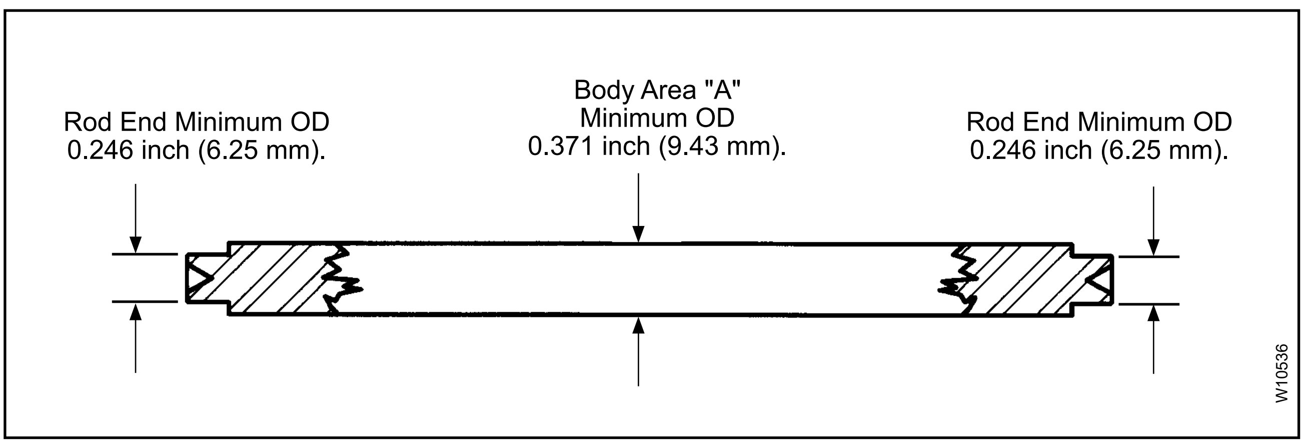
Start Lock Piston Ring
Figure 5-15

Component Inspection Criteria
Table 5-1

	Inspect	Serviceable Limits	Corrective Action
P.	START LOCK PISTON RING (Item 215) Refer to Figure 5-15		
(1)	Visually examine the threads of the start lock piston ring for corrosion product or damage.	Corrosion product 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 Inc. 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 hole.	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 Inc. 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 Inc. 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.

Component Inspection Criteria
Table 5-1

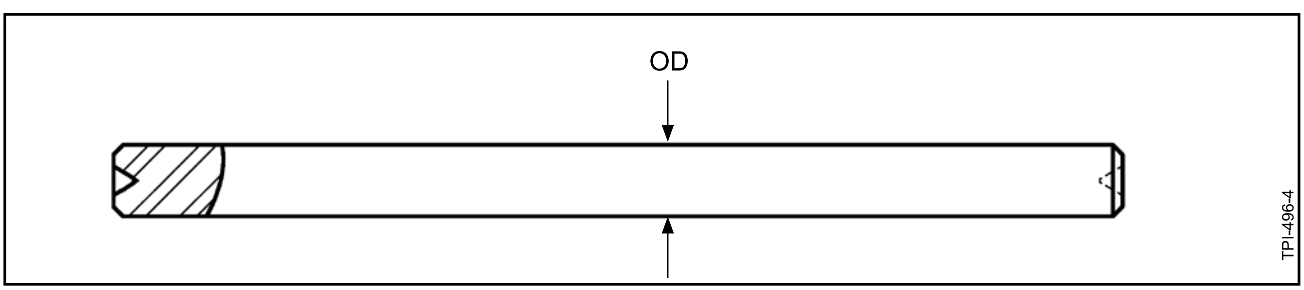
Inspect	Serviceable Limits	Corrective Action
Q. ANTI-ROTATION ROD, p/n B-7370 (Item 250) Refer to Figure 5-16		
(1) Visually examine each anti-rotation rod for bending.	Bending is not permitted.	If there is bending, replace the anti-rotation rod.
(2) Visually examine each anti-rotation rod for corrosion product and pitting.	Corrosion product or pitting is not permitted.	If there is corrosion product or pitting, replace the anti-rotation rod.
(3) Measure the OD of each anti-rotation rod end.	The minimum OD permitted is 0.246 inch (6.25 mm).	If the diameter is less than the permitted serviceable limits, replace the anti-rotation rod.
(4) Visually examine the OD of each anti-rotation rod Body Area "A" for wear.	If the anti-rotation rod Body Area "A" shows wear, measure the wear. The minimum OD permitted is 0.371 inch (9.43 mm).	If the diameter is less than the permitted serviceable limits, replace the anti-rotation rod.
(5) Magnetic particle inspect the anti-rotation rod in accordance with Hartzell Standard Practices Manual 202A (61-01-02).	A relevant indication is not permitted.	If a relevant indication cannot be removed within the permitted serviceable limits, replace the anti-rotation rod.



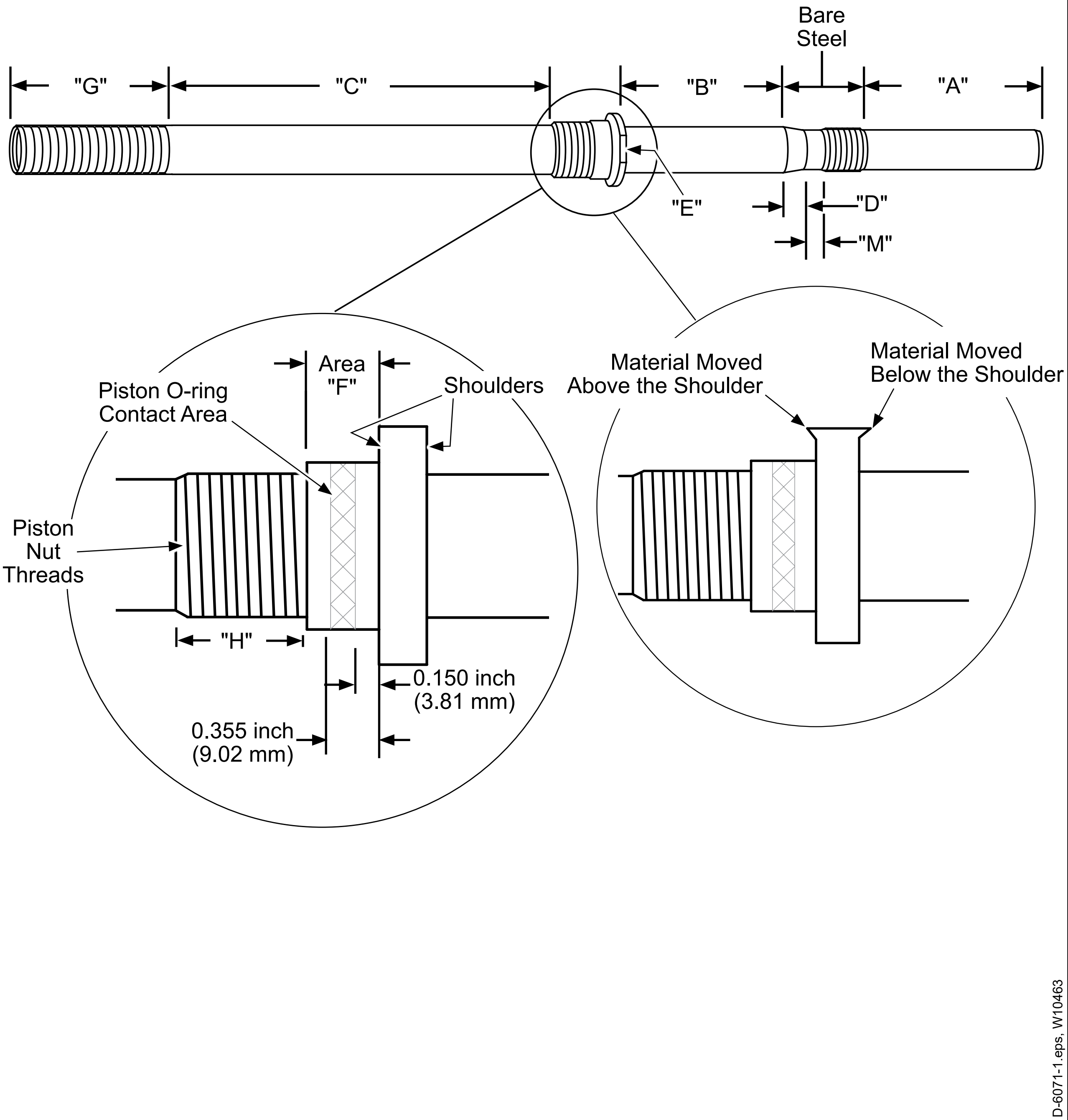
Anti-rotation Rod, p/n B-7370
Figure 5-16

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
Q1. ANTI-ROTATION ROD, p/n 106004 (Item 250) Refer to Figure 5-16.1		
(1) Visually examine each anti-rotation rod for damage.	Damage that affects the fit and function of the anti-rotation rod is not permitted.	If the damage is greater than the permitted serviceable limits, replace the anti-rotation rod.
(2) Visually examine each anti-rotation rod for bending.	Bending is not permitted.	If there is bending, replace the anti-rotation rod.
(3) Visually examine each anti-rotation rod for corrosion product and pitting.	Corrosion product or pitting is not permitted.	If there is corrosion product or pitting, replace the anti-rotation rod.
(4) Visually examine the OD of each anti-rotation rod for wear.	If there is wear, measure the OD of the anti-rotation rod. The minimum OD permitted is 0.367 inch (9.33 mm). Wear through the hard chrome plating is not permitted.	If the wear is greater than the permitted serviceable limits, replace the anti-rotation rod.
(5) Visually examine the hard chrome plating coverage on each anti-rotation rod.	Hard chrome plating must completely cover the OD of the anti-rotation rod.	If the hard chrome plating coverage is less than the permitted serviceable limits, replace the anti-rotation rod.
(6) Perform magnetic particle inspection of each anti-rotation rod in accordance with the Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).	A relevant indication is not permitted.	If there is a relevant indication, replace the anti-rotation rod.



Anti-rotation Rod, p/n 106004
Figure 5-16.1



Pitch Change Rod - p/n D-6506 and 103872
Figure 5-17

Component Inspection Criteria
Table 5-1

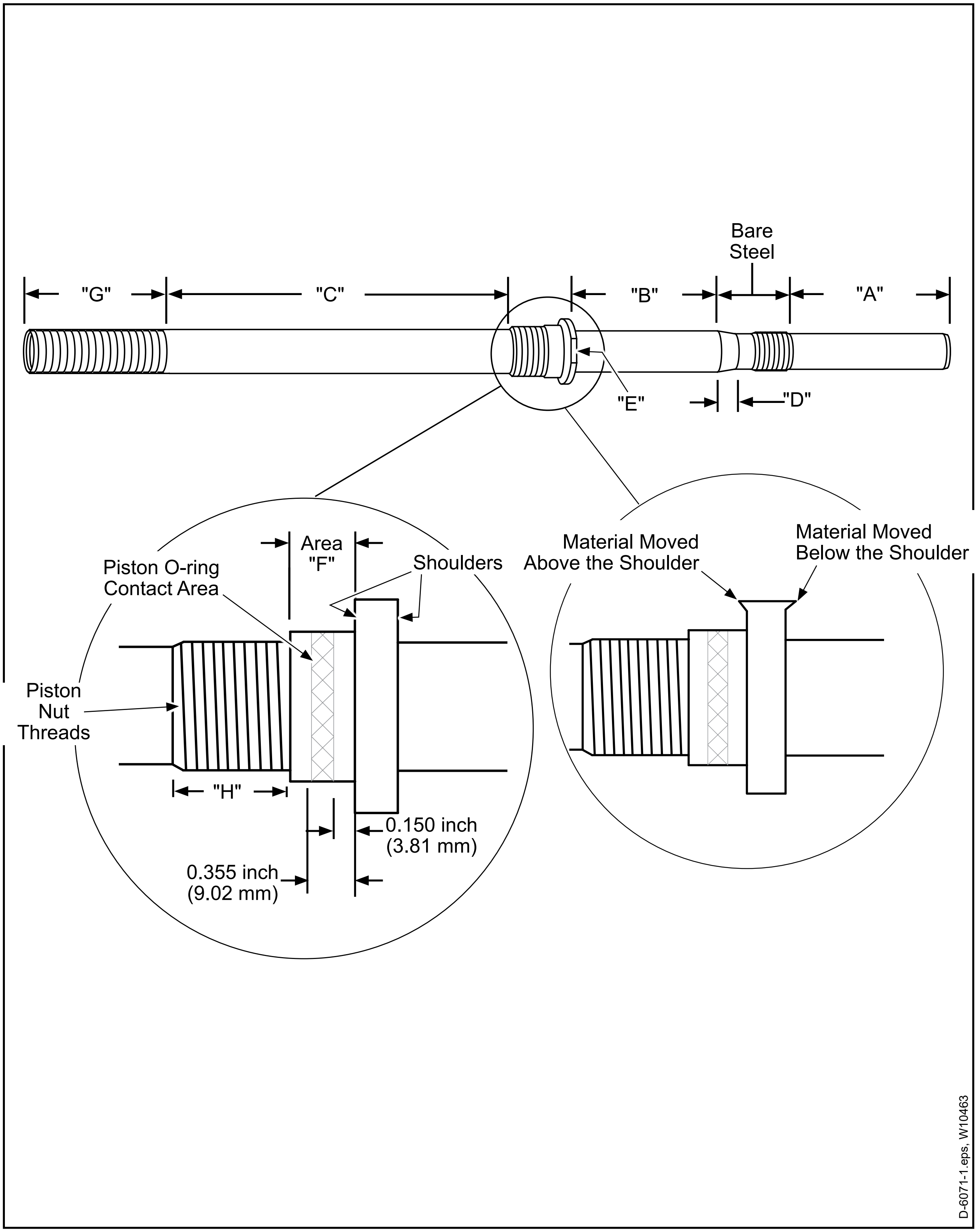
Inspect	Serviceable Limits	Corrective Action
R. PITCH CHANGE ROD, p/n D-6506 and 103872 (Item 270) Refer to Figure 5-17		
(1) Visually examine the pitch change rod for corrosion product and pitting.	Except where specifically permitted in this section, corrosion product is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits. Pitting is not permitted.	Remove corrosion product using glass bead cleaning. Refer to the Cleaning chapter of Hartzell Propeller Inc. 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 pitch change rod.
(2) Visually examine the pitch change rod for chrome plate coverage (Areas "A", "B", and "C").	Minor wear on corners and random light scratches are permitted; otherwise, complete coverage is required.	If the chrome plate coverage is less than the permitted serviceable limits, return the pitch change rod to Hartzell Propeller Inc.
(3) Visually examine the pitch change rod threads for Cadmium plate coverage (Areas "G" and "H").	Minor wear on corners and random light scratches are permitted; otherwise, complete coverage is required.	If the coverage is less than the permitted serviceable limits, cadmium replate the threaded areas of the pitch change rod in accordance with the Cadmium Re-plating chapter of the Hartzell Propeller Inc. 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. Damaged threads must not interfere with mating part threads.	If damage is greater than the permitted serviceable limits, replace the pitch change rod.
(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.

Component Inspection Criteria
Table 5-1

	Inspect	Serviceable Limits	Corrective Action
R.	PITCH CHANGE ROD, p/n D-6506 and 103872, continued (Item 270) Refer to Figure 5-17		
(7)	Visually examine the pitch change rod OD 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 corrosion product, pitting, 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 or damage is 0.007 inch (0.178 mm).	Using an abrasive pad CM47, or equivant, polish to remove damage or pitting. If the corrosion product cannot be removed or if damage is greater than the permitted serviceable limits, replace the pitch change rod.
(11)	Using a borescope or fiber optic flashlight, 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 Inc. Standard Practices Manual 202A (61-01-02).

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
R. PITCH CHANGE ROD, p/n D-6506 and 103872, continued (Item 270) Refer to Figure 5-17		
(12) 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 is less than the permitted serviceable limits, replace the pitch change rod.
(13) Magnetic particle inspect the pitch change rod in accordance with the Magnetic Particle Inspection chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).	A relevant indication is not permitted.	If there is a relevant indication, replace the pitch change rod.



Pitch Change Rod - p/n 106212
Figure 5-17.1

Component Inspection Criteria
Table 5-1

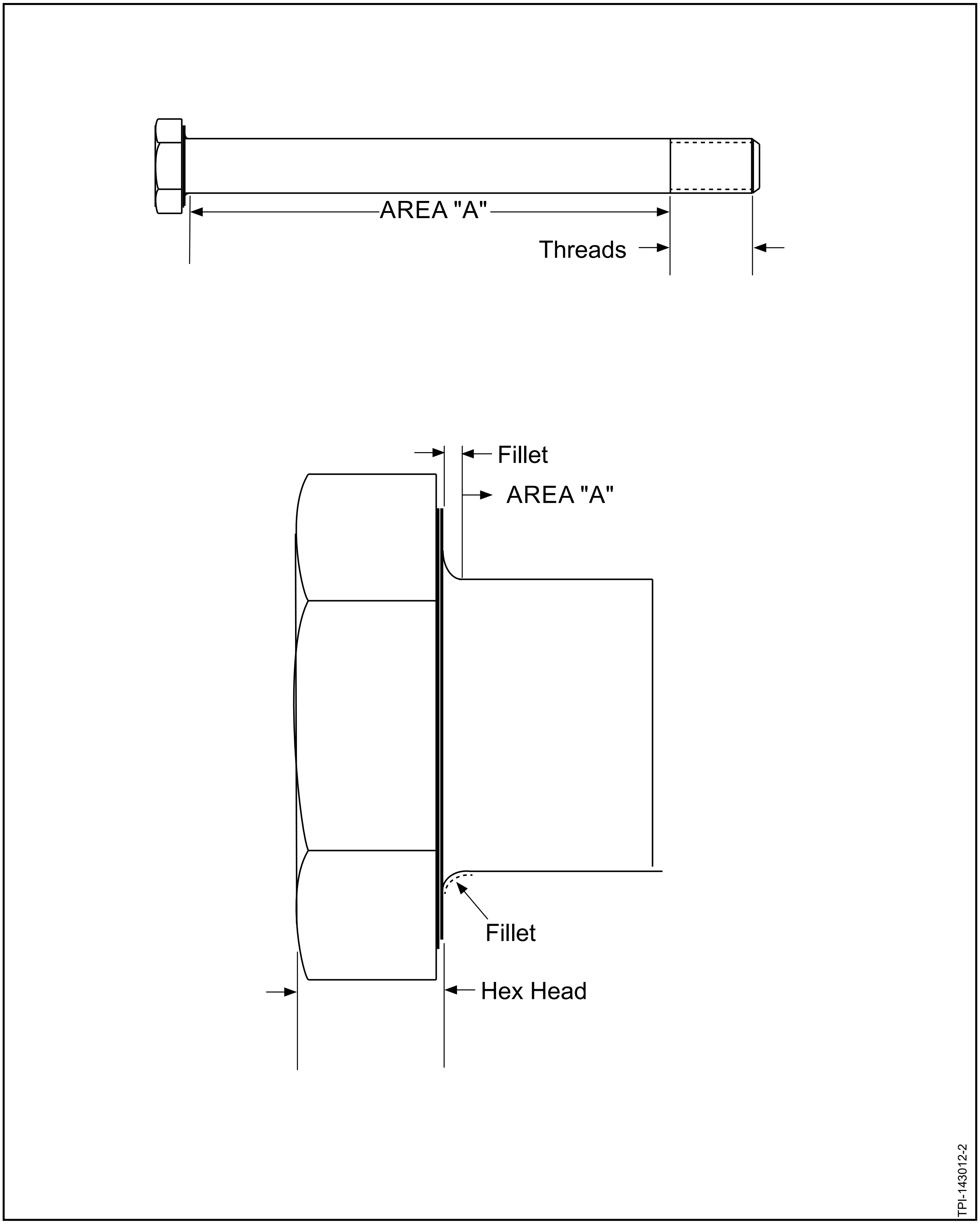
Inspect		Serviceable Limits	Corrective Action
R1.	PITCH CHANGE ROD, p/n 106212 (Item 270) Refer to Figure 5-17.1		
(1)	Visually examine the pitch change rod for corrosion product and pitting.	Except where specifically permitted in this section, corrosion product is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits. Pitting is not permitted.	Remove corrosion product using glass bead cleaning. Refer to the Cleaning chapter of Hartzell Propeller Inc. 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 pitch change rod.
(2)	Visually examine the pitch change rod for chrome plate coverage (Areas "A", "B", and "C").	Minor wear on corners and random light scratches are permitted; otherwise, complete coverage is required.	If the chrome plate coverage is less than the permitted serviceable limits, return the pitch change rod to Hartzell Propeller Inc.
(3)	Visually examine the pitch change rod threads for Cadmium plate coverage (Areas "G" and "H").	Minor wear on corners and random light scratches are permitted; otherwise, complete coverage is required.	If the coverage is less than the permitted serviceable limits, cadmium replate the threaded areas of the pitch change rod in accordance with the Cadmium Re-plating chapter of the Hartzell Propeller Inc. 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. Damaged threads must not interfere with mating part threads.	If damage is greater than the permitted serviceable limits, replace the pitch change rod.
(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.

Component Inspection Criteria
Table 5-1

	Inspect	Serviceable Limits	Corrective Action
R1.	PITCH CHANGE ROD, p/n 106212 (Item 270) Refer to Figure 5-17.1		
(7)	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.
(8)	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.
(9)	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 corrosion product, pitting, 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 or damage is 0.007 inch (0.178 mm).	Using an abrasive pad CM47, or equivant, polish to remove damage or pitting. If the corrosion product cannot be removed or if damage is greater than the permitted serviceable limits, replace the pitch change rod.
(10)	Using a borescope or fiber optic flashlight, 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 Inc. Standard Practices Manual 202A (61-01-02).

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
R1. PITCH CHANGE ROD, p/n 106212, continued (Item 270) Refer to Figure 5-17.1		
(11) Measure the pitch change rod OD in areas "A", "B", and "C".	The minimum permitted OD in Area "A" is 0.870 inch (22.10 mm). The minimum permitted OD in Area "B" is 1.058 inch (26.88 mm). The minimum permitted OD in Area "C" is 0.994 inch (25.25 mm).	If the OD is less than the permitted serviceable limits, replace the pitch change rod.
(12) Magnetic particle inspect the pitch change rod in accordance with the Magnetic Particle Inspection chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).	A relevant indication is not permitted.	If there is a relevant indication, replace the pitch change rod.

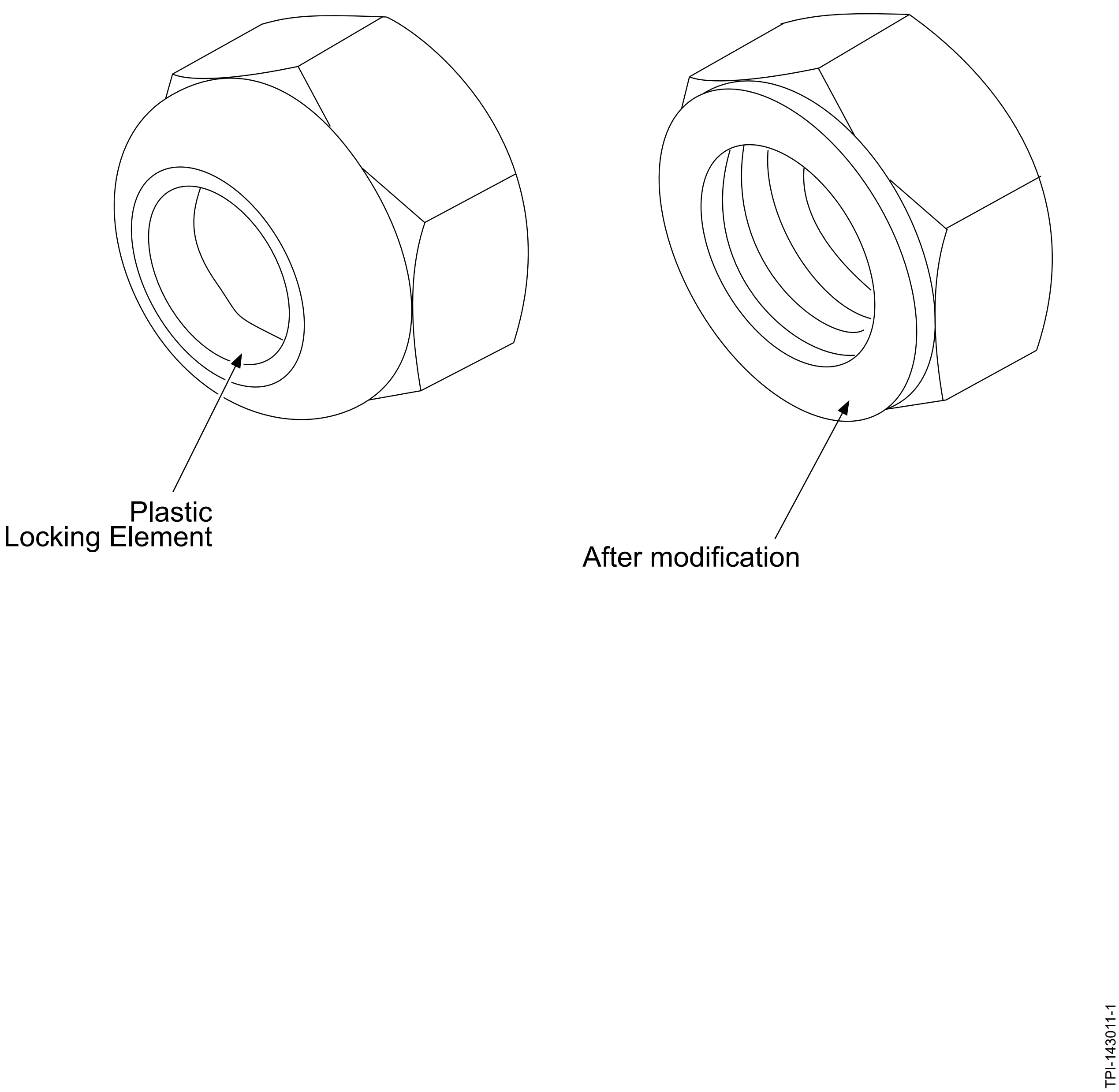


Hex Head Bolt
Figure 5-18

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
S. HEX HEAD BOLT (Item 430) Refer to Figure 5-18		
(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 that 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.	Corrosion product may be removed using glass bead cleaning. Refer to the Cleaning chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). 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 heax 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 the scoring is greater than the permitted serviceable limits or 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.

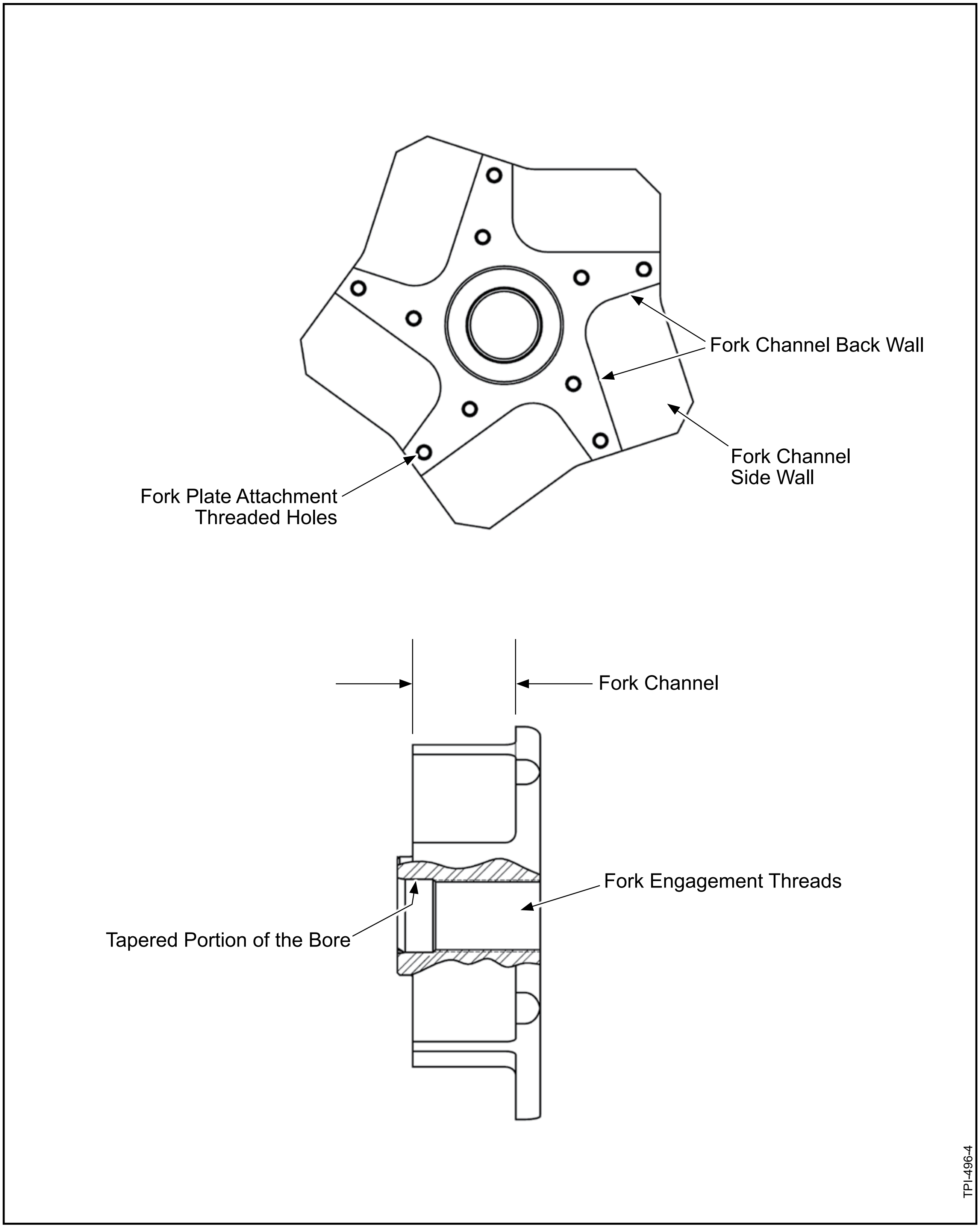
NOTE: Machine the nut to remove the plastic locking element and metal housing - or alternately, remove the plastic locking element only.



A-2043-1 Nut Modification
Figure 5-18.1

Component Inspection Criteria
Table 5-1

Inspect		Serviceable Limits	Corrective Action
S.	HEX HEAD BOLT, CONTINUED (Item 430) Refer to Figure 5-18 and Figure 18.1		
(5)	Visually examine the threads of the hex head bolt for damage and pitting.	A maximum total accumulation of damage and pitting of 3/4 thread 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 5-18.1.	Limited thread file repair is permitted, but must be considered as thread damage. If the damage and pitting is 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 Inc. 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 theads, or minor abrading of the cadmium plating on the hex head because of wrenching are permitted.	Cadmium replate and bake for a minimum of 23 hours within four hours after plating the hex head bolt in accordance the Cadmium Replating chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).



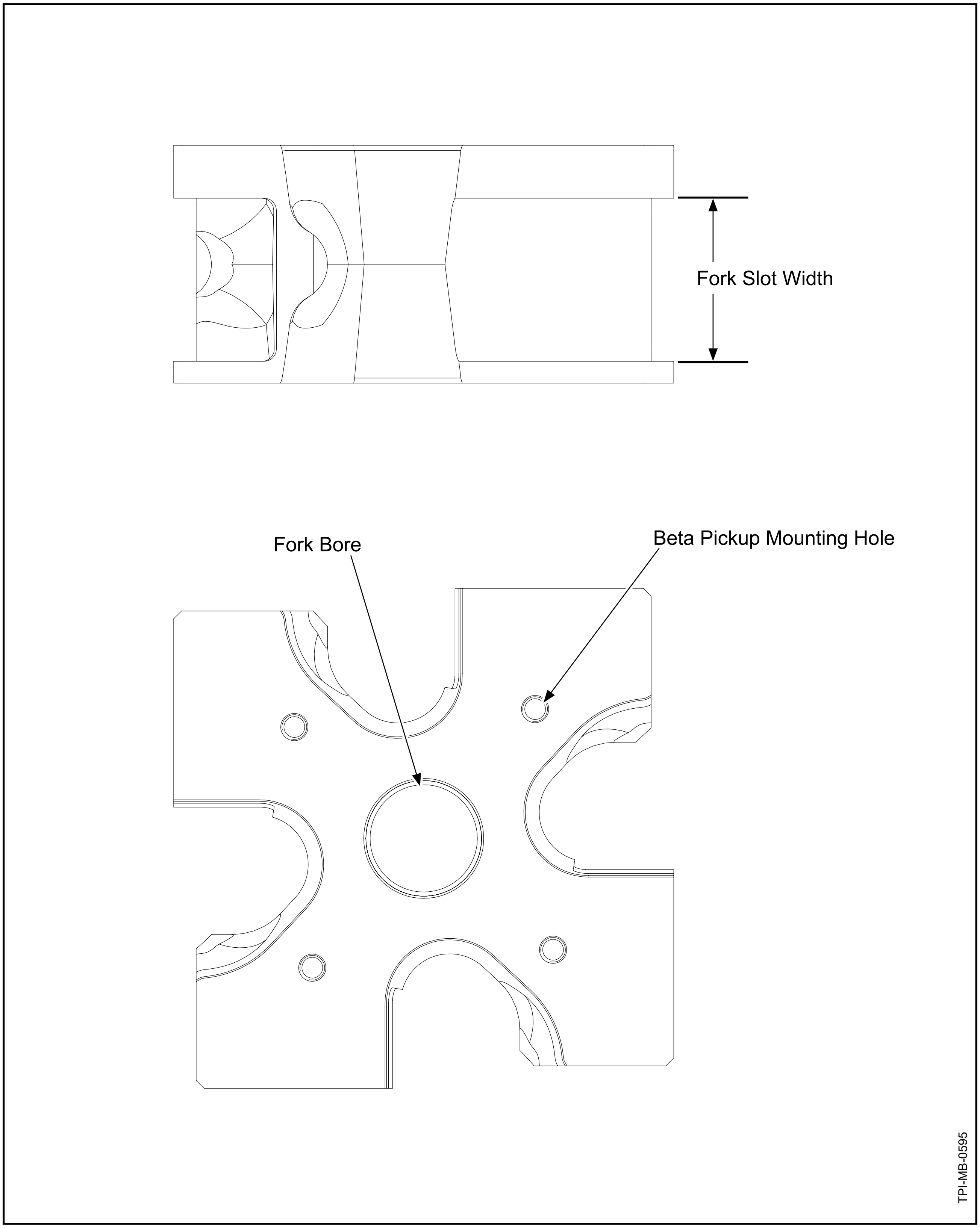
Fork - p/n 106066 and 107361
Figure 5-19

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
T. FORK, p/n 106066 and 107361 (Item 500) Refer to Figure 5-19		
(1) Visually examine the fork for corrosion product, pitting, or damage.	Corrosion product is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits. The maximum depth of pitting is 0.005 inch (0.12 mm). The maximum permitted total area of damage is 0.5 square inch (322 square mm). The maximum permitted diameter of an individual pit is 0.032 inch (0.81 mm). A maximum of 10 non-linear pits within a 1 square inch (645 square mm) area are permitted. Linear pitting is not permitted.	Remove corrosion product using glass bead cleaning. Refer to the Cleaning chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). If the corrosion product cannot be removed or if the pitting or damage is greater than the permitted serviceable limits, replace the fork.
(2) Visually examine the pitch change rod engagement threads of the fork bore for damage.	One thread of total accumulated damage is permitted.	If the damage is greater than the permitted serviceable limits, replace the fork.
(3) Visually examine the fork plate attachment threaded holes (10) for damage.	One thread of total accumulated damage in each hole is permitted.	If the 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.	If there is wear or damage, measure the depth of wear or damage. The maximum permitted depth of wear or damage is 0.003 inch (0.07 mm).	If the wear or damage is greater than the permitted serviceable limits, replace the fork.
(5) Visually examine the fork channel side wall and fork channel back wall for wear or damage.	If there is wear or damage, measure the depth of wear or damage. The maximum permitted depth of wear or damage is 0.008 inch (0.20 mm) compared with the adjacent undamaged surface.	If the wear or damage is greater than the permitted serviceable limits, replace the fork.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
T. FORK, p/n 106066 and 107361, continued (Item 500) Refer to Figure 5-19		
(6) Visually examine the external surfaces, not including the fork channel surfaces and pitch change rod bore, for wear, nicks, scratches, or other damage.	If there is wear or damage, measure the depth of wear or damage. The maximum permitted depth of wear or damage is 0.005 inch (0.12 mm).	If the wear or damage is greater than the permitted serviceable limits, replace the fork.
(7) Perform magnetic particle inspection of the fork in accordance with the Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).	A relevant indication is not permitted.	If a relevant indication is within the permitted serviceable limits, repair it in accordance with the Corrective Action in this table. If the relevant indication is not within the permitted serviceable limits, replace the fork.
(8) Visually examine the fork for cadmium plate 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 plate must cover the fork.	If the cadmium plating coverage is less then the permitted serviceable limits, cadmium replate the fork in accordance with the Cadmium Replating chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).



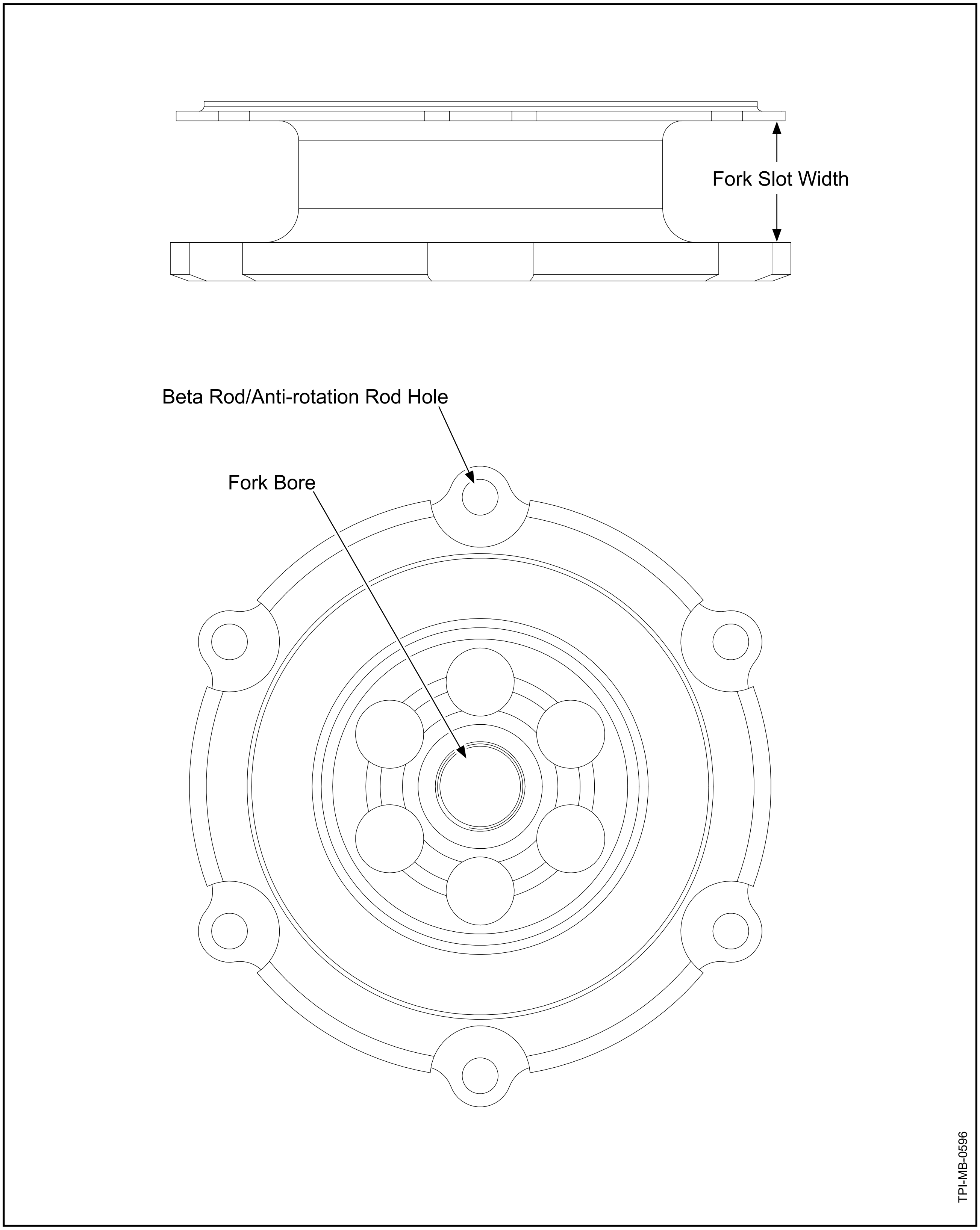
Fork - p/n 107094
Figure 5-19.1

Component Inspection Criteria
Table 5-1

Inspect		Serviceable Limits	Corrective Action
T1.	FORK, p/n 107094 (Item 500) Refer to Figure 5-19.1		
	(1) Visually examine the fork (excluding the slots, threaded bore and tapered section of the bore) for corrosion, pitting, wear, scratches, or other damage.	Corrosion is not permitted. If there is corrosion, remove it in accordance with the Corrective Action in this table. The maximum permitted depth of pitting, wear, scratches, or damage is 0.003 inch (0.07 mm).	Remove corrosion using glass bead cleaning in accordance with Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). If corrosion cannot be removed, or if the depth of wear, scratches, or damage is greater than the permitted serviceable limits, replace the fork.
	(2) 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.
	(3) 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.
	(4) Visually examine the spacer mounting holes for thread damage, if applicable.	One thread total accumulated damage is permitted.	If damage is greater than the permitted serviceable limits, replace the fork.
	(5) 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.
	(6) 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.
	(7) Measure the width of each fork slot.	The maximum fork slot width is 1.266 inches (32.15 mm).	If the slot width is greater than the permitted serviceable limits, replace the fork.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
T1. FORK, p/n 107094, CONTINUED (Item 500) Refer to Figure 5-19.1		
(8) Magnetic particle inspect the fork in accordance with the Magnetic Particle Inspection chapter of the Hartzell Propeller Inc.Standard Practices Manual 202A (61-01-02).	A relevant indication is not permitted.	If there is a relevant indication, replace the fork.
(9) Visually examine the fork for cadmium plate 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 plate must cover the fork.	If the cadmium plating coverage is less than the permitted serviceable limits, cadmium replate the fork in accordance with the Cadmium Replating chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).



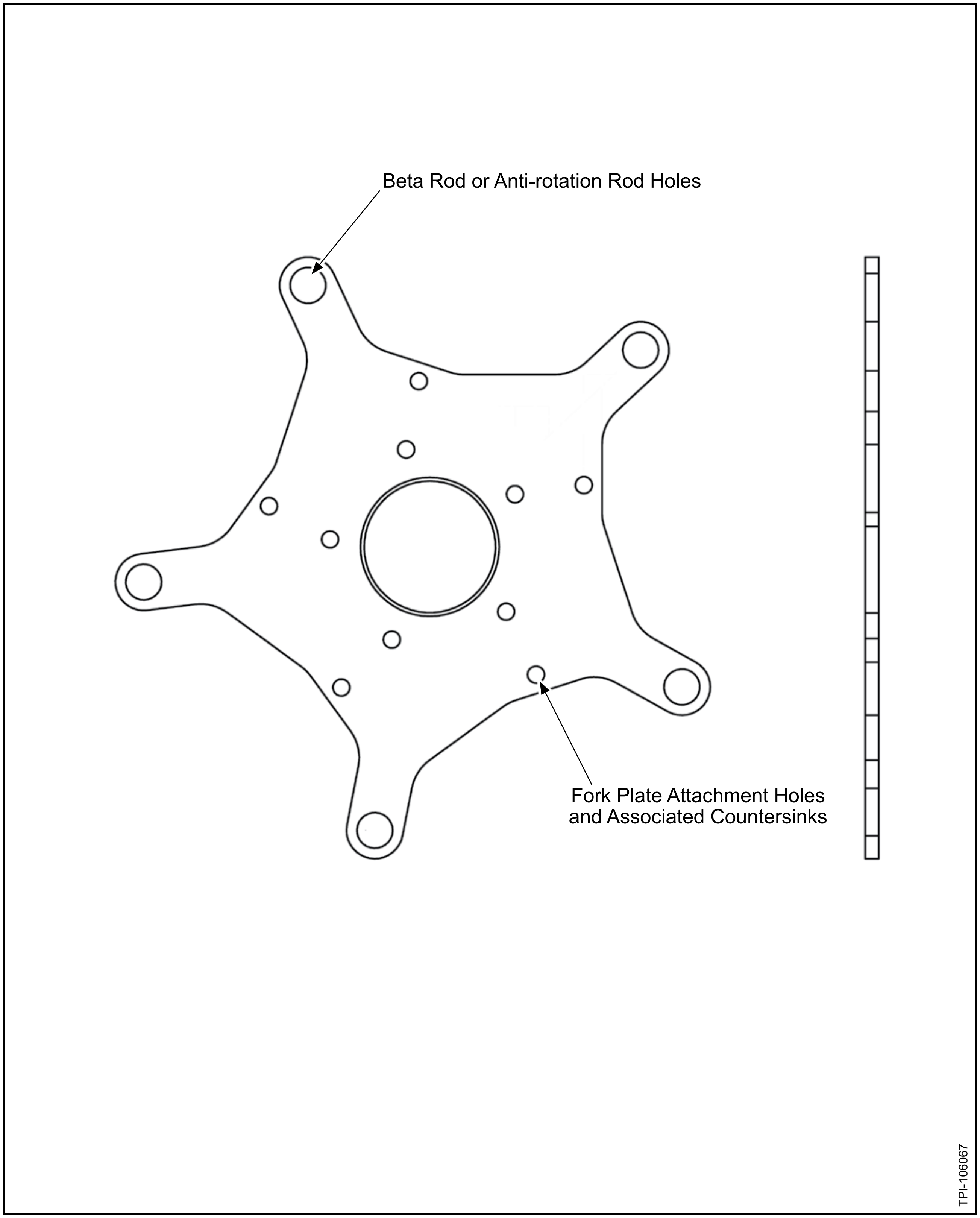
Fork - p/n 108044
Figure 5-19.2

Component Inspection Criteria
Table 5-1

Inspect		Serviceable Limits	Corrective Action
T2.	FORK, p/n 108044 (Item 500) Refer to Figure 5-19.2		
	(1) Visually examine the fork (excluding the slots, threaded bore and tapered section of the bore) for corrosion, pitting, wear, scratches, or other damage.	Corrosion is not permitted. If there is corrosion, remove it in accordance with the Corrective Action in this table. The maximum permitted depth of pitting, wear, scratches, or damage is 0.003 inch (0.07 mm).	Remove corrosion using glass bead cleaning in accordance with Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). If corrosion cannot be removed, or if the depth of wear, scratches, or damage is greater than the permitted serviceable limits, replace the fork.
	(2) 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.
	(3) 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.
	(4) 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.
	(5) Measure the width of each fork slot.	The maximum fork slot width is 1.266 inches (32.15 mm).	If the slot width is greater than the permitted serviceable limits, replace the fork.
	(6) Measure the ID of the six beta rod/anti-rotation rod holes.	The maximum permitted ID of the beta rod/anti-rotation rod holes is 0.405 inch (10.28 mm).	If the ID is greater than the permitted serviceable limits, replace the fork.

Component Inspection Criteria
Table 5-1

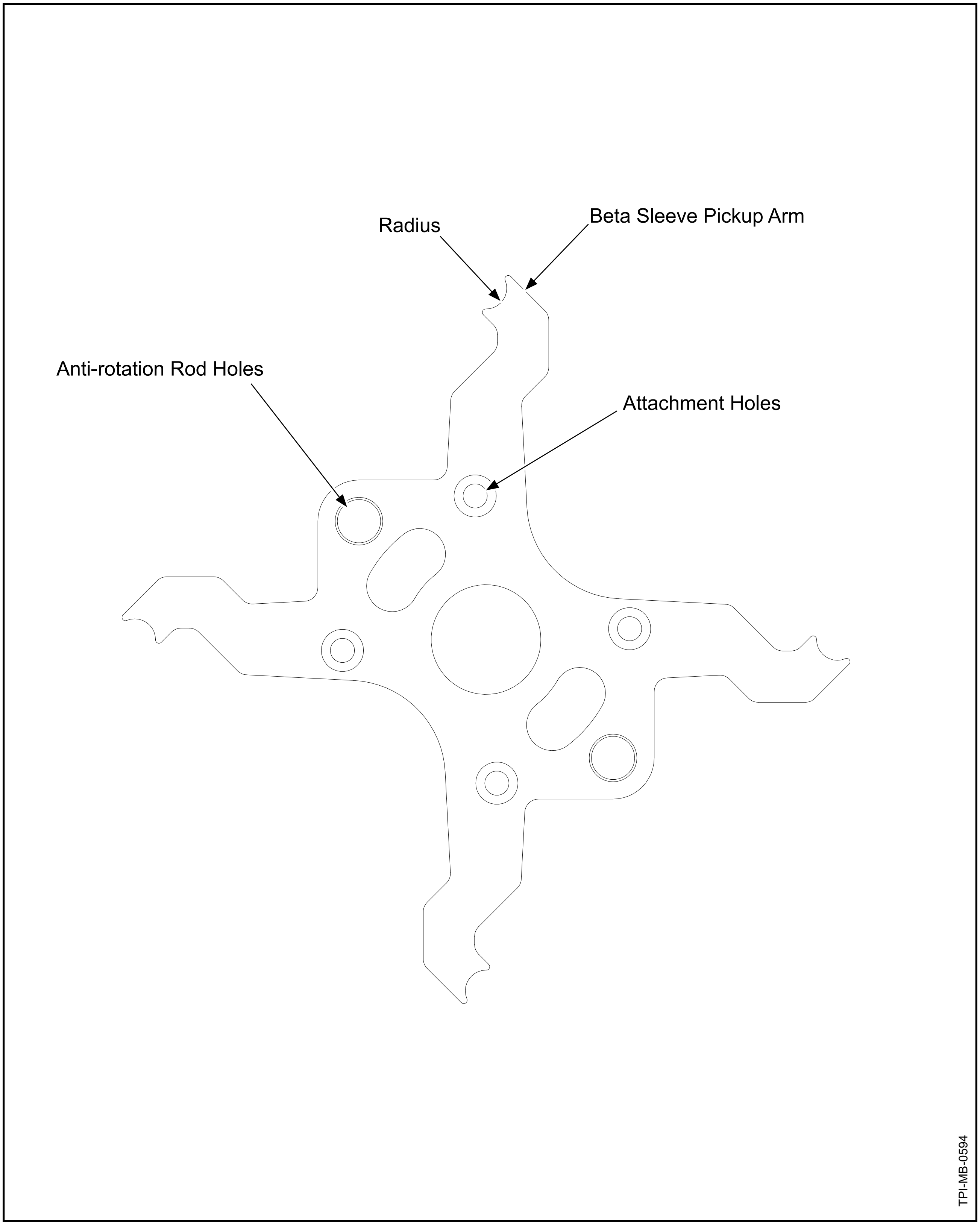
Inspect	Serviceable Limits	Corrective Action
T2. FORK, p/n 108044, CONTINUED (Item 500) Refer to Figure 5-19.2		
(7) Magnetic particle inspect the fork in accordance with the Magnetic Particle Inspection chapter of the Hartzell Propeller Inc.Standard Practices Manual 202A (61-01-02).	A relevant indication is not permitted.	If there is a relevant indication, replace the fork.
(8) Visually examine the fork for cadmium plate 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 plate must cover the fork.	If the cadmium plating coverage is less than the permitted serviceable limits, cadmium replate the fork in accordance with the Cadmium Replating chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).



Fork Plate
Figure 5-20

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
U. PLATE, FORK (Item 510) Refer to Figure 5-20		
(1) Visually examine the fork plate for corrosion product, pitting, nicks, scratches, or other damage.	Corrosion product is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits. If the fork plate is damaged, dimensionally inspect it. The maximum permitted depth of damage is 0.005 inch (0.12 mm). The maximum permitted total area of damage is 1 square inch (645 square mm). The maximum permitted diameter of an individual pit is 0.032 inch (0.81 mm). A maximum of 10 non-linear pits within a 1 square inch (645 square mm) area are permitted. Linear pitting is not permitted.	Remove corrosion product using glass bead cleaning. Refer to the Cleaning chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). If the corrosion product cannot be removed, replace the fork plate. If damage is greater than the permitted serviceable limits, replace the fork plate.
(2) Visually examine the fork plate for wear from the cam follower.	If there is wear, measure the depth of wear. The maximum permitted depth of wear is 0.003 inch (0.07 mm).	If the wear is greater than the permitted serviceable limits, replace the fork plate.
(3) Visually examine the fork plate attachment holes for wear or damage.	If there is wear or damage, measure the depth of wear or damage. The maximum permitted depth of wear or damage is 0.003 inch (0.07 mm).	If the wear or damage is greater than the permitted serviceable limits, replace the fork plate.
(4) Visually examine the fork plate for cadmium plating coverage.	A maximum of 10% of the base metal visible is permitted.	If cadmium plating coverage is less than the permitted serviceable limits, cadmium replate and bake the fork plate in accordance with the Cadmium Replating chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).
(5) Measure the ID of each beta rod hole (3) and anti-rotation rod hole (2) in the fork plate.	The maximum permitted ID of each beta rod or anti-rotation rod hole is 0.405 inch (10.28 mm).	If the ID is greater than the permitted serviceable limits, replace the fork plate.



Beta Pickup
Figure 5-21

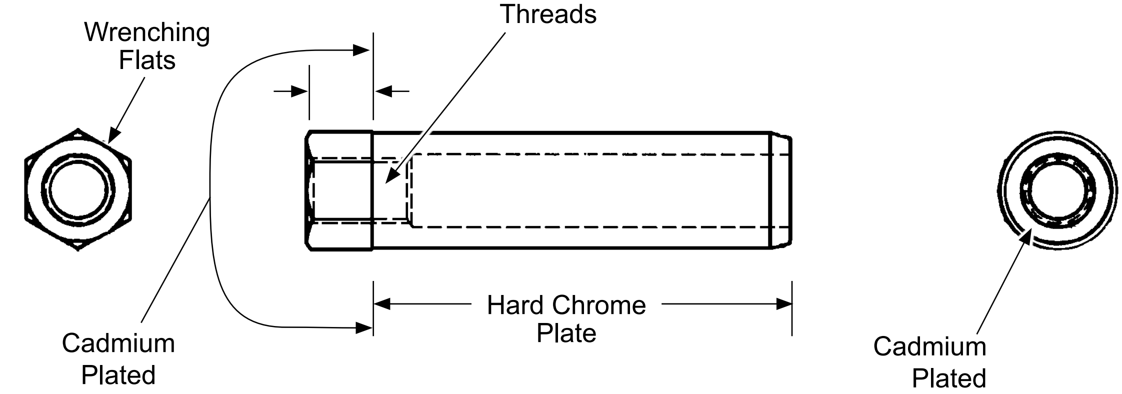
Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
U1. BETA PICKUP (Item 515) Refer to Figure 5-21		
(1) Visually examine the beta pickup for corrosion product, pitting, nicks, scratches, or other damage.	Corrosion product is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits. If the beta pickup is damaged, dimensionally inspect it. The maximum permitted depth of damage is 0.004 inch (0.10 mm). The maximum permitted total area of damage is 1 square inch (645 square mm). The maximum permitted diameter of an individual pit is 0.032 inch (0.81 mm). A maximum of 10 non-linear pits within a 1 square inch (645 square mm) area are permitted. Linear pitting is not permitted.	Remove corrosion product using glass bead cleaning. Refer to the Cleaning chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). If the corrosion product cannot be removed, replace the beta pickup. If damage is greater than the permitted serviceable limits, replace the beta pickup.
(2) Visually examine the radius of each beta sleeve pickup arm for wear.	Wear that exceeds a radius of 0.200 inch (5.08 mm) is not permitted.	If the wear is greater than the permitted serviceable limits, replace the beta pickup.
(3) Visually examine the beta pickup attachment holes for wear or damage.	If there is wear or damage, measure the depth of wear or damage. The maximum permitted depth of wear or damage is 0.003 inch (0.07 mm).	If the wear or damage is greater than the permitted serviceable limits, replace the beta pickup.
(4) Measure the ID of the anti-rotation rod holes in the beta pickup.	The maximum permitted ID of each beta rod or anti-rotation rod hole is 0.405 inch (10.28 mm).	If the ID is greater than the permitted serviceable limits, replace the beta pickup.
(5) Perform magnetic particle inspection of the fork in accordance with the Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).	A relevant indication is not permitted.	If there is a relevant indication, replace the fork.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
U1. BETA PICKUP, CONTINUED (Item 515) Refer to Figure 5-21		
(6) Visually examine the beta pickup for cadmium plating coverage.	A maximum of 10% of the base metal visible is permitted.	If cadmium plating coverage is less than the permitted serviceable limits, cadmium replate and bake the beta pickup in accordance with the Cadmium Replating chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

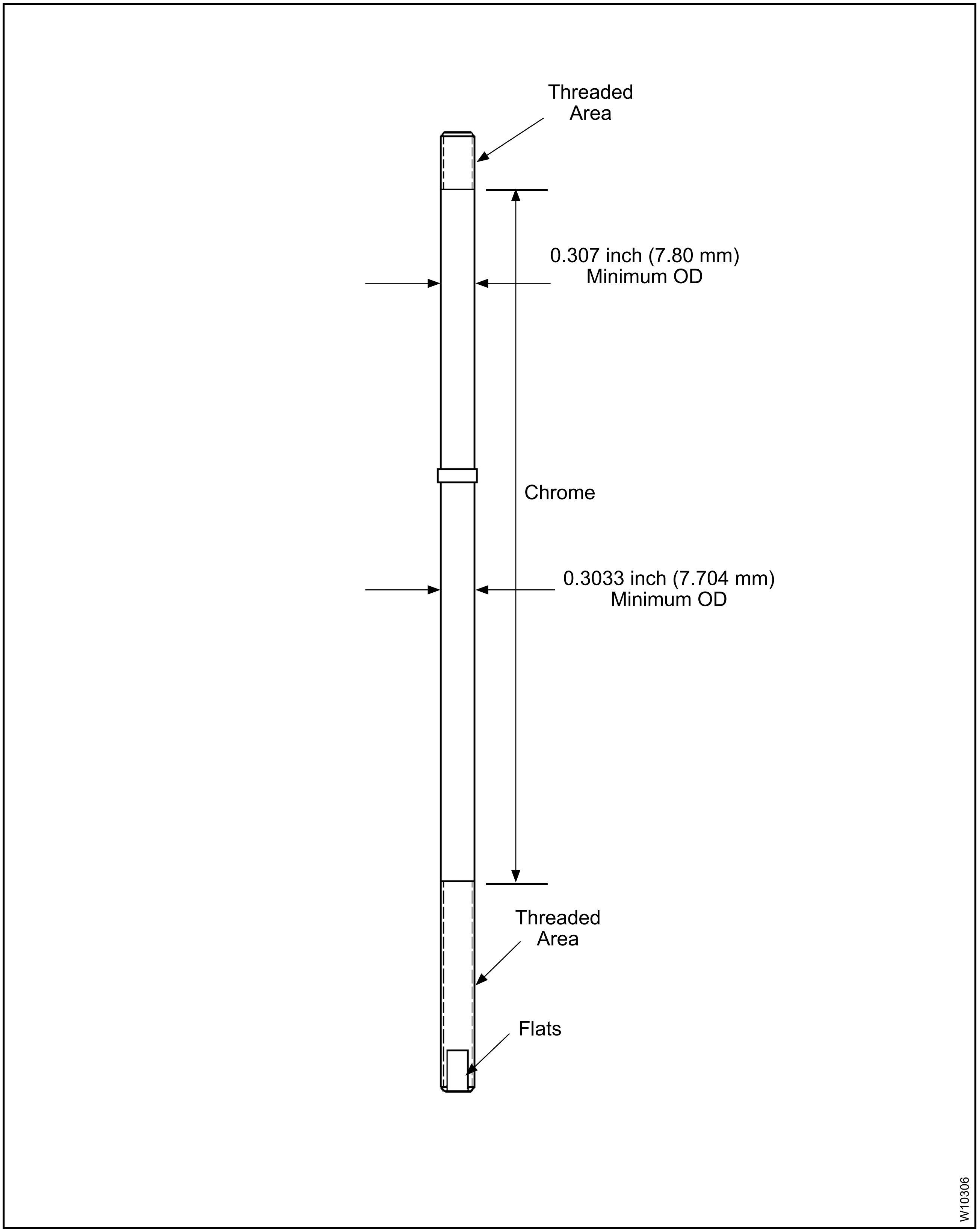
(Blank Page)



Threaded Beta Sleeve
Figure 5-22

Component Inspection Criteria
Table 5-1

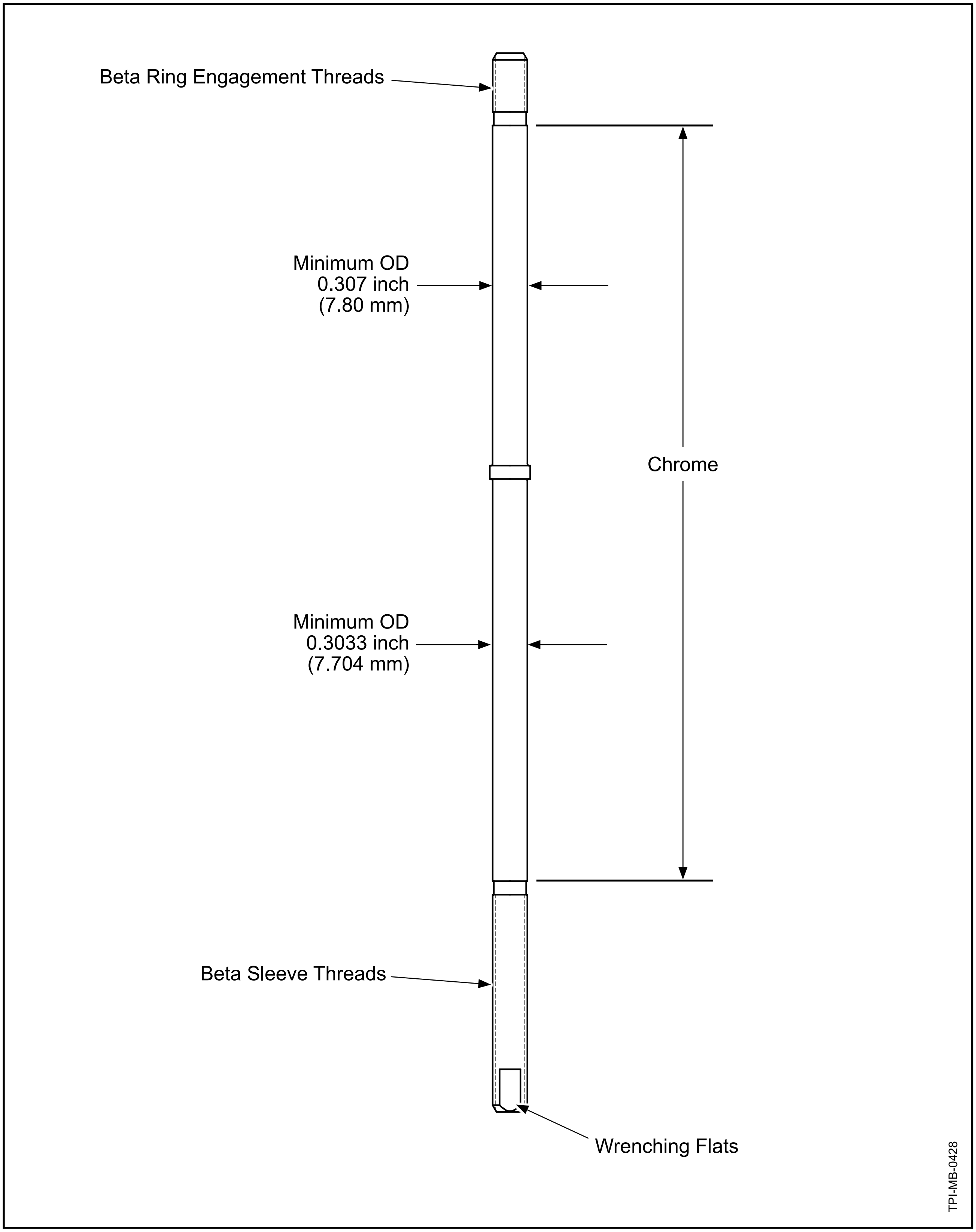
Inspect	Serviceable Limits	Corrective Action
V. THREADED BETA SLEEVE (Item 540) Refer to Figure 5-22		
(1) Visually examine the threaded beta sleeve for corrosion product and pitting.	Corrosion product is not permitted in cadmium plated areas. If there is corrosion product in cadmium plated areas, remove it in accordance with the corrective action repair limits. The maximum permitted depth of pitting is 0.005 inch (0.12 mm). Corrosion product or pitting is not permitted in areas of hard chrome plate.	Remove corrosion product with glass bead cleaning. Refer to the Cleaning chapter of Hartzell Propeller Inc. Standard Practices Manual 202A, (61-01-02). If the corrosion product cannot be removed, replace the threaded beta sleeve. If depth of pitting is greater than the permitted serviceable limits, replace the threaded beta sleeve.
(2) Visually examine the threads for damage.	One thread total accumulated damage is permitted.	If the damage is greater than the permitted serviceable limits, replace the threaded beta sleeve.
(3) Visually examine the wrenching flats for damage.	Sufficient flat surface must remain on two opposing flats to permit an open-end wrench to engage.	If a wrench will not engage, replace the threaded beta sleeve.
(4) Visually examine the threaded beta sleeve for hard chromium coverage.	Except for a few scratches and corners with hard chromium coating missing, complete coverage is required.	If the coverage is less than the permitted serviceable limits, replace the threaded beta sleeve.
(5) Visually examine the threaded beta sleeve for damage in the remaining areas.	The maximum permitted depth of damage is 0.005 inch (0.12 mm). Damage must not interfere with installation or operation of the beta adjust nut.	If the depth of damage is greater than the permitted serviceable limits, replace the threaded beta sleeve.



Beta Rod - p/n C-453 and 101649
Figure 5-23

Component Inspection Criteria
Table 5-1

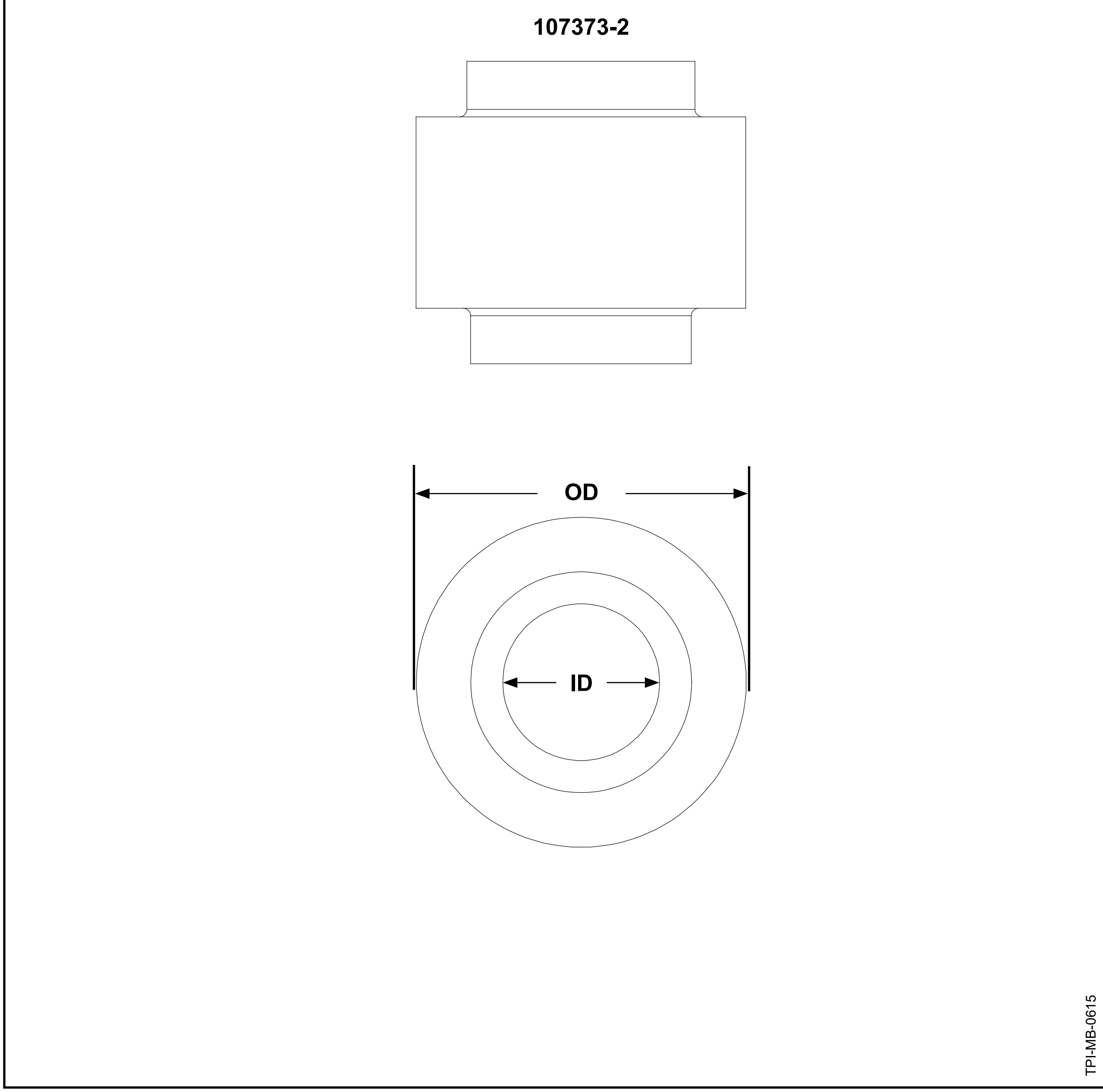
	Inspect	Serviceable Limits	Corrective Action
W.	BETA ROD, p/n C-453 and 101649 (Item 550) Refer to Figure 5-23		
	(1) Visually examine each beta rod for bending or distortion.	Bending or distortion is not permitted.	If there is bending or distortion, replace the beta rod.
	(2) Visually examine each beta rod for damage that penetrates the chrome surface.	Damage must not penetrate the chrome surface.	If the damage is greater than the permitted serviceable limits, replace the beta rod.
	(3) Visually examine the condition of the threaded areas of each beta rod.	Damage or wear must not exceed 10 degrees of circumference.	If the damage or wear is greater than the permitted serviceable limits, replace the beta rod.
	(4) Visually examine the cadmium plating coverage on the threaded areas of the beta rod.	Except for a few minor scratches and corners with cadmium plating missing, cadmium plating must completely cover the threaded areas of the beta rod.	If the cadmium plating coverage is less than the permitted serviceable limits, cadmium replate and bake the beta rod in accordance with the Cadmium Replating chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).
	(5) Measure the OD of each beta rod.	Refer to Figure 5-23 for applicable limits.	If the OD is less than the permitted serviceable limits, replace the beta rod.
	(6) Visually examine the flats of the beta rod.	There must be sufficient flat without damage to permit an open-end wrench to engage.	If a wrench will not engage, replace the beta rod.
	(7) Magnetic particle inspect each beta rod in accordance with the Magnetic Particle Inspection chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).	A relevant indication is not permitted.	If there is a relevant indication, replace the beta rod.



Beta Rod, p/n 107372
Figure 5-23.1

Component Inspection Criteria
Table 5-1

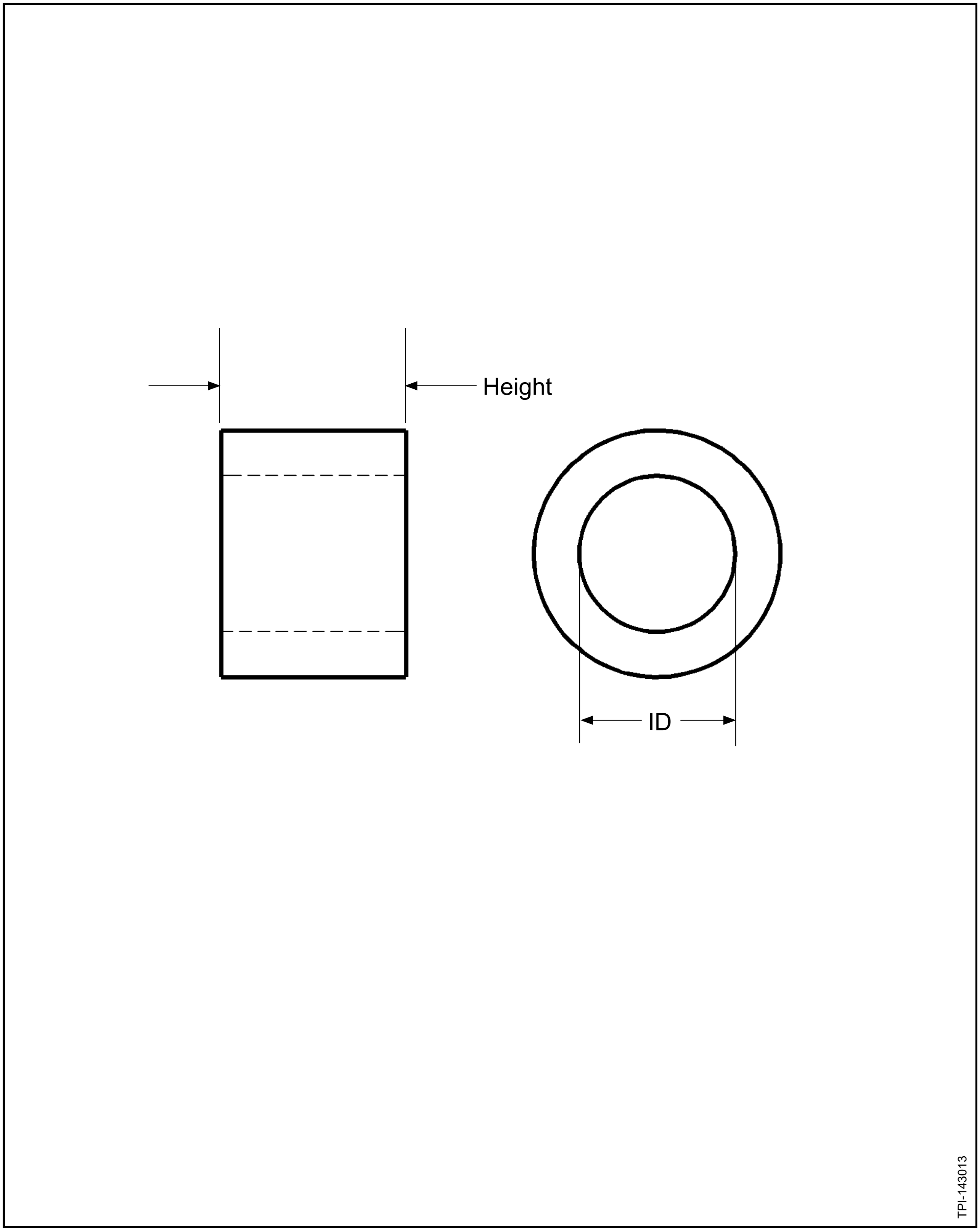
Inspect	Serviceable Limits	Corrective Action
W1. BETA ROD, p/n 107372 (Item 550) Refer to Figure 5-23.1		
(1) Visually examine each beta rod for bending or distortion.	Bending or distortion is not permitted.	If there is bending or distortion, replace the beta rod.
(2) Visually examine each beta rod for damage that penetrates the hard chrome surface.	Damage must not penetrate the hard chrome surface.	If the damage is greater than the permitted serviceable limits, replace the beta rod.
(3) Visually examine the beta ring engagement threads for damage or wear.	Damage or wear up to 90 degrees of circumference for each thread is permitted. A maximum of one half thread of total accumulated damage or wear is permitted.	If the damage or wear is greater than the permitted serviceable limits, replace the beta rod.
(4) Visually examine the beta sleeve threads for damage or wear.	A maximum of one half thread of total accumulated damage or wear is permitted.	If the damage or wear is greater than the permitted serviceable limits, replace the beta rod.
(5) Measure the OD of each beta rod.	Refer to Figure 5-23.1 for the applicable limits.	If the OD is less than the permitted serviceable limits, replace the beta rod.
(6) Visually examine the wrenching flats of the beta rod.	Sufficient flat must exist without damage to permit an open-end wrench to engage.	If a wrench will not engage, replace the beta rod.
(7) Fluorescent penetrant inspect each beta rod in accordance with the fluorescent penetrant Inspection chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). CAUTION: DO NOT REMOVE HARD CHROME TO PERFORM THIS INSPECTION.	A crack is not permitted.	If there is a crack, replace the beta rod.



Spring Guide
Figure 5-24

Component Inspection Criteria
Table 5-1

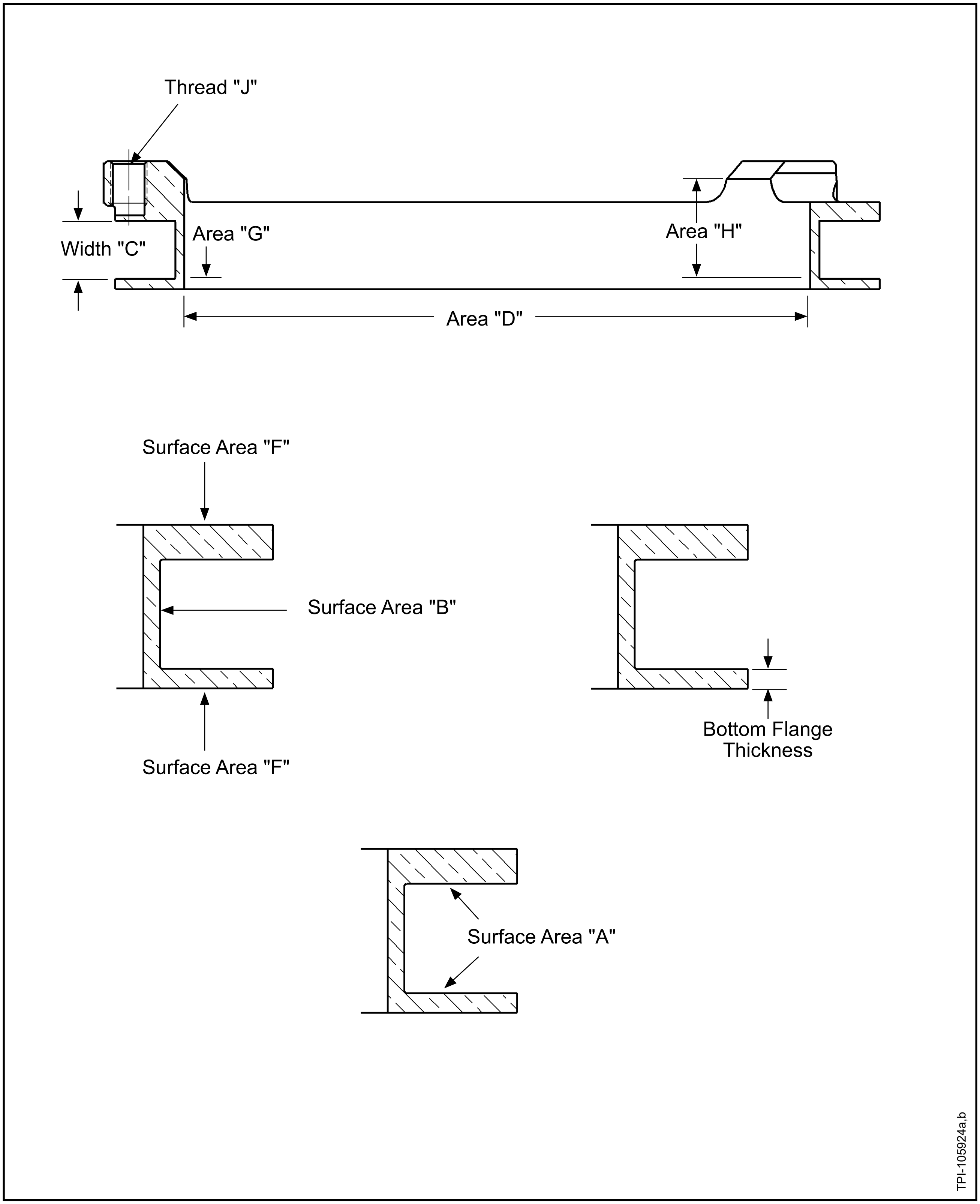
Inspect	Serviceable Limits	Corrective Action
X. SPRING GUIDE (Item 605) Refer to Figure 5-24		
(1) Visually examine the spring guide for corrosion product and pitting.	Corrosion product is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits. The maximum permitted depth of pitting is 0.003 inch (0.07 mm).	Remove corrosion product using glass bead cleaning. Refer to the Cleaning chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). If the corrosion product cannot be removed, replace the spring guide. If the pitting is greater than the permitted serviceable limits, replace the spring guide.
(2) Visually examine the spring guide for wear or damage.	The maximum permitted depth of wear or damage is 0.003 inch (0.07 mm).	If the damage is greater than the permitted serviceable limits, replace the spring guide.
(3) Visually examine the spring guide OD for wear. If there is wear, measure the OD.	The minimum permitted OD is 0.449 inch (11.40 mm).	Using an abrasive pad CM47 or equivalent, remove any pushed up material that may interfere with the installation or operation of the spring guide. If the wear or damage is greater than the permitted serviceable limits, replace the spring guide.
(4) Visually examine the spring guide ID for wear. If there is wear, measure the ID.	The maximum permitted ID is 0.328 inch (8.33 mm).	If the ID is greater than the permitted serviceable limits, replace the spring guide.
(5) Penetrant inspect the spring guide in accordance with Penetrant Inspection chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).	A relevant indication is not permitted.	If there is a relevant indication, replace the spring guide.



Spacer
Figure 5-25

Component Inspection Criteria
Table 5-1

	Inspect	Serviceable Limits	Corrective Action
Y.	SPACER (Item 615) Refer to Figure 5-25		
	(1) Visually examine the spacer for corrosion product, pitting, damage, or wear.	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, damage, or wear is 0.003 inch (0.07 mm).	Remove corrosion product using glass bead cleaning. Refer to the Cleaning chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). If the pitting, damage, or wear is greater than the permitted serviceable limits or if the corrosion product cannot be removed, replace the spacer.
	(2) If the spacer has wear, measure the height of the spacer at eight equally spaced locations around the circumference of the spacer.	The minimum permitted height of the spacer is 0.272 inch (6.90 mm). The maximum permitted variation of height is 0.003 inch (0.07 mm).	If the height of the spacer is less than the permitted serviceable limits or the variation of height is greater than the permitted serviceable limits, replace the spacer.
	(3) If the spacer has wear in the ID, measure the ID of the spacer.	The maximum permitted ID of the spacer is 0.325 inch (8.25 mm).	If the ID of the spacer is greater than the permitted serviceable limits, replace the spacer.
	(4) Magnetic particle inspect the spacer in accordance with the Magnetic Particle Inspection chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).	A relevant indication is not permitted.	If there is a relevant indication, replace the spacer.



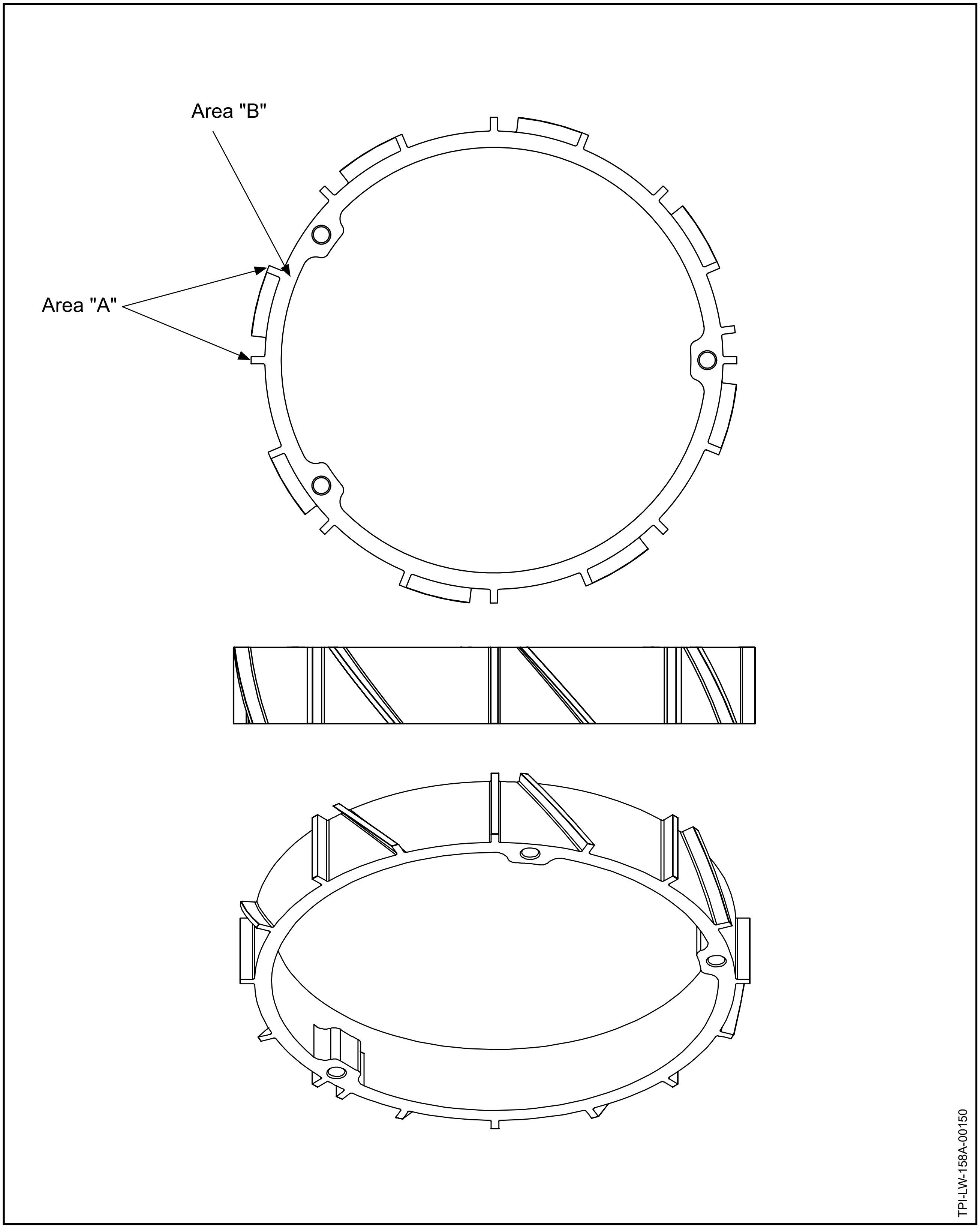
Beta Ring- p/n C-452, 105924 and 107495
Figure 5-26

Component Inspection Criteria
Table 5-1

	Inspect	Serviceable Limits	Corrective Action
Z.	BETA RING, p/n C-452, 105924 and 107495 (Item 620) Refer to Figure 5-26		
(1)	Visually examine the beta ring for a crack.	A crack is not permitted.	If there is a crack, replace the beta ring.
(2)	Visually examine the bottom of the threaded holes for impressions made by the beta rods.	The maximum permitted depth of impressions in this area is 0.004 inch (0.10 mm).	If the depth of impression is greater than the permitted serviceable limits, replace the beta ring.
(3)	Visually examine the sidewalls of the groove for scratches (Area "A").	The maximum permitted depth of a scratch is 0.004 inch (0.10 mm). Pushed-up material caused by scratches is not permitted.	Using an abrasive pad CM47 or equivalent, polish to remove pushed-up material adjacent to the scratch only. If the depth of the scratch is greater than the permitted serviceable limits, replace the beta ring.
(4)	Visually examine the groove of the beta ring for scratches or gouges (Area "B").	A scratch or gouge must be repaired. The maximum permitted depth of repair is 0.007 inch (0.17 mm).	Refer to the Repair chapter of this manual if the damage is within the permitted limits. If depth of repair is greater than the permitted serviceable limits, replace the beta ring.
(5)	Measure the width of the groove in the beta ring (Width "C").	The maximum permitted width is 0.510 inch (12.95 mm).	If the width is greater than the permitted serviceable limits, replace the beta ring.
(6)	Measure the ID of the beta ring (Area "D").	The maximum permitted ID of the beta ring is 5.4270 inches (137.845 mm).	If the ID is greater than the permitted serviceable limits, replace the beta ring.
(7)	Measure the thickness of the bottom flange on the beta ring. Measure a minimum of four separate points on the bottom flange.	The minimum permitted thickness at any point on the bottom flange of the beta ring is 0.073 inch (1.85 mm).	If the thickness is less than the permitted serviceable limits, replace the beta ring.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
Z. BETA RING, p/n C-452, 105924 and 107495 - CONTINUED (Item 620) Refer to Figure 5-26		
(8) Visually examine the three holes for damage (Thread "J").	For each hole, a maximum of one half thread of total accumulated damage is permitted.	If the damage is greater than the permitted serviceable limits, replace the beta ring.
(9) Measure any depression or gouge on the outside surface of the beta ring (Surface Area "F").	A depression or gouge must be removed. The maximum permitted depth for a depression or gouge is 0.007 inch (0.17 mm).	Refer to the Repair chapter of this manual if the damage is within the permitted limits. If damage or repair is greater than the permitted serviceable limits, replace the beta ring.
(10) Visually examine the area beginning on the side opposite the lugs extending 0.1875 inch (4.763 mm) toward the lug side of the inner surface as shown ("Area G").	A groove or scratch that is 0.007 inch (0.17 mm) deep or less must be removed. A groove or scratch that is deeper than 0.007 (0.17 mm) is cause for retirement of the beta ring.	If there is a groove or scratch that is 0.007 inch (0.17 mm) deep or less, polish the inner surface using an abrasive pad CM47 or equivalent, maintaining a maximum ID of 5.4270 inches (137.846 mm). If damage is greater than the permitted serviceable limits or corrective action, replace the beta ring.
(11) Visually examine the inner surface, excluding "Area G", above, but including the inner surface of the lug areas, for grooves and scratches (Area "H").	A groove or scratch that is equal to or less than 0.007 inch (0.17 mm) deep does not require repair.	If there is a groove or scratch that is deeper than 0.007 inch (0.17 mm), polish the inner surface using an abrasive pad CM47 or equivalent, maintaining a maximum ID of 5.4270 inches (137.846 mm). If damage is greater than the permitted serviceable limits or corrective action, replace the beta ring.
(12) Penetrant inspect the beta ring in accordance with the Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).	A relevant indication is not permitted.	If there is a relevant indication, replace the beta ring.



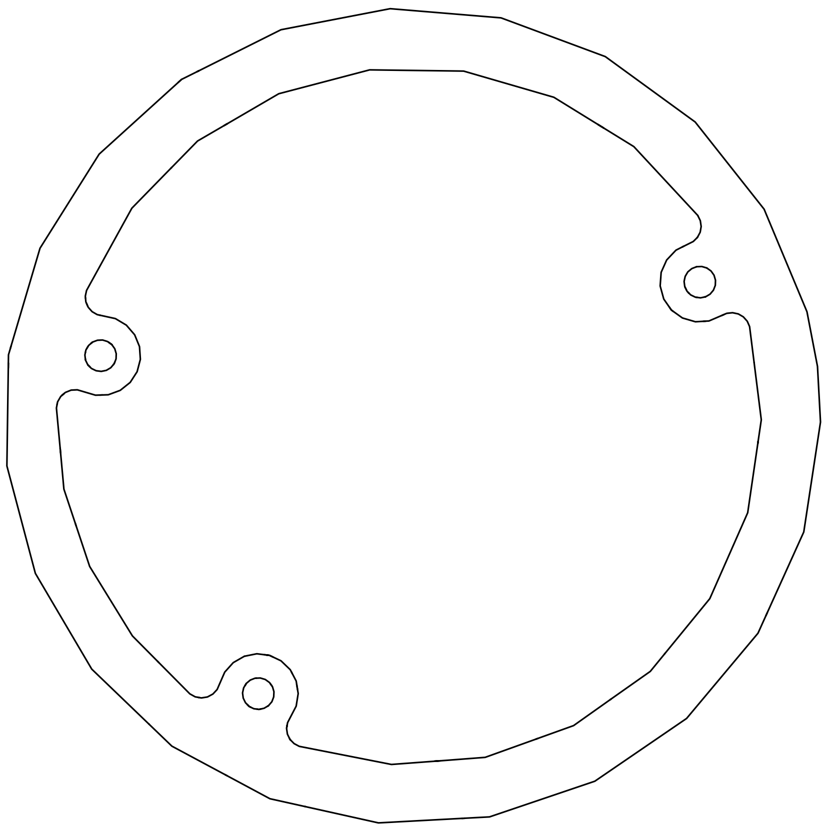
Beta Ring - p/n 108192 and 108272
Figure 5-26.1

Component Inspection Criteria
Table 5-1

	Inspect		Serviceable Limits	Corrective Action
Z1.	BETA RING, p/n 108192 and 108272 (Item 620) Refer to Figure 5-26.1			
	(1)	Visually examine the beta ring for a crack.	A crack is not permitted.	If there is a crack, replace the beta ring.
	(2)	Visually examine the bottom of the threaded holes for impressions made by the beta rods.	The maximum permitted depth of an impression in this area is 0.010 inch (0.25 mm).	If the depth of an impression is greater than the permitted serviceable limits, replace the beta ring.
	(3)	Visually examine the three threaded holes for damage.	A maximum of one half thread of total accumulated damage is permitted.	If the damage is greater than the permitted serviceable limits, replace the beta ring.
	(4)	Visually examine the beta ring for corrosion and pitting on the ID.	Corrosion is not permitted. The maximum permitted depth of pitting is 0.005 inch (0.12 mm).	Using an emery cloth, spot polish to remove corrosion or pitting. Repair is permitted to a depth of 0.015 inch (0.39 mm). If the damage or repair is greater than the permitted serviceable limits or the corrective action limits, replace the beta ring.
	(5)	Visually examine the OD and the teeth protrusions on each side for corrosion, pitting, damage, and scratches (Area "A").	Corrosion, pitting, damage, or scratches are not permitted.	If there is corrosion, pitting, damage, or scratches in the OD or teeth protrusions, replace the beta ring.
	(6)	Visually examine each end inboard of the teeth for corrosion and pitting (Area "B").	Corrosion is not permitted. The maximum permitted depth of pitting is 0.005 inch (0.12 mm).	Using an emery cloth, spot polish to remove corrosion or pitting. Repair is permitted to a depth of 0.005 inch (0.12 mm). If the damage or repair is greater than the permitted serviceable limits or the corrective action limits, replace the beta ring.
	(7)	Degauss the beta ring.	A gauss of 0 ±3 is permitted.	If the gauss does not meet the serviceable limits, replace the beta ring.

Component Inspection Criteria
Table 5-1

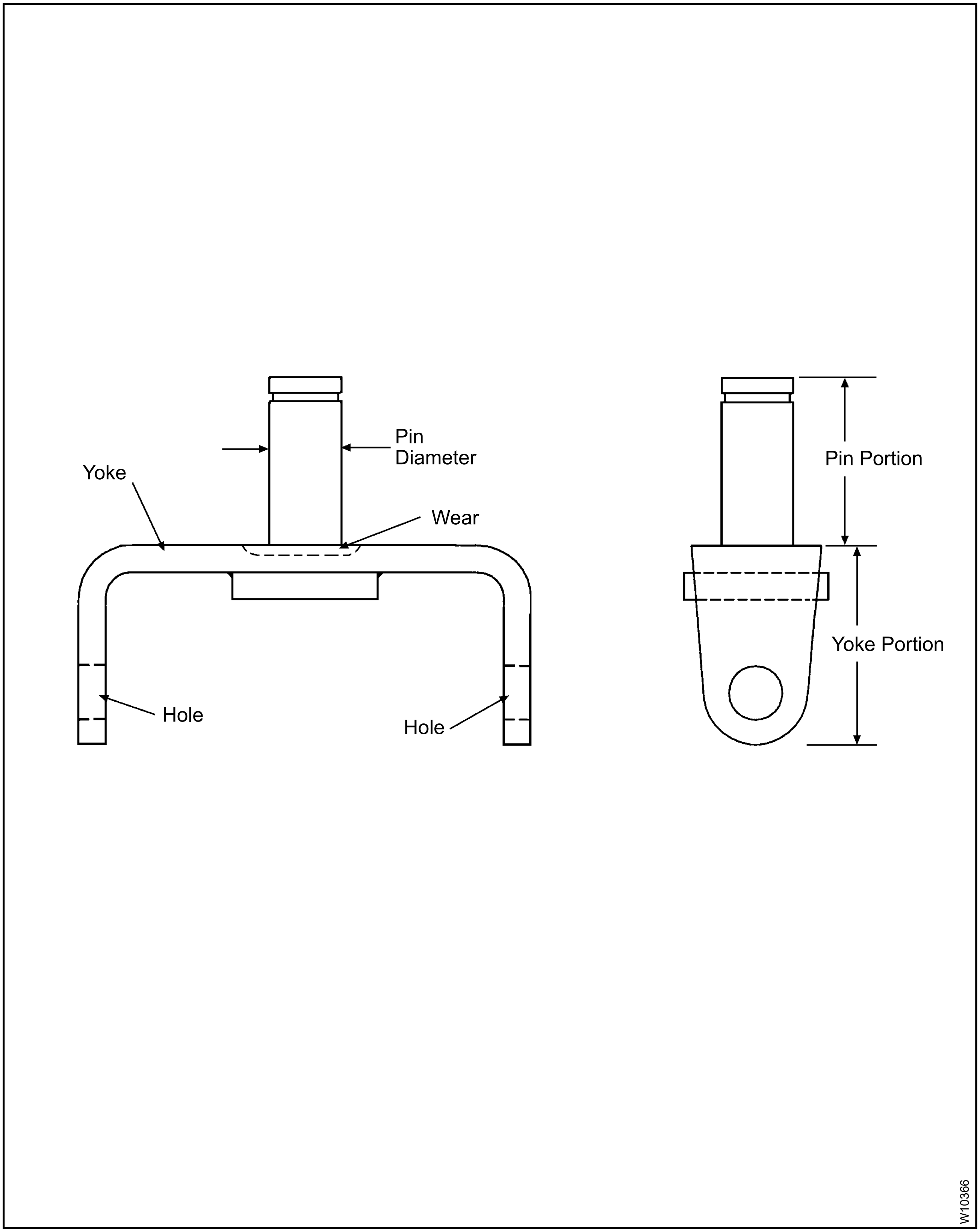
	Inspect	Serviceable Limits	Corrective Action
Z1.	BETA RING, p/n 108192 and 108272, CONTINUED (Item 620) Refer to Figure 5-26.1		
	(8) Magnetic particle inspect the beta ring in accordance with the Magnetic Particle Inspection chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).	A relevant indication is not permitted.	If there is a relevant indication, replace the beta ring.



Beta Rod Support Ring
Figure 5-27

Component Inspection Criteria
Table 5-1

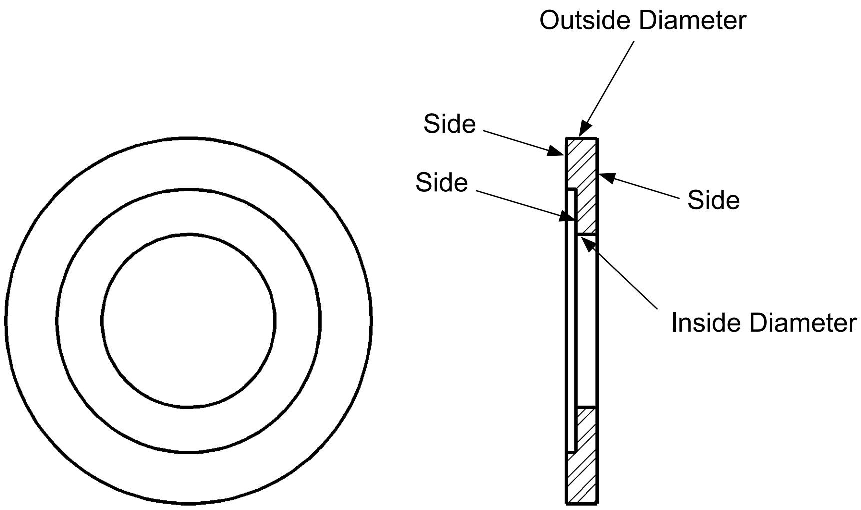
Inspect	Serviceable Limits	Corrective Action
AA. <u>BETA ROD SUPPORT RING</u> (Item 630) Refer to Figure 5-27		
(1) Visually examine the beta rod support ring for corrosion product and pitting.	Corrosion product is not permitted. Pitting may not cover more than 10% of the beta rod support ring surface. 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 Standard Practices Manual 202A (61-01-02). If the corrosion product or depth of pitting is greater than the permitted serviceable limits, replace the beta rod support ring.
(2) Visually examine the beta rod support ring for wear.	If there is wear, measure the wear. 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 beta rod support ring.
(3) Visually examine the beta rod support ring for flatness.	The beta rod support ring must be flat. Dimensional measurement of flatness is not required.	If the flatness of the beta support ring is not within the serviceable limits, replace the beta rod support ring.
(4) Visually examine the beta rod support ring for cadmium plating coverage.	Loss of cadmium plating that is caused by the clamping nuts around each of the three holes is permitted. Sparse and light, random scratches are permitted. In all other areas, complete coverage of the cadmium plating is required.	If the cadmium plating coverage is less than the permitted serviceable limits, cadmium replate the beta rod support ring in accordance with the Cadmium Replating chapter in Hartzell Standard Practices Manual 202A (61-01-02).



Yoke Unit
Figure 5-28

Component Inspection Criteria
Table 5-1

Inspect		Serviceable Limits	Corrective Action
AB. YOKE UNIT (Item 880) Refer to Figure 5-28			
(1)	Visually examine the yoke unit 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) in the yoke portion only. Pitting is not permitted in the pin portion.	Remove corrosion product using glass bead cleaning. Refer to the Cleaning chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). If the corrosion product cannot be removed, replace the yoke unit. If the damage is greater than the permitted serviceable limits, replace the yoke unit.
(2)	Visually examine the yoke unit for damage.	The maximum permitted depth of damage is 0.005 inch (0.12 mm) in the yoke portion only. Light scratches are permitted in the pin portion. Damage must not interfere with the mating part.	Remove raised material that is above the normal diameter of the pin. If the damage is greater than the permitted serviceable limits, replace the yoke unit.
(3)	Measure the pin diameter.	The minimum permitted diameter is 0.2475 inch (6.287 mm).	If the diameter is less than the permitted serviceable limits, replace the yoke unit.
(4)	Measure the diameter of each of the two holes in the yoke portion.	The maximum permitted diameter is 0.1895 inch (4.813 mm).	If the diameter is greater than the permitted serviceable limits, replace the yoke unit.
(5)	Examine for wear to the yoke portion where the pin and yoke meet.	The maximum permitted depth of wear is 0.005 inch (0.12 mm).	If the depth of wear is greater than the serviceable limits, replace the yoke unit.
(6)	Visually examine the yoke unit for cadmium plating coverage.	A few scratches and corners with cadmium plating missing is permitted; otherwise, complete coverage is required.	Replate the yoke unit in accordance with the Cadmium Replating chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).



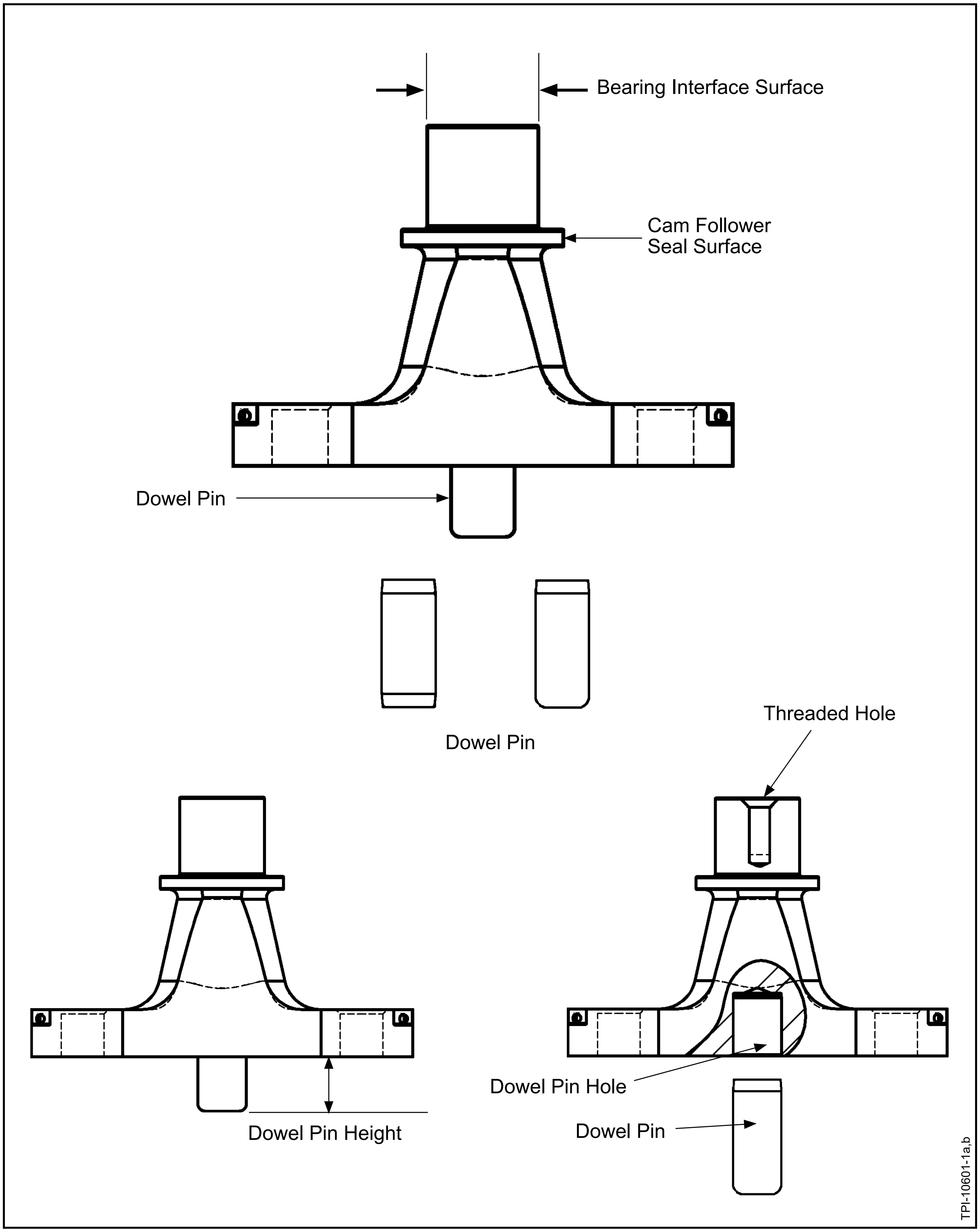
Retaining Washer
Figure 5-29

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
AC. RETAINING WASHER (Item 980) Refer to Figure 5-29)		
(1) Visually examine the sides and inside diameter of the 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 retaining washer.	After applying masking material to the outside diameter of the retaining washer, corrosion product may be removed by glass bead cleaning. If the corrosion product cannot be removed, replace the retaining washer. Refer to the Cleaning chapter of Standard Practices Manual 202A (61-01-02). If pitting is greater than the serviceable limits, replace the retaining washer.
(2) Visually examine the sides and inside diameter of the 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 retaining washer.	If scratches are greater than the serviceable limits, replace the retaining washer.
(3) Visually examine the retaining washer for wear or damage.	Wear or damage is not permitted.	If there is wear or damage, replace the retaining washer.
(4) Visually examine the outside diameter of the retaining washer for corrosion product and pitting.	Corrosion product or pitting is not permitted.	If there is corrosion product or pitting, replace the retaining washer.
(5) Visually examine the outside diameter of the retaining washer for scratches.	A scratch is not permitted.	If there is a scratch, replace the retaining washer.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
AC. RETAINING WASHER, CONTINUED (Item 980) Refer to Figure 5-29		
(6) Visually examine the outside diameter of the retaining washer for wear or damage.	Wear or damage is not permitted in the base metal. 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 micro-inches (0.40 Ra micro-meters).	If wear or damage is greater than the serviceable limits, replace the retaining washer.
(7) Measure the outside diameter of the retaining washer.	The minimum permitted diameter with cadmium plating is 0.950 inch (24.13 mm).	If the diameter is less than the serviceable limits, replace the retaining washer.
(8) Visually examine the retaining washer for cadmium plating coverage.	A few random scratches are acceptable on the sides and inside diameter; otherwise, cadmium plating must completely cover the sides and inside diameter of retaining washer. Cadmium plating must completely cover the outside diameter without scratches ,although slight cadmium plating loss on the corners between sides and outside diameter is permitted.	Replate and bake the retaining washer in accordance with the Cadmium Replating chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).



Pitch Change Knob Bracket
Figure 5-30

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
AD. PITCH CHANGE KNOB BRACKET (Item 950) Refer to Figure 5-30		
(1) Before inspection, remove cadmium plating in accordance with the Cadmium Replating chapter of Hartzell Propeller Inc. 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 be within the permitted Serviceable Limits for this part given in this section.		
(3) Visually examine the bearing interface surface for damage, corrosion product, or pitting.	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.	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.	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 are greater than the permitted serviceable limits, replace the pitch change knob bracket.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
AD. PITCH CHANGE KNOB BRACKET, CONTINUED (Item 950) Refer to Figure 5-30		
(6) Measure the OD of the cam follower seal surface.	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.
(7) 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 threaded hole.	Corrosion product is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits. If the pitch change knob bracket has pitting, dimensionally inspect. 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 Inc. Standard Practices Manual 202A (61-01-02). If the corrosion product cannot be removed, replace the pitch change knob bracket. 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 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

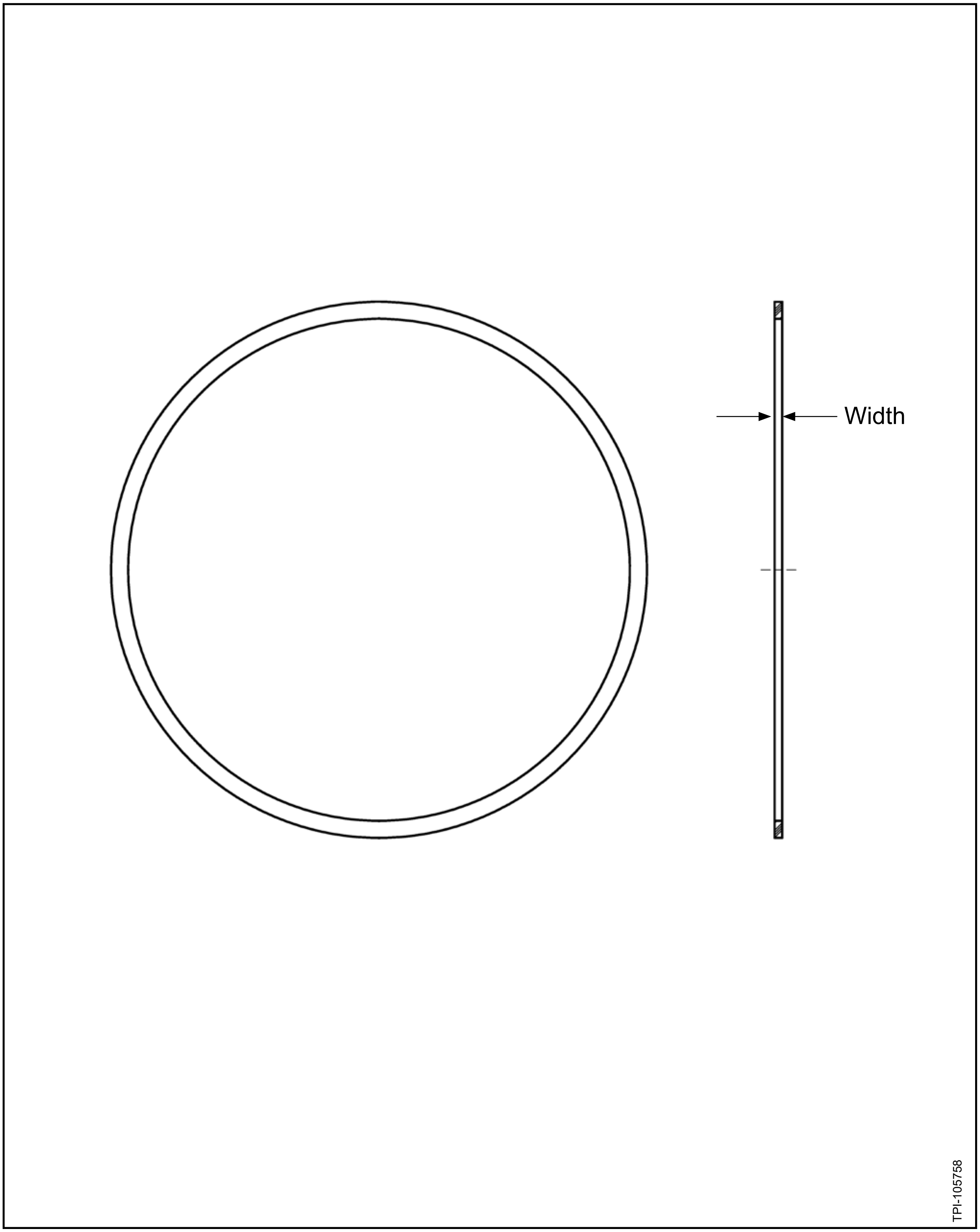
Inspect	Serviceable Limits	Corrective Action
AD. PITCH CHANGE KNOB BRACKET, CONTINUED (Item 950) Refer to Figure 5-30		
(8) Visually examine the pitch change knob bracket for nicks, scratches, or other damage. NOTE: This inspection and repair does not include the bearing interface surface, the threaded hole, or the cam follower seal surface.	If the pitch change knob bracket is damaged, dimensionally inspect. 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 edge and blend into machined surfaces. If the nicks, scratches, other damage, or repair are 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.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
AD. PITCH CHANGE KNOB BRACKET, CONTINUED (Item 950) Refer to Figure 5-30		
(10) Measure the height of the dowel pin from the pitch change knob bracket base.	The maximum permitted height is 0.440 inch (11.17 mm).	If the height of the dowel pin is greater than the permitted height, 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.
(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 for corrosion product or pitting.	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) If the pitch change bracket has safety wire holes, visually examine the pitch change knob bracket safety wire holes.	The safety wire hole must be able to secure the safety wire.	If damage is greater than the permitted serviceable limits, replace the pitch change knob bracket.
(15) Visually examine the pitch change knob bracket for safety wire holes.	There must be a safety wire hole for each bolt hole.	If there are no safety wire holes, add the safety wire holes in accordance with the section "Modification of the Pitch Change Knob Bracket for the Addition of Safety Wire Holes" in the Repair chapter of this manual.

Component Inspection Criteria
Table 5-1

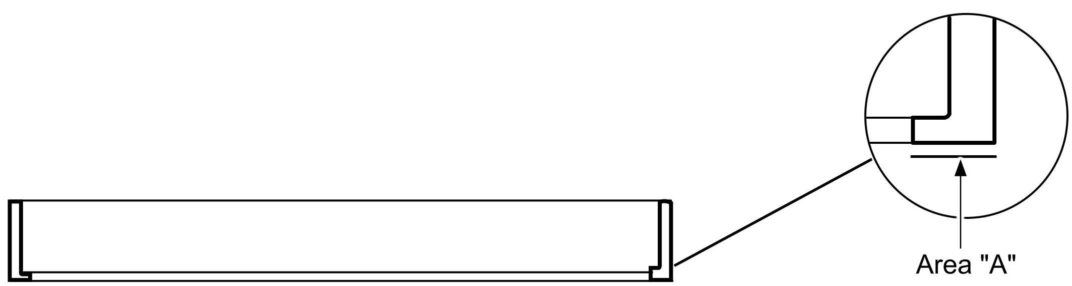
Inspect	Serviceable Limits	Corrective Action
AD. <u>PITCH CHANGE KNOB BRACKET, CONTINUED</u> (Item 950) Refer to Figure 5-30		
(16) Perform magnetic particle inspection of the pitch change knob bracket in accordance with the Magnetic Particle Inspection chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). <u>NOTE</u>: 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.
(17) If removal of the dowel pin is not required, apply masking material to protect the dowel pin from cadmium plating materials.		
(18) If the pitch change knob has successfully passed 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 Inc. Standard Practices Manual 202A (61-01-02).		



Blade Shim
Figure 5-31

Component Inspection Criteria
Table 5-1

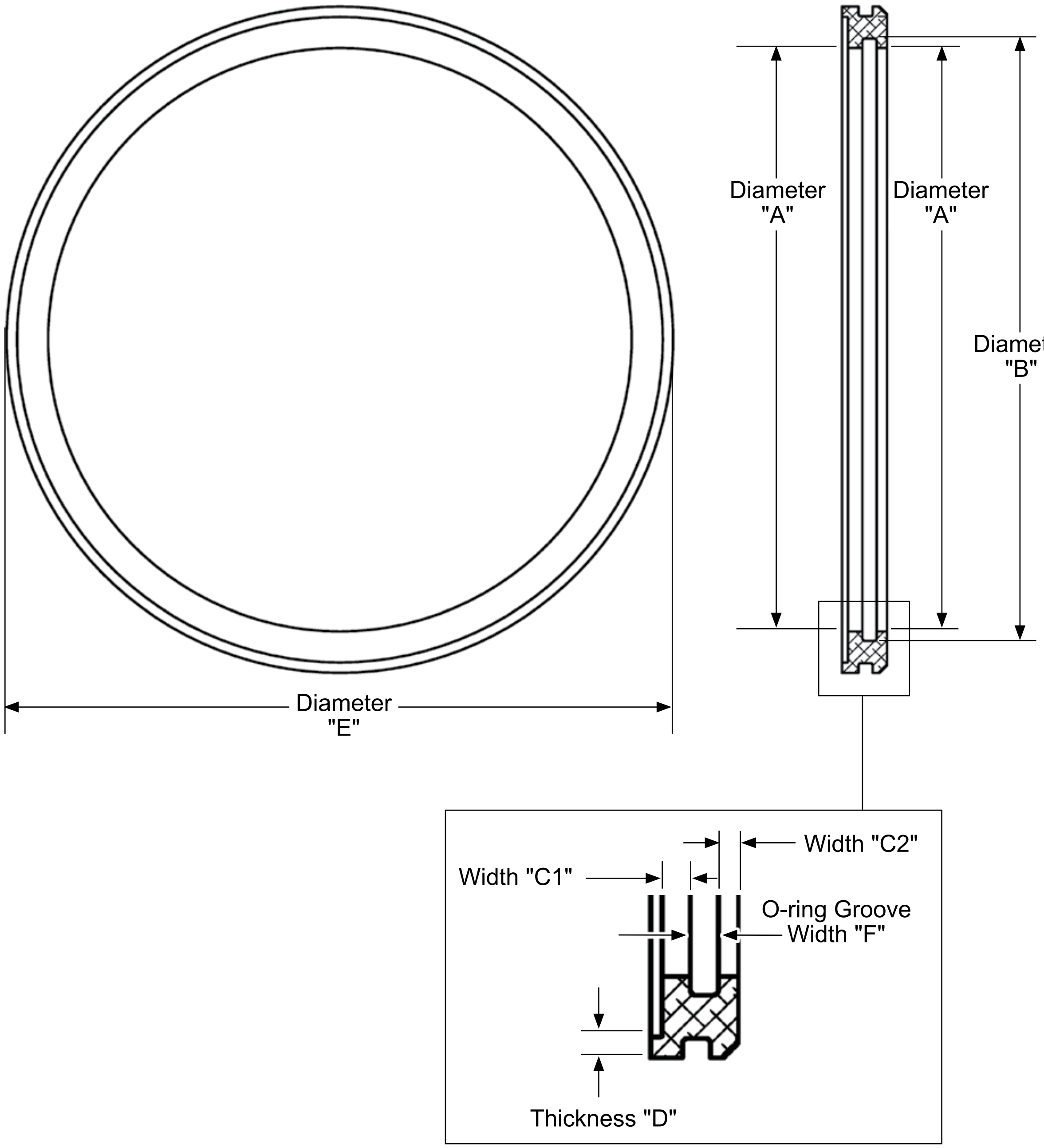
Inspect		Serviceable Limits	Corrective Action
AE.	SHIM, BLADE (Item 1020) Refer to Figure 5-31		
	(1) Visually examine the blade shim for damage, missing material, separation, or form irregularities as a continuous ring.	Damage, missing material, separation, or form irregularities are not permitted.	If there is damage, missing material, separation, or form irregularities, replace the blade shim.
	(2) Measure the width of the blade shim.	The minimum permitted width is 0.045 inch (1.15 mm).	If the width is less than the permitted serviceable limits, replace the blade shim.
	(3) Measure the thickness variation of the blade shim.	The maximum permitted variation is 0.010 inch (0.25 mm).	If the variation is greater than the permitted serviceable limits, replace the blade shim.



Bearing Retaining Ring
Figure 5-32

Component Inspection Criteria
Table 5-1

	Inspect	Serviceable Limits	Corrective Action
AF.	BEARING RETAINING RING (Item 1010) Refer to Figure 5-32		
	(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 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 Inc. Standard Practices Manual 202A (61-01-02). If the corrosion product cannot be removed, replace the bearing retaining ring. If the corrosion product or pitting is greater than the permitted serviceable limits, replace the bearing retaining ring.
	(2) Visually inspect the bearing retaining ring for corrosion product, pitting, or wear in Area "A”.	Corrosion product, pitting, or wear through the cadmium plating is not permitted.	If there is corrosion product, pitting, or wear through the cadmium plating, replace the bearing retaining ring.
	(3) Except for Area "A", visually inspect 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.
	(4) Visually inspect 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 Inc. Standard Practices Manual 202A (61-01-02).



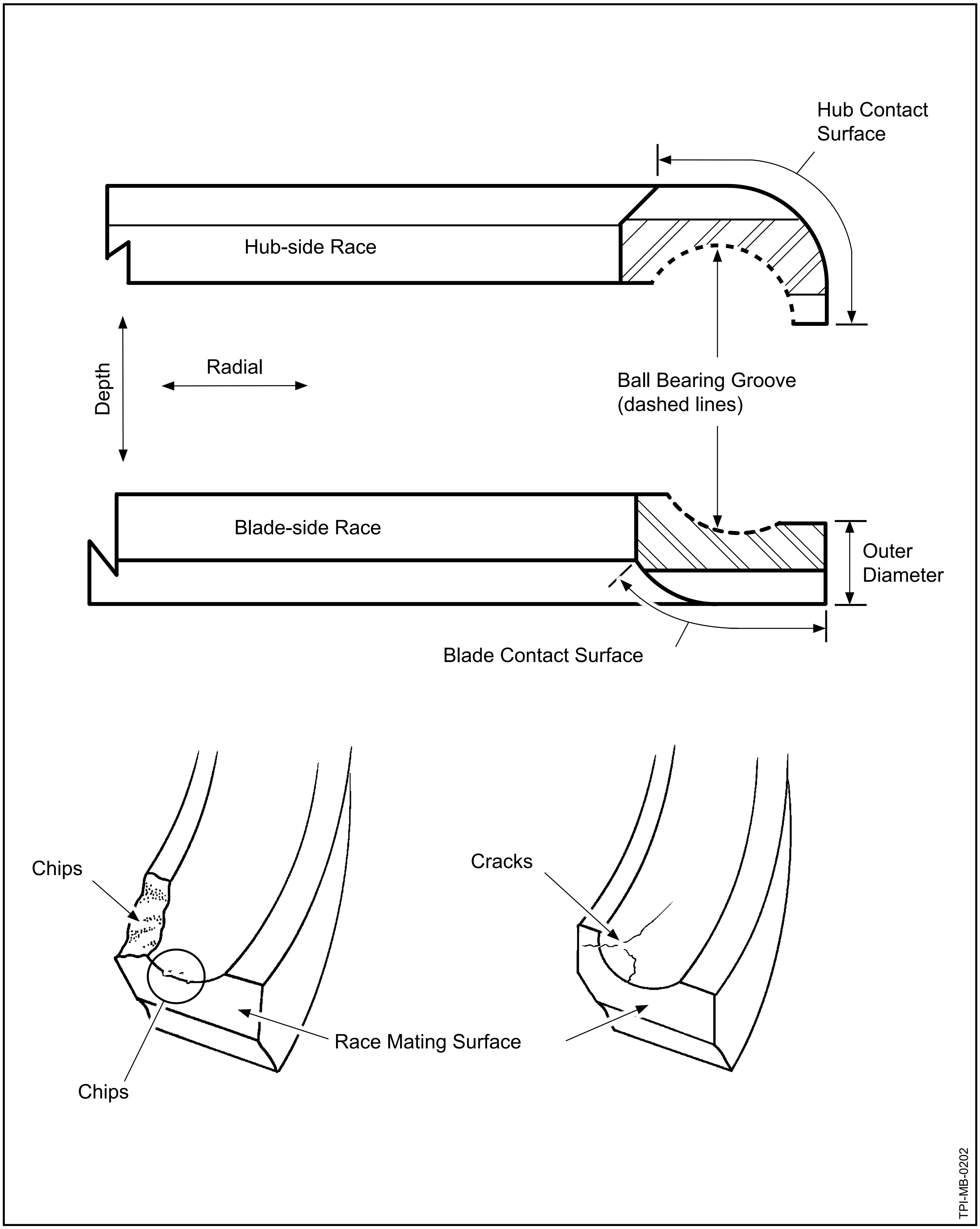
"A" MAXIMUM DIAMETER	"B" MAXIMUM DIAMETER	"C1" MINIMUM WIDTH	"C2" MINIMUM WIDTH	"D" MINIMUM THICKNESS	"E" MINIMUM DIAMETER
4.550 inches (115.57 mm)	4.750 inches (120.65 mm)	0.060 inches (1.53 mm)	0.050 inches (1.27 mm)	0.065 inches (1.66 mm)	5.075 inches (128.91 mm)

106064

Blade Seal
Figure 5-33

Component Inspection Criteria
Table 5-1

Inspect			Serviceable Limits	Corrective Action
AG.	BLADE SEAL (Item 1040) Refer to Figure 5-33			
	(1)	Visually examine the blade seal 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. If there is pitting, wear, or damage, measure the depth. The maximum permitted depth of pitting, wear or damage is 0.007 inch (0.17 mm).	Using an abrasive pad CM47 or equivalant, polish to remove corrosion product, pitting, wear, or damage to a maximum depth of 0.010 (0.25 mm). If the depth of corrosion product, pitting, wear, damage, or repair is greater than the permitted serviceable limits or the corrective action limits, replace the blade seal.
	(2)	Measure the O-ring groove Width "F".	The maximum permitted O-ring groove Width "F" is 0.175 inch (4.44 mm).	If the O-ring groove Width "F" is not witihin the permited serviceable limits, replace the blade seal.
	(3)	Measure the O-ring groove Width "F" for uniform width variation.	The maximum permitted width variation is 0.015 inch (0.38 mm).	If the width variation is greater than the permited serviceable limits, replace the blade seal.
	(4)	Measure the blade seal features "A", "B", "C1", "C2", "D", and "E".	The permitted limits are given in the table in Figure 5-31.	If any measurement is not within the permitted serviceable limits, replace the blade seal.



Blade Bearing Race
Figure 5-34

Component Inspection Criteria
Table 5-1

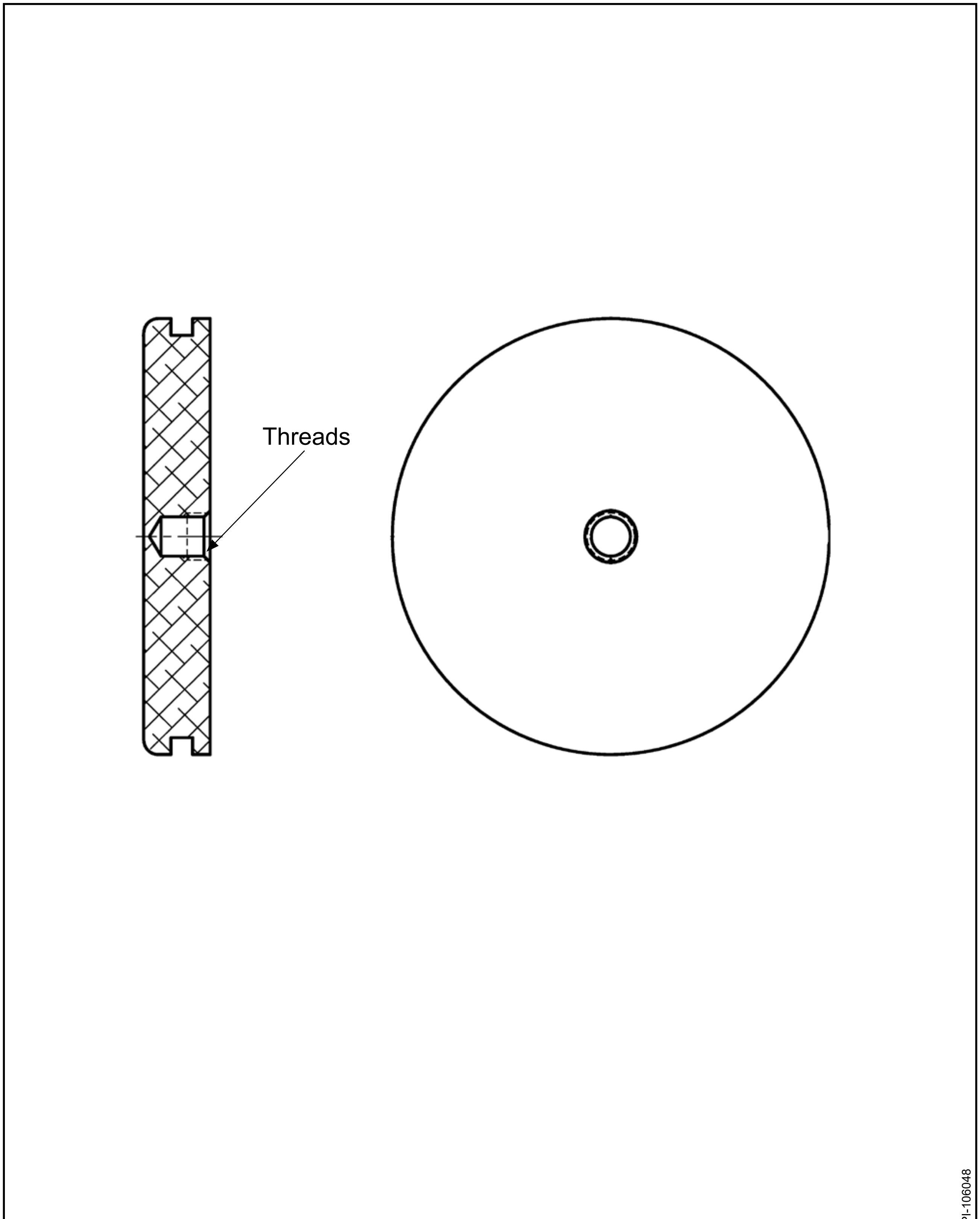
Inspect	Serviceable Limits	Corrective Action
AH. BLADE BEARING RACE (Item 1070, 1090) Refer to Figure 5-34		
(1) Visually examine the ball bearing groove in each race for corrosion product.	Corrosion product is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits.	Remove corrosion product using glass bead cleaning. For glass bead cleaning refer to the Cleaning chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). If the corrosion product cannot be removed, replace the race.
(2) Visually examine the ball bearing groove in each 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.	If the pitting is greater than the serviceable limits, replace the race.
	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 race is 0.12 square inch (77.4 square mm) (two races for each bearing set). Pitting must not interfere with bearing ball movement or support.	
	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 race.
	Fretting damage is not permitted.	If there is fretting damage, replace the 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 race.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
AH. <u>BLADE BEARING RACE, CONTINUED</u> (Item 1070, 1090) Refer to Figure 5-34		
(3) Except for the ball bearing groove, visually examine all other surfaces of each 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 Inc. Standard Practices Manual 202A (61-01-02). If the corrosion product cannot be removed, replace the race.
(4) Except for the ball bearing groove, visually examine all other surfaces of each 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 race is 0.25 square inch (161.2 square mm) (two races for each bearing set).	If the pitting is greater than the permitted serviceable limits, replace the race.
	Fretting damage is permitted on the outer diameter of the races that interface with the bearing retaining ring (1030). Fretting must not loosen the tight fit with the bearing retaining ring (1030).	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 (1030) to the race is not tight, replace the race.
	Wear is not permitted.	If there is wear, replace the race.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
AH. BLADE BEARING RACE, CONTINUED (Item 1070, 1090) Refer to Figure 5-34		
(4) Except for the ball bearing groove, visually examine all other surfaces of each race for pitting, wear, fretting, and damage - continued.	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 race.
(5) Visually examine the race for chips or cracks that are adjacent to the mating surfaces of the race.	Chips or cracks that are adjacent to the mating surfaces of the race are not permitted.	If there are chips or cracks adjacent to the mating surfaces of the race, replace the race.
(6) Magnetic particle inspect each race in accordance with the Magnetic Particle Inspection chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).	A relevant indication is not permitted.	If there is a relevant indication, replace the blade bearing race.



Blade Plug Inspection Area
Figure 5-35

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
AI. BLADE PLUG (Item 1130) Refer to Figure 5-35		
(1) Visually examine the blade plug 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 0.010 inch (0.25 mm). The maximum permitted total area of pitting is 20% of the blade plug surface.	Remove corrosion product to a maximum depth of 0.010 inch (0.25 mm) using glass bead cleaning. If the corrosion product cannot be removed, replace the blade plug. Refer to the Cleaning chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). If the depth or amount of pitting is greater than the permitted serviceable limits, replace the blade plug.
(2) Visually examine the threads of the blade plug for damage.	A maximum of one thread of total accumulated damage is permitted.	If the damage is greater than the permitted serviceable limits, replace the blade plug.
(3) Visually examine the blade plug for scratches, gouges, or other damage.	The maximum permitted depth of damage is 0.010 inch (0.25 mm). Damage must not interfere with the fit of the blade plug in the blade bore.	Using an abrasive pad CM47 or equivalent, polish pushed up material to blend with the surrounding surfaces. If the damage is greater than the permitted serviceable limits, replace the blade plug.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
AJ. BALANCE WEIGHT (Item 1220)		
(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 Inc. 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 balance weight in accordance with the Chromic Acid Anodizing chapter of Hartzell Propeller Inc. 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 balance weight in accordance with the Cadmium Replating chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

REPAIR - CONTENTS

LIST OF FIGURES

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 INC. OR NOT SPECIFICALLY REFERRED TO IN HARTZELL PROPELLER INC. MANUALS. CONTACT HARTZELL PROPELLER INC. 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

   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 Inc. 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 Inc. 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 Inc. should shot peen Hartzell propeller parts.

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

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

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

b Contact the Hartzell Propeller Inc. 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

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) Refer to Appendix A of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02) Volume 3.

C. Blades

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

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

D. Spinner Assemblies

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

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

E. Ice Protection Systems

(1) For ice protection systems supplied by Hartzell, refer to Hartzell Propeller Inc. 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).

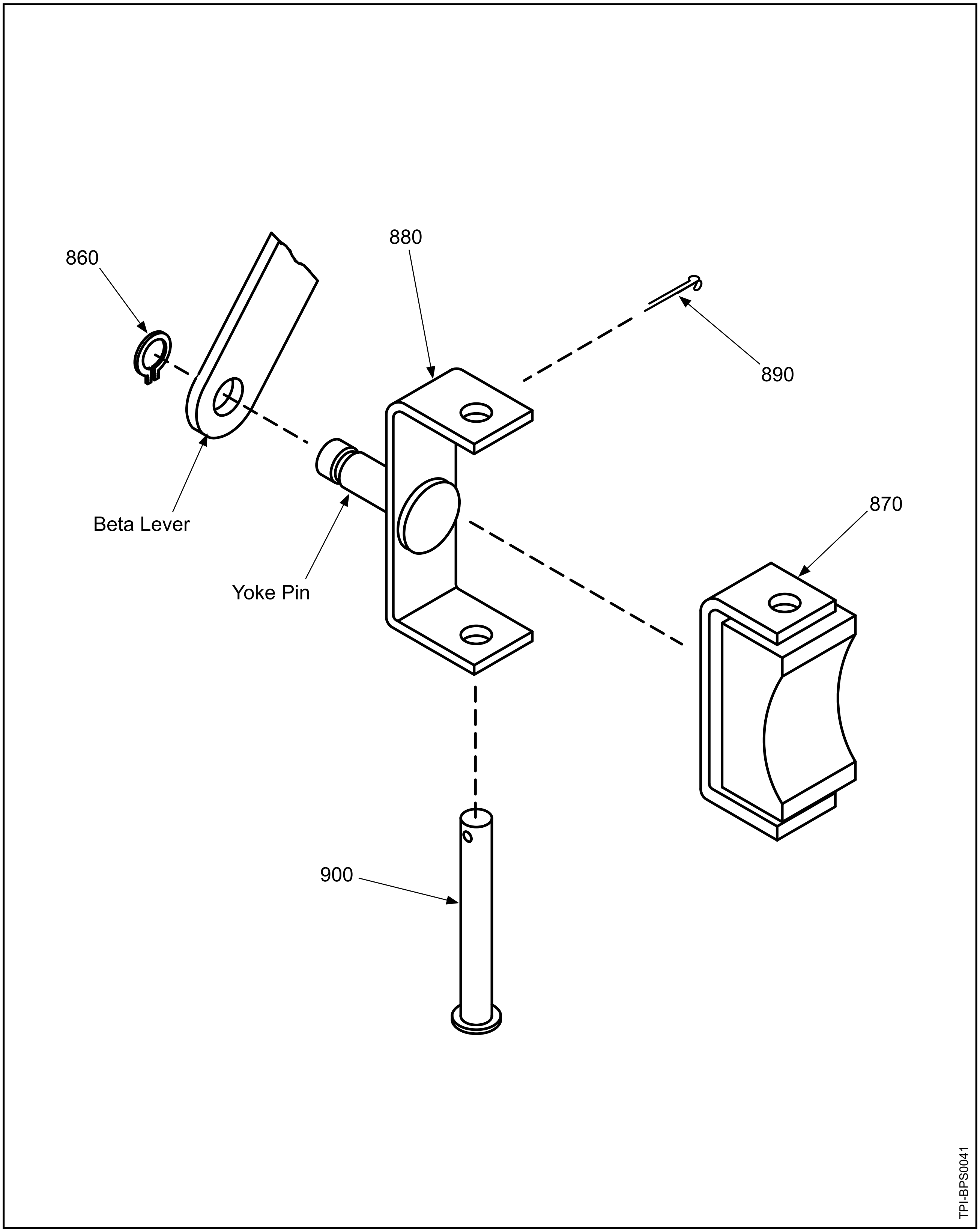
3. Specific Repair Procedures

A. Repair of Damaged Balance Weight Attachment Holes and Lubrication Fitting Holes

(1) For requirements and procedures for repair of balance weight attachment holes and lubrication fitting holes, contact Hartzell Propeller Inc. Product Support.

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 Inc. Standard Practices Manual 202A (61-01-02).



Beta Feedback Block Assembly
Figure 6-1

C. Beta Feedback Block Assembly

(1) Repair of Binding Problem

(a) General

1 The clearance between the yoke pin and the corresponding linkage (beta lever bushing) may become too close because of a buildup of plating and foreign particles between the two pieces (Refer to Figure 6-1). This may cause binding, and may result in too much wear to the carbon block, beta ring, and beta linkage.

(b) Repair Procedure

1 Examine the beta lever and beta feedback block assembly (850) interface for free movement.

2 If there is binding between the yoke pin and the corresponding linkage (beta lever bushing), perform the following steps:

a Disconnect the beta linkage.

b Remove the beta feedback block assembly (850) from the beta ring (620).

c Polish the yoke pin to provide adequate clearance and to prevent binding.

d Reinstall the beta feedback block assembly (850) into the beta ring (620). Refer to the section, "Checking the Carbon Block Unit/Beta Ring Clearance" in the Fits and Clearances chapter of this manual.

e Reconnect the beta linkage to the carbon block assembly (850).

f Reinspect to make sure that there is no binding between the beta lever and carbon block assembly (850) interface.

(2) Replacement of Carbon Block Unit or Yoke Unit in the Carbon Block Assembly

CAUTION: THE CARBON BLOCK UNIT (870) MUST BE REPLACED AT OVERHAUL.

(a) If the carbon block unit (870) and/or the yoke unit (880) become too worn between overhaul intervals, replacement of one or both parts is necessary.

1 Remove the cotter pin (890) from the end of the clevis pin (900).

2 Remove the clevis pin (900) from the assembly.

3 Remove the carbon block unit (870).

4 Replace the yoke unit (880) if it is beyond serviceable limits listed in the Check chapter of this manual, or replace the carbon block unit (870) if there is too much wear or if there is damage.

5 Move the clevis pin (900) into place.

6 Secure the clevis pin (900) with a cotter pin (890).

7 Refit the carbon block unit (870).

8 Refer to the section, "Checking the Carbon Block Unit/Beta Ring Clearance" in the Fits and Clearances chapter of this manual.

9 Establish the required clearance by dressing the block sides as necessary.

D. Beta Ring Repair: p/n 105924 and 107495 Only

(1) General Repair

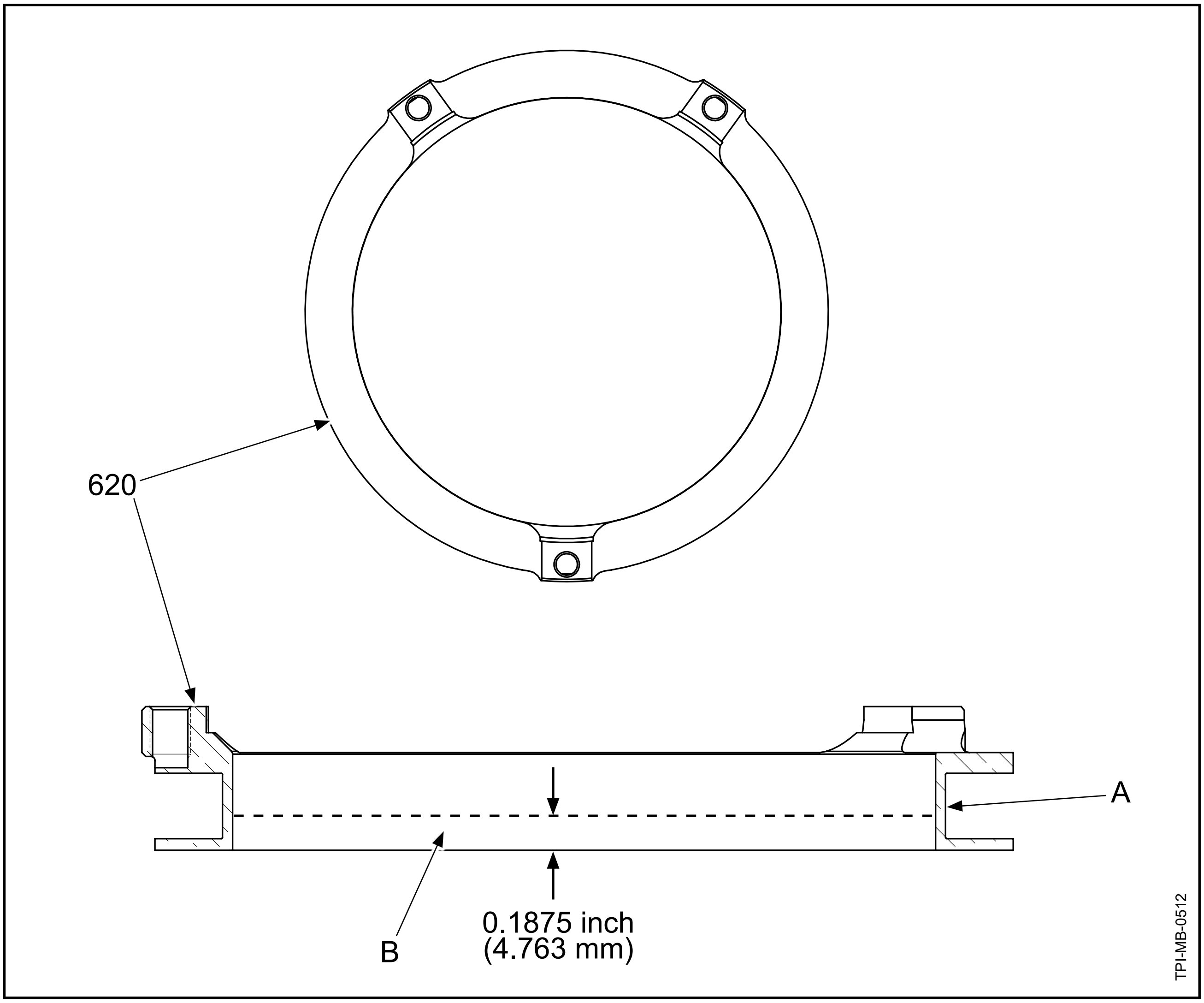
(a) Using a soft cotton wheel, polish the beta ring (620).

(2) Interior Surface Repair

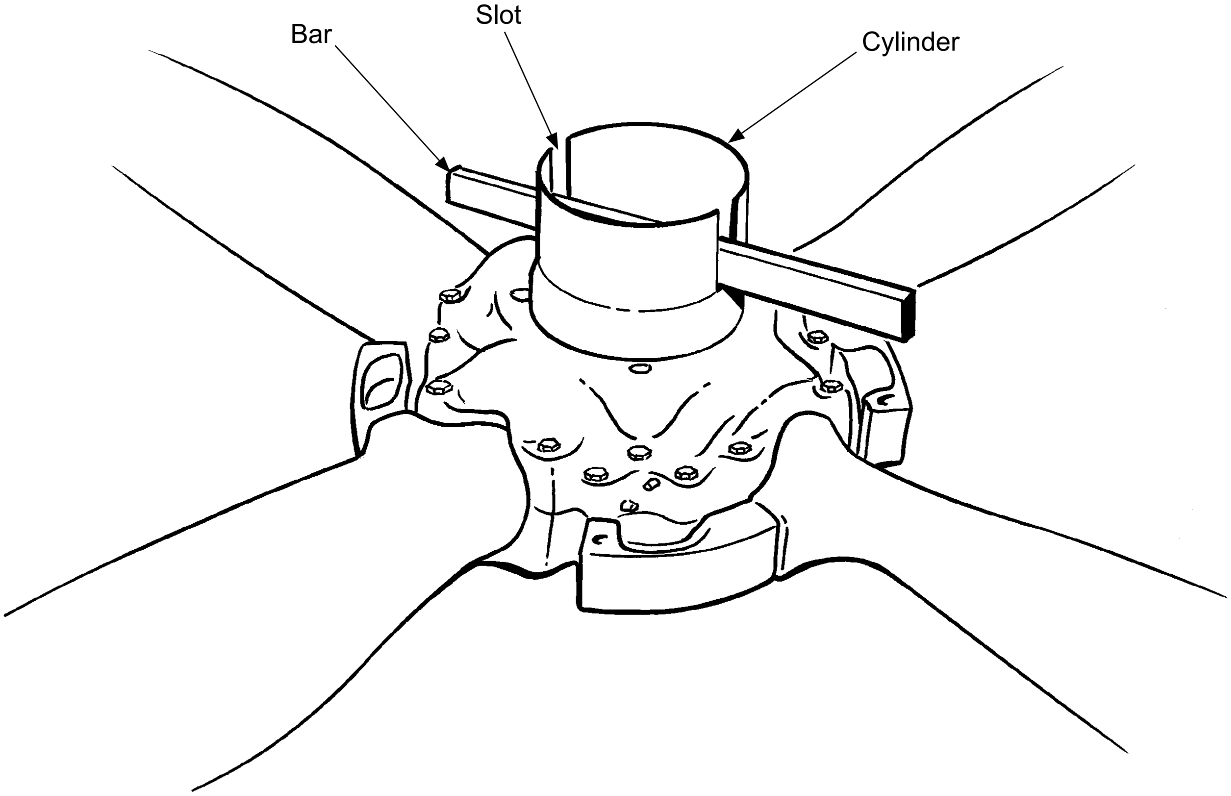
(a) The surface of the beta ring groove may be repaired if it is worn or scratched:

1 Remove grooves or scratches in areas A and B (Figure 6-2). Refer to the serviceable limits found in the Check chapter of this manual.

2 Using 80- to 120-grit emery cloth and finishing with 240-grit polishing compound, make the surfaces of the beta ring smooth.



Beta Ring Interior Surface Repair
Figure 6-2



Cylinder Removal
Figure 6-3

E. Cylinder Removal

(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 6-3.

(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 and stop 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. Feathering Compression Spring Zinc Chromate Primer Repair

(1) Cleaning

(a) For procedures for cleaning the feathering compression spring (110), refer to Cleaning of Steel Parts in the Cleaning chapter of Hartzell Standard Practices Manual 202A (61-01-02).

(b) Inspect the feathering compression spring (110) for scratches, corrosion, and zinc plate coverage in accordance with the Check chapter of this manual.

(c) Using 120 grit or finer sandpaper, remove any loose material and feather the existing coating.

(d) Using solvent CM106, clean the entire feathering compression spring (110).

(e) Permit the solvent CM106 to air dry.

(2) Painting

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

(a) Apply a layer of zinc chromate primer CM67, or equivalent, to the entire surface of the feathering compression spring (110).

(b) Permit the zinc chromate primer, CM67, or equivalent to dry for a minimum of 24 hours before handling.

(c) Examine the feathering compression spring (110) for complete coverage of the zinc chromate primer CM67 or equivalent.

1 If zinc chromate primer CM67 or equivalent coverage is not complete, repeat steps (2)(a) through (2)(c) of this procedure.

G. Reverse Adjust Sleeve Bushing Removal and Installation

(1) Removal Procedure

(a) Put a customer supplied 1.187 inch (30.14 mm) 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.

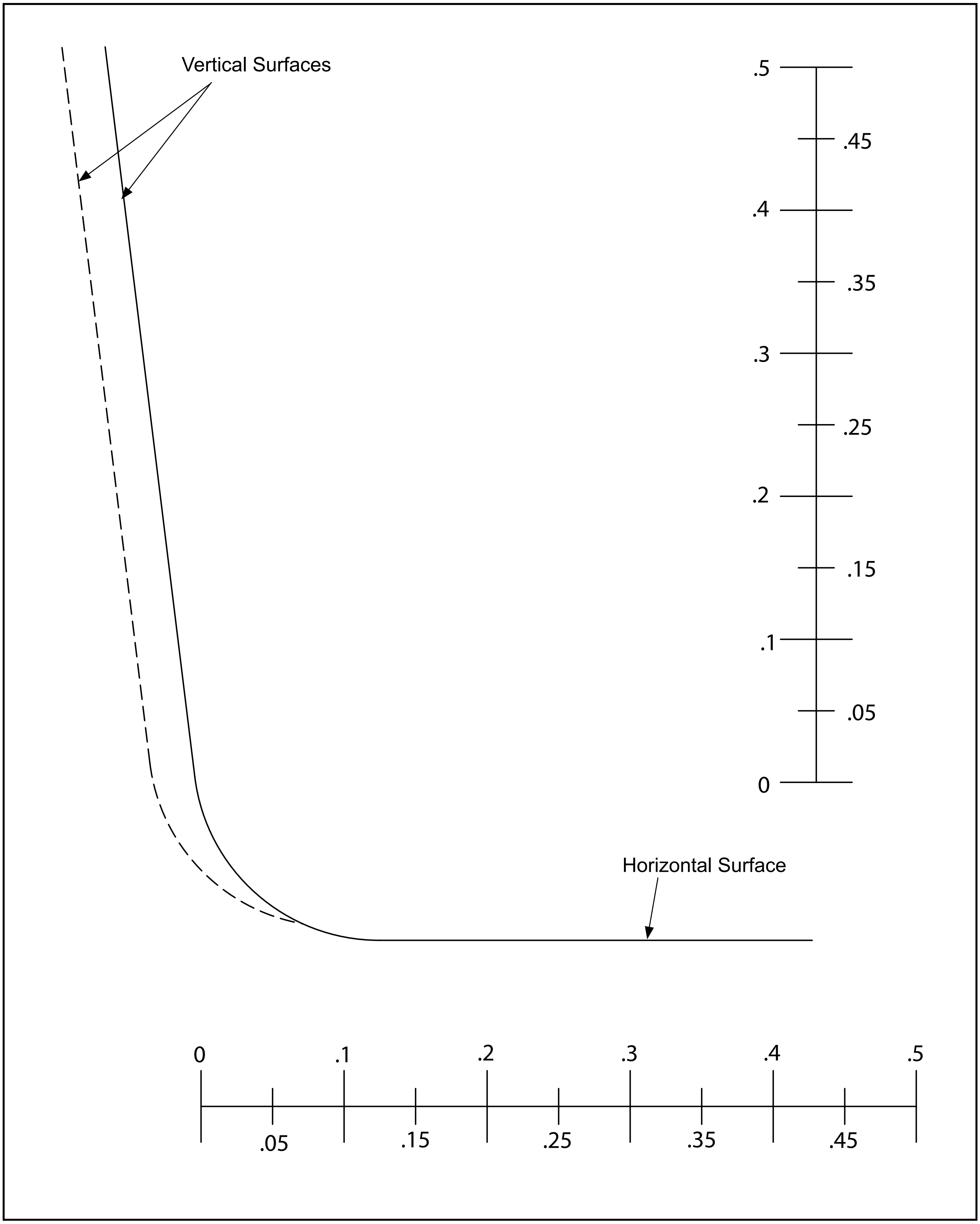
(c) By hand, turn the reverse adjust sleeve on the reamer to cut out the bushing.

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.

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

(2) Installation Procedure

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



Optical Comparator Overlay
Figure 6-4

H. Inspection of the Internal Surface of a Cylinder

(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 6-5.

(b) An optical comparator 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 companies that produce a comparator considered acceptable for inspection purposes, refer to the section "Approved Optical Comparators" in the Special Tools, Fixtures, and Equipment chapter of Hartzell Composite Blade Overhaul Manual 135F (61-13-35).

(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.

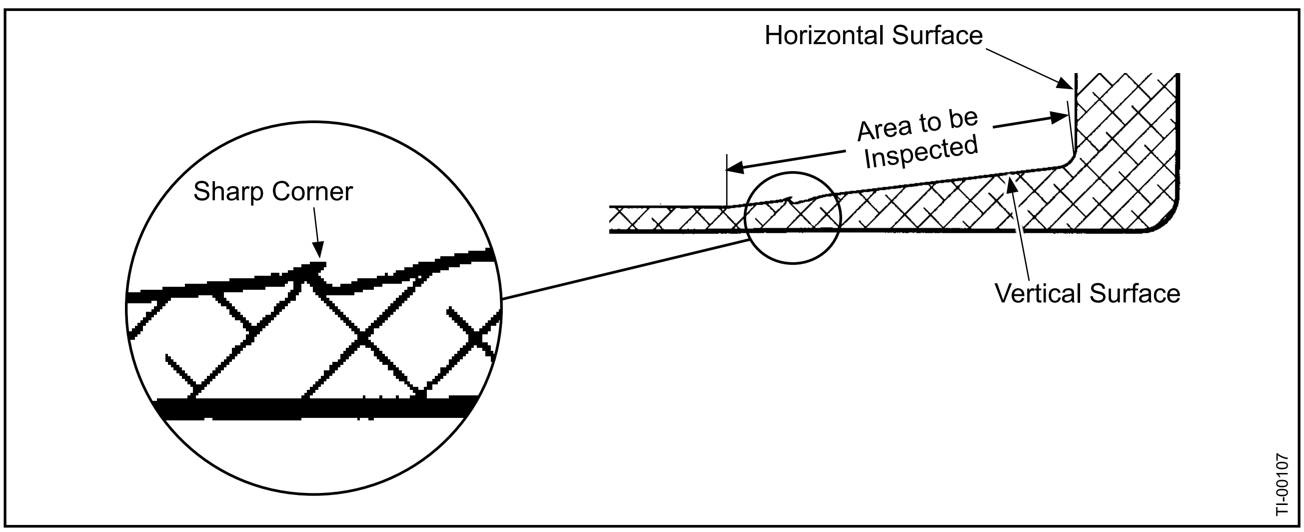
2 If a different magnification is desired, use figure 6-4 as a pattern and adjust the scale, as necessary, for the different magnification.

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

(2) Inspection for a Sharp Corner. Refer to Figure 6-5.

(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.



Inspection for a Sharp Corner
Figure 6-5

(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 material 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 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 is 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.

ASSEMBLY - CONTENTS

ASSEMBLY - CONTENTS, continued

LIST OF FIGURES

LIST OF FIGURES, continued

LIST OF TABLES

1. General (Rev. 5)

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 Inc. 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 Inc. 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 Inc. 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.

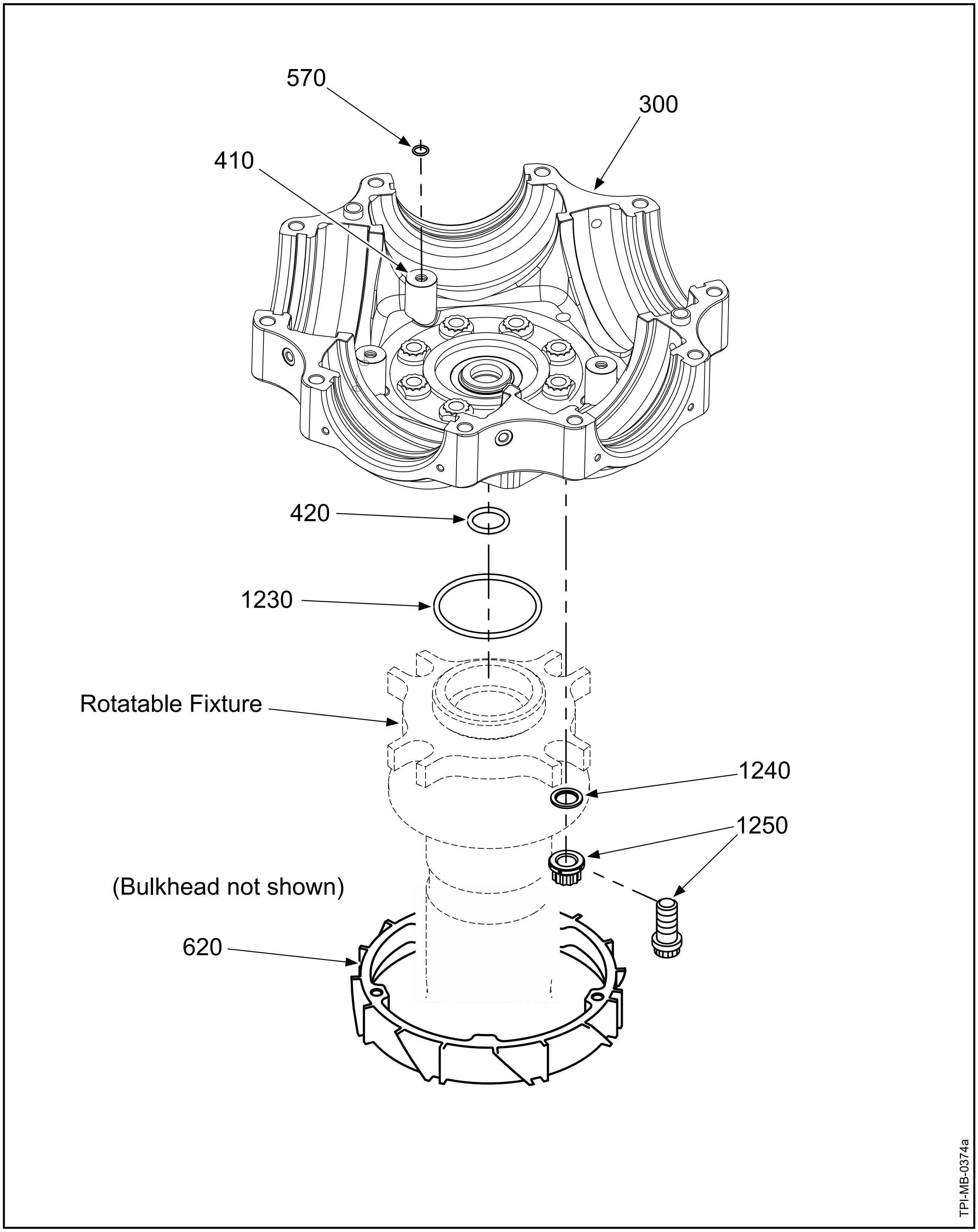
D. Blade Bore Plug/Bearing Installation

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

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

E. Blade Angle Information

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



Hub Assembly
Figure 7-1

2. Hub Assembly Procedures

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 EITHER COMPRESSED AIR THAT HAS BEEN FILTERED FOR MOISTURE, OR NITROGEN.

CAUTION 3: DO NOT EXCEED A PRESSURE OF 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. All Propeller Models

(1) Install components of the hub assembly/unit (295/300) in accordance with Appendix A in the Aluminum Hub Overhaul chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

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

(2) Mount the engine-side of the hub (300) onto a rotatable fixture in accordance with the following steps and Figure 7-1:

(a) Install a new pitch change rod O-ring (420) in the engine-side of the hub (300).

(b) Install an O-ring (570) into the groove provided in each beta spring retainer (410).

CAUTION: INSTALL THE SPINNER BULKHEAD/DE-ICE SLIP RING BEFORE ASSEMBLING THE BETA SYSTEM COMPONENTS.

(c) With the threaded holes facing up, put the beta ring (620) over the rotatable fixture of the assembly table TE129 or equivalent.

(d) With the inboard-side of the bulkhead facing up, put the bulkhead over the rotatable fixture.

1 Put the bulkhead on top of the beta ring (620).

(e) Install the O-ring (1230) on the rotatable fixture to seal between the hub and rotatable fixture.

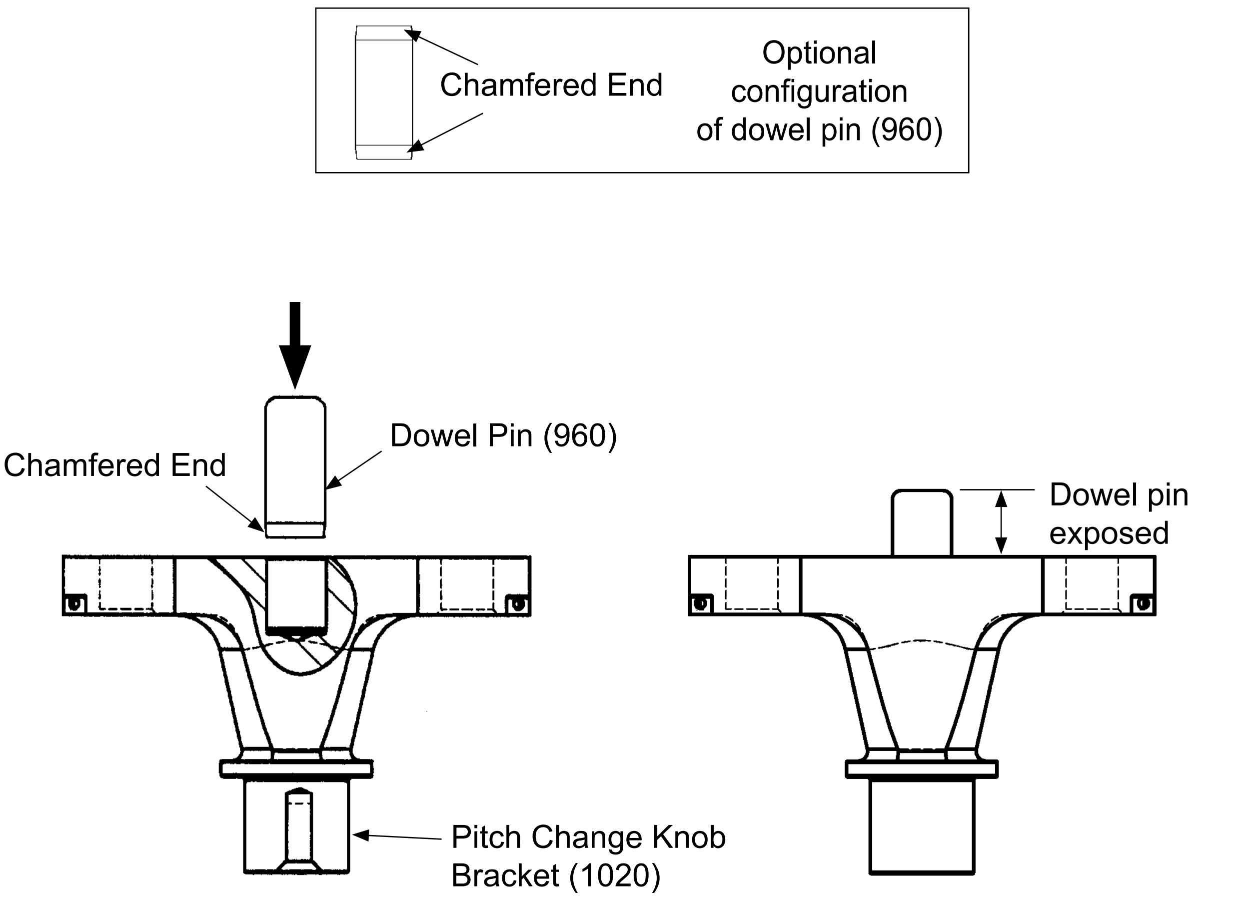
(f) At two places 180 degrees apart, install one washer (1240) and one hub mounting bolt or nut (1250) to attach the engine-side of the hub (300) to the rotatable fixture.

1 Tighten the hub mounting bolts or nuts (1250) until tight.

(g) Using solvent CM23 or CM106, clean the inside surface of the hub (300), the parting line face, and the O-ring groove.

B. ( )D3( )-( )( )A(1,2) Propellers Only:

(1) Install a new O-ring (290) in the hub bushing (350) in the cylinder-side of the hub (300) .



Installing the Dowel Pin
Figure 7-2

3. Blade Assembly and Installation

A. Blade Assembly

(1) General

(a) The following procedure assumes that the blade has been inspected, reworked, and repaired and that the counterweight and the blade thrust bearings are installed in accordance with Hartzell Propeller Inc. Composite Blade Manual 135F (61-13-35).

(2) Install the blade plug (1130) in the bore of each blade using the following steps:

(a) Apply a light layer of lubricant CM12 to the blade plug O-ring (1120).

(b) Install the blade plug O-ring (1120) on the OD of the blade plug (1130).

(c) Install the blade plug (1130) in the bore of the blade.

(d) Install the internal spiral retaining ring (1140) in the groove provided for it in the bore of the blade.

(3) Installing the Dowel Pin

(a) If the dowel pin has been removed, press the chamfered end of the dowel pin (960) into the pitch change knob bracket (950), leaving 0.415 ± 0.025 inch (10.54 ± 0.63 mm) of the dowel pin exposed. Refer to Figure 7-2.

(4) Lubricating the cam follower (970).

NOTE: The cam followers (970) are shipped from Hartzell Propeller Inc. greased with approved lubricant.

(a) Lubricating of the cam follower (970) is not necessary if one of the following two criteria are met:

1 It has been less than two (2) years from the date marked on the packaging by Hartzell Propeller Inc.

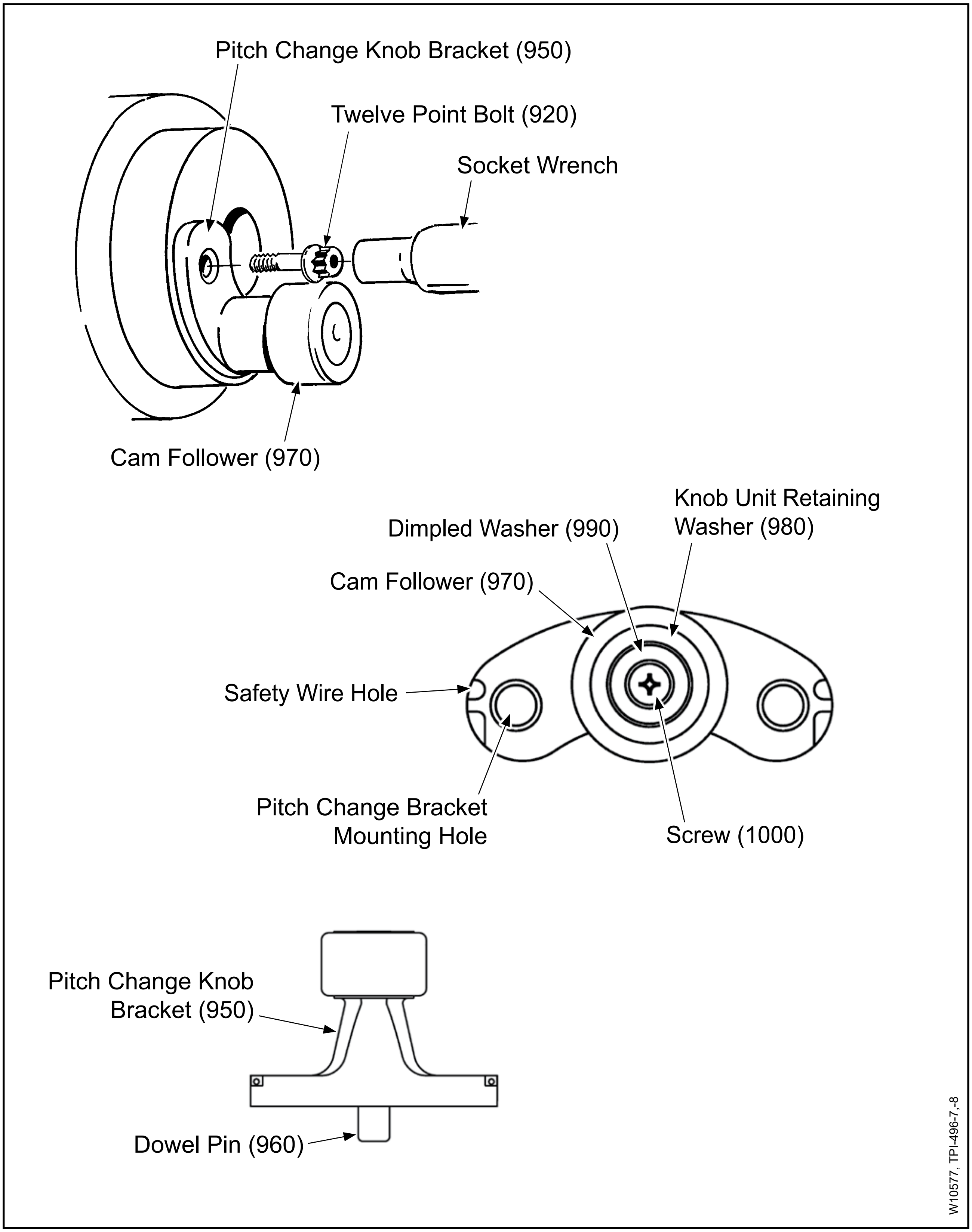
2 It has been less than one (1) year from the date of receipt if there is no date marked on the packaging.

WARNING: 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.

(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 (970).

2 Using lubricant CM12, lubricate the cam follower (970).



Assembly of the Pitch Change Knob Unit
Figure 7-3

(5) Install the cam follower (970) on the pitch change knob bracket (950), using the following steps. Refer to Figure 7-3.

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 threads in the top of the pitch change knob bracket (950) and the threads of the screw (1000).

(b) Permit the threads to dry.

(c) Apply threadlocker CM21 to the clean, dry threads in the top of the pitch change knob bracket (950).

(d) Put the cam follower (970) on the pitch change knob bracket (950).

(e) With the counterbored side up, put the knob unit retaining washer (980) on the end of the pitch change knob bracket (950).

(f) With the raised side down, put the the dimpled washer (990) on the knob unit retaining washer (980).

(g) Examine the knob unit retaining washer (980) and the dimpled washer (990) on the pitch change knob bracket (950) to make sure that the parts are seated correctly.

(h) Apply threadlocker CM21 to the clean, dry threads of the screw (1000).

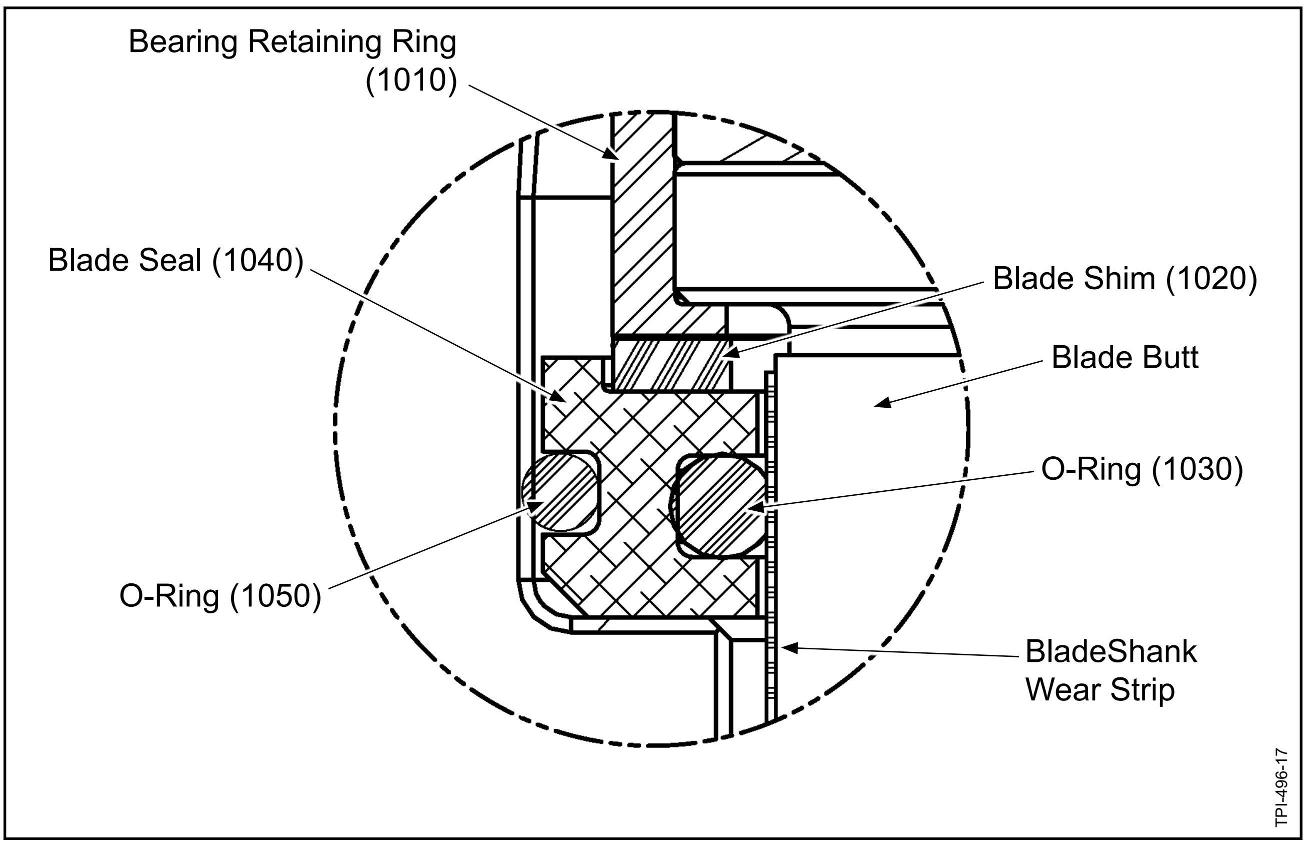
(i) Using the screw (1000), attach the cam follower (970), knob unit retaining washer (980), and the dimpled washer (990) to the pitch change knob bracket (950).

(j) Torque the screw (1000) in accordance with the Torque Values Table 8-1 in the Fits and Clearances chapter of this manual.

(k) Repeat steps (3) through (5)(j) of this procedure for each of the remaining pitch change knob brackets (950).

Pitch Change Knob Bracket Part Number	Change of Blade Angle
106061-1	-0.3°
106061-2	---
106061-3	+0.3°

Blade Pitch Change Unit Selection
Table 7-1



Pre-load Blade Seal Housing and Blade Shim Installation
Figure 7-4

(6) Installation of the Pitch Change Knob Unit - Refer to Figure 7-3

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

(b) Put the pitch change knob unit (940) onto the butt of the blade.

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

(d) Using a mallet, tap the pitch change knob bracket (950) until it is firmly against the butt of the blade.

1 Use the alternate pitch change knob unit 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.

2 Install the 12 point bolts (920).

3 Torque each bolt (920) in accordance with Table 8-1 in the Fits and Clearances chapter of this manual.

4 Safety wire the bolts (920) to the hole in the pitch change knob bracket (950) in accordance with NASM33540.

(e) Repeat steps (6)(a) through (6)(d)4 of this procedure for the remaining blades.

(7) Installation of the blade seal (1040), O-rings (1030, 1050), and the blade O-ring (1110). Refer to Figure 7-4.

(a) Using lubricant CM12, lubricate the blade O-ring (1110).

(b) Install the blade O-ring (1110) on the outboard blade wear strip on the blade

(c) Using lubricant CM12, lightly lubricate O-rings (1050, 1030).

(d) Install the blade O-ring (1030) in the groove provided for it on the ID of the blade seal (1040).

(e) Install the blade O-ring (1050) in the groove provided for it on the OD of the blade seal (1040).

(f) Install the blade seal (1040) with the blade shim (1020) and the O-rings (1050, 1030) on the blade.

1 The thickness of the blade shim (1020) that was measured at disassembly will help determine the thickness of the shim to be installed.

a Use a blade shim (1020) that is slightly thicker than the shim that was removed to offset wear on the components. Refer to Table 7-2.

2 Using lubricant CM12, lightly lubricate the O-rings (1050,1030) before installing the blade seal (1040) with the blade shim (1020) and the O-rings (1050,1030) on the blade.

3 Using lubricant CM12, lubricate the inboard wear strip.

4 With the blade shim (1020) facing the bearing retaining ring (1010), install the the blade seal (1040) with the blade shim (1020) and the O-rings (1050,1030) on the blade.

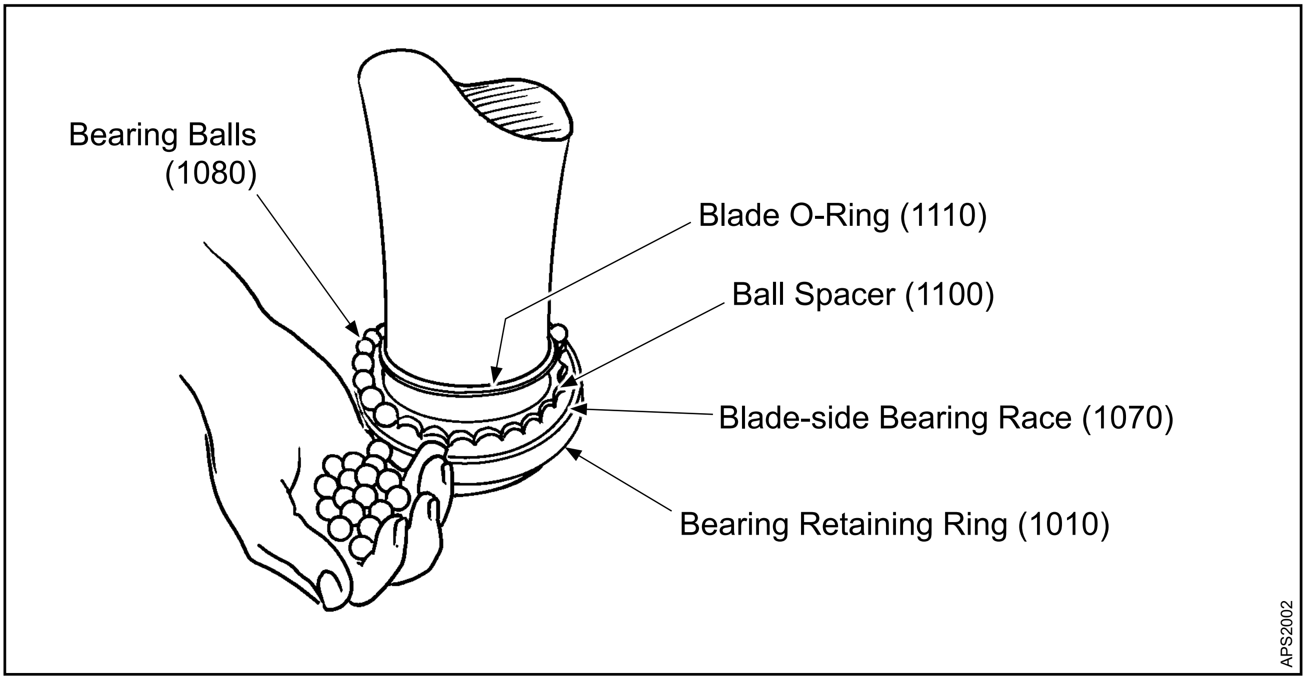
5 Firmly seat the blade seal (1040) with the blade shim (1020) and the O-rings (1050,1030) against the bearing retaining ring (1010).

CAUTION: MAKE SURE THAT THE O-RINGS (1030, 1050) ARE SEATED IN THE GROOVES OF THE BLADE SEAL (1040) WHEN THE BLADE SEAL (1040) IS INSTALLED ON THE BLADE.

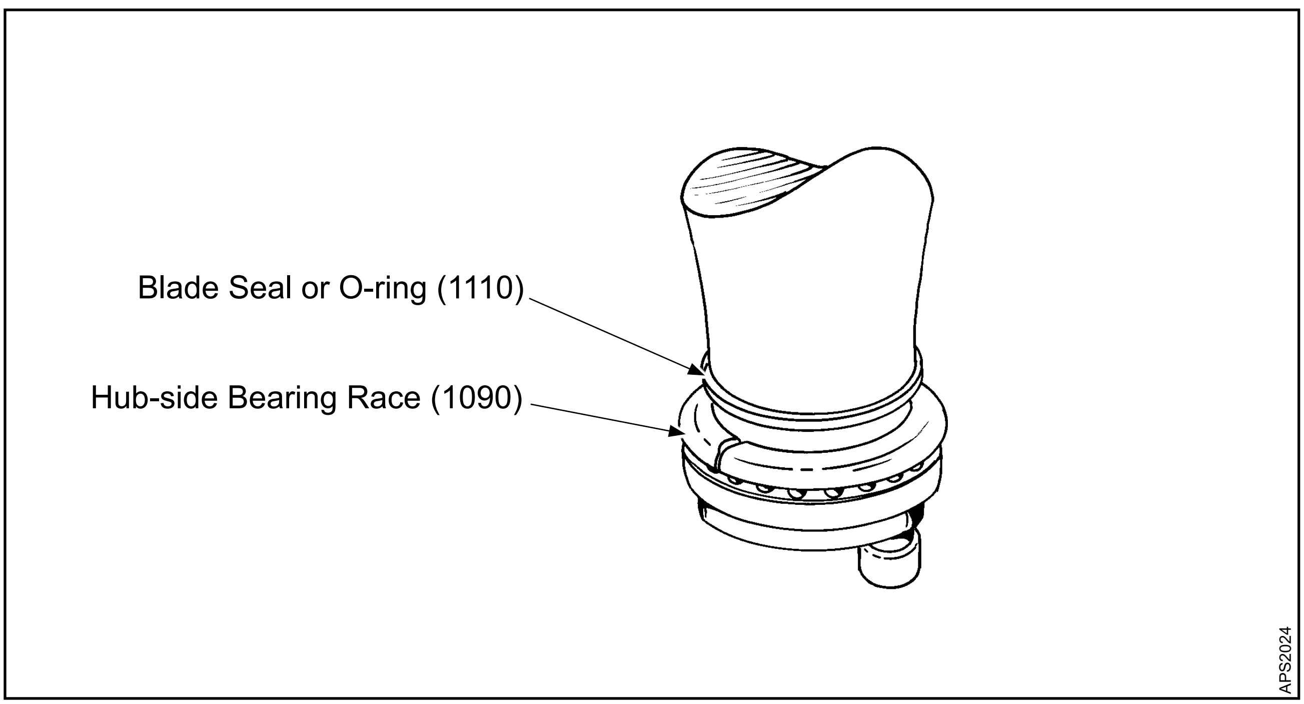
6 Make sure that the O-rings (1030, 1050) are seated in the grooves of the blade seal (1040).

Part Number	Thickness (inch)	Thickness (mm)
105758-050	0.050	1.27
105758-055	0.055	1.39
105758-060	0.060	1.52
105758-063	0.063	1.60
105758-065	0.065	1.65
105758-067	0.067	1.70
105758-070	0.070	1.78
105758-073	0.073	1.85
105758-075	0.075	1.90
105758-077	0.077	1.95

Blade Shim Thickness
Table 7-2



Installation of the Blade-side Bearing Race and Bearing Balls
Figure 7-5



Installing the Hub-side Bearing Race
Figure 7-6

(8) Installation of the Bearing Balls and Hub-Side Bearing Race - Refer to Figure 7-5.

(a) Using lubricant CM12, lubricate the blade-side blade bearing race (1070).

(b) Put the ball spacer (1100) on the blade-side blade bearing race (1070).

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

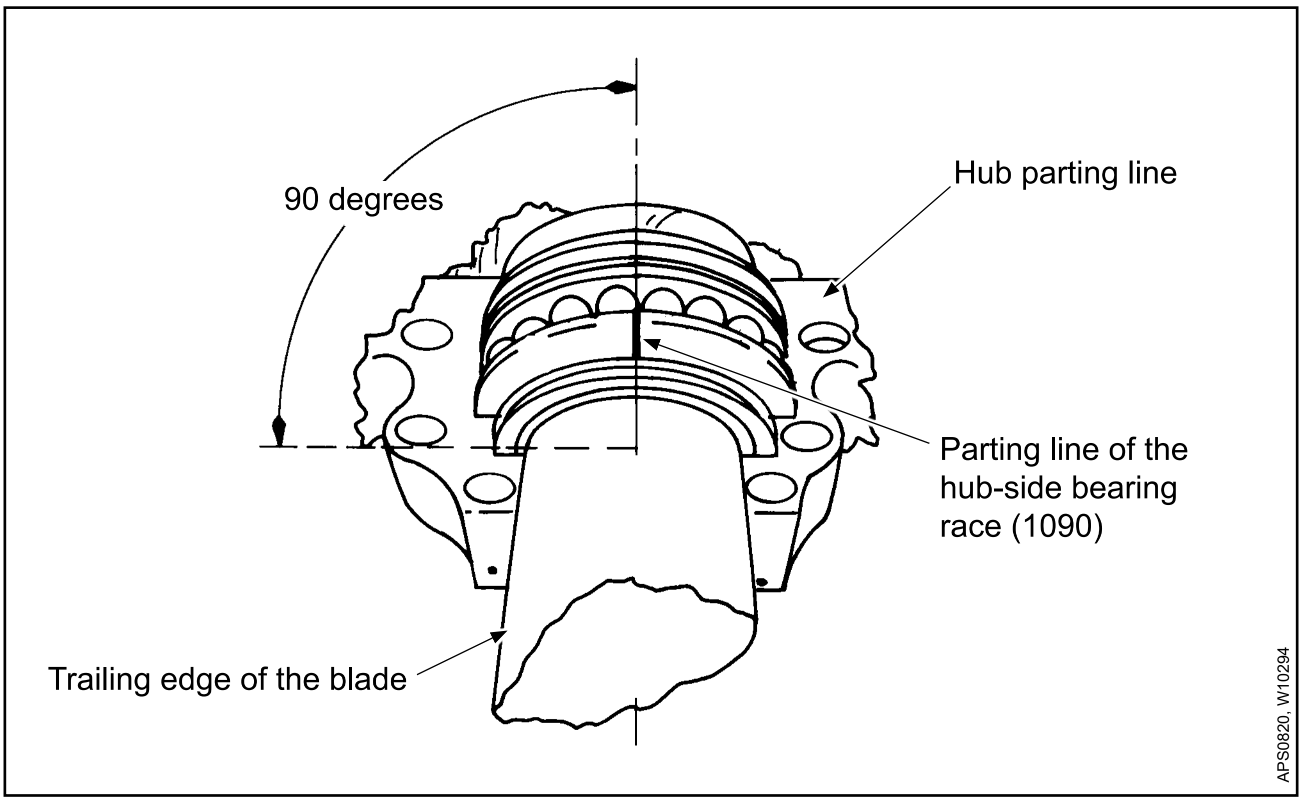
(c) Put the bearing balls (1080) in the openings of the ball spacer (1100) on the blade-side bearing race (1070).

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

(d) Put the hub-side bearing race (1090) on the bearing balls (1080). Refer to Figure 7-6.

1 Install the hub-side bearing race with the parting line perpendicular to the hub parting line when installed in the hub. Refer to Figure 7-6.

(9) Repeat steps (7)(a) through (8)(d)1 of this procedure for the remaining blades.



Installing a Blade in the Hub Socket
Figure 7-7

B. Blade Installation

CAUTION: TO AVOID BLADE OR HUB DAMAGE, DO NOT USE FORCE TO INSTALL THE BLADE INTO THE SOCKET.

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

CAUTION: EACH BLADE MUST BE SHIMMED IN THE HUB SOCKET THAT IT WILL OCCUPY WHEN ASSEMBLED. DO NOT SHIM ALL THE BLADES IN THE SAME SOCKET.

(2) Install each previously assembled blade in accordance with the following steps:

NOTE: Blade clamp TE25 may be used to hold the parts together when installing a blade.

(a) Install the blade assembly into the socket of the engine-side half of the hub (300).

(b) Using a feeler gage, measure the gap between the hub and the hub-side bearing race. A gap of 0.003-0.006 inch (0.07-0.15 mm) is recommended.

1 If the gap is less than 0.003-0.006 inch (0.07-0.15 mm), remove the blade and replace the blade shim (1020) with a thinner blade shim. Refer to Table 7-2.

2 If the gap is greater than 0.003-0.006 inch (0.07-0.15 mm), remove the blade and replace the blade shim (1020) with a thicker blade shim. Refer to Table 7-2.

(3) Make sure that the parting line of the hub-side bearing race (1090) is perpendicular to the hub parting line when the blade is installed in the hub (300). Refer to Figure 7-7.

(4) When all the blades have been successfully installed in the sockets of the hub (300), temporarily install the cylinder-side half of the hub (300).

(a) Install one hub clamping bolt (430) and washer (440) in the hub clamping bolt hole next to the leading edge of each blade.

(b) Install a washer (450) and a nut (460) on each hub clamping bolt (430).

(c) Tighten the nuts (460) until snug. Do not torque the nuts (460) at this time.

CAUTION: INCORRECT SHIMMING CAN CAUSE THE BLADES TO BE TOO LOOSE OR TOO TIGHT IN THE HUB.

(5) Examine each blade for free rotation and end play.

(a) Free rotation

1 If the blade does not rotate freely in the hub socket, make sure that the blade O-ring (1110) is seated correctly in the hub socket.

(b) Blade End play and Fore-and-Aft Movement

1 Using one finger and thumb, apply a light load of approximately 5 lbs. (0.45 kg) to the blade in the direction of the check being performed.

a Apply the load at the mid-span of the blade approximately in line with the blade decal.

2 Measure the blade movement at the tip of the blade.

a Make sure that the blade end play and fore-and-aft movement is within the limits specified in Table 8-2, Blade Tolerances, in the Fits and Clearances chapter of this manual.

(6) If any blade does not rotate freely in the hub socket or if blade end play for any blade is greater than the limits specified in Table 8-2 in the Fits and Clearances chapter of this manual:

(a) Remove the cylinder-side half of the hub (300).

(b) Remove the blade.

(c) Remove the pre-load blade seal housing (1040) and O-rings (1050, 1030).

(d) Remove the blade shim (1020).

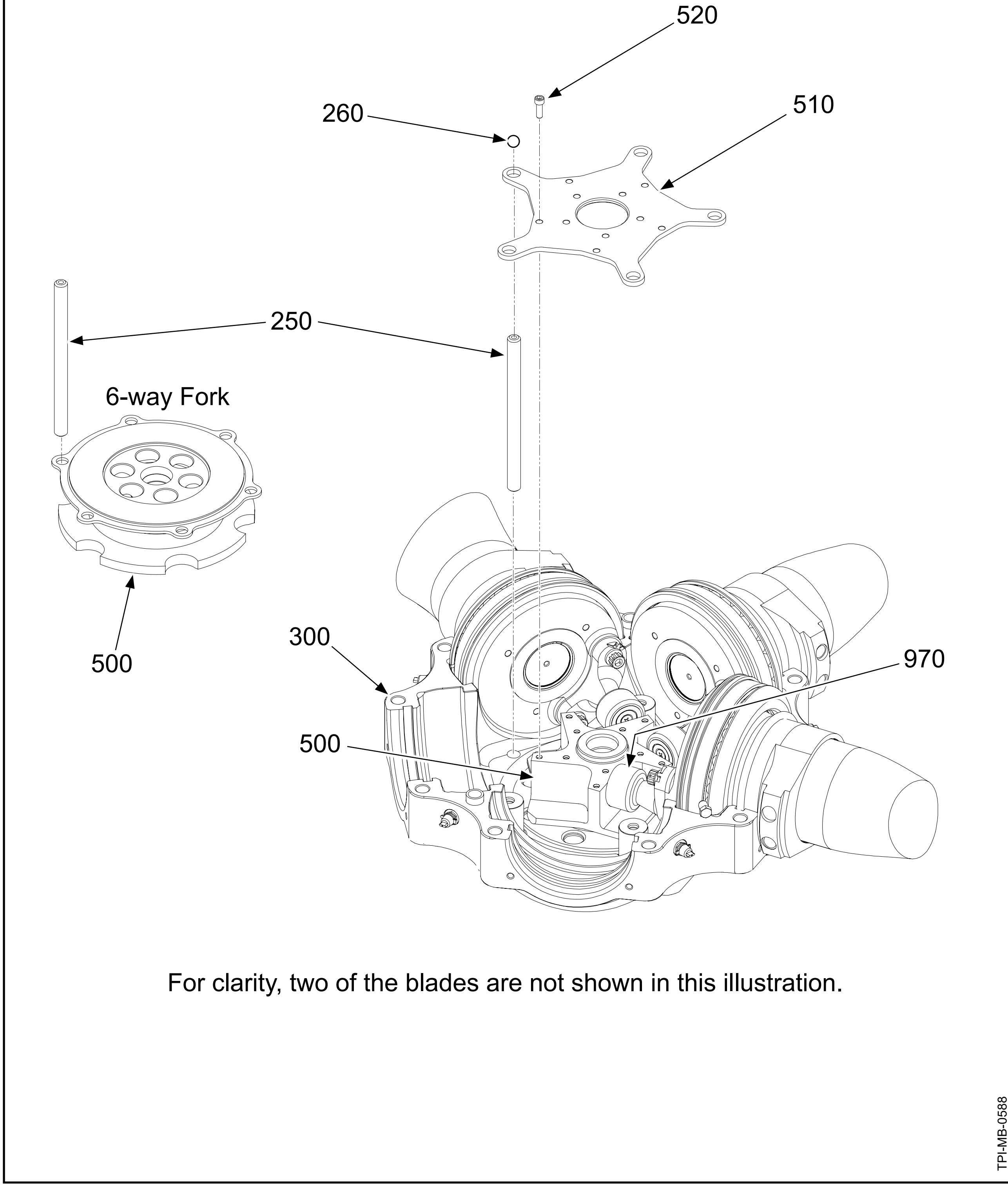
(e) Replace the blade shim (1020) with the next thinner or next thicker blade shim, as necessary. Refer to Table 7-2.

(f) Install the blade shim (1020) in the recess of pre-load blade seal housing (1040).

(g) Using lubricant CM12, lightly lubricate O-rings (1050, 1030) before installation of the blade shim (1020) and pre-load blade seal housing (1040) with O-rings (1050, 1030) on the blade.

(h) With the blade shim (1020) facing the bearing retaining ring (1010), install the blade shim (1020) and pre-load blade seal housing (1040) with O-rings (1050, 1030) on the blade.

(i) Firmly seat the pre-load blade seal housing (1040) against the blade shim (1020).



Installing the Fork/Blades/Anti-rotation Rods
Figure 7-8

CAUTION: MAKE SURE THAT THE O-RINGS (1030, 1050) ARE SEATED IN THE GROOVES OF THE PRE-LOAD BLADE SEAL HOUSING (1040) WHEN THE PRE-LOAD BLADE SEAL HOUSING (1040) IS INSTALLED ON THE BLADE.

(j) Make sure that the O-rings (1030, 1050) are seated in the grooves of the pre-load blade seal housing (1040).

(k) Install the cylinder-side half of the hub (300).

(l) Install the hub clamping bolts (430) and washers (440) in the hub clamping bolt holes that are next to the leading edge of each blade.

1 Install a washer (450) and a nut (460) on each hub clamping bolt (430).

2 Tighten the nuts (460) until snug. Do not torque the nuts at this time.

(m) Check each blade for free rotation.

(7) Repeat steps (5) through (6)(m) of this procedure until all blades rotate freely in the hub and that the maximum permitted blade end play is within the limits specified in Table 8-2, Blade Tolerances, in the Fits and Clearances chapter of this manual.

(8) Remove the cylinder-side half of the hub (300).

(9) Remove blades from the hub in accordance with the applicable step:

(a) (4,5)D3( )-( )( )( ) propellers:
Remove two blades from adjacent hub sockets.

(b) 6D3( )-( )( )( ) propellers:
Remove three blades from adjacent hub sockets.

(10) Apply anti-seize compound CM118 to the threads of the fork (500).

CAUTION: BE SURE THE TAPER IN THE CENTER THREADED HOLE OF THE FORK (500) IS FACING TOWARD THE CYLINDER-SIDE HALF OF THE HUB (300) TO CORRECTLY FIT ON THE PITCH CHANGE ROD (270) THAT WILL BE INSTALLED LATER.

(11) Install the fork (500) in the engine-side half of the hub (300), aligning the pitch change rod hole in the fork (500) with the pitch change rod hole in the hub (300) and aligning each blade cam follower (970) with a channel in the fork (500). Refer to Figure 7-8.

(12) Re-install the two/three blades that were previously removed from adjacent hub sockets

(13) Install the anti-rotation rods (250) in the hub (300) in accordance with Figure 7-8.

(a) Put each anti-rotation rod (250) in the depression provided for it in the engine-side half of the hub (300).

(14) If applicable, install the fork plate (510) or beta pickup (515) in accordance with Figure 7-8 and the following steps:

(a) Slide the fork plate (510) or beta pickup (515) over the anti-rotation rods (250) and push down until it touches the fork (500).

(b) Using the screws (520), attach the fork plate (510) or beta pickup (515) to the fork (500).

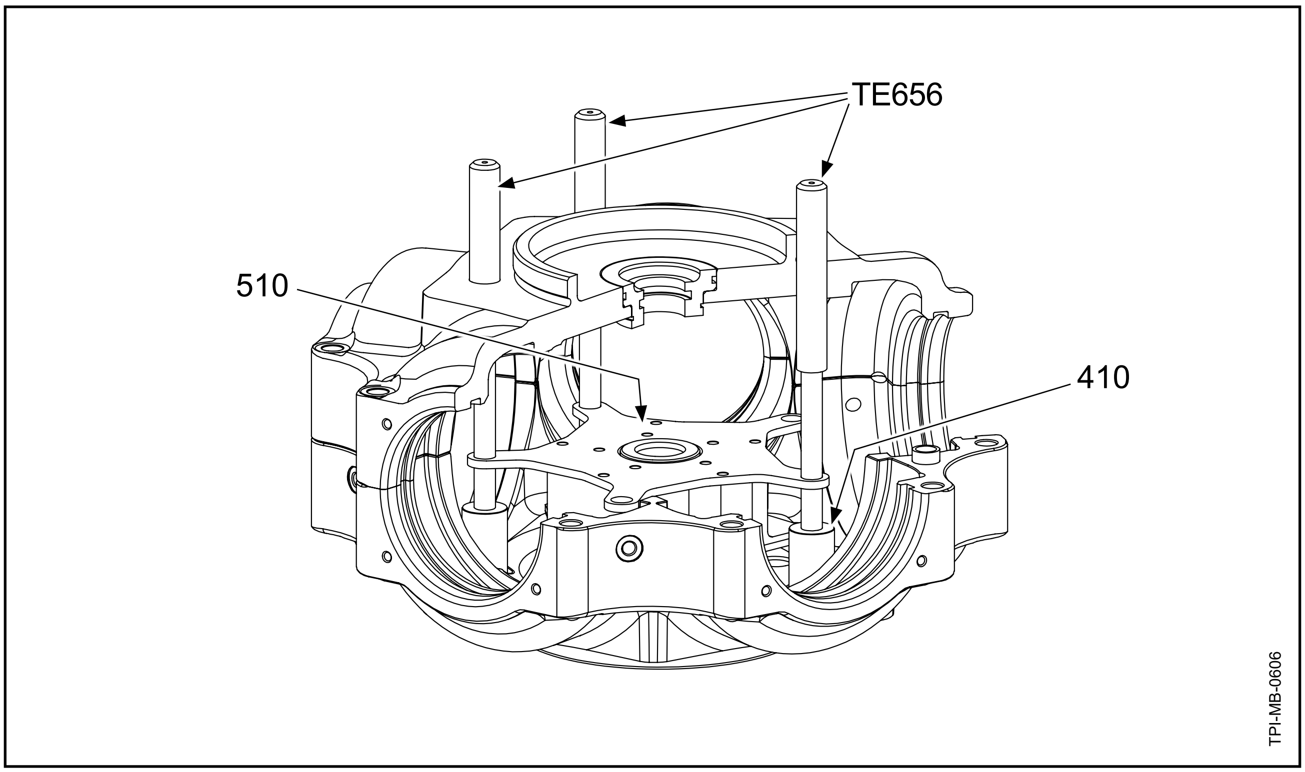
(c) Torque each screw (520) in accordance with the Torque Values Table 8-1 in the Fits and Clearances chapter of this manual.

(15) Install the anti-rotation rod spacers (260) in accordance with Figure 7-8 and the following steps:

(a) Put a small amount of lubricant CM12 on the top of each anti-rotation rod (250).

(b) Put an anti-rotation rod spacer (260) in the lubricated depression on the end of each anti-rotation rod (250).

(16) Install three alignment rods TE656, into the beta spring retainers (410) through the fork plate (510), beta pickup (515), or 6-way fork (500) as applicable. Refer to Figure 7-9.



Alignment Rods TE656
Figure 7-9

CAUTION: MAKE SURE THAT THE BLADE O-RING (1110) IS CORRECTLY ALIGNED IN THE HUB GROOVE WHEN INSTALLING THE CYLINDER-SIDE HALF OF THE HUB (300).

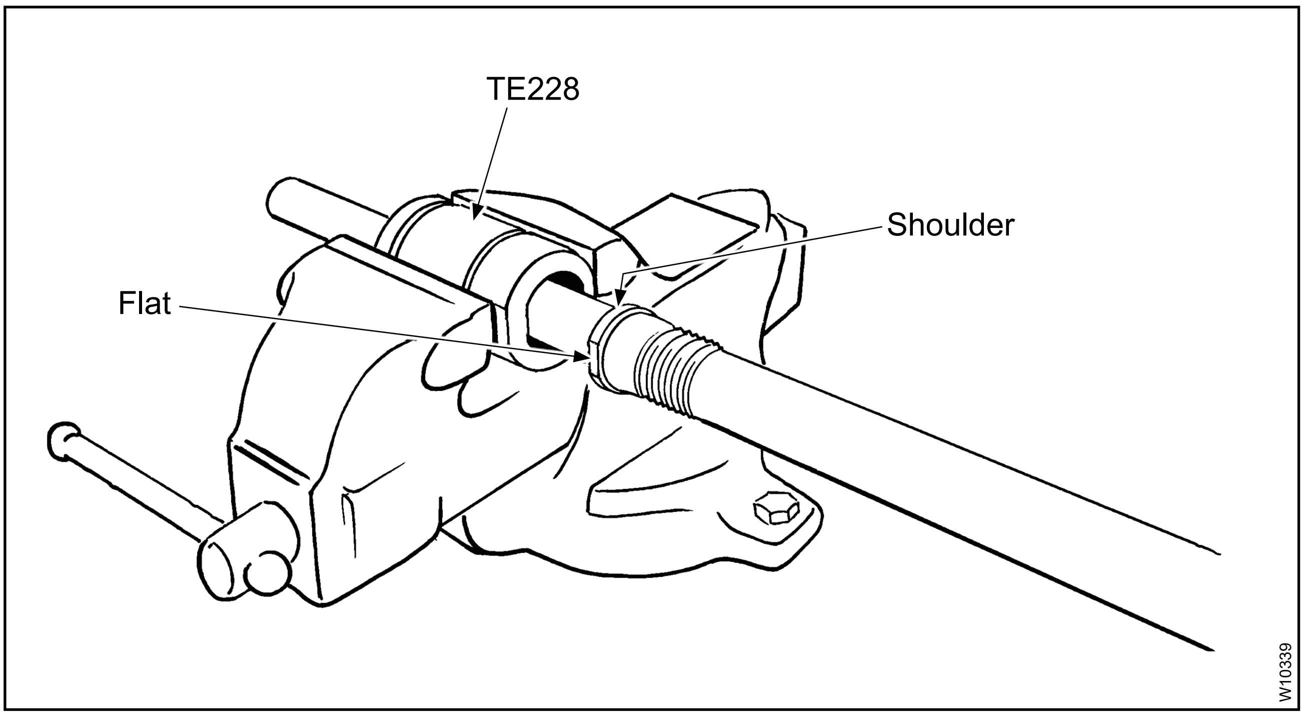
(17) Install the cylinder-side half of the hub (300) in accordance with the following steps:

(a) Position the cylinder-side half of the hub (300) over the three alignment rods TE656 and apply pressure until it is seated onto the engine-side half of the hub (300).

(b) Install the hub clamping bolts (430) and washers (440) in the hub clamping bolt holes that are midway between each of the blade sockets.

1 Install a washer (450) and a nut (460) on each hub clamping bolt (430).

2 Tighten the nuts (460) until snug. Do not torque the nuts at this time.



Using the TE228 Tool on the Pitch Change Rod
Figure 7-10

4. Pitch Change Unit Asssembly: ( )D3( )-( )( )A(1,2) Propellers

A. Installing the Piston onto the Pitch Change Rod

(1) Install the small piston O-ring (220) in the ID of the piston (210).

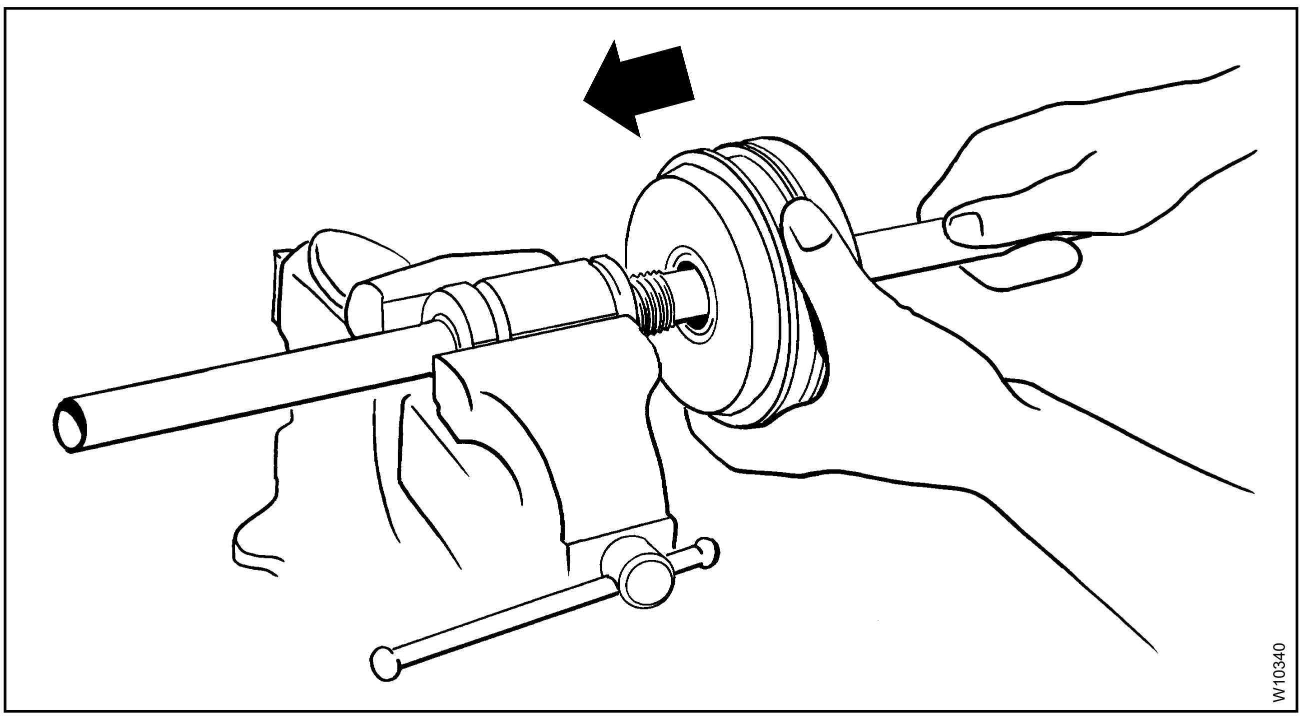
(2) Install the piston (210) on the pitch change rod (270).

(a) Put the piston installation socket TE228 in a vise. Refer to Figure 7-10.

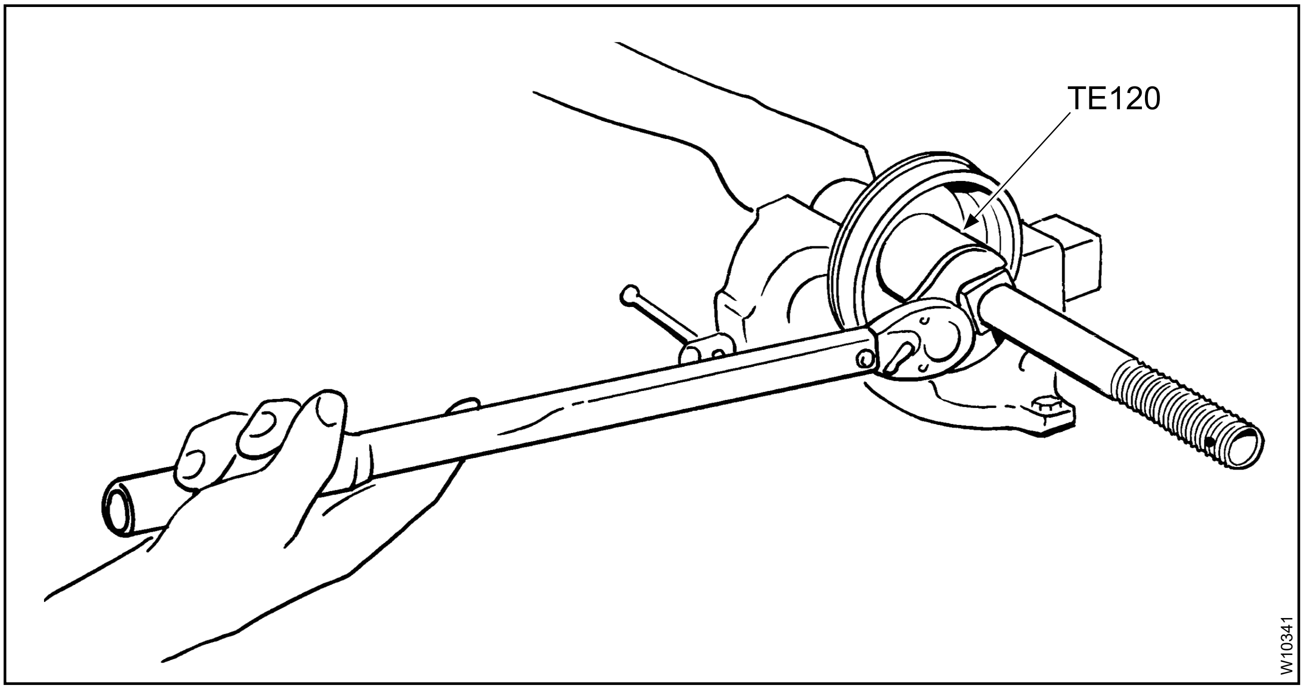
(b) Insert the pitch change rod through the piston unit installation socket TE228, fitting the socket over the shoulder flats on the pitch change rod as shown in Figure 7-10.

(c) Move the piston (210) into place against the shoulder on the pitch change rod (270). Refer to Figure 7-11.

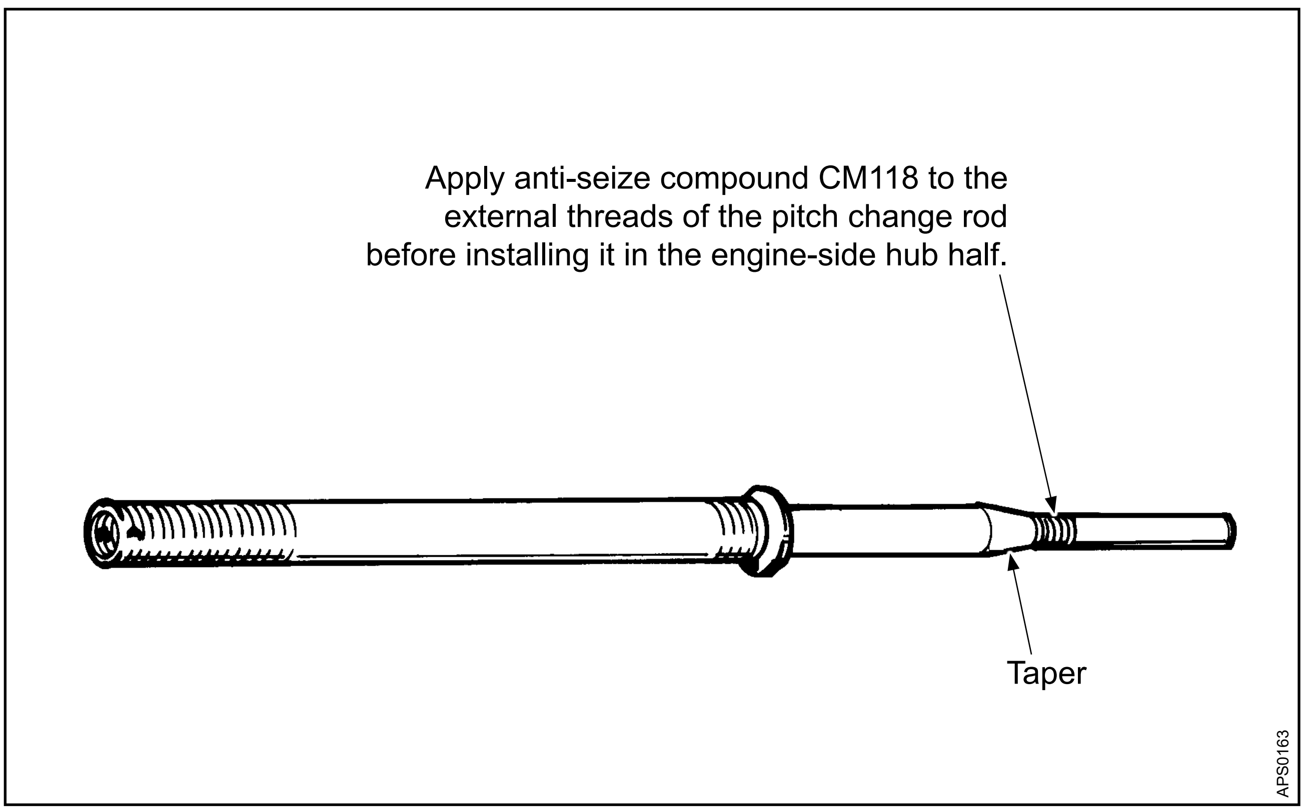
(d) Turn the piston self-locking nut (200) on the pitch change rod (270) until the self-locking nut locking mechanism engages the pitch change rod threads.



Installing the Piston
Figure 7-11



Torquing the Piston Nut
Figure 7-12



Applying CM118 to the Pitch Change Rod
Figure 7-13

(3) Using the modified deep well socket TE120, torque the piston self-locking nut (200) against the piston (210) in accordance with Table 8-1 in the Fits and Clearances chapter of this manual. Refer to Figure 7-12.

(4) Apply anti-seize compound CM118 to the external threads adjacent to the tapered section of the pitch change rod (270). Refer to Figure 7-13.

(5) Insert the small diameter end of the pitch change rod (420) into the cylinder-side half of the hub (300) and through the fork (500) and the engine-side half of the hub.

CAUTION: WHEN INSTALLING THE PITCH CHANGE ROD INTO THE FORK, DO NOT EXCEED THE MAXIMUM TORQUE IN ACCORDANCE WITH TABLE 8-1 IN THE FITS AND CLEARANCES CHAPTER OF THIS MANUAL.

(6) Turn the pitch change rod (270) into the fork (500).

(7) Using the modified deep well socket TE120 on the self-locking hex nut (200), torque the pitch change rod (270) in accordance with Table 8-1 in the Fits and Clearances chapter of this manual.

(8) Move the blades by hand to make sure the blades have full range of movement from reverse pitch to feather pitch.

B. Cylinder/Spring Pack Assembly

CAUTION: REFER TO THE APPLICABLE AIRCRAFT TYPE CERTIFICATE DATA SHEET AND/OR HARTZELL PROPELLER APPLICATION GUIDE FOR SPECIFIC BLADE ANGLES REQUIRED.

(1) Install the piston OD O-ring (240) in the groove closest to the hub. Refer to Figure 7-14.

(2) Cut the necessary length of piston dust seal material (230).

(a) Cut the piston dust seal material (230) 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 7-14.

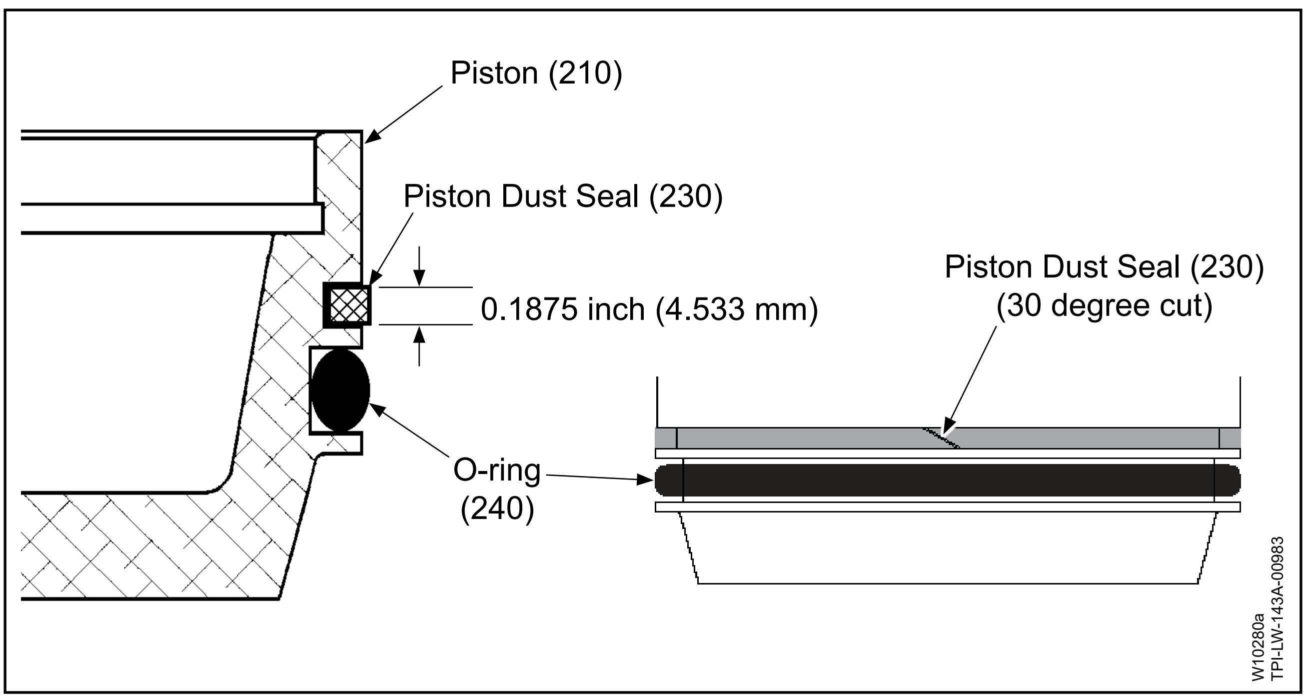
(3) Soak the piston dust seal (230) in aviation grade turbine engine oil until the seal is completely saturated.

(4) Squeeze the excess oil from the piston dust seal (230).

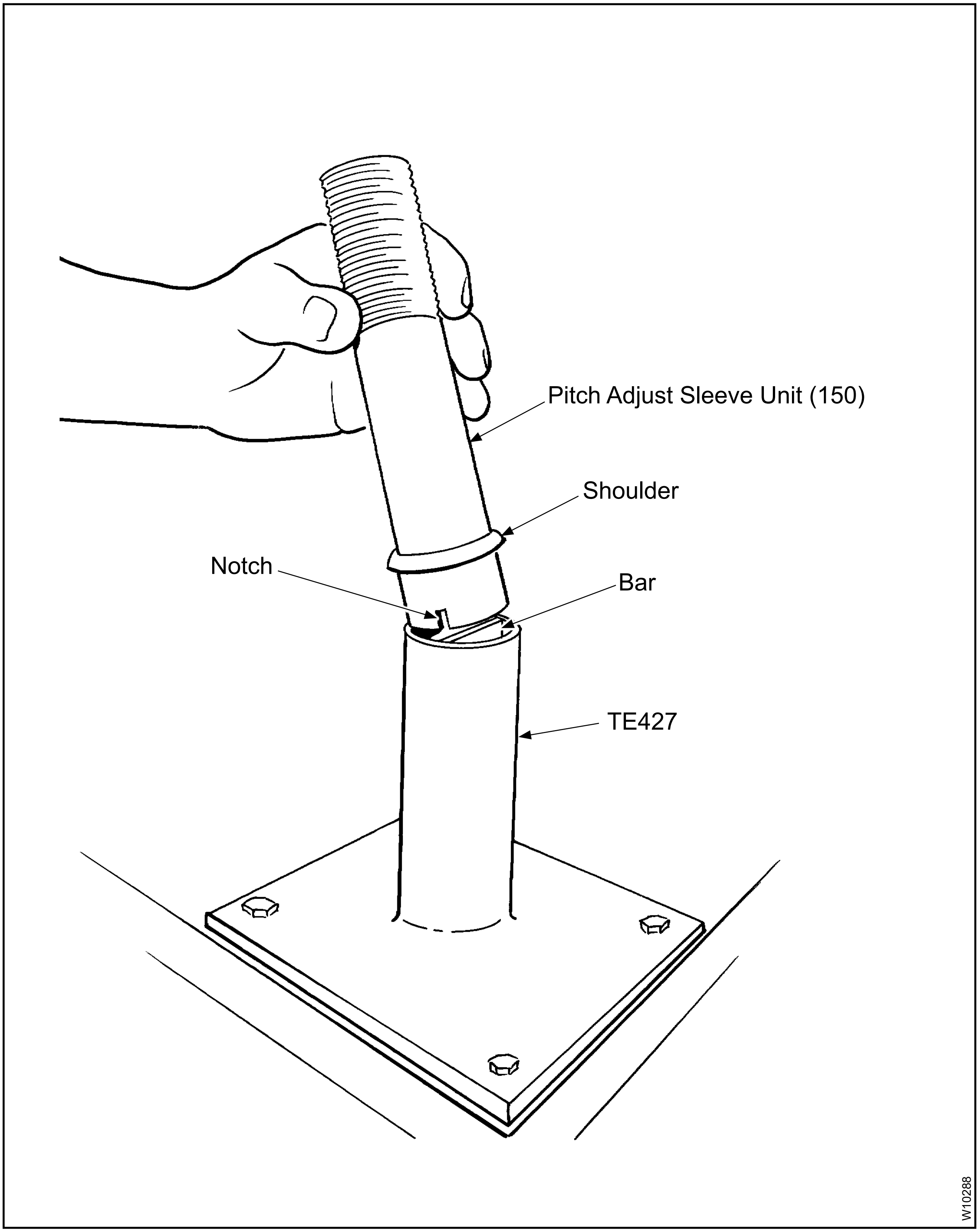
CAUTION: MAKE SURE THAT THE PISTON DUST SEAL (230) IS FREE OF FUZZ.

(5) If the piston dust seal (230) 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 (230) in the remaining piston OD groove. Refer to Figure 7-14.



Piston O-ring and Piston Dust Seal
Figure 7-14



Pitch Adjust Sleeve Unit
Figure 7-15

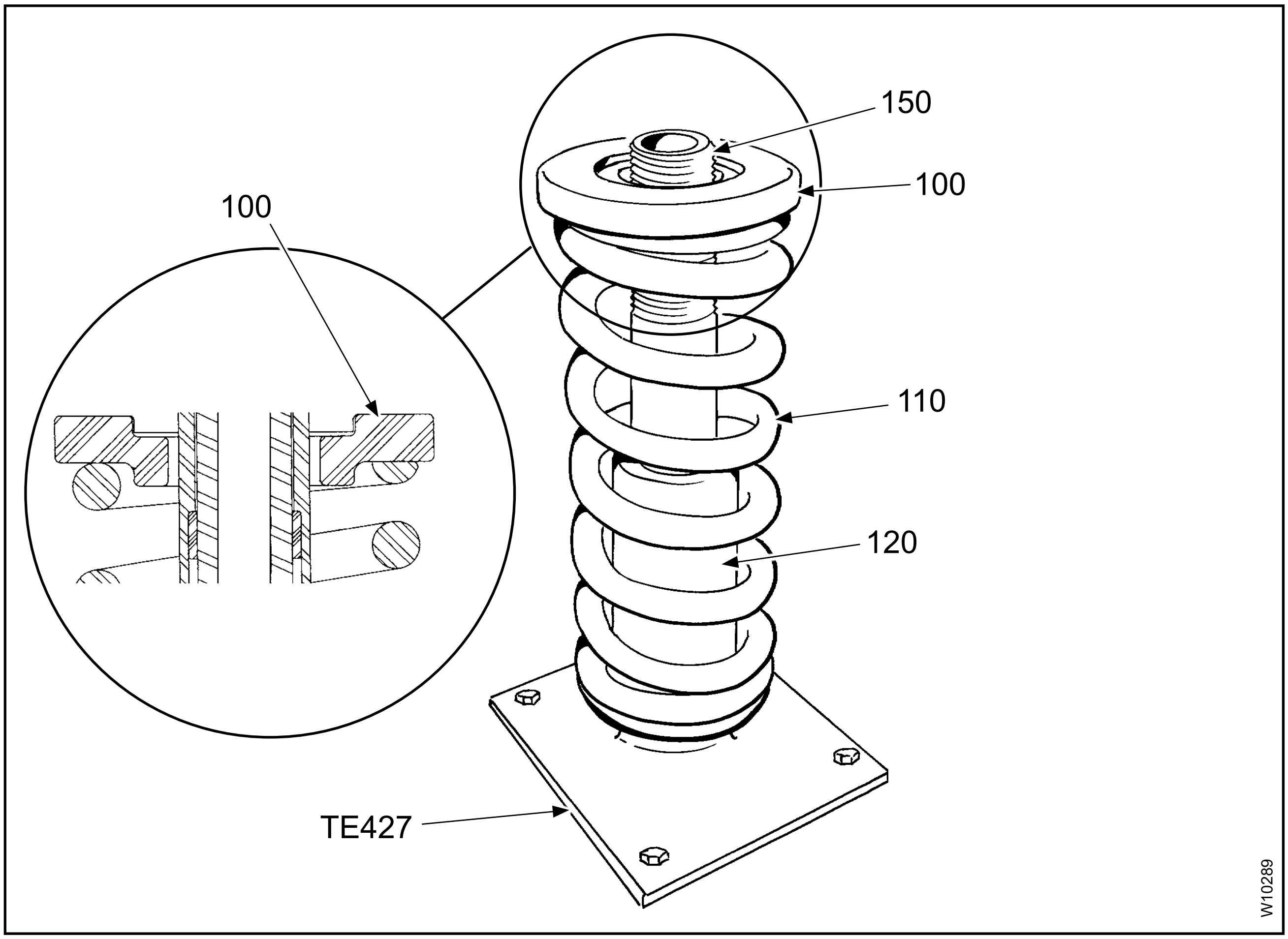
(7) Installing the cylinder.

(a) Installing the pitch adjust sleeve unit (150) into the cylinder using the sleeve installation tool TE427, or equivalent:

1 Fit the notches of the pitch adjust sleeve unit (150) into place on the bar of the sleeve installation tool TE427, or equivalent. Refer to Figure 7-15.

2 Put the spring guide (120) over the pitch adjust sleeve unit (150) on the sleeve installation tool TE427, or equivalent until the spring guide is resting on the pitch adjust sleeve unit shoulder. Refer to Figure 7-15 and Figure 7-16.

3 Apply anti-seize compound CM118 or CM151 to both end coils of the feathering compression spring (110) and the first two threads of the pitch adjust sleeve unit (150).



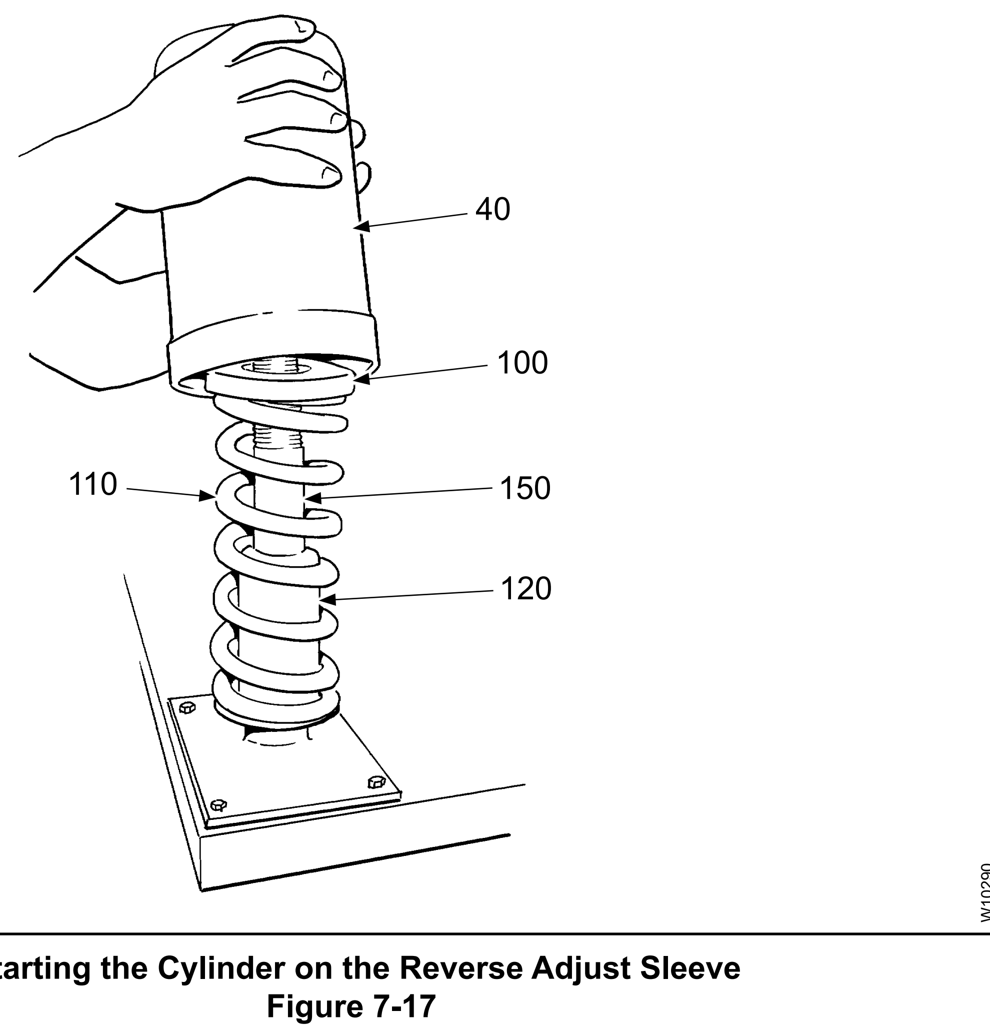
Installing the Feathering Compression Spring/Pitch Adjust Sleeve Unit
Figure 7-16

4 Put the feathering compression spring (110) over the pitch adjust sleeve unit (150) and spring guide (120) on the sleeve installation tool TE427, or equivalent, with the feathering compression spring resting on the lip of the spring guide (120). Refer to Figure 7-17.

5 With the raised shoulder toward the feathering compression spring (110), install the forward spring retainer (100), if applicable, over the pitch adjust sleeve unit (150) on the sleeve installation tool TE427, or equivalent. Refer to Figure 7-16.

CAUTION: DO NOT DAMAGE THE PITCH ADJUST SLEEVE UNIT (150) OR THE CYLINDER (40) THREADS WHEN INSTALLING THE CYLINDER.

6 Put the cylinder (40) over the parts on the sleeve installation tool TE427, or equivalent, and turn the cylinder onto the pitch adjust sleeve unit (150). Refer to Figure 7-17.



Starting the Cylinder on the Reverse Adjust Sleeve
Figure 7-17

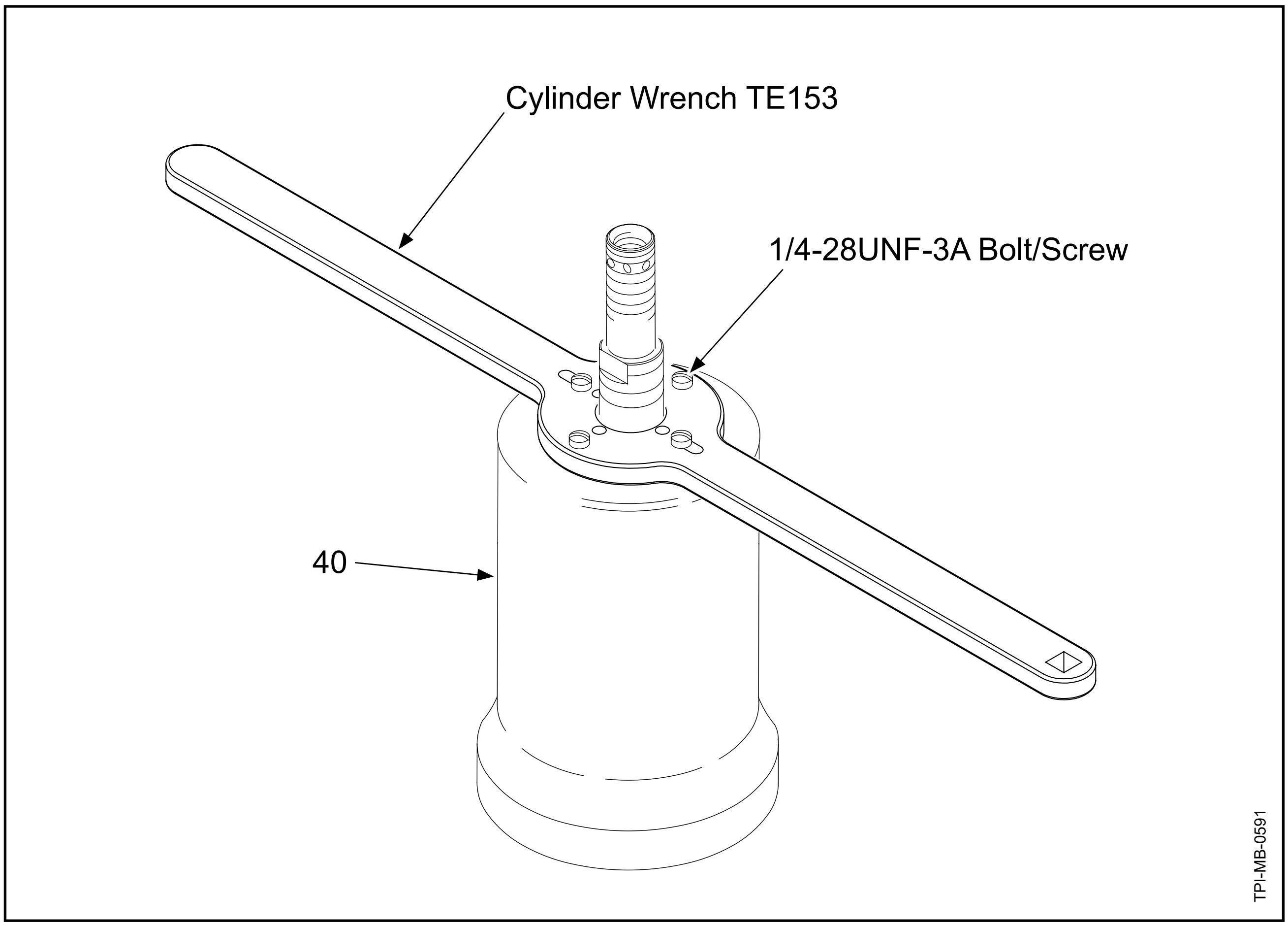
7 Using four 1/4-28UNF-3A bolts or screws, attach the cylinder torque wrench adapter TE153, or equivalent, to the cylinder (40). Refer to Figure 7-18.

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 (110) is fully compressed.

WARNING: USE CARE WHEN HANDLING A CYLINDER CONTAINING A COMPRESSED SPRING.

9 With the cylinder torque wrench adapter TE153 attached, remove the cylinder (40) from the sleeve installation tool TE427, or equivalent.



Cylinder Wrench TE153
Figure 7-18

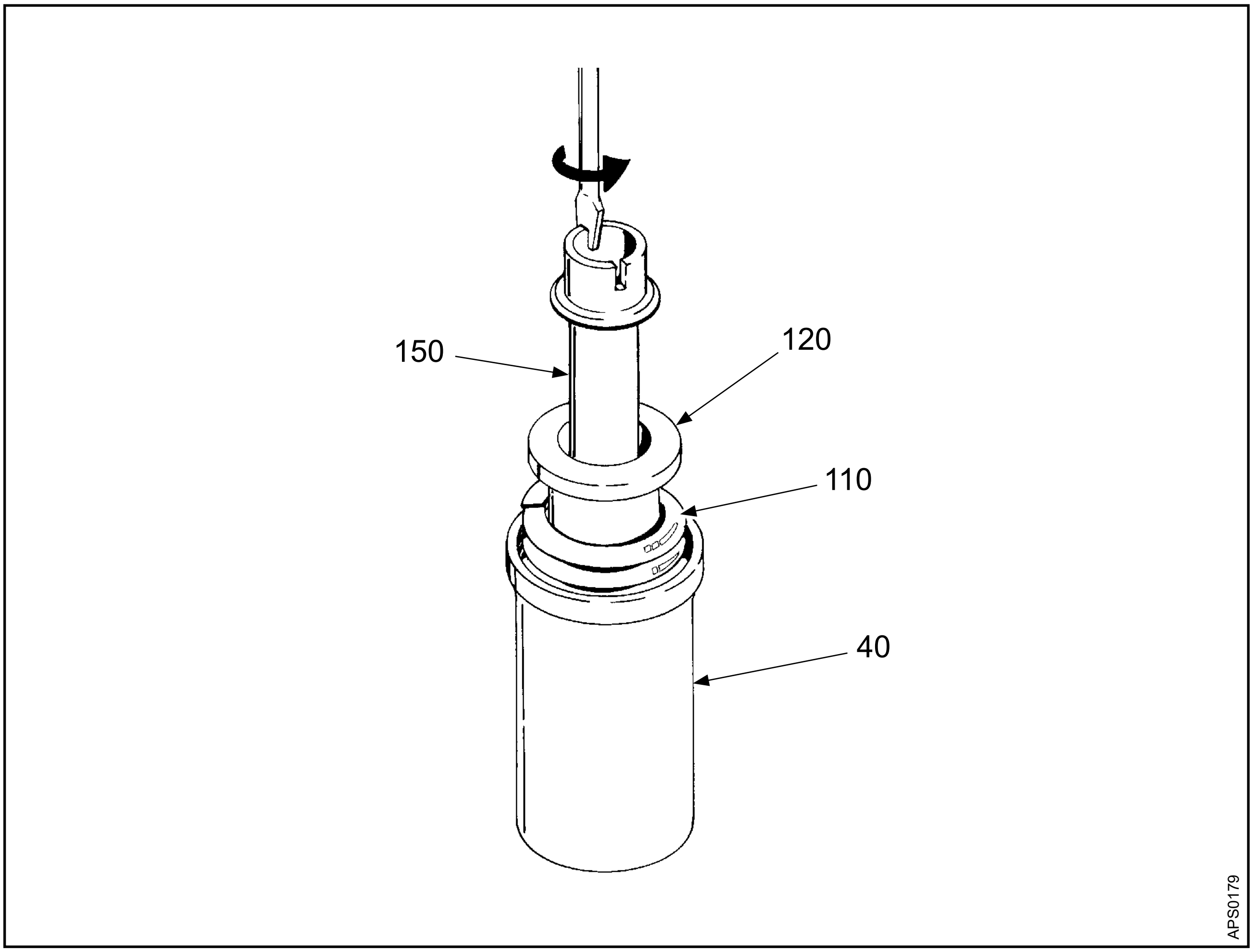
(b) Installing the pitch adjust sleeve unit (150) into the cylinder without the sleeve installation tool TE427, or equivalent:

<u>1</u> Apply anti-seize compound CM118 or CM151 to both end coils of the feathering compression spring (110) and the first two threads of the pitch adjust sleeve unit (150).

<u>2</u> Install the pitch adjust sleeve unit (150) through the spring guide (120), feathering compression spring (110), and the forward spring retainer (100).

<u>3</u> As shown in Figure 7-19, use a screwdriver in the slot in the pitch adjust sleeve unit (150) 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 until the Feathering compression spring (110) is fully compressed.

<u>4</u> Using four 1/4-28UNF-3A bolts or screws, attach the cylinder torque wrench adapter TE153, or equivalent, to the cylinder (40).



Installing the Pitch Adjust Sleeve Unit
Figure 7-19

(c) Install the cylinder-half hub shoulder O-ring (280). Refer to Figure 7-20.

CAUTION: DO NOT APPLY ANTI-SEIZE COMPOUND CM118 TO THE MOUNTING THREADS ON THE CYLINDER.

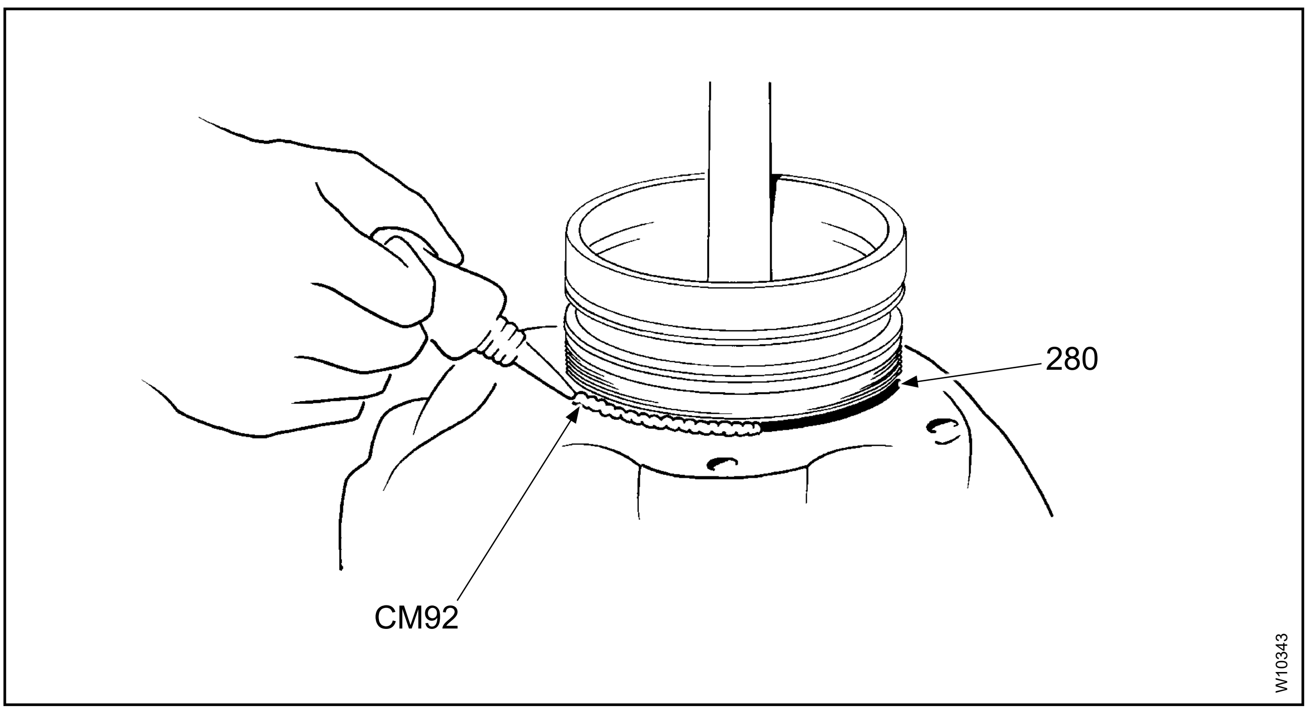
(d) Apply anti-seize compound CM118 to the cylinder mounting threads on the hub only.

1 Using a clean cloth, remove any excess anti-seize compound CM118 from the area above the cylinder mounting threads on the hub.

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 next to the O-ring.

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.

(e) Apply a bead of sealant CM92 around the shoulder of the cylinder half of the hub next to the O-ring (280). Refer to Figure 7-20.



Applying a Bead of Sealant to the Hub Shoulder
Figure 7-20

CAUTION 1: DO NOT DAMAGE THE CYLINDER THREADS WHEN INSTALLING THE CYLINDER (40).

CAUTION 2: DO NOT DAMAGE THE PISTON O-RING (240) WHEN INSTALLING THE CYLINDER (40).

(f) Carefully put the cylinder (40) over the piston unit (320) onto the threads of the hub (300).

CAUTION: MAKE SURE THAT THE CYLINDER THREADS ARE ALIGNED WITH THE HUB THREADS.

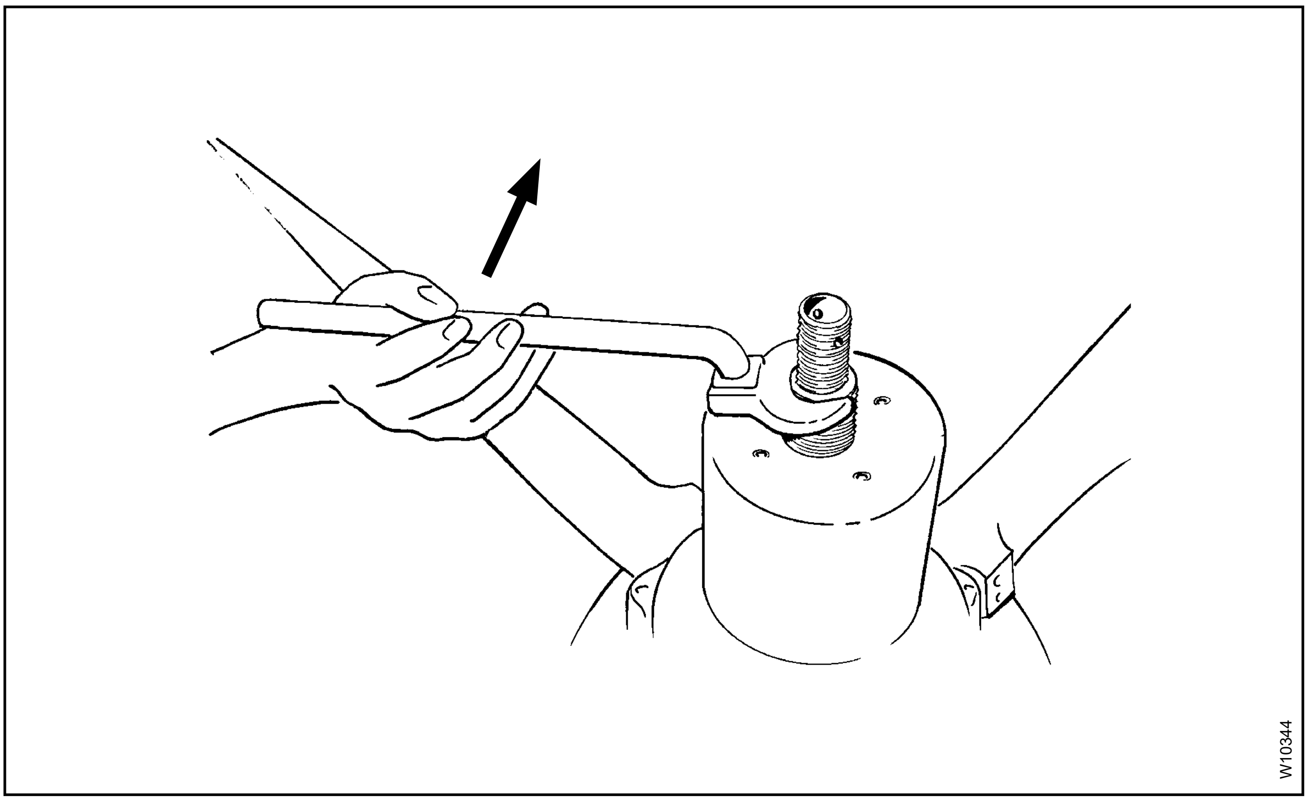
(g) Turn the cylinder (40) counterclockwise until the threads align.

(h) Thread the cylinder (40) onto the hub threads by hand.

(i) Using the torque wrench adapter TE153, or equivalent, torque the cylinder (40) onto the hub (300) 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 and cylinder (40).

(k) Remove the torque wrench adapter TE153 from the cylinder (40).

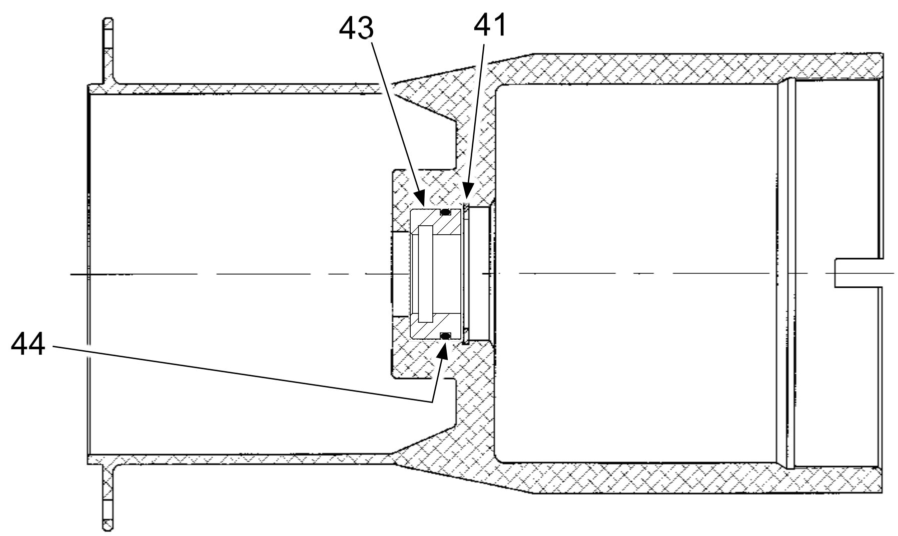


Turning the Pitch Adjust Sleeve Unit
Figure 7-21

CAUTION: IF THE FEATHERING COMPRESSION SPRING (110) IS NOT IN CONTACT WITH THE PISTON, THE PISTON WILL FORCEFULLY CONTACT THE BOTTOM OF THE FEATHERING COMPRESSION SPRING WHEN 200 PSI IS APPLIED.

(8) Using a 1-3/16 inch open end wrench, engage two of the flats on the pitch adjust sleeve unit (150) and turn it approximately 3 turns clockwise or until there is no resistance, permitting the feathering compression spring (110) to make contact with the piston. Refer to Figure 7-21.

(9) Install the drilled hex nut (30) on the pitch adjust sleeve unit (150).



108298 Cylinder Bushing Installation
Figure 7-22

5. Pitch Change Unit Asssembly: ( )D3( )-( )( )B1 Propellers

A. 108298 Cylinder Bushing Installation

(1) Before installing the cylinder bushing (43), inspect the cylinder (40) in accordance with the Check chapter in this manual.

(2) Apply grease CM12 to the O-ring (44).

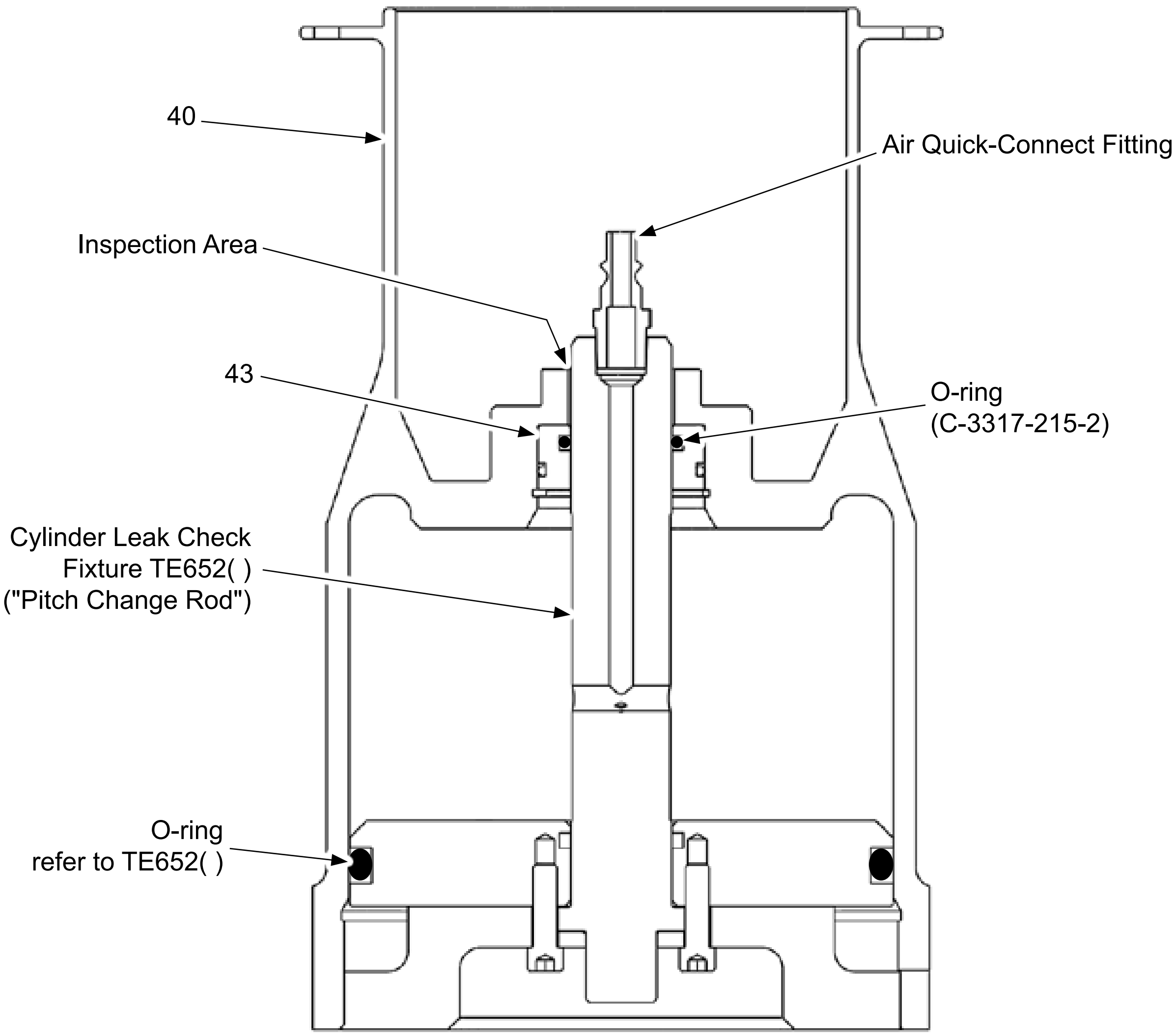
(a) Install the O-ring (44) in the O-ring groove on the OD of the cylinder bushing (43).

(3) Apply grease CM12 to the bore of the cylinder (40).

(4) Position the cylinder bushing (43) with the O-ring (44) closest to the retaining ring groove as shown in Figure 7-22, then press the cylinder bushing into the bore of the cylinder (40).

(a) Install the retaining ring (41) in the retaining ring groove of the cylinder to retain the cylinder bushing (43).

(5) Perform a leak check in accordance with the section, "Cylinder Leak Check Procedure" in this chapter.



Cylinder Leak Check Procedure
Figure 7-23

B. Cylinder Leak Check Procedure (Refer to Figure 7-23)

NOTE: This procedure requires cylinder leak check fixture TE652( ).

(1) Inspect the O-rings on the cylinder leak check fixture TE652( ).

(a) Install a new or serviceable O-ring (C-3317-215-2) in the groove on the ID of the hub bushing (43).

(b) All surfaces of the fixture, including the threads must be clean and free of nicks and scratches.

(2) Apply a thin layer of grease CM12 to the O-rings, cylinder threads, and the diameter of the "pitch change rod" on the cylinder leak check fixture TE652( ).

CAUTION: DO NOT DAMAGE THE THREADS WHEN INSTALLING THE CYLINDER (40) ONTO THE CYLINDER LEAK CHECK FIXTURE TE652( ).

(3) Install the cylinder leak check fixture TE652( ) from the threaded end of the cylinder (40) as shown in Figure 7-23.

(a) Turn the fixture TE652( ) until the fixture threads are fully engaged with the cylinder (40).

(4) Put the cylinder/fixture on a flat surface with the air quick-connect fitting facing up.

(5) Apply 200 psi (13.79 bars) of air pressure to the air quick-connect fitting.

(6) Check for leaks in the inspection area identified in Figure 7-23.

(a) Apply leak detector CM122 to the inside of the cylinder (40) where the "pitch change rod" of the cylinder leak check fixture TE652( ) contacts the cylinder.

1 Observe for approximately 10 seconds.

2 A leak is indicated by continuous bubbling at the inspection area.

3 A leak is not permitted.

(b) If a leak is detected:

1 Inspect the O-rings for damage and unwanted material.

a Remove unwanted material.

b Replace the O-ring(s).

2 Repeat the leak inspection procedure.

a If the leak cannot be stopped, replace the cylinder bushing (43), then repeat the leak inspection procedure.

(7) After the test is complete, remove the cylinder (40) from the cylinder leak check fixture TE652( ).

(a) Remove and discard the O-ring (C-3317-215-2) from the ID of the cylinder bushing (43).

(b) All fixtures and tools should be cleaned and stored to prevent contamination by airborne particles (dust, paint, etc.).

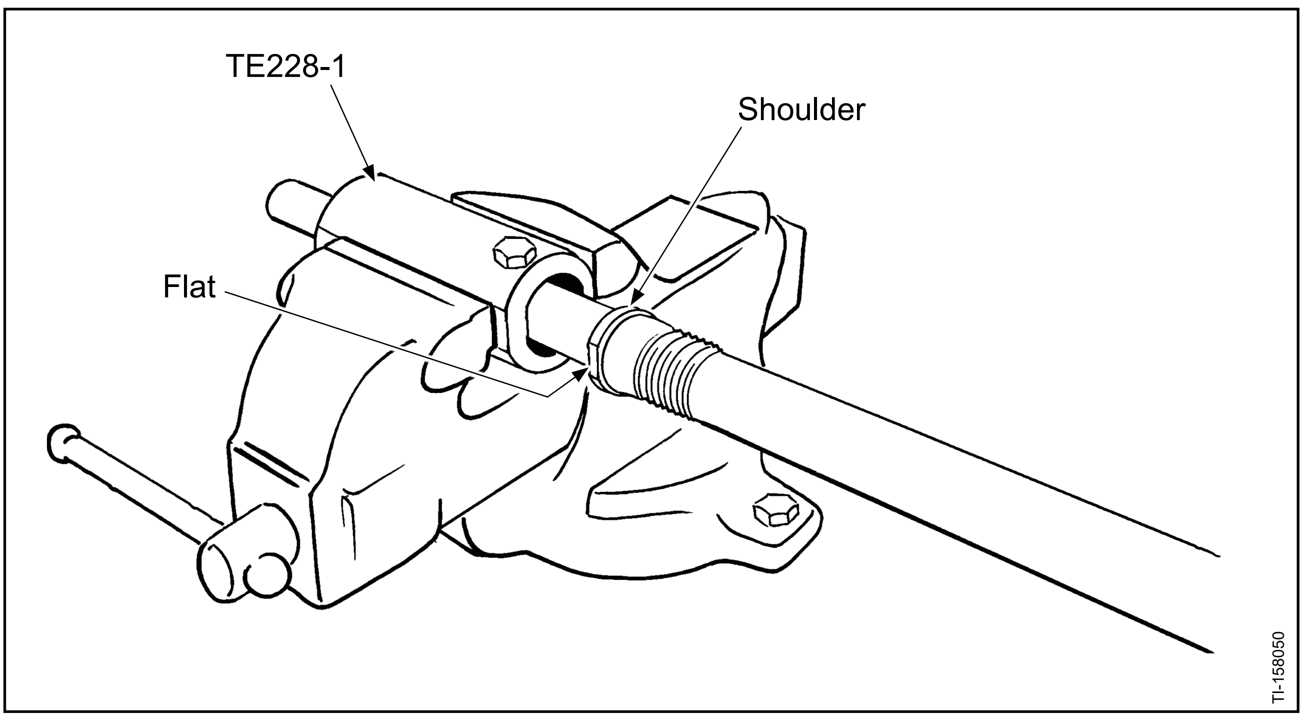
C. Installing the Piston onto the Pitch Change Rod

(1) Install an O-ring (220) in the groove provided for it in the ID bore of the piston (210).

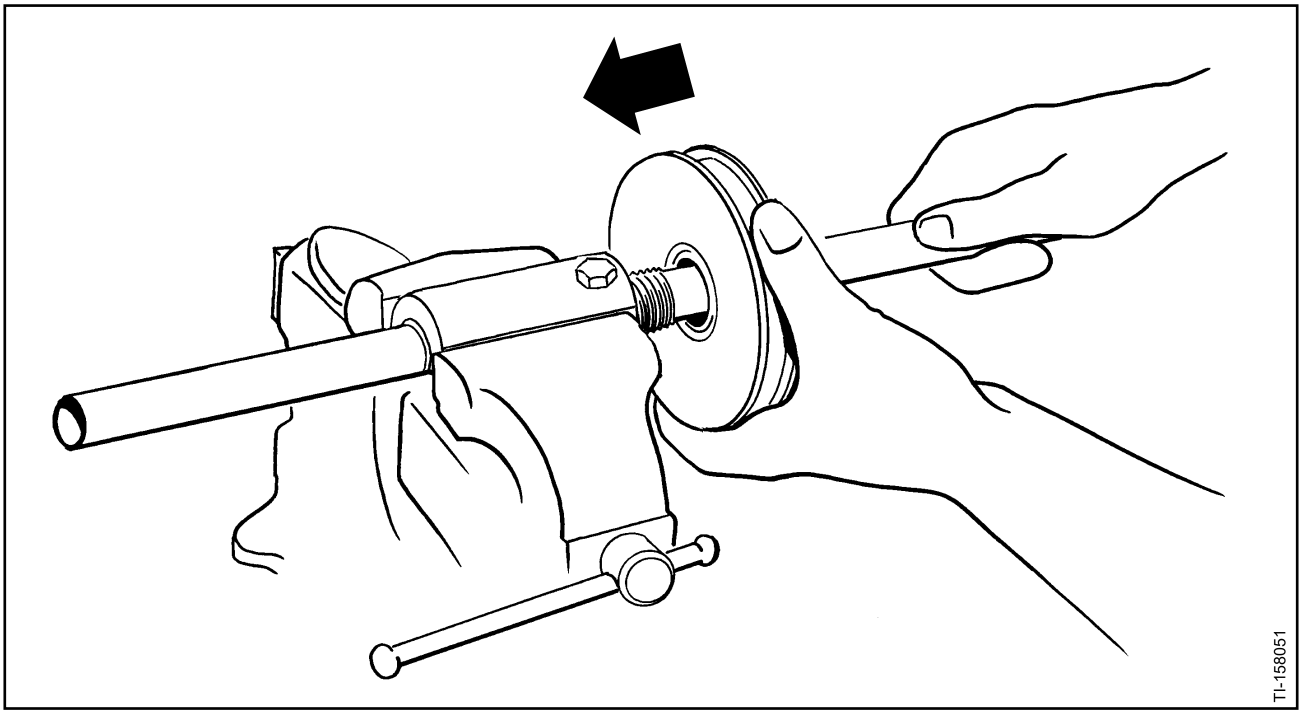
(2) With the cupped side of the piston (210) pointing away from the flats on the pitch change rod (270), install the piston on the pitch change rod.

(a) Put the piston unit installation socket TE228-1 in a vise. Refer to Figure 7-24.

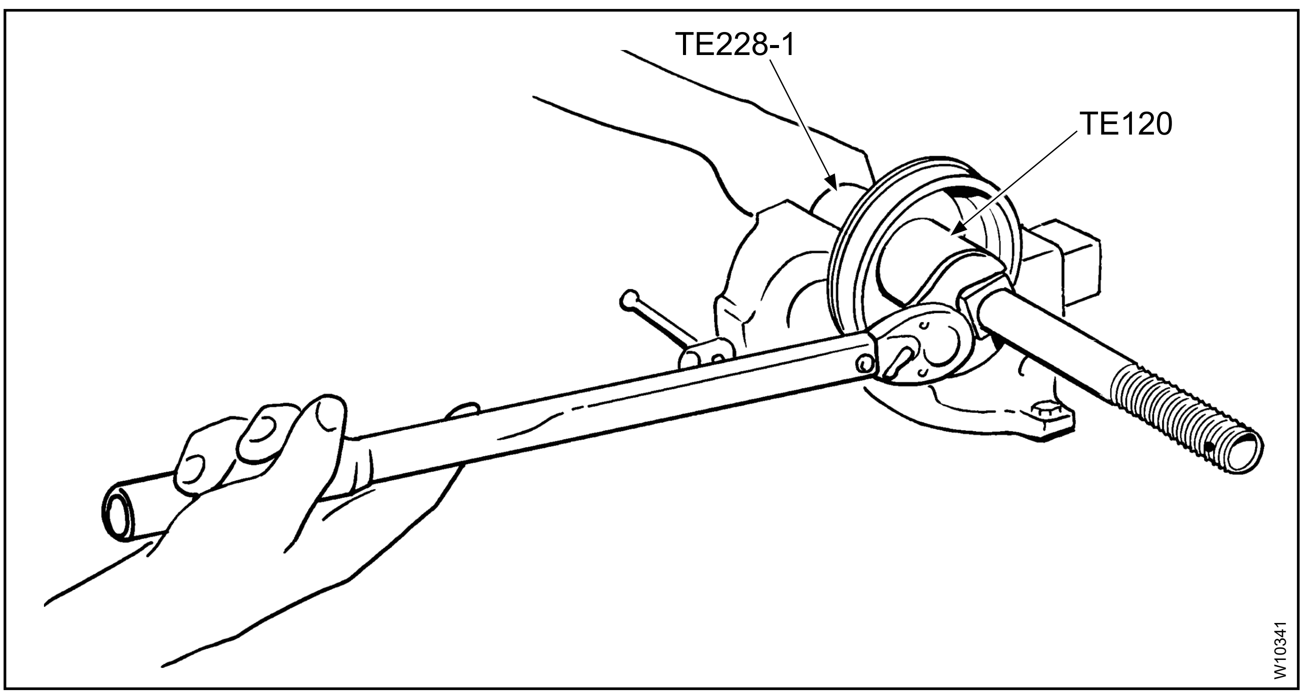
(b) Insert the pitch change rod (270) through the piston unit installation socket TE228-1, fitting the socket over the shoulder flats on the pitch change rod, as shown in Figure 7-24.



Using the TE228-1 Tool on the Pitch Change Rod
Figure 7-24



Installing the Piston
Figure 7-25



Torquing the Piston Nut
Figure 7-26

(c) Put the piston (210) into position against the shoulder on the pitch change rod (270). Refer to Figure 7-25.

(d) Turn the piston self-locking nut (200) onto the pitch change rod (270) until the self-locking nut locking mechanism engages the pitch change rod threads.

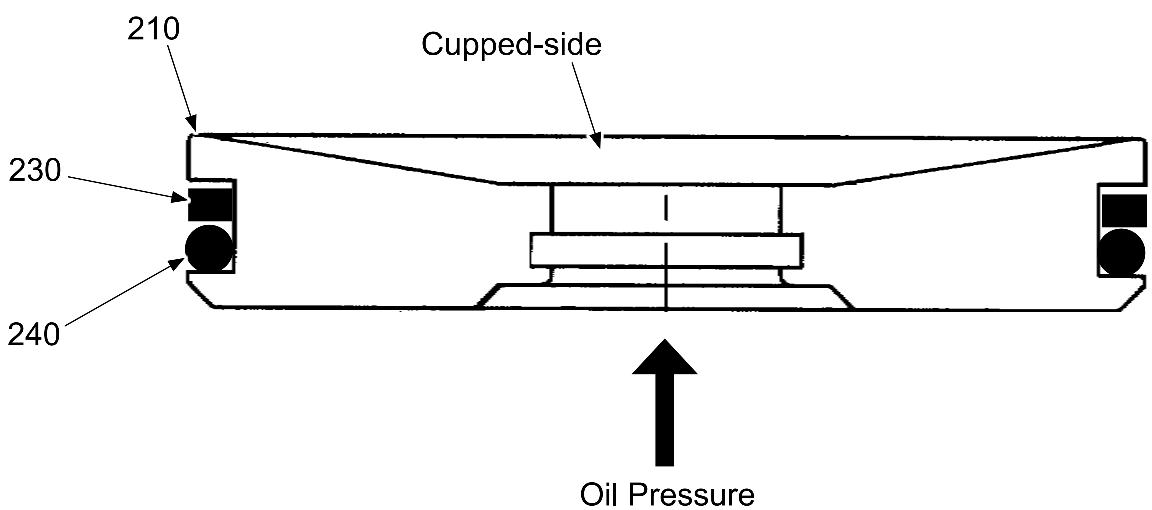
(3) Using the modified deep well socket TE120, torque the piston self-locking nut (200) against the piston (210) in accordance with Table 8-1 in the Fits and Clearances chapter of this manual. Refer to Figure 7-26.

(4) Remove the installation socket TE228-1 from the pitch change rod (270).

(5) Install the O-ring (240) on the OD of the piston (210).

CAUTION: THE BACK-UP RING (230) MUST BE POSITIONED ON THE SIDE AWAY FROM THE OIL PRESSURE OR SEVERE OIL LEAKAGE WILL OCCUR.

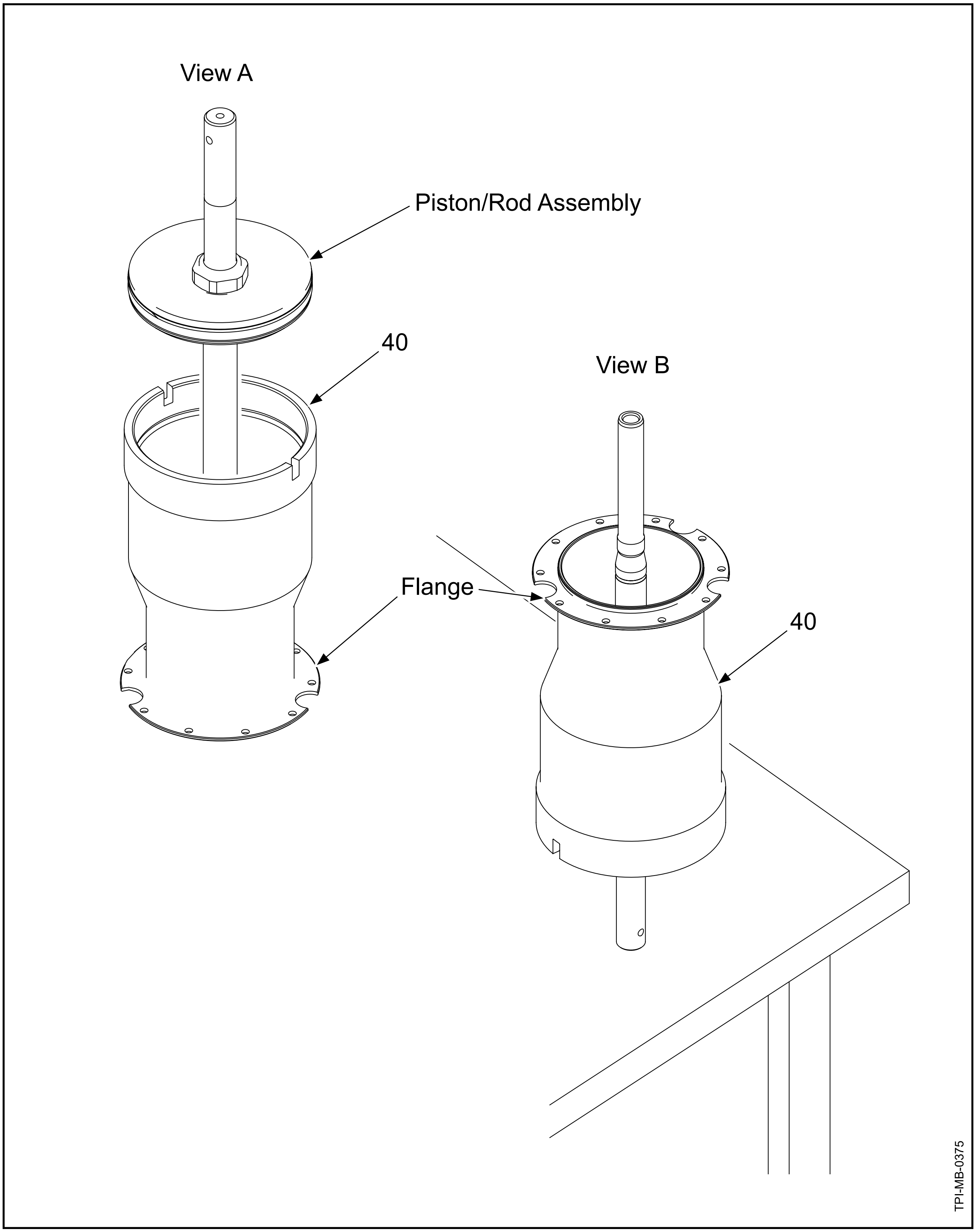
(6) With the back-up ring (230) on the side toward the cupped side of the piston, install the back-up ring on the piston (210). Refer to Figure 7-27.



NOTE: Illustration is for the location of the back-up ring (230) and the O-ring (240) only.

W10340

Installing the Back-up Ring
Figure 7-27



Installing the Piston/Pitch Change Rod Assembly in the Cylinder
Figure 7-28

D. Cylinder/Spring Pack Assembly

(1) If the cylinder bushing (43) was removed, install the cylinder bushing (43) in accordance with the section, "Cylinder Bushing Installation Procedure for a Previously Removed Bushing" in the Repair chapter of this manual.

(2) Install an O-ring (42) in the ID of the cylinder bushing (43) that is installed in the cylinder (40).

(3) Apply a thin layer of grease CM12 to the inner walls of the cylinder (40) when the piston (210) is installed.

(a) Using too much grease can cause leakage during propeller operation.

(4) Install the piston/pitch change rod assembly into the cylinder in accordance with the following steps and Figure 7-28:

(a) Turn the cylinder (40) so that the flange is down as shown in View A of Figure 7-28.

CAUTION: DO NOT PINCH THE PISTON OD O-RING (240) BETWEEN THE WALL OF THE CYLINDER (40) AND THE PISTON (210). SEVERE OIL LEAKAGE WILL RESULT.

(b) Insert the piston/pitch change rod assembly into the top of the cylinder (40).

(c) Turn the cylinder assembly so that the flange is up, as shown in View B of Figure 7-28.

CAUTION: DO NOT DAMAGE THE PISTON/PITCH CHANGE ROD ASSEMBLY OR THE CYLINDER (40) WHEN ENGAGING THE PISTON.

(d) Lightly tap the pitch change rod assembly on a padded flat surface, as necessary, to engage the piston (210) into the cylinder (40).

(5) Install the feathering spring (110) in accordance with the following steps and Figure 7-29:

(a) Put the spring seat (100) over the pitch change rod (270) against the cylinder (40). Refer to Figure 7-29.

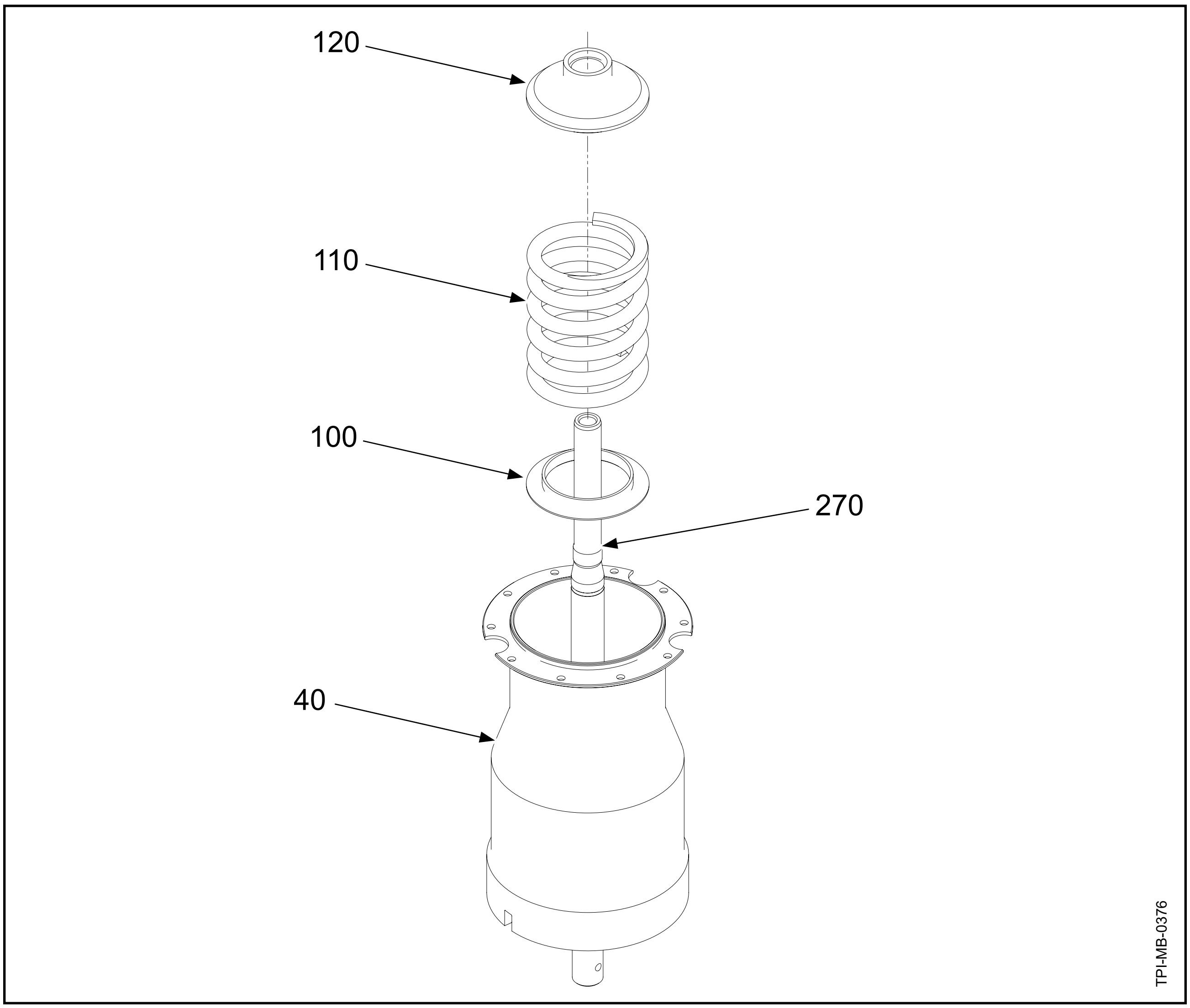
(b) Put the feathering spring (110) over the pitch change rod (270).

(c) Put the spring retainer (120) on the pitch change rod (270).

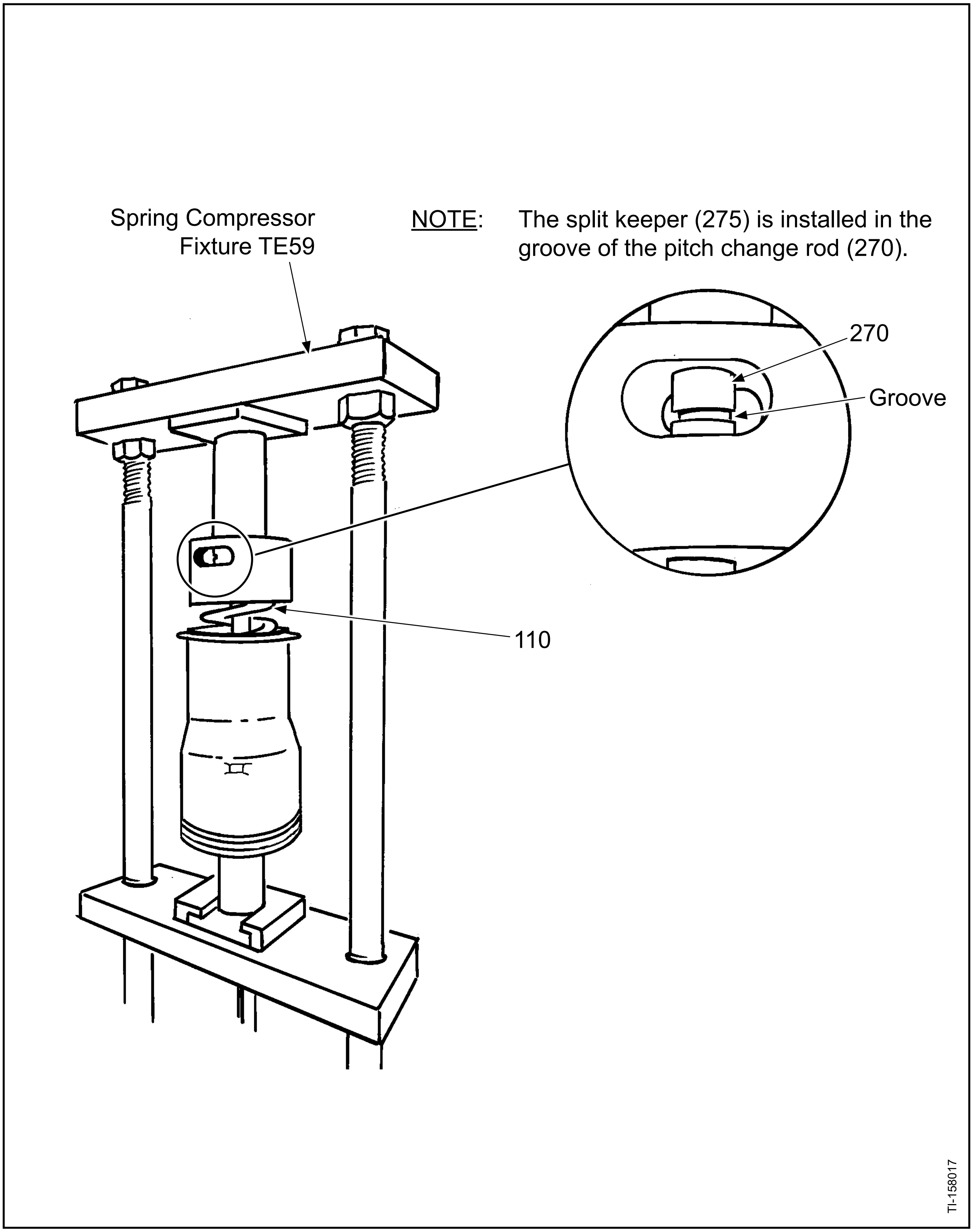
(6) Prepare the split keeper (275).

(a) Using an appropriate customer procured cutting tool, cut the split keeper (275) at the slots provided.

(b) Remove any burrs at the cut edges of the two pieces of the split keeper (275).



Installing the Feathering Spring
Figure 7-29



Compressing the Cylinder/Spring Pack
Figure 7-30

(7) Put the cylinder/spring pack assembly into the spring compressor fixture TE59, or equivalent as shown in Figure 7-30.

<u>WARNING</u>: USE EXTREME CAUTION WHEN PERFORMING THIS PROCEDURE. THE FEATHERING COMPRESSION SPRING ASSEMBLY IS LOADED TO APPROXIMATELY 800 POUNDS (363 kg) FORCE. MAKE SURE OF THE SAFETY OF PERSONNEL IN THE VICINITY DURING THE ASSEMBLY PROCEDURES.

(8) Compress the feathering spring (110) until the split keeper (275) can be installed.

(9) Install the two pieces of the split keeper (275).

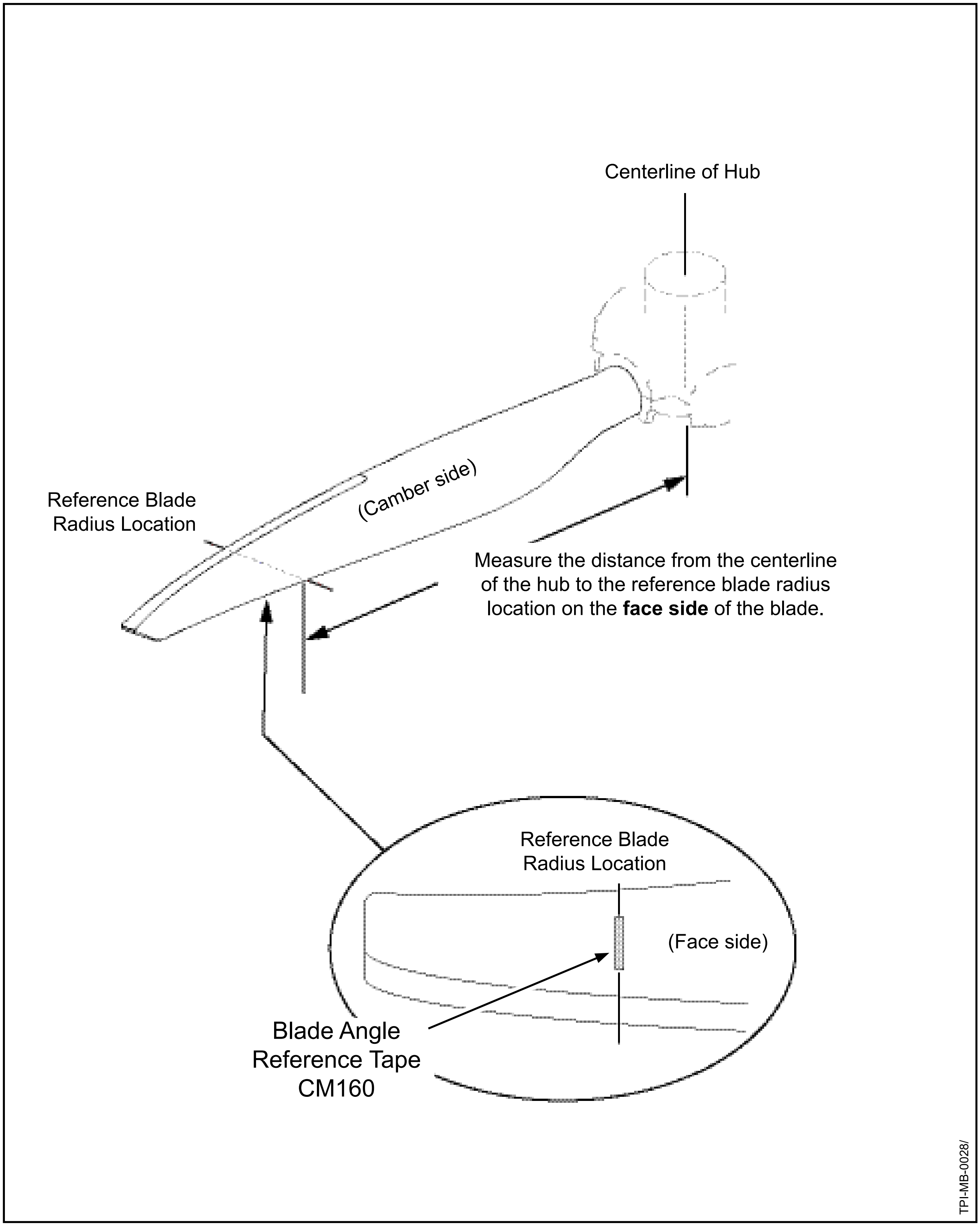
<u>CAUTION</u>: MAKE SURE THAT THE TWO PIECES OF THE SPLIT KEEPER (275) ARE COMPLETELY ENGAGED IN THE SPRING RETAINER (120) AND DO NOT DISLODGE FROM THE GROOVE IN THE PITCH CHANGE ROD (270) DURING DECOMPRESSION OF THE CYLINDER/SPRING PACK.

(10) While constantly observing the two pieces of the split keeper (275) to make sure that they remain in the correct positions in the pitch change rod groove, carefully decompress the cylinder/spring pack.

<u>WARNING</u>: USE CARE WHEN HANDLING A CYLINDER CONTAINING A COMPRESSED SPRING.

(11) Remove the cylinder/spring pack assembly from the spring compressor fixture TE59.

(12) Set the cylinder/spring pack assembly aside until needed for propeller assembly.



Blade Angle Reference Tape
Figure 7-31

6. Blade Angle Reference Tape Application (Optional)

A. Application Procedure

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 7-31.

(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. Refer to Figure 7-31.

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 piece of reference tape CM160.

(f) Spray each piece of reference tape CM160 with clear lacquer CM129 to prevent peeling.

7. Blade-to-Blade Angle Tolerance Check

A. ( )D3( )-( )( )A(1,2) Propellers

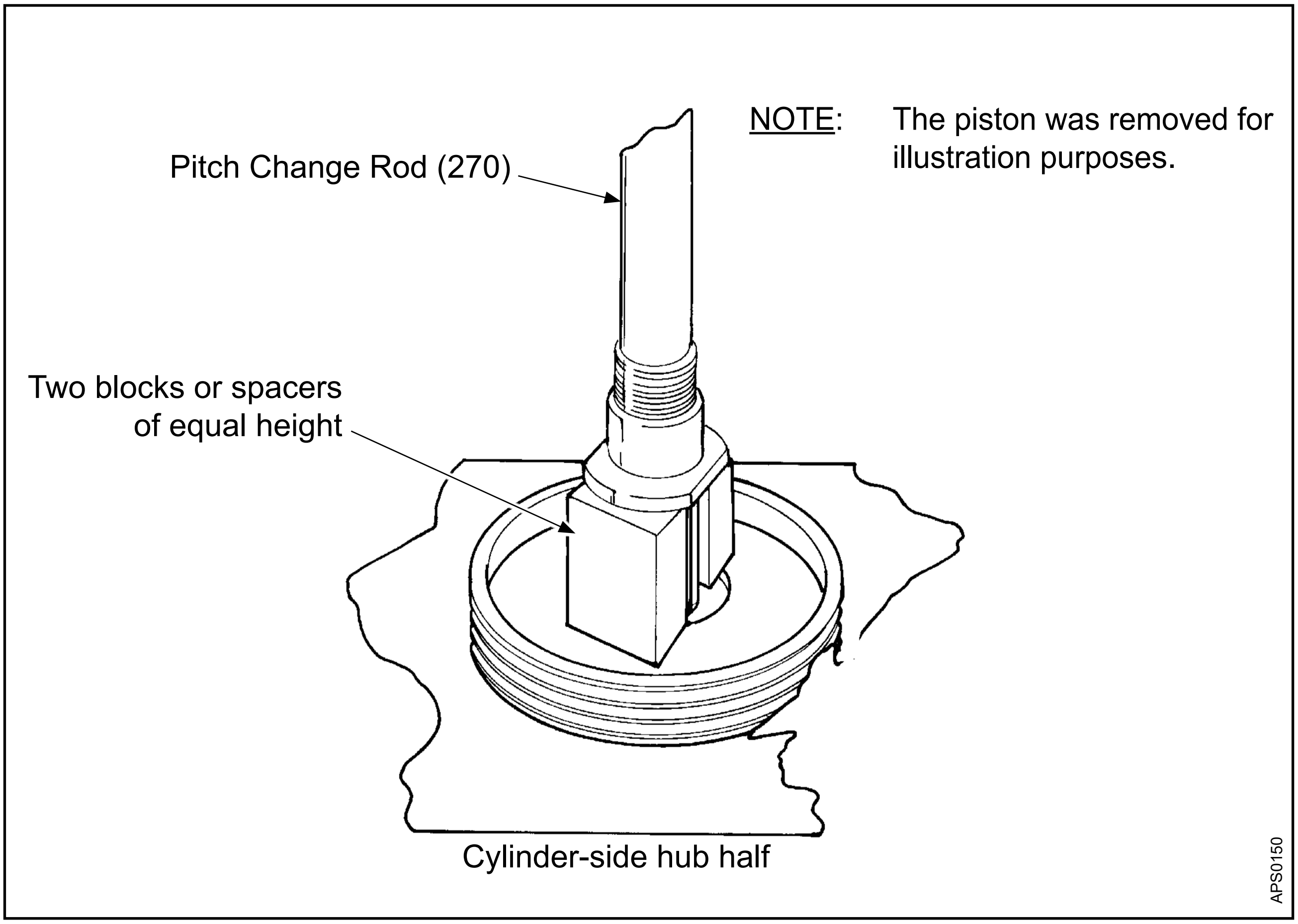
NOTE: The purpose of checking the blade angles is to verify that the blade angles of all of the blades are within 0.2 degree of each other at the reference blade radius.

(1) As shown in Figure 7-32, put two blocks or spacers of equal height under the piston and on opposite sides of the pitch change rod 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 low blade angle for this check is 18 to 25 degrees.

(b) Move the blades by hand toward the high pitch position to make sure that the cam followers are properly seated against the fork.



Checking Blade-to-Blade Angle Tolerance
Figure 7-32

(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 unit(s) on the blade(s).

a Refer to the chart, Blade Pitch Change Unit Selection, in Table 7-1 to select the appropriate pitch change bracket 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 of each other, continue to the next step.

NOTE: When assembling a propeller that will be disassembled for shipping, it is not necessary to remove the pitch change rod and the cylinder-side hub half, to install the remaining hex head bolts (430), washers (440, 450) and self-locking nuts (460), or to apply CM92 to the hub mating surfaces.

(5) Remove the pitch change rod and the cylinder-side half of the hub (300).

B. ( )D3( )-( )( )B1 Propellers

NOTE: The purpose of checking the blade angles is to make sure that the blade angles of all of the blades are within 0.2 degree of each other at the reference blade radius.

(1) Temporarily install the cylinder/spring pack assembly.

(a) Carefully thread the pitch change rod (270) into the fork (500) by turning the cylinder (40) as far as possible by hand.

(b) Install two bolts (90) and washers (95).

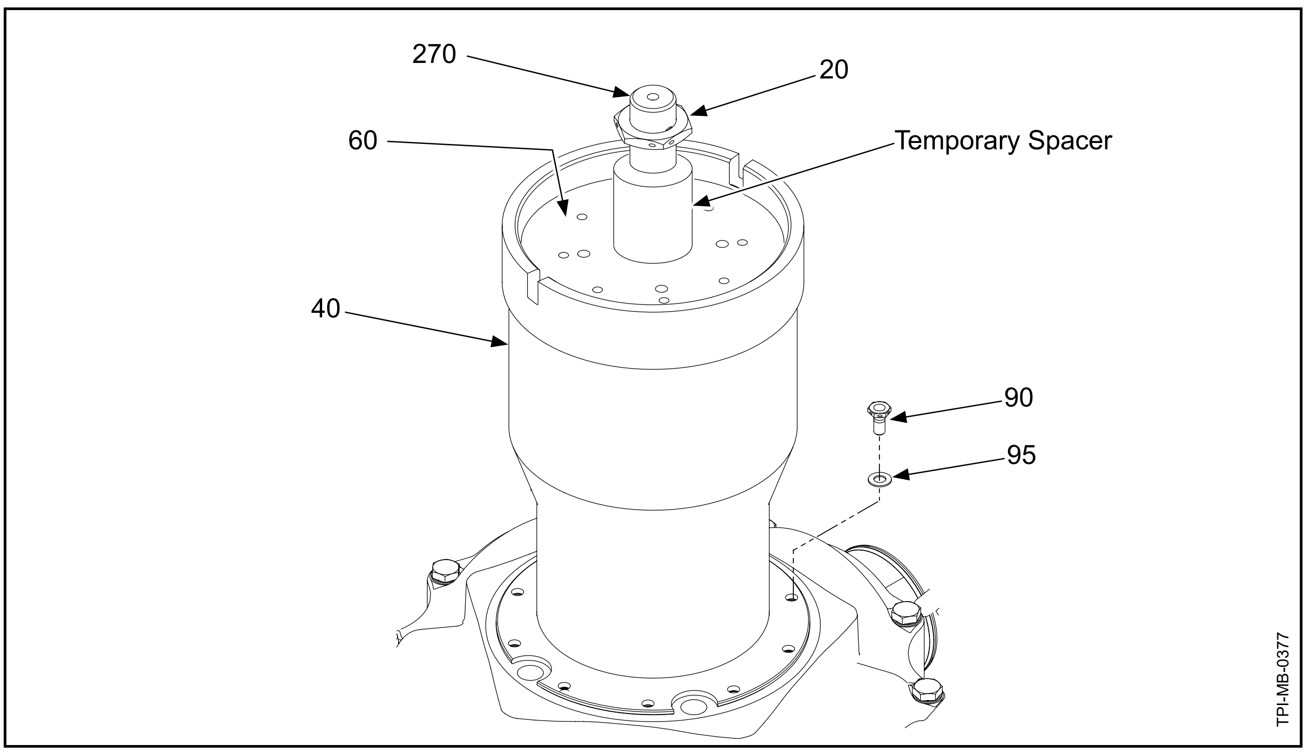
NOTE: The bolts (90) with washers (95) will hold the cylinder (40) in position during the required blade measurements.

CAUTION: DO NOT DAMAGE THE THREADS OF THE CYLINDER (40) WHEN INSTALLING THE PITCH STOP PLATE (60).

(2) Manually turn the pitch stop plate (60) into the top of the cylinder (40) until several cylinder threads are showing.

(3) Install a locally procured temporary spacer on the pitch change rod (270) as shown in Figure 7-33.

(a) The temporary spacer must be approximately 3 inches (76.2 mm) tall and must have a center hole with a diameter that is larger than the pitch change rod (270).



Installing the Temporary Spacer
Figure 7-33

(4) Turn a drilled thin hex nut (20) onto the end of the pitch change rod (270).

(5) 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 low blade angle for this check is 18 to 25 degrees.

(b) Move the blades by hand toward the high pitch position to make sure that the cam followers are seated against the fork.

(6) 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 unit(s) on the blade(s).

a Refer to Table 7-1 to determine the applicable pitch change bracket to increase or decrease the blade angle.

2 Recheck the blade-to-blade angle tolerance until the tolerance is on all four blades is within the permitted limit.

NOTE: Each blade has tolerances for blade angles at the various blade stations. The ultimate effects of these tolerances on 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.

(7) When the difference between the highest blade angle and the lowest blade angle is within 0.2 degree of each other, continue to the next step.

NOTE: When assembling a propeller that will be disassembled for shipping, it is not necessary to remove the pitch change rod (270) and the cylinder-side hub half, to install the remaining hex head bolts (430), washers (440, 450) and self-locking nuts (460), or to apply CM92 to the hub mating surfaces.

(8) Remove the cylinder/spring pack assembly and the cylinder-side half of the hub (300).

8. Sealing the Hub Halves

A. Procedure

CAUTION: DO NOT PERMIT EXCESSIVE SEALANT TO BE SQUEEZED INTO THE BLADE RETENTION SOCKETS.

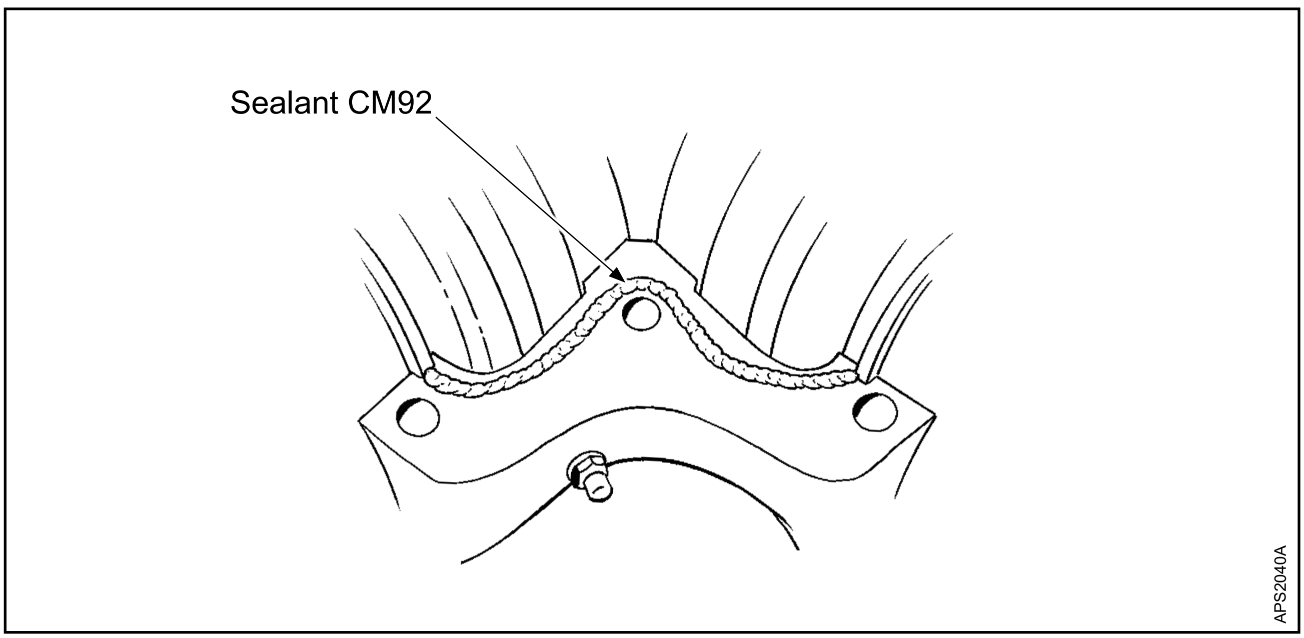
(1) Put a bead of sealant CM92 on the hub mating surfaces. Refer to Figure 7-34.

(a) Sealant must contact the blade O-rings.

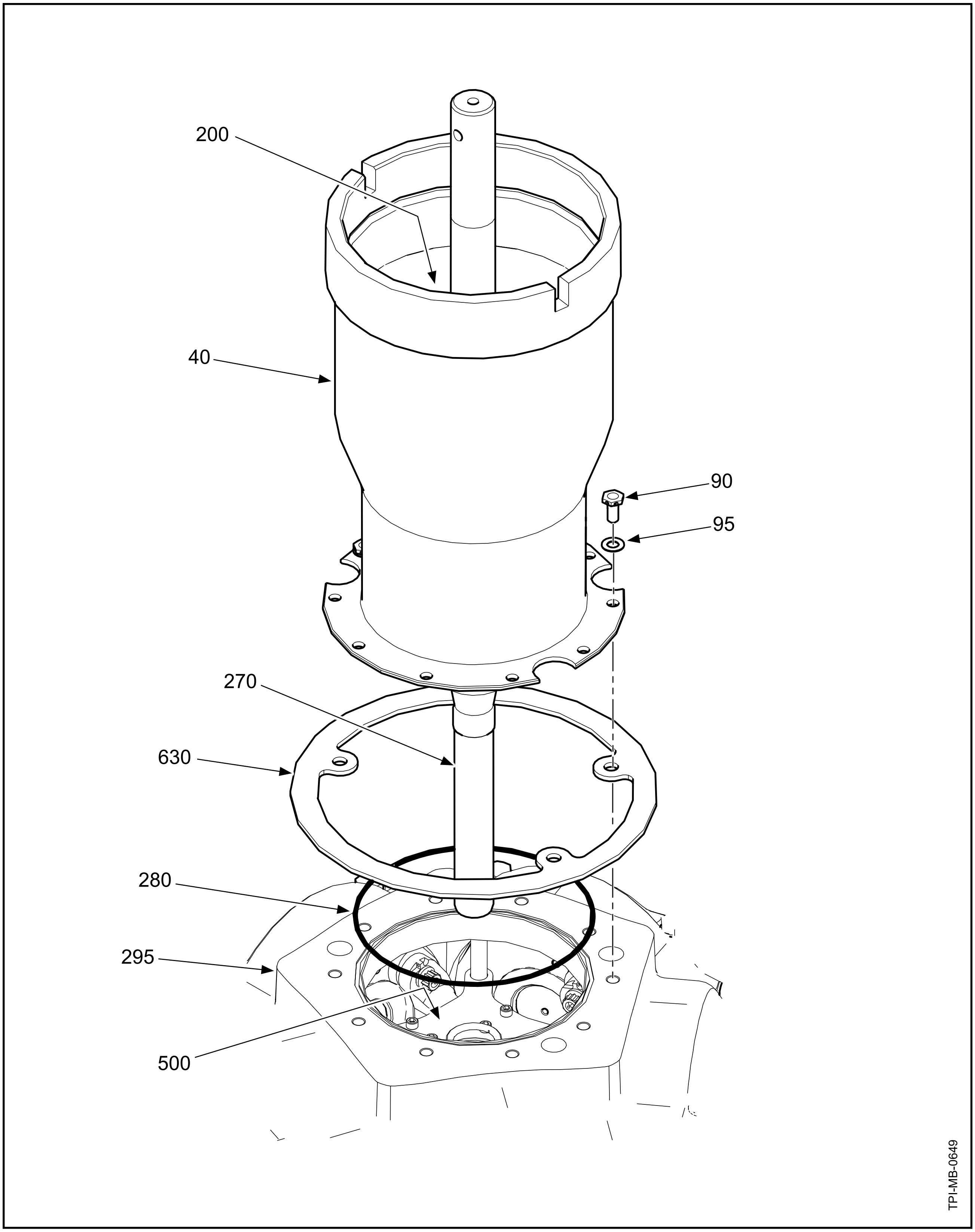
(b) Use only enough sealant on the mating surfaces so that a small amount will be squeezed out along the entire parting surface when the hub nuts are properly torqued.

(2) Install the hex head bolts (430), washers (440), washers (450), and self-locking nuts (460).

(3) Torque the nuts (460) on the hex head bolts (430) in accordance with Table 8-1 in the Fits and Clearances chapter of this manual.



Sealing the Hub Halves
Figure 7-34



Cylinder/Spring Pack Assembly Installation
Figure 7-35

9. Cylinder/Spring Pack Assembly Installation

A. ( )D3( )-( )( )B1 Propellers

(1) Install the cylinder/spring pack assembly in accordance with Figure 7-35 and the following steps:

(a) Move the blades to reverse pitch position.

(b) Using lubricant CM12, lubricate the cylinder mounting O-ring (280).

(c) Install the cylinder mounting O-ring (280) in the groove provided for it on the top of the cylinder-side hub half (295).

(d) (5,6)D31-( )( )B1 only:
Place the beta rod support ring (630) on top of the hub (295).

WARNING: USE CARE WHEN HANDLING A CYLINDER (40) CONTAINING A COMPRESSED SPRING.

(e) Apply a thin layer of anti-seize compound CM118 to the external threads of the pitch change rod (270) that extend from the cylinder/spring pack assembly.

(f) Apply a thin layer of grease CM12 to the end of the pitch change rod (270) that will be installed in the hub (295).

(g) Install the cylinder/spring pack assembly, carefully aligning the pitch change rod (270) with the hole in the fork (500).

1 Manually turn the cylinder (40) to thread the pitch change rod (270) into the fork (500).

(h) (5,6)D31-( )( )B1 only:
Rotate the beta rod support ring (630) to align the tabs with the cutouts in the flange of the cylinder (40), then lift and rotate the beta rod support ring so that it is on top of the cylinder flange.

1 Position the tabs of the beta rod support ring (630) between bolt holes in the cylinder flange.

(i) Using a 1-5/8 inch deep well socket or a crowfoot wrench and a suitable extension on the piston nut (200), tighten the cylinder/spring pack assembly into the fork (500).

1 Torque the cylinder/spring pack assembly in accordance with the torque given for the pitch change rod (270) in Table 8-1, "Torque Values" in the Fits and Clearances chapter of this manual.

(j) Install ten hex bolts (90) and ten washers (95).

1 Torque the hex bolts (90) in accordance with Table 8-1, "Torque Values" in the Fits and Clearances chapter of this manual.

10. Blade Installation Checks

A. Blade Movement/Blade Track

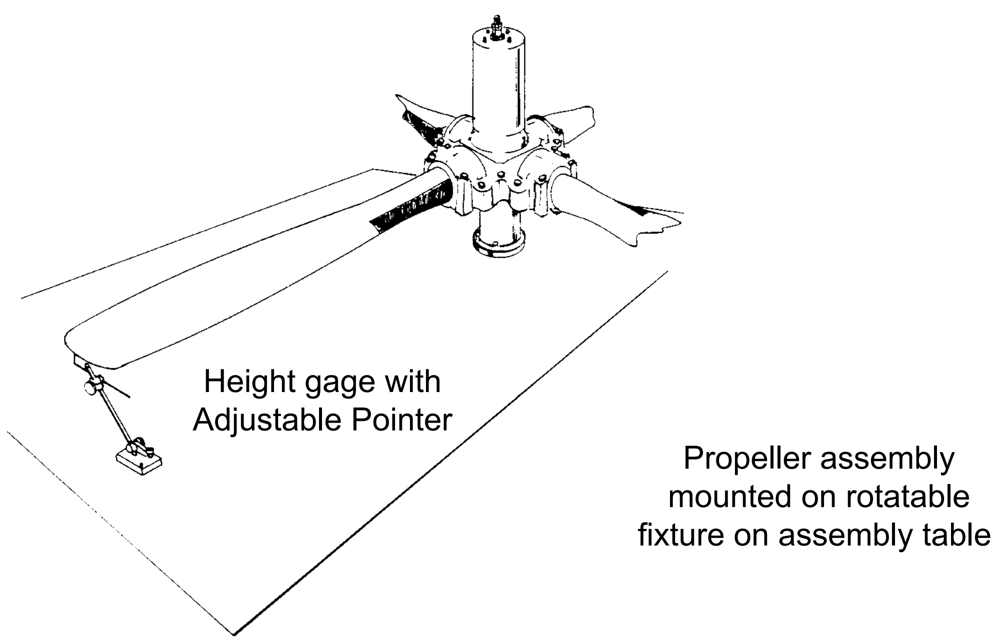
(1) Apply 200 psi (13.78 bars) air pressure to the propeller to move the blades toward low pitch until the blade tips are approximately parallel to the bench surface.

(2) Check for fore-and-aft or end play movement in each blade in accordance with the Fits and Clearances chapter of this manual.

(a) If there is too much fore-and-aft movement in a blade, it may indicate that the blade is shimmed incorrectly. Refer to the section, "Installing the Blades" in this chapter.

CAUTION: BLADE TRACK MUST NOT VARY MORE THAN 0.12 INCH (3.0 mm) FROM HIGHEST BLADE HEIGHT TO LOWEST BLADE HEIGHT.

(3) Using a height gage, measure the blade track at the tip/face of each blade. Refer to Figure 7-36. Refer to the Fits and Clearances chapter of this manual for blade tolerances.



NOTE: A four bladed propeller is shown for illustration purposes only.

Checking Blade Track
Figure 7-36

11. Setting the Reverse Blade Angle

A. ( )D3( )-( )( )A(1,2) Propellers

(1) Refer to the applicable Aircraft Type Certificate Data Sheet or Hartzell Propeller Inc. Application Guide Manual 159 (61-02-59) for the specific reverse blade angle and reference blade radius required.

(2) Apply 200 PSI (13.78 bars) air pressure to the propeller to move the propeller pitch change components against the pitch adjust sleeve unit (150).

(3) Remove play from the blades by pushing the counterweight or counterweight clamp of each blade toward feather.

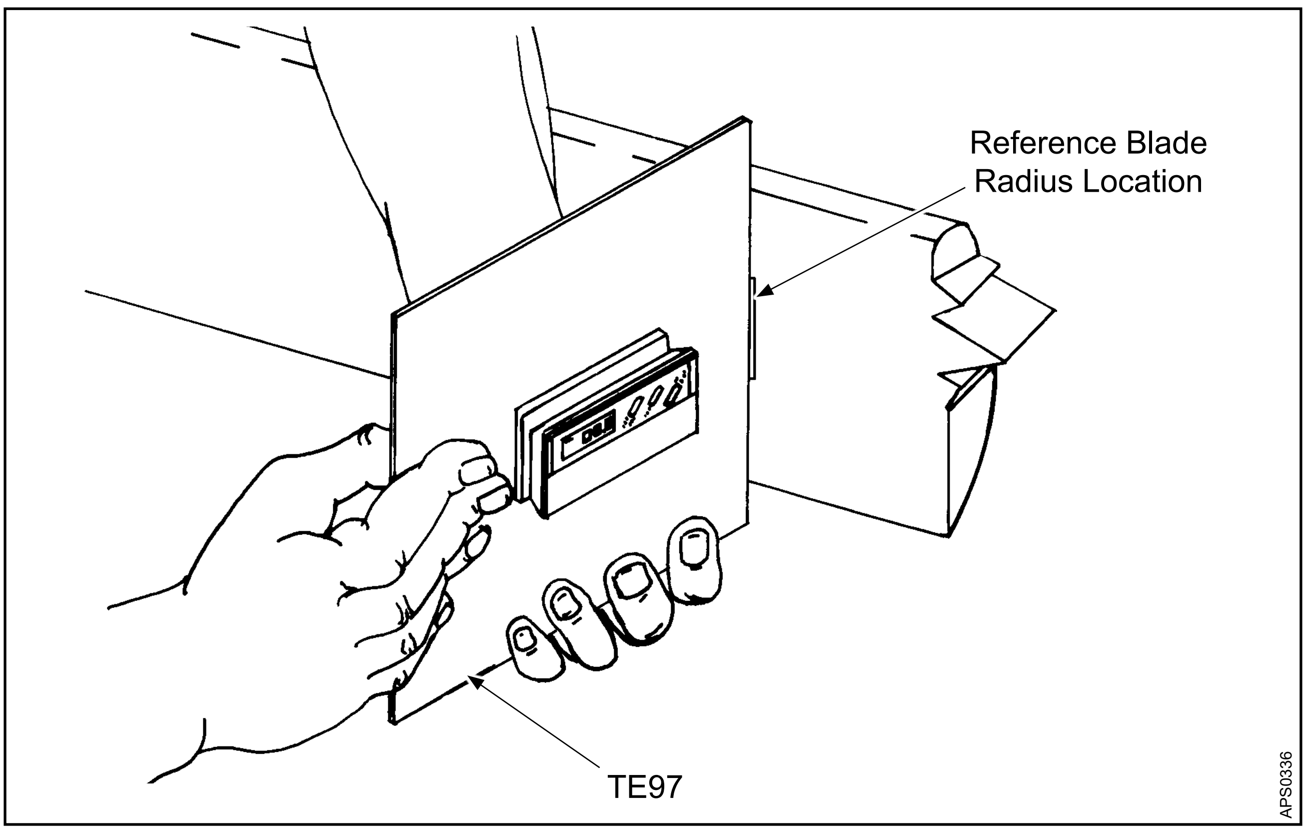
(4) Using a protractor TE96, TE97, or equivalent, check the reverse angle of each blade at the appropriate blade radius location. Refer to Figure 7-37.

(5) If the reverse blade angle is not correct:

(a) Relieve the pressure from the propeller.

(b) Turn the pitch adjust sleeve unit (150) clockwise to decrease the amount of negative pitch or counterclockwise to increase the amount of negative pitch.

NOTE: One full turn of the pitch adjust sleeve unit equals approximately five degrees.



Checking Blade Angles with Protractor TE97
Figure 7-37

(6) After adjustment, repressurize the propeller to 200 PSI (13.78 bars) air pressure, and remeasure the reverse angle.

(7) When the correct reverse angle has been established in all five blades, turn the drilled hex nut (30) on the pitch adjust sleeve unit (150) against the cylinder (40).

CAUTION: DO NOT PERMIT THE PITCH ADJUST SLEEVE UNIT (150) TO ROTATE WHEN TORQUING THE DRILLED THIN HEX NUT (30).

(8) While holding the pitch adjust sleeve unit (150), torque the drilled thin hex nut (30) against the cylinder in accordance with Table 8-1 in the Fits and Clearances chapter of this manual.

(9) Cycle the propeller to feather and back to reverse.

(10) Measure the reverse blade angle.

(a) If the angle is incorrect, loosen the drilled hex nut and repeat steps (4) through (9) of this procedure.

(b) When the reverse blade angle is correct, continue to the next step.

(11) Install the corrosion resistant washer (80) and fillister head screw (70) in one of the holes provided in the cylinder (40) and tighten.

NOTE: When assembling a propeller that will be disassembled for shipping, it is not necessary to install safety wire to the drilled thin hex nut (30) and the fillister head screw (70).

(12) Using 0.032 inch (0.81 mm) minimum diameter stainless steel wire, safety wire the drilled thin hex nut (30) to the fillister head screw (70).

B. ( )D3( )-( )( )B1 Propellers

(1) Apply anti-seize compound CM118 to the threads of the pitch stop plate (60).

(2) By hand, turn the pitch stop plate (60) in the top of the cylinder (40). Refer to Figure 7-38.

(a) If necessary, the torque wrench adapter TE153 may be used to install the pitch stop plate (60).

(3) Apply air pressure, moving the propeller to reverse pitch angle.

(4) Using protractor TE96, TE97, or equivalent, measure the reverse angle of each blade at the applicable station. Refer to Figure 7-37.

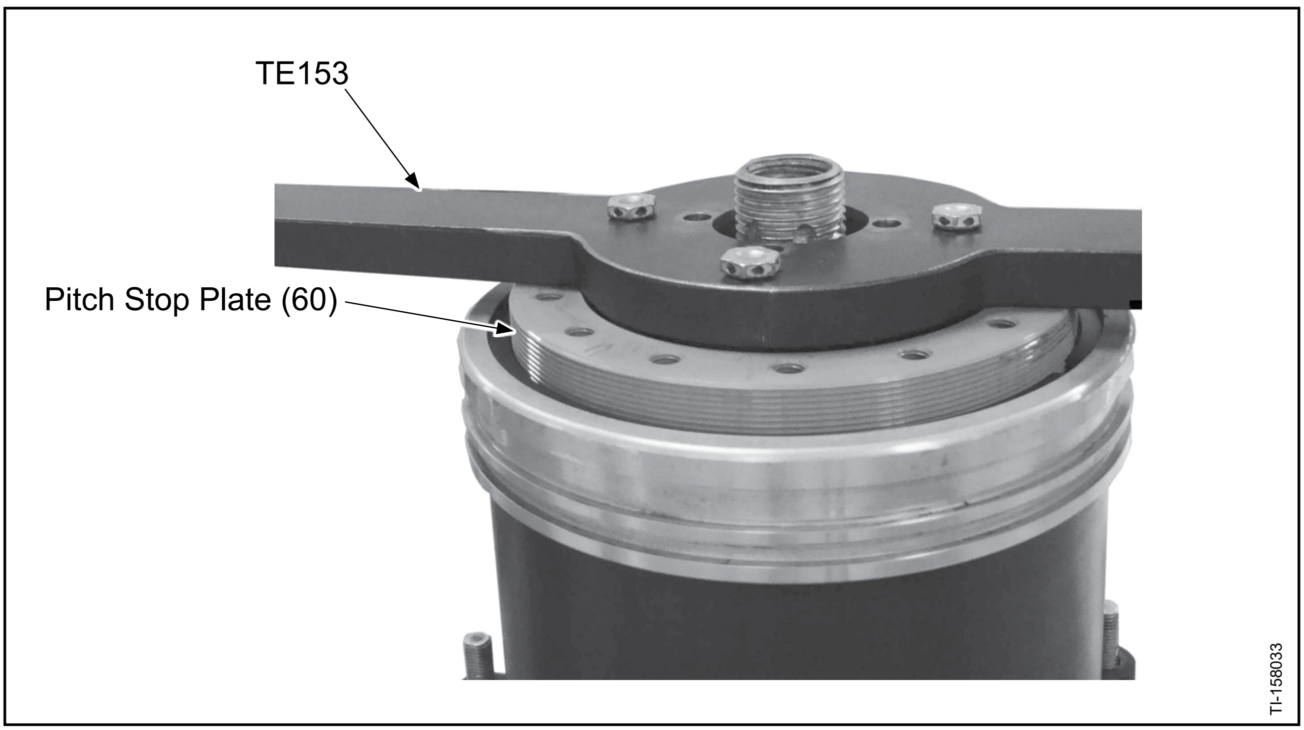
CAUTION: DO NOT ADJUST THE REVERSE BLADE ANGLE WITH THE PROPELLER PRESSURIZED.

(5) If the reverse blade angle is not correct, relieve pressure from the propeller.

(a) Turn the pitch stop plate (60) clockwise to decrease the reverse blade angle.

(b) Turn the pitch stop plate (60) counterclockwise to increase the reverse blade angle.

NOTE: One full turn of the adjustment plate equals approximately 1.5 degrees of angle.



Installing the Pitch Stop Plate
Figure 7-38

(6) After correction, repressurize the propeller, and measure the reverse angle.

(7) Repeat steps (3) through (6) of this procedure until the reverse angle is correct.

(8) When the reverse angle is correct for all the blades, install the anti-rotation plate (50) in accordance with the following steps and Figure 7-39:

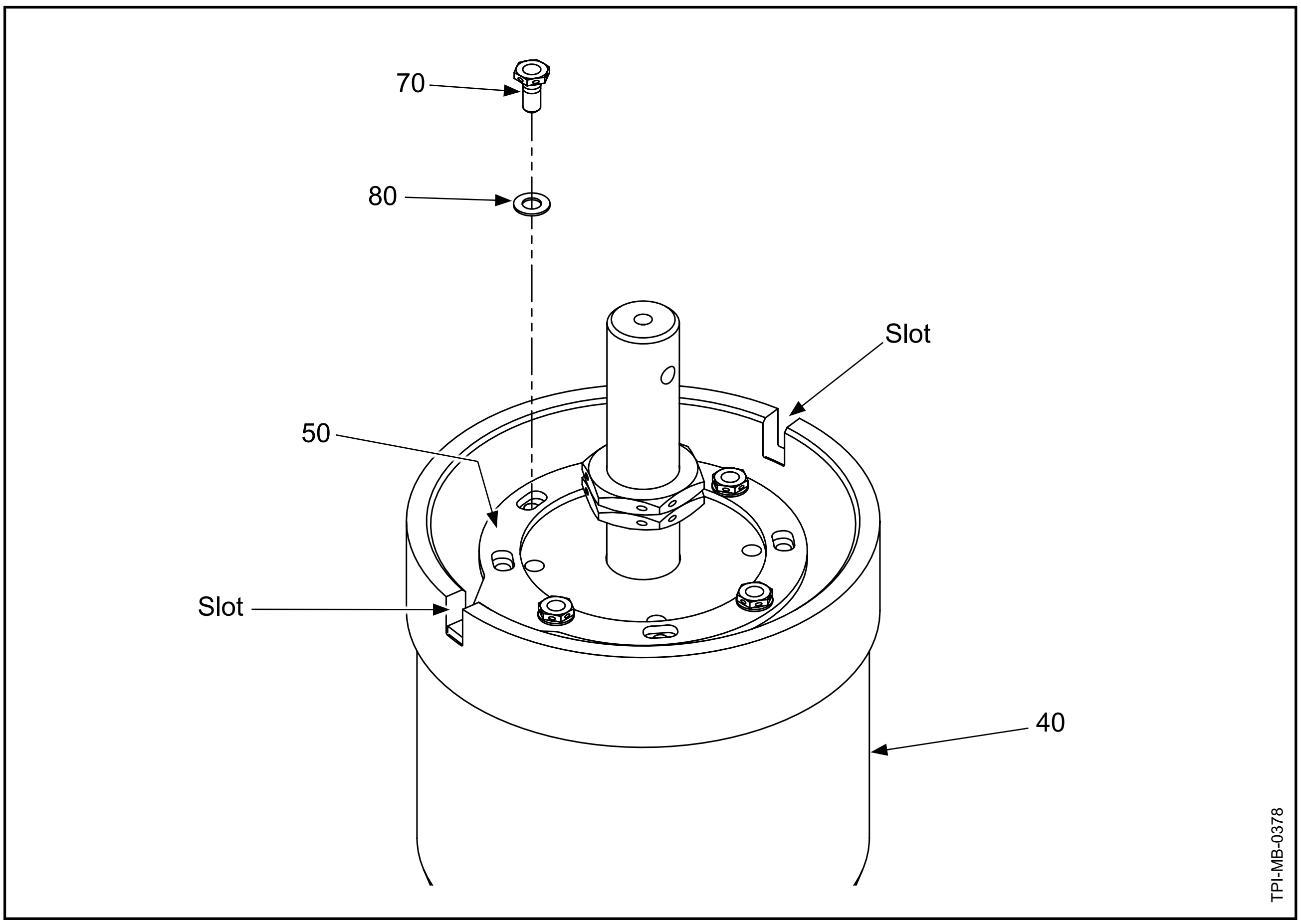
(a) Put the anti-rotation plate (50) on top of the pitch stop plate (60) with the tab of the anti-rotation plate in one of the slots at the top of the cylinder (40).

1 If the mounting holes in the anti-rotation stop plate (50) do not align, rotate the plate to put the tab in the other slot on the cylinder (40).

(b) Using four bolts (70) and washers (80) attach the anti-rotation plate (50) to the pitch stop plate (60).

(c) Torque each bolt (70) in accordance with the Torque Values Table 8-1 in the Fits and Clearances chapter of this manual.

(d) Safety wire the bolts (70).



Installing the Anti-rotation Plate
Figure 7-39

(e) Optionally, apply a small bead of sealant CM93 to the threads of the cylinder (40) that are visible above the anti-rotation plate (50).

NOTE: The sealant CM93 protects the exposed threads of the cylinder from damage.

(9) Safety wire the cylinder mounting bolts (90).

NOTE: When assembling a propeller that will be disassembled for shipping, it is not necessary to install safety wire to the cylinder mounting bolts (90).

12. Setting the Feather Blade Angle

A. ( )D3( )-( )( )A(1,2) Propellers

(1) Refer to the applicable Aircraft Type Certificate Data Sheet or Hartzell Propeller Inc. Application Guide Manual 159 (61-02-59) for the specific feather blade angle and blade radius required.

CAUTION: TO ACHIEVE THE CORRECT FEATHER BLADE ANGLE, THE THIN HEX NUT (20) MUST CONTACT THE SHOULDER OF THE PITCH ADJUST SLEEVE UNIT (150).

(2) Release all air (or oil) pressure from the propeller.

(3) Install the drilled thin hex nut (20) on the pitch change rod (270) and turn until it bottoms against the pitch adjust sleeve unit (150).

(4) Apply air pressure to the propeller to move the pitch change rod (270) and the drilled thin hex nut (20) off of the pitch adjust sleeve unit (150).

(5) Turn the drilled thin hex nut (20) 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 drilled thin hex nut (20) to rest on the pitch adjust sleeve unit (150).

(7) Remove play from blades by pushing the counterweight or counterweight clamp of each blade toward feather.

(8) Using a protractor TE96, TE97, or equivalent, check the feather angle of blade number one at the appropriate blade radius. Refer to Figure 7-37.

(9) If the feather blade angle is not correct, apply enough air pressure to the propeller to move the pitch change rod (270) and drilled thin hex nut (20) off of the pitch adjust sleeve unit (150).

(10) Adjust the feather blade angle by turning the small nut (20) on the pitch change rod.

NOTE: One full turn of the small nut equals approximately five (5) degrees.

(a) To decrease the angle, turn the small nut (20) clockwise.

(b) To increase the angle, turn the small nut (20) counterclockwise.

(11) When the correct feather blade angle is established for all of the blades, install a second thin hex nut (10).

CAUTION: THE THIN HEX NUT (20) MUST NOT MOVE WHEN TORQUING THE THIN HEX NUT (10) AGAINST THE THIN HEX NUT (20).

(12) Torque the thin hex nut (10) against the first thin hex nut (20), 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.

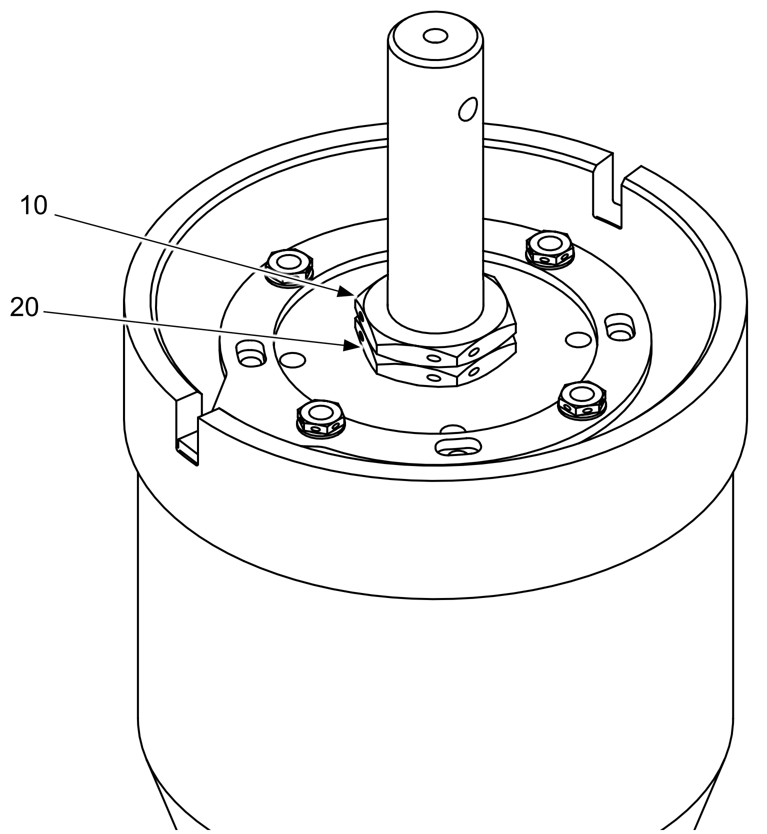
(14) Measure the feather blade angle.

(a) If the angle is incorrect, loosen the thin drilled hex nut (10) and repeat steps (8) through (13) of this procedure.

(b) When the feather blade angle is correct, continue to the next step.

(15) Using 0.032 inch (0.81 mm) minimum diameter stainless steel wire, safety wire the two thin hex nuts (10, 20) together for safety.

NOTE: When assembling a propeller that will be disassembled for shipping, it is not necessary to install safety wire to the thin hex nuts (10, 20).



Setting the Blade Feather Angle
Figure 7-40

B. ( )D3( )-( )( )B1 Propellers

(1) Install the feather adjust thin drilled hex nut (20) on the pitch change rod (270). Refer to Figure 7-40.

(2) Release the pressure from the propeller.

(3) Using a digital protractor TE97 or equivalent, measure the feather angles of each blade at the applicable blade station. Refer to Figure 7-37.

CAUTION: DO NOT ADJUST THE FEATHER ANGLE OF THE BLADES WITH THE PROPELLER DEPRESSURIZED AND THE FEATHER ADJUST THIN DRILLED HEX NUT (20) TOUCHING THE PITCH STOP PLATE (60) BECAUSE DAMAGE TO THE PROPELLER COULD RESULT.

(4) If the blade feather angle is not correct, apply enough pressure to the propeller to move the pitch change rod (270) forward to access the feather adjust thin drilled hex nut (20).

(5) Change the blade feather angle by turning the feather adjust thin drilled hex nut (20). Refer to Figure 7-40.

NOTE: One full turn of the feather adjust thin drilled hex nut (20) equals approximately 1.5 degrees of blade angle.

(a) Turn the feather adjust thin drilled hex nut (20) clockwise to decrease the blade feather angle.

(b) Turn the feather adjust thin drilled hex nut (20) counterclockwise to increase the blade feather angle.

(6) Turn the feather adjust thin drilled hex nut (10) on the pitch change rod until it touches the feather adjust thin drilled hex nut (20).

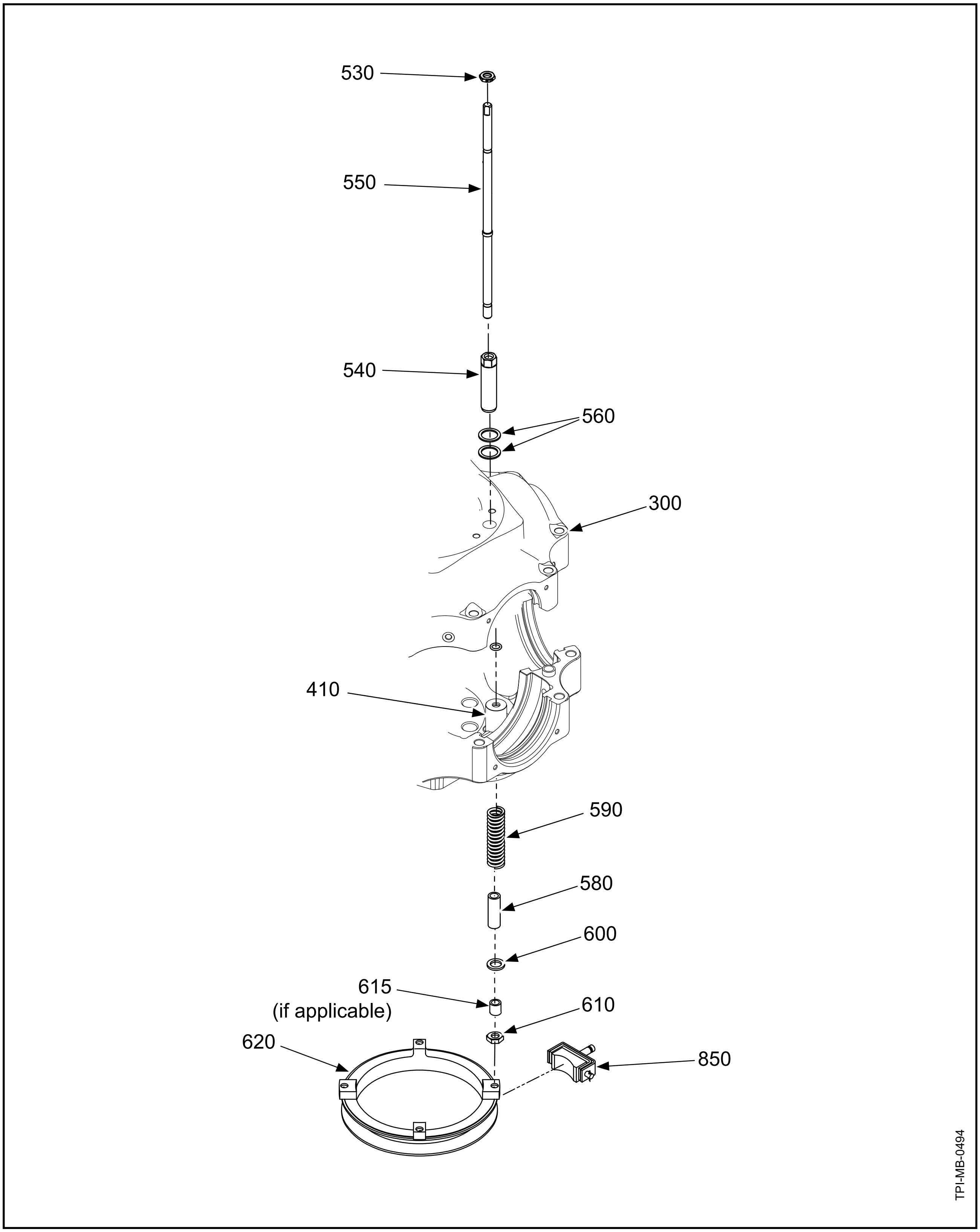
(7) While holding the feather adjust thin drilled hex nut (20), torque the feather adjust thin drilled hex nut (10) in accordance with the Torque Values Table 8-1 in the Fits and Clearances chapter of this manual.

(8) Remeasure the blade feather angle for all blades.

(9) If the blade feather angles are not correct, make adjustments as necessary using the applicable steps in this section.

(10) When the blade feather angles are correct, safety wire the two feather adjust thin drilled hex nuts (10, 20) together.

NOTE: When assembling a propeller that will be disassembled for shipping, it is not necessary to install safety wire to the two feather adjust thin drilled hex nuts (10, 20).



Beta System Assembly: ( )D3-( )( )( ) Propellers
Figure 7-41

13. Beta System Assembly: ( )D3-( )( )( ) Propellers

A. Beta System Component Installation

CAUTION: INSTALL THE SPINNER BULKHEAD/DE-ICE SLIP RING BEFORE ASSEMBLING THE BETA SYSTEM COMPONENTS.

(1) Install the two backup rings (560) into each beta system hole in the cylinder-side half of the hub (300). Refer to Figure 7-41.

(2) Install the beta rods (550) through the beta rod holes in the cylinder-side half of the hub (300).

(3) Put the beta rods (550) through the beta spring retainers (410) until a shoulder on the beta rod contacts the beta spring retainer.

(a) If the shoulder on each beta rod (550) interferes slightly with the fork plate (510), move the propeller blade angle toward reverse pitch with air pressure to increase the clearance between the beta rod shoulder and fork plate (510).

(b) Release the air pressure when the beta rods are in place.

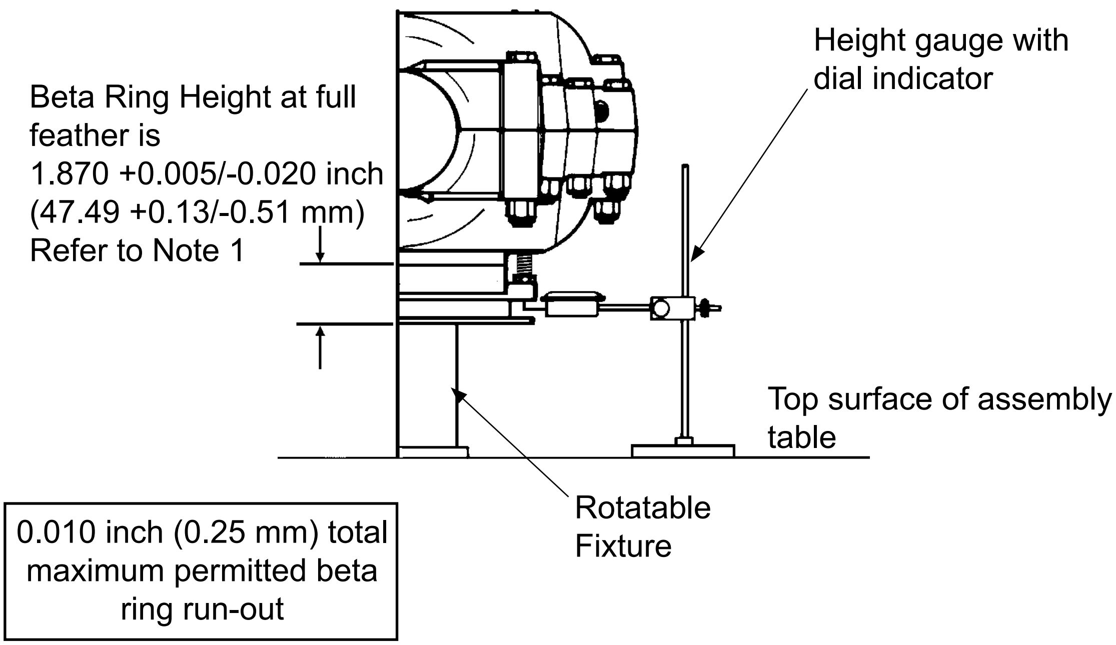
(4) Install a beta sleeve (580), beta spring (590), washer (600), spacer (615) if applicable, and thin hex nut (610) onto the engine-side of each beta rod (550).

(a) Optionally, use the spring installation tool TE658 to compress the beta compression spring (590) when installing the hex nuts (610). Refer to the section, "Using the Spring Installation Tool" in this chapter.

CAUTION: ROTATE THE BETA RODS (550) ALTERNATELY, NO MORE THAN TWO FULL TURNS AT A TIME TO AVOID WARPING THE BETA RING (620).

(5) Install the beta ring (620) on the engine-side of the beta rods (550). Engage the flats on the beta rods on the cylinder (40) side of the hub (300) and turn the beta rods into the beta ring (620) threaded holes.

(6) Rotate each beta rod (550) to the bottom of each beta ring (620) threaded hole and then unthread each beta rod one thread.



NOTE 1: Beta ring height dimension is from engine flange-to-propeller flange interface to engine side of beta ring.

NOTE 2: Check beta ring run-out with beta ring engaged by the beta system and check the beta ring run-out with the beta ring disengaged from the beta system.

Beta Ring Height and Run-out Check
Figure 7-42

B. Beta Ring Height and Run-out Check

(1) Using a depth micrometer, measure the height of the beta ring (620).

(a) Adjust the height by rotating the beta rods (550) clockwise to decrease or counterclockwise to increase.

(2) Using a dial indicator in accordance with Figure 7-42, check the run-out of the beta ring (620).

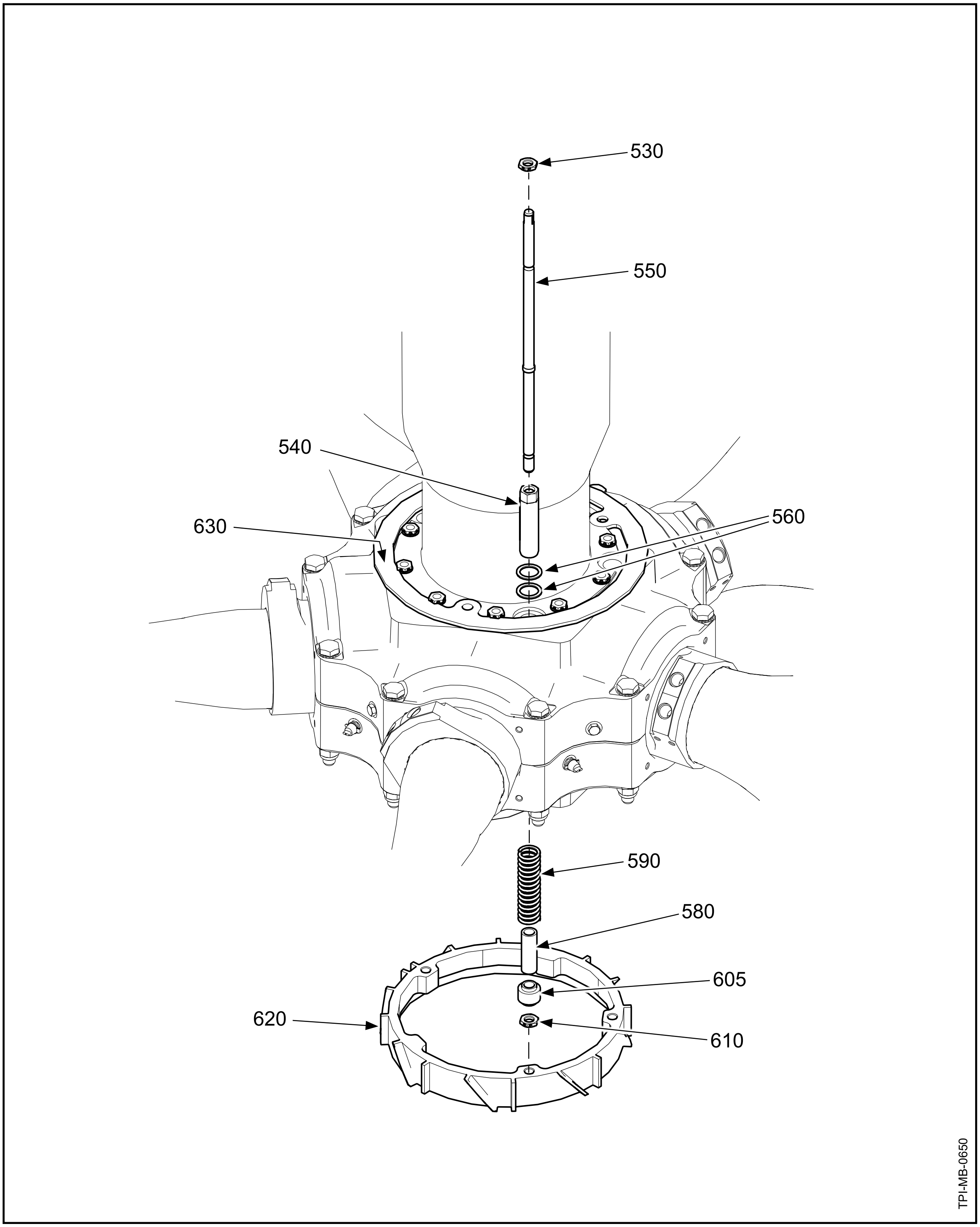
(a) The run-out of the beta ring (620) must be within 0.010 inch (0.025 mm).

(3) Torque the thin hex nuts (610) against the beta ring (620) in accordance with Table 8-1 in the Fits and Clearances chapter of this manual.

(4) Measure the run-out and the height of the beta ring and correct as necessary. Refer to Figure 7-42.

(5) Install a beta sleeve (540) and thin hex nut (530) on the cylinder hub side of each beta rod (550).

NOTE: The beta sleeve (540) and thin hex nut (530) will be correctly positioned in the Setting Low Pitch section in this chapter.



Beta System Assembly: ( )D31-( )( )( ) Propellers
Figure 7-43

14. Beta System Assembly: ( )D31-( )( )( ) Propellers

A. Beta System Component Installation

CAUTION: INSTALL THE SPINNER BULKHEAD/DE-ICE SLIP RING BEFORE ASSEMBLING THE BETA SYSTEM COMPONENTS.

(1) Install the beta system components in accordance with the following steps and Figure 7-43.

(a) Install the two backup rings (560) into each beta system hole in the cylinder-side half of the hub (300).

(b) Install the beta rods (550) through the beta rod holes in the cylinder-side half of the hub (300).

(c) Put the beta rods (550) through the beta spring retainers (410) until the shoulder on the beta rod touches the beta spring retainer.

1 If the shoulder on a beta rod (550) hits the fork plate (510), move the propeller blade angle toward reverse pitch with air pressure to increase the clearance between the beta rod shoulder and fork plate (510).

a Release the air pressure when the beta rods are in position.

(d) Install a spring guide sleeve (580), beta compression spring (590), spring guide (605), and thin hex nut (610) onto the engine-side of each beta rod (550).

1 Optionally, use the spring installation tool TE658 to compress the beta compression spring (590) when installing the hex nuts (610). Refer to the section, "Using the Spring Installation Tool" in this chapter.

(e) Install a beta sleeve (540) and thin hex nut (530) on the cylinder hub-side of each beta rod (550).

NOTE: The beta sleeve (540) and thin hex nut (530) will be correctly positioned in the Setting Low Pitch section in this chapter.

CAUTION: ROTATE THE BETA RODS (550) ALTERNATELY, NO MORE THAN TWO FULL TURNS AT A TIME TO AVOID WARPING THE BETA RING (620).

(f) Install the beta ring (620) on the engine-side of the beta rods (550).

1 Using a 1/4 inch open-end wrench on the flats on the cylinder-end of the beta rods (550), turn the beta rods into the beta ring (620).

B. Beta Ring Height and Run-out Check

CAUTION: PROPER ADJUSTMENT OF BETA RING HEIGHT, HEIGHT RUN-OUT, AND O.D. RUN-OUT ARE CRITICAL WHEN ASSEMBLING MODEL ( )D31-( )( )( ) PROPELLERS. DO NOT DEVIATE FROM THE REQUIRED DIMENSIONAL VALUES AND TOLERANCES, AS BETA SYSTEM MALFUNCTION CAN RESULT.

(1) Using a depth micrometer, measure the height of the beta ring (620).

(a) Beta ring height is measured from the aft surface of the beta ring (620) to the propeller engine flange surface. Refer to Figure 7-44.

(b) Set the height of the beta ring (620) to 2.004 inches (50.90 mm) ±0.002 inch (0.05 mm).

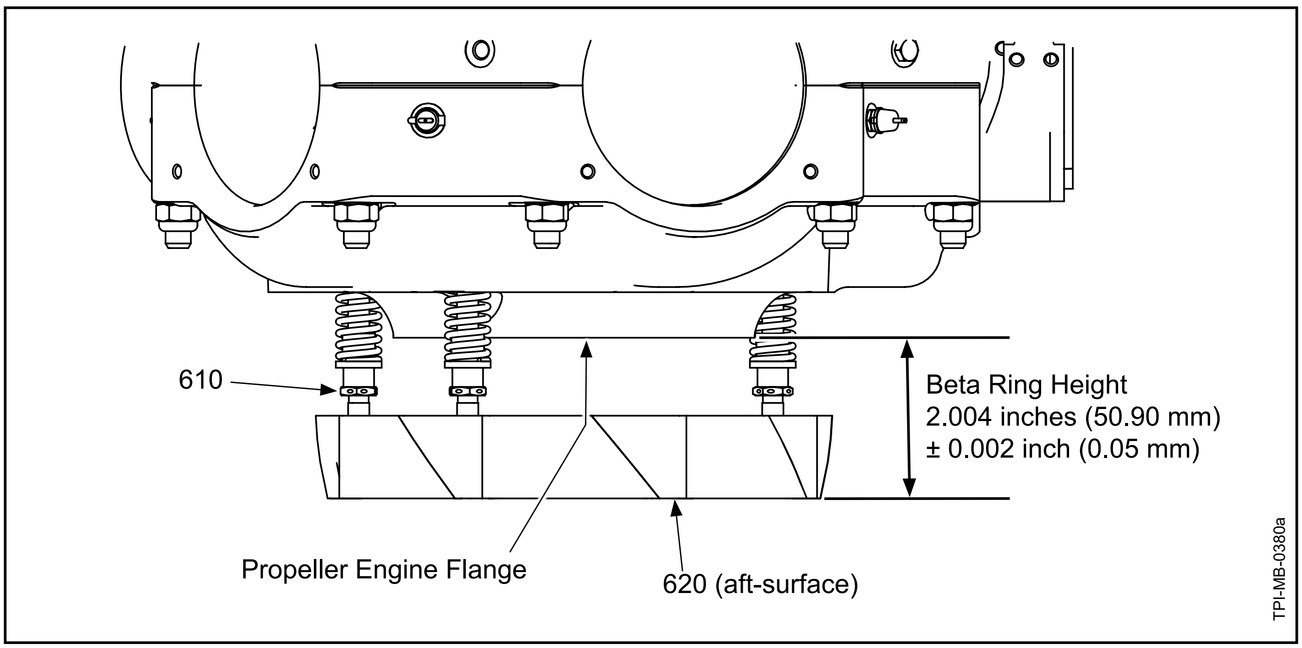
(c) Adjust the height by rotating the beta rods (550) clockwise to decrease or counterclockwise to increase.

(2) Using a dial indicator on the aft-surface of the beta ring (620), check the height run-out of the beta ring. Refer to Figure 7-44.

(a) The height run-out of the beta ring (620) must be within 0.004 inch (0.10 mm).

(3) Using a dial indicator on the angled splines of the beta ring (620), check the OD run-out of the beta ring. Refer to Figure 7-45.

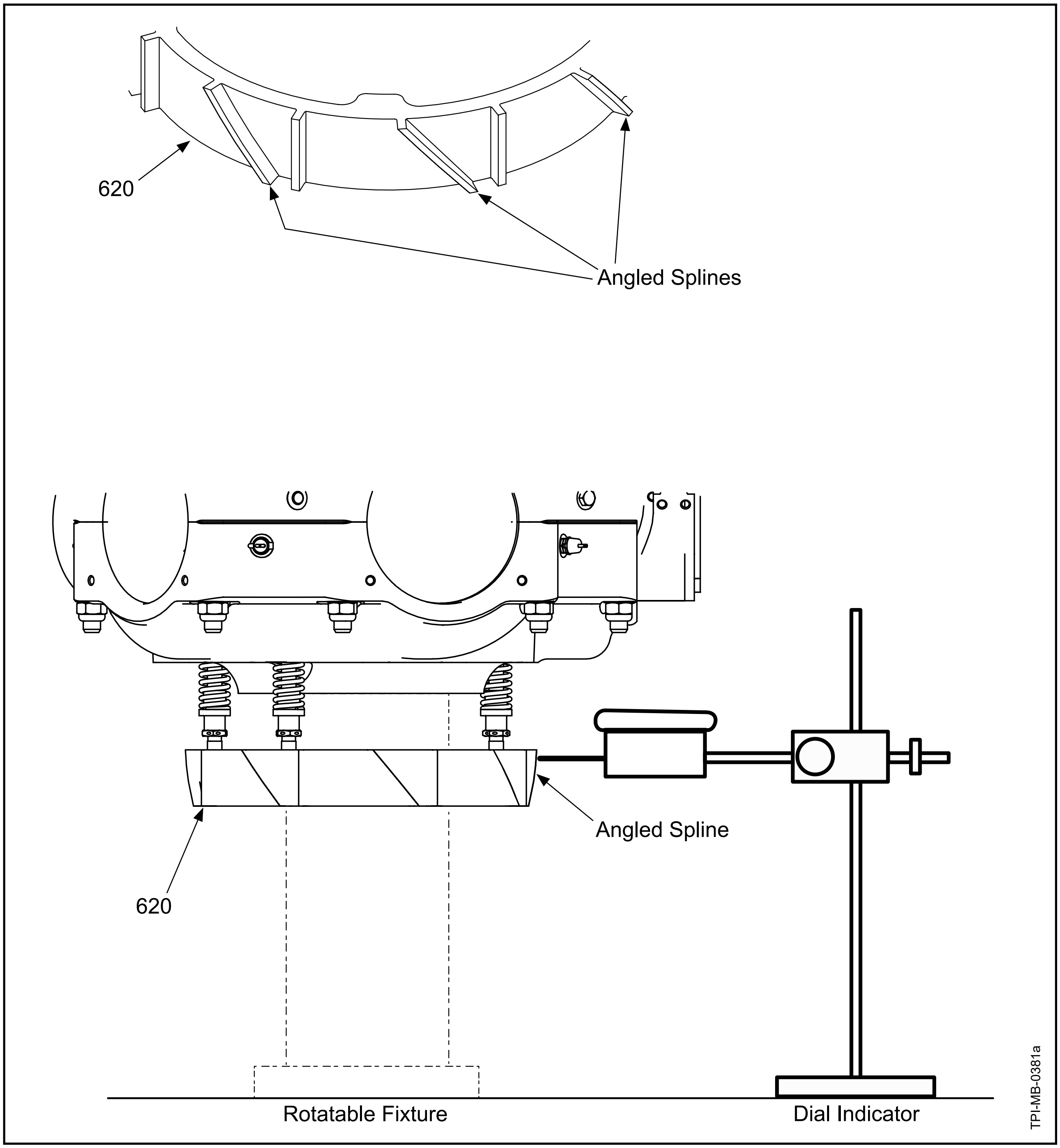
(a) The OD run-out of the beta ring (620) must be within 0.015 inch (0.38 mm).



Beta Ring Height
Figure 7-44

(4) Torque the thin hex nuts (610) against the beta ring (620) in accordance with Table 8-1 in the Fits and Clearances chapter of this manual.

(5) Measure the height of the beta ring and the run-out (height and OD). Correct as necessary. Refer to Figure 7-44 and Figure 7-45.



Beta Ring OD Run-out
Figure 7-45

C. Beta Rod Support Ring Installation

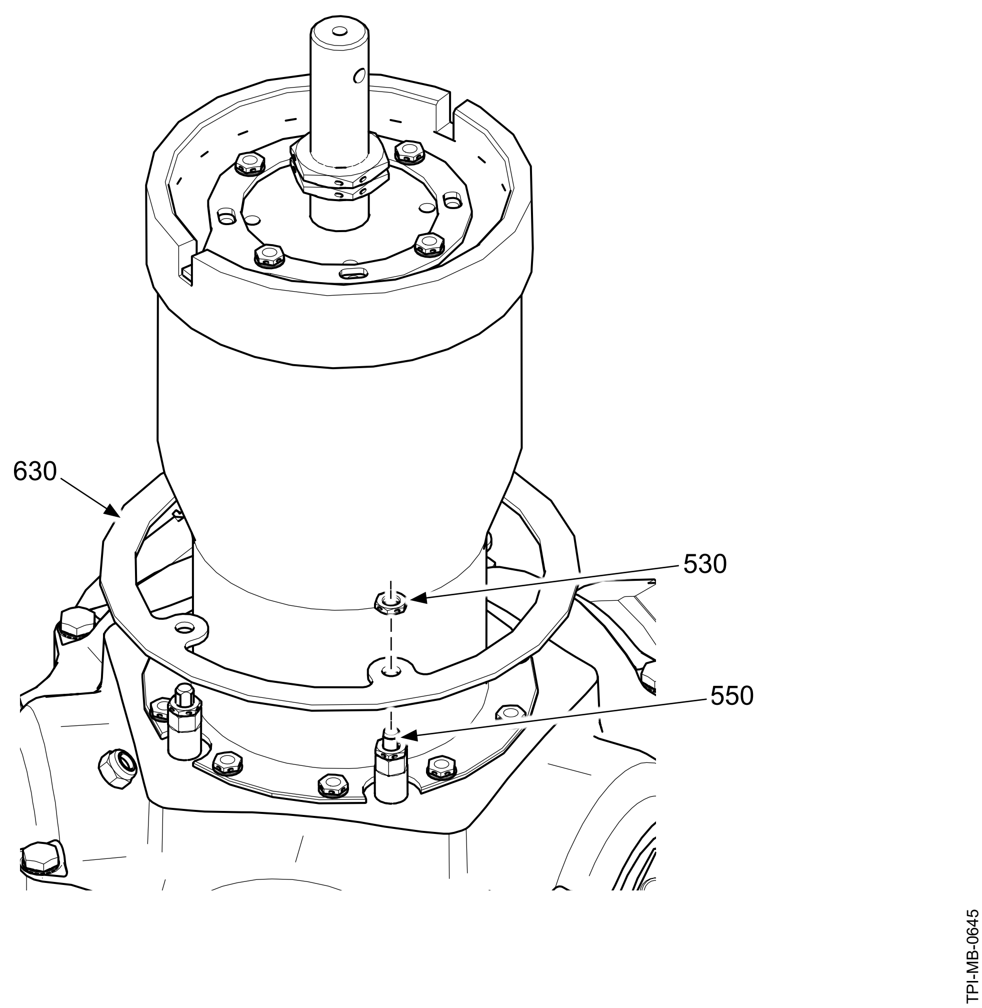
(1) Install the beta rod support ring (630) onto the beta rods (550) in accordance with Figure 7-46 and the following steps:

(a) Install the beta rod support ring (630) on the three beta rods (550).

(b) Install three hex nuts (530) onto the beta rods (550).

1 Torque the hex nuts (530) in accordance with Table 8-1 in the Fits and Clearances chapter of this manual.

(c) Safety wire the hex nuts (530) on both sides of the beta rod support ring (630).



Beta Rod Support Ring Installation
Figure 7-46

15. Using the Spring Installation Tool

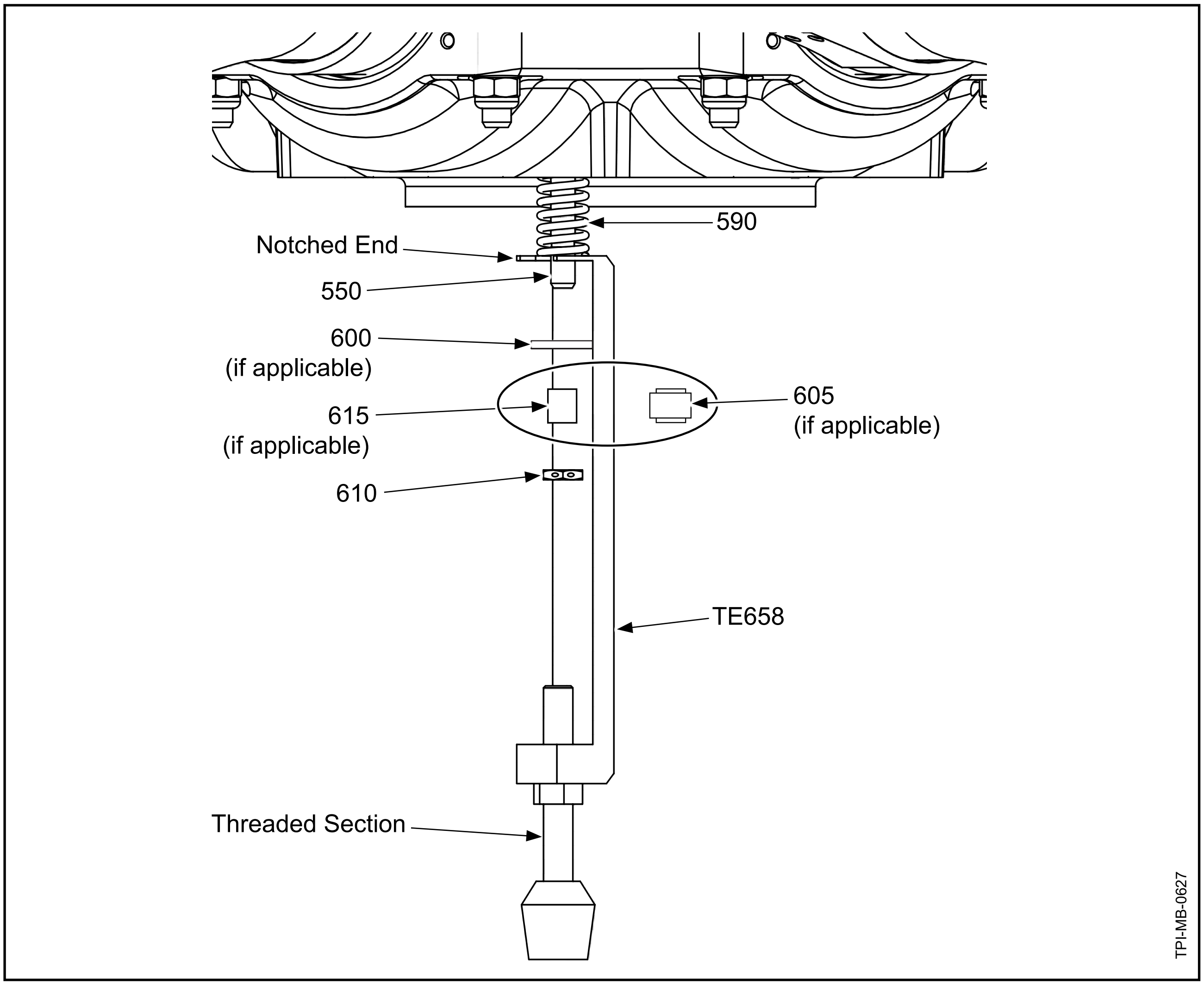
A. Installing/Removing the Beta Compression Spring

(1) Insert the notched end of the spring installation tool TE658 onto the beta rod (550) to compress the beta compression spring (590). Refer to Figure 7-47.

(2) Adjust the threaded section of the spring installation tool TE658 as necessary to compress the beta compression spring (590) until the threads on the beta rod (550) are exposed.

(3) Install the washer (600), spacer (615), or spring guide (605) as applicable, then install the drilled thin hex nuts (610).

(4) Remove the spring installation tool TE658 from the beta rod, then complete the assembly steps in the applicable procedure.



Spring Installation Tool
Figure 7-47

16. Setting the Low Pitch Blade Angle

A. All Propeller Models

(1) Refer to the applicable Aircraft Type Certificate Data Sheet or Hartzell Propeller Inc. Application Guide Manual 159 (61-02-59) for the specific low pitch blade angle and reference blade radius required.

(2) Pressurize the propeller to the low pitch blade angle.

(a) Lock the air pressure into propeller to maintain the low pitch blade angle.

(3) Rotate each beta sleeve (540) into the hub until it touches the fork plate (510).

(4) Install one thin hex nut (530) onto each beta rod (530) and tighten the nuts against the beta sleeves (540).

(a) Torque the thin hex nuts (530) in accordance with Table 8-1 in the Fits and Clearances chapter of this manual.

(5) Release the air pressure, then repressurize the propeller to the low pitch blade angle.

NOTE: The beta sleeves (540) and fork plate (510) should just contact.

(6) Recheck the low pitch blade angle and adjust the beta sleeves (540) if required.

(7) Apply 200 psi (13.78 bars) air (or oil) pressure to the propeller.

(8) With the propeller in full reverse, check the run-out of the beta ring in accordance with the applicable step below:

(a) ( )D3-( )( )( ): Using a dial indicator in accordance with Figure 7-42, check the run-out of the beta ring (620).

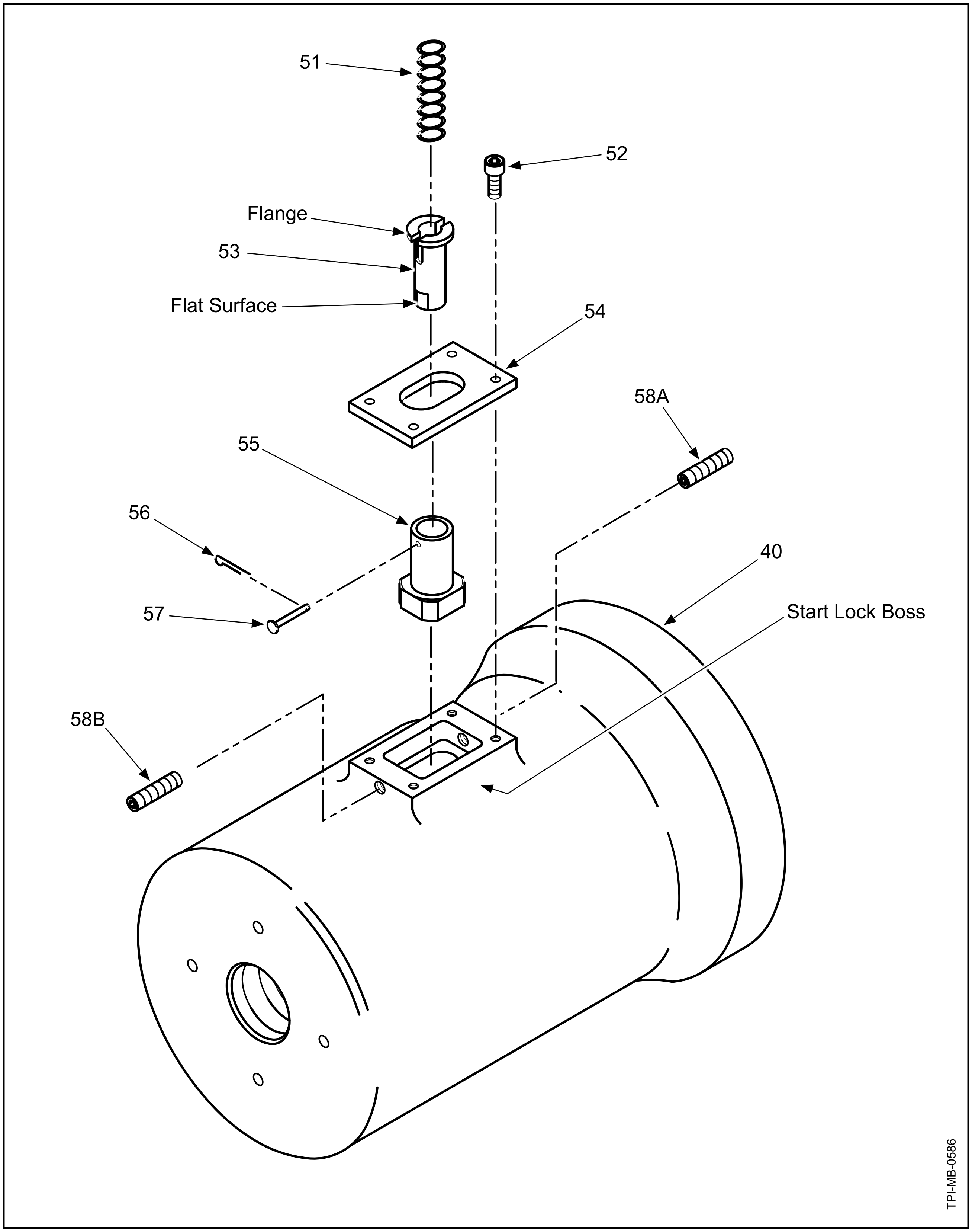
1 The run-out of the beta ring (620) must be within 0.010 inch (0.25 mm).

(b) ( )D31-( )( )( ): Using a dial indicator on the aft-surface of the beta ring (620), check the height run-out of the beta ring. Refer to Figure 7-44

1 The height run-out of the beta ring (620) must be within 0.004 inch (0.10 mm).

(9) Correct if necessary by readjustment of the beta sleeves (540).

(10) Recheck the low pitch and correct as necessary.



Start Lock Assembly
Figure 7-48

17. Start Lock Assembly (applicable models only)

A. Install the Start Lock Components - Refer to Figure 7-48

(1) Install one set screw (58A) into the start lock boss hole that is closest to the base of the cylinder (40) as shown in Figure 7-48.

(a) Repeat this step for the start lock boss on the opposite side.

(b) Turn the set screws (58A) an equal number of turns.

(2) Insert the start lock housing (55) through the start lock cover (54).

CAUTION: THE FLAT SURFACE ON THE START LOCK PIN (53) MUST FACE AWAY FROM THE HUB.

(3) Slide a start lock pin (53) into the start lock housing (55).

(a) Position the flat surface of the start lock pin (53) toward the lip of the piston (210).

(4) Put a compression spring (51) inside the start lock pin (53).

(5) Compress the compression spring (51), then insert the clevis pin (57) and cotter pin (56).

CAUTION: MAKE SURE THE FLAT SURFACE ON THE START LOCK PIN (53) FACES AWAY FROM THE HUB WHEN INSTALLING THE START LOCK HOUSING (55).

(6) Install the squared portion of the start lock housing (55) into the channel inside the start lock boss, then put the housing cover (54) over the start lock boss.

CAUTION: DO NOT TIGHTEN THE CAP SCREWS (52) AT THIS TIME.

(7) Using four cap screws (52), loosely fasten the housing cover (54) to the start lock boss.

NOTE: The cap screws (52) will be tightened after setting the start lock angle of the blades.

ATTENTION: IF BLADE ANGLES (FEATHER, REVERSE, LOW PITCH) HAVE ALREADY BEEN SET, IT IS NOT NECESSARY TO INSERT SPACERS BETWEEN THE START LOCK PIN (53) AND THE START LOCK HOUSING (55).

(8) Insert a 0.25 inch (6.3 mm) thick spacer between the flange on the start lock pin (53) and the start lock housing (55).

NOTE: The spacer prevents interference with subsequent piston movement.

(9) Repeat steps (2) thru (8) of this procedure for the other start lock.

B. Setting the Start Lock Angle of the Blades - Refer to Figure 7-48

(1) Apply 200 psi (13.78 bars) air pressure to the propeller and move the blade pitch to the reverse stop.

(2) Tighten the four cap screws (52) until snug against the housing cover (54).

NOTE: This will hold the start lock housing (55) and the start lock pins (53) square with the cylinder (40), and ensure that the start lock angle of the blades is correct.

CAUTION: DO NOT THREAD THE SET SCREW (58B) INTO THE CAVITY OF THE START LOCK BOSS ON THE CYLINDER (40).

(3) Install one set screw (58B) into the start lock boss hole that is closest to the top of the cylinder (40) as shown in Figure 7-48.

(a) Turn the set screw (58B) so that approximately four threads protrude from the start lock boss.

(b) Repeat this step for the start lock boss on the opposite side.

(4) If applicable, remove the 0.25 inch (6.3 mm) thick spacers used to hold the start lock pins (53) off the start lock housings (55) while the blade angles (feather, reverse, low pitch) were set.

(5) Release the air pressure to the propeller so that the start lock ring (215) on the piston (210) engages the start lock pins (53).

(6) Pull on each start lock pin (53) to verify engagement with the start lock ring (215) on the piston (210).

(a) If the start lock pin (53) is not engaging the start lock ring (215), it will move away from the cylinder (40) when pulled.

1 If the start lock pin (53) moves away from the cylinder when pulled, turn the set screw (58B) into the start lock boss until the start lock pin does not pull away from the cylinder.

(7) Using a protractor TE96, TE97, or equivalent, measure the start lock angle at the appropriate reference blade radius.

(a) If the start lock angle is correct:

1 Go to step (8) in this procedure.

(b) If the start lock angle is not correct:

1 Calculate the difference from the desired angle (± degrees).

2 Apply 200 psi (13.78 bars) air pressure to the propeller and move the blade pitch to the reverse stop.

3 Adjust two set screws (58B) equally to increase/decrease the start lock blade angle.

a Turning the set screws (58B) into the start lock boss will decrease start lock angle.

b Turning the set screws (58B) out of the start lock boss will increase start lock angle.

NOTE: One full rotation of the set screw (58B) equals approximately 1.7 degreess of blade pitch change.

4 Release the air pressure to the propeller so that the start lock ring (215) on the piston (210) engages the start lock pins (53).

5 Repeat step (7) of this procedure until the start lock angle is set correctly.

(8) Verify start lock pin (53) engagement with the start lock ring (215) in accordance with step (6) of this procedure.

(9) Torque the four cap screws (52) against the housing cover (54) in accordance with Table 8-1 in the Fits and Clearances chapter of this manual.

(10) Using 0.032 inch (0.81 mm) minimum diameter stainless steel wire, safety wire the four cap screws (52) to each other.

(11) Turn two set screws (58A) into the start lock boss until they bottom out against the start lock housing (55).

NOTE: This will secure the start lock housing (55) in place.

18. Beta Feedback Block Assembly/Installation

A. ( )D3-( )( )( ) Propellers Only - Refer to Figure 7-49

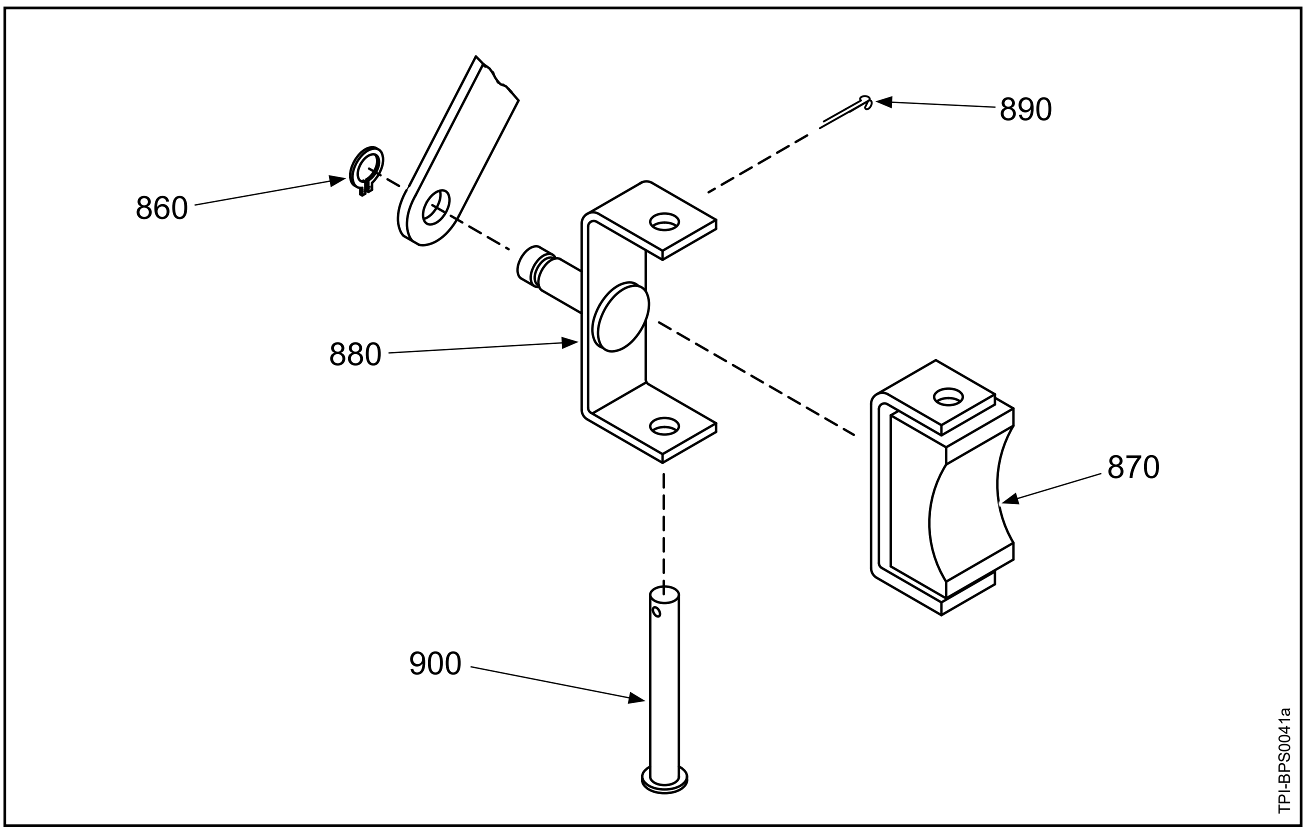
(1) Put the carbon block unit (870) in the yoke unit (880) and align the holes in the yoke unit with the through hole in the carbon block unit.

(2) Install the clevis pin (900) through one yoke unit (880) hole, through the carbon block unit (870), and out of the opposite yoke unit hole.

(3) Install the cotter pin (890) through the hole in the clevis pin (900).

(4) The external snap ring (860) will be installed when the beta feedback block assembly (850) is installed onto the aircraft.

(5) Refer to the Fits and Clearances chapter of this manual for the installation of the beta feedback block assembly onto the aircraft.



Beta Feedback Block Assembly
Figure 7-49

19. Leak Test (Rev.3)

A. Leak Test Procedure

NOTE: Refer to the Illustrated 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 (470) in the applicable side of the hub (300).

(a) Tighten each lubrication fitting (470) until finger-tight, then tighten one additional 360 degree turn.

(2) Install the lubrication plugs (471) in the applicable side of the hub.

(a) Leave one lubrication plug hole open for leak testing.

(b) Tighten each lubrication plug (471) until finger-tight, then tighten one additional 360 degree turn.

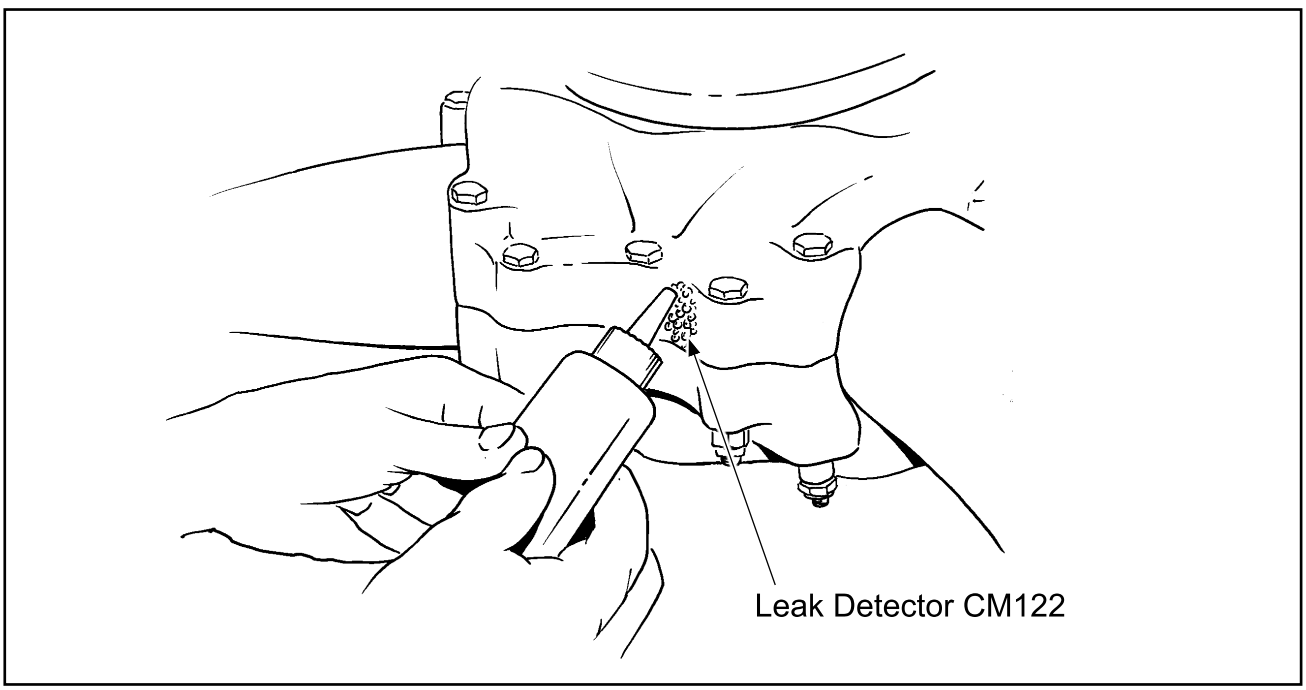
(3) With the hub installed on the propeller test stand, perform the leak test in accordance with the following steps:

(a) Move the propeller to high or low pitch as applicable.

1 Non-feathering propellers: High pitch

2 Feathering propellers: Low pitch

(b) Apply leak detector CM122 to the open lubrication plug hole. Refer to Figure 7-50.



Hub Leak Test
Figure 7-50

(c) Cycle the propeller to purge air trapped in the hub.

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 (471) in the applicable side of the hub (300).

(a) Tighten the lubrication hole plug (471) until finger-tight, then tighten one additional 360 degree turn.

20. Post-Assembly Procedures

A. Counterweight Installation

(1) For the correct counterweight for the propeller, refer to the Hartzell Propeller Inc. Application Guide Manual 159 (61-02-59).

(2) For installation of a counterweight on a composite blade, refer to Hartzell Propeller Inc. Composite Blade Maintenance Manual 135F (61-13-35).

B. Propeller Lubrication

(1) Lubricate the propeller in accordance with the Propeller Lubrication chapter of the Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

C. 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 drilled screws (1210).

(1) Perform static balance of the propeller in accordance with the Static and Dynamic Balance chapter of the Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

D. Label Placement

(1) For information about label usage, refer to the Parts Identification and Marking chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

21. Disassembling a Propeller 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 Inc. manuals.

(3) For additional assembly information, refer to the section, "General" in 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 section, "Important Information" 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 and bulkhead to show alignment of the bulkhead to the hub, before removing the bulkhead from the hub.

(3) Remove all balance weight screws (1210) and balance weights (1220).

(4) Disconnect the electric de-ice lead wires from the hub and bulkhead, if applicable.

(5) Disassemble the beta system. Refer to the section, "Beta System Disassembly" in the Disassembly chapter of this manual.

(6) Disassemble the hydraulic system and pitch adjustment unit. Refer to the section, "Hydraulic System and Pitch Adjustment Unit Disassembly" in the Disassembly chapter of this manual.

NOTE: It is not necessary to remove the pitch adjust sleeve unit (150) from the cylinder or the piston (210) and self locking nut (200) from the pitch change rod.

(7) 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 in accordance with the applicable procedures in this chapter.

(8) Packing the Propeller and Blades for Shipping

(a) Refer to the Packaging and Storage chapter of Hartzell Propeller Inc. 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 thrust bearing, blade seal, and grease on each blade shank.

22. 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 have been marked for alignment with the hub unit.

(2) Remove all balance weight screws (1210) and balance weights (1220).

(3) Disassemble the beta system in accordance with the section, "Beta System Disassembly" in the Disassembly chapter of this manual.

(4) Disassemble the hydraulic system and pitch adjustment unit in accordance with the section, "Hydraulic System and Pitch Adjustment Unit Disassembly" in the Disassembly chapter of this manual.

NOTE: It is not necessary to remove the pitch adjust sleeve unit (150) from the cylinder or the piston (210) and self locking nut (200) from the pitch change rod.

C. Propeller Reassembly

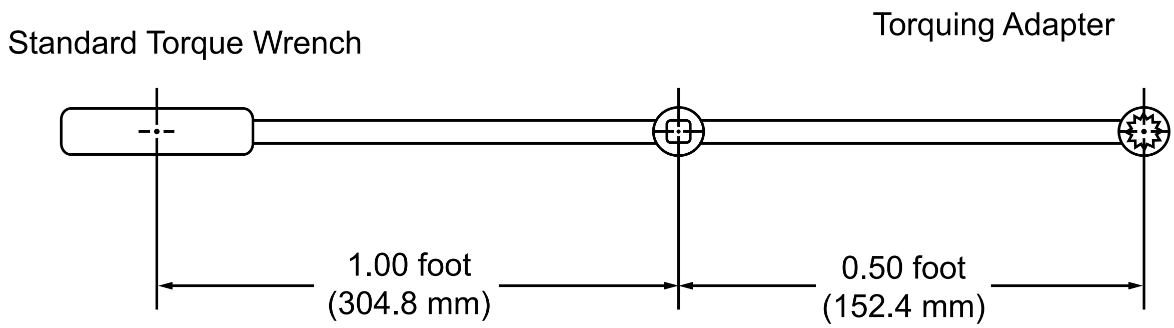
(1) Reassemble the propeller in accordance with the applicable procedures in this chapter.

(2) Reconnect the electric de-ice lead wires to the bulkhead, if applicable.

FITS AND CLEARANCES - CONTENTS

LIST OF FIGURES

LIST OF TABLES



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

EXAMPLE:

$$\frac{\text{100 Ft-Lb (136 N•m) x 1 ft (304.8 mm)}}{\text{1 ft (304.8 mm) + 0.50 ft (152.4 mm)}} = \text{66.7 Ft-Lb (90.4 N•m)}$$

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. 2)

   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 Inc. 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.

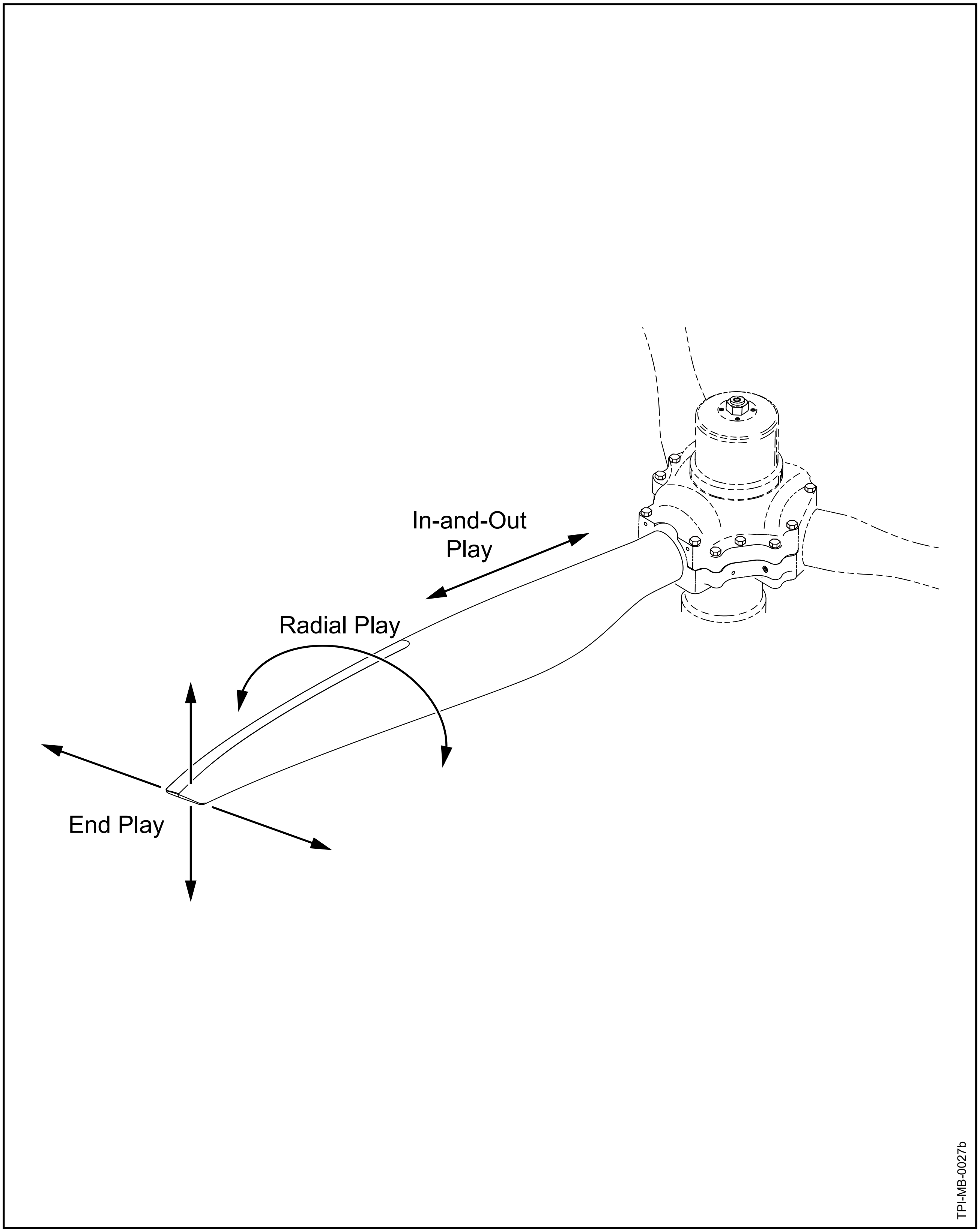
CAUTION 2: FOR TORQUE READING WHEN USING A TORQUE WRENCH ADAPTER, REFER TO FIGURE 8-1.

NOTE: Torque tolerance is ± 10 percent unless otherwise noted.

Item No.	Part Number	Nomenclature / Location	Torque		
			Ft-Lb	In-Lb	N•m
10, 20	B-3839-16	Nut, Hex, Thin, Drilled	120	1440	163
30	B-3375	Nut, Hex, Thin, Drilled	165	1980	224
40	D-484	Cylinder	200 wet	2400 wet	271 wet
	D-488	Cylinder	200 wet	2400 wet	271 wet
52	B-3821	Screw, 10-32, Cap	---	72	8.1
70	B-3384-2H	Bolt, 1/4-28, Hex Head	13	156	18
	B-3841-5	Screw, 1/4-28, Fillister Head	---	41	4.6
90	B-3384-2H	Bolt, 1/4-28, Hex Head	13	156	18
200	B-474	Nut, 1 1/8-12, Hex, Self-locking	100	1200	136
270	D-6506	PCP: Rod, Pitch Change	80 wet	960 wet	109 wet
	103872	PCP: Rod, Pitch Change	80 wet	960 wet	109 wet
	106212	PCP: Rod, Pitch Change	80 wet	960 wet	109 wet
460	A-2043-1	Nut, 3/8-24, Hex Self-locking	22	264	30
520	B-6521-8	Screw, 10-32, 100 Deg. Head	---	72-84	8.2-9.4
	B-6605-LB8P	Screw, 8-32, Cap	---	24-29	2.8-3.2
530	B-3839-5	Nut, Hex, Thin, Drilled	---	120	13.5
	B-3898-5	Nut, Hex, Thin, Drilled	---	120	13.5
610	B-3839-5	Nut, Hex, Thin, Drilled	---	120	13.5
	B-3898-5	Nut, Hex, Thin, Drilled	---	120	13.5
920	B-3830	Bolt, 5/16-24, 12 Point / Pitch Change Knob Bracket	18-22	216-264	25-29
1000	B-3867-272	Screw, 10-32 100°, Head, Cres	---	8-10	0.9 - 1.1
-	B-3384-( )	Bolt, 1/4-28, Hex Head	---	96-120	10.9-13.5
-	A-2070-( )	Screw, 1/4-28, Button Head	---	96-120	10.9-13.5

-ITEM NOT ILLUSTRATED

Torque Values
Table 8-1



Blade Play
Figure 8-2

2. Blade Tolerances

A. Blade Play

(1) Limits for blade play are specified below. Refer to Figure 8-2.

(a)	Radial Play	±0.5 degree (1 degree total) measured at reference station
(b)	In-and-Out Play	0.020 inch (0.50 mm)

(c) End Play:
Leading Edge to Trailing Edge
Fore-and-Aft (face to camber)

NOTE 1: Hartzell Propeller Inc. Raptor-series propellers use specially designed spacers within the propeller to achieve the required blade fit. The blades may feel loose in the hub when compared to Hartzell Compact-series propellers. During propeller rotation, the blade fit within the propeller is the same as other Hartzell propeller models.

NOTE 2: Blade tip play is affected by the fit of the blade within the propeller, and also by movement of components within the engine and the aircraft. The following check will evaluate only the fit of the blade within the propeller.

1 Using one finger and thumb, apply a light load of approximately 5 lbs. (2.2 kg) to the blade in the direction of the check being performed.

a Apply the load at the mid-span of the blade approximately in line with the blade decal.

2 Measure blade play at the tip of the blade.

a The maximum permitted blade play is 0.25 inch (6.3 mm).

(d) If blade play is greater than the permitted limit, contact the Hartzell Propeller Inc. Product Support Department.

B. Blade Track

(1) Blade Track — 0.125 inch (3.17 mm)

C. Blade Pitch Tolerance

(1) Blade pitch setting tolerance between blades at low pitch — 0.2 degree

3. Checking the Carbon Block Unit/Beta Ring Clearance - ( )D3-( )( )( ) Propellers Only

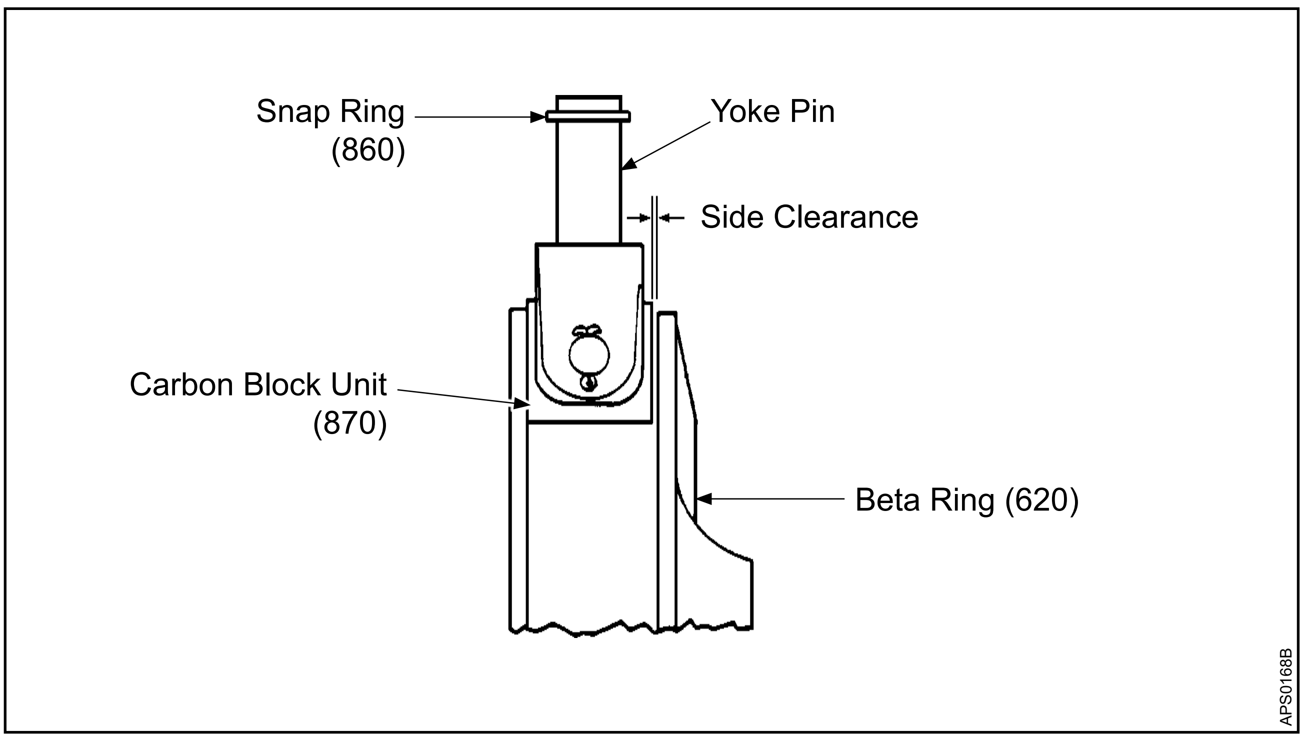
A. Procedure

(1) Check the following clearance dimension upon installation of the beta feedback block assembly in the beta ring, and whenever unusual conditions exist that could create excessive wear. Refer to Figure 8-3.

(a) The minimum permitted side clearance between a new carbon block unit (870) and the beta ring (620) when installed is 0.001 inch (0.03 mm).

(b) The maximum permitted side clearance between the carbon block unit (870) and the beta ring (620) is 0.010 inch (0.25 mm).

(c) If the side clearance between the carbon block unit (870) and the beta ring (620) is not within the permitted limits, replace the carbon block unit.



Carbon Block Unit/Beta Ring Clearance
Figure 8-3

(Blank Page)

SPECIAL TOOLS, FIXTURES, AND EQUIPMENT - CONTENTS

(Blank Page)

1. <u>Tooling and Facility Requirements</u> (Rev. 1)

   A. Standard Tooling

      (1) Propeller repair stations certified by the FAA or international equivalent to overhaul Hartzell Propeller Inc. 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 Inc. 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.

(Blank Page)

ILLUSTRATED PARTS LIST - CONTENTS

PROPELLER PARTS LISTS and FIGURES

SUB-ASSEMBLY PARTS LISTS and FIGURES

(Blank Page)

1. Introduction (Rev. 1)

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 Inc. 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 Inc. Application Guide Manual 159 (61-02-59).

D. Ice Protection System Components

(1) Ice protection systems are application specific. Refer to Hartzell Propeller Inc. Application Guide Manual 159 (61-02-59).

(a) For components of ice protection systems supplied by Hartzell, refer to Hartzell Propeller Inc. 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. 1)

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) Items 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 Inc. identification number for the part.

(2) Use the Hartzell Propeller Inc. part number when ordering the part from Hartzell or a Hartzell-approved distributor.

C. Description

(1) This column provides the Hartzell Propeller Inc. description of the part.

(2) Bullets and indentations are used to indicate parts that are components of a sub-asssembly.

(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.(5) Service Documents

(a) In the event of modification or repair of an existing part, the supersedure, replacement, or obsolescence of a part, or the addition of parts installed by a Service Bulletin (SB) or Service Letter (SL), the SB or SL number will appear in the Description column as “SB_____”, or "SL_____” after the description.

4. Vendor Supplied Hardware (Rev. 1)

A. Important Information

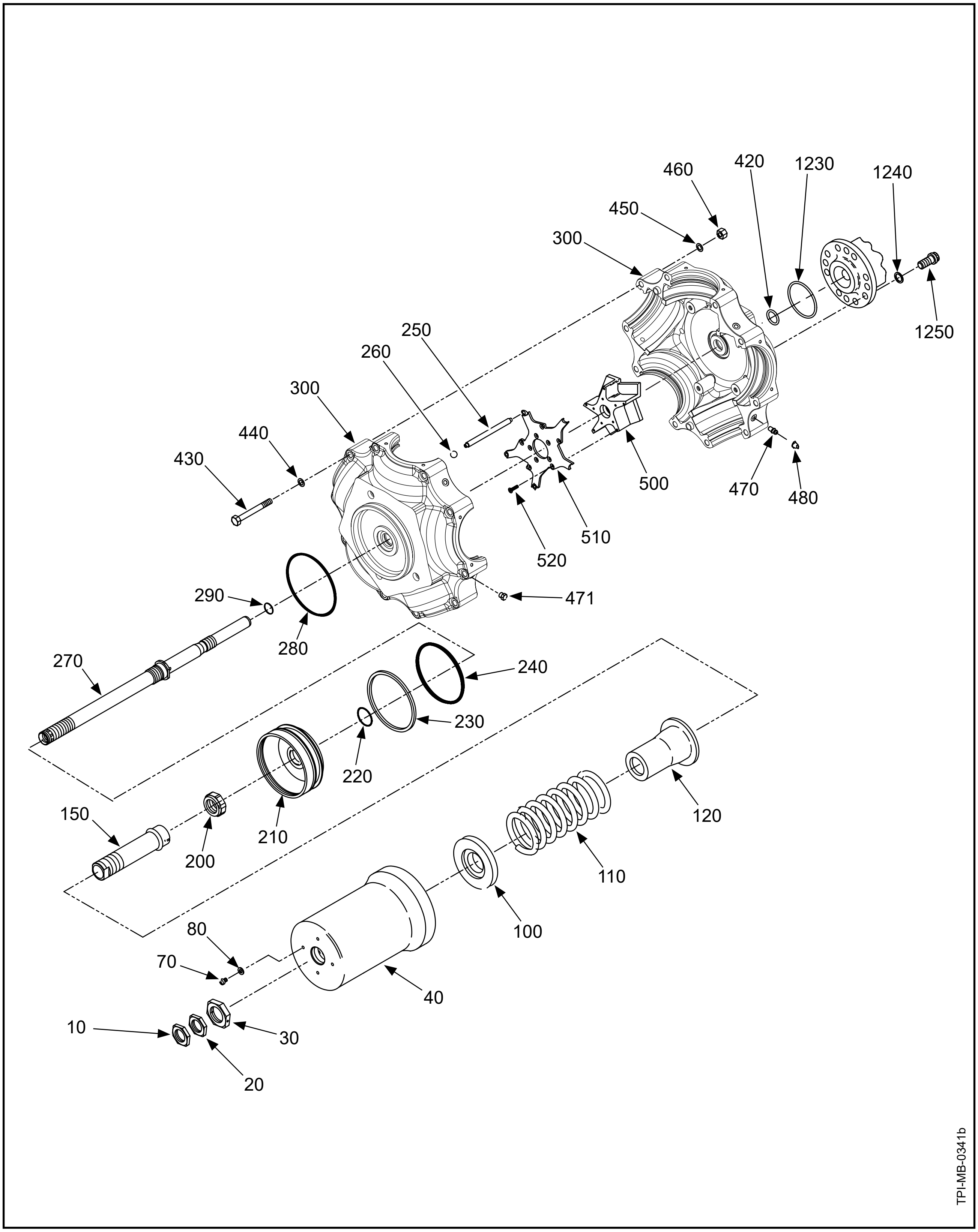
(1) Many O-rings, fasteners, and other vendor supplied hardware listed in Hartzell Propeller Inc. manuals have previously been specified with AN, MS, NAS, or vendor part number. To provide internal controls and procurement flexibility, Hartzell part numbers have been assigned to all O-rings, fasteners, and hardware. Part shipments from Hartzell Propeller Inc. 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 Inc. products without additional standards imposed by Hartzell.

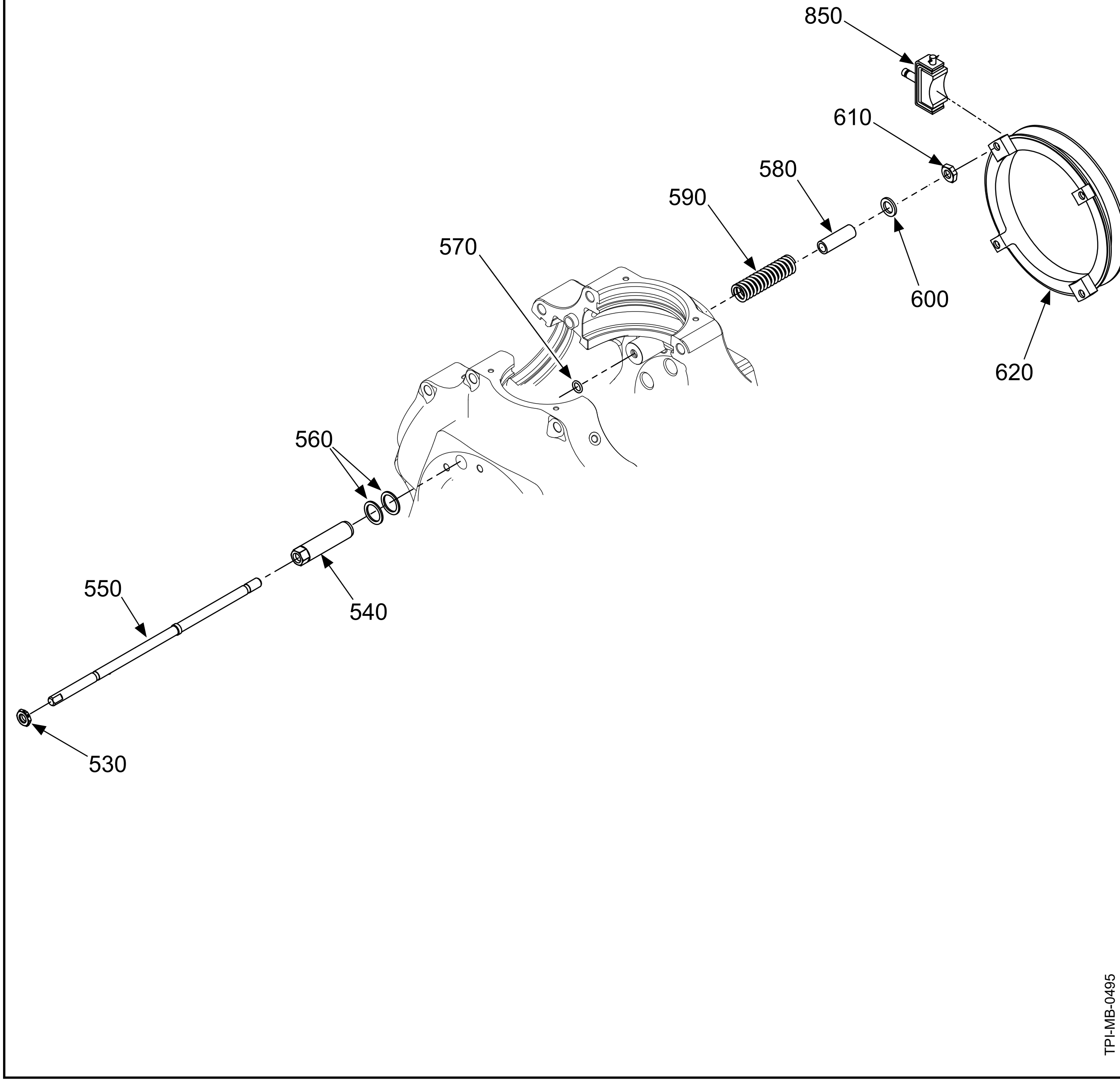
(a) For a listing of part number interchangeability, refer to the Vendor Cross Reference chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

(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 Inc.



5D3-N338A(1,2): Propeller Parts
Figure 10-1



5D3-N388A(1,2): Beta System Parts
Figure 10-2

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
		5D3-N338A(1,2)				
10-1		**PROPELLER PARTS**				
10	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
20	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
30	B-3375	• PCP: NUT, 1 3/8-12, HEX, THIN, DRILLED		1		PCP
40	D-488	• PCP: CYLINDER		1		PCP
70	B-3841-5	• SCREW, 1/4-28 SCREW, FILLISTER HEAD		1	Y	
80	B-3837-0463	• WASHER, CORROSION RESISTANT		1	Y	
100	B-6768	• SPRING RETAINER, FOWARD		1		
110	C-6760	• PCP: SPRING, COMPRESSION, FEATHERING		1		PCP
120	B-6761	• GUIDE, SPRING, PLASTIC		1	Y	
150	B-6758	• PCP: SLEEVE, PITCH ADJUST - UNIT		1		PCP
-160	C-6759	• • PCP: SLEEVE, REVERSE ADJUST ONLY AVAILABLE AS PART OF ITEM 150		1		PCP
-170	A-441	• • BUSHING, SLEEVE		1		
200	B-474	• NUT, 1 1/8-12, HEX, SELF-LOCKING		1	Y	
210	C-492	• PISTON		1		
220	C-3317-217	• O-RING (PISTON ID)		1	Y	
230	B-1843	• SEAL, DUST, PISTON		1	Y	
240	C-3317-426-2	• O-RING (PISTON OD)		1	Y	
250	106004	• ROD, ANTI-ROTATION		2		
260	B-6068	• SPACER, ANTI-ROTATION ROD		2	Y	
270	D-6506	• PCP: ROD, PITCH CHANGE		1		PCP
280	C-3317-251	• O-RING (CYLINDER MOUNTING)		1	Y	
290	C-3317-213-2	• O-RING (CYLINDER-SIDE BUSHING ID)		1	Y	
300	105916	• PCP:HUB UNIT, 5D3-N338( ) (REFER TO "105916 HUB UNIT" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
420	C-3317-211-2	• O-RING, ENGINE-SIDE BUSHING ID		1	Y	
430	A-2432	• BOLT, 3/8-2, HEX HEAD		10		
440	B-3834-0632	• WASHER		10	Y	
450	B-3834-0632	• WASHER		10	Y	
460	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		10	Y	
470	A-279	• FITTING, LUBRICATION REPLACED BY ITEMS 470A AND 471		10	Y	
470A	A-279	• FITTING, LUBRICATION REPLACES ITEM 470 IN ENGINE-SIDE OF HUB		5	Y	
470B	C-6349	• FITTING, LUBRICATION, 45° ALTERNATE FOR ITEM 470A		5	Y	
471	106545	• PLUG, LUBRICATION (POST HC-SL-61-354) REPLACES ITEM 470 IN CYLINDER-SIDE OF HUB		5	Y	
480	B-6544	• CAP, FITTING, LUBRICATION USED WITH ITEMS 470, 470A, AND 470B		5	Y	

EFF CODE	INFORMATION

- ITEM NOT ILLUSTRATED

5D3-N338A(1,2)

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
		5D3-N338A(1,2), CONTINUED				
10-1		**PROPELLER PARTS, CONTINUED**				
500	106066	• FORK, FIVE BLADE		1		
510	106067	• PLATE, FORK, FIVE BLADE		1		
520	B-6605-LB8P	• SCREW, 8-32, CAP		10	Y	
10-1		**PROPELLER MOUNTING PARTS**				
1230	C-3317-230	• O-RING (FLANGE)		1	Y	
1240	A-2048-2	• WASHER, MOUNTING, 9/16 INCH CSK		8	Y	
1250	B-3339-1	• TWELVE POINT 9/16-18 MOUNTING BOLT		8	Y	
10-2		**BETA SYSTEM PARTS**				
530	B-3839-5	• PCP: NUT, HEX, THIN, DRILLED		3	Y	PCP
540	B-457	• SLEEVE, BETA, THREADED		3		
550	C-453	• ROD, BETA		3		
560	A-3623	• RING, BACKUP		6	Y	
570	C-3317-011	• O-RING (RETAINER)		3	Y	
580	A-466	• SLEEVE, GUIDE, SPRING		3	Y	
590	B-458	• SPRING, COMPRESSION, BETA		3	Y	
600	A-2411-1	• WASHER		3	Y	
610	B-3839-5	• PCP: NUT, HEX, THIN, DRILLED		3	Y	PCP
620	105924	• BETA RING		1		
850	A-3044	• BETA FEEDBACK BLOCK ASSEMBLY (REFER TO "A-3044 BETA FEEDBACK BLOCK ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
10A-1		**BLADE RETENTION PARTS** (REFER TO "BLADE RETENTION PARTS" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		BALANCE PARTS				
-1210	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		AR	Y	
-1220	A-2424( )	• BALANCE WEIGHT		AR		

EFF CODE INFORMATION

- ITEM NOT ILLUSTRATED

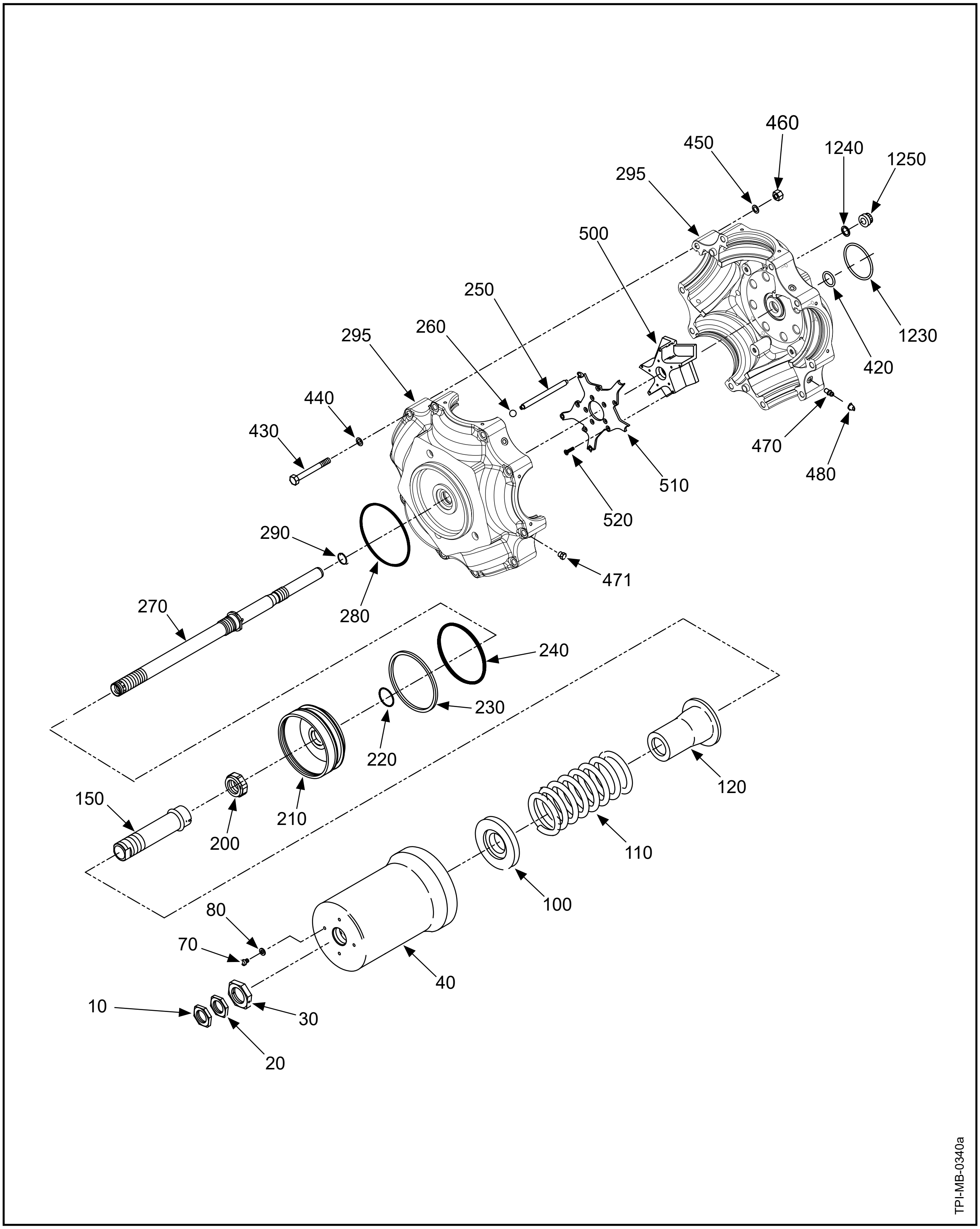
5D3-N338A(1,2), continued

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
		5D3-N338A(1,2), CONTINUED				
		COUNTERWEIGHTS/MOUNTING BOLTS				
		• COUNTERWEIGHT APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER INC. APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION				PCP
		• COUNTERWEIGHT MOUNTING BOLTS REFER TO THE APPLICABLE HARTZELL PROPELLER INC. BLADE MAINTENANCE MANUAL: MANUAL 135F (61-13-35) - COMPOSITE BLADES MANUAL 133C (61-13-33) - ALUMINUM BLADES				
		COUNTERWEIGHT SLUGS/MOUNTING HARDWARE				
		• COUNTERWEIGHT SLUGS AND SLUG MTG. HARDWARE APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER INC. APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION				
		SPINNER PARTS				
		APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER INC. APPLICATION GUIDE MANUAL 159 (61-02-59) AND THE APPLICABLE HARTZELL PROPELLER INC. SPINNER MAINTENANCE MANUAL: MANUAL 127 (61-16-27) - METAL SPINNER ASSEMBLIES MANUAL 148 (61-16-48) - COMPOSITE SPINNER ASSEMBLIES				

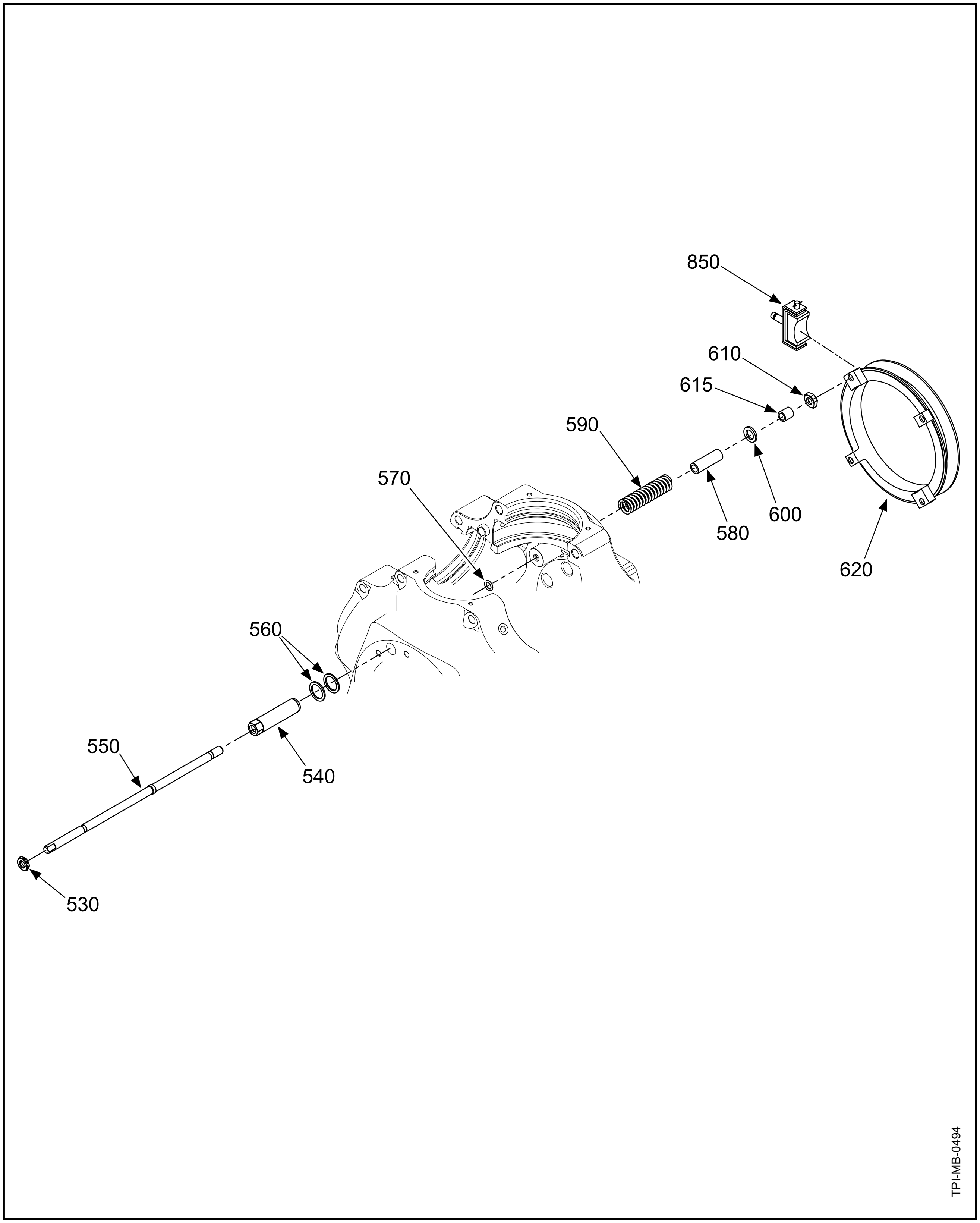
EFF CODE INFORMATION

- ITEM NOT ILLUSTRATED

5D3-N338A(1,2), continued



5D3-NK366A1: Propeller Parts
Figure 10-3



5D3-NK366A1: Beta System Parts
Figure 10-4

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
		5D3-NK366A1				
10-3		**PROPELLER PARTS**				
10	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
20	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
30	B-3375	• PCP: NUT, 1 3/8-12, HEX, THIN, DRILLED		1		PCP
40	D-488	• PCP: CYLINDER		1		PCP
70	B-3841-5	• SCREW, 1/4-28 SCREW, FILLISTER HEAD		1	Y	
80	B-3837-0463	• WASHER, CORROSION RESISTANT		1	Y	
100	B-6768	• SPRING RETAINER, FOWARD		1		
110	C-6760	• PCP: SPRING, COMPRESSION, FEATHERING		1		PCP
120	B-6761	• GUIDE, SPRING, PLASTIC		1	Y	
150	B-6758	• PCP: SLEEVE, PITCH ADJUST - UNIT		1		PCP
-160	C-6759	• • PCP: SLEEVE, REVERSE ADJUST ONLY AVAILABLE AS PART OF ITEM 150		1		PCP
-170	A-441	• • BUSHING, SLEEVE		1		
200	B-474	• NUT, 1 1/8-12, HEX, SELF-LOCKING		1	Y	
210	C-492	• PISTON		1		
220	C-3317-217	• O-RING (PISTON ID)		1	Y	
230	B-1843	• SEAL, DUST, PISTON		1	Y	
240	C-3317-426-2	• O-RING (PISTON OD)		1	Y	
250	106004	• ROD, ANTI-ROTATION		2		
260	B-6068	• SPACER, ANTI-ROTATION ROD		2	Y	
270	103872	• PCP: ROD, PITCH CHANGE		1		PCP
280	C-3317-251	• O-RING (CYLINDER MOUNTING)		1	Y	
290	C-3317-213-2	• O-RING (CYLINDER-SIDE BUSHING ID)		1	Y	
295	107955	• PCP:HUB ASSEMBLY, 5D3( )-NK366A( ) (REFER TO "107955 HUB ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
420	C-3317-211-2	• O-RING, ENGINE-SIDE BUSHING ID		1	Y	
430	A-2432	• BOLT, 3/8-2, HEX HEAD		10		
440	B-3834-0632	• WASHER		10	Y	
450	B-3834-0632	• WASHER		10	Y	
460	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		10	Y	
470	A-279	• FITTING, LUBRICATION (ENGINE-SIDE OF HUB)	A	5	Y	
470A	C-6349	• FITTING, LUBRICATION, 45° (POST HC-SL-61-187) ALTERNATE FOR ITEM 470		5	Y	
471	106545	• PLUG, LUBRICATION (CYLINDER-SIDE OF HUB)	A	5	Y	
480	B-6544	• CAP, FITTING, LUBRICATION USED WITH ITEMS 470 AND 470A		5	Y	

EFF CODE	INFORMATION

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
		5D3-NK366A1, CONTINUED				
10-3		**PROPELLER PARTS, CONTINUED**				
500	106066	• FORK, FIVE BLADE		1		
510	106067	• PLATE, FORK, FIVE BLADE		1		
520	B-6605-LB8P	• SCREW, 8-32, CAP		10	Y	
10-3		**PROPELLER MOUNTING PARTS**				
1230	C-3317-230	• O-RING (FLANGE)		1	Y	
1240	A-2048-2	• WASHER, MOUNTING, 9/16 INCH CSK		8	Y	
1250	107957	• NUT, MOUNTING, CRES, 9/16-18, 12-POINT	A	8	Y	
1250A	107585	• NUT, MOUNTING, 9/16-18, 12 POINT ALTERNATE FOR ITEM 1250	A	8	Y	
10-4		**BETA SYSTEM PARTS**				
530	B-3839-5	• PCP: NUT, HEX, THIN, DRILLED		3	Y	PCP
540	B-457	• SLEEVE, BETA, THREADED		3		
550	101649	• ROD, BETA		3		
560	A-3623	• RING, BACKUP		6	Y	
570	C-3317-011	• O-RING (RETAINER)		3	Y	
580	A-466	• SLEEVE, GUIDE, SPRING		3	Y	
590	B-458	• SPRING, COMPRESSION, BETA		3	Y	
600	A-2411-1	• WASHER		3	Y	
610	B-3839-5	• PCP: NUT, HEX, THIN, DRILLED		3	Y	PCP
615	101382-1	• SPACER		3		
620	107495	• BETA RING		1		
850	A-3044	• BETA FEEDBACK BLOCK ASSEMBLY (REFER TO "A-3044 BETA FEEDBACK BLOCK ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
10A-1		**BLADE RETENTION PARTS** (REFER TO "BLADE RETENTION PARTS" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		BALANCE PARTS				
-1210	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		AR	Y	
-1220	A-2424( )	• BALANCE WEIGHT		AR		

EFF CODE	INFORMATION
A	DO NOT MIX 107957 NUTS AND 107585 NUTS ON THE SAME PROPELLER

- ITEM NOT ILLUSTRATED

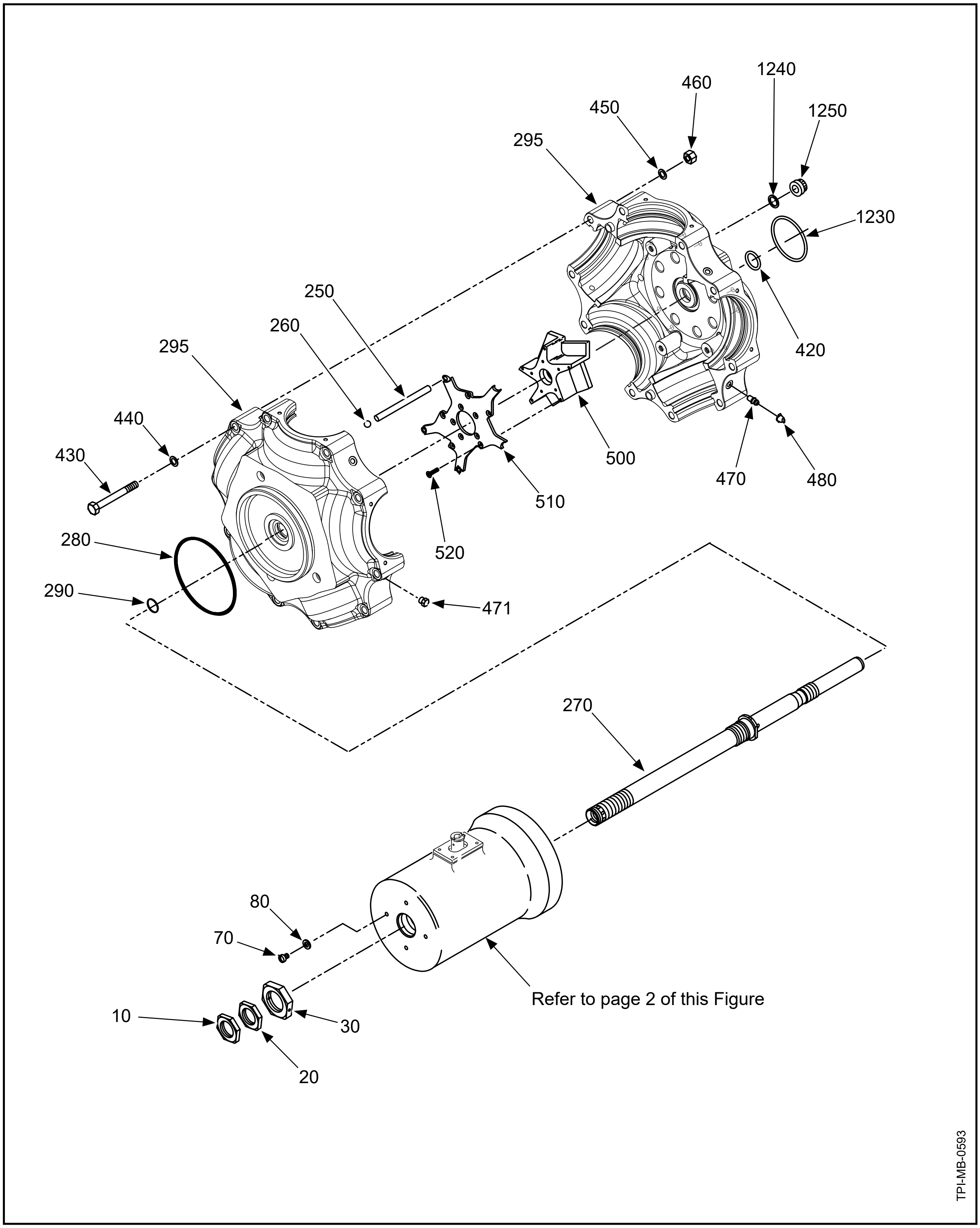
5D3-NK366A1, continued

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
		5D3-NK366A1, CONTINUED				
		COUNTERWEIGHTS/MOUNTING BOLTS				
		• COUNTERWEIGHT APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER INC. APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION				PCP
		• COUNTERWEIGHT MOUNTING BOLTS REFER TO THE APPLICABLE HARTZELL PROPELLER INC. BLADE MAINTENANCE MANUAL: MANUAL 135F (61-13-35) - COMPOSITE BLADES MANUAL 133C (61-13-33) - ALUMINUM BLADES				
		COUNTERWEIGHT SLUGS/MOUNTING HARDWARE				
		• COUNTERWEIGHT SLUGS AND SLUG MTG. HARDWARE APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER INC. APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION				
		SPINNER PARTS				
		APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER INC. APPLICATION GUIDE MANUAL 159 (61-02-59) AND THE APPLICABLE HARTZELL PROPELLER INC. SPINNER MAINTENANCE MANUAL: MANUAL 127 (61-16-27) - METAL SPINNER ASSEMBLIES MANUAL 148 (61-16-48) - COMPOSITE SPINNER ASSEMBLIES				

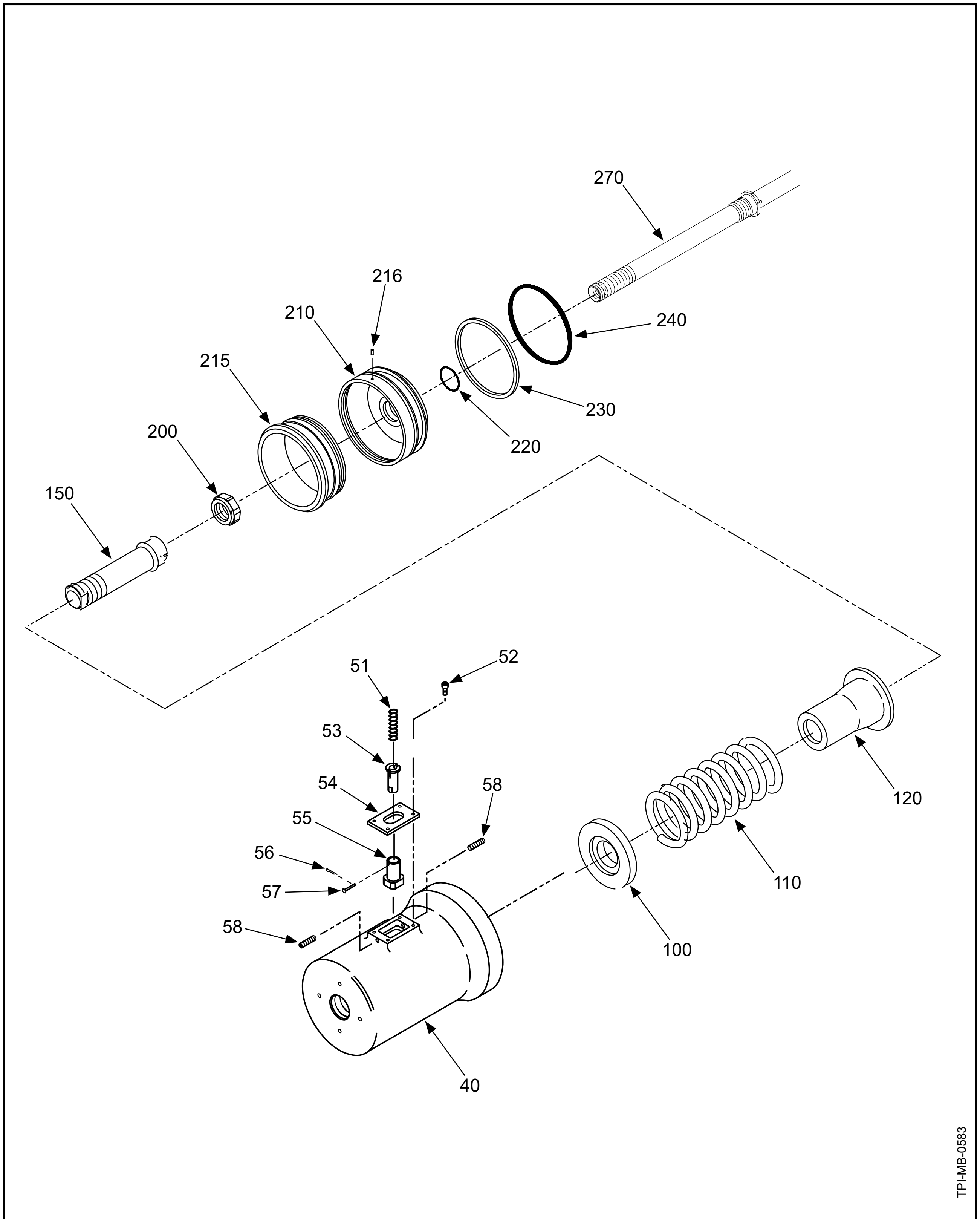
EFF CODE INFORMATION

- ITEM NOT ILLUSTRATED

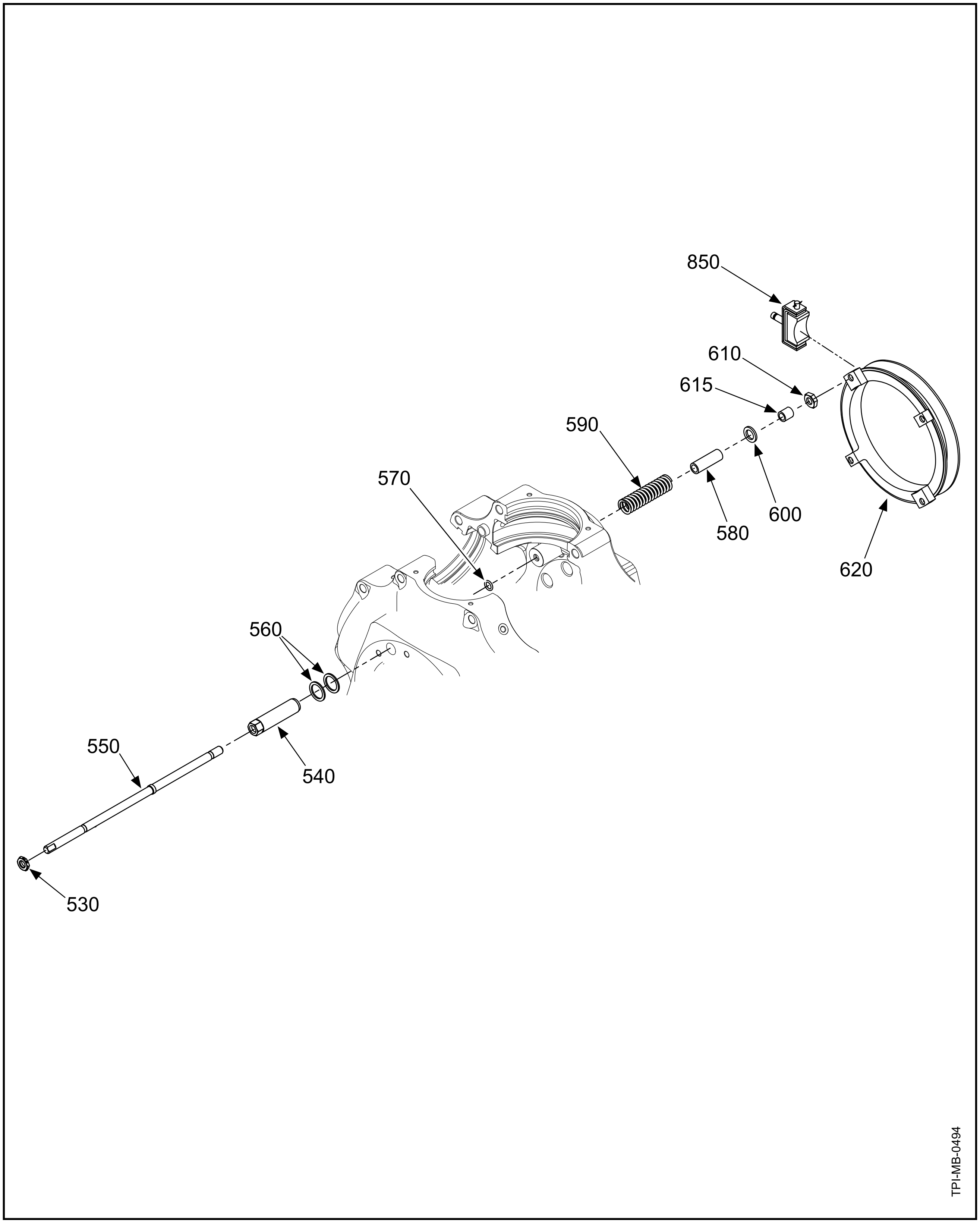
5D3-NK366A1, continued



5D3-NK366A1Y: Propeller Parts
Figure 10-5, page 1 of 2



5D3-NK366A1Y: Propeller Parts
Figure 10-5, page 2 of 2



5D3-NK366A1Y: Beta System Parts
Figure 10-6

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
		5D3-NK366A1Y				
10-5		**PROPELLER PARTS**				
10	B-3839-16	PCP: NUT, HEX, THIN, DRILLED		1		PCP
20	B-3839-16	PCP: NUT, HEX, THIN, DRILLED		1		PCP
30	B-3375	PCP: NUT, 1 3/8-12, HEX, THIN, DRILLED		1		PCP
40	D-484	PCP: CYLINDER		1		PCP
51	B-658	SPRING, COMPRESSION		2	Y	
52	B-3821	SCREW, 10 -32, CAP		8	Y	
53	A-2620-1	PIN, START LOCK		2		
54	B-446	COVER, HOUSING, START LOCK		2		
55	B-444-4	HOUSING, START LOCK		2		
56	B-3838-1	COTTER PIN		2	Y	
57	B-2877	CLEVIS PIN, 3/32		2	Y	
58	B-6639-131	SET SCREW		4	Y	
70	B-3841-5	SCREW, 1/4-28 SCREW, FILLISTER HEAD		1	Y	
80	B-3837-0463	WASHER, CORROSION RESISTANT		1	Y	
100	B-6768	SPRING RETAINER, FOWARD		1		
110	C-6760	PCP: SPRING, COMPRESSION, FEATHERING		1		PCP
120	B-6761	GUIDE, SPRING, PLASTIC		1	Y	
150	B-6758	PCP: SLEEVE, PITCH ADJUST - UNIT		1		PCP
-160	C-6759	• PCP: SLEEVE, REVERSE ADJUST ONLY AVAILABLE AS PART OF ITEM 150		1		PCP
-170	A-441	• BUSHING, SLEEVE		1		
200	B-474	NUT, 1 1/8-12, HEX, SELF-LOCKING		1	Y	
-205	C-497	PISTON UNIT		1		
210	C-492	• PISTON		1		
215	B-493	• RING, PISTON, START LOCK		1		
216	B-3842-0250	• SPRING PIN, 3/32", CRES		1	Y	
220	C-3317-217	O-RING (PISTON ID)		1	Y	
230	B-1843	SEAL, DUST, PISTON		1	Y	
240	C-3317-426-2	O-RING (PISTON OD)		1	Y	
250	106004	ROD, ANTI-ROTATION		2		
260	B-6068	SPACER, ANTI-ROTATION ROD		2	Y	
270	103872	PCP: ROD, PITCH CHANGE		1		PCP
280	C-3317-251	O-RING (CYLINDER MOUNTING)		1	Y	
290	C-3317-213-2	O-RING (CYLINDER-SIDE BUSHING ID)		1	Y	

EFF CODE	INFORMATION

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
		5D3-NK366A1Y, CONTINUED				
10-5		**PROPELLER PARTS,**				
295	107955	PCP:HUB ASSEMBLY, 5D3( )-NK366A( ) (REFER TO "107955 HUB ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
420	C-3317-211-2	O-RING, ENGINE-SIDE BUSHING ID		1	Y	
430	A-2432	BOLT, 3/8-2, HEX HEAD		10		
440	B-3834-0632	WASHER		10	Y	
450	B-3834-0632	WASHER		10	Y	
460	A-2043-1	NUT, 3/8-24, HEX, SELF-LOCKING		10	Y	
470	A-279	FITTING, LUBRICATION		5	Y	
470A	C-6349	FITTING, LUBRICATION, 45° (ENGINE-SIDE OF HUB) ALTERNATE FOR ITEM 470		5	Y	
471	106545	PLUG, LUBRICATION (CYLINDER-SIDE OF HUB)		5	Y	
480	B-6544	CAP, FITTING, LUBRICATION (USED WITH ITEM 470)		5	Y	
500	106066	FORK, FIVE BLADE		1		
510	106067	PLATE, FORK, FIVE BLADE		1		
520	B-6605-LB8P	SCREW, 8-32, CAP		10	Y	
10-5		**PROPELLER MOUNTING PARTS**				
1230	C-3317-230	O-RING (FLANGE)		1	Y	
1240	A-2048-2	WASHER, MOUNTING, 9/16 INCH CSK		8	Y	
1250	107957	NUT, MOUNTING, CRES, 9/16-18, 12-POINT	A	8	Y	
1250A	107585	NUT, MOUNTING, 9/16-18, 12 POINT ALTERNATE FOR ITEM 1250	A	8	Y	
10-6		**BETA SYSTEM PARTS**				
530	B-3839-5	PCP: NUT, HEX, THIN, DRILLED		6	Y	PCP
540	B-457	SLEEVE, BETA, THREADED		3		
550	101649	ROD, BETA		3		
560	A-3623	RING, BACKUP		6	Y	
570	C-3317-011	O-RING (RETAINER)		3	Y	
580	A-466	SLEEVE, GUIDE, SPRING		3	Y	
590	B-458	SPRING, COMPRESSION, BETA		3	Y	
600	A-2411-1	WASHER		3	Y	
610	B-3839-5	PCP: NUT, HEX, THIN, DRILLED		6	Y	PCP
615	101382-1	SPACER		3		
620	107495	BETA RING		1		
850	A-3044	BETA FEEDBACK BLOCK ASSEMBLY (REFER TO "A-3044 BETA FEEDBACK BLOCK ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		

EFF CODE	INFORMATION
A	DO NOT MIX 107957 NUTS AND 107585 NUTS ON THE SAME PROPELLER

' - ITEM NOT ILLUSTRATED

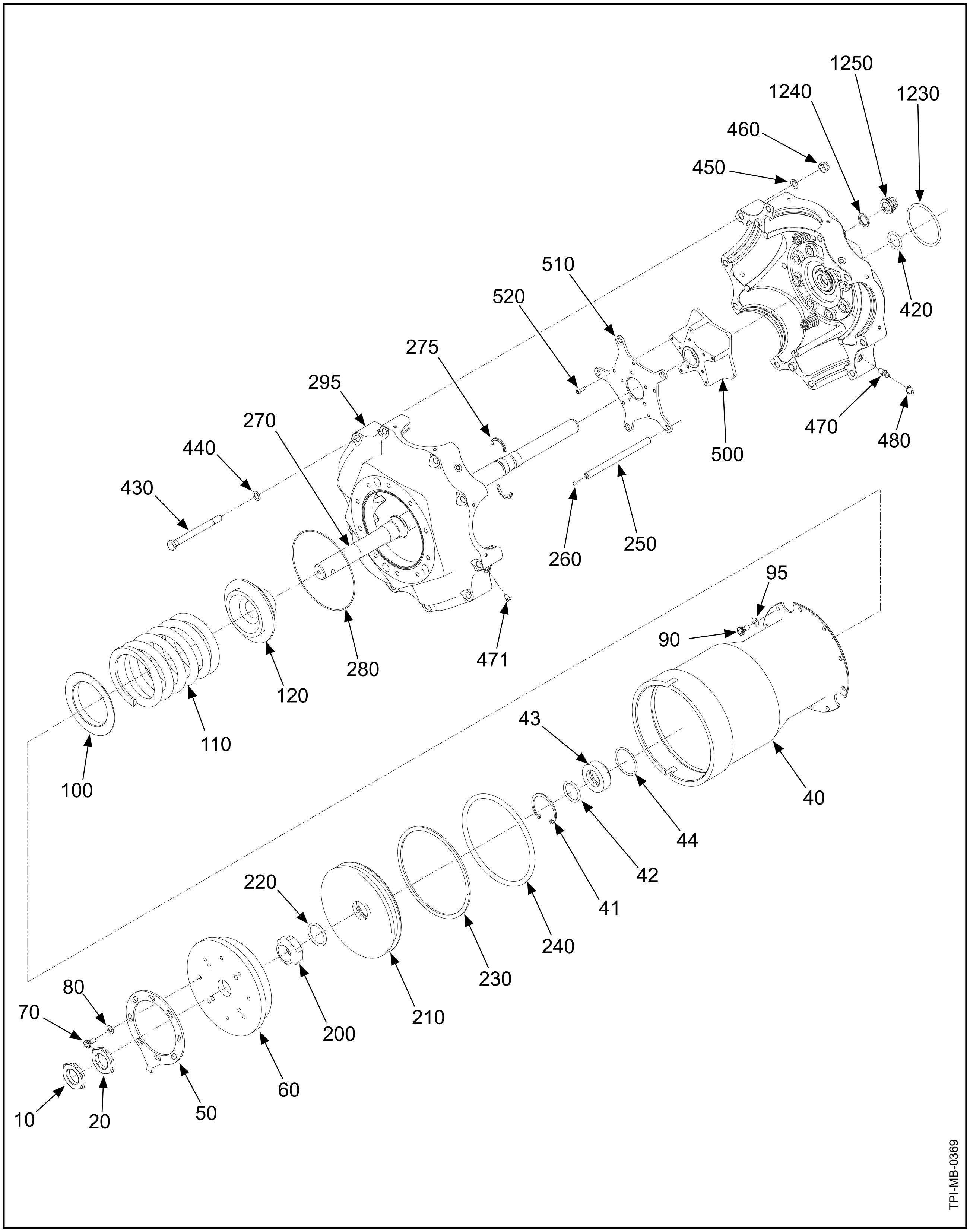
5D3-NK366A1Y, continued

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
		5D3-NK366A1Y, CONTINUED				
10A-1		**BLADE RETENTION PARTS**				
		(REFER TO "BLADE RETENTION PARTS" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		BALANCE PARTS				
-1210	B-3840-( )	SCREW, 10-32, FILLISTER HEAD		AR	Y	
-1220	A-2424( )	BALANCE WEIGHT		AR		
		COUNTERWEIGHTS/MOUNTING BOLTS				
		COUNTERWEIGHT APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER INC. APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION				PCP
		COUNTERWEIGHT MOUNTING BOLTS REFER TO THE APPLICABLE HARTZELL PROPELLER INC. BLADE MAINTENANCE MANUAL: MANUAL 135F (61-13-35) - COMPOSITE BLADES MANUAL 133C (61-13-33) - ALUMINUM BLADES				
		COUNTERWEIGHT SLUGS/MOUNTING HARDWARE				
		COUNTERWEIGHT SLUGS AND SLUG MTG. HARDWARE APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER INC. APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION				
		SPINNER PARTS				
		APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER INC. APPLICATION GUIDE MANUAL 159 (61-02-59) AND THE APPLICABLE HARTZELL PROPELLER INC. SPINNER MAINTENANCE MANUAL: MANUAL 127 (61-16-27) - METAL SPINNER ASSEMBLIES MANUAL 148 (61-16-48) - COMPOSITE SPINNER ASSEMBLIES				

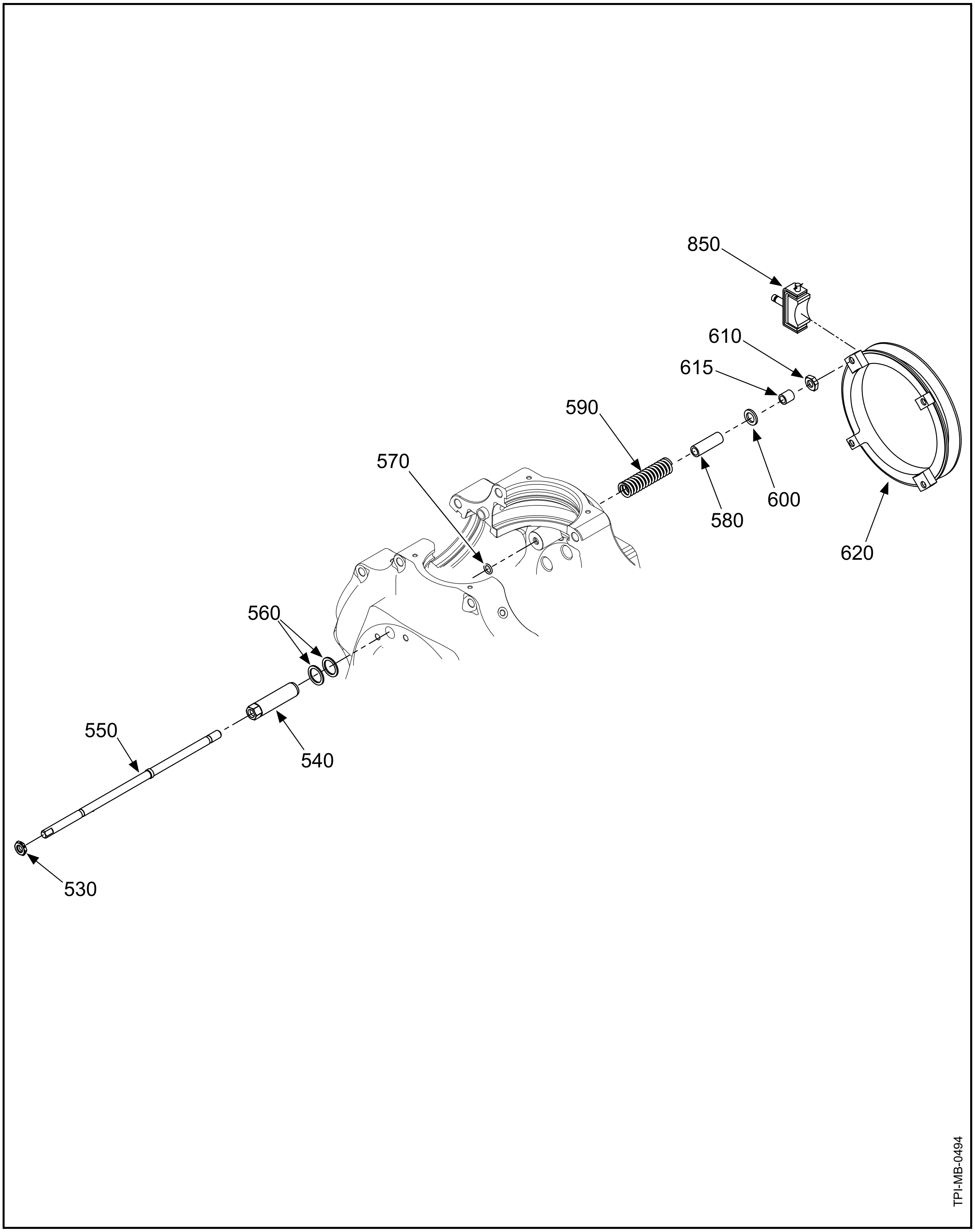
EFF CODE INFORMATION

- ITEM NOT ILLUSTRATED

5D3-NK366A1Y, continued



5D3-NK366B1: Propeller Parts
Figure 10-7



5D3-NK366B1: Beta System Parts
Figure 10-8

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
		5D3-NK366B1				
10-7		**PROPELLER PARTS**				
10	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
20	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
40	107650	• PCP: CYLINDER		1		PCP
41	B-6629-175PP	• RING, RETAINING, INTERNAL		1	Y	
42	C-3317-215-2	• O-RING (CYLINDER BUSHING ID)		1	Y	
43	108298	• BUSHING, CYLINDER		1		
44	C-3317-129	• O-RING (CYLINDER BUSHING OD)		1	Y	
50	106897	• PLATE, ANTI-ROTATION		1		
60	106893	• PCP: PLATE, STOP, PITCH		1		PCP
70	B-3384-2H	• BOLT, 1/4-28, HEX HEAD		4	Y	
80	B-3837-0432	• WASHER, CORROSION RESISTANT		4	Y	
90	B-3384-2H	• BOLT, 1/4-28, HEX HEAD		10	Y	
95	B-3837-0432	• WASHER, CORROSION RESISTANT		10	Y	
100	101558	• SPRING SEAT		1		
110	102224	• PCP: SPRING, COMPRESSION, FEATHERING		1		PCP
120	101556	• PCP: SPRING RETAINER, FLANGED		1		PCP
200	B-474	• NUT, 1 1/8-12, HEX, SELF-LOCKING		1	Y	
210	107651	• PISTON		1		
220	C-3317-217	• O-RING (PISTON ID)		1	Y	
230	B-5132-431	• SEAL, DUST, PISTON		1	Y	
240	C-3317-431-2	• O-RING (PISTON OD)		1	Y	
250	106004	• ROD, ANTI-ROTATION		2		
260	B-6068	• SPACER, ANTI-ROTATION ROD		2	Y	
270	106212	• PCP: ROD, PITCH CHANGE		1		PCP
275	A-3687	• KEEPER, SPLIT		1	Y	
280	C-3317-050	• O-RING (CYLINDER MOUNTING)		1	Y	
295	107965	• PCP: HUB ASSEMBLY, 5D3( )-NK366( ) (REFER TO "107965 HUB ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
420	C-3317-212-2	• O-RING (HUB BUSHING ID)		1	Y	
430	A-2432	• BOLT, 3/8-2, HEX HEAD		10		
440	B-3834-0632	• WASHER		10	Y	
450	B-3834-0632	• WASHER		10	Y	
460	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		10	Y	

EFF CODE INFORMATION

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
		5D3-NK366B1, CONTINUED				
10-7		**PROPELLER PARTS, CONTINUED**				
470	A-279	• FITTING, LUBRICATION (ENGINE-SIDE OF HUB)		5	Y	
471	106545	• PLUG, LUBRICATION (CYLINDER-SIDE OF HUB)		5	Y	
480	B-6544	• CAP, FITTING, LUBRICATION USED WITH ITEM 470		5	Y	
500	107361	• FORK, FIVE BLADE		1		
510	106067	• PLATE, FORK, FIVE BLADE		1		
520	B-6605-LB8P	• SCREW, 8-32, CAP		10	Y	
10-7		**PROPELLER MOUNTING PARTS**				
1230	C-3317-230	• O-RING (FLANGE)		1	Y	
1240	A-2048-2	• WASHER, MOUNTING, 9/16 INCH CSK		8	Y	
1250	107957	• NUT, MOUNTING, CRES, 9/16-18, 12 POINT	A	8	Y	
1250A	107585	• NUT, MOUNTING, 9/16-18, 12 POINT ALTERNATE FOR ITEM 1250	A	8	Y	
10-8		**BETA SYSTEM PARTS**				
530	B-3898-5	• NUT, HEX, THIN, DRILLED		3	Y	
540	B-457	• SLEEVE, BETA, THREADED		3		
550	101649	• ROD, BETA		3		
560	A-3623	• RING, BACKUP		6	Y	
570	C-3317-011	• O-RING (RETAINER)		3	Y	
580	A-466-1	• SLEEVE, GUIDE, SPRING		3	Y	
590	B-458	• SPRING, COMPRESSION, BETA		3	Y	
600	A-2411-1	• WASHER		3	Y	
610	B-3898-5	• NUT, HEX, THIN, DRILLED		3	Y	
615	101382-1	• SPACER		3		
620	107495	• PCP: RING, BETA		1		PCP
850	A-3044	• BETA FEEDBACK BLOCK ASSEMBLY (REFER TO "A-3044 BETA FEEDBACK BLOCK ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
10A-1		**BLADE RETENTION PARTS** (REFER TO "BLADE RETENTION PARTS" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		BALANCE PARTS				
-1210	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		AR	Y	
-1220	A-2424( )	• BALANCE WEIGHT		AR		

EFF CODE	INFORMATION
A	DO NOT MIX 107957 NUTS AND 107585 NUTS ON THE SAME PROPELLER

- ITEM NOT ILLUSTRATED

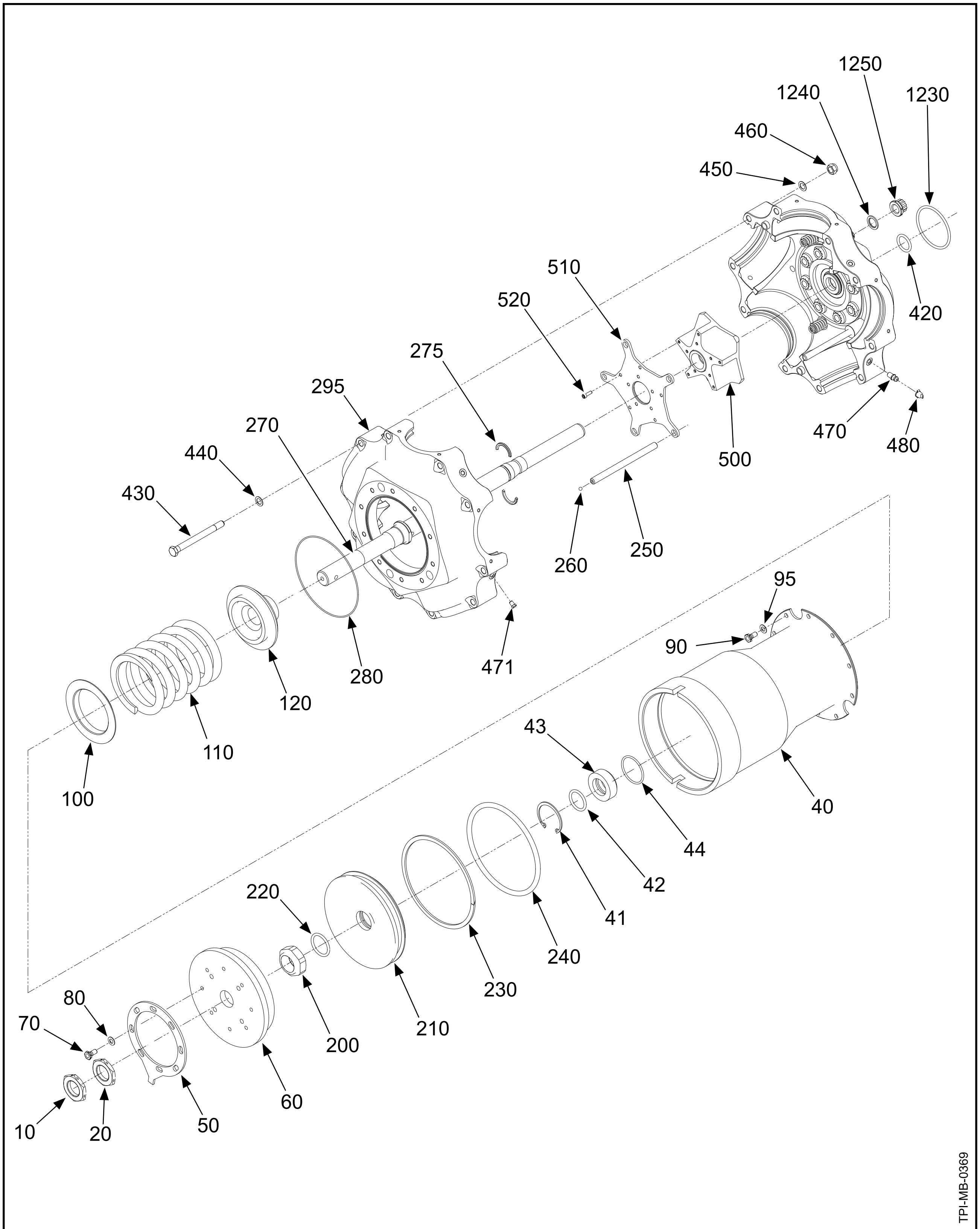
5D3-NK366B1, continued

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
		5D3-NK366B1, CONTINUED				
		COUNTERWEIGHTS/MOUNTING BOLTS				
		• COUNTERWEIGHT APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER INC. APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION				PCP
		• COUNTERWEIGHT MOUNTING BOLTS REFER TO THE APPLICABLE HARTZELL PROPELLER INC. BLADE MAINTENANCE MANUAL: MANUAL 135F (61-13-35) - COMPOSITE BLADES MANUAL 133C (61-13-33) - ALUMINUM BLADES				
		COUNTERWEIGHT SLUGS/MOUNTING HARDWARE				
		• COUNTERWEIGHT SLUGS AND SLUG MTG. HARDWARE APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER INC. 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 INC. APPLICATION GUIDE MANUAL 159 (61-02-59) AND THE APPLICABLE HARTZELL PROPELLER INC. SPINNER MAINTENANCE MANUAL: MANUAL 127 (61-16-27) - METAL SPINNER ASSEMBLIES MANUAL 148 (61-16-48) - COMPOSITE SPINNER ASSEMBLIES				

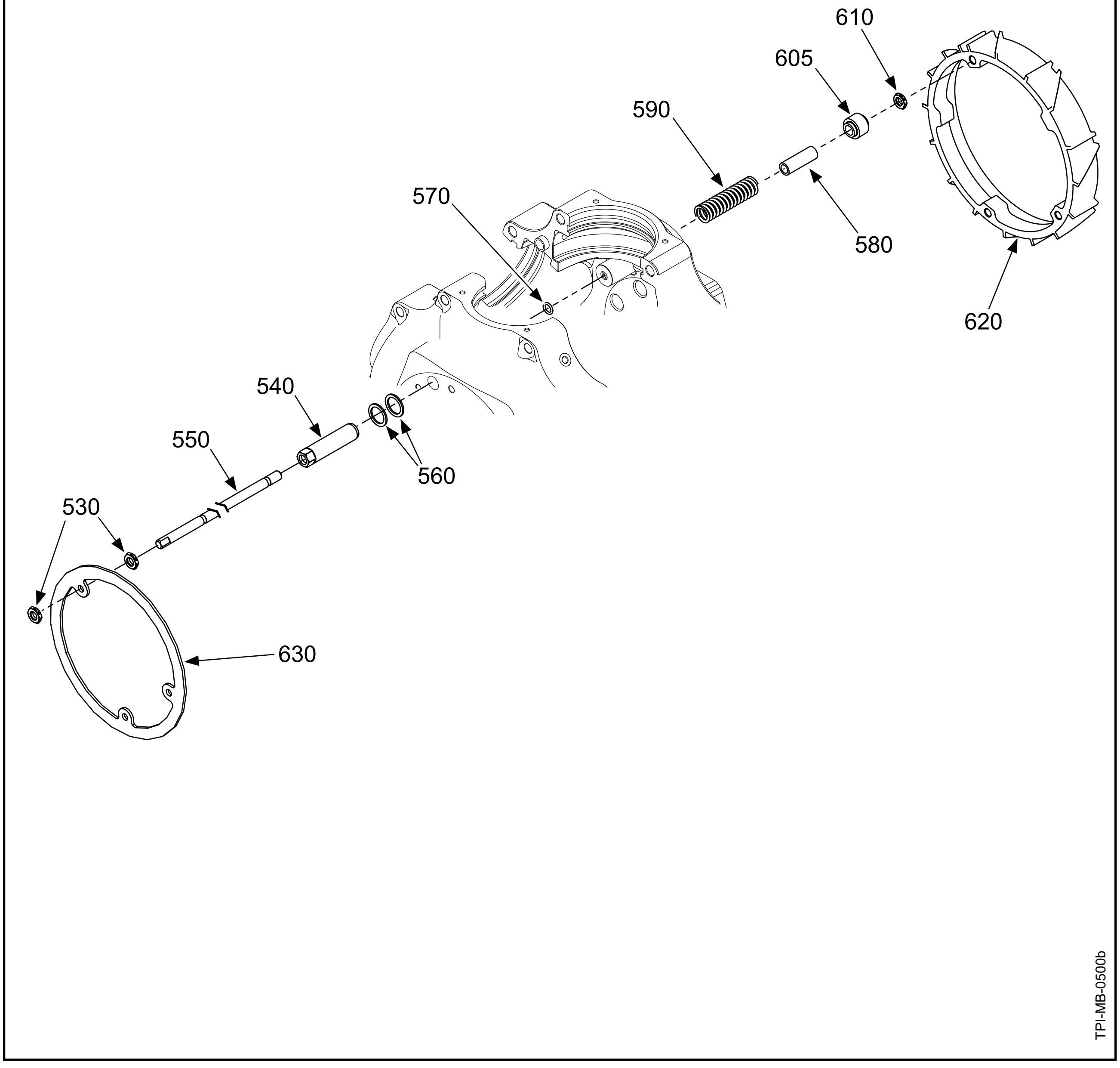
EFF CODE INFORMATION

- ITEM NOT ILLUSTRATED

5D3-NK366B1, continued



5D31-NK366B1: Propeller Parts
Figure 10-9



5D31-NK366B1: Beta System Parts
Figure 10-10

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
		5D31-NK366B1				
10-9		**PROPELLER PARTS**				
10	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
20	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
40	107650	• PCP: CYLINDER		1		PCP
41	B-6629-175PP	• RING, RETAINING, INTERNAL		1	Y	
42	C-3317-215-2	• O-RING (CYLINDER BUSHING ID)		1	Y	
43	A-3784	• BUSHING, CYLINDER REPLACED BY ITEM 43A		1		
43A	108298	• BUSHING, CYLINDER REPLACES ITEM 43, POST HC-SB-61-392		1		
44	C-3317-129	• O-RING (CYLINDER BUSHING OD)		1	Y	
50	106897	• PLATE, ANTI-ROTATION		1		
60	106893-1	• PCP: PLATE, STOP, PITCH		1		PCP
60A	106893	• PCP: PLATE, STOP, PITCH ALTERNATE FOR ITEM 60		1		PCP
70	B-3384-2H	• BOLT, 1/4-28, HEX HEAD		4	Y	
80	B-3837-0432	• WASHER, CORROSION RESISTANT		4	Y	
90	B-3384-2H	• BOLT, 1/4-28, HEX HEAD		10	Y	
95	B-3837-0432	• WASHER, CORROSION RESISTANT		10	Y	
100	101558	• SPRING SEAT		1		
110	102224	• PCP: SPRING, COMPRESSION, FEATHERING		1		PCP
120	101556	• PCP: SPRING RETAINER, FLANGED		1		PCP
200	B-474	• NUT, 1 1/8-12, HEX, SELF-LOCKING		1	Y	
210	107651	• PISTON		1		
220	C-3317-217	• O-RING (PISTON ID)		1	Y	
230	B-5132-431	• SEAL, DUST, PISTON		1	Y	
240	C-3317-431-2	• O-RING (PISTON OD)		1	Y	
250	106004	• ROD, ANTI-ROTATION		2		
260	B-6068	• SPACER, ANTI-ROTATION ROD		2	Y	
270	106212	• PCP: ROD, PITCH CHANGE		1		PCP
275	A-3687	• KEEPER, SPLIT		1	Y	
280	C-3317-050	• O-RING (CYLINDER MOUNTING)		1	Y	
295	107965	• PCP: HUB ASSEMBLY, 5D3( )-NK366( ) (REFER TO "107965 HUB ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
420	C-3317-212-2	• O-RING (HUB BUSHING ID)		1	Y	
430	A-2432	• BOLT, 3/8-2, HEX HEAD		10		

EFF CODE	INFORMATION

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
		5D31-NK366B1, CONTINUED				
10-9		**PROPELLER PARTS, CONTINUED**				
440	B-3834-0632	• WASHER		10	Y	
450	B-3834-0632	• WASHER		10	Y	
460	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		10	Y	
470	A-279	• FITTING, LUBRICATION (ENGINE-SIDE OF HUB)	A	5	Y	
471	106545	• PLUG, LUBRICATION (CYLINDER-SIDE OF HUB)	A	5	Y	
480	B-6544	• CAP, FITTING, LUBRICATION USED WITH ITEM 470		5	Y	
500	107361	• FORK, FIVE BLADE		1		
510	106067	• PLATE, FORK, FIVE BLADE		1		
520	B-6605-LB8P	• SCREW, 8-32, CAP		10	Y	
10-9		**PROPELLER MOUNTING PARTS**				
1230	C-3317-230	• O-RING (FLANGE)		1	Y	
1240	A-2048-2	• WASHER, MOUNTING, 9/16 INCH CSK		8	Y	
1250	107957	• NUT, MOUNTING, CRES, 9/16-18, 12 POINT	A	8	Y	
1250A	107585	• NUT, MOUNTING, 9/16-18, 12 POINT ALTERNATE FOR ITEM 1250	A	8	Y	
10-10		**BETA SYSTEM PARTS**				
530	B-3898-5	• NUT, HEX, THIN, DRILLED		3	Y	
540	B-457	• SLEEVE, BETA, THREADED		3		
550	107372	• ROD, BETA		3		
560	A-3623	• RING, BACKUP		6	Y	
570	C-3317-011	• O-RING (RETAINER)		3	Y	
580	A-466-1	• SLEEVE, GUIDE, SPRING REPLACED BY ITEM 580A	B	3	Y	
580A	A-466-1	• SLEEVE, GUIDE, SPRING REPLACES ITEM 580, POST HC-ASB-61-405	C	3	Y	
590	B-458	• SPRING, COMPRESSION, BETA REPLACED BY ITEM 590A		3	Y	
590A	109235	• SPRING, COMPRESSION, BETA REPLACES ITEM 590, POST HC-ASB-61-405		3	Y	
605	107373	• GUIDE, SPRING REPLACED BY ITEM 605A		3		
605A	107373-2	• GUIDE, SPRING REPLACES ITEM 605, POST HC-SB-61-401		3		
610	B-3898-5	• NUT, HEX, THIN, DRILLED		3	Y	
620	108272	• PCP: RING, BETA		1		PCP
630	109438	• RING, SUPPORT, ROD, BETA		1		

EFF CODE	INFORMATION
A	DO NOT MIX 107957 NUTS AND 107585 NUTS ON THE SAME PROPELLER
B	Revision H and prior [OD: 0.461 in. (11.70 mm)]
C	Revision I and later [OD: 0.450 in. (11.43 mm)]

- ITEM NOT ILLUSTRATED

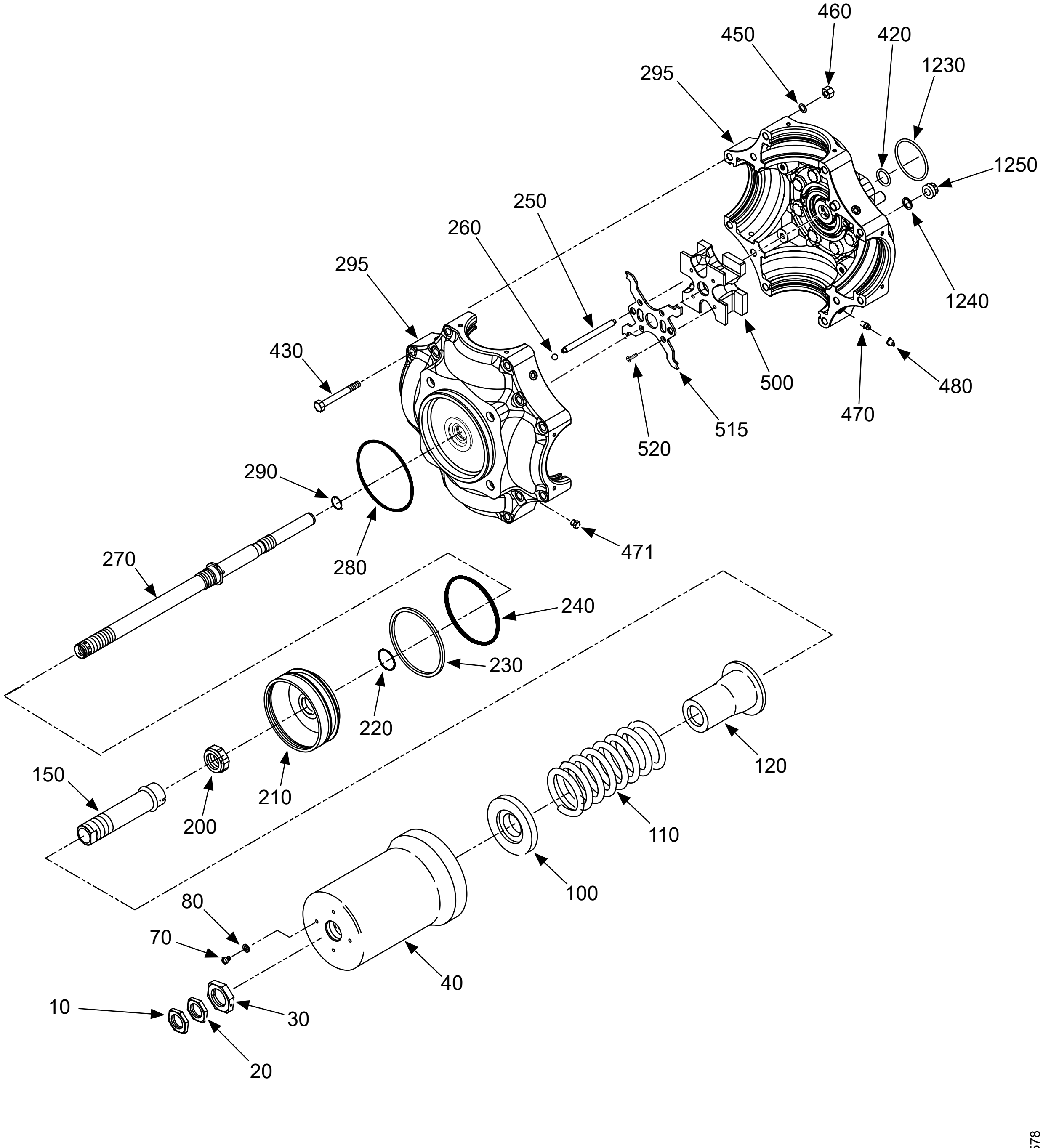
5D31-NK366B1, continued

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
		5D31-NK366B1, CONTINUED				
10A-1		**BLADE RETENTION PARTS** (REFER TO "BLADE RETENTION PARTS" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		BALANCE PARTS				
-1210	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		AR	Y	
-1220	A-2424( )	• BALANCE WEIGHT		AR		
		COUNTERWEIGHTS/MOUNTING BOLTS				
		• COUNTERWEIGHT APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER INC. APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION				PCP
		• COUNTERWEIGHT MOUNTING BOLTS REFER TO THE APPLICABLE HARTZELL PROPELLER INC. BLADE MAINTENANCE MANUAL: MANUAL 135F (61-13-35) - COMPOSITE BLADES MANUAL 133C (61-13-33) - ALUMINUM BLADES				
		COUNTERWEIGHT SLUGS/MOUNTING HARDWARE				
		• COUNTERWEIGHT SLUGS AND SLUG MTG. HARDWARE APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER INC. 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 INC. APPLICATION GUIDE MANUAL 159 (61-02-59) AND THE APPLICABLE HARTZELL PROPELLER INC. SPINNER MAINTENANCE MANUAL: MANUAL 127 (61-16-27) - METAL SPINNER ASSEMBLIES MANUAL 148 (61-16-48) - COMPOSITE SPINNER ASSEMBLIES				

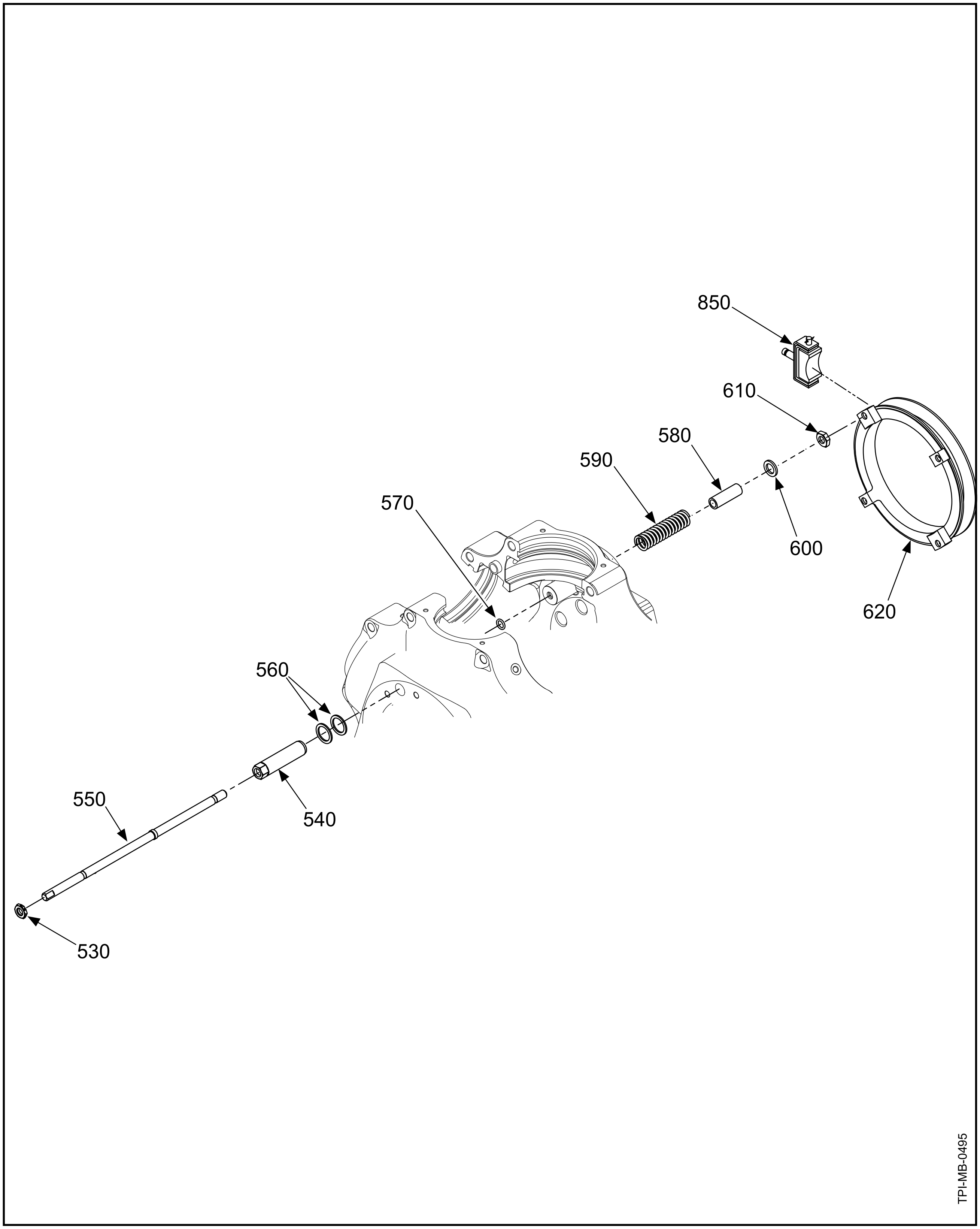
EFF CODE INFORMATION

- ITEM NOT ILLUSTRATED

5D31-NK366B1, continued



4D3-NK338A1: Propeller Parts
Figure 10-11



4D3-NK338A1: Beta System Parts
Figure 10-12

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
		4D3-NK338A1( )				
10-11		**PROPELLER PARTS**				
10	B-3839-16	PCP: NUT, HEX, THIN, DRILLED		1		PCP
20	B-3839-16	PCP: NUT, HEX, THIN, DRILLED		1		PCP
30	B-3375	PCP: NUT, 1 3/8-12, HEX, THIN, DRILLED		1		PCP
40	D-488	PCP: CYLINDER		1		PCP
70	B-3841-5	SCREW, 1/4-28 SCREW, FILLISTER HEAD		1	Y	
80	B-3837-0463	WASHER, CORROSION RESISTANT		1	Y	
100	B-6768	SPRING RETAINER, FOWARD		1		
110	C-6760	PCP: SPRING, COMPRESSION, FEATHERING		1		PCP
120	B-6761	GUIDE, SPRING, PLASTIC		1	Y	
150	B-6758	PCP: SLEEVE, PITCH ADJUST - UNIT		1		PCP
-170	A-441	• BUSHING, SLEEVE		1		
200	B-474	NUT, 1 1/8-12, HEX, SELF-LOCKING		1	Y	
210	C-492	PISTON		1		
220	C-3317-217	O-RING (PISTON ID)		1	Y	
230	B-1843	SEAL, DUST, PISTON		1	Y	
240	C-3317-426-2	O-RING (PISTON OD)		1	Y	
250	B-7370	ROD, ANTI-ROTATION		2		
260	B-6068	SPACER, ROD, ANTI-ROTATION		2	Y	
270	D-6506	PCP: ROD, PITCH CHANGE		1		PCP
280	C-3317-251	O-RING (CYLINDER MOUNTING)		1	Y	
290	C-3317-213-2	O-RING (CYLINDER-SIDE BUSHING ID)		1	Y	
295	109024	PCP:HUB ASSEMBLY, 4D3( )-NK338( ) (REFER TO "109024 HUB ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
420	C-3317-211-2	O-RING, ENGINE-SIDE BUSHING ID		1	Y	
430	A-2432	BOLT, 3/8-2, HEX HEAD		12		
450	B-3834-0632	WASHER		12	Y	
460	A-2043-1	NUT, 3/8-24, HEX, SELF-LOCKING		12	Y	
470	C-6349	FITTING, LUBRICATION, 45° (ENGINE-SIDE OF HUB)		4	Y	
471	106545	PLUG, LUBRICATION (CYLINDER-SIDE OF HUB)		4	Y	
480	B-6544	CAP, FITTING, LUBRICATION (USED WITH ITEM 470)		4	Y	
500	107094	FORK, FOUR BLADE		1		
515	107090	BETA PICKUP		1		
520	B-6521-8	SCREW, 10-32, 100 DEG HEAD		4	Y	

EFF CODE	INFORMATION

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
		4D3-NK338A1( ), CONTINUED				
10-11		**PROPELLER MOUNTING PARTS**				
1230	C-3317-230	O-RING (FLANGE)		1	Y	
1240	A-2048-2	WASHER, MOUNTING, 9/16 INCH CSK		8	Y	
1250	107957	NUT, MOUNTING, CRES, 9/16-18, 12-POINT	A	8	Y	
1250A	107585	NUT, MOUNTING, 9/16-18, 12 POINT ALTERNATE FOR ITEM 1250	A	8	Y	
10-12		**BETA SYSTEM PARTS**				
530	B-3839-5	PCP: NUT, HEX, THIN, DRILLED		8	Y	PCP
540	B-457	SLEEVE, BETA, THREADED		4		
550	C-453	ROD, BETA		4		
560	A-3623	RING, BACKUP		8	Y	
570	C-3317-011	O-RING (RETAINER)		4	Y	
580	A-466	SLEEVE, GUIDE, SPRING		4	Y	
590	B-458	SPRING, COMPRESSION, BETA		4	Y	
600	B-3851-0532	WASHER		4	Y	
610	B-3839-5	PCP: NUT, HEX, THIN, DRILLED		8	Y	PCP
620	C-452	BETA RING		1		
850	A-3044	BETA FEEDBACK BLOCK ASSEMBLY (REFER TO "A-3044 BETA FEEDBACK BLOCK ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
10A-1		**BLADE RETENTION PARTS** (REFER TO "BLADE RETENTION PARTS" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		BALANCE PARTS				
-1210	B-3840-( )	SCREW, 10-32, FILLISTER HEAD		AR	Y	
-1220	A-2424( )	BALANCE WEIGHT		AR		

EFF CODE	INFORMATION
A	DO NOT MIX 107957 NUTS AND 107585 NUTS ON THE SAME PROPELLER

- ITEM NOT ILLUSTRATED

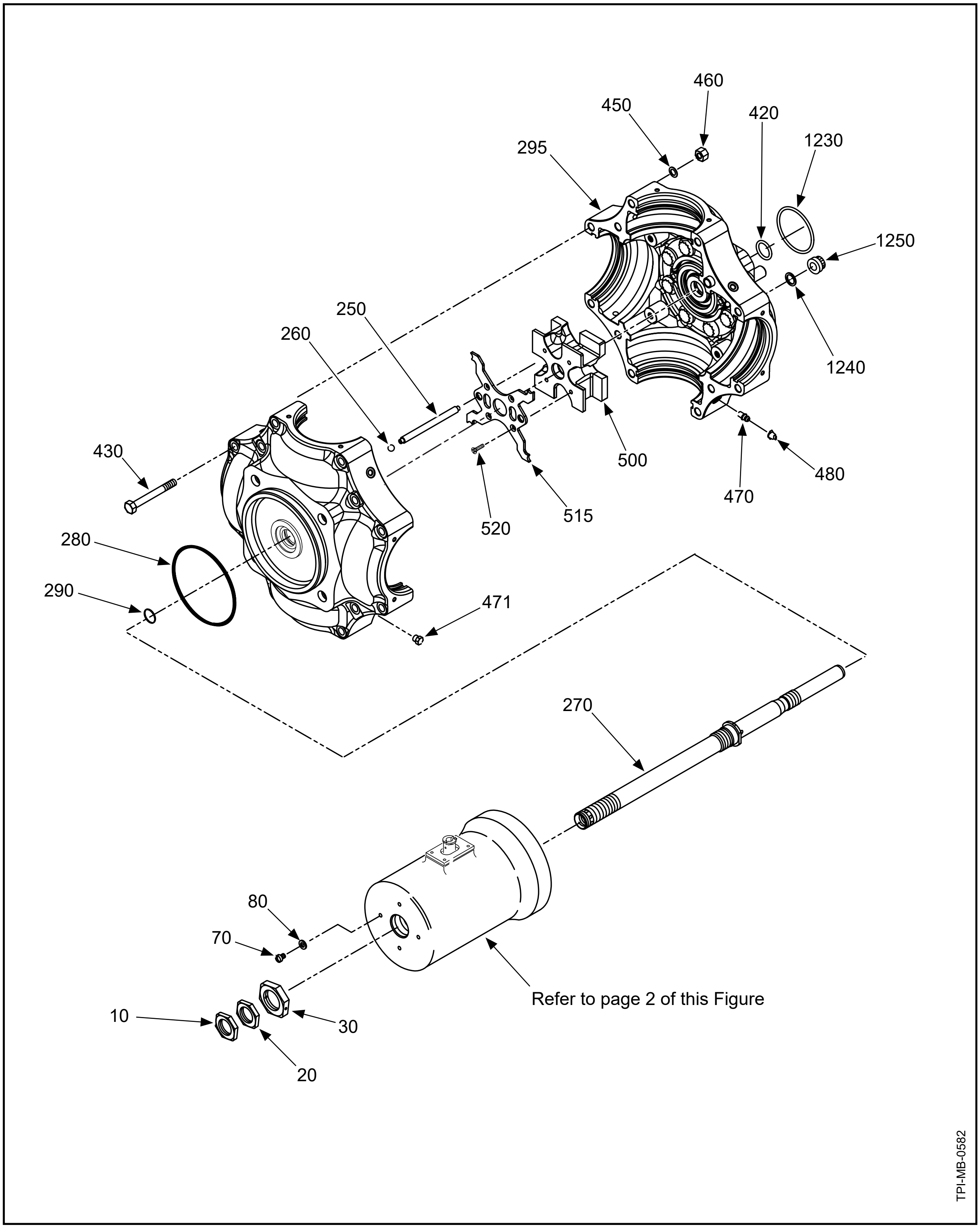
4D3-NK338A1, continued

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
		4D3-NK338A1( ), CONTINUED				
		COUNTERWEIGHTS/MOUNTING BOLTS				
		• COUNTERWEIGHT APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER INC. APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION				PCP
		• COUNTERWEIGHT MOUNTING BOLTS REFER TO THE APPLICABLE HARTZELL PROPELLER INC. BLADE MAINTENANCE MANUAL: MANUAL 135F (61-13-35) - COMPOSITE BLADES MANUAL 133C (61-13-33) - ALUMINUM BLADES				
		COUNTERWEIGHT SLUGS/MOUNTING HARDWARE				
		• COUNTERWEIGHT SLUGS AND SLUG MTG. HARDWARE APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER INC. 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 INC. APPLICATION GUIDE MANUAL 159 (61-02-59) AND THE APPLICABLE HARTZELL PROPELLER INC. SPINNER MAINTENANCE MANUAL: MANUAL 127 (61-16-27) - METAL SPINNER ASSEMBLIES MANUAL 148 (61-16-48) - COMPOSITE SPINNER ASSEMBLIES				

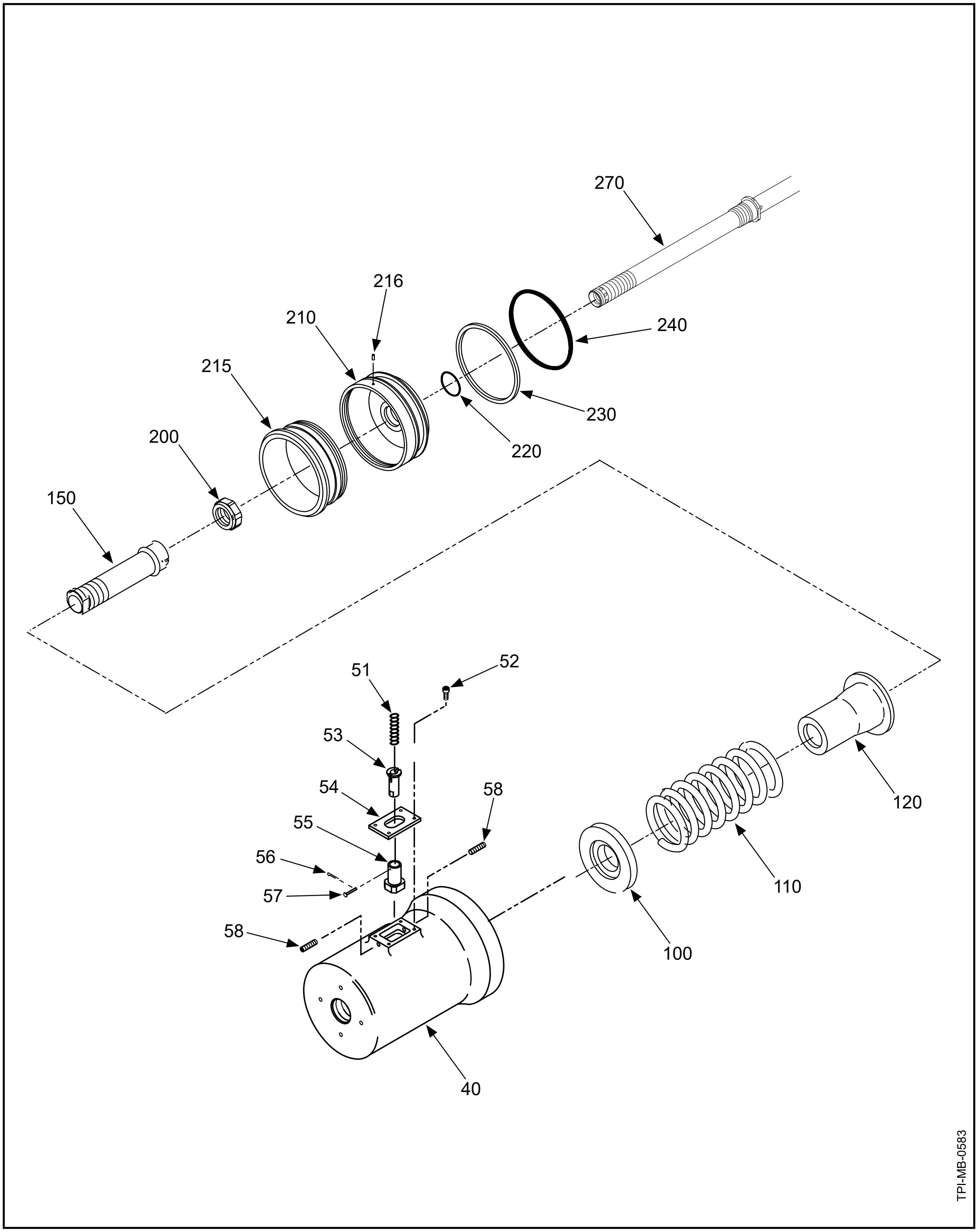
EFF CODE	INFORMATION

- ITEM NOT ILLUSTRATED

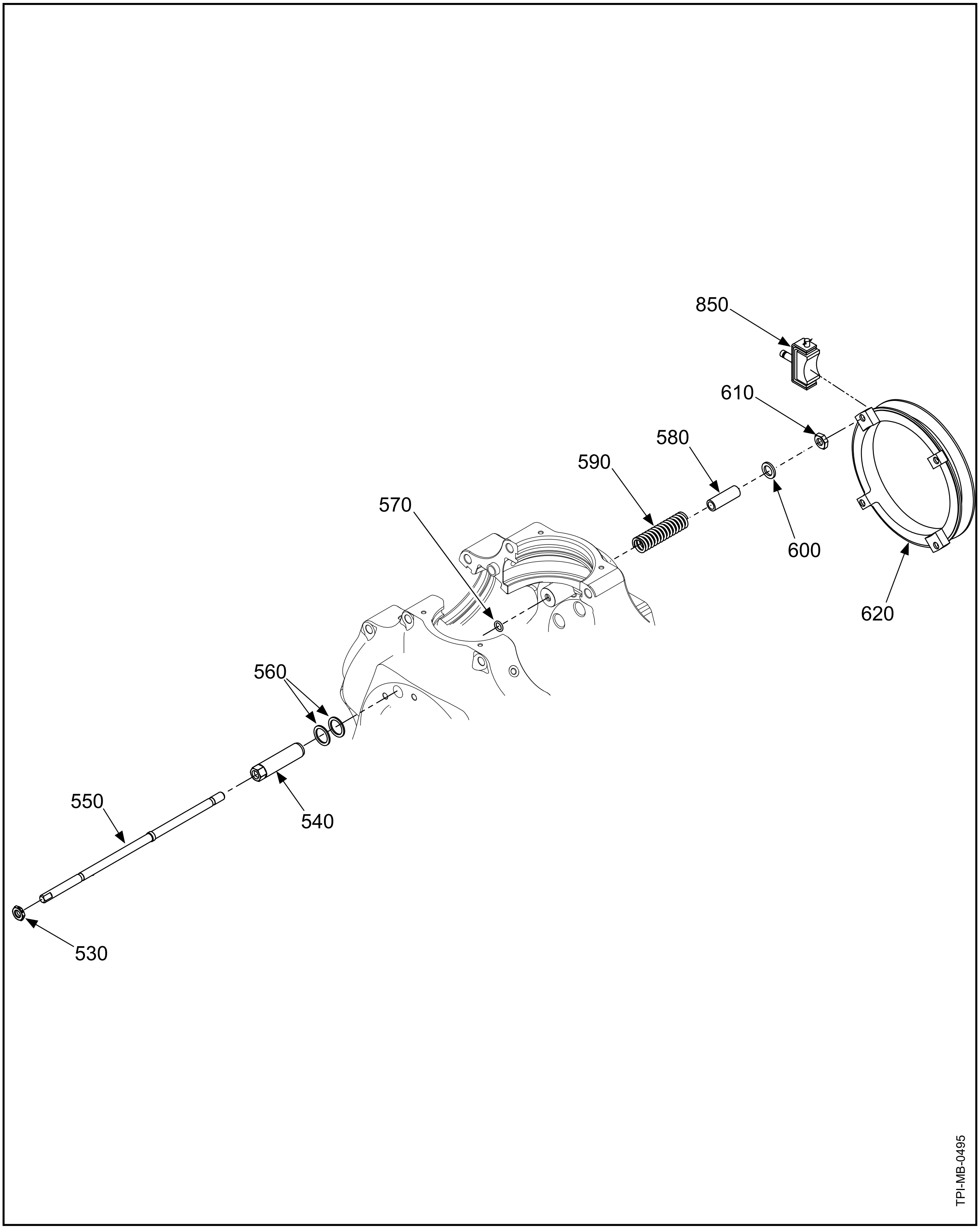
4D3-NK338A1, continued



4D3-NK338A1Y: Propeller Parts
Figure 10-13, page 1 of 2



4D3-NK338A1Y: Propeller Parts
Figure 10-13, page 2 of 2



4D3-NK338A1Y: Beta System Parts
Figure 10-14

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
		4D3-NK338A1Y				
10-13		**PROPELLER PARTS**				
10	B-3839-16	PCP: NUT, HEX, THIN, DRILLED		1		PCP
20	B-3839-16	PCP: NUT, HEX, THIN, DRILLED		1		PCP
30	B-3375	PCP: NUT, 1 3/8-12, HEX, THIN, DRILLED		1		PCP
40	D-484	PCP: CYLINDER		1		PCP
51	B-658	SPRING, COMPRESSION		2	Y	
52	B-3821	SCREW, 10 -32, CAP		8	Y	
53	A-2620-1	PIN, START LOCK		2		
54	B-446	COVER, HOUSING, START LOCK		2		
55	B-444-4	HOUSING, START LOCK		2		
56	B-3838-1	COTTER PIN		2	Y	
57	B-2877	CLEVIS PIN, 3/32		2	Y	
58	B-6639-131	SET SCREW		4	Y	
70	B-3841-5	SCREW, 1/4-28 SCREW, FILLISTER HEAD		1	Y	
80	B-3837-0463	WASHER, CORROSION RESISTANT		1	Y	
100	B-6768	SPRING RETAINER, FOWARD		1		
110	C-6760	PCP: SPRING, COMPRESSION, FEATHERING		1		PCP
120	B-6761	GUIDE, SPRING, PLASTIC		1	Y	
150	B-6758	PCP: SLEEVE, PITCH ADJUST - UNIT		1		PCP
-170	A-441	• BUSHING, SLEEVE		1		
200	B-474	NUT, 1 1/8-12, HEX, SELF-LOCKING		1	Y	
-205	C-497	PISTON UNIT		1		
210	C-492	• PISTON		1		
215	B-493	• RING, PISTON, START LOCK		1		
216	B-3842-0250	• SPRING PIN, 3/32", CRES		1	Y	
220	C-3317-217	O-RING (PISTON ID)		1	Y	
230	B-1843	SEAL, DUST, PISTON		1	Y	
240	C-3317-426-2	O-RING (PISTON OD)		1	Y	
250	B-7370	ROD, ANTI-ROTATION		2		
260	B-6068	SPACER, ROD, ANTI-ROTATION		2	Y	
270	D-6506	PCP: ROD, PITCH CHANGE		1		PCP
280	C-3317-251	O-RING (CYLINDER MOUNTING)		1	Y	
290	C-3317-213-2	O-RING (CYLINDER-SIDE BUSHING ID)		1	Y	

EFF CODE	INFORMATION

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
		4D3-NK338A1Y, CONTINUED				
10-13		**PROPELLER PARTS,**				
295	109024	PCP:HUB ASSEMBLY, 4D3( )-NK338( ) (REFER TO "109024 HUB ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		PCP
420	C-3317-211-2	O-RING, ENGINE-SIDE BUSHING ID		1	Y	
430	A-2432	BOLT, 3/8-2, HEX HEAD		12		
450	B-3834-0632	WASHER		12	Y	
460	A-2043-1	NUT, 3/8-24, HEX, SELF-LOCKING		12	Y	
470	C-6349	FITTING, LUBRICATION, 45° (ENGINE-SIDE OF HUB)		4	Y	
471	106545	PLUG, LUBRICATION (CYLINDER-SIDE OF HUB)		4	Y	
480	B-6544	CAP, FITTING, LUBRICATION (USED WITH ITEM 470)		4	Y	
500	107094	FORK, FOUR BLADE		1		
515	107090	BETA PICKUP		1		
520	B-6521-8	SCREW, 10-32, 100 DEG HEAD		4	Y	
10-13		**PROPELLER MOUNTING PARTS**				
1230	C-3317-230	O-RING (FLANGE)		1	Y	
1240	A-2048-2	WASHER, MOUNTING, 9/16 INCH CSK		8	Y	
1250	107957	NUT, MOUNTING, CRES, 9/16-18, 12-POINT	A	8	Y	
1250A	107585	NUT, MOUNTING, 9/16-18, 12 POINT ALTERNATE FOR ITEM 1250	A	8	Y	
10-4		**BETA SYSTEM PARTS**				
530	B-3839-5	PCP: NUT, HEX, THIN, DRILLED		8	Y	PCP
540	B-457	SLEEVE, BETA, THREADED		4		
550	C-453	ROD, BETA		4		
560	A-3623	RING, BACKUP		8	Y	
570	C-3317-011	O-RING (RETAINER)		4	Y	
580	A-466	SLEEVE, GUIDE, SPRING		4	Y	
590	B-458	SPRING, COMPRESSION, BETA		4	Y	
600	B-3851-0532	WASHER		4	Y	
610	B-3839-5	PCP: NUT, HEX, THIN, DRILLED		8	Y	PCP
620	C-452	BETA RING		1		
850	A-3044	BETA FEEDBACK BLOCK ASSEMBLY (REFER TO "A-3044 BETA FEEDBACK BLOCK ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		

EFF CODE	INFORMATION
A	DO NOT MIX 107957 NUTS AND 107585 NUTS ON THE SAME PROPELLER

- ITEM NOT ILLUSTRATED

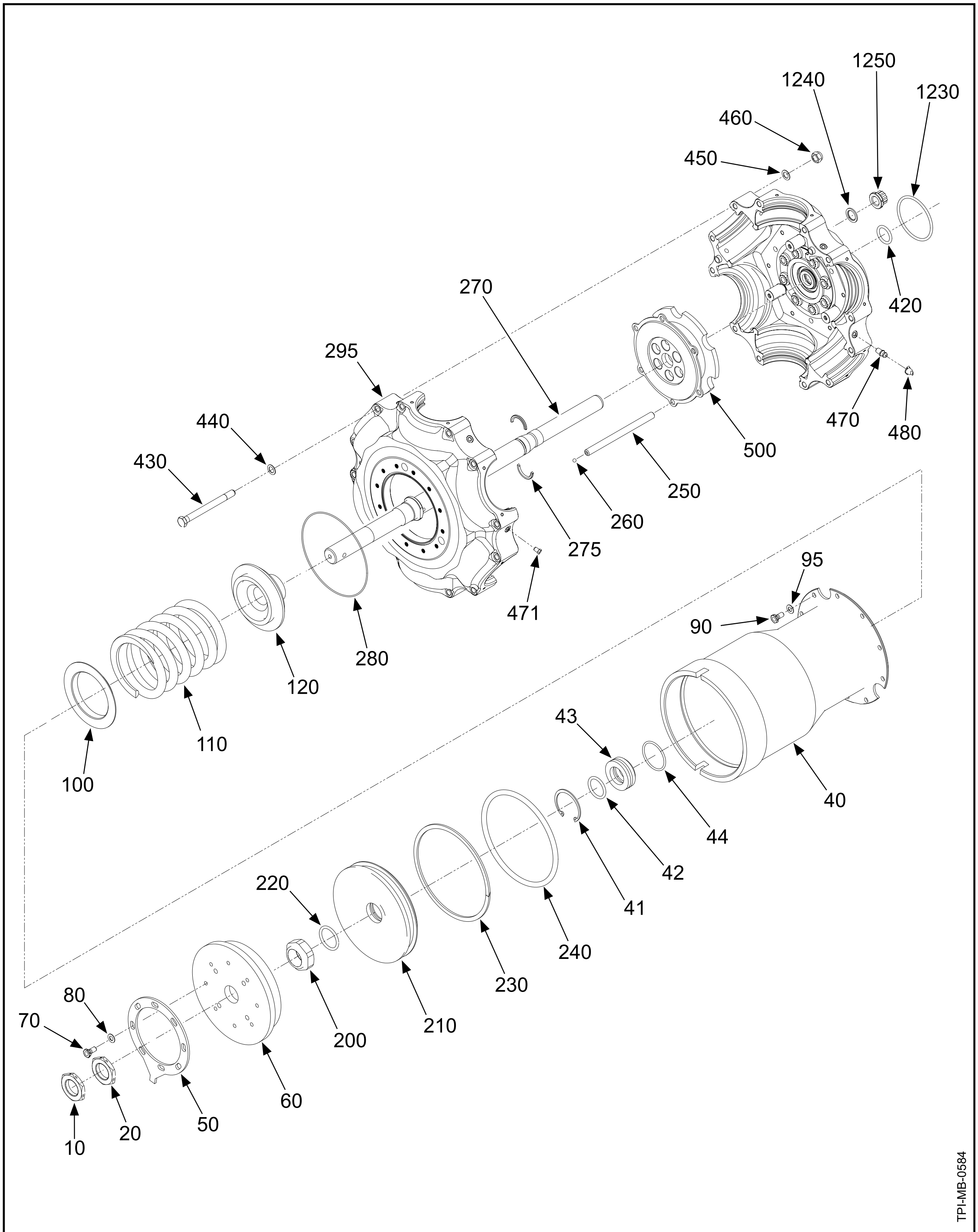
4D3-NK338A1Y, continued

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
		4D3-NK338A1Y, CONTINUED				
10A-1		**BLADE RETENTION PARTS**				
		(REFER TO "BLADE RETENTION PARTS" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		BALANCE PARTS				
-1210	B-3840-( )	SCREW, 10-32, FILLISTER HEAD		AR	Y	
-1220	A-2424( )	BALANCE WEIGHT		AR		
		COUNTERWEIGHTS/MOUNTING BOLTS				
		COUNTERWEIGHT APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER INC. APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION				PCP
		COUNTERWEIGHT MOUNTING BOLTS REFER TO THE APPLICABLE HARTZELL PROPELLER INC. BLADE MAINTENANCE MANUAL: MANUAL 135F (61-13-35) - COMPOSITE BLADES MANUAL 133C (61-13-33) - ALUMINUM BLADES				
		COUNTERWEIGHT SLUGS/MOUNTING HARDWARE				
		COUNTERWEIGHT SLUGS AND SLUG MTG. HARDWARE APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER INC. APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION				
		SPINNER PARTS				
		APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER INC. APPLICATION GUIDE MANUAL 159 (61-02-59) AND THE APPLICABLE HARTZELL PROPELLER INC. SPINNER MAINTENANCE MANUAL: MANUAL 127 (61-16-27) - METAL SPINNER ASSEMBLIES MANUAL 148 (61-16-48) - COMPOSITE SPINNER ASSEMBLIES				

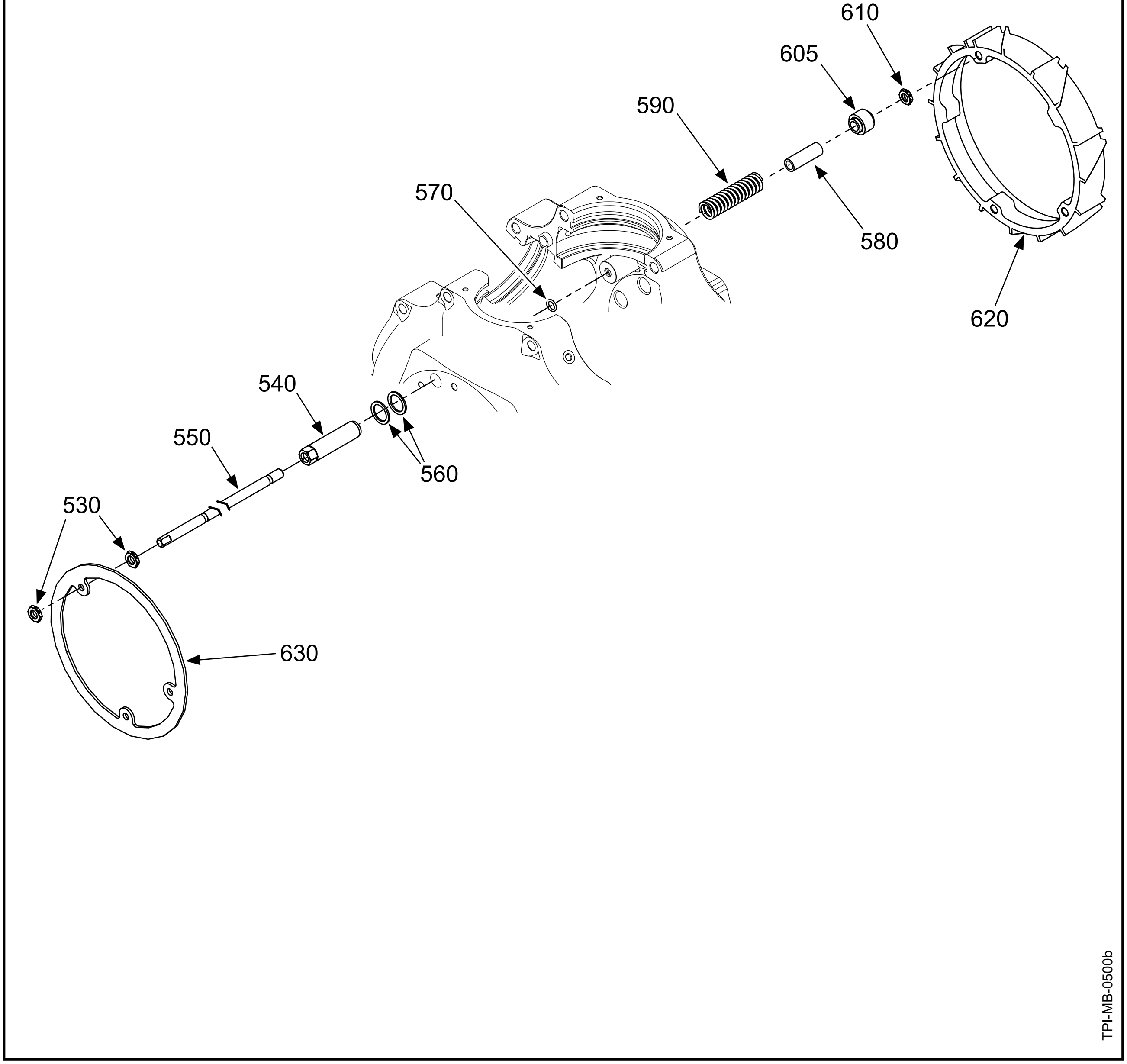
EFF CODE INFORMATION

- ITEM NOT ILLUSTRATED

4D3-NK338A1Y, continued



6D31-NK366B1: Propeller Parts
Figure 10-15



6D31-NK366B1: Beta System Parts
Figure 10-16

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
		6D31-NK366B1				
10-15		**PROPELLER PARTS**				
10	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
20	B-3839-16	• PCP: NUT, HEX, THIN, DRILLED		1		PCP
40	107659	• PCP: CYLINDER		1		PCP
41	B-6629-175PP	• RING, RETAINING, INTERNAL		1	Y	
42	C-3317-215-2	• O-RING (CYLINDER BUSHING ID)		1	Y	
43	108298	• BUSHING, CYLINDER		1		
44	C-3317-129	• O-RING (CYLINDER BUSHING OD)		1	Y	
50	106897	• PLATE, ANTI-ROTATION		1		
60	106893-1	• PLATE, STOP, PITCH		1		
70	B-3384-2H	• BOLT, 1/4-28, HEX HEAD		4	Y	
80	B-3837-0432	• WASHER, CORROSION RESISTANT		4	Y	
90	B-3384-2H	• BOLT, 1/4-28, HEX HEAD		10	Y	
95	B-3837-0432	• WASHER, CORROSION RESISTANT		10	Y	
100	101558	• SPRING SEAT		1		
110	102224	• PCP: SPRING, COMPRESSION, FEATHERING		1		PCP
120	101556	• PCP: SPRING RETAINER, FLANGED		1		PCP
200	B-474	• NUT, 1 1/8-12, HEX, SELF-LOCKING		1	Y	
210	107651	• PISTON		1		
220	C-3317-217	• O-RING (PISTON ID)		1	Y	
230	B-5132-431	• RING, BACKUP		1	Y	
240	C-3317-431-2	• O-RING (PISTON OD)		1	Y	
250	106004	• ROD, ANTI-ROTATION		3		
260	B-6068	• SPACER, ANTI-ROTATION ROD		3	Y	
270	106212	• PCP: ROD, PITCH CHANGE		1		PCP
275	A-3687	• KEEPER, SPLIT		1	Y	
280	C-3317-050	• O-RING (CYLINDER MOUNTING)		1	Y	
295	108234	• PCP: HUB ASSEMBLY, 6D3( )-NK366B1( ) (REFER TO "108234 HUB ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
420	C-3317-212-2	• O-RING (HUB BUSHING ID)		1	Y	
430	A-2432	• BOLT, 3/8-2, HEX HEAD		10		
440	B-3834-0632	• WASHER		10	Y	
450	B-3834-0632	• WASHER		10	Y	
460	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		10	Y	

EFF CODE	INFORMATION

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
		6D31-NK366B1, CONTINUED				
10-15		**PROPELLER PARTS, CONTINUED**				
470	A-279	• FITTING, LUBRICATION (ENGINE-SIDE OF HUB)		5	Y	
471	106545	• PLUG, LUBRICATION (CYLINDER-SIDE OF HUB)		5	Y	
480	B-6544	• CAP, FITTING, LUBRICATION USED WITH ITEM 470		5	Y	
500	108044	• FORK, SIX BLADE		1		
10-15		**PROPELLER MOUNTING PARTS**				
1230	C-3317-230	• O-RING (FLANGE)		1	Y	
1240	A-2048-2	• WASHER, MOUNTING, 9/16 INCH CSK		8	Y	
1250	107957	• NUT, MOUNTING, CRES, 9/16-18, 12 POINT	A	8	Y	
1250A	107585	• NUT, MOUNTING, 9/16-18, 12 POINT ALTERNATE FOR ITEM 1250	A	8	Y	
10-16		**BETA SYSTEM PARTS**				
530	B-3898-5	• NUT, HEX, THIN, DRILLED		3	Y	
540	B-457	• SLEEVE, BETA, THREADED		3		
550	107372	• ROD, BETA		3		
560	A-3623	• RING, BACKUP		6	Y	
570	C-3317-011	• O-RING (RETAINER)		3	Y	
580	A-466	• SLEEVE, GUIDE, SPRING		3	Y	
590	B-458	• SPRING, COMPRESSION, BETA REPLACED BY ITEM 590A		3	Y	
590A	109235	• SPRING, COMPRESSION, BETA REPLACES ITEM 590		3	Y	
605	107373-2	• GUIDE, SPRING		3	Y	
610	B-3898-5	• NUT, HEX, THIN, DRILLED		3	Y	
620	108192	• PCP: RING, BETA		1		PCP
630	109428	• RING, SUPPORT, ROD, BETA		1		
10A-1		**BLADE RETENTION PARTS** (REFER TO "BLADE RETENTION PARTS" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		BALANCE PARTS				
-1210	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		AR	Y	
-1220	A-2424( )	• BALANCE WEIGHT		AR		

EFF CODE	INFORMATION
A	DO NOT MIX 107957 NUTS AND 107585 NUTS ON THE SAME PROPELLER

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
		6D31-NK366B1, CONTINUED				
		COUNTERWEIGHTS/MOUNTING BOLTS				
		• COUNTERWEIGHT APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER INC. APPLICATION GUIDE MANUAL 159 (61-02-59) FOR PART NUMBER AND PROPELLER CRITICAL PART (PCP) IDENTIFICATION				PCP
		• COUNTERWEIGHT MOUNTING BOLTS REFER TO THE APPLICABLE HARTZELL PROPELLER INC. BLADE MAINTENANCE MANUAL: MANUAL 135F (61-13-35) - COMPOSITE BLADES MANUAL 133C (61-13-33) - ALUMINUM BLADES				
		COUNTERWEIGHT SLUGS/MOUNTING HARDWARE				
		• COUNTERWEIGHT SLUGS AND SLUG MTG. HARDWARE APPLICATION SPECIFIC REFER TO HARTZELL PROPELLER INC. 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 INC. APPLICATION GUIDE MANUAL 159 (61-02-59) AND THE APPLICABLE HARTZELL PROPELLER INC. SPINNER MAINTENANCE MANUAL: MANUAL 127 (61-16-27) - METAL SPINNER ASSEMBLIES MANUAL 148 (61-16-48) - COMPOSITE SPINNER ASSEMBLIES				

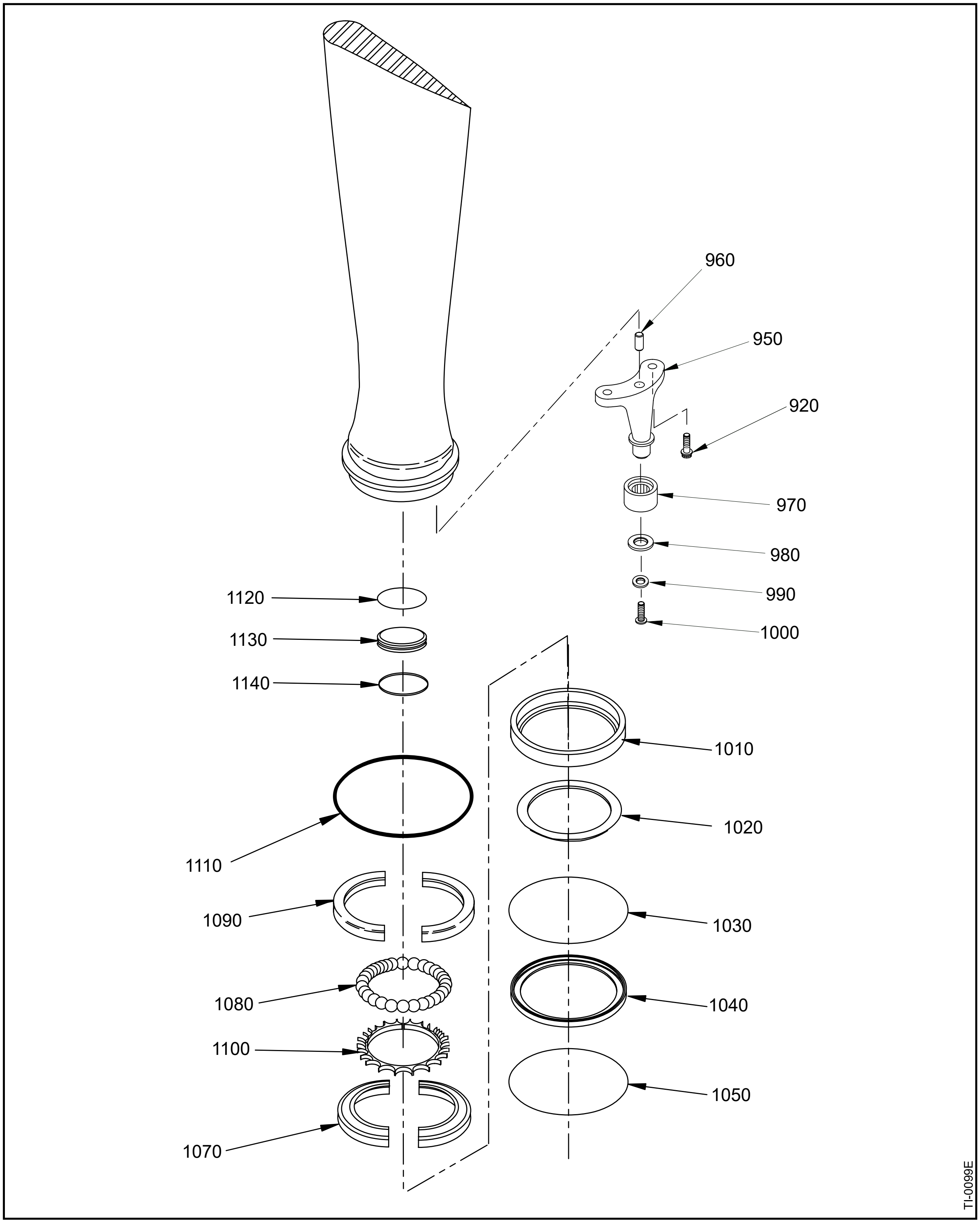
EFF CODE	INFORMATION

- ITEM NOT ILLUSTRATED

6D31-NK366B1, continued

(Blank Page)

SUB-ASSEMBLY
PARTS LISTS and FIGURES



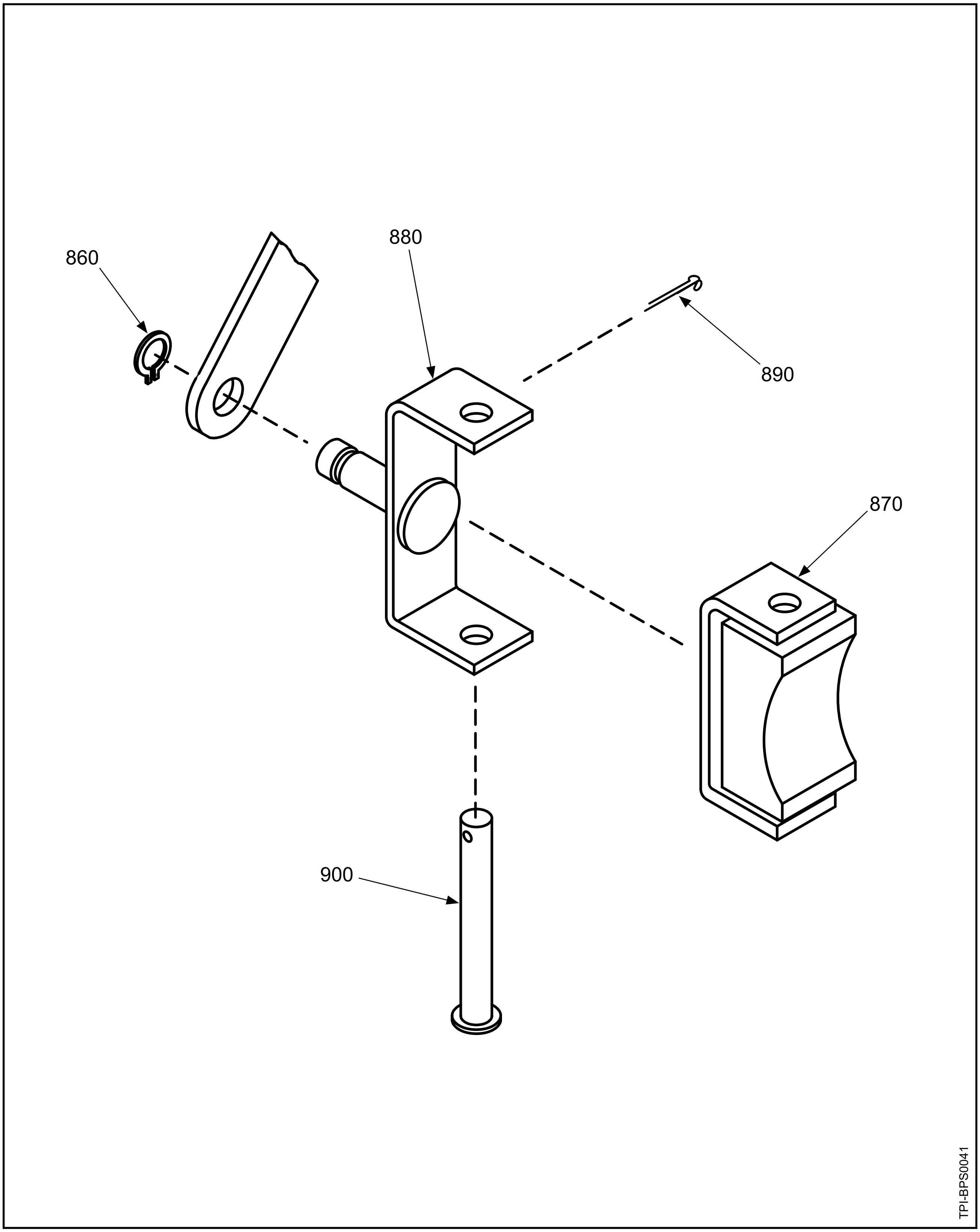
Blade Retention Parts
Figure 10A-1

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-1		**BLADE RETENTION PARTS** **All quantities (UPA) in this parts list are per blade assembly.**				
920	B-3830	TWELVE POINT BOLT		2	Y	
-940	106063-( )	BRACKET, KNOB, PITCH CHANGE - UNIT		1		
950	106061-( )	• BRACKET, KNOB, PITCH CHANGE		1		
960	B-6260	• DOWEL PIN, 3/8 INCH		1		
970	B-6545	• CAM FOLLOWER		1	Y	
980	103395	• KNOB UNIT RETAINING WASHER		1		
990	B-3860-10L	• WASHER, DIMPLED, 100° CRES		1	Y	
1000	B-3867-272	• SCREW, 10-32 100°, HEAD, CRES		1	Y	
1010	101512	RING, RETAINING, BEARING		1		
1020	105758-( )	SHIM, BLADE		AR		
1030	C-3317-246	O-RING (PRE-LOAD BLADE SEAL HOUSING ID)		1	Y	
1040	106117	SEAL, BLADE		1		
1050	C-3317-158	O-RING (PRE-LOAD BLADE SEAL HOUSING OD)		1	Y	
-1060	C-792	BEARING, RETENTION, BLADE		1		
1070	C-792-B	• RACE, BLADE SIDE		1		
1080	B-6144-1	• BALL, BEARING, 3/8 INCH DIA.		33	Y	
1080A	B-6144-1-1500	• BALL, BEARING, 3/8 INCH DIA. (BOX OF 1500)		RF		
1090	C-792-A	• RACE, HUB SIDE		1		
1100	B-793	BALL SPACER		1	Y	
1110	C-3317-340-8	O-RING (BLADE MOUNTING)		1	Y	
1120	C-3317-028	O-RING (BLADE PLUG)		1	Y	
1130	106048	PLUG, BLADE		1		
1140	A-5839-156	RING,RETAINING,INTERNAL SPIRAL (BLADE PLUG)		1	Y	

EFF CODE	INFORMATION

- ITEM NOT ILLUSTRATED

Blade Retention Parts

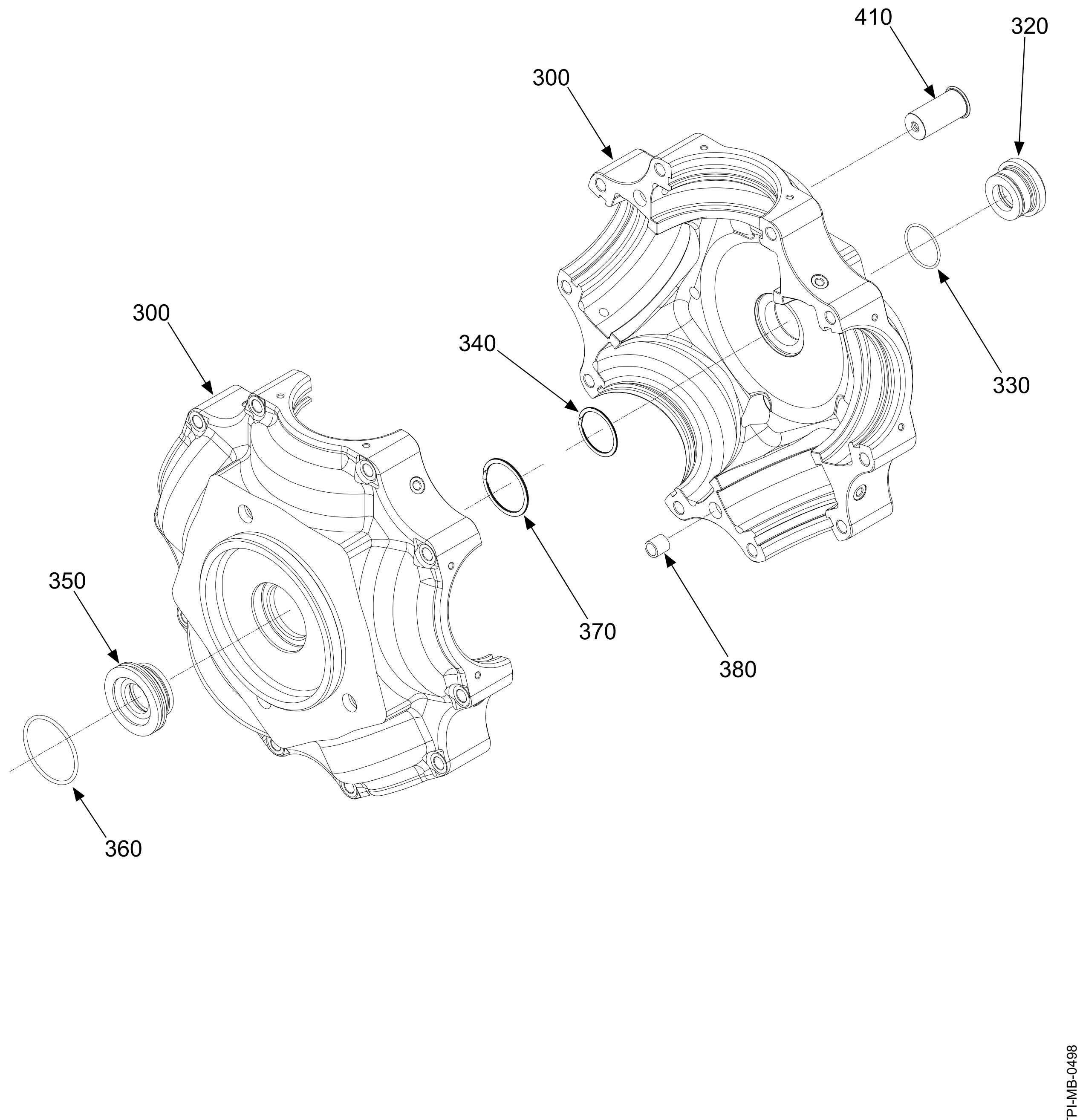


A-3044 Beta Feedback Block Assembly
Figure 10A-2

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-2		**A-3044 BETA FEEDBACK BLOCK ASSEMBLY**				
-850	A-3044	• BETA FEEDBACK BLOCK ASSEMBLY		1		
860	B-3843-25PP	• • SNAP RING, EXTERNAL		1	Y	
870	A-3026	• • CARBON BLOCK - UNIT		1	Y	
880	A-3025	• • YOKE UNIT		1		
890	A-4543	• • COTTER PIN, T HEAD		1	Y	
900	B-3844-53	• • CLEVIS PIN		1	Y	

EFF CODE INFORMATION

- ITEM NOT ILLUSTRATED

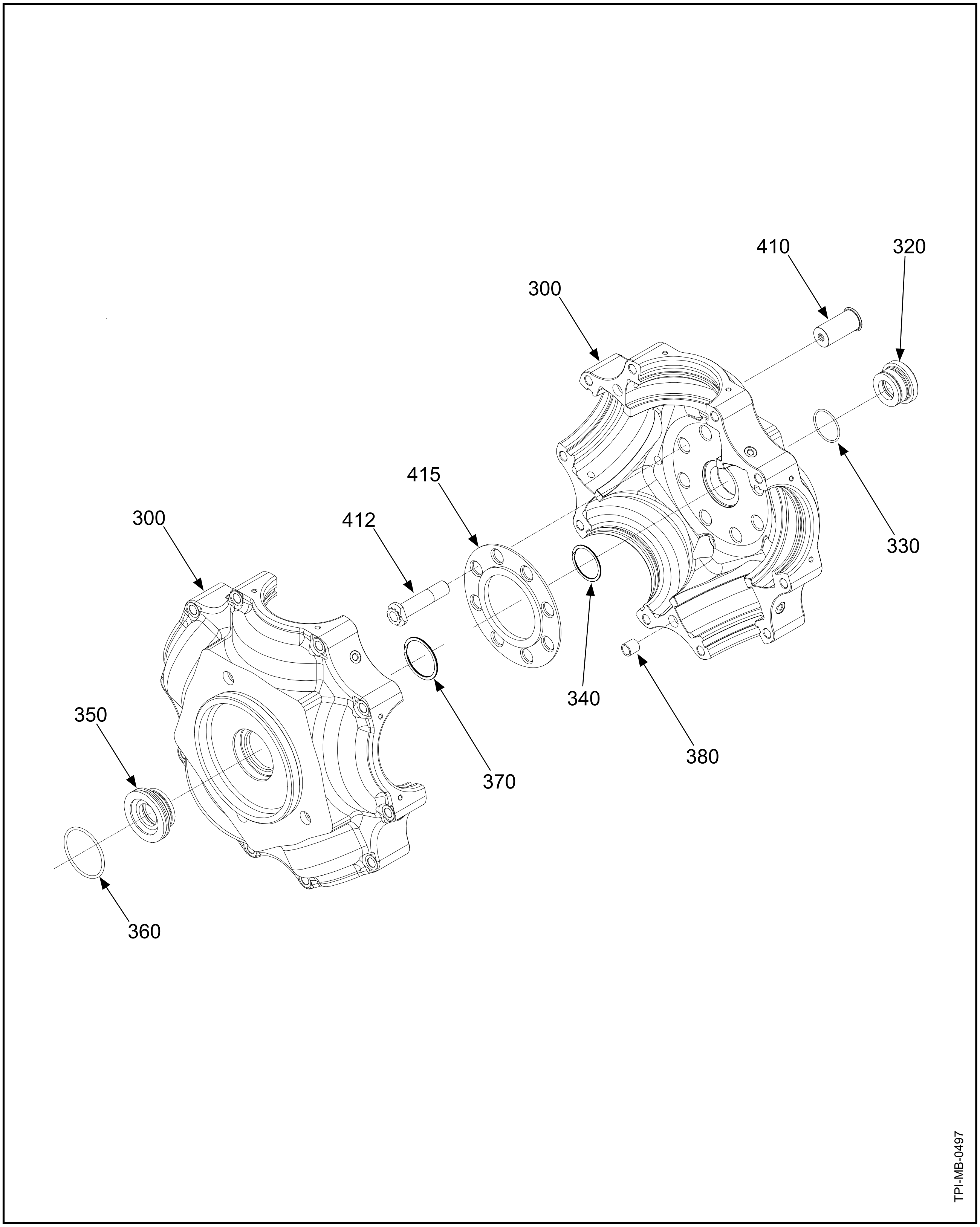


105916 Hub Unit
Figure 10A-3

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-3		**105916 HUB UNIT PARTS**				
300	105916	PCP:HUB UNIT, 5D3-N338( )		1		PCP
320	B-6108	• HUB BUSHING, ROD (ENGINE-SIDE)		1		
330	C-3317-026-2	• O-RING (ENGINE-SIDE BUSHING OD)		1	Y	
340	A-6153-137	• RING, RETAINING, EXTERNAL, SPIRAL (ENGINE-SIDE)		1	Y	
350	B-5952	• HUB BUSHING, ROD (CYLINDER-SIDE)		1		
360	C-3317-135-2	• O-RING (CYLINDER-SIDE BUSHING OD)		1	Y	
370	A-6153-162	• RING, RETAINING, EXTERNAL, SPIRAL (CYLINDER-SIDE)		1	Y	
380	A-2249	• HUB BUSHING, GUIDE		2	Y	
-390	B-6142	• INSERT, 1/4-28, CRES, COILED		10	Y	
-400	B-1243	• INSERT, 9/16-18, CRES, COILED		8	Y	
410	B-454	• SPRING RETAINER, BETA		3		

EFF CODE INFORMATION

- ITEM NOT ILLUSTRATED



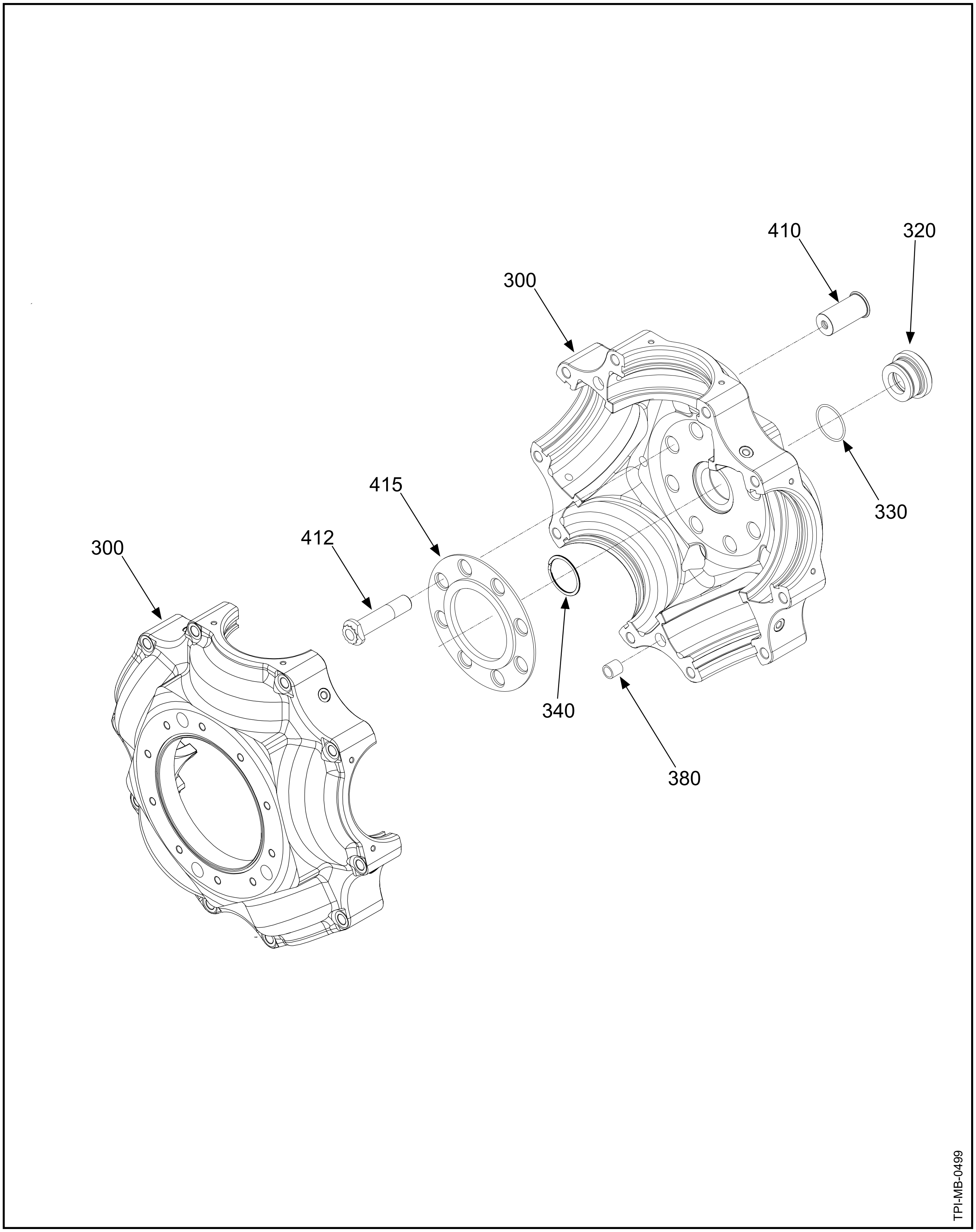
107955 Hub Assembly
Figure 10A-4

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-4		**107955 HUB ASSEMBLY PARTS**				
-295	107955	PCP:HUB ASSEMBLY, 5D3( )-NK366A( )		1		PCP
300	107953	• PCP: HUB UNIT, 5D3( )-(N,I)K366A( )				
320	B-6108	• • HUB BUSHING, ROD (ENGINE-SIDE)		1		
330	C-3317-026-2	• • O-RING (ENGINE-SIDE BUSHING OD)		1	Y	
340	A-6153-137	• • RING, RETAINING, EXTERNAL, SPIRAL (ENGINE-SIDE)		1	Y	
350	B-5952	• • HUB BUSHING, ROD (CYLINDER-SIDE)		1		
360	C-3317-135-2	• • O-RING (CYLINDER-SIDE BUSHING OD)		1	Y	
370	A-6153-162	• • RING, RETAINING, EXTERNAL, SPIRAL (CYLINDER-SIDE)		1	Y	
380	A-2249	• • HUB BUSHING, GUIDE		2	Y	
-390	B-6142	• • INSERT, 1/4-28, CRES, COILED		10	Y	
410	B-454	• • SPRING RETAINER, BETA		3		
412	103560	• BOLT, MOUNTING, 9/16-18, FLANGED		8	Y	
415	107954	• RING, MOUNTING BOLT		1		

EFF CODE INFORMATION

- ITEM NOT ILLUSTRATED

107955 Hub Assembly



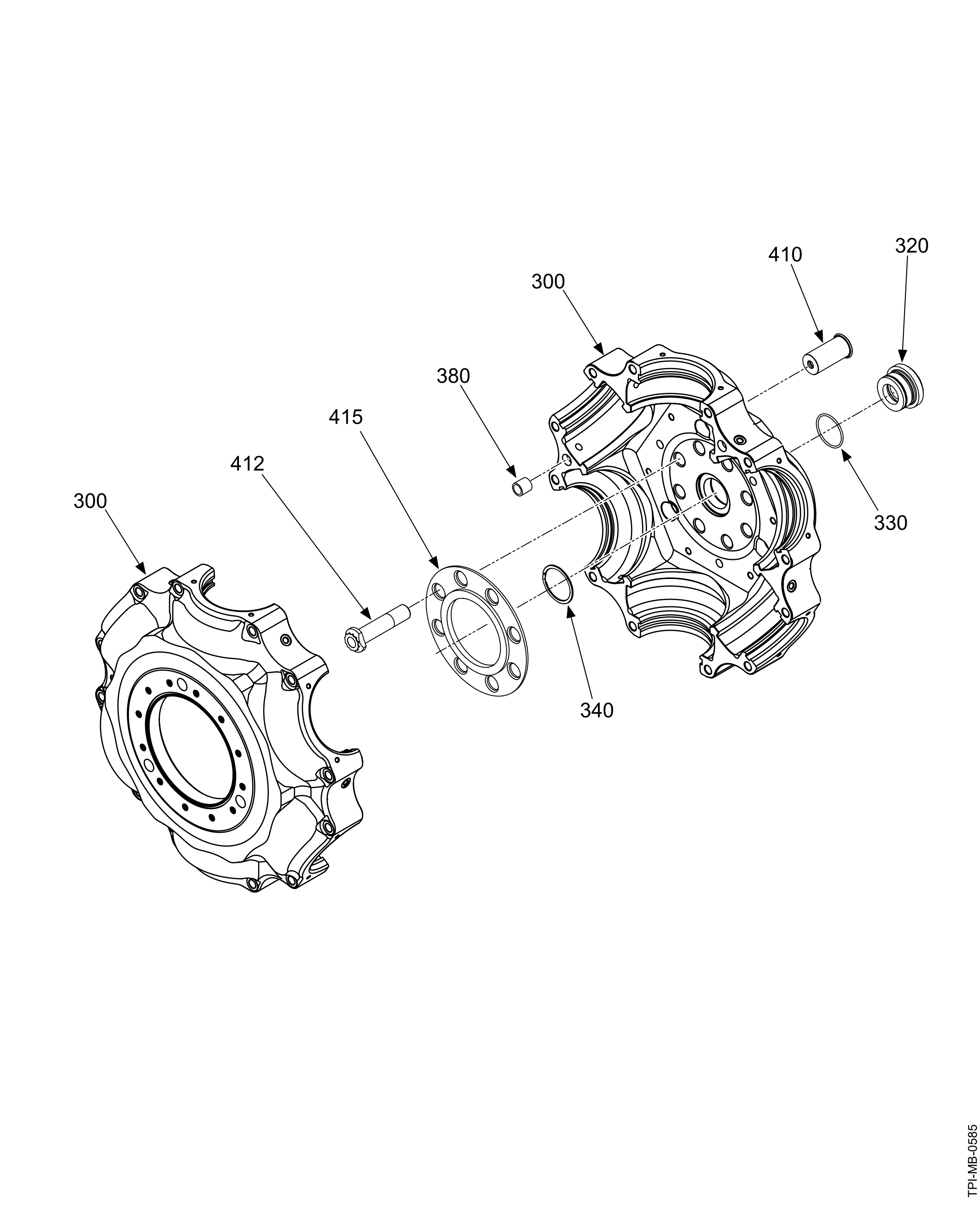
107965 Hub Assembly
Figure 10A-5

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-5		**107965 HUB ASSEMBLY PARTS**				
-295	107965	PCP: HUB ASSEMBLY, 5D3( )-NK366( )		1		
300	107964	• PCP: HUB UNIT, 5D3( )-NK366( )		1		PCP
320	108346	• • HUB BUSHING, ROD		1		
330	C-3317-123	• • O-RING (HUB BUSHING OD)		1	Y	
340	A-6153-137	• • RING, RETAINING, EXTERNAL, SPIRAL		1	Y	
380	A-2249	• • HUB BUSHING, GUIDE		2	Y	
-390	B-6142	• • INSERT, 1/4-28, CRES, COILED		18	Y	
410	B-454	• • SPRING RETAINER, BETA		3		
412	103560	• BOLT, MOUNTING, 9/16-18, FLANGED		8	Y	
415	107954	• RING, MOUNTING BOLT		1		

EFF CODE	INFORMATION

- ITEM NOT ILLUSTRATED

107965 Hub Assembly



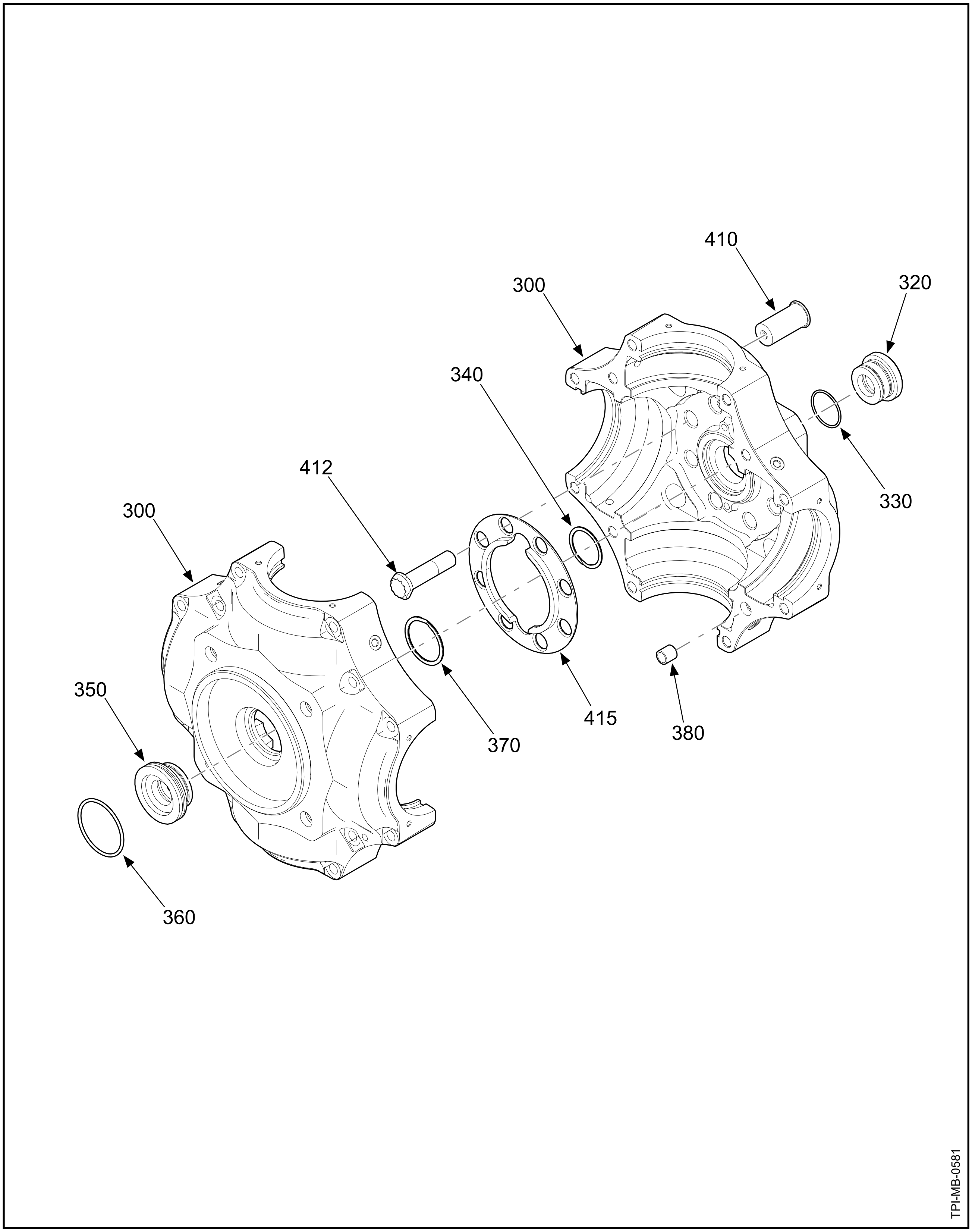
108234 Hub Assembly
Figure 10A-6

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-6		**108234 HUB ASSEMBLY PARTS**				
-295	108234	PCP: HUB ASSEMBLY, 6D3( )-NK366B1( )		1		
300	108164	• PCP: HUB UNIT, 6D3( )-NK366B1( )		1		PCP
320	108346	• • HUB BUSHING, ROD		1		
330	C-3317-123	• • O-RING (HUB BUSHING OD)		1	Y	
340	A-6153-137	• • RING, RETAINING, EXTERNAL, SPIRAL		1	Y	
380	A-2249	• • HUB BUSHING, GUIDE		2	Y	
-390	B-6142	• • INSERT, 1/4-28, CRES, COILED		18	Y	
410	B-454	• • SPRING RETAINER, BETA		3		
412	103560	• BOLT, MOUNTING, 9/16-18, FLANGED		8	Y	
415	107954	• RING, MOUNTING BOLT		1		

EFF CODE	INFORMATION

- ITEM NOT ILLUSTRATED

108234 Hub Assembly



109024 Hub Assembly
Figure 10A-7

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-7		**109024 HUB ASSEMBLY PARTS**				
-295	109024	PCP: HUB ASSEMBLY, 4D3( )-NK338( )		1		
300	109022	• PCP: HUB UNIT, 4D3( )-NK338( )		1		PCP
320	B-6108	• • HUB BUSHING, ROD		1		
330	C-3317-026-2	• • O-RING (HUB BUSHING OD)		1	Y	
340	A-6153-137	• • RING, RETAINING, EXTERNAL, SPIRAL		1	Y	
350	B-5952	• • HUB BUSHING, ROD		1		
360	C-3317-135-2	• • O-RING		1	Y	
370	A-6153-162	• • RING, RETAINING, EXTERNAL SPIRAL		1	Y	
380	A-2249	• • HUB BUSHING, GUIDE		2	Y	
-390	B-6142	• • INSERT, 1/4-28, CRES, COILED		8	Y	
410	B-454	• • SPRING RETAINER, BETA		4		
412	109023	• BOLT, MOUNTING, 9/16-18, FLANGED		8	Y	
415	109021	• RING, MOUNTING BOLT		1		

EFF CODE	INFORMATION

- ITEM NOT ILLUSTRATED

109024 Hub Assembly

(Blank Page)